MODEL BUILDER

MARCH 1977

volume 7, number 63

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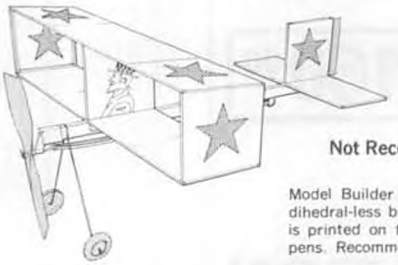

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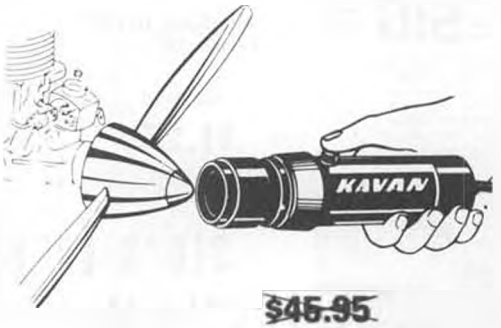

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January 1972

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

Vol. 2, No. 4 $1.00

February 1972

Minnow U/C profile scale racer.
Fokker E-III R/C scale.
Al Vela's E-Z Boy 1/2A
E-Z Boy 1/2A, Al Vela.
Peanut Ford Flivver.
Fiberglassing over balsa, by Le Gray.
Spoiler, FAI Combat.

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Mar/April 1972

Yankee Gull R/C glider 8' to 12' span.
Miss Cosmic Wind, QM R/C Pylon racer.
Peanut Scale Bucker Jungmann.
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Ryan ST 3-views.
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Bob White Wakefield.
Mongster QM biplane R/C pylon racer.
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Three profile Peanuts.
Deperdussin 3-views.
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Fairchild 51, 1" scale, R/C or F/F.
SAM-5 A/2 Nordic.
1912 Avro G rubber.
Comanche C stand-off R/C scale.
Travelair 2000 2" scale R/C, by Editor.
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Vol. 2, No. 9 $4.00

August 1972

Bonzo stando[illegible] R/C sport pv[illegible] scale.
Counterf[illegible] ailless A/1 [illegible]ic.
Shoes[illegible] R/C QM.
Pear[illegible] aylorcraft on [illegible]ts, also big one.
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MODEL BUILDER

MARCH

1977

volume 7, number 63

621 West Nineteenth St., Costa Mesa, California 92627

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CONTENTS

FEATURES

SCALE VIEWS

CONSTRUCTION

Cover: Dick Steely had a very good reason for building this 1.8 inch-to-the-foot scale R/C model of a WACO UPF-7 . . . he is the proud owner of a real one, which he is now in the process of restoring, at his home in Westlake Village, California. Just think . . . when he goes to enter a scale contest, he can carry his model *in his documentation!*

"...THREE if by AIR"

(Letters to the Editor)

Dear Sirs:

In 1943, I was stationed at Hobbs Army Air Base in New Mexico. While there, I was in Base Photographic Lab. I had gotten acquainted with a group of model builders from Hobbs, one of which had the XP-3 as a Control-Line Model, Forster .99 (If I remember right.) I can't remember his last name, first was Joe. Picture was developed and printed in the Base Lab. Was taken at a school yard.

Frank Ehling was also on same Base . . . different Squadron. We started a Model Club. Actor Jimmy Stewart was also there, learning to fly B-17's.

I'm still building, am S.A.M. 734, also OX5 Aviation Pioneers Member, having flown OX-5 airplanes before 1941. First flight 1919, a rotary engine Avro 504K. I was 2-1/2 years old. Now 60.

Started modeling in Brooklyn 1928, after seeing an older boy flying a twin pusher in Prospect Park. I remember a Model Shop one block from Eastern Parkway, near Bedford Ave. Harold Osborne, Tustin(?), lived near me in Binghamton, New York, before WWII, and we used to build and attend contests for several years.

Ed Rowe, Endicott, N.Y.

• • •

Dear Bill:

Just a note about your comment on UPS insurance coverage on pg. 104, 1/77 issue. All packages are automatically covered for $100, unless you declare more. Each $100 extra costs 25¢ per hundred. You must write the declared amount on the book also. Full instructions are in the front of each book. Models can be insured for the proper value if declared, and extra charges are paid. Dr. Martin didn't follow the above as I didn't a couple of months ago. I lost over $700 on some electronic cash register parts due to not knowing the proper way to apply extra insurance. Please pass the word on to others. I don't want them to learn the hard way also.

George Mattei, Hamden, Conn.

• • •

Dear Bill:

Received the January issue of MB *the other day and did a fast scan. Lo and behold . . .no "Chopper Chatter". I couldn't believe it! It just couldn't be. As a last resort I checked the index . . . sure enough, no "Chopper Chatter". in fact, there wasn't a photo of a chopper in the whole issue. Hopefully the February issue will make up for it.*

I guess there is probably a good reason, maybe John will explain in the next issue. Chopper articles are very welcome during the cold winter months, since flying in this miserable weather can be disastrous.

All kidding aside, I enjoy John Tucker's column very much and look forward to it every month. John comes up with something interesting every month.

Congratulations on putting out such a fine magazine.

Joe Oltra, Monroe, Conn.

Never fear, Joe, John has not deserted. He is Chief Pilot and Head of Operations for Air California, which has a fleet of Boeing 737s and Lockheed Electra prop-jets, teaches aviation classes four nights a week, and commutes to his San Diego home for weekends.

Reason he missed the January issue was that he sneezed three times in mid-November.

Dear "Ed":

Your excellent magazine has increased my knowledge of and interest in models immeasurably in the past two years. Of all the magazines, I buy regularly, yours is one of the two I read and re-read.

Your balance of material, format and choice of printing stock are superior. My preference is for rubber power and Model Builder alone satisfies my appetite on a regular basis.

I have a few requests that you or your readers can hopefully answer:

(1) Do you know where I can obtain plans for the various "Moths"? The Tiger Moth is my all-time favorite plane. I have built the Tiger and know where to get Puss and Gypsy Moth plans. How many more "Moths" are there? Where can I get information and history on "Moths".

(2) Does anyone know where I can get a Puss Moth kit produced by Guillow about 5 or 6 years ago?

Thanks for you help. Keep up the good work.

Warner Lard, Madison, Conn.

Obviously a man of excellent taste, Warner, you like Moths and Model Builder! Perhaps Milt Sheppard, 617 Stanbridge Rd., Morton, PA 19070 can help you with your Moth research.

• • •

Dear Peanut Program Promoter:

Please place my name on your portentous prominent Parcel Post Proxy Peanut Posting. I was just pleased as punch at the proclamation of your prodigious peanut proxy program. Being not too proficient and very procrastinating, the probability of procuring a peanut prize isn't very promising at present, but I will portend to provide you with a proforma of profluent performing peanuts providing I'm profficient in procurring the proper parts pieces and plans.

My partner is presently planning to present her peanut for performance. So please provide us a pair of entry pages so we can begin preparing our peanuts to perform in your Peanut Proxy Panorama. I hope and pray that our peanuts won't be pulverized, pounded, and pinched by mailing them Parcel Post. We expect our planes to meet par with other peanuts in performance in your proxy program. Thanks, Peanut Promoters,

David and Marilyn Smith, Phx, AZ

This peck of peachy prose is positively paralyzing!

• • •

Gentlemen:

I wish to congratulate you for the beautiful cover on the October issue of Model Builder, which is one of the nicest I have ever seen.

If any of your readers are interested in model shipbuilding, they can write to the following addresses:

The Nautical Research Journal
10012 Portland Place,
Silver Springs, M.D.. 20901

Mystic Seaport, Inc.
Mystic, Conn. 06355

Mystic Seaport has a fine collection of ship models plus several full size sailing craft. They also have a fine Nautical library. A visit to Mystic seaport would be enjoyed by the whole family.

Richard Salomon, W. Hartford, Conn.

• • •

Dear Bill:

This letter is written in the hope that someone in your readership will be interested enough in flying boats and/or electric powered flight to get in touch with me.

Twelve inches of ice on the pond and drifts of snow on the fields certainly inhibit experimentation with miniature flying boats and electric powered aircraft. We can test the flight characteristics of these aircraft off fluffy snow with or without skis, but we'll have to wait for softer water before we can

test their ROW capabilities, the prime goal for hydros.

I have been quite pleased by the take-off and flight characteristics of flying boats powered by glow engines from 110 cu. in. (weight 42 oz., wing area 398 sq. in.) to .45 cu. in. (weight 110 oz., wing area 690 sq. in.). To date, I have not yet been able to get an .02 powered plane to ROW (12 oz., 225 sq. in.), at least not with single channel controls. However, this size ship flies beautifully from hand launch. As a passing thought, I think that a lighter, more durable hull can be built of fiberglass than of balsa.

Electric power fascinates me for its lack of noise, mess and vibration, and for its freedom from the idiosyncrasies I've encountered in small internal combustion engines. Granted, electric power has its own drawbacks, like lack of duration and high weight-per-horsepower, but I've had a ball with single and twin 02s (hand launched only to date). Nor have I been able to get a single 25 or a twin 15 off grass, but both have flown with high-start assist. I have had marginal success with a twin 15 off water . . . as at Brimfield last September. When the water softens, I hope to demonstrate reliable ROW characteristics with a modified twin 15 and, hopefully, with a twin 02.

Does this type of experimental aviation interest any of you? If it does, I will welcome letters, phone calls and visits.

Nelson Whitman
125 Great Pond Road, Simsbury, Ct.. 06070
(203) 658-0269

• • •

Dear Mr. Northrop,

From its inception "Model Builder" *has, as its name implies, appealed to those with a wider range of interest than addressed by many similar publications. In my view, this has contributed to your significant and continuing success.*

As an active "jack-of-all-trades" modeler for about 45 years, interest and activity continue in all of the following categories:

1) Aircraft: Rubber (esp. peanuts), CO_2, FF, RC and miniature scale.

2) Miniature Ships: From ancient craft, esp. sailing ships (circa 1700) to modern warships . . . based on all techniques from plank-on-frame to superdetailing high quality "plastic models".

3) Live Steam and Model Engineering: Museum quality non-operative locomotives to miniature operating stationary plants and moving vehicles.

4) Tools and Technique: In a sense, this is the broadest area for creativity and skill development and, when applied across all above categories 1) – 3), affords opportunity for much cross applicability of techniques ranging from pattern making, metal and plastics casting, precision wood and metal machining, through photo etching of parts.

5) Research and Material Sources: Basically, this is a time consuming and difficult information gathering activity in categories 2), 3), and 4) and in my opinion, is the principal reason for any limited growth vis-a-vis aircraft modeling. Exceptions to the above statement are to be found through several British publications (e.g. "Model Engineer") and the increasingly successful American publication "Live Steam" (Live Steam, Box 286, Cadillac, Michigan 49601). Research over several decades has revealed that many excellent material, tool and plan sources exist, but in general, do not appear in domestic modeling literature.

The purpose of the above verbosity is to add resounding support to the statement in the article "Model Ship Building" of your Jan., 1977, issue: "Letters from readers indicate that there are many model ship building enthusiasts out there in need of a way to exchange information. We'll set it up if there is sufficient response to this article."

It is my earnest hope that you can receive the support necessary to provide not only "a sort of clearning house . . . and put you in touch with each other" but to seriously consider the business potential of continued expansion of the scope of "Model Builder" *to address categories 2), 4) and 5) above.*

To this end, allow me to make a suggestion: Namely, through your excellent publication conduct a "Model Builder" Questionnaire (possibly covering all categories) and publish the results. This approach was taken by William C. Fitt, Editor and Publisher of "Live Steam." The questionnaire was published in the August 1975 issue and the "State of the Hobby" results (based on a 22% response) should be of value to anyone interested in model building even though conducted from the viewpoint of "Live Steam."

Yes, there are many of us "out there," with a broad range of related and mutually supportive interests. Because of this, please continue to expand your scope, and if a meaningful media of information exchange can be established (e.g. via "Model Builder"*), many of us would contribute to and benefit from its success. Add my name to your list of those to be "put in touch," and since the phone is an increasingly important means of communication, my home phone is (313) 573-7314.*

Gordon Stanley, Warren, Mich.

Reponse to the model ship building "test case" has been moderate in quantity but very enthusiastic (barring last month's letter which was purposely published as a teaser). We already have a prominent name in modeling who is interested in "conducting" a department on the subject, if we wish to start one.

• • •

Dear Bill:

Amen to Mammoth Classic Scale! Isn't that what attracted us to model building and flying in the first place, the ability of our own creations to look and act like their full scale counterparts? I should say so!

A few years ago, Don Lowe proposed a similar scheme in MAN, but there was no follow-through. However, his plan pertained to aerobatics or pattern, if you will, to the extent that the model would perform only those maneuvers which its full scale parent had the ability to do.

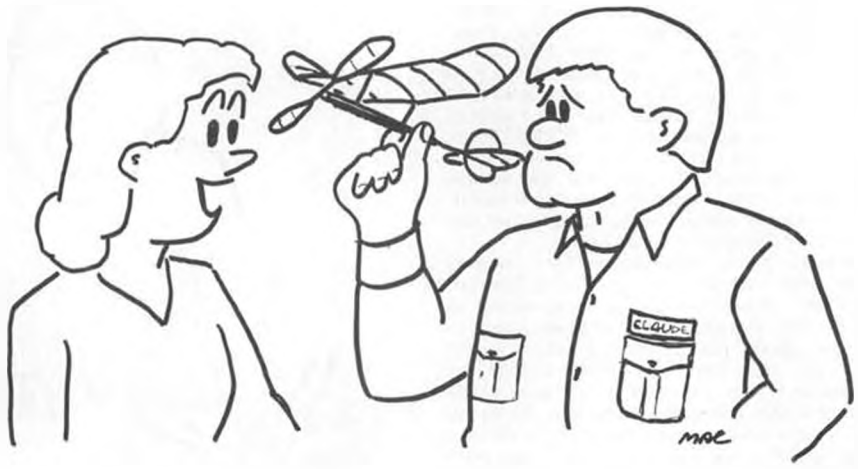
Personally, a combination of the task list you offered and aerobatic maneuvers such as above would be to my liking, but that doesn't take preference to your suggestion that models be built from sticks and a few sheets (I ain't building ribs a la Hungerford). They would be glorious things to see.

Enough of opinions. What do we do to act? Onward and forward to find a core of enthusiasts in this area.

William Salnikov, Coweta, Okla.

The core is forming! Yours is one of many enthusiastic letters received. We saw some of Don Lowe's demonstrations with a purposely "under-powered" Cub in Dayton, and agree that mild aerobatics could be carefully worked. How about some suggestions?

Continued on page 110



"If it takes a 16-dollar-an-hour plumber three evenings to build one, how come they call it a Pennyplane?"

from Bill Northrop's workbench . . .

• On Saturaday, January 22, the Nationals Executive Committee held its annual planning meeting for the 1977 Nationals. For the first time, representatives of key special interest organizations were invited to sit in during the meeting, and were permitted opportunities to be heard when the discussions related to their particular phase of modeling. We were there in our capacity of USPJA (U.S. Pattern Judges Association) President.

Word has just been received that the initial plans, event schedules, and job assignments determined by the committee during that meeting, have been approved by the AMA Executive Council. This means that the following schedule of events is about as official as you can get at the moment.

FREE FLIGHT

Saturday, Aug. 6: (All Indoor) AMA Stick, Cabin, Paper Stick, and FAI Stick.

Sunday, Aug. 7: (All Indoor) H.L.G., Pennyplane, Easy B, AMA Scale, Peanut Scale.

Monday, Aug. 8: Turn in Rubber Scale entries for static judging by 10 a.m. Pick-up from 6 to 9 p.m.

Tuesday, Aug. 9: A/1 Towline, C Gas, Payload, and Rubber Scale. Turn in Scale Gas entries for static judging by 10 a.m. Pick-up from 6 to 9 p.m. Process Wakefield from 7 to 9 p.m.

Wednesday, Aug. 10: Half-A Gas, Wakefield, Scale Gas. FAI Power processing from 7 to 9 p.m.

Thursday, Aug. 11: FAI Power, Coupe, H.L.G., Cargo. A/2 Towline processing from 7 to 9 p.m.

Friday, Aug. 12: A Gas, Unlim. Rubber, A/2 Towline. Turn in Peanut Scale entries for static judging by 10 a.m. Pick up from 6 to 9 p.m.

Saturday, Aug. 13: B Gas, Rocket, Helicopter Cl. III, Peanut Scale.

CONTROL LINE

Monday, Aug. 8: Open Mouse Race Cl. II, Jr.-Sr. Mouse Race Cl. II, FAI Team Race, Jr.-Sr. Slow Combat, Open Slow Combat. Turn in Scale entries for static judging by 10 a.m.

Tuesday, Aug. 9: B Speed, B Proto Speed, Formula 40, Jr.-Sr. Stunt, Open Scale Race, Open Slow Combat.

Wednesday, Aug. 10: C Speed, D Speed, Jet Speed, Open Stunt Qualifying, Jr.-Sr. Scale Racing, FAI Combat, Carrier I.

Thursday, Aug. 11: A speed, FAI Speed, Open Stunt Finals, Open Rat Race, Jr. Combat, Sr. Combat, Carrier II.

Friday, Aug. 12: Half-A Speed, J. Walker Flyoff, Jr.-Sr. Rat Race, Jr.-Sr. Slow Rat Race, Open Combat, Profile Carrier.

Saturday, Aug. 13: Half-A Proto, Half-A Profile Proto, Open Slow Rat Race, Open Combat, AMA and Sport Scale.

RADIO CONTROL

Sunday, Aug. 7: Pattern Processing from 1 to 5 p.m.

Monday, Aug. 8: Pattern Qualifying (7 a.m. to 1 p.m.), Q.M. Pylon (1:30 – 8 p.m.). Turn in AMA Scale entries for static judging by 10 a.m.

Tuesday, Aug. 9: Pattern Qual., Q.M. Pylon, Soaring Qualifying (7:30 a.m. – 7 p.m.).

Wednesday, Aug. 10: Pattern Qual., Q.M. Pylon, Soaring Finals. Formula I processing from 8 to 11 a.m.

Thursday, Aug. 11: Pattern Qual., Formula I Pylon, Soaring Finals. Turn in Sport Scale entries for static judging by 10 a.m. Scale transmitter processing from 10 a.m. to 12 noon.

Friday, Aug. 12: Pattern Finals, Formula I Pylon, Soaring Finals. Pick up all scale entries from 6 to 9 p.m.

Saturday, Aug. 13: Pattern Finals (7 – 10 a.m.), Formula I (10 a.m. to 5 p.m.), AMA and Sport Scale (5 to 8 p.m.), Scale Soaring (2 p.m. –).

Sunday, Aug. 14: AMA and Sport Scale from 7 a.m. to 6 p.m.

NOTES

FAI Free Flight events will be flown by rounds, ending at 5:30 p.m. All other outdoor free flight ends at 4 p.m.

Indoor is tentatively set for Norton AFB, about 15 miles from March. Hangar is 90 feet high, domed, with lights hanging to 62 feet. These will be raised during competition, to unknown height.

Free flight site is largest ever! Alkaline flats, and miles in all directions. One catch . . . as of now, availability is 99.99% positive. Keep fingers crossed!

Q.M. Pylon processing time not shown. Will probably take place Monday 8–11 a.m. "Milk can" method of processing entirely safe for R/C flying at same time.

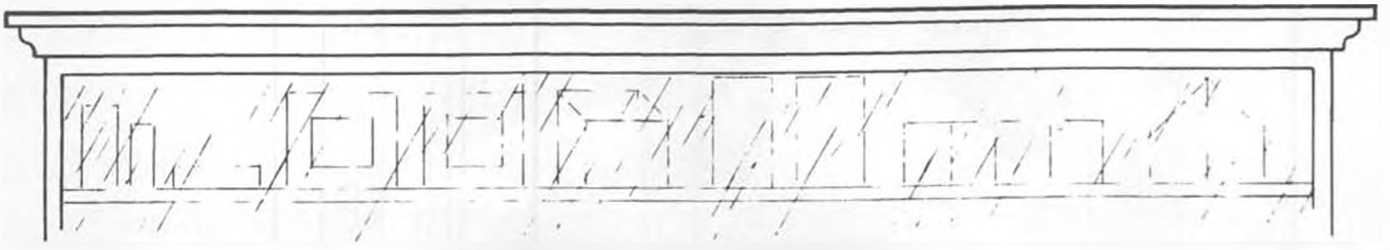
All scale entries will be static judged in the order turned-in, like taking numbers at the meat counter. All scale entries will be on display this year. Sport scale models will be at least 10 feet back from *all* viewers. AMA and Sport Scale will be flown together. USPJA judges will score both Pattern and Scale R/C flying!

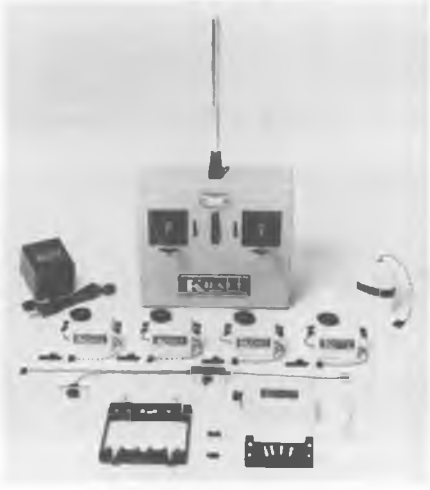
Soaring events will be held at the free flight site. Plenty of room for both!

All of the radio control and control line site area is paved in concrete. In order to erect sun shades (and you'll need them!) try the following suggestion by C/L Director Bob Vojslavek: Take along two 2x4s about 16 to 20 feet long, depending on the size of your canvas. Drill a hole in the center of the 4 inch face of each, so that when the 2x4s are

Continued on page 110

OVER THE COUNTER





The 1977 Kraft "Sport Series" radio which sells for $299.95.

The latest Aeromodeller Annual is now available.

The Probar W-2 sail winch is proportional, plugs directly into receiver.

The Astro Flight Power Panel for field boxes.

• Next to what automobile to buy, the next biggest decision faced by the average R/C modeler is probably what radio system to buy. The guys down at Kraftland have made life considerably simpler with the introduction of a new Sport Series for 1977, the KP-4A.

Obviously designed and built for the modeler on a budget, it is just as obvious that compromises were made only in the luxury feature department. The results are a basic four-channel system incorporating the results of many years of experience, coupled with the latest in semi-conductor design. A quality slim-line, all-aluminum transmitter case houses such features as competition type open gimbal sticks, nickel cadmium batteries, and transformer type charger, all standard with both the transmitter and airborne system. The KPR-4A receiver incorporates a double-tuned R.F. section and exclusive noise and interference rejection circuitry.

This system is available with either KPS-14IIA or KPS-15IIA servos, and a KB-4EA 550 mah battery is standard equipment for the airborne, though the lighter 450 mah types can undoubtedly be used.

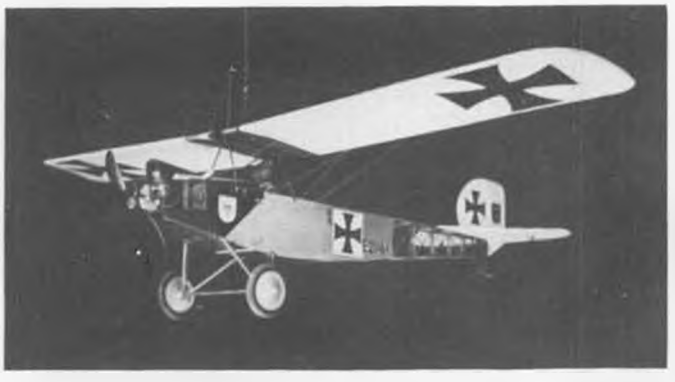
An interesting feature of the transmitter is the use of a 6-volt battery, though the claimed input power is not significantly lower than that of other 9 volt radios. This is not particularly difficult to achieve with the many improved RF transistors now available, and should not present a range or reliability problem.

Using the published weights, we came up with 11.9 ounces for the standard airborne system, less the servo trays and switch harness. This can be considered an average weight for this type of system; using the KB-4S or 4M (450 mil) batteries will reduce this by 1.2 ounces.

All of this, plus the famous Kraft reputation for service and quality for only $299.95. For complete information about this and all other fine Kraft R/C systems and products, contact Marty Barry or Dave Shadel at Kraft Systems, Inc., Box 1268, Vista, CA 92083. Tell them you read about the KP-4A in MB.

* * *

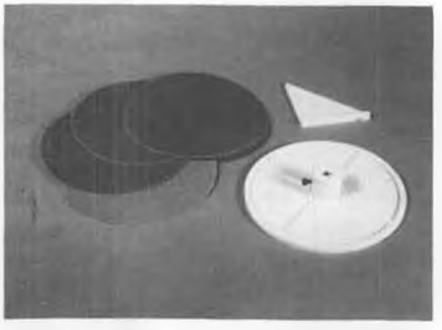
The Series 50 Air Trails 'Sportster", by Cal Aero-Model, for 3-channel radio.



Latest version of the famous 'Antic' is this Proctor Parasol.

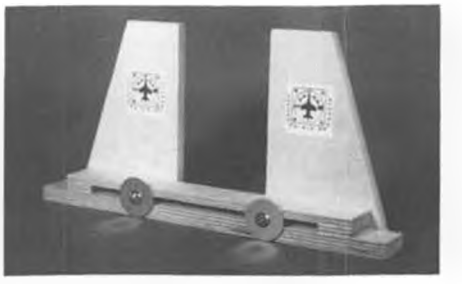
Precise and linear throttle control, plus muffler, for Cox .049-.051 TD, by Hiscott.

Mike Gretz designed Smith Miniplane, kitted by Sig. Span 44 inches, for .35 to .45 engines and four-channel radio.



Sanding discs, backing disc, and miter guide by Strick's Enterprises (formerly Mathes).

Molded, lightweight racing wheels, by Kustom Kraftsmanship.



Fuselage Jig Station, by Southern R/C Products.

Super-scientific Bubble Balancer for props, by Howard Huebl.

Astro Flight, Inc., pioneer in Silent Flight, has introduced another in its long list of items designed to make life easier on the modeler and his pocketbook.

The Astro Flight Power Panel is designed to provide the proper voltages for your starter, glow plug, and fuel pump, all from one single power source, such as the Astro 12 Volt Gel Cell. Not only do you save the cost of the various batteries needed to individually power the above items, you save having to carry the extra weight. The use of a rechargeable battery also means you can start off for a days flying confident that one of your dry cell operated devices will not roll over and die at the field.

This well designed unit is constructed on a thick 3-1/2 x 6 inch aluminum panel, which contains a large, easy-to-read meter to monitor current flow in various functions, jacks to which leads are connected for the different devices, and a switch for the fuel pump. The latter is a positive operating wide rocker that is easily worked even with greasy fingers, not a skinny little slide switch to break fingernails, or a toggle to fumble with.

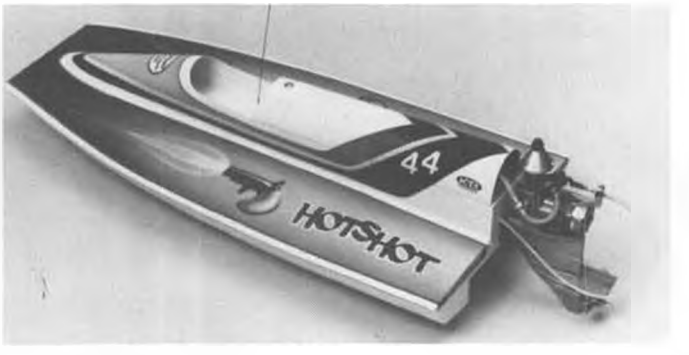
The Astro Flight Power Panel comes with complete instructions, and all necessary plugs, and the result will be a neat, safe, spark-free installation. Included are directions on how to field charge receiver and transmitter batteries, and Astro 020 system batteries.

Soon to be at your local hobby store, at $22.95. Inquiries to Astro Flight, Inc., 13377 Beach Ave., Venice, CA 90291.

* * *

Apparently, there is already a waiting list for the latest addition to Sig's Mini Air Force. And justifiably so; how many

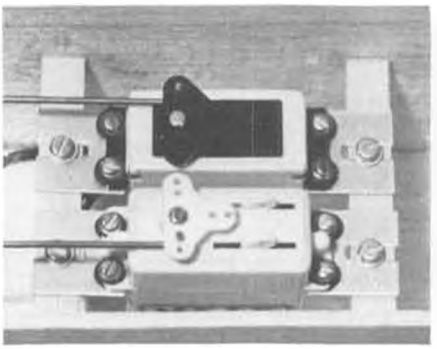
Atlas Van Lines, U-76 Unlimited Hydro, 40 class semi-scale kit by Dumas Products.



Dumas Products' "Hot Shot", for the new K & B outboard 3.5 .

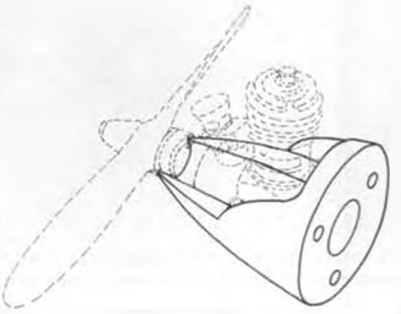
Wire wheels, by Milman Engineering Co., Inc.

Curtiss Commando, C-46, in 1/72 plastic scale, by Williams Brothers.



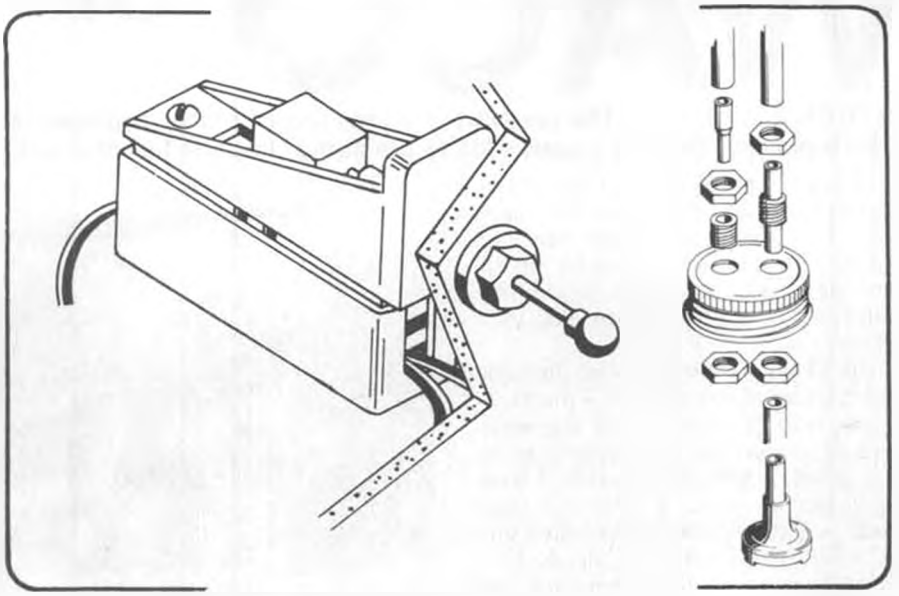
Adjustable servo mounting plates, from Ace Radio Control, by Vic Zugel.

Dust free (to 10 microns) spray booth for small items, by Bal Dar Industries, Inc.



Tough new wrap-around engine mount for Half-A engines, by Fourmost.

Clip-on meter for meterless transmitters, by RS Systems.



Switch mount, for exterior operation of interior switch, and fuel can cap fittings, both from Du-Bro.

of us are going to be able to resist the Smith "Miniplane", in 44-inch R/C?

Designed by Mike Gretz, from Glen Sigafoose's full size "Mini", it was built by Maxey Hester, who used it to place 1st in the 1976 Canadian Nats and 1st in the 1976 Multiwing Championships.

This 650 square inch, 40-1/2 inch long beauty is designed for .35 to .45 engines, and is priced at $49.95.

In the tradition of all the other fine Sig kits, this one features ABS molded cowling and pants, die-cut balsa and plywood parts, formed landing gear, formed cabane struts, full size plans and illustrated instructions.

A hardware package is enclosed, including hinges, horns, tail wheel bracket, engine mounts, bolts, brackets, and even an aluminum engine mount.

This kit, to be available March 1st, is complete even to the Sig's Mini Air Force decal, as found on Glen's full size bird. Get on the waiting list, at your dealer's or direct with Sig Manufacturing Co., Inc., Montezuma, IA 50171.

* * *

Need something to turn you on? Try one of the latest goodies from Du-Bro Products. It's the new Kwik-Switch Mount.

This 6-piece set allows the R/C modeler to mount the airborne system switch where it ought to be, inside the fuselage, away from all dirt, grime, and engine exhaust residue. Only one 3/16 hole is required, and no alterations to the switch or mount are necessary. It will mount on all body thicknesses, and can be used as a 'Push-On' or 'Push-Off', whichever you prefer.

Equally at home on planes, helicopters, boats or cars, the price is only $1.75, complete, designated as Catalog No. 203.

Another piece of good news from this company is the fact that it is now furnishing the Fuel Can Cap Fittings, as supplied with the Kwik Fill fuel pump,

Continued on page 104

MB's Chuck Blackburn photographed this UPF-7 at Sunset Beach, California (location now called Meadowlark Airport), in 1958. The owner, a barnstorming pilot of many years, was teaching aerobatics in the Waco, even though he had never gotten around to getting a pilot's liscense!

WACO UPF-7/PT-14

By DICK STEELY . . . The prettiest of a long line of pretty airplanes (and not just because they all happened to be biplanes), this one means a lot to the author because he's the lucky owner of a real one!

● There was something about the Weaver Aircraft Company right from the beginning. The design of those fantastic looking new biplanes caught many admiring glances at airports around the country right up into the late '30s. They still do!

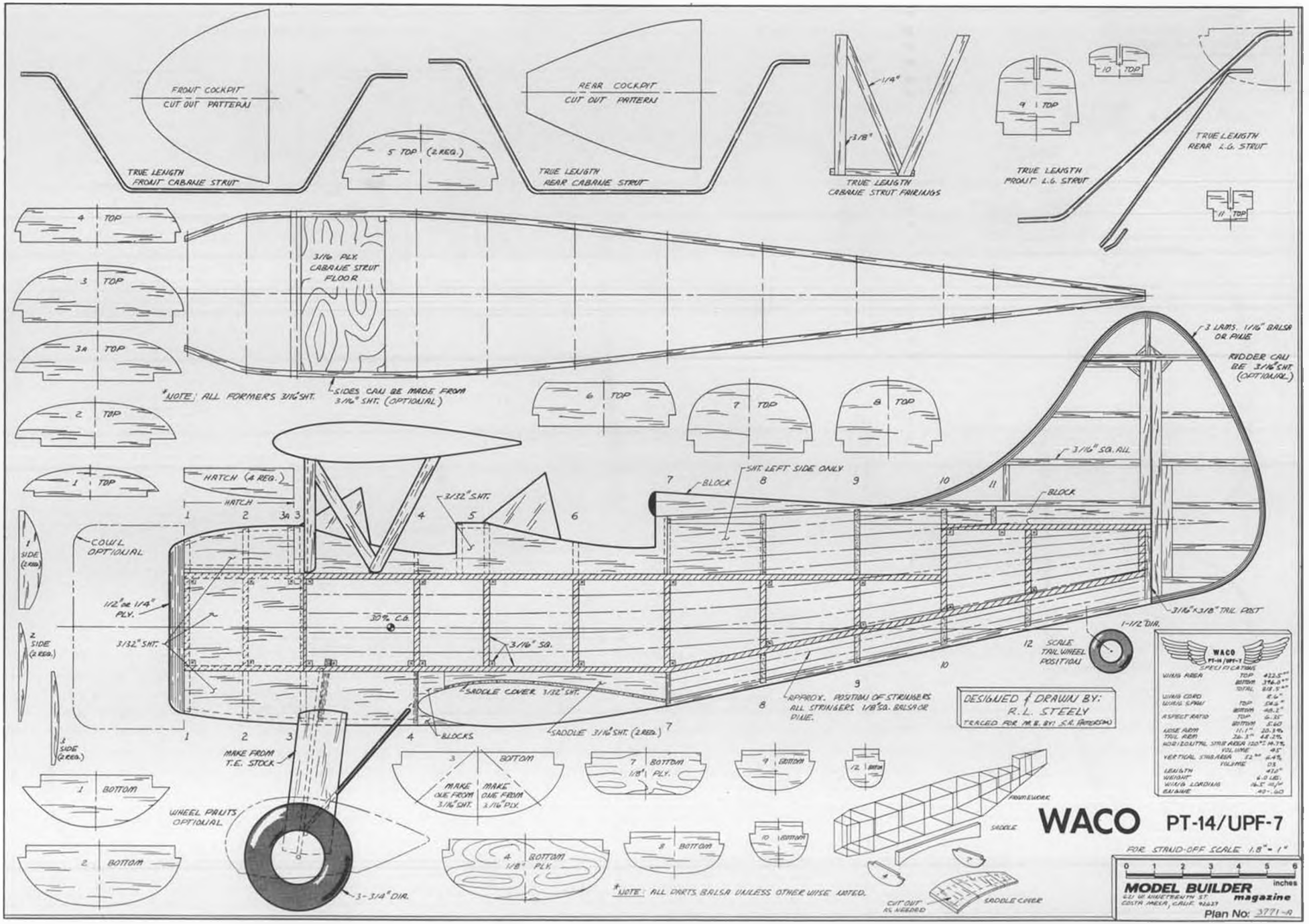
The Troy, Ohio airplane building firm had turned out many nice machines by the mid-'30s, to provide the much admired vehicle for the budding needs of a growing aviation industry. I wonder if they knew at the time that those needs would be shortly channeled into the military pilot-training needs of a nation soon to be fighting for it's very survival. I doubt it.

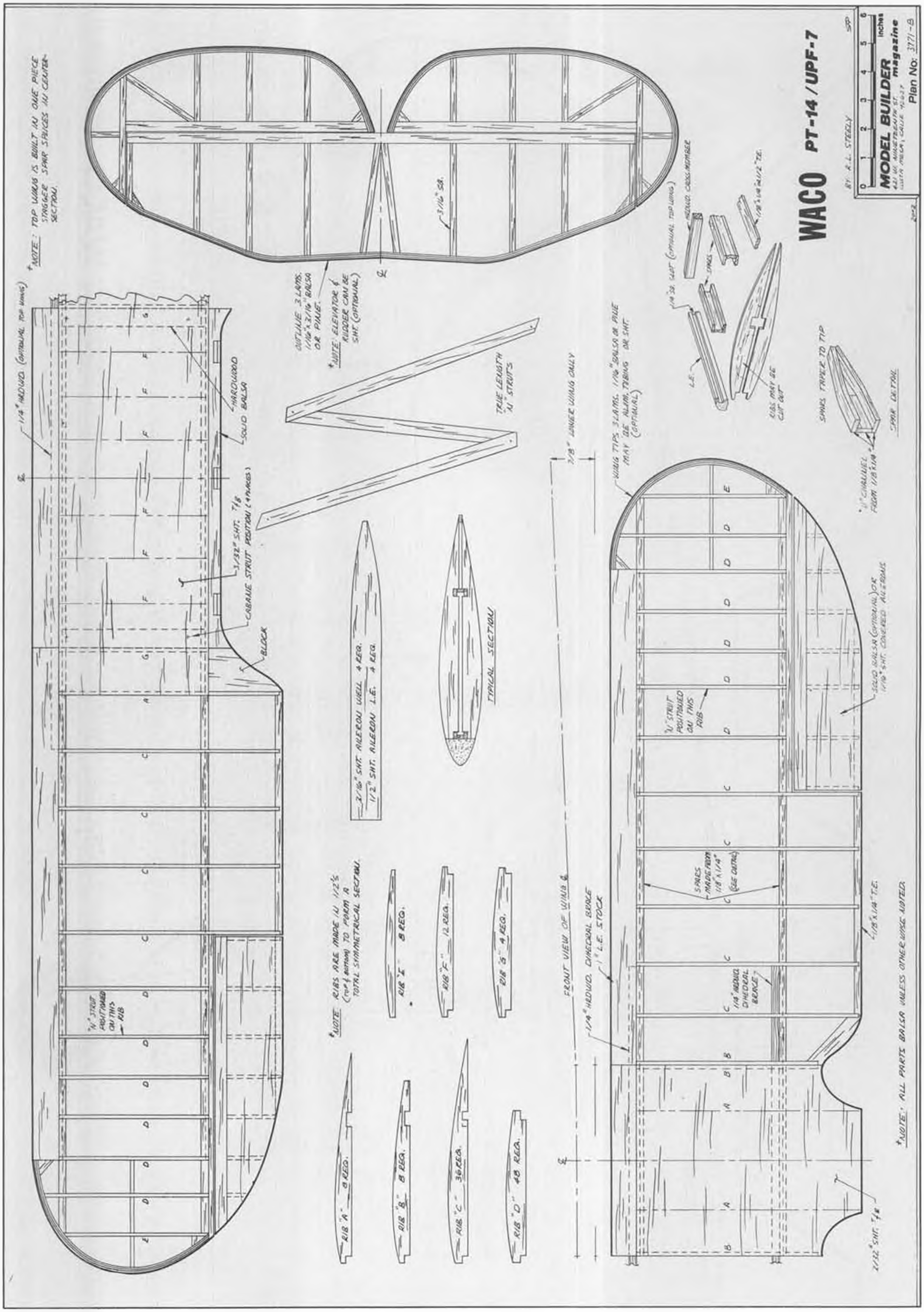
Intended for civilian use, the UPF-7, produced in small numbers by comparison with many other trainers of the day, was soon to be the most singly produced WACO aircraft in the company's history. Between 1937 and 1942, 600 were built for use in the civilian pilot training schools around the country. The yellow wings, royal blue fuselage and oversize insignia were familiar sights around many airports. Oddly, only 13 were actually military aircraft, the remainder being used by the civilian pilot training schools, who were in effect, training the pilots who would take part in World War II.

Very few are left, only a little over a hundred, and one of them is mine . . . !

Framework shot of the author's model UPF-7. Plans were developed from Paul Matt 3-views, published in his Historical Aviation Album series.

Note similarity of this photo to one at top, even though they were taken 18 years apart. Long legs and wide tread of model seemed out of scale, until compared to real ship.


FRONT COCKPIT CUT OUT PATTERN
REAR COCKPIT CUT OUT PATTERN
TRUE LENGTH FRONT CABANE STRUT
TRUE LENGTH REAR CABANE STRUT
TRUE LENGTH CABANE STRUT FAIRINGS
TRUE LENGTH REAR L.G. STRUT
TRUE LENGTH FRONT L.G. STRUT
5 TOP (2 REQ.)
9 TOP
10 TOP
11 TOP
4 TOP
3 TOP
3A TOP
2 TOP
1 TOP
6 TOP
7 TOP
8 TOP
3/16 PLY. CABANE STRUT FLOOR
*NOTE: ALL FORMERS 3/16" SHT.
SIDES CAN BE MADE FROM 3/16" SHT. (OPTIONAL)
3 LAMS. 1/16" BALSA OR PINE
RUDDER CAN BE 3/16" SHT. (OPTIONAL)
3/16" SQ. ALL
SHT. LEFT SIDE ONLY
BLOCK
HATCH (4 REQ.)
HATCH
3/32" SHT.
COWL OPTIONAL
1/2" OR 1/4" PLY.
3/32" SHT.
30% C.G.
3/16" SQ.
SADDLE COVER 3/32" SHT.
SADDLE 3/16" SHT. (2 REQ.)
BLOCKS
MAKE FROM T.E. STOCK
3/16"x3/8" TAIL POST
1-1/2" DIA.
SCALE TAIL WHEEL POSITION
APPROX. POSITION OF STRINGERS ALL STRINGERS 1/8" SQ. BALSA OR PINE.
1 SIDE (2 REQ.)
2 SIDE (2 REQ.)
3 SIDE (2 REQ.)
1 BOTTOM
2 BOTTOM
3 BOTTOM
4 BOTTOM 1/8" PLY.
7 BOTTOM 1/8" PLY.
8 BOTTOM
9 BOTTOM
10 BOTTOM
12 BOTTOM
MAKE ONE FROM 3/16" SHT.
MAKE ONE FROM 3/16" PLY.
WHEEL PANTS OPTIONAL
3-3/4" DIA.
*NOTE: ALL PARTS BALSA UNLESS OTHERWISE NOTED.
FRAMEWORK
SADDLE
CUT OUT AS NEEDED
SADDLE COVER
DESIGNED & DRAWN BY: R. L. STEELY
TRACED FOR M.B. BY: S.A. PETERSON
WACO PT-14/UPF-7
SPECIFICATIONS
WING AREA TOP 432.5 sq.in.
BOTTOM 396.0 sq.in.
TOTAL 828.5 sq.in.
WING CORD 16 in.
WING SPAN TOP 54.4 in.
BOTTOM 48.2 in.
ASPECT RATIO TOP 6.35
BOTTOM 5.60
WING AREA 11.1 in.
TAIL ARM 26.3 in. 48.3%
HORIZONTAL STAB AREA 130 sq.in. 14.7%
VOLUME .97
VERTICAL STAB AREA 72 sq.in. 8.4%
VOLUME .03
LENGTH 47.0 in.
WEIGHT 6.0 LBS.
WING LOADING 16.5 oz/sq.ft.
BALANCE 40%-60%
WACO PT-14/UPF-7
FOR STAND-OFF SCALE 1.8" = 1"
0 1 2 3 4 5 6 inches
MODEL BUILDER magazine
621 W. WHITTIER ST. COSTA MESA, CALIF. 92627
Plan No: 3771-A


WACO PT-14 /UPF-7
BY: R.L. STEELY
MODEL BUILDER magazine
Plan No: 3771-B
inches
*NOTE: TOP WING IS BUILT IN ONE PIECE STAGGER SPAR SPLICES IN CENTER-SECTION.
TYPICAL SECTION
TRUE LENGTH "N" STRUTS
FRONT VIEW OF WING
SPAR DETAIL
*NOTE: ALL PARTS BALSA UNLESS OTHERWISE NOTED.

The radio controlled model size was determined by taking the Aeromaster wing chord, and the airplane in general, so the characteristics should be quite similar in handling and performance.

FUSELAGE

Construct 2 fuselage sides over the plans, using either 3/16 balsa sheet cut out over shaded area outline, or 3/16 balsa square, layed out over shaded area.

Cross-members of 3/16 square balsa are used to hold the two sides together. Formers are glued to the cross-members. Join the sides by placing them over top view and cementing cross-members as indicated, and as indicated by "X" on side view.

Assure that all pieces are assembled straight and square.

Cut main formers, plus side formers (at F1, F2 and F3), from 3/16 balsa. Glue them to framework.

Note that former F3 is a two-piece former . . . the front being balsa and the rear cut from 3/16 plywood. Fasten main landing gear wire to the plywood former, using your favorite method. Epoxy the F3 former/landing gear assembly onto framework.

Cut out and epoxy two 3/16 balsa bottom wing saddle supports in place. Cement 3/32 balsa sheet cover, the grain running spanwise, across the saddle support area. When cement has dried, cut access hole as desired.

Make cabane struts. Cut out cabane strut floor from 3/16 plywood and epoxy into fuselage framework. Fasten cabane struts onto cabane strut floor your favorite way.

Cover forward fuselage cockpit areas, nose area, area F3 forward, and the area from bottom wing leading edge forward with 3/32 balsa sheet.

Glue 1/8 balsa or pine stringers where indicated on fuselage framework. Note that formers are not notched. This allows stringers to be glued on in a smooth flowing line and so that the covering material will not touch the formers.

Make nose block from 1/4 or 1/2 inch plywood. Epoxy in place.

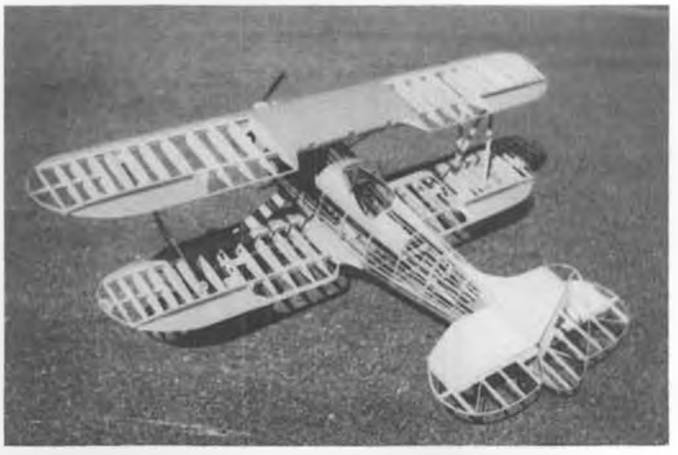
Scale tailwheel assembly can be made and installed at indicated scale position. Stand-off scale tailwheel may be epoxied to rudder.

If desired, a forward nose section access hatch can be made as indicated and attached, using your favorite method. Likewise the lower wing hold-down.

Continued on page 100

Close-up of the 220 HP Continental W670 radial. Carburetor below prop shaft. Seven-cylinder engine was usually uncowled.

According to the registration number, this was only the 10th of 509 stock UPF-7s built. Note Waco insignia along side of cockpits. Top wing center section holds 50 gallons of fuel.



Another framework shot. Curved surface outlines are laminated. Wing construction similar to MB editor's Spruce Goose, split ribs.

Same angle as at left, but with covering in place. Author is now re-building a 1-to-1 scale UPF-7! How's that for documentation!

Panoramic shot of the outdoor demonstration area at the Southwest Model Show, Dallas, Texas. Immediately behind the light stand is the entrance to the Cotton Bowl. Wind was such that the fixed-wingers had to come over . . . or through, the trees to the right. They all made it.

'REMOTELY SPEAKING...'

R/C News, by BILL NORTHROP

SOUTHWEST MODEL SHOW

Before getting into our report on the first annual Southwest Model Show, staged in Dallas, Texas, January 15 and 16, 1977, we want to give some credit that seems well deserved. While at the show in Dallas, we fired one 36-exposure roll of Plus-X film through our Nikon, figuring this would give us good enough photo coverage to go along with the article. During processing, the negative was run through the automatic printer, which proceeded to gouge a deep scratch through almost the entire length of the film. The results are evident in some of the pictures you see. Rather than deprive the show of the pictorial publicity it deserves, we decided to publish the photos, even though they should have been rejected. Main Photo, of Santa Ana, California, was kind enough to give us a whole new roll of film to make up for the damage . . .

Note variety of models on display. Dave Sweeney, at nose of Mk. II Clipper, and Dick Johnson, right, at work, judging the Old Timers.

Organized by ex-Dallas Cowboy Mike Clark and his cohort Chuck Holden, it was obvious that the careful research these two had undertaken while attending other modeling trade shows, had paid off. The Dallas show had few if any of the frailties of a new-born infant, but rather, came on as a mature adult. The exhibit was set up in the Women's Building at the State Fair Grounds, right next to the famous Cotton Bowl. A nearby parking lot provided space for outdoor aircraft, rocket, and car demonstrations, while a huge pond next to the building was the scene for electric and gas powerboat and swan chasing demonstrations.

About 75 to 80 exhibitors booths were arranged in a well-spaced area inside the Women's Building, surrounding a long, crowd-insulated static model display island. A centrally located informa-

View from opposite direction of top photo. Three 1/8 scale racers put on wild, impromptu race, with spin-outs and "touch-and-goes".

Trophies were placed by winning models in time for spectators to have a close look at them. A darn good idea.

This was about the shortest distance AMA President, Johnny Clemens ever had to travel in order to M.C. a show. The public knew what AMA was all about when he had finished!

tion booth also contained the P.A. system. Spectator parking was free, albeit a little sparse and for some, a long walk . . . which would have been OK if not for unusually cold though clear weather.

For exhibitors and spectators who had to travel some distance (which, except for Dallas and Ft. Worth citizens, is *some distance!*), there are excellent hotels and motels within minutes of the fairgrounds. Probably unfamiliarity had something to do with it, but the freeway signs around Dallas seem slightly less than enlightening. Like when a local modeler told us to pick up I-20 South, it turned out to be I-30 . . . but it was also I-20 a few miles back . . . if you know what we mean. And the labryrinth which is also known as Dallas/Ft. Worth International Airport is an experience all by itself.

We gotta tell this one, because Johnny Clemens and friend Velma were witnesses, so there's no use trying to keep it quiet. Johnny and Velma were at the airport to meet John Worth, whose plane was due from Washington about the same time as our plane from sunny Cal. As it turned out, Washington's airport was iced shut (!) so John wouldn't arrive until the next day. So the Worth reception committee became the Northrops' reception committee. After some humorous diddling around the various traffic circles and "no this and no that" zones, our committee finally got us to the National Car Rental pick-up station. Armed with the keys to an Olds Cutlass, we dashed out in the cold, dark night to bring the car back to the station for loading Anita, the luggage, and the "committee" (we all finally took a shuttle from the "committee's" parked car to the rental lot).

This pond . . er, lake . . er, body of water was just across the street from the exhibition building, providing an excellent scene for boating demonstrations . . . also some R/C swan chasing!

As we shivered and shook ourselves into the cold interior of the Olds, we found ourselves surrounded by a strange sight . . . frosted glass! Undaunted (the last shot of "anti-freeze" aboard the plane had not completely worn off) we drove the car to the station, hanging halfway out the open driver's door in order to see ahead. Pulling up to the curb, we had the defroster going full blast, but the car was still cold, and so was the air, so all the windows were still coated with a layer of ice.

As everyone got into the car, and the trunk closed on the luggage, a black gentleman in National uniform appeared with a large pan of water and a scraper, and proceeded to clean off the entire

Jerry Burk keeps watch over some valuable engines at the MECA (Model Engine Collectors Association) booth.

Bruce and Leslie Norman, the pair to beat at any Old Timer contest, pass out the good word from the SAM booth.

As can be seen from this collection, Old Timer modeling is big in the Dallas, Texas area! Models well protected by rail set-back.

This proves that UFOs are real. Only someone from outer space could have come up with this one!

windshield. Next he went around to the back and cleared the rear window. This was great! Realizing that we would also have to see to the side, we rolled down the driver's window to ask if he had enough water left to do ours. The time it took to do this was exactly the time it took for him to walk from the rear of the car and throw some water on the drivers window . . . which was now open! You guessed it . . . right in the face! Laurel and Hardy couldn't have done it better. Even though we were all sitting, we fell over laughing; and if that wasn't funny enough, we recovered just in time to see our black friend, relieved that we all took it the right way, reenacting the whole scene for the National employees inside . . . complete with pantomime recreation of our cranking down the window, and his perfectly timed delivery with the pan of water. We could almost hear Mack Sennet yelling "Print it!"

Aside from the above, the first annual Dallas show will *also* be remembered as the very successful beginning to what we feel can become as great a show as the Toledo Exposition. It is in a vast, untapped area of the country, it is centrally located, the primary and support facilities are unlimited, and its management is in solid, capable hands. The average opinion of spectators, most of whom had never seen a modeling trade show, was one of complete enthusiasm, "I'm sure going to tell my friends to come next year", and, "I could have won a trophy if I had brought a model, wait'll next year!"

Not one of the major exhibitors with whom we discussed the show had anything but praise for the capable organization, and the obviously immediate success. There won't be a long period of growth; it is bound to at least double by next year. Carl Goldberg was one of the more enthusiastic first-time exhibitors, and he is determined that many of his missing contemporaries will be present for the 1978 opening.

MAMMOTH CLASSIC SCALE

In disclosing our thoughts on a special class of R/C scale model, extra large, and using an open-type construction similar to the classic rubber-powered scale model that has maintained its purity of form throughout the many years of model aircraft development (January R/C column), we neglected to credit a partner in the crime, so to speak. Le Gray, our ex-editorial assistant and former R/C Soaring editor, was with us when the lightning first struck, and shared the initial throbs of mental development which gradually put the concept together.

When Le moved to Northern California, it appears that our physical paths were not the only things to diverge. Approximately two years ago, Le put his thoughts on Classic Scale (perhaps the "Mammoth" that we added is not necessary) through the typewriter and sent us a copy.

Since our disclosure in the January issue has aroused so much interest . . . quite a bit more than expected . . . it is appropriate that we publish Le's thoughts (we also caught Hell for the oversight!) so that our readers can have more ideas to consider in fine-tuning the class to the peak of interest. As Le's discussion is too lengthy to fit into the column in its entirety, we'll excerpt those portions which contain additional and different points of view as related to our suggestions in the January column.

"The concept of Classic Scale (C/S) has been hanging around in the dusty skull caverns of a couple of outstanding West Coast modelers for several years. What is it? Well, its big R/C scale model airplanes is what it is. And who are the 'outstanding modelers'? Okey, dammit, so it's only Northrop and me . . . he was out standing in the front yard, and I was out standing in the driveway one time when we talked about it.

"It all started in early 1971 at Taft, California, during one of those two-day free-flight affairs. Old Flying Buddy (OFB) Lenny Curiel was there picking up enough hardware to silver plate the tail of the Queen Mary . . . not the boat, the Lady. As the first day wore on, OFB brought one of his R/C Old Timer free-flight models over where some of us purists were working R/C sailplanes.

"Lenny fired up a .29 powered Comet Clipper, ROG'd, and climbed it out like a miniature Air-Knocker. We watched and finally wheedled a turn to play, with OFB's admonition, 'Don't

A surprising hit at the show was Richard Harrison's boomerang display. At least you don't need R/C or DTs to bring 'em back!

Charlie Smith's Grumman J2F-6 "Duck" was a popular display model in Dallas. He's touring west on vacation.

loop or nothin'. The wings won't take it.' The whole operation was like in slow motion. Beautiful! Throttle back to idle and a slow, easy sink was evident. Find and circle in one of Mother Nature's best and climb for free . . . or push the throttle and go back for another try. Sorta like built-in ridge lift. And not too noisy with a muffler . . . at altitude.

"Next day, Lenny brought out the big stuff . . . a sure 'nuff 193X vintage, 8-foot span, Something-or-Other parasol with a .45 engine. Ugly as hell, with a wire birdcage of a contraption that supported the wing . . . which was bent only out at the ends . . . and about as real looking as a burlesque queen. Well, you could do worse. In the air, that turkey was something else. Slow, majestic, quiet and realistic in movement, if not in form. With just a little imagination, Northrop's touch-and-go's could have been a J-3 on any pre-war, grass strip. Even the lousy ones looked good . . . every bounce and quiver of 'em . . . including the full-throttle go-around.

"The conversation during the drive back to L.A. was divided between periods of complete and pensive silence and verbalization of fevered mind flashes which usually commenced, 'Hey, how about . . .'. By the time we got home, several basics had been resolved. Maybe not optimized, but a good running start at something new, fun, and interesting. It sorta came down to ten points of logic . . . or whatever:

(1) Had OFB's models there at Taft been of realistic outline configuration, they would have been the most scale-like machines we had ever seen. In the air . . . at a distance . . . they were real.

(2) If scale-like flight characteristics are maintained, piloting skill need not be much above the neophyte level . . . at least for the simpler machines. If Northrop could do good touch-and-go's, what's the big deal?

(3) Scale-like flight characteristics can only be obtained with large, lightweight, low-powered models.

(4) Construction will most likely have to be sticks and fabric similar to Old Timer free-flight and jumbo rubber scale, in order to obtain lightweight structures.

(5) For interest and eyeball pleasure, all models should be at the same scale size. The multitude of prototype configurations would make this no hardship . . . almost any size model could be built by appropriate selection of full-scale subject.

(6) There is no reason why this, or any other concept, should appeal to every modeler. Some guys ain't even hangin' around with blondes, and they think they're happy.

(7) An activity program. . . that's grownup talk for 'play time' . . . must be developed that doesn't get all screwed up by politics and/or rule making.

AMA's new booth is colorful and attractive. Would hate to have Larry Bolich's job of setting it up and packing it for each show!

(8) Any given C/S model must be competitive forever. Whatever we decide to do with them sould be such that new, bigger, better, more powerful configurations do not have an advantage or cause the obsolescence of any existing model.

(9) Let's keep it fun!

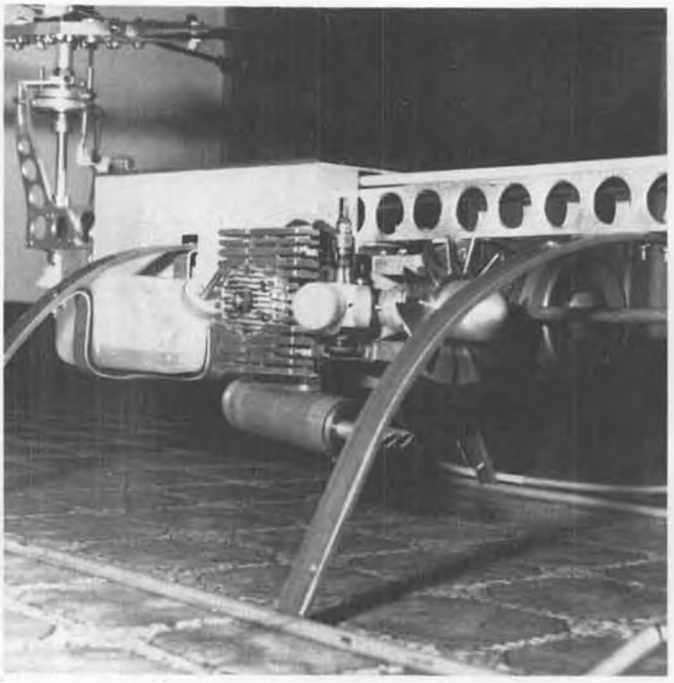
(10) Let's keep it fun!

"One of the first items to be resolved was what scale size should be modeled. The entire premise seemed to dictate a larger-than-usual model. The final decision favored the 1/4 scale size. Several reasons. The 1/4 scale would be a bit easier to work when enlarging drawings, since the common architect scale could be read directly. The 1/4 scale size would also be eaiser to judge, if such ever were allowed to become a factor. There was some personal experience with 1/4 scale. Northrop had done some keen things with his old Gypsy Moth . . . I remember the month he told me about it one night . . . and had an Aeronca C-3 well on its way when he took the wagon train West. Fortunately, it made it through the Indian raids. The old Miniature Aircraft Corporation Taylorcraft was, and still is, quite successful . . . although some modernization of construction details wouldn't hardly hurt at all. Plans are available from John Pond. Bud Nosen Models offers a 1/4 scale Aeronca 'Champion'. Vintage R/C Plans offers drawings for the J-3 Cub *(see February's cover. wcn)* Bill Bertrand's fabulous, low-winged Aeronca L was a featured construction article in Flying Models magazine. RCM published the Typsy "Junior" plans at 1/4 scale. A J-3 Champ or T'craft at 1/4 scale would work out to about 9-foot span, and that seemed about right as a basic size reference.

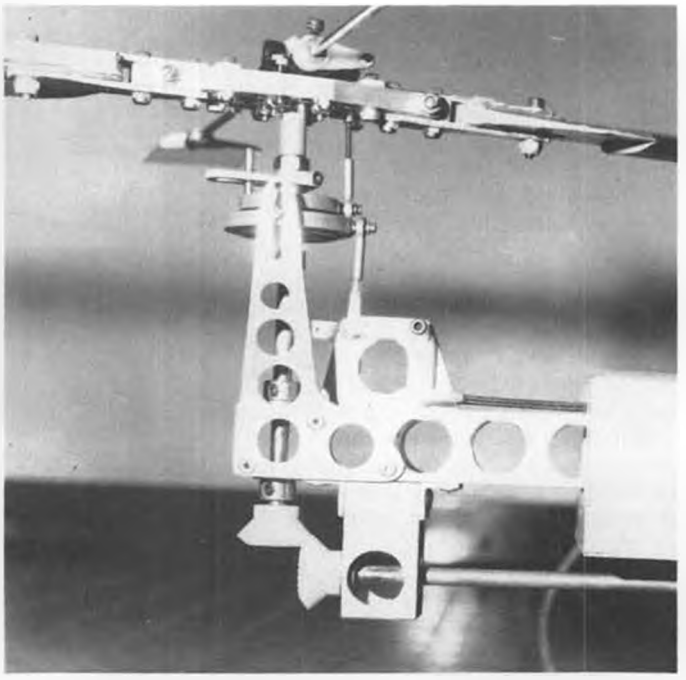
"But won't those aerial tubs weigh 35 pounds? They better not . . . and needn't! Sure, follow current, conventional airframe construction procedures for pattern and pylon ships and ya better keep your knees together when you pick one up. But that's not the idea. If you can't remember, check the plans on a few Old Timer free flight or jumbo rubber scale designs. Or, if all else fails, check full scale structure. That's the way C/S models must be built. Lotsa sticks . . . or tubes . . . and hardly any solid balsa tail surfaces or slab sided fuselages at all. All kinds of nothin' in

Continued on page 108

Charlie Viosca returns his electric-powered "Spearfish" to the display area following an outdoor demonstration. English kit imported by Polk's will be reviewed next month.



Experimental tandem helicopter, scratch-built by Jerry Holcomb, Vancouver, Washington.



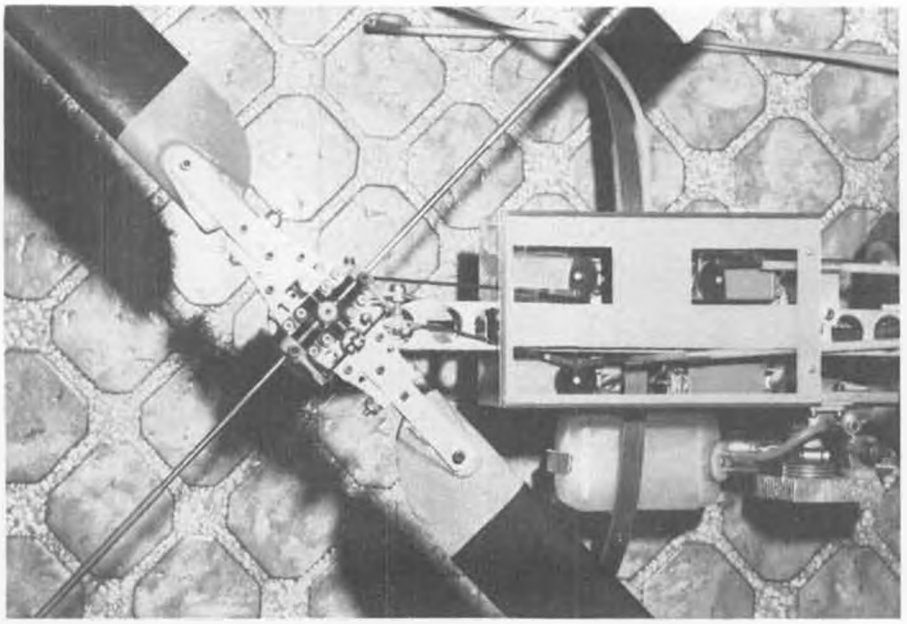
Front end (Howdya know?) of Jerry's tandem chopper. Rube Goldberg couldn't have come up with a more intricate linkage!

CHOPPER CHATTER

By JOHN TUCKER

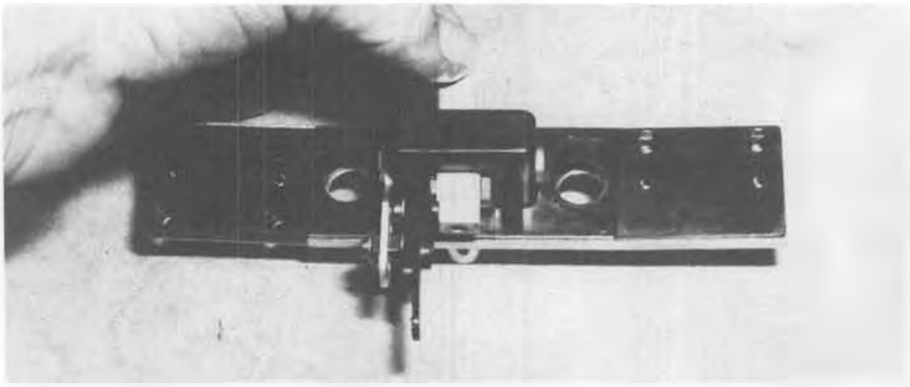
• She was a real pretty little chopper, drifting slowly along at about 50 feet above the deck. The pilot had her under perfect control and was obviously enjoying himself tremendously . . . that is, until the engine suddenly quit, and that pretty little bird fell straight to the ground like a brick! Fortunately, the damage was fairly light and only required a bit of fiberglas work plus a set of rotor blades and a new landing gear. The reason for the engine failure was found to be a "split" in the fuel tubing, just where the pick-up tube attaches to the brass fitting inside the tank. As long as the fuel level was above the split, everything was fine, but when the fuel burn was down to half-full, the split was uncovered and air was drawn into the carb. Looking a little further revealed that the brass tube had a very sharp edge that was undoubtedly responsible for the split fuel line. Moral of this story is to check those fittings periodically, practicularly inside the tank. During the initial installation, be sure to chamfer the edges of the brass tubes so that they are free of all sharp edges and burrs. This safety precaution is so basic, we all tend to forget it and need to be reminded once in awhile.

While we're on the subject of replacing rotor blades, the other day, I

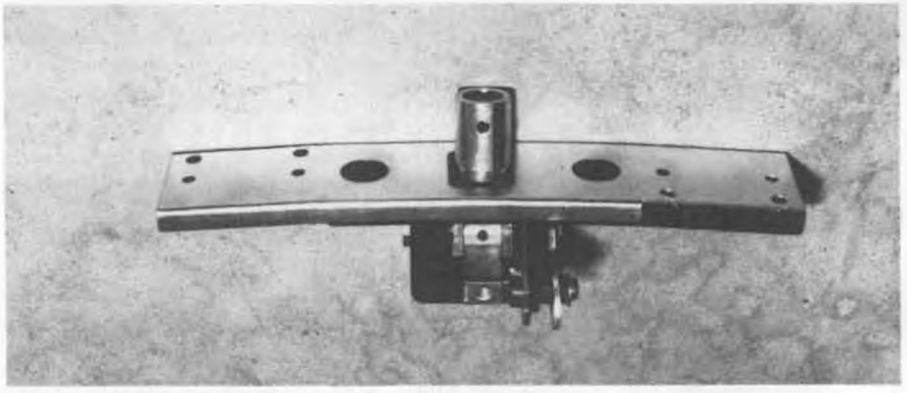


Overhead shot of Holcomb's tandem helicopter, showing radio compartment, fuel tank, and engine. Jerry's tandem experiments have included successful rubber powered models.

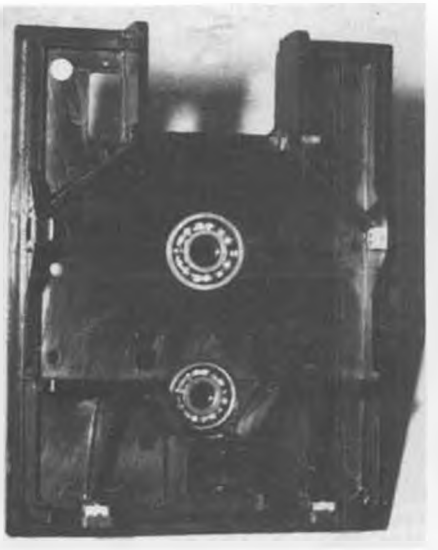
Overall shot of Holcomb's experimental ship. Difficult to get the whole thing in one shot!



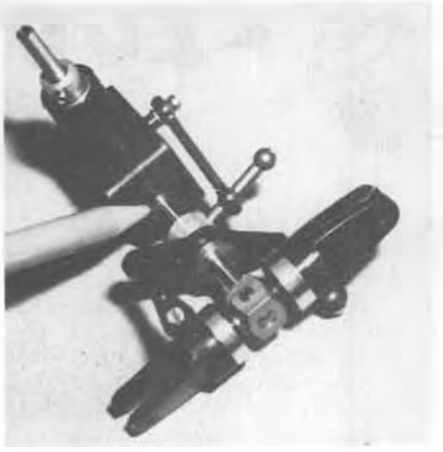
Steel plate being inserted into Alouette rotor head to limit stabilizer bar travel. See text for more info on latest kit modifications.



Alouette main rotor. Steel plate reinforcement "cupped" around original plastic head.



Underside of new Alouette main transmission base plate. Note the added webs.



Pencil points to ball bearing in new Alouette tail rotor transmission.

received a set of Heli-Baby rotor blades which were sent to **Model Builder** by Crystal Products, 2118 Archdale Drive, Charlotte, N.C. 28210, for evaluation. These blades are real quality products and require only light sanding prior to covering. I wasn't able to identify the wood used, but it was similar to the original ones supplied in the kit . . . strong, but very light-weight. We were advised they will be available at $4.77 per set, and that's a price which can't be beat! They also have a see-saw available for the Heli-Baby at $11.95, so you might write them in case you need spares.

1977 ATLANTA HELICOPTER CHAMPIONSHIPS

I received a note from Dan Dougherty, Contest Director, concerning the 2nd Annual Atlanta Helicopter Championships to be held April 23 and 24, 1977 (9 a.m. - 4 p.m.) at the new Cobb County R.C. Field, just a few miles northwest of Atlanta, Georgia. This contest is AMA sanctioned, and will be using the AMA proposed rules for Scale, Novice, Intermediate and Expert. Special rules are planned for the beginner, such as, lifting off, appearance points, etc.

Many events are planned, with all kinds of merchandise for prizes, such as . . . 1977 Kraft Radio, Alouette Kit, Revolution Kit, Kraft .61 Engine, and many, many accessories. Trophies will be awarded for 1st, 2nd and 3rd places.

Headquarters motel will be the Holiday Inn, Marietta, Georgia, and special discounts are available. Out-of-town flyers will be met at the Atlanta Airport and taken to the motel and field. Pre-registration for the big event is requested . . . I suggest you write Dan and request an information packet containing all the details and maps; Dan Dougherty, 3761 Macedonia Road, Powder Springs, Georgia, 30073, Phone (404) 943-6776.

TANDEM CHOPPERS

James Combs, who is stationed in Okinawa, wrote a short letter telling of the high interest in R/C choppers on the island, mainly by the Japanese. James has a Cobra 450, Kalt Jet Ranger and a Humming, all flying well. His latest acquisition was a Revolution, but he hasn't had time to fly it yet. The main reason for his letter was to secure information on Tandem helicopters, since he is planning to scratch-build a Boeing Vertol 107. Naturally, my first thought was to put him in contact with Jerry L. Holcomb, 1010 N.E. 122nd Ave., Vancouver, Washington, 98664, who has done a lot of experimenting with twin rotor R/C choppers. I also dug out the old files to see what Jerry had submitted in the past.

As a result of that little research project, I came up with egg all over my face!! Seems that Jerry sent quite a bunch of data and photos back in 1975, and I had filed them for a future issue. Well, I guess this is pretty far enough into the future so will include the pertinent photos in this issue. James, I suggest you write Jerry direct . . . gosh only knows what he's come up with in these past months! *(Don't feel bad, John. Jerry was going to send us an article on a rubber powered Tandem design. We're still waiting! wcn).*

Jerry started his Tandem rotor research by building several rubber powered models, before moving on to the larger R/C versions. He sez, "Number 1 tandem never really flew . . . too heavy. Built Number 2 with a revised drive train and it proved to be flyable with its little .19, provided the weather wasn't too hot. Went to an H.P. .40 and had plenty of power. Again used the free flapping rotor design (see photos). All control by cyclic, but the next one will have collective pitch on at least one end. All up weight of model in photos was 7 lbs., but hope to get No. 3 down to 6 lbs. The photos show the original .19 power plant." (photos courtesy of Mark Freeman). I hope you'll forgive me Jerry, it was really an oversight! And if you'll send more detail on Tandem rotors, I'll give it priority!

DS-22 ENSTROM

Another letter, from Ralph F. Arendt,

Continued on page 95

How it all started! Rich Tanis (left) with Sam Ressler and the Buccaneer he built in 1941, and converted to R/C assist.

Rich Tanis some of the trophies and publicity material from his original O/T R/C Contest.

PLUG SPARKS

By JOHN POND

• Many modelers regard history as a rather dull subject, but the history of modeling is always worth preserving. This column has carried articles on British, Swedish, New Zealand, etc., activities, but up to now not too much has been written on United States activities in Old Timer Radio Assist. This event has caused a tremendous revival in old time models.

Radio controlled old timers were around for a long time before Rich Tanis and his North Jersey Radio Control club ever gave serious thought to actually staging such a contest. Many people (including the writer) found that old time designs made excellent trainers. As a matter of fact, most all of the old San Francisco Vultures trained on the writer's ancient Buzzard Bombshell equipped with a single channel Controlaire with cascaded escapements to give rudder and motor control.

Rich Tanis ran across a fellow named Sam Ressler who had an old Buccaneer Special built from a kit he purchased in the fall of 1941. (Price, $12.50 then!)

Finished in 1941, the model was flown at the Knickerbocker Golf Course in Englewood, New Jersey and later on, many other fields in New Jersey.

When Rich Tanis went to work in Clifton, N.J., he met Sam Ressler, who by then had replaced the Brown Jr. in his Buccaneer with a K&B Torpedo .35. The airplane now sported a single channel radio; rudder-only operation. Rich gave Sam a hand to fly the model, and it turned out to be so relaxing and so much fun, that Tanis started giving serious thought to building several models himself (having given away all of his models when he went off to war).

About this time, the John Pond plan service was discovered by Tanis, and he saw some models built from those plans. Finding out it was now possible to build these old models, Tanis gave serious thought to the idea of staging an old timer contest.

Looking about for help on the idea, Tanis found an excellent man in Everett "Woody" Woodman. Enthusiastic meetings were held at Woody's home. Tanis was so pepped up over the idea of staging an old timer R/C contest that he sat down and wrote out the rules right then. This consisted of two free flight duration type events and one pylon event.

As to the latter, it is truly a shame

Cliff Silva flies this 14 ft. Michael Roll design from his wheelchair. Both are trophy winners.

Chris Christensen with Bantam powered Spook 48. Chris organized and sponsored the Ocie Randall Memorial O/T Contest.

"Herky", a beautiful model built and flown in the spring of 1938 by Melvin Yates. Lou Levine uncovered this model design intact, in Joliet, Illinois.

Miss SAM Champs, 1977, Miss Tricia Webster, Manchester, Tenn., age 20, Junior at Univ. of Tennessee, and lucky dad, Lee, has her as a helper!

that this novel event was abandoned as this looked like the best event of all, with those old timers chug-chugging around the course. In later contests, the simple idea of duration was preferred, so the pylon event was abandoned. However, the idea by Tanis of scoring one point per second, with the use of a landing circle, has survived.

Now that Tanis had gotten the boys to agree to an old timer radio assist contest, he launched into a tremendous flurry of work, producing beautiful trophys and trophy stands (!), with many special awards, including the unique Chuck Gill "melted" trophy.

Being a draftsman of some sorts, Rich designed a participation award certificate to be given to every contestant. Along with this, a souvenir arm patch was designed by Tanis and made up for those who wanted a souvenir of this meet (although the writer was unable to attend, he did receive a very highly treasured patch for supplying those much needed plans).

Things were really rolling now. Rich contacted over one hundred prospective sponsors for prizes. Guess who got stuck with packaging them up properly? No rest for the wicked!

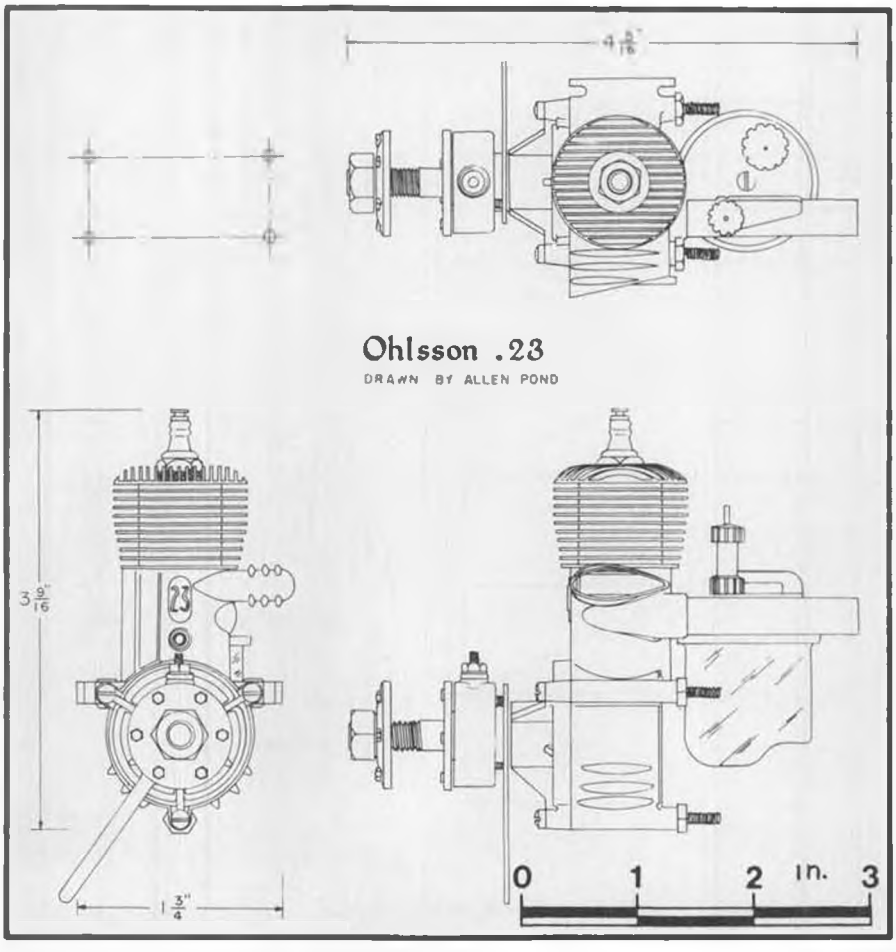
Probably what put the idea of R/C Old Timers over with a tremendous bang and invoked tremendous interest was the idea Tanis had to use the WRAMS Show as an advertising media to publicize the upcoming meet. Wow! Did this ever go over. With a gold framed attractive poster to attract attention, Rich and the boys gave away over a thousand handbills announcing the meet.

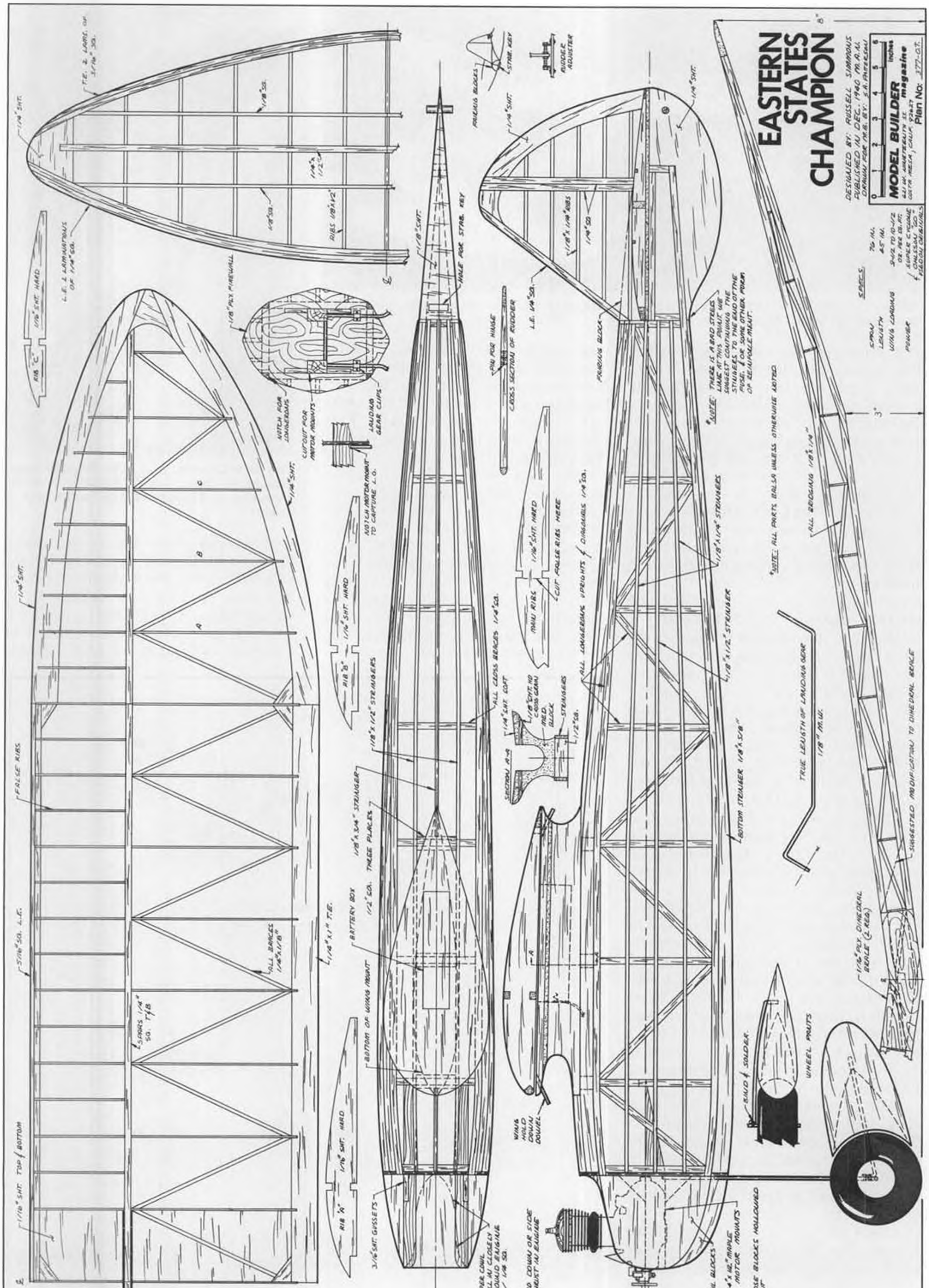
With the North Jersey R/C Club fully committed now, Rich Tanis and Gene Fuller began to write articles for the club newsletter to be distributed to other clubs, to increase interest. Gene Fuller later did a report on the meet in the October 1971 issue of Flying Models (This is the date when **Model Builder** first started, so don't blame us for not covering the meet!)

With the meet a tremendous smash hit, the North Jersey boys simply had to stage another in 1972, July 1 and 2. Tanis was successful in getting Flying Models magazine to sponsor the meet, putting up a beautiful Perpetual Trophy. Dave Jagge (later SAM R/C Rules Coordinator) won this award, using a Playboy Senior.

With Old Timer R/C F/F gaining such recognition, Tim Banaszak, the Contest Manager for the 1972 SAM Champs (held at Bong AFB that year) invited the North Jersey club to put on R/C events. Inasmuch as Woody Woodman had been receiving considerable publicity as C.D. of other meets, Tim contacted Woody to run the events (This was truly a shame, as Dick Tanis was completely overlooked).

The boys from Jersey; Woodman, Beshar, and Thoms, showed up for the O/T R/C events, but unfortunately, the invitation to participate came too late to generate any publicity. Undaunted, however, the boys flew demonstration flights all day and aroused considerable





FULL SIZE PLANS AVAILABLE – SEE PAGE 112

Old photo of old plane! Dave Paine, Jackson Heights, N.Y., built this Miss America in 1937. Site was Curtiss Field, in Valley Stream, Long Island.

Just a few years later than the above photo, here's Dave Paine's latest Miss America, with Super Cyclone and Kraft radio. Gee, talk about being in a rut!

Perennial O/T CD, Woody Woodman, seen at the Oshkosh Nats with R/C Comet Sailplane.

interest.

Rules were the same as employed at the Second NJRCC Annual for O/T R/C. Interestingly enough, the rules as promulgated by Tanis, are practically the same as the original rules published in the SAM Rule Book, even to the same fold-out format!

Well, the die was cast now. Old Timer R/C Events were firmly established when the events were officially flown at the Nationals (Oshkosh 1973) as part of the unofficial Old Timer Events annually staged by Pond at the Nationals. Interest had generated to the point that even the author showed up with a Merco 60 powered New Ruler!

With Woody Woodman handling the contest, and Joe Beshar showing the way with an ST 60 powered (!!) Playboy, the first Nats O/T Events were a success, despite showers in the afternoon (By then all the flying was over, and the writer had been held captive at the local Shakey's Pizza Parlor).

The addition of R/C events at Oshkosh brought out numerous old timers interested in this phase of the game. Noted at the annual SAM Banquet were faces such Leo Weiss, Joe Elgin, and a host of model editors. No question that the old timer movement had been revived on the east coast!

Most surprising of all in this revival, was a complementary rising of free flight activity. Many of those modelers

Continued on page 72

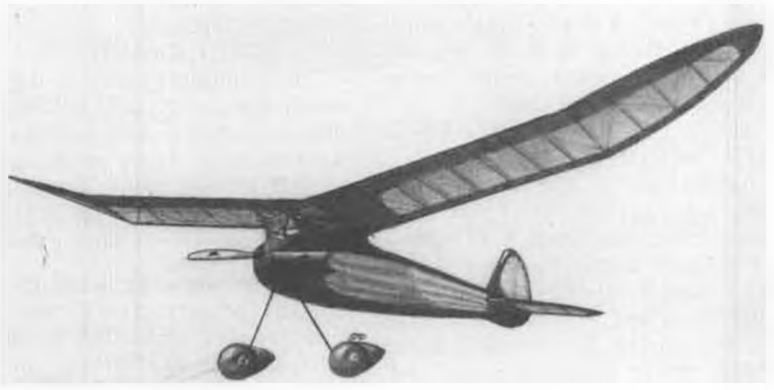
EASTERN STATES CHAMPION

OLD TIMER Model of the Month

Designed by: Russell Simmons

Drawn by: Al Patterson

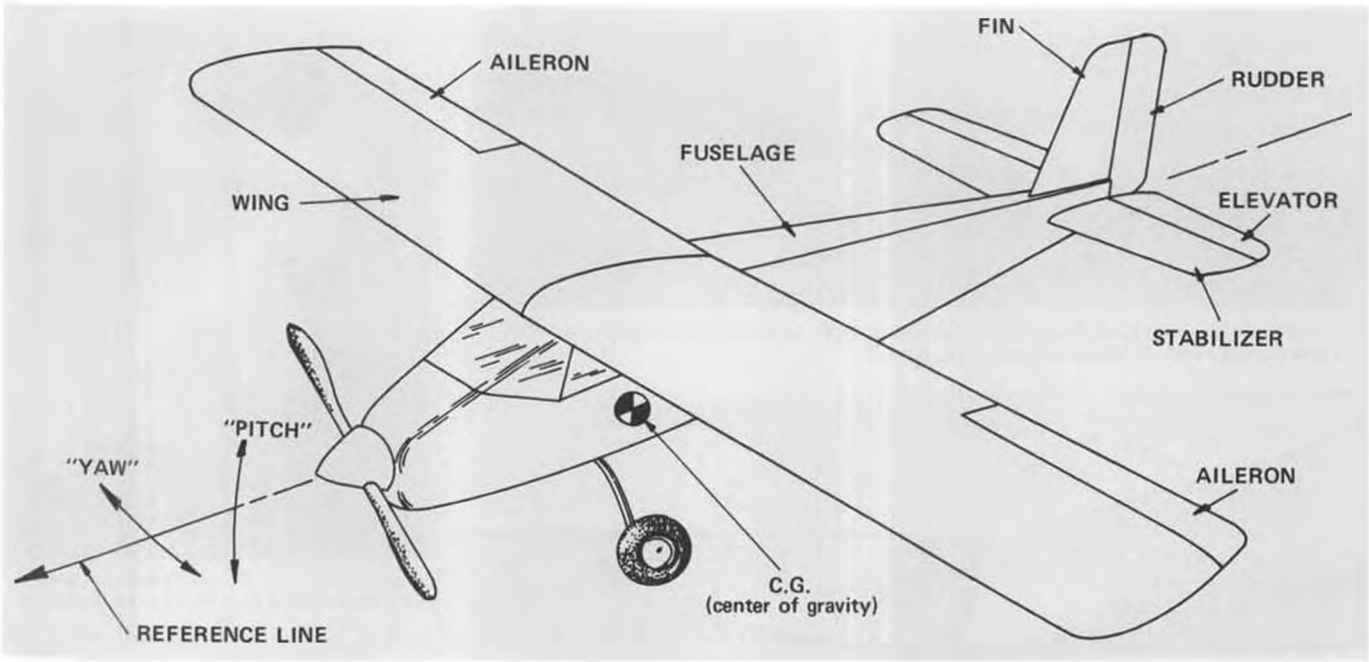
Text by: Bill Northrop



• For M.A.N.'s editor, Charles Hampson Grant, to say ". . . this is one of the finest gas models in the country . . ." was really a terrific compliment, as it did NOT use a Grant X airfoil. Actually, the rather thin, flat-bottom section was similar to what many modelers still consider to be the best compromise; one that allows a fast climb to get above the normally dead surface air, and into the "up stuff" that most any airfoil will do well in.

Plans for Russell Simmons' design were published in the December 1940 issue of M.A.N., and it was given the matter-of-fact name, "The Gas Champ." To identify it in recent years, it has become known as the "Eastern States Champ (the name "Eastern States Champion" was printed on the plans), and it was at this New Jersey contest that it gained its recognition as a consistent winner. It not only won for Simmons, but also chalked up wins for other modelers who built ships from the same plans . . . the true test of a good design.

Consistent with early magazine plans, no balance point is indicated or mentioned. A good starting point is 25 to 30% back from the wing's leading edge, but watch the lifting stab. The designer calls for a 1/4 inch of wash-in in the left wing (T.E. down), and no thrust offsets. •



AERODYNAMICS FOR THE NON-TECHNICAL MODEL FLIER

By GEORGE A. WILSON, Jr. . . . Here is something of value to the new aircraft modeler, as well as the experienced flier who has trimmed by instinct without really knowing why certain things happened.

• When a model airplane flies well, it isn't by accident! A builder may accidentally make a model that flies well; but, no model flies well unless it is "set-up" right, and the laws of physics are the rules for this. Luckily, these rules are fairly simple, and with a little experience, any modeler can either learn them or develop an inherent feel for them. There are thousands of model flyers who will claim they know nothing about aerodynamics but, on the other hand, do a great job of adjusting a model to fly right. These modelers are the proof that model aerodynamics can be learned without really trying!

WHY SHOULD YOU BE CONCERNED ABOUT "AERODYNAMICS

Aerodynamics is the science that explains why aircraft fly. Apart from following directions when you build a model to assure that its parts are aligned properly, that it balances at the recommended place and that it is free from warps, the process of making a model fly well is one of "trial and error", and, the less errors that occur during this process, the better the model will survive. All too many models are "wiped-out" during the testing stage, or damaged so badly they never fly well. A little knowledge about aerodynamics will assist you greatly during the adjustment stage. Experience is even a greater help.

WHY DO THE PLANES FLY?

To fly, an aircraft (We will limit this article to heavier-than-air, fixed-wing aircraft.) first needs something to move it forward through the air. This may be an engine or the force of gravity when the craft is gliding. The forward motion of the wings causes them to "lift" the aircraft. In addition, an aircraft needs stabilizing devices to make it fly in a straight line and not flutter about like a falling leaf.

These fundamental requirements are "forces". The motor force is called "thrust". The wing's upward force is called "lift", and the stabilizing devices are called "stabilizing forces".

WHAT IS THE "CENTER-OF-GRAVITY"?

The center-of-gravity is the point at which the aircraft will balance in ALL directions; fore-and-aft, left-to-right, and top-to-bottom. If we could support the aircraft at this point, it would remain in any position in which it is put. The CG is a convenient (and proper) point to choose when we want to consider how the forces react on an aircraft. If an aircraft were supported at its CG, a force applied to it at any other point would tend to make the aircraft rotate around the CG. This concept is important to the discussion that follows, since we will be talking about forces being applied to the aircraft when it is supported by the air through which it is flying, which is essentially the same as its being supported at its CG.

BALANCE POINT

(Many construction articles and plans mistakenly confuse C.G. and "Balance Point." More often than not, the fore-and-aft balance point *of a model is indicated on plans by a shaded triangle or circle, located somewhere under the wing, and it is referred to or identified as the C.G. Actually, it is the point where the model should balance, parallel to the ground, if suspended by the modeler's finger tips, and is only the "C.G." in one-third of the total sense. Back to you, George. wcn)*

WHAT DOES THE TERM STABILITY MEAN?

A stable model can be trimmed to fly smoothly in a normal, right-side-up position; an unstable model will most likely fly in a path that will lead to a crash, and no amount of trimming will correct its unstable performance. Fortunately for the novice, established designs (kits and published plans), when built as directed, are stable and can be trimmed to fly stably. The only real stability adjustment that is left to the modeler is the location of the balance point. The other factors that affect stability are built into the model, and are not easily changed.

Within certain limits, stability increases as the balance point is moved forward. In general, a very stable model is a safe model that will fly a relatively straight path even under windy conditions. However, a model that is too stable is not necessarily a model that flies very well. An over-stable U-control model will be very difficult to maneuver; a glider that is too stable will ignore thermals. The radio control stunt model should be "marginally stable". In this case, the model is easily steered around

the sky, but will more than likely crash if the pilot takes his mind off it for more than a second or two. *(A precision aerobatic R/C model has "zero stability" i.e., it will continue in the direction last aimed until some outside force or control movement acts to change it. wcn)*

Stability is inherent in the design of an aircraft; trimming the model by moving the control surfaces and/or shifting the balance point will allow you to realize the stability and to control the amount of stability that the model has.

WHY DO PLANES NEED "STABILIZERS"?

An aircraft needs stabilizing forces to give it a sense of direction. Stabilization can be achieved most easily by adding fins like those on the back of an arrow. "Drag Forces" could also be used (like the tail of a kite) but forces that tend to slow the aircraft down ("drags") are counterproductive to the thrust and, therefore, wasteful. Good aircraft design practice minimizes drag wherever practical to, in turn, minimize the amount of power (and fuel) required.

In conventional aircraft, up/down (or longitudinal) stabilization is provided by the stabilizer and elevator, and left/right (or directional) stabilization is provided by the fin and rudder. These devices can be looked at as acting like weather vanes; they tend to make the back of the aircraft follow smoothly behind the front (see Figures 1 and 2).

A third stabilizing force is provided by the dihedral in the wings, which tends to make the aircraft fly right-side-up. Without some sort of stabilization, the aircraft might tend to rotate around a lengthwise axis like a bullet leaving the rifle barrel of a gun. A wing is most effective in producing lift when it is horizontal. Visualize a plane trying to fly on its side with its wings vertical, and you can see that the wings provide no upward lift in this position. Therefore, if a wing has dihedral, the wing that starts to drop produces more upward lift and the opposite wing produces less. The net result is a force tending to rotate the aircraft back toward its level position (see Figure 3).

The three fundamental stabilities required are: 1) Up/Down stability, which is called "pitch" or "longitudinal stability", 2) Left/Right stability, which is called "yaw" or "directional stability", and 3) Rotational stability about the lengthwise dimension of the aircraft, which is called "roll" or "lateral" stability. (Spiral stability must also be considered, but is omitted from this discussion because of its relative complexity.)

WHAT DOES THE TERM "DRAG" MEAN?

Any force that tends to slow an aircraft is known as a "drag". Aircraft are streamlined to minimize drag and the amount of power required to make them fly. Drag forces increase with speed, and if they are unbalanced above and below the center-of-gravity, they can cause the aircraft to dive or climb just as control surface forces do.

Drag forces behind the CG also tend to stabilize the aircraft. The drag caused by the tail surfaces increase weathervane action. However, it is best to use stabilizing forces that do not cause drag as the principle methods of stabilization.

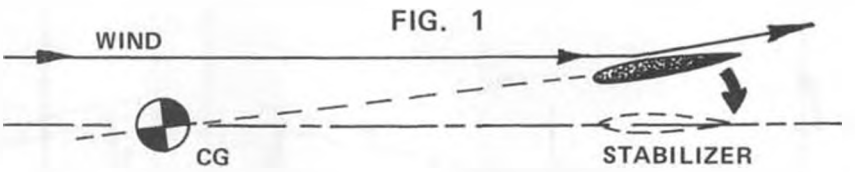


FIG. 1

The fin and stabilizer act in a weathervane fashion; when they move parallel to the wind, there is equal pressure on each side. If they are at an angle to the wind, the force of the wind striking them tends to make them align themselves with the wind. Rudders and elevators do the same sort of thing. The stabilizer may also be used to balance other forces, such as the wing's lift, if the center-of-gravity is not at the CG.

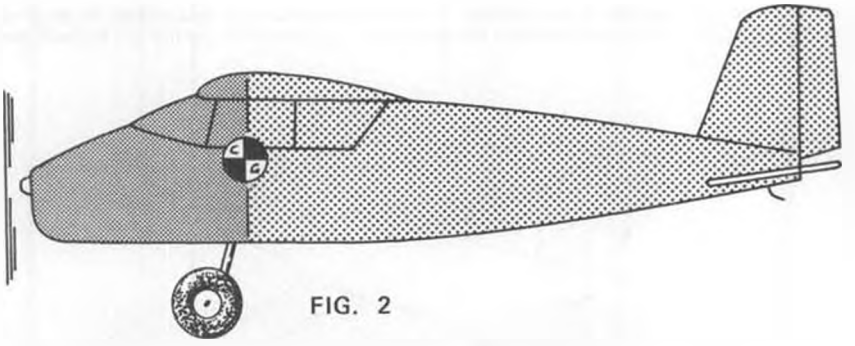


FIG. 2

The side area behind the CG should exceed the side area in front of the CG. This insures that "weathervaning" will occur, and that the model will fly straight ahead. The farther the area is from the CG, the more effective it is. If the tail is long, a relatively small fin/rudder will balance a large area just in front of the CG.

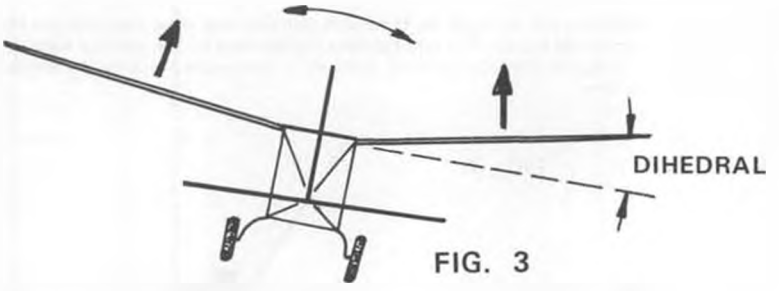


FIG. 3

Dihedral causes the model to rotate itself back to an even keel, because the lower wing works more effectively against gravity than does the wing that is tilted upward. When a wing is vertical, its lift is horizontal and does not tend to offset gravity at all.

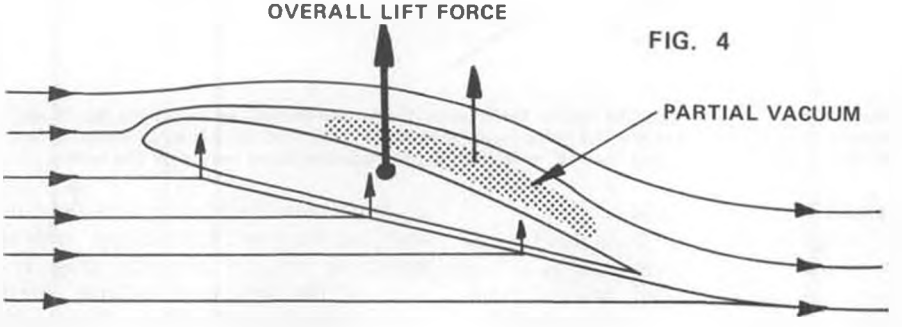


FIG. 4

The wing lifts because of the partial vacuum formed as the air passes over its top surface, and because of the air that is deflected downward by the bottom of the wing. The total lift can be treated as a single force, acting at the wing's center-of-lift.

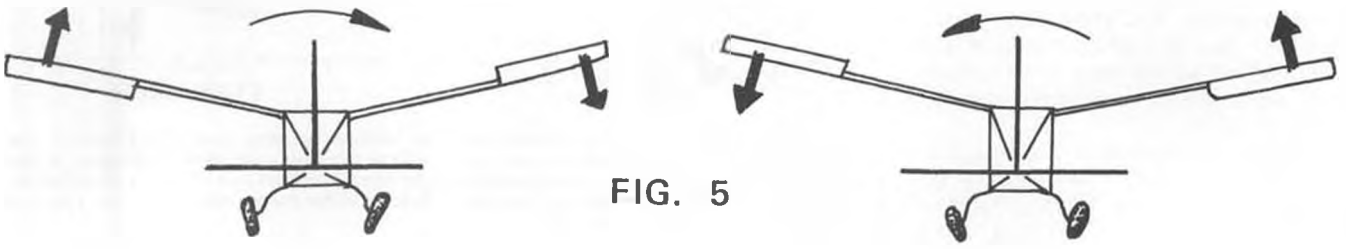


FIG. 5

The ailerons work opposite to one another. They cause the model to roll around its lengthwise dimension, and are used to bank the model left or right. Dihedral tends to work against aileron action, and therefore should not be used excessively in a model equipped with ailerons.

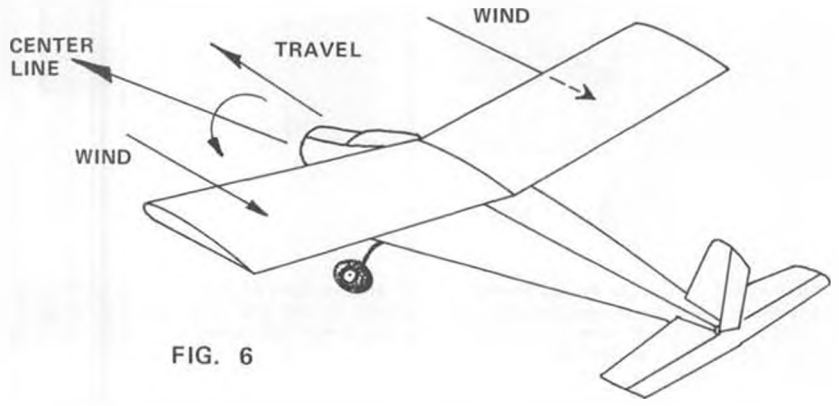
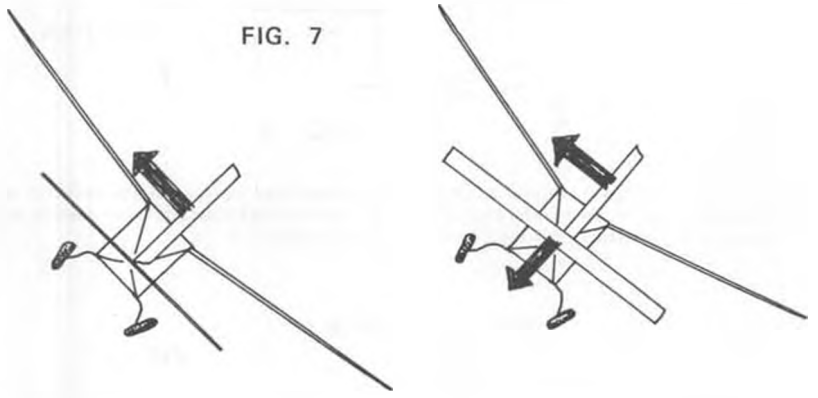


FIG. 6

Dihedral causes the model to bank when it starts to skid, putting one wing forward and the other behind in the direction of travel. The wind strikes the bottom of the leading wing, lifting it upward, and strikes the top of the lagging wing, pushing it downward, causing the model to bank in the proper direction.

FIG. 7



When in a banked attitude, the rudder tends to both turn the model and to lift the tail. If up elevator is used, the force created helps turn the model in the direction of the turn (either left or right), and tends to lower the tail, or counteract the upward force caused by the rudder.

HOW DO WINGS WORK?

Wings produce lift by deflecting air downward under them, and, as a consequence, being pushed upward themselves. You can easily demonstrate this effect by extending your hand (carefully) outside a moving automobile and tilting it slightly (frontside up). However, the majority of the lift results from the vacuum that forms on top of the wing. Of course the wing must be moving to create lift and, it is obvious, that the faster it moves the more lift it produces (see Figure 4).

Wings also produce drag. The lift-to-drag ratio (lift divided by drag or L/D) is an important consideration in how airfoils are designed; the designer tries to maximize lift and minimize drag. The ratio of the wing span to wing chord, called aspect ratio, also affects the lift-to-drag ratio. Long, narrow wings have high L/D; that is why they are used on gliders. The L/D ratio changes as the angle-of-attack of the wing, relative to the air through which it is passing, is changed. As the angle-of-attack increases, the lift and drag both increase. Up to a point, the lift should increase faster than the drag. At the "stall angle", the lift rapidly decreases and the drag rapidly increases. Here again, the experiment of extending your hand (very carefully) outside a moving automobile will quickly demonstrate the stall angle.

As you raise the front edge of your hand, the air pushing it backward will become very apparent, and the lift will disappear when your hand nears the vertical position, the backward push is drag. Again, observe that, when your hand is nearly horizontal, the drag (push backward) is minimum. It should also be apparent from this experiment that drag increases with speed. The faster a plane flies, the more important it is to make it smooth and streamlined to minimize drag; for double the speed, drag is increased four times.

HOW DO CONTROL SURFACES WORK?

The rule is: adjust the model for good glide by changing the balance point or the stabilizer/elevator setting and then, adjust for good powered flight by changing the thrust-line. The "force-set-up" is a matter of keeping the forces generated by the flying surfaces and that generated by the motor, in balance.

The foregoing discussion can be extended to cover many other cases. These involve different balance points with respect to the wing's center-of-lift and different motor configurations where, typically, the thrust line does not pass through the CG. Again, if you want to go into these cases, we suggest you find some of the fine articles and books that cover this subject in more detail. What we have presented here should make it easier for you to cope with your first inherently stable models.

CONCLUSION

Most beginners start by building from kits. Most kit-built models will fly well if you 1) build them like the plans say to build them, 2) build them as light as practical (avoid colored dope and other things that add weight, 3) remove any warps that may be in the flying surfaces, and 4) add weight to the nose or tail to make them balance at the point shown on the plans. The material in this article will help you appreciate what is going on when your model flies, and will help you "fine tune" it to get maximum performance. However, the best way to become expert is to get

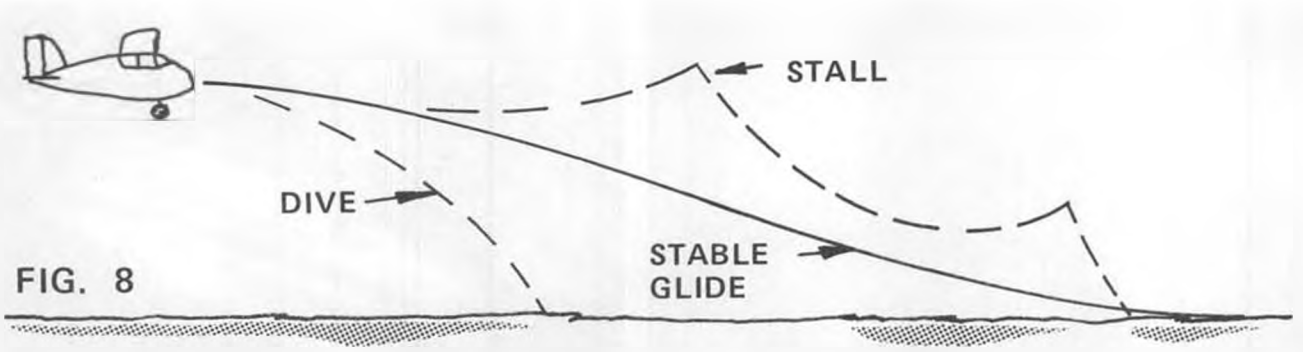


FIG. 8

Adjustments to obtain a stable glide are made by changing the balance point (CG), or the angle of attack of the wing, or the horizontal stabilizer. Moving the CG forward (adding weight to the nose) reduces the tendency to climb, and makes for more overall stability. If the CG is at about 25% to 30% back from the wing's leading edge, and you are adjusting a standard outdoor rubber trainer or R/C trainer, it is best to use stabilizer adjustments for good glide trim. Leave unusual force set-ups to the experts!

help from an expert and get a great deal of practice yourself. There are people in every activity who are "naturals", but most of us have to work to achieve success. In this case, it is not very difficult if you have a little knowledge, get some help (if possible), and follow the instructions you get to the best of your ability.

From the foregoing, we can see how an aircraft is supported in the air by the wing's lift and what is necessary for it to be stable in flight. Your next question is probably, "How is the aircraft steered?" Just as we have devices built into the aircraft to make them stable in the forward direction and in rotation about their lengthwise dimension, we have "control surfaces" to disturb the stable condition when we wish to steer the airplane. On the tail, the rudder steers left/right and the elevator steers up/down. On the wing, the ailerons rotate the aircraft around its lengthwise dimension. These surfaces work like the wing. When they are operated, they deflect air away from them and, in turn, get pushed in the opposite direction. For example, if the rudder surface is turned to the right, the force of the wind on it pushes the tail end of the aircraft to the left. The actions of the other control surfaces are similar.

The ailerons on the wing work opposite to one another; when the left aileron goes up, the right one goes down. In this case, the left wing is pushed downward and the right wing upward, and the aircraft rolls to the left. (See Figure 5.)

(This explanation should also help to explain why it is impractical to add ailerons to a ship that has been designed to fly stably without them.

Dihedral, as described earlier, acts to keep the plane level from tip-to-tip. Ailerons in such a wing must try to overcome the stabilizing action of the dihedral. As a consequence, the two opposing forces fight each other . . . often times to a draw . . . the plane continues to fly in level attitude even though ailerons are deflected!

More often than not, if ailerons are added to a model that has been designed to fly without them, it will yaw in the opposite *direction to the control application! When the ailerons are deflected, drag is also produced, in addition to the rotational effect. A "down" aileron creates more drag than an "up" aileron, therefore, with the rotation cancelled out by the dihedral, the drag takes over. For example . . . if you try to bank to the right, the left aileron is deflected down. The dihedral cancels the rotational force, and the drag on that side will pull the model to the left. wcn)*

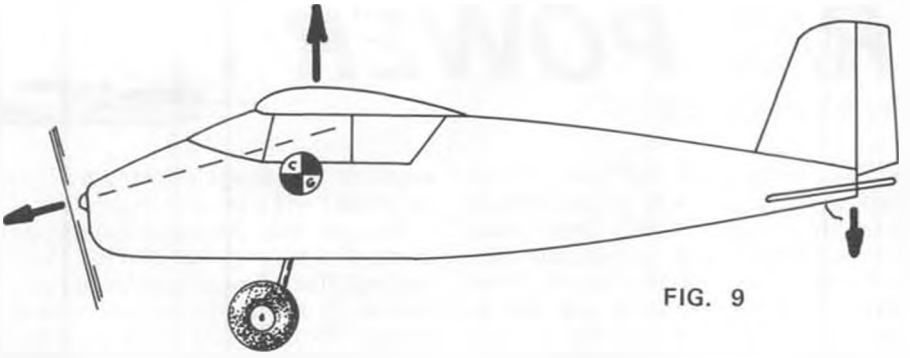
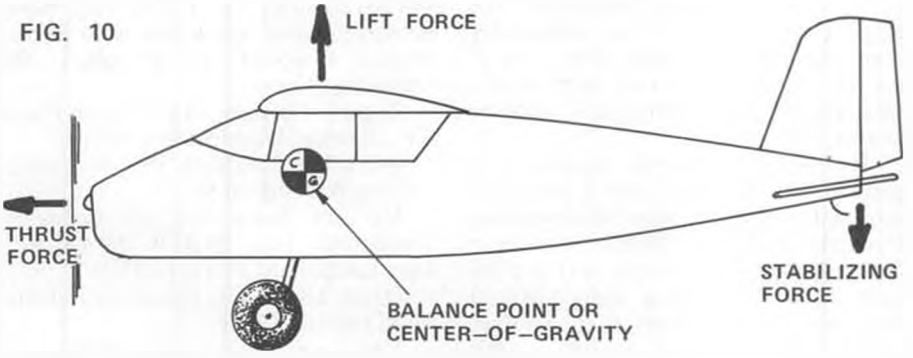


FIG. 9

Down-thrust is used to offset the extra wing lift caused by powered flight. When gliding (power off), the lift acting upward behind the CG is offset by the horizontal fin's downward acting force.



A typical inherently stable force set-up. The wing lift is counteracted by a downward force from the stabilizer. It has been assumed, in this case, that the drag forces above and below the CG balance out each other.

HOW DOES AN AIRPLANE MAKE A CONSTANT - ALTITUDE TURN?

It is important to remember that the forces produced by the control surfaces act upon the aircraft itself and, therefore, turn the aircraft with respect to its CG. For example, if an aircraft is in a knife-edge flight position, left/right control as seen from the ground is effected by the *elevator* and up/down control by the rudder. A pilot flying in the aircraft has little problem with this change. However, when the pilot is on the ground, he must develop an ability to translate controls with respect to the attitude of the aircraft. This is particularly important for the radio control pilot, but is also important to those who are adjusting free flight models.

Even the simple constant-altitude turn is not as simple as it appears at first

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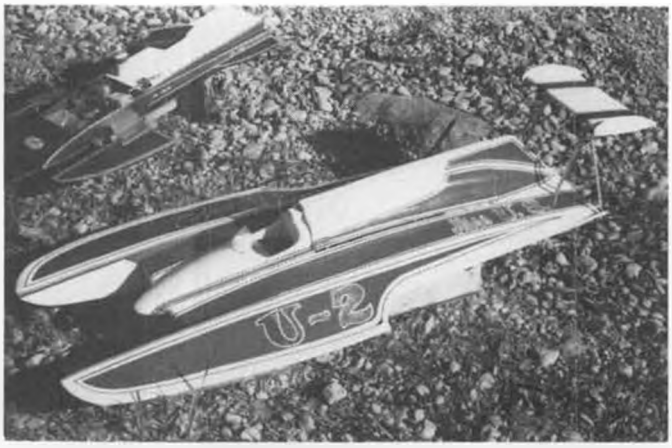
The 1-to-1 scale Miss U.S. at her best in a heat during the Detroit Gold Cup.



Doug Riha's "Miss U.S.", with OPS 60 power, as seen at the Minute Breaker's regatta in Illinois.

R/C POWER BOATS

By BOB PREUSSE

• The "Scale Unlimited" class is the best thing to hit R/C power boating since the outrigger hydro. These boats are very realistic, fun to race, and they definitely have spectator appeal. Since very little information is available to most boaters, we would like to give you some pointers on how to get started, who to contact, and special building tips.

All boats are modeled after unlimited hydroplanes from the past or present, at 1/8 scale 1-1/2 inches to-the-foot. The purpose of the class is to realistically duplicate the Unlimiteds, with most of the major detail: cockpit with driver, fake engine or cowling, paint scheme and lettering, etc.

The Scale Unlimiteds became very popular on the West Coast a few years ago. In this area, the class has developed through NAMBA (North American Model Power Boat Association) and the hard work of several individuals. I understand Roger Newton of Renton, Washington, is given credit as the "Founding Father", as he has been building these boats for several years, and from the photos I have seen of his work, I can see why he is so well known for his scale Unlimiteds. Roger has an excellent assortment of plans available, on which I will give more details later.

More recently, the class has developed in the Mid-West via the IMPBA (International Model Power Boat Association). District IV and District II have approximately 60 boats registered currently, and we hope to have 20 "THUNDERBOATS" on the circuit this season.

To get started, you have to select a boat. This is not always as easy as it sounds. As Scale Unlimited Chairman of IMPBA District IV, I find that many boaters do not know where to go for photos. I would like to suggest the following sources:

Roger J. Newton, 14518 167th Place, S.E., Renton, Washington 98055.

Hydro Merchandising, P.O. Box 4215, Seattle, Washington 98104.

Ms. Sue Sponnoble c/o Cameron-Freidlander, Inc., 2020 W. Mcnab Rd., Fort Lauderdale, Florida 33309.

David Lee, 4456 Beauvior, Indianapolis, Indiana 46236.

You could also try contacting the sponsor or owner of the proto-type unlimited. They may be most helpful in suppling photos, data, brochures, patches, decals, etc.

The boats are primarily constructed of good grade aircraft plywood, from 1/8 scale plans, but there are a few fiberglas kits on the market. Be sure they conform with the building and design rules. IMPBA and NAMBA have specific "Scale Unlimited" rules. Obtain a copy of these before you begin building or you may run into problems later. You can contact the District Director or the President of either organization for rules. IMPBA's address is 24310 Prairie Lane, Warren, MI 48089. NAMBA is c/o Mrs. Myrtle Coad, Rte. A, Box 19, Lower Lake, CA 95457.

Before you order plans, you must register your boat with the District Chairman or person in charge of scale unlimiteds in your area. Again, the parent organization can help you reach the right person. Most of the rules have a no duplication clause . . . only one boat of a kind per district. So you must register properly to hold your selection. This is a good rule. It keeps the class authentic. You may have the one-of-a-kind Atlas Van Lines, U-70 or, Miss Budweiser, U-12.

Most of the boaters are using one source for plans. Again that name Roger Newton pops up. Roger has three sheets available on most unlimiteds. The first

Ron Wickersham's beautiful "Mr. Fabricator" has excellent cockpit detail.

Showpiece paint job on this Redman unlimited, OPS powered.

Boats entered in Silver Cup Trophy Race at Lake Ida, Illinois (l to r): Lincoln Thrift, Miss Buwweiser, Miss North West Tank Service, Shennandoah, Mr. Fabricator, Atlas Van Lines, Shakey's Special, Miss U.S., and Countryboy. Sorry, we weren't given the names of the owners.

"Miss Bardahl" scale unlimited placed 3rd at Dist. IX champs for Pal Jennings, San Diego.

Beautiful scale "Pay 'N Pak" and trailer by Leonard Feeback. Seen at NAMBA Dist. IX championships.

The author's OPS 60 powered Lincoln Thrift, as seen at the Minute Breakers regatta.

sheet is 1/8 scale (1-1/2 inch to-the-foot) for bulkheads, sponson walls, cockpit walls, etc. The second sheet is also full scale, showing the general assembly of bulkheads and stringers. The third sheet is 1 inch scale, and gives you an overall view of the completed boat. This sheet shows general paint scheme and marks. Last time I talked to Roger, the going rate was $20.00 per set. This is a fair price for the work involved. Most of his plans have increased the width (beam) by as much as 10%. This was to increase the stability of the boat primarily in the turns, but also down the straightaway. The NAMBA and IMPBA rules I have seen allow for this 10% adjustment on the beam.

CONSTRUCTION TIPS

1. Roger's plans have a sketch of a building jig. DO NOT TAKE THIS SKETCH LIGHTLY. This is the MOST important step in construction. Without a true, hard building surface, your boat will not be constructed properly. The jig I used was made on 3/4 inch plywood. We have used it for constructing models of the Jones 28-1/2 foot and the Jones 29-1/2 foot hulls. It has an adjustable surface so that we were able to vary the packing point according to each version. Be sure to cover the entire mounting surface with Saran Wrap so that the pieces to not become epoxied to the jig.

2. Next, cut out all bulkheads, etc. I would suggest that you attach each bulkhead drawing to the appropriate size plywood (as per plans) with rubber cement. This allows for easy clean-up of each part afterwards. I would also suggest that you lighten up each bulkhead by making circular cut-outs in each part. These cut-outs also are needed for draining moisture from the hull via sponson caps.

3. The plans do not have any step-by-step instructions. A common oversight is to forget to put the boat's floor and bottom stringers in place on the jig before gluing the bulkheads in place.

4. The inside sponson walls are pinned to the sides of the jig. You can see why the jig must be square, because the tunnel of your boat will take it's shape there. Aluminum headed press

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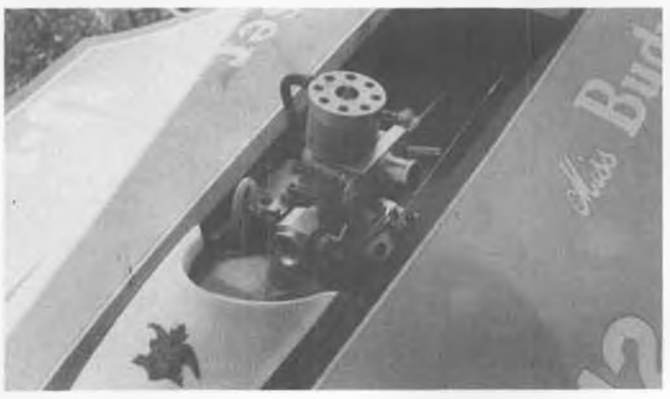
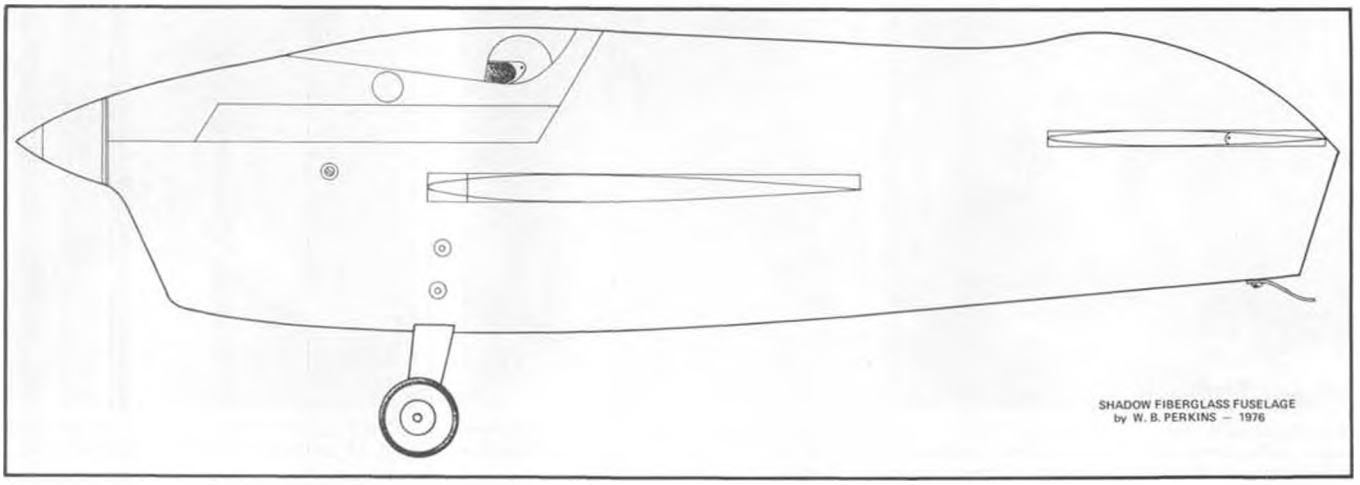


Close-up of "Miss Budweiser", built by the author's brother, Gary Preusse.

The controversial U-95 Turbine Boat.



Control line

By "DIRTY DAN" RUTHERFORD
PHOTOS BY AUTHOR UNLESS NOTED

• Back in the Jan. '77 C/L column, I dropped in plugs for all of the specialty C/L groups now in existence. If you were paying attention, and are a true C/L enthusiast, you joined up with your favorite organization. If not, you are still missing out on a good thing . . . especially if you are a "Stunt Grunt" like myself.

For example, the December '76 issue of *Stunt News* had a neato presentation concerning how the SSF's (Serious Stunt Fliers) go about setting up their internal controls. It was all there, from which elevator-to-flap-movement ratio preferred, to bellcranks, bushing of same, flap horns, elevator horns, leadouts, etc. A panel of 11 SSF's (Bob Hunt, Les McDonald, Gene Schafter and Bob Gieske to name just a few) laid it all out as to how they go about doing the very simple appearing job of hooking up control linkage in a Stunt ship. Linkage in a Stunter may appear, to R/C, or F/F eyes, to be simple, but it is hardly that, as anyone even bordering on being a Stunt flier knows.

Where else but in a newsletter generated by SSF's could you find this kind of information? No place. It is highly specialized in the first place, and can't be done up in a short couple of paragraphs in the second place. So enthusiasts magazines normally can't use the material, even when it is available.

I guess I've made my point. If you are into Stunt, join PAMPA. Send $6.00 to: Wynn Paul, 1640 Maywick Drive, Lexington, Kentucky 40504. For you folks living someplace other than the U.S. or Canada, better make it $12.00. In any case, make checks payable to PAMPA or stick with U.S. currency only.

MORE STUNT STUFF . . .

Although I am convinced that a Nationally-competitive Stunt plane can be built with readily available components, there are a number of special items that normally must be obtained via the "send the guy your money and hope he is honest" route. Actually, I probably shouldn't put it that way, as I don't personally know of any rip-off types operating within our midst. Some of them are damn slow in delivering, but that is to be expected when dealing with anybody who isn't actually geared to full-time production, or with enough money to warehouse their goods. I'll just say that the following is only for your information, and that I am not endorsing either the products or services, unless I specifically say otherwise.

I guess that the winner of Open Stunt (oops, Precision Aerobatics) deserves a bit of consideration, so Control Specialties Company, owned by none other than Bob (Stunt) Hunt is up first. CSC claims to produce the best foam wings available, and I most certainly will not argue with that claim. Hunt's own '76 NATS winning Genesis

Kathy Perry ready to launch Dick's Class I Seamew from Carrier deck at Dayton Nationals.

Dave Hemstrought's semi-scale PT-19 stunter. A really good looking ship in the air.

This series of photos shows Remy "Streamer Creamer" Dawson, as he demonstrates the second most useless skill in the world (Dan didn't mention what he figures is Number One!), flying C/L while riding a unicycle. He's from Edmonton, Alberta, Canada.

used both wing and stab done up in foam, and by CSC, of course. I have seen a number of CSC foam wings that local Stunt Grunts ordered from Bob, and have yet to see any kind of flaw in them. They are absolutely straight, very light, and simplify the building of a PASSFSSFASGA (Precision Aerobatics Stunt Ship For Serious Stunt Fliers And Stunt Grunts Alike) a tremendous amount. Even assuming that you can build a balsa wing that comes out as light as a CSC wing (doubtful), I'll bet my best Stunt engine that you can't build a wing that is as warp-free. The foam wings are sheeted for you, and then cored out with a foam cutter. They're shipped in their own foam cradles, so the chances of shipping damage is very small.

CSC has foam wings available for many different published, kitted, or just plain popular designs. Or they will cut custom wings to your specs.

For the R/C guys who read this column (there are a few, believe it or not), be advised that CSC can also supply your needs. I believe that Tony Bonetti uses CSC wings in his "Trouble" series of Pattern planes, and a friend in the Portland, Oregon area has an Ugly Stik using a CSC wing.

CSC also has the custom, in-flight adjustable handle to offer, as well as landing gear blocks, Genesis plans, and adjustable leadout fixtures. Write to: Control Specialties Company, 205 Wood Avenue, P.O. Box 268, Middlesex, New Jersey 08846. Or call (201) 469-1663.

Carlos Aloise is starting up in reworking engines for Stunt, plus building his own Stunt engines for sale. I've seen some of Carlos' work, and it was super, although I have no first-hand experience with running any of his breathed-on engines. That situation will soon change, as I just sent Carlos an ST 46 R/C and an ST 36 PP R/C. The 46 will be set up for Stunt and the 35 is for use in Profile Carrier. When I get some time on both these engines, I'll have more to say about Carlos' abilities.

One engine that does sound very interesting is a TD that Carlos sells in either .049 or .051 size, and left or right-hand rotation. Carlos says his TD's have the torque to swing large diameter props (21,000 rpm on a Cox 6-3 grey), so they ought to be great for the wee Stunt planes starting to appear around the country. The TD will cost ya $33.00, and not a penny more. Cost of the motor itself, handling charges, postage, etc. is included in the price.

Also offered by Carlos are special lightweight Stunt engines in both the 40 and 50 size. The 40 weighs 5.8 ounces, doesn't require any break-in, and goes for $80.00. The 50 weighs 9.2 ounces, was developed specifically for Stunt, and is claimed to equal an ST 60 as far as power output is concerned (in fact, they call it a 60, due to this). Total price for the 50 (or 60 . . . whatever) is $84.00.

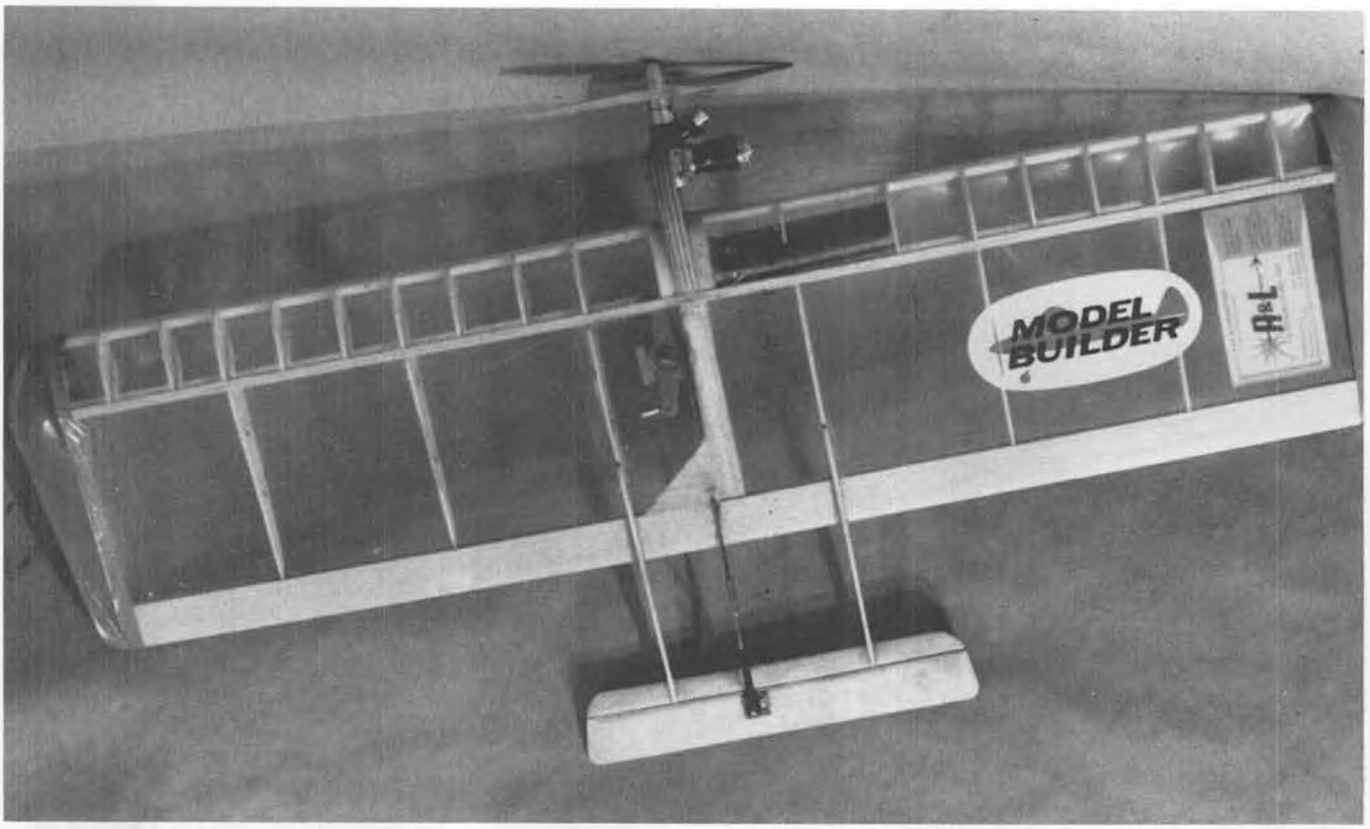
Although we have only talked about Aloise Stunt motors here, they are ready to rework any engine for any event, so you might want to get in touch with them. Write to: Aloise Engineering and Development Co., 2314 Loy Lane, Los Angeles, California 90041. Or call (213) 254-9795.

Bob Paul (claimed to be no relation to Wynn Paul, Editor of Stunt News) says that he will fit and clean up the engine of your choice for list price, plus $20.00. Bob obviously supplies the engine. He also is offering the "Bob Paul" muffler and it sounds (heh, heh) good. The muffler is held on with two 4-40 bolts, and can be removed easily while not interfering with the cowl. The muffler goes for $20.00, and Bob will

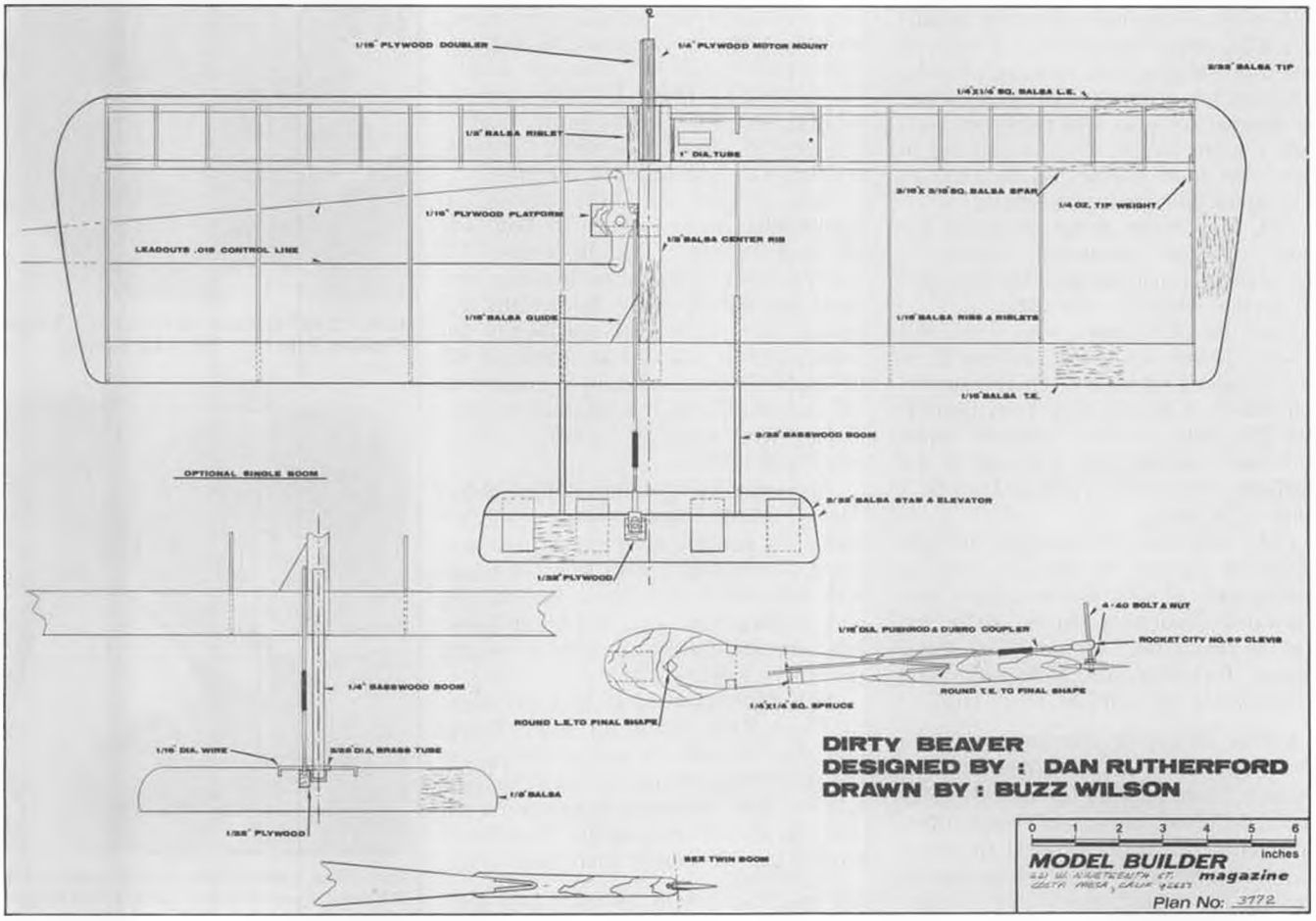
Continued on page 86

Laird "Doc" Jackson, 1976 C/L W/C's Team Manager. Also edits FAI CLS Gazette.

Tim Gillot, ready to pit Dave Clarkson's TR at '76 Nats. Typical diesel starter's first finger!



DIRTY DAN'S "DIRTY BEAVER"



By DAN RUTHERFORD . . . Originally meant to be a "tuner upper" for the hot-shot combat flier, this model fits right in to a new event that is rapidly gaining popularity . . Half-A Combat!

• Although .049 Combat planes have, as a rule, been completely ignored by most serious Combat fliers, I would hope that anybody interested in Combat will build and fly a Dirty Beaver.

The DB is in no way related to what you would consider to be just another .049 Combat plane. The plans and pics show the obvious; the plane is very light, plus being cheap and quick to build. What is not so obvious is the fact that a DB can be punched into the ground without much (if any) damage. Even if the DB is broken, it is easy to fix, as all of the structure is readily accessible. Center section sheeting turns out to be a pain to install, and just makes repair of the bent plane more difficult.

Also not too obvious is the flying abilities of the DB. The plane will turn very tightly and quickly. Consecutive loops are super, quick, and successive reversals of direction are also super. "Wiggles" are the planes strong point, and allow you to really show-biz the folks with maneuvers that are extremely difficult to follow.

I could go on with an outrageous description of the DB's proven superiority as a Combat plane, but won't. Just think about this for a bit. About a year ago, Charlie Johnson (Yawnson) came out and said that .049 Combat was the lowest form of Combat and wasn't worth bothering with. I disagreed with that, and to show the "California Flash" that he was wrong, I shipped him a complete Dirty Beaver (ready to fly with engine, lines, handle, etc., all he had to do was put fuel in the bladder) and told him to try it out. Charlie did a complete 180 on his impressions of .049 Combat. He found that a proper .049 Combat plane can set even the most experienced Combat flier back a bit, with performance that is regarded as possible only with 35 size (AMA Combat) planes.

With that in mind, I want to say (if it's not already obvious) that the DB is not just a good .049 Combat plane, it is a good *Combat* plane, regardless of the size of the engine hung on the front. So, although the DB may be most attractive to those interested in getting into Combat, or younger fliers who are bucks-down and simply can't afford the bigger planes, it was actually designed by and for serious Combat fliers interested in doing a lot of Combat flying . . . and doing it without going broke or dipping into the season's supply of AMA Combat planes.

I imagine that should be enough propoganda to throw at you, let's go into building a stock of DB's.

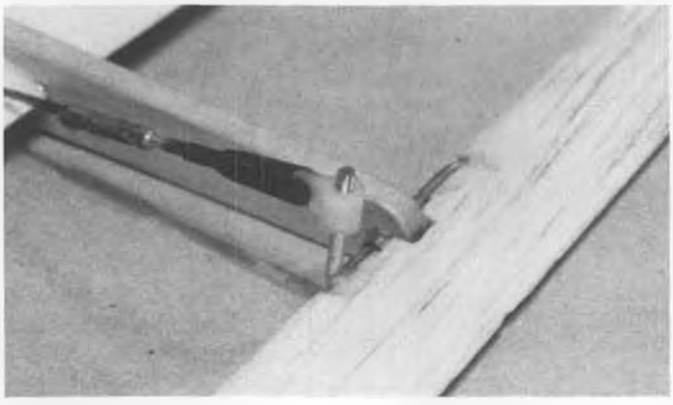
Check over the plans and get enough materials with which to build. The DB is quick to build, so being held up by not having enough wood or whatever is annoying. Notice the span, and that there will be a bit of waste if you use 36 inch wood. Sorry about the waste, but the DB is designed for performance, not economy at any cost. If you want, the span can be cut by an inch and 48 inch stock for the LE, TE and spars will eliminate waste. Your choice, but I recommend leaving the design as is, using the scraps as expensive epoxy stir sticks.

A template can be made of 1/16 ply and this used to cut ribs, one at a time, with a super-zoot Uber Skiver knife. Personally, I cut 1x7 rectangles of 1/16 and 1/2 inch balsa. Eight pieces of 1/16 and one of 1/2 are required per plane. A neat stack is made of these 9 pieces of wood, and all the ribs are cut in one quick session on the jig saw. Be sure to cut the ribs complete with spar slots, LE and TE notches.

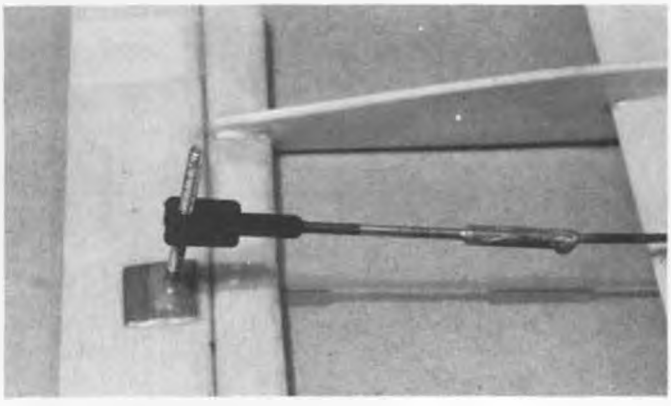
Remove the 1/2 inch rib from the stack and cut in the 1/4 square slot for the spruce bellcrank mount. The ribs are all ready to install when this is done.

Whack a couple of TE pieces out of 1/16 balsa. As long as your lungs are already full of balsa dust, go ahead and cut out all of the wood pieces required. Makes the actual assembly of the plane go a bunch faster. Don't forget the false ribs.

I suppose that you should decide which tail assembly to use before getting too far into this. The plans show two ways to do it . . . they both work just



Single boom version, as shown directly above, is stabilizerless (!). Elevator hinges directly on boom. Note variation of "Dial-A-Turn".



Twin-boom version. Both are shown on plans. Gee, Dan, what about that sloppyblob of solder on the connector sleeve!

A gaggle . . (gang, school, herd, bunch?) of "Dirty Beavers" ready for battle. All are covered with FasCal. Brightly colored Monokote is used on tips so you can find them in the daylight.

fine, but I personally prefer the normal, twin-boom system for this plane.

On your perfectly straight building board that is faced with a piece of Celotex (available at lumber yards), lay out a straight line that is used as a guide for positioning the TE piece. Also draw in lines that are at 90 degrees to this base line. These are used to position the center rib and tip ribs. With the TE, center and tip ribs properly aligned by these lines, everything else just kinda automatically falls into the proper place. A more elaborate jig may be used, but is hardly necessary.

Pin the bottom TE piece to the board. Be sure it is aligned with the previously drawn line. With 5-minute epoxy, glue the bottom spar and 1/4 square spruce sub-spar to the center rib. Before the epoxy sets, lay this assembly in place, gluing the center rib to the TE with Hot Stuff. A weight placed on the center rib will hold it in place until the epoxy sets up. From here on out, I use Hot Stuff for gluing. You can use whatever kind of glue you like, but Hot Stuff has come down a bunch in price, making it quite reasonable in cost. The LE is glued to the center rib (get it lined up pretty well). Now slip all ribs and false ribs into position and glue to TE, bottom spar and LE. Install and glue top spar and top TE piece. Slip in the 1/16 ply bellcrank platform. Good ol' 5-minute epoxy can be used here, if you prefer.

Mark the left tip rib for leadout location, and place a bellcrank in position on the platform. Using a straightedge laid on top of the wing, one end over the forward leadout position the other over the forward arm of the bellcrank, mark all ribs for leadout holes. Do the same for the aft leadout. With an ordinary hand-held paper punch, punch a hole in each rib directly below each mark.

Take the framed wing off the board and sand the LE round. Just as well sand the whole thing while you're at it. With the LE shaped, glue the tips in place and add the 1/4 ounce tip weight to the outboard tip.

I forgot the bladder tube . . . hopefully you didn't, as it is rather difficult to install at this stage of construction. An Estes BT-50 rocket tube is used for the bladder tube. It is cut to length and both ends plugged with 1/16 balsa. You can fuel proof it by sloshing dope around inside and then pouring out the excess.

With that, all you have to do is install the bellcrank, thread the leadouts through the inboard wing panel, attach pushrod to the bellcrank, and glue leadout guides to the inboard wing tip. Don't forget the triangular piece of balsa used as a pushrod guide, and a bit of structure to attach the covering to. With that, you can cover the wing. Most any kind of plastic film works fine, I use FasCal because it is cheap and strong. The tips are covered with Monokote, as it is much easier to work around the curves and gives some color to the plane, making it easier to see when flying.

The boom assembly is next, and it is pretty simple. The only thing about it that may cause problems is the strange looking control horn made with a 4-40 bolt and Rocket City clevis/button parts (stock no. 69). This assembly is called the Dirty Dan "Dial-A-Turn", and it is highly recommended if you expect to get the plane set up properly for maximum turn performance. A normal control horn may be used, but is definitely inferior to the "Dial-A-Turn".

With the boom assembly completed (including a couple of coats of clear), it is glued to the wing. If FasCal is used for covering, it is not necessary to remove the covering where the booms attach.

The linkage is now completed by soldering the Du-Bro coupler and threaded rod to the pushrod. Adjust

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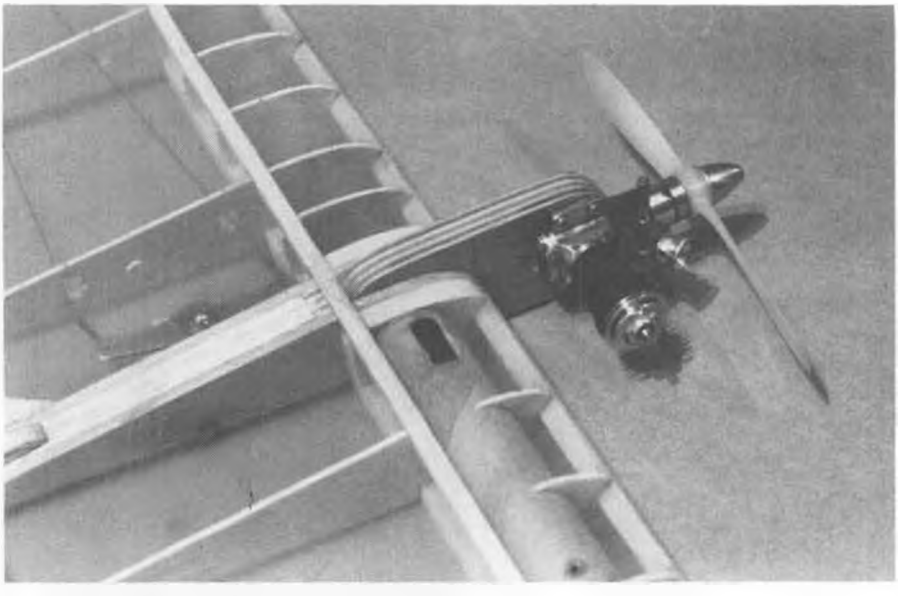
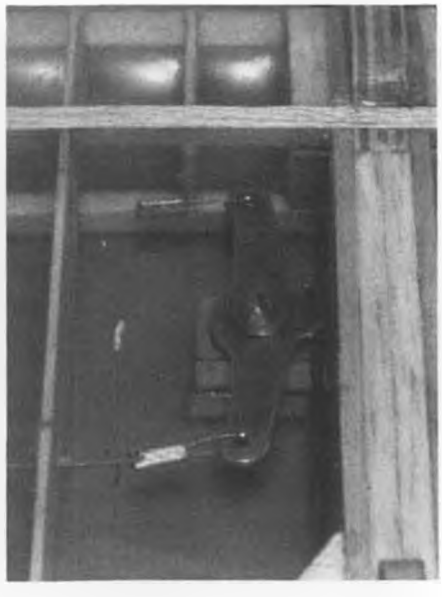
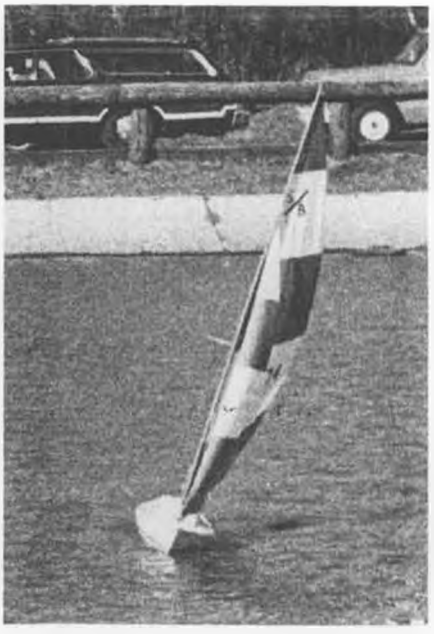


Close-up of center section, showing rocket tube installation for bladder. Note vent hole. Kustom Kraftsmanship needle valve is used. Design is basic, no needless extras.



Bellcrank installation as seen through FasCal covering. Leadouts are old .018 combat lines.

Ray Ozmun's 1976 ACCR winning 36/600 shows reasonable amount of twist in jib by shape of slot between jib leech and mast.



Way too much twist in S/B 374's main, note upper third luffing. Jib not luffing, so foot is probably overtrimmed and stalled.

Bob Scott's immaculate Yankee, with modified rudder aboard. It's deeper (7-7/8") and wider at bottom (3-1/4").

STRICTLY SAIL

By ROD CARR

• One of the bonuses found in R/C sailing is that improved skill and increased competition success is more a matter of understanding, than it is of money. You can buy more expensive winches, you can buy more expensive radio gear, and there are those who buy ready-built boats from a handful of "masters" who are supposed to have somehow anointed their hulls with go-fast blessings . . . But when the gun goes off, we all sail in the same wind (more or less). How well you are able to work with that wind, and how efficiently you extract power from it to drive your boat, is more a matter of comprehension and your grasp of the physical systems involved, than it is of the price tag. The result is that you can markedly improve your performance by putting some time and effort into learning the basics of airflow science and hydrodynamics, which have controlling effects on your boat.

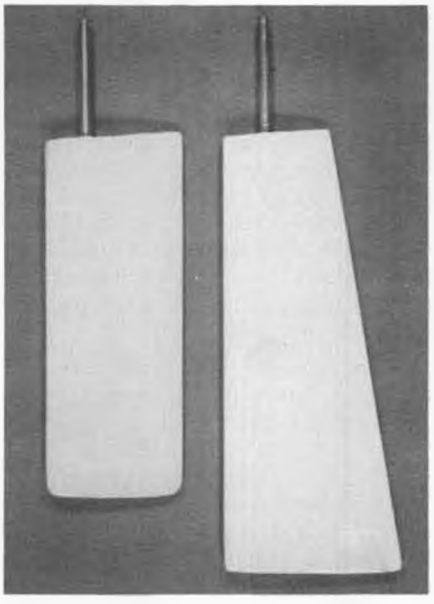
There are many good texts available on sailing, written for our prototype counterparts, and applicable directly to our vessels. A trip to the local library, enrollment in the marine section of the Book-of-the-Month Club (called the Dolphin Book Club), or a visit to a marine supply outlet, will provide more than enough material for winter and between-heat reading. If you query the fellows who do the best in our sport, you'll find that they have studied, not shelled out dollars, but studied to try to gain a grasp and an appreciation for what it is that makes their boats go!!!

It is also possible to do meaningful experiments which will increase your own understanding, as well as provide information for other skippers. This column describes one such experiment.

A fundamental consideration of sail efficiency centers on two characteristics of wind flow . . . speed and direction. Taken together, we often represent both in a schematic way on paper as an arrow which points in the proper direction and has a length made proportional to the speed observed. As mentioned earlier in these pages, the mere motion of your boat through the water in completely still air would cause a small passenger to feel a breeze on his face. If the real wind (true wind) now begins to blow, that fellow will feel an apparent wind made up of a sum of the true wind that is blowing and the other wind generated as the boat moves through the water.

This total wind felt aboard the boat is called apparent wind. It is this apparent wind to which the sails respond. Accepting the idea that there is one correct setting for the sail for maximum efficiency in any given apparent wind, we see immediately that anything that changes the speed or direction of the true wind, or the speed or direction of the boat, will cause a change in the apparent wind. Any one of the four that changes will be reason enough to change your sail trim.

Let us consider only one of those 4 variables . . . the speed of the true wind, and see what effect it has on the sails. A simple example will suffice. Suppose you are sailing to weather with the sails close-hauled. The apparent wind is made up of the "boat wind" which is coming from dead ahead, and of the true wind, which is from somewhat ahead of the beam. Let the true wind die, i.e., drop to 0. The only remaining airflow is caused by boat motion. It is now coming from directly dead ahead and all your sails will luff, the boat stands up, and you start to slow down. Now, suppose that you are faced, not with a complete loss of the true wind, but only with a slowing of it. Your apparent wind would still draw somewhat ahead, and the only way to keep your sail efficiency up would be to bear away from your original course, bring the true wind somewhat aft, and



Yankee rudder as modified by Bob Scott, Clawson, Mich. Standard rudder on left.

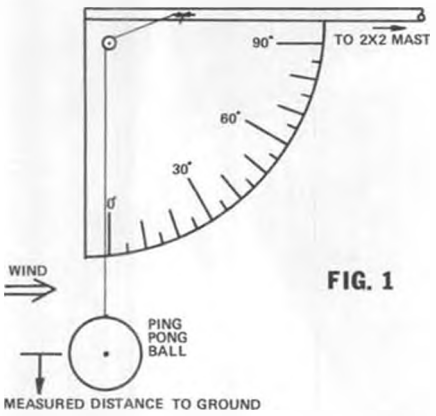


FIG. 1

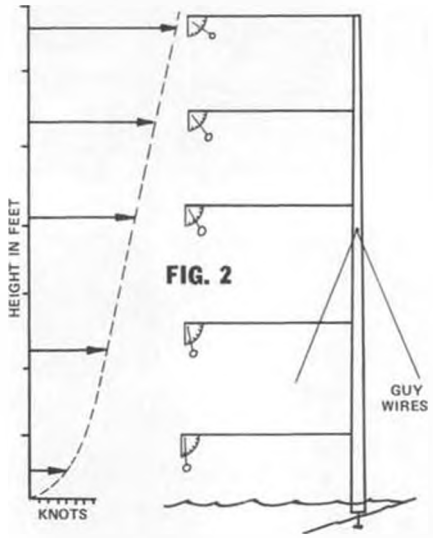


FIG. 2

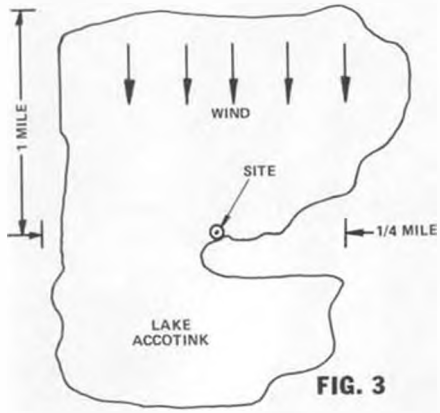


FIG. 3

hope that the new apparent wind would fill your sails. What we have discovered here is that a change in the speed of the true wind will require either a change in the boat's heading, or a change in the angle of attack of the sails.

We have all spent a lot of time trying to remove twist from our sails, I've written a good deal about vangs and travelers and how they can be rigged to do just that. But what if there is a change in wind speed as one goes from the deck of the boat to the masthead, in other words, change in velocity at various levels above the water surface. Common sense tells us that at 40 or 50 feet aloft, the speed of the true wind is something close to its "free stream velocity", i.e., it is not affected by the water surface in open areas. It also seems reasonable to assume that the true wind right down next to the water must be almost zero. The air molecules intimately in contact with the water surface might have a speed related to any water current that was flowing, but in our recent discussion of heavy-air sailing, we found out that the surface water flows first forward, and then backward, as waves pass. So that considering air motion to be nearly zero at the surface is a pretty good approximation.

Now we have two points on some kind of a curve, zero wind speed next to the surface, and some kind of unaltered "free stream" speed aloft at 40 to 50 feet. Some kind of wind blows between these two levels, and the simplest expectation is that there is an increase in wind speed with altitude. A mathematician would call this a velocity gradient. Go up the mast a few feet and the wind is blowing harder.

In a preceding paragraph, we convinced ourselves that a change in the speed of the true wind was going to require a change in trim of a sail which had been working at maximum efficiency. A common sense kind of analysis of the actual structure of the true wind convinces us that there is some kind of a gradient of wind speed as one goes up from the water. The inescapable conclusion is that different parts of the sail are going to have to be trimmed differently if we want them to work at peak efficiency (I promise to look at the efficiency problem in detail in a future column).

You are now at a point in your understanding that I reached in 1970. Being a lazy fellow, I never went any further, until I started wondering if having the top quarter of my main leech fluttering while going to weather was indicative of a power loss. Experiments with leech tension proved helpful, and I finally started beating the bushes for some hard information on the true wind and its variation with height. Scholarly papers from Dr. Keith Ruggles and Dr. Erik Mollo-Christensen of MIT, and Dr. P.A. Sheppard of Imperial College of Science and Technology in London, were obtained. In both cases, the information presented did not extend near enough to the water surface to be helpful, and the data taken was not closely spaced either. Recently, SAIL Magazine published an article by Richard Hirsch which began to get closer to our needs. He moored a catamaran in open water and spaced anemometers up its mast from 6 to 38 feet above the water. He ran all their cables to read-out dials clustered in a box and rigged a camera to take pictures of all the dials at once, obtaining an instantaneous reading of the velocity profile. His conclusion was that the velocity at 6 feet was typically 80-90% of the free-stream velocity, considered to be at 38 feet. He worked in wing ranges from 5 to 25 knots, and observed a similar distribution throughout the whole range.

Other than these references, information for below 6 feet, in 1 or 2 foot increments, just didn't exist. And if we believe Mr. Hirsch, there must be a change from 0 to 6 that is 80-90% of the change observed all the way up to 38 feet. In only 6 feet of altitude, this says that the gradient is steep, and may be variable in form as the free stream velocity changes.

Well, there was no other way to find out but to do it ourselves. So we set to work to provide the instrumentation we needed. In Figure 1 you will see the Mark I King Kong Ping-Pong Anemometer! A ping-pong ball was suspended by a thread from the center of a quadrant. The harder the wind blows, the greater the thread angle on the protracter. A cleat was provided on the 1/2 inch maple support dowel to allow adjustment of the length of the string. The dowel was a force fit in a 7 foot length of 2x2, which allowed it to be twisted enough to assure that the ball and thread were hanging free. As an exercise, I derived a calibration curve of angle versus wind speed, using a drag coefficient for a hemisphere found in Curry's 1924 book. Actual calibration was carried out from a jury rig hanging out the window of my 1965 vintage Mustang. The two curves differed only by a factor of two, and probably reflected a drag contribution from the thread that I had ignored in my analysis.

The whole apparatus was assembled as shown in Figure 2, and with the help of Bob Harris, was anchored upwind from a 1.5 foot high peninsula in the middle of Lake Accotink, in Springfield, Virginia (Fig. 3). Shown along with the apparatus in Figure 2 is the resulting

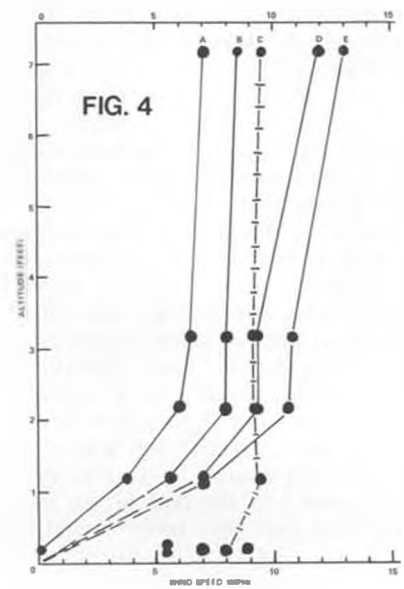


FIG. 4

profile that one can plot after reading the angle from each protractor, converting it to wind speed, and plotting it on graph paper. As installed, the top meter was just about 7 feet above the water.

I used a 135mm lens on my camera and shot a whole roll of film of this contraption on a day when maximum wind speed was about 17 knots at the 7 foot elevation. Each picture is an instantaneous measurement of the speed at each level. A number of things should be mentioned as having possibilities for biasing the results.

(1) We have assumed only horizontal wind movement in our analysis. If there is vertical movement caused by turbulence, it could conceivably buoy up the ball giving a false measurement.

(2) If a picture was taken after a puff, some of the balls may be swinging rather than leaning up against the wind pressure as we specified. Indeed, a few of the shots show higher wind speeds at lower levels, indicating some cases of such a pertubation.

(3) The lowest indicator was only 2 inches off the water, and as small wavelets passed, they had the effect of squeezing air upward under the ball, giving a buoyancy effect as mentioned in No. 1. As a results, some of the readings given by this indicator are anomalous. In Curry's book, he mentions the idea that there is actually an overall upward inclination of air movement near the surface and he picks 4° as a likely angle. I don't know whether he is talking about packets of air richocheting off the water surface or what, but our lowest ping pong ball certainly did do some odd dancing.

(4) All of the above sum up to say that what we want to extract from the photos is some sort of a weighted average behavior, rather than trying to make up a complete story for each frame.

The profiles in Figure 4 are illustrative. Note that the data from the bottom indicator has been plotted, but only in the case of profiles A and C does it seem to fit the pattern of the rest of the profile.

Profile A is the situation that I think exists just after the arrival of a puff. The air near the water is still, since the energy of the puff is working its way downward, chewing up the 1 to 2 foot thick boundary layer. Profiles B, D and E could be considered later stages in the process, with profile C being the final situation just after the puff has started to die out. If we consider the free-stream velocity to have been about 16.25 mph at 38 feet, then 80% of that is the 13 mph we observe at 7 feet in profile E. But assuming that there was a time between E and C when the 7 foot speed was 13 mph, we see that the 8 knots established at the lowest point on profile C is over half of the free-stream velocity.

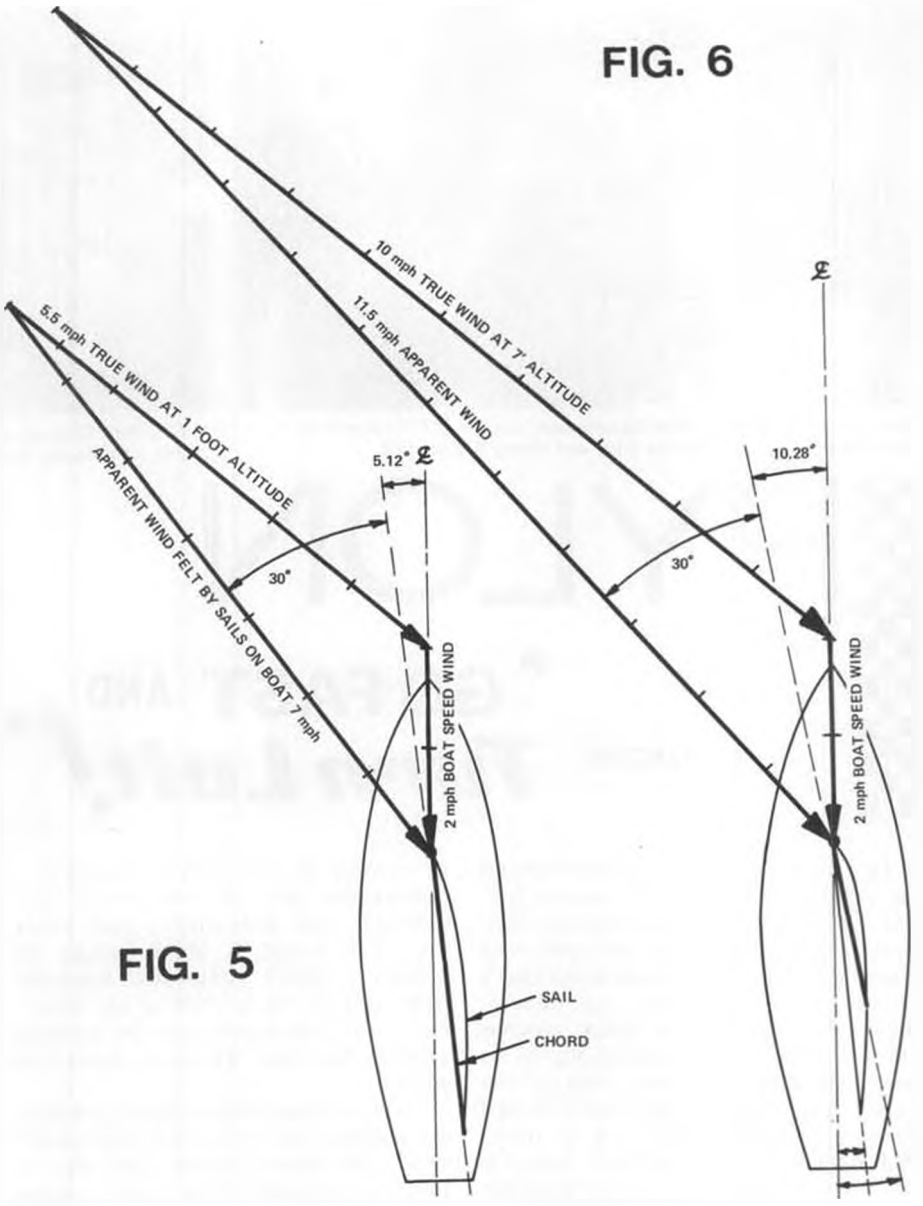


FIG. 6

FIG. 5

Now let us consider the difference in velocity between the 1 foot level and the 7 foot level. This is a good approximation of the foot and head altitudes of an EC/12, Newport 12 or most Marbleheads. Averages observed in profiles A, B, D and E show that at 1 foot, the speed is 5.5 mph, while at 7 feet, it is about 10. At either extreme in the profiles, this 50% ratio is a pretty good approximation.

What kind of an effect will this have on sail trim?

First of all, let us assume that the angle between the apparent wind and the chord of the sail must be 30° for maximum efficiency. This is way off base, but will get the message across, and is much easier to diagram. Figure 5 shows the angle, the chord and the means for getting the apparent wind, at the foot of the sail. Boat speed is 2.0 mph, true wind we will let be the 5.5 mph average from above. The angle between the centerline of the boat and the chord of the foot of the sail is shown as 5.28°, and the angle between that chord and the apparent wind as 30°. Notice that the apparent wind is larger (7 mph) than the true wind speed or the boat speed. Also notice that the apparent wind appears to come from a direction nearer the bow than the true wind as a consequence of the boat speed wind. The angle between the centerline of the boat and the apparent wind is 35.12°.

If we now go up to the mast head, the true wind has increased to 10 mph as a consequence of the wind gradient that we have measured. In Figure 6, the faster true wind speed of 10 mph is plotted. The apparent wind now grows to 11.5 mph and draws aft to an angle of 40.28° from the centerline of the boat. To maintain the specified angle of 30° with the chord of the sail, the angle the chord makes with the centerline has to be increased to 10.28°. For the sake of comparison, the previous foot chord from figure 5 has been drawn in.

Continued on page 107

Winners of the QMRC Mile Square race, Jan 30, '77. Expert (l to r): Bob Root 1st, Kent Thomas 2nd, and Henry Arance 3rd.

Standard Class winners at Jan. 30 QMRC races (l to r): Bill Racer 1st, Leo Martin 2nd, and Kathy Root 3rd.

PYLON

"GO FAST AND *Turn Left!*"

By JIM GAGER

• Oh, groan! What kind of editor would set a deadline for copy on January 3rd? *(An editor who is trying unsuccessfully to get the March issue out on time! wcn)* Doesn't he know that columnists don't usually write until the last minute, which means this is being written January 1st under conditions of a severe hangover? The only thing to look forward to today is our club's annual Frost Bite Flight, which has as many club members as are willing or crazy fly on New Year's Day, no matter what the weather. The temperature outside is minus 2 degrees F (I refuse to use the Celcius scale, as I'm sure the whole plan to convert to the metric system is a Communist plot to undermine our Country), and with the 22 mph winds the chill factor is about minus 35 degrees . . . (later) . . . Just back from the field, and 26 flyers showed up! That's more than are usually out on a warm, summer Saturday afternoon. Guess we *are* nuts.

After a night like last night, and with the coming race season still some length away, the easiest course right now is to reflect on some memorable incidents of years past. Names will/may be changed to protect the innocent or embarrassed.

Like the time Phil, Al, Jim and Bill traveled to the far northeastern corner of a mythical state called O-H-IO for a contest. The distance involved required leaving early Saturday evening for a long, six-hour trip in a cramped station wagon. Arrival was to a small suburban town at 1 a.m. This town, which we'll call Onehorse, had only one motel open at this hour, and it looked like the kind where they rented the rooms by the hour, but there wasn't much choice, so they took it.

Jeez! The rooms smelled like they had been flooded at one time and never cleaned since. The "boys" liberally sprinkled "aeu de Nitro" around to improve the aroma a bit . . . at least if it was going to smell it would be a smell they enjoyed. Everybody retired so as to get as much rest as possible. Bill and Phil paired off in one room and Jim and Al in another.

Shortly after retiring, Jim heard a loud pounding coming from the other room. As it continued for some time, Jim and Al investigated. Seems the room next door to Phil and Bill was occupied by someone playing rock music quite loudly, preventing them from getting

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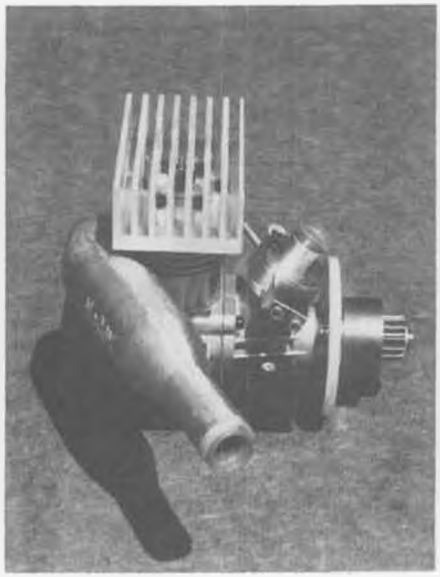
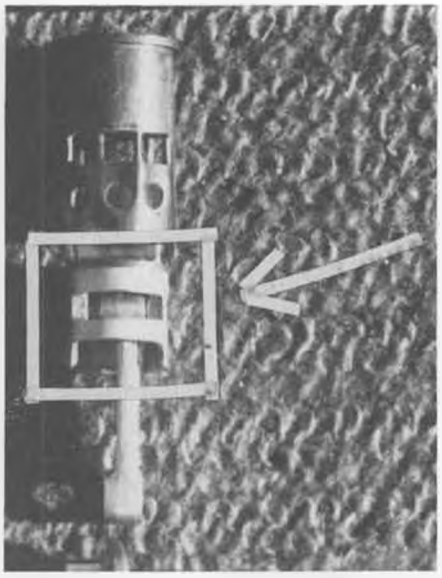
Kathy Root doing her thing, as husband Bob handles the back-seat driving, for a change.

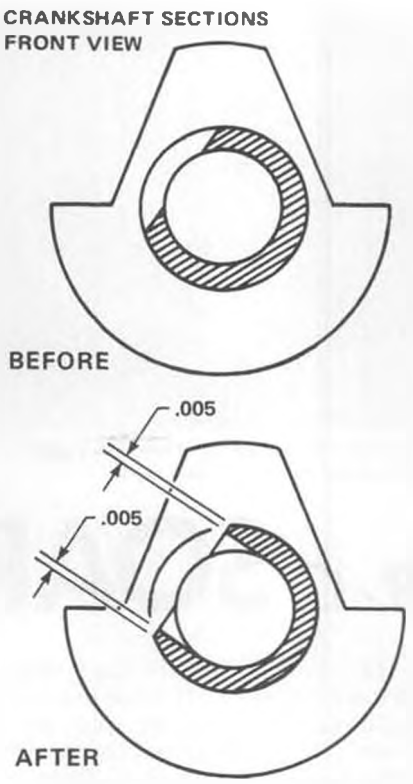
The 1976 QMRC Top Winners (l to r): Bob Root 1st, Bob Novak 2nd, Kent Thomas 3rd, Nick Nichols 4th, and Eloy Marez 5th.



K&B 3.5 cc engine is "the" one. Larger, hardened wrist pin and larger carb really make it go.



Relieved piston in McCoy/Veco uncovers case transfer port. Same thing helps K&B 3.5.



R/C AUTO NEWS

By CHUCK HALLUM

● This time of the year, most of the racers in the east and mid-west are hybernating because of the bad weather. But this doesn't stop the thinking, planning and building process. Meanwhile, in the west and far, far southeast, racing continues. This month I'll try to tie up a few loose ends and bring you up to date on some other things.

First off, everybody wants to know about the new Super Tigre and OPS 3.5 cc engines. I've heard nothing on the OPS, but the ST 3.5 is out and available to some. I personally have not seen the ST engine, but people say it looks super-strong mechanically. However, in stock, straight-out-of-the-box condition, the ST 3.5 is down about 1,500 rpm from the K&B 3.5 at high revs on the same prop. This bit of info comes from Dick McCoy. But with some work, the rpm's can be brought up, and the ST engine may be more reliable than the K&B . . . time will tell.

As stated in earlier articles, there are only a few things that need to be done to the K&B 3.5 to make it more reliable and possibly go a little better. These changes were: 1) put in a harder, slightly larger diameter wrist pin . . . Dick McCoy has these, 2) relieve the bottom of the piston at the two front transfer ports so they are open more when the piston is at BDC, 3) taper the back of the crank bore slightly, and 4) sharpen the retard edge of the crank inlet port . . . but don't change the timing.

On item one, there is no problem. Several readers have asked about item two. A sketch and picture of this same modification to a Veco are shown. Right now, I don't have pictures of a K&B 3.5 to show you, but do this same thing for the two front transfer ports. The bottom of the front of the piston should be raised about 1/8 inch over about 90° (±45° from front center). This allows the crankcase gas to flow into the transfer passages and cylinder a little easier. The two side by-pass ports have lots of clearance flow area at BDC, so don't worry about them.

Tapering the outlet bore of the crank probably lets the gas flow around the con-rod better when the piston is at BDC, thus improving rpm's. Sharpening the closing side of the crank intake port will let just a little more fuel mixture enter the engine at high revs.

The opening side of the crank port could be sharpened, but very little, if any, as additional mixture would get into the engine. My engines do not have a packed crank bore at the front . . . mostly because I didn't have time to do this. However, some people say they have packed the crank bore and the engine slowed down . . . which is hard to believe.

These next few items from Dick McCoy, probably help the reliability of

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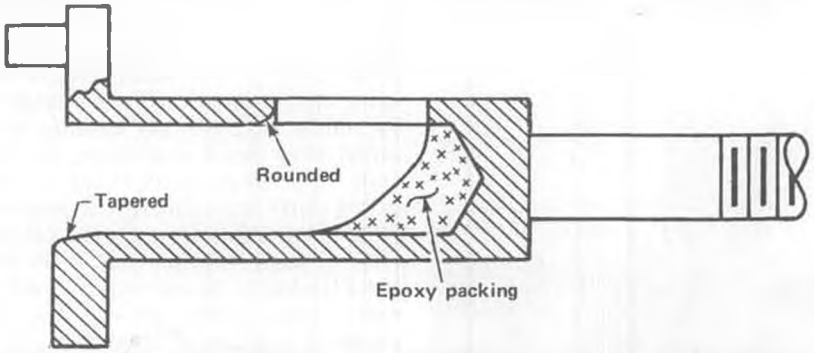
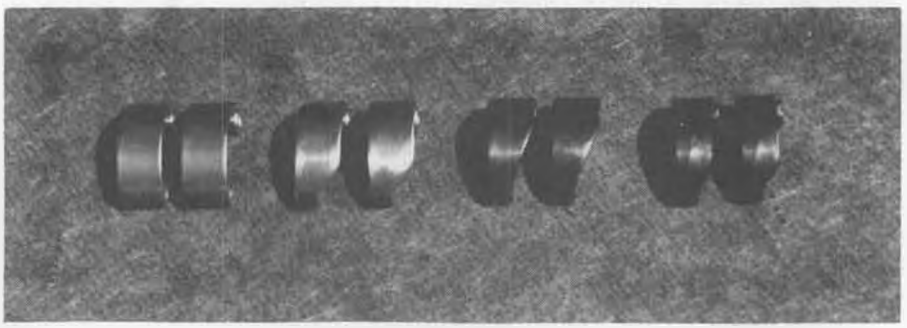
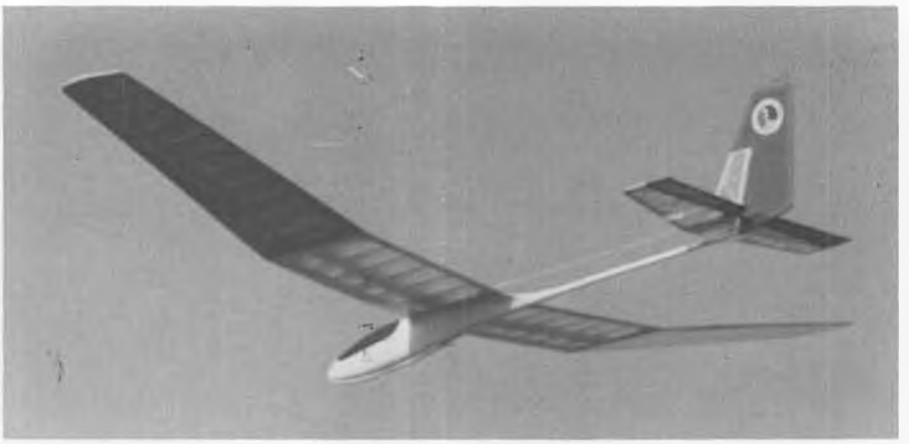




Steel clutch shoes trimmed for variable clutch slip. Stock shoes left, slippery narrow shoes right. You can see which ones I use!

Legionair 100 curls around to make a pass. Same chord as 140, but less span.



Fiberglas portion of fuselage is the same as the 140, but the aluminum tube tail boom is smaller and shorter. Wing construction features aluminum tube spars.

R/C SOARING

by Dr. LARRY FOGEL.

PHOTOS BY AUTHOR

• The Legionair 100 is Cecil Haga's entry into Standard Class, but this plane should suit you whether you are a Sunday flyer, sportsman, experimentalist, or serious competitor. There are only a few important differences between this plane and its predecessor, the Legionair 140. The wings have the same chord, but the panels are shorter. The fiberglas portion of the fuselage is the same, but the aluminum boom is 1/2 inch diameter rather than the 3/4 inch diameter of the 140. The 100 is designed for speed, and can be ballasted up to 6-1/2 pounds, which doubles the unballasted wing loading. Cecil suggests ballasting by dropping .41 calibre lead slugs into the tubing in the inboard wing panels, using dowels to fill the unused part of the tubing, thus preventing the weight from moving around during flight.

For building, I defer to Paul Denson. Following the instructions, he advises that you, "Build the fuselage first. Then the dihedral angle for the ply root wing ribs will be exact, if you allow them to dry in place taped to the fuselage. Same goes for the wing panels. Make the inboards first; if you tape them to the outer panels the dihedral angle will dry correctly in place. Cut the servo tray for your servos and receiver *before* assembling it into the fuselage halves; it is exceedingly difficult to do afterwards."

Paul found the method recommended for building the wings to be awkward.

"No difficulty was found in building from the bottom up. Lay out all the bottom sheeting, including the cap strips. Glue on the leading edge. Before beginning construction, push the spar through all ribs and make sure all notches for the leading edge are exactly the same distance from the tubing. Remove the tubing, cement the wing ribs to the bottom sheeting and the leading edge. When dry, slide the tubing through the holes in the wing ribs. A little bit of twisting helps. Then glue the tubing to each rib with white glue. Pay attention to what the designer says about this . . . he is *right* . . . white glue is the *only* glue that will take the torsion around the spar tubing without shearing. A number of builders have recommended that the manufacturer replace the mahogany ply pieces in the kit with aircraft ply. I believe that this is being taken under advisement.

"The most fabulous idea of the whole design is the way in which he gets the empennage exactly in line with the wing, that is, at 0^{o} incidence. I shimmed up the wing rods with books until the bottom of the fuselage wing saddle measured exactly level, then put a piece of sandpaper under the empennage fillet and shoved it back and forth until it was all sanded. See the pictures on the plans for details; it comes out perfectly to 0^{o}.

"The basic materials furnished for a Legionair 100 include a fiberglas fuselage, aluminum boom, aluminum spars and all balsa and ply necessary to complete the plane. The only hardware included is the tow-hook release. In addition to the two sheets of plans, which are extremely complete, there's a 10-page instruction manual with some construction drawings. Some parts are die-cut and some are shaped; the shaped parts are excellent, the die-cut parts were not up to that quality.

Paul Denson with his Legionair 100 which is discussed in this month's article.

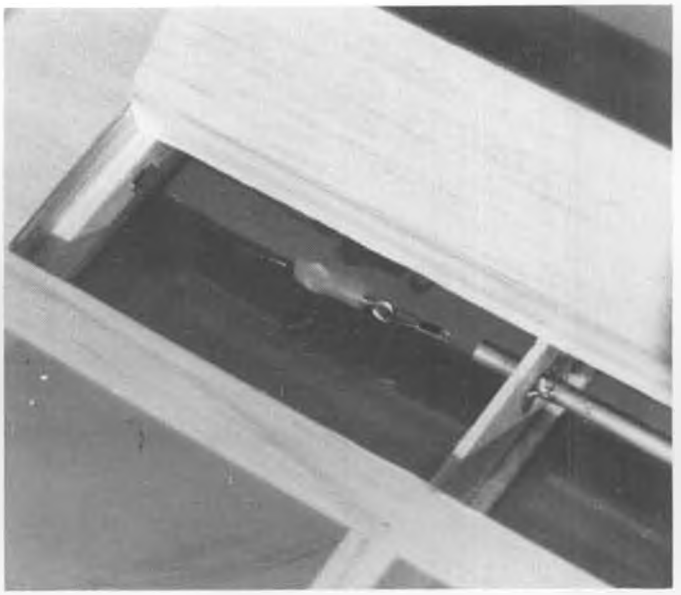
"One of the most unusual features of the kit is the 3/8 inch diameter carry-through aluminum spars and the 1/2 inch aluminum boom. Another great feature allows the empennage to be taken off simply by removing three machine screws.

"The recommended wing loading is 7 ounces per square foot. This sailplane has a wing loading of 7.4 ounces per square foot; the ready-to-fly weight is 48 ounces. The extra weight over what was recommended was brought on by adding 1/32 inch ply webbing in the center wing panels and boxing the spars with 1/32 inch ply in the first three bays of the outer wing panels. This was done strictly as a matter of personal preference. Cecil indicated that if the wing is built exactly as instructed it will be more than strong enough for any maneuver you care to attempt.

"The fuselage was painted with white acrylic enamel. No trouble was found putting the Citizen-Ship flight pack in the fuselage. This is an excellent kit. It is not intended for a beginner, but the average builder should not find it too difficult. Everything fits together snugly. Here is a kit you will enjoy building."

Bill Denson, Paul's brother, developed an ingenious way to hook up the spoilers using adjustable screws through nuts soldered to the swivel which is hooked on to the servo arm. A thin nylon covered cable then passes through tubing

Cockpit of the Legionair, showing the spoiler drive mechanism.



Inboard spoiler connection for Legionair. More description in text.

coming out to a hook, which can be connected to the spoiler control cable that is part of the inboard panel. A small piece of rubber tubing can slide over the hook to make certain that there isn't a disconnect at an undesirable time.

My wife, Eva, covered the flying surfaces of my Legionair 140 with transparent Monokote, yellow on top and transparent blue under the wings, so as to yield an apparent green as you watch the plane overhead. This worked well, and so I asked her to cover this Legionair in transparent yellow over transparent red to produce an orange . . . but it didn't work out that way. It seems the red is far too dark in comparison to the yellow.

In flight, the Legionair 100 is faster than you'd think. It penetrates very well, and is highly maneuverable. I've flown it in everything from dead air to over 20 knots and been more than satisfied with its performance. The spoilers are most effective. In fact, so effective that it's well to use them with considerable caution. Full deployment starts an immediate nose dive unless you coupled spoiler control with up-elevator. Cecil assures me that this bird is so strong that it can pull out of any dive with safety.

In summary, here is an efficient 100 inch aircraft that behaves more like its larger sister in high winds, yet much like some smaller aircraft in the final phase of landing. Chalk up another success for Cecil Haga.

* * *

Have you seen a thermal lately? Yes, I mean visually. Well, I've been watching some. Last weekend I took the family to Palm Springs and there spent some time in a Jacuzzi bath during evening hours. The water was 110°F and illuminated from under the surface. The air was about 50°F, so the steam could readily be seen rising from the surface. As long as the air was calm, the "thermals" seemed to rise randomly and dissipate without pattern. But when there was a slight breeze, you could see vortices form and rise in a distinctive manner. They would look like "dust devils" . . . tiny whirlwinds, bending as they rose. The ordinary vapors would dissappear a few feet over the surface of the water, whereas these thermals could easily be seen up to a height of almost 20 feet. The typical diameter was about five or six inches. I couldn't help but wonder what a small model would do in such an updraft. Perhaps this is a way to gain further insight into how thermals behave over the soaring site.

* * *

Okay, so you've driven to the soaring site, only to find that your wash-out in the wing tip has been "washed out" by the sun or other heat during the transit or prior storage. Bob Simon, of the Torrey Pines Gulls, suggests a remedy, "Use the heat of your car's exhaust to rewarp your wings." Why didn't I think of that? A word of caution: Keep your nose away from that heat source so as to prevent "washing out" the pilot as well.

The author lends a heave as the Legionair 100 goes off for another flight.

* * *

While flying my modified Hobie Hawk, I noted to Al Doig that there was a slight tendency for it to porpoise (a fascinating fugoid figit). He disapproved of my attempt at poetry *(probably because it was dangerous! wcn)* and simply told me to add a bit of nose weight. That did the trick.

* * *

I've found it useful to wrap masking tape around the smooth end of extra drill bits. That makes them handy tools without the need for drill or chuck.

* * *

By the time you read this, the plans for the 1977 AMA Nats should be coming into final focus. We expect this to take place at March Air Force Base, near Riverside, California, during the traditional week in mid-summer *(See "Workbench". wcn)* The soaring portion of this event will take place at a nearby but separate site. Rick Norwood, District X Vice President of the National Soaring Society, is coordinating this matter. We look forward to a large participation by all interested parties. Here's another opportunity for the National Soaring Society to represent the interests of the RC soaring community. Further details on this event and the 1977 NSS/RC Soaring Excellence Award program can be found in *Sailplane*, the journal of the National Soaring Society. If you're not a member by now, you ought to be. ●

KEITH-RIDER R1 "SUZY"

By TOM NALLEN . . . A special and unique event had its first Nationals showing in Dayton, Ohio. This was the winner of what we hope will become a classic, the Thompson Trophy Race for rubber scale.

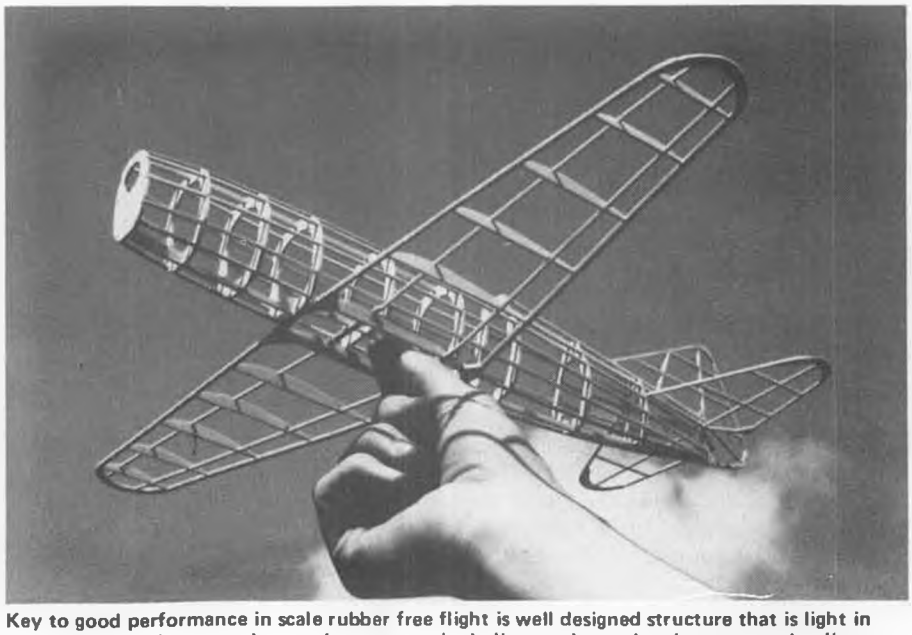
• Do you ever get the feeling that in rubber powered flying scale we've painted ourselves into a corner? A corner where the high wing is king . . . and the monarchy perpetuates itself. Variety, they say, is the spice of life. But where have all the low-wings gone, the mid- and shoulder-wings? Sadly, as far as competition is concerned, we find many of our most popular and attractive designs on the endangered species list. What a shame that the classic "Hurricane" or the graceful Travel Air "Mystery Ship" usually fly in lonely skies with the beauty of the flight often witnessed by only the builder and perhaps a few of his friends. We've short-changed ourselves with our own rules.

However, in the past few seasons, a new battle arena for the offbeat types has opened up in several scale hotbeds around the country. In the spotlight are models of the memorable National Air Racers of 1930-1939, regarded by many as the Nobles of aviation's Golden Age. The improvement of the breed has been dramatic over only a couple of years, and the performance of some of these pylon polisher models is nothing short of sensational. For example, Ralph Kuenz's Folkerts SK2 has flown O.O.S., and Royall Moore, known in some circles as the sixth Granville brother, has a Gee Bee Z which has flown over 70 seconds at a contest.

In these raceplane events, the simultaneously mass launched models fly, not against the stopwatch, but are pitted against each other in head-to-head, sudden-death confrontation. Flyers dwindle steadily, as the first plane down in each flight or lap is erased from further competition, until finally a winner (or survivor) stands alone.

An equalizer is provided by the requirement that rubber motors cannot be changed once the event has begun. The suspense of this round-type, lap-by-lap flying is heightened by the prospect of suddenly finding one's self among the spectators via the blown motor route. The psyche jobs and gamesmanship rampant along the starting line have brought about some of the most remarkably wretched launches ever witnessed anywhere . . . like straight down. But watching those colorful racers zoom away at the starter's signal and fight it out, rounding those imaginary pylons, is a scale buff's delight.

Raceplane competition has become a regular feature whenever those intrepid wingsters of the Flying Aces Club gather. Most of my racing experience has been at the F.A.C. 'drome in Durham, Connecticut, where the rules evolved by CD's Dave Stott and Bob Thompson are used. These rules, as related by Stott, follow this article. If your group would like to try a little throttle bending, I urge your consideration of them, because



Key to good performance in scale rubber free flight is well designed structure that is light in weight and has the strength to endure repeated windings and occasional premature landings.

these rules have proven eminently workable.

A Thompson Trophy Race was run as an unofficial event at the 1976 Nationals, sponsored by the Erie Model Aircraft Association of Pennsylvania. The checkered flag was ably handled by the genial veteran, Vic Didelot. Twelve speedy birdmen from around the nation assembled on the tarmac at Wright-Patterson AFB, where a light early evening breeze made for almost ideal racing conditions. All entries were replicas of full size Thompson Trophy racers.

The first heat saw Ralph Kuenz's Folkerts SK2, plagued with motor trouble from the start, touch down early. Texan George Meyers' Folkerts was out next, victim of a Panhandle launch, probably brought on by instant mental replays of the Kuenz speedster's demise.

In the following heat, the Californian, Clarence Mather's very light Caudron 460 was scratched. His Renault engine sputtered and seemed to lose power. Next out went Chuck Schobloher, flying the Chester "Jeep", defeated in his attempt to pack in that extra turn before the launch. His motor blew, tattering his fuselage and shattering his hopes.

The helmeted and goggled Bob Thompson, Connecticut speed merchant, had trickier Pirelli which let go in the air, ending the day for his gold and black

Photo by Chris Clemens

A Thompson Trophy Race heat gets under way at the '76 Nats (l to r): Ken Johnson and Jeep (behind Thompson), Bob Thompson and Laird 'Solution', Tom Nallen and 'Suzy', and Ralph Kuenz and Folkerts. A.F. Museum in background.

Laird "Solution". Russ Brown, the Ohio circle burner, dropped out as he suddenly encountered trim problems and his Chester "Goon" spun into the grass early, as the racing went on.

In the next lap, Jack Russ, who previously had put up several long flights with his tiny, super-light Folkerts, stalled following the launch and rolled in. Up to this time he had appeared to be the favorite. Massachusetts' sixteen year old Mickey Nallen had been hanging in there gamely, but his trim silver Keith-Rider "San Francisco I" was first down on the next lap.

Still in the running were Ken Johnson's "Jeep", New Jersey's Don Garafalow with his smooth flying Caudron, Pres Bruning's Racewings "Chambermaid", and the Keith-Rider R1 "Suzy" presented here. They came together on the starting line to battle it out for the gold in the final heat.

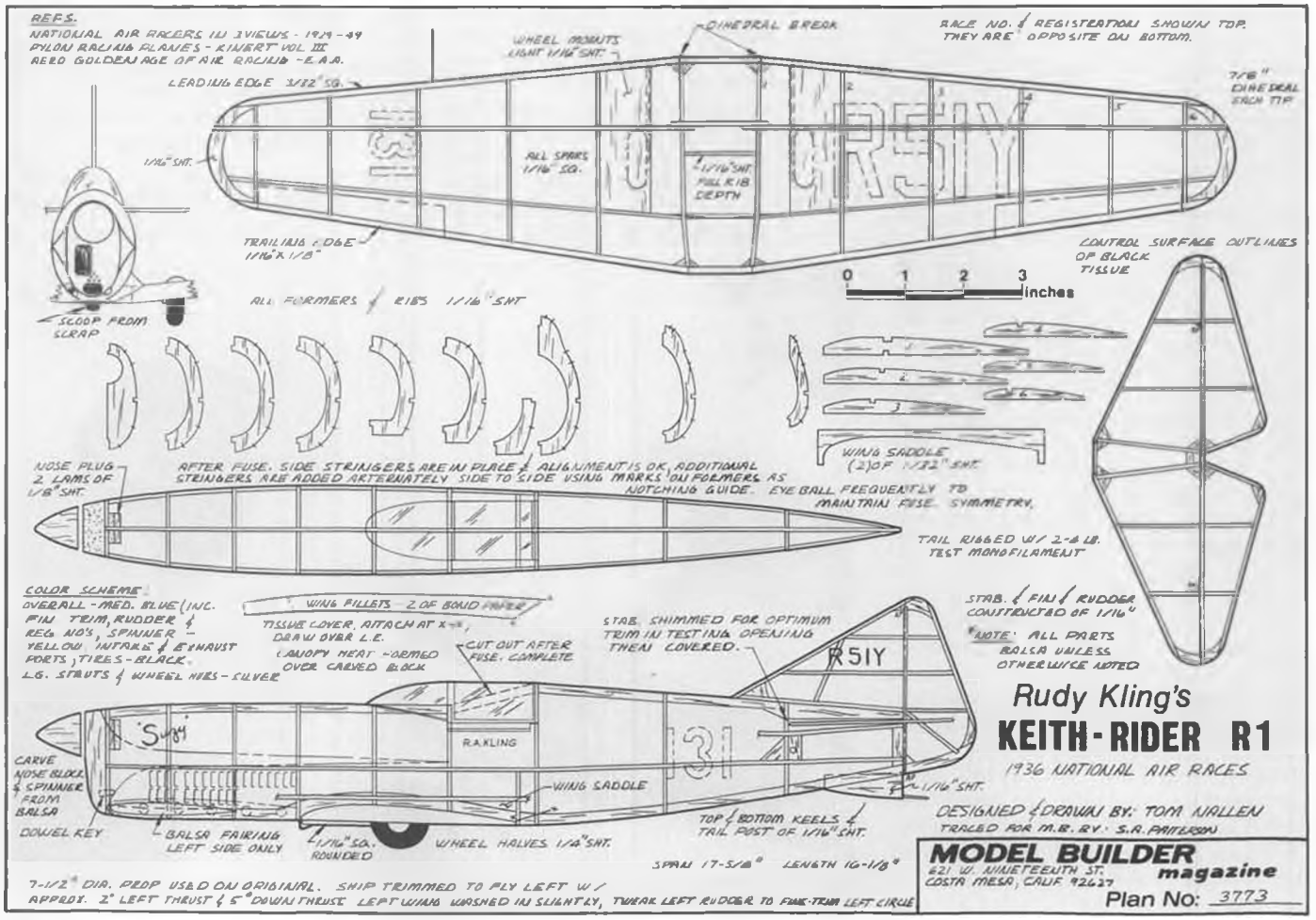


Photo by Bob Clemens

The '76 Nats Thompson Trophy gang (l to r): standing; Ralph Kuenz - Folkerts "Toots", Chuck Schobloher - Chester 'Special', George Meyer - Folkerts 'Toots', Jack Russ - Folkerts 'Toots', Bob Thompson - Laird 'Solution', Tom Nallen - Keith-Rider 'Suzy'. and Clarence Mather - Caudron. Kneeling; Ken Johnson - Chester 'Jeep', Pres Bruning - 'Chambermaid', Mick Nallen - 'San Francisco I', Russ Brown - Chester 'Goon', and Don Garafalow - Caudron. A great turn out for an exciting event. Let's hope it is continued at future Nats.

The dark blue Caudron balked at the launch, and never finding her groove, flew out of the money. With the remaining flyers nerves and rubber wearing thin, the succeeding lap found Johnson's "Jeep", although climbing to great altitude and gliding well, settling for third place. The "Chambermaid" and "Suzy" were left to race to the checker.

In the final lap, a 54 second flight was barely good enough for "Suzy" to flash in the winner, Bruning's ship close behind. So ended the first National Thompson Trophy race for models, and it was great fun.

If you think you'd like to try your hand at turning a pylon, here is a representation of the Keith-Rider R1 as campaigned in 1936 by Rudy Kling. The R1, spanning only 21 ft., was powered by a 544 cu. in. Menasco engine rated at 260 HP. It began it's racing life, as the all silver "San Francisco I", and from 1939 through 1936, was among the most consistent money winners on the air racing scene. During her racing life, she served as the mount of such noted speed flyers as Ray Moore, Steve Wittman and Roger Don Rae. After her acquisition by Kling in 1935, the R1, now wearing blue and yellow colors and dubbed "Suzy", garnered a world light-plane closed course speed record as she scorched a 100 kilometer course in Denver at 228 MPH. "Suzy" passed from the racing ranks at Los Angeles in 1936 when Kling, having been beaten by the Caudron of Detroyat for the Greve Trophy, rolled her into a ball while swerving to avoid a movie truck that came into his path during his landing. Kling escaped serious injury and went on to achieve even greater acclaim for his work aboard the Folkerts aircraft. This little speedster typifies the race-planes of the era, and is fun to fly. "Suzy's" best official time to date is 86 seconds. She consistently does 50 to 60 seconds, having gone over a minute many times.

The fuselage is built using the keel and former method. The only points perhaps needing mention are the need for care in maintaining fuselage alignment, and the slot for the stab. Stringers are added alternately side-to-side, attached first at the middle of the fuselage and working toward the nose and then toward the tail. As the stringers are brought to the rear post, a slot for the stabilizer is created that is tapered, but closed off at the rear by the post. At the post, which runs from upper to lower keel, fill in between the glued-on stringers with scrap sheet. The tail post should be cut through just below the upper keel to allow insertion of the stab and, when in place, glue lightly at the rear. After covering and assembly, but without prop and rubber, add clay to the noseblock to place the CG at the front spar of the wing and test glide over that well-worn tall grass, changing stab trim as required for optimum glide. The tapered opening provides shimming room for the leading edge and is covered over when final glide trim is achieved.

As a starting point, drill about 5° downthrust and 2° left thrust into your

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Photo by Chris Clemens

Author Tom Nallen packs in a few more winds before last lap, as R/C modeler, Col. Davila, Wright-Pat based, holds. Patches in wing are result of slight mid-air in a previous meet.

A LOOK AT MODEL ROCKETRY

By DOUGLAS PRATT . . .

• To make up for the shameful lack of pictures in this month's column, we have a large amount of news from the NAR. I want to offer thanks to the God of model rocketry that my plea for club newsletters was so well answered. Please keep them coming; and also send a copy to **Model Builder,** so they can read 'em too.

First to come in was *Impact*, the newsletter of the NAR Catastrophic Section (as Chevy Chase says, "Yes, that's their real name.") in Homewood, Alabama. The NARCS newsletter features a report on NARAM-18, written in part by George Gassaway, who emerged from the competition as C division national champion. There is also word on "NGRM-76" (that's North Georgia Regional Meet; model rocketeers are incurable inventers of acronyms) and plans for a two-stage payload bird. Most interesting is the "Modroc Update" column. This features a report from Terry Lee, newly-appointed National Contest Board Chairman. Terry's job is a rough one; as well as compiling statistics (for which he sometimes uses a computer), he is charged with interpreting the basic Sporting Code rules. *Impact* reports three new contest board rulings. First, in Parachute Duration, it is emphasized that *no* separations whatsoever are allowed, i.e., every thing except the recovery wadding must remain attached to the parachute during descent for a qualified flight. Terry has also clarified the rule on incompletely-deployed chutes, by ruling that at least one corner of the chute must catch air to qualify.

In boost-glide and rocket-glide events, Rule 10.3 now applies to glider entries. This ruling allows the CD to designate a "safe recovery area" and qualifies any flight where the model is visible but impossible to recover, as in a tree or power line. And, finally, in Plastic Conversion, plastic models of jet aircraft are now allowed, but the engines must be mounted in or on the fuselage. The ruling also emphasizes the fact that the decision of the Range Safety Officer is final on whether or not the model will be allowed to fly. RSO's are tough on plastic models (with good reason), so competitors are advised to have convincing proof that their model has been tested for stability.

Ric Gaff kindly sent along a copy of the *Lost Trek*, published by the Summit City Aerospace Modelers in Fort Wayne, Indiana. This is Ric's last issue as editor, since, despite the predictions of his friends, he has found a good job. It doesn't surprise the people who have read *Trek* for the last couple of years; we know that he can do a good job. The *Trek* passes along an excellent article on streamer duration optimization, by newly-elected NAR trustee Chris Flanagan. Chris points out that a substantial increase in duration can be achieved by attaching the shock cord, to one corner of the end of the streamer, rather than the middle of the end. Airflow causes the streamer to curve into a helix, appreciably increasing drag. He also discusses the pros and cons of tissue paper streamers as opposed to the usual crepe.

Also in the *Lost Trek* is a reprint of a 1920 New York Times editorial stating

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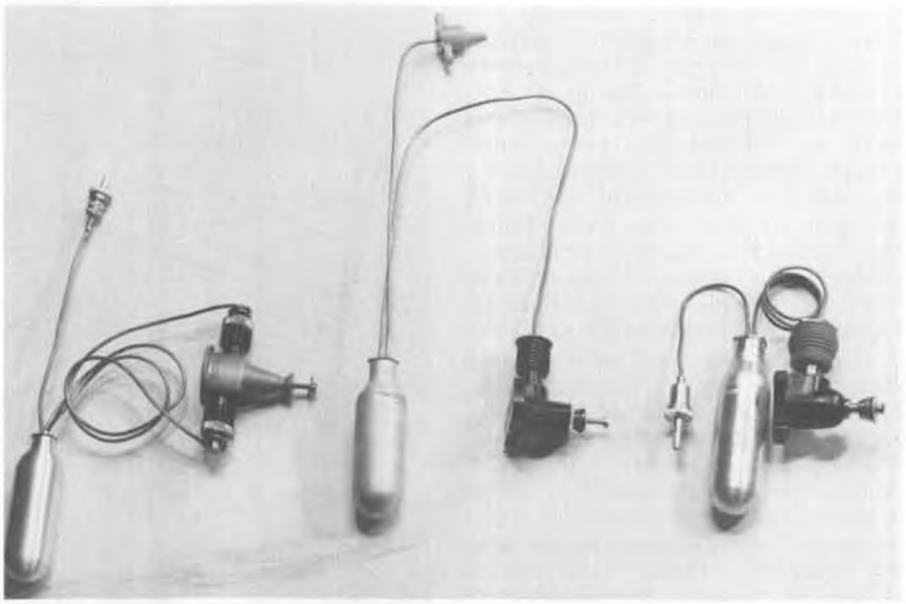
. . 5 . . 4 . . 3 . . 2 . . 1 . . SWOOSH! Rocket demonstration at the Dallas Trade Show.

The author lends a hand in MB's booth at the Dallas-based Southwest Model Show. Anita Northrop almost hidden at lower left.

The NAR booth at the Southwest Model Show, photographed at a moment when it wasn't occupied by lots of spectators.



The three CO_2 engines now available from distributors and/or hobby shops (l to r): the Brown Jr. twin(single is the same, less one cylinder), the TELCO, and the Shark.

Close-up of Brown twin installation in modified Guillow Aeronca Champ, by Milan Kacha, of Czechoslovakia.

PSSsst! WANNA TRY CO_2?

By BILL HANNAN . . . This interesting report from "The Hangar" brings us up to date on a modeling power source that has had several ups and downs. This time, it's coming back with lots of strength.

• CO_2 engines are not new; according to Louis H. Hertz, author of *The Complete Book of Model Aircraft, Spacecraft and Rockets*, such powerplants were operational in the 1890's. And, Pioneer hang glider designer/flyer Otto Lilienthal planned to fit a CO_2 engine to one of his aircraft, but unfortunately was killed before the installation was completed.

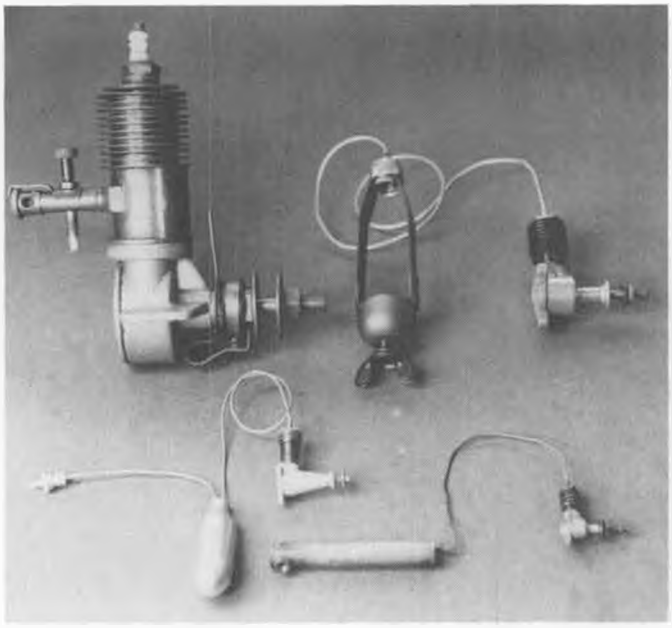
Advertisements for commercially produced model CO_2 units appeared before World War I in aviation magazines from Germany, France and England, and V.E. Johnson published descriptive comparisons on two of them in 1912. Both were surprisingly sophisticated; one featured three cylinders, and the other was an eight-cylinder radial! However, gum-bands reigned supreme, and CO_2 was for all intents and purposes forgotten by model builders until the 1940s.

Enter Bill Brown IV, of Brown Junior Ignition engine fame, who had long been seeking to develop a smaller and lighter power plant, suitable for really tiny flying models. In the February, 1943 edition of Mechanix Illustrated, appeared the first known published photograph of a Brown Jr. CO_2 engine. This unit was capable of turning a 3 inch diameter propeller at some 10,000 rpm, and it (or a similar prototype) demonstrated its efficiency by flying a model out of sight. Encouraged, Brown and some associates organized Campus Industries to produce the A-100 and "Bee" CO_2 engines. Also, a larger Brown design was put into production by Herkimer Tool Co., under license, as the "O.K." CO_2. All three engines were featured in model magazines of the period, powering projects designed by famous modelers such as Howard McEntee, Roy L. Clough Jr., Frank Ehling, and Ken Willard.

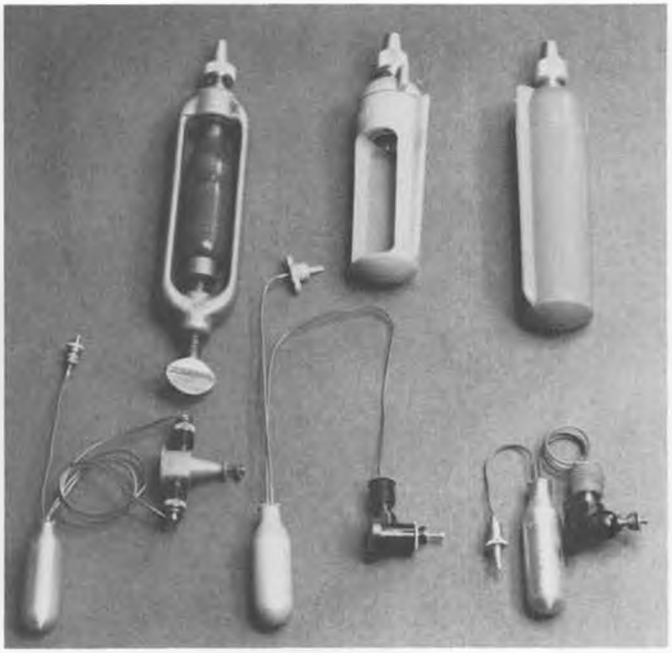
Other brands of CO_2 engines also appeared on the market during that era, including a virtual copy of the Campus, and a Keil Kraft design from England. Again, however, the mass market response was lacking . . . perhaps because regular "gas" engines and fuel were so cheap, and flying fields were abundantly available. Thus, the CO_2 engines again faded from the scene.

During the 1960s, Bill Brown took a fresh look at matters. Conditions had changed. Developers were gobbling up every vacant plot of land in sight, and the general public had become much more aware of "noise pollution". Additionally, glo-engine fuel prices were beginning their ever-increasing upward spiral. Perhaps, thought Brown, the time was right to introduce another CO_2 engine! In the interim, Bill had been redesigning his earlier efforts, which suffered from a few problems and inconveniences. His long years of experience had taught him several important lessons: the O.K. engine had been much too large, and required a heavy CO_2 capsule, which was good for only a single flight. On the other hand, the A-100s had been a bit on the delicate side, subject to rapid

A "Mini-Old Timer", from a Buzzer Model (Ed Toner) kit, with Brown Jr. .005 engine, by Milan Kacha. This, and photo above right by Miroslav Kvapil.



A few Brown Jr. milestones: Upper left, the great ignition engine ; upper right, the O.K. CO_2 engine; lower left, the .005 CO_2 now discontinued; lower right, the 1/8" bore and stroke Campus A-100.



Another photo of the three currently available CO_2 engines, each with its charger (l to r): Brown, TELCO, and Shark.

wear if incorrectly maintained, and were rather tricky to load.

Starting with a clean sheet of paper, Brown evolved the .005 CO_2 engine, which was manufactured under the long dormant, but still highly-esteemed Brown Junior Motors Inc. label. The new unit featured a revolutionary refillable aluminum "fuel" tank, easy adjustment of rpm, even while operating, a long-life bearing system, and a new loading device. Reception among model builders was immediate and favorable. Perhaps *too* favorable, since Brown's limited production facilities were not able to keep pace with the demand. With virtually no publicity other than word-of-mouth, and a few magazine mentions, orders poured in from as far away as Europe and Australia. As a precision, largely hand-fitted product, output was bound to be limited, and in fact, only about a thousand of the .005s were produced. Now discontinued, it has already become a collector's item.

During 1974, two new designs emerged from Brown Jr. Motors, designated the MJ 70 (70 cubic millimeter displacement) and the MJ 140, a twin cylinder version. Brown had long been a fan of the metric system, and chose this opportunity to make the conversion. The new units are quite different in appearance and construction from the earlier .005 engines, and have already found their way to many parts of the world. As of this writing, production is again lagging behind the demand, but a few dealers report limited stocks available.

Late in 1976, several new CO_2 engines, all of foreign origin, began to appear, and two of them are now on the U.S. market. We have received samples of each, and felt that comparisons might be of interest. Since we are not properly equipped for scientific evaluations, we must confine our comments to appearances and general impressions. Our own flying experience has been limited to the Brown Junior products, but Walt Mooney and Bob Peck have achieved successful results with the foreign engines.

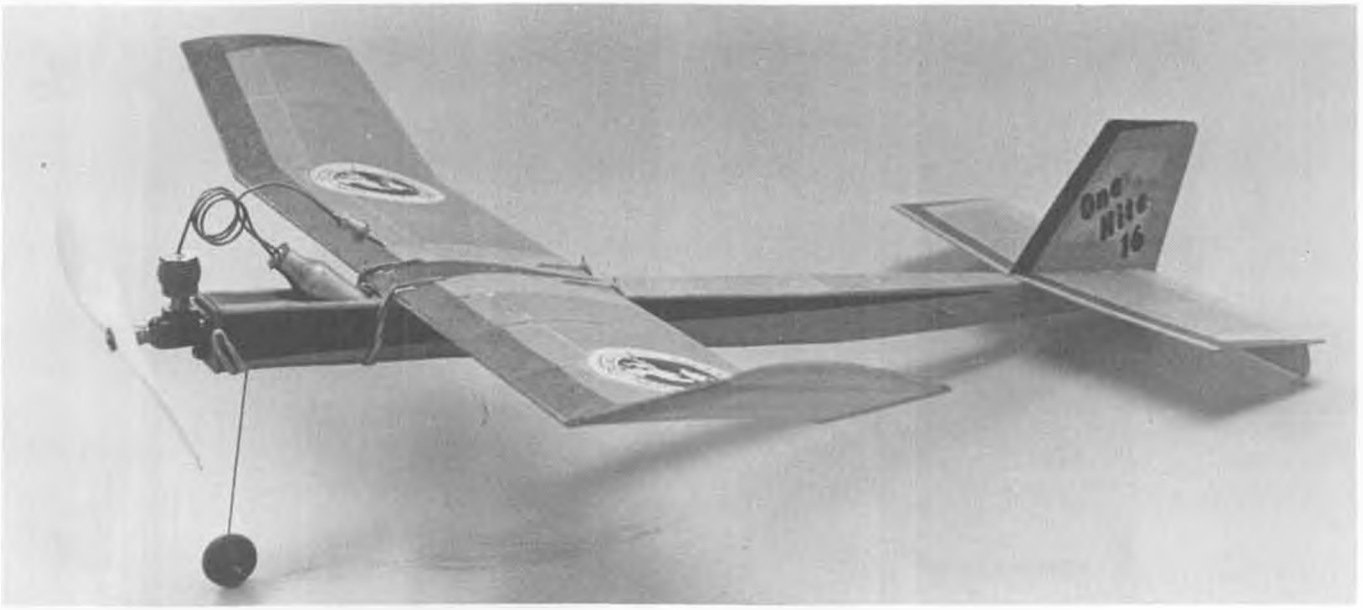
Before getting into details of the particular engines, let us try to examine the attractions (and detractions) of CO_2 engines as a group: Advantages include easy, one-flip starting, quiet operation, no need for model fuel-proofing, no batteries required, and no danger of overheating. Additionally, the engines may be operated with a large variation in prop diameters, allowing scale-size propellers on short landing gear subjects, and slow, rubber-power design, large-diameter props on other types, if desired. The engines may be idled down to a mere tick-over, which offers a relatively safe way to flight-test new models.

Like all man-made products, there are also, of course, disadvantages. In very cold weather, a CO_2 engine will hardly function, and even if it does, efficiency will be reduced. There seem to be quality control problems with the CO_2 "fizz" capsules themselves, regardless of brand, and it is difficult to achieve consistent results. Along similar lines, the filling operation can involve variations, leading to unexpectedly short (or long!) run durations. Some have singled out the fragile nature of the copper fuel tubing, which can be easily kinked and/or broken. This, however, is largely a matter of heavy-handed handling on the part of the model operators, and difficulties can be minimized with care.

Another thing we feel that deserves mention is that these engines are not to be regarded as toys. CO_2 is a high-pressure substance (up to 900 psi, according to some sources) and must be treated with respect and caution. First and foremost, the capsules (or filled engine tanks) should not be subjected to intense heat. This means, among other things, don't leave them in the trunk of your car or under that big back window on hot days. And certainly don't intentionally apply heat in hopes of increasing power output. And, even though they turn slower than glo engines, CO_2 propellers are quite capable of giving one a sharp rap on the fingers, so exercise the usual cautions due ANY type of engine.

Now to our comparative observations: The Brown Junior products are the most

Continued on page 101



The Peck-Polymers "One Nite 16" rubber ship converted for CO_2 power. Shark engine installed.

FREE FLIGHT SCALE

By FERNANDO RAMOS

• With the advent of two new CO_2 engines on the market, the Shark and the Telco (Bill Hannan is giving a full report on all available CO_2 engines so I won't go into that at this time.), and the Brown Jr. Company seemingly keeping pace with their already established product, I felt that a brief discussion on this type of power and suitable scale models might prove interesting. For starters, Peck-Polymers has received several new products from the Brown Jr. Co. to help make the use of CO_2 more functional and appealing. They have five new tanks in the following sizes:

1.75 cc, 1-1/16" long x 1/2" diameter, 1/8 oz.

2.75 cc, 1-1/2" long x 1/2" diameter, 1/4 oz.

6 cc, 1-1/2" long x 3/4" diameter, 1/3 oz.

10cc, 2-1/2" long x 3/4" diameter , 1/2 oz.

20 cc, 4" long x 3/4" diameter, 3/4 oz.

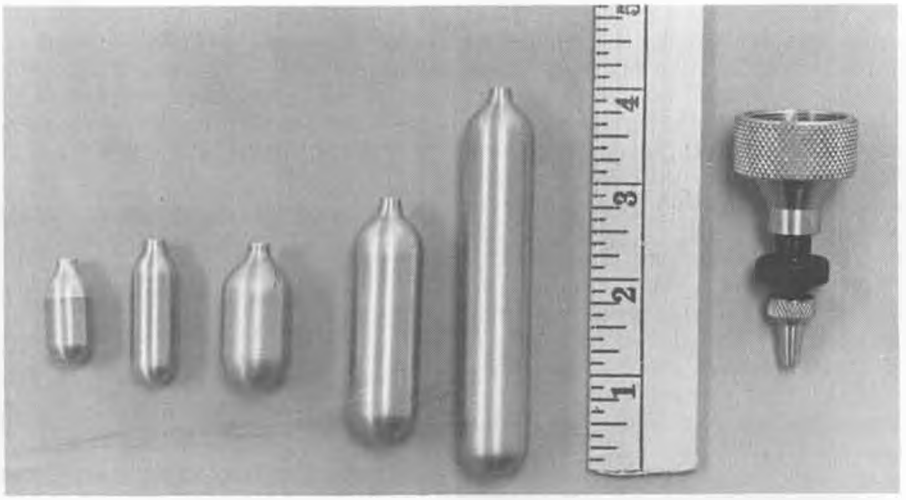
The advantages of having a variety of tank sizes should be quite obvious. The very smallest tank is ideal for those who fly in small school yards, and the very largest is just the ticket for the Brown twin, which has required several of the regular size tanks soldered together in order to get any kind of duration. Now, one can choose the tank best suited to one's scale needs.

Filler nozzle assemblies can also be obtained in order to convert either the Shark or Telco engines to use one common filler, plus taking advantage of being able to switch tank sizes at will. One other much needed item from Brown is a charger nozzle assembly that fits onto an "Ansul" CO_2 fire extinguisher. These extinguishers are available throughout the U.S., and apparently come in four sizes; 4-1/4, 6-1/4, 7-1/2, and 10-1/2 inches long. Most fire extinguisher outlets carry this unit. When the tank has been expended, just exchange it for a new one, and pay only for the cost of a charge. This unit really gives a tank a full charge. The Brown charger fits right onto the engine's tank nozzle. I used this unit to fill the tank of my ABC Robin and got a two minute plus engine run. It was one of the longest flights the model has ever had! Write to Peck-Polymers for their latest sheet on CO_2 engines and accessories.

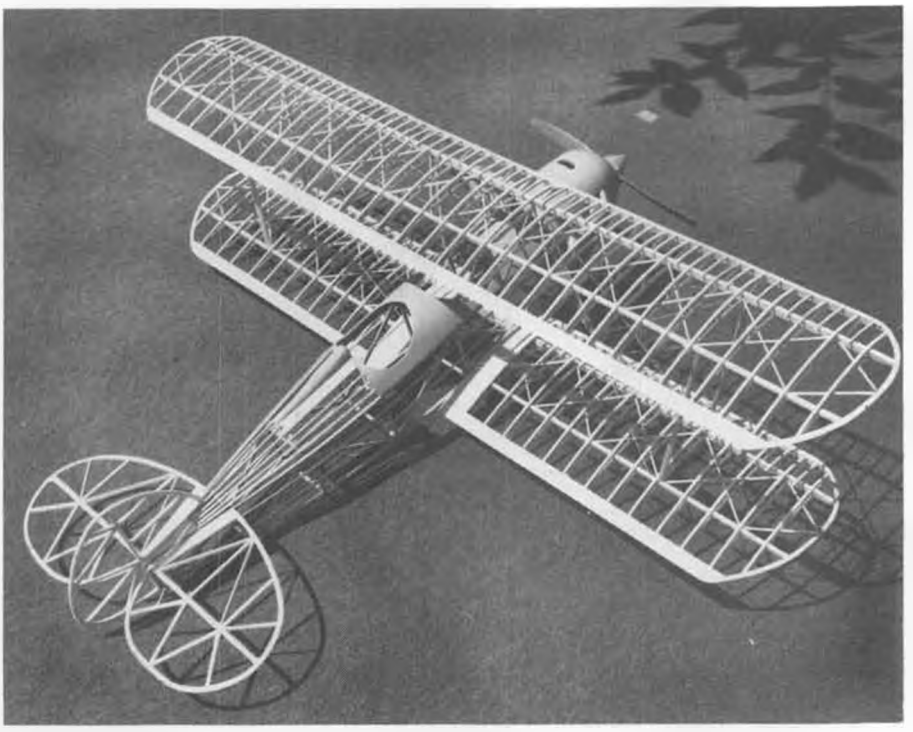
I personally feel that the ideal set-up for a CO_2 powered model is to keep it light in weight so the engine can be run under a low throttle condition. Otherwise, the gas consumption is so fast that duration is almost non-existant. If your model gets too heavy, use one of the new tanks so the engine can be speeded up accordingly.

One good way to train yourself in the use of these engines is to put one into one of the fairly new Monogram all-plastic foam scale rubber models. The installation is quick, and the models fly pretty well. If they get damaged they can easily be repaired using white glue. This way, you can get use to all the little quirks and characteristics of these CO_2 engines. Another use for this type of test bed is for trying out a variety of propellers. You may find that you want to carve your own. Also vary the engine settings. See how slowly you can run it and still have the model perform satisfactorily. When you are satisfied with the performance of your engine, then decide what scale model you want to build for it.

The first question that you may ask



Variety of tanks now available for the Brown engines, also can be adapted to fit the Telco and Shark. Fitting on right adapts "Ansul" fire extinguisher tanks for filling engine tanks.



Long-time modeler, Joe Hankes, Beaver Dam, Wisconsin, built this 33 inch span Waco 10 for .049 power. Longerons are 1/8 square spruce, and the prop was hand-carved from mahogany.

FIG. 1

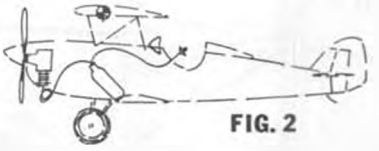


FIG. 2

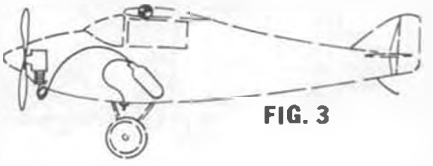


FIG. 3

yourself is how big or small should it be? The answer to this depends on how are you at building light but strong structures. This more than anything, could be the deciding factor. I personally feel that a model of between 24 and 26 inch span is ideal, but these have to be built lightly. As an example, my ABC Robin weighs 1-1/2 oz., has a 24 inch wingspan, and because it is light, the engine can be throttled down so that duration from each CO_2 cartridge is very respectable. If you like the larger models, but are prone to build heavy, then go to the twin engine, using the larger tank. The power of this engine is very surprising.

If large models are not appealing to you, then I would recommend a span between 16 and 20 inches. Of course, weight at this size is a major factor also. If you build a small model too heavily, then add the extra weight of the engine and tank, one hard landing could do it in. Any of the Tern kits, generally referred to as Walnut Scale, just about fit into this small size category.

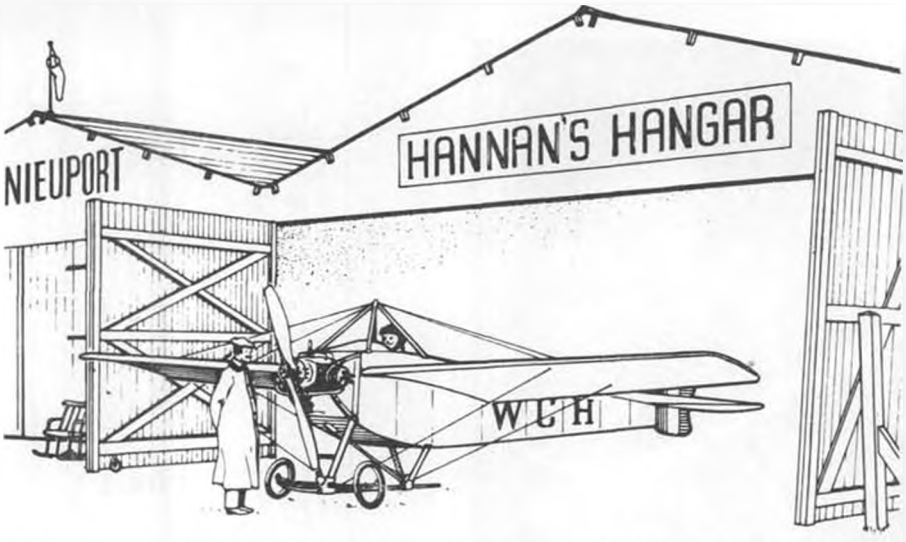
If you are a biplane freak, as I am, the ideal size is between 18 and 21 inch span. I had a Tiger Moth with an 18 inch span, on floats, that flew extremely well on low power. Yet, if any of you have ever seen the Sopwith Tabloid drawn by Kingsley Kau (the plans are available from Peck-Polymers), it has a 21 inch span, with lots of wing area and a "chunky" fuselage. I've seen a couple of these powered by CO_2, and they flew absolutely great!

After you have decided which model you want to build you may ask yourself this question. What type of construction should be used? Should it be similar to a gas model or a rubber model? Well, if you build a small model with gas-model structure, you will end up with a lead sled. I would suggest using a regular rubber model structure, with only a few exceptions. These would include a plywood firewall (1/32 is plenty good), and a stouter landing gear. This need not be more than .040 (maybe .032 in some cases). The only other area which will require "beefing" is in the location of the filler nozzle. This is probably the only drawback to CO_2, it takes a tremendous amount of pressure to place the nozzle of the cartridge onto the filler nozzle of the engine. So, whatever bulkhead station you choose to place the filler nozzle, has to be sufficiently strong to take both the pressure of the filler cartridge and the squeezing of the hand on the model while charging. There is no quicker way to crunch your model than to squeeze it too tightly while charging. So the structure in this area has to be able to handle these two forces.

Look at the illustrations showing the three installation methods normally seen in CO_2 models. The tank should always be placed neck-high so that the engine does not "flood" with excess gas. The filler nozzle is placed as specified above, and is permanently mounted. The other option for a parasol or biplane is to let the filler nozzle float freely through the cockpit opening. The last drawing shows my favorite method (one of my learned colleagues disagrees with me, but I'm happy with the performance using this installation). The tank is place neck-high, but not vertically mounted, the filler nozzle is located below the fuselage where it isn't so obtrusive. When I fill

Continued on page 83

Here are the ANSUL CO_2 Fire Extinguisher cartridges which may be used, with the Brown Jr. adaptor fitting, to fill CO_2 engine tanks. Trade in empty cylinder for CO_2 charge only.



"Don't store Jumbos and Peanuts together . . . one may eat the other!"

● Our lead-in line this month was authored by Jim Dean, avid scale model builder and "old-timer" fan.

A FEW THOUGHTS
ON SCALE COMPETITION

With the California Nationals forthcoming, fresh attention is being focused on what it takes to win. On the subject of scale judging, Frank Scott opines that, ". . . a well-chosen minimal presentation is far better than the majority of three-pound portfolios I've seen. I'm afraid that the bulk of control line ships I've judged have been accompanied by volumes of irrelevant garbage. It is not unusual to open a modeler's presentation to find a 3-view of a P-51B, for example, attempting to serve for a model of a P-51D. Portfolios also often include photos that may seem meaningless to a harried judge. So I feel that well-chosen captions can be most helpful. For instance: 'Attention is directed in the above photo to details of steps, wing-walks, hand-holds and antenna', so that the judges will have some idea of what to look for."

Having had a few turns in the judging arena ourselves, we wholeheartedly concur. In fact, any builder serious about scale competition should give judging a try, as it will prove to be an eye-opening experience. It is much easier to see problem areas in your own models after spending a few hours examining someone else's. You may THINK you look over your competitors' entries carefully just by gazing at them, but until you actually JUDGE them, by comparison with others, you can't possibly realize how much may be learned.

Another scheme that can be used to sharpen your perception, is to judge your own model as critically as possible, using the complete AMA rules applicable to your entry. You may be surprised to find glaring errors, or overlooked areas needing attention, owing to the built-in "tunnel vision" effect of being so close to your own work during the construction phases.

A final thought concerning scale presentations; watch your spelling! We spotted several glaring boo-boos during a recent judging session, and though not really against the rules, such errors certainly do not reflect care or precision!

Fred Williams built this tiny model violin. It features tuneable nylon monofiliment strings!

LINDBERGH TRIBUTES

The Frank Zaic-initiated Lindbergh award is picking up steam, with the originator having kicked off the donation drive with a very generous contribution. Your support is earnestly solicited.

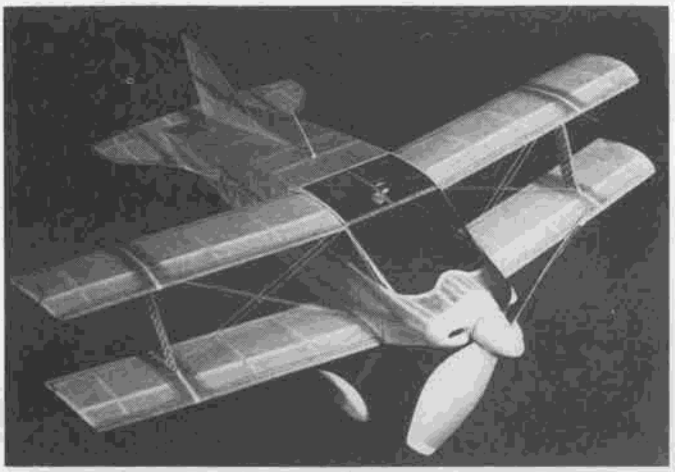
Meanwhile, the Experimental Aircraft Association plans to construct a full-scale flying reproduction of the "Spirit", which will be flown to many parts of the country, in a reenactment of Lindbergh's post transAtlantic tour.

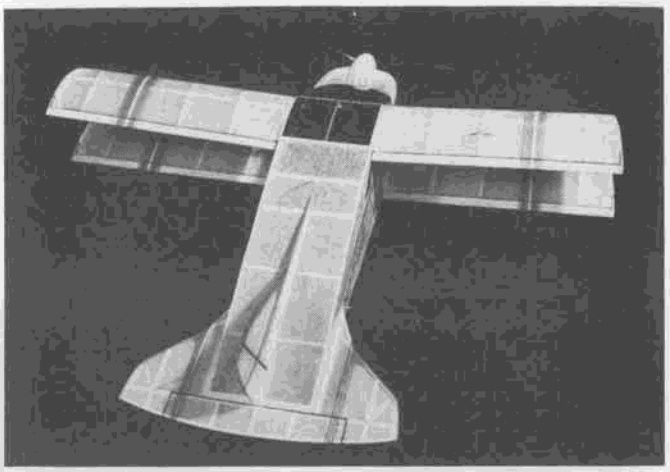
In the realm of modeling, in addition to the **Model Builder** "Peanut of St. Louis" added attraction to this year's

Continued on page 93

"Bill's Flying Service" hangar, by Bill Miller, is really just an artistically decorated shoe box used as a field kit. Photo by Dick Benjamin.

Birch and laminated basswood highchair, based on illus. in old Sears catalog, Bill Hannan.





HIPERBIPE PHOTOS BY BOB MOSHER

PEANUT

SORRELL SNS-7 "HIPERBIPE"

By PRES BRUNING . . . One of the most eye-catching of modern biplanes, we'll probably see many versions in model form. Just to get warmed up, try this one on for size.

The Sorrell SNS-7 High Performance Biplane, "HIPERBIPE", is a very interesting, very 3-dimensional looking airplane, and quite an aerobatic performer as well. This is one of those planes that just cries to be built in model form. As a Peanut, it is quite large. You can imagine how big it would be as a Walnut. Dig that large square fuselage (plenty of room for rubber to flop around in)! Also, that flying fuselage allows you to use the scale horizontal stabilizer.

Let's begin construction by talking about the fuselage. I built two identical sides inside of a cardboard cut-out profile. To space the two fuselage halves apart accurately, I taped a cardboard section between the landing gear vertical pieces. Next, I taped a folded-over piece the width of the cross pieces to top, bottom, and trailing edge of the fuselage rear. Now being ridgidly braced, glue in the remaining cross pieces, removing the cardboard afterwards. Now add the remaining longitudinal stringers. Cover canopy base line from the second vertical back from nose block to the fourth vertical with black Dri-mark stained bond paper. Now add in basswood cabin bracing struts and landing gear. Two verticals of medium hard 1/16 square balsa were added in the center ahead of the motor peg, 1/2 inch apart from each other, to prevent bending of the motor peg. Next, cover the entire fuselage, minus canopy area, with white superfine Japanese tissue. Now is the time to add the tissue trim and lettering.

Before building the wings, trace the wing plans and turn over, giving you the plans of the left upper and lower wing halves. Nothing unusual about the construction, other than the tips being shaped to fit at an angle using a cardboard angle or balsa angle block to assure same set up for all four tips. Now cover,

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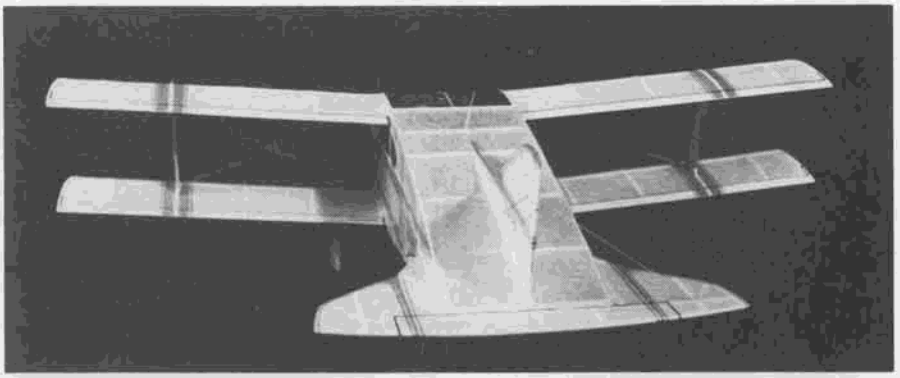
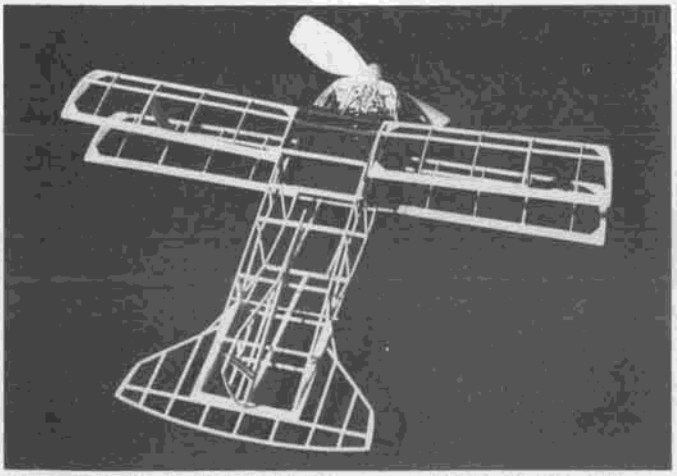
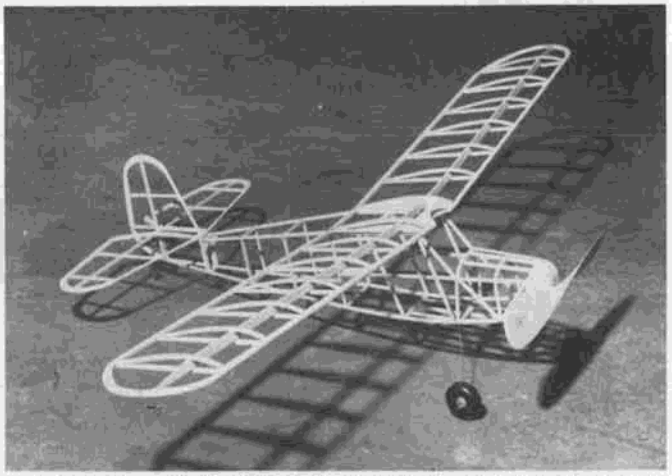


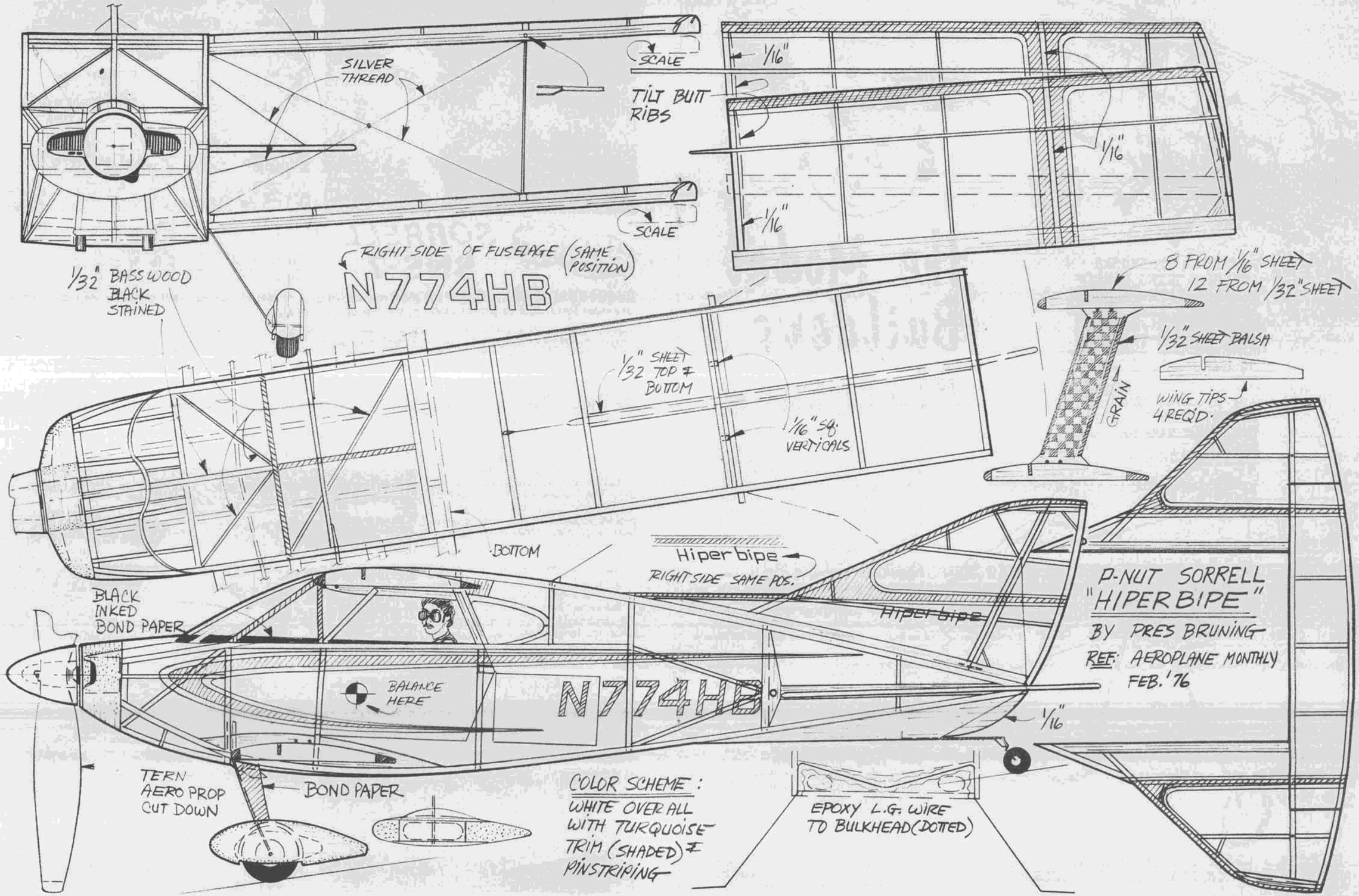
Among many distinguishing features of the "Hiperbipe" is the continuous-width fuselage, making it operate like an airfoil in flight.

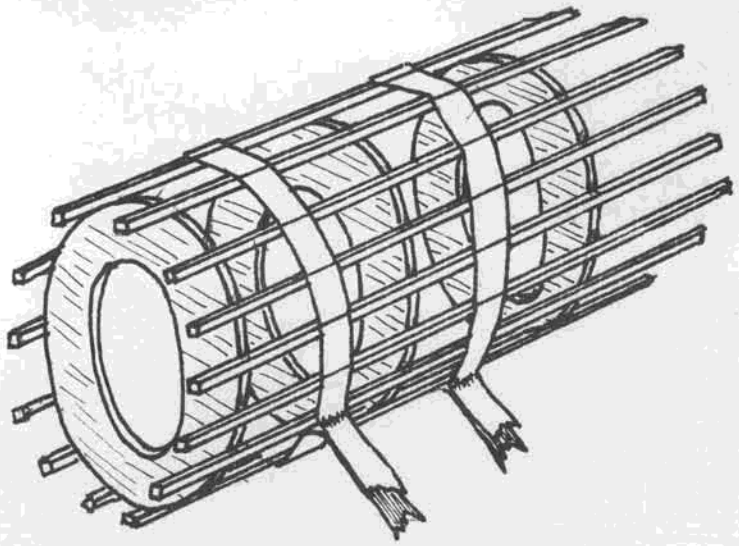


If you don't like to bend fuselage longerons, this is your plane! An interesting design from most any angle.



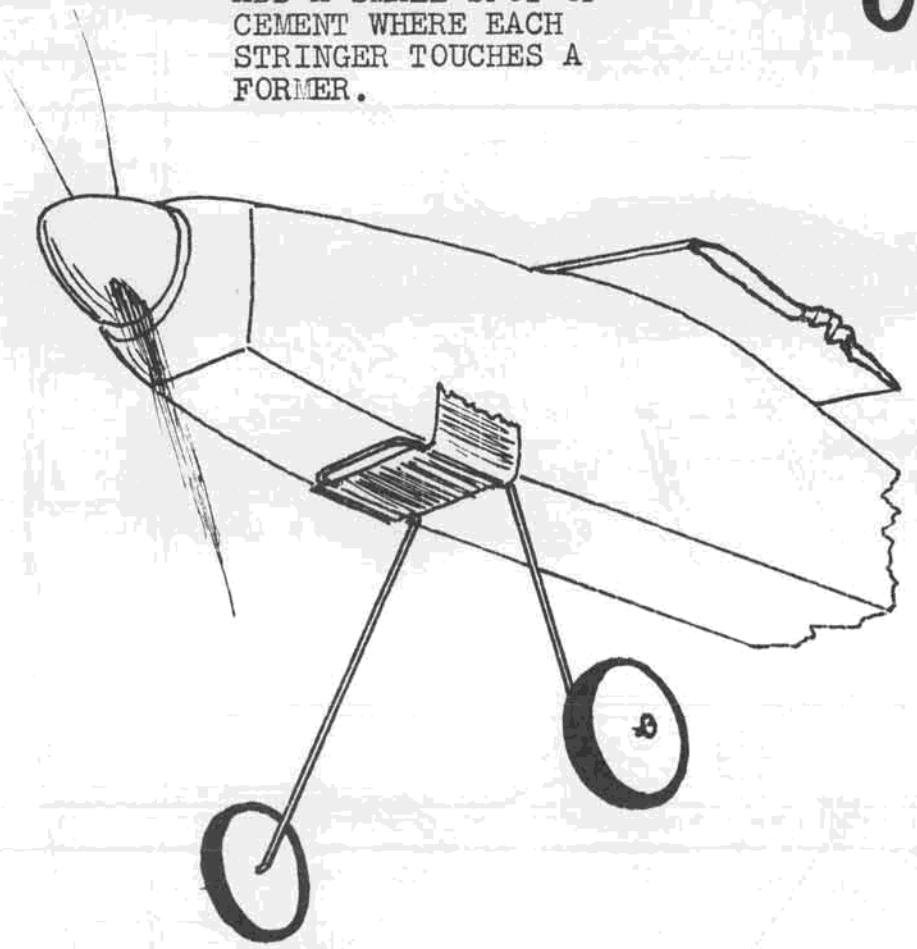
For next month, Walt Mooney will be back with this easy-to-build WW II Aeronca Defender O-58A, or L-3.


SILVER THREAD
SCALE
TILT BUTT RIBS
1/16"
1/16"
1/16"
SCALE
RIGHT SIDE OF FUSELAGE (SAME POSITION)
N774HB
1/32" BASS WOOD BLACK STAINED
1/32" SHEET TOP & BOTTOM
1/16" SQ. VERTICALS
8 FROM 1/16" SHEET
12 FROM 1/32" SHEET
1/32" SHEET BALSA
GRAIN
WING TIPS 4 REQ'D.
BOTTOM
Hiperbipe
RIGHT SIDE SAME POS.
Hiperbipe
P-NUT SORRELL
"HIPERBIPE"
BY PRES BRUNING
REF: AEROPLANE MONTHLY FEB. '76
BLACK INKED BOND PAPER
BALANCE HERE
N774HB
1/16"
TERN AERO PROP CUT DOWN
BOND PAPER
COLOR SCHEME:
WHITE OVER ALL WITH TURQUOISE TRIM (SHADED) & PINSTRIPING
EPOXY L.G. WIRE TO BULKHEAD (DOTTED)



POSITION STRINGERS ON FORMERS USING NARROW MASKING TAPE. PUT ONE LENGTH OF TAPE AROUND BETWEEN THE FORMERS WITH ENOUGH TENSION TO HOLD THE STRINGERS TIGHTLY TO THE FORMERS.

ADD A SMALL SPOT OF CEMENT WHERE EACH STRINGER TOUCHES A FORMER.



IT DOES A GREAT JOB OF HOLDING LANDING GEAR ON SMALL SPORT MODELS

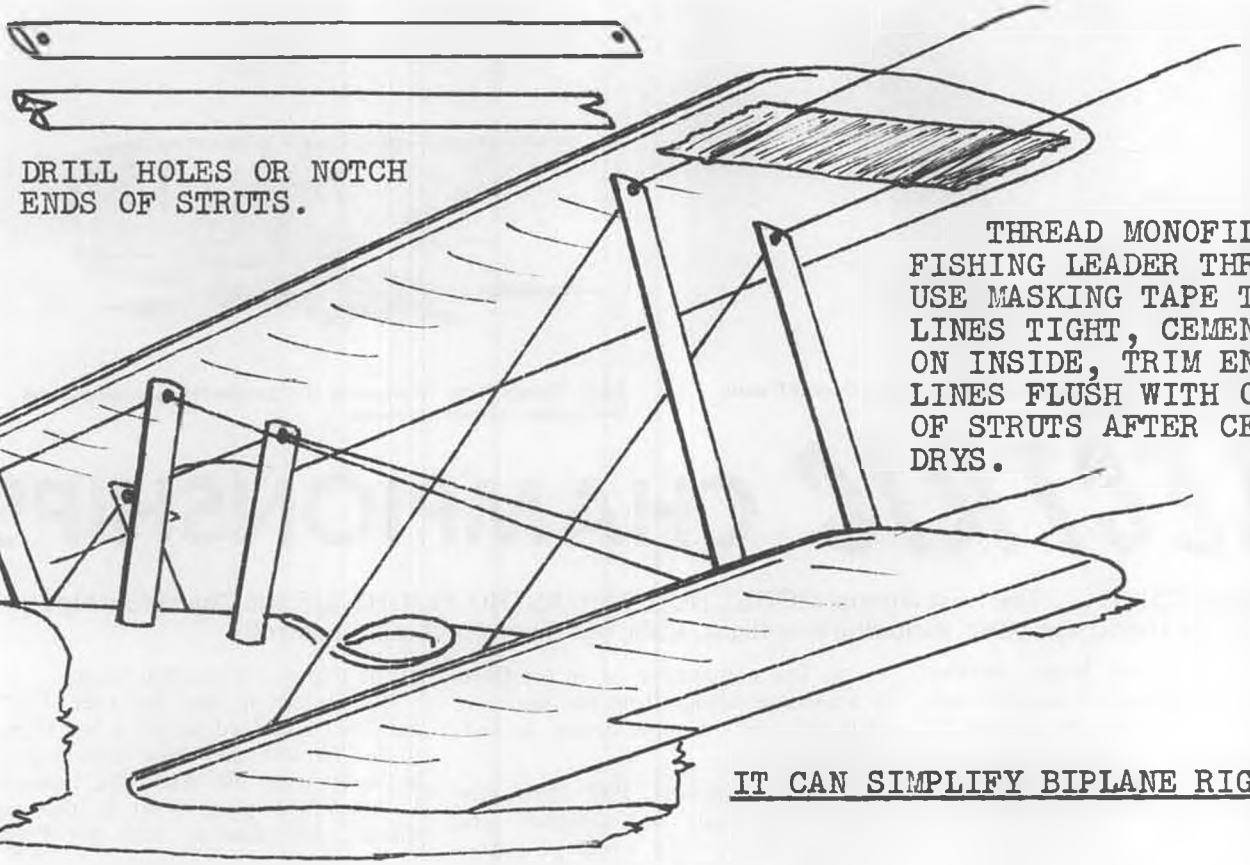
IT CAN HOLD SMALL COMPONENTS SEMI-PERMANENTLY

the Model Builder's Classroom

By WALT MOONEY

• Have you ever tried masking tape as a model construction aid? Masking tape, or as it is sometimes referred to, "Drafting tape", is supplied in rolls of varying width from 1/4 inch to 3 inches. In various places it can be used to replace straight pins, thereby eliminating pin holes and the chances we take of splitting balsa structure. It can also be used as a clamp and as a replacement for rubber band holding devices. Masking tape can make the installation of wire rigging a lot easier. This, of course, is a temporary connection. It can also be used for more permanent attachments such as to hold a landing gear on sport models.

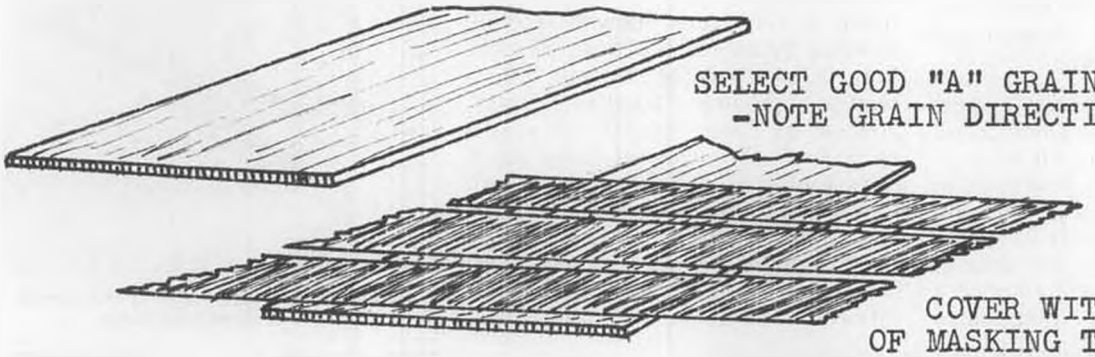
In addition, it can be used to prevent cracking in wrapped sheet balsa covering. When a sheet is bent, the convex side of the sheet is placed in tension and the concave side is in compression. Along the grain, balsa is a strong wood in tension. But across the grain it is very weak, and will split easily. It isn't very strong in compression either, across the grain, but nothing splits while being pushed together. The masking tape resists stretching and prevents the convex side of the balsa sheet from being put under tension. It about doubles the compression load, but this is no problem. After the curved sheet is cemented in place and the cement has dried, the tape can be removed. With this technique, you can bend "A" grain 1/32 sheet balsa almost like folding paper. •



DRILL HOLES OR NOTCH ENDS OF STRUTS.

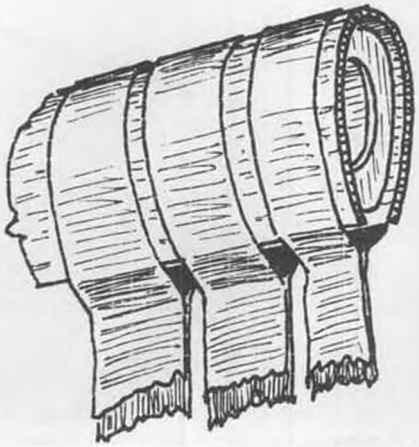
THREAD MONOFILIMENT FISHING LEADER THRU HOLES, USE MASKING TAPE TO KEEP LINES TIGHT, CEMENT LINES ON INSIDE, TRIM ENDS OF LINES FLUSH WITH OUTSIDE OF STRUTS AFTER CEMENT DRYS.

IT CAN SIMPLIFY BIPLANE RIGGING.



SELECT GOOD "A" GRAIN BALSA
-NOTE GRAIN DIRECTION ON END-

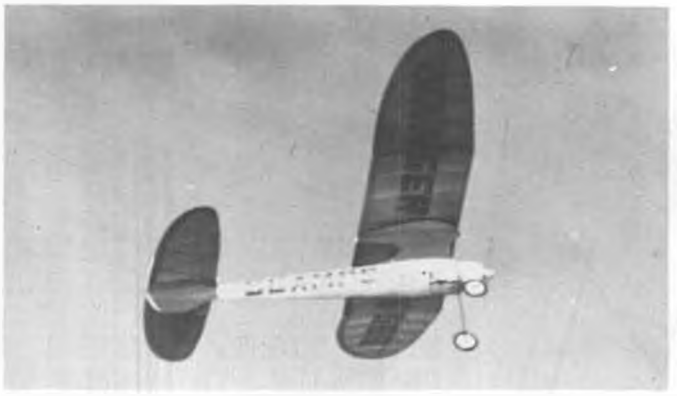
COVER WITH STRIPS OF MASKING TAPE ON THE OUTSIDE OF THE SHEET, LET THE ENDS OF THE TAPE EXTEND WELL BEYOND THE EDGES OF THE WOOD



WRAP THE SHEET AROUND THE MODEL STRUCTURE. THE TAPE WILL PREVENT THE TENSION SIDE, (OUTSIDE), FROM SPLITTING. THE INNER SIDE WILL BE SQUEEZED TOGETHER AND AFTER THE CEMENT DRYS THE TAPE CAN BE REMOVED

IT CAN ELIMINATE THE NEED TO WET SHEET BALSA FOR WRAPPED COVERING

PHOTOS BY DAN SHAW



Gene Wallock placed first in Old Timer and third in Open FF with this Astro 10 powered Ranger.

Keith Shaw's Astro 15 powered R/C Curtiss Hawk taxiing. Weak landing gear caused problems.

ELECTRIC CHAMPIONSHIPS

By BOB BOUCHER . . . The First Annual MODEL BUILDER/ASTRO FLIGHT Electric Championships had something for almost everyone, including free flight, scale, old timers, and radio control.

• The First Annual Model Builder/ Astro Flight Electric Championships was held at Mile Square on January 16. The contest was a fantastic success, the weather was beautiful (70 degrees, no wind, and blue skies), and a total of 47 entries; 22 in R/C, and 25 in Free Flight, made for lively competition. Over 100 spectators from Southern California were there to cheer for their favorites. Mitch Poling came down from Seattle, Washington, John Pond from San Francisco, and Ed Swenton and Mark Smith from San Diego.

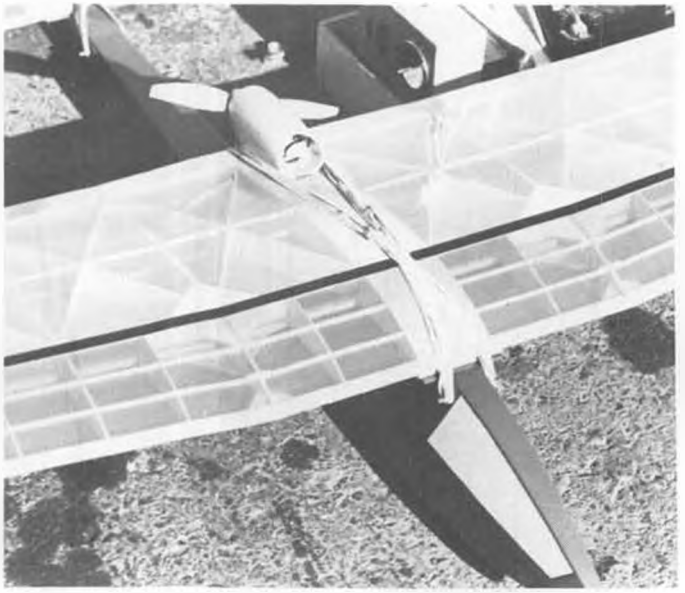
This was the first electric contest for Mark Smith, and he demonstrated his flying ability by piloting his Astro 15 powered Bushwhacker to first place in Sport Pattern. Bob Imrisek, who destroyed his beautiful Fournier RF-4 in a practice flight just before the contest, borrowed Mark's plane and finished a close second in aerobatics. Bob loaned event. The comradship of all the flyers is a pleasant change from the aggressive attitudes seen at some power contests hereabouts.

In R/C Sailplane, Phil Bernhardt, master craftsman and designer, won with his original Sky Sucker, a pusher powered with an Astro 10 swinging an 8 x 4 at 14,000 RPM and soaring on a set of Satellite 1000 wings and stab. R/C Scale was won by Mitch Poling, flying a very cute Sopwith Tabloid powered by an Astro 020 on six cells. Bob Boucher placed second with a Fokker Trimotor "Southern Cross", powered by three Astro 020 and guided by a Kraft three-channel radio. Keith Shaw took third honors with his beautiful Curtiss Hawk. He took first in static points, but had landing gear problems. Harry Apoian, one of the two flight judges, volunteered to hand launch, but threw an Armenian curve ball (see photo) so the ship was retired for repair.

Bill Stroman ran the Free Flight activities, managed to get a few flights in for himself, and took second place in scale with his Astro 02 powered Valkrie. First place went to that old master, Bill Warner, with his Petite

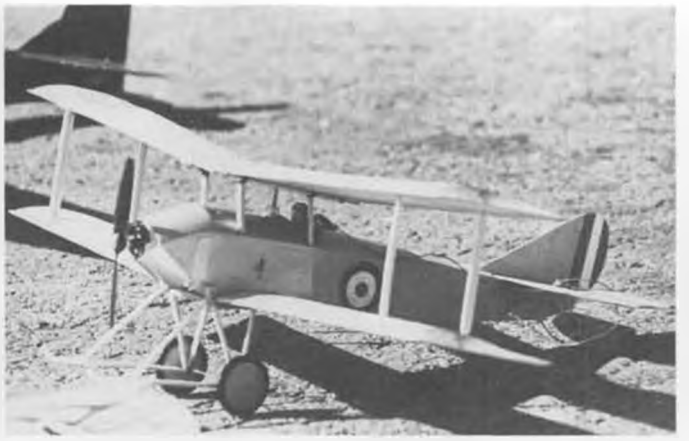
Bob Boucher's R/C Fokker Trimotor circles for a landing with three dead sticks.

Phil Bernhardt launches his electric powered sailplane "Sky Sucker". Satellite wing and stab on special fuselage, won its event.



Close-up of Astro 10 mounting on Bernhardt's "Sky Sucker." Provides excellent air circulation for cooling motor.

Bill Warner's Airspeed Ferry, with three Astro 01 motors. Battery problems prevented successful flights.



Mitch Poling's winning R/C scale Sopwith Tabloid. Astro 02 motor and Cannon radio.

Brochet. Old timer replica was captured by Gene Wallock, with his Astro 02 powered Ranger. He also placed a close third in Free Flight Open with the same model. In Free Flight Open, it was a close battle between Tony Naccarato with his Astro 05 powered Starduster, and Hal Cover with his VL Hytork powered Hi Torque (not too original). Hal got a nearly perfect last flight, and aced out Tony in the last round.

Free flight Jr. was won by Scott Cover with his Eaglet. The most original scale entry was Bill Warner's Airspeed Ferry with three prototype Astro 010 motors, but Bill had some problems with his batteries. Bill entered three planes in scale. He was determined to win, and so he did! The contest results are listed below.

Mitch Poling launches his Sopwith Tabloid. Traveled from Seattle, Washington for event.

Mark Smith and his Astro 15 powered Bushwacker, which won R/C Sport Pattern.

R/C Sailplane

1	Phil Bernhardt	Sky Sucker	Astro 10
2	Mitch Poling	Electric Drifter	Astro 05
3	Dale Black	Old Tweaky	Astro 05

R/C Scale

1	Mitch Poling	Sopwith Tabloid	Astro 02 Special
2	Bob Boucher	Fokker Tri-motor	Astro 02 triad
3	Keith Shaw	Curtiss Hawk	Astro 15

R/C Sport Pattern

1	Mark Smith	Bushwacker	Astro 15
2	Bob Imrisek	Bushwacker	Astro 15
3	Bruce McAvinew	Pilot	Mabuchi

FF Scale

1	Bill Warner	Petite Brochet	
2	Bill Stroman	Valkrie	
3	Hal Cover	Couger	

Old Timer FF

1	Gene Wallock	Ranger	Astro 020
2	J. Riese	Broklyn Dodger	Astro 020
3	Annie Naccarato	Zipper	Astro 020

FF Jr.

1	Scott Cover	Eaglet	
2	Tony Whitney	Skyriser	
3	Jon Fasola	no name	

FF Open

1	Hal Cover	Hi Torque	VL Hytork
2	Tony Naccarato	Starduster	Astro 05
3	Gene Wallock	Ranger	Astro 02

Bob Boucher launches Astro 05 powered Super Malibu for Tat Li.

The undoing of a Hawk! Harry Apoian finds out it's not easy to hand launch a biplane.

Some of the winners at the Valley Circle Burners Fun-Scale contest, Sepulveda Basin, Sept. 1976 (l to r): Terry Aldrich's Aerostar 600, 7th; Ron Duly's He-111z, 2nd; Tony Whitney's Dornier 335; Dale/Joe Kirn's Mitchell TB-25N Camera Ship, 6th; Frank Kelly's Martin PBM-3D, 4th; and Dave Braun's Westland Whirlwind, 1st.

The 1/2-A SCENE

By LARRY RENGER

• Let's talk about Scale. I know, Fernando Ramos, Walt Mooney, and Bill Hannan all bend your ear on the subject, but please bear with me. The message I want to get across is that scale modeling can be fun. You don't have to kill yourself searching for paint flakes from the Red Baron's triplane, or spend a fortune for the last remaining three-view of some obscure airplane. Why put a year in construction?

For my money, the way to go is build a kit, put enough decor on so it looks good IN THE AIR *(This is what Sport Scale should be! wcn)*, and then fly for the pure fun of it. Believe me, you aren't limited in your selection any more. Most 1/2A kits currently available as R/C or F/F are easily adapted to control-line flying, if that is your thing.

The majority of 1/2A scale kits are made by a very few manufacturers. The list shown includes most of the 1/2A scale kits of which I am aware.

There are also a multitude of kits by Sterling, Comet, and Guillows, which may be adapted to 1/2A power, details are left mostly to the builder.

Changing the subject only slightly, I would like to call your attention to a couple of scale builders. These gentlemen are short on years, but they have what it takes. The lad holding up a B-25 is not "Son of Jolly Green Giant" playing games with Frank Tallman's airplane. He is Joe Kirn, and he took first in Junior C/L Scale at the Nationals with this bird. He even used photographic reproductions to get the lettering perfect. Two Tee Dee .049's make this ship a fine flyer.

Next, getting an assist from Papa Ken (designer of ACE's new Aero Commander Shrike kit) is Tim Holden. He did a magnificent job on a House of Balsa P-51. Finishing touches include cockpit detail, pilot, panel lines, gun-smoke and exhaust stains plus weathering. This picture was shot at Mile Square during the OCRC annual scale meet. Tim competed in Stand Off scale against the adults, and came in with a better score than most! *(To clarify a point. We were one of the two static judges, Frank Szekula was the other. Tim's score was good even though we properly ignored the cockpit detail, smoke stains, weathering, etc. which does not count in Sport Scale. wcn)*

Tim Holden anchors his House of Balsa P-51, while Papa Ken gives an assist in engine starting.

House of Balsa P-39 "Airacobra".

Joe Kirn with his B-25 camera plane, as used by Frank Tallman for air-to-air movies.

Beautiful C3B "Bull" Stearman, by Flyline Models, for 3-channel radio and .049 power.

BD 5-1/2 (semi-scale) by M&H Hobbies. For 2-channel radio and TeeDee .049. Span is 43".

Yet another approach to scale model flying was demonstrated at a recent contest held by the Valley Circle Burners. September 26, 1976 was the time, and the Sepulveda Basin was the place for the "First Annual 1/2A Engine Profile Scale Meet." There were 13 entries, and as you can see from the photograph, quality and imaginative selection of subject were the order of the day. Not shown is Mike Keville's third place winner, the Fokker T.V, featured as a construction article last month. Photograph courtesy of Dale Kirn. He said that all entries were nicely finished and actually flew. Start thinking now about what you will fly there next year.

Final item on scale for this month. I have been recently involved in several discussions on a separate 1/2A Stand-Off Scale R/C event. As a dedicated non-competitor, I don't want to issue a set of rules which only I think is neat. What would be good is for you, the reader, to use this column as a forum for development of rules and to focus interest.

So far, the gist of the idea is as follows:

1. Maximum total displacement to be .051 cu. in., i.e. two .020 engines, or up to five .010 engines for multi-engine models.
2. Two-channel control only.
3. Flight pattern to include only those maneuvers which a 2-channel airplane can do, most of the stand-off scale routine.
4. Takeoff requirement deleted for safety (Few models with ailerons would have ground steering capability).

Sounds like fun! Probably should maintain a 10 foot judging distance to keep the models simple. Let me know what you think about this or other possible 1/2A events.

Ladies and Gentlemen, forgive me, but I must climb on the soapbox for a

Continued on page 96

Manufacturer	Model	Size	Remarks
Flyline	Stearman C3B	35" .049	3-Channel
	Curtiss Robin	41" .049	2 to 3-channel
	Velie Monocoupe	22½" .010	FF
	Bellanca Skyrocket	34½" .020	FF, Pulse, or very small proportional
	Kinner Sportster	39" .049	3-channel
	General Aristrocrat	36" .020/.049	FF or PulseRadio
House of Balsa	P-39 "Airacobra"	36" Tee Dee .049	2-channel
	P-51	"	"
	ME109	"	"
	P-47 "JUG"	"	"
	Chipmunk	"	"
JETCO	Rearwin Speedster	38" .049	RC/CL/FF details on plan
	Cessna 170	36" .02-.049	FF & R/C
	Piper Super Cruiser	40" .049	FF
Sig	Schweizer 1-30	40" .010-.049	RC/CL/FF
	Spitfire	18" .049	CL only
	P-40 Warhawk	18" .049	CL only
	Super Cadet	35" .020-.049	FF & CL
	Piper Super Cruiser	36" .020-.049	FF, CL, R/C
	Fairchild 24	36" .020-.049	FF & CL
Top Flite	Thunderbolt	18" .049	All have formed balsa shell fuselages and plastic cowl. Semi-Scale
	Zero	18" .049	
	Hellcat	18" .049	
R/N	1910 Avro MK IV Triplane	32" .020	FF
	1911 Caudron	31" .020	FF
	1915 Beachy	25" .020	1-ch R/C
	1925 Consolidated PT-1	36" .020	FF
	1909 Bleriot XI	26" .010	FF
	1930 Longster III	36" .020	1-ch R/C
	Fleet 16B	28" .020	2-ch R/C
Big Art's Models	ME 163 "Komet"	33½" Tee Dee .049	2-ch R/C
M&H Hobbies	BD 5½ (semi-scale)	43" Tee Dee .049	2-ch R/C
Hobby Shack (Pilot kits)	Rickey Rat	34" Tee Dee .049	2-ch R/C
	Little Toni	38" Tee Dee .049	2-ch R/C

Tom Hutchinson with his Unlimited Dragmaster at the Blaine/Hastings FAI Finals, Labor Day Weekend, 1976. Dave Whatsistrum photo.

FREE FLIGHT

By BOB STALICK

• About the time this issue of **Model Builder** reaches your hands, the 1979 FAI F.F. Program should be under way. Although at the time of this writing, the entire 1979 program has not been completed for ratification, the Qualifying Trials have been approved to begin on March 1, 1977. These Q.T's are to be held in as many places around the country as possible. Since there are no changes in the format over previous years, fliers should know just exactly what to do. In case there are some new competitors who would like to give one of the three events a try, the Q.T. rules are very simple:

1. You must obtain a Qualification Performance Affidavit, either from AMA (for $5.00) or at the site of the Q.T. (for $6.00). This Affidavit will allow you to compete until you have reached the necessary qualification time, which can take as many Q.T's as you wish or need.

2. When you obtain your Qualification Performance Affidavit from AMA, you will also receive a number of vouchers, which must be certified by a C.D. and affixed to the surfaces of the models you are going to fly. These vouchers contain pertinent information about the models you are flying.

Bob Stalick "hisself" shows off his twanger hook-equipped Dragmaster A/2, built from a Hutchinson kit.

3. In order to qualify for the next stage of the competition, you must achieve a minimum flight time of 14 minutes in the 7 flights allowed.

4. Finally, you should have a valid AMA license and $5.00 FAI Stamp in order to compete in the program.

Competition at the Q.T. level will continue until 2 weeks before the AMA Nationals, which is going to be held at March AFB in California. Information on Q.T's which are going to be held in your area will be carried in Competition News, as well as by the numerous free flight newsletters which are published by active clubs. Since there are normally a large number of Qualification Trials, most competitors can fly at several, and don't need to overly concern themselves about not qualifying in the first one that comes along.

Join in on the action and get yourself into FAI.

AMA NATIONALS

As previously mentioned, with the AMA Nats scheduled for March AFB, near Riverside, California, westerners will have the opportunity to fly at this big event close to home for the first time since 1967, when the Nats was last held at Los Alamitos. Efforts are under way to hold the indoor events at the Santa Ana Blimp Hangar *(No, the Marines are stubborn. wcn)* one of the best indoor sites around. Outdoor free flight events will be held 12 miles from March AFB. According to the rumors I've heard, the site is large and generally excellent, with mucho chase area for the errant free flight model. The only pro-

blem could be from afternoon winds and the probability that it will be dusty and tough on engines due to the sandy nature of the dry surface.

Hopefully, this meet will draw the number of contestants which will encourage AMA to move the Nats back to the West Coast every so often, so that we won't have to wait ten years until the next go around.

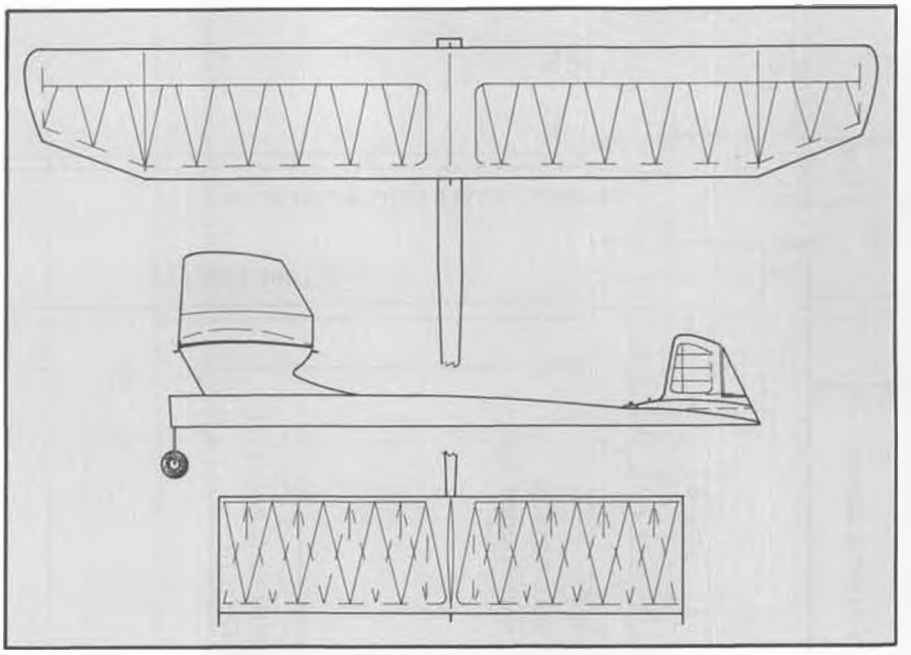
THREE VIEW OF THE MONTH . . .
FRANZEN A/2

Another Olofsson design, Lars brought this model to the 1976 Nationals from Sweden. The model was built just for this competition, and during testing sessions, it performed extremely well. A malfunction of the circle-tow hook caused him to tow it into the ground, doing untimely damage during the contest itself. The editor (good ol' B.S.) then attempted to help Lars with repair of the model, and managed to catch the wing in Lars' flight box, with resulting terminal damage. So, the Franzen (Friend, in Swedish) did not get to do its job during the meet.

There are a couple of features about the model which make it very appealing. One is the extreme simplicity of the design. The wing is built with the same rib template from root to tip. The trailing edge is tapered in order to provide some wash-out and lightness to the tips. The center section is flat, and even though it is connected with music wire, the entire assembly is strapped onto a platform built into the top of the fuselage. This allows for ease of transportation and storage, as well as providing a safety feature for the model in case of cartwheeling. The fuselage is ultra simple, and with the use of the fiberglas boom, can be built in an evening. A final feature is that in addition to tapered spars in the wing, and in order to distribute the load under tow, it also has 1/64 plywood sheet glued onto the wing both on the top and bottom of each main panel, which further strengthens these areas. Lars designed and built the model in a week . . . just before hopping in a jet to come across the ocean to compete at the U.S.A. Nationals. Most of us ought to be able to build it in at least a month . . . if we stick to it.

DARNED GOOD AIRFOIL — NACA 6306

While on the A/2 theme, I thought it would be a good idea to include another A/2 airfoil for your consideration. This one was developed right here in the U.S.A., for use as a glider section. It is one which I have used in the Simplex A/2 featured not too long ago in **Model Builder**, and it is very similar to the Mountie Section, flown by some of the Canadians. The attributes of the airfoil include sensitivity to lifting air, ease of adjustment, and a reasonable still air time. Recommended stab section is a very thin (6%) flat-bottom or slightly undercambered thin section. About 70 sq. inches in the stab with a normal 25 to 28 inch tail moment arm would do the trick.



MYSTERY MODEL for MARCH

MYSTERY MODEL FOR MARCH

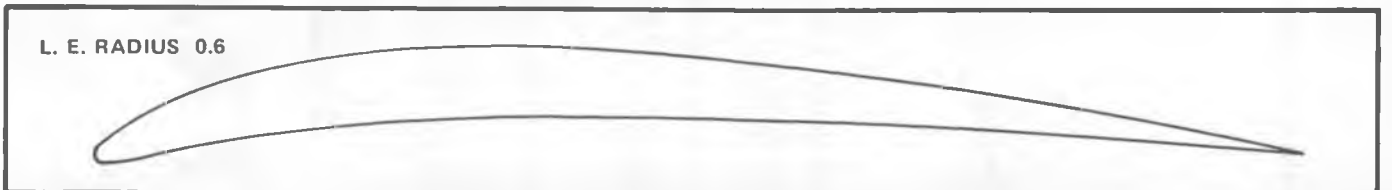
Well . . . Well . . . Well. Here we have one which shouldn't prove too much of a problem for those of you who were casting up gas models during the late 1950's. In fact, this is still a good ship for AMA competition. In its 1/2A version, it would be very competitive with today's scorchers. It featured a very thin undercambered airfoil, thin stab section, and auto-rudder. The version shown in the sketch accompanying this month's article is the A-B variation, but it shouldn't be a big mystery to us oldtimers, now should it? If you know of its name . . . or perhaps you even have a picture of yourself holding this model . . . drop it in the mail to Bill Northrop. He will send you a reward for your promptness and your intelligence . . . or is it memory? The only person who can't enter this little competition is Dirty Dan Rutherford. For him, the rules are different . . . he's got to accompany his answer with a 25,000,000 word (or less) explanation of how he got his name.

DO-IT-YOURSELF
CIRCLE TOW HOOK

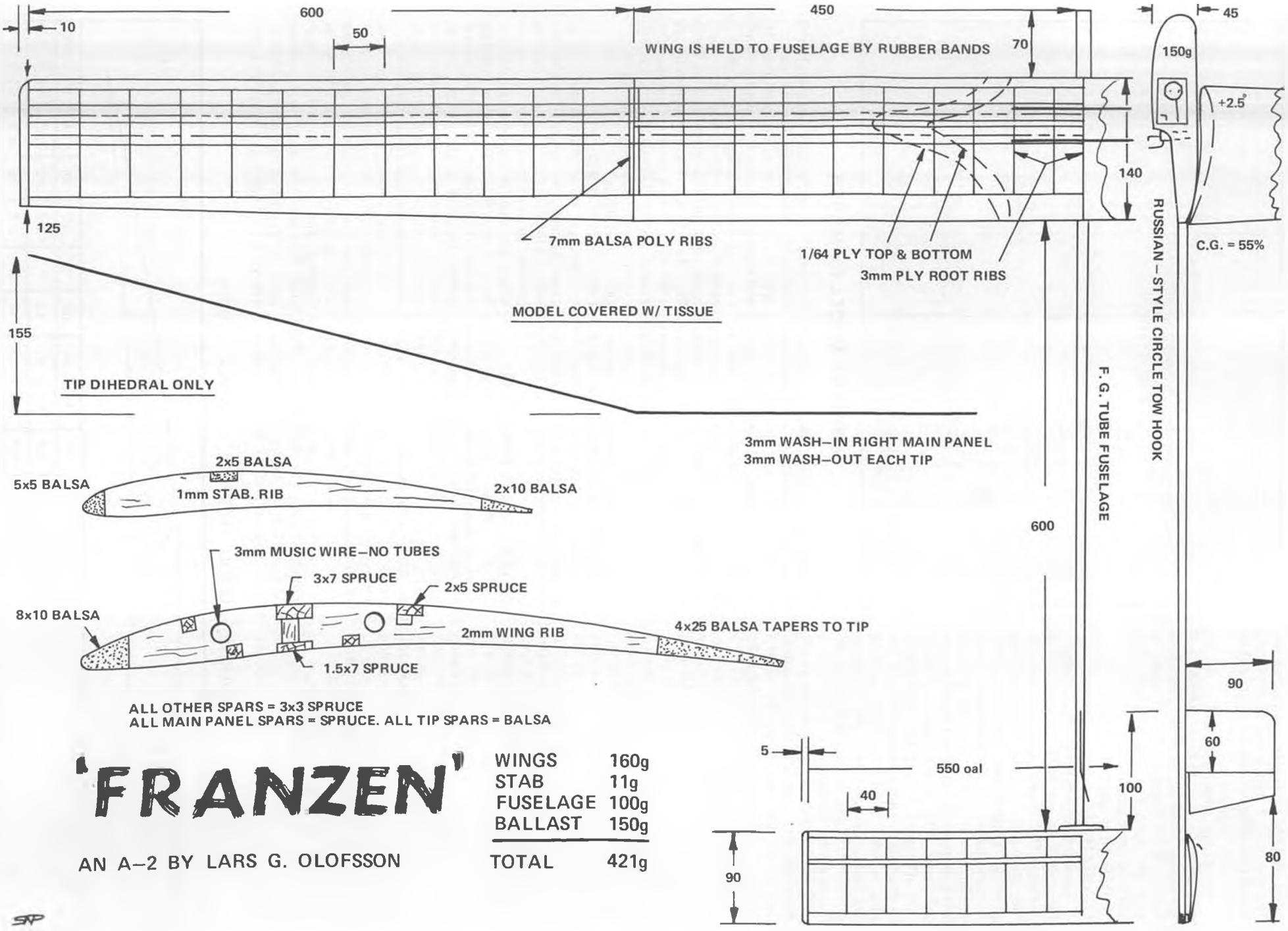
There are some of us in the field of modeling who recognize that we are indeed klutzes when it comes to putting together some of the mechanical marvels which are used in today's competition. Most of us would just as soon purchase the item in question from a legitimate source, install it in our models, and go out and chase the elusive thermal. Fortunately, there are people who do make and sell goodies that allow us to do so.

In circle towing, there are two examples which are commercially available for our use. One is the Maxaid unit, developed by Elton Drew in England, and sold through NFFS Supplies. This is a "Twanger" type and has some of the drawbacks associated with this style of towhook. The other is the

DARNED GOOD AIRFOIL — NACA - 6306



STATION	0	1.25	2.5	5	7.5	10	15	20	30	40	50	60	70	80	90	95	100
UPPER	0	1.6	2.4	3.7	4.8	5.8	7.2	8.2	9.0	8.7	8.1	7.2	5.9	4.2	2.3	1.6	0
LOWER	0	-0.4	-0.3	0	0.5	0.9	1.7	2.4	3.0	2.9	2.8	2.6	2.2	1.6	0.8	0.5	0



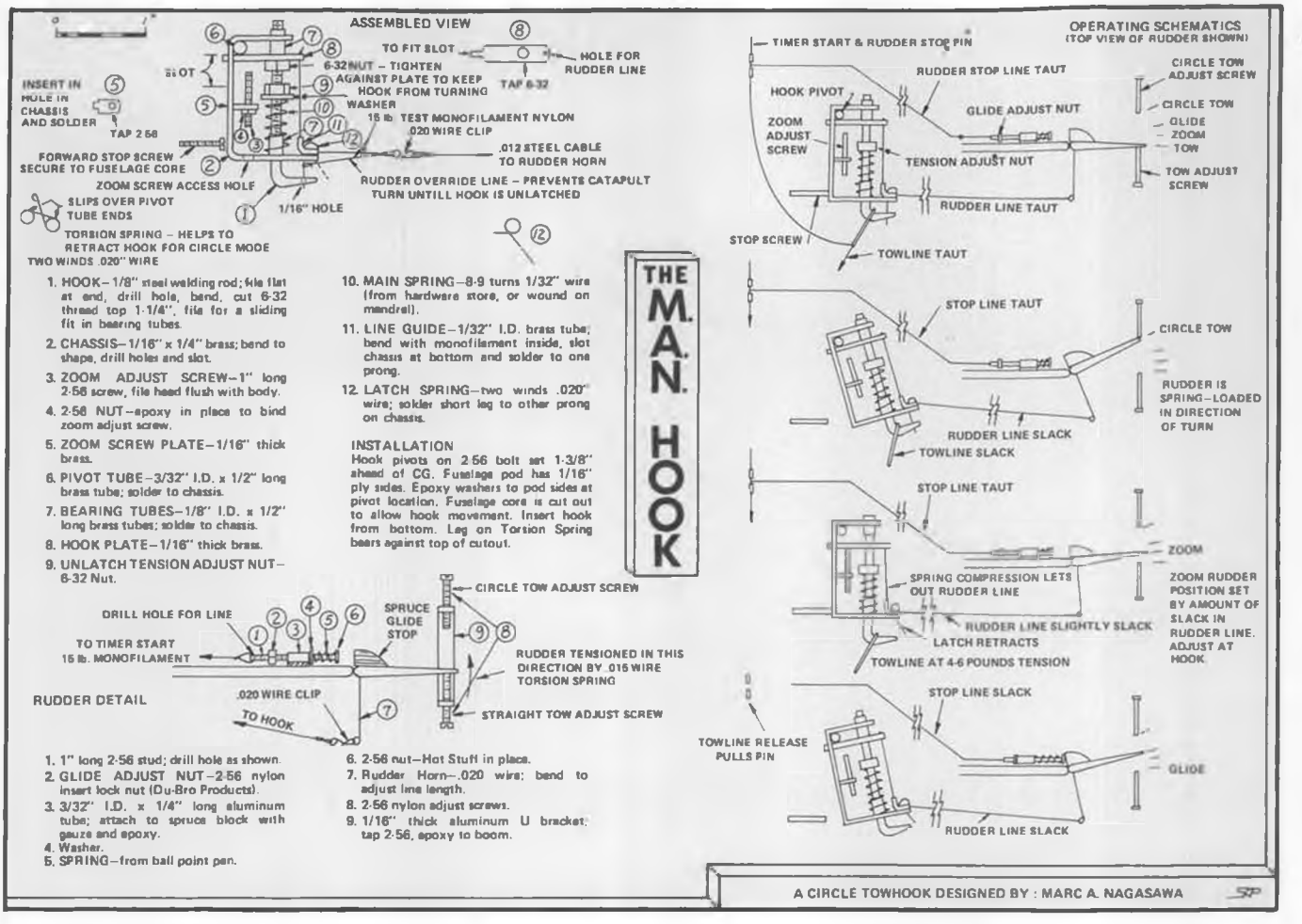
ALL OTHER SPARS = 3x3 SPRUCE
ALL MAIN PANEL SPARS = SPRUCE. ALL TIP SPARS = BALSA

'FRANZEN'

AN A–2 BY LARS G. OLOFSSON

WINGS	160g
STAB	11g
FUSELAGE	100g
BALLAST	150g
TOTAL	421g

SAP



Hatschek style towhook, which is available in kit form from Jim Crocket Replicas. The Hatschek hook hit needs to have some springs bent and then, with some judicious filing and drilling, it can be installed in your A-2.

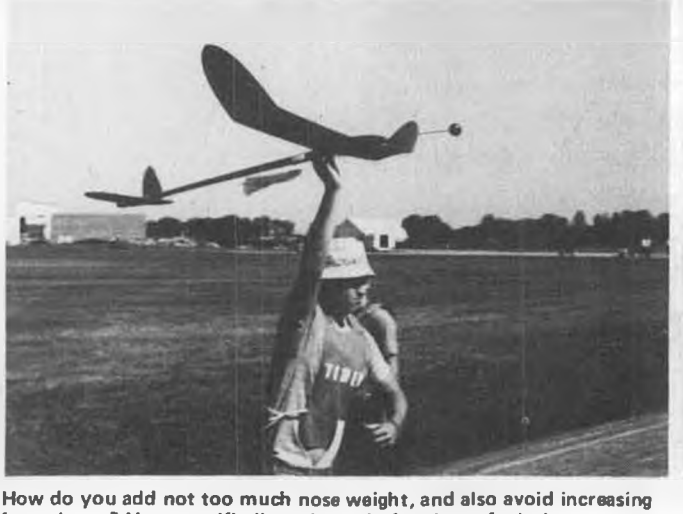
Fortunately, there are others who are always on the lookout for a better mousetrap . . . or circle towhook, if you please . . . and one which is simply made with non-exotic parts or tools. Such is the case with this month's feature: The M.A.N. Hook, by Marc. A. Nagasawa.

Before I get into the construction and operation of this neat little towhook, I feel I should mention a few words about Marc. First, he lives in Seattle and won the Boeing Scholarship Contest last year . . . at age 18. He is a quiet and extremely meticulous modeler who builds and flies some of the most attractive models you would ever care to see. Next month, I will feature his A/2 as a 3-view. Here's what Marc has to say about the M.A.N. Hook.

"The M.A.N. hook is an easy-to-make circle towhook that uses readily available materials, and does not require anything other than hand tools to make. The rudder stop shown on the plan is similar to the one used by John Clear, as shown in the September, 1975 issue of **Model Builder**, but allows for more precise adjustment of the various settings. My first A/2 used the Hatschek hook from the January, 1974 issue of *Flying Models*, but I encountered several problems with it, most notably unexpected unlatching. The M.A.N. hook was used in my Sa-Hal-Lee A/2 glider, and I prefer this type of hook to any other now."

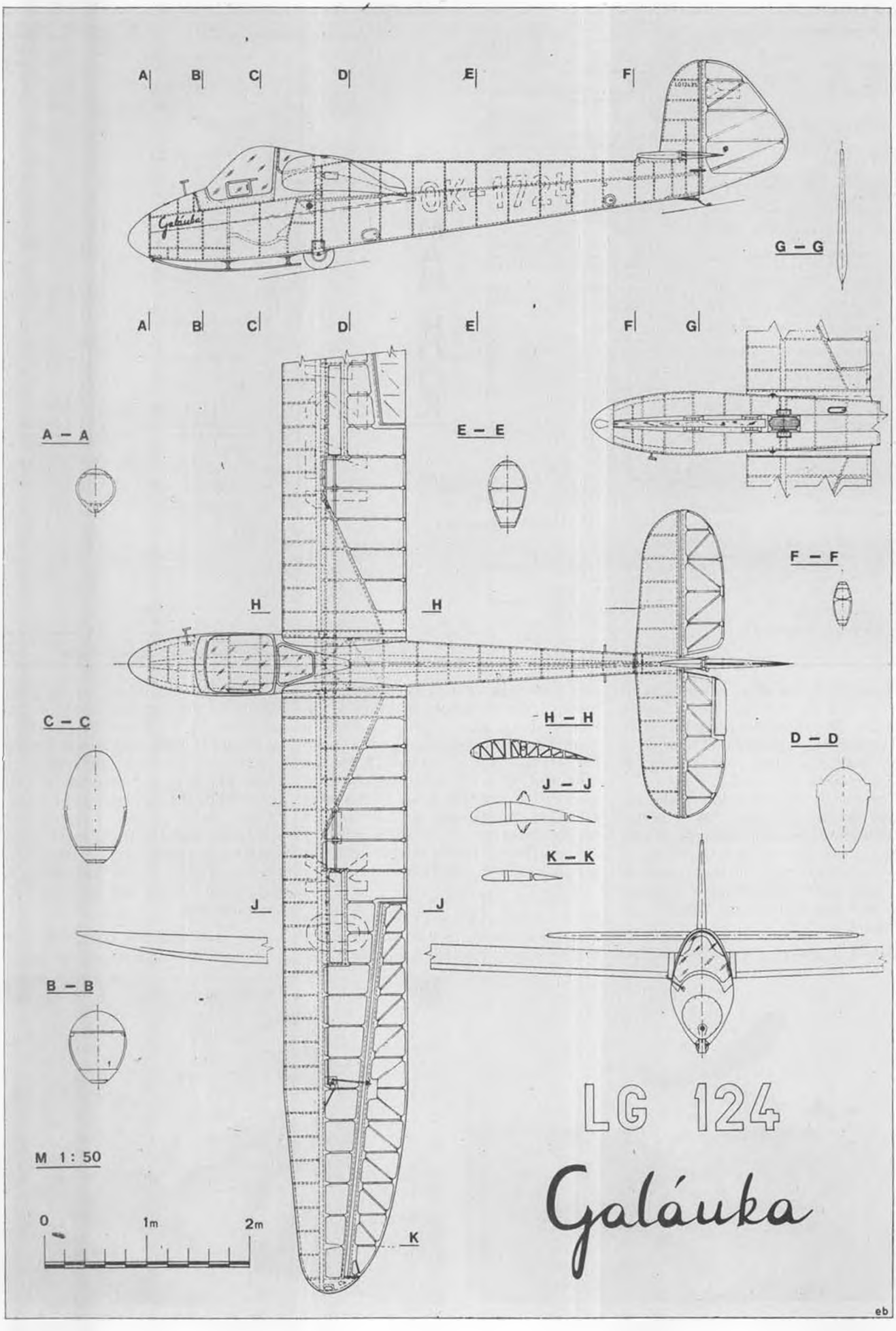
I should add one comment to the

Continued on page 72



How do you add not too much nose weight, and also avoid increasing frontal area? Hang a golfball on the end of a piece of wire!

Lars Olofsson dismantles Franzen A/2 at the '76 Nats after flight box chewed off a wing panel (with the help of our B.S.!)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FOR Ms ONLY

(Mrs.) CHAR ROHRING
4494 Tanglewood Trail
Saint Joseph, Mich. 49085

"I wouldn't worry about it. A lot of people spend more time with their hobby than with their job."

• Flu season is past, thank God. Anyone with a modeler husband knows they must guard his health. Would you like to become heir to your basement? The very thought should encourage us all to take good care of the R/C flier when he hits the bed as a patient. The world knows the trials of caring for a sick man, but caring for a sick modeler takes on new proportions.

The sick modeler must have an assortment of hobby gear about him. Who are we to say a fever isn't lowered by the coolness of a frozen juice can muffler pressed against the temple? Did you ever hear of propping a set of plans against a pillow so you could read while flat on your stomach with your head turned to the side? Would you believe taking model airplane plans along to the bathroom when the reason for the trip was to throw up?

I want to share a medical truth that came to light this past winter. By careful observation of Bill's after-working-hours habits, I came to this interesting conclusion. His hobby interest is a barometer of his health. To be more exact, a man's willingness to follow his hobby is a good indication of his well-being.

Here are a few guidelines to help you evaluate the health of your mate.

Visible condition: pale and off his feet.

Auditory input: "I guess I'll go to bed early and look at these plans."

Diagnosis: a mild case of something or other. Don't worry!

Visible condition: slightly nauseated and feverish.

Auditory input: "If I build and get some new smells in the house, I know I'll feel better. That Lemon Pledge is so strong."

Diagnosis: a mild case of something or other. Don't worry!

Visible condition: pounding headache that leaves six deep forehead lines.

Auditory input: "I'm going to call Gene Ireland to see if he read about the B-25 for sale in the Trade Lines."

Diagnosis: a mild case of something or other. Don't worry!

Visible condition: stiff aching leg joints causing a Charlie Chaplin-like walk.

Auditory input: "If this is the Guillain-Barre syndrome, I hope I'm paralyzed in a sitting position so I can still build."

Diagnosis: a mild case of something or other. Don't worry!

But beware. No matter how minor the visible condition, if he doesn't want to talk about, build, or fly an airplane, call your doctor at once. He's sick! Here is a truism worthy of Benjamin Franklin. A modeler is ill when his hobby fails to excite him.

During this last flu season, Bill had a headache that lasted for days. His head pounded and he could stand no noise louder than the pages of this magazine turning. The usual bell that our family gives to the sick member just wouldn't work. Bill devised a simple method of getting his needs attended. He wrote notes on 5x7 sheets and folded them into airplanes. Then he sailed them out the bedroom door and down the stairway. He knew I would occasionally pass the foot of the stairs as I did the 259 things a woman does around the house on a Saturday afternoon. These airplane messages covered a variety of orders from, "Water!" to my favorite which read, "Dear Char, I need the Sept. 1972 issue of **Model Builder**. It's got a purple border on two sides of the cover. I think there's an article in it about a big 'paper' glider shaped like this note. Thanks. Love, Bill" (Check page 31 of that issue.) Now how's that for memory from a guy who just yesterday asked me where we kept the toaster!

I have time for one final reminder before I go to dash off a notice of cancellation to Trade Lines. If there is a sick modeler in your home today, you can go serenely about your business as long as he's well enough to reach a limp arm over the side of the bed and drag a model magazine off the towering stack. He's not really sick, he's just in love. •

Nurse, what does he mean, "Is there a window in the recovery room overlooking the parking lot?"

F/F . . . . . *Continued from page 69*

preceding notes. Lars Olofsson seldom uses the circle tow capabilities of his gliders, believing instead that it is seldom necessary if you wait until thermal air is coming through. The prime reason for such a hook, in his explanation, is for the zoom release function, which allows for an altitude increase over the more simple kinds of towhooks. Anyhoo, you pays yer money and takes yer cherce.

In attempting to draw this column to a close this month, I would like to encourage all of you out there in **Model Builder** Free Flight land to consider sending pictures of yourselves with your models in action directly to **Model Builder.** How else will you get your name in lights and your activities recorded on the pages of time (oops, different magazine)? Nonetheless, if you tire of seeing pictures of the same old N.W. modelers all the time, do something about it.

Also, to those of you who have written in recently and are still awaiting a reply, keep the faith. I'm catching up with the correspondence, but it does take awhile.

While you are waiting, build a Nordic and a Towhook, enter the Qualification Trials and make yourself famous.

See you next month with more.

The drawings accompanying this article are self-explanatory, and should allow you to make one up in your spare time over the weekend. Along with this hook and the Franzen A/2, you should be ready to go test flying before your area holds its first FAI Qualification Trials.

Marc sent along the following notes about the operation of the towhook:

1. With the tow ring on the hook, the hook latched, the pin holds the timer off and the rudder plunger forward (with spring compressed). When the towline is pulled under tow, the rudder is held straight (adjustment is by straight tow adjust screw at rudder).

2. A hard pull of 4 to 6 pounds unlatches the hook (unlatch tension is adjusted by moving the unlatch adjust nut up or down on the threaded hook), spring compression allows slight slack on the rudder line, and the rudder moves slightly to give zoom release (zoom deflection is adjusted using the zoom adjust screw).

3. Model is released into a thermal in a climbing turn, the release pin allows the plunger to push the rudder back to the glide setting (adjust using the glide adjust nut) and at the same instant starts the timer. ●

Plug Sparks . . . *Continued from page 25*

flying R/C were originally free flight boys, and with the field opening up for this activity, it was only natural free flight flying would spring up. Despite what each side has to say, it is simply a case of good back scratching. Both sides profit!

The Old Timer R/C Assist events really came of age when the SAM Champs were hosted by the Old Time Eagles (an organization put together by Woodman and Beshar) at the Lakehurst NAS. With fellows such as Jack Bolton and John Lord offering to host the meet on a Naval Air Station, it was a foregone success.

At this meet, eight old timer R/C events were offered, plus the new R/C Texaco Event as sponsored by the writer. This, in conjunction with twelve free flight events, made it the biggest of all SAM Championships from the standpoint of number of events offered.

That same year, the O/T R/C Events were continued at the Nationals (Lake Charles), on a Wednesday, at the LARKS field, to complement the F/F events annually held on Friday. In comparison to the SAM Champs, only four events were held, yet enthusiasm was further kindled.

With Joe Beshar, now President of SAM, the O/T R/C movement continued to swell. The announced goal of 1000 members was easily surpassed in the first year, with old free flighters flocking to this new-found form of fun.

Of course, every new movement has its growing pains, and the O/T R/C phase had its problems. In an attempt to reduce the amount of power applied to the old time designs, Beshar arbitrarily decreed a power loading of 225 sq. in. per tenth of cubic inch displacement (This in spite of a contrary vote!)

Modelers have pretty well accepted this loading, but a new problem arose in the form of hot Schneurle-ported engines. These engines completely antiquated the power loading rule to the point where several committees have been appointed to study the problem and come up with recommendations.

The writer's pet event, R/C Texaco, has also come in for its share of lumps,

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particularly over converted glow engines. which out-run and out-economize the old gems. This will also be considered by the Rules Committee.

Regardless of the foregoing, old timer with radio assist is here to stay. There can be no arguing the charm of old timers, and in conjunction with radio, the big monsters can be flown with impunity in the cities. Nothing like a slow, graceful fly-by in a precision event.

In wrapping up the report on O/T R/C developments, SAM 21, the club responsible for running the O/T R/C Events at the Las Vegas SAM Champs, will be staging separate events for ignition in the R/C Texaco Event, SAM 21 is pioneering the way back to competition ignition flying in R/C old timers. The name of the game is FUN!

ENGINE OF THE MONTH

This column has run drawings of the early Ohlsson engines (Miniature and Gold Seal), but the engine that put Ohlsson on the map was the incredible Ohlsson 23.

First introduced in the September 1938 issue of Model Airplane News, this engine was a sensation. Here was a small motor that would start and run *reliably*. Ohlsson engines were so straightforward in starting, any newcomer to the game could operate the 23 with very little trouble.

For a little background, Irwin actually ran a contest to name his new engine. Wouldn't you know it, after numerous ideas and names, such as "Ora," "Zip", and "Whiz", he finally settled on the most logical name, the Ohlsson 23. In later discussions with Ohlsson, he freely admits the Ohlsson 23 was his real "bread-and-butter" engine. Exact quantities of production engines are a little nebulous, but by the time World War II arrived, over 50,000 had been produced!

Ohlsson introduced an innovation in engines when he spot-welded the cylinder with a die-cast aluminum crankcase that featured an integral exhaust stack and intake tube. The cast aluminum front cover (which was the only way to get the piston and conrod out) was bolted to the crankcase. Interestingly enough, this front cover included the bronze main bearing and ball bearing thrust washer.

It was this simple arrangement that allowed Ohlsson to produce the front rotary valve conversion which ran much more powerfully than the original three-port arrangement. This postwar addition was regarded as a stopgap by most (and even by Ohlsson), as the Ohlsson 29 and 33 were engines designed specifically for the front rotary valve crankshaft.

As noted before, the cylinder and cylinder head were machined from one piece, the inside being "blind" bored to size. Interestingly enough, where the Ohlsson 60 had a cast iron piston, the Ohlsson 23 featured a stamped steel type. In talking about this unique engine, a prospective buyer of an old Ohlsson 23 would do well to look carefully at the spot welded connection between cylinder and the crankcase. Any looseness here indicates an engine with trouble.

Ohlsson engines were modified slightly over a ten year period; the most obvious external feature was the elimination of the beam mount lugs on later models. Of course, many modelers, accustomed to mounting their engines this way, finally forced Ohlsson to issue a set of stamped fittings that served to mount the engine on beams.

When the Ohlsson 23 first made its appearance, it turned 7,200 rpm on a 10x4 prop. This was an exciting advance for small engines, and popularized the Class B event to the extent that practically every kit of that era showed an Ohlsson 23 in its nose. It wasn't until years later, when the Class displacement size was set at .29 for Class B, that the Ohlsson found itself outstripped for performance in its class by the .29 engines. Almost a case of rules changing the engine off the market (we don't do that today, do we? Haw!) *(No, we don't! wcn)*

For the technically minded, the Ohlsson 23 featured steel tubing wrist pins, and a die cast connecting rod with a bronze bushing at the lower end. The carburetor and gas tank being attached to the intake tube, made a convenient and neat method of keeping a model from becoming oil soaked.

The enclosed timer, a feature originated by Ohlsson, had a pressed steel housing. Timer points were readily accessible, and could be easily adjusted by screws on the timer housing. Probably the only weak link was the floating point system, which sometimes lost a point as these were simply spot welded. In all fairness, it must be noted that Ohlsson timers were quite trouble-free. particularly when compared to other engines of its time.

Ohlsson 23 engines were what the name implied, .23 cu. in. displacement,

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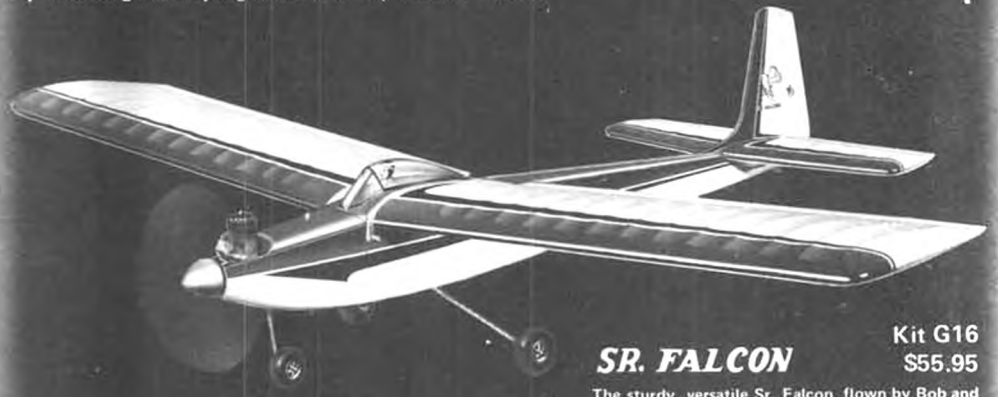

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SAM REPORTS

Just finished a long distance call from Tim Banaszak, SAM Secretary Treasurer, and the following tidbits of information are offered to you, the reader.

A new SAM decal (1/2 size) will be available from Tim at 25¢ each. The SAM patch (for sewing on shirts) is still available, and we believe the price is $2.00

A new O/T club, the MAM (Michigan Aero Modelers) has been organized by Karl Spielmaker and Wayne Cain. This will replace the old GRIMES Club (Grand Rapids Ignition Model Engines Society) in Michigan, particularly in the Hastings area.

In spite of the grumblings and pains of growth, SAM is now over 1400 members strong. Great stuff! We are now to the point where SAM is recognized as the largest individual organization in the AMA framework.

Incidentally, for those who are wondering how the vote came out for the converted ignitions, the vote was 197 for and 160 against *(Not a very clear majority. wcn)* Al Hellman has been appointed Chairman of the Committee on Converted Engines and will pick his committee. According to Al, he will get himself a real representative group this time which will better represent the average modeler in SAM. Let's hope his committee can come up with some recommendations by the next SAM Annual Business Meeting in Las Vegas, June 29, Stardust Hotel & Casino.

News from the AMPS of Northern California indicates they finally will become a SAM Chapter. This is always a source of amazement to the writer. Those who profess the most interest in Old Timers do not support the only organization for O/T. One other surprise is that most SAM Chapters do not require all their members to join SAM, yet claim to be the leading lights in the SAM movement.

There is no intent to point the finger at anyone, but only to remind one and all that any organization is only as good as the membership, its officers, and the activity. You can't do anything by non-participation!

FLIGHT PLUG FLASHES

Just read the last issue of the SCIF newsletter, "Flight Plug", to be put out by the late editor, Brick Brickner. Among the interesting reading was the fact that Roy Turner's (Denver) Albatross, which had been missing since the Memorial Day Free Flight Championships, has been found. Recovered by a cowboy 40 miles from the Taft site, the only thing remaining was the Super Cyclone engine and fuselage front-end. That California sun will bleach the bones of anything!

The SCIF Year-Ender contest, held in late December (does this get to the easterners!) was held at Lake Elsinore on a beautiful day. Attendance was way down. Small wonder! After fifteen or more O/T contests in the year, one can get his fill of flying.

Most of the flying (before the afternoon wind came up) was done by a select few who could climb above the 300 foot heat inversion. Those lucky ones were Larry Clark, winner of the .020 Replica Event; Rudy Calvo, .020 Replica Antique; Ray Berens, who won both Wakefield and Commercial Rubber Events; and Hal Cover, who dragged out his old Jasco 100 to win the Towline glider event.

SPECIAL PLUG

Gene Wallock, of P&W, producers of partial kits for old timers, announces that he is producing a partial kit for the Dallaire Sportster, a nine foot cabin model used quite successfully by the writer for many years. This is in addition to the full kit being marketed by M&P (Dick Mathes) in Texas.

The point Gene wanted to make is, that regardless of which kit you purchase, you should look into the package offer being made by Superior Balsa for

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the Dallaire wood. They are cutting spruce and balsa in four and five foot lengths, just the thing for building long fuselages and big span wings. Gene sez the spruce longerons, spars, plywood doublers, etc., are simply bee-youti-ful! Check the ads in **Model Builder** for the address. You won't be sorry, as Superior Balsa is also offering a special price on this package!

BOWDEN CONTEST

Received a most enthusiastic report from Jim Dean, news editor of the SCAMPS newsletter, "Hot Leads", regarding the Bowden Precision Contest held at Lake Elsinore recently. He reports an excellent turnout on a chilly day (50 to 60° F is cool?) where everyone enjoyed themselves.

Imagine flying one at a time as your name is called. Does this ever change the tempo of a contest! Best of all, there is no waiting for a time, no second guessing for a thermal (or lack of it in this case), and best of all, you are not restricted to the type model or engine you care to use. Somebody has re-discovered FUN!

Three flights were given to each contestant, with the minimum total deviation from two minutes in each flight being adjudged the winner. Flight times went something like this:

				Total Deviation ↓
1. Hal Cover	2:09	2:06	2:35	0:50
2. Gene Wallock	2:29	1:35	1:59	0:55
3. Al Hellman	2:06	2:12	2:38	0:56

How about that for the first three places? Close competition!!!

SAM 7 "YANKEE"

The masthead of SAM Chapter No. 7 (above) shows that Carmen Botticello is still the newsletter editor. Of particular interest to the columnist was the notice for the 1977 contests: "All ignition engines converted from glow, will be handicapped the same as for glow engines." Talk about an over-kill! The pendulum swung too far that time! The first thing that occurs to the writer is what do we do with all those McCoy engines that have been switched back and forth? Methinks a can of worms has been opened.

FLORIDA FLASHES

The writer expressed considerable dismay over the demise of Jim Kloth, as Jim was the main reporting source from the "Deep South". However, the slack has been taken up temporarily by "Gorgeous Gawge" Perryman who submitted a report on the King Orange International.

Held on December 23 through Jan. 2, George felt this was the longest KOI to date. The weather didn't help a bit, as it was generally cold and windy (Better not let the Florida Chamber of Commerce hear that, Georgia Boy!), a novelty in Jacksonville, Florida. Several mornings featured ice, and the cloudy, wet wind didn't help things a bit.

With flights limited to two minutes "maxes", very few models were lost. In fact, the rubber event was the only event to feature maxes across the board . . . George Perryman, natch! Wayne Cain, all the way from snow-bound Michigan, was the busiest guy on the field winning .020 Replica, O/T Ignition, second in O/T glow, and second in R/C Assist. How about that?

To round out the winners, Tom McLaughlin won first in O/T glow, with Phil Peach taking three places in the various events. Also noted at the

KOI were several Canadian boys who made the long trek to Jacksonville. George concludes by saying he might try gas. Stay where you are George, we don't need any more hot competition in the gas event. The Fort Worth people are killing us now!

BAMBOO

When building old time models, rubber powered in particular, it has always been a problem to locate bamboo for the wing tips and in some cases, the tail outlines.

The writer used to haunt rug sales companies, in particular those importing foreign rugs. These generally come rolled up on a bamboo pole. If you are lucky enough to acquire one of these, you will have enough bamboo to build a thousand models.

However, for those who have been unable to locate bamboo, Carter Watts of the Utah State Aeromodellers, comes up with a unique source. He noticed in the local supermarket at the Specialty Foods section, they offered a bundle of 500 skewers for $2.29. All bamboo!! He found they were 8 inches long, perfectly round and clear grain from one to the other. Carter finds other uses for these bamboo strips, such as front and rear wing hold-down pegs, wear pieces for sub-rudders, hand launched glider leading edge and a myriad of other uses. In short, use bamboo!

ACETATE SHEATH

Some issues back, we mentioned that acetate sheath, a material used for women's under-clothing and costumes, made an excellent covering material. Canadian modeler Don Dodsworth, reported that it accepted dope, shrank nicely, and best of all, came in a myriad of rainbow colors.

As a follow-on, Doug Wilkie, now located in Denver says you don't have to dope if you don't want to, as it will shrink (using a heat gun) very similar to Monokote. How about that? He also states painting is not necessary, nor is it necessary to hunt for the right shade, as the material can be dyed with RIT coloring dyes. You should look into this material if you are tired of paying astronomical prices for silk!

SUBWAY STORIES

We have all read in the old magazines about the experiences of the New York modelers and the way some took the subway to a contest. Tim Dannels sez this is true, but not during the peak hours when humanity is jammed into the cars with a shoehorn. This image of a modeler in a mass is entirely erroneous. Several New York modelers, who will remain anonymous, freely admit that they waited for an hour or two until the rush was over before they would risk their models in the subway crowd. Not everyone knew why Louie Garami, who brought his model to the contest in a paper bag, left the contest early. He was just trying to beat the 5 o'clock crowd home! The writer feels he has destroyed another myth, but ya gotta call 'em as you see 'em!

WRAPUP

In the last issue, this columnist announced that the Old Timer Events at the Nationals would again be held this year for the benefit of those modelers who are unable to attend both the SAM Champs and the AMA National Championships. Announced were the free flight events on Friday, Aug. 12, but what we missed was the O/T R/C Events on Wednesday, Aug. 10. This will include Class A, Class B, Class C, and Texaco Events. Trophies to third in

each event. The place will be announced prior to or at the Nationals, as the local R/C club in Riverside must be contacted for use of their field outside of the base. We'll have the usual O/T Banquet, so don't miss the fun! ●

R/C Pylon . . . *Continued from page 40*

any sleep. No one in the other room responded to the knocking. A visit to the manager's office elicited no help, as nobody would respond to their ringing bell. Back to the objectionable room, repeated knocking on the windows, doors, and outside walls getting no response. Al and Jim went back to their room and Phil and Bill were going to try to make the best of it.

About twenty minutes later Al and Jim were aware of the high-pitched scream of two racing 15's leaned out to the maximum. Back they trotted to Phil's room. These guys were running their engines in the hopes of creating enough disturbance to get the other room to quit making *their* noise. No success, so they shut the engines down to keep from ruining them or wasting the few good runs they normally have.

Now, in addition to the odor of fuel, they also had exhaust fumes to kill the other unsavory smells. Well, it was apparent nobody was going to get to sleep until the problem was solved. By now it was a matter or principle, so they all put their heads together to come up with a solution.

Since one of the guys was an electronics engineer, he was the logical one to come up with the idea of shorting out the motel's entire electric supply in order to cut the electricity to the offending room and thereby cutting off the music. Well, it was a great plan, carried out with great finesse. There was only one minor problem . . . the only power they could manage to blow was their own room. The music continued for about another 10-15 minutes while our heroes tried to figure out what to do next. Suddenly and without warning, it stopped. Taking advantage of the 4 a.m. miracle, they went to bed with thoughts of the 9 a.m. race. And off these stalwart gents went that morning, with no idea at all about who could have let the air out of all the tires on the other cars parked at the motel that night . . . Like I said, it was a matter of principle.

Or, how about the several incidents we've personally witnessed of exceptional displays of flying ability. At a race in Chicago, we watched a guy by the name of Frank show us his Miss Dara's ability to do rolls immediately after take-off. Nothing to it, you say. Well, Frank didn't crash as you might have expected. He merely did one complete 360° roll and continued on to Number 1 pylon and then completed the race. Sure was a beautiful roll . . . he didn't lose heading or anything.

Same race, different pilot, same type airplane . . . Miss Dara . . . Jim M. was circling the pylons at a high rate of speed when he strayed a little too far from the course and flew through some trees. The plane was lost from sight briefly, and when it emerged from behind the trees it appeared that Jim had lucked out, as the plane was still traveling in a straight line at high speed. Then someone noticed something bright flutter down from the trees. At that same instance, Jim M's plane went into a serious of high speed snap-rolls and it became evident that the fluttering object was his right wing panel. Pow . . .

scratch one Miss Dara!

Same field, another race, another time, with 40 mph winds blowing cross wind to the pylon course. Bill P. demonstrated his piloting skill when on one takeoff the wind blew his plane to the right when his helper released it. When it did that, it caught the right wing-tip on his flight box, causing the Form I "lil' Toni" to turn 180° to the original take-off direction (Pause a minute and try to comprehend just how fast all this is happening; with something like this going on there is no time for the pilot to think. Everything is automatic, instinctive reaction). With the aircraft now rapidly approaching the pilots gathered between Pylons 2 & 3, Bill took one of the few options open . . . he continued to fly the aircraft and made a right hand turn to head back toward No. 1 and continue the race. After the race was over, and everybody had a chance to talk about it, it was probably more unnerving than when it was actually happening. What would your reactions have been, seeing a racer rapidly approaching you and no place to run to?

Enough of that. How about a helpful hint?

We recently obtained some liquid latex from a local sign shop. These people use the stuff as a masking medium. The latex is a water-based material that is sprayed on. It dries to a tinted transparent film. When dry it can be drawn on to lay out your design. The design is then traced over lightly with a sharp Uber-Skiver knife and the film then peeled off of the area to be painted. We've had best results in removing the rest of the protective mask while the paint is not yet dried. Waiting until the paint dries might necessitate tracing around the design with the knife again to cut the paint loose from the mask. This needs to be done because the latex isn't always strong enough to tear the paint cleanly along the masked lines, and it may also peel some of the painted-on design loose.

One of the better features of using this type of masking is that if you're doing a multi-colored or complex design-over-design type paint scheme, you can see what you've already done and it makes it easier to lay out the succeeding color patterns.

The latex mask also does not grip as tightly as masking tape or plastic electrical tape might, and therefore lessens the risk of pulling the paint loose from the aircraft when removing the masking.

We've even done some pin-striping by laying out the stripes with trim tape over the masking film and then tracing along the tape with a sharp knife. The tape is then removed, and along with it comes the latex masking. Why go to all that trouble when you could just use trim tape? Beats the hell out of me . . . well, really, if you then sand the airplane over all and then spray with clear, there will no longer be a ridge along your trim stripes. Just another step in helping your aircraft to be at the head of the handicap line and getting you those precious seconds in every race by being able to take off first in your heats.

Just one word of caution with using this type of product: The latex must be sprayed on fairly heavily, because if it's too thin when you go to remove it, it will stretch, and if the film strength isn't great enough, it will tear and snap back . . . probably right into that just painted area. We pass that

along as hard-earned, first-hand knowledge. The best way we found to spray it on is to spray a full coverage coat just this side of causing it to run, and letting that dry only until it begins to get tacky and then spraying it again, and then repeating the process once more. If you let the film dry too long, you'll find that instead of having a nice thick film you'll have several layers of film and will run into problems removing it. *(Apparently Jim has not seen Ralph White's Fliteglas Models ads featuring Liquid Masking Film. This material is similar to the stuff Jim has described, but according to Ralph, it does not cause the problems Jim experienced with the latex he purchased locally. Shows to go you, Ralph, you should be advertising in* Model Builder! *wcn).*

NEWCOMERS TO RACING . . . HOW DO YOU START?

So you can take off and land by yourself and the airplane is under control 95% of the time when you're flying, and you've seen a few Formula I races and would like to try it. Well, maybe you ought to hold off on that Form I for awhile. A Quarter Midget is really the way to get involved without being way, way over your head.

First off, you should invest in the highest quality radio gear you can possibly afford. You need a set that has good reliability, for at the speeds you're going to constantly be, you don't want to take any needless chances with radio problems. Another thing you want in your radio is good servo resolution and repeatability. You want your servos to return to center exactly the same each time they've performed a control function, because if they don't, the airplane will always seem to change trim on you as you're flying.

Again, because of the speeds at which you'll be flying, even slight control surface deviations will be magnified greatly. Engines have pretty much standardized during 1976. The only competitive out-of-the-box engine was the Rossi. As of late, the new Cox 15 has shown up at a few races, but really hasn't proven itself equal to or better than the Rossi. Nor has it been available long enough to RC racers to prove its longevity. The little feedback we've gotten on it indicates that, on the same prop, it turns at or slightly greater rpm than a Rossi. However, going on the great reputation that Cox has built up over the years, we're sure that it's going to be a good engine. So you guys pay your money and take your choice.

The best insurance you have of having a competitive engine is to take care in breaking it in. There are as many different opinions on how to correctly break in an engine as there are racers. We suggest you follow the manufacturer's recommended break-in procedures, as they developed it and should know what they're talking about.

In the case of the Rossi, the directions are in Italian, and unless you read the language, it may be a bit difficult to understand. May we just suggest you break it in in a clean area, up off the ground, doing so slowly, in short, one or two-minute running sessions and allowing it to cool in between runs.

The most important thing about breaking in an engine in is to not get the needle setting too lean and allow the engine to overheat. The runs should progressively get longer and the engine should be brought closer to normal operating conditions, i.e., rpm's and operating temperatures. Again, watch out for lean runs; that's probably ruined more engines than anything else.

Now you need an airplane. You probably can't go wrong by starting out with an available kit. Read some of the contest reports (preferably in this magazine) and see what airplane is doing the winning and try to locate one of them. Flying the same plane as the winners doesn't guarantee that you'll win, but at least it should be an indication that the plane is flyable.

When building, bear in mind that you want to try to come out with a finished airplane weighing as close to 2-1/2 pounds as possible. While a plane weighing as much as 3-1/2 lbs. can still win, you're going to give the guy with a minimum weight plane an added advantage. Keep in mind that the engine will weigh approximately 7 oz.; your airborne radio (depending upon size) will weigh at least 10 oz. installed; landing gear and wheels add about 3 oz. The weight of these items adds up to about 20 ounces, leaving only about 20 ounces to complete the airframe and finishing process. A 2-1/2 pound airplane, ready to fly, can be done, but it takes careful work and attention to do it. If yours is a little heavy, don't give up, because with care and devotion to the cause,

you'll get there.

What can you expect at a typical race? A lot of help! You'll find that with very few exceptions, all of the racers you'll meet will be more than willing to give you whatever help you need. If you need a glow plug, you'll get one; need a competitive prop, you'll get one. Racers will share everything you might need to race, many will simply give you whatever you need, but don't abuse their generosity . . . at least offer to pay for whatever you use, many times payment will be refused. I'm not suggesting that you don't try to come prepared, because if you habitually show up without your equipment, you'll find the well running dry.

All the advice you could possibly want is available . . . some good, some bad. Again, try to pick someone who's winning and solicit his advice. At least you'll be able to feel confident he knows what he's talking about. Of course, you are always welcome to write to us in care of the magazine and we'll do our best to give you a satisfactory answer.

Before you enter your first race, get out and lay out the actual pylon course, complete with pylons, and practice-fly. *Don't* try to fly right on the deck and close to the pylons right off the bat, because contest nerves and the other aircraft in the race completely change your flying abilities and reactions, but you'll at least know what's expected of you and you'll probably be going in the right direction.

Don't expect to begin picking up trophies right off either. Unless you've a great deal of flying experience and can exhibit your abilities under moments of tension, stress, and excitement, there will be a learning and developing process to go through. While you should strive to win every race, you should also be concentrating on the things that can really put you on top. Strive to finish every race, learn to fly a consistent course, and most of all, learn to fly without having to think about every control stick movement needed to get you where you want to go. Do these things, and eventually the winning will come. And how sweet it is!

Why did we suggest you choose Q-M over Form I? Only because of the speed difference between the two. A Formula I that has been built straight and true, has the C.G. in the correct spot, and has the correct amount of control surface deflection, will be as easy to fly (or easier) as the Q-M. The thing that makes the Q-M a better choice in the beginning is that you have twice as much reaction time as with a Form I. One last suggestion . . . if you haven't made up your mind as to whether you want to race or not . . . DO IT! Racing is really WHERE it's at!

See you in Toledo, Ohio, the first weekend in April.

QMRC NEWS

The 1976 season of fast and furious racing under conditions from ideal to "what the hell are we doing here?" wound up with the Top Five winners as follows:

	NAME	AIRPLANE	RADIO	ENGINE
1.	Bob Root	Lil' Cobra	Orbit	Rossi
2.	Bob Novak	Rickey Rat	RS	Rossi/Cox
3.	Kent Thomas	P-39	RS	Rossi/Cox
4.	Nick Nichols	Lil' Cobra	Kraft	Rossi
5.	Eloy Marez	Lil' Cobra	Orbit	Rossi

The latest member of QMRC is MB's own Kathy Root, who decided to shed her "Call Girl" title, and become a "Callee". She entered the RC Bee hosted Mile Square race, January 30th, and placed Third in Standard Class. To our knowledge, this is a first in Quarter Midget Racing, and hope that it gets some of the other ladies in the ranks stirred up enough to join us.

We all know that it is not recommended for a husband to teach his wife to drive a car. Apparently, the same applies to flying R/C, as previous attempts by Bob to teach Kathy had not met with too much success. It wasn't until they moved from Seattle to California, and joined into a building and flying team with Eloy Marez, that Kathy decided to try again, with Eloy as instructor. Joe Bridi's RCM Trainer took her to the solo stage, and from then on it was full speed ahead.

As she picked up her Lil' Cobra and walked off the flight line after her first heat, Kathy was asked by one of her friends, "Howdja do Kathy?", to which she answered: "Well, I didn't crash, I didn't cut, and I didn't vomit".

Formula One?? Just as soon as we have some time!! •

F/F Scale . . . . *Continued from page 51*

the tank, the model is upside down so the gas can flow easily into the tank. If you have doubts that the structure can take the punishment, use a pair of needle-nose pliers under the neck of the filler nozzle . . . this is what I do.

In each case, the tank should be located at the C.G., otherwise you will be adding unnecessary weight to your model in getting it to balance. One other system that doesn't always lend itself to every installation, is the one where the engine and tank are mounted as a single unit. This unit can slide

into the fuselage from the front and includes the nose block. It can be removed for charging and replaced for flight. The advantage to this type of set-up is that it can be easily exchanged between models. The disadvantage is that you have to choose a design that has a nose large enough to accommodate the tank assembly.

Oiling the engines should be done at regular intervals. I prefer to use light oil that is used for model railroad locomotives, and comes in a tube-like dispenser with a needle point. Oil should be placed in the engine's ports and into the crankcase via the prop-screw hole.

Any time that soldering has to be done to replace a fitting, line, etc., care has to be taken that excess heat doesn't damage the "O" rings. I prefer to remove the "O" ring first, then solder, and replace the ring with a new one. Seems as though I can't get the ring off without damaging it. They really fit tightly. One other caution . . . be careful when taking anything off the engine or the filler nozzle, there is either a little check ball or a hard rubber insert that can be lost forever.

CO_2 is definitely another way to go for having some fun flying scale, whether it be for small field flying or contest flying. I imagine, with the addition of larger tanks, we will be seeing our first CO_2 powered R/C models.

* * *

Now for some miscellaneous ramblings. My friend Jack Elem has left aeromodeling for model boating and scale ship building. This latest endeavor of Jack's has given me some insight as to what is going on in the world of ship building, and before turning up your nose . . . you better take another look. I've been involved in model railroading for many years, and the techniques, materials, etc., that are used in this branch of the hobby have been a great help in my aeromodeling. Model ship building also incorporates modeling techniques, materials, and specialized tools that can certainly help the flying scale fraternity as well. You think we're nuts? These guys make jigs for about everything, and there's more work in scale ships than one can imagine. They make special tools to make their ropes, which vary in brading, thickness etc. The list is endless.

The other day, Jack talked me into going to an all ship model shop that has recently opened in our area, and I was very pleasantly surprised. My main point of interest was finding out more about the various kinds of wood that these modelers use. Basswood is one very popular wood that goes into model ship building, but there is a multitude of others that could be used by aeromodelers as well. Take for instance, orange wood. This wood is ideal for making cabane, interplane, and landing gear struts on WW I type aircraft. Just a clear finish over the wood would be required . . . no staining. There's hollywood (no puns please) that bends like a spring without being wet. These are just a couple of examples.

Since I like to laminate my wing outlines, I usually need longer strips of basswood than is available. I found some walnut that is 1/32 x 1/8 x 39.37 inches (1 meter), which I plan to use on the model I'm building for the Nats, if I can't find suitable basswood. Walnut, when soaked in ammonia, is just as flexible as basswood. I haven't made

comparative weighings, but the walnut doesn't seem to be any heavier. The shop owner has a friend who is cutting nearly all of his wood, and he is going to talk to him about cutting basswood in either one yard or one meter lengths. If this does happen, and you like using or have a need for longer strips, I'll pass the word along.

A hint that I picked up from the ship modeling fraternity has to do with the use of Deft. Deft is a product that probably all of you have used at one time at another for finishing furniture or the like. This hint has to do with making non-glare glass. If any of you have priced this product, you'll realize that it is quite costly . . . usually twice as much as regular glass. You may be asking yourself, what do I care about non-glare glass? If you take photos from books for documentation and the like, particularly from those with glossy pages, you can then see the need for non-glare glass. Usually this is placed on top of the picture being photographed. When framing pictures or photos, the non-glare glass gives them a softer look.

Making this type glass is something less than simple. Take the piece of glass you plan to use and prop it up on a clean surface at about a 45 degree angle. Spray on an even coat of Deft, than rotate the glass 90 degrees and repeat the same process. When dry, the sprayed side faces toward the picture. If you do not have spray equipment, Deft does come in an aerosol can. Incidently, Deft can be thinned with ordinary lacquer thinner.

* * *

Those of you who are AMA members and have spent some time reading all of the scale rules proposals, begin to realize that many modelers want changes in the area of F/F scale. I'm not going to dwell on the finer points of each proposal, other than to say . . . if you don't like the way things are now, they could get worse. So read each proposal that affects the event you prefer, decide whether the new proposals are an improvement or not, then let your respective scale contest board member know your feelings. Remember, the way the system works is that a rule change can be proposed (good, bad, or indifferent), and if the board members do not get any feedback, the proposal will pass. *(The system also has a schedule, and the preliminary vote for 1978 rules is already history. wcn)* Then it takes another two years before another change can be made. You have until Sept. 1 but please don't wait that long before expressing your concerns to your scale board member. *(Sept. 1, 1978, Fernando. We are now in the second year of a two-year cycle. Plenty of time for 1980 rules! wcn)*

* * *

Last but not least, I finally got a chance to run my Davis diesel conversion for the .020 Cox engine. All I can say is that I'm very much impressed with this conversion. I took the engine on my Flyline Bellanca and swapped heads, then gave it a whirl. I cranked away with no results. With an Astro 1/2A starter, she started right up. I fine-tuned it using both the needle valve and the compression screw. With a 6/3 Rev-Up prop it was turning 7,000 rpm's, which makes this pretty ideal for scale work.

I had a talk with Bob Davis the other day, and he is very much against using the Astro Flite 1/2A starter, due to the excessive rpm's. With a diesel, in particular, there is a chance of getting too much fuel drawn into the engine, which not only causes flooding . . . but can create a hydraulic lock. Should this happen, there goes a rod and possibly a crank! I feel that the starter is OK if you're real careful. The engine starts very quickly with the normal prime you would ordinarily give this size engine. A quick burst from the starter and the Cox is off and running. Use it for short bursts only. Prolonged cranking with the starter will do the damage.

I've run the engine on both the synthetic fuel available from Davis Development, and the English Quick-start fuel. The engine performed equally well on either. I still haven't had the time to spend on the .049 conversion.

My real interest in diesels is in the .020 to .035 displacement, and the Davis conversion really fills the bill. I'm looking forward to building a certain biplane with this conversion, and as an added bonus . . . NO FUEL PROOFING! Long live Floquil!

Flightmasters scale calendar . . . March 27 at Mile Square for rubber and gas F/F scale only (peanut and regular rubber one class; electric, CO_2, and gas one class also). June 12 . . . R.O.W. Scale at Lake Elsinore. •

Power Boats . . *Continued from page 31*

pins (available in any office supply store) are ideal for pinning the parts to the jig.

5. Make the bottom stringers, that seal the inside cockpit wall to the floor, triangular shaped. When in place, you will have a neat fillet to facilitate each removal of fuel, oil, and water from the engine compartment.

6. Some of the boaters have installed 10 oz. fuel tanks in each sponson (for - ward bulkhead) that can be filled with water to adjust the balance point, or just to add weight to the nose on windy days. Sounds like a good idea, unless you have already put the deck on, and then I'm sure you don't want to hear about it!!!

7. The deck on my boat is 1/16 inch 3-ply. I heated the epoxy with a heat gun so that it would spread thinly to the inside surface of the deck. I also recommend placing a layer of glass cloth on the underside of the deck. The cloth will give added strength to the deck without adding much weight. The push pins are a must for holding the deck in place. I used approximately 80 pins to hold each half in place.

8. The paint scheme on most of the Unlimiteds is more detailed and complex than you would normally paint on a regular boat. However, the extra time required for masking, stencils, etc., is well worth the effort.

An alternative to some painting would be to paint the boat the basic color and add trim, letters, and numbers with Sig Manufacturing solid color decal sheets. The final phase is to spray clear epoxy paint over the whole boat. Read the July, 1976, issue of **Model Builder** on Dumas Pay-n-Pak for all the details on this method.

9. If you need plans for a dummy engine, write to me c/o *Roostertail Mail.* I'll be glad to supply you with whatever information you need.

SUPPORT THUNDERBOATS! •

C/L . . . . . . *Continued from page 33*

fit the muffler to your engine for another $5.00. I would suppose it is best to have Bob do this, as the exhaust stack has to be faced off to give a tight fit between the muffler and engine, and two 4-40 holes have to be drilled and tapped into the engine. For more info, write to: Bob Paul, 4428 W. 49th St., Cleveland, Ohio 44144.

In this part of the country, Y&O props are kinda rare. A batch of them came in with Howard (Kernel) Rush a couple of years ago, but that's about it. However, in other areas of the country, I understand that these props are popular for use in Stunt. If you want some, try Bill's Mail Order Hobby, 503 West Astor, Lee's Summit, Missouri 64063. Call: (816) 524-1634.

I guess that's about it for specialized Stunt items, at least for now. Anybody offering "goodies" for sale is invited to let me know about them.

NICKNAME CONTEST

I've been thinking that we ought to have a nickname contest, as there seem to be hundreds of people who have them . . . Nicknames that is, not contests. The fact that you don't know of one let alone two or three good reasons for such a good contest, does not bother me in the least, so why not send me either your own nickname, or a friend's (enemies are also eligible). I'll gather a panel of highly distinguished nickname freaks and we'll pick out the best one or two. Prize will either be the entire contents of three **Model Builder** wastebaskets; a life subscription to American Aircraft Modeler; a $50.00 credit for use at the next Special Pro Combat meet held in

San Diego and requiring a $50.00 entry fee; a totally revolting, insulting, and obscene letter from Dirty Dan; or two "I enjoy Model Aviation" stickers for the bumper on your super-zoot contest-goin' vehicle. Now I realize that these prizes may be a bit more than you can handle, so for the unimaginative, we will also offer a choice of an Uber Skiver knife set, or a year subscription to MB.

A contest is hardly a success without a few entries, so to insure the contest is at least partially successful, I have decided to pre-enter a few of the nicknames that come immediately to mind. If your own nickname follows, consider yourself entered and don't bother me with a letter.

Pre-entered nicknames are: The California Flash, Remy "Streamer Creamer" Dawson, "Mad Mike" Keville, Col. Rush, Jim "The Spic" Morway, (the infamous) Stanley B. Youngblood, Rich "von" Lopez, Mike "Nitroholic" Hazel, Bob "Stunt" Hunt, "Big" Mike Strieter, Flipper and Whipper (Les Pardue and Phil Shew, respectively), "The Lone" Renger, Bill "Moose" Allen, Don "The Godfather" McKay, "Round Man" Tom Hutchinson, "Wild Bill" Netzeband, John "120 Is No Big Deal" Gimbel, Phil "P.T." Granderson, Harry "Yawn" Higley, Dave "Hermit" Jones, Ira "Brutus" Keeler and Gert Frogg.

Surely you have a nickname that can compete with the above, so send it to me at: 920 240th St. S.E. no. 1, Bothell, WA 98011, or to **Model Builder**. Your entry must be postmarked by the end of March . . . thereabouts.

Results of the "I don't particularly care for the C/L column because . . ." contest to be announced next month. Aren't these contests at least as much fun as watching an SSF rub out clear coats?

TIRED OF PLAYING "POP GOES THE CRANK"?

As this is being written, Rich Brasher is about ready to whack out a hundred or so of his own-design, bullet proof cranks for the Fox Combat Special. If you want to get any, you probably ought to hurry, as a big hunk of the first run is going to the N.W. Combat fliers.

As mentioned previously, I have been using one of these cranks, and it added 200 rpm on my particular engine, plus being unbreakable. I've tried everything to pop this crank, but she just won't do it.

Rich is giving a price break in quantities, with one crank going for $20.00, and two or more for $18.00 each. I would suggest adding a buck or two for postage, especially if you would like yours sent first-class.

The cranks some complete with a special prop driver assembly that features a shield for the front bearing. Very nicely made cranks, and just the thing to keep that honkin' Fox of yours from grenading itself when you need power rather than that sickening look at a free-wheeling prop. You can get the cranks from: Rich Brasher, 327 Howland Ave., Redwood City, California 94063.

SPEAKING OF GAMES, "POP GOES THE REAR BEARING" ISN'T MUCH FUN, EITHER

The stock Fox rear bearing has given me some problems. Although they don't look too good on first inspection, I decided to try them before passing judgement. But now judgement has been passed. I've had two rear bearings spit the retainer off and generally mess things up a bit inside. Rich Brasher has done more work with the Fox than anybody I know of, and he says to use an MRC TRW R8 ABEC-1 bearing. I've got some of these bearings, but haven't used them yet, so won't elaborate (lie to you). If Brasher says they work, that's good enough for me.

I guess the preceding makes the Fox C/S sound like a bit of a dog, but that is hardly the case. The Fox is (in my opinion) the best Combat engine yet. It's not perfect, but then I doubt if we will ever see the perfect Combat engine. Combat motors must live in an environment that is hardly conducive to long life. We under-prop them for level flight so they will work in the turns, they get punched in the dirt with fair regularity, they are force-fed all manner of weird brews, the engine's internals must endure

severe changes of loads constantly, and not to mention being attacked by all of the Moto-Tool artists who hack up a good engine and then wonder why they have problems with their "work of art".

The Fox will do the job for you in out-of-the-box condition. If you really know what you're doing, it can be persuaded to pump out more power than you can possibly use on Nemesis-sized planes.

To back up the above statement, I have some mph figures, obtained on pretty large airplanes set up for Combat flying, to throw at you, but will pass . . . partly because I'm not the one going at the unspecified speed, and primarily because you'll have to see it at the '77 Nats to believe it.

TEAM RACE STUFF

I've been in touch with Walt Perkins, and he has expressed an interest in helping me with a few things concerning TR. As my total exposure to TR has been reading AeroModellers for the past couple of years, talking with Tom Knoppi (local TR Freak), and watching TR at the '76 Nats, this help is not only appreciated, it is absolutely necessary. So I've got a few writings from Walt that we will look over in the next couple of months. Most of this has been previously published in the Gazette, n/l of FAI CLS. See what you're missing by not joining FAI CLS and the other C/L groups? Here's Walt . . .

"Philosophy . . .

"Winning the World Championships, in my mind, begins with the first stroke of the pencil on the paper when you begin to design the plane. Design is just the first of a long string of connecting and interacting events or systems which must function smoothly as a part of the whole. You can have the hottest engine in the world, but it won't do you any good in an old junker plane with stale fuel and a green pilot! To be successful in TR, you will have to become successful in each minute phase of the process. Take for example, the simple act of a pit stop. What is your concept of a pit stop . . . when does it start and stop? How important is your positioning in relation to the segment line? Are you and your pilot practiced enough that the act of catching the plane, refueling it and releasing it are second nature? If you answered that one yes, let me get to the real meat of this harangue. Have you examined your technique, whatever, it is, for an absolute minimum of waste motion and time? Since this is the name of this game, you should examine every phase of your program with the same thought in your mind: Is this component contributing the maximum that it can to reliability, function, speed, laps, strength, predictability, repeatability, or whatever, while adding the absolute minimum that it can to weight, drag, complexity, or any other negative aspect?

"Observe what others are doing and instead of copying them, try to think of some way to improve on their system. Hell, if you do what they do, you'll be as good as they are; with a little brain power, you could be better. I agree with the philosophy that a good stock engine, conventional airplane, and lots of practice, are the way to go. But sooner or later you'll want to be better than average. Why not start from the beginning toward that goal? Be basic; but try to be better at being basic than anyone else!

"Also, be systematic in everything you do. Don't be afraid to change something . . . but be sure you know how the change has affected your times. Keep notes, a diary, so you can sit down and calmly evaluate what has happened. Never change more than one thing at a time. If you do, and your performance doesn't change, how do you know whether one thing helped and the other hindered? It takes longer to do things one at a time, but you will at least have concrete results to analyze (you did write down the results, didn't you?). I think you must be getting the idea by now. I don't think anyone flys TR just for fun. So if you're going to do it, you might as well do it right.

Signed, Walt Perkins."

That's pretty good start for us and Walt makes some very good points in the above. Next month we'll hear from Walt concerning his thoughts on reducing weights on TR planes.

MISSING VOTE, MISSING VOTE, WHO'S GOT THE MISSING VOTE?

Lots of games this month, but I regard this one as hardly a joking matter. In a sneak preview of the results of the initial CLCB ballot from Ron McNally, it appears that one of the members of the CLCB failed to get his vote in on time. It wasn't me, and I don't know who it was of the other CLCB members. And I don't particularly care who it was, as I feel that regardless of the guy's name or position, he needs a kick in the butt. With all of the problems the CLCB has, it is unbelievable

that a member of that board would not get his vote in on time. If this was the first time this happened. I wouldn't say much, but this is not an isolated case.

If you feel that your District should be represented (and I can't imagine you feeling otherwise) on the CLCB, why don't you check out things and see if it was your guy who let you down. For those who find that they have been left out in the cold, a call to your District V.P. is definitely in order. And you should probably expect some definite action to be taken. The V.P.'s appoint these guys, and they can also replace them, with somebody who can handle the responsibility.

LATER THE NEXT DAY

Just got a note from AMA HQ and now I know who missed getting his ballot into the mail on time (or at all). However, I'm not saying who it is. You'll have to look it up for yourself. Just say hello to Hardy Broderson for me when you call him to bitch about your lack of representation on the CLCB.

AND ANOTHER NOTE FROM TODAY'S MAIL

In connection with my Product Preview column in Model Retailer (a very good trade magazine), I heard from Harry Roe at Fusite (makers of GloBee plugs, Fire Plug, etc.), and Harry says that they will be coming out with a second generation version of their Racing plug. The new plugs will feature an all-new material for the element, and this material is supposed to be very rigid and strong in a high temperature environment. Also, the element will hold up in piped engines, such as Goodyears with megaphones, and Speed ships running full pipes.

Fusite will recommend that the fuel used in combination with this new plug be at least 50% nitro! That ought to make everybody who likes to tip the can of nitro with a heavy hand a bit happier.

HGK DOES NOT RHYME WITH GHQ

Most of you probably won't understand that lead-in, but that's OK. The point is that many have decided that the HGK 15 is either a joke or a flop. I know that I was to test one for MB back sometime, but the thing wouldn't start, let alone run fast. Actually, I did manage to get it running once, but it didn't turn very high. Then I heard that the HGK's were spitting out rotors, peeling the chrome off the walls of the cylinder, and other bad things that I didn't particularly want to put up with. So the engine just sits around gathering dust.

Now I hear that Dave Clarkson, your basic English Racing Freak, also had an HGK 15 that was collecting dust, but he decided to give his one more try . . . and now holds the record in England for an event that they like to think is as neat as our Goodyear class of racing. Dave says that his HGK felt very loose, but seemed to come in real well after a few break-in runs, and is now going real fast and restarting real well.

Now, I know that the English are pretty slow and all that, but they're coming along and now use honkin' Rossi 15's in their inferior version of Goodyear. I seriously doubt that their Rossi's could touch the best seen at the '76 U.S. Nats, but like I said, they're coming along. So the fact that Clarkson is blowing everybody's doors off with an HGK indicates that maybe the motor deserves another look. Especially if you have one laying around collecting dust!

WAM COMBAT RESULTS FROM '76 SEASON

Rich "von" Lopez sent along the following results from the WAM Combat season, so I thought I'd let everybody take a look at them. Rich's report was quite complete and brought up some points that I'll expand upon later.

1/2A COMBAT
1. Mike Spindler
2. Edmond L. Bridant
3. Glenn Williams

A COMBAT
1. Edmond L. Bridant
2. Rich "von" Lopez
3. Mike Spindler

BC FAST COMBAT
1. Edmond L. Bridant
2. Dale Carter
3. Paul Klahn

SLOW COMBAT
1. Mike Spindler
2. Jeff Jung

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TOP TEN 1976 WAM COMBAT PILOTS

1. Mike Spindler
2. Edmond L. Bridant
3. Paul Klahn
4. Dale Carter
5. Glenn Williams
6. Rich "von" Lopez
7. Matt Rodrigues
8. Doss Porter
9. Jo Hsu-Wu
10. Jeff Jung

HIGH SCORE FOR 1976

June 13, 1976, A Combat, 140 points, Edmond L. Bridant.

CLUB COMBAT CHAMPIONS

Flying Tigers, with 217 points.

I had a couple of lies to tell ya, but they will wait until next month, I suppose, See ya then. •

Beaver . . . . . *Continued from page 36*

the "Dial-A-Turn" to give equal stab deflection up and down and about 3/8 inch total movement. More or less stab movement will no doubt be required, but 3/8 inch is about all you'll want for the first flight.

The motor mount is cut out of 1/4 inch ply and simply glued to the center rib, after removing the covering in this area. This style of mount is plenty strong, although you probably don't believe it. If it bothers you, a couple of dowels can be installed, pinning the mount to the center rib. The plans and pics show a 1/16 ply doubler on the mount. but this is not necessary either.

Next up is mounting of the Cox TD .049, and this is where you better pay attention. I personally like my DB's to balance 1/16 inch back of the bottom spar, but this makes for a very touchy airplane. Many people have difficulty flying my DB's level, they are so touchy. So you probably ought to try for a balance point just slightly in front of the bottom spar for best results on that first flight. With rubber bands holding engine to mount, shift engine back and forth until the plane balances where you think you want it. Mark this location and drill mount for 2-56 bolts. Install engine with these screws and double-check to be sure you don't have some up or down thrust in the engine. If you want, a bit of out-thrust can be used, but it is not necessary if the plane is built straight.

Speaking of being built straight, check to be absolutely sure there are no warps in the wing. When viewed from behind, the TE of the wing would appear to be centered on the wing along its entire span. Do not expect a warped DB to fly very well. *Do* expect a warped DB to chase you across the circle!

With that, your DB should be ready to fly, so let's discuss the other equipment required for serious .049 Combat. The engine is very important . . . the DB loves power and you should give it all you can. This means a honkin' TD .049 (or .051, although the .051's don't have any more power). A talk with locals who are involved in 1/2A Speed may help you to get more power out of your engine. Or the local F/F guys *may* be of some help. It has been my experience that F/F guys actually know very little about reworking engines and I offer Bob Stalick as proof positive of this statement! *(Oh, Oh. Here they go again! wcn)*

For more power without having to do it yourself, contact Joe Klause at Kustom Kraftsmanship, P.O. Box 2699, Laguna Hills, CA 92653, or Carlos Aloise, Jr. at Aloise Engineering and Development Co., 2314 Loy Lane, Los Angeles, CA 90041. Both Joe and Carlos know how to rework the TD's into screamers and also charge a reasonable fee.

At the least, use a TD that has been well broken-in. An absolute necessity is to use a Kustom Kraftsmanship .049 needle valve assembly. Either order it from Joe or get one at your local shop.

Use of high nitro fuel and ittsy-bittsy props will help to get the power and rpm required to properly motivate a DB. I regard 60% fuel as about right, and 40% as a minimum. In trying many blends of fuel, I have settled upon Nitrotane's 1/2A 60% and 1/2A 70% as the best, and highly recommend them. A Top Flite 5-1/4x3 nylon is a very good and practical prop, while a Top Flite 5-1/4x3 wood Power Prop offers a bit better performance . . . they also break easily, however.

With the right fuel and the mentioned props, your engine ought to be able to make at least 23,500 rpm, which I regard as the minimum needed to properly haul around a DB. An rpm figure of 25,000 plus is even better, but takes a pretty special engine to achieve.

For maximum power and consistent runs in maneuvers that are quite violent, a pressure system is needed, and the bladder system, now so common in AMA Combat, is the way to go. Most any bladder will work just fine, but I

have the best results with either a small Tatone bladder or the new Midwest surgical tubing bladders, again in the small size. Both of these bladders are too long for the tube in the DB, so need to be shortened an appropriate amount. I use bladders that are about 1-1/4 inches long.

For a feed line from the bladder to the engine, use the smallest surgical tubing you can find. If it slips off the nipple on the needle valve assembly when flying the DB, then the tubing is too big.

The bladder is filled with a 2 ounce syringe. If your shop doesn't have any (they should, Tatone markets one), then drop in to see your local vet at his Fido Hospital and ask for a 2 ounce dose syringe.

It is very important to use the proper size and length of lines on your DB. In this area, we use .012 dia. x 35 foot lines, and would never consider another size, at least for two-up Combat flying. If all you want to do is to Show-Biz the locals, then .008 x 35 foot lines are great, but they are very fragile and will surely get cut the first time you get in any kind of line tangle while flying Combat. Lines shorter than 35 are not recommended, as the turn rate on 35 foot lines is already faster than you are used to on an AMA Combat plane. Just staying up, while trying to fly level and with two guys in the center (after a kill has been made, for instance) is a real problem when both guys are running flat-out.

A special handle for .049 Combat is also necessary. The leadouts on a regular handle (like an EZ-Just, for example) are simply too stiff to be worth using on these planes that have very light line tension. I make my own handles from 3/4 inch plywood, and use old .018 Combat lines for leadouts. A bolt through the handle locks the lead-outs in position and allows adjustment of the handle. For a "quick 'n dirty" .049 handle, pick up either a Goldberg or Sig number. The dacron supplied with the handle may be used for leadouts on the handle, which works just fine.

Before going any further, I want to reemphasize the warning about having your DB too tail-heavy. If you set it up like mine, chances are very high that you won't like the plane at all, finding it to be vary hard to fly level, let alone pointing it through maneuvers. Right now, go over and check your new DB for proper balance point. If the balance point isn't at least at the forward edge of the spar (preferably in front of it), then add some weight to the front of the plane until it is.

Right now you are probably wondering why I like the DB on the tail-heavy side. Good point, and I'll tell you why. In this area, we developed our .049 Combat planes to use as practice planes. They are not for contest work, they are for going out once or twice a week and flying "grudge" matches against the meanest, baddest Combat fliers you can find. I have found that it is to my advantage to fly touchy, wiggly, mean-bad-'n-nasty .049 Combat planes. This style of plane requires constant attention while flying. Make a wrong move and you miss a cut or kill . . . maybe even smack the ground. Put simply, this kind of plane gives you a very "educated" hand in a short time.

Once you do get to the point where you are effective with a plane set up like mine, a good, honkin' Fast Combat plane feels extremely pointable and docile. *Docile!?* An AMA Combat plane that feels *docile?* Yes, that's right, but you'll have to try it before you'll believe me. I've given you a shot at it with this article . . . all you have to do is build a design that took me two years to develop to this point.

While checking the balance point, I hope you also made sure there are no warps in the wing, no left-thrust in the motor, wing tip weight installed, and insured that there is no more than 3/8 inch total movement in the stab. If you have 1/4 inch total movement, that is fine for the first flight, at least.

We're ready to go flyin'. Hook up the lines and be sure that level at the handle corresponds to level at the stab. Your first flight may be a bit much for you, and the last thing you need is a handle that is out of adjustment. With the 2-ounce syringe, fill the bladder with fuel. Don't overdo this, as an over-filled bladder will give "false" pressure, resulting in a lean setting when the bladder relaxes a bit. I normally fill the bladder with about 3/4 ounce of fuel.

With a clamp, pinch off the fuel tubing until ready to start the engine. Open the Kustom Kraftsmanship needle about 1-1/2 turns. Prime the motor just a bit through the exhaust ports. Hook up the glow clip (always use a fresh, hot battery when starting a TD . . . I use a 2-volt lead-acid battery, and it's the hot tip for getting a TD to light off quickly) and you're about ready to fire

it up.

Remove the clamp from the feed line and hold it pinched off with one hand. Don't release the line until the engine starts. Flip the prop as quickly as possible. "Lazy Flippers", using old batteries, have an incredible amount of trouble starting TD's. Do it right and they'll start almost as easily as any other high-performance engine normally used in Combat. When the engine fires on the prime, quickly release the feed line. If the engine goes rich instantly (quite likely), give the feed line a pinch or two to get the rpm up and screw the needle in a little. Keep at it until the engine is running WFO. With the engine screaming, open the needle up until it is again a bit rich and running slower. When the DB is launched, the engine will lean out some and hopefully be right on as to needle setting. If not, adjust needle accordingly before the next flight.

With the engine set right, be sure your launcher doesn't ruin your whole day. Tell him to release (not throw or push) the DB straight ahead and just a little bit up. You be sure to help out by taking a step or two backwards as the plane is launched.

Once in the air, you're on your own. Wring it out for all it's worth and be prepared for a shock in the performance department.

There is a lot of talk within MACA, that super Combat organization, about having .049 Combat as an added attraction at the '77 Nats in Riverside, California. It will probably be an after-hours thing and may or may not be flown to an official set of rules. Larry (Lone) Renger, of Cox, has arranged for trophies to be donated by Cox, so it is quite possible that .049 Combat will come off as an added Combat event at this year's Nats.

Even if the plans fall through on the .049 Combat thing, there will be a number of us there with .049 planes, and we'll be looking forward to doing some heavy practicing with them. Bring a few Dirty Beavers of your own and take on people such as Rich "von" Lopez, Gary Stevens, Phil Granderson, Dirty Dan, etc. Even Charlie Yawnson might have some .049 planes with him!

To participate more fully in Combat, and to be up to date as to what is happening in Combat, be sure to join MACA (Miniature Aircraft Combat Association). To join, send $6.00 to: MACA Treasurer, Tom Southern, 2207 Paul, Longview, Texas 75601. In belonging to MACA, you'll be part of the most progressive of the special interest groups now functioning within the AMA. As a bonus, you'll be getting a monthly newsletter that is anything but dull! •

Hannan . . . . . *Continued from page 52*

Postal Proxy Peanut contest, Dan Kilgore is providing a trophy to the best Peanut reproduction of the "Spirit", in the Miami, Florida indoor contest on May 22. Not to be outdone, Royall Moore, of the Connecticut Flying Aces Club, has offered a prize or trophy to be awarded *at each and every* model meet held by the Flying Aces Club and Glastonbury Modelers this year, for the winning model of a "Spirit"!

A MODEL IS A MODEL IS A MODEL

Many have a tendency to become so specialized in particular type building, that they completely overlook the rewarding efforts being produced in other modeling disciplines. This month we present a couple of photographs showing rather unusual projects. The miniature violin is the work of Fred Williams, eldest of the Williams Brothers, now retired. His latest production is one in a series of tiny musical instruments that will form part of a diorama. Each item is carefully researched, and handcrafted from materials such as hardwoods, brass, plastic, and aluminum. Included are harps, a string bass, guitar, pipe organ, and various other instruments. Although not specifically intended to be played, some of them may be tuned, and do emit faint but mellow sounds.

Another photo depicts a 1 inch to 1 foot scale highchair, by your scribe. This was contructed by way of investigating miniature furniture, an ancient hobby that has recently undergone a tremendous resurge in popularity. This particular piece, based upon an illustration in an old catalogue, was made primarily from birch, turned on a Sherline lathe. The back was laminated from basswood in the same manner as model aircraft wing tips. As is the case with so many projects, a great deal more time and effort was involved than originally anticipated. Yet, it was an interesting change-of-pace, and offered an insight into yet another type of model building.

YE OLDE MODEL ENGINES

While browsing through a "Chicago Aero Works" vintage model aeroplane accessory catalogue in the library of the San Diego Aerospace Museum, we encountered descriptions of two rather strange power plants. One was called the "Hercules Model Motor", which "Runs by Gas, Air, Steam or Water"! Weight was listed at 4 ounces, and power output as 1.4 horsepower. Price with container: $12.50.

The other unit was called the "Turbognome", and was "a high-powered gunpowder motor", with a weight of 3 ounces and an output of 1/10 horsepower. It was touted as a "cheap and effective way to fly your model". Price? Only $3.00. Step right up, folks! In the same catalogue we found rubber motor strand listed at 5 cents per yard for "extra fine quality".

THE BELLS TOLL

Aviation lost several important figures recently, with the passing of Clarence D. Chamberlin, Waldo Waterman, and Jacques Pouliquen. Chamberlin was famous for his record-breaking flights, such as his New York-to-Germany flight during 1927, in the Columbia Bellanca.

Waterman was San Diego's first flyer (1909) at the age of 15, with a self-constructed hang glider. He later worked with Glenn Curtiss on North Island floatplane experiments, and went on to design and manufacture a remarkably varied series of airplanes. His "Arrowplane", Waterman Racer, and "Aerobile" have all been the subject of published model designs. Several of his aircraft survive today, in the collections of the San Diego Aerospace Museum and the Smithsonian Institution.

We had the privilege of conversing with Waldo on several occasions, and found him thoroughly delightful and full of enthusiasm for everything even remotely connected with aviation.

Jacques Pouliquen has been mentioned in these pages several times in the past, having almost single-handedly introduced and promoted Peanut Scale flying in his native France. An architectural model builder by trade, Pouliquen operated a model aircraft business as a sideline. His model Farman, which participated in the first **Model Builder** Proxy Peanut contest, is now in the Russ-Craft Model Museum. Our sympathy is extended to his wife Loly, who plans to continue the model business in his memory.

HANG GLIDER TESTS

The enormous wind-tunnel located at Chalais-Meudon, France, has certainly served a variety of purposes, including testing of the German Focke-Wulf 190 during WW II, tethered training of gyro-glider pilots, testing of supersonic Concorde models, and now, according to *Letectvi + Kosmonautica* magazine, testing of a Rogallo type hang glider!

MORE NEWS FROM FRANCE

Roger Aime kindly sent in the results of the most recent "Concours du Cacahuetes" Peanut meet sponsored by the Model Air Club of Marseille. Fifty entries participated, a remarkable turnout by any standards, with many little-known types entered. For example, a Boisavia, REP 2 bis, Legrand S, Nizier, and a Leningradec, must have kept the static scale judges on their toes.

Models from several clubs competed, along with one lone proxy entry from the U.S. of A., a Ganogobie mailed in by Ms. Jill Peck. Imagine Jill's delight upon learning she had placed first in the Junior category! Tied for first honors in the open class were Christian Frugoli with a Nieuport, and M. Roland with a Bronco. The Frugoli family was well represented in the Junior event too, with a second place award going to young Michel, who flew a Nesmith, followed by D. Mauro, who entered an Andreason. Second in the open class was captured by another Frugoli, J. Francis, who did the job with a Hirondell. We hope a few of these models will make appearances in the forthcoming MB Postal!

AND SPEAKING OF PEANUTS

With the latest change on the American political scene, Peanuts are in the news every day. And while the world's most famous peanut farmer is busy "rorganizin' the guvmint", everyone seems to be jumping on the peanut bandwagon. Latest is the San Diego Zoo, which named a newly born rhinoceros "Karanga", which turns out to be Swahili for "Peanut"!

NOSTALGIC TRIVIA DEPARTMENT

Frederick Eade sent us a copy of the American Institute of Aeronautics and Astronautics Newsletter, from which we learned that the very first Buck Rogers radio broadcast was aired on November 7, 1932. So now you know. Does anyone else remember the neat little die-cast metal rocket ships that were marketed about that time? Only a nickel or so, they came in different configurations, as I recall, and were equipped with tiny pulleys on top, enabling them to be slid down a tightly-stretched string.

Doubtless a few collectors have some squirreled away somewhere. If so, we'd like to see a photo!

CO_2 NEWS

Action is picking up in CO_2 powered models, with all three currently available brands appearing during the recent

brands appearing during the recent Orbiteer's scale contest held at Lake Elsinore. During this unusually well organized meet, promoted by Bill Noona, the AMA "Gas" scale rules were employed, which permit electric and CO_2 power plants to compete directly against glo and diesel-engined models. Clearly this has served to increase participation and interest in the class.

The Orbiteers are now discussing a new event for Indoor CO_2 scale contests, with several models already in action. To head off the overabundance of "ho-hum" type models which have invaded Peanut Scale, they propose to limit entries to models of 1/2 inch scale only. This is intended to permit a vast choice of subjects, but will severely handicap short-wingspan aircraft, since at that scale, they will have very little area, needed to support the engine and fuel tank. We wish them luck, but somehow suspect the usual "loop-hole finders" will find a way to beat the system!

AND SPEAKING OF CO_2

Brown Junior Motors has just released a fine line of new fuel tanks, which should greatly extend the flexibility of the engines. Although intended for use with Brown Jr. units, distributor Bob Peck reports that they may be easily adapted to other brands of engines as well. The tanks are available in tiny "gumdrop" size, suitable for limited schoolyard flying, intermediate sizes, and a large 20 cc unit, which would probably put the average model out of sight. Doubtless the latter would be appropriate to R/C type CO_2 powered models. A stamped, addressed envelope to Peck-Polymers will bring you a description of sizes and prices. Box 2498, La Mesa, CA 92041.

PARTING SILLYISMS

During the fine indoor contest sponsored by the Camarillo Flying Circus, Chuck Conover and Walt Mooney were both flying tiny scale models of perhaps 8 inch span. Walt claimed to be using rubber obtained from a well-known actress' brassiere for power. "No wonder your models are always getting busted" said one wag.

According to a sign atop the L.A. Nuthouse (a company in the nut business, honest), another name for a Pilot's License is "Fly Paper"!

(Speaking of odd business names, there is a small specialty clothing shop in Newport Beach called "The Brick Shirt House. wcn)

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Choppers . . . . *Continued on page 21*

1508 Dale Drive, Sioux Falls, South Dakota, 57101, who asks for information concerning the flyability of the Schluter DS-22 Enstrom kit. Being back in the "hinterlands", he hasn't been able to get much help in R/C chopper flying, but he has built and successfully flown Dave Keats' "Polecat". Somewhere along the way, he had been told that the Schluter "S" rotor head would surely cause a crash, even if he was lucky enough to get it to work at all! So . . . he is going to hold-off flying until he hears better news.

Maybe the following will give you a little "boost" Ralph . . . back in the Feb. 1974 **Model Builder**, I gave a report on the "S" head and had nothing but praise for its unique design and excellent control characteristics. Suggest you find a copy and read it over. Also, the Sept/Oct 1974 issue of **Model Builder** showed several pics of a fine DS-22, built by a friend of mine, Dave Martin. Dave bought his kit while on tour in Japan, built it aboard ship, and learned to fly it in slow circles about himself in a single day. I also flew the ship and was amazed at its natural stability and ease of control in hover. At that time, neither of us was experienced enough to try fancy maneuvers and acrobatics, but it sure was good enough for normal R/C helicopter maneuvers. So . . . go ahead and give it a try, Ralph, and forget the bad things you have heard about the machine!

1977 ALOUETTE MODIFICATIONS

In keeping with the factory policies, the Kavan Alouette kit has been updated with several new modifications to improve the reliability of this little gem. Very little needs to be said about the way it maneuvers . . . it's second only to its big brother, the Jet Ranger! The latest kits now contain a new tail rotor transmission which has been beefed-up somewhat, and also has a ball-bearing on the shaft (in place of the bronze bushing).

The plastic main rotor head now has a steel plate "cupped" about its length to provide a great element of crash-worthiness and rigidity to the blades. A small steel plate is now included to limit the travel of the stabilizer bar so that it doesn't knock-off the canopy or dummy engine with hard-over control. Additional truss-struts are provided for strengthening the top side of the tail boom, and the tail rotor has additional anchoring with set screws. The greatest change is in the main transmission base plate, which has been reinforced with extra webbing molded into the plate, both on the top and bottom.

We have just been advised that the special price on these kits will remain

in effect for the rest of this year. If you haven't found out about it yet, better check with your dealer . . . you can get two Alouettes for a little more than the price of one of most any other R/C helicopter!

NEW ENGINE MUFFLER

Two or three nights ago, I wandered up to Fullerton to show off my new car to Charlie Gilbert (an ardent and accomplished scratch builder). While we were wandering around his shop, I noticed that one of his choppers had that "funny-looking" muffler hung onto the side of his favorite engine. You know which one I mean, the one that looks like a large golf-ball (or small tennis-ball) . . . I never can remember the name, but I have seen it in the magazine ads and can't get the shape out of my mind. Anyway, I asked Charlie if it was any good, and he replied "let's take it out in the back yard . . . I'll turn on the flood lights, and we'll fly it". Wow! Charlie lives in a very stately residential area and is surrounded by neighbors (the kind who would be upset by any little noise at 11 p.m. at night). I could just see those little old ladies leaning out of their window, brandishing canes and throwing dishes at us the moment the chopper was fired up! To my amazement, the little .40 "puffed" into life with the barest whisper of a noise . . . and I mean "puffed"! There was no roaring, no barking, just a gentle sound. Lift-off was made with 1/3 power and lots of reserve left over with no top-end power loss. And not a single window popped-open! Believe, me, I was convinced by this night-time demonstration that here was a muffler that *really* worked. I certainly am going to get a hold of a couple of them and try them for myself!

FINAL APPROACH

Coming up next month will be a review of my latest . . . converting the Bridi "Shrike-Commander" airplane to a helicopter configuration . . . you'll be pleased with the trim lines . . . I certainly was! Also, more news on Cliff Cottrell's Hughes 500 and Baby Jet Ranger fuselages. In the meantime, dust off those rotors and practice up for the summer season . . . it should be a great one. BCNU. ●

Halt-A . . . . . *Continued from page 65*

few words. I need photographs of models to publish in this column. Manufacturers have been very helpful and most of what you see are the pictures of kit prototypes. I think it would be of even more interest to everyone to see what the "modeler in the field" is flying. Please send me pictures of your airplanes.

But! The pictures have to be useable for publication. This means black-and-white, glossy finish, 5x7 size preferred. Look carefully at the pictures in this magazine. Remember, they were sharper and had more detail before they went through the printing process.

Try to get interesting, but uncluttered backgrounds. Lighting should be from hazy, but definite sunlight to keep contrast in the printable range. Move in close to your subject, people already know what grass looks like. Go to your local camera shop and ask how your pictures can be improved. It doesn't take a new, expensive camera for anyone to produce good photos, just a bit of careful thought about what the final picture should look like.

Final flash news . . . There is to be an all-1/2A scale meet at Mile Square sometime next year. More details as they become available. ●

Aerodynamics . *Continued from page 29*

glance. We should first consider the process of "banking", which is done to minimize skidding in a turn and to cause the passenger's effective weight to be straight down in his seat. The latter effect is of little concern in models, but the former is very important if we want crisp, sharp turns rather than sloppy ones that take up a great deal of the sky. Banking or tilting the wing on the inside of a turn downward can be accomplished by using the ailerons in an RC model, or automatically as a side benefit of the dihedral in the wings. When a turn is started by using the rudder, the aircraft tends to turn around its CG and to skid sidewise. The wind under the forward wing forces this wing upward because of the dihedral angle, and the aircraft tilts, causing a bank in proper direction (see Figure 6). (For the more knowledgeable reader, it is recognized that there is a more rigorous explanation of what happens, involving such things as the effective speed of the opposite wings.)

Step-by-step, here is what happens: right rudder causes the aircraft to yaw to the right about its CG; the left wing rotates forward; the wind under the left wing tilts it upward; and we have a properly banked right turn. However, in the banked position, the rudder now acts to turn the aircraft to the right and downward with respect to the ground. The rudder is still turning the aircraft right with respect to itself, but not with respect to the ground. This effect is the same left or right; the rudder causes the aircraft to fly downward in a turn. To counteract the down, up elevator control must be used. In fact, once in a banked position, many aircraft can be turned using the elevator only. Most RC models with ailerons are flown with little or no use of the rudder. Again, step-by-step; rudder causes a turn around the CG, dihedral causes the forward wing to tilt upward and elevator (the rudder may be neutralized at this point) completes the

turn and maintains level flight (see Figure 7). In the RC model; the ailerons cause the aircraft to roll, and the elevator holds the turn and maintains constant altitude flight. In the free flight model; a stalling glide many times can be eliminated by the rudder which produces both turning and downward control.

WHY IS THE "THRUST LINE" IMPORTANT?

Model aircraft fly in two principle modes; powered and gliding. The gliding mode must be correctly adjusted before power mode adjustments are made. Any defects in the glide performance usually become much worse when power is applied. Many RC models and control line models are very difficult (if not impossible) to glide test. In these cases, the balance point, wing, angle-of-attack, and stabilizer angle swing should be carefully checked before flight, and adjustments made after powered flight has occurred.

Glide is adjusted for straight flight and for smooth descent; no dives and no stalls (see Figure 8). When power is applied, the glide adjustments should not be changed. Powered flight performance should be adjusted by changing the direction in which the propeller points; the "thrust line".

The first consideration in adjusting the thrust line is to compensate for the so called "torque effect" of the propeller itself. The propeller turning in one direction causes the aircraft to roll in the opposite direction. With a right hand propeller, the aircraft tends to roll to the left, and the result is a left hand turn. "Right thrust", or pointing the propeller to the right slightly, will counteract the propeller's torque effect.

Similarily, in control line models, the thrust line is pointed to the outside of the flying circle to help assure that the model will maintain tension on the control lines.

The most important thrust consideration is controlling the excess climbing tendency that frequently results when the model flies faster under power. This frequently results in looping, especially when too much power is applied to an untested model. This problem is particularly troublesome in rubber powered models, since the initial burst of power from the rubber is often many times as strong as the power during the middle of the motor run. The cure is to point the propeller downward to kill some of the climbing tendency (see Figure 9).

It is almost universally agreed that glide adjustments should be made first and powered flight adjustments second. There are exceptions in certain rubber powered models, where it turns out that the total flying time is under power. Here, it has been found, the maximum time results when the model lands at about the same time that the rubber power is depleted. In this case, we have only a single-powered mode of flight to consider. However, in most cases, experts will still carefully check out the glide first.

WHAT DOES THE TERM FORCE-SET-UP MEAN?

The discussion that follows will be limited to a simple case in which the aircraft has a basic stability and flight capability. Let us assume that the rudder is adjusted for straight flight and that the wing has lift; enough, at flying speed to sustain level flight or cause the model to climb. Now, consider the up/down (pitch) forces that are acting. The wing's lift-center is behind the CG, tending to raise the tail of the model. To balance this tail-up-/nose-down tendency, the horizontal stabilizer is set at a negative angle and its force is down, offsetting the wing's lift (see Figure 10). These are the principle forces at work in this case, assuming that the thrust line from the motor passes through the CG, and that the drag from the wing and other structure above the CG is offset by the drag from the landing gear and other structure below the CG. Drag above the CG tends to rotate the model nose-up and vice-versa. All of the forces we have been considering are related to the airspeed of the model. Therefore, the force set-up must be such that increasing speed causes a steady increase in climb rate. In this particular set-up, if the lift increases faster than the stabilizing effort from the horizontal stabilizer, the model would tend to dive with increasing speed. This may happen during glide tests on a model. If it does, there are two ways to correct it. First the horizontal stabilizer or elevator can be reset to give more down force at the tail, or the balance can be changed by moving the balance point back toward the tail. Similarly, if the model tends to stall in the glide, the stabilizer and/or elevator should be set more positive or the balance point moved forward.

The force-set-up just described is typical of that used for many well-designed, stable models. If the balance point is near 25% of the wing chord in a

typical beginner's rubber powered model or an RC trainer, the model will fly very steadily and should quickly recover from disturbances (gusts, typically).

So far, we have considered the force-set-up for unpowered flight, or the case of powered flight with the thrust line being through the CG, and balanced drag above and below the CG. When power is added and the speed increases, the model may climb rapidly (even loop in bad cases) or dive, depending upon which force (the wing lift or the stabilizer's balancing force) increases most with increased flying speed. If the model has been previously adjusted to glide properly, we should not disturb the balance, or the wing or stabilizer angles, to correct for difficulties that occur only when power is added. Too much climb should be corrected by pointing the propeller downward, and a dive should be corrected by pointing the propeller upward. ●

R/C Auto . . . . *Continued from page 41*

the K&B more than anything else. Dick has pistons which are fitted to K&B liners (yours if you send it), and much stronger rods. He also has harder crankshafts . . . as you've probably found, if you've done any work on it, the stock one is pretty soft. Write to Dick McCoy, C/O C&H Inc., 10767 Monte Vista, Ontario, CA 91761, if you want more info. He also has some ST 3.5's in stock if you want one. I'll soon have some pictures of all the K&B 3.5 mods that we've covered here, as well as all the parts Dick puts out.

Another item which needs updating is fuel tanks. Several things have occurred over the last couple of years. Some time ago, when we went to the super Veco-McCoy engines with 60 and 61 size carbs, acceleration jumped considerably and tank design had to change. I used to use a tapered, or sloping bottom tank to give me a low fuel warning. The increased acceleration began starving the engine of fuel, even when the tank was half to a third full. Sump design had to be changed to flat bottom and relocated at the rear, but the length (and width) of the sump still allows me to have a low fuel warning if the fuel pick-up is at the front of the sump. We've also gone from chicken-hopper tanks to muffler-pressurized tanks . . . then pressurized chicken-hoppers, and some racers are trying fuel pumps. Some guys are even going back to the straight chicken-hoppers. Pit stops have gotten faster and faster, and some changes have occured to the fuel tank filler concept. I'll be bringing you up to date on all these things soon, and will have pictures and sketches as well.

I really don't know how to approach the next problem . . . when to progress to the super engines. I don't think anyone questions that when starting, it is best to use a 19 carburetor and no more than 10% nitro fuel. Besides that, it is even advisable to run the engine rich (bubbering) so that power is considerably down. Even with this kind of power, there will be spin-outs for the beginner for quite a while. Eventually, the car seems to improve and the driver can get it around the track in a reasonable manner, even when the engine is leaned down a little. Time to this point might be 1 or 2 months, maybe a little more. Now is when the new driver really starts thinking about how to go faster and notices all of those super-go engines and is tempted (and lots do) to start trying super-horsepower engines. Personally, I think the driver is just beginning to understand the car, how to keep everything working, and the things he can do to it to make it handle better for him. If the driver goes to more power at this point, I don't think he will learn how to adjust the car or drive properly. So my recommendation is to stay with the 19 carb and 10% nitro fuel a little longer . . . maybe just jump up to 25-30% nitro if traction really comes up. When the car doesn't handle quite right, make some changes to the car to make it go better . . . and see what happens. The driver will find that the car can do amazing things and he'll also win lots of races, too. Sometime after the first *year*, I think the driver may be ready to switch to the super-horsepower engine. If you don't believe me, ask the opinion of some of the good drivers in your area. But now (after the year of apprenticeship), when you have handling problems, you will *know* what to do to the car because you will have *learned* what to do. Some problems will be new and the driver will know what they are *not*, and be able to solve them a little faster. Possibly the only way you may progress faster than this is if you are a member of a very close team that really works together. Wait until you yourself have gone through the cycle, and look back and see what you think.

One thing for beginning drivers that cannot be emphasized enough is the value of a slipping clutch . . . even for the expert and good amateur drivers using those super-horsepower engines. When you're just a beginner, the slipping clutch really helps control those spin-outs when getting on the throttle after a slow corner. The slipping clutch really readuces the amount of power that can be delivered to the rear wheels. Clutch slip can be increased by lightening the clutch shoes (particularly on the end away from the pivot) and by increasing the spring restraining force. For the Veco 19 engine, up to the super-stock mods (with 19 carb and 10% nitro fuel), there will be no problems with clutch overheating. But when you're an expert

driver, and you need clutch slip to help out on controlling that super-horsepower, then clutch overheating problems start. The first thing to do is drill some holes (angled like a propeller) in the front face of the clutch bell that will help some to cool the clutch when the car is moving. Next I tried drilling some angled holes in the flywheel, just outside of the bell diameter, so that some air might blow over the clutch when the car is stationary or when the car is at low speed. These two things helped minimize the overheating problem, but on certain tracks or with certain track conditions, when I wanted lots of slip, the problem was back. Well, now I think the problem is solved. I have put an air pump right behind the clutch to draw air through the clutch holes in the front face at all times, even when the car is stopped. I'll let you know how the idea works out later. •

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

water shrink (pin down), dope and decorate the wings with doped-on turquoise Tern Aero tissue. Next, glue lower wings in first, at the prescribed dihedral angle, and join lower wing spars with 5-minute epoxy. By the way, the pin striping was drawn on the doped tissue with No. F-447 Process Blue Magic Marker Studio fine-line pen obtainable at artist supply stores. This is recommended before assembling the wings, tail, etc., as it is easier to work flat than struggle between struts and flying wires.

The vertical and horizontal stabs are similarly built. For trailing edges, wet 1/16 square balsa and pin down in a curve in both cases. The vertical stab-fin and rudder are cut apart and soft wired hinged, top and bottom, with 5-minute epoxy. Also I recommend using Hot Stuff glue for the entire framework, as it doesn't add weight, but your fits must be good and snug. Covering and trimming is done the same way as for wings and fuselage. Bond the vertical stab to the fuselage. Now glue horizontal stab to the trailing edge of the fuselage and lightly spot-glue the forward stab points to the fuselage, to allow for fine flight adjustment later.

The most difficult decorating was done on the pre-doped wing struts. I drew a vertical datum line with the pen and laid out small squares on either side, working to the extremities of the struts on both sides as well. Now add the struts in before adding the top wings.

The rigging is always a time for struggle, but patience is the rule. I find it easier to anchor one end of each thread first, then work the other ends into the joints of wing and fuselage with a touch of glue on a toothpick, cutting the loose ends after completely dry. Wet the cotton thread for assured tightness.

Now add in the cabin transparencies. This is done by carefully laying a thin bead of 5-minute epoxy around the perimeter of the window opening. Using a toothpick with window gunk caulking on the end, touch the transparency in the middle and pick up carefully, locating it in place. Twist off the toothpick. Do the same for the other side and top. The windshield was vacuformed over a shaped sugar-pine block, using side, plan and front-views as a form guide, allowing enough form run-off and marking the trim off line on the form with pencil. All canopy framework trim was added with Scotch brand rubber cement tape, taped to one side of Japanese tissue, then cut to appropriate width strips. With the backing pulled off one end, carefully secure strips to canopy.

The spinner is a model rocketry nose-cone, turned down with sandpaper in a clamped down electric drill, using a cardboard template to check profile accuracy. With a Dremel tool, hollow the center out, then carefully slot on either side to fit over a cut-down Tern Aero prop.

The completed model, with one loop of 1/8 Pirelli rubber, 14 inches long, weighed in at 16 grams.

After testing indoors and out, I finally adjusted my model to fly to the right using approximately 1-1/2° right thrust and +2° down thrust, and very little right rudder. A small tab of scotch tape was added on the right lower wing for indoor flying in our small grade school gymnasium. Outdoors, the tab can be removed and decrease rudder to open up the turn. Turns were flat and the flight very stable and slow. Build it light! •

Rocketry . . . . *Continued from page 47*

that Dr. Goddard's rockets couldn't possibly reach the moon because they wouldn't work beyond the atmosphere. Sounds like people who say the Viking programs were a waste of money!

The kindly U.S. Postal Service also brought us a (crushed) copy of the *Novaar Free Press* from Novaar, the Northern Virginia Association for the Advancement of Rocketry (say that five times fast!). Editors Larry Hootman and Chris Tavares offer coverage of Vacuum-1 (a Novaar regional) as well as an assortment of plans and crossword puzzles. The one-and-only Col. Howard Kuhn has an article on finishing techniques in this "Freep", with some good hints on lacquer vs. enamel and the value of 400-grit sandpaper. Most appreciated is an up-to-date Contest Calendar, with definite dates for a couple of small area meets and two of the most prestigious regionals, ECRM and AARDVARK.

The East Coast Regional Meet

(ECRM-12, this year) has been held for twelve straight years at Camp A.P. Hill, Bowling Green, VA. Events this year include Mercury Dual Eggloft, four glider events, four classes of parachute and streamer duration, and open Spot Landing. AARDVARK (I'm not going to explain what it stands for!) is six years old this year, and is held on the site of last year's NARAM, Allentown College, in Center Valley, Pa. This year, they're flying single payload, three glider events, Predicted Altitude, Design Efficiency, and Class 2 Altitude. The dates for ECRM-12 are April 23 and 24, and for AARDVARK-6, June 25 and 26. More information on these and other meets will be forthcoming in the *Model Rocketeer*, NAR's monthly magazine. You can get NAR membership info by writing to NAR HQ, Box 725, New Providence, NJ 07974.

The M.I.T. Rocket Society passed along the announcement of their 10th annual Technical Convention (has it really been that long?). The MIT group is probably the most technically advanced in the country, and their *Journal* (editions of which are available through NAR Technical Services) is an impressive example of just how technical the hobby can get. Unfortunately, since MITCON is held in January this year, and I have other plans, I won't be able to attend, but I have trusty friends who have promised to report all the gory details.

Tom Hoelle, NAR Trustee and Midwest Regional Manager, sent along a copy of his personal newsletter. Tom has solved the communications problem in his region by answering all of his letters once each month; then dittoing all four or five pages and mailing it out in all directions. In an organization plagued by lack of communication, Tom really stands out as an innovative problem-solver. This time he reports that NAR has finally secured its second-class mailing permit (loud sighs of relief). That was the hassle that loused up delivery of the *Model Rocketeer* for a while last year. Tom also gives a personal recommendation that I second and pass along: *Jane's Pocket Book of Missiles*. It's good for general knowledge and quite fair for scale data. I've seen it in bookstores, and it can easily be ordered through any bookseller.

It being that time of year, I sent off my NAR renewal and got in return the discount coupons, a shiny new license, a spiffy decal, and a catalog of material now available from NAR Technical Services. This last deserves mention. NARTS is where you send for all your jacket patches and decals, true; but it also lives up to the "technical" in its name. For starters, if you are forming a club or have one that could use a shot of adrenalin, the excellent *NAR Section Manual* is available for two bucks. The third *NAR Technical Review* is now in print, covering some noteworthy R&D reports presented at the last few NARAMs. Gordon Mandell's classic report, *Fundamentals of Dynamic Stability*, is in stock, as is the new (and great) sixth edition of Harry Stine's *Handbook*. And finally, the NAR has used NARTS to attack a fundamental problem in scale modeling: finding decent data. NARTS has 3 scale packs available now, with information compiled by experts. They are all you need for your basic substantiation packets. Loud cries of thanks and applause go to the Leader Administrative Council, which engineered the scale packs. You can order all NARTS supplies (if you're a NAR member, of course) from NAR HQ.

And finally, a travel recommendation: there is a scale modeler's paradise in Washington, D.C. I refer to the new National Air and Space Museum, opened by the Smithsonian last July 4. I decided to take a side trip over the Christmas holidays for a look, and it was worth the effort. You see, several years ago I was involved in a project with master modeler Mike Howell, which led to the building of a scale Scout D. It placed well in some major competitions, and the whole project was a labor of love. Well, when I opened the door of the NASM and marched inside, there, smiling down at me, was a real, genuine, honest-to-God Scout D. I spent two hours lovingly examining every inch.

Furthermore, if you go in the Satellite Hall, you'll find an exhibit of early model rockets! And on weekends, several of the Washington-area clubs are staffing a booth, where they build model rockets and explain them to the guests. I talked to Alex Dobrenchuk and Chris Boffey, two fellows from the NARHAMS club; they were extremely enthusiastic about the exhibit. Their enthusiasm was infectious, too; for hours, they answered questions and passed out club information to the crowds. It's good to see people doing such a splendid job of popularizing our hobby. •

WACO . . . . . *Continued from page 15*

WINGS

Both wings are constructed in similar fashion. A full scale WACO UPF-7 has a Clark 'Y' airfoil. Such an airfoil may be easier to construct, and may be used if desired.

Spars are constructed from 1/8 by 1/4 hard balsa to form a 'U' shaped channel. Ribs, in halves, are then cemented onto each side of the spars, with leading and trailing edges supporting. This technique differs somewhat from traditional wing construction. You may find it quite interesting and perhaps very useful.

Commence wing construction by laying a strip of 1/8 by 1/4 hard balsa

onto a straight line. Cement two 1/8 by 1/4 strips of hard balsa onto either side to form the 'U'-shaped spar. This method, as you can now easily see, provides a slot where spar joiners, made from 1/4 inch plywood in various lengths as desired, may be inserted. This presents a very strong, light, and straight spar. After spars are made, lay them over the wing plan and cement as many 1/4 by 1/4 cross-members into the 'U'-channels as desired.

Cut wing rib halves from 1/8 inch balsa sheet and cement them onto spars. Let dry. Turn wing over and cement bottom rib halves in place. Let dry. Construct wing center sections in the same manner and cover with 3/32 balsa sheet. Cement leading and trailing edges onto framework.

Make wingtips from 1/8 or 3/16 balsa, or from laminations of pine, and cement to framework.

Ailerons can be made from solid balsa aileron stock, or they can be built-up, using aft section of rib 'C' as a guide, cut down to allow for 1/16 covering.

Make wing interplane struts from 3/16 pine.

Fasten cabane struts to top wing center section. Use your own favorite way.

Ailerons can be operated by torque-tube or bellcrank methods.

TAILFEATHERS

Tail sections can be built up from 3/16 balsa square, or can be made from 3/16 balsa sheet or pine laminations (3 minimum) in the same manner as wingtips. Use plan outline of surfaces as guide.

FINISHING

I covered my UPF-7 with polyester and painted it with Aero Gloss dope. Color scheme selected was that used during the World War Two years for the standard Army Air Corps primary trainer, royal blue and yellow. I finished mine to fit that standard, without cowling or wheel pants, like the PT-14. You may wish to "doll up" your version like the civilian UPF-7.

This is my last radio control model project for a while, as I recently purchased a real WACO UPF-7 which I am currently restoring.

I hope that some of you will build more radio controlled UPF-7's and help bring back the memories of one of the most beautiful biplanes ever made. It's an attention getter! A good-looking two-winger of which you will enjoy every minute. Good luck! •

Pssst . . . . . *Continued from page 49*

costly of the tested engines, but do reflect the extra investment in terms of extremely precise machined appearance and nearly all metal construction. The single and twin-cylinder types are composed of identical parts, and in fact, may be converted from one form to the other. The steel cylinders are topped with brass heads, which feature steel ball-valves in nylon seats. The crankcase is alloy, and mounting is radial via two 0-80 size screws. The pistons are of an impregnated nylon with metal inserts, while the connecting rods, fuel tank, back plate, and filler nozzle are aluminum. The fuel tubing is copper, soldered to brass fittings. Head and fitting seals are "O" rings, and the inlet nozzle check valve is a rubber-like material. The engine comes equipped with a Williams Brothers 5-1/2 inch diameter nylon propeller. Speed regulation is by cylinder rotation.

The cast alloy charger is an extra cost option, and features steel fittings and an aluminum nozzle. Its spring-loaded steel ball-valve seats in a nylon insert, and the charger-to-filler fit may be adjusted. The solid steel tapered needle punctures the CO_2 capsule with relative ease.

Printed instructions recommend sewing machine oil for lubrication at 20-flight intervals, or "whenever engine appears dry". Model size suggestions range from 15 inch through 28 inch wing span range.

A product of Ticket Equipment Limited, of England, the TELCO CO_2 Engine is packaged in an attractive triangular carton, containing a foam-plastic inner tray. The engine features a steel cylinder finished in some sort of black coating. We understand from a British source that this coating has been eliminated from later versions of the engine. The cylinder head is brass, and encloses a steel ball valve operating in the steel cylinder. The crankcase, piston, backplate and filler nozzle are of plastic. The connecting rod appears to be either brass or bronze, and is of extremely neat appearance.

The fuel tank appears to be matte-finished aluminum alloy, and is equipped with a brass fitting. Fuel tubing is copper, soldered to the various brass fittings. The filler valve features a steel ball valve, and seals are "O" rings. The engine is furnished with a yellow plastic propeller of just under 5-1/2 inch diameter. Speed regulation is by an eccentric crankshaft bearing flange. With this system, the entire crankshaft is displaced up or downward in relation to the piston-operated ball-check valve; in contrast to the other two engines, which, in effect, move the ball check valve seat in relation to the crankshaft. In either case, it can be seen that a decrease in distance results in an advance in timing, and therefore an increase in engine speed. The advantage of the TELCO system is that the delicate copper fuel line is not disturbed during speed adjustments, as it is in the case of

the other two brands of CO_2 engines. Offsetting this advantage, however, is the totally inadequate tool provided by TELCO. This stamped steel unit is less than 1/16 inch thick, and is expected to adjust an equally thin cam ring on the front of the engine. We found this difficult to do with the engine stationary, and virtually impossible with the engine running. Curiously, early prototypes of this design featured a simple lever, much like the spark-advance levers of the old ignition engines, and we feel this would be a much more convenient solution to the problem. Failing that, the adjustment tool should be at least three times as thick.

The charger is of injection-molded orange plastic (a very good idea, since we've had trouble finding plain chargers dropped in grassy fields). The fittings of the charger are metal, and the plastic-lined filler nozzle is adjustable to eliminate leakage. The puncture needle is hollow, eliminating the need to back off the cartridge screw, as on the Brown design charger. Initial effort required to puncture the seal was fairly high, however.

The TELCO is furnished with mounting screws, washers and nuts, as well as colorful decals, and a very thorough instruction sheet. The latter offers you your choice of languages, incidentally. SAE 10 or 3-in-1 oil is described as suitable, at intervals of 50 flights. Displacement is given as 0.06 cc, and unit weight as 14 grams, less propeller.

The third engine in our review is the "SHARK", Powermax product, which according to importer Nat Polk, was financed by the Irish government! The "SHARK" engine is manufactured by Harden Associates Limited, Lancashire, England. Its packaging consists of a molded foam container with an attractive cover featuring the stylized SHARK logo. Instructions consist of a single sheet with large illustrations, evidently in an effort to overcome the language barrier. Surprisingly, no reference to lubrication was included in our sample, which certainly must have been an oversight, and doubtless will be corrected soon. Furnished is a white plastic propeller of 5-1/4 inch diameter, and an injection - molded plastic charger equipped with metal fittings.

The engine is slightly larger externally than the Brown or Telco unit, but appears to be of similar displacement. The crankcase, cylinder muff, piston and backplate are plastic, while the crankshaft bearing and connecting rod appear to be bronze. The aluminum fuel tank is slightly taller than those of the other two engines, and is topped with a brass cap, connected to the engine and filler valve by the usual tiny copper capillary tubing. The filler valve housing is brass, the check valve a rubber-like material, and the filler connection is aluminum.

Mounting is by three screws (not furnished) through the triangular crankcase rear section. Speed regulation is via rotation of the cylinder assembly. Cylinder head, fuel tank, and filler nozzle assemblies are sealed by "O" rings.

CONCLUSIONS

All three engines tested ran well, started instantly, and attracted considerable attention from fellow enthusiasts. What other reciprocating engines could be safely tested inside an ordinary home without offending the other occupants?

All are capable of reverse rotation (just flip 'em the other way), making them useful for pusher installations, but also reminding us to check for proper rotation before launching a model, as a careless flick can set them running "wrong way 'round"!

We suggest you examine all three brands before making a choice. Our guess is that different people will have different preferences, just as they do in automobiles, women, etc. Each has its favorable points, plus a few eccentricities to keep things interesting. Personally, we are glad to have all three types.

Thanks to the following individuals who, directly or indirectly, supplied the author with information used in the preparation of this article: Bill and Dave Brown, Brown Junior Motors, Inc. John J. Brown (no relation!), author of "Wind Mills", Model Engine Collector's Journal. Bob Peck, Peck-Polymers. R.G. Moulton, MAP Publications, and the late Howard McEntee. ●

Suzy . . . . . *Continued from page 46*

noseblock. The original flies in wide left circles. The left wing is slightly washed-in, and tweaks of left rudder give precise control of circle size. If "Suzy" oscillates longitudinally in flight, add a little more downthrust. A prop of 7-1/2 inch diameter, carved of pine, is used on the original (plastic is fine), swung by four strands of Pirelli (2mm) about 26 inches long when new. The rubber stretches with use, and after the Nats and a subsequent FAC meet, "Suzy's" motor measured close to 31 inches in length and had nothing left. With a new motor, I like to work up from about 145 to 160 turns, with a 9:1 winder, as the heats go along. I don't use a free wheeler on my racer because dependability is paramount, and Murphy's Law is big in elimination type flying. However, most of the guys use them, and if you are confident in your device, it should add to your time.

The airplane is covered entirely with blue Japanese tissue, with the exception of the rudder and noseblock, which are yellow. Adhesive-backed yellow plastic shelf liner, purchased in a local department store, was used for all of the trim on the plane but the written "Suzy" on the cowl and the small registration numbers on the fin. These were painted on with a triple 0 brush. My model, less prop, noseblock, and rubber weighs in at .7 oz.

"Suzy" is a veteran of over 200 flights, and though wearing many patches, and with a lube-spattered fuselage and the subtle warps of old age marring her beauty, she still loves to fly.

THOMPSON TROPHY RACE RULES, as described by DAVE STOTT.

"We have no scale judging! We only have certain requirements that each model must measure up to. We think that when the actual racing is under way, the guy who wins at the end of the flying should be the true winner, and not be the victim of an anti-climax by scale judging.

"In a nut shell, our requirements for racers are; no folding props, classic construction (that is, built-up tissue-covered double surface, sheet where real ship was metal or wood is optional), no undercambered airfoils, correct coloring and marking must be on. (We have relaxed the marking in cases where a guy has been up half the night to finish his ship for the race. But they must be on the next time the ship is entered), 24" span limit. We reluctantly bar Page's racer and Mr. Mulligan due to their obvious advantage. Before 12:00 noon on the contest day we require 2 random flights be put in by all racers, timed, of course. This is our "Shell Speed Dash". The first 10 placers qualify for the Greve and/or Thompson, depending on the fact of their design being raced or intended to be raced in either of these real life events. That is, to say a Pesco Spl. could not be used in the Greve, but only in the Thompson. A Jeep would qualify for either or both (at flyers discretion) as the real Jeep did.

We use the times and placing in the Shell to set up the line up of two 5-plane heats in the Greve & T.T. The winner of the Shell is in the first heat, as well as the 3rd, 5th, 7th and 9th placers. The others go in the 2nd heat. Launching is done at a starters signal with contestants lined up at 6 ft. intervals. Each heat is two flights long. (Laps, as we call 'em). First guy down is eliminated each time. This leaves 6 guys (3 from each heat) qualified for the Final Race.

"The Final is flown the same way . . . first guy down is out, until two remain for the last lap. A blown motor puts you out of the race immediately, as it would in real life. No motor changing once heats and final are under way. Two minutes to wind motors. So, a final would run 5 laps (flights) if no one blew a motor. A long and nerve wracking

grind, for a guy might have to fly two laps of a heat, and five of a final, plus stay up the longest to win. And there is always the danger of a mid-air collision!

"We also have one event for the non-qualifiers, that is the guys who did not place in the top ten in the Shell. It is simply a line up and one flight. Last guy down is the winner. In that way no one goes without getting some action." ●

Counter . . . . . *Continued from page 11*

as a separate package.

All of the pieces necessary for a neat, clean and safe installation on your favorite fuel can are supplied, and can be used with any fuel pump you may own.

Listed as Catalog No. 192, and priced at $1.75.

Check with your hobby dealer first, if unavailable write Du-Bro Products, Inc., 480 Bonner Rd., Wauconda, IL 60084. Tell them MB sent you.

* * *

If you have not yet bought that K&B 3.5 outboard engine that you've admired at the local boat shop only because you can't decide what to put it in, look no further. The new Dumas 'Hot Shot' is just what the doctor ordered.

Designed for the new NAMBA approved class, expected to be one of the hottest classes in R/C model boating, the 'Hot Shot' is expected to not only get you on the water quick, but keep you ahead of the competition.

Constructed of mahogany and birch plywood, the kit is complete, including turn fin. Bolt on your engine, install your favorite two-channel radio, and go racing.

Length is 24 inches, beam is 12 inches, and the price is only $22.95.

Also new from Dumas, for the increasingly growing scale unlimited hydro class, a new kit of the Atlas Van Lines, U-76 Unlimited Hydroplane.

This 40 class semi-scale kit of the 1976 "Thunderboat" national champion, is a great way for the beginner to start in the hydro class, though it is as competitive as the driver's experience.

This 36 inch long die-cut mahogany and birch plywood kit is complete and ready to assemble.

The U-76 kit is priced at $44.95; a complete hardware package, Dumas No. 2328, is available at $42.95.

Contact your local dealer first, if he can not help you, make waves directly at Dumas Products, 790 So. Park Ave., Tucson, AZ 85719.

* * *

A new completely proportional plug-in version of its well-proven W-1 Sail Control Winch has been introduced by Probar Design. Designated as it's Model W-2, this winch boasts of some of the features of the W-1; 40 inch-pounds of power, 5 second travel time, and a compact 2 x 2 x 5 inch size. In addition, the W-2 will plug directly into the receiver, and does not require extra batteries. It is available with either Kraft or Futaba connectors, or with bare wires for installation of the proper plug to fit your favorite brand of R/C system.

All necessary hardware, including winch arm blank, is included for $95. Address all your inquiries to Probar Design, P.O. Box 639, Escondido, CA 92025.

* * *

Next time you are in the Costa Mesa, Los Angeles, San Francisco, or Houston, Texas area, and are Eastern lobster hungry, we unreservedley recommend the 'Hungry Tiger' restaurants. Great dining, in a tranquil airplane atmosphere, brought to you by the same folks who previously operated the Flying Tiger Line.

Which is as tasty a way as we know to tell you about the new Williams Bros. 1/72 scale model kit of the famous Curtiss Commando, the C-46, shown here in the colors of that famous airline. Probably most famous for its operation over the Himalayan "Hump", this airplane also saw service with the then Army Air Corps., the US Navy, the Nationalist Chinese Air Force, and after the war, with a large number of civilian lines.

This new kit, a must for all serious collectors, comes with all necessary items to detail it to match exactly your favorite type. Two different propellers were used, and are furnished; 3-blade Hamilton and 4-blade Curtiss. Hard or flexible tires, retracted or extended, may be installed. And you have a choice of decal markings.

We recommend this, and other Williams Bros. kits to the builder of RC Scale, as an easy source of information, as well as a model of your model to study prior to construction.

From your dealer, or send 25¢ for complete illustrated catalog, from Williams Bros., 181 Pawnee St., San Marcos, CA 92069.

* * *

From San Diego, the home of the Spirit of St. Louis, the Antic, and other famous airplanes, now comes the Proctor 'Parasol'.

Designed to fly at a very low realistic airspeed, this 1/4-size semi-scale monoplane kit is priced at $86.50. The kit is complete with highly detailed full-size plans, construction manual, assembly photos, all parts accurately cut from highest quality materials, and all hardware formed and assembled.

The Parasol spans 76-1/4 inches, is 59-1/2 inches long, and is designed for a .45 or bigger engine. The wing area is

891 square inches, and weight is 6.75 pounds. Any four-channel R/C system should drop right in, and is required for normal operation.

The wings are quickly detachable for transportation, and can be installed for flight in two minutes. It may be flown as a landplane, or as a seaplane. Conversion from one mode to the other takes approximately five minutes.

An interesting introduction to the art of scale radio control building, from Proctor Enterprises Corp., P. O. Box 9641, San Diego, CA 92109.

* * *

We suppose that lighter-than-air wheels will come along someday, but at this time, the lightest ones we know of are Kustom Kraftsmanship's new Racing Wheels. Made of a low density polymer material, these 1-1/4 and 1-1/2 inch wheels weigh less than 1/5th of an ounce.

Available only in a streamline version, and completely fuel proof, they should be just the thing for all racing types of airplanes, both R/C and control line. The tire is molded directly on a precision machined aluminum hub, and can not come off under any conditions. Hub sizes are 3/32 for the smaller wheel, and 1/8 for the 1-1/2 inch size.

Only $1.95 per pair, they are now distributed through A & L, Ace R/C, Midwest Model Products, and presently on their way to our local shops. Direct orders accepted. From Kustom Kraftmanship, P.O. Box 2699, Laguna Hills, CA 92653.

* * *

A new and novel idea in servo mounts, the brain child of one Vic Zugel, is now available from Ace R/C Inc., Box 511, Higginsville, MO 64037.

It consists of a mounting plate for each end of the servo, to which the grommet isolated ears are mounted with No. 2 self-tapping screws. The plate is then mounted to the servo rails, with No. 4 self-tapping screws. The important difference is that the No. 4 screws fit into a 1/4 inch long slot, thereby permitting the servo to be moved back and forth that amount. This eliminates the need for an adjustable clevis, saving room and expense.

This also makes the servo assembly much easier to remove for use in another model, as only two screws have to be removed. This tray fits the Ace Digital Commander Bantam and Dual-Rack servos, as well as any D&R Bantam, Dunham or any servos with 13/32 inch spacing between the ears.

Enough grommets, eyelets, screws and mounting plates for mounting two servos are included in this $1.59 package from Ace R/C.

* * *

For 1/2A Fans Only. Another new item, a first of its kind from any manufacturer.

It is called the 'Airflow Engine Mount', featuring a wrap-around design that results in super strength and reduced drag around the engine. It is molded from glass-filled nylon, and fits .049 and .051 engines.

It can be painted with epoxy paints, weighs less than one ounce, and is easily set to whatever thrust adjustments you prefer.

The engine is mounted with No. 2 sheet metal screws provided, though there is ample material to drill and tap if preferred. Socket screws (4-40) are recommended for mounting to the firewall. Priced at $2.50, and manufactured by Fourmost Racing Products, 4040 24th Ave., Forest Grove, OR 97116.

* * *

Bal Dar Industries, 347 Bowline Dr., Vacaville, CA 95688, has recently introduced it's new "Paint Box", a miniature completely enclosed paint booth designed for completely dust free spray painting of models and other objects. A large capacity (24 x 17 x 15 inch) white corrugated cardboard box is fitted with a clear plastic front, and an air filter arrangement that completely removes dust particles as small as 10 microns (.00039 mm) from the air inside. Powered by any home style vacuum cleaner, the constant flow of air also removes paint overspray, resulting in what is claimed to be the most professional paint job you've ever had.

Not only are the results superior, but you can even paint in the kitchen without complaints about the smell and the mess.

Soon to be available at most hobby stores, available immediately direct from Bal Dar, $14.99 Postpaid. California residents don't forget 6% for the state.

* * *

Southern R/C Products, Inc. announces the immediate availability of its new Fuselage Jig Station, designed to help you assemble perfectly true built-up fuselages.

Each station provides parallel vertical bracing, adjustable in width from 0 to 6 inches. You may purchase and mount on your own building board or table only as many Jig Stations as you require, nothing else need be bought.

Complete with all hardware and complete instructions, this new building aid is available from Southern R/C Products, Inc., Rt. 3 Box 47, Nims Lane, Pensacola, FL 32503.

* * *

Strick's Enterprises, P.O. Box 2340, Lake Havasu City, AZ 86403, has announced the recent acquisition of the Power-Mite table top disc sander manufacturing facilities from Mathes Electronics. (See MB "Over the Counter", Sept. 76).

This handy tool has been improved, and is now available in three models. The original model now designated as Standard, is priced at $24.95. A new Heavy-Duty model, claimed to have 43% more power, is priced at $29.95. A Deluxe version of the Heavy-Duty model, with all available accessories, costs $34.95.

The available accessories, also packaged separately, are a molded backing disc, for either the Standard or Heavy Duty sander at $4.95; pre-cut, self-adhesive sanding discs, in either fine, medium or coarse, or assorted grades, are packaged at four for $1.95; and last but not least, a molded miter guide, used to set the table for perfect 45 and 90 degree sanding, is only 95¢.

Try your local shop first; then try Strick's. Tell 'em both MB told you about it.

* * *

Do you remember Air Trails Magazine, and the Air Trails 'Sportster', circa 1939? If so, you've been enjoying this hobby of ours for a long time.

And to keep you enjoying it, Cal Aero-Model, 7142 Bluesails Dr., Huntington Beach, CA 92647, has just released this old favorite in its "Series 50" Old Timer R/C Line. Scaled to a 50 inch span for a total of 380 squares, it flies on three channels with any .09 to .15 engine. Primarily intended for the Sunday Flyer, it meets SAM rules for R/C assist if competition is your game.

This $33.50 kit features pre-cut parts, some hardware, formed landing gear, and high quality wood throughout.

Check your dealer, or inquire direct.

* * *

RS Systems, 5301 Holland Dr., Beltsville, MD 20705, has recently introduced something different in the way of a test instrument for the R/C flyer. Especially valuable to the owner of the meter-less transmitters, this light weight device clips on the antenna and gives you an accurate and immediate check of some of your transmitters 'innards'. Proper use will tell you if your tuning drifted, your batteries are discharged or defective. And most important, it'll tell you this BEFORE you've released your pride and joy.

This RS-RFM RF Meter can be used with any make of transmitter, comes with complete instructions and suggested uses. Check with your RS dealer, or inquire direct.

* * *

The interest in Half-A R/C continues, and more and more interesting items are appearing for this phase of our hobby.

One of the latest, and most interesting is the Hiscott Throttle/Muffler control, for the Cox Medallion and Tee Dee .049 and .051's.

Completely machined to tolerances as closed as .0005 inch, this unit gives close to linear RPM response from the average 5/8 inch servo travel. Installa-

tion and adjustment are both simple. A drop of only 300 to 400 rpm at the high end is claimed, and long periods of idle are possible with no engine overheating.

Priced at $16.95, and guaranteed for one year, the unit can be used without the muffler, as a throttle only. They are on the way to your local hobby dealer, or order direct from Hiscott Components, 2910 Peppertree Lane, Unit C, Costa Mesa, CA 92626.

* * *

Neither the English "Aeromodeller" nor Ron Moulton, it's Managing Editor, should need much introduction. And neither should their 'Aeromodeller Annual', the 1976-77 version of which has just been released.

This year's 5-3/8 x 8-1/2, 144 page version covers everything from A-frame rubber designs to compressed-air driven scale models, R/C, and even an R/C model airship.

Articles and information have been excerpted from model publications of 12 nations . . . **Model Builder** included, naturally. Interestingly enough, a glossary of aviation/model terms is included, for the reader of Polish, English, Russian and German publications.

Must reading for all serious modelers, the book is priced at 2.25 English pounds; our local bank gave us the latest exchange rate of $1.7475 to the pound. For more information, and US prices and shipping costs, inquire to Publicity Dept., Argus Books, Ltd., Argus House, 14 St. James Rd., Watford, Herts. Merrie Olde Englande, naturally.

* * *

A most innovative answer to the prop balancing problem has become available recently. Known as the "Bubble Balancer", it is designed to accommodate props with 3/16, 1/4, and 9/32 inch prop holes, and is claimed to take all the guess-work out of balancing propellers.

Constructed entirely of metal, using a super sensitive level, the Bubble Balancer has hardened frictionless pivot points and surfaces. It can be used to balance props with any number of blades, in all directions.

The Bubble Balancer is priced at $12.95, plus $1.50 for postage and handling. Sleeves for 5/16, 3/8, and special size prop holes are available for $1.50. Order direct from Howard Huebl, Box 193 Route 4, Mankato, MN 56001.

* * *

Milman Engineering Co., Inc. 3448 Bishop Rd., Chehalis, WA 98532, announces the availability of spoked wheels for scale and standoff scale models in sizes from 2-3/8 to 5 inches.

The tires are molded of Buna rubber, either smooth or treaded. The rims and spokes are nickel plated steel, and nylon bushings are installed in 1/8 or 5/32 inch I.D., depending on wheel diameter. Tire widths vary from 3/8 to 3/4 inch, and weights from 3 to 10 ounces, all based on diameters.

Write direct to Milman Engineering for complete information including prices. Tell them MB sent you. ●

Sailing . . . . . *Continued from page 39*

From this exercise we conclude that complete removal of twist from a sail will be detrimental, and all other things being properly adjusted, we should allow about 5° twist in a sail with a 65 to 75 inch luff. If a sail foot is significantly closer to the water as it is on some of the 36/600's, it might be necessary to reassess the situation, since our Figure 4 shows the steepness of the gradient to be greater nearer the water, and hence percentage change in true wind speed will be greater.

All the previous comments I have made about tight leaches, and leaches which are overtrimmed, still hold. Also, the 5.12° boom angle is not real. It will be significantly different for different boats, for different sail cuts, and so on. What is real is the 5°+ of twist that should be allowed for in the sail as one goes up the mast.

Where do we go from here? A couple of further projects suggest themselves. The first is to use a video tape set-up to film the action of the indicator pole. Since the tape can be played back in 1-second stop action we could build a series of 1-second profiles. By connecting the dots with a smoothed curve and then putting the profiles themselves back on video tape one could make a movie of the actual arrival of a puff. I think that there would be ample proof of a theory I have on why many models when hit by a puff, first heel, then slow down, and finally all of a sudden round up, luffing head to wind. Believe me, you'll read about it right here in **Model Builder** if we manage to complete the task.

A second use for this data is going to be in the calculation of power distributions and heeling moments for those classes which have changeable sail plans. It also may make some meaningful contributions to the design

of storm sails for the one-designs such as the EC/12, which has such a bad time in heavy air. All in all, it seems to have been worth the effort. It has really just opened the door on an area of basic aerodynamic research that will pay off for model yachtsmen in improved performance, for which the only charge is to scratch your head and dig in to it.

Remember to send your AMYA dues of $5.00 to the Secretary, 2709 So. Federal Highway, Delray Beach, Fla. 33444. And I'll field questions accompanied by a self-addressed, stamped envelope to Rod Carr, 7608 Gresham St., Springfield, VA 22151. •

Remotely . . . . *Continued from page 19*

between the pieces, and that doesn't weigh much.

"Engines for C/S won't be a problem so far as power requirements are concerned, but unless geared, few will be able to swing a scale sized propeller. A good .45 should handle most lightplane configurations . . . though a .60 or better will be required for higher horsepower prototypes, and if converted to ignition, should be able to turn a larger, near-scale prop and still offer a good rpm range. Brute force is neither required nor desired. Few, if any, full size J-3's offer STOL takeoff performance, so why should a 1/4 scale model?

"Aerobatics, for those so inclined, needn't depend upon brute force either. Unlike the average R/C pattern or even sport model, C/S should fly realistically. Only very specialized, extremely high power/weight ratio full scale airplanes can even approach the full power maneuvers of models . . . such as vertical climbs from level flight. The C/S aerobatic pilot should plan a nose low, speed build-up entry into loops, rolls and other velocity-dependent maneuvers. Only makes sense. And, oh boy, just listen to them wires whistle. Whoooeee!

"Cylinder heads for phoney radial or other exposed engines will require some skill and ingenuity, but with the casting and expanded-foam plastics now commonly available, these can be formed by most hobbyists with a bit of guidance and patience. Special size and contour spinners will be a bit tricky. Okey. So be it. Propellers . . . true scale diameter and shape . . . might be reserved for static display. They'll undoubtedly be hand-whittled and seldom used for flight. Remember, at 1/4 scale, many will be 18 inch diameter and bigger.

"There's little doubt but that C/S will put some real building back into modeling. Unless a person decides to go the very limited kit or plans route, it's going to be a design and scratch-build activity. And why not? That's fun, too. And talk about pride of ownership! Should give the magazines a chance to publish some unique new designs and "how to" material.

"C/S model longevity should be excellent. With radio systems available that can provide all the control a pilot can use . . . and often times, more . . . the slow flight speeds and low mass of C/S models should relegate most mishaps to just that . . . minor accidents. The concept demands that flying be accomplished in near ideal conditions. Certainly, very little wind can be tolerated. Any breeze more than about 8 or 10 mph could be hazardous.

"Materials of construction for the airframe could well become something other than 'automatic balsa'. Spruce, bass and pine could be most useful and economical, as could expanded bead foam block and sheet. The cost of sheet balsa wing ribs for a 15-inch chord, 8-foot span biplane could rival the tooling and setup charges for Ford's Pinto. Foam sheet with balsa cap strips might save a week's wages. Certainly, thin veneer, aluminum sheet or even card stock overlayed with a light fiberglass laminate could find many uses. Interplane struts can utilize aluminum tubing . . . not necessarily the sizes and grades available at hobby counters . . . streamlined with balsa trailing edges and wrapped with cloth tape. Flying and landing wires of small diameter, braided flexible wire . . . as in U-control . . . might terminate in miniature turnbuckles such as offered by Lou Proctor Enterprises.

"So that's some of the basic thinking, problems and potential for C/S aircraft models. Now, what the hell do we do with them?

"Most important is 'have fun'. This could range from static display and one-atta-time fly-by demonstrations at picnic-type affairs, to competitive, free-style aerobatics, spot landing events, slow flight demonstrations, short-field and obstacle take-off and landing contests . . . the whole she-bang. Again, 'fun' has got to be the rule . . . or rather, the

philosophy.

"Let's look at some examples. Spot landing. Broken props . . . or engines stopped by dinged props, assuming a power-on event . . . should be cause for disqualification of the attempt. As should nose-ups or any damage for that matter. Should be a reasonable event. Dead-stick landings would be an interesting variation.

"Free-style aerobatics. This one will be tough to judge . . . and so maybe isn't a good thing *(Agree! wcn)*. If it is used, though, the winner should be whoever puts on the best show . . . regardless of aircraft type. If a guy is interested in this sort of thing, he should be flying a Great Lakes, or Bucker, or Skybolt, not a Heath Parasol. No reason to try and equate or equalize all comers to a common base. If a guy with a clipped-wing T-craft or Monocoupe puts on the best show . . . give him the big silver. Maybe judging could be two-fold: a panel of experts judging "realism of performance" combined with a popular vote by contestants and/or spectators for best "show". Could have individual and team events.

"Slow flight demonstrations could be judged over a measured course against time. The longer it takes to get from Point A to Point B the better. All-out speed could use the same course and distances. Makes the whole thing simpler.

"Flight efficiency would be based on the 'delta' between slow flight and speed performance. Might require a bit of work to equate top scale speed of model to that of the prototype, but it could be done. Short-field takeoff and landings . . . especially over obstacles . . . could be a real blast . . . and very challenging . . . provided that the power available in the model was not 'out of scale', so to speak.

"For a couple of minutes now, let's assume that hundreds and hundreds of modellers who read and hear of this Classic Scale thing agree that it could be great sport. Accordingly, hundreds of large, scale model projects are started, and very soon there is a sizable fleet of C/S planes. So now what do we do? Or more specifically, what do we do with "them"? How about nothing? That doesn't mean "nothing" really . . . but it does mean "nothing" competitively. Ya gotta admit it's a unique proposal, but not without precedent.

"Anyone who has ever visited a full-scale antique or EAA aircraft fly-in undoubtedly can recall the rows and rows of beautiful machines on static display. Sort of a show and tell for grownups. There's lots of hanger flyin', oohin' and aahin', exchanges of worthwhile information, horse-tradin', lyin' and socializin'. Sure, there's some flying and ride-tradin', and an hour or so each day of the affair may even be devoted to organized spot landing, bomb dropping and flight efficiency contests. But not everybody plays. The major thing is to be there, to see and to share. And these guys and gals have one hellava good time doin' it.

"Now let's consider what the merits of a similar approach might be for Classic Scale. First and foremost is comeraderie . . . getting with other folks of similar interests to enjoy and share a total activity. Certainly, unscheduled, sport demonstration flying would be in order, on a first-come, frequency available, limited flight time basis. But no pressure to fly if the mood and circumstances weren't right. Maybe an hour each morning and each afternoon could be dedicated to competition events for those who so desired.

"Classic Scale could be good fun and highly competitive without the problems that seem to develop in other aspects of the sport . . . if there is no attempt to establish a National Champion, and IF there are no all-encompassing national rules. Guidelines, yes, but nothing that formalizes or regiments our "outings". So long as there are no classes or categories, and so long as tasks do not endanger aircraft, and so long as air-

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craft and pilots compete primarily against their own potential, we shouldn't get into too much trouble. Let every get-together stand alone!" ●

Letters . . . . . *Continued from page 7*

• • •

Dear Bill:

I have been receiving and enjoying **M.B.** *for about 3 years now, and I think it's the best on the market.*

In last month's issue in your RC column, you mentioned "Mammoth Classic Scale" aircraft construction as a possibility.

This hit me where I live because for some time now I've been blowing up some old "Rubber Scale" plans to 10 foot span versions.

Currently I am building a 10 foot-5 inch span "Fairchild Ranger" with what I belive to be an inexpensive, light weight construction incorporated in it.

I am going to submit it to you for possible publication when it's all complete.

I think the "Mammoth Classic Scale" is a great idea. I hope it goes over in a big way.

Bill Wilson, Kountze, Texas

Enjoyed the pun in your last sentence! Yes, it seems to be going over in a "big" way. We're anxious to see your weight-saving construction, and especially the Fairchild 24 "Ranger". It appears that we're both right on the same track. ●

Workbench . . . *Continued from page 8*

laid across each other, the center pole of the canvas support can be set into it. Also drill a hole in each leg to accept the corner posts. Screw-eyes or nails can be inserted for the tie-down ropes. A couple of sandbags or other suitable weights will be handy in case the afternoon wind gets a little too strong.

We found both quicky-cheap and slow-luxury type restaurants within walking distance of the motels, all open Sundays . . . and them that has it at all, has it Sundays too . . . all forms of anti-freeze, that is! For one, we highly recommend the *Cask 'N Cleaver*. The menu is painted on a wine jug, the 2 inch thick filet mignon melts in your mouth, sauteed fresh mushrooms are served in a sizzling skillet, and the salad bar won't quit. All of that plus something to ease the pain, and you still have enough change out of a ten to pay the tip!

Riverside is about 70 freeway miles directly east of Los Angeles International Airport. Air travelers can also take a feeder line from LAX to Ontario (no, not Canada, silly!), which is only about 15 miles from Riverside. And, of course, everywhere in Southern California has to be located with respect to Disneyland. In this case, it's about 45 freeway miles west-southwest of Riverside. **Model Builder's** office is about the same distance, only a little farther south, and closer to the Pacific Ocean (3 miles away). You're all welcome to stop by and pay a visit!

INTERNATIONAL MODELER SHOW

By the time this issue reaches you, official word will be out that the Los Angeles Convention Center has been selected as the site for the first annual International Modeler Show, on Friday, Saturday, and Sunday, March 10, 11, and 12, 1978. Unlike the MAC Show held in Anaheim, California, the Los Angeles show will *not* include crafts and model railraod exhibits. It will, on the other hand, feature all types of model aircraft, boats, cars and rockets, and will include the three basic aircraft varieties (radio control, free flight, and control line).

Over 100 exhibitor booths will be occupied by manufacturers of products related to the modeling hobby, and a large area will be set aside for a static display of models which will be judged for excellence, and duly rewarded. It also appears likely at this time that an adjacent area will be available for outside demonstrations of various types of aircraft and cars.

The Los Angeles Convention Center is a beautiful new complex with its own underground parking, located in the active center of downtown Los Angeles, near many theatres, night clubs, restaurants, and hotels.

More details and information will be made available as developed. Manufacturers interested in obtaining booth reservations may call (714) 548-4700, or write to IMS, P.O. Box 127, Costa Mesa, CA 92627. Organizers of the show include Bill and Anita Northrop, and Donald A. "Pat" Patton.

PHOULED UP FOTOS

Have you noticed the relatively new Kodak papers that most photo process houses are using? First appearing in

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WANT: PreWar Air Trails, Bill Barnes, Unknown Worlds, Cleveland Modelmaker News, E.H. Scott radios. Fabris, 3626 Morrie Dr., San Jose, CA 95127.

"DROME AERO" Models built to order. Vintage Aircraft a specialty, kit or scratch-built. S.A.E. for quote. N. Coldrick, 867 W. Graceway Dr., Napoleon, Ohio 43545. Phone (419) 592-9641.

NEW BOOK-Indoor Scale Model Flying. Learn to make your rubber scale models fly, for the price of one inexpensive kit. $3.95 plus .30 postage. Fred Hall, Sunrise Terrace, Westville, NH 03892.

TISSUE PAPER, 19 colors, S.A.S.E., brings free sample booklet, 15 cents per sheet. Bill Wilson, P.O. U, Kountze, Texas 77625.

IGNITION ENGINES: The entire O.S. Max line of fine engines is available converted to ignition engine operation. These engines are eligible for OLD TIMER competition and are the very finest obtainable anywhere. We also offer a complete line of ignition accessories, i.e., coils, timers, condensers, etc. Send for free 1977 price list. 77 Products (Otto Bernhardt), 17119 So. Harvard Blvd., Gardena, California 90247.

MODEL AIRPLANES PLANS. Peanut, Walnut, Hazelnut, Rubber, CO_2, Gas. S.A.S.E. for list. Modernistic Models, P.O. Box 6974, Albuquerque, New Mexico 87107

NEW PEANUT PLANS: Fike E, Tailwind, Warwick Bantam, Sonerai 1, Junkers D-1. $1 each. Plus many other Peanuts, Walnut, Jumbo scale. Stamp for catalog. Aero Era, 11333 North Lake Shore Dr., Mequon, WI 53092.

MODEL PLAN SERVICE offers new and exciting plans for model builders-R/C, R/C scale, sailplanes, controline. Send 25¢ for catalog to: MPS, 1008 E. Chalynn, Orange, CA 92666.

New Line of PEANUT SCALE flying models. The Gere Sport, P-47D, PT-19 and others. Catalog 35¢. Gene Dubois Models, P.O. Box C, Acushnet, Mass. 02743.

EXHIBITION – or flying peanut scale "Vought Vindicator". Win contest with this one. Plans $1.50. R. L. Stearns, 514 Holden St., Raleigh, NC 27604.

WANTED FOR CASH: Old spark-ignition engines, parts and plane kits. Russell Stokes, Rt. 1, Box 73J, Keller, Texas 76248.

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MODEL BUILDER, 621 West Nineteenth St., Costa Mesa, Ca. 92627

INDEX TO ADVERTISERS

color print processing, the paper is now also being used for black and white printing.

There is one particular characteristic of this paper which can be both annoying, and in some cases, downright harmful. Have you ever tried to write some information on the back of one of these prints? A pencil simply leaves no mark at all, so you have to use a felt or ball-pointed pen . . . This is the annoying part . . . Next comes the damage.

Let's suppose you remove your latest batch of photos from the return envelope, and while the information is still fresh in your mind, you jot down names, dates, places, etc., on the back of each photo. Once finished, you stack them all together and put 'em back in the envelope. Now you've done it! Chances are, that when you pull those prints out to show them off sometime later, the information on the back of the top picture will have transferred to the face of the next one down, and so on. The only photo to remain undamaged will have been that top one! And once it's on there, nothing short of dynamite will remove it!

Some inks are worse than others, and some may not transfer at all, but most of them will, particularly dots, periods, and letters made by backing over a previous mark. Many modern inks appear to be dry because they don't smear, but they actually remain moist for quite a long time. Combine this characteristic with the plastic-like texture of the back of the print paper, which does not seem to absorb the ink,

and you've got yourself a portable miniature printing press!

What to do about it? It's actually quite simple. Remember the calypso song with the line that goes "back-to-back, and belly-to-belly"? After writing the information on the backs of the prints, stack the first two back-to-back, the third print then faces the second (belly-to-belly), the fourth print goes back-to-back with the third, the fifth print faces the fourth (belly-to-belly), and so on. Simple, no? As an added bonus, the prints will tend to remain flat instead of curling toward the emulsion side.

Why do we use up so much space on this subject? Well, dammit, we can't publish photos with a bunch of bass-ackward printing across them, that's why! Now aren't you glad we told ya?

Dormitories of UCR (University of California, Riverside) will be available for Nats workers (free) and for contestants desiring inexpensive lodging ($5.00 per night).

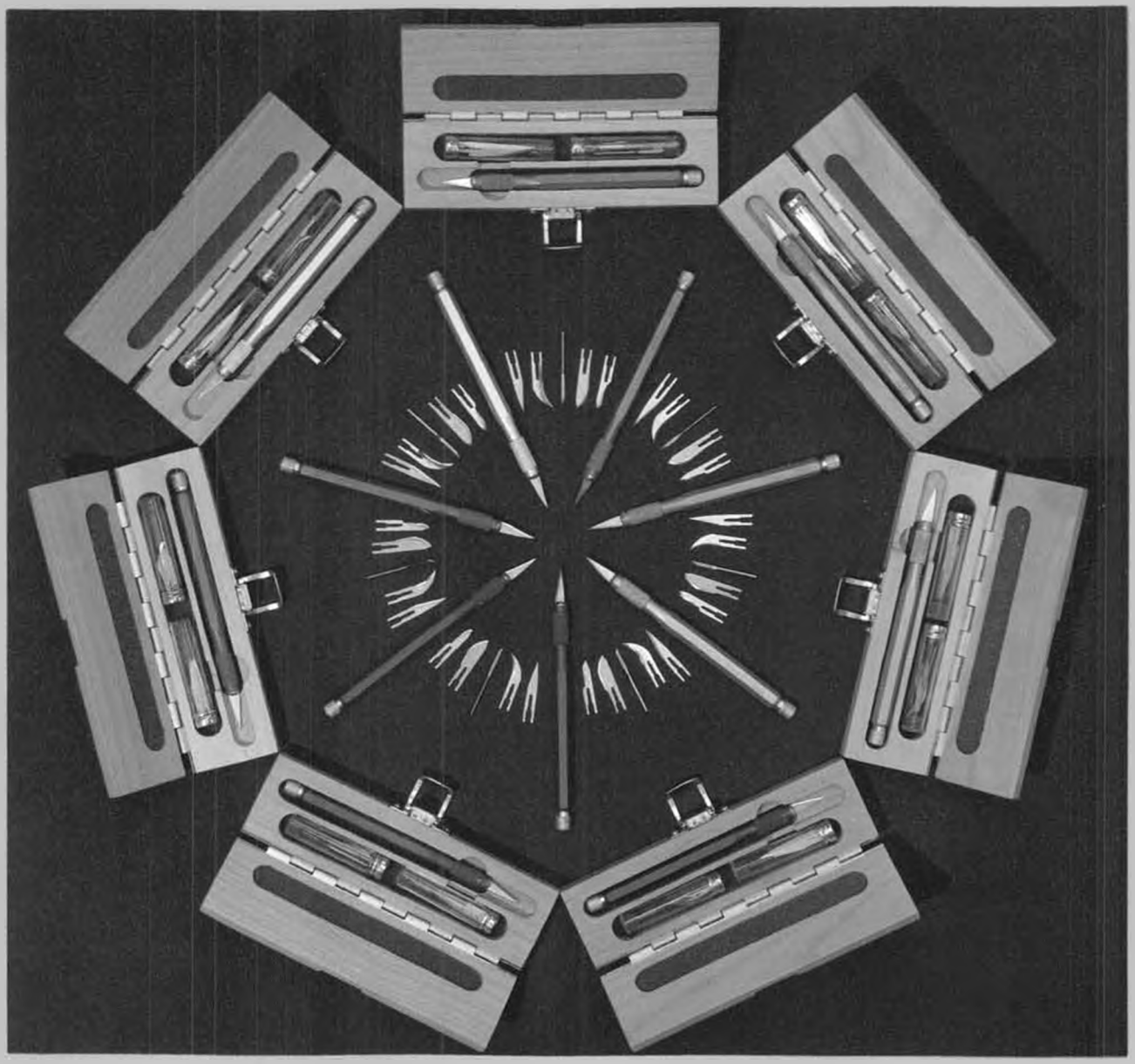
A complete list of motels is available from the Riverside Chamber of Commerce, 4261 Main St., Riverside, CA 92501, (714) 683-7100.

The following list is just some of the motels on "Motel Row" (University Ave.) which runs right into freeway 395/15, which in turn, goes right by March AFB, just 5 miles southeast of town.

American Motelodge (80 units),
1350 University, 682-1144
California 6 Motel (61),
1260 University, 784-2131
Caravan Inn (130),
1860 University, 686-8262
Farmhouse Motel (21),
1393 University, 683-3011
Holiday Inn (128),
1200 University, 682-8000
Howard Johnson's (104),
1199 University, 682-9011
Ramada Inn (98),
1150 University, 682-2771

There are approximately 14 other motels in the area. The Ramada, Holiday Inn, and Howard Johnson's are within a stone's throw of each other, and the freeway. Two are high-rise, while Howard Johnson's is on one level, with parking near each unit . . . the handiest for taking models to and from your room for charging, repairs, etc. Motel rates range from $8.00 for a single, up through $28 for a double. Singles in the "big name" motels start at $18.00. The above phone numbers are all area code 714, and the address zip is 92507. •

IN THE BEST CIRCLES, IT'S **über skiver**



A PRECISION INSTRUMENT FOR THE DISCRIMINATING MODELER

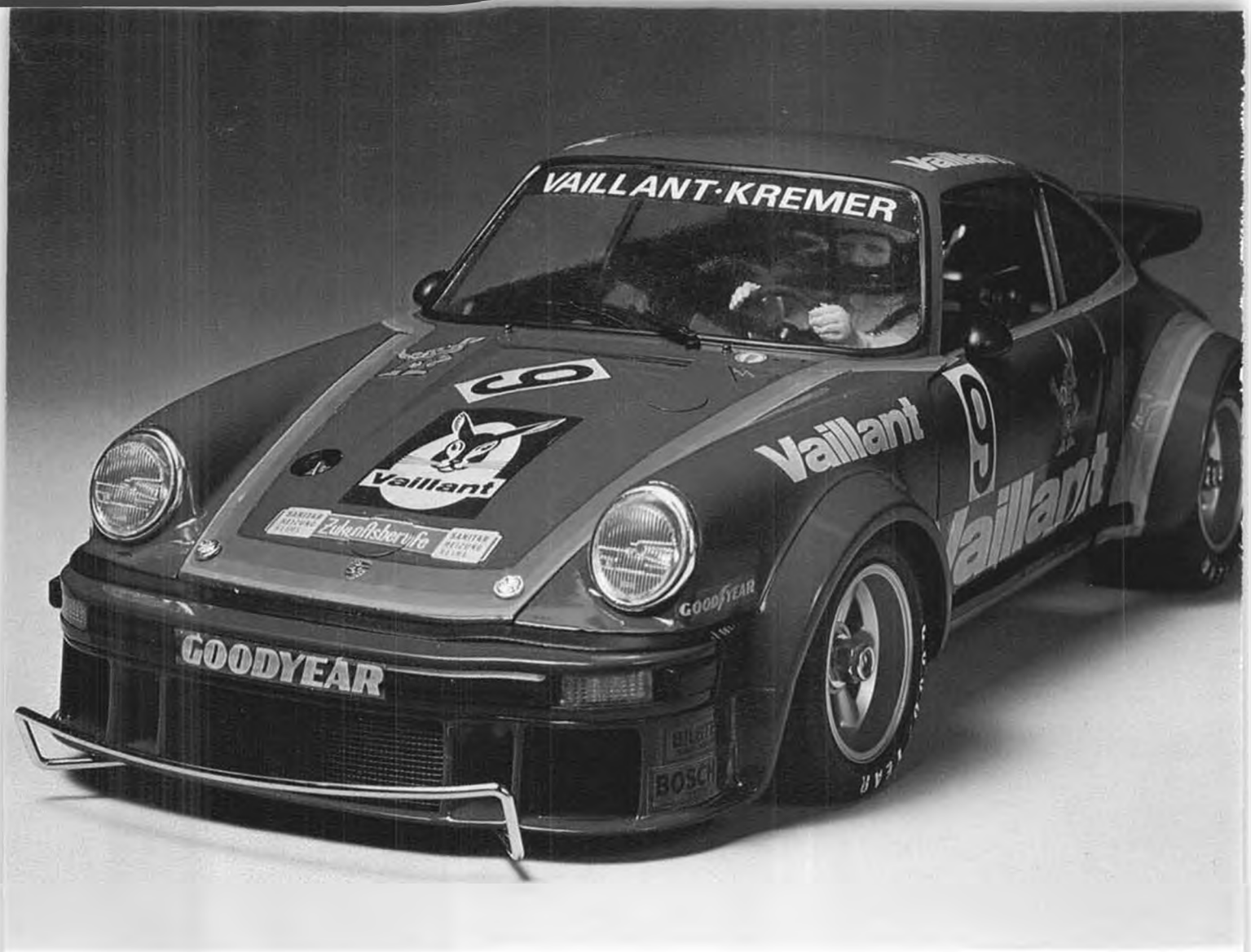
- *Safe, Rear Draw-Bar Clutch*
- *Precision, Instrument-Quality Materials*
- *Strong-Holding Advanced Collet Design*
- *Non-Rolling Hex Cross-Section*
- *Deeply Knurled, Non-Slip Grip*
- *Long-Life, Stainless, Surgical Steel Blades*

Available in seven anodized handle colors: silver, blue, red, green, gold, copper, violet.

Complete set in fitted hardwood case; includes uber Skiver, together with two vials containing six No. 11, six No. 15, one No. 12, and one No. 20 . . . A total of 14 blades $12.95
Individual handles (specify color) $5.10
Vial of 6 blades (No. 10, 11, 12, 15, or 20) $2.10

See your dealer, or order direct.
Dealer inquiries are invited.
All direct orders sent postpaid in U.S.
California residents add 6% sales tax.

MODEL BUILDER PRODUCTS
621 West Nineteenth St., Costa Mesa, California 92627



THE R/C CAR THAT'S NEITHER TOYISH NOR TEMPERMENTAL...JUST SOLID FUN

MRC-TAMIYA'S ELECTRIC PORSCHE TURBO KIT **PERFORMANCE NOT PROMISES** Move into high gear with this MRC-Tamiya solid, radio control special. It promises performance, it promises fun, it promises reliability . . . and it delivers. Not one of those go-one-way slowly toys, nor a flash-on-the-track you keep adjusting every spin. This one's got spunk, spirit and you can depend on it because it's from MRC-Tamiya. It's the new dimension in R/C car enjoyment with big performance features, powerful electric motor and stand up engineering that will last.

ENGINEERING EXCELLENCE . . . Set the gear ratio you want (there are four ranging from 4.6/1 to 19.4/1). Run it indoors, outdoors, in the driveway, den, street or yard. This Porsche is complete with two forward and one reverse speeds. It includes realistic rear suspension as well as semi-pneumatic-type rubber tires that take to rough and smooth surfaces like a cat. And its proportional steering offers command control.

Depending on your preference, you can power it with rechargeable nickel cadmium batteries, or with four dry cells. And for strength and durability you can't beat the strong ABS plastic body or the rugged Delrin gears. The little things have been considered, too, like lightweight, adjustable frame to accommodate different body designs; shock absorbing front end; differential gear for road hugging cornering. And for your convenience, the kit includes double face tape for mounting R/C gear, extra screws and washers for emergency and even extra plastic for reinforcing, repairing or customizing your Porsche.

See the MRC-Tamiya Porsche Turbo RSR electric car at your hobby dealer. Then do a little wheeling and dealing for the fun of it . . . with a real R/C car.

TAMIYA

MODEL RECTIFIER CORPORATION
2500 WOODBRIDGE AVE. EDISON, N.J. 08817

SPECIFICATIONS:
Length: Over 14"
Width: Over 7"
Gears: Four

Speeds:
Two Forward
One Reverse