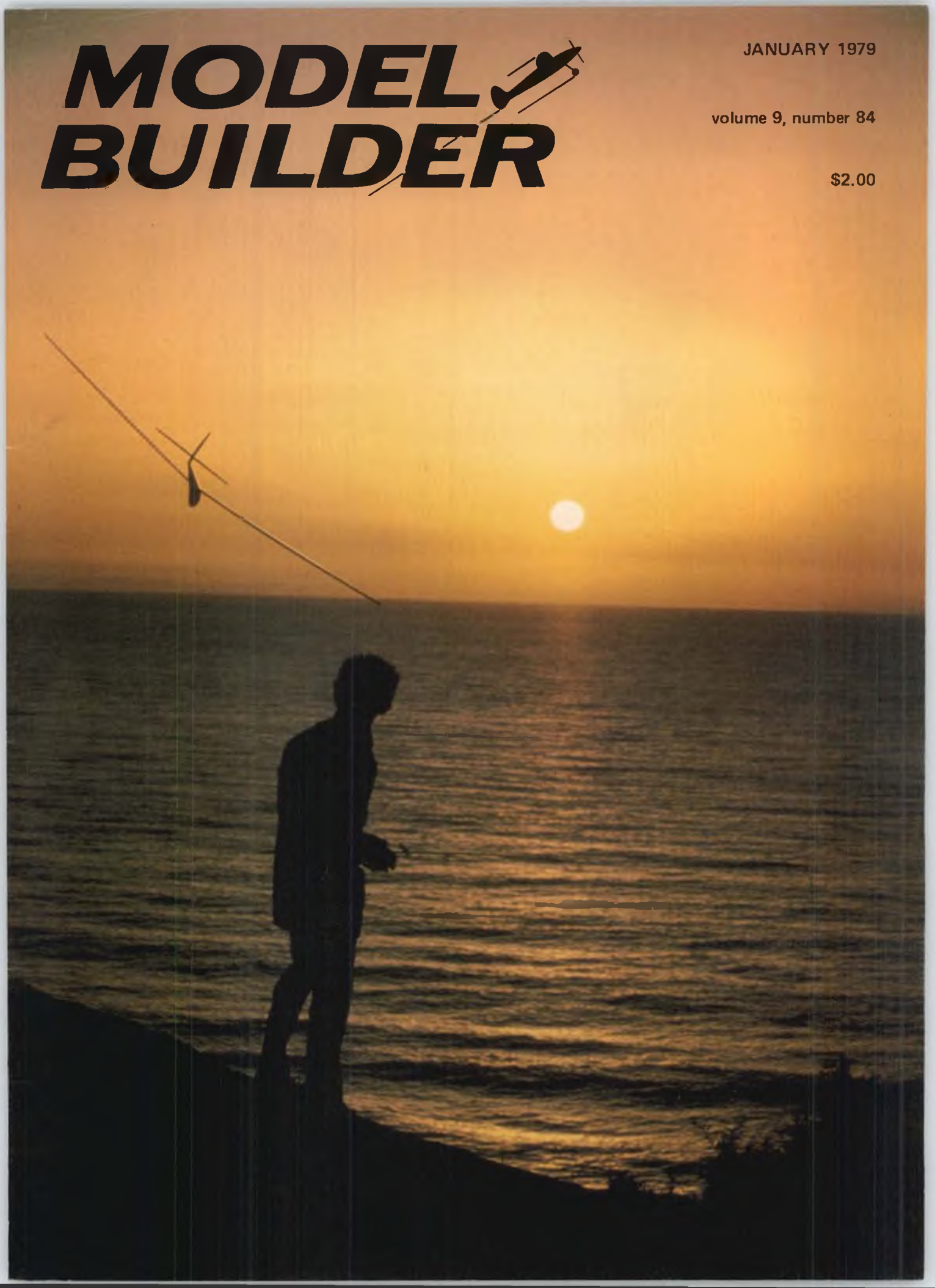
MODEL BUILDER

JANUARY 1979

volume 9, number 84

$2.00

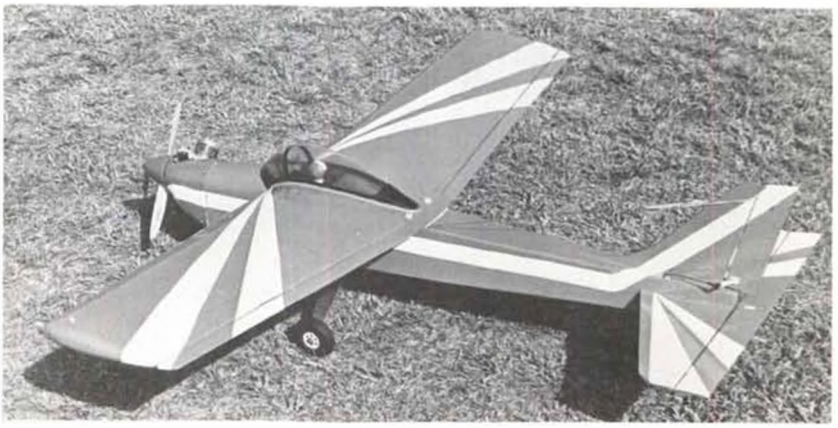


1978 ALL SIG KIT FUN FLY

COUNCIL BLUFFS COBRAS' FIELD DIRECTED BY BUD KILNOSKI OF BUD'S HOBBY - SEPT. 24TH

The 5th annual Sig Fun Fly developed growing pains this year when entries jumped to 83, compared to 48 in 1977. The flight lines were long and only three of the planned events were held but ideal weather allowed alot of good flying. Best of all, Bud's big free barbeque had enough food on the grill to satisfy the long line of chow hounds.

Below: Rick Holmes (Council Bluffs, IA), a junior flier (age 15), had this Skybolt at the contest. Bottom: Veteran scale builder Bud Atkinson (Blue Springs, MO) even paints his pattern airplanes like scale prototypes. His Kougar has a blue and gold Blue Angels color scheme.



Left: The action in the "Kill The Kite" event made it popular with spectators. Here, Will Hicks' (Omaha, NE) Liberty Sport comes close as the kite takes evasive action. He brought it down with a string cut. Above: Jim Taylor's (Bellevue, NE) red and white Kavalier was test flown at the contest. Flew fine with Fox .40 power.

Above: Airplanes built from seven different Sig kits can be seen in the first twenty feet of the long and busy pit area.

SIG

CONTEST RESULTS

SIG 500

1st	Chuck Jones, Spencer, IA	Kougar
2nd	Mike Lee, Omaha, NE	Kadet
3rd	Rich Kral, Omaha, NE	Kadet
4th	Rick Altee, Sioux City, IA	Kougar
5th	Harlon Boatman, Falls City, NE	Komander
6th	Jerry Peters, Alexandria, MN	Kadet
7th	Gerald Wilson, Oakland, IA	Kadet

LOOPS-A-LOT

1st	Clark Wade, Council Bluffs, IA	Kougar
2nd	Bill Albin, Omaha, NE	Komet
3rd	Harlon Boatman, Falls City, NE	Komander
4th	Will Hicks, Omaha, NE	Liberty Sport
5th	Charlie Tordick, Omaha, NE	Kougar
6th	John Nollendorfs, Lincoln, NE	Kiwi

KITE KILL

1st	Gene Strauss, Falls City, NE	Komander
2nd	Will Hicks, Omaha, NE	Liberty Sport

BEAUTY WINNERS

Best Monokote: Dave Howlette, Red Oak, IA Kadet

Best Paint: Larry Skiles, Deer Creek, IN S Chipmunk

HAVE YOUR OWN FUN FLY! BUILD ONE OF THESE FLIGHT-PROVEN SIG KITS SEEN AT THE CONTEST:

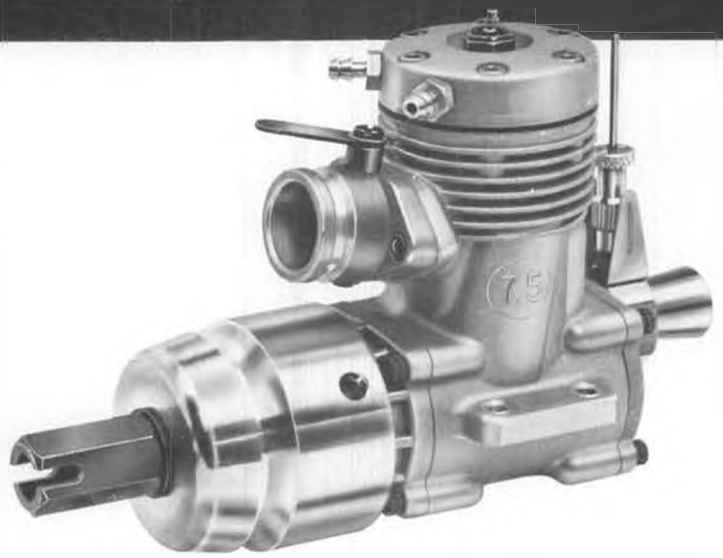
RC-26	CLIPPED WING CUB	$39.95
RC-31	KADET	$34.95
RC-32	KOMANDER	$39.95
RC-33	LIBERTY SPORT	$64.95
RC-34	SKYBOLT	$62.50
RC-35	KOUGAR	$44.95
RC-36	KLIPPER	$20.95
RC-39	KAVALIER	$39.95
RC-42	KIWI	$37.50
KBRC-1	SUPER CHIPMUNK	$59.95

Above: This sharp Liberty Sport by Dick Howlette (Red Oak, IA) is in the standard kit color scheme. Below: Another model painted like the kit prototype was John Nollendorf's (Lincoln, NE) Kiwi with Super Tiger .46 power.

PLACE YOUR ORDER NOW FOR SIG'S LATEST COMPLETE CATALOG - $2.00

SIG MANUFACTURING CO., INC. . . Montezuma, IA 50171

NOW everything you've loved about K&B MARINE ENGINES *plus more....*



in the K&B 7.5cc (.45) R/C Inboard MARINE RACING ENGINE

We feel certain this new K & B 7.5cc Marine Engine will break many or all of the existing records held by the highly successful K & B 6.5cc Marine Engine. It has power to spare! It is equipped with a rear exhaust butterfly throttle and water-cooled head.

Features include:

- CHROMED BRASS SLEEVE and LOW EXPANSION ALUMINUM PISTON constitute the ABC combo.
- CON ROD — machined from 7075-T6 aluminum solid bar stock. Bushed both ends.
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Another sure winner! This engine has been developed specifically for Ducted Fan operation. We feel as confident about this Ducted Fan engine as we do the above Marine engine.

Now you can have a Ducted Fan engine "right out of the box," complete with Perry Pump/Pump Carburetor.

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- CON ROD — machined from 7075-T6 solid aluminum bar stock. Bushed both ends.
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- HIGH PERFORMANCE HEAD — machined from solid aluminum bar stock.
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With our expertise, our years of experience (30 years), and our quality control, you expect the best from K & B. That's what you get!

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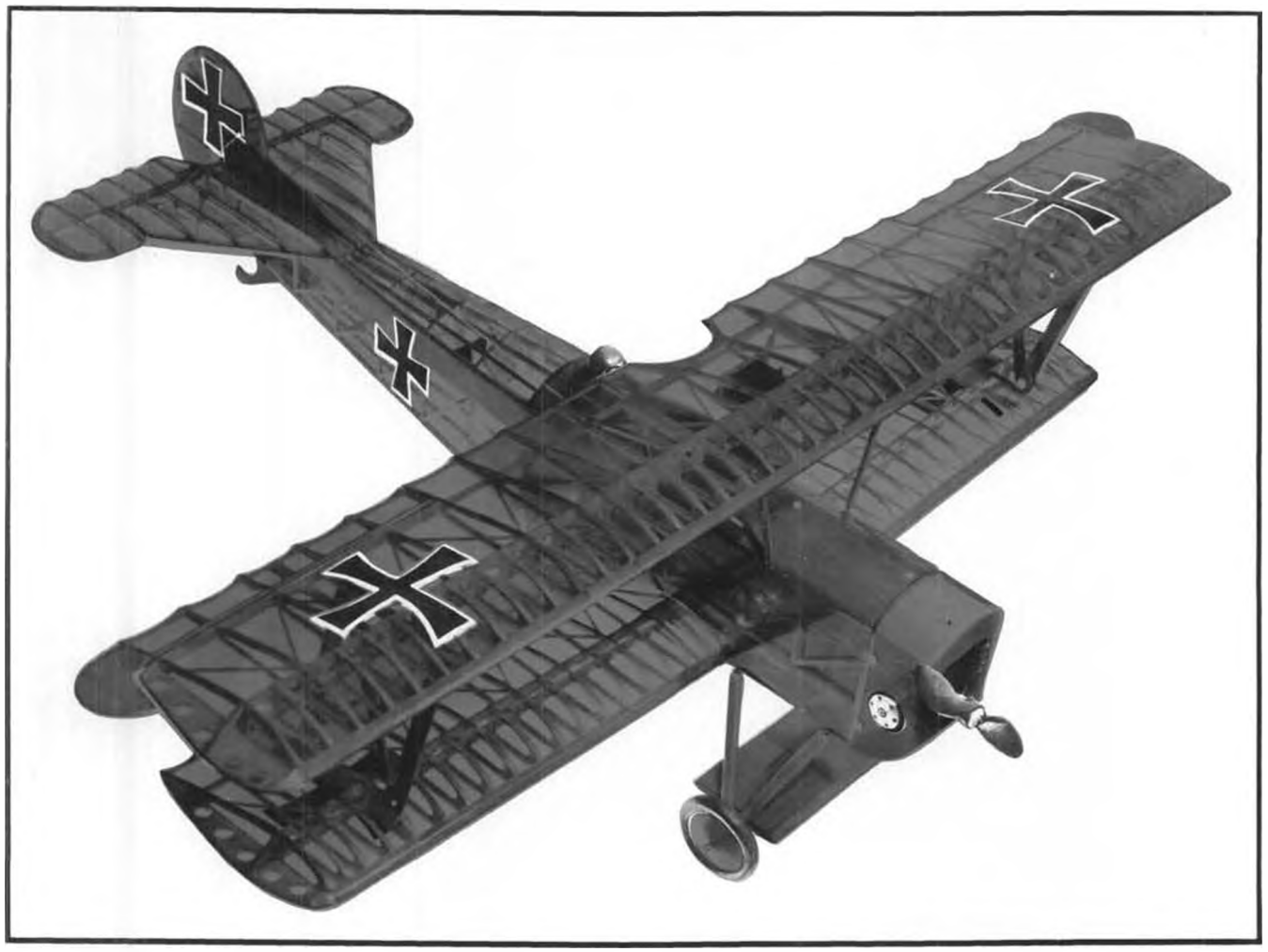

Semi-big fun scale Fokker D VII

Gentle and stable, a trainer that looks like an airplane with performance to suit the discriminating flyer.

Quick build up
Engines .60 - .80
Wing span 72"
Wing area 1488 sq. in.
Weight 10 lbs.
4 channel radio required

KIT OL 781

$97.50

See your dealer or order direct postpaid

Kit features: 2 full size rolled plans (wing and fuselage) • Step by step instruction manual with photographs • Quality die stamped balsa parts • Machine cut hardwood parts • Machine cut and pre-sanded plywood parts • Pre-formed balsa blocks • Pre-formed leading and trailing edges • Heavy duty one piece ABS cowl • Pre-formed landing gear and cabines.

Accessories include: 5" scale wheels • Spandau machine guns • Scale pilot • Self adhesive decals

Hardware package includes: Aluminium motor mounts • Pinned hinges • Snap-links • Control horns • Nylon bolts • Landing gear straps • Socket head bolts and blind nuts.

First in a series of vintage aircraft. Prototypes flew great with a K&B .61 and 14-4 prop. Dealer and distributor inquiries invited.

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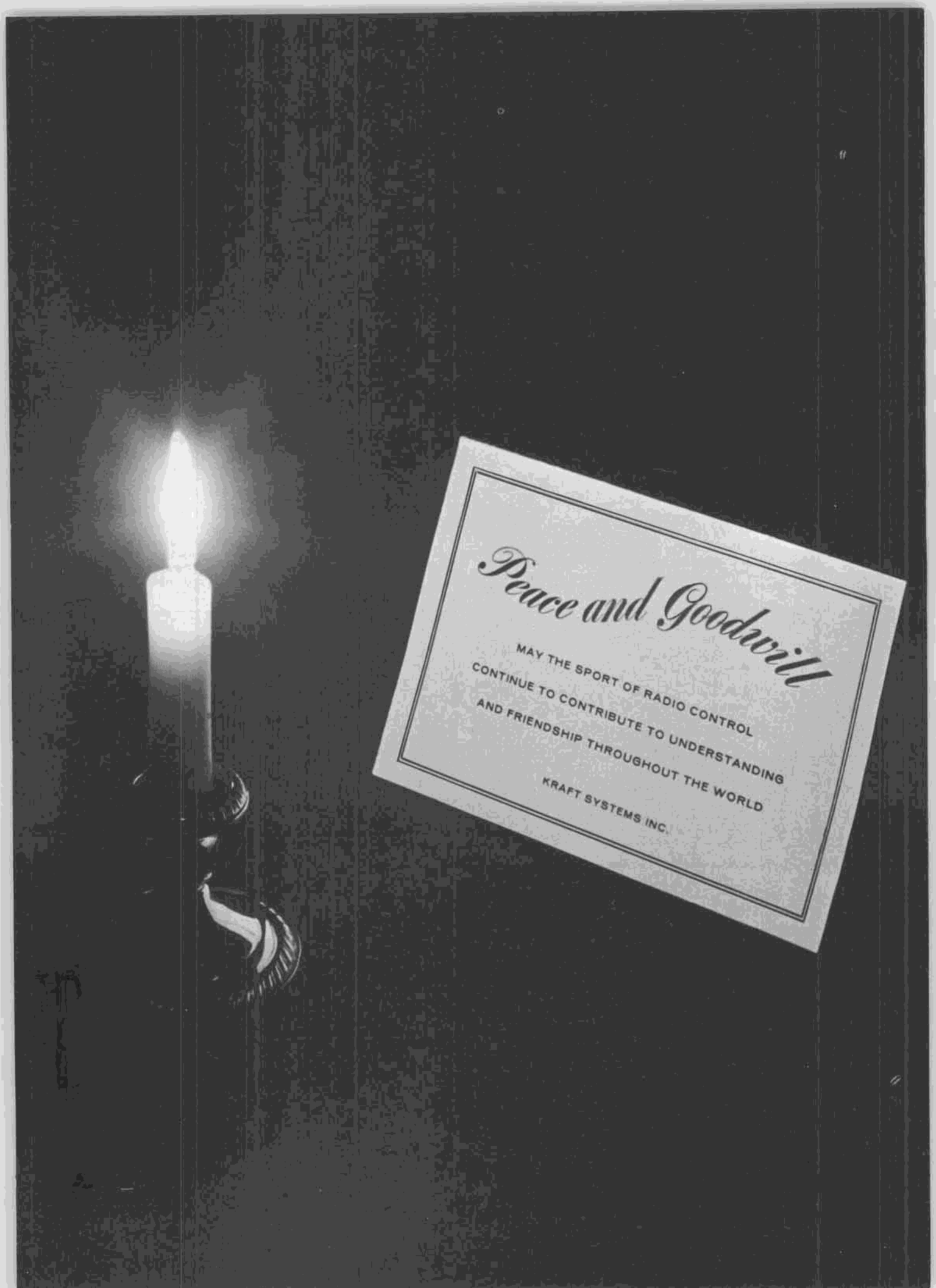
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Bonzo stand[illegible] R/C sport pl[illegible] scale.
Counterf[illegible] SOLD OUT ailless A/1 [illegible]ic.
Shoes[illegible] R/C QM.
Pear[illegible] aylorcraft on [illegible]ts, also big one.
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MODEL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

JANUARY

1979

volume 9, number 84

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Subscriptions $20.00 per year, $37.00 for two years. Single copies $2.00 Add $3.50 for postage per year outside of U.S. (except APO).

Published monthly by MODEL BUILDER Magazine, 621 West Nineteenth St., Costa Mesa, CA 92627. Phone (714) 645-8830

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CONTENTS

FEATURES

SCALE VIEWS

CONSTRUCTION

COVER: Sunset on the Pacific at Torrey Pines, and Scott Jenkins, San Diego, has "one more flight" with his Hybrid Hawk (pre-production Hobie Hawk fuselage with Scott's own blue foam cored, balsa sheeted wing panels with hardwood spars and leading edges), span 8'–4", weight 38 ounces, 2-channel Kraft '71. Dramatic photo was taken by Greg Geehan on Kodachrome II, 35mm, at f/8, 1/250 sec.

THE CITY OF NEW YORK
DEPARTMENT OF PARKS
BOROUGHS OF MANHATTAN AND RICHMOND
BUREAU OF RECREATION
MUNICIPAL BUILDING
10th FLOOR

No. 1

3/2/29 19

Permission is Hereby Granted Frank Zaic

residing at 381 - 10 Ave to fly

model airplanes at Sheep Meadow Central Park

Season 1929, Subject to the Rules and Regulations of the Department of Parks.

NOTICE

All persons visiting the Park under this permit will be required to observe all the Rules and Regulations of the Park; to remain on the lawn designated for the game, and to conduct themselves in a decorous manner.

No responsibility will be assumed by the Department for the loss of individual property of any kind.

Supervisor of Recreation

WALTER R. HERRICK
Commissioner of Parks, Boroughs of Manhattan and Richmond.

Reduced photo of Permit No. 1, from the City of New York, Department of Parks, Boroughs of Manhattan and Richmond, issued to Frank Zaic on March 2, 1929, giving him permission to fly model airplanes in The Sheep Meadow, a portion of famed Central Park, New York City. See text for Frank's story.

from Bill Northrop's workbench . . .

EVERYBODY OFF THE FIELD!

That familiar cry, which so many modelers have heard over the years, brings back an interesting little anecdote by well-known modeler, designer, theoretician and yearbook publisher, Frank Zaic. Just further proof that there's still nothing new in this world.

"I was just about to launch my twin pusher into its first flight when the man in blue came up and in a loud voice said, 'Everybody off the field!' The temptation to swing the arms forward and release the model was there, but I thought better of it and lowered the twin down. And while my brother John and I were disassembling and packing the models into our carrying cases, the policeman dispersed the crowd that had gathered around us during the flight preparation. Well, better luck next Sunday.

"After our street became too small for our models, we found that the only open space for flying in New York City was located in Central Park. It is in the middle of the park, near the row-boat lake, and it is known as the Sheep Meadow. You may have seen it many times in TV programs.

"At that time, we lived on the Lower East Side. Not exactly the East Side that is/was featured in the films, but in the area where Peter Stuyvesant lived, and not too far away from the "Village". To reach the meadow, it meant a fifteen minute walk to the Astor Place Subway station, a 5¢ fare, and ride to 72nd Street and Lexington Avenue. And then about half-an-hour or more of walking with our model boxes.

"Since I worked during the week, which, at that time meant four hours on Saturdays, our flying was restricted to Sunday. As you can imagine, Sunday was one day when the Central Park was loaded with strollers . . . so that by the time we set our boxes down in the middle of the Meadow, we were in the center of a spectator ring several persons thick. It was a very cooperative assemblage. The ring would open up in front of us when we were ready to launch the twin pushers. The flights were on the gentle side as they were not overpowered. Just a gentle or rambling circling around. But we were seldom able to get in more than two or three flights before the park police broke up the crowd and shooed us off the meadow. We could not blame the park management. It was trying to preserve the meadow as a green area, and it did not allow loitering, sitting or lying or any other group activity.

"Then came a special Sunday. We brought our models out as usual. The spectators ring seemed a bit larger than usual. But before we had a chance to get one flight, the police were already in action. Normally, we would be in a hurry to pack up and leave, but this time we just stopped assembling and waited for the police to come directly to us . . . we did not move when we were told to 'get moving'. Instead I pulled out a slip of paper and handed it to the policeman. He read the paper, looked at us for a moment, handed the paper back without a word, and then turned around and told the spectators to get moving. And we were now left alone to fly as much as we wanted, with police protection, so to speak . . . the piece of paper that I handed to the policeman is reproduced here. It is Permit No. 1 to fly model planes in the Sheep Meadow, Central Park.

"Note that the address on it would place us on the West Side, while actually we lived on the East side. Well, the address shown was of the place where I worked as a radiator and fender repair man (It was not uncommon for many of us at that time to start working at 15 and go to night school. I had a bit of business school but did not like it.). I talked about our flying problems with our salesman. He decided to write to the Park Department about it. I do not know what he wrote, but he must have made a good case, or he may have implied that we were small children playing with model airplane toys, and were bullied by the police. Be it as it may, the permit came along in due time.

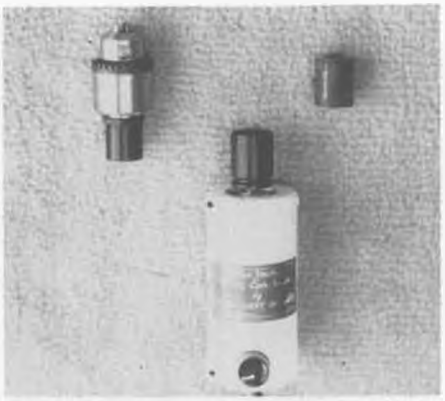
"We did not take advantage of our special privilege any more, as our models were outflying the area. We had to move our flying to Corlandt Park, which meant two subway changes and a round trip of at least three hours. But the wide open

Continued on page 124

FLASH!!!! In a temporary, stop-gap measure (and we hope it's VERY temporary), AMA's Executive Council, on November 5, 1978, timidly adopted the FAI's very weak definition of a model airplane, quote, "An Aeromodel is a heavier-than-air craft of limited dimensions, with or without engine, not able to carry a human being", as part of the AMA Safety Code.
This represents the Council's first step in accepting the fact that AMA must come up with a firm separation line between AMA legal models and FAA legal aircraft, man-carrying or otherwise . . . before the FAA does it for us, and makes it very hard to live with. Although we commend the Council for recognizing the problem and attempting to do *something* about it, we feel the FAI definition is hopelessly vague and totally inadequate to stem the desire of some modelers and manufacturers to carry the monster model tidal wave far beyond common sense and sound reasoning.

OVER THE COUNTER

New pre-wired electric power systems from Astro Flight.



Drill chuck adapter for the Astro Flight Mini-Starter, for on-the-field work.

• Want more horsepower to the watt? It is now available for you, with Astro Flight's 1979 line of electric motors. They now utilize high energy magnets and lower resistance windings, as one of the recent improvements. These precision-made motors also feature extruded steel magnet housings, die-cast and machined aluminum end bells, and seven-slot diamond-turned armatures. The end results are more power for weight, and for the amount of electrical energy consumed.

Astro's motors are available singly, and in various sizes. They can also be purchased with a completely pre-wired system, ready to use. These systems include all connectors, switches, proportional speed controls when applicable . . . everything to plug in and go. The systems are priced according to the size of the motor and the accessories required for the intended installation.

Another really terrific idea from Astro Flight is the new chuck adapter for the Astro Mini-Starter. This quick-on, quick-off adapter installs a 1/4-inch Jacobs chuck into the end of the starter cup, allowing field or shop use of the fast-turning motor as a drill or hand grinder. Complete with chuck key, at $10.95.

Available now at your local dealer, or order direct from Astro Flight, Inc., 13377 Beach Ave., Venice, CA 90291.

* * *

You can't keep a good thing down. Sterling Models is re-releasing its one-of-a-kind R/C model ship, the Lumba-Lumba, suitable for display or as a fully operational R/C model.

The Lumba-Lumba is 38-1/2 inches long, with a beam of 8-5/8 inches, and can be gas or electric powered. There is more than ample room under the removable superstructure for any installation desired.

The completely pre-fabricated kit contains die-cut balsa and plywood parts, specially-carved parts, decals, a molded plastic smoke stack, full-size drawings, and step-by-step instructions. An accessory fitting set is also available.

The Lumba-Lumba is $41.95, at many hobby stores, or write for information. Sterling Models Inc., 3620 "G" St., Philadelphia, PA 19134.

* * *

The latest yummy from Flyline Models, Inc., is the ever-popular Great Lakes Trainer, for four-channel R/C and .15 to .25 engine power.

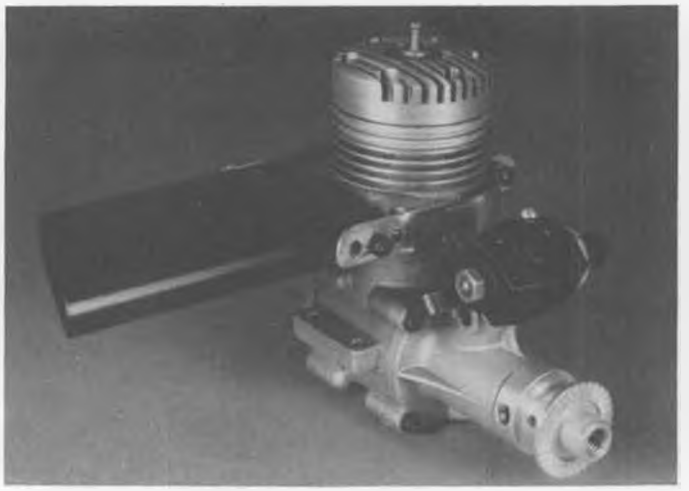
This addition to Flyline's squadron of American Classics is now ready to join your squadron, and should be available at the corner hobby shop. It comes as a well-engineered and complete 1-1/2-inch scale kit, and is priced at only $34.95.

From Flyline Models, Inc., 2820 Dorr Ave. (B-2), Fairfax, VA 22031.

* * *

San Francisco's "Quarter Headquarters", about whose mounts and mufflers for big engines we have recently told you, has come up with another accessory to make life easier for us. It is a throttle control arm that converts the normal sideways movement of the Quadra throttle arm to the push-pull movement of a servo. The assembly consists of an aluminum mounting shoe.

Good news for boaters! Sterling is again producing kits for the Lumba-Lumba cruiser.



Muff-L-Aire II, a new type of muffler from Du-Bro.

Great Lakes Trainer is a new addition to the line of really attractive models from Flyline.

Skyhawk II, available as a semi-kit from Bob Violett Models.

"Head Lock", glow plug connector from Model Products Corp.

bellcrank, wire linkage, and mounting screw.

It is simple and foolproof. You bolt it on, hook up the servo clevis, and go fly. Price is only $7.95.

Quarter Headquarters, whose address is P.O. Box 12321, San Francisco, CA 94112, is currently selling direct only. Send your orders or requests for complete information on its full line of Mammoth Scale accessories direct, and tell them **MB** sent you.

* * *

In view of so many recalls of so many mass-produced products, from automobiles to hair driers, we find it refreshing to remember that this has not yet hit our hobby. I am always impressed too, to find something that I considered dependable and successful has been further improved, obviously at more expense to its maker. And when a manufacturer delays release of a product due to his insistence on further testing, that too is news.

And that is the situation with the previously announced and advertised .049 ducted fan-powered ARF Skyhawk from Midwest Products. You guys will have to wait a little longer, while Frank Garcher has Nick Ziroli and his team of experts work out a few problems with the production program. The wait shouldn't be too hard to endure if you keep in mind that when it does arrive, it'll be better.

We'll keep you posted. If you get anxious, check with the gang at Midwest Products Co., 400 S. Indiana St., Hobart, IN 46342.

* * *

A new concept in mufflers, called the Muff-L-Aire II, has recently become available from Du-Bro Products Co. It is designed for side exhaust engines only, and uses some techniques and ideas not previously seen.

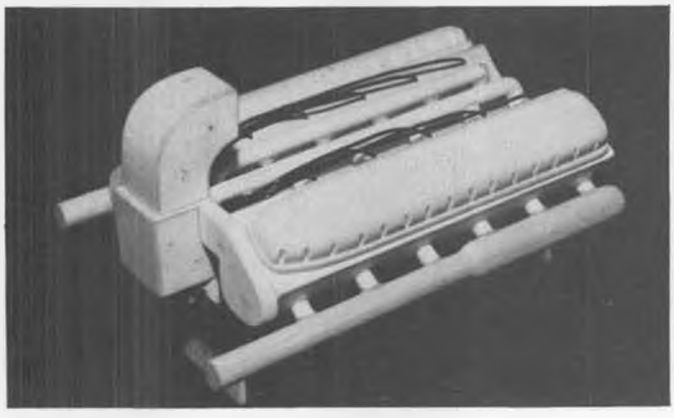
Throttle linkage for Quadra engines, by Quarter Headquarters.

O-ring racing wheels, by Bob Violett Models.

The Muff-L-Aire II is available in three models, a Mini, for .09 to .25 engines, a standard size, which Du-Bro designates as a Universal model, for all .29 to .80 engines; and a special one for the K&B side exhaust .40. Looking like nothing more than an exhaust extension, which makes it extremely small and light, the Muff-L-Aire's muffling action is due to an internal adjustable spring that allows one to control the backpressure, and thus the engine exhaust note, as desired.

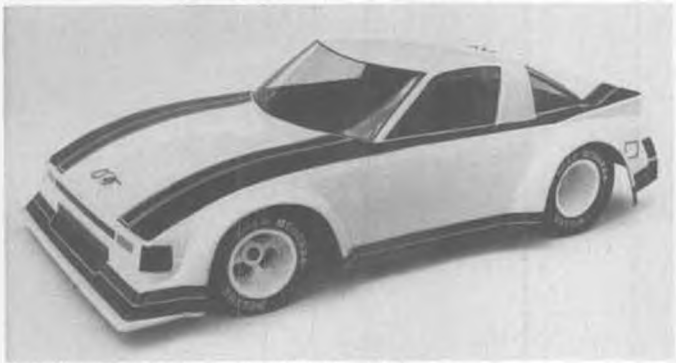
Instructions are included on how to adjust the Muff-L-Aire to your specific requirements. A pressure tap is included, which may be either side or top mounted. The length of this muffler may be altered as much as 1 inch to fit special installations. All necessary hardware is included.

The Mini-Muff-L-Aire is priced at $6.95; the larger ones are $8.95. Now available at your nearest Du-Bro dealer, or write Du-Bro Products, Inc., 480 Bonner Rd., Wauconda, IL 60084.

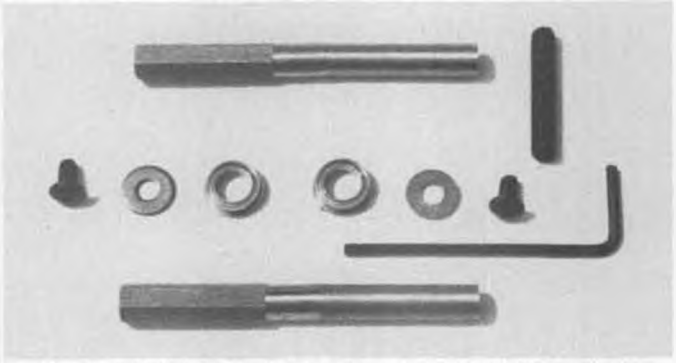


Scale dummy engine for Hydros, from The Pipeline.

"Streaker", fiberglass Deep-Vee from Steve Muck.

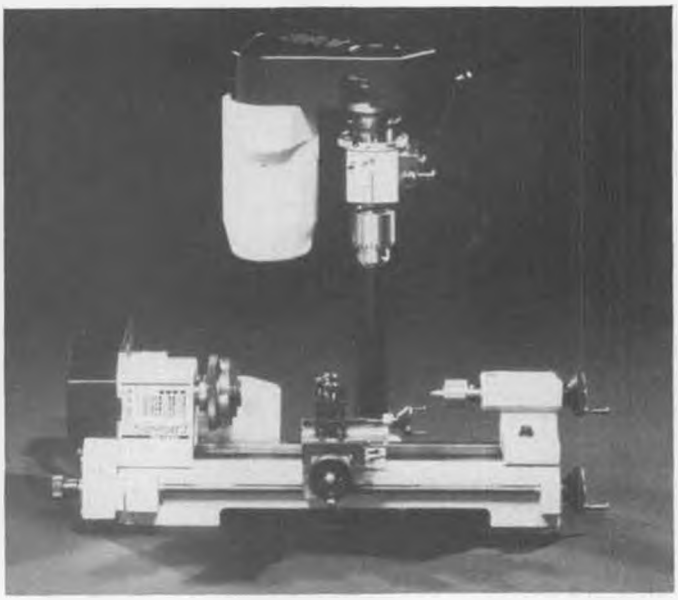


Bolink's new electric-powered Mazda RX-7.



Also from Bolink is this ball-bearing axle kit, for Bolink and other makes of cars.

A handy new item from Dremel is a 4-inch tilt arbor table saw.



Latest version of the Unimat lathe is the new Unimat 3, by Emco-Lux.

* * *

Last month, we told you about Repla-Tech International's new plans, books, photos, and parts service for the Cessna "Agwagon", a 48-inch R/C scale project. The second of that series, the Czech Zlin Z-50L is now completed, and ready for you.

This is the airplane that was used by the Czech team and World Champion Ivan Tucek at the recent IX World Aerobatic Championships. The model spans 51 inches, for a .35 to .60 engine, and at least four channels.

The basic plans, four sheets full, are $10.25. Various construction and scale data booklets are available, as well as photo packets of the model and/or full-size airplane. Combined economy packages of the plans, plus books and/or photos can also be ordered. The total package of everything available for the Z-50L is $24.50.

A vacu-formed clear butyrate canopy is also on hand, priced at $5.75, or $3.98 for slightly blemished seconds.

This is the most complete service of this kind that we have seen. The construction instructions even include a list of materials required, and many building and flying hints. A complete catalog describing these and the many other well-done Repla-Tech drawings can be obtained for $1 from Repla-Tech International, 48500 McKenzie Hwy., Vida, OR 97488.

* * *

The Pipeline, P.O. Box 1868, Fremont, CA 94538, just sent us a photo of its Scale Dummy Hydro Engine to share with you. It comes as a basic kit, all pre-cut, from which you can assemble either an Allison, Series E, or Budweiser-style engine. The main difference between these powerplants seems to be in the valve covers, and the instructions explain how to make the necessary changes. If the full-scale engine that you are duplicating is turbocharger-equipped, the instructions also cover how to equip your dummy engine.

The kit, complete with instructions, ignition wires, and a photo of the assembled engine, may be obtained

Continued on page 122

The second in Repla-Tech's series of model plans is the Zlin Z-50L.

R/C WORLD

The prototype "Big John", just after completion in spring of 1962. Covered in "rip-stop" blue and yellow parachute nylon, control was by Deans relay/reed radio, and insufficient power was a Forster 99 ignition engine, later replaced by adequate Fox .59. For more info, see "R/C WORLD" column.

Flight INSTRUCTOR

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

• Merry Christmas to all our readers, and may the new year bring you new thrills and knowledge of flying! I also hope the new year brings me more letters for this column, or next year we may celebrate its demise.

The time of year is upon us when the modelers of most of this country turn to the basement or garage workshop to create that masterpiece for next year's flying. The time has arrived to decide what to build, and this decision can make or break your flying next season, so it must be made with care and reasoning, rather than simply sentiment. If you are a beginner and have not yet learned to fly, or have barely learned, then resist the temptation to build a "Super Whammie 5000", and instead concentrate on getting two or three good trainer-type airplanes (Falcon, Kadet, Fledgling, Geni, etc.) built and ready for spring. Building two or three good trainers will allow you to absorb those inevitable mistakes without losing a large part of the flying season while you repair or replace that Super Whammie.

"Hey, I'm not a beginner and I'm really set on building that 'Super Whammie' with retracts, flaps, dive brakes, and a working relief tube. What's more, I plan to power it with two 'Super Zoomer' engines with the latest triple reflex tuned pipe and use 78% nitro fuel to make it go." Boy, if I've heard this story once, I've heard it a hundred times, and it invariably comes from an individual who either hasn't yet learned to fly or who is a "veteren" of perhaps twenty or thirty flights. LEAVE THESE PROJECTS TO THE EXPERTS. This type of project has caused more modelers to quit in disgust than I could count in a hundred years.

If you're an advanced sport flier, then you would do well to consider building a couple of Ugly Sticks, Kaos's, Kwik-Flis, Sportsmasters, etc. This type of airplane will make a better flier out of you, and assure you of a successful season of flying.

For the expert sport flier, the sky is the limit as to airplane selection, but if this flier has competitive intentions, then he should consider any of the contemporary designs for his area of interest, and if he is smart, he will seek the advice of the guys in his area who are already competing, before selecting which airplane to build.

By now you have probably noticed that I haven't mentioned scale airplanes. If your inclination is toward the scale airplanes, then your selection of what airplane to build is even more critical, and many factors must be considered. First, you must decide what you want to do with the airplane, as well as taking an honest look at your flying ability. If you are an average flier and want a realistic airplane to sport fly on Sundays, then the selection should be an airplane which is very conventional in planform, and yet is impressive enough to suit the builder. The large 1/4-scale airplanes are ideal for this, as they are impressive, yet the majority are easy to fly. The biggest disadvantage to this type of plane, besides transporting it, is that it is generally not good in high winds, but this doesn't matter to the sport flier, as he can fly it when he chooses.

If your intention is to build next year's Toledo winner, then your choice should be dictated by what you can build most accurately and what will impress the judges most. These museum-type scale airplanes should be flown only by the expert flier under ideal conditions. If you build this type of airplane and are not an expert flier (be honest with yourself), then get someone who is to fly it.

Now let's look at a class of scale that is growing in popularity. The Stand-Off Scale class has created a whole new category of scale models which not only look great but usually fly well. Stand-Off Scale contests are growing and appeal to many types of fliers. The casual sport scale nut enters what he has and enjoys himself while competing only for the fun of it. This type of flier usually shows up with some odd airplane which is fun to fly and a crowd pleaser, if not a winner. The serious competitor in the Stand-Off Scale event must be somewhat cold in his analysis of a competitive airplane. First, it must be an airplane which will fly well under any conditions which he might encounter at a contest.

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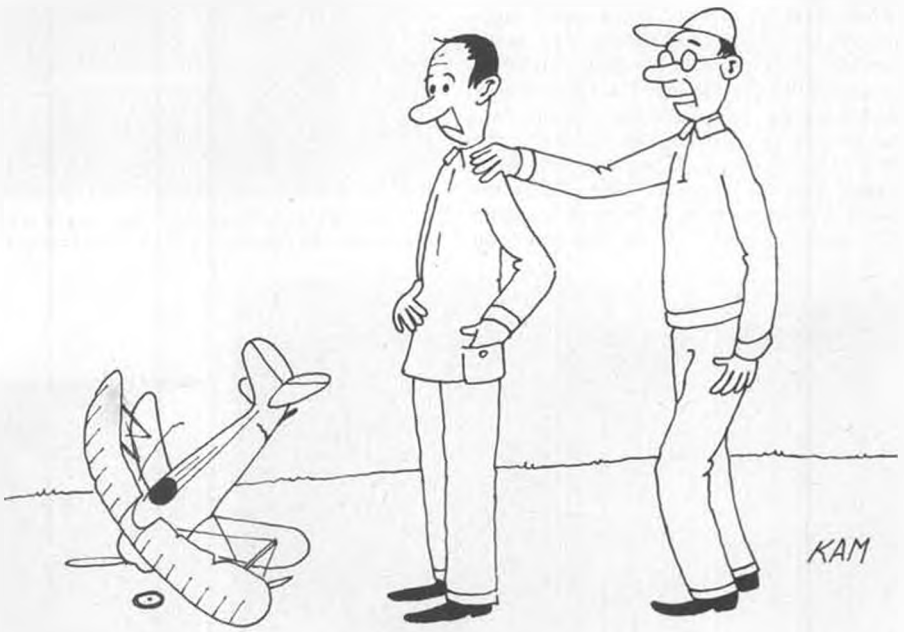


"If it's any consolation, the prototype crashed on its maiden flight also!"

George Dickinson, Somerville, New Jersey, built this Great Lakes 20 years ago from MB editor's plans published in American Modeler. Plans now available through MB. Power was a K&B .09 with compound escapements on rudder and elevator. Black and yellow model is now retired.

R/C WORLD

By BILL NORTHROP

HOW TO PUT DOWN A JOHN

We received a somewhat unusual question in the mail some time ago, and as the writer's signature was not readable, we couldn't answer him directly. The question was intriguing, the kind you laugh about at first, and then as you think about it, the correct answer becomes a challenge. The question was this . . . How Do You Land Big John?

First of all, for those of you who may have been so unfortunate as to never being introduced to Big John, it is a 76 inch span R/C biplane which we first designed and built back in 1962. First controlled by a Bill Deans reed radio (relay type) operating Bonner Duramite Servos (developed by Bob Elliot, of Logictrol International), a Don Brown Quadruplex proportional system was subsequently installed in 1963. At the first U.S. World R/C Record Trials, on Labor Day Weekend, 1963, Dahlgren Naval Weapons Lab, Dahlgren, Virginia, Big John casually joined the specially prepared altitude ships and surprisingly flew to 7,470 feet, which might still be a record for R/C biplanes . . . if such a category existed.

In September of 1964, a 7/8 size Big John, renamed Duster, was published in *Model Airplane News*. Incidentially, we will be republishing this model sometime soon in **Model Builder**, featuring a version built by friend and modeler Tom Laurie, of Newport Beach, California.

Big John really became known to the modeling public when the second version, "O.M.T." (One More Time), was

Bob Temple, Gold Coast R/C Club, has flown this O.S. 4-cycle 60 powered, 2-1/2" scale Gipsy Moth with the Florida Air Show Team. Ship is a crowd pleaser. Photo by Teri Reidding.

Another view of George Dickinson's Great Lakes. Being low powered, all flights were from a hand launch. Silk and dope finish.

Another Dickinson model, this Platt Waco is the F-3 version. Finish is red and white Hobbypoxy over nitrate dope, on Super Coverite.

Magnificent Boeing 747 demonstrated at the scale World Champs. Span is 11 feet, weight 57 lbs., four HP 60 FS engines. One transmitter controls flying surfaces and inner engines, while second controls outboard engines and lighting system(!) Ron Moulton photo.

Larry Sutherland, Director of Banos, Cal State University Fresno, built this Proctor Nieuport II. Power is an O.S. Goldhead 60, with a 13x5 prop. World Engines S/S radio.

Prototype fan-jet Mig 15 from Byron Originals leaves a dust trail as it takes off for demo flight at Las Vegas QSAA Fly-In. Exceedingly fast, stable, and maneuverable.

Larry Sutherland proudly holds his Nieuport aloft for detail shot. Model flies great.

published in *R/C Modeler* in 1967. Over the years, many copies have been built and flown. More recently, updated drawings of the first Big John have become available from **Model Builder**. A construction article was published in the September, 1973 issue of **MB**. This model combines the simpler construction of the original design, along with refinements from the O.M.T. version. Plans are available at $5.00 a copy including 3rd class postage, or add 65¢ for first class.

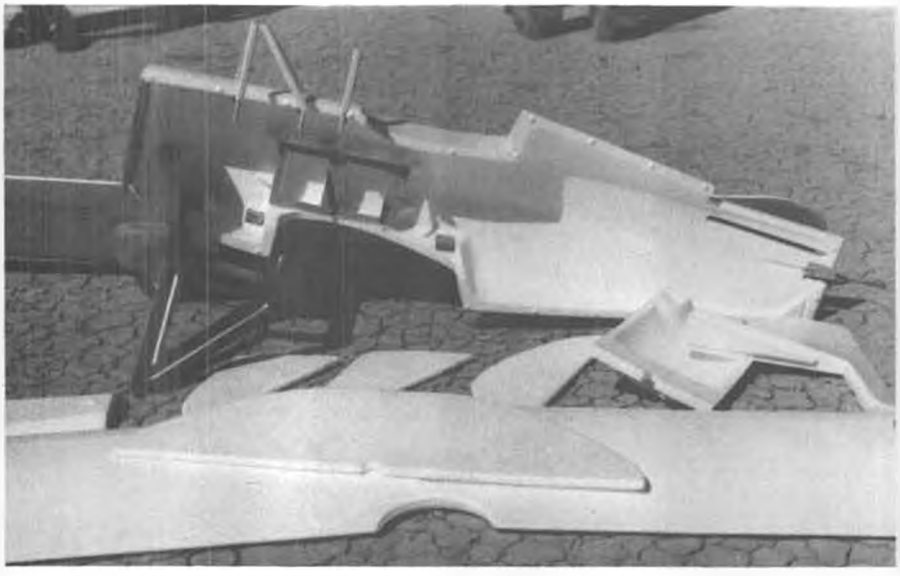
B.J. has established itself as an easy-to-fly, stable and forgiving model which, until the coming of Mammoth Scale, has continually held the limelight as the biggest model at any flying session. In all of that time, we've never heard of one being difficult to land . . . deadstick or otherwise. Still. . .

The questioner pointed out that the model seemingly stopped in mid-air if

Eddie Morgan, QSAA founder, awards Powder Puff trophy to winner and QSAA Secretary Pat Bunker, who flew 9 foot span Aeronca Champ.

New retracts for large scale aircraft, by Jim Fox, of Custom Retracts.

Jim Cline's ex-RVP "Robbin" weighs 45 lbs., spans 12 ft., has observation bulb nose. Polaroid XS-70 camera shoots aerial pics, drops prints in tray. McCulloch 2.7 engine.



The Byron Originals 1/3-scale Pitts, to be available soon, is all molded foam. Finished aircraft weighs 13 to 16 pounds, can be painted or Econocoted. Beautiful flying capabilities.

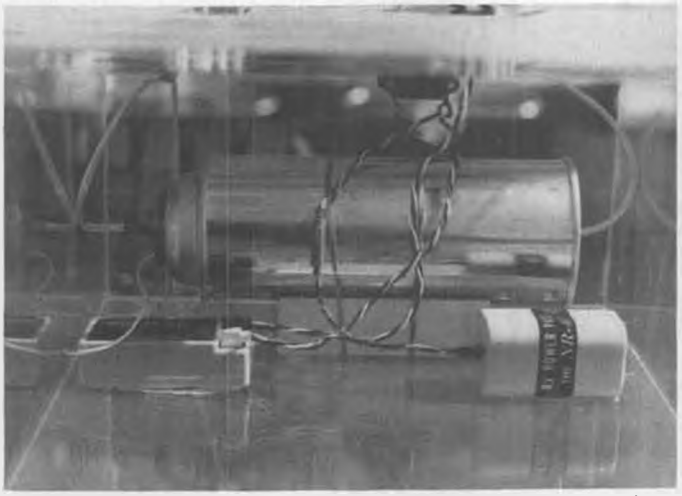
the throttle was backed off to idle. In order to land properly, he found it necessary to hold half throttle until the plane was just off the ground, then chop to land.

First of all, for a plane of this type and size, the above procedure is not at all abnormal. Assuming average care in construction, the weight should come out at around 9 to 10 pounds, and this, coupled with a total frontal area of about 300 sq. in., provides considerable drag for the engine to overcome. In most cases, a good 60 is sufficient power for Big John . . . unless you insist on being able to perform vertical climbing rolls, and the like. Our O.M.T., which now hangs in **MB's** office, originally weighed under nine pounds (by way of judicious use of contest balsa), and the Enya 60 of that time (1965-1967) could pull it through the old vertical eight, which was an outside loop on top of an inside loop, started at the bottom. Admittedly, however, the top loop was always smaller than the bottom one!

Any modeler in the early days of R/C knew how to land deadstick, as this was the normal situation when you flew with escapements, pulse rudder, or Galloping Ghost, and without engine control. You flew until the engine ran out of fuel, and then landed. In the case of

Belt drive reduction unit by Byron Originals. With Rossi, a 13-1/4 lb. Pitts could hang on prop and then accelerate . . . straight up!

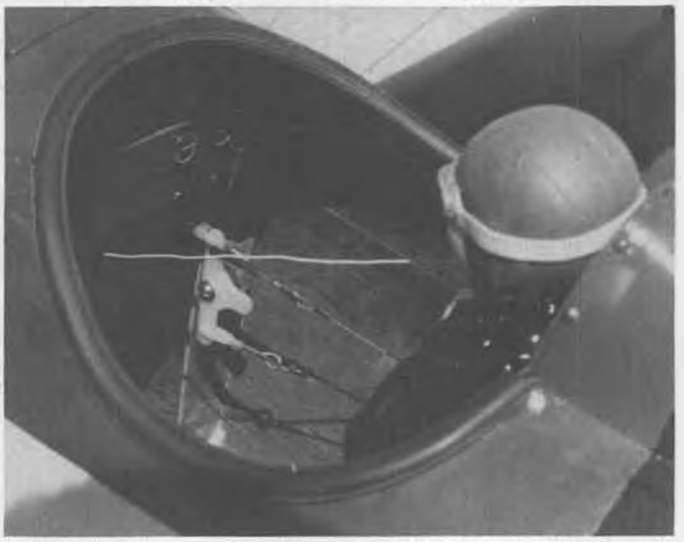
Eastcraft's demonstrator Fleet, with starter-equipped Quadra engine. Unit is really at home in large aircraft.



Air/gas storage tank for Fox retracts, compared to normal size receiver and airborne pack. Unit has plenty of power to lift big wheels.

This Byron Originals Pitts put on startling aerobatic demonstrations, flown by Dean Copeland. Bound to be a popular product.

Tom Bunker thanks daughter for drawing HIS number to win Futaba 7-channel radio donated by Eric Meyers, of Great Plains Dist!



Cockpit of Nate Rambo's Albatross D-5. Built up of bulkheads and strip planking, all cut from 1/8-inch mahogany door skin.

rudder-only, the models were usually trimmed for a fast, steep glide. Without elevator control, a flat glide could mean trouble in the air, particularly on a windy day when it was easy to go too far downwind, but difficult to penetrate the wind and return to the flying field. The trick in making a smooth landing with rudder-only was to approach the ground in a banked turn. At the last instant, a quick shot of opposite rudder would pop the model out of the turn, and the speed built up in the turn would produce extra lift, raising the nose for a nice flair, just as the model touched down. Not easy to do every time!

With elevator control available, you immediately trim in or hold some down elevator pressure when the engine stops in order to maintain flying speed. Without engine, your elevator becomes your glide speed control . . . a little up for slower speed, a little down to increase speed. Obviously, your approach pattern has to be shorter . . . and your first approach is your only approach!

Landing deadstick also has some other considerations. Chances are, the landing will be hotter than it would if your engine is idling. Crazy? No. Remember, we said you have about 300 sq. in. of frontal area on Big John. Now then, suppose the engine is idling. The turning 12 inch propeller forms a disc with an area of 113 sq. in., 1/3 as much as B.J. itself. At a certain rpm, the prop thrust is zero relative to the aircraft speed through the air. As the rpm is increased, the prop provides more thrust and adds to the normal glide speed of the model. As the rpm's are decreased, however, the prop disc area becomes a partial drag, effectively increasing the total frontal area of the model, and thus slowing the glide speed. We wonder if Quarter Midget pylon fliers, who are supposed to land with engines idling,

Continued on page 124

Don Anderson, of Champaigne, Illinois, had some nice flights with his big orange and white Super Fli. Model is all conventional balsa and ply construction.

PHOTOS BY AUTHOR

DFH-21 MINI FAI PATTERN

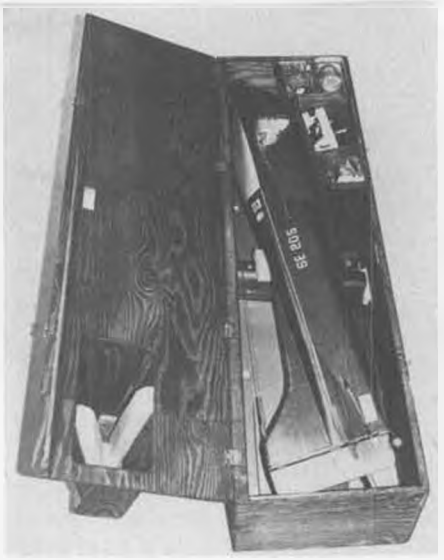
By BENGT LUNDSTROM

The author's "Den Flygande Hyvelbanken" (Flying Carpenter's Bench) FAI pattern ship in a .15 version. (See the 'DFH-18' in June '76 MB)

• I have taken part in international pattern F3A contests for several years. I have lived in a house, an apartment and I have traveled by air, train, bus, car and it has worked. But what a hell just because of the size of the .60 models.

These .60 sized models fly great. And the still bigger jumbo models are easy to make to fly nicely. But haven't you also thought about the trouble with big models:

They take a lot of time to build,
They are expensive and complicated to build,
They take a lot of space to store,
They are very difficult to transport,
A crash or even a hard landing is a disaster,
They consume a lot of fuel,
They are often noisy and very dangerous,



All packed up and ready to go! Box carries model and everything you need to fly.

Single-wheel version (top) is fine for smooth runways, but if you fly off grass or a bumpy field, Bengt recommends the tandem wheel set-up to prevent nose-overs on takeoff.

And they need very large air fields.

I think people would take their models with them much more if they just were more easy to put in a small, protective box. We could bring the models with us on vacation or more often take part in faraway contests.

Admittedly, the smaller models do not fly as smooth and gracefully as the big ones. But by working hard, the difference is not so big, and why must everything be so easy? The hi-jumper does indeed jump above the cross-bar and not just walk under it.

Therefore, I looked for:

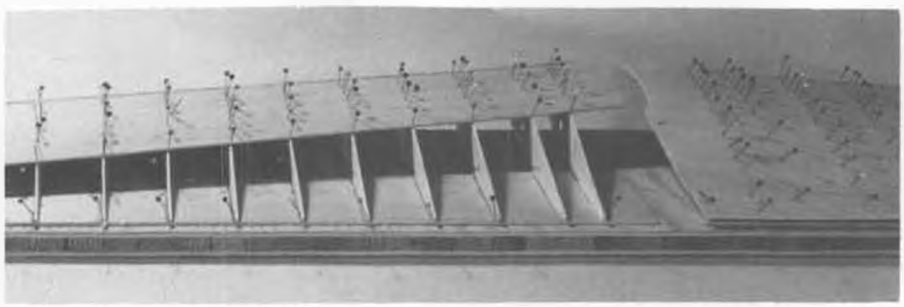
A) The biggest box that could be transported easily.

B) The smallest pattern plane possible to use in contests exactly like those we have today.

The box size, of course, depends upon where you live and fly, and your habits. But there is one size limit nowadays for

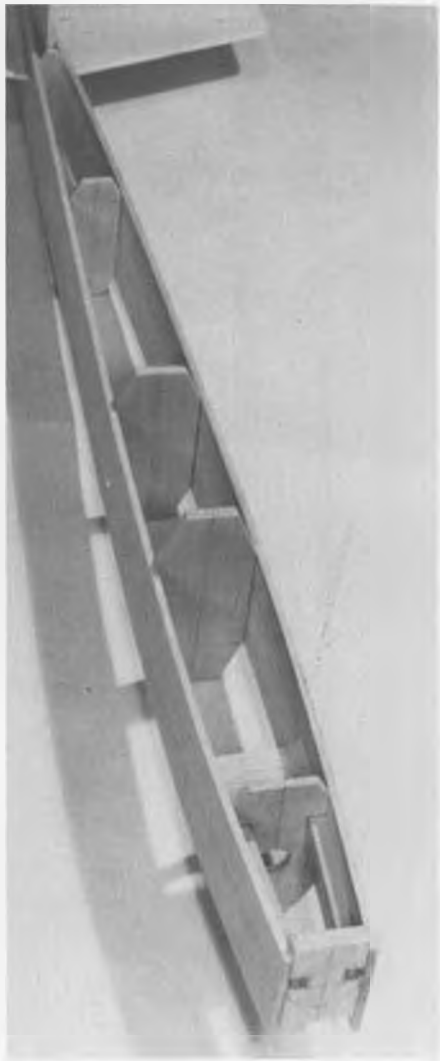
Wing ribs carved and sanded. Set in foreground still has plywood templates attached. Pencil line across ribs indicates transition between straight and curved part of rib.

Start of wing construction. Wings are built upside down. Balsa sheet pinned to the board is top t.e. sheet.



Gluing the bottom sheeting in place. Be sure the sheeting is glued well to each rib, as there are no spars in the wing.

Aileron controls are installed before finishing the top wing sheeting. As on the DFH 18 (MB, June '76), the DFH 21 uses differential ailerons.



Start of fuselage construction. Use light wood, particularly in the tail.

transatlantic flights: The sum of length, width, and height must not exceed 62 inches. The box must also house fuel, transmitter, and tools . . . *all* you need for flying.

The model size I chose depended upon the availability of well-developed and powerful engines. The .15 size (2.5 CM^3) engines are the highest developed of all sizes. The choice was obvious. The model size finally became: span 41 inches, length 42 inches. The box dimensions will then use: 41.7 + 11.8 + 8.7 inches = 62 inches. However, one half of the stabilizer would not fit inside the chosen dimensions. I had to "hide" it in the handle. This was probably not what the airlines intended with the 62 inches. I hope they won't be too hard against us for this illegality!

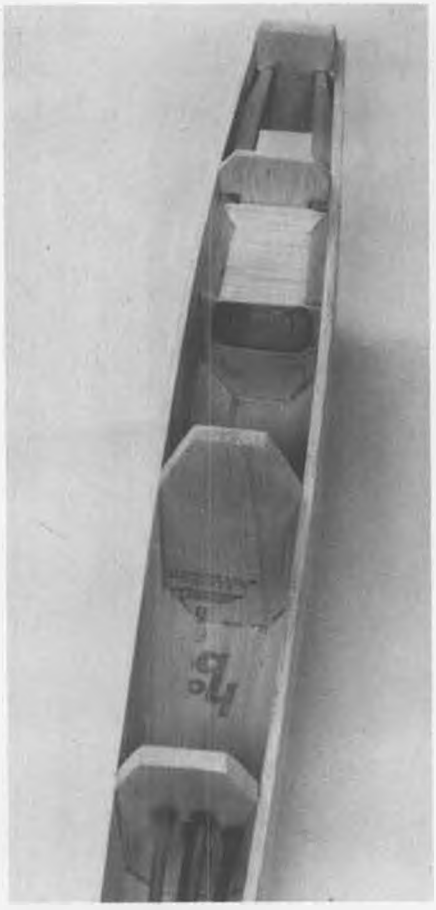
When you make a smaller pattern model, you have to make it a little more advanced to compensate for its size handicap. That's why you find: A mid-wing concept with high side area for knife-edge flight . . . low weight by all built-up balsa design . . . a top .15 engine (Rossi, Super Tigre, Cox Conquest) . . . a long tail for smooth elevator action . . . twisting ailerons to compensate for the small span . . . dual sensitivity on all control surfaces . . . double push-pull rods to get rid of play completely . . . use of racks on elevator for a smoother response around neutral . . . a U-2 type single or double-wheel landing gear.

What you have to sacrifice: The power/weight ratio is smaller than on a .60 ship . . . the span is a little short.

In the air the "DFH 21" has an elevator and rudder response like a .60 ship. The ailerons feel a little more nervous because of the much shorter span. You can't make as many climbing rolls. This is much improved with dual sensitivity on ailerons and other surfaces. The "DFH 21" is the best plane I have flown for easy-to-make, easy-to-control snap rolls, in spite of the small size.

I have taken part in some (1979 program maneuvers) F3A contests with this much smaller ship. I will never be able to place at the top, but the score up to now is about 70% from the top. I think I can reach a 50% position with more training, but hardly better as long as the other guys have top .60 models (four times as big).

Could there be a "quarter pattern" contest? I hope so. They say "big is beautiful", but I feel "smaller is much smarter".



Fuselage construction shot shows double push-rod tubes to both the rudder and elevator.

BUILDING OF THE MODEL

Build it light, particularly in the tail.

WING

The airfoil chosen has one very critical feature: The rear third of it is completely flat from tip to tip. Therefore, the wing can be built on a flat building board and you will easily get a straight and warp-free wing, even with a complicated built-up type design. You must follow this sequence:

A) Build each wing half upside down on the rear, upper flat portion.

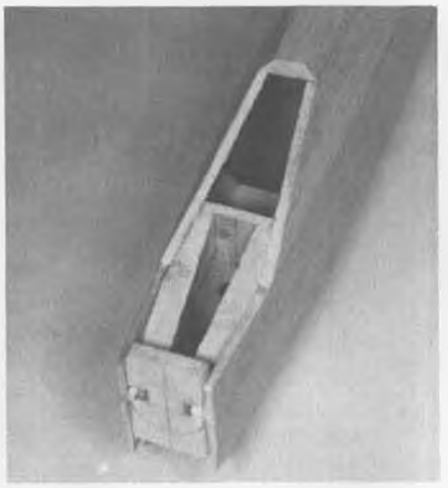
B) Fit all sheets to the wing bottom.

C) Remove the wing halves and fit the rear "spar".

D) Make the long pushrods and fit their cranks.

E) Having the wing right side up, join the wing halves with the pushrods fitted. Now the bottom of the whole wing is pinned to the building board. There is no dihedral.

Tail surfaces. Use the lightest wood available.



Fuselage construction complete with exception of top nose block.

F) Complete the upper sheeting.

G) Put the epoxy and fiberglass reinforcement in the center, after the wing is ready.

Building this way is much easier than you think, if you are accustomed to foam wings. And you will have a much lighter and better wing.

FUSELAGE

Again, avoid all unnecessary weight in the tail.

A) Make the two vertical sides of equal hardness.

B) Make a subassembly of the bulkheads No. 1 and 2 with the hardwood engine bearers.

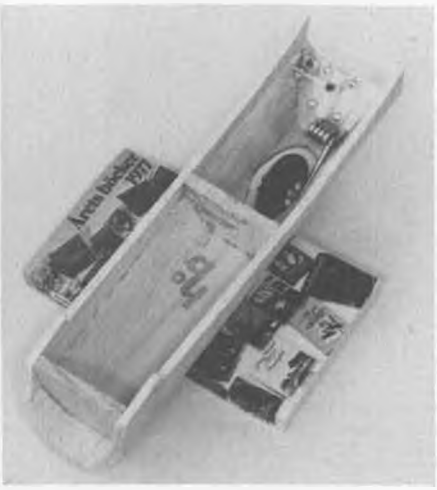
C) Glue the fuselage sides to the subassembly and join them in the back. This must be done with a symmetrical curvature. If not, pull them apart and glue again.

D) Fit the rest of the bulkheads, the stabilizer, and the fin. Fit all pushrod tubes and make the tank compartment.

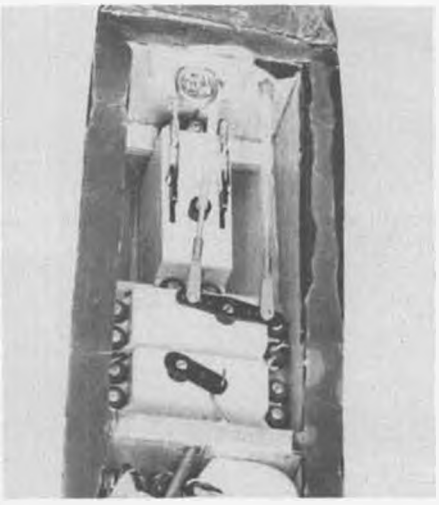
E) Fit the lower inclined fueslage sides and the bottom. If you will use two-wheel gear, put in the nose gear now. You can make it on a finished model, too.

F) Using spare blocks, make the engine bay.

G) Fit the top inclined fuselage sides and the top.



Bottom fuselage section before gluing to wing.



Radio installation. Note double push/pull rods to rudder and elevator.

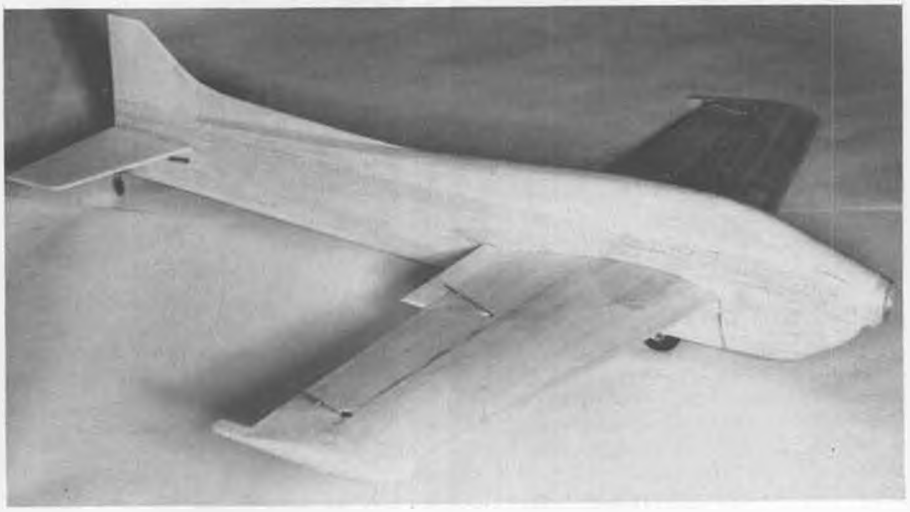
H) Cut out the wing hole and the belly pan. Glue the wing bed balsa reinforcement above the wing.

I) Fit the landing gear to the belly pan and mount the belly pan to the wing. Fit all wing attachment details.

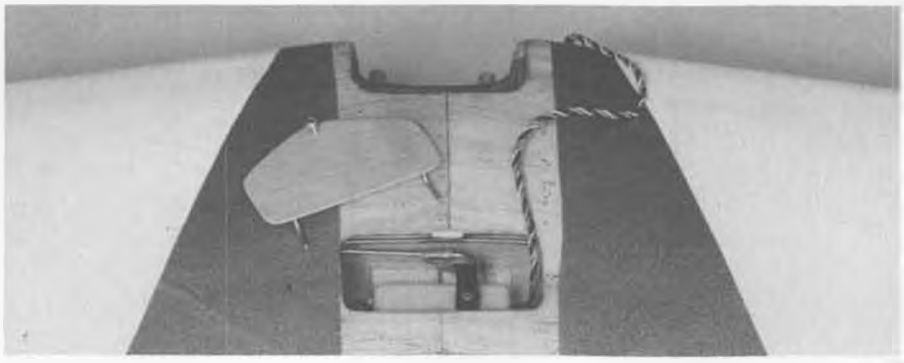
J) Apply epoxy and fiberglass to the fuselage and wing-belly pan assy.

K) Make all servo installations.

L) Make all ailerons, elevators, and



Basic framework complete, with the exception of the control surfaces. Huge fuselage side area gives good knife-edge flight characteristics.



Aileron servo installation. Servo cover hatch is not really necessary.

Tail surface details. Push/pull control rods to elevator are evident in this photo. This type of control set-up provides slop-free movement, important in a pattern ship.

Engine installation and landing gear details. Original model used a Cox Conquest .15.

the rudder. Note that they are a little thinner than the main surfaces, to soften up the response around neutral (I hope).

FINISHING

To save weight, use Solarfilm or Monokote instead of paint. The weight with empty tank must not be more than 1250 grams. This ends up with a surface loading of around 48 gm./dm^2.

FLIGHT TRIM

If necessary, add weight in the nose or tail to get the indicated CG position.

If you fly on a very good field, you can use the low single-wheel landing gear, but it will give quite long takeoff runs. The single wheel is also fine for hand starts (try that on your 8 lb., .60 model if you dare!).

If you have a grass field, I recommend the higher tandem wheel set-up, which will prevent tail-up accidents and gives shorter takeoffs.

A) Check the CG position with empty tank.

B) Adjust the aileron, elevator, and rudder throw as indicated. I recommend dual sensitivity on all surfaces.

Elevator: for normal flying, use movements as small as possible. This is very important. The bigger throw (shown in parentheses on the plan) is used for spin and snap rolls.

Ailerons: Adjust for three rolls in 5.6 seconds. The higher throw is used to get quicker rolls in vertical maneuvers. It is also some help in spin and snap rolls.

Rudder: Normal throw for all rolls except snap rolls. The higher throw is for Figure M, snap rolls, and spin.

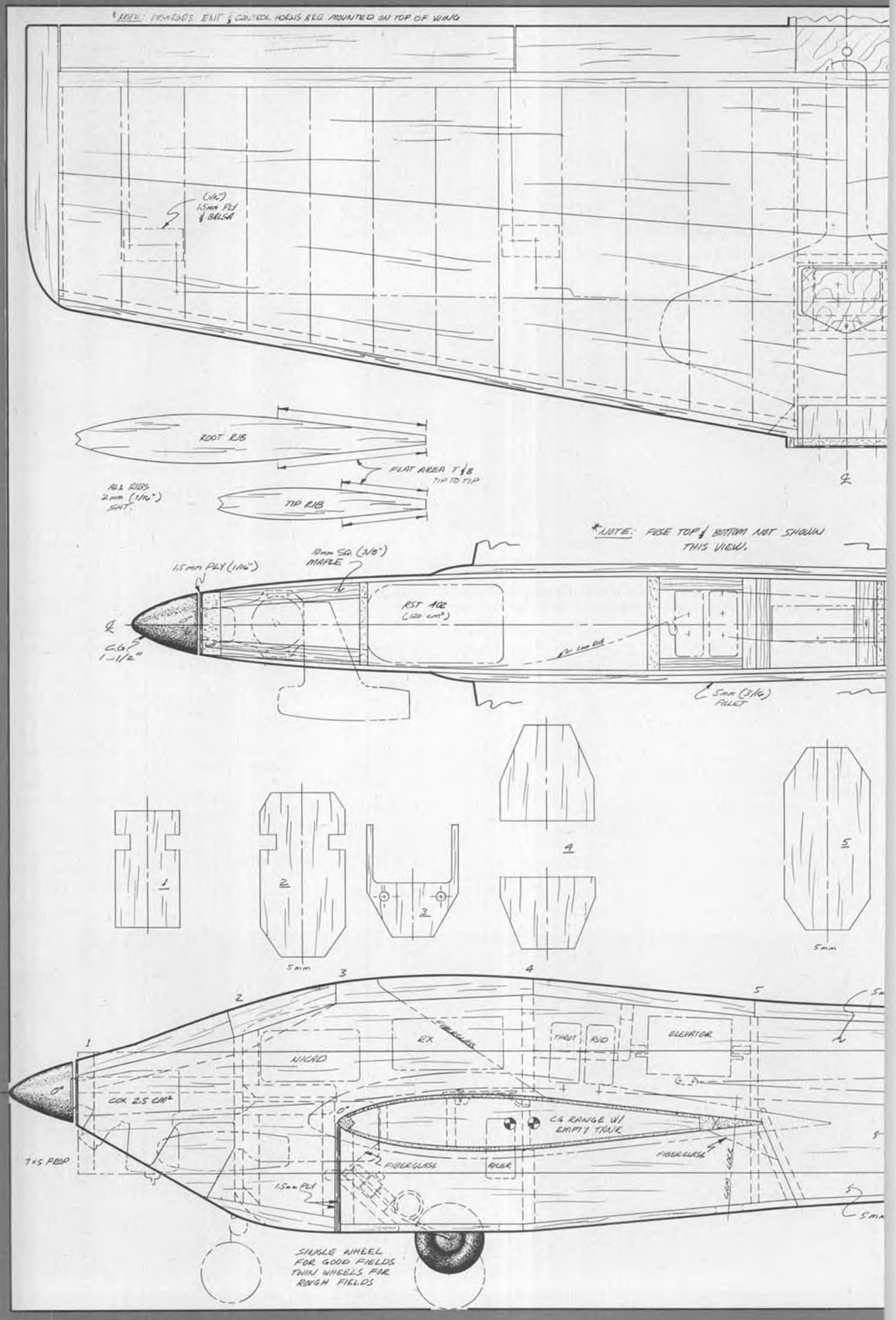
C) Check the wing tips to make them weigh even. If necessary, add lead (it is *always* necessary). However, in flight, you can still have serious problems with uneven weighing wings. This is very touchy.

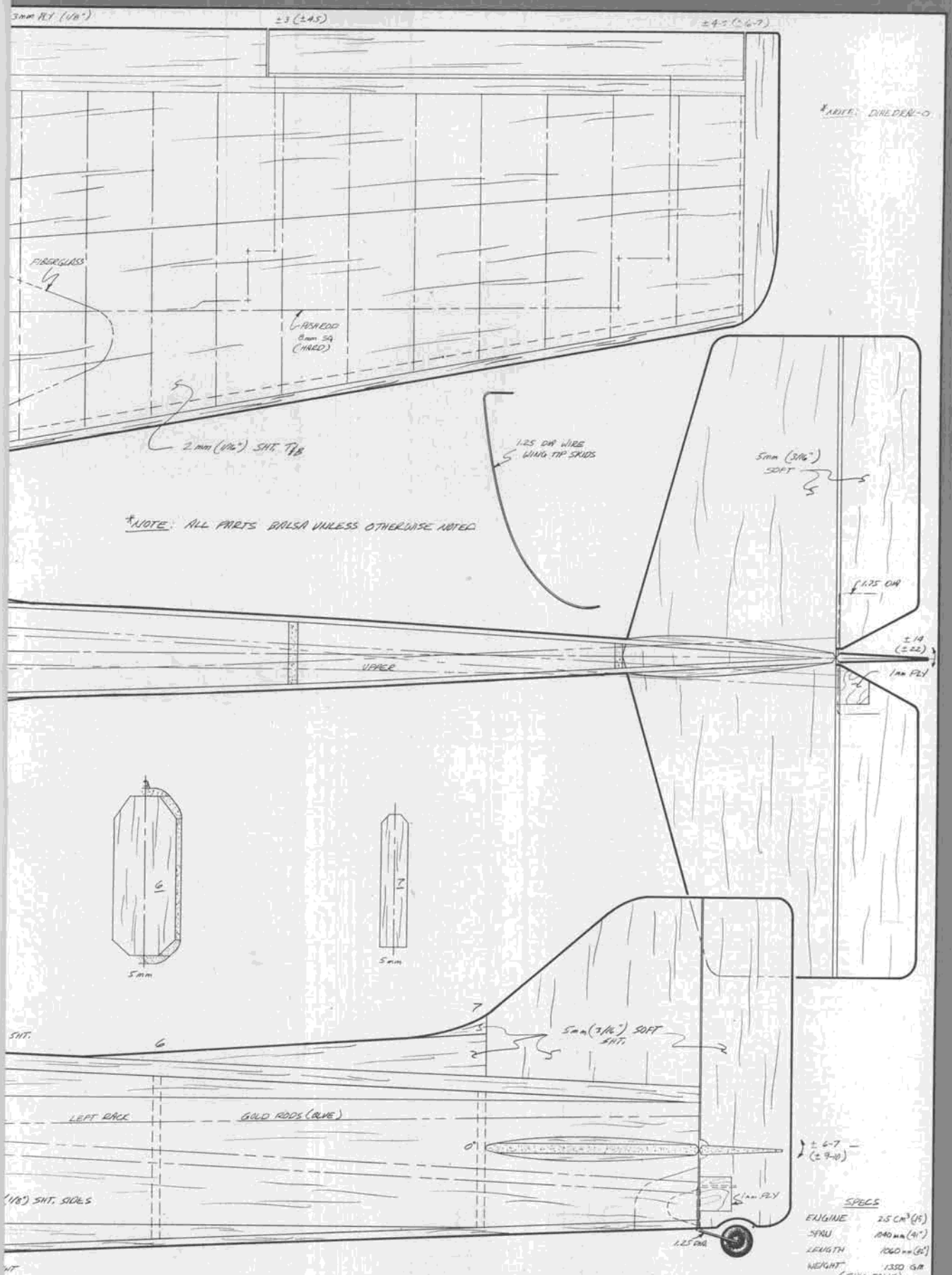
1) Trim the model straight and level and note if one wing drops. Then fly inverted and note which tip drops. If the same wing drops, this one is too heavy. If the other wing drops just give some aileron trim.

2) A much more sensitive method is to apply "G" forces by making several outside loops, assuming you first have the plane OK in straight and level flight. If the model rolls more to the right on the top than on the bottom, you have to put lead (2-20 grams) in the left tip.

Continued on page 22

Let's see you take your .60-size model to the field this way! Compact airplane/flight box makes good sense for those who do a lot of traveling and sometimes wish they had a model they could take with them to fly in their spare time.


NOTE: PUSHRODS EXIT & CONTROL HORNS REQ MOUNTED ON TOP OF WING
(1/16") 1.5mm PLY & BALSA
ROOT RIB
FLAT AREA T 1/8 TIP TO TIP
TIP RIB
ALL RIBS 2mm (1/16") SHT.
NOTE: FUSE TOP & BOTTOM NOT SHOWN THIS VIEW.
1.5mm PLY (1/16")
10mm SQ. (3/8") MAPLE
RST 10Z (620 cm²)
C.G. 1-1/2"
5mm (3/16") FILLET
1
2
3
4
5
5mm
FIBERGLASS
EX
THROT
R/D
ELEVATOR
WING
COX 2.5 CM²
C.G. RANGE W/ EMPTY TANK
FIBERGLASS
AILER
FIBERGLASS
1.5mm PLY
7¼5 PROP
SINGLE WHEEL FOR GOOD FIELDS TWIN WHEELS FAR ROUGH FIELDS



DFH 21

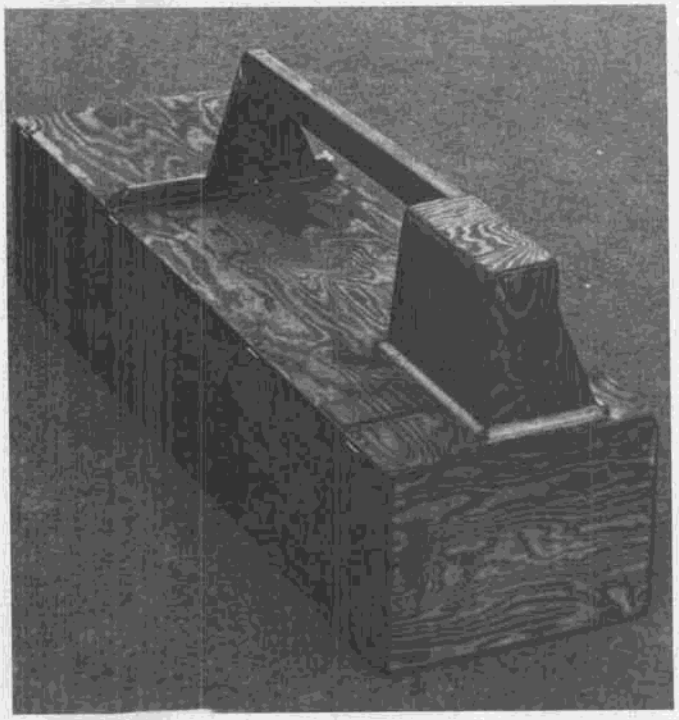
"Den Flygande Hyvelbänken 21"

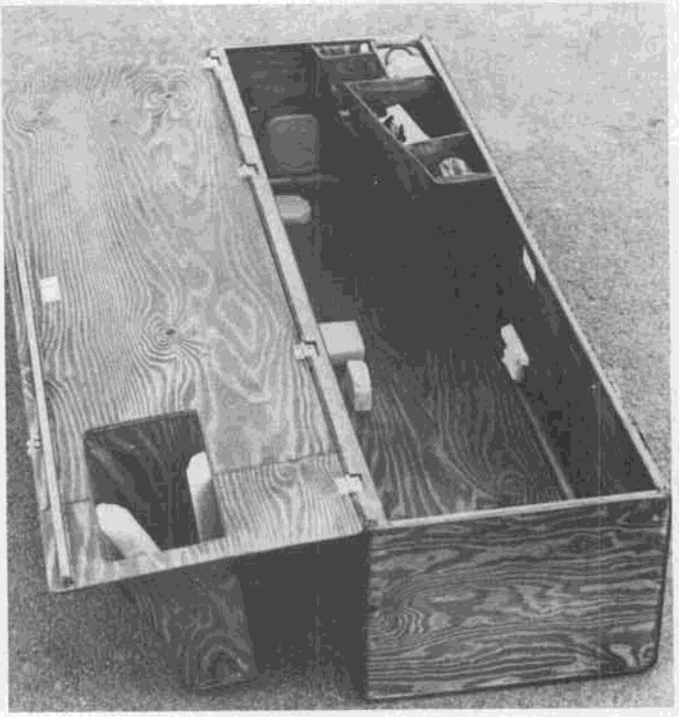
DESIGNED & DRAWN BY:
BERNGT LUNDSTRÖM

TRACED FOR M.B. BY:
SAL PRIFRION

MODEL BUILDER magazine
621 West 19th St., Costa Mesa, CA 92627

Plan No: 1791





Two views of the DFH 21 transportation/flight box. Fuselage lays on its side, over the wing, and half of the stab fits into the box lid. Box is designed to the maximum size that the airlines will allow.

That's because the "G" forces are adding to the gravity in the bottom of the loop, but the gravity is less on the top.

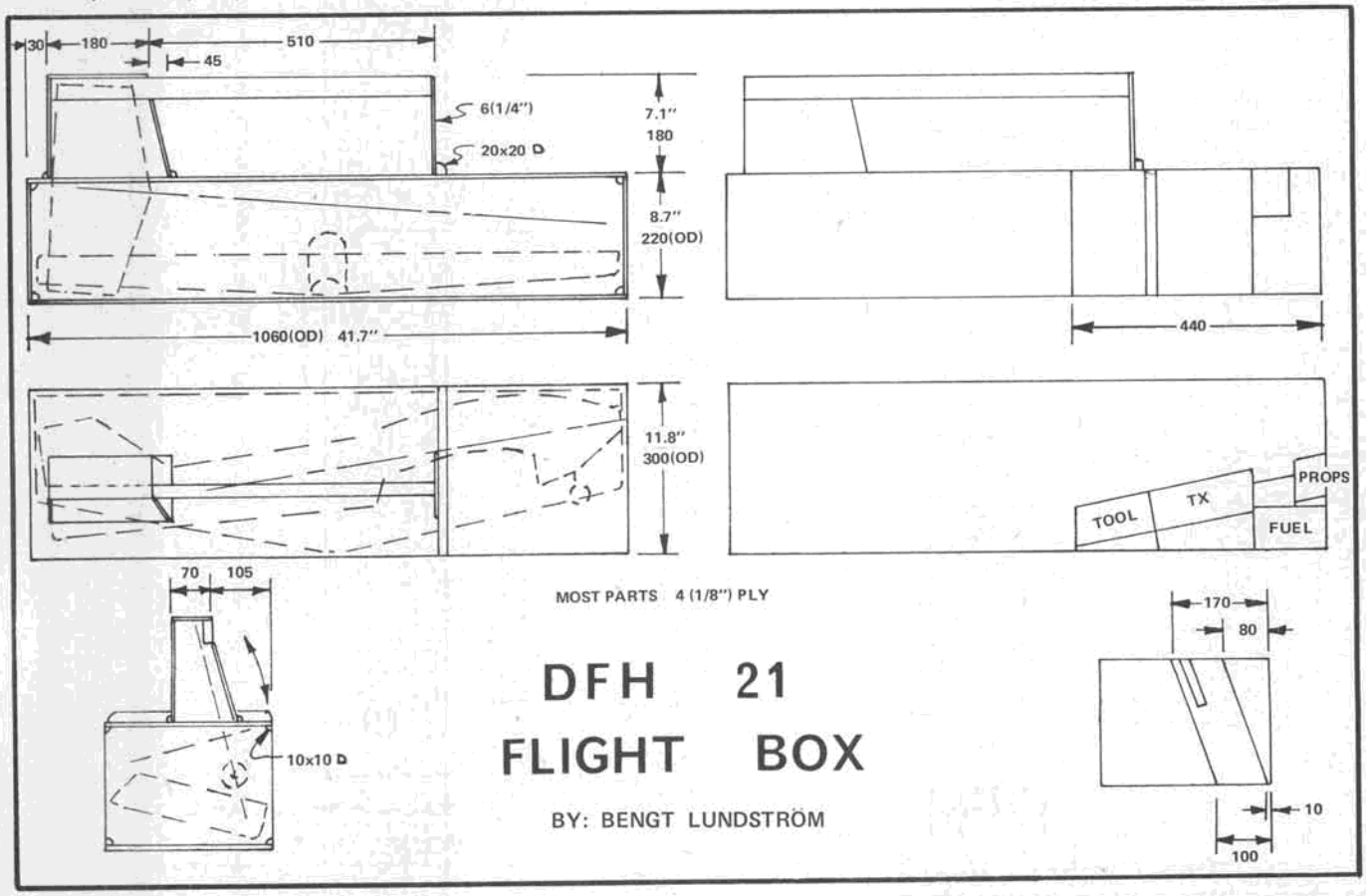
3) If you are confused, just put 5 grams in one tip and note what happens.

Don't listen to people who say it is impossible to make a warpy model fly OK. It is always possible to make a "bad" model fly fine if you just work with it. The only problem you may have to live with is that it stalls and spins more easily to one side than the other.

THE TOTAL CONCEPT FLIGHT BOX

To take full advantage of your DFH 21, I recommend building the box, too. As it is a tight fit, check to see that your wing and fuselage will fit before it is too late. You will have to modify the box to suit the size of your transmitter and fuel can.

The only bad thing with this box is that you can't change much on the model. Changes are, however, not needed as the DFH 21 really flies very good. •



PHOTOS BY BILL KALLAM

Bill Kallam, Madison, North Carolina, modified our Upton Baby Ace plans to scale a local Baby Ace built by Bill Schultz. Model was constructed in less than two months.

1 TO 1 SCALE

By BOB UNDERWOOD

The Little Red Hen was pleased when she found the seed. If she could find some help, the result would be a wonderful treat later on.

"Who will help me plant the seed?" she asked. Nobody would help; not the cat or dog or pig.

"Who will help me reap the grain?" she asked. Nobody would help; not the cat or dog or pig.

"Who will help me take it to the miller?" she asked. Nobody would help; not the cat or dog or pig.

"Who will help me bake the bread?" she asked. Nobody would.

"Who will help me eat the bread?" she asked. Stampede! The cat, dog, and pig cometh, post haste!

It's an old nursery story, and, while it's not totally apropos, consider the situation which is perpetually true during the time that rules are changed or developed.

Constantly, one hears comments about how this or that needs to be changed or what additions must be made. The debate is long and hard during contests or at club meetings. Opinions creep into newsletters, but they rarely make it to the place where they will do the only good; AMA headquarters and the Contest Board.

Those suggestions that do make it through the conception stage are then faced with another problem. The Contest Board members, just as the Little Red Hen, plead for help and advice. It rarely comes. The cat and dog and pig remain mute and wait for the result.

At the end of the rules cycle, the advice appears, and then we hear our three silent charges. With variations, we hear positive, helpful statements like, "What's the matter with that blankety-blank Contest Board?" Off we go with another cycle of "Why didn't they?"

The method employed in developing rules occurs not only over a long period of time, but allows continuous input and even opportunity for modification during the process. By and large, the task falls upon the shoulders of a precious few in the final analysis.

As a member of the R/C Board for District VI, I can echo the comments of Sally Brown in the *K-Factor* (for you scale-only types, that's the pattern association newsletter) when she lamented the fact that her husband, Dave, receives very little guidance on voting. During the last rules cycle, I received 11 responses from District VI. *(A big 20 in District X. wcn)*

The initial rules proposals are out, printed in *Model Aviation*, and your help is requested. By the time you read this, the national scale organization, NASA, will have polled its membership so that some formal communication can be sent to the Scale Contest Board.

If we wish to share the bread with the Little Red Hen, is it too much to expect that we share the burden as well?

WHAT'S A "MANAGER"?

Following the Scale World Champs in England, most of the participants find themselves speaking at club meetings, sharing their experiences. A question that has appeared is, "Why does the team need a manager?"

Certainly, in various contests, including the Nats, we don't find ourselves using a manager to help us compete. Why is this necessary on an international level?

Believe it when it's said that a manager is a helpful item. Some of the tasks that fall into his realm of responsibility include the following types of things:

The pre-event concerns involve transportation, in some cases, as well as maintaining the necessary communication required in making a team a team. One item that sounds simple but often involves more work than anything else is the arrangements for fuel. Very often,

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That's not a gash on the fuselage, but a reflection of the forward wing strut. Power is a Super Tigre 60 with a Stewart reduction unit. Colors are Army olive drab and yellow.

The Second Annual Las Vegas Fly-In, sponsored by the Quarter Scale (or whatever) Association of America, was located on Searchlight Dry Lake, about 20 miles east of the famous gambling city. Befitting the size of the aircraft, the size of the gathering was also enormous. All photos on these pages by MB's editor. Verbal coverage and more pics next month.

MAMMOTH SCALE

By RON SHETTLER

AN OPEN LETTER TO AMA, MAAC, AND FAI

A lot has been said for and against the trend toward larger models. Some statements are factual and others so far off base as to be misleading. The latter should somehow be marked, if there is any question as to accuracy. I realize that we live in a country with freedom of speech and expression, but we do have a responsibility when expressing or printing a technical opinion to make sure that it is correct and does not mislead anyone, especially when it involves safety. When one wishes to express an opinion of what constitutes a pretty airplane or what event turns you on, by all means tell the world. If an event causes you concern in that it might affect your area of the hobby, by all means check it out. Get the *facts* first, then express your opinion based on the factual knowledge of where safety is a factor. Many of the "big model" people I'm in contact with are genuinely concerned about safety and *are doing something about it.*

Let's therefore correct some "opinions" in the Letters to the Editor column of the October 1978 issue of *Model Aviation*, expressed by Glenn F. Gresens, and I quote: "Everyone knows, however, that a Quadra engine can produce 5 hp with mild rework and a dose of nitro." FACT: the Quadra puts out 2 actual dyno horsepower. As the developer of the Quadra engine (for our use) and being closely associated with the factory which produces it, we are not one of the "everyone knows" people. We have engines running continuously under one test or another, including oils, fuels, etc., some of which will never be used in our present product. If there is any way we can easily get 5 hp out of the product with mild rework and a dose of nitro, by all means, "everyone", let us know. There are a few industrial applications which could use expendable

Maus Taoto won Best Stand-Off Scale trophy with this 1/3-scale Pitts S2A. Futaba, Quadra, 21 lbs. Flown by Dave Lloyd.

Rearwin Speedster displayed by Joe Bridi, and a future kit from same. Built by Lou Stanley.

Beautiful blue and silver Curtiss-Wright Jr. by Bruce Lund, Mobile, Alabama, won Best of Show. Powered by O&R 1.2, 10 ft. span.

Nate Rambo's Albatross D-5. Fuselage built up from 1/8-inch mahogany door skin material. Quadra power, 20x6 Top Flite, 25-1/2 lbs.

Don Anderson fits the wing to his beautiful 100 inch Super Fli. K&B Superpoxy over sanded Monokote, Eastcraft starter, Quadra.

Bud Barkley, Ontario Canada, won Scale with this magnificent Tiger Moth 82C. Quadra, 3.47 scale, 28 lbs., Futaba, plans coming!

Whaddya mean, transportation problem! Bert Baker built roof saddle for his Cherokee 235, drives at (ahem) 70 mph without problem. Quadra, 24 lbs., 93 in. span, full kit available.

power.

Now for some facts on the Quadra engine. The head and block of a Quadra are a one-piece casting; the head is not removable for reworking. The piston runs in a chromed alloy casting, and any port reworking could destroy this finish. It has a one-piece crankshaft, and you can't restroke the engine by pressing in a new crankpin at a different height, nor is there enough material available to regrind the crank to obtain a different

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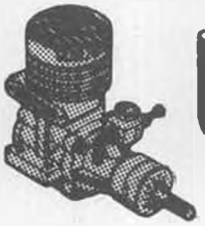
Bruce Lund holds RCM Best of Show trophy presented by QSAA Sec. Pat Bunker. Host Eddie Morgan far right. RCM's visible reps are Dick Tichenor (left) and Dick Kidd, in the wild shirt.

"Miss America" on slow fly-by provides comparison with P-51 from Byron Originals.

FUEL LINES



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Laguna Hills, CA 92653

OTTO BERNHARDT
17119 S. Harvard
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Send in your questions, relative to glow or ignition engines, and these experts will give you the correct answers.

KLAUSE

• Can you name a fun thing in model aviation? One of those things you really look forward to doing? How about breaking-in a new engine? Without a doubt, that's bound to bring a chorus of groans of disagreement. Nevertheless, it is something that we all must do. Either that, or take up hand-launched gliders, sailing, etc.

Let's assume that you have a brand-new .049 or .051 in hand. First, remember that the manufacturer carefully prepared it for you. It has a lot of potential. However, how well it performs will depend considerably upon your operating techniques. To begin, the engine should have a minimum of fifteen minutes of break-in time before it is used in your model. Actually, thirty minutes would be better, and even then, additional running will be necessary before the engine reaches its peak. The exact amount of time will vary with each engine, your fuel, and the particular type of flying you'll be doing. Obviously then, the performance which you ultimately obtain will be affected by the break-in period. Do it carefully and thoroughly.

It is suggested that you use the procedures outlined below, but first, AN IMPORTANT NOTE OF CAUTION! NEVER, *NEVER* stand in line with the operating plane of a running propeller, and be very careful of the propeller whenever you adjust the mixture. The possibility of prop failure always exists. Serious injury can result from being struck by a piece of material from an operating prop. Touching a running prop is equally dangerous. It is also your responsibility to ensure that no one else is endangered by your engine or prop. Further, it is suggested that you use a hearing protection device, such as ear plugs. Prolonged periods of close exposure to a screaming engine, such as on a test stand, can damage your hearing.

Start with a solid test stand . . . a piece of 1/4-inch plywood and a few wood screws simply won't do. It must be solid to do the job right. Next, use a prop that will not overload the engine. A 5x3 prop and 15% nitro fuel are suggested for the initial break-in period. The objective is to run the engine for several minutes at a time at high rpm, but with a slightly rich fuel setting. This will enable the moving parts to "mate" together at a relatively cool temperature with plenty of lubrication. Unquestionably, we must have some heat in order to run the engine, but we don't want too much heat. A lean setting will cause too much heat, and we'll end up in the dreaded heat/friction spiral. During the first run of several minutes, let the mixture remain at the rich setting. On the second and subsequent runs, about every minute or so, peak the engine out for about ten seconds, and then richen it slightly again. Be careful not to overlean the engine. An engine should never be run, other than momentarily, at an extra-lean setting. Run the engine in this manner for periods of several minutes at a time, with thorough cooling in between runs. Repeat this cycle for at least fifteen to thirty total minutes of operation, or until the engine runs smoothly and steadily without any sagging or rpm loss.

After this initial break-in period, gradually increase the nitro content of your fuel, and experiment with various compression ratios to obtain the maximum performance for your particular event. Note: The engine, as delivered, is equipped with three copper head gaskets. Decreasing the number of gaskets naturally increases the compression ratio. The nitro content and compression ratio which will give maximum performance will, of course, vary with atmospheric conditions. (Refer to the Fuel Lines column in the December issue of **Model Builder** for a more detailed explanation of this matter.) The modelers who take advantage of the right nitro and compression combination, and also practice with all of their equipment, usually are the ones who are in the winner's circle.

In addition to the above, periodic maintenance will be necessary. The lubricants in fuels tend to leave a residue on the cylinder wall and piston. Some fuels are worse than others, but they are all prone to do so in hot, humid weather. This residue is often referred to as engine "varnish". It increases friction, degrades performance, and is especially prevalent with fuels whose lubricant contains carbon. To remove it, disassemble the piston and cylinder, and scour off the brownish-colored varnish with No. 000 plain steel wool. Do not use abrasives, wire brushes, or scrapers of any kind. They will all ruin the cylinder. The 000 steel wool will not harm the bore. When all the varnish has been removed, very thoroughly wash, rinse, and dry the cylinder and piston, apply a good preservative, and reassemble the engine.

It is also wise to occasionally check the ball socket joint where the connecting rod is attached to the piston, especially during the early operation of the engine. If "play" develops in the ball socket joint, performance will decrease. Too much play will lead to connecting rod or piston failure. Usually the crown of the piston will bulge and break away. Use a piston/rod reset tool to tighten the ball socket joint. They are available at most good hobby shops, or by mail order from Kustom Kraftsmanship. (See KK advertisement elsewhere in this issue.)

Lastly, a few words about the general care of your engine. Keep it scrupulously clean. Dirt, dust, and grime are the worst enemies of any precision, high-performance engine. Be sure your tank is clean. Flush it out with plain methanol if you haven't used it in a week or so. Use a filter, and after each day of operation, use a good preservative such as WD-40 or Marvel Mystery Oil. If your engine becomes contaminated with dirt, carefully disassemble it, thoroughly clean it, and apply a preservative. If you treat your engine properly, it will provide you with many hours of pleasure. Finally, remember safety first, last and always.

If you'd like to read about a particular subject in this column, let us know about it. A simple postcard is all that's necessary. If you have a specific question you'd like answered, just send a stamped envelope to: Joe Klause, P.O. Box 2699, Laguna Hills, CA 92653. •

BERNHARDT

• Many of my readers have written me asking advice on choosing a glow engine best suited for conversion to ignition operation. This is a very interesting subject, and is important to anyone having to make a choice. Some engines are better suited for ignition operation than others, and some are just not worthwhile fooling with.

The main difference between alcohol (glow) and gasoline (ignition) operation is the amount of heat that is generated while running. Alcohol burns relatively cool, requiring minimal cooling fin area for heat dissipation, whereas gasoline burns hot and therefore requires considerably greater cooling fin area. If an engine is allowed to get too hot, the lubricating oil breaks down and severe damage will occur between the cylinder and piston surface, with a resulting loss of compression and power output. In a model aircraft, the only thing that removes the heat generated by the combustion of fuel is the air from the propeller moving by the cooling fins of the cylinder. The greater the cooling fin area, the more heat will be removed. This is especially important in regard to the design of the cylinder head, as more heat is transferred to the head than to

the cylinder fins.

Having ample cooling area should be the foremost condition to be met when choosing a glow engine for conversion to ignition. Incidentally, while on the subject of cooling fins, for greatest cooling efficiency, all fins should be kept clean of dirt and grime. Painted fins are absolutely no good. Paint of any kind is a type of heat insulator and tends to hold the heat in. A color anodized head or fin assembly is not to be confused with a painted surface. Anodizing has no effect on cooling.

Next item of importance when choosing a glow engine for ignition conversion is the type of bearings the engine is equipped with. An engine having double ball bearings on the crankshaft is preferred over one having sleeve bearings. Ball bearings, if kept reasonably clean, will last indefinitely, whereas sleeve bearings start increasing their clearance from the time the engine is first run. An engine equipped with a high-quality bronze main bearing will outlast one with a cheap bearing by a considerable margin. Engines with the crankshaft turning in the aluminum crankcase without a bronze bearing usually have a very limited life. The first indication of trouble is when oil is observed escaping from the front of the main bearing. Unless it is fixed, it will only get worse. The first choice for main crankshaft bearings would be a double ball bearing. In smaller engines, look for a good quality, close-fitting bronze bearing with a ground steel thrust washer between the main bearing and the propeller drive washer. This is important when using an electric starter. Without it, the front of the main bearing will grind away, resulting in excessive end play in the crankshaft.

If possible, check on the type of bearing material used in the crankshaft end of the conrod. A bronze-bushed rod is more expensive for a manufacturer to make, but it possesses a higher quality and performance life than a conrod without bushings.

Pistons are extremely important when making a choice of engines for ignition operation. In engines of .40 displacement or larger, pistons with rings are preferred over ground and lapped pistons. A lapped piston is fine for the smaller engines. Performance is excellent as long as it holds good compression. Also, the replacement cost for a new piston and cylinder liner is usually slight. In larger engines, this is a good deal more costly, and when replacement is necessary, usually only one part is required instead of two. Also, in larger engines, the rate of expansion between the piston and cylinder due to heat is more noticeable than in smaller engines. In larger engines with piston rings, the pistons are constructed from aluminum instead of steel, resulting in lighter weight and less vibration. In a ringed piston engine, usually only the piston rings require replacement.

In conclusion, choose a brand that will have parts easily available, should you need them. There is nothing so frustrating as having to wait months (and I mean *months*!) for some simple replacement part to arrive. •

ALDRICH

• Well, it looks like we finally found a way to get proof that someone reads this hack's meanderings . . . act dumb! Not that we're not, but our column discussing the weather's effects on our 2-cycle mills really brought the best response yet, even if one of them is from another very fine mag.

Above all, we don't profess to have been capable of putting on paper the comments that follow . . . or we probably would have. After enough years, most any dummy should be able to figure out what to do under certain weather conditions, even if he can't fully explain exactly why. Anyhow, after 40 years at this game, we've learned enough to give credit where it is due. Anytime you feel you have something that will help the rest of us, by all means send it in. We'll most certainly pass it on.

On with the letters in the order received:

Dear George: I've been meaning to write to you for some time now, so now I am. The thing that finally got me off my duff and over to the typewriter was your column in the October **Model Builder**, *the one about temperature and humidity effects on fuel mixture.*

Airplane pilots are quite familiar with air density as it applies to fuel mixture. The most obvious example of this is that the mixture must be leaned as altitude is gained. Air density, of course, decreases with altitude.

There is, also, another phenomenon known as "density altitude", which refers to the air density on the surface in other than "standard" conditions. As the temperature and humidity rise, so does the density altitude. In other words, the air density at the surface is now equivalent to a higher altitude on a "standard" day.

Hot air is less dense *than cold air. That's why hot air balloons fly. Humid air is* less dense *than dry air, because water vapor is lighter than air. Note: we're talking here of water vapor, not water droplets. Vapor is gaseous; it is not moist the way fog is, for example. Humid air, contrary to popular belief, is not "heavier" than dry air. Not as long as the water is in the form of vapor.*

The term "relative humidity" refers to the amount of water vapor that can be held in the air at a given temperature. As the temperature rises, the amount of water vapor the air can hold increases. (Which is why we dry clothes and other things with hot air.) Therefore, if the air temperature is increased, but the amount of moisture in the air remains the same, the relative humidity *goes down. If the air temperature is suddenly reduced, the relative humidity goes up. If the temperature reduction is great enough, the moisture condenses into visible fog.*

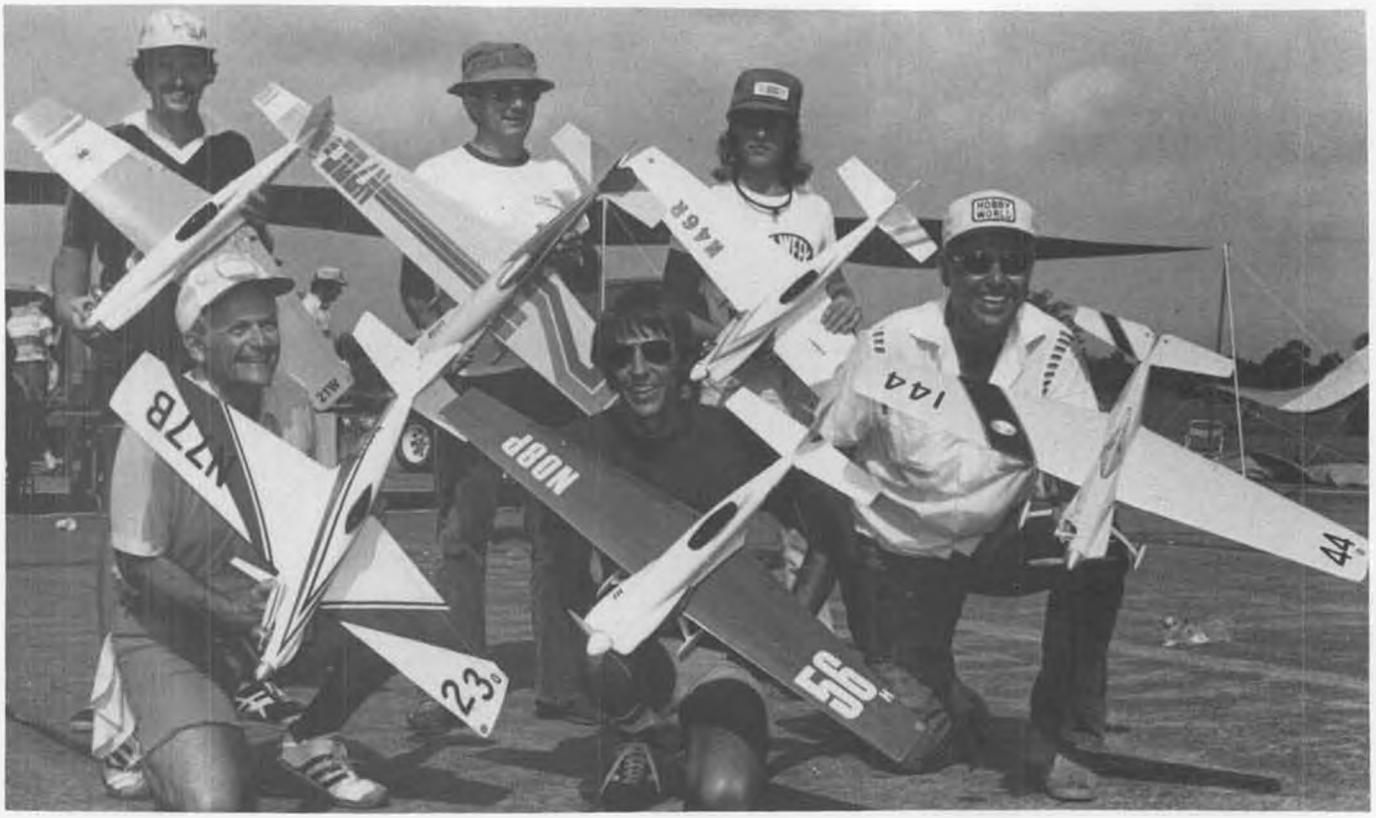
Now then, to your example of flying in the morning, and then later in the day. In the morning, the air was cool, therefore more dense. Also, although the relative humidity was fairly high, the actual moisture content of the air was not excessive. Higher air density requires a rich fuel mixture in order to obtain the proper air/fuel ratio.

Then, later in the day, the air temperature went up. And, as you said, the relative humidity went down. But it was relative humidity *that went down . . . the actual moisture content in the air probably remained the same, or might even have increased due to the hotter air's ability to hold more moisture.*

Result: The air density was now lower than it was in the morning. And what do we have to do when the air density

Continued on page 97

John Morrill, of El Segundo, California, did an outstanding job on this .29 diesel which appeared as a construction article in the May and June 1948 issues of M.A.N. Morrill photo.



Top bananas in Quarter Midget at the '78 Nats were (standing, I to r): Dennis Sumner, 6th; Tom Christopher, 5th; and Brian Richmond, 4th. Kneeling, I to r: Tom Baker, 3rd; George Parks, 2nd; and Bob Reuther, 1st. Only 21 entries competed in Q-M.

PYLON "GO FAST AND *Turn Left!*"

By JIM GAGER

PHOTOS BY AUTHOR UNLESS NOTED

• What if they held a race and nobody showed? The '78 Nats weren't quite that bad, but sure came close. Only 21 Quarter Midget and 38 Formula I entries actually competed this year, resulting in the lowest turnout in many years. Why the low turnout? Speaking only for myself and various other racers here in the Midwest who I talked with prior to and after the event, two reasons stand out: The decision to run qualifying rounds for Form I (which was rescinded prior to the Nats, but not soon enough nor broadcast widely enough to do much good) and the reputation (deserved or undeserved) of hot-humid August Louisiana weather. The rumor that the AMA was forcing the Nats to be held on this particular piece of property because it had been donated (and deeded) to the AMA, undoubtedly contributed to the small entry turnout.

Let me say here and now that I put no credence in that rumor, as the elected officers in AMA are still responsible to us, the general membership, and had said property been turned over to the AMA, we would have been notified of it shortly after the deed transfer. The Louisiana site just had to be the best available site, or the only available site, for this year to have been selected for use, poor weather reputation or not. The officers realize, I'm sure, that within reason, they must perform in a manner pleasing to their constituents, else they won't be around very long. After all, it's not like they're the Federal Government. Wonder where the Nats will be in '79???

Twenty-one entries made processing easy on the first Sunday for event

Slow start in Formula I. First plane is usually gone by the time the flag drops.

Now, that's more like it! The flag is just starting to come down and Bob Smith is already releasing Ron Schorr's Polecat.

Top three in Form I at '78 Nats (l to r): Bob Smith, 3rd, Polecat; Ron Schorr, 1st, Polecat (which also took top appearance points); and Dave Shadel, 2nd, Little Toni.

Tom Christopher (right) with the help of his caller, John McDermott (left), set a new fast time of 1:26.8 at the Nats with his Cox .15-powered Prather Toni.

Caller Bill Preis does a dance while Charlie Brunner rounds pylon No. 3. Note the protective barrier for the pylon judge. Photo taken at '78 Nats.

director Ed Rankin and his crew. Radio frequency checking (to ensure everyone was actually flying on the frequency on which they registered) and safety inspection went smoothly and only minor repairs had to be made by some entries to pass inspection. A twenty-one entry matrix creates problems of its own, in that very soon into the rounds you start repeating flying against guys you just flew against, plus it causes some fliers to have back-to-back heats, which fouls things up a bit, too.

One situation several of the contestants had trouble understanding was why, with 15 hours scheduled for flying Q-M, were the races stopped early each day and only ten hours of time used? Seems like if you travel that far to race and the entry turnout is low, the least you could expect is to fully use the alloted time.

The races were singularly unspectacular, except for Tom Christopher's new record fast time of 1:26.8, flying his Cox .15-powered Prather Toni. Proving that trite but popular adage that you have to go ten laps to win, the one zero Tom picked up along the way kept him out of first place, dropping him all the way to fifth.

Hard luck guy of the race had to be Dennis Sumner, who went into the last round tied for first and mid-aired in his last heat with Greg Doe, which dropped Dennis back to sixth place. Bob Reuther's consistency and familiarity with his old tried and true Miss Cosmic Wind and Rossi copped first place.

Best Senior trophy was taken by Tom Giertz with his Cox-powered Prather Toni, and Best Junior trophy was taken by John Pagan with his Rossi-powered Firecracker.

We can't leave Q-M without mentioning the story we heard about a Cox factory (or ex-Cox factory) representative selling stock out-of-the-box Coxes. The fact that he was selling them isn't unusual in itself, except that he was getting seventy-five bucks a copy. Odd, when the list price is $59.95, and discount houses sell them for as low as $37.00. *(Engines were not "production*

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Charlie Brunner with his unidentified Formula I (looks like a Little Toni) and caller Bill Preis. Bill was 12th in Formula I.

Bob Reuther getting ready to fire up the S.T. X-40 in his very pretty and colorful Polecat. Greg Doe holding.

Jack Elem, man of all hobbies, launches his Friendship sloop "Nefertiti", momentarily distracting a young fisherman. Nice to see something other than the usual Bermudan rig. Jack hails from Fullerton, California.

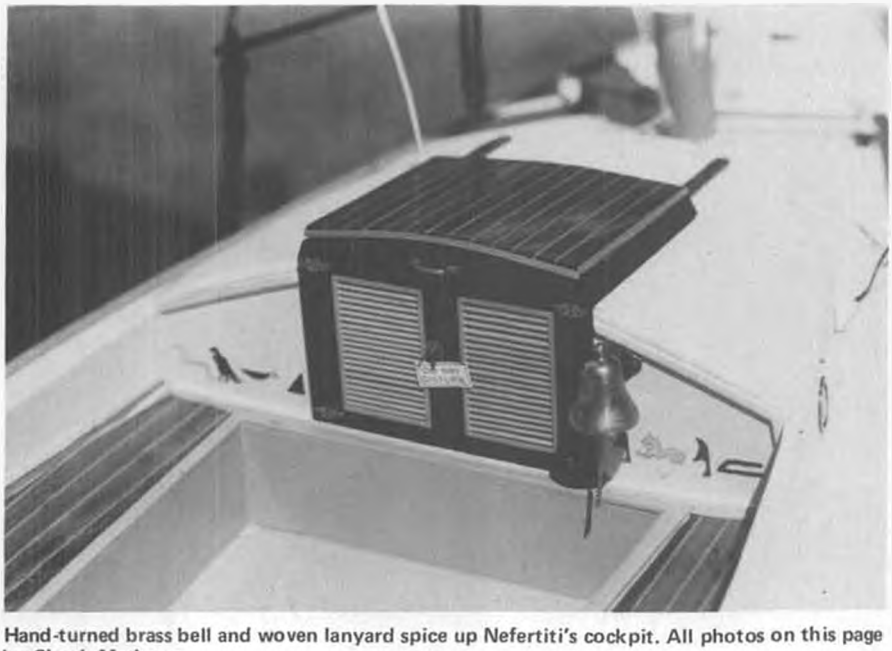
STRICTLY SAIL

By ROD CARR

• Jack Elem, of Fullerton, California, was kind enough to provide us with the heading pictures of his Friendship Sloop NEFERTITI. He utilized a Mainwaring hull and the book ENDURING FRIENDSHIPS for the source of plans and information for outfitting. All fittings on the boat were hand-made except for the Fisher blocks. The blocks were covered with exotic woods such as ebony, purple heart, and paduak to simulate the traditional look of the Friendship. Cabin and hatches were planked with walnut, and caulking represented with basswood strips. The hull topsides are black, with white waterline and copper below. Ballast is nine pounds of No. 8 lead shot. All rigging is removable for transportation, including the bowsprit.

Jack reports that there are 8 of the boats under construction or already sailing. He belongs to the Ship Modelers Association, a scale club that brings 60 to 70 members to each meeting. My thanks to Jack and to Howard Jackson and Chuck Matthews for the photos.

I have been getting the Minuteman



Hand-turned brass bell and woven lanyard spice up Nefertiti's cockpit. All photos on this page by Chuck Mathews.

Camber is hard to control in non-club jibs, as can be seen here. Still pretty, though.

Kilburn Adams, who designed the steam launch featured in our September '78 issue, also designed and built this fine looking gaff-rigged schooner. The length overall is 50 inches and the beam is 12-3/4. Total displacement is 21 pounds, with 15 pounds of lead shot/epoxy ballast.

MYC newsletter regularly, and this month I got a copy of the one from the Hecksher R/C Model Yacht Club. The editor, Dick Wischer, reports that the club is going to participate in a hobby show at Brookwood Hall Park, in East Islip, New York. They plan to show off their growing fleet of 36/600 class boats in hopes of finding new members to fill out their heat list. He indicates that their group is considering separating the fleet into wooden and fiberglass hull sections. Maybe I can get some further information on the reasoning for such a division of boats. The inference is that there is a difference in capability between them. Since there is no mention of multi-hulls, this may be a new problem that the wide-open 36's will be facing in the upcoming season.

One of my pet peeves is seeing an otherwise beautiful boat marred by the ugliness of crooked or uncentered numerals on its sails. This is usually the result of the skipper putting numerals on the sail after registering the boat. Sails that come ready to go from the numerous good sailmakers are conspicuously neat and precise in their lettering. You really only need two things for even, neat lettering. First, a clean horizontal surface as big as a card table. A card table would be good. Second, take your numerals and trace them on clean, white paper in the arrangement that your class rules require. In the case of a class like the 50/800's, measure the length of your sail number, then center the class symbol over the numeral. Draw a horizontal line under the whole thing and place the pattern under the sail with the line perpendicular to the leech of the sail. On full-sized boats, the individual panels run perpendicular to the leech, and numerals are typically sewn on a single panel, not crossing any seams. This means that numerals on the mains'l are not parallel to the waterline of the boat.

Unless you are comitted to sailing in international competition, keep the number of numerals to a minimum. Don't use the US in the EC/12 class, for example, even though it is optional. The reasons are that the extra numbers just add to the clutter and make it more difficult to read for the race committee, and they also add a significant stiffening of the sail in the area of the upper batten, which cuts down the drive available. Where possible, consolidate numerals; the M in the 50/80 class can

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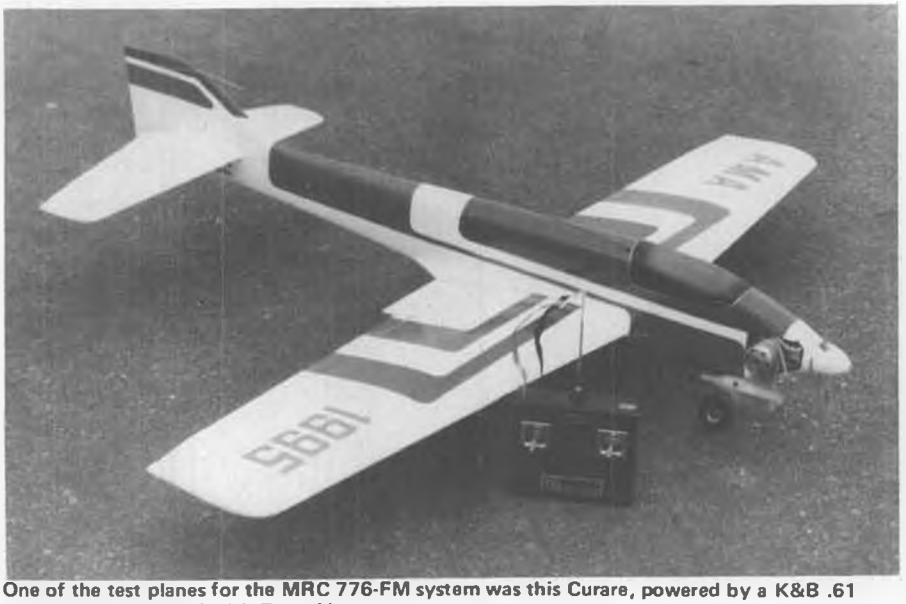
Ship moves well, even in near-calm weather. Hull is epoxy glass, teak planks over 1/16 mahogany deck, mahogany cabin, teak and spruce trim. If there's enough interest, MB will publish plans and arrange for glass hulls. Let us know.



One of the test planes for the MRC 776-FM system was this Curare, powered by a K&B .61 pumper and equipped with Rom Air retracts.

Transmitter and receiver. Except for FM label, looks just like the standard 776 unit.

FM R/C IS HERE!

By ELOY MAREZ

PHOTOS BY AUTHOR

• For some of us, at least, Frequency Modulation R/C is here! A number of companies, including Cox/Sanwa, Kraft Systems, and Model Rectifier Corporation (MRC) showed Frequency Modulation radios at the various trade shows in 1978. The Sanwa was a "show only" system, as it was on the 40 Mhz foreign band. The Kraft and MRC systems were on the U.S. Amateur Six Meter (53 Mhz) band. Kraft's system is apparently modified from a version they are preparing for the European market, while the MRC is a modified version of its FM system that has been available in Japan for some time, which is also being aimed at the Europeans and the U.S. now.

The modifications mentioned are necessary changes to operate on Six Meters, and probably to go from narrow to wide band FM; the former being used overseas, while only the latter is permitted in the U.S. (Remember, to legally operate on 6 meters requires, at the minimum, a technician's license, for which a written exam and five word-per-minute code test must be passed.)

Notice the scattering of the words "apparently" and "probably" in the of things, based on the existing regulations and the requirements they impose. At this point (the development stage) of U.S. FM systems, all of the above named companies are rather close-mouthed about the technical details of their systems. Competition being what it is, we can all understand their reasons for being so. Actually, I did receive some very interesting material, given to me in confidence, and which has to be treated as such at this time.

Of primary interest to most of us who are builders and fliers rather than electronic freaks, is the question of what is FM, and what can it do for me? The latter you will have to decide for yourself. Here and now, we will touch on some basics, and relate to you our experiences with the MRC Six Meter FM System where it counts . . . at the flying field.

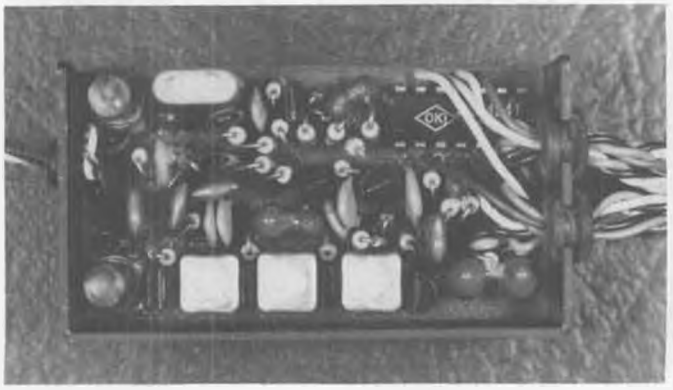
First, let's touch on that Six Meter business. Somehow, we R/C'ers have gotten into the habit of stating frequency in two different standards, probably having picked it up from Hams who use "meters" when speaking of a band (a set of frequencies or channels) and "kilo-" or "megahertz" when speaking of an exact point in that band. When we speak of 72 Mhz, and Six Meters, it is the same as saying an airplane has a wingspan of five feet and is one meter long!

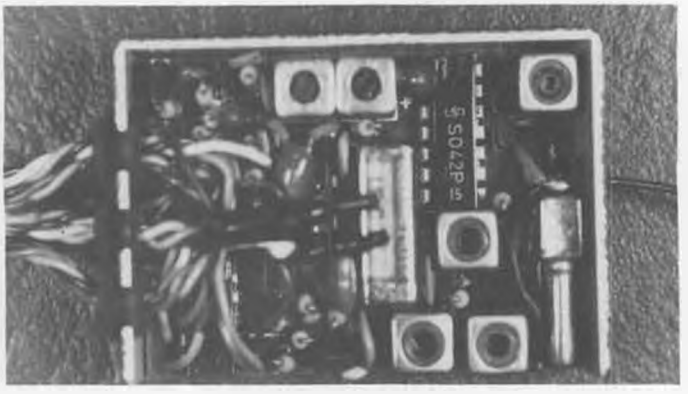
Frequency, measured in kilohertz (1000 cycles per second) or megahertz (1000 Khz per second), refers to the number of fluctuations per second made by the radio frequency wave, which is an alternating current. Meters, in this case, refers to the actual distance the wave has traveled during one complete cycle.

Applying the proper conversion factor, we find that our 27 Mhz band can and is referred to as the Eleven Meter band. Six Meters, we already know, is 53 Mhz. Our 72 Mhz band could be referred to as Four Meters, but isn't, and please don't start.

The next part of today's lesson can be entitled "FM for Fliers". FM, or Frequency Modulation, is but one of the methods used to add intelligence, or a command, to the radio frequency wave, which is referred to as a carrier wave.

In its purest form, turned on and off at certain intervals, the carrier can be used to transmit information in the form of Morse Code. It was also used in the early days of R/C, in an on-and-off fashion, to





Standard AM receiver (left) and new FM receiver, for comparison purposes. Interesting to note that FM does not require a much greater number of components. Note the two IC's, crystal filter, and all shielded coils in FM receiver.

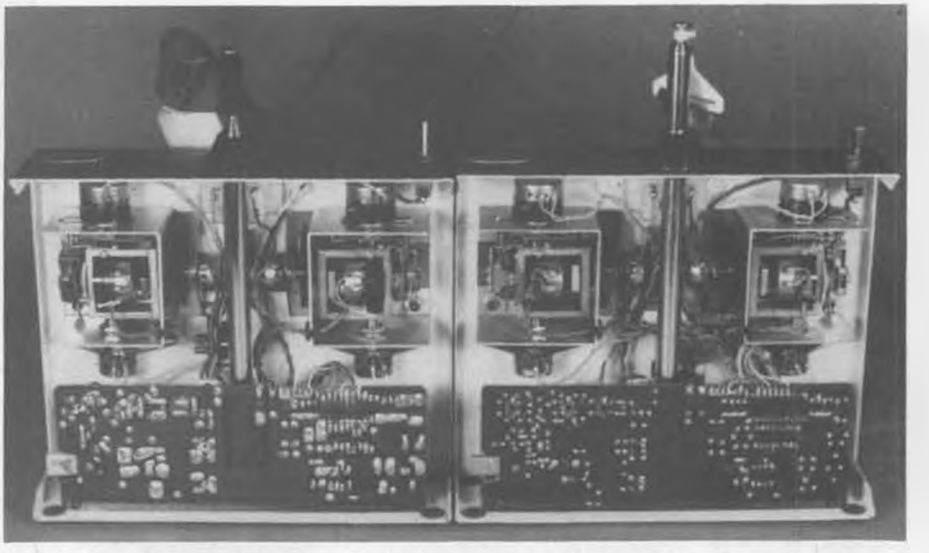
key a relay and in turn an escapement. R/C then followed the same path as other radio developments, and went to AM, or Amplitude Modulation (as is used for more complex modulation, such as voice and music for entertainment broadcasting) for proportional R/C.

Amplitude Modulation is a transmission method during which the frequency of the signal is kept constant, while the amplitude, the highest value reached during a cycle, is varied in tune with the information to be received at the other end.

In the case of Frequency Modulation, the amplitude, the peak value, is kept constant, while the frequency itself is varied to transmit information. The amount by which it is varied is referred to as the "deviation". Various amounts of deviation have been set for different applications, and are referred to as narrow band or wide band FM.

There are some definite advantages of FM over AM. An FM system has higher immunity to amplitude fluctuations, which can be caused by a number of things, among them those long, low approaches that some R/C systems won't tolerate. Another cause can be interference from voice-modulated transmitters on nearby frequencies, a problem we know full well from the CB'ers on 27 Mhz. FM has more built-in protection from swamping, which some R/C systems experience now and then. And it is relatively free from interference from static caused by nature, such as lightning. This is easily proved. If you haven't already done so, next time there is lightning in the air, tune your broadcast radio to AM and then to the FM band, and notice the absence of static crashes on FM. This same feature, the reduced susceptibility to interference caused by sparking, means that FM systems should work better in high-interference environments, such as ignition engine powered airplanes, and helicopters with their high number of metal-to-metal contacts.

The Japanese and European magazines are full of advertisements for FM R/C systems, and just about every major manufacturer has an FM set. Still, there seems to be some doubts with some of them, and with some of the engineers, as to exactly what the advantages are, and if they outweigh the disadvantages. The magic question, that of manufacturing cost, does not seem to enter into it, as these foreign FM systems are not priced much higher than their AM equivalents, if at all. Some of the doubts are purely technical, and at least one company, Simprop, which makes Hanno Prettner's radios, has opted to go with a modified type of narrow band-width AM modulation called Sinus Smallband Modulation (SSM).



AM (left) and FM transmitter internals, also to show that FM is not much more complicated to build than AM.

Down here at the fliers' level, we can look at other things. For example, I find it interesting to note that in Germany, with its FM's, SSM's, and whatever, they are able to have 27 channels between 26.995 and 27.255 Mhz, whereas with our band-width requirements, we only have five. Thus, they must be doing something right over there.

Where we will go in this country depends on Uncle, as I have no doubts that our manufacturers will be able to develop systems for us at whatever frequencies and for whatever modulation methods are authorized. We have, through AMA, asked for 23 more frequencies, and I am certain, modulation other than AM. We even offered to give up 27 Mhz which, of course, we almost have, as far as actual use. Hopefully, we will have news about these new frequencies in the not-too-distant future.

Which finally brings us to my in-the-air experiences with MRC's new 776-FM system.

Basically, if it wasn't for the FM sticker on the transmitter and receiver, you would take it for an MRC 776. It is identical in size, weight, and looks, also to the 775 (See **MB** Dec.'76 and Aug.'78). This was the first bit of good news, as I have found these systems well made in all respects. In fact, my first question, upon learning that an MRC FM system was to be available soon, was "Are you going to use the same metal open gimbals as in the 775?" . . . the gimbals being one of my favorite features of this system. They did, and again the reader is referred to the previous article on this subject.

My 776-FM is a pre-production prototype, and a few changes will doubtlessly occur before it is produced in quantity. I would expect a different colored or finished case, to differentiate it from its AM cousin.

The one external, readily noticeable difference in the FM system is the servos. MRC has opted to include its

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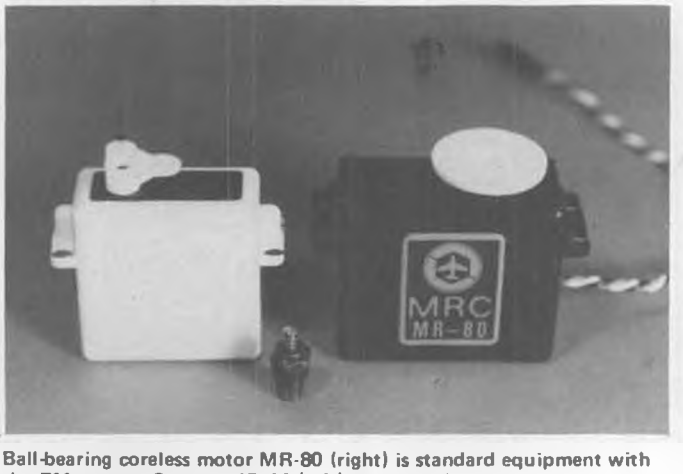


Ball-bearing coreless motor MR-80 (right) is standard equipment with the FM system. Smaller MR-60 (left) also available.

Receiver size comparison. FM unit is wider but no deeper or longer. MRC 776-FM system will cost about $450.

FAMOUS R/C AIRCRAFT..... NO. 3 'MAC'S ROBOT'

By FRAN McELWEE . . . Third installment of our "Famous R/C Aircraft" series, the "Robot" started many an early R/Cer on his way, including our editorial assistant, Eloy Marez. It's still a nice trainer/sport design.

• This rudder-only single channel model was presented in the September 1951 issue of *Air Trails* as an improved version of the "Radart", which was also published in A.T., in the April 1949 issue.

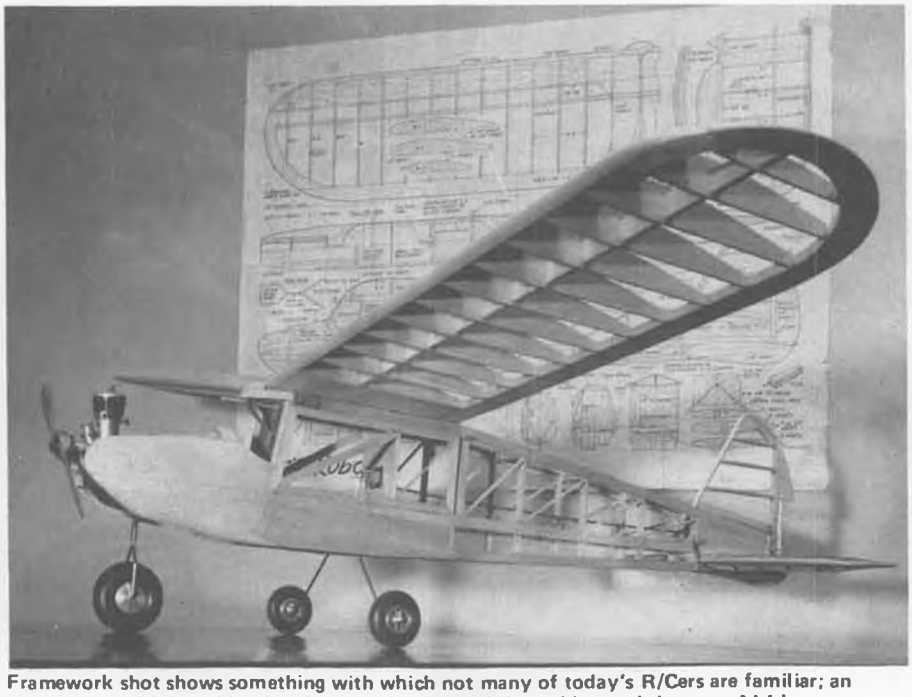
The design was an attempt to make a faster flying model than was usually seen at the meets of that time. This enabled the writer to win a few meets in the East, including the Mirror Meet and a second in the Navy Bombing event at the Dallas Nats in 1951.

It was rugged; the weakest point I remember was perhaps the nose gear, which would bend back due to the rudder-only type of landings. Without elevator control, there was no flair except on the occasional recovery from a turn before touching down. Built today, it would have a spring nose gear (steerable, of course), and with elevators the Robot could make beautiful landings.

A later Robot was built at that time, to be named the "Super Robot", naturally! It had a double cross-over torsion nose gear, still not steerable. Control was handled by a T.T.P.W. system, Walt Good's brain child. It controlled two English "Mighty Midget" electric motors for dual proportional rudder and elevator, and an escapement for two-speed motor control (high and low). Power was a Fox .35 Stunt engine fitted with an exhaust throttle. The ship had a semi-symmetrical airfoil and the fuse construction was changed. Sheet balsa was used instead of the crutch. This type of construction was popularized by Hal deBolt. No flight results were achieved, as it was demolished after several minutes of the first flight. It was the lead acid batteries made for a cigarette lighter that failed. The lead connection broke under vibration, and it did the ship in. That's an argument for not trying new things (the batteries) in a new ship!

One interesting event the Robot placed in was at the 1951 Nats at Dallas. There was an event sponsored by the Navy, called "Navy Bombing". Points were awarded for short field takeoff, bomb drop on target, and short landing.

I made a catapult out of a skein of rubber and anchored it in the expansion joint of the runway. The Robot was pulled into the air in 19 ft. However, my friend Cliff Schaible had a larger, lighter plane, and my sling got it off the ground in 9 ft. These were the only points scored in the contest. The late great, Jim Walker, was the only other contestant, and he scored zero points! Jim did a long, unassisted takeoff, and the bombs were dropped from too low an altitude. Jim won the regular event that year, and Cliff is now known for transistorized ignition and Old Timer Texaco event



Framework shot shows something with which not many of today's R/Cers are familiar; an escapement with its rubber band power. It operated the rudder, and that was ALL!

wins.

For this, Cliff and I won a trip on an aircraft carrier. The Navy flew us from N.J. to Pensacola and back.

That Robot had two receivers in it, controlling rudder on one frequency and two-speed engine control (escapement) and a time-delay bomb release on the other frequency. That Robot was the original one built (No.3). The next one (No.4) had the 465 MHz equipment put out by McNabb. The main difference was in locating the rear gear further forward for easier takeoffs.

While testing for the '51 Nats, I had a flight I'll never forget. I was flying No.4 and had a tumbling, ground-looping type of landing. The ship must have been but casually inspected, for on the next flight, I immediately saw difficulty.

The plane had a very slight left turn, and on the first application of right rudder, the stab was seen to rock to 45° to the fuselage. Evidently, the rubber bands holding it on had come off as a result from the previous landing, and now I believe one rubber band secured the stab to the fuse, this one going diagonally across the tail, as it was my practice to do.

The McCoy .19 Sportsman engine was running well on the Walker pressure tank. With careful taps of right rudder, the Robot gained great altitude, even though the elevator cocked up at every command. I don't believe any turns were done in the wind which held it back, so it hadn't gone too far upwind.

Anyway, of course, it finally happened. The ship got a little too far to the left of the wind and a longer right rudder command had to be held. The stab snapped up against the fuse and came off. The ship, now with no horizontal area and with the down-thrust built in, did about 1-1/2 outside loops and then fell into an inverted spiral. With the pressure fuel system, the engine didn't miss a beat.

Since it was at a great altitude, I had time to punch the microswitch and found that rudder control would stop the spiral. Now it went for quite some distance inverted, nose high in the air with the now up-thrust.

It fell into another inverted spiral, another stop and a plateau. As luck (not skill) would have it, the last inverted flight was at minimum altitude and it nosed down in high grass. Total damage was a broken prop!

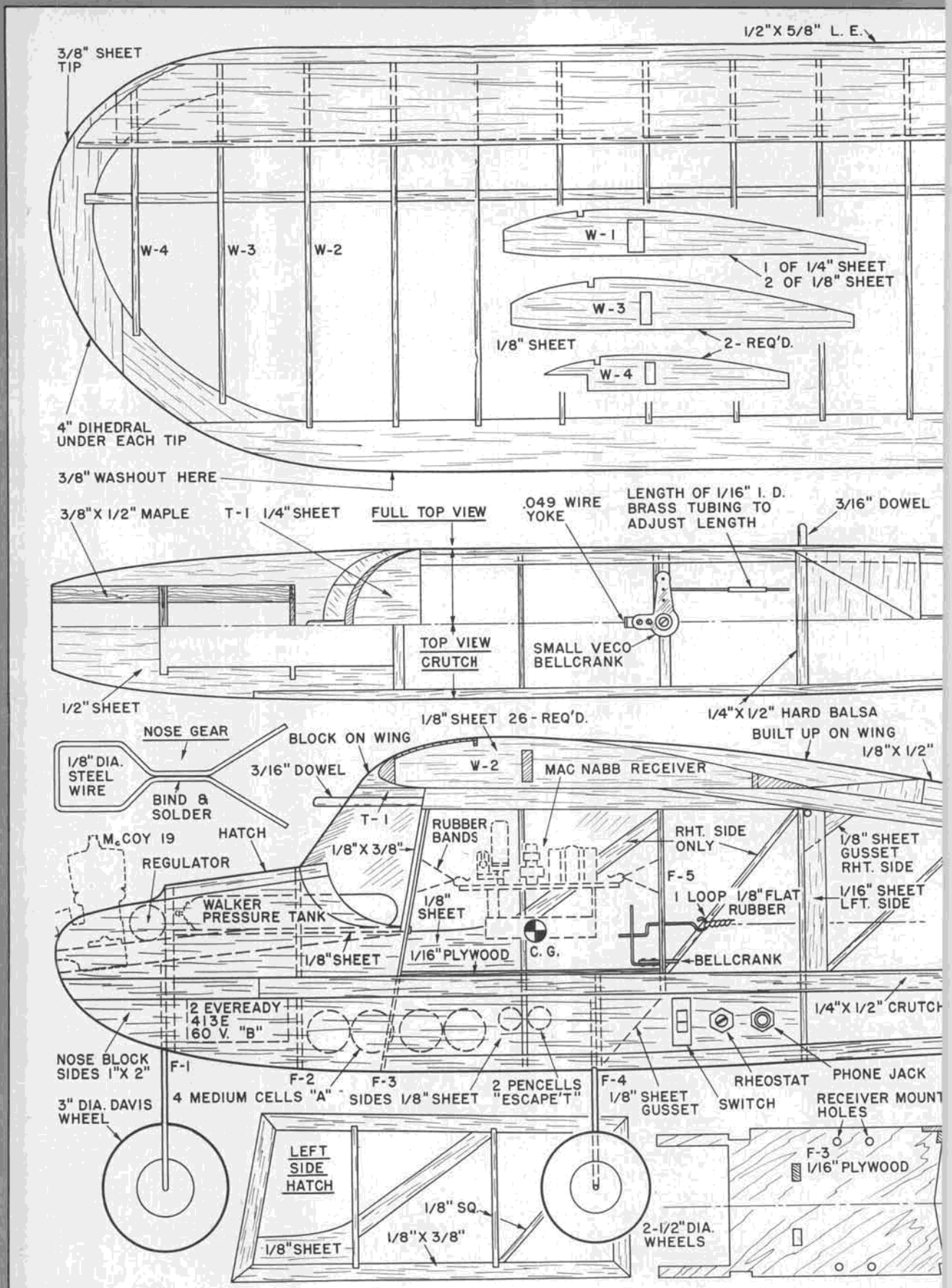
John Zaic, testing some free flights nearby, came over to inspect the "wreck". On seeing that only the prop was broken, he presented me with an English molded rubber prop with some remark like "No need to break that". The tail came down some distance downwind, and a friend chased and retrieved it for me. The Robot was soon airborne again.

The original lasted some seven years of a lot of flying, and the ship brings back many fond memories for me. •

Here is the author, about 1951, with (l to r): No. 4 Robot, No. 3 Robot, and the Radart, which was presented in the April 1949 issue of Air Trails. You're looking at real pioneer aircraft!

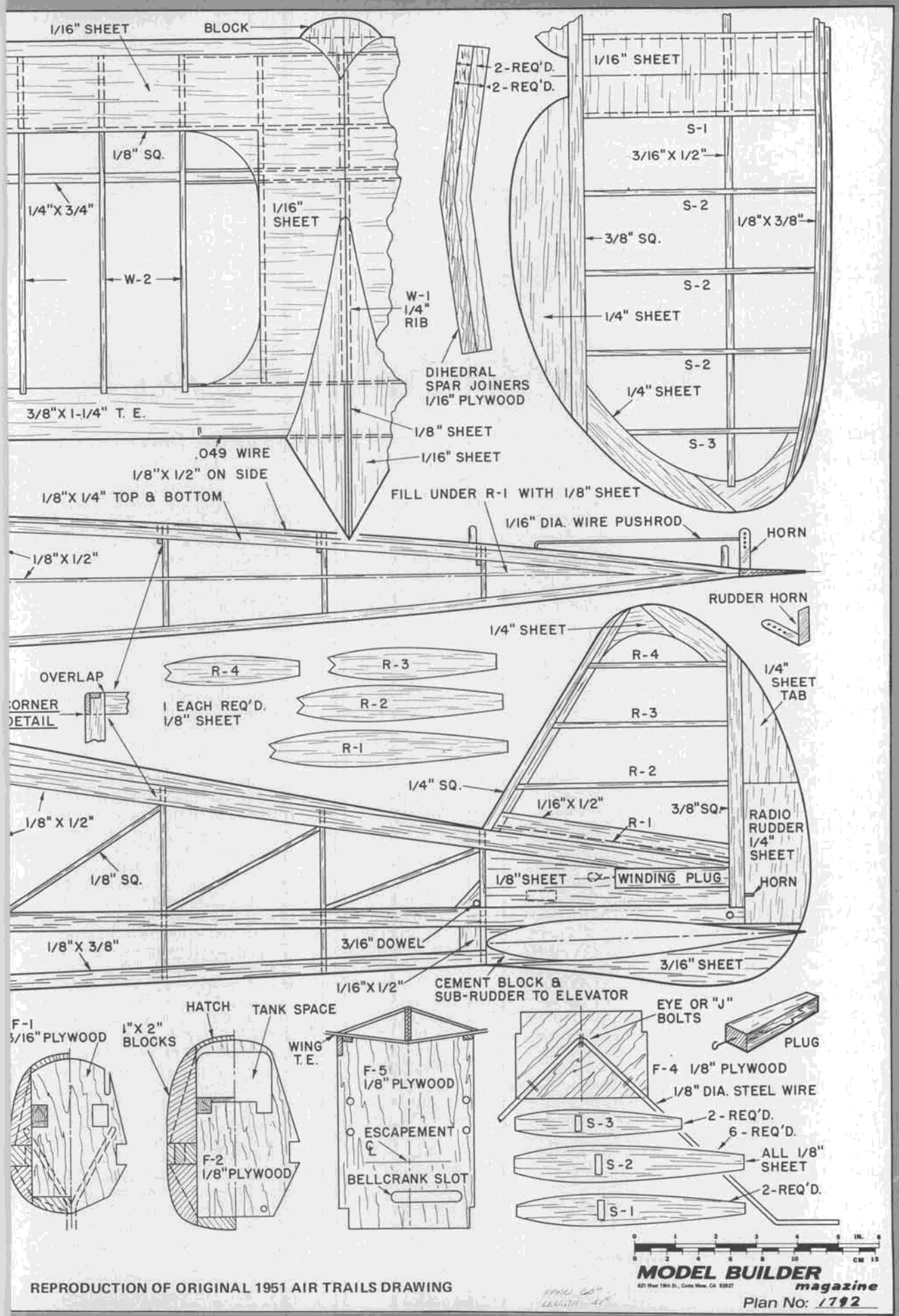
The Radart and Robot appeared to be fairly similar except for the landing gear. Nose wheel was always first thing to touch ground, even on better landings.

Partially completed model posed along with some of the elaborate testing equipment that was an important part of every R/Cer's collection in the early days.

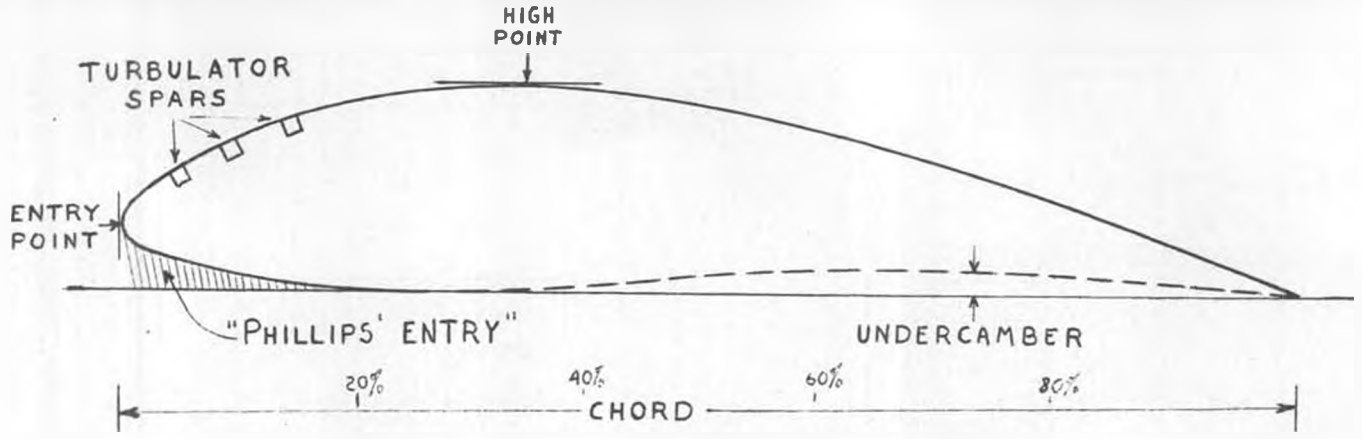


"Mac's Robot"

DESIGNED BY: FRAN McELWEE



REPRODUCTION OF ORIGINAL 1951 AIR TRAILS DRAWING



DESIGNING YOUR OWN SAILPLANE

By DAVE THORNBURG . . . Part One in a series on sailplane design for the do-it-yourselfer. This month's article discusses airfoils and what kind of performance to expect from them.

• So you're thinking about designing The Ultimate Sailplane. You've built and flown quite a few of the available kits, and you already have a good idea of what you want in the way of looks and handling. You know what size model (two-meter, standard, open) you need, and you're pretty well settled on the number of control functions it should have.

So you begin your engineering research.

You read *MODEL GLIDER DESIGN*, by Frank Zaic, and Eric Lister's *SAILPLANE DESIGNER'S HANDBOOK*. Suddenly your head is full of Drag Coefficients and Elliptical Span Loadings and Centers of Lateral Area. Your brain stalls, snaps, and fall off into a tight spin. The whole thing is just too complicated . . . you decide to take up golf, instead (Hit de ball, chase de ball, hit de ball again. . .).

Wait a minute, friend.

Life is always much simpler than any explanation of it. Besides, these two books, valuable though they are, are nothing more than *dictionaries of glider engineering*. They're not meant to be step-by-step instructions . . . they're for reference. When you sit down to write a letter, you don't read the whole dictionary first. You just scribble along until you get stuck, then you consult the dictionary . . . right? So put these two dictionaries back on the shelf, get out the doodling paper again, and let's get started on your dream.

First, a couple of simple rules. You won't find these rules in either of the two dictionaries listed above. Still, every designer I know uses them:

1) If it looks right, it probably is.
2) When in doubt, copy.

What these two rules do is tie you to the mainstream of glider evolution, keep you from wandering too far off into left field. The biplane canard, for example, hasn't *looked right* to designers since about 1910, so it's probably safe to say "forget biplane canards . . . try something that looks a little more like an Aquila or a Windrifter."

And don't be discouraged if the first few planes you draw look *too much* like Aquilas or Windrifters, or whatever you're currently flying. This is perfectly normal. Bud Grover and Dave Shadel showed up at the 1974 SOAR Nats with a pair of standard-class ships they called "Finalists". Bud had designed them, and Bud's favorite airplane was the Windfree. Although the Finalist had over 700 square inches of wing (the Windfree has 555), the family resemblance was so strong that Bud and Dave spent all three days trying to explain to everyone that they were flying *original designs*, not just tricked-out Windfrees. Both fliers later quit soaring and went to power, "so the motor noise would drown out people's stupid questions."

The same thing happened to Greg Cook at the FAI Semi-finals in Los Angeles this year. He flew his 121-inch Alcor, with 1176 square inches of wing (and a max loading of over 18 ounces per square foot!) for the entire first day, with everyone calling it an Aquila. Admittedly, the Alcor does look like an Aquila, in exactly the same way that the Taylorcraft looks like the J-3 Cub. But, just like the Cub and the T-craft, the big difference is in the airfoil.

Because airfoil IS design. Airfoil and wing loading determine most of the important performance characteristics of a sailplane . . . everything else is, to a great extent, mere cosmetics. So the first thing you need to do is designing your dream-soarer is to settle on an airfoil section.

Let's look at some of the possibilities.

For years, our model soaring airfoils were undercambered. Wing loadings were low, glide speeds were slow, and soaring was considered to be pretty much a fair-weather sport (If the wind blew too hard the gliders tended to disappear backwards over the horizon, so most pilots stayed home and daydreamed whenever the weather wasn't reasonably calm. Besides, everyone "knew" that thermals only come out on warm, calm days. . .).

The most popular airfoil in these days (and up 'til around 1968 or '70) was the NACA 6409. Skinnier than the 6412 and most of the Gottingen sections from Germany, the 6409 still had enough thickness to accommodate a nice deep spar or two. This airfoil was immortalized on the old Olympic 99, a kit that many of today's soaring pilots who consider themselves "old hands", learned to fly on.

In the late sixties, a couple of decided improvements on the venerable old 6409 chattered out of the computers of Professor Dr. Richard Eppler of Germany: the Eppler 385, and the slightly thinner E-387. Both airfoils had sharper noses and longer Phillips entries than the NACA series, characteristics which seemed to improve their speed range. They were reputed to be the first airfoils specifically generated for *model* use; up until then, our airfoils were mostly hand-me-downs from full-scale engineering.

The "Kurwi 68" design, imported from Germany by Windspiel Models until the kit went out of production in 1973, was perhaps the ultimate undercambered soarer; it used the 387 on a long, tapered, very high aspect ratio wing that just seemed to fly and fly and fly.

So if your dream is a large, light, dignified, fair-weather floater, and you don't object to the covering problems associated with undercambered airfoils, then the 6409 or one of the Epplers is still not a bad choice, especially if you want to recreate the Thirties look with maybe a semi-scale Minimoa or Rhonsperber or Slingsby Gull. Just keep in mind that all deeply-undercambered airfoils get

really doggy as the wing aspect ratio goes down, so try to keep your AR up to at least 12:1 for both the 6409 and the E-385 (Aspect ratio, remember, is a measure of the "stubbiness" of a wing. It's found by dividing the average chord into the wingspan. Thus, the AR for the old Olympic 99, with its 8-inch chord, was 99 divided by 8 = 12.38)

But the winds of change continued to blow, especially on contest days, and the undercamber era was doomed. The two airplanes that did the most to flatten the bottom of America's airfoils were the Graupner "Cirrus" and "Cumulus". Imported from Germany, where ridge-soaring is far more popular (and practical) than flatland thermalling, these two designs introduced U.S. modelers to an idea that full-scale designers had stumbled onto some fifteen years earlier: *the only thing more important than minimum sink is maximum go.*

The Cirrus and the Cumulus, with their simple, flat-bottomed 12% airfoils and their absurdly heavy wing loadings (the Cirrus was around 9.5 ounces per square foot, the Cumulus almost 11) won contest after contest. They could fly when the wind blew. They could even fly *upwind* when the wind blew . . . they seemed always able to penetrate out to wherever the lift was at the moment. And when the lift went weak, they might have to circle faster and wider than the lighter ships, but they didn't seem to fall through much quicker than the planes with undercamber. They ruled the skies.

The "Cirrus-type" airfoil still appears in kits and magazine plans today, and it undoubtedly will for years to come. The Aquila, Legionaire, Monterey, Olympic II, Paragon, Southern Kite, Windfree, and Windrifter all use some variation of the flat-bottomed "Cirrus-type" airfoil. This type of section is often referred to as a "Clark Y," although the real Clark Y has a much higher entry-point and a Phillips entry extending back to 20% chord. Most modelers leave out this long entry, for ease of building. (Take the Phillips entry out of the Clark Y, and what you wind up with is very close to the USA 35b.)

Many people feel that this type of airfoil is the best all-around choice for the scratch builder. It certainly is readily available . . . you can copy some variation of it from almost any kit or plan in circulation today. It's easy to build: a 12% thick wing takes a lot less engineering than a 6% thick wing does. And the center of pressure is relatively stable (compared to undercambered airfoils), so you don't have to worry as much about properly-designed stabilizers as you might otherwise.

But . . . and this may not be important to you . . . the Cirrus-type airfoil won't take you any place that folks haven't already been. The simple flat-bottom has been pretty near stretched to its limits already. Here are those limits:

THE SAN FERNANDO SCHOOL OF TURBULATED TWELVE-PERCENTS

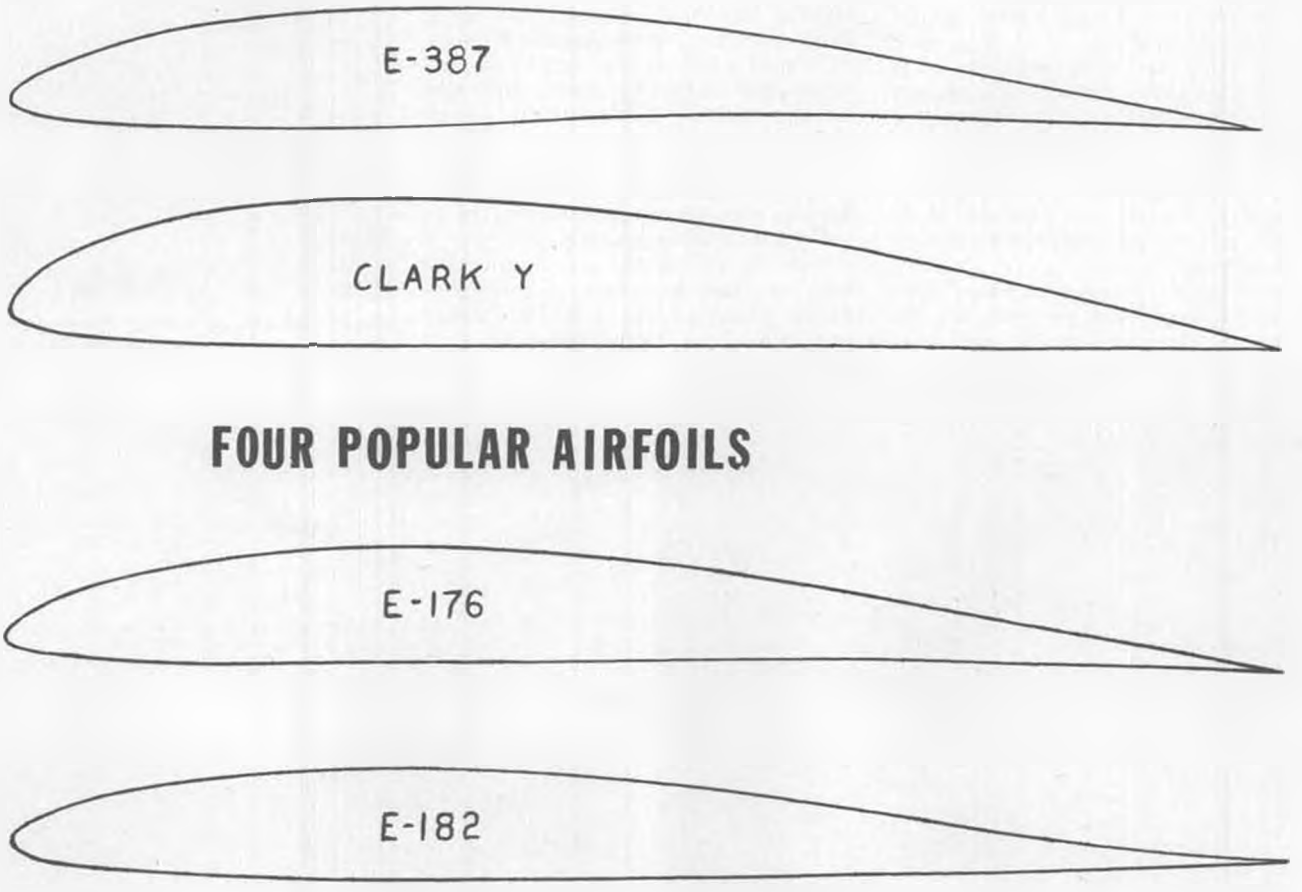
This school includes Ed Slobod's amazing little 72-inch Pierce Arrow, which started it all; Tom Williams' Windrifter, the plane that taught Rick Pearson how to win contests, so he could teach the rest of us; the Pierce 970 and its big brother, the Paragon; the 150-inch Sailaire and the new flat-bottom Viking.

All these airplanes fly well under normal conditions. They penetrate reasonably well at light loadings, they slow down so easily that spoilers are hardly necessary, and they can carry the needed ballast for high winds or speed runs without clapping their wings or falling out of the sky. They tow exceedingly well (meaning *exceedingly high*). They're good, all-around performers, and they will be winning the boring, simple-minded, duration-plus-landing contests we Americans are addicted to for years to come.

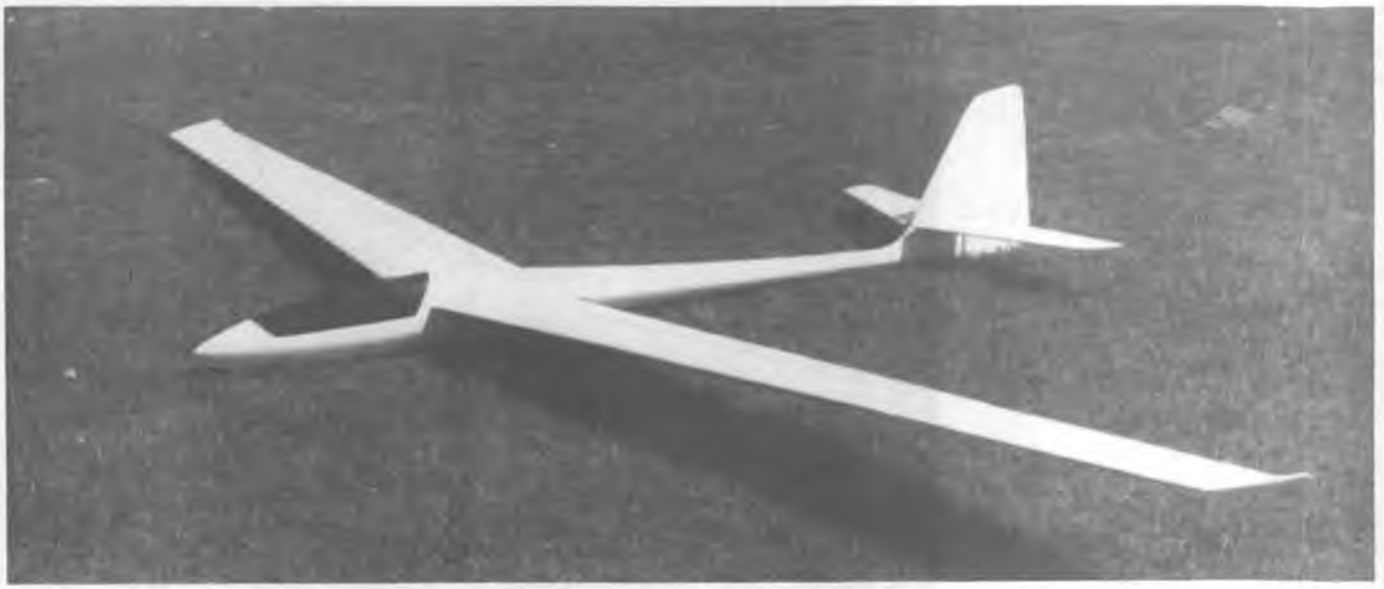
One of this school's recent variations is the 12% turbulated flat-bottom with heavy Phillips entry. Blaine Rawdon's Mirage is an example, as well as the semi-symmetrical Viking that put Terry Koplan on the American FAI team. If you're looking for a bit more top-end speed out of your floater, you might want to explore this variation; plans for both designs are currently available.

THE DALLAS SCHOOL OF SMOOTH 8% FLATBOTTOMS

Continued on page 105



The airfoils shown here are all currently in use on model sailplanes, here and abroad. Note that three of them are Epplers . . . part of a series of airfoils developed especially for R/C soaring by Prof. Richard Eppler of Germany.



One of the three high-performance models from England's Solent Sailplanes is the Ridge Rover, shown above with the standard 104-inch wings; the model also has plug-in wing tips that increase the span to 151 inches. Kit features glass fuselage, pre-built wings and tail surfaces.

R/C SOARING

by Dr. LARRY FOGEL

PHOTOS BY AUTHOR

Dave Jones with his 2-meter version on the Raven flying wing, which he also designed.

• Let's look at the latest crop of R/C sailplanes! Three kits that span the gamut come from England. Solent Sailplanes (10 & 11 Carlton Place, Southampton, England, telephone 0703-31420) now offers the Ridge Racer, Ridge Rover, and Royalist.

The Ridge Racer, designed by Tony Baker, is just that . . . a sleek slope soarer of 74-inch wingspan with 650 square inches lifting 2-1/2 to 3-1/2 pounds (9 to 12.5 ounces per square foot wing loading). For racing, you can add up to 5 pounds of ballast and operate at 21 ounces per square foot. Then this bird really moves.

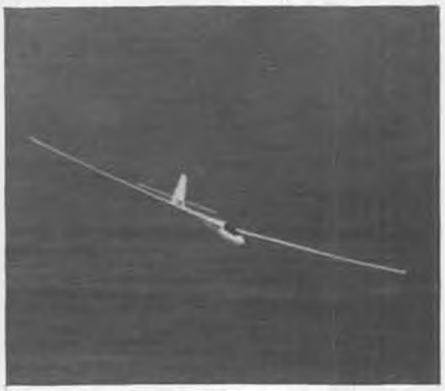
The Royalist, designed by Mike Trew, represents the other extreme. It's designed for thermal soaring and cross-country events. Here the 175-inch span of 25:1 aspect ratio carries 6-1/2 pounds and operates at 11 ounces per square foot. This plane can be ballasted to 10 pounds for cross-country flying (20 ounces per square foot). The wing benefits from all three worlds: the root section is a Wortmann airfoil, the intermediate section is Eppler, while the tip is an NACA section. Full-length flaperons provide more than adequate maneuverability. The fuselage comes pre-finished in fiberglass with the rudder and elevator hinges built into the T-tail. It's truly an impressive bird.

Then there's a clever compromise between these extremes . . . the Ridge Rover. Designed jointly by Tony Baker and Mike Trew, this sailplane offers a

Dave Jones launching his Raven 2M. Model was designed for 2-Meter events. Plans are available from Dave; see text.

Gliding in for a landing. Raven 2M can be built to FAI minimum wing loading. Photo taken at SULA club field.

Radio installation in Murph Misiewicz' Ridge Rover. Five servos control elevators, rudder, flaperons (2 servos), and releasable towhook. Flight shots at right.



The ultimate in small R/C models! Well, almost. Frank Cox is only faking the R/C launch of a North Pacific "Chuck'R" F/F glider. Got a laugh, anyway!

unique feature . . . plug-in wingtips which convert a slope ship into a thermal machine. In the short-wing version (aspect ratio of 14:1), the 104-inch span carries 4.4 pounds with 5.3 square feet of wing area, for a wing loading of 13 ounces per square foot. With the plug-in tips in place, the aspect ratio is increased to 21:1, bringing the span to 151 inches. The weight is then 4-3/4 pounds, the area is 7-1/4 square feet, and the wing loading goes down to 10 ounces per square foot.

Here again, the fuselage comes prefinished in white fiberglass. The wings are foam already covered with obechi wood. All the required linkage is provided in this ARF kit. Your task is simply to cut out and mount the ailerons, which become flaperons through an electronic mixer (provided as part of the kit), and to mount the wings on the fuse. Throughout, the material is of high quality, but this kit is not for the beginner. Remember that precision is required in properly spotting the wing mounting holes, or you'll end up with a flying corkscrew.

Murph Misiewicz, of Encinitas, undertook this project and, as expected, produced a superb-looking craft. Five servos were used to control rudder, elevator, flaperons, and the releasable towhook. Monokote covers the fully-sheeted wings, making these match the smooth texture of the fuselage. The swept wings are held in place by four Graupner retainers, an excellent choice in that they never let the wings shift in flight, yet offer longitudinal flexibility on landing (assisted by the thin vertical rectangular steel wing wire).

All in all it's a fine design. I've now flown this bird in both configurations inland and quite extensively at Torrey Pines. In the aerobatic configuration, it performs slow rolls in a majestic fashion. It has the kind of inertia required for carrying through complicated maneuvers. With short wings in place, the rudder provides far more yaw than when the wings are extended. In the thermal configuration, you can turn using only rudder or ailerons, but it's far

Bert Glibbery's homemade transmitter measures the force exerted on the stationary control stick, moves servos accordingly.

better to use both sticks and make coordinated turns. This takes a bit of practice, but it's worth it. If you want to see some crazy maneuvers and lose energy fast, try crossing the controls either way. That is, right rudder and left aileron, or the reverse.

In any case, flaperons are particularly valuable. It's nice to be able to undercamber the airfoil in flight and still have full aileron authority. This way, you can

John Lupperger, of Riverside, and his modified Beaver. John took out the dihedral and added ailerons. These little ships really perform on only two channels.

cope with light lift or, if there's need for speed, you can reflex the airfoil and whisk through the sky. You drop the flaps in final approach. This slows the bird, and steepens the descent. The result is a gentle landing with ground track of a foot or two. I highly recommend the Ridge Rover to all those who want a fine, flexible flier . . . it's a "plane for all seasons". By the way, Windspiel Models (Rt. 3, Box 457, Coeur d'Alene, Idaho 83814) handles the Ridge Racer, Royalist, and Ridge Rover kits. Why not call (208) 664-6894 for details?

You may remember the Raven . . . a thermal flying wing designed by Dave Jones, of Los Angeles. Well, plans for a scaled-down version of the Raven are now available for two-meter competition; hence the name Raven 2M. This sailplane can be built to the FAI minimum loading and flies well at five ounces per square foot. According to Dave, "The flat-bottom wing version of this craft is slightly less buoyant but more stable; that is, it has a wider range available for the center of gravity. Even with the low wing loading, the Raven 2M penetrates like an eight ounce per square foot tailed model." It's important to remember that some area of any flying wing serves as the stabilizer, so that the effective wing loading is actually higher than that usually quoted. In any case, I've owned and flown the Raven and it was indeed a pleasure. I'm sure the Raven 2M will be an equal joy.

Rumor has it that Rick Pearson is readying a two-piece wing version of this sailplane for competition, including ballast tubes in the wing to give it a greater speed range. This new flying wing should be more maneuverable than the original Raven. It is suitable for slope flying in low and moderate winds. According to Dave, it can perform all the normal rudder/elevator maneuvers including inverted flight. You can obtain

John's Beaver in flight. Model appears to have a flat-bottom airfoil.

a copy of the plans for this new bird directly from Western Plan Service for $5.00 postpaid (5621 Michelle Drive, Torrance, CA 90503).

John Lupperger of Riverside admired the Beaver, but decided to make it even more aerobatic. He reduced the dihedral and added ailerons. The small span makes the bird appear fast. What's more, it really *is* fast. And now it's fully aerobatic as well.

Also on the small end of the spectrum is an unnamed creation by Ron Fikes, of Palo Alto. This 31-inch span V-tailed sailplane is scratch-built around foam wings and operates with ailerons and elevator, and is balanced near the edge of stability. It zips through the sky performing wild maneuvers. You ought to see this one snap-roll!

Bert Glibbery, of San Diego, is an electronics engineer. He decided to try modifying the transmitter to make it force sensitive (rather than displacement sensitive). This was accomplished by incorporating strain gauges into the control stick. These measure the amount of pressure you exert on this stiff stick. The plane behaves accordingly. At first it feels strange, but with a little practice,

Continued on page 106

Another miniature aerobatic slope soarer, this one by Ron Fikes, of Palo Alto. The 31-inch span wing uses a foam core. Model features an unusual underslung sub-rudder.

Contest Director Horace Hagen conducting the pilot's meeting prior to the start of official flying.

Ron Barker picks up his trophy for 1st place in Expert from CD Hagen. Ron flew a Rev-Olution II with an HB .61.

PHOTOS BY PAUL BARTOLI

EAST COAST • R/C HELICOPTER • CHAMPIONSHIPS

By HORACE HAGEN . . . Drawing a total of 27 contestants in three categories, this was the first East Coast R/C Helicopter Championships that had decent flying weather . . . and then just barely!

• The date for this year's contest was chosen with the help of the 1978 Farmers Almanac, in the hope that the weather might be better than that encountered during the first two contests. The CD had an alterior motive, in that the blame for bad weather could now be placed on the Almanac. The Sunday in the month of August that looked the most promising was the 20th.

The Farmers Almanac was not receiving much praise on the morning of the contest because of the heavy overcast, but for once we had no rain nor high winds. Most of the contestants had arrived by 10:00 a.m., and after a short pilots' briefing, the contest got under way. There was some hesitancy on the part of some of the helicopter pilots to enter the contest. A few did not enter until about halfway into the first round of competition. This was probably due to a combination of not wanting to be the first contestant to be called to fly, and also wanting to wait and see what the competition had in store.

The first round of competition was flown on a single flight line because it was felt that most pilots prefer to hear their engines in flight and prefer to watch their opponents fly. However, at the end of the first round (the first round took almost 3 hours to complete), it became quite clear that in order to complete 3 rounds of competition, a second flight line would have to be opened. The manpower and equipment required to do so was readied. The CD requested a show of hands from the contestants who favored opening a second flight line. Since no hands were raised, only two rounds of competition on a single flight line were flown, and the final score was determined by the single best flight.

EXPERT				
1)	Ron Barker	Rev-Olution II RH	HB .61 PDP	Futaba
2)	Ralph Dalusio	Heli-Boy	Webra .61 FRS	Variant
3)	Faye Peoples	Homebuilt	S.T. .60	Kraft
4)	Larry Davidson	Heli-Boy	HP .61 SS	Kraft SS
5)	Tom Knerr	Heli-Boy	YS .60	S & O
INTERMEDIATE				
1)	Wally Rodriguez	Heli-Baby	O.S. .45H	Kraft
2)	Ed Thielemann	Jet Ranger	HP .61 SS	Kraft
3)	Les Stone	Rev-Olution I	O.S. .45H	Kraft
4)	Ron Palmer	Rev-Olution II RH	Webra .61 FRS	Futaba
NOVICE				
1)	Larry Smith	Heli-Boy	YS .60	ProLine
2)	Wash Martin	Jet Ranger	Webra .61 FRS	Kraft
3)	Joe Kinsey	Rev-Olution I	K&B .40	ProLine
4)	Steve Habershaw	Jet Ranger	Webra .61 FRS	Kraft
5)	Tom Unger	Shark 60	O.S. .60 FSR	Kraft

As in each of the previous contests, there was an increase in the number of entries. The Novice, Intermediate and Expert classes had 18, 4, and 5 entries respectively.

Some significant developments have taken place since last year's contest. One totally new helicopter kit and one highly modified helicopter kit were introduced. With these machines, maneuvers

Continued on page 95

Pete Smith flew his Alouette II in Novice, along with 17 other pilots.

Lenny Labella (left) and Ed Thielemann demonstrate proper and safe starting procedure for Jet Ranger.

Few pilots of the Depression era could afford a Stearman 4D with a price tag of $12,000. This one was sold to Bob King, of Los Angeles, on May 20, 1930. The airplane was later converted to a 4E.

STEARMAN 4E

PART TWO
(Conclusion)
by PETER WESTBURG

● The Stearman 4's were originally big fun airplanes, but not many pilots in the dire days of the Depression could afford the $12,000 price tag. Most were sold to business firms and as mailplanes. The Bull Stearman was a big airplane, grossing out at close to two tons as it started its takeoff run. The 300-hp engines were approximately 45-1/2 inches in diameter; the big Wasp Sr. had a diameter of 51-1/2 inches. The fuselage behind the big round mills was faired to slab sides, but there was plenty of room for two passengers up front.

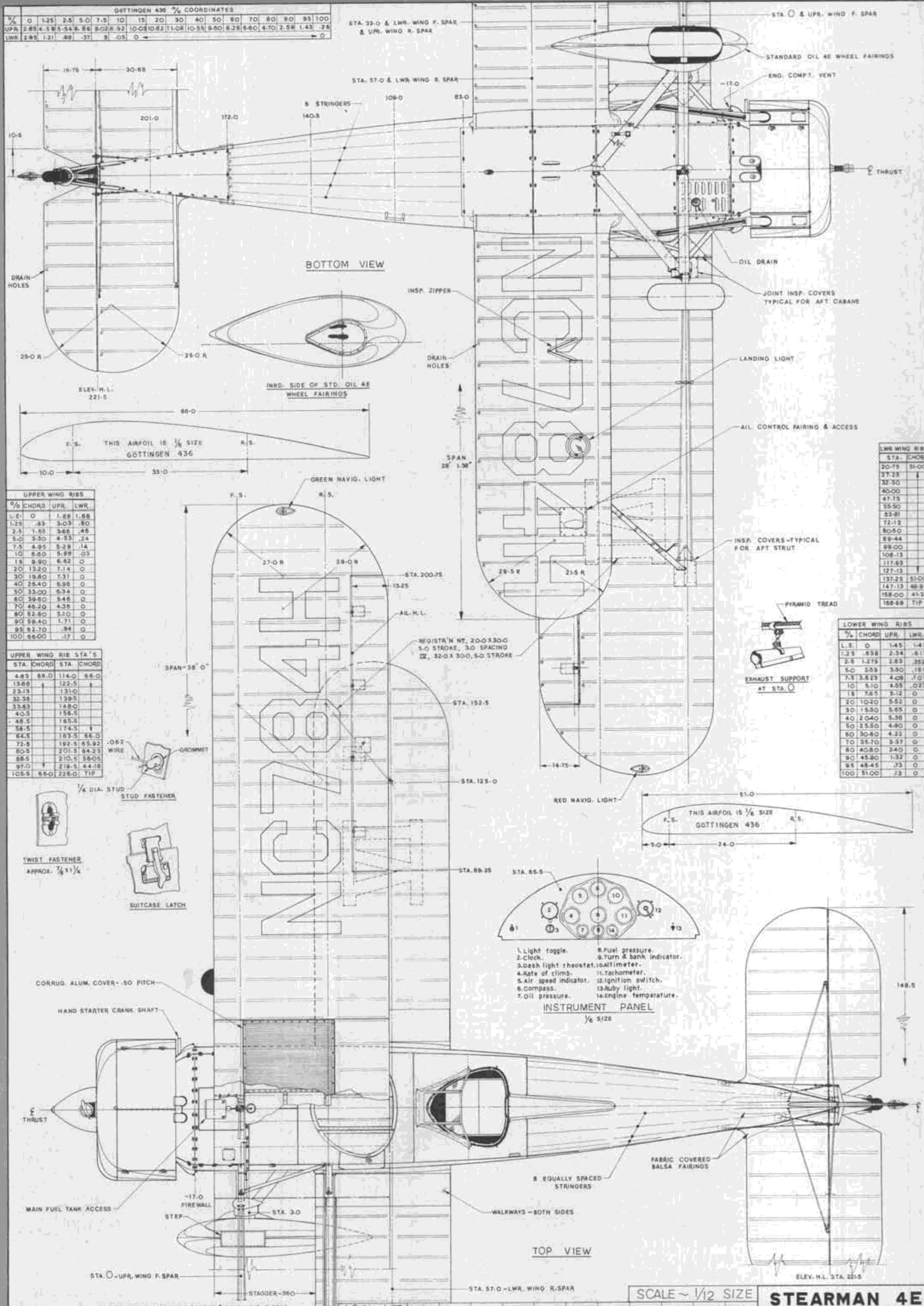
A good way to tell a 4C from the others is by comparing the exhaust systems; the Wright J-6 had an exhaust collector ring which formed the leading edge of the NACA cowl. On the Pratt & Whitney powered versions, the twin exhausts emerged from holes on each side of the cowl near the trailing edge. The Wasp Jr. had a rectangular carburetor air scoop and oil cooler under the cowl, while the Wasp Sr. had two carb air scoops above the cowl.

The most colorful of the Stearman 4's were the three flown by Standard Oil of California. They were Standard Chevron gas station red on the top surface of the upper wing, top and bottom of the fuselage, fin, rudder, and part of the wheel fairings. The center stripes on the fuselage and wheel pants were Chevron blue, and the rest of the airplane was aluminized dope. Stock Model 4's were finished in various colors and patterns, a black fuselage and yellow wings common on many airplanes, including the Canadian Airways mailplanes.

It rains hard in Wichita, Kansas. It rains so #&@¢*! hard that the Arkansas River overflows. That is why there are no authentic engineering drawings of the Stearman 4's, or any other Stearman

CF-ASF was one of several 4EM's purchased by Canadian Airways. Engine was a 420-450 hp P&W Wasp Sr. Mail container was a cylindrical can in the front cockpit.

This is the same airplane pictured at the bottom of p. 44 in last month's article, but before the wheel pants were painted and cowl lettered. One of the sexiest bipes of all time.



GÖTTINGEN 436 % COORDINATES

%	0	1.25	2.5	5.0	7.5	10	15	20	30	40	50	60	70	80	90	95	100
UPR.	2.85	4.59	5.54	6.86	8.02	8.92	10.03	10.82	11.08	10.55	9.60	8.26	6.60	4.70	2.59	1.43	.26
LWR.	2.85	1.21	.69	.37	.5	.05	0 →										→ 0

UPPER WING RIBS

%	CHORD	UPR.	LWR.
L.E.	0	1.88	1.88
1.25	.83	3.03	.80
2.5	1.65	3.66	.46
5.0	3.30	4.53	.24
7.5	4.95	5.29	.14
10	6.60	5.89	.03
15	9.90	6.62	0
20	13.20	7.14	0
30	19.80	7.31	0
40	26.40	6.96	0
50	33.00	6.34	0
60	39.60	5.46	0
70	46.20	4.36	0
80	52.80	3.10	0
90	59.40	1.71	0
95	62.70	.94	0
100	66.00	.17	0

UPPER WING RIB STA'S

STA.	CHORD	STA.	CHORD
4.83	66.0	114.0	66.0
13.88	↑	122.5	↑
23.13		131.0	
32.38		139.5	
33.63		148.0	
40.5		156.5	
48.5		165.5	
56.5		174.5	↓
64.5		183.5	66.0
72.5		192.5	65.92
80.5		201.5	64.23
88.5		210.5	58.05
97.0	↓	219.5	44.18
105.5	66.0	228.0	TIP

LWR. WING RIBS

STA.	CHORD
20.75	51.00
27.25	↑
32.50	
40.00	
47.75	
55.50	
63.81	
72.13	
80.50	
89.44	
99.00	
108.13	
117.63	
127.13	↓
137.25	51.00
147.13	49.91
158.00	41.31
168.69	TIP

LOWER WING RIBS

%	CHORD	UPR.	LWR.
L.E.	0	1.45	1.45
1.25	.638	2.34	.617
2.5	1.275	2.83	.352
5.0	2.55	3.50	.189
7.5	3.825	4.09	.107
10	5.10	4.55	.023
15	7.65	5.12	0
20	10.20	5.52	0
30	15.30	5.65	0
40	20.40	5.38	0
50	25.50	4.90	0
60	30.60	4.22	0
70	35.70	3.37	0
80	40.80	2.40	0
90	45.90	1.32	0
95	48.45	.73	0
100	51.00	.13	0

Beautiful! This is the one Stearman 4E bought by Standard Oil of Louisiana. Color scheme is not known. As of December, 1975, this airplane is supposedly being restored by the Antique Airplane Association.

prior to the PT-13. All original drawings of those aircraft were stored safely in a basement of the Stearman factory, and all were totally ruined by a flood. There is almost no honest-to-God good data on the airplanes, not even in the files of the Federal Aviation Administration, which is supposed to have prints of all certified airplanes.

I was able to obtain, through the generosity of Boeing/Wichita, a report on the 4CM with a fairly good front and side view, and many excellent photos via Walt House of Boeing/Wichita. Mr. A.J. Shortt, Asst. Curator of the National Museum of Science and Technology, Ottawa, Canada, made careful measurements of the 4E in the museum; and many photos of the same airplane were furnished by Jack Vanderveer of Schenectady, N.Y. Without their help, the drawings of the Bull Stearman could not have been made. •

NC783H was the first 4E delivered to Standard Oil of California. Color scheme was red upper and lower fuselage and upper surface of top wing, blue fuselage stripe.

Five used Stearman 4D's were bought by the Tennessee Valley Authority for use as malaria control dusters. NR563Y was originally NC563Y and bought by the Texas Co., New York. Propeller driven device on lower wing is a battery charger.

One of American Airway's 4CM's was modified to take an inverted Ranger V-12 of 420 hp. Airplane was designated 4RM-1.

R/C FORUM with

Hal deBolt

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

Mail in your questions or concerns.

• We all pick up a lot of information and learn new things at the flying field, that is the place in many cases where we get our advice. We often think that it is the best place for advice, as in many cases, we can see what is advised being demonstrated for us. Somehow, seeing is believing. More often than not, when a rank beginner goes for a purchase at the hobby shop, he will tell the clerk to give him "so and so" because Joe at the field recommended it. Usually, the beginner could not do better, at least the advisor at the field is active in R/C and probably has experience with the product which he suggests. If not that, he will at least have something to compare with other types or brands that he may have had in mind. You could do a lot worse than to ask for advice at a flying field. . .

Flying fields also promote "bull sessions", and from these you can often learn how much or how little the fliers know about the intricacies of the equipment they use. As we all know, the "bull sessions" are where you expound upon the facets which you know best, and if you make an impression, then a little of your ego is satisfied! I never attended a bull session that wasn't interesting, and a guy can only lose if he walks away from one. Occasionally, the talk will take another tact and we will find something which no one in the group understands.

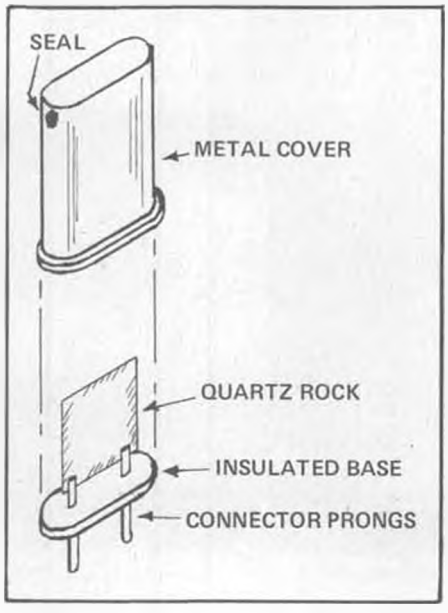
Just such a tact was taken in a recent session, and as the question was one which is often heard in other places, perhaps some light should be shed on it. One of the group had recently had a "hard landing" after which his receiver was dead. On examination, the technician had told him that his crystal was bad, put in a new one, charged him a good buck, and he was in business again. Everyone in the group knew that this was a common failure, knew that the receiver and even the transmitter had to have one. Most knew that somehow the crystal controlled the frequency of the system, and if you wished to change frequency, you had to change crystals in some manner. One member suggested that all he had to do was change a "module" in his system to change frequency. Another figured he had it better yet, all he had to do was flip two switches.

One of the more experienced in the group was quick to point out that with either method, you were in effect changing crystals.

What in reality did each of these two R/Cers do? When the "modules" were changed, either just the oscillator section of the RF generator or the entire RF generator was changed to the new frequency. RF means radio frequency, of course. RF being the base upon which we transmit all of our coding. The RF oscillator would be the portion of the RF generator which creates the transmitter frequency and responds to the frequency in the receiver.

By flipping the switches, the 2nd R/Cer simply disconnected one set of crystals and connected into the generator another set on a different frequency. One kibitzer in the session was quick to say that both the receiver and transmitter are "tuned" to the particular crystal in use. So, how could you change crystals without tuning? Normally you cannot, at least you cannot do it and have reliable operation. The system which uses the switches does not have the normal type of RF generator that has a very narrow band of frequencies to which it will respond. The switchable system has an RF oscillator which will respond to a broader range of frequencies. Usually these systems use two frequencies which are adjacent to each other to keep the response width as narrow as possible. Then to get optimum performance, they are tuned to a frequency which is halfway between those to be used. It all works fine, of course. Although the system is not operating at its maximum capability and is more susceptible to interference, it is most usable, as experience with it has shown. The real answer that the bull session seemed to be looking for was, how come the darn crystals are always failing? Then further talk indicated that many did not even know what one looked like and no one knew how they were made, what they were composed of, or how they worked.

When we know what something is, how it works and even why it is expensive, then we are usually satisfied and can use it more intelligently. In the case of the crystal this is also important, as the crystal is just about the single most expensive item in a radio. So, let's discuss the crystal as it is used in our equipment.



First back to basics for a moment. With R/C we create a radio wave at a very specific frequency. Then we change it into a tone (musical note) which is in turn at a specific frequency but much lower than the radio frequency. The second is an audio frequency and this can be generated at most any radio frequency. After this is done, we take the audio modulated radio frequency and digitalize it . . . break it up into short bursts by electronically turning it on and off. By varying the time on for these bursts, we can feed information which the servos will respond to, just as we would like them to.

Most radio equipment is variable in frequency. You change the frequency on your home radio to listen to different stations. An airline pilot has a number of different frequencies which he will tune to in flight to get the information which he needs. A favorite pastime of the ham radio operator is to scan the dial; go through a whole range of frequencies to find who is on the air.

When the FCC gave us permission to use radios for remote control, they very wisely, and for several reasons, specified that we should only operate on the frequencies which they allotted to us. The C.B. operators also have a similar restriction as an example of others who are so regulated. What makes us different from some other types of radio transmission is that they also specified that we must operate within a 5% range of the exact frequency in use.

When you consider that 72 megahertz, translated to 72 million times per second, that you must stay within 5% of this, and that a receiver's performance is only best when it is tuned to the EXACT frequency, then you can understand the problems our radio engineers and manufacturers had when this regulation was announced. As we now realize, the answer was to crystal control the frequency, and the crystal is only in our systems to keep us legal. Of course, in so doing, it prevents us from interfering with each other; at least as long as two of us don't try to use the same frequency!

Just to clarify a bit, so I will not get too many letters chastising me . . . you do not have to have a crystal controlled *receiver*. Your receiver can be frequency tunable. In fact the FCC does not regulate receivers . . . *anyone* can operate one. However, a crystal controlled receiver is the most reliable way to match to a given transmitter and all of our manufacturers take advantage of this fact.

Originally crystals were not generally available for the frequencies which the FCC allotted to us, in fact, the crystal manufacturers had very little experience making them for such high frequencies. Then, when we did get them, they were many times larger than what we have

Continued on page 110

GUADALAJARA OTRA VEZ!

PHOTOS BY AUTHOR

By ELOY MAREZ . . . High on the list of "must" R/C affairs for a growing number of modelers, this contest, in spite of having a number of competitive events, is still an all-out fun occasion. Think about it for next year.

Guadalajara, once again! There are contests every year that are musts for certain classes of fliers. Some are regional, such as the traditional North-South glider meet here in California, and some are of international interest as well as participation, such as the annual Bakersfield Formula One bash. There are countless fliers around whose building and contest plans revolve around one or more of these events.

For a growing group of us, when we make the year's plans, high on the list is Guadalajara in September. For those of us who've been there before, it isn't hard to explain why this is so, even though there are larger contests, more competitive events, contests nearer by, and even though it is something of a pain to crate and lug airplanes around on an airline.

One of the reasons we go back is to see many of our friends, most of whom we haven't seen since last September. And there are always new friends to be made; R/C is healthy and growing in Mexico. The friendliness and hospitality of the Mexican fliers and all connected with the contest are without a doubt the greatest we experience anywhere.

Another one of the reasons we all return is the city itself. Guadalajara . . . there is no other city quite like it anywhere. Its parks and plazas remind you of Spain. Its marketplace is one of the largest and most colorful in the world. It has big city excitement at a resort city's slow pace. It is an ideal place to vacation before or after the contest!

This year, otra vez . . . once again . . . the Club Aeromodelismo de Jalisco (Aeromodeling Club of the State of Jalisco) sponsored this annual 16th of September Independence (from Spain) Day event, for R/C gliders, Pattern in three classes, Formula One, and Open Pylon Racing.

Contest headquarters, the "El Tapatio" Hotel, has to be experienced to be believed. It is perfectly modern, yet without any of the sterility, the efficiency sans personality of some of the chain motels found in this country. It is built on a hill, with the entrance, office, and a few shops at the base, and the rest of the housing units built along a winding road that ends at the top, where the

The fliers from Texas (l to r): Don Downing, John Riggs, Max Blose, George Gauseware, Curly Rucker, and Jim Simmons.

Formula I winner Don Downing, with his Model Merchant Super Mustang, getting a hold from Leopold Leal of Logictrol de Mexico.

ProLine's Jerry Bonzo and Gaston Mathelin of Mexico City discuss modeling over some Guadelajara Kool-Aid.

Leopold Leal (left) and Miguel Medrano donated this "Revenger" pattern ship to Raul Aguilera, 1st in Novice.

Marcial Davila of Mexico City does the flying while Kraft's Marty Barry does the calling.

Eleven-year-old Gustavo Inman Jr. placed 3rd in Novice Pattern. Watch out, guys!

Hector Davila, originally from Honduras, now of Mexicali, flying in the Pattern event.

restaurants, bar, disco, play areas, and a swimming pool complete with swim-up bar are located. The rooms themselves are in buildings of various styles and sizes; little bungalows that either perch on the side or are dug into the hillside. We find it very attractive, and with the special rates that the club arranges for every year, not at all unreasonably priced.

We seldom eat lunch or dinner at the hotel, but breakfast is a treat. All you can eat . . . the buffet starts with fresh fruits, such as pineapple, watermelon, cantaloupe, papaya, goes through the breads, cereals, and juices, and ends with eggs, potatoes, refried beans, meats of three or four choices, and all the coffee, or whatever your morning beverage is, that you could want.

We sometimes think that this is part of the plan to defeat us, because after that kind of breakfast, who is going to be in any shape to do any serious flying?

In fact, the hospitality can be a real problem. For example, one of our friends in Mexico is also one of that country's most popular singers, a very talented young man named Victor Iturbe. Victor, or "Piruli", as he is affectionately known by his friends and fans, has a repertoire ranging from the

Luis Castaneda, of Puebla, taxis out his Webra .91-powered Akromaster. Will fly in Las Vegas Tournament of Champions.

Well-known singer Victor "Piruli" Iturbe and lady-type pylon flier Kathy Root with her entry in Open Pylon.

The big winners from the U.S. (standing, l to r): Max Blose, George Gauseware, Kathy Root, Don Downing. Front, l to r: Joe Bridi, Marty Barry, Eloy Marez.

The contingent from the Club de Modelismo, of the city of San Luis Potosi.

Too bad the Club de Aeromodelismo de Jalisco couldn't afford any trophies!

"Caramba! Turn *that* way, dummy!" Raul Aguilera points the way for Jesus Mata.

very old traditional romantic ballads to the faster, more modern music; his fans come in all types and ages.

Now, on this particular weekend, Piruli was there both for the contest, and professionally. He was the big attraction at one of the city's newest and most modern hotels, the "Aranzazu". Some of us were fortunate enough to be invited, which looked almost hopeless upon our arrival; reservations had disappeared weeks ago, and the place was full to bursting.

Yet, in the middle of the multitude, enough space magically appeared right in front of the stage to hold two small tables, and 14 model aficionados. During the show, the audience was treated to a few words about R/C modeling, an invitation to the contest, and we were all individually introduced and treated to a champagne toast.

After that, since it was almost on the way home anyway, we went to Garibaldi Plaza, the original home of Mexico's traditional "Mariachis", the strolling strings and brass musical groups that are so much a part of that country. This part of the city never sleeps, and for a while it

Continued on page 90

Joe Bridi and his new oatmeal bowl, for winning 1st in Expert Pattern. Jose Barrios, CAJ President, left, and his wife, right, make the award.

Marty Barry of Kraft, doing the only ten-point maneuver he managed all weekend.

PHOTOS BY AUTHOR

SAN DIEGO

DISTRICT 9 LABOR DAY POINTS RACE

By ELOY MAREZ

• The San Diego model boat basin, located in beautiful Mission Bay, on the outskirts of the city, is the home of the very active San Diego Argonauts. This was the site of the annual District 9 Labor Day points race, for which enthusiasts from all over Southern California gathered once again to pit their skills and craft against each other.

This is probably one of the nicest sites around; it is a sheltered basin, and is completely surrounded by thick green grass, trees, and there are facilities of all types nearby.

When the last wake subsided, the results were as follows:

A MONO

Joe Jusak

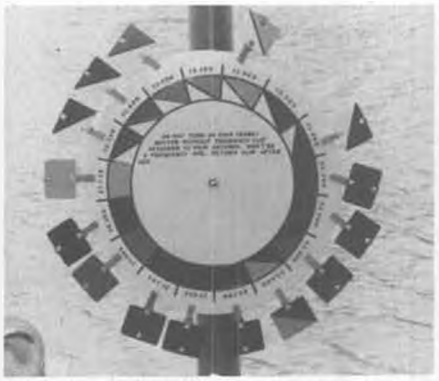
Continued on page 103

Ellie Tom, wife of K&B's Customer Service Manager, Bobby, with B&E Team boat.

John Brodbeck Sr. and Bobby Tom, caller, both of K&B. John won a 1st and 2nd.

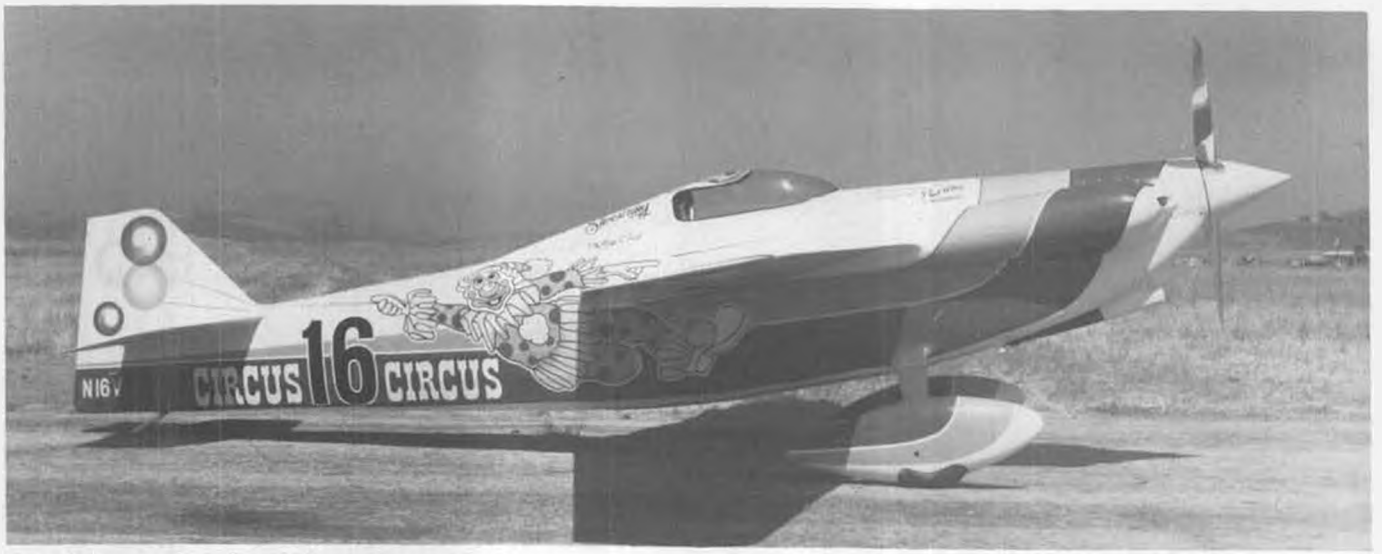
Beautifully painted Wardcraft "C" Mono by John Holland, of San Diego.

Latest design from George Campbell, designer of the Prather Deep-Vee and the Eaglet.



Very nice nautical-style frequency control board, but why are they using frequencies reserved for airplanes only?

Terry Prather launching for his father Al. Ya better get that nose down, Al, before she stalls!



PHOTOS BY AUTHOR UNLESS NOTED

Overall side view of the "new" Shoestring racer. Paul White and his crew did an outstanding job of rebuilding the 29-year-old racer into a super-potent machine. Estimated speed is somewhere around 300 mph! Circus Circus Hotel/Casino is new sponsor. Warren Shipp photo.

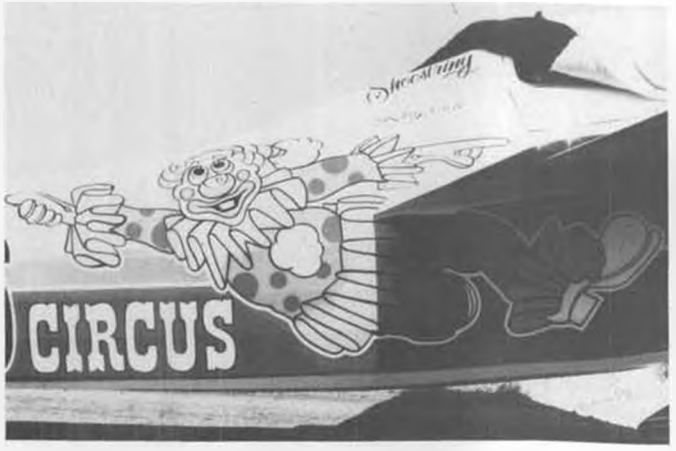
the Circus Circus SHOESTRING

By BILL HANNAN . . . A photographic tour of probably the hottest Formula I racer in the world, fresh out of the shop after a complete rebuild. Who will be the first modeler to duplicate it?

• Recently, Warren Shipp and I were privileged to attend the debut of the "new" Shoestring racer. This famous bird, originally constructed 29 years ago, has been one of the winningest aircraft ever campaigned. It presently holds world speed records for its class, including a best qualifying speed of 242 mph and racing average of 236 mph. Estimated speed now is approximately 300 mph, and this from only 100 hp! Spanning 19 feet, the craft weighs only 590 pounds empty, and with pilot and fuel added, about 800 pounds.

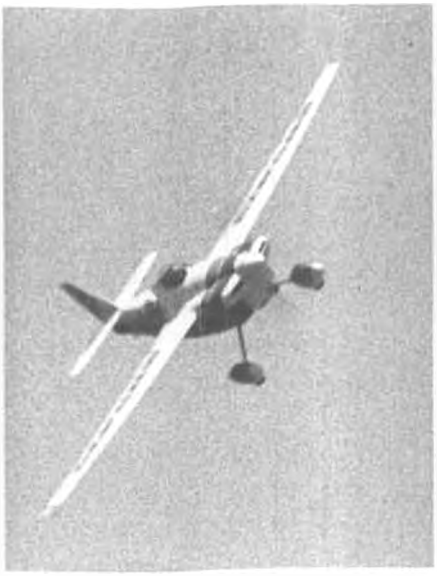
Paul White, well-known model and "homebuilt" enthusiast, is the Crew Chief, and was responsible for most of the rework. His rebuild involved replacement of these components: fuselage tubing, stringers, formers, fuel tank, instrument panel, cheek cowlings, wheel pants, and . . . well, you get the general idea. The aircraft fabric was removed from the wings and tail sur-

Shoestring pilot, Ray Cote, test-flew the ship in his clown suit. Here he is congratulated by his boss, T. Claude Ryan, who founded the Ryan Aeronautical Corporation. Shipp photo.



Closeup of the clown design on the fuselage. Here's a real challenge for you Formula I and Quarter Midget guys!

Weary crew after hauling the Shoestring the full length of Ramona Airport, after landing.



Note the wing flex that occurs during a high-G turn. Unloaded wing has no dihedral.

Shoestring making a high-speed low-level pass. Clean lines of the aircraft are evident in this photo. The airplane has an extremely fast roll rate.

Head clown Paul White saving wear and tear on the tailskid.

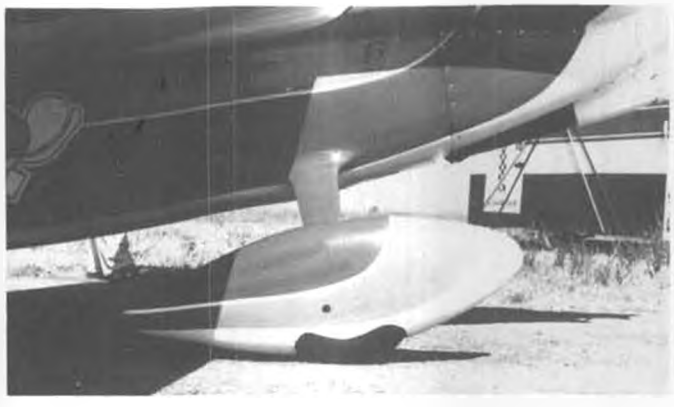
faces and replaced with lightweight fiberglass cloth, using model aircraft techniques.

Circus Circus Hotel/Casino is the new sponsor, and the dazzling white, orange, purple, and yellow paint scheme leaves no doubt about that fact. As Paul says, "It attracts the bees . . . they think it is a giant flower!"

In keeping with the circus theme. the entire crew, including the pilot, wears clown suits, complete with red rubber noses, while working on the racer. Needless to say, this leads to many jocular comments from the spectators.

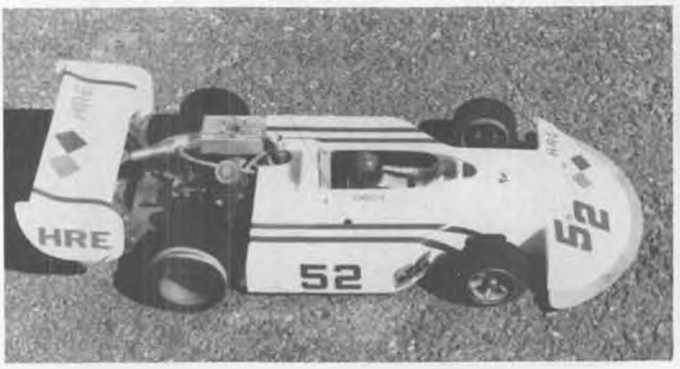
Pilot/owner Ray Cote, a former Navy carrier pilot, flight instructor and sky-writer, is currently associated with Teledyne Ryan Aeronautical Company, as Manager of Flight Operations and Travel Services. His demonstration of Shoestring left no doubt in our minds that the formerly great performer is now *super*. The roll rate is incredibly fast, approximating that of an R/C pattern aircraft, at least to this observer. Our selection of photographs is presented with the model builder in mind . . . one who is fearless about paint and markings! •

Shoestring crew and two "civilians", Mr. and Mrs. Mel Larson, of the sponsoring Circus Circus Hotel/Casino.



Minimum wheel pant/ground clearance necessitates very careful landings. A tire change means cutting open the fiberglass.

What do they transport Shoestring in ? Why, a SHOEBOX, of course!



Chuck Hallum's '76-77 Oval car features forward and left weight plus big wing fins for aerodynamic stability.

Gino Ghersi's World Cup car. Small wing fin area, but also small front end side area.

R/C AUTO NEWS

By CHUCK HALLUM

PHOTOS BY AUTHOR

• Aerodynamic and center of gravity (CG) effects upon car handling are this month's topics. The last tech article covered CG and acceleration combinations. CG shifts can also affect the aerodynamic stability of the car. One of the main reasons for the rearward shift of CG in the car described in the last tech article was for evaluation of CG/CP (center of pressure) effects. Because, even if you don't realize it, cars and airplanes have similar aerodynamic stability effects. Except in cars, it is only one of several effects that must be taken into consideration.

What is the aerodynamic CG/CP effect? Well, let's look at an arrow, or dart, to get the general idea. When an arrow is traveling head first, as shown in Fig. 1, the fins keep the tail end behind the head at all times (as long as it's traveling through an atmosphere, anyway). If the arrow gets sideways or tail first, the drag, or pressure forces, on the fins make the tail end get behind the head again. From a simple standpoint, a body is stable if the CG is ahead of the CP. The further behind the CP is from the CG, the more stable the body.

Now, what is the CP of a car, and where is it located? If we assume the car gets exactly sideways to the direction of travel, the CP is approximately the centroid (center) of the side area. If you cut a cardboard template of the side view of your car, the CP would be about the point at which a string attached to the template would allow the template to hang horizontally. For an old style sports car body, the CP may almost be about mid-way along the wheel base. Newer sports cars have tail fins, and the CP is closer to the rear wheels than the front wheels. So, newer sports cars with fins are aerodynamically more stable, or less unstable, than older sports cars.

The above example gives you an idea of what we're talking about. Also, it gives you an idea of why fins (on the rear wing) can help a formula or Indy car get better aerodynamic stability. Overall car stability is comprised primarily of traction stability and aerodynamic stability. And aerodynamic stability, or effects, become more pronounced as velocity increases.

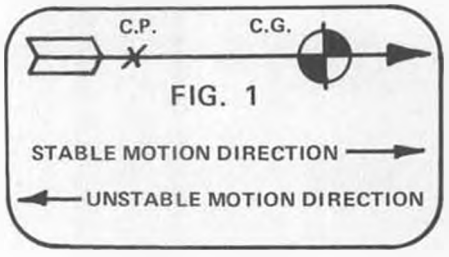


FIG. 1

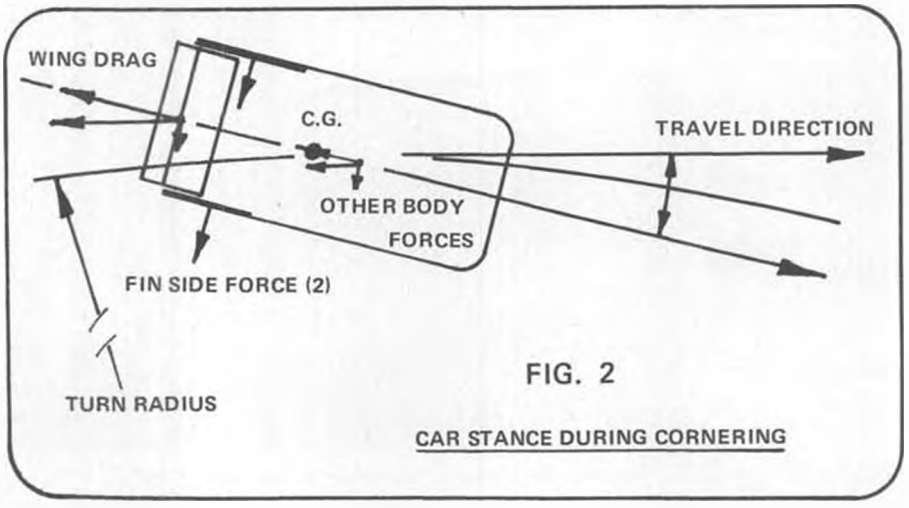
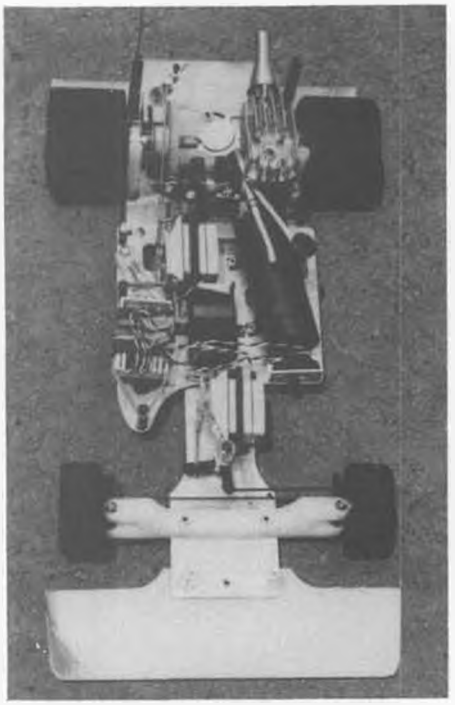


FIG. 2

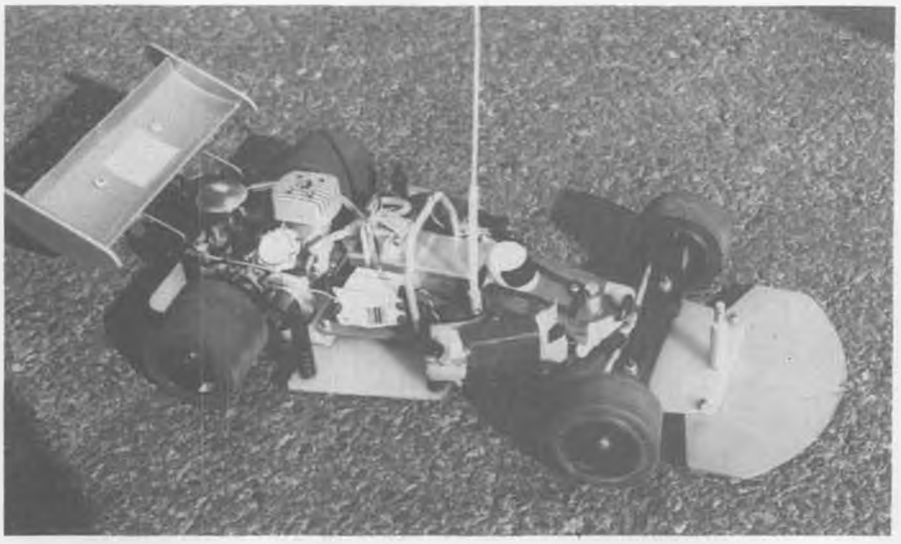
CAR STANCE DURING CORNERING



Franco Sabattini's World Championship car. Forward and left weight OK for formula racing (counterclockwise), but not U.S. sports cars.

Very seldom does a car get sideways to the direction of travel (if the car is to run properly). So, we must look at aerodynamic stability, or relative positions of CG/CP, at smaller angles of car slip. Car slip is here defined as the angle between the car centerline and the direction the car is traveling. Figure 2 shows this angle. In order for the rear tires to generate a rear side force, the slip angle is somewhere around 10 degrees. Note that in this attitude, both tail fins as well as the rear wing are providing stabilizing forces. So, the real CP of the car should be based on at least both tail fins and possibly some additional area equivalent to wing drag restoring force. Also, the fins may be more effective aerodynamically than the body. On the cardboard profile view of the body, we could add another tail fin and determine a new CP to get a more accurate location. The additional fin area will move the CP to the rear and increase the aerodynamic stability of the car.

Stability, when used by itself, means the rear end wants to stay behind the front end. Or something tends to keep



Phil Greeno's World Cup car. Weight is located forward for aerodynamic stability. Differential controls power oversteer.

the rear end toward the back. So, stability is like understeer. The extreme in stability is a car that can only go in a straight line.

An interesting thing is that if the CG is offset to the inside of the turn, aerodynamic stability during the turn is greater than if the CG were on the car centerline. When the CG is to the left of the car centerline, the CP is to the right of the CG, so that the car would have a tendency to steer to the right (because of the drag torque). Hence, the car will understeer a little more on left turns than right turns. The left biased weight not only helps left turn traction, as shown in the last tech article, but also helps left turn aerodynamic stability.

On my CG test sports-road car (last tech article), I shifted the weight to the rear and to the right a little. The basic idea was to get a car with better low speed power stability and higher stability on right turns (than left turns). The rear shift of CG also was to decrease high speed aerodynamic stability so the car would turn better at speed. However, on high-speed right turns (and most high-speed turns are right turns), the CG bias to the right seemed to cancel the effect of the CG bias to the rear.

A formula car without rear wing (and fins) is usually aerodymically unstable. The CP of the body is probably ahead of the mid-wheelbase point (see Fig. 3) . . . the front part of the body (sides) is more effective, area-wise, than the part between the wheels. But the rear wheels and "trapped" area just in front of the rear wheels do help aerodynamic stability some at low slip angles. The car CG is typically 55% to 60% of the wheelbase back. So, the bare formula car is normally aerodynamically unstable. When we add a rear wing, the car becomes more aerodynamically stable at zero or low slip angles, but not at higher angles, as the wing frontal area decreases. The drag of the wing is what provides the stabilizing force. When fins are added, more stabilizing force is provided, especially at higher slip angles. And possibly the car becomes aerodynamically stable.

Figure 4 shows how the size of rear wing fins on my oval-formula cars have changed over the years. Even in 1974, with the small wing side fins, I could feel the effect of the fins on stability. During one Nats qualifying heat, a fin broke off and car handling decreased noticeably. Since that time, all my oval-formula car wing tip plates have been physically tied to each other through the center of the aerodynamic wing, so that it is impossible for the tops to come off . . . unless the whole darn thing breaks. I can't say there is any noticeable improvement of aerodynamic stability from the '75 fin to the '78 fin, but they are all a little better than the '74 fin. With the CG a little forward and to the left, the cars are very aerodynamically stable and can even be controlled when the tail end swings out at high speed. It is interesting to note that all MRP, Delta, and HRE cars in the 1978 Nats expert oval main event had good sized tail-wing fins.

Now, after all this, remember that the overall car stability is a sum of the traction stability and aerodynamic stability. When rear side force traction is reduced to zero, due to power application/track conditions, there usually is still appreciable front traction . . . and probably no amount of aerodynamic stability will help. But if the rear of the car is just breaking loose, then positive aerodynamic stability will help. On some of the cars we investigated, under hard forward acceleration, there was understeer, and usually R/C cars exhibit some high-speed understeer. So, there are times when a decrease of aerodynamic stability might be desirable. Also, remember that traction stability is controlled by many things . . . tire compounds, caster, weight bias, CG

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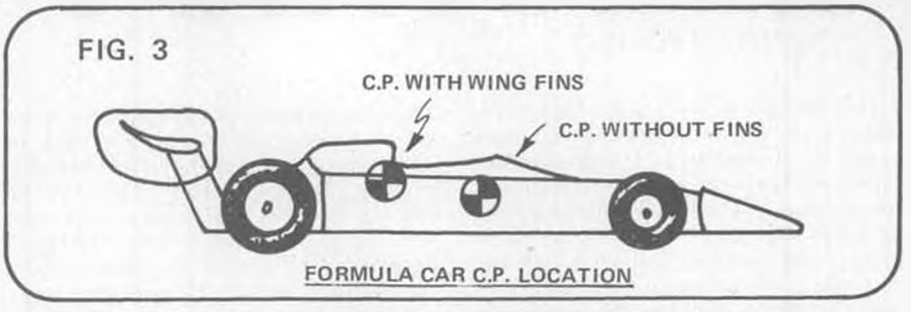
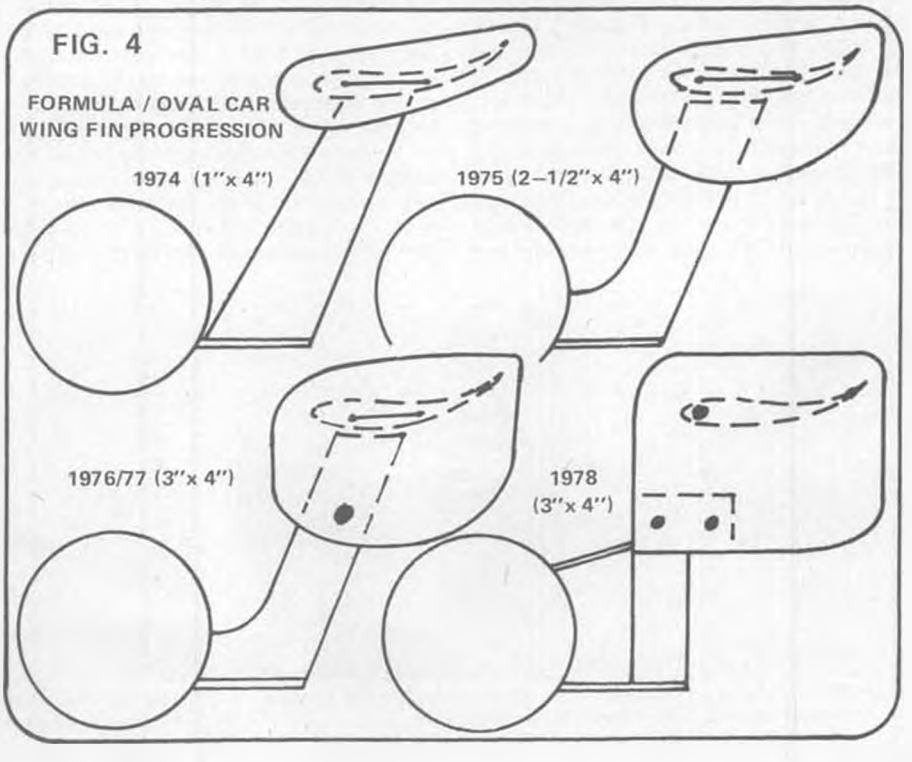
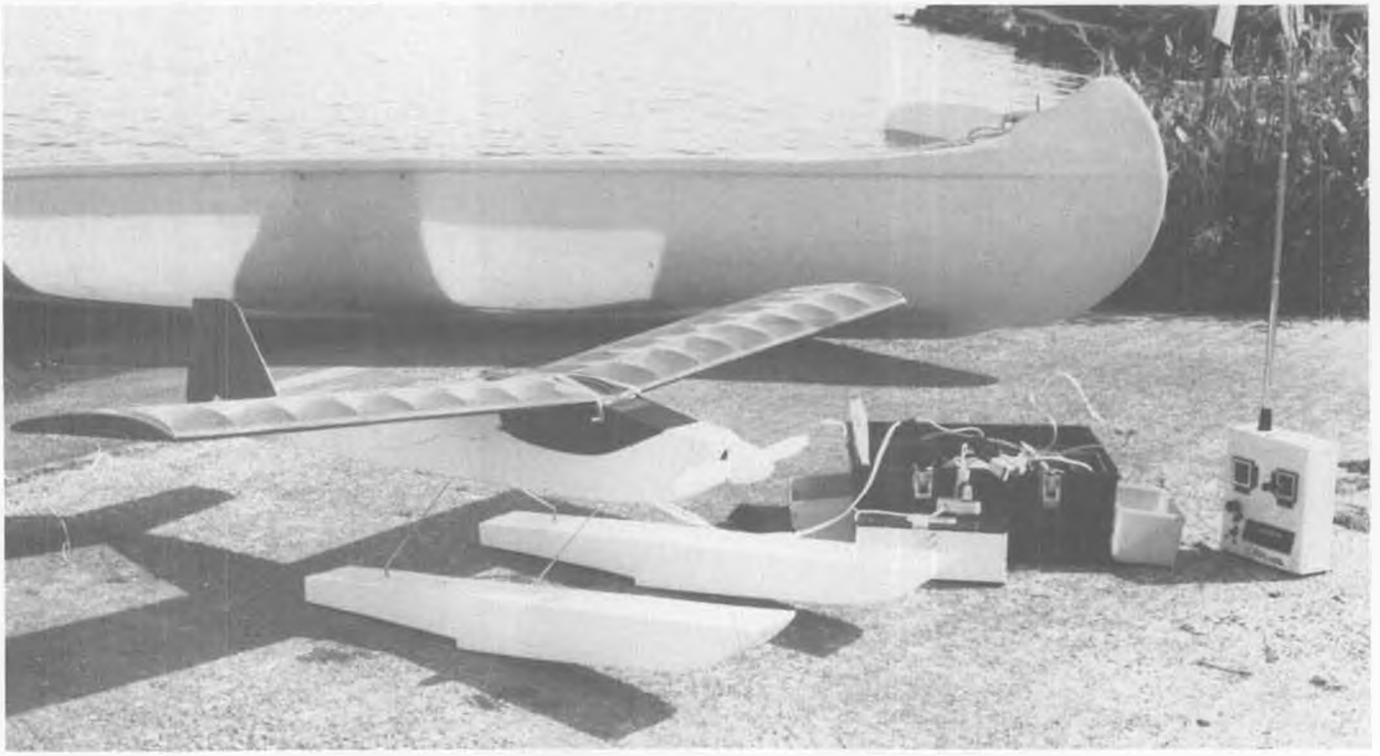






Mitch Poling's original design "Astro Sport" charging up for a flight off Lake Washington. Model appears to have different floats than those pictured in the October issue. This month, Mitch discusses battery charging . . . the biggest bugaboo of electric flying.

ELECTRIC POWER

By MITCH POLING

PHOTOS BY AUTHOR

• The big breakthrough in electric power came when the Boucher brothers found a reliable way to charge nickel cadmium batteries in fifteen minutes. Fifteen minutes is a comfortable length of time; most sport fliers spend that much time between flights just talking, tinkering, or visiting. For the more impatient, two airplanes fill in the gap nicely, with practically back-to-back flying. Since I usually have two or three planes with me, I can fly continuously with no fuss, muss, or bother. However, charging is not well understood by most fliers, so let's take a look at some of the details and working rules.

The easiest and best way to fast charge for the beginner is via the Astro Flight charge system, because it is simple and allows a safety margin as well. This is the constant voltage charge method, in which the charging voltage is held fixed, and the charging current starts at a high value and tapers down to a low value at the end of the charge. This is all taken care of by the voltage characteristics of the battery being charged; no fancy electronics are necessary at all. In fact, the same system is used in your car for the lead acid battery, and acts the same way. In the case of the nickel cadmium cell, it depends on the fact that a nickel cadmium cell will rise to a little over 1.5 volts when it is fully charged (the normal voltage is 1.25), and the overvoltage will cut the current down. The rule of thumb is to use a charging voltage of 1.5 volts per nickel cadmium cell in the battery pack. When the nickel cadmium cell reaches its overvoltage of 1.5 volts, the charging voltage of 1.5 volts can no longer push current in; i.e., the two voltages oppose and cancel each other, and the charging current drops to a low value. This all takes about fifteen minutes for about a 90% charge, which gives a safety margin of 10%, so the battery won't start generating gas internally and pop its top. The charge current starts at about six times the ampere hour rating of the cell and drops to about the same as the ampere hour rating of the cell. The Astro .550 Ah. cells are a good example. The charge (for a discharged cell) starts at about 3.5 amperes and drops to about 0.5 amperes at the end of fifteen minutes.

George Beaver with his powered glider. Model uses a Drifter fuselage, home-brew wing, Astro 05 motor. An excellent flier.

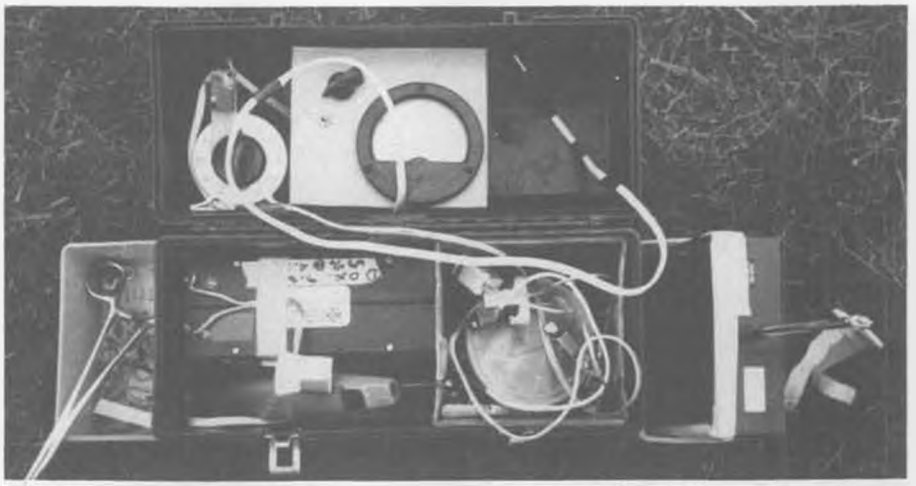
The Olympic II makes a fine motorglider. Hank West scratch built his, weighs 46 oz. with Astro 05 and 2-channel radio.

There are some practical rules to follow for the Astro method. The most important, bar none, is that the charging battery must have its full voltage and a rated capacity of 4 Ah. or better. I am constantly asked about why somebody gets short flights and low power, and nine times out of ten the charging battery is over the hill. If you get short flights and low power, get a nice, new charging battery, and a lot of problems will be solved. I like either gel cells or nickel cadmium charging batteries the best because they are clean and sealed. Motorcycle batteries work just fine, but they always seem to have acid leaks. The gel cells are available from most hobby sources. I use a 4.5 Ah. nickel cadmium pack for charging; it has an extra "punch" because it has such a low internal resistance. These packs are hard to find. Local medical equipment manufacturers occasionally sell damaged packs, which can be repaired by replacing bad cells. Speaking of internal resistance, some people have tried using the dry lantern or flashlight batteries to charge with. It just doesn't work, as the dry cells have so much internal resistance that they cannot deliver much current. That's too bad, because they have just the right voltage: 1.5 volts.

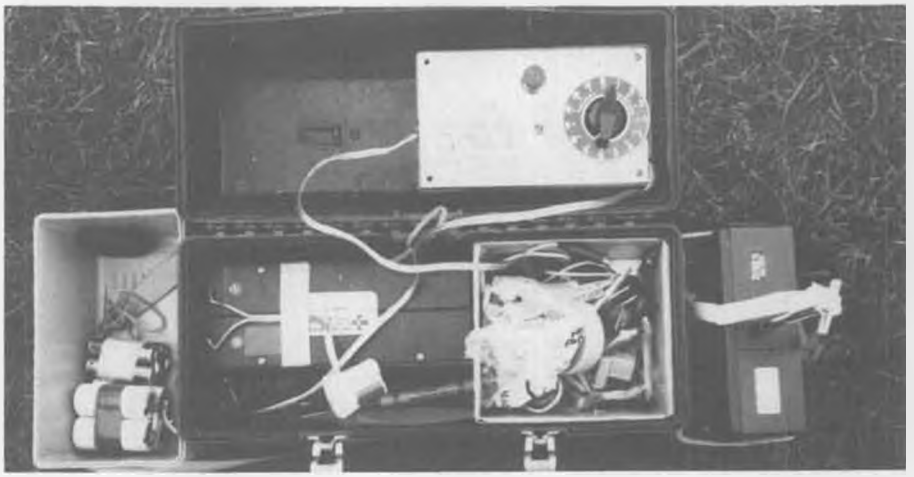
Nickel cadmium cells with 1.25 volts, and lead acid cells with 2.0 volts, don't work out quite so simply. The voltages that work are multiples of six volts (i.e., three lead acid cells or five nickel cadmium cells). So, using the rule of 1.5 volts for each cell to be charged, you can charge four cells with 6 volts, eight cells with 12 volts, twelve cells with 18 volts, and sixteen cells with 24 volts. The in-between numbers, like ten cells, get left out in this method. By the way, when I talk about four cells, eight cells, etc., I am talking about cells connected in series. As an example, four nickel cadmium cells in series is 1.25+1.25+1.25+1.25 volts = 5 volts total.

Another rule of thumb in this method is that only General Electric cells work. I understand that Sanyo and some others that are built under license from GE work also, but I have not tried them. The reason for this is that most nickel cadmium cells are built "cheap"; they have only a single tab inside to run the current to the cell ends. This leads to poor ability in both delivering and accepting current, because of resistance. The GE cells (and those built under license) have the entire ends of the electrode plates *welded* to the cell ends, which gives all kinds of current path and very low resistance inside. You learn quickly in electric power that low resistance is good in power circuits!

The Astro charging method doesn't require any equipment except extension cord wire to connect the charging battery to the nickel cadmium pack (about four feet is right), but it is a very good idea to have a timer-operated cutoff switch to stop the charging after fifteen minutes. I got in a conversation once and forgot a battery on charge. It survived a thirty-minute charge, but it got quite hot! Sears Roebuck sells a good switch, number34-AY-7536, which I use and like. I have also used a Lux kitchen timer (available at most hardware stores) rigged to close a lever switch made by the Cherry Co. (available at radio parts stores). An ammeter that can read up to six amperes is a good idea too, because it makes it easy to follow the charging process. These ammeters are really hard to find. I occasionally see one in electronic surplus stores, but I don't know of any regular source. If you do, let me know!



Mitch Poling's homemade charging set-up features 12 amp meter, Lux Kitchen timer, and lever switch. Ni-Cd charging battery is from battery-operated medical equipment.



Similar set-up as above, but with Astro Flight Rapid Charger. Lunch box also holds Xmitter, rubber bands, cordless soldering iron, broken props, spare flight pack . . . everything but lunch!

Astro Flight has put all this together in its Auto Charger, which is quite reasonably priced and avoids all the hassle of trying to dig up timers and ammeters. If you have plenty of time and little money, go ahead and do it on your own; otherwise, I recommend the "store-bought stuff".

There are some more items to talk about concerning the Astro type of charging, but I've rambled on long enough, so we'll save it for a later column. There is also the technique of using a voltage greater than 1.5 volts per cell, then dropping the current with a resistor. There are more pitfalls for the beginner in this technique than in the Astro Flight approach, but it is the way used by all the 1/12-scale electric cars. We'll save that, too, for a later column.

I've finished a prototype indoor R/C electric plane for the Indoor Record Trails in Pasadena in January, but no flights as yet. It has a little over four square feet in area, 50-inch span, 16 ounces with a Cannon super-mini and an Astro 020. It is built quite sturdily, more so than is needed for indoors, so that I can hit a wall with it and still survive! This indoor R/C flying is new to me; I have no feel for how hard or easy it might be. I think I'll call it the "Astro Dandy", after Ken Willard's indoor R/C "Gym Dandy" that he flew indoors years ago (with a Cox .010).

I bought a helium balloon at the local Bumbershoot festival (it rains here!) to check out my figures on helium lift. The balloon gave a lift of .8 ounces per cubic foot, but the lift got poorer as time went by. Just overnight, the lift dropped to .4 ounces per cubic foot, with hardly any change in the size of the balloon. This must mean that the helium is escaping, which is hardly news, but it also means that some air is going in to replace it. This will be of interest to those who plan to enter the electric airship event at Pasadena. But enough. Till next time, enjoy the electric hobby! •

The Comet tour, sponsored in 1941 by the Comet Model Airplane and Supply Co. From left: McKenna (didn't get first name), Erle Kenton, Carl Goldberg, and Virgil Rice.

PLUG SPARKS

PHOTOS BY AUTHOR

By JOHN POND

• For the first time in fifteen years, the columnist was unable to run the Old Timer events at the AMA Nationals. This had gotten to be such a fixture that most everyone took it for granted the events would be held.

While at the SAM Championships Victory Banquet, the writer announced he would be unable to attend the Nationals at Lake Charles. Much to his gratification, Tom Sutor offered to fill in, but only for the free flight portion. He also offered to set up a booth and stage the annual banquet; in short, do the job up brown! As a matter of fact, Tom even had the results published in the Nats paper. Good deal.

Later on, the columnist received the results and a letter describing the action. For this we are again indebted to Tom Sutor, a real veteran at running outstanding free flight contests.

Tom starts off by saying there were only about 35 contestants, due to the late notice of the Old Timer events being continued. However, to make up for this, the weather was simply great, with no rain or wind. The lack of wind did increase the humidity, and of course, the weather did get hot! This made for quite a few "max" flights and a real enjoyable time for all. Tom says one thing was very apparent: everyone wants these special events carried in the future Nationals. After all, you don't say "whoa" to a horse in the middle of a horse race!

Somehow or another the traditional Old Timer Reunion Banquet got sidetracked from its original slot of Friday night by the National Free Flight Society. This rather independent action (and we are all supposed to be pulling together!) thoroughly finished the O/T Banquet when it was moved to Thursday night. The banquet was a real dud, with only eighteen attending! Truly a shame!

Those who attended the O/T Reunion Banquet held an open discussion about the continuance of Old Timer events at the Nationals. A considerable number of good ideas were generated for improving the SAM Old Timer activities at the Nationals. There certainly was no lack of enthusiasm!

Tom Sutor has volunteered to make up a shipping display that can be sent by United Parcel Service. This display can be quickly put together and used at most any function. The writer has in mind the trade shows held during the first four months of the year. The SAM Booth could stand a little more professional look!

Tom is also asking for ideas about the design. This request will also be published in SAM Speaks. Let's hear from you one way or another! Tom has an idea to use high-quality drapery material to be mounted on a collapsible (or demountable) aluminum frame. Each succeeding year, the SAM association could print the current SAM logo, either on a tee shirt or shoulder patch.

Probably the best idea for a booth display (as suggested by Tim Banaszak) would be a rotating three-sided display. Tom feels he can get this made very inexpensively with a professional sign painter to do the lettering. What we need are ideas on what to put on the display.

Due recognition was given to George Perryman for his untiring efforts to promote activity in the O/T Junior events at the Nationals. One of the thoughts generated at the banquet was to try to initiate action of the SAM Chapters to sponsor or send a Junior to the Nationals to compete in the Old Timer events.

In this line of thought, George Perryman has volunteered to promote Junior activity in Old Timer events, particularly at the Nationals. Everyone will recognize this, as the Junior modelers are our future SAM Championships winners.

Sutor goes on to say, that he was greatly assisted by Robert Lane in run-

The "one-armed bandit", Norm Burnham, of the SAM 49'ers club, can fly better with one hand than most guys can with two!

Mel Ferrel's "Jeepers Creepers", powered by an Ohlsson .23. Appears to have either a retracting gear or drop-off dolly.

You're not a true Old Timer unless you've built a Comet Dipper. Sherman Gillespie, of San Jose, produced this gem.

Wall Cordwell's diesel-powered "Pusher Pup" U/C job, seen at the O.T. shindig at the Old Warden Aerodrome in England.

ning the Old Timer booth at the Nats. Bob brought a flock of models to put on display, sat with Tom, and acknowledged all questions. And there were a million of them! Also at the booth was our indefatigable Secretary, Tim Banaszak, who actually ran out of SAM membership application blanks! This is simply great!

Tom reports the O/T events went off without a hitch. It appears that all constestants had a super time, with everyone taking something home for their trouble. The results looked something like this:

CLASS A GAS
1) Larry Boyer
2) Rudy Kluiber
3) Bill Hale

CLASS B GAS
1) Sal Taibi
2) Jim Belsen
3) Rudy Kluiber

CLASS C GAS
1) Harry Murphy
2) Dave Sweeney
3) Larry Boyer

30 SECOND ANTIQUE
1) Larry Boyer
2) Sal Taibi
3) Tim Banaszak

.020 REPLICA
1) Sal Taibi
2) Tom McLaughlan
3) George Flemming Jr.

RUBBER STICK
1) George Perryman
2) George Batiuk
3) Charles Sotich

RUBBER CABIN
1) Ed Mate
2) Larry Boyer

In correspondence with Terry Rimert, a recently appointed Nats Free Flight Coordinator, it appears the 1979 Nats may again be held at Lake Charles. As of this writing, there have been no other offers. Terry assures us, as an NFFS representative, that the Old Timers will still be scheduled for Friday. Now all we have to do is to square away the O/T Banquet night. Traditionally, the banquet has served as the vehicle to award all the trophies won in the various Old Timer events.

If things work out right, the columnist hopes to resume the three days of O/T flying that were initiated at the Riverside Nationals. We're gonna have a real ball!

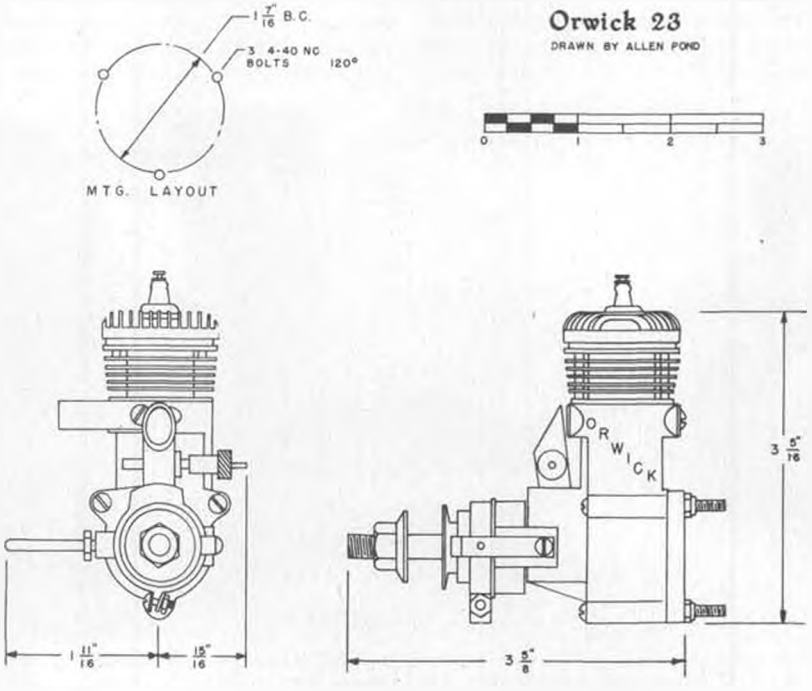
ENGINE OF THE MONTH

Most modelers are quite familiar with Hank Orwick's .64 cu. in. engine that was so highly successful, but few know that H.C. Orwick put out other sizes of engines, notably .23, .29, and .32. There was also a .73 cu. in. engine known as the "Miracle 60" (it was a miracle if it ever was a 60). This engine, incidentally, led to the AMA restriction of a maximum .65 cu. in motor displacement.

In describing the Orwick .23 this month, we are indebted to Karl Carlson, who obtained a considerable amount of correspondence between Orwick and Hoffman Model Supply, of Sioux City, Iowa. In those days, Orwick had just broken up with Cunningham and was operating out of 1523 West 70th St., Los Angeles, CA. The breakup of the partnership was inevitable, with Orwick, the perfectionist, always delaying production, and Cunningham, the impatient one, wanting to get into immediate production regardless of minor faults of the particular engine.

In one of his letters to Hoffman, Orwick gives out the following on his Orwick .23: "We have a pleasant surprise for you . . . an Orwick .23 has been mailed to you yesterday. We haven't received our literature yet, so I will attempt to give you a few instructions on it. The engine requires *very little* choking, due to the size of the crankshaft in comparison with the engine. Once or twice, with the propeller being pulled through, is usually plenty. The needle valve is not a bit sensitive, so it can be screwed in or out by the round (turn) if necessary without taking the engine from one extreme to the other. The top of the tank should be at least level with the needle value. A little bit above won't hurt.

"The engine you receive will require a small amount of breaking in, but after about 15 minutes, it should run wide open if you leave the needle valve set in a rich two-cycle. We have had more



Bert Pond with his Leja Tractor at the 1978 SAM Champs. Bert was recently out on the West Coast, stopped by the MB office to visit. A very interesting fellow!

Never too busy to help, Sal Taibi holds Ohlsson .60-powered Playboy for Dave Sweeney, of Dallas, Texas. Photo taken at the SAM Champs.

success in flying with a 9-inch propeller by letting it wind up. The 10-inch prop appears to hold the rpm down. The Comet 9-inch prop has proven good for us and should be available in your part of the country. The engine should turn in excess of 10,000 rpm for most efficiency."

In another letter, Hank again hands out some advice which many modelers today would do well to heed:

"You (Hoffman) mentioned that this customer couldn't get the engine to run more than half advanced. We check-ran it here and the motor gets up and really arcs, but it is a little tight to run more than 10,000 rpm. Over that speed, it shows a slight tendency to stick, but please inform your customer there is nothing to be gained in taking one engine apart to see why it is tight. Disassembly is bad medicine for any engine, and should be avoided entirely except in the most extreme emergencies."

In his letter of March 6, 1947, Hank Orwick reveals some rather interesting philosophy regarding the use of bushings versus ball bearings. We pick up his letter at this point:

"You mentioned that you had prospective customers who would not buy the Orwick engine because it had no ball bearings. My personal opinion is that this is not the reason they won't buy it. Addition of ball bearings would increase the weight by 5 or 6 ounces. Then they would complain about the engine being too heavy. Besides, it isn't simply a matter of adding ball bearings. It would require an entirely new engine design. In the first place, we couldn't use the front rotary anymore. You say OK (Herkimer) does it, but they use only one bearing instead of two. The shaft isn't supported on both ends, and they knock out their mains all the time. After you have covered all of this with those hard-to-sell customers, ask they why it is that General Electric, on their high-speed motors that turn 125,000 rpm, uses bushings instead of ball bearings. We don't want you to misunderstand us, but this is our opinion and all our experience with the engine in *free flight* has born us out in this contention. If your customers really insist on ball bearings, why not sell them a McCoy?"

In the light of the foregoing, it is no great surprise that the basic engine was continued by Hi Johnson when he took over the Orwick concern after Hank's unfortunate demise. As they say, the proof is in the pudding, and Johnson proved it for another ten years with the same basic design. No question about it, Orwick was an excellent craftsman who knew his engines, and they were the most powerful of their time.

30 YEARS AGO, I WAS. . .

Mervin Buckmaster, Editor of the Australian modeling magazine, *Airborne*, writes to say the Old Timer column in his publication is going over great. He also thanks the columnist for an Anderson Spitfire promised to Merv during the last trip to the Australian Nationals.

Speaking of the Spitfire, it reminded Mervin of one his fondest early aeromodeling memories. Merv sez pardon me if I reminisce, but here's how it was in the early modeling days of Australia.

"It was late in 1953 when my family had just moved down from a small country town to the city (Melbourne). One Saturday afternoon, my brothers and I heard a model aero engine and immediately rode on our bikes to find out what all the noise was about. Soon we came to a large football (soccer in Australia) field with seating practically all around the oval. On the beautiful smooth green grass was a small group of big boys clustered around several controlline models.

Sal Taibi again, this time with his wife, Nan, and the 1937 Anderson Pylon he flew to 1st place in 30-second Antique at the SAM Champs. Model uses a Forster .99.

"We waited until one went into the air and held our breaths as the model did loops and figure-of-eight maneuvers, while all the time producing a shattering (so it seemed to our ears) noise that echoed and re-echoed against the empty grandstands.

"The model was a 'Go-Devil', about five-foot wingspan, flying on 60-ft. lines and powered by . . . a Spitfire! If my conversion to model airplanes hadn't taken place before then, the sight of that big model sweeping majestically about the sky did the trick. I wanted to be a modeler from that day on!"

(Columnist's note: Buckmaster's wishes were more than fulfilled, as he has been extremely active in model flying. During the past two years he started up a model airplane magazine that was sorely needed to fill the gap left by the defunct Flying News. Mervin has never lost his enthusiasm for models, and in particular, for Old Timers. His Comet Sailplane at the recent Australian Nationals was a real work of art. The Australian modelers are to be envied for such an outstanding modeler and editor. He should become the Bill Northrop of Australia. How about that?)

VERNON BOEHLE

For those who are not aware of it, another great has dropped from this worldly scene and gone to a better free flight field.

While building the Boehle "Giant", Bob Von Konsky decided to call the original designer, Vernon Boehle, and get his ideas about his design and how he kept the weight of this fifteen-foot monster to six pounds. (It was imperative that the weight be kept to a minimum, as it only had a Baby Cyclone for power.)

Daddy Warbucks caught Henry Struck in the process of tuning the Anderson Spitfire in his original New Ruler. Model still flies great after all these years.

After some information calls to the Indianapolis switchboard, Bob was actually able to run down the location of Vernon Boehle's home and telephone number. Upon placing the long distance call, Mrs. Boehle (Vernon's mother) answered and informed Bob that Vernon had passed away rather quietly and unobtrusively about a year ago.

This columnist wants to make special note of Vernon Boehle's passing, as he was one of the early modelers who set the pace during those wonderful years of 1935 to 1940. Truly, a wonderful time with the most exciting and imaginative modelers!

BIG BOMBERS

With all the interest being generated in the Mammoth scale and quarter scale models, it is no great surprise to this columnist to see this trend start to develop in the Old Timer movement.

The idea of building huge old time free flights (R/C operated) is nothing new, as Tom Schoneau was trying to pioneer this in Illinois. His club, known as the SOBBB (Society of Big Bomber Builders) did produce a few large Powerhouses, New Rulers, and Sailplanes, but activity has fallen off, as Tom has been real busy with his M-N-M Hobby Shop.

When Speed Hughes of SAM 30 came out with his Boehle Giant at the recent Thermita After-Bay Contest at Oroville, the boys were really struck on how slowly and majestically these huge models fly! Four fellows from SAM 21 decided to jointly build Boehle Giants, but all fell by the wayside except Bob Von Konsky, who has not only finished the model but recently flew it quite successfully.

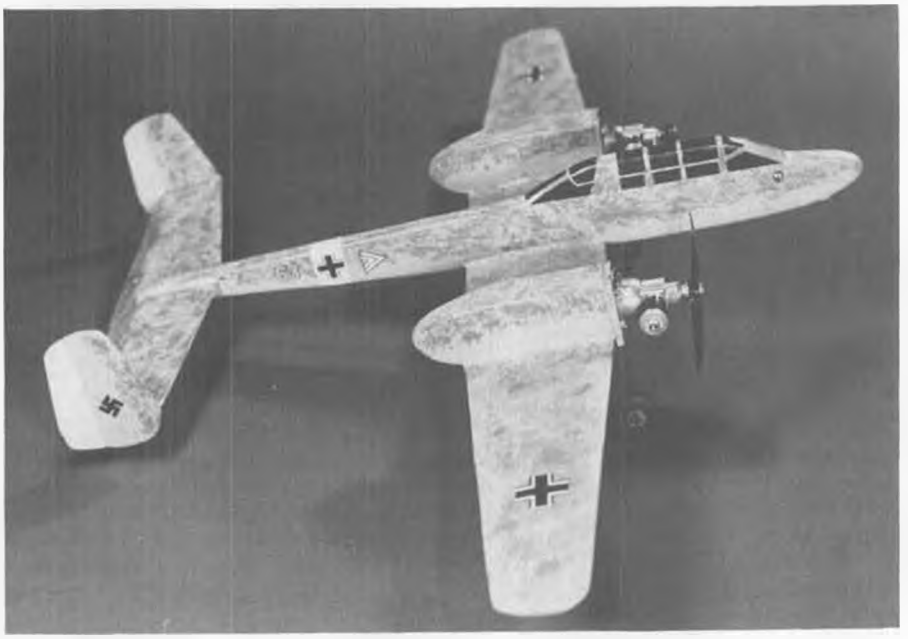
The writer, not to be outdone, has almost completed a double-size, 12-ft. Rod Doyle Folly II. With a twenty-inch chord, don't you wish you had the Monokote franchise on that model!

This has led to suggestions by Karl Tulp and Bob Von Konsky that some special dispensation be made for the larger models. Tulp's suggestion (which may be the best) is to start a special event just for models of no less than ten-foot wingspan.

Continued on page 119

Chet Lanzo is getting to be a "steady" at the SAM Champs, flew a Lanzo Stick in Texaco.

At the SAM Champs, the group from England gathers around Leon Shulman to view his scrapbook. Must be a wealth of memories in there!



Pseudo Messerschmitt controlliner designed by Frank Scott and built by Rich Lidde. Long landing gear and long nose keep the props on the twin .020's from touching the ground.

The 1/2-A SCENE

By LARRY RENGER

• Well, the Nats have come and gone for 1978, and I missed it. Doggone it, going to the Nats is FUN! Worse yet, I have to get what little information I can on 1/2A Stunt secondhand. The most interesting fact is that all three First place winners were repeats of last year! Yup, victorious in Open was Bob Whitely, Senior was won by Dave Fitzgerald, and Junior was again copped by Dan McClellan.

Unfortunately, I only have the name of one other place winner, and that's Bill Howe, who took 2nd in Open. The other bad news is that the entry was down this year, with only nine fliers in the three classes. Come on, guys, this has got to be one of the easiest events to prepare for. You could have taken 2nd and 3rd in Senior with a plastic Cox PT-19, just by taking off, doing 2 level laps, one loop, and landing!

The good news is that the competition in Open and the quality of models is getting better. Anyone out there who got reproducible photos of the event, please send them to me! By the way, the wind was at its highest during the week for . . . what else . . . Half-A Aerobatics!

BEGINNER'S WORKBENCH

Recently I taught a friend how to fly R/C. He did very well in learning how to handle his 2-channel Cox Centurion. There was one area, though, which presented particular difficulty. The problem came in getting the plane back down safely. Thinking back, I realized that this was my worst hurdle, too, when I was learning. When you are flying high, all you have to do is keep the airplane in sight and keep it from coming down. When it comes time for landing, however, you usually have to add a lot of planning and accuracy to your maneuvering.

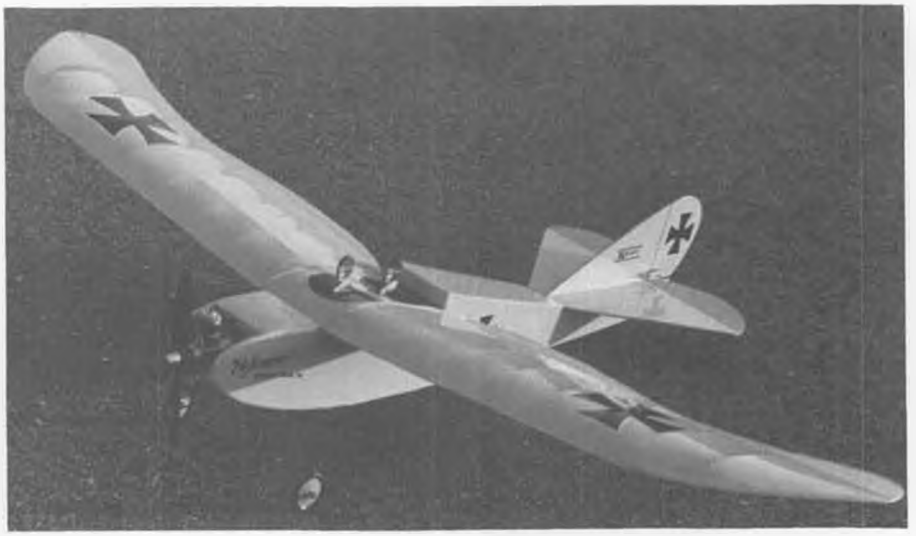
So, how do you go about learning how to land? First, let's see what it is you are trying to accomplish, then we'll talk about how to learn it. The ideal landing ends up with the model at a dead stop right in front of you, intact, unscathed, whole, flyable, right side up, pointed in the same direction as it was last flying!

To get there, think of your approach path as three legs of a square. The first leg is parallel to the runway, about 200 to 300 feet away, depending on the size, speed, and glide angle of your model. The airplane should fly past you about 30 to 50 feet up, headed downwind. This initial position creates a "window" for you to aim at, which sets up your whole landing. The model is flown about as far downwind as it is away, turned at right angles to reach the runway, and then turned again upwind toward you, right over the runway. The model should have been losing altitude all this time and be 10 to 15 feet high as you line up on final. Now all you have to do is make gentle corrections to keep the model straight, and start to pull back on the stick SLOWLY as you get below 2 ft. altitude. Try to hold the model about 6 inches off the ground and keep it there. If you are on low throttle or dead stick, the model will land itself smoothly. A throttled engine seems to shorten the first part of an approach, but prolong the final and rollout portions, as compared to a dead engine. I don't know why.

Anyway, that's what you are trying to do . . . now, what can you do to get there? I suggest that you try flying through your "window" under full power first. After you get so that you can hit that spot, try flying the full three legs again under full power, staying at the 30 to 50 ft. altitude. The thing to remember is that, with the engine throttled back, the model will be coming down by itself in a glide, so no special elevator input is required.

OK, so far so good. You can hit your window, you know where and how to turn. The next thing is to be sure you have lots of altitude when the engine quits if you are going to be landing dead stick. That way, you have time to get to and through the "window". If you are going too fast through the window, fly that leg out just a bit. If you are going slow, shorten it up a tad. Even if you don't change your approach, all that happens is that you'll land about 20 feet longer or shorter. After a few tries, you will have the approach for your particular model well in your mind.

Just one more comment. A proper landing requires that the model be flying toward you on final approach. You had better practice this with some



Competition Models' Taube is an easy-to-build, easy-to-fly, scale-looking model that uses a Golden Bee and 2-channel radio.

altitude until it's comfortable. The alternative is to fly the model almost into the next county if you want to fly it away from you on landing.

Next topic is another minor venture into the world of photography. The lesson for today is how to take sharp pictures. There are only four things which can cause poor pictures. The least important one is camera quality. Nearly anything but a low-cost miniature "110" camera will take a photo good enough for publication if you use it correctly. The three vital factors are exposure, focus, and shake.

First, you have to either set the camera exposure to the light conditions, or be sure to shoot the photo when the sun is out, with a non-adjustable camera. If you use flash, put the subject at the correct distance and be sure there is a light-colored background nearby. A room corner is ideal, because the reflections will "fill in" harsh shadows.

Focus is next. Don't be shy about pacing off the distance to your subject if you don't have some sort of range finder. If you have a non-focusing camera, arrange your subject so that you are at least 8 ft. away. Usually this requires a person or two to go with the airplane, or else it looks pretty lonely!

Most critical of all is that the camera must be absolutely steady during the exposure. My mother used to nearly give her camera a karate chop to take a picture. You could actually see the camera move . . . ugh!

The primary tricks to holding a camera steady are to use the camera strap wound around your hands to help hold it tight, hold your breath while taking a picture, and gently squeeeeeze the release. Don't shove it; increase your finger pressure very slowly. The camera will go off by itself. One added trick I use is to press the release with the bone of my first finger joint, not the fleshy pad of my fingertip. This seems to help.

Back to airplanes!

First photo model for the month is a twin-engine U/C trainer designed by Frank Scott. This particular version was built by Rich Lidde, a youngster in Frank's neighborhood. Construction is all-balsa, and power is by a pair of Cox Pee Wee .020's. Styling was inspired by the Messerschmitt BF 110. The nose has been lengthened to help balance, but even more, it prevents prop damage in case of a nose-over on takeoff. The prop tips just won't touch the ground.

R/C twins double your fun, but this one won't kill your budget. Ace's Rockwell Commander is a good choice for a first twin, easy to build and has great performance.

O.S. Max .10 FSR is an excellent powerplant for any small 3-4 channel ship.

Frank says that he has no starting problem with the Cox engines, and in flight there is no problem with engine synchronization or with either engine quitting. The model just flies perfectly.

Next model is another twin. This one is Ace's Rockwell Commander. Using two Tee Dee .049's, this beauty is a real crowd pleaser. You get that lovely sound, great performance, and you don't really have to disassemble it to get it in your car! The other consideration is that you don't have to own an oil well to be able to afford one. Cheap to buy, cheap to fly!

Third airplane is another C/L plastic wonder from Cox. The reason for including this is the special throttle system it has. You can kick in high or low throttle in mid-air, but only two control lines are used. This feature really makes the model fun to fly. I found that on low throttle, full up elevator and an bit of "reverse whipping" would make the model nearly hang in mid-air. How about a two-line/two-speed 1/2A carrier event? This baby will really step out on high speed.

Final airplane for this month is a kit from Competition Models. This little schoolyard scale job takes a Golden Bee and two channels of R/C to fly. As you can see, the model, a Taube, is of very simple construction, but the lines are exceptionally graceful. Whatever happened to graceful, flowing lines on full size airplanes, anyway? The latest ones look like someone was cutting up old milk cartons and the roll from inside some paper towels. Ah, for the good old days! (Then again, who wants to fly cross-country at 70 mph with a 2000-foot ceiling?)

Last photograph is of the second-best .10 in the whole wide world. The O.S. Max .10 FSR comes in ahead of the Tee Dee .09 in the power department, but behind Webra's 1.8cc "Speedy". When you consider the throttle, muffler, and availability, this is a very nice engine. Max's engineers came up with a nifty way to get Schneurle porting into a very small package. The results are an engine

Continued on page 101

This ready-to-fly plastic controlliner from Cox features a special throttle system that uses only the two control lines; no third line is used.

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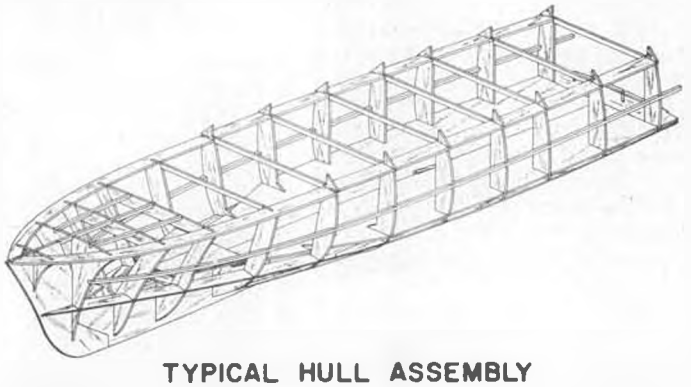

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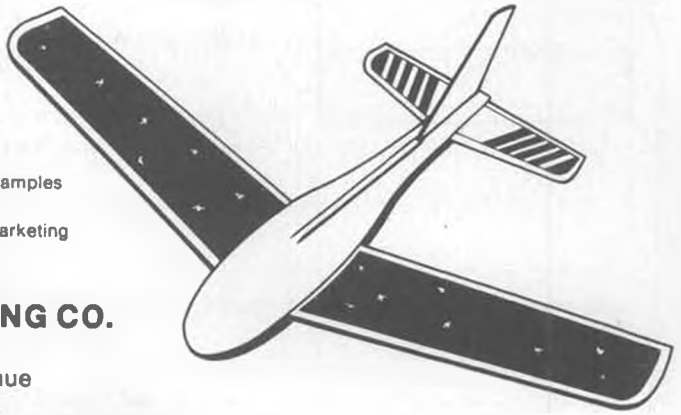

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A Damon Company
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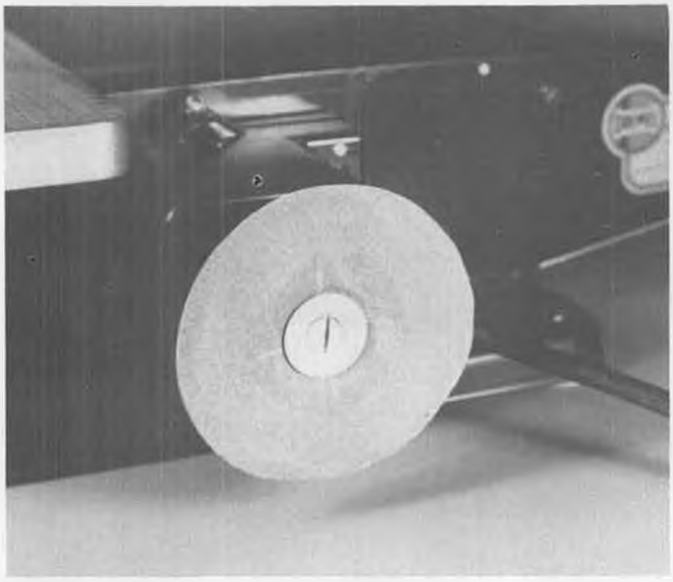
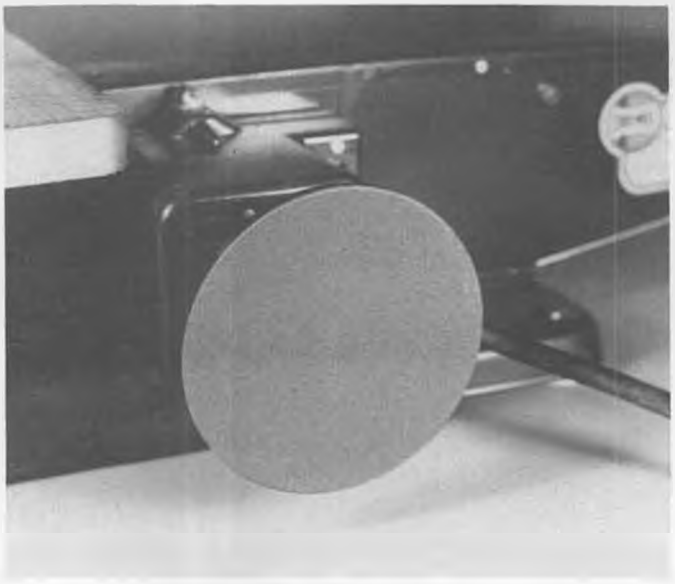


The floppy, inaccurate rubber-backed sanding disc furnished with the Dremel Moto-Shop. No good for precision work.



Strick's Enterprises solid-back disc on Dremel Moto-Shop. Only thing missing is a small, solid work table.

PHOTOS BY AUTHOR

MODIFYING ●●●●● ●●●● THE DREMEL SANDING DISC

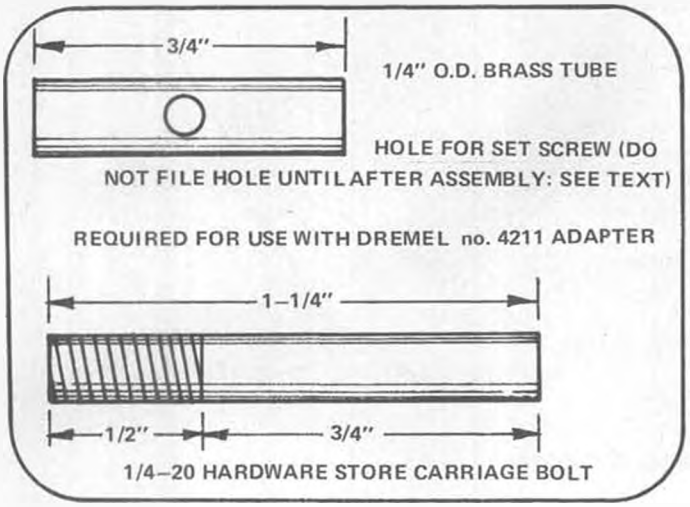
By ELOY MAREZ . . . Not one, but two different ways to adapt the molded sanding disc from Strick's Enterprises to the popular Dremel Moto-Shop. Once you use it, you won't ever build without it again!

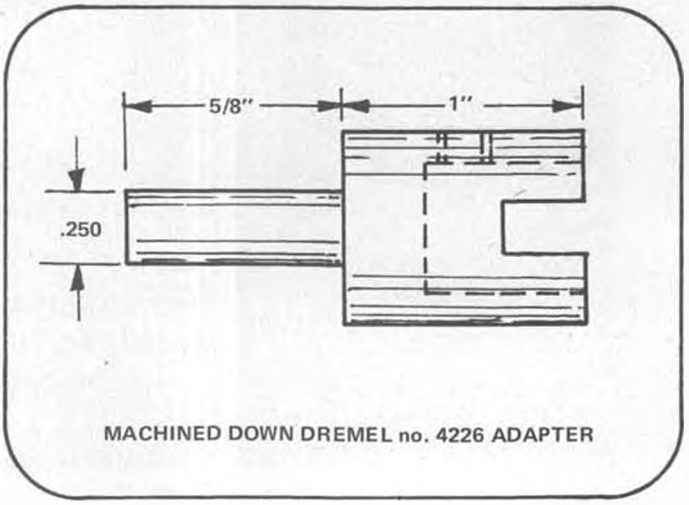
• The Dremel jig saw, actually called by the maker a "Moto-Shop", as it is equipped with an external motor shaft to which a number of accessories can be attached, is high on the list of most modelers' planned or actual first purchase of power tools. And rightfully so, for it is a versatile piece of equipment, capable of handling the largest percentage of modeling materials in most of the sizes that we work with.

One of the accessory attachments, the flexible rubber-backed sanding disc, is useful for removing large amounts of material, and for rough sanding and shaping. But it is not really designed for accurate end and finish sanding, such as can be done with a rigid disc. Once you have used a rigid-disc sander, such as the "Powr-Mite" 4-inch sander by Strick's Enterprises, you'll wonder how you ever got along without it. The "Powr-Mite" has an adjustable work table, miter, and you can purchase the adhesive-backed, pre-cut sandpaper discs in all grades necessary for model building. It is powerful enough to handle all the materials we build from. We use it and recommend it.

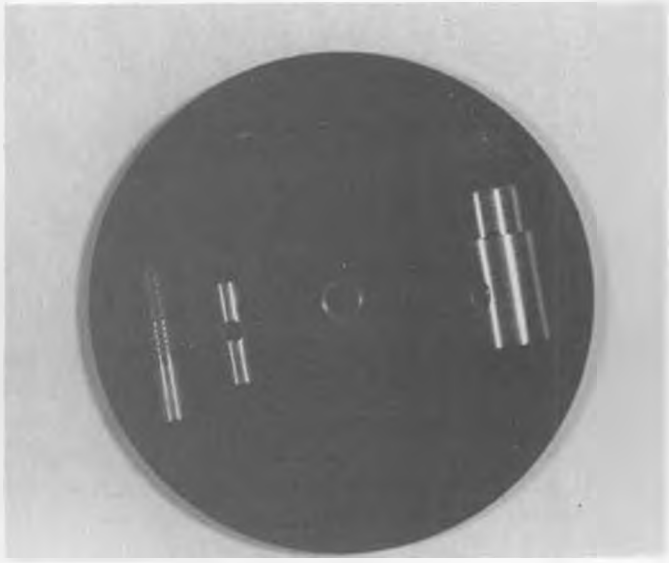
However, there is always the matter of the modeling budget, and maybe you think you need a new pumper .60 more than you need a "Powr-Mite". If so, and you already have a "Moto-Shop", we recommend you consider adding the disc part of the "Powr-Mite" to the Dremel. We have worked out two methods of doing so, one which uses all readily available Dremel and hardware store items, and for which you need only a hacksaw and a file to assemble. The second method will result in a slightly truer running disc, but requires about ten minutes of your lathe-owner friend's time.

For the first method, you'll need a Dremel arbor adapter, part No. 4211, which is the one that comes with the rubber backing disc; a hardware store 1/4-20 partially threaded bolt, and a 3/4-inch piece of 1/4-inch O.D. hobby shop brass tubing. The tubing and the bolt are cut to the dimensions shown in the sketch, and the tubing is slipped over the unthreaded portion of the bolt. From then on, it is obvious. The threaded portion of the bolt goes into the Dremel arbor adapter, and the disc goes over the brass tubing. Be sure the end of the tubing and bolt are flush with the outside of the disc, and tighten the set screw just enough to make an impression on the brass tubing. Take everything apart, and file a hole in the tubing so that when reassembled, the set screw will go through the hole and bear directly on the bolt. Take it apart once more, and file a flat spot on the bolt at the place the set screw goes. This time,





Adapter parts for the simpler of the two methods. Be sure to use a 1/4" *carriage* bolt; the shank will be undersize enough to provide a close fit in the 1/4" O.D. (7/32" I.D.) brass tube.



Adapter parts cut to size and ready for assembly.

when you get it all together, it is ready to be installed on the motor shaft per the instructions from Dremel.

The other, and preferred way, also starts with a Dremel arbor adapter. In this case, it is No. 4226, as furnished for use with the grinding wheel and wire brushes. One end fits over the motor shaft, and is left as is. The other end, 3/8-inch in diameter and threaded, requires turning down to 1/4 inch to accept the disc from Strick's "Powr-Mite". As before, note where the set screw bears on the newly turned-down portion, and file a flat there. Assemble, and install on your "Moto-Shop".

The second method described above results in a truer-running disc, but even the worst combination of either way is accurate enough. The purist can try different positions of the disc on the shaft until any alignment errors are averaged out and the disc runs perfectly true.

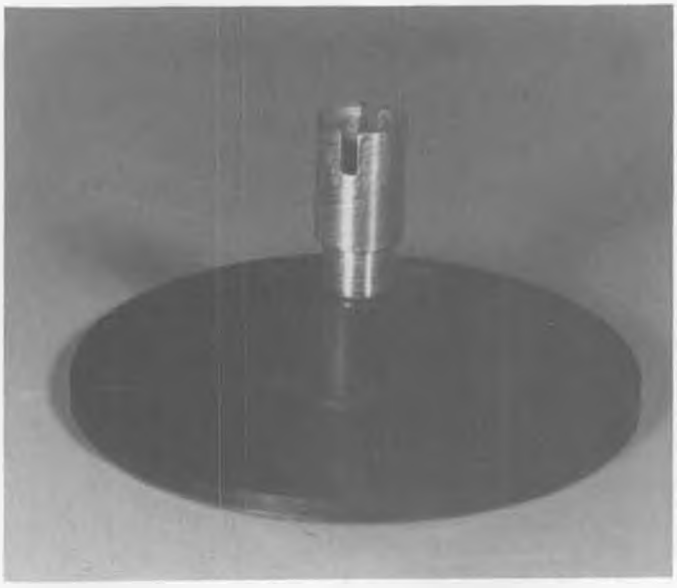
The Dremel adapters mentioned should be available from the dealer from whom you purchased your "Moto-Shop". If he doesn't have them and can't get them, they can be ordered from Sig Manufacturing Co., Montezuma, IA 50171. They are priced at $1.20, plus a postage allowance, depending on where you are.

The disc, Strick's Heavy-Duty model, for 1/4-inch shaft is priced at $4.95. Adhesive-backed sandpaper discs cost $1.95 for four, in either fine, medium, coarse, or assorted, and $3.95 in an economy assortment that contains 10 discs. The "Powr-Mite", as well as all of the above, can be ordered directly from Strick's Enterprises, P.O. Box 2340, Lake Havasu City, AZ 86403. All of the items are also listed in Ace R/C's catalog, whose address is Box 511, Higginsville, MO 64037.

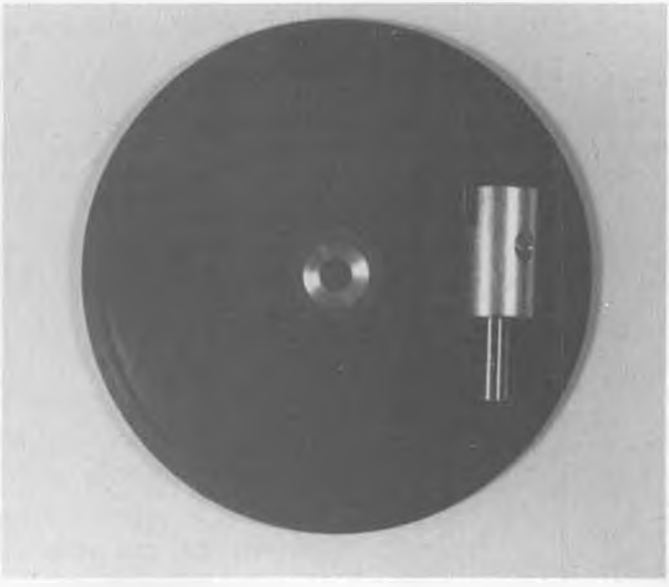
The versatility and accuracy of your new sander can be increased even more with the addition of a work support table or platform, such as is part of the "Powr-Mite". A simple inverted U-shaped table, made from three pieces of half-inch plywood will be adequate. The work surface of the table should be about 1/8-inch or so below the centerline of the motor shaft.

We recommend the use of some sort of eye protection any time a power sander of this type is used. And, while these small ones with no external motors or belts or moving parts other than the disc are not as dangerous as many other power tools, they can still wreck your fresh manicure, so be careful with the fingertips also!

You may now choose between calling it your Drick's, or your Stremel . . . in either case, it will add considerably to the quality of your work at a definite savings in time. •



Sanding disc with arbor adapter attached, using the parts shown above.



Dremel No. 4226 arbor adapter, turned down to fit the hole in the disc. This is the better of the two methods, but requires a lathe.

ANNOUNCING!

MODEL BUILDER magazine's

FIFTH ANNUAL INTERNATIONAL

Parcel Post Proxy Peanut RUBBER SCALE CONTEST!

Every peanut model, from near or far, will be proxy flown, indoors, by some of the U.S.A.'s best rubber scale flyers, including Walt Mooney, Bill Hannan, Clarence Mather, Bob Peck, Fernando Ramos, Bill Warner, and many others.

Local modelers will be allowed to enter, but their planes must also be proxy flown, and no verbal or physical help will be allowed from the owner . . . only written instructions to the proxy flier, as allowed for all entries.

SPECIAL EVENT

This year's contest will feature a one-design *event, for Walt Mooney's easy-to-build and fly De Havilland DH-6 (Jan. '74 MB). For this event only,* no documentation will be required! *Static judging will be based only on workmanship and fidelity to Mooney's plans, a* FREE *copy of which will be included with your contest papers.* That's right . . . put any color and markings on your DH-6 entry that you wish. *Same model cannot be entered in the regular World War I category.*

Open to modelers from all parts of the world... any nationality... any age... any sex... come one, come all!

AWARDS to include TROPHIES and MERCHANDISE . . . ALSO, a KRAFT RADIO SYSTEM to the

GRAND PEANUT of 1979!

(HIGHEST OVERALL COMBINED STATIC AND FLIGHT SCORE)

PRIZES FOR THE SPECIAL ONE-DESIGN EVENT INCLUDE A RADIO SYSTEM FOR FIRST PLACE OVERALL, PLUS PRIZES FOR BEST WORKMANSHIP AND BEST FLIGHT TIME. Other prizes include such items as; Peanut Scale kits and materials, electric and glow powered engines, CO_2 engines, Uber Skiver knives and sets, T-Shirts, and much more!!

Contest Director: CARL HATRAK

Competition will be divided into five (5) classes: Pioneer, World War I, Golden Age, World War II, and Modern. There will also be individual awards such as; most distant entry, best shipping container, entry most damaged in shipping (Don't try hard for that one!), best entry built from Walt Mooney plans, best model by a female, best entry by any modeler under 15 years of age, oldest qualifying contestant, youngest qualifying contestant, best biplane (Big John Award!), best entry built from a Peck-Polymers kit, longest flight, most static points, plus a few surprises.

Chief Static Judge: RUSS BARRERA

Scoring will be based on the total of each entry's static scale points (100 maximum) and flight points (100 maximum). Static judging will be according to AMA Indoor Rubber Scale rules. Flight points will be the average of the two best flights out of four official flights (10 seconds minimum, 100 seconds maximum). Ties will be broken by highest single score, or a fly-off. Number of attempts to be limited, subject to size of total entry. DO NOT SEND UNTESTED MODELS! *A three-man jury will preside over all decisions.*

SCHEDULE: Register by mail on or before February 1, 1979
Models to be on hand on or before April 1, 1979
Contest to be held approximately April 15 to May 1, 1979

Send in now for your registration form, which includes an entry blank, a complete set of rules, and other particulars. Write to:

MODEL BUILDER PROXY PEANUT CONTEST
621 West Nineteenth St., Costa Mesa, California 92627 USA

FREE FLIGHT AND CONTROL LINE

This magnificent control line "Bent Wing" Corsair was designed and scratch-built by Dr. Jorge Marquez, of Puerto Rico.

Bud Romak winding for an official. Bud got 40:55 on this flight, totalled 81:22 for second place behind Jim Richmond.

Bud Romak with his indoor ship. Site was the airship hangar at Cardington, England. U.S. team was 2nd behind Great Britain.

PHOTOS BY AUTHOR

INDOOR 1978 WORLD CHAMPIONSHIPS

By JIM MOSELEY . . . An eyewitness account of the 1978 Indoor World Champs held at Cardington, England. The U.S. did well, taking first in individual and second in team standings.

• Although not an indoor flier, I had been involved in one way or another with previous Indoor World Championships at Cardington in 1972 and 1976, and on each occasion found it to be a memorable experience in all respects. Early in the year, rumors circulated that the 1978 contest might well return to the R101 airship shed with the cancellation of the infamous European salt mine venue; these were discounted when Lakehurst became the likely site, only to revive once more when it was heard that the New Jersey hangar could not be obtained at the time required.

In March, the SMAE Secretary, George Lynn, notified me that he had just received confirmation from the F.A.I. that the Championship was to be in the U.K., and I promptly booked in for the entire period of the event, timekeeping for the two days of the contest proper and generally enjoying the company of the many friends made previously for the remainder of the time, as well as shooting a few rolls of film meantime.

The SMAE was already heavily committed for August with the U/C and Scale World Championships, to be held at Woodvale, and the addition of the Indoor event to the calendar at such short notice necessitated a great deal of work for those officials and assistants involved in the organization, and the fact that the event proceeded as planned is a credit to all so concerned and involved, particularly George Lynn, who also served as CD during the Championships, and with thanks also due to the proprietors of Model and Allied Publications (publishers of *Aeromodeller*, amongst other magazines), who underwrote the finances of the venture.

The British team was practicing only a week before the contest, and at that

New World Champion, Jim Richmond, gets 2nd place team diploma from Bill Hulbert.

Canadian team member Ron Higgs was 3rd with a 76:29 total. First time on team.

Mike Thomas, of the Canadian team, taking his well-built model out for an official. Few new design trends were seen.

English team member Derl Morley's best time was 38:06. Prop on Derl's model is almost as big as the wing!

Sven-olov Linden, a member of the Swedish team, had flights of 32:54 and 31:34, for a total of 64:28.

Canada's Jack McGillivray fitting the prop to his model. Model has higher-than-usual wing and low camber airfoil.

Contest Director George Lynn did an outstanding job of running the meet.

Klaus Nottemann, of W. Germany, seems to be holding his breath while working on his indoor ship. Klaus' best flight was 32:07.

time the shed was obstructed with balloons and various assorted equipment, the roof had holes in places, and the structure was festooned with hanging ropes. At that time it seemed very possible that no improvement could be made in the intervening period. However, the Service and civilian staff worked like beavers, moving balloons into the other hangar alongside, patching the roof panels, and securing the multitude of lines, and by the practice day, August 26th, the shed was clear with the exception of a small airship tucked away at the far end of the area, together with a quantity of palleted material.

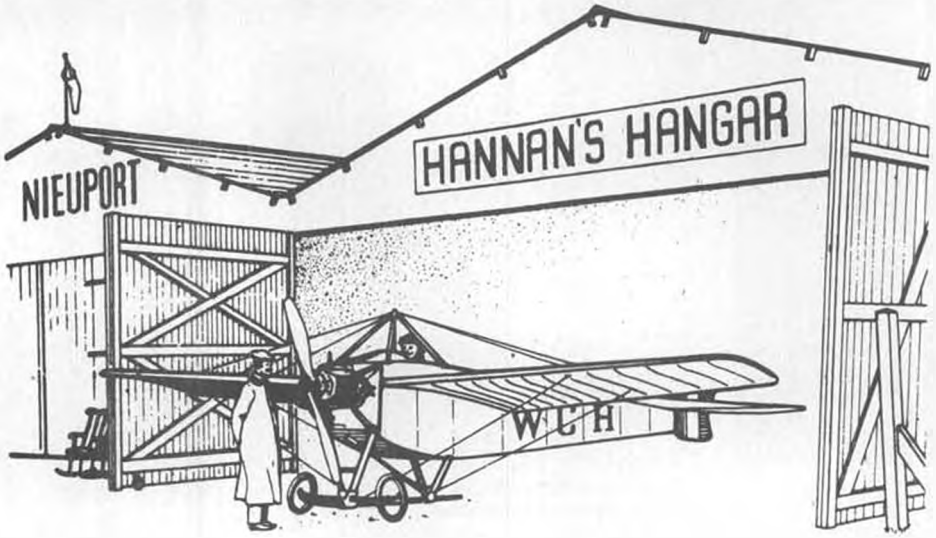
Once again, contestants, supporters, and officials were housed in officer cadet quarters at R.A.F. Henlow some nine miles from the flying site, and Friday found the dormitories rapidly filling with enthusiasts from 15 nations . . . or, rather, 14 nations, as the Argentinians failed to arrive; a disappointment, especially as theirs was the first entry to be received in Indoor from that country. The R.A.F. catering standards were to the same high level as in 1976, and although the outstanding cold buffets supplied at the hangar on that occasion were missing this year, adequate packed lunches were provided.

Saturday saw a mass exodus from Henlow after breakfast, the organizers providing a small bus for those with no personal transport, which ran a regular ferry service between the quarters and Cardington. In the hangar, tables were quickly appropriated by teams and models unpacked amongst a great deal

Continued on page 111

Swedish team member Sven Pontan also flew FAI Team Race at U/C W/C, is accomplished cyclist and pistol shot!

Eduard Ciapal of Poland had a two-flight total of 73:13, presently holds FAI Cat. III record.



Dr. Dee Matthews demonstrates that it is possible (but not easy!) to launch and photograph a model in flight. Peanut Farman "David" is CO_2 powered.

"A few good turns a day should not make anyone dizzy."

• Ask any control-line flier!

WOODVALE WRAP-UP

Although results from the international contest held at Woodvale in England have been previously reported, information received since appears worthy of note, because the future of World Championship scale model flying may be drastically affected.

The proceedings were marred by political action, which resulted in the withdrawal of certain teams, even though some had actually reached the contest site. The net result was the elimination of the World Championship Control-line Scale event from the program, and expressed fears for its future. An FAI requirement stipulates that a minimum of five countries must participate for an event to have international recognition, and that all FAI member nations must be invited.

Walt Perkins gave this report: "The 'official' word on C/L Scale, as given to me from the World Championship Headquarters, was that it was cancelled 'simply from lack of sufficient entries'. It was obvious they didn't want to talk about *why* there weren't sufficient entries! Several teams left the first day, some members in tears; others philosophically shrugging their shoulders and shaking their heads. A lesson to be learned: With government support (greenbacks) come government strings!" *(Sometimes even without government support we get government strings . . . see last month's "Workbench" column. wcn)*

Doug Gillies reacted in this manner: ". . . seems an awful shame that this has to happen . . . no country on Earth is so pure that it can throw stones with a clear conscience."

Woodvale Scale director Eric Coates expressed the opinion that C/L Scale may never again appear as a World Championship event, saying: "I don't see 5 teams travelling to Canada in 1980. I doubt if there will even be a U.K. team possible by then."

Certainly it is unlikely that the model builders themselves are creating the problem (although there ought to be many more of them supporting control-line scale!). They have their hands full enough with GENUINE difficulties,

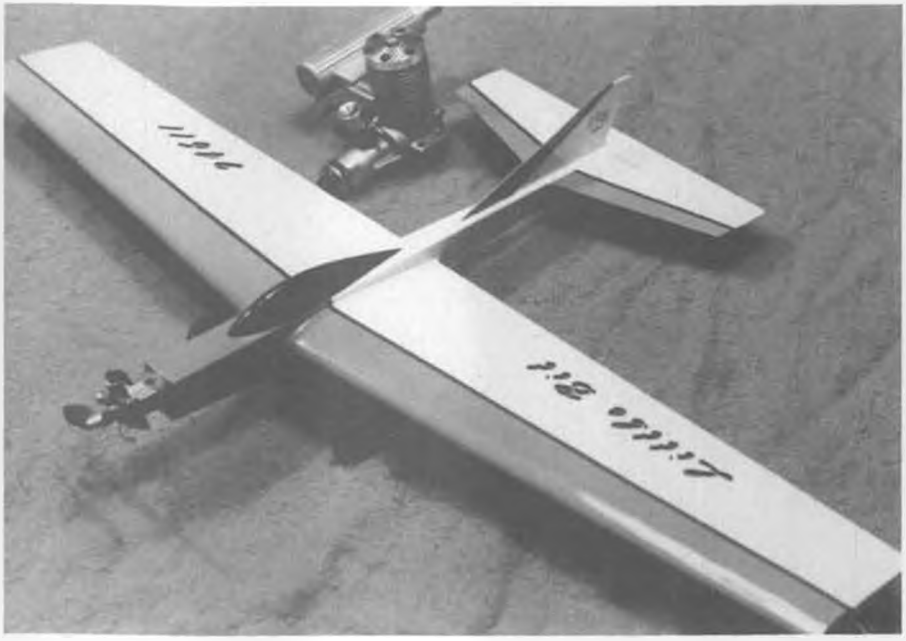
Continued on page 107

The old and the new: Cecil Peoli Pusher and Lotus Espirit belonging to Hal Cover, seen at the SCAMPS Twin Pusher contest at Mile Square. Model flew beautifully.

Rubber-powered Fokker D-XXIII by Osvald Jamisch, of Czechoslovakia, built from plans by the photographer, Lubomir Koutny.

The "Twirp" construction article (MB, Nov. '75) had a photo of the author's daughter, Beth Gibson, holding the model; the caption described Beth as "pushrods, bellcranks, and all", because of the full-body steel and leather brace she wore for years. Shown above is the latest Twirp, scaled up to 30", also being held by Beth, who is no longer operated by pushrods, bellcranks, and all (thank God).

Randy Heydon with his pride and joy. Model has amazing performance for its size.



Randy is waiting for Little Bit to grow up so he can take the .010 off and hang an S.T. .46 on the nose. Plans include a special lightweight handle to improve control feel.

PHOTOS BY BART KLAPINSKI

"LITTLE BIT"

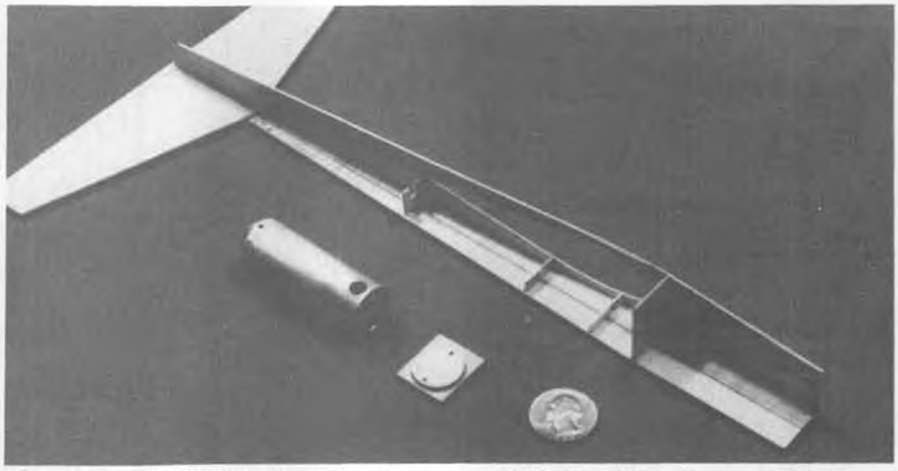
By RANDY HEYDON . . . Wanna do a "one up" on the guy who's bragging about his ability with a Half-A stunter? Pocket your day's supply of fuel in a medicine bottle and head for the circle with this cutie.

• Take a little bit of balsa, a little bit of effort, and a little bit of practice; put them all together and what do you get? A whole lot of airplane! Designed expressly to take advantage of the powerful Cox .010 engine, "Little Bit" is not just a scaled down .35-size stunt ship. The high aspect ratio wing, combined with a reasonable amount of wing area and light weight, amounts to performance that will amaze the local stunt grunts, as it will fly the complete AMA stunt pattern on up to 35-foot lines! If you think you are ready for a small, high-performance stunt machine, or just want an excuse to buy an engine that costs six-hundred dollars a pound, read on.

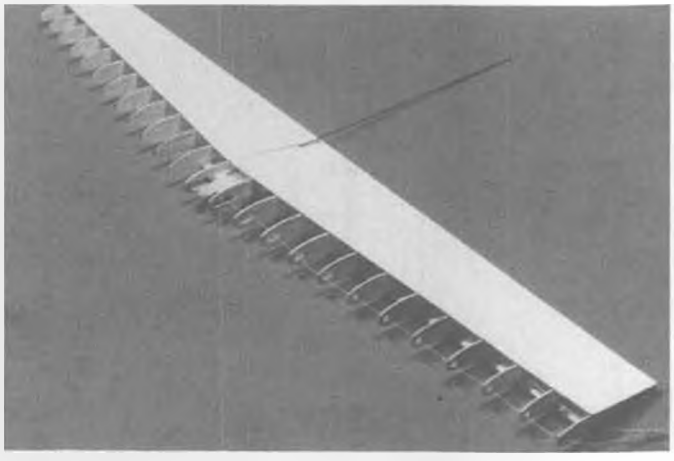
WING

Cut out the top and bottom trailing

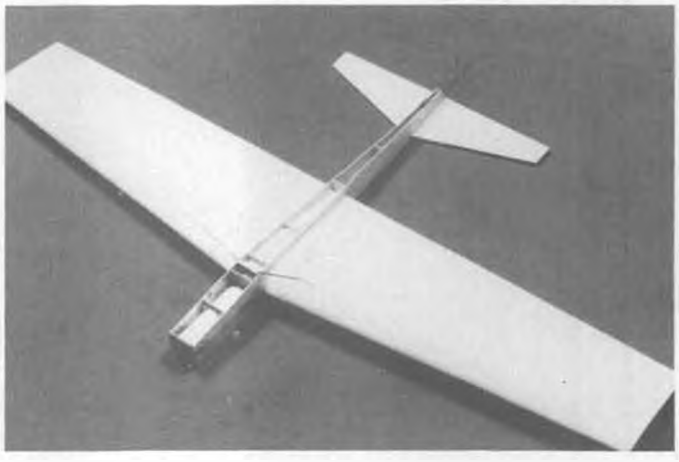
Continued on page 102



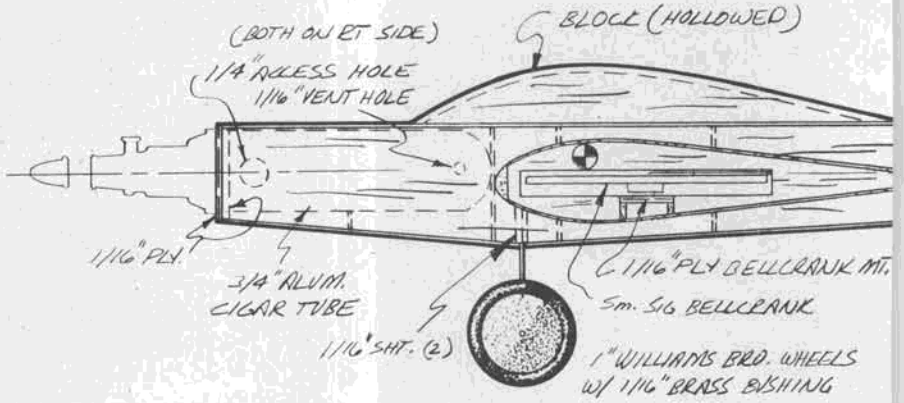
Partially completed fuselage, firewall, and tank tube. Finished model weighs a mere 2-1/2 ounces. Note the access and vent holes drilled in the tank tube.

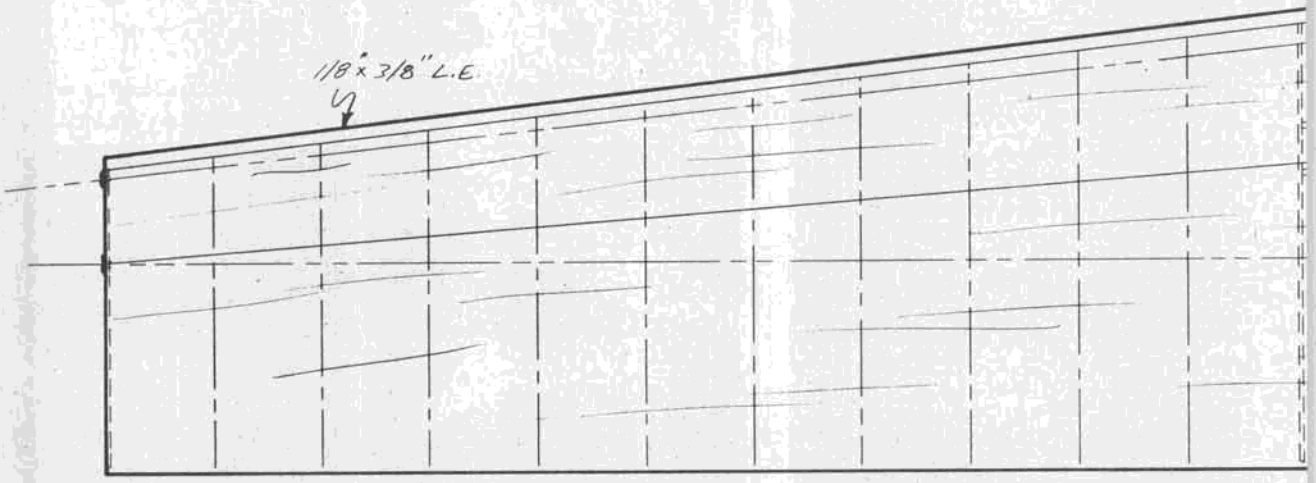


Wing assembly with controls installed, ready for the l.e. sheeting and l.e. cap.



Bottom view of the basic structure. Hole in fuselage side at nose is for fuel line access. Model uses a bladder tank.



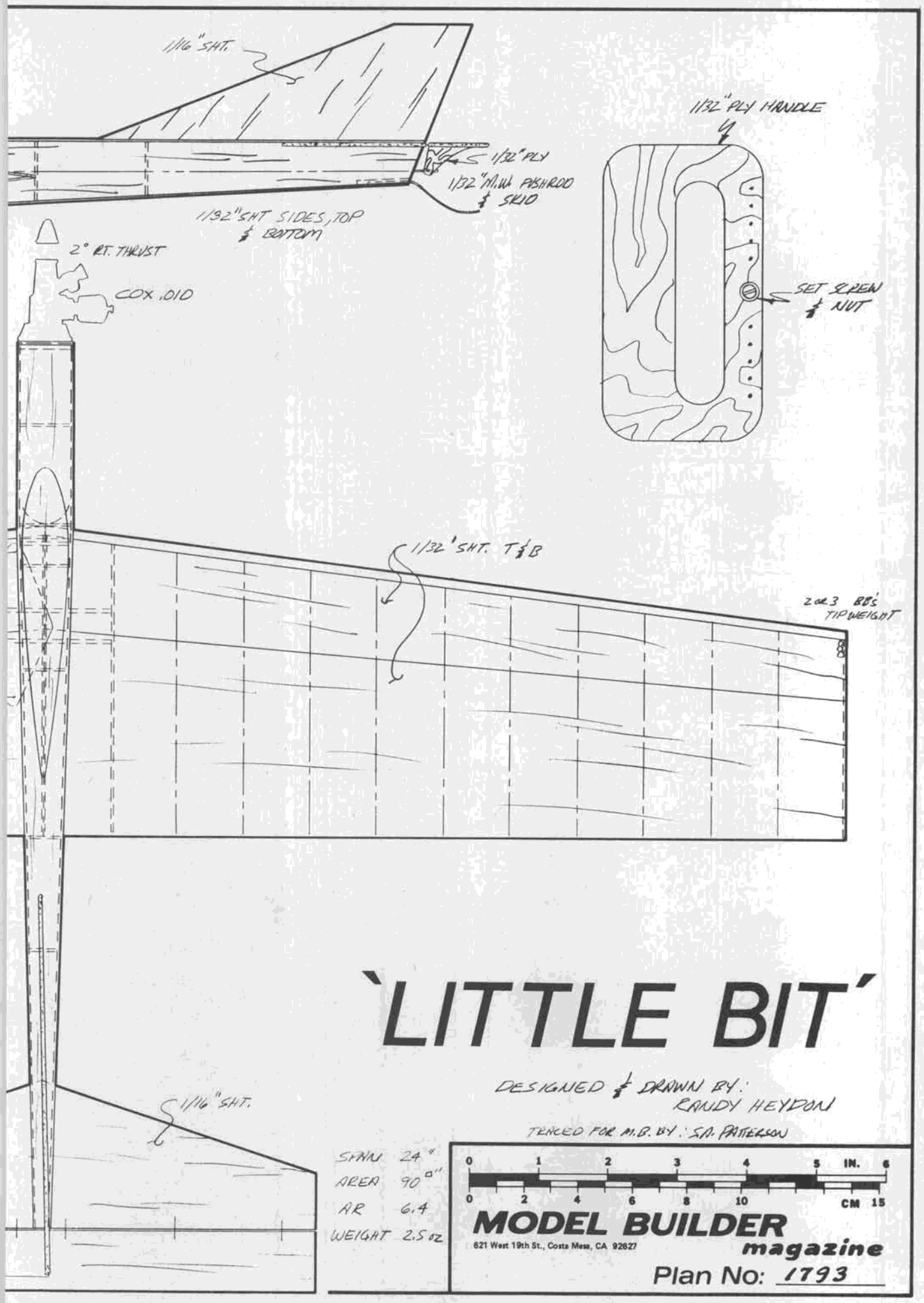


*NOTE: SELECT WOOD CAREFULLY
USE CONTEST WOOD EVERYWHERE EXCEPT IN THE FUSELAGE.

1/32" PLY RIB TEMPLETS
ALL RIBS 1/32" SHT.

*NOTE: ALL PARTS BALSA UNLESS OTHERWISE NOTED

SEWING THREAD HINGES


1/16" SHT.
1/32" PLY
1/32" M.W. PUSHROD & SKID
1/32" SHT SIDES, TOP & BOTTOM
2° RT. THRUST
COX .010
1/32" PLY HANDLE
SET SCREW & NUT
1/32" SHT. T&B
2 or 3 BB's TIP WEIGHT
1/16" SHT.
`LITTLE BIT'
DESIGNED & DRAWN BY: RANDY HEYDON
TRACED FOR M.B. BY: S.A. PATTERSON
SPAN 24"
AREA 90.0"
AR 6.4
WEIGHT 2.5 oz
0 1 2 3 4 5 IN. 6
0 2 4 6 8 10 CM 15
MODEL BUILDER magazine
621 West 19th St., Costa Mesa, CA 92627
Plan No: 1793

Scene at the C/L World Champs. FAI Combat winner Mick Tiernan (left) has it out with Stu Holland. Charlie Johnson photo.

The most outstanding model at the W/C (at least when flown by Fraisse, of France), being launched by French teammate.

Control line

By "DIRTY DAN" RUTHERFORD

SPOKE TOO SOON

Last month I mentioned the stack of rules proposals facing members of the CLCB (Control Line Contest Board), and that the stack was not as thick as usual. Since then, some more proposals have come shuffling in to bring us up to almost 90.

And a few have been of the wacko variety; I see some problems coming up here shortly. Best thing for you to do is to keep current on these proposals and let somebody, preferably your representative on both the CLCB and any special interest advisory boards, know what you think.

Mixed in the stack of late arriving proposals is one to create another class of Combat, this one for 1/2A. I just can't believe that somebody would want this class of Combat added to the AMA rulebook. Small-bore Combat can be a lot of fun when flown at local contests or informal practice/flying sessions, but to fly it as a regular AMA event across the country would destroy the fun aspect of the event.

Let me explain. As it stands now, there are no AMA rules pertaining to small-bore Combat, so when a group decides to fly the event for fun, they tend to look to their local fliers for guidance in what type of small-bore Combat events to stage. In one area, it may be that WW-II biplanes powered by Cox Black Widows will draw the best, so the rules stipulate that. For another group, Golberg Lil' Wizards with any .049 engine may work best for what they want out of the event.

In this area we went in for 1/2A Combat several years ago, but only as an event to practice with. I don't recall but very few

Ron Duly and one of the Carrier ships he flew to 1st in Class I and II at Aero-Challenge.

At left is Paul Smith with wife Moira, on right is Kelly Henocq with his wife (sorry, didn't get her name). At Aero-Challenge '78, Paul won Slow Combat, Kelly won FAI and Fast Combat.

(if any) serious 1/2A Combat events being flown in sanctioned contests in this area, even though we enjoy top-level Combat competition in the AMA events. We simply wanted to practice Combat, so left the rules pretty loose. In fact, about the only requirements were 35-foot lines and an .049 or .051 engine.

All of the flying took place on weekends and Wednesday evenings, and was of the "grudge match" variety. You just got ready and challenged somebody to a match. With Phil Granderson, Gary Stevens, and myself involved, there got to be quite a duel going on, with the three of us and several others continually trying to come up with a model that would turn tighter, fly faster, and be more stable than the other guy's.

We learned a lot about building very quickly, eliminating anything not absolutely necessary to top performance, building light, and how to make TD .049's scream their guts out and like it . . . up to a point.

At the peak of interest in small-bore Combat, quite a number of us had models that made a really good AMA (Fast) Combat plane feel a little slow and unresponsive. In my case, I wanted planes that were harder to fly than any Fast ship. The idea here was that if I could get good at flying a twitchy plane, then flying a honkin' Fast ship would be more like flying a Slow Combat plane. Being in full control of the model is half the battle in any Combat event, you know. At any rate, my final in a series of designs was the Dirty Beaver, which I published in **MB**. It is very easy to build, should *not* be punched into the ground, is a bit tail-heavy, making it extremely fast on the controls, and will turn tight enough to do figure-eights inside the loops of most any other 1/2A Combat model you would care to name, the designs of Granderson and Stevens being about the only exceptions.

With such models, you can imagine what the matches were like. Fast and furious is the only way to describe the way we flew; it was difficult for even seasoned Combat fliers to keep up with the action. Unlike most 1/2A Combat matches you see, we got to the point where we could take cuts with fair accuracy, even with the tiny 5-inch diameter props, and to see a clean kill made was not at all out of the ordinary. I recall a match with Gary where both of us had three cuts on the other, finally ending in a superb kill (your choice as to who got the kill).

Besides superior models, all of us ended up with a few other things of interest. Special handles had to be designed and built, as the 1/2A models have very little pull. What we came up with were lightweight handles with leadout wires of .018 in. dia. Ultimate performance meant the use of .008 control lines, but these are very fragile. Most of the time we used .012 lines, but even then the lines were cut with models flying away. Once I got cut loose and the model flew away, powered by one of Scott Newkirk's honkers. Never did find the plane.

But the biggest thing that all of us ended up with was boxes of blown motor parts. To get that last bit of speed and turning ability, we used 5-1/4 x 3 props (Top Flite nylon, or better yet, Top Flite Super-M), 60% and 70% nitro fuel, and a few internal tricks done to the engines themselves. For me to blow at least one honkin' engine per flying session was not uncommon; one day I blew up three of them.

The above is not to complain in any way. I got more out of flying 1/2A Combat than it cost me, so I have no regrets. What I am trying to point out is the level of competitiveness 1/2A Combat will achieve, if it makes it to the AMA rulebook. We've been there already and have proven that, while it was terrific fun for our group, the event would be nothing more than another Fast Combat event, using smaller models and engines.

Another thought just struck. When we were really into 1/2A Combat, it was much easier for a beginner to get started in Slow or Fast than 1/2A. Most of the stuff we were using wasn't available at the local hobby shop, the trick handles being just one item.

I would think that 1/2A Combat would be much better off if left out of the AMA rulebook, leaving local clubs a much freer hand in deciding exactly what type of 1/2A Combat event meets the needs of their fliers, and then writing up their own rules. And, yes, I know that AMA rules can be modified to suit each group's requirements, but when dealing with an official AMA event, the clubs usually go the easy way, using AMA rules.

I've taken a lot of space from this month's column for the discussion about 1/2A Combat, but the points made also apply to many other events. The first to come to mind is the now official 1/2A R/C Pylon event, which is a real joke to anybody who has been involved in 1/2A Pylon. Another example is AMA Slow Rat, which has to be the convincer that local fly-for-fun events are completely destroyed, at least as far as the original intent of the rules is concerned, when said event goes AMA.

INDOOR C/L RACING

With many modelers socked in by weather, I suppose it is about time to dig out the letter from Ol Blu's (sic) keeper, Glenn Lee. Glenn wrote me after mention of the CO_2-powered Indoor C/L Racing in one of last year's columns.

Seems that the planes are called Gnat Racers, races are 70 laps, two fliers per race, lines are 10 feet long, only the Telco CO_2 engine is allowed, and it must be fed with the stock Telco tank. Also, only one charger is allowed in each pit. You can use more than one CO_2 cartridge, but each fresh one has to be used in that one charger allowed.

Note that this event is not of the R-T-P (Round The Pole) variety, as widely practiced in England with electric-powered models. No, in this event you actually fly the plane from the center of the circle, just as in any C/L racing event. I know that friend Bill Hannan got confused on this point, so maybe some others did also.

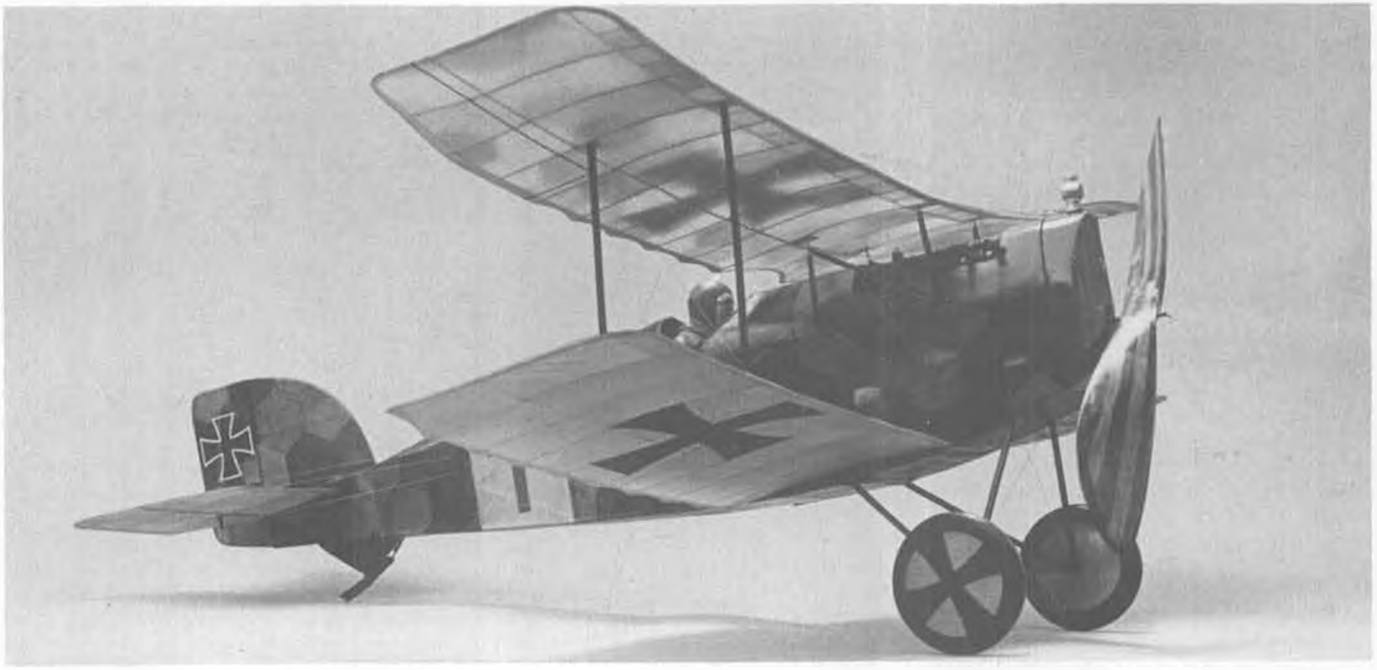
With the short lines, there are lots of possibilities as far as sites go . . . any room 30 x 30 ought to be OK. It might be nice to have a high ceiling, but then again, an 8-foot ceiling would eliminate any problems concerning high flying, now wouldn't it?

Almost forgot, Gnat Racing was invented by the Tree Town Modelaires. Glenn emphasized that point, and if the

Continued on page 101

Just some of the goodies given away at the '78 Aero-Challenge. Proceeds went to Muscular Dystrophy research. Bill Allen photo.

Three of the guys involved in Gnat Racing (l to r): Page Peterson, Pete Mazur, and Jerry Meyer. Photo by Glenn Lee.



PHOTOS BY AUTHOR

AVIATIK D-1

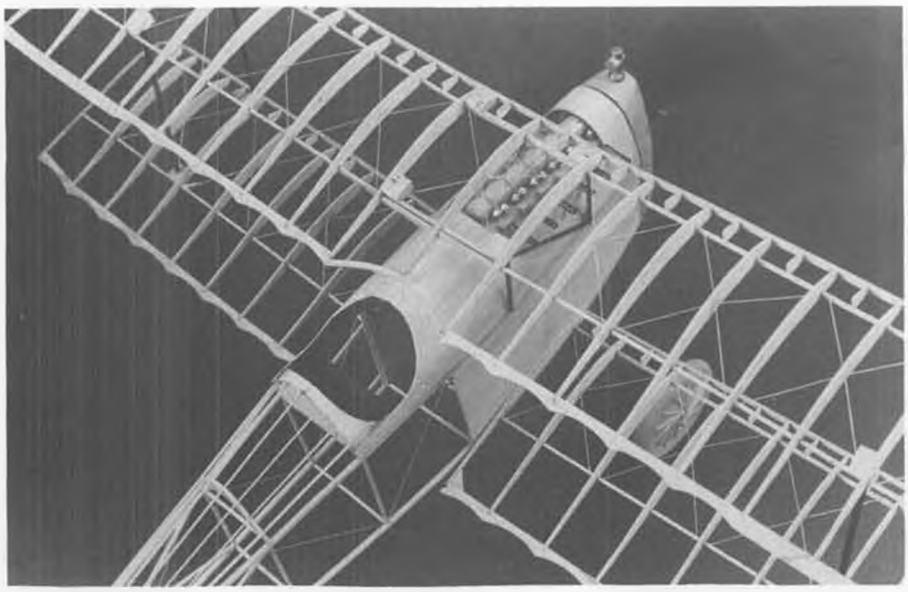
By BILL NOONAN . . . Another lesson in the fine points of outstanding free flight scale construction, by one of the recognized experts. Even if you don't plan to build this model, you can learn a lot by reading about it.

• The Aviatik D-I, sometimes called the Berg D-1, after its designer, was of Austro-Hungarian origin, and was used on the Italian front in considerable numbers between autumn, 1917, and the armistice in 1918. It was a compact, single-seat fighter with a wingspan a little over 26 feet. The hatchet-like fueslage provided relatively good protection and accommodation for the pilot. The D-I's robust appearance belied a somewhat fragile structure, which was subject to constant modification during its short-lived production by no less than five manufacturers.

The Austro-Hungarian army assigned a complex numbering system to its aircraft. The system identified the aircraft constructor, model type, and aircraft number in the series. As an example, our reproduction is of Aviatik D-I, 138.43. The number identifies the 43rd plane produced by Aviatik in the second production order (Aviatik was assigned 38, 138, 238, and 338 prefixes). The source for all of our information in preparation of the model is Profile Publication number 151. You may wish to consult it for color schemes, etc.

The Aviatik company, and its chief designer, Julius von Berg, were the orginators of the D-I, but the design was always being changed during production by other contractors. This accounts for the varied appearance, particularly in the radiator area and placement of armament. Pilots found the D-I responsive and pleasant to fly, but the cooling was its Achilles Heel; hence the fiddling around with the radiator design.

Production documentation in Austro-Hungary was a bit careless in 1917, so it is not known exactly how many D-I aircraft were built by the five contractors, but it is thought to number about 700 to 800.



Closeup of Aviatik structure reveals Bill's close attention to detail. Note especially the detail on the engine. Odd-looking gizmo on top of the engine cowl is an air pump.

CONSTRUCTION

Fueslage construction follows the time-honored method of building the sides over the plan. Hold the main (top and bottom) 3/32 sq. longerons on the wax-paper-covered plans by using plastic "pin-downs" (available through Peck Polymers). These handy little gizmos secure the balsa in place without the hazard of splitting the wood. The upright and diagonal components are hard 1/16 square balsa, with the exception of the nose and tail uprights, which are 3/32 square. Use of 1/16 stock allows the 1/32 sheeting to be inset into the fuselage, forming flush sides. Be sure to make a right side and a left side, one built over the other, separated with Saran Wrap or wax paper to prevent surplus glue from causing problems.

When thoroughly dry, remove the sides from plan and cement them together at the tail post, holding with a weak clamp. Set the fuselage on bottom longerons and cement in the 3/32 cross braces at the widest point in the fuselage, forward of the cockpit. Check the fuselage for alignment by sighting from

the front. When these cross-pieces are dry, add the rest, confirming taper width at former stations. This is important, as the formers won't fit if there is a discrepancy here.

Laminate two pieces of 1/32 medium balsa sheet at 90-degree angles to make former material. This is a little more trouble than using 1/16 sheet, but it provides stronger parts which resist splitting when being notched for stringers.

Do not notch the formers when cutting them out. Cement them in place at their respective stations. When the formers are dry, establish the center stringer line by holding a straightedge along the center line of the fuselage. Mark them with a soft pencil or fine marker. File stringer slots to accept 1/32 x 3/32 basswood stringers. Repeat the same procedure for the adjacent stringers. Cement the stringers in place, noting 1/32-inch reduction in the stringers depth forward of bulkhead F5. This is to accommodate the 1/32 sheet balsa covering which forms the cockpit and cowl. Carefully bend the sheet covering over the area described. It is well to start at the center stringer and work your way around to the right top longeron, then repeat on the left side. This operation will require patience and judicious use of pins and cement.

Cut the 1/32 sheet balsa nose and tail sides and inset them into the fuselage sides, cementing to the longerons and 1/16 square uprights. Sand carefully when dry, to make the best base for a neat covering job.

Cut two paper patterns, one for the engine cowling cut-out, the other for the cockpit. Position each in the correct place and trace with a soft pencil. Remove the 1/32 sheet, including the surplus stringers underneath. This can be done with both a sharp modeling knife and fine-tooth saw. A Dremel tool circular saw is handy for cutting the stringers. Sand the edges when complete, noting that the engine cut-out is "coved" in the corners.

The author and the completed model, ready for winding . Note the trim tab on the upper port wing. Model has a very realistic rustic appearance.

Laminate the nose block from three pieces of medium 1/4-inch sheet balsa, the center lamination set 90 degrees from the others. Rough-form with a knife and sanding disc. Spot-glue to the fuselage with Hot Stuff, Zap, or similar. Finish contouring to conform to the fuselage shape, finishing with progressively finer grades of garnet paper. Carefully cut the nose block from the fuselage and drill a hole for the thrust button, providing for about 2 degrees down-thrust. The radiator is cut from brass filter screen. It is cemented in place later, after the model is doped.

The simulated Daimler-Benz engine is made of balsa. The major components are separate pieces: 1) base, 2) exhaust manifold, 3) intake manifolds, 4) valve cover, and 5) rocker arm-valve spring assemblies. The exhaust pipes are cocktail straws. The assembled engine sits on a 1/32 sheet balsa "floor" between former F1 and former F3. Valve springs may be simulated by wrapping coarse thread around 1/16-inch diameter dowels. Finish the engine with three coats of sanding sealer. Paint it dark gray. A worn metallic appearance may be had by buffing the engine with powdered graphite, available from locksmiths.

Going from the nose to the tail, the rubber motor anchor is made of 3/16-inch O.D. aluminum tube, held by friction fit between two laminated uprights. See side view.

The tail skid assembly was a rather ingenious affair, not the usual sterile, characterless appendage. The conical base (part TS on our model) was a handsomely conceived plywood veneer support which provided a fulcrum for the pivoting hardwood skid. Landing shock was taken by a sort of bungee cord attached to the longerons. There is no record of any Austro-Hungarian pilot ever complaining about the tail skid.

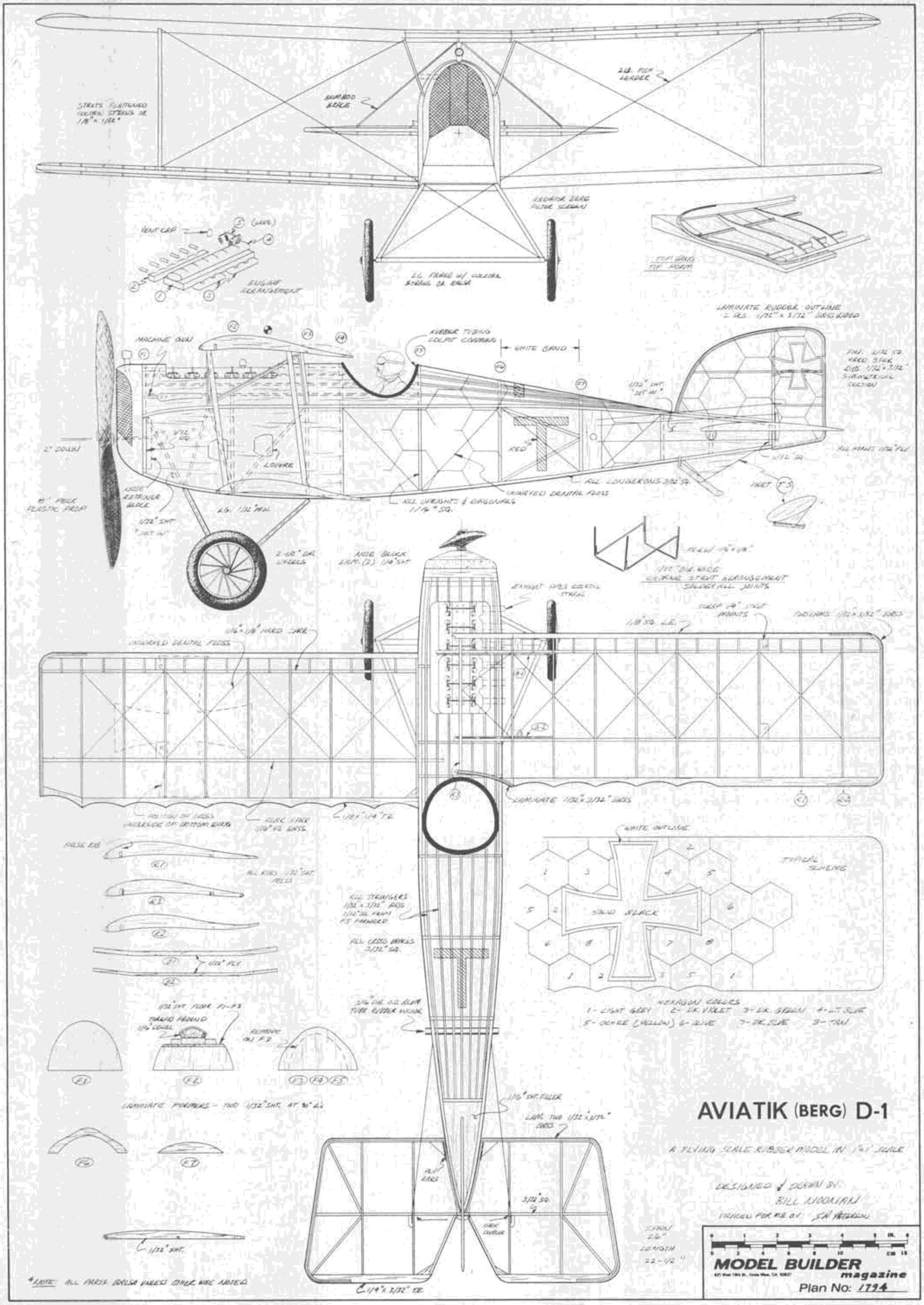
Bend the landing gear from 1/32-inch diameter music wire. Bind the front and rear legs to the fuselage cross-pieces with thread. Cement it well with epoxy. Solder the spreader bar in place after binding with fine brass wire. Wheels 2-1/2 inches in diameter are commercially available, however, we made ours of balsa, turning them on a drill press. Simulated spokes were incorporated on the outer sides, covered with tissue, and doped. The landing gear struts were covered with cocktail straws to bring them to a scale appearance. A balsa fairing would achieve the same illusion.

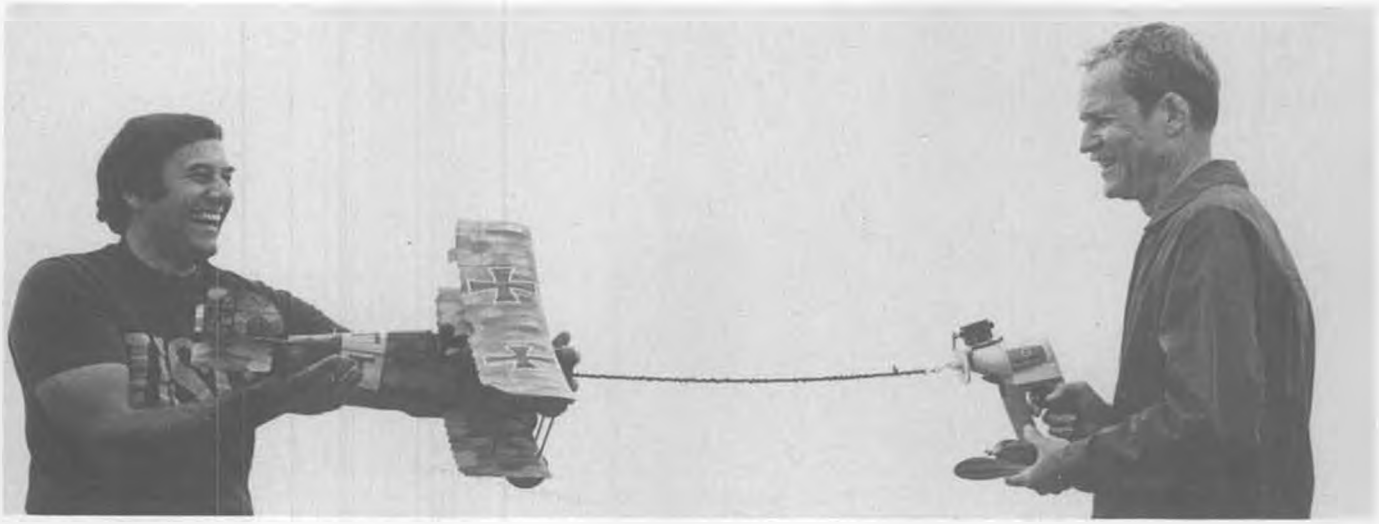
TAIL SURFACES

Both the vertical fin and the stabilizer have laminated outlines. Soak strips of 1/32 x 3/32 basswood overnight in water to which about 10% household (not detergent) ammonia has been added. Rinse them in fresh water and wipe before bending 2 pieces around cardboard or scrap balsa forms to make a 1/16 x 3/32 part. Titebond or any white glue may be used to hold the laminations together. Wipe away surplus glue before pinning (not through the wood) around the form.

While the outline is drying, cut rib and spar components for the fin and stab. The fin has a 3/32 square hard balsa spar, tapered toward the top. Fin ribs are 1/32 x 3/32. The stab spar is 3/32 square, and stab ribs are cut from 1/32 sheet. The stab trailing edge is 1/4 x 3/32, shaped

Although it looks like a lot of work, the hexagonal camouflage pattern is not all that hard to do. The pattern is applied to white tissue paper using a template and "Ad Marker" pens.


AVIATIK (BERG) D-1
A FLYING SCALE RUBBER MODEL IN 1"=1' SCALE
DESIGNED & DRAWN BY
BILL NOONAN
MODEL BUILDER
magazine
Plan No: 1794
WHITE BAND
MACHINE GUN
2" DOWN
LOUVRE
ALL LONGERONS 3/32 SQ.
WHITE OUTLINE
SOLID BLACK
TYPICAL SCHEME
HEXAGON COLORS
1 - LIGHT GREY 2 - DK. VIOLET 3 - DK. GREEN 4 - LT. BLUE
5 - OCHRE (YELLOW) 6 - OLIVE 7 - DK. BLUE 8 - TAN
LAMINATE FORMERS - TWO 1/32" SHT. AT 90° &
*NOTE: ALL PARTS BALSA UNLESS OTHERWISE NOTED.



Fernando Ramos seems to be saying, "Heh, heh, heh, can I let go now, Bill?" Bill's winder was adapted from a Black & Decker cordless drill and features a cam-operated stroke counter. Full details of the winder were covered in the July '78 MB.

before assembly. Build both the fin and stab over the plans, securing the dry laminated outline in place. Cement ribs on the respective spars, position this assembly, and cement to the laminated 1/16 x 3/32 outline. Add gussets and provisions for control horns. These are made of 1/16 sheet balsa and prevent the tissue from sagging when the horns are cemented in place after covering.

Incidence change is provided for by hinging the stab at the spar where it contacts the fuselage tail post. Note that the stab fits snugly to the fuselage sides. Note the 1/32 ply "ears" just behind the stabilizer leading edge on the underside. The function of these is to allow incremental changes in incidence (negative or positive) to effect trim adjustment during flight testing. Merely drill a small diameter hole in the plywood to allow a pin to be stuck into the fuselage sides, holding the stab in the desired position. When final trim has been established, the stabilizer may be permanently cemented in place and the brace struts added.

WINGS

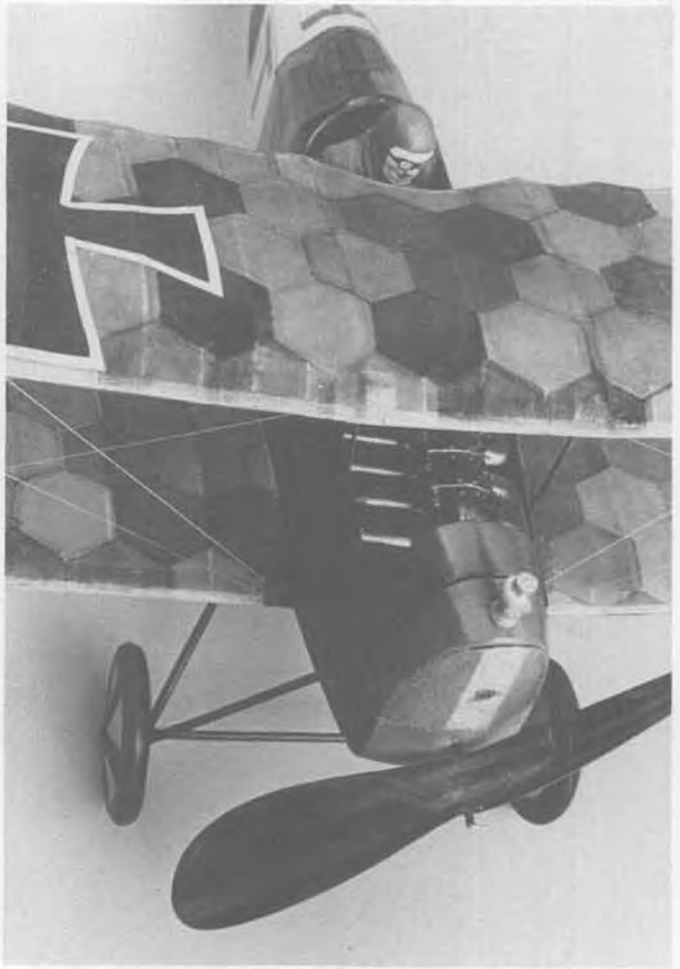
The most distinctive feature of the Aviatik is the washout on the tips of the upper wing. On the full-size aircraft, this feature was incorporated in the ailerons, which were found on the upper wing only.

Cut 30 R1 ribs from medium grade 1/32 sheet balsa. Cut two R2 ribs, one R3 rib. Exercise care when cutting the spar

Continued on page 98

Complete structure. Model is wearing the original prop, which was laminated from 1/64 plywood but had too much pitch.

Another view of the ready-to-cover structure. Washout in top wing ailerons is evident, as is Bill's outstanding workmanship.



Good detail shot of the nose and pilot. Peck-Polymers prop is painted to look like a full-size laminated prop.

Willard Smitz winding his Wakefield at the '78 Taft FAI Finals. Smitz flew well, placing in the top ten in both Wake and Nordic. A very underrated flier!

Who would bring rain gear to TAFT? Bob Meuser models his Labor Day outfit.

FREE FLIGHT

by TOM HUTCHINSON

PHOTOS BY AUTHOR

• Well, gang, ole blue eyes is back! The same even-tempered Round Man whose rantings and ravings graced this same column for 2 or 3 issues some 5 years back has returned to haunt the rear section of the magazine. Hopefully, my tenure will be longer this time around.

It's going to be pretty hard to follow Bob Stalick's act. For the past 5 years, his columns have set a high standard for both content and style. (Hope regular readers don't notice any dropping-off of either one.)

This is the paragraph where new columnists usually ask their readers for future contributions, and I'm not going to be any different. I think that a monthly column should consist of about 1/3 news, 1/3 hints and tips, and 1/3 column. If the first 2 items don't come from the readers, then the last will most certainly come from your new columnist, drunk with the power of his new position.

What I'd like to do in the future is include a compilation of readers' ideas on the same topic, in the same issue, so that a greater diversity of views can be presented in one issue. Therefore, as a start, I'd like to invite letters on these topics: the FAI program (indoor and outdoor), the future of free flight, the future of the Nats, the Junior problem, the cost of free flight, and where are the flying sites? In the hints area, I'd like to find out how different folks handle these situations: circle towhooks, Nordic timer-start systems, remote DT set-ups (fuse or timer at front of model), VIT systems for power models, and HL glider DT's. When enough contributions on a given topic have arrived, I'll edit and publish the whole lot.

TAFT FAI FINALS

While **MB** didn't have an official correspondent at the Finals, we have enough eyewitness accounts to give you an idea of what happened at Taft on Labor Day weekend. First, a description of the weather from CD Bill Hartill: "Taft weather was as expected the first 2 contest days. Hot (110°) and dry, with only a little breeze. The heat was doing a good job of wearing people down, and then on the third day, the dawn brought dense black clouds, thunder in the distance, and even a few flashes of lighting. This was followed, naturally enough, by rain. Not heavy (heavier than the usual Oregon showers, though, TH), but a light, intermittent sprinkling (usually at the beginning of each round. TH). This sort of thing has never been seen before at Taft this time of year. The wet weather made for damp models, but there seemed to be no drop in performance. The sharp drop in temperature that came with it was quite welcome, but now what to do with all the ice and Gatorade?"

The following account is by Jim Thornberry, from the BAT SHEET:

"It took 18 rounds, including 3 early-morning rounds for 4-minute maxes, spread over 3 days, to select the team that will go to Yugoslavia next year. After 18 rounds, only 15 seconds separated first from third in Nordic. The winning scores in both Wakefield (Walt Ghio) and Power (Carl Bogart) are perfect scores! Incredibly good flying!!

"Still not convinced? Could you have

Bob Piserchio, Ed Turner, and Fudo Takagi take time out to watch one of the fabled Taft "Trashmovers". When one of these things comes through, grab everything in sight and hold on!

Tom Kerr dropped less than a minute over 3 days' flying at Taft, placed 4th.

injured your hamstring a day or so earlier, bandaged your leg up, run despite doctor's orders, lost a ship the first day, and still won Nordic? Easy California weather, you think? How about 15-minute-long rounds each morning at 6:20, 6:55, or 7:30 a.m. for **4**-minute maxes? (none of the top 5 Nordic fliers did even 3 minutes at 6:20 a.m.) Then to have it rain (yes, *rain*) the entire last day, weighing down your Wake or robbing your engine of power. Think you could get a perfect score?

"In Nordic, the early-morning rounds plus the Northwest-style weather on the third day separated the good from the very good fliers. The earlier the early-morning round started, the tougher it was to find any lift. The top 5 fliers averaged only 151 sec. at 6:20; at 6:55 they averaged 184 sec., while by 7:30, they averaged 231 seconds (with 3 maxes). Those top 3 California fliers also did very well in some very non-California type weather on the last day, with Jim and Marc trying to close the gap. The only real casualty this day was Willard Smitz, who was leading when the wet towline slipped from his grasp and the ship unlatched at low altitude when he recovered the line.

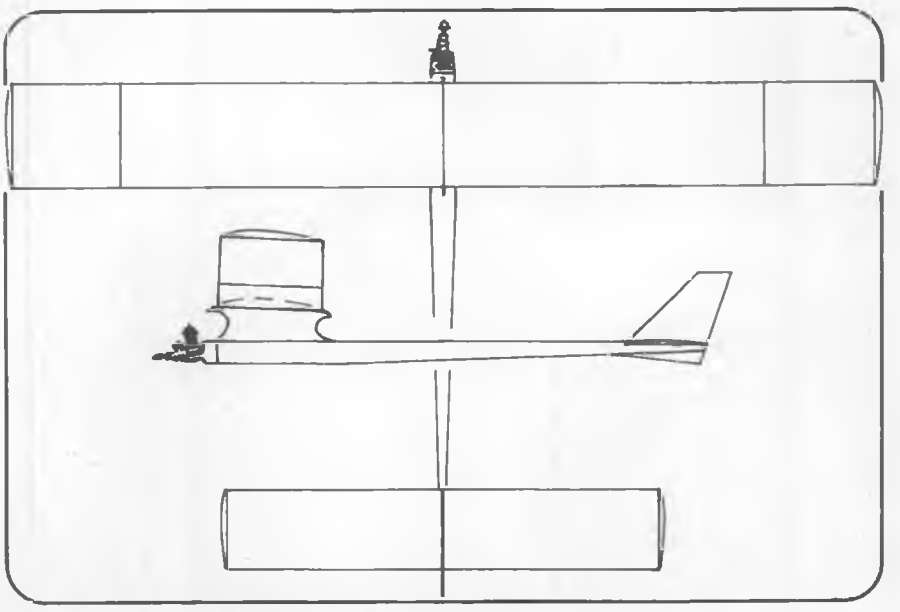
"Nothing radically new in glider or towhook design was seen, aside from some variations on latch hooks. Most fliers circle-towed with latch hooks. The top 3 fliers in A/2 appeared to use their designs which have been previously published in the NFFS Digest. Wilson's ship uses V-dihedral.

"Electronic thermal detectors were used by about 1/4 of the rubber and power fliers. Cattail fluffies were used often, too.

"After 18 rounds, you don't make the team by just being lucky; you've got to be good and well-prepared. With 8 of 9 team members from California, there should be ample opportunity to send a well-organized, practiced and tested team to the World Champs. As Rol Anderson pointed out, up to now that has probably been our weakest point in comparison with the Soviets or North Koreans. For us, 1979 should be a very good year."

And now I guess I should add a few of my own observations and amplifications to the above remarks. I went there primarily to compete, not to report, so be patient if the details are sketchy or incomplete.

One point that should be made emphatically is that the guys who made the team did it because they were better-prepared, not because of any great "home field" advantage. I know that the 5 Southern Californians on the team have been out practice flying every weekend for the past 3 years! They have flown at Taft a lot, but could hardly have had much practice in the weather that prevailed on the crucial last day. What advantage they did have was in lots of early-morning and light-lift test flying over the past 3 years. They were ready for this contest and the rest of us also-rans weren't.



JANUARY MYSTERY MODEL

This was the first Finals I've attended where competitors were expected to do some timing (although there were at least 2 who made the team without timing a single flight). There was a bit of grumbling among the rubber and glider fliers the first day about the reluctance of power fliers to do their share, but this quickly solved itself.

When the rains came on the last day, it looked like it might be possible for some catching up to be done. But the leaders in Power were smiling when the first drops fell. They had models easily capable of maxing in no-lift conditions, and were mainly interested in avoiding downdrafts. (The afternoon rounds did more sorting-out in Power the first 2 days than the early-morning rounds.) The same was true of the Wakefield leaders: they had good calm-weather models and could only be helped by the lack of the monster-type downdrafts.

The calm, wet weather made it more difficult for the Nordic leaders, but they didn't make any mistakes. The calm weather was ideal for the leaders' downwind piggyback tactics, letting them circle downwind in a parking orbit until somebody upwind found lift. They had obviously practiced the maneuver to perfection after observing the Russian teams doing the same thing at the World Champs. Had the weather been windy as well as wet, it might have been a different story with a different ending.

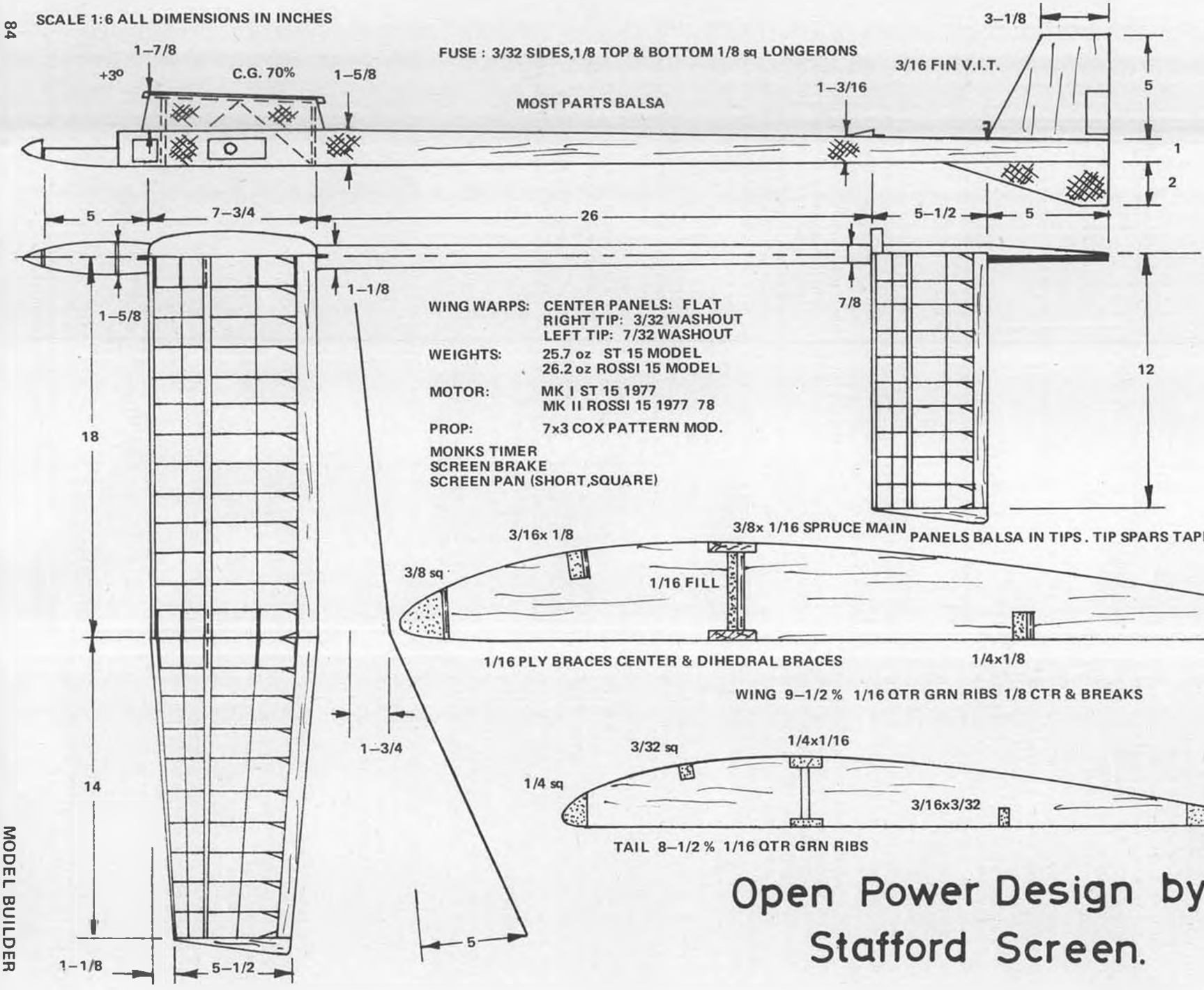
The early-morning round with its 4-minute max was a new feature of the Finals this time, intended to sort out those fliers with flyoff potential. An analysis of the first-round scores is included in the table, where the average score of all contestants is compared to the scores of those who finished in the top 5 and top 10. The effects of how early the round was flown are also shown.

1978 TAFT FAI FINALS
AVERAGE FIRST ROUND SCORES

6:20	FIA	FIB	FIC
All	129 sec	186 sec	211 sec
Top 5	151	220	239
Top 10	150	213	239
6:55			

The reason you don't see any more Nordic photos. Both MB correspondents are waiting in line, prior to the beginning of a round. Photo taken by Pete Young.

SCALE 1:6 ALL DIMENSIONS IN INCHES



Open Power Design by Stafford Screen.

Bruce Hannah III caught at moment of release with FAI Power ship at Taft.

All	142	160	200
Top 5	184	227	239
Top 10	173	190	237
7:30			
All	174	194	212
Top 5	231	240	240
Top 10	215	235	234

The top 5 fliers in A/2 and Wakefield did significantly better than average in all the early rounds, but their margin of superiority was much greater in the 7:30 round than any other. The earlier the round started, the lower the scores, and the smaller the margin between the top 5 and the average. The Power average showed the least variation with starting time, but there was nearly a minute's difference in the average A/2 score between the 6:20 round and the 7:30 round. Wakefield averages also didn't vary that much with start time.

A good first-round capability was important, but not necessarily decisive. There were 9 A/2 flyers with better first-round averages than Bob Isaacson, but he ended up on top. It was much more important not to make any major goofs in the later rounds, and Bob only dropped 6 seconds in these rounds. Willard Smitz averaged 212 seconds in the early A/2 rounds, but his 60-second disaster on the last day put him out of the running. Paul Crowley did nearly as well in the early rounds, but a zero round killed his chances.

The significance of the early-round scores lies in how much better the best guys did in the 7:30 round, when there was light lift rather than dead air. The top fliers were able to find thermals under difficult conditions, and I think this is a much more valuable skill for U.S. team members than pure dead-air capability. Strong consideration should be given to having the early round start a little later than the crack of dawn, to put more emphasis on light-air thermal detection. And perhaps the early-morning max in Power should be 5 minutes, since the average performance in the first round so closely approached the max.

The trend in FAI Power models has shifted from the all-red, elliptical-tipped models of 5 years ago to all-natural sheeted surfaces. Very few of the power models followed the fad of tri-tails, and all of the team members had a single rear fin. There were an awful lot of erratic power patterns, except among the winners. Carl Bogart's ship impressed me with its smooth, one-turn pattern, when I watched it the first day and immediately tagged him as a strong dark horse. Roger Simpson has probably more European contest experience than any power flier in the country (except his brother), but has been dogged with bad luck at previous Finals. He and Doug Galbreath flew similar designs. Doug's Summerwind design impressed me enough 2 years ago that I asked for plans and am building one now. I'll try to get a 3-view drawn up for a future column.

The Power rounds usually seemed to end within 10 minutes of the start. Everyone seemed to roar off at once, whenever one model was launched, regardless of the air. Lots of mass launches into poor air resulted. It was really difficult to time engine runs under such conditions. I can certainly see how timekeepers at the World Champs have a rough time.

Walt Ghio has a really impressive Wakefield. Motor run was usually about 65 seconds on 24 strands of 1/8 rubber. It really climbed well for a long-run Wake. Walt told me he developed this model especially for Taft, after doing poorly at the 1974 Finals there. After every contest flight, Walt would load a new motor into the model, wind it up, then go off to the testing area on his bike for a practice flight. In addition to this, he helped Dick Myers fly Nordic, and did more than his share of timing. An impressive performance.

Chris Matsuno also had an impressive long-motor-run Wake. He flew John Gard's Monarch design, and got a 65-second run on 10 strands of FAI rubber

Keith Martin displays what every well-equipped power flier should be wearing.

or a 55-second run on a 12-strand Vintage Aero motor. He flew this model for 11 straight maxes, then cracked the tailboom and flew another model for a poor score on the last round of the 2nd day to break the string. Bob White and Bob Piserchio flew similar twin-fin models with shorter runs but extremely high climb. Their patterns, as usual, climbed like power models, with no dip or hestitaion at any point. Bob White was using some of the new Filati, the translucent brown stuff similar to that used by the North Koreans, at least for the early rounds.

As Jim Thornberry noted, there weren't any significant trends in construction or towhooks noted in A/2. I was pleased to see 7 people flying Ultimate Dragmasters from our kits, especially since they were mostly newcomers to such a high level of competition. Jim Bradley and Harry Grogan, both from Florida, had some nice-looking sheet-wing models. Jim also had a neat towhook latch of which I didn't get a picture. (More details in a later column.)

Bob Piserchio winding his Wakefield at FAI Finals. Bob qualified for the U.S. team along with Walt Ghio and Bob White. Clouds in background are unusual at Taft. So is rain!

Carl Bogart prepares for his last flight, under the watchful eye of Doug Galbreath. Carl was the only flier to max out for 3 days at FAI Finals. Bob Stalick photo.

CANADIAN WORLD CHAMPS TEAMS

At the same time the U.S. finals were going on, the Canadians held their final team selection trials near Toronto. Since there aren't as many Canadian FAI modelers, their selection procedure for the final is a bit different. The only requirement is to have totaled 14 minutes or more at each of 2 or more FAI 7-round contests. Their feeling is that with so few fliers, they don't want to eliminate anyone too soon.

Here are the Canadian teams for Yugoslavia:

F1A
Tam Thompson
Peter Allnut
Gordon McKenzie

F1B
McGillivray
Roberts
O'Grady

F1C
F. Schlacta
M. Burns
D. Sugden

YOU BE THE JUDGE

The FAI rules regarding attempts caused quite a few hassles at Taft, especially in A/2. There were as many people flying in a line as at the World Champs, and with so many circle-towing at once, tangles were inevitable. Part of the hassle was brought about by fliers who hadn't read the rulebook (the new line-tangle rule has been in the AMA rulebook since 1976) and by a jury that decided to ignore the rulebook in making their decision at times.

Before proceeding any further, let me quote from the pertinent sections of the rulebook:

"DEFINITION OF OFFICIAL FLIGHT. a. A first attempt equal to or greater than 20 seconds. b. A second attempt whatever the time achieved.

"DEFINITION OF AN ATTEMPT. There is an attempt when the model is launched and when: a. the flight duration is less than 20 seconds after release of the cable; b. the glider returns to the ground without release of the cable; c. the competitor runs so far away from the timekeepers that moment of release of the cable cannot properly be established; d. when a part of the model becomes detached during the launch or during the flight time; e. the model or the launching cable collides with another launching cable during towing (linecrossing) and the model is released from the cable within 1 minute from the linecrossing. Should the model continue its flight in a normal manner, the competitor has the right to demand the flight to be accepted as an official flight, even if the demand is made at the end of the attempt.

"An attempt may be repeated when the model collides with another model in flight, or a person while being launched. Should the model continue its flight in a normal manner, the competitor may demand that the flight be accepted as an official flight, even if the demand is made at the end of the attempt."

Doug Joyce always flies canards. This time he cut his finger in prop, flew for 3 days with baseball-size bandage on it.

The change between the current rule and the old one is that now a line-crossing results in either an attempt or an official flight, not a repeat of an attempt as before.

Now let's illustrate the rule and its application by a quiz, using some actual examples from the Taft Finals.

1) Contestant A has been circle-towing for a long time, and the timer doesn't notice the release of the line (even though he is near the flier) until the helper points this out. Timer doesn't start his watch, because he didn't see the line release, but neglects to notify the flier or his helper. The model maxes and DT's downwind. Contestant A comes back thinking he's got a max on the board. Five minutes before the end of the round, the helper checks the board and notices no score. A hurried re-fly results in a 104 score. How do you rule on the protest?

A) Re-fly after the end of the round.

B) Believe the witnesses to the flight and grant a max.

C) The 104-second flight is official.

2) Contestant B has a line-cross at the beginning of the 1st round. On the 2nd attempt, his model is knocked out of the sky at 103 seconds. The round ends while he is towing on his 3rd try. What score should he receive?

A) Zero, since he did not get off the line before the end of the round.

B) 103 seconds.

3) Contestant C has a line-cross in the 12th round. The event director informs him that this is now his second attempt. After release, his model is knocked down by another towline, resulting in a 47-second flight. Do you allow him another try?

A) No, the rule permits an attempt to be repeated only if collision occurs with another model.

B) Yes, the intent of the rule permits a repeat attempt if the model is interfered with by part of another model's launching apparatus.

4) Contestant D crosses lines with Contestant E. E's flag is ripped off and stays on the model, while the rest of line drops off. What do you rule?

A) Attempt, the flag did not come off the model.

B) Official flight, the launch cable was released.

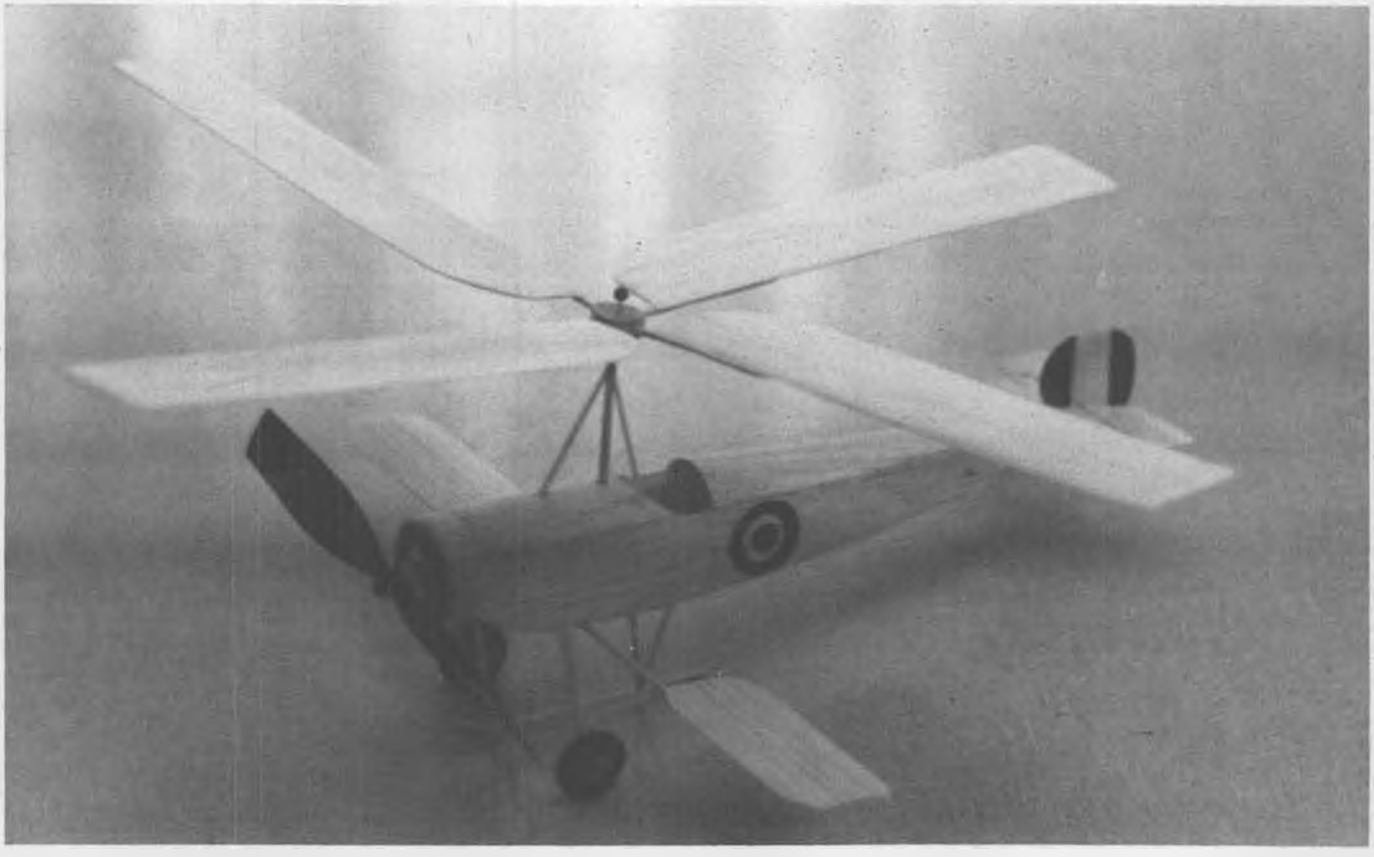
5) In another round, Contestant D crosses lines with Contestant F. F's flag and line are cut, leaving only the ring on the model. What do you rule?

A) Official flight, flag came off.

B) Attempt, launching cable did not detach completely.

6) Contestant D has a line-cross. On his 2nd attempt, his model dethermalizes on tow and comes down without release of the cable. He tries again and maxes. What should his score be for this round?

Continued on page 98



PHOTOS BY AUTHOR

CIERVA C.6C AUTOGIRO

By DON DRURY . . . If you've ever thought about building an autogiro, but dismissed it because of the complexity and/or time and material investment, here's your chance to satisfy your curiosity. Go for it!

• While looking for something different to fly indoors this winter, I ran across the Cierva Autogiro in Doug Rolfe's book of historical aircraft.

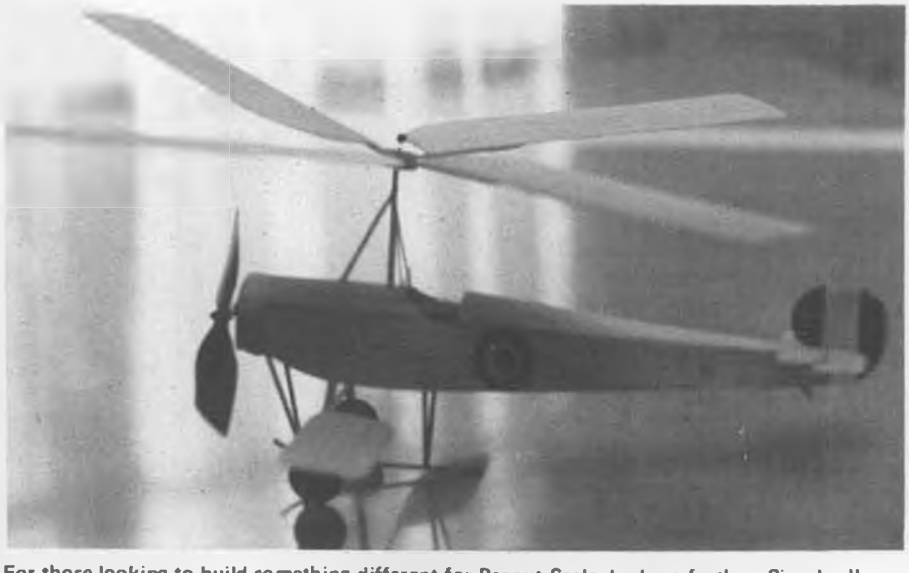
Some twenty-five years ago, I built my first autogiro, using an existing rubber-powered sport model, with the addition of twin sub-rudders and three-bladed rotor for the wing. This little 24-inch span model required a lot of experimenting, but once the formula was figured out, it flew very well.

The gym, which the Ann Arbor Board of Education has made available to the modelers of the area, is very small and has a twenty-foot ceiling, which led to a Peanut Scale design of the British version of the C.6A Cierva Autogiro. The design lends itself to sheet balsa throughout; however, it must be built as light as possible. Use lightweight 1/32 sheet sanded to 1/64, except for the bulkheads. The rotor hub is a 1/32 ply and foam sandwich mounted to a 1/16 hardwood dowel or toothpick with a pin. Rotor blades should track uniformly and freely.

The following adjustments are necessary for success with your autogiro: 8 degrees positive incidence to the plane of the rotors; 5 degrees of dihedral; 3 degrees negative incidence in each blade. Best results are obtained with about 6 degrees of down thrust, and the model should fly to the left. To achieve this, bend the rotor shaft a bit to the left. Use thrust and blade angles for all trimming. The elevator and rudder have little or no control. The glide pattern is flat, but straight down.

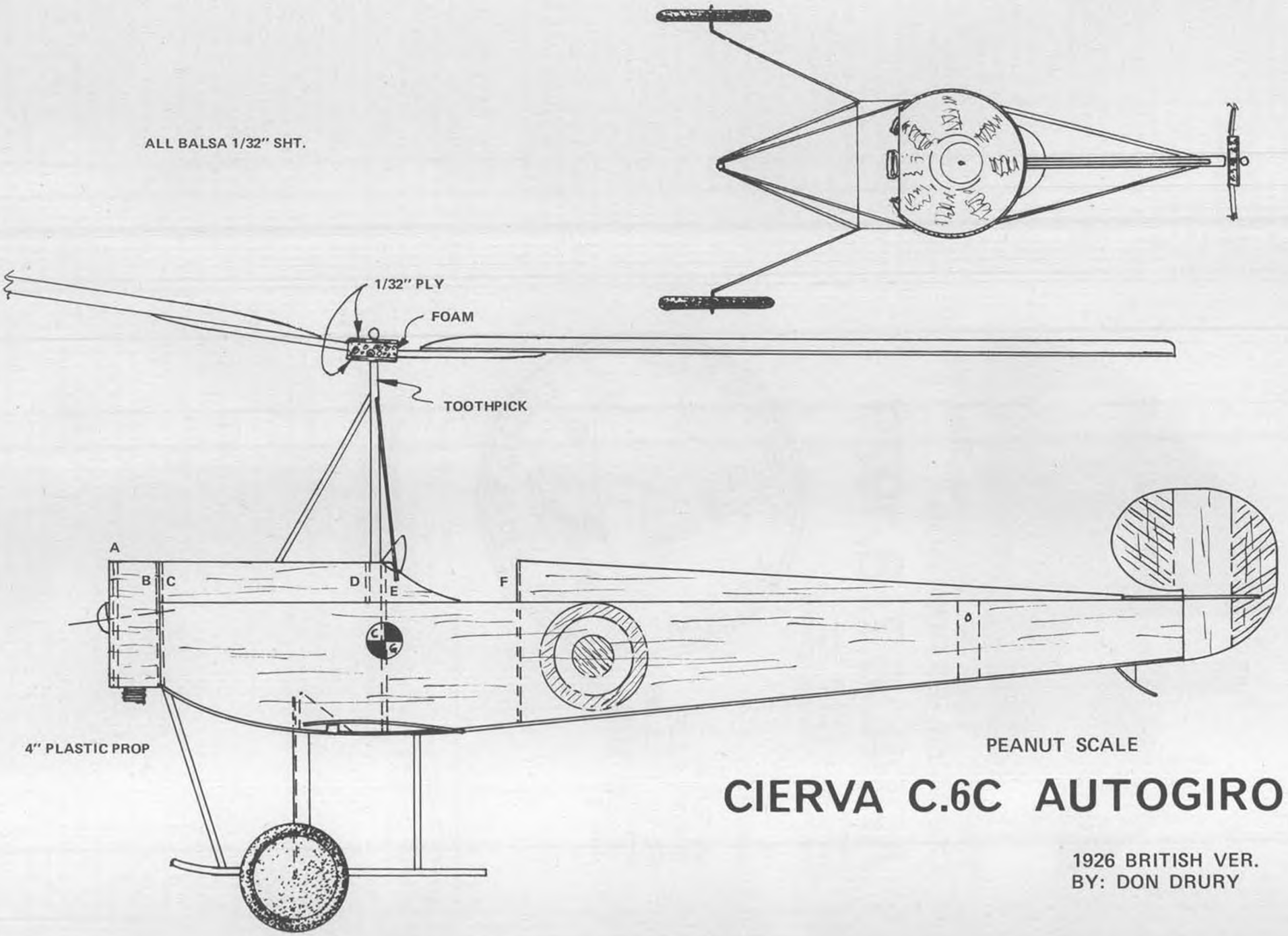
The rotor blades must be spinning prior to flight or test glide. Hold the model with the nose up and move forward to start the blades rotating. If test gliding, drop the model; if wound up, launch the same as you would with any small rubber job. The only other adjustments needed would be to increase or decrease the amount of rubber used.

This model will surprise you with its stability and is a real thrill to watch. I hope everyone will try one and have as much fun with it as I have had. •



For those looking to build something different for Peanut Scale, look no further. Simple all-sheet model is quick to build, is surprisingly stable in flight. Looks really neat in the air!

C
F
E
D
1/16" sq.
A
B



PEANUT SCALE

CIERVA C.6C AUTOGIRO

1926 BRITISH VER.
BY: DON DRURY

TOLEDO

TWENTY-FIFTH ANNUAL RADIO CONTROL EXPOSITION

APRIL 6, 7 & 8, 1979

FRIDAY	9 am to 6 pm
SATURDAY	9 am to 6 pm
SUNDAY	9 am to 3:30 pm

presented by

WEAK SIGNALS R/C CLUB
PO BOX 5772
TOLEDO, OHIO
43613

Otra Vez! . . . . *Continued from page 50*

looked like we never would, either.

Dawn seemed to come much earlier than usual that morning, and we of the Root/Marez racing team were not at all unhappy that it was not a day on which racing was scheduled. The K&B 6.5cc serenade, played with a Latin beat, would not have been the pleasant music that it generally is.

The following evening, before we had time to fully recover from that little escapade, was the contest "fiesta", which only those who have had really bad luck and MUST rebuild before the next day's flying dare miss. It follows the general way in which the CAJ does things: First Class. Each table gets its own bottle and assortment of mixes, and is decorated with flowers in vases bearing the CAJ emblem, and made especially for this contest. There is an orchestra of at least 12 pieces, and a trio of strolling violinists makes its way from table to table as the excellently prepared and served dinner is consumed.

This year, a new touch was added. A raffle was held for the wives of the contestants for their choice of any of a number of finished and painted pattern-type airplanes which were part of the decorations. Amidst cries of the Spanish equivalents of "Boo" and "Fix", the winner was announced to be the wife of the club president, Jose Barrios.

In addition to the aforementioned racers, other U.S. modelers in attendance were Curly Rucker, George Gauseware, Jim Simmons (all from the Forth Worth Thunderbirds), Dr. John Riggs and Max Blose, from Waco, all from my home state of Texas. The radio manufacturers were represented by Don Downing from Logictrol International, Marty Barry from Kraft Systems, and Jerry Bonzo from Proline Electronics.

Jose Dona, of Exportations, Ltd., Irvine, CA, also joined us, as did a pattern flier of some skill, one "Pepe" Bridi, who also has a balsa chopping company just north of us here in California.

As part of our team, we had whom we think is presently the only lady pylon racer in the country, and possibly the world: ex-call girl now pilot, Kathy Root. Kathy raced in Open Pylon, which is not Open Pylon as the AMA sees it, but an anything-goes event that is raced in Mexico, and for which entries will range from Pattern and Formula One airplanes to stock and cut-down Quickies.

Kathy's bird, flown with her own special pink transmitter, was husband Bob's design for this event, a 3-1/2 pound version of his very successful "Li'l Cobra" Quarter Midget with 350 square inches, a slightly enlarged tail assembly, and a K&B .40 up front. Faaast!

This airplane has been christened "El Tapatio", which is a Mexican colloquialism for anything or anybody from the city of Guadalajara. This seems an appropriate name, as the model was developed especially for racing there, taking into account the 5000-foot altitude. There is no event in the U.S. for which it can be used. Kathy's bird is the feminine counterpart, "La Tapatia".

This event is popular with racer designers, as it allows them to try ideas without the restrictions imposed by the other racing events. Another interesting race flown in Mexico is a 60-minute enduro, now extended to 69 minutes by a not-to-be-outdone club in Mexico City. This is also a pylon event, in this case flown by a team of three or four: pilot, caller, flagman, and mechanic. The only requirement is the fuel tank; a maximum of 20 ounces is allowed. The object is to fly as many laps as possible during the specified time, and each member of the team must fly a minimum of ten minutes. After every landing, a change of crew positions has to be made; i.e., caller becomes pilot, pilot becomes flagman, etc. The last race we know of was won by a Middle Stik/K&B Sport .40 combination. Should be loads of fun.

All four-point heats straight across got Kathy into a fly-off for first place with veteran Marcial Davila, and Alejandro Benitez. Marcial's greater experience, which once earned him a Formula One win at Whittier Narrows amongst California's best, also earned him a win in this race. But Kathy's second is nothing to be sneered at, and has been a great source of glee to our local friends who find it extremely comical that she is beating me (4th Place), who taught her to fly, and Bob, who taught her to race. In this contest, he had a no-start, which didn't do his final standing any good at all. I have tried in vain to explain to some of these so-called "friends" that we three race as a team, and if one wins, we all win. All this does is make them laugh even more. . .

I always remember Kathy's classic remark, which all racers can identify with, as she was walking off the flight line after her very first Quarter Midget heat. One of the other ladies present asked, "Kathy, how did you do?" The answer was, "Well, I didn't cut, I didn't crash, and I didn't vomit!"

Thus, Open Pylon honors went to Marcial Davila, Kathy Root, and Ale-

jandro Benitez, in that order. Contrary to my normal standings, which is always one place away from the hardware, my two-year-old Spickler Quickie, veteran of two trips to Guadalajara and now equipped with a K&B racing .40, helped me to a 4th place and a silver cup. Actually, I tied in points to Joe Bridi . . . yeah, he raced a Quickie also. We were on the same frequency, and rather than fly against the clock, besides which it was getting dark, we decided to flip, which I won. That two-headed peso will get them every time! Thanks, Joe!

In all, the U.S. did quite well. We carried off three of the four first places. We also came away with one second, a third, my fourth, and three fifths. This is only a small portion of the 35 silver cups of various sizes that were passed out Sunday afternoon. Boy, if you are a trophy hunter, this is the place to come.

One of the mentioned Firsts is now back in Texas, most probably on the place of honor on the mantel of glider flier Dr. John Riggs. Other glider winners were:
2nd: Arturo Lomeli, Guadalajara
3rd: Max Blose, Waco, TX
4th: Carlos Flores, Guadalajara
5th: Luis Munguia, Mexico City

First place in Formula One also went back to Texas, in the hands of the able Don Downing, whom we had somewhat worried. Some of us, nice persons that we are, had him convinced that in order to keep that silver gallon jug, he'd have to drink it full of something. Beer was acceptable, but a real "macho" could not do it with such a sissy drink; it should be something stronger, like tequila. I really think Don would have tried; it was not an easy win, and it is a beautiful trophy.

Don's airplane was his Super Mustang, which is but one of an extensive line of racing, scale, and sport models that he markets through "Model Merchant", of Irving, Texas.

The other Formula One winners were:
2nd: Albert Cabrera, Guadalajara
3rd: Sergio Camano, Mexico City
4th: Francisco Gonzalez, Mexico City
5th: Raul Aguilera, Guadalajara
6th: Jesus Mata, Guadalajara
7th: Jose Calderon Sr., Guadalajara
8th: Ricardo Maciel, Guadalajara
9th: Omar Lopez, Mexico City
10th: Ramon Virgilio, Mexico City

Pattern, the event with the most entries, wound up with fly-off in Expert between Joe Bridi, Luis Castaneda, Salo Feiner (who is not doing too well since daughter Rita got married and resigned as his mechanic), Alex Benitez, and Kraft Systems' Marty Barry. Results were:
1st: Joe Bridi, Wilmington, CA
2nd: Luis Castaneda, Puebla
3rd: Salo Feiner, Mexico City
4th: Alejandro Benitez, Cuernavaca
5th: Marty Barry, Vista, CA
6th: Don Downing, Irving, TX
7th: Alejandro Elizondo, Mexico City
8th: Hugo Lopez, Mexico City
9th: Luis Garcia Blake, Mexico City
10th: Marcial Davila, Mexico City

Intermediate class Pattern winners were:
1st: Gilberto Gallego, Mexicali
2nd: Jorge Burgueno, Culiacan
3rd: Jose Calderon Jr., Guadalajara
4th: Jose Calderon Sr., Guadalajara
5th: George Gauseware, Fort Worth, TX

Novice Pattern was won by:
1st: Raul Aguilera, Guadalajara
2nd: Gustavo Inman Sr., Guadalajara
3rd: Gustavo Inman Jr., Guadalajara
4th: Jacobo Sevilla, Culiacan
5th: Luis Cantu, Monterrey
6th: Victor Barrientso, Mexico City
7th: Alejandro del Castillo, San Luis Potosi
8th: Guillermo Aguilar, Mexico City
9th: Carlos Pardo, San Luis Potosi
10th: Jose Barrios, Guadalajara

Raul Aguilera, winner of the Novice Class in Pattern, in addition to his silver cup was also awarded a completely finished and equipped (less radio) "Revenger" Pattern airplane, donated by Logictrol de Mexico, in the persons of Miguel Medrano and Leopoldo Leal, who head up the Logictrol operation in Matamoros, just across the border from Brownsville, Texas.

In this event, we were extremely pleased to see young eleven-year-old Gustavo Inman, Jr. place third. This is only his second year of flying, and it is always refreshing to see young talent on the way. The Castanedas and Davilas best beware.

In addition to the wins already mentioned for the U.S. contingent, we have one more success to report: I set a new record! Yeah, after all these years of flying, I finally came through with a first: I was the first to fly FM R/C in Mexico . . . For some months, I have been test flying one of Model Rectifier Corporation's soon-to-be-available 53 Mhz Frequency Modulation systems. It has worked extremely well here, and the Mexican atmosphere did not present any problems. In the close proximity of airplane-to-airplane and transmitter-to-transmitter of pylon racing, it worked perfectly.

During some of the breaks, we were treated to some fine flying by Luis Castaneda and his Webra .91-powered

Mammoth Scale "Akromaster", with which he will compete at the Las Vegas Tournament of Champions in November. Buena suerte . . . good luck, Luis!

Sunday is the worst day of this four-day event; everyone is getting tired, and those who live within driving distance and plan to be at work the following morning are saying their goodbyes. We had also planned to leave that evening, as this IBM Selectric gets cranky if allowed to cool off too much. But we had a slight delay. . .

Some of you might remember in my report of the 1977 contest that we were late in leaving. Aeromexico kept us at the airport most of the night with promises, promises, nothing but promises. This year, flying Aeromexico was not even a consideration, and it is interesting to note that none of the Americans from any location travelled on that airline. Well, we were delayed again, though it was not the fault of the airline this time. In fact, Western Airlines took extremely good care of us and our unwieldy airplane box. This time, it was the airline controllers who decided to do their thing. We had left California in the midst of a grocery store distributors slow-down; having just gotten over a grocery clerk's strike, and facing a possible postal strike, we took this one in stride. If the local restaurants and the credit card companies didn't strike, we'd survive. And survive we did; we got a day's shopping in Guadalajara's "Tlaquepaque" district, famous for its typical products of many types, and were on the way home the following day.

At our last dinner with some of our friends in Guadalajara, we all drank a toast in mild tequila (less than 50% nitro) to "Guadalajara '79", which means we are going back, and we started our plans on the airplane flying home. Let's see . . . three Pattern airplanes, plus three Formula One's and three "El Tapatio's", plus at least one back-up of each type, that'll take a box about eleven meters long by . . . does anyone know how much it costs to charter a 747?

If you are a doper, stay away from Mexico, I hear they put you in jail and throw away the key. To which I say "Amen" and hope they never find it. But if you are a modeler, and a gentleman . . . Oops, sorry Kathy . . . I mean a gentleperson, forget the horror stories and come join us for Guadalajara '79. You can even eat the food, as your scales will confirm when you get home.

The cost? From Los Angeles, this 1500-mile flight costs as little as $130 round trip. Drawing a 1500-mile arc from Guadalajara, it takes in Denver, Kansas, and parts of Florida, so it must be within that amount for many of you, less for some, and just a little extra for many more. So, if you can stand terrific hospitality in beautiful surroundings and some really stiff competition flying, plan to join us next September. We will gladly put you on our list to provide information to next summer. Until then, in Mexican fashion, Salud (health), Amor (love), y Pesetas (wealth) to you, and Happy Flying! •

1 to 1 . . . . . *Continued from page 23*

the fuel available in other areas can cause a number of problems, particularly if you are accustomed to using nitro and you are flying in Europe where it is not easily obtained.

During the event, there are numerous items to occupy the manager's energy. In most cases, local housing, set up by the host, must be cleared and worked out. There are meetings with the officials, where the manager operates as a spokesman.

In the case of the U.S. Scale team, meetings are held with the complete team to check presentations and strategy for the competition.

An important function revolves around the need to have someone who can maintain a positive, helpful attitude in an understanding way. Very often, a competitor requires a great deal of help in this way. The pressures of competition on an international level can be intense.

There are, of course, other things involved in the task. Speaking as a competitor, I can honestly say that I appreciate having a team manager to free me from these additional concerns. Our manager this year, George Buso, represents the type of individual required for the job. He was firm and positive when necessary in representing the team with the officials and hosts. At the same time, he presented a friendly, outgoing attitude. He and his wife, Olive, revealed a very real concern for the team and our showing in the competition.

A full-scale "thank you" to the Busos for filling the task in an admirable way!

COLOR ME RED

Probably one of the most difficult problems to solve with scale aircraft is in the area of paint. The matching of colors is not the only problem. Trying to mate-up a glossy photo of an aircraft partly in shadow and full sunlight is mind-boggling, but only part of the difficulty.

On the market today, there are a number of excellent paints in the form of two-part epoxies, enamels, polyurethane, dopes, and the like. One very great problem, however, is that more often than not, the basic colors available do not match your needs. This then creates the need to mix to obtain the correct color, shade, tint, or tone. In some cases, it just can't be done with standard factory-mixed colors.

Perhaps you've gone that route only to find that mixing results in an entirely different color, or a glorious shade of mud! Basically, this is caused by the fact that the colors you are working with, even if they appear to be pure, basic colors (red, yellow, blue), are mixtures themselves. One can become terribly frustrated with this condition.

There are some possible solutions to this. One would be to search the world for aircraft that match the paint. Good luck! On the other hand, try some of the following:

If the aircraft is relatively new, there are color systems available, such as Randolph, that provide matching colors in several types of finishes. There may be some difficulty in obtaining them in small quantities, less than a gallon, from aircraft supply stores.

Operating in the same area of newer aircraft, a very good source can be a *good* automobile paint supply store. Their charts will generally include colors used by Piper, Cessna, etc. There are cross reference charts available, for most often each color will carry several names, depending upon what brand of aircraft is involved.

An item you need to consider is the fuelproof quality of the finish available through the auto source. You can generally feel safe with auto acrylic enamel; however, you may want to test it, especially if you are accustomed to higher nitro levels. Acrylic lacquer may cause some problems. A newer finish, which comes in two parts, is called Imron, but I have no information on it at the present.

It is possible, of course, to custom mix these types of finishes if you can find a compassionate, patient dealer. By using his charts, you can sift through the myriad colors available and generally get close.

There are many aircraft whose vintage prevents using this approach, since they just don't show up on any charts. Our scale friend from the Kansas City area, Bud Atkinson, has licked that problem long ago. He used, and I assume he still does, a good quality enamel available commercially and mixes his own from the basic mixing colors. As I recall, he uses Sherwin Williams brand. There seems to be no fuel problem, and his color choices are unlimited. In addition, Bud has used flatteners to duplicate military flats with various degrees of sheen.

One factor that you must take into consideration is the manner in which you are going to apply the finish. The obvious preference would be to spray, but certainly not everyone has equipment to do this. When it comes to applying a finish with a brush, many new problems crop up, and paint selection may become even more critical.

The epoxies flow well and can be brushed. This is true of most of the slower drying finishes. One difficulty with brushing is that it is very easy to build up weight quickly, because you

get much more paint on the surface. For this reason, if you are able to afford it, the investment in some type of spray equipment is helpful. Many people are familiar with the Miller equipment, which is relatively inexpensive and will operate most of the airbrushes available.

There are *many* other factors involved in the area of painting. We will operate on some of these in future articles. One item that is most helpful in your finish is often overlooked. The modeler will get a super finish with his final sanding, and then neglect to get the even-colored primer finish to start painting on. As a result, the color must be put on much heavier in order to overcome the mottled finish produced by the earlier sanding. Bear in mind that the final color will be affected by the primer color under it. Plan ahead.

LETTER LOG

Some mail has appeared recently that I would like to include, since it contains some items that need to be said.

I was pleased to hear from Joe Thorpe, of Columbia, Missouri. Joe sent along a photo of a Dornier DO-28 "Skyservant", but unfortunately it was in color, making it difficult to use in the magazine. In Joe's letter, he addresses a problem which never ceases to rear its ugly head.

"In a rush of enthusiasm, I ordered plans from Bob Holman for the De Havilland "Mosquito" and the Junkers JU-88 bomber, and now am having a devil of a time getting documentation materials. I realized belatedly that I went at this 'bassackwards', i.e., it seems that one should start with photos (suitable for proof-of-scale presentation) of a specific aircraft, get 3-view material, and then, with appropriate plans, build to that specific aircraft."

All we can say to Joe is that he has copious company in this problem, but at least he didn't go ahead and build and *then* try to find the info. Many times, pleas have echoed back and forth across the country for information to match something a modeler has already built. Generally, this results in disaster.

The scale association, NASA, is attempting to address itself to the problem, and the beginning efforts of providing documentation sources is being done by Jamie Gielens, of Canada. These sources will be available to association members. Hopefully, Jamie will receive information to add to this as we go.

I received a nice note from Dick Graham, of Bloomfield, Iowa recently. Dick mentioned that he has been out of modeling for several yeârs but is remembered for some fine scale models (such as the Liberty Sport kitted by Sig).

"I have started to rebuild a Pawnee cropduster that I smashed at the Oshkosh Nats a few years ago. It's been in the attic of a shed, and I believe the mice did about as much damage as the crash."

A suggestion to Dick might be to use actual pesticide to spray as a scale operation. Not only could he keep the mice away, but should the judges give him a rough time, perhaps. . .

A very nice letter came from Oz O'Brien, of Louisiana. Oz addresses himself to the possible addition of a third scale class. At the risk of placing only a small portion of his letter in print, may I quote:

"A current push by some towards stand-off judging from 50 ft. is a step in the wrong direction. That will perpetuate the poorly-built but excellent flying aircraft, and this, I feel strongly, will eventually bring us back to the point from which we seem to be departing; the pattern-type, 'same bag in a new komona' aircraft."

Oz suggests a third class of "Novice Precision" to take care of the "not-so-hot flier but great builder." He points to the success of the 1/4-scale get-togethers and some of the "un-contests" that have been held in which fellows have an opportunity to show their wares without having to worry about being a super flier.

Of course, several clubs have added novice classes to their scale contests, and they have seemed to result in bringing some newcomers to the scale scene.

I suspect this article has come full circle, since any discussion of this subject becomes academic, unless a formal proposal has been made; unless the proposal receives some support; unless the scale board receives communication concerning the proposal.

Oz suggests that he would like re-

action from other modelers. I guess that's what it's all about, isn't it? Thought and communication.

SHORT SHOTS

Robart has scale wheels available which feature raised writing on the side to duplicate both U.S. and continental brands. In addition, there are X-tread found on many World War II aircraft.

Have you used a Micro Flame torch yet? Scale builders often have to fabricate items which need silver soldering, or in some cases brazing of small brass parts. The Mirco Flame torch will handle these jobs and makes an important field box item for contests. Read the instructions *carefully.*

In closing. . .

There once was a modeler named Pace
Who said, "I'm the best," with straight face.
"A scaler first class
Above the great mass
Why am I still in last place?" •

Choppers . . . *Continued from page 43*

such as loops and rolls can be flown by any pilot who has achieved the proficiency equivalent to that required to fly the Intermediate AMA maneuvers. At the time of last year's contest, only a few pilots in the whole country could handle loops and rolls. In contrast, at this year's contest, almost every pilot in the Expert class flew loops and rolls.

The types of helicopters flown included 6 Jet Rangers, 6 Heli-Boys, 4 Revolution I's, 3 Super Babies, 3 Alouette II's, 2 Revolution II RH's, 1 Heli-Baby, 1 Shark 60, and 1 homebuilt. Additionally, out of the 27 helicopters, 24 were powered by engines with Schnuerle-type porting.

Every CD is concerned about the financial outcome of a contest, especially in the case where the activity represents a minority interest within the sponsoring club. This year's contest made a slight profit for the first time.

I would like to thank each member of the Monmouth Model Airplane Club who helped run the contest. A special thanks goes to registrar Carol Vanacek, flight line coordinator Dick Robbins, frequency coordinator Charlie Williams, and scorekeeper Harrison Boggs. Also, a special thanks to Linda Goedkoop, Susan Hagen, and Dot Roane for handling the food concession. They all did a terrific job and I hope they volunteer to do it again next year. •

R/C Auto . . . . *Continued from page 55*

location, clutch slip, fuel, etc., etc. The aerodynamic down forces (not side CP) can improve traction stability as well. The rear wing and front body shape increase the tire loads (but not the car mass) as the car speed increases. The rear wing is usually more effective than the front body, so that rear traction improves more than the front traction. So, aerodynamic down forces can effect traction and give a car high speed understeer as well as the side CP/CG effects.

We now have enough information to start analyzing why certain cars are set up the way they are. But remember another factor . . . "different strokes for different folks". What works for me may not work for you. Phil Greeno's World Cup formula car has the weight forward (probably 55/45 rear/front) to help aerodynamic stability. With this weight distribution, and a formula car, there would be considerable power oversteer, so differential was added to control the power oversteer. The differential also helps wet track performance.

Now let's look at Franco Sabattini's World Championship sports car. Franco appears to like a forward CG for a little power oversteer, or else he converted a formula car chassis. The component layout indicates the car was probably first set up for counterclockwise running.

Now let's get a little closer to home. As mentioned earlier, my experimental (CG shift) HRE car has quite a bit of weight on the rear wheels, so the car has slight power understeer on high-traction tracks. My standard car has the weight a little further forward and turns better on high-traction tracks, but is a little loose on dirty tracks. My sports cars usually weigh in at about 5 lb., 4 oz. to 5 lb., 6 oz. with the K&B 3.5 engine. I think the car is

easier to control with the slightly greater (over 5 lb. minimum) weight. However, in the superstock class, I run my car right at the minimum because with the reduced power there are fewer control problems.

Associated cars sometimes suffer from understeer. The power understeer is usually related to the high CG of the radio tray and excessive toe-in. Recently, team drivers have discovered that lowering the CG (rear end primarily) helps power understeer, as I've been saying in this column for five years. Most Associated drivers, and many others, leave the full body spoiler on sports cars intact and put the rear wing leading edge between the fins. As a consequence, there is considerable drag at the rear, hence lots of high speed aerodynamic stability, and some high speed understeer.

Thorp cars have a forward CG, so they have lots of aerodynamic stability and work well for formula cars. Thorp cars can really be thrown around. But the forward CG makes the rear end a little loose, and differential helps. The forward CG also tends to give high speed (steady speed) understeer, so soft front tires and front suspension are normally used. The forward CG also indicates why the cars work so much better on high-traction tracks, such as Thorp Raceway.

Delta cars normally have pretty fast engaging clutches, so unless you have a well-trained throttle finger, there may be considerable throttle oversteer. The new Super J chassis has a low chassis plate and CG . . . giving more low speed power oversteer . . . so the cars work best on high-traction tracks. Hard front tires are used to control the oversteer. A good punch of the throttle will induce oversteer, except at higher speed, where aerodynamics, the low CG, and hard front tires tend to give understeer.

Note that clutch slip can help both low speed power oversteer and low speed power understeer. Clutch slip will reduce the power applied to the rear wheels so more traction force is available for stability. Also, reduced power application decreases forward acceleration and aft weight shift, so power understeer problems will be reduced if they exist.

Something else of interest can occur: experiencing oversteer and understeer on the same corner. This could, and did, happen on turn No. 1 of the '78 Nats track at Rattey's Raceway with about a 40-foot radius. Turn No. 1 (the big turn with some banking) is entered at fairly low speed with lots of acceleration potential, but a fairly uniform speed is reached by the mid-point. With a high car CG you can experience low speed power understeer on the first half of the corner and then oversteer on the last half when essentially a steady speed is reached and side weight transfer decreases rear traction. However, aerodynamic stability will be more effective on the last half of the turn and help control oversteer. With a low CG, you can experience accelerating power oversteer (because of decreased rearward weight transfer) initially and then understeer on the latter portion of turn No. 1 when aerodynamics are effective and rear traction is a little more optimum. My sports and G.T. cars tended to exhibit the high CG characteristics and Art Carbonell's the low CG characteristics. On this corner, you have to hit a happy medium on CG adjustment.

At Thorp Raceway, the sweeper entering the back straight has a radius of about 20 feet. The sweeper is entered at low speed (from a 150° tight corner) and the car is still accelerating pretty hard at the end. Normally, on this corner a car will exhibit the same characteristic through the complete turn, because the car is accelerating continuously and speed does not allow aerodynamics to be fully effective.

Well, now is the time to send me questions or comments. Send them to Chuck Hallum, 18276 Foxglove Way, Irvine, CA 92715. I'll try to answer them in future articles. •

Pylon . . . . . *Continued from page 29*

line stock", they were "hand-fitted stock", and go fast! wcn)

Formula I competitors were more willing to come to the '78 Nats (that, or more desperate for a contest), as the entry number shot all the way up to thirty-eight. Processing was a snap, if a

bit unorthodox with regard to frequency checking. As compared to past Nats, when upwards of 150 Formula I's had to be scale judged, this year's total of 70 planes made the difficult job relatively easy. The number one aircraft turned out to be a Polecat belonging to Ron Schorr. Ron's win in handicapping was soon to be followed by other honors to be bestowed upon him.

Frequency gang-ups caused problems in making up a matrix. Three-plane heats were used, disappointing many competitors and unnecessarily prolonging the number of heats needed to fill a round of racing. With 38 contestants and three-plane heats, there shouldn't have been any need for fliers to repetitively fly against one another, but unfortunately they did.

Again, the races were uneventful, except for Irwin Funderburk's K&B-powered El Bandito fast time of 1:13.8. Hard luck guy in F-I had to be Dave Shadel, who was in first until his last heat, when he mid-aired with Tom Christopher (not too lucky for Tom, either) and dropped back to a tie for second with Bob Smith. A frequency conflict prevented flying the tie off, and by virtue of a one-tenth of a second faster time, Dave wound up in second.

Tension was high for Ron Schorr's last race, as due to scheduling of heats, his last flight could either win or lose it for him. Ron stood the pressure as a true champion and the win moved him to 27 points, one point ahead of Shadel and Smith, both tied with 26 points. Steve Barrett, with his S.T. X40-powered Prather Toni, took the trophy for Best Senior and Drew Telford took the Best Junior trophy.

Of course, every contest needs volunteer workers so that others may come and enjoy doing their own thing. The Nats is no exception, and I'm sure that those who attended would like to thank all those selfless, dedicated souls who planned, ran, and worked at this year's contest. It's not an easy job, especially if you'd rather be flying. Let's hope that next year the turnout is worthy of the name of the contest.

See you at the races. . . •

Fuel Lines . . . . *Continued from page 27*

decreases? We have to lean the fuel mixture.

I seriously doubt that the fuel was "displaced by water" in the morning. It's simply that the air was more dense in the morning.

Again, airplane pilots know that it takes more runway to get airborne on a hot, humid day than it does on a cool, dry day. Two reasons for that: The wings don't develop as much lift in low-density air, and the engine doesn't develop as much power (because of a weaker fuel/air charge) in low-density air. A supercharger, or course, solves the latter problem.

Anyway, I've experienced all this in airplanes, model airplanes, and model boats. And you're right, judicious needle tweaking is an important part of engine power. I hope I've done a bit to clarify why we have to tweak. My very best regards, Don Typond. Model Aqua News, M.A.N.

* * *

Dear George: Your comments in "Fuel Lines", in the October 1978 issue of **Model Builder**, *on fuel mixture problems interested me. Perhaps some comment would be of help.*

The primary reason for the needed change in mixture (air-fuel ratio) was a change in the density (weight) of the air. As the temperature increased, the air density decreased, so the amount of fuel needed to maintain the required air-fuel ratio decreased.

This need for a specific air-fuel ratio is best shown in the flight of full-scale aircraft; as the aircraft gains altitude into less dense air, the mixture is constantly leaned to maintain full engine power.

One more comment may be of interest; moist air is lighter than dry air. For a complete explanation of that little gem, consult your local weather man. I enjoy all your comments wherever they're read. Best regards, Roy D. Strader.

* * *

Dear George, In your October 1978 **Model Builder** *article, you asked for help in understanding weather effects. FAA circular AC 90-14A tells a lot about*

the subject, and it applies to models just as to full-size aircraft. Some key points:
1) The engine sucks in a fixed volume of air each revolution. The density of the air determines the amount of fuel required for optimum power: less dense, leaner mixture; more dense, richer.
2) Air density is controlled by three things: pressure, temperature, and humidity.

a) Pressure varies, but very gradually unless a cold or warm front passes your area (one air mass displacing another).

b) Temperature varies widely in the course of a day, and has a great effect on air density. A 30° F rise in temperature, in effect, raises the elevation of your airport about 2,000 feet!

c) Humidity has a less effect. Water vapor is lighter than air, so the density of the atmosphere is lower when humidity is high.

3) If you want to set a record, wait for cold, dry air, and high pressure. For normal flying, readjust the mixture whenever the temperature changes noticeably. Best regards, John Reynolds.

Now, how 'bout that, sports fans? Anyone else care to jump into this? Sure gets interesting!

Dear Mr. Aldrich: HELP!!! I need help. I'm having engine problems. I have a Fox 29 R/C that powers a Falcon 56. The problem is that when I use a low nitro fuel, the engine will only run with the battery connected to the glow plug. If the battery is disconnected, the engine will run for only one minute or so. If I reconnect the battery, the engine will run fine with no problems. I tried a higher nitro fuel, like Missile Mist, and the engine runs very good on it with no apparent problem. I've taken the engine apart with the help of someone more experienced, and we found nothing wrong. I would be very thankful for any help you can give. Thank you, Robin Rayborn.

Dear Robin: If your Fox 29 R/C would not keep running on any kind of fuel, I'd say change the glow plug. In fact, I'm still prone to believe you have a bad plug. Try a new one, and if that doesn't help, try a different brand.

There is another possibility or three. 1) The engine has a compression leak. Either crankcase or head gasket leakage can cause this condition, and it'll do it on any fuel. 2) The head compression is too low. If the cylinder head has two gaskets under it, remove one and see if your problem continues. 3) The piston/cylinder is worn out.

The Fox 29 R/C carb is somewhat sensitive and requires careful adjustment, especially when the weather changes (see above).

Please let us know if any of the above helped or regardless, how you solved your problem. It is most intriguing. If you are still unable to solve the problem, send it to me and I'll give it a go. (Nobody else, now; this guy has got my curiosity up!) •

F/F . . . . . *Continued from page 86*

A) Zero, the time achieved on the second attempt.

B) Max, the time achieved on the third attempt.

In each situation, the decision reached by the jury was the last choice. I personally agree with their rules interpretations, except for Example 6. In this case, unlike the others, the rules are unmistakeably clear: the score of the second attempt is the official flight. Just as unmistakeable is the rule that a line-cross results in an attempt. Contestant D should have known the rule well, after having 2 previous linecrossings. The event director was familiar with the rule, since he quoted it to Contestant C (me) the day before. Why, then, did the jury choose to ignore what was written in plain black and white in the rulebook? Was it really because of the "confusion and apparent universal lack of knowledge about the rules", as Bill Hartill says? Is it ethical for the jury at a national event like the FAI Finals to be made up entirely of members of one club? If the jury had based its decision on the written rules, in this case, the Nordic team would have a different composition. As I write this, I've received a letter from AMA stating, "Because the jury acted on a Nordic protest without the correct information concerning the status of current rules, the Jury has been asked to reconsider its decision in light of the above information."

THIS MONTH'S THREE-VIEW

Stafford Screen won 2 out of the past British Nats Open Power events with this "plain vanilla" model. Note that it meets FAI specs for size and weight, so it's no ultra-lightweight. Secret of its success? From *Free Flight News:* ". . . How does he do it? Attention to detail must be a very large part of the answer. Staff's utterly throrough approach to checking everything before and after the flying session as well as on the field results in very few mistakes being made, and most dropped time is a result of finger trouble, not bad luck!"

THIS MONTH'S MYSTERY MODEL

Thought I'd start you out on an easy one. You won't have to research in any foreign magazines for this month's

mystery. Be careful, though, it's not a Galaxie . . . that would be *too* easy! Send your guesses to **MB**, and the first correct reply (with the usual handicap) gets a free sub.

The DGA (Darned Good Airfoil) series will be temporarily suspended until I find out whether there are any DGA's not already published in **MB**. There is a strong possibility that the entire collection of DGA's will be available. Details of this when available.

Recent Mystery Model winners are as follows:

JULY: Gerald Knoblauch, Simsbury, Connecticut, "B" F/F Gas design by Paul Romac, 1959.

AUGUST: Dave Hulka, Inglewood, California, "The Forerunner", by Paul Del Gatto, 1952.

SEPTEMBER: John Hemphill, Jacksonville, Florida, Dan Sobala's "Geef", 1957-58.

OCTOBER: Bill Wilson, Fredericksburg, Virginia, Foam Fuselage "Satellite", by Bob Hunter, 1957.

NOVEMBER: Bill Park, Charlotte, North Carolina, "Mainmove", by Germany's Benno Sabel, 1957.

Each winner receives a free, one-year new or extended subscription to **Model Builder.** •

Aviatik . . . . . *Continued from page 79*

slots in the ribs, particularly the rear spar, as the little beggars are pretty skinny back there.

Here is the construction procedure we followed (upper starboard wing): Mark the rib stations on the 1/8 x 1/16 hard balsa front spar, as well as on the 1/16 square basswood rear spar. Cement ribs along the front spar, but do not pin the assembly over the plan. Without dallying, cement the rear spar in place. Before the cement is set, position this structure over the plans and rapidly confirm parallel rib alignment and perpendicularity. After you are satisfied that all is *OK*, pin down this assembly and cement the leading and trailing edges in place. The trailing edge should be shaped, but not scalloped, before cementing it in place. Repeat this procedure with the three other wing panels.

The funny wing tip is the most unorthodox part of the upper wing, and calls for a somewhat unusual form for lamination lay-up. It will be necessary to make two of these, one for the right wing and one for the left. They may be made of 3/8-inch balsa, or carefully bent from cardboard, reinforced with contour ribs. This form serves a dual function by providing a "platform" for the tip form as viewed from the top, and as an airfoil contour form when viewed from the side. The basic side configuration closely follows the undercamber of the wing until about 2/3 the way back on the chord, where it swoops up. It should work in coincidence with rib R2. The sketch shows form relation to the wing. The laminated tips are laid up independently of the wing, of course. The bottom wings require different forms.

Cement the tips in place after letting them dry overnight on the form. Add false ribs to all panels. Join the right and left upper wing panels, using plywood spar braces, so that each tip has a 1/2 inch of dihedral. Add the curved (laminated) piece at the t.e. of the upper wing center section.

Cement the 1/4-inch thick balsa strut mounts in place for both cabane and interplane struts. The strut mounts for the cabane struts should have a piece of 1/32-inch I.D. aluminum tubing fitted in them. These are to receive the 1/32-inch diameter wire struts which are bent in the shape of a flat-bottomed "U" and epoxied in the correct position on the fuselage cross bracing. A diagonal wire soldered in place provides the necessary rigidity to keep the assembly from swaying fore and aft. See sketch for typical cabane arrangement. Struts should be brought to the approximate scale width with 1/16 x 1/8 balsa fairings, cut to a streamline cross-section. Cement these to the wire and apply sanding sealer.

The interplane struts were made from cocktail straws, slightly flattened and plugged at each end with 1-inch hard balsa which is allowed to protrude about 1/4-inch. This protrusion fits into the appropriate hole drilled in the balsa strut mount in the wings. You may wish to substitute 1/8 x 3/32 balsa for struts.

COLOR SCHEME AND COVERING

The Aviatik D-I's sported no less than five different paint and camouflage schemes, reflecting progress from the prototype through squadron assignments on the Italian front. The hexagonal motif used on our model was most frequently seen.

To achieve the hexagonal design, we simply cut an appropriate-size hex aperture in a piece of thin cardboard, and used "permanent" Ad Markers, available at artist's supply stores, moving the hex template across white tissue which had been taped down to a firm support. A piece of tissue about 14 x 11 inches is a convenient size would be sufficient to cover the tops of two wing panels.

Although it sounds laborious, the process goes rather rapidly if you make simple preparations. Determine approximately how much tissue you will need to cover the camouflaged portions of the model. These include all surfaces except the undersides of the wings and stab, and the fuselage. The wing and stab undersides are cream color; the fuselage, which was plywood covered, was natural wood color, or medium brown.

A common desk blotter placed under the tissue before taping the edges tends to prevent the marker ink from spreading to the adjacent color.

Rather than attempt to describe the complicated repeat pattern followed by the Austro-Hungarian air forces in WW-I, we shall only suggest colors that are appropriate and readily available in the felt-tipped markers. You may wish to consult the Profile Publication for an accurate scheme, reproduced in color.

Here are the colors: light gray, dark violet, dark green, light blue, ochre (yellow), olive, dark blue, and tan.

The markers which are identified as "permanent" are not water soluble, so you can water or alcohol spray the tissue to shrink it after applying it to the framework. Don't take the term "permanent" too literally, however. The colors tend to change when subjected to sunlight over a prolonged period of time.

After you have prepared the tissue with what may seem like a zillion hexagons, follow conventional covering practice in applying the tissue to the framework. The "T" insignia which appears on both sides and the turtledeck of the aircraft is cut from red tissue. A white tissue background band is applied first, but does not go on the underside of the fuselage, which is solid brown. The nose and cowling, which surrounds the engine back to former F3, is painted red.

Crosses may be cut from black tissue and applied after the model is clear doped. Some Aviatiks are shown in photographs with crosses without white outlines. We followed that arrangement, but it looked strange, so we added the white outline with bond paper, on the top wing and rudder crosses only.

MISCELLANEOUS

After covering and shrinking tissue, apply two coats of diluted clear dope, with plasticizer, to minimize warping.

The easiest way to assemble the model is to slip the finished top wing into the wire ends of the cabane strut assembly. Establish the incidence carefully as shown in the plans. Apply cement to root ribs of the bottom wing and cement them to the fuselage, taking particular care to observe alignment. The bottom wings should have the same incidence as the top, and the dihedral should be the same. When you are satisfied that the alignment is true, allow everything to dry thoroughly, then "spring" the wings slightly and insert the interplane struts, seating the strut ends in the proper holes. Hot Stuff in place. Apply Hot Stuff to the cabane mounts. The flying wires are simulated from 2-pound test fish leader. All struts are painted dark gray.

The odd projection coming out of the top of the cowling immediately above the radiator is an air pump, and presumably functioned somewhat as a supercharger. It can be fashioned from balsa, and painted silver. Aviatiks had all sorts of vents and inspection louvres scattered about the forward fuselage sides. The photographic reference we have shows them in all sorts of different places. They may be fabricated from thin aluminum or cut from scrap balsa. On the real plane, they hinged at the entering edge, and could be swung out for access to a hole about 4 inches in diameter in the plywood side of the fuselage. Details, like the bust of the pilot and machine gun muzzle (left side of model only) with streamline fairing, may be made of balsa.

The control horns projecting from the tail surfaces are cut from 1/32 plywood and painted black. Carefully cut tissue on the stabilizer and rudder where you have included the balsa supports. Cement the horns in place. Add control wires, which may be fashioned from silk thread or fish leader.

FLYING

The propeller we first tried was made by laminating two 1/64 plywood blades (to make a 1/32-inch thick blade) around a pine prop blank. It turned out to have excessive pitch, so we substituted an 8-inch Peck-Polymers plastic prop, which gave good results.

The model should balance a little forward of the center of the top wing. To achieve this, it is necessary to add about 12 to 14 grams of lead to the nose. Simply drill a little cavity inside the nose block and secure the weight. It can be held in place temporarily with clay until balance adjustment is confirmed.

The model flies well on six strands of 3/16 FAI rubber. The greatest number of winds tried so far has been about 1000, with lubed rubber. It is a good precaution to use a winding tube if you intend to pack in maximum turns, as the camouflage tissue is difficult to patch in case of rubber breakage, to say nothing of all those balsa uprights!

The model is extremely stable in flight. The biggest difficulty we had was in

getting it to fly in acceptably tight circles. Right thrust helped in this respect.

The Aviatik D-I is an unusual modeling subject, providing very good appearance and flying characteristics. Why not add it to your fleet? •

Half-A ..... *Continued from page 63*

with muffler and throttle that is more powerful than an unmuffled, unthrottled Tee Dee .09. That's a bunch of power, since the .09 is the size with the highest specific power output in that series of Cox engines.

Just a closing thought here. I am taking a class in jewelry making, and found that jewelry supply houses have an awful lot of really neat tools! Send to Grieger's (900 S. Arroyo Parkway, Pasadena, CA 91109) for their catalog, and you'll see. Just don't let your wife see it, or you will soon be broke. You can get all kinds of super-fine metalworking tools, and for you scale freaks, how about lost wax casting genuine metal scale fittings?

Have fun and fly lots (also fly in parks, schoolyards, etc.). •

C/L ..... *Continued from page 77*

TTM wants credit, they got it.

With any luck at all, this event will catch on everyplace except in SoCal. If it were to become popular down South, then surely P&B would propose Gnat Racing as an AMA event . . . and I really couldn't handle that.

DUKE CITY DOPE

The above is a regular section of the newsletter of the Albuquerque Thunderbirds, editied by Phil Shew. I'm not prone to quoting from newsletters, but the DCD section of their post-Nats issue is just too good to pass up, especially the bit about Linda Wheeler . . . anybody who has seen Linda can relate to it very well indeed. I know; I've talked to her a couple of times and still can't remember what her face looks like. . .

"THE FICKLE FILLY AT THE NATS

The Fickle Filly noticed that several T-Birds attending the Nationals were showing definite signs of that dread disease known as 'Polishness'. Symptoms include:

1) Pitting at 99 laps in Team Race.
2) Losing pattern points in Stunt for flying 5 laps inverted instead of 6.
3) Trying stunts with a Class I Carrier ship.
4) Throwing a rod . . . in your motorhome generator?
5) Expecting fast service at Tony's Pizza joint.
6) Running out of fuel in Profile Carrier.
7) Subjecting a brand-new TWA to the destruct test.
8) Volunteering to cover the Racing events for *Model Aviation*.
9) Leaving the cameras back at the dorm . . . every single day.
10) Not looking Linda Wheeler in the eye when talking to her.
11) Getting help to turn a mediocre 30-second pit in Junior Slow Rat into a slow 40-second pit.
12) Vacationing in Lake Charles, LA.
13) Staying home."

MORE DOPE

As long as I'm stealing material from the T-Birds newsletter, here is another interesting piece. . .

"THE NEVER-ENDING BATTLE OF IMPORTANCE

Ever since Pilots and Pitmen got together to make teams, there has been an argument of who is more important, the pilot or the pitman.

"Now, the pitmen are important because of their humorous ways of stopping engines with fingers and other parts of the body, which usually end up in pain. But besides that, they are only good for starting the engine when the starter says 'Go!' at the beginning of a race. They also sometimes restart the engine when the plane comes in for a pit. They also have cute ways of slowing the plane down, like putting a shin in front of the plane or grabbing the wing so it suddenly falls to the ground, and other things like that.

"Now, those cute, darling, modest pilots are really useful. To be a good pilot, you have to know how to whip and how to hold back. For instance, if a guy is going to pass you, you have to know how to whip, so it doesn't look so bad; you also have to know how to hold back so the other guy can catch up, then you really let out and make him look bad.

"To be a good pilot, you have to know

how to block, so if all else fails, you can hold back to make it harder to pass.

"Then, one of the smaller details is knowing how to take off and land, because if you can't take off, you may snag the other pilots' lines. Also, if a pilot can't land, you're really in trouble, because the poor, lazy, crude pitman will have to walk, sometimes jog, but rarely run, around the circle to get the plane.

"The pitman can only blow the race; the pilot can blow everything. It's quite obvious that the pilot is more important.

"Name witheld on request . . . initials T. Smedley."

AERO-CHALLENGE

I can remember several years ago being copied in on a very ambitious project being taken on by Bill "Moose" Allen. Bill, without the benefit of a C/L club in his town (DeKalb, Illinois), a proper flying site or any of the other things usually regarded as absolutely necessary to put on a large C/L meet, decided to put DeKalb on the map with an annual C/L contest. Knowing that to just put on another average, local contest wouldn't do it, Bill has gone absolutely crazy in promoting his meet that has tie-ins with the Jerry Lewis Muscular Dystrophy benefit.

The first year of the contest was small, compared to what it is today, with $149.10 being donated to MD research. The third year saw a donation of $650.00, and this year's meet came up with $1297.75. Not bad at all, huh?

But money donated can't tell the story of the attraction of this contest. This year there were 137 contestants, coming in from 12 states, plus entries from Canada and England. They flew most all C/L events; Scale, Sport Scale, Precision Aerobatics, all of the Combat events, all of the Racing events (including FAI TR), and a bunch of classes of Speed.

Glenn Lee smoked for a 165.99 run in Formula 40, but couldn't quite back it up for a record. In Rat, Paul Tune did 4:45.9, then went to Slow Rat for a 5:26.5 to win both of these events with very quick times.

Ron Duly made the trip to Aero-Challenge with Charlie Johnson and won Carrier Class I with 357.67, then took Carrier Class II with 359.38. For his trouble, Ron won an HP .40 and an OPS .60, plus some other goodies. Seems that Ron left wishing that he had also taken a Profile Carrier model with him.

In Combat, I hear there was a lot of good flying, but the most amazing performance had to be that of Kelly Henocq, from England. Kelly took third in Slow, then won FAI Combat flying two stock kit VooDoos powered by Rossi .15's. Definitely pushing his luck, Kelly then borrowed an AMA (Fast) ship from Chuck Rudner and proceeded to win Fast Combat! In winning two events and taking third in another, Kelly only lost one airplane, that being Rudner's used in Fast. Sounds as if this guy is good enough to fly with us up here in the N.W. Please bring your own planes, however, Kelly!

A full report on Aero-Challenge '78 is bound to show up in several magazines, so we won't go into it any further, other than to point out that C/L contest flying is still strong and that a really big annual contest can be staged by anyone willing to do the promotion work necessary, even if there isn't any local C/L activity to speak of. Many congratulations to Bill Allen for undertaking, and pulling off, such an ambitious project.

THE CHALLENGE

Ahh, the challenge from **MB**'s Pylon Person, Jim Gager, has now been released. Unfortunately, it is rather unworkable. Something about me flying a .15-powered Combat plane on 150-foot lines . . . Jeeezz. Added in there was also something about flying it off at Lake Tahoe and having **MB** pay for our expenses. I'm all for that, of course, but wouldn't want to fly on 150-foot lines, even for a freebie to Lake Tahoe.

Still, the very thought of a challenge from another **MB** columnist gets my competitive instincts up to full activity. I'll have to think about this for awhile and then issue my own challenge.

Speaking of challenges, you may remember that there was one between Bob Stalick, former **MB** F/F columnist, and myself. The challenge, which Bob never did show up to meet, and the fact that he is a *former* **MB** columnist, surely are related.

Careful now, Jim, you may be the next **MB** writer to hang your head in shame, throw the typer against the wall, and swear to give up writing for (not much) pay, going back to the more sensible world of flying models for fun and self-amazement. •

Little Bit . . . . . *Continued from page 73*

edge skins. Pin one down over the plans and mark the rib locations. Pin twenty-five rib blanks between a root and tip template and carve and sand them to shape. Separate the ribs, putting the smallest one on the outboard wing tip and the next rib on the inboard wing tip.

Alternate back and forth until they are used up. Punch holes in the ribs where needed and glue all the ribs in place, except the root rib. Install the control system. Carve out the root rib so it will fit without interfering with the bellcrank, and glue in place. Bevel the trailing edge and install the top skin, taking care to route the pushrod through so that it works without binding.

By now you might have noticed that the inboard wing is a tad wider. Don't worry, it is supposed to be. With the wing flat on the board, cement the top leading edge sheeting in place. Follow by flipping the wing over and installing the bottom leading edge sheeting. Now epoxy two or three BB's in the right wing for tip weight. True up the leading edge and install the leading edge cap. Carefully sand the leading edge to shape with No. 400 sandpaper. While your arm is still warmed up, sand the entire wing with No. 600 sandpaper, using very light pressure. Put the wing in a safe place until needed.

FUSELAGE AND TAIL

Little Bit is now assembled upside down. Mark a center line down the top sheeting. Install the formers and one fuselage side, taking care to maintain correct alignment. The wing and horizontal stab are installed next. The remaining side is slid over the wing and installed now. A 3/4-inch cigar tube is cut to length and a 1/4-inch access hole drilled for the bladder. Follow this with a 1/16-inch vent hole. Be sure you de-burr these holes! Install the cigar tube and firewall, using epoxy to ensure a good bond. Bend the landing gear to shape and glue it between two pieces of 1/16 sheet, as shown on the plans. Glue the landing gear and bottom sheeting in place. When all is dry, flip it over and install the canopy and vertical stab. Make up the control horn and hinge the elevator to the stab with light thread. Finally, slide the wheels on and solder the retainers in place. Use as little paint as possible to keep the weight down to about 2-1/2 ounces. Before installing the motor, drill out the venturi with a 1/16-inch drill to increase the power and make the needle valve setting less critical. Install the motor, and it's ready to fly.

FLYING

Before flying, be sure the center of gravity is at least as far forward as shown on the plans. Flying can be done on up to 22 feet of strong dacron sewing thread or up to 35 feet of .004-inch wire. Using the handle shown on the plans is recommended, as the line tension is very light and it will improve your feel of the plane.

Little Bit may never win a stunt contest for you, but if small is your thing, GO FOR IT. •

Boat Races . . . *Continued from page 51*

Al Prather
Dick Aubert
B MONO
Eddie Patten
John Brodbeck Sr.
Richard Taylor
C MONO
George Lanese
Doug Nystrom
Tray Holland
A HYDRO
John Brodbeck Sr.
Louis Kara
Dick Aubert
B HYDRO
Joe Monohan
Doug Nystrom
Wally Stewart
C HYDRO
William Blackford
Wally Stewart

Mickey Kenkes

•

FM R/C . . . . . *Continued from page 34*

top-of-the-line servo, the ball-bearing, coreless motor MR-80, which is optional with the other systems. Admittedly, it is too big for you Half-A'ers, but it is perfectly at home in any .40-powered or even larger airplane, and probably even some down to the .20's. It measures 1-3/4 inches long X 7/8 inches wide X 1-3/8 inches high, and weighs 2.1 ounces. For those of you who will want to use this system in smaller airplanes, the MR-60, the equal of most other mini servos on the market, is compatible and available.

As it turned out, I flew this system both with the MR-80 and with the MR-60. Initially, I dropped the system in my Spickler Quickie, which has been my 775 test bed for many months, and which was all set up for the MR-40's, which are the same size as the MR-80's. At the same time, I was putting the finishing touches on a Curare, in which I planned to install one of my old Orbits, using servos with the same Dunham mechanics as used for the MR-60. Since it didn't require any change in servo mounts or pushrods, I decided to install the 776-FM with the smaller servos in the Curare. So far, so good, and both airplanes are still in use, with the receiver moving from one to the other as the need and mood changes.

In the MR-80, the designers have effectively overcome two of the major servo problems: friction, and the inertia of the motor armature. The friction (in the gear train and related bushings) is greatly reduced through the use of the ball bearing supported output shaft. The coreless motor, having less weight and therefore less inertia to overcome, requires less starting current, and is also easier to stop once it does start rotating. The end results, other than smoother operation, show up as increased torque versus electrical consumption. The MR-80 is rated at 50.5 inch ounces, as compared to the MR-40, which is rated at 36 inch ounces, and the MR-60, at 32. Time for stop-to-stop operation for the MR-80 is .5 seconds; .7 seconds for the MR-40, and .6 for the MR-60.

Kinda makes the -40 and the -60 look like slouches, doesn't it? But, in all fairness, they should only be compared to other non-ball bearing, standard motor servos, to which they measure up very favorably.

With four MR-80 servos and a 500 mah battery, the weight of the airborne system is approximately 15 ounces. Using a 450 mah battery will save slightly over two ounces, at almost no reduction in available flight time.

In addition to the MR-80, the other new feature we find notable, is the addition of 270-degree trim wheels, instead of the 80-degree trim levers previously seen on the 775 and most other transmitters. Total servo trim movement remains the same, but the mechanical movement required has been extended over three times, and results in some really fine trimming capabilities. In addition, the trim pots used are non-linear, the result being that the servo-to-trim-wheel movement becomes less as you move away from the center position of the wheel. You can think of it as a type of reverse exponential on the trims . . . sensitive in the center where you need it, less so towards the end as you approach the desired position.

This is extremely important with racing and high performance airplanes. Coupled with a system that always returns to the exact same neutral every time, it is an unbeatable combination. One of my racing friends from Mexico was here in California not too long ago, and I let him fly this system in my Quickie racer. After a couple of flights, he commented that it was the best-centering system he had yet flown, that coming back to stick neutral from any position resulted in no discernable change of flight trim from what he had put in.

Physically, the insides of both the transmitter and receiver closely resemble the AM systems. Apparently, the parts count does not go up to any great degree with FM, nor does it appear to get greatly complex. The transmitter uses fairly normal encoder and RF circuitry, the main difference being that the encoder output is fed to the oscillator, instead of to a buffer stage. The

heart of the receiver is two integrated circuits manufactured by Seimans in Germany, which are presently considered to be as good as you can get for this application. The receiver uses three stages of IF amplification and a ceramic filter. Shielded coils, another desirable feature, are used in the front end and oscillator sections.

As of this writing, I have been flying the MRC 776-FM every weekend for three months, except for a couple when I was out getting beaten at the Q-M races. We've been through the up high; down low, far out; antenna pointed right at it; and all the other situations during which temporary loss of control has been known to occur. Through it all, this system worked like a champ. While it isn't intended to be a so-called "super radio" with buttons (and bows!), it is mechanically and electronically sound, both in design and in manufacture. And it has worked every time I asked something of it, which, when it comes right down to it, is about all that we can ask of any radio.

I feel that we all owe a vote of thanks to MRC for pioneering this new system, especially when it may never come to large production as we are used to with 72 Mhz AM sets. The time, money, and effort involved must be tremendous. So far, it has only paid off for us Ham R/C fliers . . . let us all hope that the regulations change soon so we can all enjoy the benefits and advantages.

The MRC 776-FM is priced at "about $450", and is available in limited quantities through MRC's many dealers throughout the country. I wouldn't imagine that there are going to be many around on dealer's shelves for some time, but if you have a Ham license and are looking for some trouble-free flying, get your name on the list at your local dealer. If you don't have a Ham license, maybe a little prayer to the FCC gods will help. •

Sailplane . . . . . *Continued from page 39*

Cecil Haga's Legionaire and all its variations make up the bulk of this school. The Legionaires were designed with super-thin airfoils for moving quickly about the windy Texas sky; they gain these superior penetrating abilities at the expense of a slight sacrifice in towing height, especially in the top half of the tow. The people who fly them feel that the trade-off is well worth it. If your flying conditions are generally windy (like, seldom under 8-10 mph), then you might want to play with one of these thin flat-bottoms.

A variation on the Dallas School of Skinniness is the series of airfoils produced by John Rimmer, down in Victoria, Texas. Not strictly flat-bottomed, these sections have about 1.6% undercamber on very low aspect ratio wings (would you believe 7.4 to one?). And they penetrate extremely well, at wing loadings of under five ounces per square foot. The secret? A 6.5% thickness! John's Callisto was published in *Model Aviation;* a two-meter version, the Nemesis, flew at the Dallas LSF this fall. He has plans for sale.

Mark Smith's Windfree airfoil might well be grouped under the skinny flat-bottomed school, since its section thickness is under 10%. (I believe Mark told me once that the Windfree foil was a flat-bottomed Eppler 374.) With only 555 square inches of wing, the Windfree is living proof that high performance can come in small packages. The combination of thin airfoil and small wing area gives the Windfree a noticeable disadvantage in towing height against most of the standard-class ships of today; but once aloft, it has performance advantages over the thicker airfoils that almost make up for the lost height.

My own Bird of Time airfoil, with its 9% thickness and unturbulated entry, might as well be grouped under the Dallas school, even though it varies significantly from the Cirrus-type by having its high-point at 42% of chord, rather than at the more normal 30%. Like the more recent San Fernando developments, the Bird of Time section has a deliberately high entry point and a lot of Phillips entry . . . this is the whole secret of its ability to move around the sky quickly. And, like the Legionaire and Windfree, it pays a small penalty in tow height for this cruising ability. The airfoil on Lee Renaud's new Aquila Grande is of this type, as is the Eppler 174 and 176.

If you're experimentally inclined in the direction of higher cruise speeds (better penetration, more hunting range from a given altitude), there's no question that the Eppler 182, shown in the drawings, is the direction of the future. About a year ago, Greg Temple, of Denver, tried a 182 on one of his 120-inch original designs (AR of 13:1, loading 6 ounces) and had nothing but praise for the section, in spite of the difficulties of building such a lean trailing edge. Whether the 182 will hold its own in extremely light air is an open question, although the brothers Sitar, over in Austria, seem to be making most of their 6-minute maxes in FAI competition. (The E-182 is the section used on their three all-glass FAI birds, one of which holds the current world speed record of over 249 mph.)

That about covers your major choices of airfoils. You should make your selection based on the type of performance you want your dream-soarer to have. Generally speaking, the thicker the airfoil, the higher the initial launch altitude you can expect, but the poorer will be the cruising range of the airplane, because thick airfoils create more drag than thin ones. This seems to apply even to thick laminar-flow sections, such as the series Hi Johnson is presently developing around his "Saloma" design, down in the . . . you guessed it . . . San Fernando Valley area.

Thin airfoils, on the other hand, are more difficult to build than thick ones, and tougher to slow down for precision landings. Their cruise speeds are generally higher, and they don't carry excess weight as gracefully as their chubby cousins do. You won't find many thin airfoils in kits, because they're not quite so easy and forgiving to fly as the thicker sections, unless they can be kept very light (say, under 6 ounces). If you design around one of these skinny foils, you may well find that you have created "a model airplane with a redline", a plane that can be dived until the wings come off . . . just like a high-performance full-scale soarer. If this possibility excites you, have at it!

REFERENCES

Book of Airfoils by Ed Dolby. Seventy-eight wing and stab airfoils drawn out, in chords from 3-1/2 to 8 inches. Available from FAI Model Supply, P.O. Box 9778, Phoenix, AZ 85068.

Model Glider Design by Frank Zaic. Ordinate charts for all the popular pre-war airfoils, plus a well-written explanation of how to plot an airfoil section. Available from AMA Headquarters, or Sig, or the author at Box 135, Northridge, CA 91324.

Modell-Technik-Berater (two volumes). All the newest Eppler profiles, but only the numbers, alas, are in English. Printed by Verlag Fur Technik und Handwerk, 757 Baden-Baden, West Germany. I bought mine from Wilshire Model Center in Santa Monica, at $6.95 a volume.

Sailplane Designer's Handbook by Eric Lister. Contains 175 airfoils, including some Epplers. Available for $5.25 from the author at 953 Klockner Rd., Trenton, NJ 08619.

Super Wings Catalog by Hi Johnson. Drawings and Ordinates for fourteen of Hi's specially developed sailplane sections, plus building and tuning info galore for foam-core glider wings. Only $1.50 from the author at 11015 Glenoaks Blvd., Pacoima, CA 91331. •

Soaring . . . . . *Continued from page 42*

fixed stick control can provide super-sensitive response. You think "right turn" and it's already there. Such controls are not for the novice. It's all too easy to overcontrol.

But such controls can provide a greater range than the usual displacement stick. In fact, the designer could choose to mix force and displacement. "Hard Over" control still provides feedback in terms of the amount of displacement, while precision control near neutral is with greater sensitivity (but feedback must be directly from the visual response of the plane). Steve Neu rigged the Glibbery transmitter to control his profile sailplane (a converted U-control kit). He can execute any maneuver you name. I had a chance to fly this set-up, and after a few minutes, could make it obey its new master.

Later I mentioned this idea to Phil Kraft, who commented that the concept of a force stick is not new. They even tried it out a few years ago, but thought it to be unsuitable for the average pilot. Nevertheless, my compliments go to Bert for his ingenuity and ability to transform an idea into practice. If you would like to try similar controls, why not read the design details in a forthcoming issue of the *Sailplane*, the journal of the National Soaring Society.

Snow Fenn, of New Zealand, notes that although Americans are devotees of the hi-start and electric winch, hand and pulley launching is still very popular in other areas of the world. He describes several different set-ups, the most obvious being a direct hand tow into the wind. A simple pulley system permits a

significant advantage. You place an angled stake in the ground between the runner and the pilot, who holds the aircraft ready for launch. The 30 to 50-pound nylon monofilament line goes from the stake, through the pulley and back through a drouge chute to the towhook on the plane. The launcher now runs into the wind and the plane rises without the usual rubber cord or battery.

But there are other configurations. You can also hook a pulley to the stake and double your advantage. Or you can use three pulleys, two on the handle pulled by the runner. All this makes good sense if you have to launch in a short field. Frank Deis and Dick Schilling taught me hand towing, and I used the multiple pulley launch system while visiting the Victorian Sailplane Championship in Australia. All this is worth learning about. A detailed article on the subject by Snow Fenn will appear in a forthcoming issue of *Sailplane* . . . another good reason for joining the National Soaring Society. All you have to do is drop a note to Jim Barr (P.O. Box 2009, Denver, Colorado 80201), with $5 for the half-year membership, or $10 for the full year.

The latest issue of *Mossquito*, the newsletter of the Mid-Ohio Soaring Society, describes some further thoughts on smooth landings versus "dorking". Bob Stought suggests, "Tape half of an egg shell, ping pong ball, or other similar item to the nose of the aircraft. If the item is cracked upon landing, the landing is considered a 'dork'." According to Barb Colgrove, the object of the landing is to "touch down at a precise landing time, say, six minutes. The spot is actually a long line drawn on the ground with a marker about three inches wide. This is not a precise line, but is basically a guideline. Somewhere on this line is drawn another line at right angles to the first line. The perfect landing is as follows: The aircraft glides in for a landing. The pilot attempts to touch down on the intersection of the two lines, or a little before that intersection. If the aircraft touches down past the intersection, no points are received for the landing. If the aircraft touches down before the intersection, then slides to a stop, it is a good landing. The distance is then measured from the intersection to the nose of the glider. The longest distance measure in inches is the number of landing points. If you land on or before the intersection, but bounce off the ground and become airborne again (even if it's only for a few inches), it's a zero landing. This calls for the most controlled landing you can make. A good sliding landing will win, if it's perfect." Note that the intersection can actually be the outside circumference of a circle, if desired. Then the landing can be made from any direction.

What do you think? Can we beat the dorking problem? Any new notions? See you next month. •

Hannan . . . . . *Continued from page 72*

imposed by mechanical, aerodynamic, and climatic considerations to have any patience remaining for artificial POLITICAL chicanery. Consider the plight of the highly-regarded Polish C/L Scale team, which had their top four entries, including Jerzy Ostrowski's magnificent P-38, virtually destroyed during the Socialist Countries' championships. Thousands of man-hours of effort wiped out at the hands of Mother Nature.

On a happier note, the Free Flight Scale event at Woodvale, which was organized on a "trial balloon" basis, appears to have been enjoyed by the majority of its participants. Bob Underwood, sole American who personally participated (proxy-flying Tom Stark's Loening), had this impression: "Great fun . . . good sportsmanship . . . wonderful models . . . I think the rules are fantastic in the respect that they allow virtually any type of model to participate. When one considers the vast variety represented, it's really great. The fellas were most tolerant, allowing an inept R/C'er to fly. They were very patient and most helpful, even to the point of 'patching things up' after damage on the way over. Mick Duce (the organizer) is a gem. I wonder if he will wear the R/C patch I gave him?"

By contrast, some of the British participants felt that the rules could have been more appropriate, although all

seemed to have a good time. Some ventured the thought that free flight is better off NOT being conducted on a World Championship basis, since the average builder seems not especially competition oriented. Winner Eric Coates feels they are "certainly not to the tune of transporting themselves and their models across the world." He also felt that only large, engine-powered models stood a chance in competition, and that such craft were hardly feasible to transport for proxy-flying.

"Doc" Martin, of Florida, might take issue with the size having any special distinction in terms of shipping, since his quite small entry arrived at Woodvale smashed flat by the Post Office, even though it had been sent in a strong box. Others were luckier, such as Walt Mooney, who sent his Peanut safely over in a simple, foam-rubber-lined cardboard box.

Second-place winner Bill Dennis, of England, also favored the large powered approach, having flown a Handley-Page twin-diesel-engined entry. Dennis feels that separate events are needed for power and rubber/CO_2, and says: "The large rubber model is all but dead in this country, and the smaller ones can't cope with anything but calm conditions . . . leaving almost total domination of the diesel model in our contests." His fellow countrymen, John Blagg and Alan Callaghan, disagree, feeling that the existing rules are to blame for low entries, and that with suitable revisions, rubber-driven models *could* be competitive with gas models.

Callaghan, who was Chief Judge at Woodvale, expressed his thoughts this way: "To be quite candid, there is a broad feeling that our diesel-powered models are the *only* way to do well in a competition such as this. This is the result of years and years of unimaginative thinking, in my view, and I long for the day that someone will show that it isn't necessarily so."

Anyone for Canada in 1980? Scalers arise!

SPEAKING OF RULES

Mike Fedor's win at the U.S. Nats with a gas-powered Peanut produced the expected reactions: "Shades of Maxwell Bassett," said Doc Martin, who rushed a rules change proposal to AMA headquarters. Dr. Dee B. Mathews agreed, saying: "Nowhere in the rules does it say that Peanut is a rubber-powered event. I think it should!" Dave Linstrum, editor of *Model Airplane News*' VTO column: "My reaction to (gas Peanuts) is truly negative . . . but it *is* legal."

Dr. Martin also proposes to institute allowance of Peanut models with either a 13-inch span wing or a 9-inch fuselage length, in order to allow high aspect ratio designs a better chance. However, the Ohio "Buzzard Droppings" newsletter retorts: "We are not too sure just what this change is expected to accomplish, but the current rule works very well indeed, and to mess with something that is working as it should is likely to result in great trouble. Let's leave Peanut alone."

And from the Flying Aces Club, who originated Peanut Scale, as well as many other fine events, a sweeping revision of rules, including this one: "*ALL* (italics ours) official events are for rubber-powered models to be flown outdoors."

Ed Whitten, writing in the "Star Skippers" newsletter: "The 'general idea' for an event *always* gets whittled down to the most lenient interpretation of the rules possible. Rules, therefore, *must* be specific to ensure that the 'general idea', or 'original intent', or 'spirit of the event' is maintained.

"Rules makers must remember that an 'event' is *not* what the originator had in mind, but *is* what his rules state. The originator, therefore, *must* spell out rules in detail to ensure the event achieves what was intended. Once the rules are formulated, one should completely forget what the original intent might have been . . . THE RULES *ARE* THE EVENT."

FLYING FOR FUN

A new gallery with this theme has been established in the National Air and Space Museum of the Smithsonian Institute. Included are such diverse exhibits as Frisbies, kites, boomerangs, gliders, a horsefly-powered model, an Aeronca C-2, and hot-air ballooning displays. Included are photos, documents, and silent films on related subjects. Good show!

SPEAKING OF MUSEUMS

The Springfield, Massachusetts, Sci-

ence Museum has sponsored a retrospective exhibition relating to sport and racing aircraft of the surrounding area. In the process of setting up the display, more material on the fascinating Gee Bee aircraft surfaced. Featured are models, photos, memorabilia, and a Miller "Zeta" aircraft. Honored guests for the opening included Robert Granville and other members of the famous family, Howell Miller, Romain Lambert, and dedication speaker Walt Boyne, of the National Air and Space Museum.

Model Gee Bees continue to achieve impressive results on the contest circuits, in such diverse categories as free flight rubber, control-line, and R/C. Modernistic Models, P.O. Box 6974, Albuquerque, New Mexico, 87197, offers 1-inch scale Gee Bee Z plans by Bill Givens. For control-line enthusiasts, Vern Clements, Box 609, Caldwell, Idaho, 83605, has available construction drawings for both the Z and R-1 Gee Bees.

Meanwhile, the full-size Z reproduction belonging to Bill Turner, at Flabob Airport, near Riverside Airport, is essentially ready for test flight. Finishing touches were hampered by the virtual army of well-wishers attempting to follow the progress of the project. Rumors of at least two full-size R-1's persist, but photographic evidence of same has been conspicuous by its absence.

ULTRALIGHT NEWS

While model aircraft continue to grow in size (Mammoth Scale), man-carrying light planes continue to shrink, with powered gliders again in the news. The large models and small people-carriers are actually meeting in the middle of the size spectrum, and are practically sharing the same powerplants. Readers who may care to learn more about the ride-in variety should investigate the "Ultra-Lite Aircraft Journal", edited by (model builder, natch!) John W. Grega. Two dollars sent to 355 Grand Blvd., Beford, Ohio, 44146, will bring a sample copy. Hint to scalers: The current issue features 3-views and photos of a Dormoy "Bathtub" and Moeller Stomo 3.

BUILD 'EM STRAIGHT

Ed Carson, of Denmark, wrote in with an observation regarding hard-to-adjust models. He feels that unnoticed fuselage construction problems may often be at fault. Says Carson: "I have, in building box-truss type fuselage models, discovered that if either side possesses a more pronounced curve, that the turning movement during flight can be drastically influenced. This commonplace defect may be noticed easily by a modeler of ripe experience, but if I do say so myself, cannot understand why it has not been mentioned in more publications devoted to our hobby. Any advice at all on how to insure absolute alignment in building box-trussed fuselages would be zealously pursued by modelers like myself."

How about it, designers? Most articles do seem to concentrate more on stressing need for accuracy in wing and tailplane structures, rather than fuse-

lages.

NEW WINDER SOURCE

Frank Scott reports seeing a novel rubber model winder adapted from an electric drill speed-reducer. A hardware and K-Mart store item, available in various ratios from 4:1 to 11:1, depending upon brand, the speed reducers cost less than $10.00. Frank sez the first one he saw was being employed by an R/C model builder! Have escapements returned?

GATHERING OF EAGLES

Chino Airport, near Los Angeles, was the scene of a massive air show devoted primarily to WW-II vintage aircraft. On hand were a number of guests, including Masajiro Kawato, the man who shot down "Pappy" Boyington. Now the two are close friends, and both have recorded their experiences in book form. Kawato explained that he had at first considered entitling his, "Bye, Bye, Black Sheep"!

Since the Chino program was to include the Confederate Air Force reinactment of the Pearl Harbor attack, Col. Bob Thacker, who was one of those trying to land a B-17 in Hawaii on that day of infamy, was invited to attend as an honored guest. However, he declined, on the grounds that he preferred to go model flying instead. Now *that's* dedication to the hobby! •

R/C Forum . . . *Continued from page 47*

now. There probably is an entire subminiature receiver today which would fit inside of the case of one of the original crystals!

Obtaining reliable crystals which would meet the FCC specifications was one of the major headaches in developing radios as we know them today. It was crystal failure or faulty operation which caused more problems in those days than anything else . . . other than the DRY batteries that had to be used! The crystal IS the heart of your transmitter and receiver. . . .

We have a little sketch which will show you how simple the construction of a crystal is and it should also emphasize why they are so fragile. You could take an I.C. chip, or most transistors, and jump on them with your feet, probably without damage. But, don't even drop a crystal, it is that fragile by comparison!

The crystal appears to be metal. However, the metal is only the cover, which is sealed to keep atmospheric changes out. It is so critical to holding its frequency that even a change in humidity could shift the frequency for which it is adjusted! You will note a drop of solder on the cover that seals a hole through which the air was evacuated. The bottom of the crystal has two prongs or leads which pass through an insulated base. These prongs emerge inside of the cover and are the support for the crystal itself, which is made of quartz, and that is all there is to a "crystal".

This construction is just great for crystals that are used at frequencies much lower than ours. The crystal does its work by vibrating in response to electrical energy when it is applied to it. The frequency of the vibration varies with the thickness of the quartz. The higher the frequency the thinner the quartz will be. While quartz is the finest material we know of for vibrating with a close frequency tolerance, it is also very fragile. Naturally, the thinner it is, the easier it cracks or breaks. One kibitzer asked another, "How come my receiver uses what is called a 'doubler' crystal and yours does not?" The doubler is simply a crystal ground to respond at a frequency which is a lower harmonic of the frequency actually desired. In fact ALL of our R/C crystals are ground to vibrate at lower frequencies than we use (the vibration frequency of the crystal is controlled by its thickness, and being stone, they must be ground to size).

The engineers discuss which harmonic to use by asking what "overtone" the crystal should be. The first R/Cer's crystal could have been ground to respond best to the 3rd overtone, and others to the 5th. The difference in response would be taken care of in the oscillator design. To find the usable harmonic of a vibration, you simply divide by 2 again and again. The efficiency of a vibration decreases as you go from harmonic to harmonic. Hence, the closer you stay to the basic frequency, the greater will be the efficiency.

The receiver which uses the "doubler" crystal simply uses it for its greater efficiency. Simply stated, the oscillator section of a transmitter or receiver is at the very beginning. The oscillator creates the RF signal in the transmitter; in the receiver the oscillator responds to an RF signal when it is received. These are tuned circuits. An oscillator is often called a transmitter. When it is "excited" it will create an RF signal. The transmitter oscillator is self-excited, when the switch is flipped it excites the crystal and RF transmission commences. The receiver oscillator always has voltage on it, but it will not conduct until the crystal vibrates, and it takes the proper frequency RF signal to create the vibration. So, in effect, crystals are on-off valves for RF signals which only open when they are vibrated. When they are closed, nothing can get through the circuits.

How does a crystal fail? There are three common ways. Least common is self-oscillation, in which they simply vibrate from some outside cause that would not effect a "good" one, perhaps because the cover or can sprung a leak. It is important that the quartz be securely fastened to the prongs. There can be a faulty mechanical connection which reduces the efficiency. Most commonly, the quartz simply cracks or breaks. Breakage, of course, means complete failure, but a crack can be troublesome. With a crack, the crystal may continue to function as normal, then fail a short time later. Other times, the crack will change the frequency slightly and when the unit is retuned, everything will appear normal again until the crack expands from the continuous vibration. What it all means is to never second guess the technician who sees some indication that a crystal should be replaced, his intuition could save you an airplane!

Why are crystals so expensive and yet composed of so little? It is quite costly to grind stone to thin wafers and to hold the tolerances in thickness as close as is necessary for our purposes. Fastening the rock to the metal prongs is a delicate operation not especially suited to mass production. Rejects are probably quite high, and anytime you reject one, you have doubled the cost of the next piece produced. There just does not seem to be anything that can be done to reduce the cost of anything as delicate as a crystal has to be.

The last question deals with the difference between a transmitter crystal and a receiver crystal. Answer is simple: nothing mechanically. The transmitter crystal is usually the fundamental of the frequency to be broadcast. The receiver crystal is either 455 Mhz above or below the transmitter's frequency to establish the intermediate frequency used in our superhetrodyne receivers.

Thinking back to what we have just discussed, you can appreciate why the performance of a crystal is so critical. First you vibrate this minute piece of quartz 72 million time per second with the RF. Then you shut this vibration on and off about every 4 milliseconds with the coding. While doing this, you expect it to start and stop vibrating INSTANTLY as the time off is much shorter than the time on. Even in this space age, that is pretty much to ask of a little old rock!

Not much room left for letters this month, but one from Robert Knutson should make the boss happy and jog a few memories. The story of the Live Wire "Trainer" in a recent issue reminded Bob that he has one of those prototype Live Wire "Senior" kits on the shelf which he purchased from the small production run, together with it, the K&B .19 recommended, and a "TTPW" R/C system to fly it with. TTPW??? Just plain "To Tough to Piddle With", or Two Tone Pulse Width, as developed by Doctor Walter Good. All of this has been sitting on the shelf for these many years, waiting for time to put it together. Talk about being prepared for some slack time! Bob is very involved in the old-timer movement and especially the Morton radial engine.

Let's keep the mail coming and maybe even a question out of your next "bull session". •

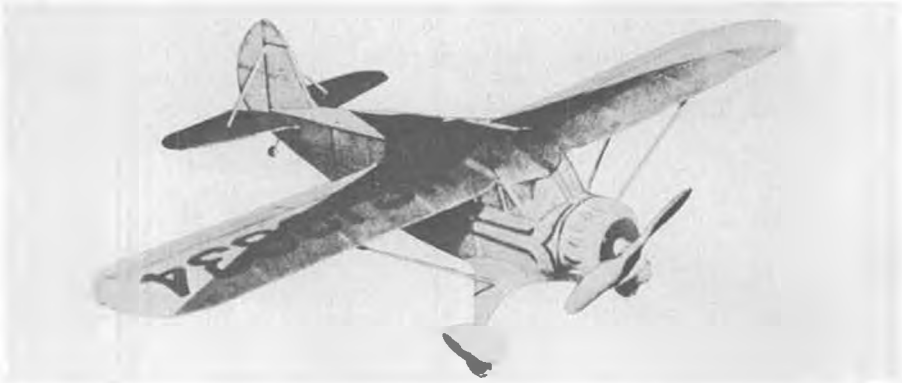
Indoor . . . . . *Continued from page 71*

of communal interest as contestants inspected other airplanes and critically watched early test flights.

The majority of those present had previous experiences of flying at Cardington, though of the American team only Richmond had flown in the site before, as a member of the team which made a clean sweep of Team, Individual, and High Time trophies on the preceding occasion. Bud Romak was present to defend his World Champion title and rapidly became favorite to do so by making two flights in excess of 40 minutes, compared to his winning total of 78:58 two years before. However, the Americans were flying well, as were the British and Canadians, and by the end of the day it was obvious from the number of 35/40-minute flights being made on all sides that the competition was going to be hard fought over the ensuing days, and at a higher standard than previously recorded.

Little obvious trend in design was noted, with the exception of Vilim Kmoch of Yugoslavia, who was putting in good times with a square-tipped V-dihedral machine reminiscent of an overgrown Easy-B. The Swiss were, once again, flying long moment arm ships with stabs now underslung from the fuselage boom, with the l.e. supported on struts and the t.e. attached to the leading edge of the fin.

Several teams were making use of lightweight transportation boxes, as introduced by the Dutch in 1976; lightly constructed of stripwood and covered with clear plastic, they enabled a model to be easily and safely moved around the hangar for processing purposes and to the flight line. U.S. Team Manager, Ray Harlan, assembled one of these boxes on Saturday and also provided the processing team with an ingenious gadget which, by means of lenses and mirrors, gave an accurate 30x indication



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of wing span measurement. This came in particularly useful in one or two borderline instances, especially with a model belonging to Linden (Sweden) which was to the maximum allowable span to within about six decimal places! Ray's enterprise and effort in transporting the apparatus across the Atlantic was much appreciated.

At a Team Manager's meeting, much argument revolved around the use of the "shark's tooth" device, used in particular by the British, which enabled a model to be caught on a balloon line and steered almost indefinitely with the propellor still turning at reduced rpm, and still technically in flight, and often making altitude up the line. Eventually its use was banned, and before the commencement of the contest, Team Managers and timekeepers were extensively briefed by the F.A.I. Jury as to permissible limits of steering and justification for same.

At 11 a.m. on Sunday, George Lynn declared the Championships open and processing began under the direction of Ian Dowsett and Butch Hadland, with each model being checked out before each official flight; Romak and Richmond both found themselves adding ballast to at least one model apiece to bring them up to the minimum 1 gram required.

Once again, the first flight of the event was by a Canadian, with Jack McGillivray posting an uneventful 35:45. Each team was allowed but one model in the air at any time, and as increasing numbers of scores began to appear on the board, it was apparent that they reflected the promise of those made in practice, with a run of 34 min. + times from Cotugno (Italy), Ciapala (Poland), Banba (Japan), together with USA's Bill Hulbert, who made a useful start with 34:39.

Ron Higgs, a relative newcomer to Indoor and on his first Team place, scored 35:16 flying a Mike Thomas design. Thomas repeated what is apparently becoming a tradition by firing his own airplane straight up into the roof; not as lucky as last time, it hung up at a mere 6:43.

Of the British team, only Derl Morley escaped problems with a 30:45, while his teammates were having a great deal of trouble with models hanging up or suffering structural failures while steering, etc. On the other hand, Bud Romak, with Erv Rodemsky assisting, fulfilled his earlier promise with a flight of 40:55 and followed this quite quickly with a second of 40:27, which left him looking good to retain his title, though speculation was sparked off by Jim Richmond, who produced a fine 41:19 initially; a lot of attention centered upon his next flight, but this was not of the same level, with 36:52.

The weather outside improved towards mid-day, and as the shed warmed, flight times improved accordingly. Both McGillivray and Higgs raised scores with 37:20 and 39:44 respectively, both flying in quite a conservative manner and with obvious further potential in hand. Thomas was having problems trying to clear the half-hour mark despite making 35/37 minutes consistently in practice.

An unsuspected hazard to the contest lay in the presence of a pair of kamikaze pigeons, which made regular strafing runs down the length of the hangar at varying height; having succeeded in collapsing at least one model in practice, they endeavored to do so once more, though achieving little more than upsetting the flight paths of models on occasion, and finally sabotaged a Swiss contestant by landing in a box of propellers lying open upon the worktable, completely destroying all eight. At one time, Paul Masterman was seen trying to entice them into a drunken stupor by offering bread soaked in plum brandy, but to no avail! Small spiders abounded, dropping from the roof to spectate closer and often attaching themselves to models . . . even in flight . . . whereupon they busily set about improving the bracing systems until carefully removed by the fliers.

As the afternoon progressed, Richmond recorded a fine 42:53 which subsequently proved to be the high time of the meet, and the writing was on the wall for Bud Romak when his final flight of the day hung up at 13:45 minutes. With the exception of Morley, who improved to a nigh of 38:06, the U.K. team was struggling to clear the half-hour mark, with Czechoslovakia and

Poland . . . always strong in Indoor . . . having similar problems.

Japan, however, was coming on strong with a run of good flights, and, to some considerable applause, Shigeyoshi Nonaka finally made a 40:36, a great step forward in achievement for a man who brought relatively crude, silk-braced models to his first Championship in 1972. Both of his teammates also made their best flights to conclude the day, but unfortunately, the team had all three models in the air together after having received permission from an official to do so. This was later protested to the F.A.I. Jury by another team, the Jury upholding the protest and thereby cancelling the two flights judged illegal.

Conditions on the second morning were cooler and less favorable, and flight times were lower than on the preceding day, though Higgs was particularly unfortunate to have his model hang up on a girder at 9:18 long enough for the stopwatches to be clocked off, whereupon it fell away and continued its flight for a total flying time of 43:15 which, had it been uninterrupted would have given him high time of the meet and raised him in the final results to 2nd place.

Romak could not produce more than 28-33 minutes on his flights, and it was obvious that the Individual Championship was already settled with Richmond's flights on the previous day; the irony for Romak was a practice flight during that afternoon which battered around the roof structure for an extended period, butting at the girders at least fifteen times before finally hanging up at 29:38 at an altitude which could have given anything from 45-50 minutes.

Attention now centered around the team prize, with the USA, Canada, and the U.K. all in with a chance and with Japan close on their heels. McGillivray continued with smooth, uneventful flights between 34-36 minutes, and Higgs finished up with a 36:45. The final outcome was a win for the U.K., followed by the USA, with Canada a close third. In fourth place came Japan, despite the loss of two flights as mentioned earlier which, had they been legal, would have lifted them to 2nd. Individually, Jim Richmond was World Champion with his "Catwalker", scoring a total of 84:42. But Romak was a worthy second place man, so close with 81:22, a great try at retaining the title and a measure of his level of consistency in Indoor work. Worthy of note is the fact that he presented his models to other contestants at the close of the event, Anders Jonsson (Sweden), an 18-year-old in his first Team, receiving one and subsequently raising his own times substantially after the contest simply by using the Romak prop on his own model. Ron Higgs of Canada came in 3rd place to the obvious delight of his teammates and supporters, and Laurie Barr of the U.K. placed 4th.

So ended the 1978 World Championships, and contestants retired to the "Angel's Reply" at the nearby town of Hitchin for an excellent and convivial banquet during which some of the more unfortunate moments came to light, such as Ron Green losing a model completely when a helium balloon exploded immediately alongside, together with Eduard Ciapala having a model land on top of the parked airship some 50/60 feet up at 34:43 . . . of the models that collided and continued to fly after a fashion on the wing of one and propeller of the other . . . and so on.

At the close of the subsequent parties at Henlow, the current theme was the declared intention of contestants to get together again once more in 1980, wherever the venue. I think most of them will make it, too.

INDIVIDUAL

1)	Jim Richmond	USA 84:42
2)	Bud Romak	USA 81:22
3)	Ron Higgs	Canada 76:29
4)	Laurie Barr	U.K. 73:57

TEAM

1)	United Kingdom	218:02
2)	USA	214:29
3)	Canada	212:52
4)	Japan	210:38
5)	Poland	205:21

•

Mammoth . . . . *Continued from page 25*

throw. The piston controls the intake timing, and it's about optimum now to complement the rest of the engine. A tuned pipe does add power to a maximum of 25% (1/2 hp), but the bulk and size of the unit for this engine usually cancels out any advantage.

One customer who is well known for his hop-up work on model engines phoned and proudly told me how many rpm he had achieved with his Quadra converted to glow. He had not previously tried it as a stock engine. We had to tell him that he had lost over 800 rpm over an average stock ignition engine on gas and oil! Anyone who has seen the inside of a Quadra will attest that the schneurle port fluting, etc., leaves little to improve by way of polishing. The present carb is actually on the large size.

Let's face it . . . the Quadra's qualities

are economy of purchase and operation, long life, and the ability to swing larger and more efficient props without soaking the aircraft or boat in unburnt fuel. A lot of money and engineering talent is being spent on the Quadra for our use, but it's going into lowering vibration, better mounting, quieter running, air cleaner, and choke. All of these are thought out with the present owner in mind so that, as in full-size aircraft engines, his engine can be updated as much as possible. I hope that answers the engine question as far as it concerns us.

In another area of this same magazine there is concern expressed over expense. Heavens, that's why a lot of us are flying large models, especially those running an ignition engine of any type.

If building economy is your bag, you can build the large models entirely of non-exotic materials. I'm sure your friendly hobby shop owner is not too happy at what his inventory costs, either. Selling you a larger quantity of less expensive goods without having to explain the world financial situation won't hurt his feelings.

There have been several accurate graphs printed showing the destructive ability of various models (example: the September 1978 issue of *RC Sportsman*). Check your present model out. My 21-lb. Quadra-powered model presents a smaller hazard than the average new generation .40-powered pattern ship. When flying my large model, I'm far more aware of the danger I expose people and property to than when flying my .40-powered model, which I also enjoy.

One factor that these graphs so far have not shown is that the damage a moving object can do is also determined by the area over which its energy is dissipated. For example, if you were gently driving a nail with a hand axe, missed the nail and hit your thumb, you would have a very sore, black thumb.

However, had the axe been turned around, you wouldn't have had to worry about the thumb anymore! Recently in England, a lad was severely and fatally wounded by a .20-powered sport model, an example of lower energy but more compact distribution. I doubt whether anyone could get hit all over with the frontal area of an 8 or 9-foot model, but there is not much consolation there.

The world speed record sanctioned by the FAI (which we are all associated with) is not held by a powered plane, but by a glider. Its weight/speed destructive force is so high it's not on any of the graphs so far printed, so gliders aren't exempt either. I enjoy flying gliders also, and just wish I had more time to pursue that part of the hobby.

Commercially produced hinges, clevises, horns, etc., have failed even on 1/2A aircraft. At least three major manufacturers are designing and/or producing large model accessories, and you can bet your bottom dollar that modelers in lighter categories will also take advantage of a sturdier product. As far as I'm aware, anything for large models presently being prototyped or starting in production is overdesigned, and *all* modelers will benefit.

Weight and displacement alone do not provide safe limits, and never have. In a recent article on Scale by Darrel Stebbins in *RC Sportsman*, he stated that AMA has not stampeded into opening the contest scene to unlimited weight and engine displacement, and sites rules 2.6 and 2.7. Rule 2.6 reads: "Single engine models shall weigh no more than 15 lbs. ready for flight, except for fuel. Multi engine models shall weigh no more than 20 lbs. ready for flight, except for fuel." Ruel 2.7 reads: "Maximum total displacement of the engine(s) will not exceed 1.25 cu. inches." Does this mean that I can buy two of the new .60's that advertise an off-the-shelf hp of 3 hp each and put them in a 20-lb. airplane, for a total of 6 hp? That's not half as bad as if I put them in a 10-lb. airplane, or is it? How about 3 Terry Tigres in an 8-lb. airplane? That's a lot of power! Somewhere, rules should ensure adequate structure-to-power ratio as well.

Scale models have reached a state of art that, in order to win with some types of models, the amount of detailing required under the old FAI rules make the wing and power loading outright dangerous. Detail, which adds nothing to the aircraft's flying ability, must be considered cargo. Large models can

handle cargo better, but even here, the power-to-weight rules must suit the type flown.

Quarter-scale pylon racers are not as dangerous, at this point, as their standard .40-sized counterparts. It has definitely been demonstrated that they are easier for the average modeler to fly, and they land and fly slower. Remember, this event started out as a scale event, not only in building but also in flying. I don't think anyone will argue with the point that it is *now* primarily a racing event, and there's nothing wrong with that if your main bag is speed; however, if it is scale, wouldn't you be downgraded in a scale event if your model approached the speed of its full-sized counterpart? The big 1/4-scale models don't have to match the speed of their Formula I counterparts to provide excitement. Four or five of these thundering around at 60 mph would provide lots of spectator appeal and excitement for pilots also, where flying a precise course could far outweigh a 10% speed advantage. As for safety, the added visibility and lower speeds would allow people to see at a greater distance from the course area.

Last and most important of all, a great many people realize that what they are flying *now* is potentially dangerous, but are afraid the big airplanes will alert others that what they are doing is also dangerous, and that they will be regulated as a result. Here is something to think about. Are we hiding behind the "toy" image, and as long as these "toys" are not exposed as being dangerous, they won't be regulated? All it takes would be a few incidents. In England it has already happened, and you can't blame that on large models. If anything, the biggies have given us a lot of good press the world over. There are many potentially dangerous sports, and they have continued because, unlike a dangerous toy which is banned on the spot, there have been rules set down to govern the sport. Many of us have dedicated a lot of time to promote model aviation as a sport/hobby, and we can use some guidelines where safety is concerned.

The main danger now is that these guidelines might be written by people who possibly have the best intentions in the world, but who have never built, flown, or been sufficiently exposed to the large models, mammoth models, or whatever you call this segment of our sport/hobby. This growth has been so rapid worldwide that we have not yet come out with a common name which adequately describes it. This writer, as a developer/distributor, ships products all over the world, and as a result, has obtained feedback from other modelers in this field over several years. I could provide input to a set of guidelines or act as an information resource, but I feel that a considerable amount of input from experienced people should be sought. It would be very sad indeed if we spent less productive effort on these guidelines (which I feel at this time should be reasonably flexible) than it takes to build a model of this type. These guidelines should at this time be safety oriented only. In this way, they can be clearly evaluated by not only the modeler but also the respective insurers, so that they might provide a clearly-worded policy which everyone can understand.

I think what everyone wants to see is a lid which satisfies those inside our sport/hobby, but more importantly, those who are not in our hobby, but who could affect it. As I mentioned earlier, displacement is not a positive safety limit. What it has done is increase dramatically the cost of powered modeling, not only in the cost of the engine but also the quantities of fuel required to run these exotic beasts. May I then suggest certified horsepower and weight alone? I would have like to have seen 3-1/2 horsepower and 35 pounds as limits. There are a fair number of these model engines which are legal under the present rules and which exceed 3 hp, and in some legal twin form, already push 4 hp. To keep things simple, how does a suggestion of 4 hp and 40 pounds sound as a *lid*? Remember that I am not suggesting we build to that, it's just the end of the line. Details can be worked out later, but that lid at least will keep everyone happy and things sane.

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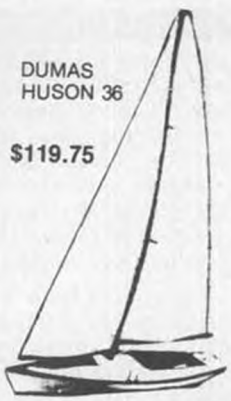

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are higher, and I doubt they will be, participating members can pick up this difference much the same as the option of the AMA magazine. It would also show full-size aviation people that we have a definite separation line which is very easy to regulate from their standpoint as well. And these standards could be met quite easily worldwide.

Enough figures are in now to show that 10 pounds per actual horsepower, properly utilized, gives good performance and realistic aerobatics in large models. If a person builds too large an aircraft, drag will kill him, performance will suffer, and I doubt whether he or anyone else will build a second version. Not all big model airplane modelers are interested in speed or aerobatics. Consider the modelers who are interested in design challenge, in lift or STOL characteristics, wing design, etc. Wing area is no longer a criterion for safety if slats, flaps, variable camber wings, etc., are utilized. Power and weight lids would work very effectively with the regulation proposed by the QSDE. For example, both aircraft and pilot have to demonstrate the ability to perform safely before exposing people and property to unnecessary risks. This is a far cry from the World Scale Championships just held in England, where previously unflown models were flown under anything but test flight conditions. The pilots, under not only the pressure of test flight, but competition as well, tend to continue potentially dangerous flight in order to achieve a better place.

A limitation on horsepower will not affect racing or any other competitive event when engines and racing classes start edging towards the horsepower lid; you simply start lowering the displacement in that class so that it again becomes a challenge for the engine boys. Manufacturers will be able to design an engine to maximum potential from Day One. Any improvements will be made in quality, mufflers, mounts, and things we need. As it is now, a 200 rpm increase in a competitor's engine means it's back to the drawing board. And that spells money. Your money.

Some of the best scale modelers in the world cannot enter competition at present. A modeler who has not only simulated a real aircraft, but actually reproduced the engine in miniature working form, could presently be disqualified because his engine exceeds the allowable displacement, even though the actual power developed is less than that of the present 60's. A modeler could choose the type of power he needs to suit the model, and more importantly, the prop he wants to drive (either directly or by speed reducers), or what is now possible: twins driven by a centrally-mounted single engine. Policing the limit would be easy; simply provide about 6 calibrated load props which could be rented, borrowed, or purchased from their respective associations. Any of these props exceeding a set rpm will indicate an excess of the horsepower limit. Also required would be a simple spring scale with only one mark on it: 40 lbs.

These ideas are not only my own, but those of many other modelers throughout the world. As a matter of interest, the present legal weight limit in Germany is 20 kilograms (approximately 42 lbs.), and in Canada, it is 35 lbs. Next month, I'll report on the Quarter Scale meet in Las Vegas, with lots of pictures, ideas, and performance figures . . . hopefully also a possible event which will allow both the spectators and the contestants alike to enjoy the meet fully without any work being done by any one single person. Amen. •

Instructor . . . . *Continued from page 11*

This means high winds, cross-winds, rough grass fields, and asphalt runways. Second, it must be an airplane for which documentation is available. This means accurate, detailed three-views, color pictures, and many detail shots. Thirdly, and very important, it must be able to score well in the air with YOU at the controls. This means sitting down and analyzing what is its potential to score well in the flying portion. If you are a very good pilot and good at precision maneuvers, then perhaps an airplane with aerobatic capability would be best, if not, then perhaps an airplane with enough mechanical options like bombs, retracts, flaps, etc., to get good flying points.

Now, to give you an idea of how to analyze an airplane, let's try a few typical ones:

Piper Cub: Nice, easy-to-fly airplane, but very bad in crosswinds and on asphalt runways. Limited aerobatic capability and subject to being downgraded for not flying like a pattern ship. It's probably not a good choice.

P-40: Should fly like a pattern ship, but the narrow landing gear and extreme angle of attack on the ground make it a bear to take off and land.

B-29: This would be difficult to detail very well, and the four engines would give you trouble. It was not an aerobatic airplane, so you would be limited to mechanical options. The unreliability of the four engines would be the killer here.

Shrike Commander: Short trike gear makes the ground handling excellent on this airplane, and if trimmed a la Bob Hoover, it could perform aerobatics. The twin engines are the bad thing here, as with one out, it tends to snap if you're not careful. Reliable engines are a must, and an expert pilot is a necessity to avoid splattering this one.

As you can see, you must look harder at the negative points of an airplane than at the good points in order to determine the likelihood of coming up with a winner.

When looking at an airplane, remember to try this checklist:

Can I build it and detail it while keeping the wing loading down?

Can I find documentation for it?

Will it fly well under all conditions?

Does it have the potential to score well in the air?

Does it appeal to me?

If you can answer yes to all these questions, then perhaps you've found your winner, but don't cheat in answering these questions. You're only kidding yourself.

Speaking of questions, I didn't recieve any this month, so I guess I'll have to quit. Send questions to: Dave Brown, 8534 Huddleston, Cincinnati, Ohio 45236. •

Plug Sparks . . *Continued from page 68*

While no rules have been worked up yet, the writer would like to hear from the readers just what they would prefer in the way of optional rules. How about the following:

1) Motors shall be limited to 1.5 cu. in. (or conversely limit the top engine size to Quadra engine size).

2) There shall be no limit on fuel allotment for weight of model. (At present, the models are limited to 1/8 ounce of fuel per pound of model, up to 7/8 of an ounce of fuel.) As an alternative, a limit on the engine run can be established; say everyone gets a three-minute motor run.

3) Flights would be limited to say, 30 minutes, with the total of two flights being adjudged the winner. This would differ from the Texaco, where the one best flight wins. In any respect, some limit would have to be put on the flights, as those large models, once they get some altitude, will soar indefinitely.

Whatever rules are tried, actual competition will refine out the unworkable rules and smooth out the regulations to the point where the fun is *not* interfered with. As the movement develops, this column will be sure to keep all interested modelers informed. That's why you read the column!

CAL AERO RIDES AGAIN

Great news! In a recent conversation with Bob Oslan, proprietor of the defunct Cal Aero, it now appears the company has received a real shot in the arm with a flock of orders. Needless to say, business is good and the company may actually show a nice profit this year.

This happy turn of events was brought on by John Maloney of World Engines, who is quite heavily interested in Old Timers. His initial effort at an Old Timer kit fell by the wayside when it was found his Scientific Eaglet fuselage was made of fiberglass; a no-no in the SAM rules.

John then experimented with another design, the Scientific Commodore, by having a model designer from India rework the plan to utilize modern manufacturing methods. When the final drawings were received, Maloney felt these were unsatisfactory and contacted Oslan for a re-design of the proposed

Commodore kit.

At this same time, Maloney stated he thought Bob Oslan's kits were outstanding. When he found Bob was discontinuing production, he promptly ordered three dozen to start the ball rolling again. Bob informs this columnist he has since produced over 100 Air Trails Sportster and Powerhouse kits for the trade.

However, like all things nowadays, the prices of the two kits had to be raised slightly. The Air Trails Sportster will now retail for $36.95 and the Powerhouse for $34.95. Still a good buy in these days of one-hundred-dollar-plus kits. If your hobby dealer can't supply you, write to Cal Aero Models, 7142 Bluesails Drive, Huntington Beach, CA 92647.

In wrapping up this happy bit of news, Bob Oslan is nearing completion of the Scientific Commodore plans for John Maloney. Bob informs this writer that Maloney is looking for bigger projects, as he really believes the future of Old Timers is in the big models. This is something that is near and dear to this columnist's heart. We like 'em big!

Keep your eyes peeled for future developments in Old Timers from World Engines. John Maloney is cooking on the front burner!

HARRY M. SCHREIBER

Those to whom this name does not ring a bell, should know that "Pop" Schreiber was one of the foremost modelers and hobby dealers in Kansas City (for years, it seems). Pop ran the Model Aircraft Institute, located at 3504 Prospect, until his retirement in 1968.

Many of the early designs emanating from Kansas City were the "Monsoon Clipper", "Flying Fool", and a considerable number of the Jimmy Allen designs. Matter of fact, this is where Bryan Wheeler was able to obtain all the old Jimmy Allen designs and preserve them for posterity.

Pop's shop was always a popular stop for Jim Walker and "Ziggy" Siegfried. Between the three, the darndest bull sessions on early radio control would develop. The first of the two to go was Jim Walker. Siegfried passed on two years ago, and now Pop Schreiber cashed in his chips on August 30, 1978, at the age of 87.

Although Pop had been out of the hobby game for the last ten years, he never lost his zest for model airplanes. Just another great pioneer gone.

SAM 21 CONTEST CAPERS

With so many O/T R/C contests being held in California, it is almost repetitious to report on them, but the latest September 9 meet held by SAM 21 brought forth an excellent reporting job from Ted Kafer that was too good to pass up. Ted reports as follows:

"Of all the problems that can happen to a Contest Director at a contest, one of the worst has to be not having a site to fly at on the morning of the contest! I arrived at Hill Country bright and early to find about six fliers waiting outside a locked gate. (Murphy's First Law: If anything can go wrong, it will go wrong.) This was not the last time Murphy's Law would take precedence this day. Luckily, the Wave Masters of San Jose had invited us to try their new field, so the meet was quickly moved to Burnett Park. This site provides a large open-sided building as a pit area and a large concrete slab for a takeoff area (This was originally a fruit drying area). The building gives good rain shelter, although only a few sprinkles made their presence despite rain in all other parts of the San Francisco Bay Area.

"SMASH (Some Maneuvers Are Sure Hits), not to be confused with MASH, although some help for the models was needed, provided a lot of color for the day. The primary color was red, and many pilots saw it. Pete Samuelson is getting to be an expert at rebuilding and/or repairing his Foote Westerner, and again demonstrated with finesse. This is the fourth or fifth time. (The word is, the radio set is getting the deep six.) Pete certainly is persistent.

"John Pond, alias Captain Crunch, did an off-field landing in a stream. When dried off, the radio checked out only to forty feet of altitude and a fifty-foot loop resulted. This brought to mind two other well-known derivations of Murphy's Law: 'Mother Nature always sides with the hidden flaw'. If you don't like that one, how about this? 'If everything

seems to be going well, you have obviously overlooked something'.

"Meanwhile, our hero, Ted Kafer, was demonstrating how to have ignition interference problems with a shielded electronic ignition system. This completely upset our boy, as the set had worked many times before in the same configuration and even without shielding! Murphy's Law strikes again!

"The piece de resistance of the day was the last flight by Warren Perkering, of SAM 30. Warren challenged the roof of the building with his Lanzo and lost. Murphy did it again with this classic: If there is a possibility of several things going wrong, the one that will go wrong will be the one that causes the greatest amount of damage. Class dismissed." Oh yeah, the results:

LIMITED ENGINE RUN

1. Ed Solenberger 14:25
2. Bill Squire 11:39
3. Dave Brodsky 9:23

TEXACO

1. Jim Kyncy 17:50
2. Ed Solenberger 16:55
3. John Pond 15:59

OLD TIMER SCALE

In the old timer activity, flying scale is fairly popular in free flight with two events, gas and rubber power. However, the same is not true of radio, perhaps because of the sport scale and AMA scale events taking precedence.

Bob Sliff, Editor of the SAM 49 newsletter, "Arcing Point", points out there appears to be a large increase in the popularity of R/C scale. It seems only right the vintage fliers get into the act. The O/T Scale Electric event at Fresno is a case in point. With a good start like this and the basic provisions being in the SAM Rule Book, why shouldn't this be added to our pleasure?

Sliff feels a combined gas and electric scale event might be the way to go, utilizing a three-part type event. This would break down to Static judging, limited motor run with a five-minute max flight with a fifty foot touch-down circle, and a very simple sport scale pattern. Bob says this could be a slow, easy event which all could enjoy. The columnist would be very curious about the reaction of the reader. Write!

LEAVE 'EM LAUGHING

The finale of this column was provided by Gene Wallock, just in time, as the writer was stuck for a humorous story to close out the fun.

Gene started off (in a long long-distance telephone call) by saying what noted die-hard old timer free flight modeler blew out all the power at Cal Poly during the late fifties (or possibly early sixties)?

Well, rather than keep you in suspense, Bruce Chandler was the culprit. He and Gene Wallock attended Cal Poly University at San Luis Obispo during the same period. At that time, free flight was well nigh impossible, and with control-line the big thing for popularity at that time, Chandler fitted up a box car type ukie with a Super Cyclone.

Well, in less time than it takes to tell about it, Chandler lost a little of his orientation and hit a power transformer plunging the entire college into darkness. Gene says that the power to the milking machines for the cows was shut off. In a short time, there were some pretty desperate cows!

Rumor has it that to this day Chandler is still persona non grata on the Cal Poly campus (not to mention the unhappy livestock). Wallock has only one comment: If Chandler had been flying a radio model he could have taken out all the transformers affecting the city. Maybe that's why he calls his engines the Black Knights. Haw-w! More darn fun!

This columnist offers the unfrocked free flighter equal time and space for a rebuttal. Double Haw! •

Sailing ..... *Continued from page 31*

be put back-to-back with the numerals below. Or put the M on, spray a stripe of paint across the sail, and then take the M off, leaving it in white for the sun to shine through.

The most consistent problem with numerals is having them blow off in cold weather. This usually happens to a new boat that was a Christmas present. To cure this problem, hang the sails in a sunny window for a few days. The sunlight will cure the adhesive, and you'll never get the numerals off.

Sometime back, I discussed the state

of the model yachting sport in these pages. The response was just about what I had expected. I don't really blame the skippers for preferring to be out in the sun sailing, rather than being closeted with a typewriter or quill pen. One massive reaction to my words was sent by Gene Dunham, presently serving as Secretary/Treasurer of the Helmsmen MYC of Long Beach, CA. His response hit many a nerve, as he had both praise and criticism for my statements. Unfortunately, Gene's comments are too lengthy to include word for word in the magazine, but the main topic of his letter deals with the poor sportsmanship and selfish attitudes shown by an all too high number of skippers. Gene has fears of AMYA's survival if such attitudes are allowed to persist. I would be glad to provide a complete copy of his letter to anyone who will send me a self-addressed, 2-stamp envelope.

AMYA dues are now up to $10.00 annually, per the vote of the membership. The cost of producing and mailing the quarterly newsletter just grew too fast to allow the old rate to continue. So, if you have your pen out to scratch a complaint to me, please send your dues to the AMYA Secretary, Bob Espenshade, 7221 Casa Adobe, Citrus Heights, California 95610. I'm fielding questions at 7608 Gresham, Springfield, VA 22151, as long as I get a stamped, self-addressed envelope. If you are a model yacht club officer and know of a club newsletter that is not being mailed out to me, give the editor the business. You are missing out on a lot of nationally distributed publicity from this very source. •

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

from Judy, at The Pipeline. Tell her **MB** sent you.

* * *

A lot of us have seen Bob Violett's "Skyhawk II" ducted fan model in action. Certainly a forerunner of things to come, this very successful model is available as a semi-kit, for which a number of additional items may be obtained.

The semi-kit includes built-up balsa flying surfaces, epoxy glass components, internal ducting, and provisions for retracts and flaps. The instructions include sixty photographs, which will guide you step-by-step. Also included is a scale clear plastic canopy, and adhesive-backed rib and former templates.

The semi-kit is priced at $129.95. The fan unit is available for $75, and the instructions only are $20. Some late additions are an avionics dorsal fin package, as used on the F and K through N models, and a non-functional long-range fuel tank. The avionics mod is $12, the tank $15.

Another recent Violett product is "O" ring racing wheels, as used on Quickies and Formula Ones. The hub part is precision molded of white nylon, resulting in less weight than the aluminum counterparts.

Only the standard 2-1/4-inch size is available, for 3/16-inch axles. Nylon bushings for 5/32-inch axles are also supplied. The wheels are $6.95 per pair; Formula One hardware necessary for mounting within wheel pants is $2.25.

The hub is in a light cream color. If you desire to paint them, the manufacturer recommends K&B Superpoxy, over a coat of K&B primer.

More information on all these goodies can be obtained from Bob Violett Models, 26516 Aiken Dr., Clarksburg, MD 20734.

* * *

If Steve Muck has anything to do with it, Dallas, Texas will someday be the R/C model boat capital of the world. He has just released another one, both IMPBA and NAMBA legal, and it's already the winner of two NAMBA District Championship races in 1978.

Aptly named the "Streaker", Steve's new boat is a fiberglass competition Deep-Vee for 6.5 cc engines. It comes complete with wooden engine rails, rear hatch, and uses the 5-inch motor mount and competition stern drive also manufactured by Steve Muck's R/C Boats. The deck installation, with built-in rub rail, makes for easy installation and super strength.

The instructions include numerous photographs and building hints. The overall length is just about one meter . . . 39-1/2 inches, and width is 10-1/4 inches.

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For more information, look for the "Streaker" at your R/C boat supplier, or write Steve at 6003 Daven Oaks Dr., Dallas, TX 75248.

* * *

Bolink has a new addition! Following in the tracks of its M.G., Corvette, and 280-Z, is a new Mazda RX-7 . . . electric, of course, and available either clear or painted. The material is "Tuffak", claimed to be stronger than the language at a 1/8th-scale race.

Also now available is Bolink's new ball-bearing axle kit, to fit all hex axle-equipped chassis such as Bolink, Jomac, Electro-craft, Leisure, Workrite, etc. Included are ball-bearings, two-piece axles, and necessary hardware.

The complete axle kit is $15.95; axle only $4.95. A catalog of all Bolink R/C car products is yours for $1.00, from Bolink Industries, P.O. Box 80653, Atlanta, GA 30366.

* * *

Show me a modeler who's been flying for any time at all and who hasn't had the plug connector come off and go into the prop, and I'll show you a glider flier! One way to eliminate this dangerous possibility, is with a "Head Lock" glow plug connector, just announced by Model Products Corp., P.O. Box 314, Pompton Plains, NJ 07444.

This new connector is a single-piece type, which is pushed on the plug, and locked with a 30-degree clockwise motion. It is claimed to stay on even under heavy engine vibration, and can be removed only after a 30-degree counterclockwise rotation. A very effective and reliable center spring contact makes a good electrical connection to the center-post.

The "Head Lock" is just slightly larger in diameter than a glow plug, making it ideal for attachment through a small hole in a cowling or cheek cowl.

Only $2.95, now on the way to your dealer, or direct.

* * *

The Unimat 3, latest version of what is probably the first of the miniature lathes, is now available as a modern machine system for metal, wood, and plastics.

With a swing of 3.6 inches and a distance between centers of 8 inches, the Unimat 3, set up as a lathe, can perform longitudinal turning and facing, taper turning, thread cutting, center drilling, polishing, and grinding.

With the addition of a vertical attachment, the Unimat 3 becomes capable of drilling and milling operations at any angle up to 90 degrees. Various other attachments can be added for working wood, such as circular sawing, jig and fret sawing, combing, grooving, coving, grinding, turning, and sanding. A flexible shaft is also made, to which any of the popular attachments can be added for flex shaft or hand grinder type of operations.

The Unimat 3 features many of the construction details of the big industry lathes, and is simple enough for the beginner to operate, yet is capable of the precision operations demanded by the professional machinists.

Complete details can be obtained from Emco-Lux, 2050 Fairwood Ave., Columbus, OH 43207.

* * *

The Dremel Company, maker of the very popular hand grinder and jigsaw, has recently introduced another interesting small electric tool for the hobbyist. It is a 4-inch tilt arbor table saw, which features an adjustable miter and rip fence. The saw is capable of up to one-inch perpendicular cuts, and mitered cuts up to 3/4 inch.

The overall size is 13 x 12 x 9 inches; the table size is 10 x 12 inches. The weight is less than ten pounds, making it easy to store and use in the small home workshop, though the base is designed for permanent screw-down mounting, if desired. A sawdust chute is located at the back of the base, to which a collector bag or vacuum cleaner may be attached.

It's engineered for safety, too . . . a see-through blade guard covers the blade at all depths and angles.

This new member of the Dremel family is called the Model 580 and is priced at $89.95 with one 4-inch combination blade, blade wrench, and mounting screws. A fine-finish saw blade is also available at $4.95.

Now at all Dremel dealers. For further data on this and the complete line of power tools, write Dremel, Division of Emerson Electric, 4915 21st St., Racine, WI 43506. ●

R/C World . . . *Continued from page 15*

will corroborate this observation.

So . . . going back to the original question. Yes, Big John (or any other model) will slow up when you drop the engine to idle. No, you don't need half throttle to keep it flying until just before touch-down . . . keep the nose down (and glide speed up) until just before touch-down, then slowly bring the stick

back. Yes, if you deadstick all the way in with the stick back, you'll mush in and go plop, probably nosing over. Yes, the easy way to land properly is to hold the nose up with power, and, if you want to make a 3-point landing (not the wingtip, but two main wheels and the tail wheel) you must combine engine and elevator to make that tail drop to the ground just as the main wheels touch. Graham Lomax, who has put in many hours of Big John flying on AMA's first show team, used to practice 3-point landings with us by the hour. We would circle both of our B.J.'s in an oval traffic pattern, shooting one landing after another, occasionally getting perfect 3-pointers. Graham had already been flying rudder-only escapement ships for two years before we started R/Cing in 1954.

GIT YER HOT STUFF!

On a lighter note (BEEEEP . . .!), through an agreement with Bob and Bill Hunter, of Satellite City, a free sample 7-gram bottle of "Hot Stuff" will be included with each shipment of Uber Skiver knives or **Model Builder** binders amounting to $10.00 or more in value. The 7-gram bottle has a retail value of $1.95.

Incidentally, by sending a stamped addressed envelope to Satellite City, Box 836, Simi, CA 93065, you'll get a free 4-page summary of tips and illustrations for uses of Hot Stuff. Our hint . . . put the bottle upright on your bench and squeeze out that last drop when you're finished for a while. Then the tube won't clog! •

Workbench . . . *Continued from page 6*

spaces . . .!

"Incidentally, the Sheep Meadow was used many times as a contest site for the Junior Birdman contests and others. And there were thermals at times which dropped the models atop the skyscrapers. In one particular contest, which was managed by Ben Shereshaw while he was director of the model club at Stern Bros. department store, we had Mayor Jimmy Walker as a visitor. He was sitting on the platform from which we also launched our speed models. Since there was no restriction on power, one of my friends, Ted Bellak, made rocket powered models. Have no idea how fast they would have covered the 100 foot distance because they exploded about ten feet after launch. You can imagine the commotion on the stand . . . I won first place with a twin pusher design which clocked 90 mph. Don't ask for the design. It was chunky, all hardwood wings and props, with about a three second motor run. Please don't do any calculations, as I want to believe the timers were right and that I really did 90 mph."

OFFICIAL SPORT YET!

Frank Zaic's reminiscing brings up another interesting item which we read in the Palm Beach Aeronauts Newsletter, edited by Fred Komlosy. In his "Comment" column, Fred says:

"I read recently a little item in a British magazine that might have far-reaching ramifications for them and might be something for us to pursue on this side of the ocean as well. It stated that Aero modeling has been declared an official SPORT in Great Britain. As such, it should be able to enjoy a greater status and qualify for using a portion of public lands, etc., etc. At first blush this doesn't seem like such a great thing, but the more you think of it, the more potential it has. I am not sure I like the term SPORT to cover model building, but if that is what it takes for official recognition and a greater slice of the recreational area pie, then SPORT IT IS! I always thought model builders outnumber discus flingers and the like, but these sort of statistics seem to take a long time filtering through."

Certainly food for thought.

WF-3 VS. WS-3

Several sharp-eyed readers noted a discrepancy in our "Model Builder Visits" article about Pete Westburg. Reference is to the scale-like, military-like monoplane design which Pete developed and was published in the July 1938 issue of M.A.N., and designated WS-3 (according to M.A.N.), or WF-3 (according to **MB**).

The most accurate designation was WF-3. This was the identity written on the backs of the original photos, and stood for the initials of the last names of Westburg and his modeling friend, Harold Ford. However, back in the late 1930's, and particularly at the time the model was published in M.A.N., Pete and his buddy were having fun making believe they were the "Westburn-Shord" aircraft company. Ford even carried it so far as to give his name as "Shord" when he went to work as a bank clerk (obviously before Social Security!). This explains the WS-3 as seen in the M.A.N. article. Shame on you, Pete, you know how much this confuses historians!

PEANUT PRONOUNCEMENTS

First, to clean up 1978 affairs. Chuck Drew, of Wethersfield, Connecticut, was hit with a double error in the prize

awarding. With a score of 115, he outpointed Ross Janke by 28 for the Best Junior Award, although Ross was originally, and incorrectly designated the winner. We're not taking back Janke's prize, but have sent another one to Chuck. Furthermore, we overlooked recognition of the overall highest flight time, which also went to Chuck, for a score of 67. He was also sent a prize for this accomplishment.

Incidentally, we want to thank the following donors of merchandise awards for the 1978 contest: Cox Hobbies, A & L Distributors, Peck-Polymers, Walt Mooney, VL Products, Bill Hannan, Williams Bros., Superior Aircraft Materials, Roald Tweet, Mark's Models, and **Model Builder** (that's us!).

Will there be a Parcel Post Proxy Peanut Contest in 1979? Do you think we would turn down a fifth!?

The 1979 contest will have a special added attraction. In 1977, we had an additional one-design category, the "Spirit of St. Louis", to commemorate Lindbergh's Flight. This time, we have selected a one-design for different reasons . . . a design that is easy to build, flies extremely well, and has character . . . Walt Mooney's version of the De-Havilland DH-6, as published in the January 1974 issue of **Model Builder**. (The fact that it's also a biplane is highly coincidental!).

To further the interest of those who prefer to build and fly, and do not care to accumulate documentary evidence of scale fidelity, there will be no such requirement (after all, once we've seen one proof of scale, we'll have seen them all). Furthermore, as the DH-6 was used by the military and also by "civilians", the color and markings could be extremely varied, so most any combination could be possible. As a consequence, static judging will be confined to workmanship and fidelity to Walt Mooney's drawings. A free set of plans will be issued with each set of contest papers requested. Also, by sending 75 cents, a copy of the January 1974 issue can be obtained from our back issues list. A DH-6 entered in the one-design event cannot also be entered in the regular World War I category.

By the way, **Model Builder** does not have a two-year rules proposal period . . . as of the 1979 P.P.P.P. contest, only rubber power will be allowed!

As with the 1977 special event, separate prizes will be awarded for this category, beginning with a radio control system as first prize. For further details, see the 1979 P.P.P.P. announcement on page 68.

LEAVE 'EM LAUGHING DEPT.

Although the following letter has been circulated among full-scale aviation clubs, it should still be entertaining to anyone interested in aviation in general. We're certainly glad it's ficticious! Thanks to Mike Pilla, Red Bank, New Jersey for sending it to us.

F.A.A. 48 Hour Request Emergency Report

Federal Aviation Agency
Washington, 25, D.C.

Gentlemen:

I was asked to make a written statement concerning certain events that occurred yesterday. First of all, I would like to thank that very nice FAA man who took my student pilot's license and told me I wouldn't need it any more. I guess that means that you're giving me my full-fledged pilot's license. You should watch that fellow though, after I told him all of this he seemed quite nervous and his hand was shaking. Anyway, here is what happened.

The weather has been kind of bad since last week, when I soloed, but on the day in question I was not about to let low ceilings and visibility, and a slight freezing drizzle, deter me from another exciting experience at the controls of an

STATEMENT OF OWNERSHIP MANAGEMENT AND CIRCULATION
(Act of August 12, 1970: Section 3685, Title 39, United States Code)

1. Date of Filing: September 27, 1978
2. Title of Publication: The MODEL BUILDER MAGAZINE
3. Frequency of issue: Monthly
4. Location of known office of publication (street, city, county, state, zip code): 621 West 19th Street, Costa Mesa, Orange County, CA 92627
5. Location of the headquarters or general business offices of the publishers (not printers): 621 W. 19th Street, Costa Mesa, CA 92627
6. Names and addresses of Publisher, Editor, and Managing Editor:
   Publisher: W.C. Northrop, Jr., 621 W. 19th St., Costa Mesa, CA 92627
   Editor: W.C. Northrop, Jr., 621 W. 19th St., Costa Mesa, CA 92627
   Managing Editor: NONE
7. Owner: Wm. C. Northrop, Jr. and A. Northrop, 621 W. 19th St., Costa Mesa, CA 92627
8. Known bondholders, mortgagees and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages or other securities: NONE
11. Extent and Nature of Circulation:

	Average no. copies each issue during preceding 12 months	Actual no. copies of single issue published nearest to filing date
A Total No. Copies Printed (Net Press Run)	45,910	47,200
B Paid Circulation		
1 Sales thru Dealers and Carriers, Street Vendors and Counter Sales	29,055	29,585
2. Mail Subscriptions	14,520	15,250
C. Total Paid Circulation	43,575	44,815
D. Free Distribution by Mail, Carrier or other means. Samples, Compilmentary and Other Free Copies	1,250	1,395
E. Total Distribution (Sum of C and D)	44,825	46,210
F Copies not distributed		
1 Office use, left over, unaccounted, spoiled after printing	645	515
2. Returns from News Agents	440	475
G. Total (Sum of E & F — should equal net press run shown in A) equal net press run shown in A)	45,910	47,200

I certify that the statements made by the above are correct and complete. Wm. C. Northrop, Jr., Publisher

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All ads are payable with order, and may be for any consecutive insertion period specified. Name and address free, phone number counts as two words. Send ad and payment to MODEL BUILDER Magazine, Classified Ads, 621 West 19th St., Costa Mesa, CA 92627.

MEGOW KITS, airplanes, and ships, old model catalog, and WW II illustrated poster, carving identification models, reprints, Verville Air Coach Jumbo Rubber plans. S.A.S.E. for list. Ira J. Keeler, 572 Deodara St., Vacaville, CA 95688.

MODEL MOTORS, new and used. Also accessories, ignition items, kits. List 25¢. T. Crouss, 100 Smyrna, W. Springfield, MA 01089.

KITS FROM MODEL BUILDER PLANS. Machine cut balsa & ply, hardware and full full size plans and instructions. REPLI-KIT, P.O. Box 374, Inverness, Florida 32650; (904) 726-4636.

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.020 REPLICA KITS: PLAYBOY SR., STRATO—STREAK, BROOKLYN DODGER, SOLONG. FREE PRICE LIST. J & R MODELS, 5021 W. Sheridan St., Phoenix, AZ 85035.

WANTED: Old-Time spark-ignition model airplane motors, magazines and gas powered race cars of the 1930's and 1940's. Russell Stokes, Rt. 1, Box 73J, Keller, TX 76248.

FF/UC SCALE PLANS. Peanuts, Walnuts, Hazelnuts, Rubber, CO_2, Gas. Modernistic Models P.O. Box 6974, Albuquerque, NM 87197.

OLD-TIMER REPLICAS: Bombshell, Clipper, Ranger, Buccaneer, New Ruler, Playboy, Mercury, others. Catalog 25¢. Micro Models, Box 1273B, Covina, CA 91722.

airplane. I was pretty proud of my accomplishment, and I had invited my neighbor to go with me, since I planned to fly to a town about two hundred miles away where I knew of an excellent restaurant that served absolutely wonderful charcoaled steaks and the greatest martinis.

On the way to the airport my neighbor was a little concerned about the weather but I assured him once again about the steaks and martinis that we would soon be enjoying and he seemed much happier.

When we arrived at the airport the freezing drizzle had stopped, as I already knew from my ground school meteorology it would. There were only a few snow flakes. I checked weather and was assured that it was solid IFR. I was delighted. But when I talked to the local operator I found out that my regular airplane, a Piper J-4 Cub, was down for repairs. You could imagine my disappointment. Just then a friendly, intelligent line boy suggested that I take another airplane, which I immediately saw was very sleek and looked much easier to fly. I think he called it an Aztec C, also made by Piper. It didn't have a tail wheel, but I didn't say anything because I was in a hurry. Oh yes, it had a spare engine for some reason.

We climbed in and I began looking for an ignition switch. Now, I don't want to get anyone in trouble, but it shouldn't be necessary to get the airplane manual just to find out how to start an airplane. That's ridiculous. I never saw so many dials and needles and knobs, handles and switches. As we both know, confidentially, they have simplified this in the J-4 Cub. I forgot to mention that I did file a flight plan, and those people were so nice. When I told them I was flying an Aztec they said it was all right to go direct via Victor-435, a local superhighway, all the way. These fellows deserve a lot of credit. They told me a lot of other things too, but everybody has problems with red tape.

The take-off was one of my best and I carefully left the pattern just the way the book style says it should be done. The tower operator told me to contact Departure Control Radar but that seemed kind of silly since I knew where I was going. There must have been some kind of emergency because, all of a sudden, a lot of airline pilots began yelling at the same time and made such a racket that I just turned off the radio. You'd think that those professionals would be better trained. Anyway, I climbed up into a few little flat clouds, Cumulus type, at three hundred feet, but Highway 435 was right under me and, since I knew it was straight east to the town where we were going to have drinks and dinner, I just went on up into the solid overcast. After all, it was snowing so hard by now that it was a waste of time to watch the ground. This was a bad thing to do, I realized. My neighbor undoubtedly wanted to see the scenery, especially the mountains all around us, but everybody has to be disappointed sometime and we pilots have to make the best of it, don't we?

It was pretty smooth flying and, except for the ice that seemed to be forming here and there, especially on the wind-

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shield, there wasn't much to see. I will say that I handled the controls quite easily for a pilot with only six hours. My computer and pencils fell out of my shirt pocket once in a while but these phenomenon sometimes occur, I am told. I don't expect you to believe this, but my pocket watch was standing straight up on its chain. That was pretty funny and I asked my neighbor to look, but he just kept staring ahead with sort of a glassy look in his eyes and I figured that he was afraid of heights like all non-pilots are. By the way, something was wrong with the altimeter, it kept winding and unwinding all the time.

Finally, I decided we had flown about long enough to be where we were going, since I had worked it out on the computer. I am a whiz at the computer, but something must have gone wrong with it, since when I came down to look for the airport, there wasn't anything there except mountains. These weather people sure had been wrong, too. It was real marginal conditions with a ceiling of about one hundred feet. You just can't trust anybody in this business except yourself, right? Why, there were even thunderstorms going on with an occasional bolt of lightning. I decided that my neighbor should see how beautiful it was and the way it seemed to turn that fog all yellow but I guess he was asleep, having gotten over his fear of height, and I didn't want to wake him up. Anyway, just then an emergency occurred, because the engine quit. It really didn't worry me since I had just read the manual and I knew right where the other ignition switch was. I just fired up the other engine and we kept right on going. This business of having two engines is really a safety factor. If one quits the other is right there ready to go. Maybe all airplanes should have two engines. You might look into this.

As pilot in command, I take my responsibilities very seriously. It was apparent that I would have to go down lower and keep a sharp eye in such bad weather. I was glad my neighbor was asleep because it was pretty dark under the clouds and if it hadn't been for the lightning flashes it would have been hard to navigate. Also, it was hard to read road signs through the ice on the windshield. Several cars ran off the road when we passed and you can sure see what they mean about flying being a lot safer than driving.

To make a long story short, I finally spotted an airport that I knew right away was pretty close to town and, since we were already late for cocktails and dinner, I decided to land there. It was an Air Force Base so I knew it had plenty of runway and I could already see a lot of colored lights flashing in the control tower, so I knew that we were welcome. Somebody had told me that you could always talk to these military people on the international emergency frequency so I tried it but you wouldn't believe the language that I heard. Those people ought to be straightened out by somebody and I would like to complain, as a taxpayer. Evidently they were expecting somebody to come in and land because they kept talking about some god damn stupid son-of-a-bitch up in that fog. I wanted to be helpful so I landed on the ramp to be out of the way in case that other fellow needed the runway. A lot of people came running out waving at us. It was pretty evident that they had never seen an Aztec C before. One fellow, some General with a pretty nasty temper, was real mad about something. I tried to explain to him in a reasonable manner that I didn't think the tower operator should be swearing at that guy up there, but his face was so red that I think he must have a drinking problem.

Well, that's about all, I caught a bus back home because the weather really got bad, but my neighbor stayed at the hospital there. He can't make a statement yet because he's still not awake. Poor fellow, he must have the flu, or something.

Let me know if you need anything else, and please send my new license airmail, special delivery.

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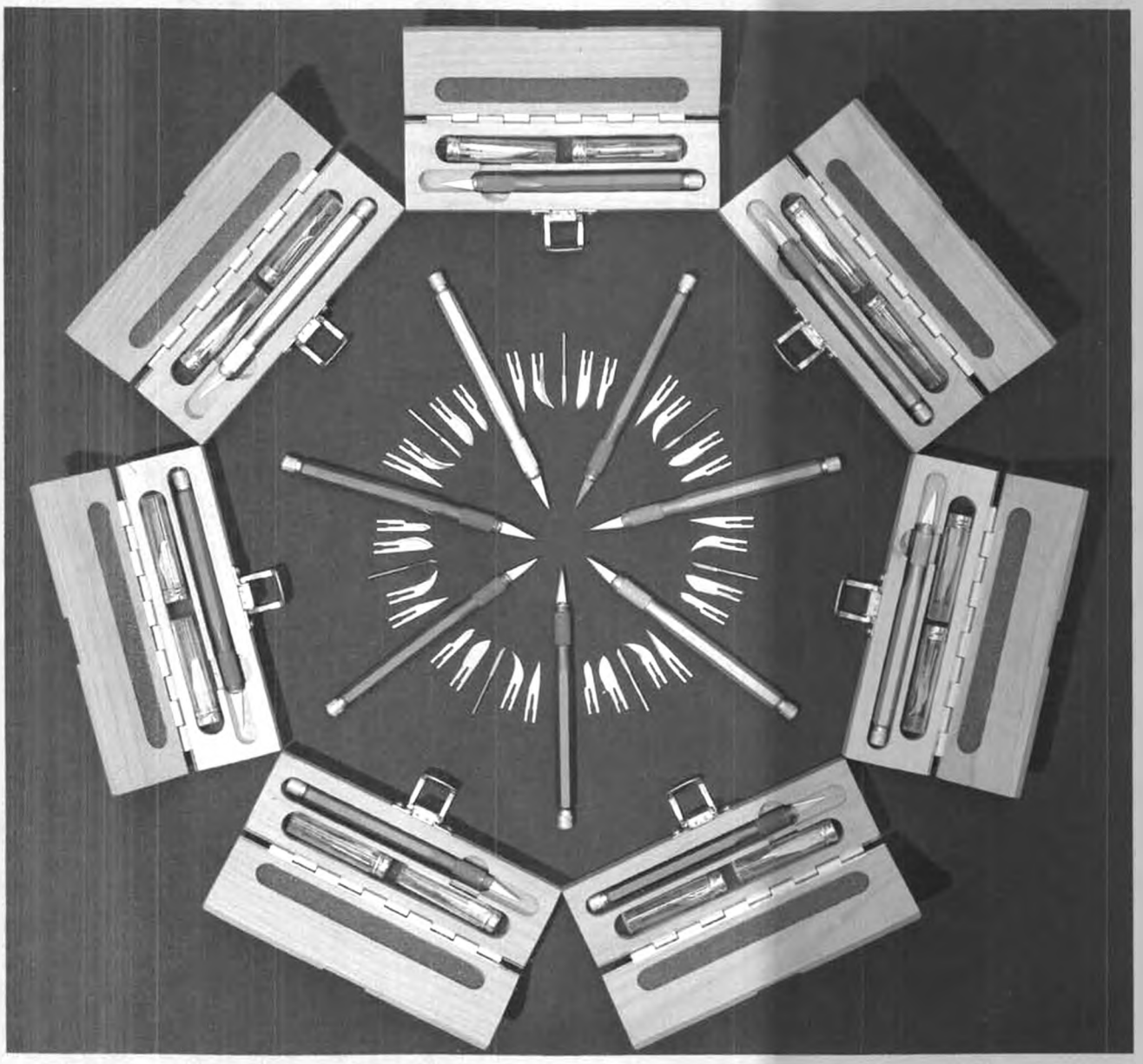

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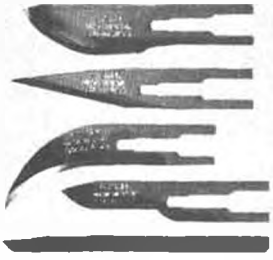

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