

MODEL BUILDER


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volume 14, number 149



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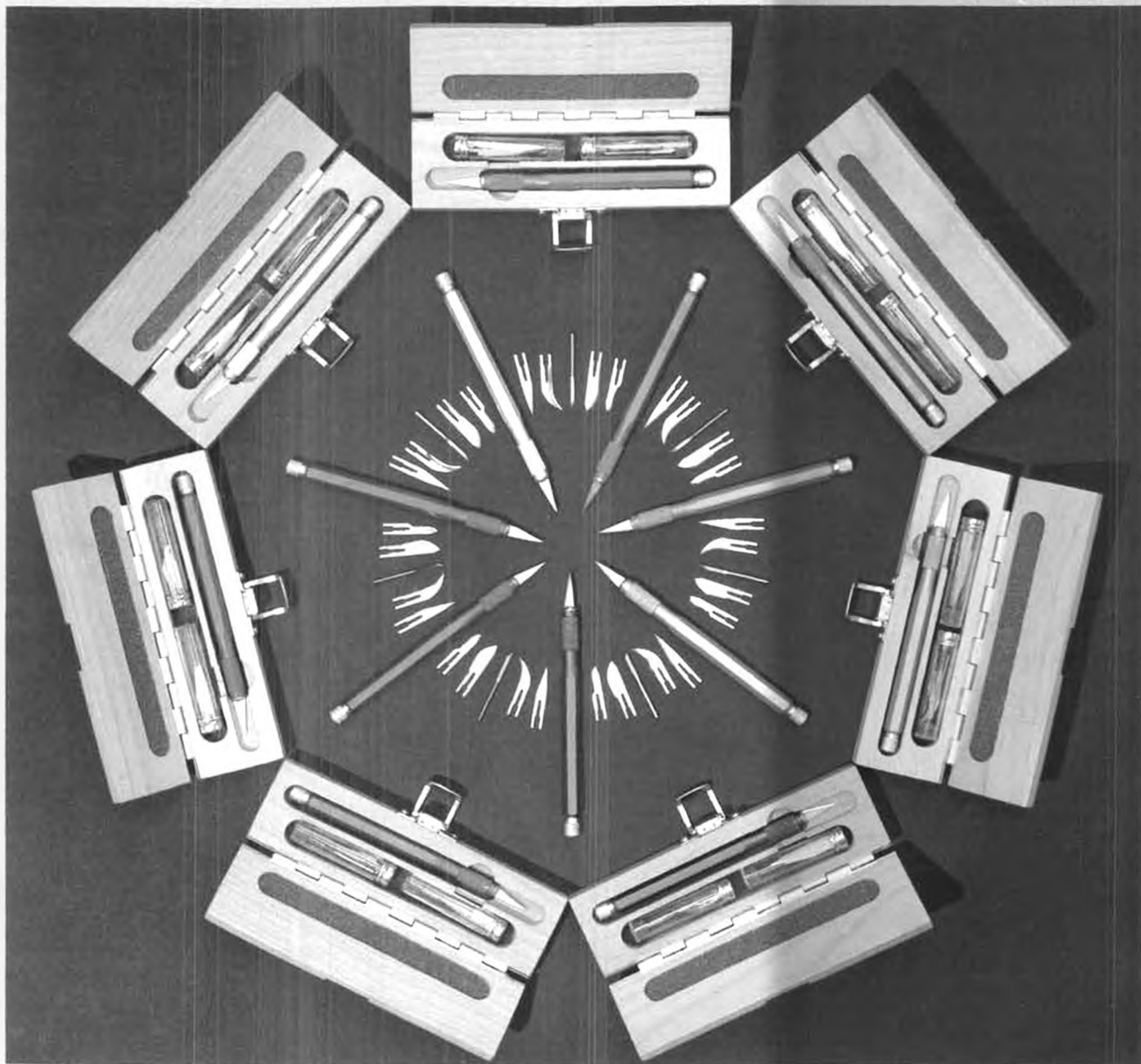
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1984

volume 14, number 149

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CONTENTS

FEATURES

WORKBENCH, Bill Northrop.....	6
DEAR JAKE	7
OVER THE COUNTER	8
ELECTRONICS CORNER, Eloy Marez	11
10th ANNUAL ASTRO CHAMPS, PART 1, Mitch Poling	12
HOW TO FLY PATTERN, Dick Hanson.....	16
BIG BIRDS, Al Alman	18
ENYA .40 FOUR-CYCLE/ZIROLI EINDECKER PRODUCTS IN USE, Werner Hoeckle	23
R/C SOARING, Bill Forrey	24
ELECTRIC POWER, Mitch Poling	30
KRAFTKIT TERCEL IN REVIEW, Howard Doering	32
SIMPLY SCALE, Cliff Tacie	34
GENTLE LADY LITE, Dan Rutherford	38
PLUG SPARKS, John Pond	39
PYLON RACING, John G. Smith	44
ACE R/C INC. CHARGE MASTER IN REVIEW, Eloy Marez	45
R/C AUTO NEWS, Dan Rutherford	46
HANNAN'S HANGAR, Bill Hannan	48
10th ANNUAL ASTRO CHAMPS, PART 2, Bill Stroman	50
FUEL LINES, Joe Klause	52
FREE FLIGHT, Bob Stalick	56
F/F SCALE, Fernando Ramos.....	60
CONTROL LINE, Mike Hazel	61

SCALE VIEWS

DOUGLAS DC-1, Nick Karstens.....	36
----------------------------------	----

CONSTRUCTION

SPRINT 7.5 RACING BOAT, Jerry Dunlap	20
WYNDIGO SLOPE GLIDER, Pete Roehling	27
SCRAPPY O.T., Ray Heit	42
BOSTON TEA PARTLY BOSTONIAN, Walt Mooney	53

COVER: This painting by our cover artist, Bob Benjamin, could represent 1942 or 1982. It might be two young US Army Air Force aviation cadets practicing close formation flying during WW-II, or it could be two middle-aged antique buffs 40 years later, in their fully restored aircraft. Yes, they're Ryan PT-22 "Recruits". A thousand of the 160-hp Kinner engined trainers were produced beginning in 1942. A similar model, with a 132-hp Kinner and wheel fairings was designated PT-21 as an Army trainer, and NR-1 as a Navy trainer.

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Main MIDDLETOWN G & G Hobby Shop 1720 Central Ave. PROSPER Lighthouse Hobby Supply Co 507 E. North Street TOLEDO The Hobby Shop 4907 Summit Street WAPAKONETA Dad's Toy Shop 129 E. Auglaize St. YOUNGSTOWN Boardman Hobby Center 6820 Market Street ZANESVILLE Thompson Radio Supplies 110 S. 6th Street</p>	<p>OKLAHOMA OKLAHOMA CITY Campbell's Hobby House 3500 N. MacArthur TULSA House of Hobbies 6914 E. Admiral Place TULSA Wings 'N Things 1350 Shelby Drive OREGON CORVALLIS Trump's (D.J.) Hobbies 1875 N.W. 9th St. PH 503-753-7540</p> <p>ONTARIO Hobby Shack 903 E. Idaho Ave. PH 503-899-6115</p> <p>PORTLAND Strictly R/C 7868 S.W. Capitol Highway PENNSYLVANIA BATH Valley Crafts & Hobbies 301-303 West Main Street PH 215-837-9066</p> <p>BATH Dick Wetzel's Hobbies 514 E. Main St. TACOMA Bill's Hobby Town 13923 Pacific Ave. PH 206-531-8111</p> <p>WALLA WALLA Harley's R/C Route 1, Box 277A PH 509-529-2618</p> <p>WEST VIRGINIA CHARLESTON Fountain Hobby Center 200 W. Washington St. WISCONSIN LA CROSSE Hobby Hub 4336 Mormon Coulee Road SHREVEPORT Mid Wisconsin Hobby Center Northway Mall 503 E. Ives St. MENDOTA Steve's Value Hardware 1512 9th Street L. Mart Shopping Ctr MILLWAUKEE All in 1 Hobby South Gate Mall 333 So. 27th Street PH 414-645-4555</p> <p>MILWAUKEE Casanova's Hobby 1423 S. Muskego Ave. PH 414-672-2700</p> <p>WAUSAU Pope's Hobby Land 640 South 3rd Ave. CANADA BAYVIEW, ALBERTA B & P Transport Ltd Box 6 PH 373-3953</p> <p>CALGARY, ALBERTA Calgary Hobby Supply, Ltd Box 3173, St. B. CALGARY, ALBERTA P.M.S. Hobby Craft Calgary North Hill Centre WINNIPEG, MANITOBA Coffler Development, Ltd 1354 Main St. PH 589-2037</p> <p>ST. JOHN'S, NL Capital Hobby Centre Ltd AUSTIN 1018 Kenners Blvd DUNDAS, ONTARIO Shyrock Hobbies Inc. 139 York Road SCARBOROUGH, ONTARIO Toronto R/C Hobby EL PASO Hal's Hobby Shop No. 57 Sunrise Center PH 915-735-1914</p> <p>FORT WORTH Mott's Hobby Shop 7241 Grapenridge Highway PH 817-281-0921</p> <p>HARTLEY Mark's Hobby Hut 804 White Street PH 806-365-4408</p> <p>HOUSTON Clear Lake Models 117 Camino S. Shopping Ctr PH 713-488-6315</p> <p>LANCASTER Star's Inc Plaza Shopping Center 1141 N. Memorial Drive LIBRA Callahan Hobbies 1229 E. Elm St. MANSFIELD John's Hobby Shop 15 N. Main MIDDLETOWN G & G Hobby Shop 1720 Central Ave. PROSPER Lighthouse Hobby Supply Co 507 E. North Street TOLEDO The Hobby Shop 4907 Summit Street WAPAKONETA Dad's Toy Shop 129 E. Auglaize St. YOUNGSTOWN Boardman Hobby Center 6820 Market Street ZANESVILLE Thompson Radio Supplies 110 S. 6th Street</p>	<p>VIRGINIA ALEXANDRIA Modelmasters, Inc. 5710 F. General Washington Dr. RICHMOND The Hobby Center 1709 Willow Lawn Dr. WASHINGTON BELLLEVUE RC Model Shop 10220 N.E. 21st St. PH 747-9914</p> <p>BELLINGHAM Hobby Hive 111 E. Magnolia CASTLE ROCK Aero Motive Products 607 Spirit Lake Highway KENT Kant Hobby Surfline 110, Meeker Mall PLYMOUTH Fingrove Model Supply 10511 136th St. East PH 845-7675</p> <p>SEATTLE Webster Supply Co 17818 Aurora Ave. N TACOMA Bill's Hobby Town 13923 Pacific Ave. PH 206-531-8111</p> <p>WALLA WALLA Harley's R/C Route 1, Box 277A PH 509-529-2618</p> <p>WEST VIRGINIA CHARLESTON Fountain Hobby Center 200 W. Washington St. WISCONSIN LA CROSSE Hobby Hub 4336 Mormon Coulee Road SHREVEPORT Mid Wisconsin Hobby Center Northway Mall 503 E. Ives St. MENDOTA Steve's Value Hardware 1512 9th Street L. Mart Shopping Ctr MILLWAUKEE All in 1 Hobby South Gate Mall 333 So. 27th Street PH 414-645-4555</p> <p>MILWAUKEE Casanova's Hobby 1423 S. Muskego Ave. PH 414-672-2700</p> <p>WAUSAU Pope's Hobby Land 640 South 3rd Ave. CANADA BAYVIEW, ALBERTA B & P Transport Ltd Box 6 PH 373-3953</p> <p>CALGARY, ALBERTA Calgary Hobby Supply, Ltd Box 3173, St. B. CALGARY, ALBERTA P.M.S. Hobby Craft Calgary North Hill Centre WINNIPEG, MANITOBA Coffler Development, Ltd 1354 Main St. PH 589-2037</p> <p>ST. JOHN'S, NL Capital Hobby Centre Ltd AUSTIN 1018 Kenners Blvd DUNDAS, ONTARIO Shyrock Hobbies Inc. 139 York Road SCARBOROUGH, ONTARIO Toronto R/C Hobby EL PASO Hal's Hobby Shop No. 57 Sunrise Center PH 915-735-1914</p> <p>FORT WORTH Mott's Hobby Shop 7241 Grapenridge Highway PH 817-281-0921</p> <p>HARTLEY Mark's Hobby Hut 804 White Street PH 806-365-4408</p> <p>HOUSTON Clear Lake Models 117 Camino S. Shopping Ctr PH 713-488-6315</p> <p>LANCASTER Star's Inc Plaza Shopping Center 1141 N. Memorial Drive LIBRA Callahan Hobbies 1229 E. Elm St. MANSFIELD John's Hobby Shop 15 N. 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DEALERS: Write For Details On How Your Name Can Appear In This Column



from Bill Northrop's workbench

FLORIDA RETAKE

It seems that our attempt to avoid any false rumors about our move to Florida, as published here in the January issue, has only caused more confusion . . . because there has been a change of plans! Said move has been shelved . . . not cancelled . . . shelved, for the time being. While we have purchased property in Sarasota, it is now leased and will continue in that status for an indefinite period. In the meantime . . .

SOMETHING GLAD

Two weekends ago, Sunday, March 11, there was a huge gathering of "off the water fliers" at Lake Elsinore, between Los Angeles and San Diego, California. It was a totally off-the-cuff affair," no events, no prizes, no fees, just a bunch of modelers getting together to gab and fly. To top off the day, who should be in attendance but Dan Lutz, just two weeks out of the hospital after experiencing a near-fatal auto accident. He's still paralyzed from mid-chest down, but from there on up he's the



MB's Editor/Publisher with his SFO Scale (Stand Far Off) model which even had a Stand Far Off name . . . Great Lake Strainer. Photo taken around 1967-8, by Tom Parent. See Text.

same cheerful guy as always. He and Nancy were there, at the water's edge, for about three hours. Sitting up in a wheelchair has strengthened his back, and he's just about ready to start cutting wood.

SOMETHING SAD

There was someone missing . . . and badly missed at the Lake Elsinore gathering. Dick Branstner passed away from a heart attack just two weeks prior. Dick, with his wife, Mary, and daughter, Tracy, had moved to the Southern California area from New Jersey, a few years ago, and until recently, did R&D work for Tyco. Dick was the man behind Bramco, a name that should immediately ring a bell with anyone in the R/C hobby in the '50s and '60s era. His reed radios and R/C engine throttles were highly rated by leaders in the hobby.

PHOTO STORIES

The lead photo this month was taken by Tom Parent, a former fellow member of the Delaware R/C Club. It dates back to around 1965, and shows MB's editor/publisher with his third ever R/C model. I had built a lot of other R/C models by the time this picture was taken, but this

airplane, in spite of being the test bed for many different control devices and radio systems, was still going strong. Although a scale model, I had been kind of loose with its scale dimensions and therefore, appropriately, with its name. I called it the Great Lake Strainer.

What made the G.L.S. an excellent test model, in addition to its stable flight and rugged construction, was the fact that the entire top deck, above the top longeron, and from the firewall to the tail surfaces, could be lifted off. Throughout its life (it was eventually sold, intact, at a club auction, and I have no idea what happened to it after that) it was flown, at various stages, with rudder-only escapement and a .19 engine; rudder-only with kick-up elevator (escapement); Galloping Ghost; relay-type reeds with a .35 on throttle, rudder, and elevator; inductive kick pulse system; and finally, proportional radio (an Orbit 3+1 system was installed and reviewed in the June 1965 issue of M.A.N.).

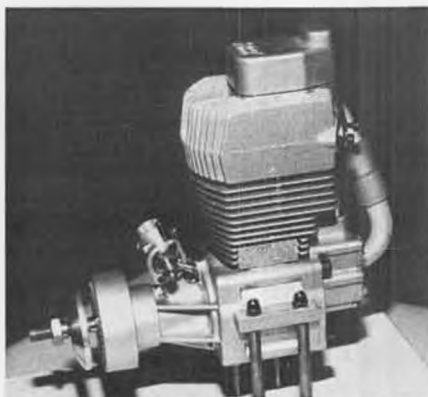
Incidentally, Tom Parent has retired from the corporate scene and now operates Tom's Arts-Crafts & Hobbies, in



Ralph Warner in his RADio Controlled Models, Inc. (RAM) booth at the IMS show. It's a month late, as explained in the text.



Ever-present crowd around the American R/C Helicopters booth prevented a clear shot to be taken . . . see text for explanation.



Super Tigre 20 cc (1.2 ci) four-stroke engine.



New 30 cc (1.8 ci) long stroke OPS 2-cycle.

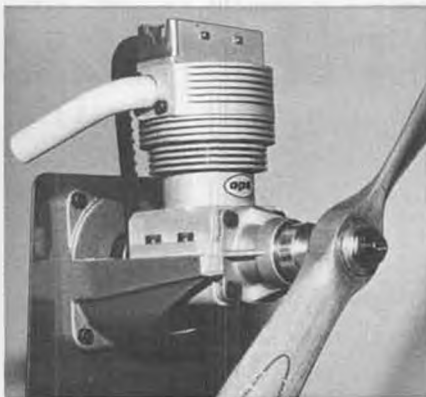
Parkside, Pennsylvania. Once a modeler . . . etc., etc.

Cees Kaijim, a contributing editor to *Hobby Bulletin*, the Dutch magazine for R/C models and electronics, sends us photos of some interesting engines seen at the 1984 Nuremberg Fair. To quote him:

"First, the Super Tigre 20 cc (1.20) fourstroke. A very unusual concept, with the carburetor in the normal two-stroke position. The mixture travels through a timed slot in the hollow crankshaft into the crankcase, and leaves it by the reed valve in the timing case, to enter the combustion chamber by the normal poppet inlet valve. The special trick is that the breathing of the engine is slightly 'supercharged' . . . the mixture is sucked into the crankcase in the upgoing piston stroke, in the down-going stroke the mixture leaves the crankcase and enters the inlet pipe via the reed valve (no blow-back into the carburetor, for the crankshaft closes that exit). The inlet valve does not open yet; only after the second 'loading' of the inlet pipe the inlet valve opens, and the combustion chamber is filled. An additional merit is the very positive lubrication of the lower end of the engine. According to Mr. Garofali of Super Tigre, only 5% oil is required.

"Next is a nicely made 15 cc (0.90) OPS four-stroke, with belt-driven overhead camshaft. This engine, fairly oversquare with a bore of 28.6 mm and a stroke of 23 mm, features a ringless ABC-construction and has a needle bearing in the conrod big-end.

"And OPS again, this time a very clean looking long-stroke 30 cc (1.80) glow-engine. It needs only 8% oil and is designed for maximum torque around



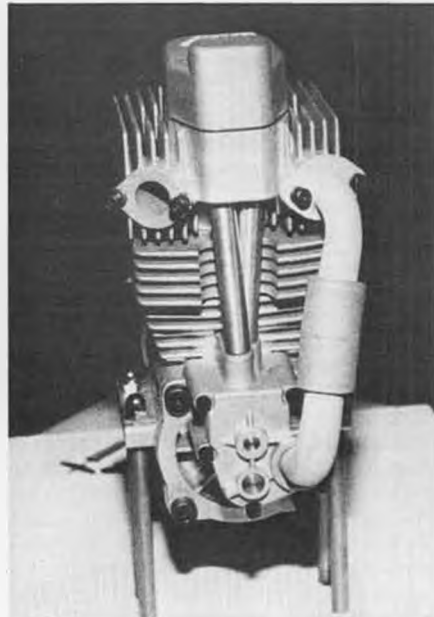
OPS 15 cc (.90 cu. in.) four-stroke. See text.

6000 rpm. OPS-engineers told me that this big-one will turn 20 and 22" props with ease!"

Although we attempted last month to publish a photo of every manufacturer/exhibitor's booth at the IMS Pasadena Trade Show, the best plans of mice and men, as usual, went awry. The two photos in this column should finish the job.

The original photo of Ralph Warner and his RAM booth came up as an eye-blinking double image. The bad news was that we couldn't print it. The good news is that we have since discovered that the negative was OK . . . we must have had a small California quake just as the print was being exposed!

As for American R/C Helicopters,



Super Tigre 20 cc four stroke from rear. All engine photos supplied by Cees Kaijim.

Inc., it was all their fault! The booth was so crowded with spectators that it was impossible to get a clear photo. The Lok-N-Start system for electric power starting of engines, which American R/C introduced at the show, simply boggled everyone's mind, and they had to see it. The photo we printed was supplied by

Continued on page 107



Advice for the Propworn

Dear Jake,

How come you never publish any letters from Canada? We need advice too, you know!

—Modeler in Montreal

Dear Modeler:

It's true that I have received letters on occasion from north of the border, but unfortunately, I never learned to read or write Canadian, so I have been unable to reply. Please accept my apologies and take solace in the fact that several letters from Brooklyn and the Bronx have gone unanswered for the same reason.

—Jake

★ ★ ★

Dear Jake:

When you consider weight, cost, ease of transport, and safety, don't you think Giant Scale models are getting too big for anyone's good?

—In Favor of a Limit

Dear In Favor of a Limit:

If a giant wants to build a large model, I, for one, am not going to tell him not to.

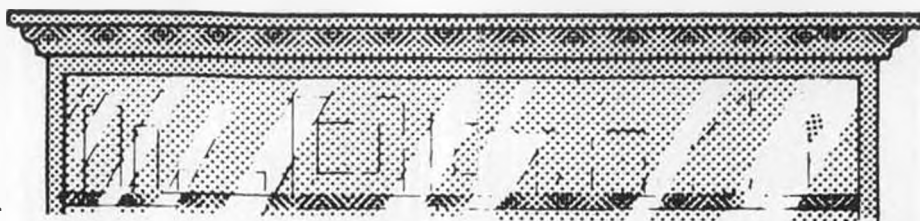
—Jake

★ ★ ★

Continued on page 104

OVER THE COUNTER

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



• Since 1943, Fox Manufacturing Co. has been turning out top quality, American made model engines for modelers the world over. More recently, Fox has introduced the Series 5 motors. There are six glow engines in the series, three for control line and three for radio control. They come in three displacement sizes, .29, .36, and .40, and each is Schnuerle ported and ball bearing supported.

The new .40, which comes in two versions (14099 Fox 40BB CL and 24099 Fox 40BB RC), is also known as the "Compact 40." And just in case you were wondering why Fox has introduced this engine when it already has a 40BB engine, the most powerful and rugged .40 on the market, we'll just have to call your attention to the word *compact*. The new .40 fits in places where the older one won't. It can be used wherever a K&B, O.S., H.B., or Enya .40 can be used. The new Fox 40BB has all the power that has made Fox engines famous, but in a lighter, more compact frame. It performs excellently on no-nitro fuel, and has superb idle and transition. Where size, weight, and power are important considerations, the Compact 40 from Fox is the answer.

The new Fox 36 RC has evolved from the highly successful Fox Combat Special. Fox took the Combat Special, gave it a new Mark X carburetor, modified the head and the porting, and basically improved the engine so that it would become the most powerful 36 RC on the market. The new Fox 36 RC combines this power with superb idling characteristics, ability to idle on no-nitro fuels, and light weight. So, if quality, performance, light weight, and economy



This new Fox Schnuerle ported, double ball bearing .29 is one of three new Fox engines.

are primary concerns in a .36-size engine, the new 13900 Fox 36BB CL and 23900 Fox 36BB RC Schnuerle ported glow engines are for you.

Lastly, we come to the engine pictured on the lead page of the "Over the Counter" column, the Fox 29BB RC. Like its bigger brothers, the 36BB RC and the 40BB RC, the 29BB RC features the Series 5 carburetor. Also, as the BB indicates, the 29BB RC has ball bearings just like the other two. Schnuerle porting assures you the most power obtainable in a stock .29 glow engine.

For more information regarding Fox products, contact Fox Manufacturing Co., 5305 Towson Ave., Fort Smith, AR 72901. Need fast answers, try the Fox "Hot Line": (501) 646-1656.

★ ★ ★
Futaba G Series radio system owners will be interested in the newest product in the Kraft Systems line which will upgrade their radios to 1991 frequency



T&D Fiberglass, Photo No. 1. See Text.



T&D Fiberglass, Photo No. 2.



T&D Fiberglass, Photo No. 3.

standards. It is now possible to convert any G Series radio system, whether AM or FM, to FM narrowband, dual conversion operation with the new Kraft KPR8FD receiver and plug-in FM transmitter module (Part No. 220-135).

The primary advantage of converting the Futaba G Series radio to a 1991 rig is the virtually interference free operation afforded by the narrowband signal and the dual conversion receiver. Say goodbye to image and various harmonic intermodulation problems. You can



New from Wendel Hostettler's Plans, the Turner Special in 1/4-scale.



Carl Goldberg Models new Jr. Tiger, for .15 to .30-size engines.



BIG Bird trainer . . . the *Learn E*, from E&L Manufacturing.



J-5 Enterprises new 1/6-scale *Stinson Voyager*.



St. Croix of Park Falls, Ltd., Rutan *Long-EZ*, a 1/5-scale replica of the famous homebuilt. (Left to right: Dick Rutan, Mike Melvill, Jim Schmidt, and Paul Schluter.)

take your frequency warning charts and throw them away.

Speaking of throwing things away, consistent with Kraft's continuing efforts to extend the life of your older equipment, you won't have to purchase new battery packs or servos. With Kraft's special plug adapters, you can use either Kraft or Futaba components with the KPR8FD receiver.

For conversion of your G Series that's good for the year 1991 and beyond, see your local Kraft hobby dealer or contact Kraft Systems Company, 450 West California Avenue, P.O. Box 1268, Vista, California 92083, (619) 724-7146.

★ ★ ★

Carl Goldberg Models, Inc. has announced its latest flying model kit for .15 to .30 sized glow engines, the *Jr. Tiger* sport low-winger. The "Son of Sky Tiger" is more than just a "junior ver-

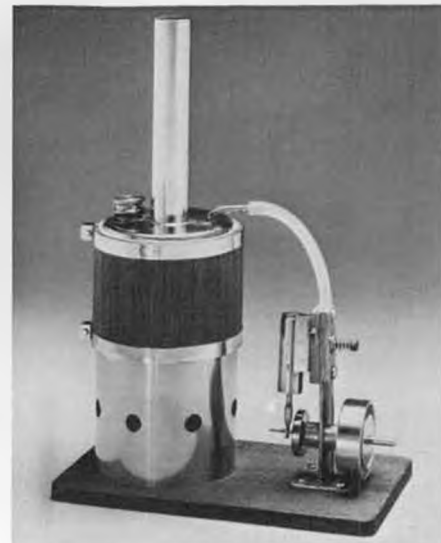
sion," however, and it has many notable features of its own.

More compact than its predecessor, the *Jr. Tiger* is the same size as the very popular *Eaglet*. As with the *Eaglet*, the *Jr. Tiger* uses a .15 to .30 engine, and it features the same *ultra simple*, step-by-step photo instructions for ease of building. It is a 50-inch span, four-channel R/C, tricycle landing gear, sport model. Goldberg Models is excited that the new *Jr. Tiger* is just the "step up" that many *Eaglet* fliers have been waiting for.

See your local hobby dealer for your *Jr. Tiger* kit, or contact the manufacturer for further details. Carl Goldberg Models, Inc., 4734 West Chicago Ave., Chicago, IL 60651; phone (312) 626-9550.

★ ★ ★

Satellite City is back in the news with its latest new products for modelers who like to build quickly.

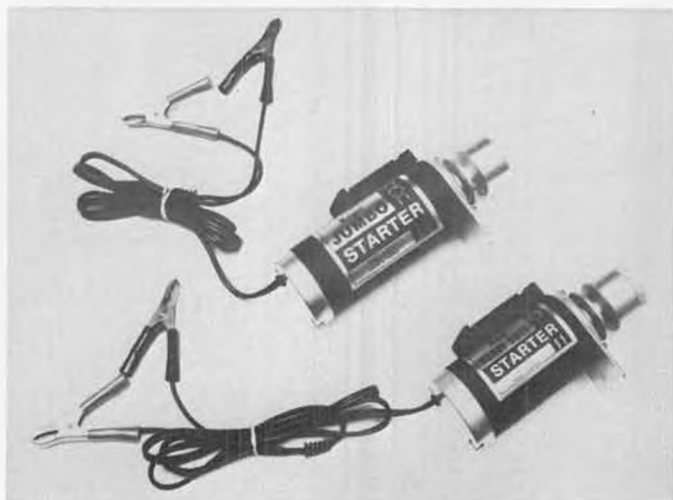


Midwest Products Model VI Steam Engine.

Leading off is the three-ounce bottle of Hot Shot with the new "Hypermist" pump which puts the Hot Shot just where you need it in a fine, close circle spray. This is the cyanoacrylate accelerator which is made from Satellite City's exclusive, non-foaming formula. Ask for it at your local hobby shop (Cat. No. HS-3).

While you're at your local hobby shop, check out Satellite City's new 3/4-ounce "E-Z-Squeeze" bottles of Hot Stuff and Hot Stuff Super 'T.' The selection now includes 1/4, 1/2, 3/4, and two-ounce bottles so that you don't have to buy any more or less than you need for any given project.

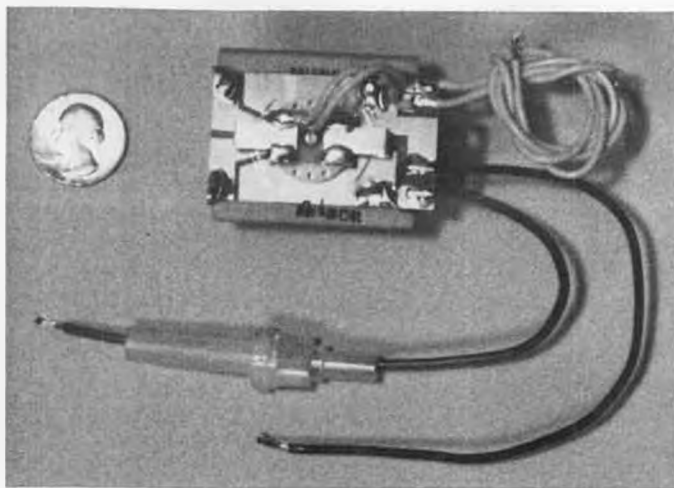
Instant glues are *not* all out of the



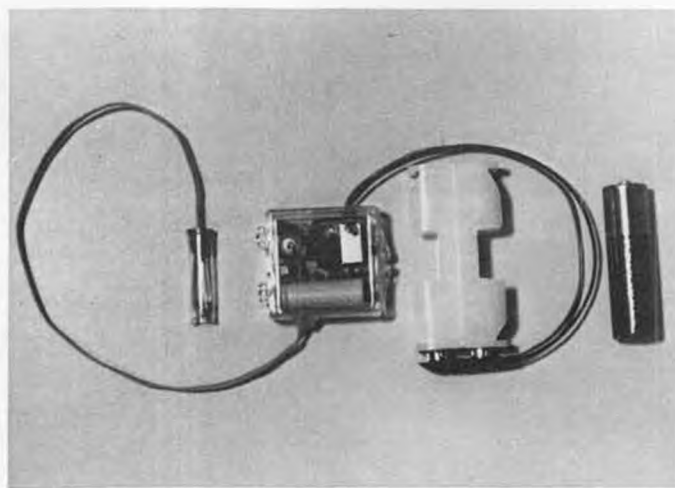
Jumbo Starter and Heavy Duty Starter from Royal Products.



Kraft Sys. narrow band FM receiver and TX module for Futaba Gs.



Car, boat, or airplane electric throttle from RAM, the RED No. 27.



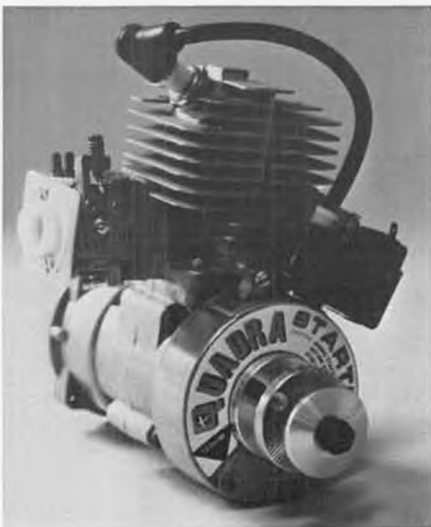
Xenon strobe light from RAM, RED No. 23, smallest and lightest.

same barrel; buy Hot Stuff, the only 100% American made cyanoacrylate. Contact Satellite City, P.O. Box 836, Simi, CA 93062, (805) 522-0062, for further information on these or other Satellite City products.

★ ★ ★
Midwest Products Co., Inc., 400 S. Indiana St., Hobart, IN 46342, has announced the availability of a small steam engine for the Midwest/Laughing Whale boat line: the Model VI Steam Engine, Boiler, and Burner. It is a small, single cylinder oscillating engine coupled to a vertical boiler. The unit features a heavy copper boiler which is wrapped in brass with genuine mahogany lagging, and machined brass parts. Only the simplest tools are required for assembly, however, this kit is not recommended for children, as some soldering is involved in assembly. This kit is compatible with the *Fantail Launch II* (Kit No. 958) and *The Tug* (Kit No. 956) as well as other R/C boat models. The unit uses Sterno as fuel, which once ignited, will provide approximately 10 minutes of running time.

Ask for the Model VI Steam Engine, Boiler, and Burner, Kit No. 980, at your local hobby shop today!

★ ★ ★
E&L Manufacturing, 8631 E. Laredo



Improved Quadra Q50S now features starter.

Lane, Scottsdale, AZ 85253, (602) 941-0633, has announced the release of its latest product for the BIG Bird flier to be... a big, 81-inch span trainer called the *Learn E*. The *Learn E* fills the gap in trainers from regular size sport or scale planes to the really BIG Birds.

Features of the *Learn E* include tough nose and main landing gear, a long fuselage which makes coordination of aileron and rudder unnecessary in normal flight, and easy construction for the convenience of less experienced modelers. In fact, much of the construction is already completed. Just as E&L's *Big E* goes together quickly, so does the *Learn E*. Wings are foam, precovered, and ready to sand. Fuselage sides are cut to full length with the stringers and vertical

braces already glued in place. The kit also comes with all hardware, even the wheels. The step-by-step instructions are written with the novice in mind.

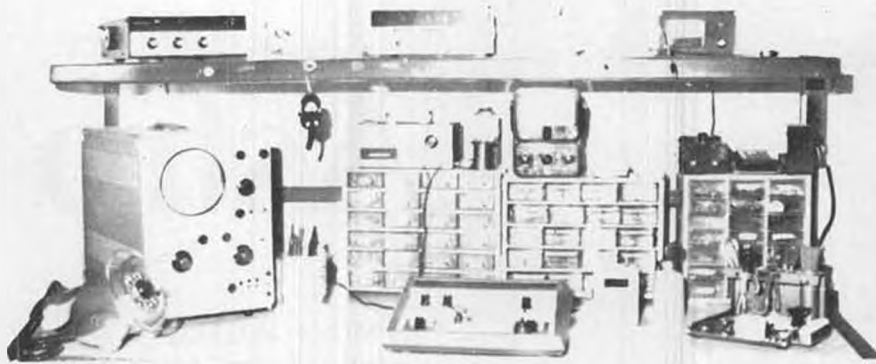
Vital statistics for the *Learn E* are: wingspan, 81 inches; wing area, 1360 square inches; weight, 16 pounds; engine, small Quadra or 2.3 Zenoah. For more information, contact E&L at the above address.

★ ★ ★
The following is a bit unusual for an "Over the Counter" announcement, but we think you will be fascinated by it. The subject is the St. Croix Long-EZ scale model, the source is the Rutan Aircraft Factory's newsletter, "The Canard

Continued on page 104



Satellite City's newest sizes (3/4 oz.) of Hot Stuff and Super 'T', and new Hypermist Hot Shot.



Condor Hobbies DET-301 Digital Engine Tachometer, for ignition engines. Device will display rpm and total elapsed time of engine run. No optical or mechanical coupling required, may be permanently installed.

Electronics Corner

By ELOY MAREZ

12 VOLT GLOW PLUG DRIVER CIRCUIT

We've received a couple of letters and suggestions recently about how to tame down 12 volts from the starter battery to drive the glow plug directly. As I said then, one of the disadvantages of many of these circuits is that they depend on a steady input voltage for correct operation. Any drop in that voltage, such as happens when the tremendous starting current of the starter motor is pulled from the battery, also effects the output of the glow plug circuit.

However, here is one that *might not* have that peculiarity. It comes from Dave Buell, with a question mark on the

last name, from Lakewood, California. Dave uses a National Semiconductor LM-338K adjustable voltage regulator, whose only purpose in life is to maintain a steady output voltage under varying input voltage conditions. He lists the advantages as follows:

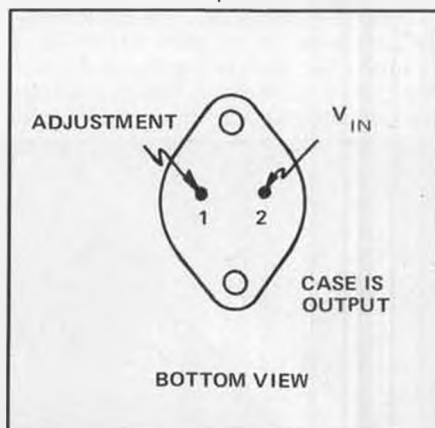
1. *Simple* — anyone can built it!
2. *Inexpensive* — about \$10 retail!
3. *Idiot proof* — short circuit proof!

Dave furnished two versions . . . and I am going to hit you with a third one. The first, and most simple one, provides 1.2 volts, which is adequate for most purposes . . . unless your engine starting techniques involve drowning the engine and cranking on it until you get the

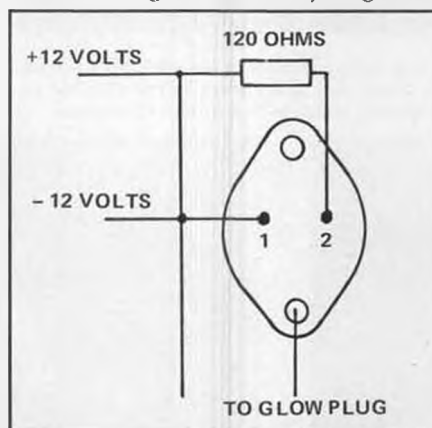
proper mixture on the way down! For 1.5 volt output, use the second hookup, which requires only one more resistor.

My thought is that this is also ideal for twins! For a parallel plug hookup (a common lead to the engine and individual leads to each plug) either of the above will work, at the stated voltages. For a series circuit (a lead to each plug only, with the connection between the two being made by the engine itself), use the second circuit with R2 being 120 ohms for 2.5 volts, 100 ohms for 2.75 volts, and 82 ohms for 3.0 volts. Of course, this voltage is the total, only half of which will be applied at each plug. At these low voltages and high currents, wire size is very important, use heavy ones, and if you measure voltages, do so right at the glow plug. Happy starting

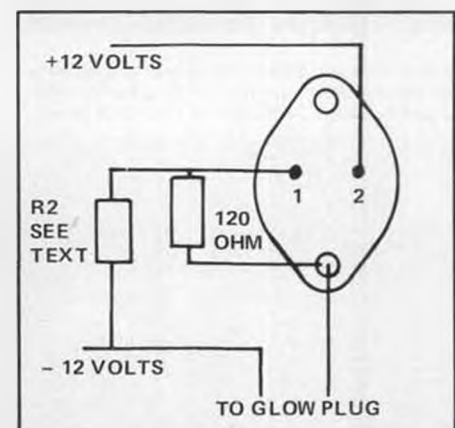
Continued on page 95



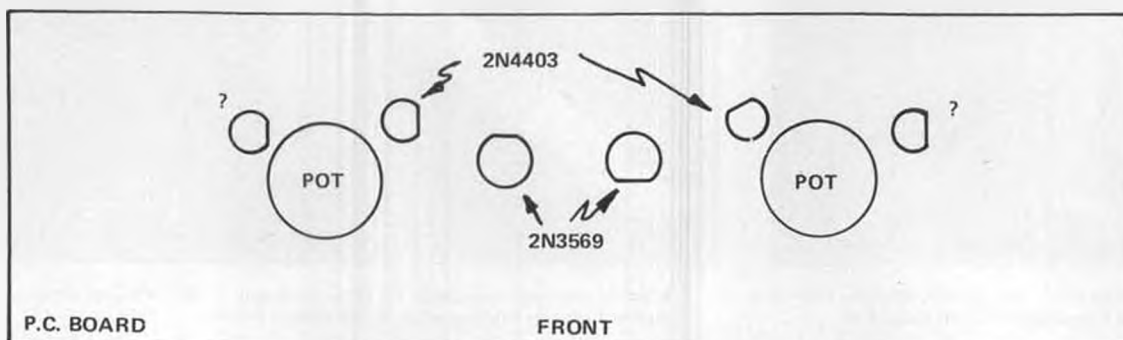
Basic connections to LM-338K Voltage Regulator used by Dave Buell for his glow plug power circuit.



This simple circuit will provide 1.2 V to the glow plug from a 12 V battery; it will compensate for voltage drops also.



Still a simple circuit, this modified version could be used for twin cylinder engines with the glow plugs wired in series.



Partial ID of semi-conductors in the Super Cycle battery capacity tester. Can you identify the others? One of our readers needs this information to get his SC back into operation.



Old Timers (left to right): Jim Ogg (Bay Ridge Mike), Larry Jolly (Comet *Interceptor*), Bill Forrey (Lehmborg *Feather Merchant*), Frank Heacox (Bowers *Fly Baby*), Roger Roth (Leisure *Playboy*), and Gary Anderson (not in photo) with his *Leisure Playboy*.



Frank Heacox, SEAM president, and his Pete Bower *Fly Baby*. Leisure Pattern motor with 2.5:1 gearbox. Took 2nd in 7-cell Old Timer.



Larry Jolly prepares to launch his OT model in Open Class Old Timer. *Interceptor* has an excellent climb with Astro 05 Challenger.



Roger Roth is a serious competitor. He took third place with this Larry Jolly Model Products *Electricus* in 7-cell Sailplane.



Steve Manganelli poses with his original design, 7-cell Sailplane class glider. Features folding prop, Keller cobalt motor.

Astro F

By MITCH POLING . . . *MB's* "Electric Power" editor travels from the Pacific Northwest to sunny Southern Cal to check out the Tenth Annual Astro Flight Championships. See page 50 for Part 2.

• The 10th Annual Astro Championships were held on February 4 and 5 at Magnolia High School and Mile Square respectively. I remember the first Astro Championships well, and I marvel at how much has changed, yet, the first championships had all the seeds that have culminated in the tenth event. The dramatic advances have been in the Seven-cell Sailplane and F3E events. Pylon didn't exist then, and there was no separate Old Timer event. Control Line modelers competed, and experienced very good performance from their Astro 020 motors. Free Flight performance was excellent with most modelers flying Astro 020s. Scale models ranged from 020 to 15 size. The Pattern event was quite impressive as there was even a twin 25 plane!

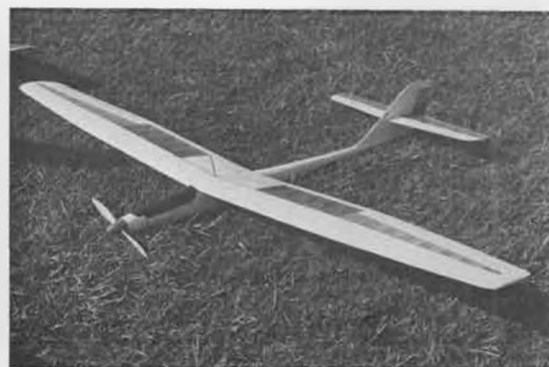
Enough reminiscing. The technological progress in motors has made a dramatic increase in performance, and the Sanyo cells have improved both performance and endurance. Most of

TENTH ANNUAL light Championships

PART I



The "heavy metal" electric event is F3E. Rick Schrameck's *Exocet* took first (left front), Steve Neu's *Exocet* took second (upper right), and Larry Jolly's *Olympian* took third (center). Other models are: B. Gerbin's *Ampere*, R. Roth's *Super Gemini*, and R. Black's *Blex*.



Steve Neu's *Exocet* . . . 90-inch span, Keller 80 motor, 13-7 prop (direct drive at 10,400 rpm), 20 1.2 Ah red Sanyo cells, 98 ounces, 850 sq. in. area, designed by Schrameck.

the winners now use cobalt motors, and all of them use Sanyos.

The Astro contest is no longer at Sepulveda Basin (which is a great improvement). This year's location and weather were especially good; I even got sunburned which is amazing to this northerner. Temperatures were in the 60s and 70s, with clear skies and little wind. In short, the Astro Champs had absolutely perfect contest conditions.

The contest started out with the Old Timer events. There were two classes, the Seven-cell and the Open. Old Timers are always appealing to me, and this year there was a good variety.

Bill Forrey won the Seven-cell event with his 72-inch *Feather Merchant* powered by an Astro Challenger 05 Gear Motor (2.75 to 1 reduction) turning an 11x7 prop. Bill went on to win a second in the Open Class! The victories were made all the sweeter because the de-

signer, Fred Lehmberg, was there and got to see it all.

I asked Fred how he designed the *Feather Merchant*. He told me that he was in high school at the time, and his physics teacher gave him a lot of help. The *Feather Merchant* was designed scientifically! I had thought that Old Timers were designed by pure intuition, this gave me a lot more insight.

Needless to say, Fred had a big smile on his face as he watched the *Feather Merchant* do its thing. It has an excellent climb, very close to the Leisure *Playboy*. As it has a full fuselage, it does not glide quite as well as the pylon jobs, which were predominant in the Open Class.

Frank Heacox came in second in Seven-cell with his *Fly Baby* designed by Pete Bowers. It was powered by a Leisure 05 Pattern Wind motor using seven 800 mah Sanyos cells. Jim Ogg came in third with his *Bay Ridge Mike* using a Leisure

05 geared to turn a 10x8 Rev-Up on seven 600 mah Sanyos. The *Bay Ridge Mike* is a cutie, and quite a bit smaller than the others, it weighed only 25 ounces!

In Open Class Old Timer, Larry Jolly took first place with his very impressive *Interceptor*. This model is a definite challenger to the supremacy of the *Playboy*, I believe that Larry will be kitting it. I hope so, the climb is fantastic, and the glide is just as good. Larry is one of the best pilots around, and knows how to go for lift. Under Larry's guidance the *Interceptor* got to really show off its stuff. It looks a lot easier to build than the *Playboy* too. Larry was using an Astro cobalt 05 with a homemade gear box which spun a modified Y&O 12-8 prop. Bill Forrey was 10 seconds behind Larry in a last-man-down flyoff and took second place with his *Feather Merchant*.



Steve Manganelli and his *DC Tempest*. Uses Keller 25/SP6 motor, Taipan 7-6 prop, 40 oz. weight, 260 sq. in. wing area. Second in Pylon.



Steve Neu's first place winning Pylon racer: twin 05s, third Astro Champs! Next year . . . ?



Rick Schrameck's Keller 50/20 powered Hobby Shack *Cavalier 40*: 10.5-7.5 prop, 18 cells, 6 lbs. Excellent aerobatics!



Dave Katagiri's original design Pattern plane. Uses Leisure/Keller 25/12 cobalt motor, 12 Sanyo sub-Cs, 9-5 Rev-Up prop, 3-1/2 lbs.



Ken Bank's first place Pattern ship, an original design, uses a Keller 20/9 motor on 7 cells, 7-6 Taipan prop. Weighs 38 ounces.



Bill Young took third in Scale with this *Laser 2000*. Ship features Astro Flight 25 Challenger motor (cobalt), uses 14 cells, weighs 5-1/2 lbs., has 500 sq. inches of wing area.



Steve Neu's Ace R/C *Super Pacer* flew with a Keller 50/14SL turning a Top Flite 9-8 prop. Took third in Pattern. Weighed 72 ounces. Wing is foam core with balsa sheeting.

Gary Andersen took third with his Leisure *Playboy*. The day was a good one for a test of pilot skill, the thermals were there, but were only moderate.

This lack of strong thermals showed up in the Seven-cell Sailplane event too, where the "floaters" did better this year than last. If you knew how to find thermals, you could max even if your plane was not one of the fast climbers. Placing was usually decided by landing points.

In the end, Larry Jolly took first, flying an *Electricus*. Steve Manganelli took second with his original design, and Roger Roth took third with his *Electricus*. So, the *Electricus* nearly took it all, but not quite! Steve's original design climbs a little more slowly than the *Electricus*, though faster than most sailplanes before 1982. However, Steve can really work a thermal, and it was neat to see him do zero sink flying for his max.

The F3E is typically the "heavy iron" electric event, and this year was no exception. The performance was "humongous." If you couldn't climb 2000 feet per minute, you could forget about winning. I'm really not kidding! The winners were at 1000 feet in 30 seconds! The special, Astro Champs F3E rules allowed 30 seconds of motor run time, and 170 seconds for the most distance you could get on a 150-meter course. Then, after landing, you got another 30-second motor run to achieve a five-minute max. Very high power, very fast planes were the order of the day, much like slope racing planes.

Rick Schrameck took first, Steve Neu took second, and Larry Jolly took third in the event. Placings were determined mostly by landing points and distance. The planes could get so high in 30 seconds that maxing duration wasn't a problem.

Rick was flying an *Exocet*, which I think is an original design with a fiberglass fuselage, 90-inch span, and 850 square inches of wing area. A Keller 80 cobalt motor turns a 13x7 prop at 10,400 rpm (direct drive) with a 20-cell, sub-C Sanyo pack. The climb is WOW!!! It really is a potent plane, it climbs like a pattern ship. Controls are aileron, rudder, elevator, and motor. Steve Neu flew an *Exocet* also. I don't know where or if these are available to the public, if they are, get one and impress your friends!

Another plane that had very nearly the same performance as the *Exocet* was the *Ampere*, an almost-ready-to-fly plane from Eismann (Germany) which is available from Wilshire Model Center. Bob Gerbin had one, with the Keller 80 and 24 sub-C Sanyos. He was right up there with the top fliers, until he hit a telephone guy wire on his last flight. Unfortunately, that ruined his chances and his plane, but the climb was like that of the *Exocet*: that WOW feeling.

Larry Jolly flew his own design, the *Olympian*, which has a fast climb and very smooth flight. It is a larger plane than the *Exocet*, and flies more like a sailplane than the *Exocet* which seems more like a pattern ship. It will be



LEFT: Clark Adam's *Astro Monocoupe* took first in Scale. Powered by an Astro 05 Challenger, the model weighed 39 ounces. Nice flier!



Woody Woodward's second place *Astro Porterfield*.



Control Line Scale, Blacksheep Squadron style! Astro 020 motors were used exclusively. Power was carried aloft with model, not on belt pack.



LEFT: Addie Naccarato flew this *Go-Go Girl* in C/L Speed. It was powered by an Astro 05 cobalt and seven 800 mah cells. Very fast.



RIGHT: Rick Schrameck's version of the *DC Tempest*; uses Keller 25/9 with seven Sanyo cut-off cells. Took third place in Pylon Racing event.

interesting to see which direction F3E will finally take. F3E concluded the day ... so on to Sunday!

Sunday is the "biggie" with Free

Flight, Control Line, R/C Scale, Pattern, and Pylon all going at once! That is enough to make a reporter go nuts! I had brought my *Aqua Sport* along (with wheels) to fly in Pattern, but after I saw what was being entered in Pattern, I decided it was better to just be a reporter! The Pattern had the emphasis this year, and there were more original designs and configurations than I had seen for quite awhile. The AMA sport sequence was used, all maneuvers had to be sequential and smooth. Ken Banks took first in Pattern, Larry Jolly took second, and Steve Neu took third.

Some of the modelers who didn't place had some very impressive planes too. Dave Katagiri had a beauty that is a

very smooth flier. It's an original design which uses a Keller 25/12 motor with a 9x5 Rev-Up prop and 12 Sanyo sub-C cells. It weighed 3-1/2 pounds with four channels. Dave would have placed, I'm sure, but on his last flight, something happened, and he could not recover the plane.

Steve Neu flew a *Super Pacer* (Ace R/C) with a Keller 50/14SL motor on 14 sub-C Sanyos turning a Top Flite 9x8 prop. The plane has a span of 50 inches, and flies at 72 ounces.

Rick Schrameck did not place in the top three either, but his plane was impressive. It was a ready-to-fly *Cavalier 40* from Hobby Shack powered by a Keller 50/20 and 18 sub-C cells. The prop used was a Zinger 10.5x7.5, and the total weight of the aircraft was six pounds. The *Cavalier 40* did excellent aerobatics. Rick's plane was entered twice, with Larry Jolly finishing second, and Rick finishing fifth.

The thing that impressed me with all three of these planes was that I was seeing what I consider to be "Pattern performance": they all flew the way the public is accustomed to seeing Pattern planes fly.

Ken Bank's plane is an original design, made of balsa with foam/balsa wings,



Bob Boucher raffled off several hundreds of dollars worth of prizes. Something for all.



Bart Hibb's strange looking *Flying Saucer* flew an impressive aerobatic routine, even outside loops! Astro cobalt 05, 2.5:1 belt reduction, 11-6 prop, 8 sub-C cells, 44 oz.

Continued on page 78

Pattern Flying

By DICK HANSON

• If you are a newcomer to our column, you may not recognize the cover photographed next to the Enya 1.2 and the O.S. 90 in our lead photo.

The model (not the girl, that's my daughter, Carrie) was our *Formula 750*. The time was May, 1981, and we were looking for a realistic flying machine that would perform like Art Scholl's *Chip-monk*. The big problem was the engine. It just wouldn't provide the low rpm power needed.

O.S. Max produced a gear box engine two years later that really performs, and we have found it to be almost unbeatable as a compact, lightweight, and high performance engine.

When we purchased our first four-cycle engine (O.S. 1.2), we had only seen a couple of four-strokers run. These were .40-size put-puts that were novel to watch, but the power levels were rather dull.

After a familiarization period with the O.S., I decided to try the Enya .90. This led to buying the O.S. 90, the Enya 1.2, and the Saito 1.2! I guess I went berserk.

These motors have provided me with hours of fascination. Why? I guess it's the old "hot rod" instincts surfacing again. Valves, cams, carbs, ignition systems (oops, that's a secret!), are great play things. If you never had a '34 coupe, or don't know what a '59 A block is, you may not understand the sickness I am trying to describe.

I used to love to travel on DC-6 airliners and listen to those big radials fire up. They sounded like an old '53 hemi getting ready to shatter your mind. Sight and sound: the perfect combo.



Dick Hanson details the best setups for Pattern planes using the O.S. .90 and Enya 1.2 four-strokers. The Hanson *Formula 750* (May 1981) would feel right at home with either engine.

Sorta like watching Crystal Gayle sing.

We have scrounged props, borrowed motor mounts, carved props, mixed fuel, fiddled with plugs, etc., and finally feel we are getting to be old friends with these engines. In fact, they will all let me start them with my bare hand! **Please don't you try this** unless you really understand the risks involved here. A heavy glove or starter can be of real hand saving value.

Let's get on with the program, now, and try to describe what we have learned so far.

Photo No. 2 shows some props we have tried that really work. This is after trying a lot of props that are well suited to 1/4-scale *Cubs* and are only intended to fly in a slow, scale-like fashion. That's not a put-down . . . just fact.

The little prop shown is an M-K Silent 2. It measures 11-1/2 inches by about 12. The O.S. 1.2 will swing this at 10,000 rpm. The Enya 1.2 (which is still quite new) runs 9,800 on the same prop. The smaller D-W is a 13 by 10. The O.S. 1.2 turns this at 9,800. The Enya is a close second, but please(!), remember that this motor is not yet up to peak performance. The 14 by 10 D-W runs 9,000 rpm on the O.S.

1.2, and again, the Enya 1.2 seems close, but I really didn't think this was a fair test. The Enya was overcompressed and started to knock when I leaned it out. The factory clearly states, "Add the enclosed head gasket to eliminate possible detonation when using large props." Also, I was using high nitro fuel which didn't help the case any.

The large MK propeller is a 14 by 8 nylon model which runs very smoothly on the O.S. 1.2 and turns 9,200 rpm. I didn't run it on the other engines because I didn't want to change the mounting hole size.

The 15 x 10 Zinger is, in our opinion, unsuited to any of my engines except the Saito 1.2. I'm reserving comments on this motor except to say that it is easily the smoothest throughout the entire rpm band, and it has a remarkably slow idle and smooth power recovery.

Photo No. 3 shows the Saito mounted in a new motor mount, which we received from Modelaire (that's in South Africa). This mount is very light, but possibly the most rigid I have tested. The wide, triangular shaped side plates really hold things steady.

My trusty CAP 21 will be the test bed

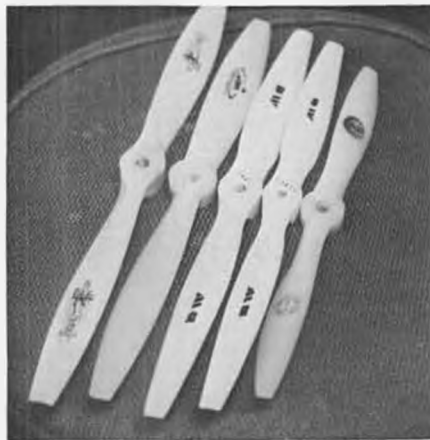


Photo No. 2.

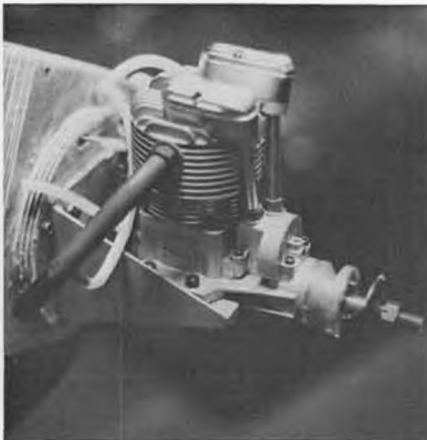


Photo No. 3.



Photo No. 4.



Photo No. 5.



Photo No. 6.



Photo No. 7.

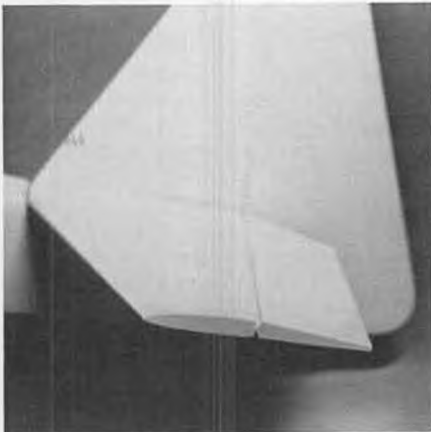


Photo No. 8

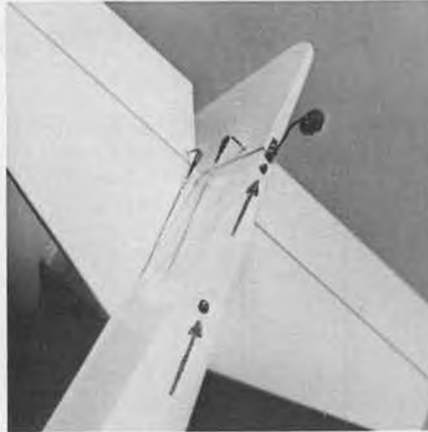


Photo No. 9.

for the Saito. It now weighs ten pounds, four ounces, which for a 1/4-scale CAP isn't bad, but I really don't expect it to compete with our seven and a half pound, 800 inch models.

The other engine shown in the group is the O.S. 90. This is our favorite four-stroke engine. It's light, small, and frankly, goes like hell! Our 750 square inch bird at 7-1/4 pounds was a startling performer using a 12 by 10 D-W propeller. Unfortunately, an old servo committed suicide and took the plane with it.

While we were running propeller tests last week, we paid special attention to vibration levels and any possible link between propeller types and engine vibration.

Here are the positive conclusions.

1) These engines all run smoother with a heavy propeller. This is understandable. The alternate stroke firing plus the single cylinder design causes a predictable pulsation. However, Saito has somehow smoothed the pulsation at idle much more effectively than the others. If you know why, tell me. I can only guess that the bore/stroke ratio, plus milder cam timing, plus the exclusive Saito feature of a lightweight cylinder/head arrangement, all contribute to the smooth idle. The reason I mention the cylinder/head arrangement is that Enya and O.S. both have more weight above the crankshaft than does the Saito.

2) The engines tested all respond differently to various fuels used. The O.S. especially likes nitro. This may be the reason that other reports of comparative power are not consistent. Furthermore, we test all of our stuff at 4,500 ft. above sea level. This really



Photo No. 10.

affects unsupercharged or non-piped engines. For those of you who have never ventured into the "Rockies," we don't get nearly the zip from our automobiles here as we experience on the sea coast, and we must advance our ignition settings to get desirable performance. My point is that a glow engine with proper compression for use here may be an overcompressed engine at sea level. Hence, performance comparisons can easily vary.

3) The motor mount and the weight of the plane can drastically amplify vibration, especially on the lighter engines. Our 1.2 O.S. really shook the tail feathers on our new "Runaround" design. The motor seemed quite smooth on the test stand using the O.S. aluminum mount, but the Hayes mount in the model didn't work the same way. We pushed and pulled the front end of the motor as hard as possible without breaking the model, and noted that the motor mount allowed about 1/16 inch of deflection when the prop shaft was pulled upward. We wanted to use this motor mount as it is compact, light, and can be easily modified to place the engine close to the firewall.

The approach to the problem was direct. Lock the front of the engine to the airframe. Picture No. 4 shows the plywood disc epoxied to the noseblock

which is bolted to a triangular shaped plate that fits snugly on the front crankshaft bearing housing.

I expected to get a whole new set of vibrations when the engine was torched off. Not so; the fuselage was remarkably smooth and the tail was solid as a rock. The only vibration was at idle speeds... but, the test was run, as were the previous tests, without the wing being fitted to the fuselage. As the model is quite light, the slow idling pulses simply made the fuselage dance on its landing gear, sort of a side-to-side step, frantically, like a small boy who has waited too long before racing to the bathroom and then finds the door locked.

It was notable that this setup was effective even on very light, small propellers. The vibes were controlled.

4) These motors run the best for me when mounted with the cylinder head in the 8 o'clock position. Look at Photo No. 5. Note the relative position of the carburetor and the fuel tank. (Photo No. 6 also shows this cylinder position.) The motor shows no signs of hesitation in any maneuver using this setup. No fuel pressure is used, but do watch that the fuel vent line faces forward to prevent low pressures from occurring in the tank. This is an old control line idea. It works.

Continued on page 67

BIG BIRDS

By AL ALMAN



DOWNTHRUST

Off hand, I can't think of any trainer or sport type flying machine that won't fly better with some amount of downthrust. And as it's "nice" to know a little something about what you're doing, the following is offered as a simple explanation about the mechanics of airplane pitch stability, and how downthrust works . . . with the one assumption that all planes have the prop in front and the tail in back.

1) In level flight, the horizontal tail surfaces produce a downward force (their "lift" is directed toward the ground), and like any airfoil, the faster the aircraft travels, the stronger this lift force becomes.

2) If something upsets the airplane (a gust of wind, a control surface movement, etc.) so that the nose points down slightly, the ensuing dive causes the plane to speed up due to gravity . . . and this higher speed results in a greater downward force on the tail, which, in turn, tends to bring the nose back up to the level starting position. A climb, on the other hand, will slow the plane down, decreasing the tail's downward force, and allow the nose to drop until the bird is level again.

3) Unless the shape or balance point of the aircraft is changed, there's only one speed at which it will not climb or dive (elevator trim provides the "shape change" to allow slow flight).

4) If the plane is trimmed to fly level at 40 knots with the engine running at half throttle, and the throttle is then fire-walled (with no other changes), the birdie will climb at 40 knots.

5) To keep the craft from reacting to such changes in engine speed (and so avoid having to cope with a nose that drops when power is chopped on final approach) we've got to find a way to overcome the increased downforce on the tail when more power is added.

6) So, by pointing the engine down a few degrees, the desired effect is achieved . . . because when the engine pulls harder, it not only causes the aircraft to speed up, but part of the downward pointing engine's thrust pulls the nose down, counteracting the increased downward force of the tail. This eliminates part of the "power chop/nose drop" behavior we were having to cope with, and lowers the amount of work we poor, slow-thumbed pilots

have to do in order to get on the ground in one piece.

900 MAH BATTERY PACKS FROM SR

These batteries have become my standard because: 1) they're no bigger than a 500 mah pack (even in a BIG Bird, a full cockpit installation can greatly reduce the room available for the receiver and battery . . . and I do like to give my airborne components as much foam rubber protection as possible; 2) They weigh only an ounce more than 500 mah packs (don't believe the current myth being perpetuated that weight doesn't count in a biggie . . . 'cause a lighter airplane is always a safer and more enjoyable airplane to fly. 3) Their capacity is absolutely amazing. Discharging any of my 900 mah packs with a 280 ma load yields a very consistent four hours and 35 minutes . . . whereas I haven't owned any 1200 mah pack that could deliver more than five hours and 10 minutes under the same load. I know that these times are accurate because an electric clock is plugged into the cyclor, and it starts and stops when the cyclor does.

I can only assume that the superior 900 mah cells are, indeed, built better than any of the other size cells we normally use. Typically, after flying for two hours, which usually includes some amount of gyrations and stick slamming, I discharge my battery, and I've never had less than a 90 minute readout on that plugged-in clock. I must point out, however, that although all my aircraft utilize at least six servos, none of my birds gross out over 17 pounds. Sooooo . . . if yours is a



Fourmost Prod. Bulkhead Fittings are very handy items. They're color coded and can be used to feed engines up to (at least) the 2.3 Zenoah Quartz. (Photo No. 4)

heavier, aerobatic airplane, a 1200 mah or larger pack may be just the ticket for you; remember, the same servos in a heavier plane will have to work harder, which translates into more current demand upon the battery pack.

While we are on the subject of batteries and cyclers, it's time to put in another plug for the proper use of battery cyclers. I can't believe how many guys use their cyclor just to discharge a pack, but never, ever get a feel for how much time a full discharge takes, or how much time is left in their pack after a flying session. The cyclor, like so many other splendid tools, is not worth much unless it's used properly. In addition to discharging right after flying to check my power reserve, I also cycle all my batteries starting on the first day of every month . . . and I log each pack's performance. If there's more than 10 minutes of difference in discharge time from the last entry, I *do not* use that pack until I find out why; either I didn't charge properly, or I didn't read the clock right . . . or the battery pack actually is going bad. I figure that I've saved a handful of airplanes in the past 12 years by finding out the easy way that a pack was below par.

About the 900 mah cells . . . SR Batteries, Inc., is the only company I know who handles this particular size. (See the SR Batteries, Inc., advertisement in



We don't know how much flying time Kimo Mapa's Nosen Big Stick has, but whether it has been flown or not, it has been a busy airplane. Originally built by Jim Souza, it was sold to Joe Manchavez . . . who in turn traded it to Kimo, who seems to be contemplating the Hawaiian countryside. The BIG Bird appears to be powered by a Quadra. (Photo No. 3)



Bill Cohen, Santa Ana, California, really likes to thermal this giant Old Timer model, a ten-foot, Forster 99 ignition powered Comet *Clipper*. This relative lightweight at eight pounds is covered with Coverite's Micafilm. This is really relaxing flight! (Photo No. 2)



From Fairbanks, Alaska . . . Paul Caulkett, a member of the Polar Bears, poses with his nine-foot Nosen *Champ*. A Fox .78 is hidden under the cowl, and a Kraft Spectrum 6 takes care of the radio link between Paul and the model. (Photo No. 6)

this issue.)

And about battery cyclers . . . you don't have to spend big bucks for one. RAM has their fairly new and inexpensive BIG Battery Cycler which will fully discharge a 1200 mah pack in less than an hour. Now this ain't a sophisticated piece of equipment, by any means, but it does the job. It's all contained within a small, red, plastic case, and instead of plugging into a clock, a very loud and raucous alarm sounds off when the minimum voltage is reached. I've used mine a number of times, and have found that if the start and stop times are carefully noted (if you're in the vicinity, you'll hear the low voltage alarm), you'll end up with a very accurate record of the battery's capacity.

CHARGERS . . . REVISITED

Back in the February issue, I lamented about the lack of adequate chargers for the bigger (1200 mah plus) battery packs . . . and got lots of response.

Bill Cohen, an Old Timer addict from Santa Ana, California, told me about the Eveready (Union Carbide) Ni-Cd battery charger that he's been using for years. It can handle from one to ten cells at charging rates of 15, 22, 45, 100, or 400 ma, and Bill pointed out that he's careful when using the 400 ma rate to charge only his 1800 mah packs. According to Bill it's a dandy unit, and according to the Union Carbide people, this charger, No. ACC100, is still part of their inventory.

Some readers made sure I was aware



Ace R/C's Internal Switch mount houses a Noble on/off switch inside the author's *Big-E*. Ace mount comes with double-stick foam tape for mounting ease (vertically or horizontally). This lets you tailor the installation to your needs and protects switch from vibes. Mount propped up for clarity. (Photo No. 5)

that Kraft still makes their dual rate plug-in charger (KBCD), although most everyone is off as to its outputs . . . which are 50 and 165 ma . . . and not 75 and 180 ma.

I have since bought one of the Ace Chargemaster kits, and it seems to be a very practical unit. I programmed mine for 50 and 90 ma on the two transmitter outputs, and 50, 90, 90, and 120 ma on the four receiver circuits. A handy chart allows you to tailor the outputs for your specific needs, as I did, and you end up with a compact charger that'll be your mainstay throughout the year. I especially like the "Normal/Trickle" switch in each of the six circuits; after a full charge, a pack can be put on trickle charge . . . indefinitely. Now every battery can be "up to snuff" all of the time, and you'll never miss out on a chance to go fly!

ACE'S INTERNAL SWITCH MOUNT

I know that we all have our very own pet ways of doing things . . . like when it comes to mounting that necessary pain-in-the-butt, the on/off switch. Some people still mount their switches to the fuselage sides, while others use a handy item like Du-Bro's Kwik Switch Mount.

I stumbled onto something I like even more, and I have been making it a part of my BIG Bird installations for six or seven years. It's a seemingly little known item

made by Ace R/C, Inc., called . . . Internal Switch Mount. Basically, it's nothing more than a half-inch wide piece of 3/32 aluminum formed into a rectangle to fit the Noble switch. What I like about it is that this aluminum "housing" can be installed just about anywhere, vertically or horizontally, with double sided adhesive foam tape . . . which acts much like an isolation mount. The Du-Bro unit, however, is hard mounted right to the airframe and is subjected to all of the vibration.

You do have to drill a 1/16 hole in the switch lever to accommodate the external pushrod when using the Ace unit, but if you go slow and easy with a good drill bit, this shouldn't be any problem. The versatility and shock protection offered by this mount can't be denied.

FIREWALL FUEL FITTINGS

Actually, Fourmost Products calls these Bulkhead Fittings, and although I'd used them in my BIG Sig Cub for connecting the Magnum .915 to its fuel supply, I wasn't sure whether or not the 3/32-inch ID of these fittings would be adequate for anything larger . . . like the Zenoah Quartz 2.3.

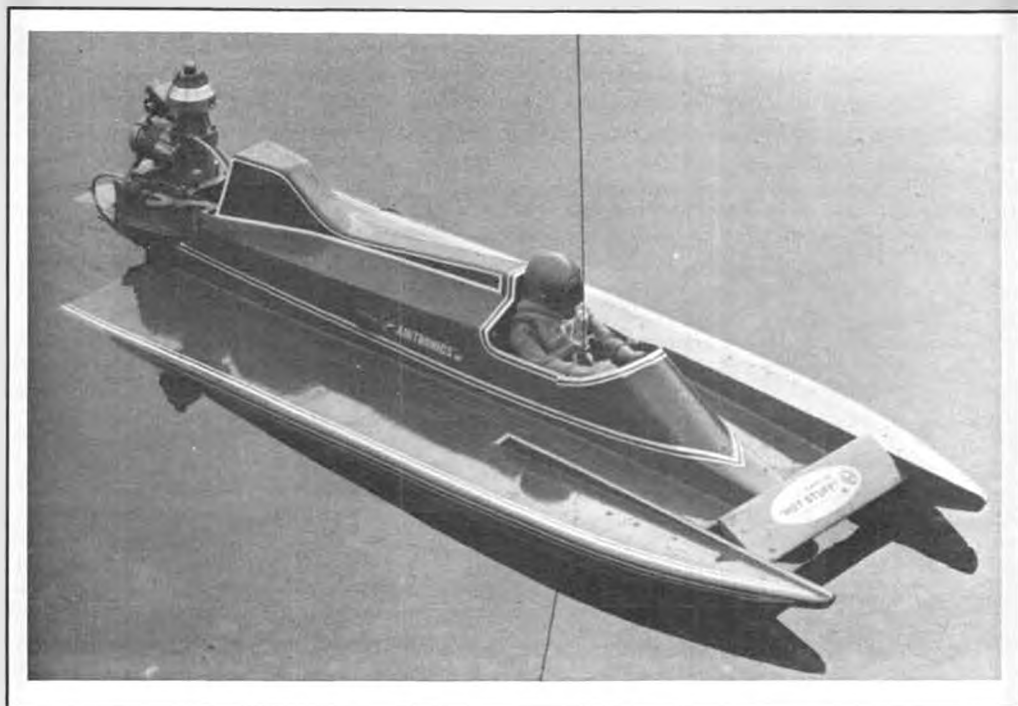
Well, my *Big 'E'* never faltered on takeoff or when going straight up, so I can safely say that the Fourmost Fuel

Continued on page 79

Too bad this was submitted as a color photo, it probably won't reproduce very well in B&W, however, what you are seeing is Bill Comstock's *Double Ugly Stick Bipe*, a strange combination of a Nosen *Big Stick* and a Hobby Shack *Das Ugly Stik*. Weighing 26 pounds, it flies slow and easy powered by a Quadra 35 cc engine. Wing loading is low, power loading is high. Took only 2-1/2 weeks to build. Michelle Cutshaw holds the monster. (Photo 1)



Jerry Dunlap's Sprint 7.5



By JERRY DUNLAP . . . The *Sprint 7.5* is a build-it-yourself racer for those boaters who would like to get into outboard tunnel hull racing in the 7.5 cc class. It features all the latest "trick" design concepts for a truly outstanding machine that really handles well.

WHY THE SPRINT 7.5?

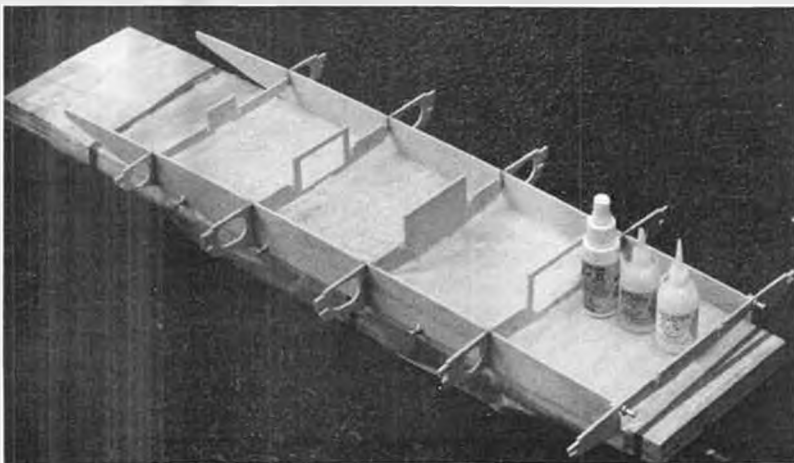
When I designed the *Dumas Hotshot 45* about three years ago, I based my dimensions on what I thought would be needed to accommodate the power of the K&B 7.5 Outboard. The prototype was built and painted prior to even receiving an engine to hang on the transom. When the 7.5 outboard was installed the results were most acceptable. The 35-1/2-inch length seemed adequate to handle the power of this

engine. Because the boat was working very well, I wouldn't have considered doing anything in the way of design changes, unless something significant happened in the class.

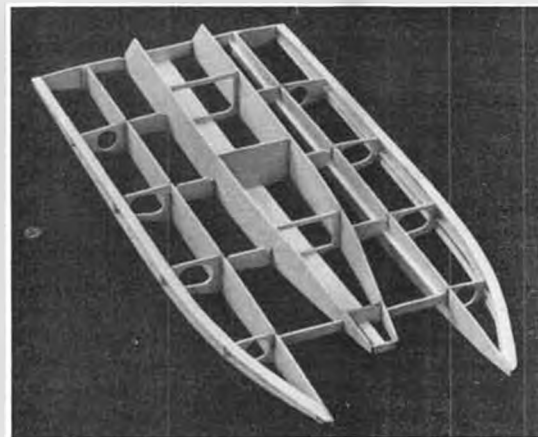
Well, wouldn't you know, last year something significant began happening in my area in the 7.5 tunnel class. A number of the guys began bolting the 7.5 Outboard on their 3.5 tunnels. Believe me, when I tell you, *that* can make for some very quick 7.5 tunnels. I

even bolted a 7.5 on one of my 3.5 tunnels to see what would happen. What happened was I got a very quick boat with some unattractive handling problems. After this little excitement, I was convinced that the 7.5 outboard didn't need 35-1/2 inches of length. I was also convinced that a 3.5 tunnel was not really the best choice for winning races in the 7.5 tunnel class.

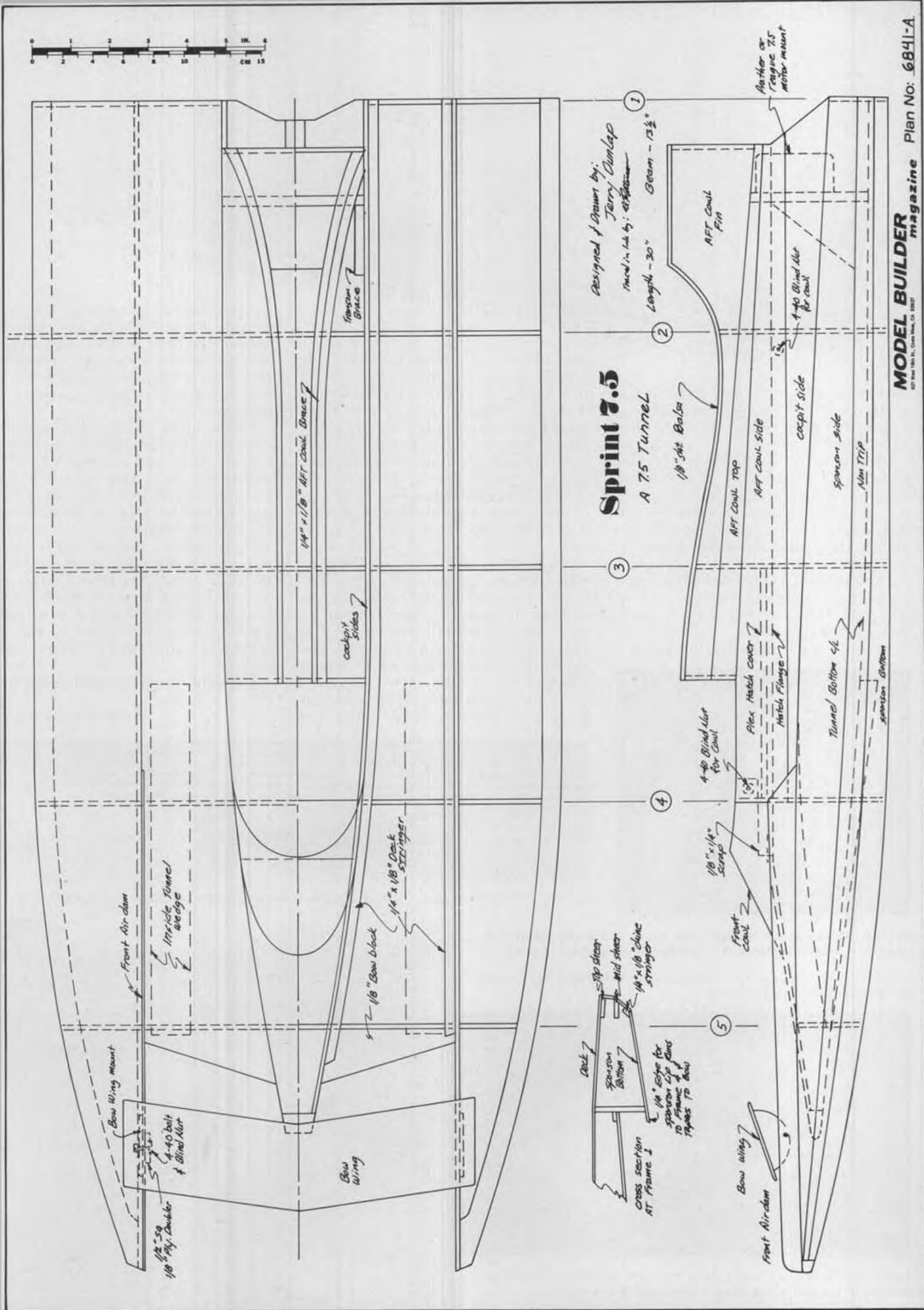
It is my belief that the main problem with these 7.5 Outboard powered



The author prefers to make hulls from building fixtures like this one where the sponson keels and hull frames are easily kept aligned.



The *Sprint 7.5* looks like this after you have completed the basic framework. The boat is then ready for the bottom sheeting.



Sprint 7.5

MODEL BUILDER
Plan No. 50118

COMPLETE, FULL-SIZE PARTS DRAWING AVAILABLE — SEE PAGE 106

tunnels is not their length but their width. I feel the 7.5 needs a little more width than most of the 3.5 tunnel designs offered.

In order to test out my theory, I took a Hotshot 45 wooden kit and made a couple of rather drastic changes. I shortened the length to 30 inches and thinned the center section and sponson profile. The standard width, however, was not changed.

The initial testing of the boat showed excellent straightaway speed, but an unacceptable sliding characteristic through the corners.

In an attempt to eliminate the sliding, I

tried all kinds of turnfins. I installed long turnfins against the tunnel side. I hung an external turnfin off the right side of the boat. I even tried a combination of a tunnel side turnfin and external turnfin. The boat would still slide when pushed hard through a corner. I thought the sponsons might be too wide. A little creative work with a band saw took care of two inches of sponson width. But the boat still slid out while going through a turn.

It was after one of the unsuccessful runs with the narrowed sponsons that I came home and looked carefully at the amount of sponson dihedral I had on this boat. I hadn't realized that in changing the kit I had somehow managed to decrease the amount of sponson dihedral. This deficiency was corrected quickly by simply applying a new bottom piece of 1/16 plywood over the existing

sponson bottom. A piece of 1/8 square material was glued to the sponson edge before the false bottom was applied. This provided the increase in dihedral. The new bottom was extended 3/16" past the sponson wall to create the sponson edge.

This was the change that made the difference. The boat would now corner exceptionally well and the speed was still there. At a late season race, I managed to turn in a 1:40 clocking with the modified kit. That was for five laps on the NAMBA oval for a total of .9 of a mile. It wasn't a record, but it was six seconds quicker than I ever ran my 35-1/2-inch hull. The boat also won two races last fall. I was convinced that the concepts developed on the modified kit were of sufficient value to warrant spending some time at the drawing board.

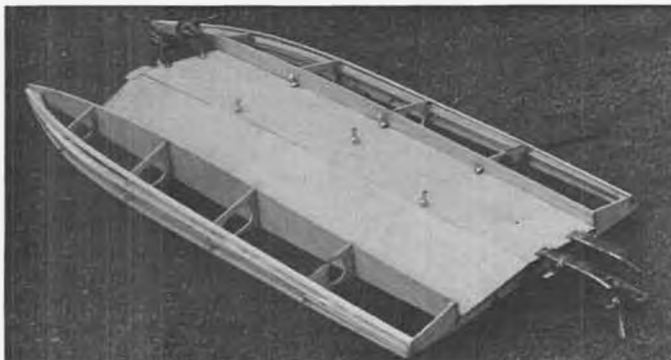
The Sprint 7.5 is the result of my latest

Continued on page 75

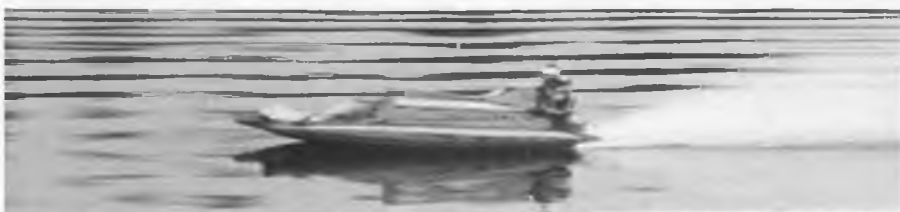


ABOVE: Clamps and map tacks keep the deck sheeting against the framework while the glue sets. Front cowl deck is glued in place.

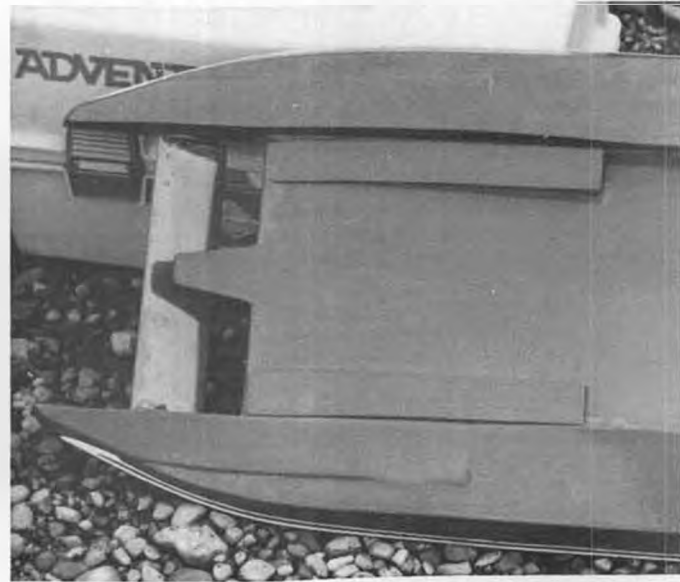
LOWER RIGHT: Sponson ramps help prevent the boat from hooking and spinning while cornering.



ABOVE: The bottom is sheeted in two sections. Clamps and map tacks hold the sections in place while the glue sets.

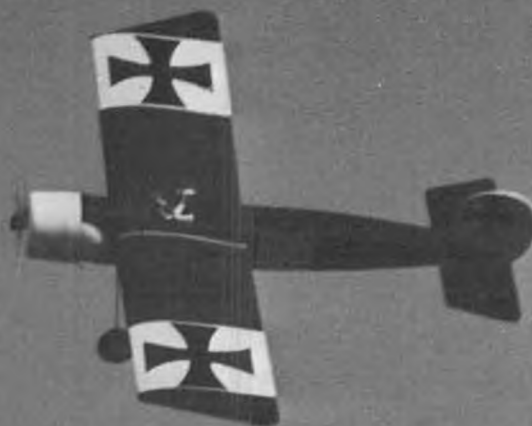


Sprint 7.5 built from plans. Racing attitude is excellent with the Sprint 7.5: flat and level.



Nick Zirolì Eindecker

Enya .40 Four-Cycle



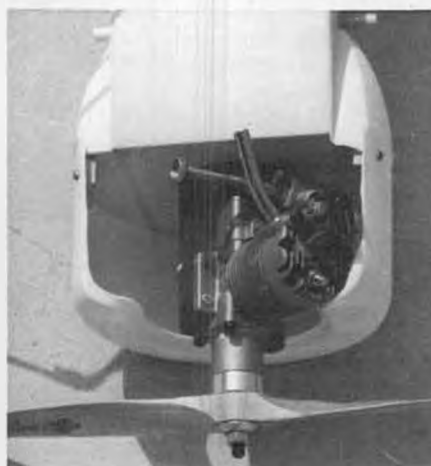
By WERNER HOECKLE . . . Four-stroke engines are the rage these days in sport flying as well as scale. The Nick Zirolì *Eindecker* is a perfect match for the Enya .40 four-cycle. It combines old fashioned looks with old fashioned sound for an unbeatable combination.

• Four-cycle engines are fun. Everything about them . . . from their general appearance, to the very low sound level, to knowing that the torque is there to pull that special airplane . . . is appealing. Fuel consumption is generally low, which adds greatly to the enjoyment per dollar spent.

One of the best things about four-cycles in general, though, is the feeling of reality that comes as a result of the slow speed, high torque flight you get with an old airplane. At idle, you'll hear the valves ticking away. As you increase throttle, the sound simply speeds up, it doesn't really get much louder, and that torque takes over. With the right airplane to complete the picture, that feeling of reality as you climb out nice and slow, is thrilling.

Enya engines, imported by Altech Marketing, Inc., P.O. Box 286, Fords, New Jersey 08863, have been a favorite of mine ever since I bought an Enya .35 for control line flying many years ago. It was the one that came in the clear plastic box with yellow foam packing, and it had an extra head as well as two different venturi inserts. They looked like jewels (still do), and always started on the first flip (no electric starters then!).

This Enya, the 40-4C Four-Cycle, comes in a less exciting box, but it is as impressive in the quality of workmanship as Enyas have always been. The cylinder liner and piston are made of a steel/aluminum alloy with a ring. Enya also makes a 35-4C Four-Cycle that is all chrome, without a ring. It's also slightly lighter and doesn't have quite the power of the .40. The .40 we used here weighs



The author chose to mount the Enya .40 inverted for easy access to needle valves, etc.

about 13 ounces and is suitable for airplanes weighing three to six pounds. Speed range is from 2,500 to 11,000 rpm with 12,000 rpm being red line.

The instructions call for 10 to 15% nitro fuel and an 11-6 prop. I used Red Max 15% with synthetic oil and got great, reliable performance. The instructions for prop selection state that a heavier weight prop is more conducive to smooth running, especially at idle, due to the flywheel effect they have. I used a Zinger 11-6W with a small weight on the shaft because my airplane needed nose weight anyway, and it worked beautifully. However, I removed the weight, just to see, and it didn't make any noticeable difference in the way the engine ran.



Radio installations are easy with all this room. Receiver is packed in plenty of foam.



The *Eindecker* E-111 is about as simple as they come. Box fuselage, straight wings.

THE AIRPLANE

You don't need an old airplane to wrap a four-cycle in, but, to me, it's the most fun. It helps to complete the illusion that the sound and appearance of the four-cycle starts (or vice versa). Nick Zirolì Models, 29 Edgar Drive, Smithtown, New York 11787, makes a pair of WW-I ships that seem to have been made for the Enya 40-4C. Nick

Continued on page 67



• Very quickly, I would like to finish off the "two part" series on mold making which is now in its third part. Actually, the mold making section is finished, but what good is a mold if you don't know how to use it? To answer this question, I will outline the procedure for making the fuselage part in a very general way. **USING THE FUSELAGE MOLD**

The first step in preparing the mold for the resin and cloth is to coat the entire upper surface of each mold half with PVA. This is done twice to ensure complete, thorough coverage. PVA alone is not enough, however, and a double waxing of the PVA comes next. Use the high carnuba content wax described last month.

You must now cut the fiberglass cloth to size and shape. This is best done by making a pattern first. My method for making a pattern is to take newsprint paper (from an old newspaper, of course) and lay it across the female image of the fuselage. (Negative image for the feminists out there who may object to this

sort of language.) By forcing the paper down into the mold and trimming it off one inch higher than the edge of the negative fuselage image, you now have a perfect pattern for cutting fiberglass cloth.

Use a good pair of scissors for cutting F/G cloth. You will only aggravate yourself if you use dull or sloppy scissors. Fiberglass is not like paper or cardboard, and poor cutting tools will not tear it, in fact, they will pull individual fiber strands and unravel the weave of the cloth.

Lay the pattern over a smoothed out section of two-ounce fiberglass cloth. I have found that a 50-50 weave works very well (this is "regular" F/G cloth), but there is a weave called "satin weave" which may be a little better. Satin weave is more flexible than regular 50-50 weave. It goes around sharp corners better and lays down inside narrow radii such as skinny tail booms and nose radii much better. Satin weave has just as many fibers going in each direction as the regular weave, but the warp goes alternately over one and under two woofs (look those up in your Funk and Wagnells!).

When the fabric is cut to size and shape, lay a heavy coat of epoxy resin into the mold. Spread it out evenly, and quickly but gently place the cloth over the resin and start to work the resin through the cloth. Use a stippling action with your brush for best results. What you want to avoid at this step is tiny (or large) air bubbles near the surface of the mold. These will become "pin holes" on the outer surface of the fuselage, not



F3B winner at New Zealand Nats was Warwick Gatland who flew his original design *Virgo II*. Warwick also built special F3B winch.

very pretty. Also, it is much less work to prevent pin holes now than to fill them in later. Make this layer "wet" with resin. An overly dry outer layer will have thousands of pin holes and will show the weave of the cloth.

Before this first layer is completely hardened, begin the next layer of cloth. You may wish to trim off the excess cloth of the first layer before you start the second if it looks like the resin is getting too hard to cut with a razor blade. Use the lip of the mold as a straightedge for the razor blade. It is best not to start the second layer before the resin starts to gel in the first layer. The reason for this is the cloth from the second layer may soak up too much resin from the first, leaving the dreaded air bubbles. With the second layer, it is not necessary to first wet the mold with resin, rather, the resin can be worked through the cloth.

The choice of cloth for this second layer is up to the modeler but my recommendation is a layer of unidirectional cloth for superior strength to weight



Ed Slobod (Pierce Aero Co.) helps Adam Peltz onto a 15% thick Bame section wing. Spar was 1/8 X 1/2 spruce, didn't fail. See this month's airfoil for "improved Bame."



Landing skid materials abound . . . this one is a piece of conveyor belt which has been fixed to the bottom of a Pierce Aero *Gemini* MTS fuselage. Welcome mats also work well.



Steve Manganelli made the upper stab in a mold which he created from an existing F/G stab. Mold techniques were featured in May.



The *Virgo II*, F3B winner in NZ. Foam core, balsa sheeted, E-193.



Chris Tank, Tawanga, NZ, prepares his F3B ship, *Mystere*. Chris was Thermal A winner in NZ Nats with different sailplane.

ratio. I use a six-ounce uni over the entire fuselage except for the upper 2/3 of the fin. Unidirectional cloth is really a misnomer because not all of the fibers are running in one direction. The uni that I have is about a 70-30 or 80-20 combo.

Carbon fiber or Kevlar may also be used as a second layer, but there are a few things you should be aware of. Firstly, C/F is a conductor of electricity (a 1/2-inch sample of C/F tow that I tested yielded a seven-ohm resistance, which isn't much!). What this means is you will have to run your receiver antenna away from the carbon (and most definitely not inside a tube of it) to prevent loss of signal or reflection interference. With Kevlar, you don't have to worry about radio reception, but it is not as stiff as the C/F. Kevlar is also much harder to work with. It is very difficult to cut while in the dry form (you need very sharp, very tight scissors), and it is even more difficult to trim with a razor blade after layup. Also, Kevlar will not sand worth a damn; it frays and frazzles and fuzzies on you (how's that for alliteration?) and in general, frustrates you! Use uni glass and you'll not yearn for higher yield (yuk!).

What I usually do for my fuselage is put a third layer of glass cloth (six-ounce regular) from the nose to just behind the trailing edge of the wing, ending in a slanted cut for stress relief. Then, I go back to the fin area and lay in another two-ounce layer of cloth the length of the fin from tip to root and up the tail boom one inch with a slanted cut.

This is all the fiberglass you need in the fuselage sides. To join the two sides, you must first be sure to trim off all excess F/G sticking up out of the mold. The mold halves must fit snugly. Bolt the halves together. Obtain one-inch fiberglass tape to join the halves of the fuselage. It's not carried by all fiberglass stores, but some have it, so keep looking till you find it.

Provided you haven't painted your mold, or used a pigmented gelcoat on the inside of the mold, you should have enough translucency in the mold to allow you to see inside the fuselage. The more light you have, the better, so try to join the halves in daylight.

Take a four-foot length of dowel or spar material and fashion a hook for the end made out of an old paper clip. Hot

stuff the clip to the wood so that it is secure. This tool will pull the fiberglass tape inside the fuselage as you push the stick through. You may wish to use an aluminum channel (3/8-inch window channel) to support the wet (with epoxy resin), one-inch F/G tape while it is being inserted into the fuse.

Another tool you will want to make is an extension brush. Follow the same idea as the hook stick, but use a disposable brush (bent to a 90° angle) on the end instead. This brush will tamp down the tape all along the seam and work out any air bubbles or buckles in the wet fiberglass.

When the F/G tape has hardened, unbolt the mold and separate the two mold halves with a screwdriver. The fuselage will pop right out of the mold, joined, straight as an arrow, and pretty as a picture. (Oh, brother!) All that remains is to clean off the mold flashing and PVA mold release.

If you need further instructions or have any questions about this technique, feel free to write me at **Model Builder**, P.O. Box 10335, Costa Mesa, CA 92627. Please note that my home address has changed, and you can now reach me at 5815 E. La Palma, No. 281, Anaheim Hills, CA 92807; (714) 777-4514. If you have me on your mailing list, please be sure you



Chris Tank launches *Mystere*. All NZ photos courtesy of Glen Spachman, Wellington, NZ.

correct the home address. Thank you.

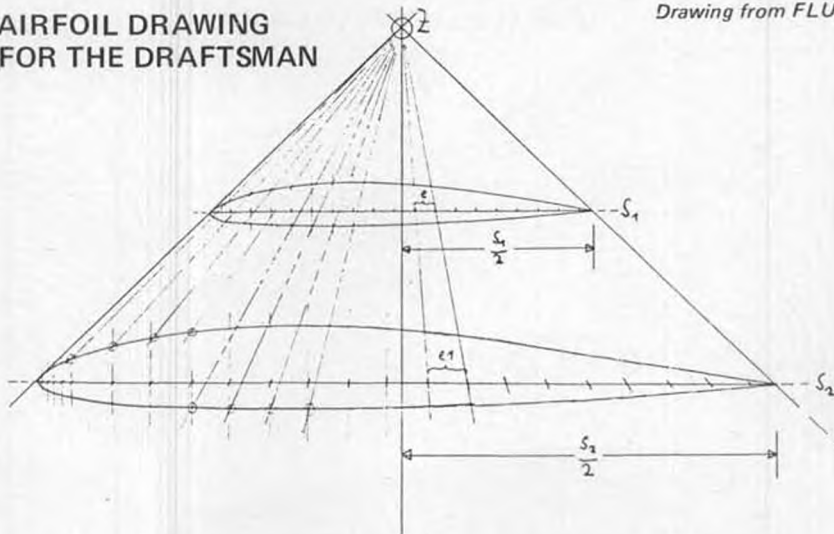
OVERSEAS CORRESPONDENCE

From the land down under comes word of the New Zealand Model Aerobatics Association national championships as reported by Glen Spachman of Wellington, New Zealand. In late December of last year (summer), approximately 50 fliers gathered at Carterton in the lower North Island to do battle in two flying events: Thermal A and F3B. Glen was CD for the thermal contest.

It is interesting to note that the Kiwis use 400 meter winch lines with a mini-

AIRFOIL DRAWING FOR THE DRAFTSMAN

Drawing from FLUG



Here is a method of drawing airfoils that is perfect for making two templates for foam wing core cutting. It'll save you from having to plot the section twice. Accuracy is a must!

mun of 200 meters to the turnaround in their national championships. Also, all other rules relating to electric winches have been adopted from the F3B rule book.

The winner of Thermal A was a guy named Chris Tank of Tawanga. He made a score of 1366 out of a possible 1380 flying a design called a *Super Taquila*. In New Zealand, this is a stretched version of the *Aquila* which is a Lee Renaud design, Airtronics kit.

The site was a sheep ranch ("flat open grassed paddock"), and judging from the looks of it in the photos, it reminds me of the sheep ranch where the Second Annual Two Meter World Cup was held in Lancaster, California, back in 1981. Forty-four pilots flew in the Thermal A event over the stubble of this paddock, and I'll bet there were 44 planes that needed patching at the end of the day. Grass stubble can be tough on Monokote or any other kind of covering.

There were 12 entries in the F3B event. A guy named Warwick Gatland took top honors in this portion of the NZ Nats flying his original design, *Virgo II*. Warwick also designed his F3B winch. It features an automatic, adjustable line tensioner which cuts off the juice to the motor when the line tension warrants it. (There were at least two winches in York at the last World Championships which had this feature.) His system must work, he won five out of the six tasks flown (two rounds, three tasks each). Brian Alexander could have used Warwick as a team member at York!

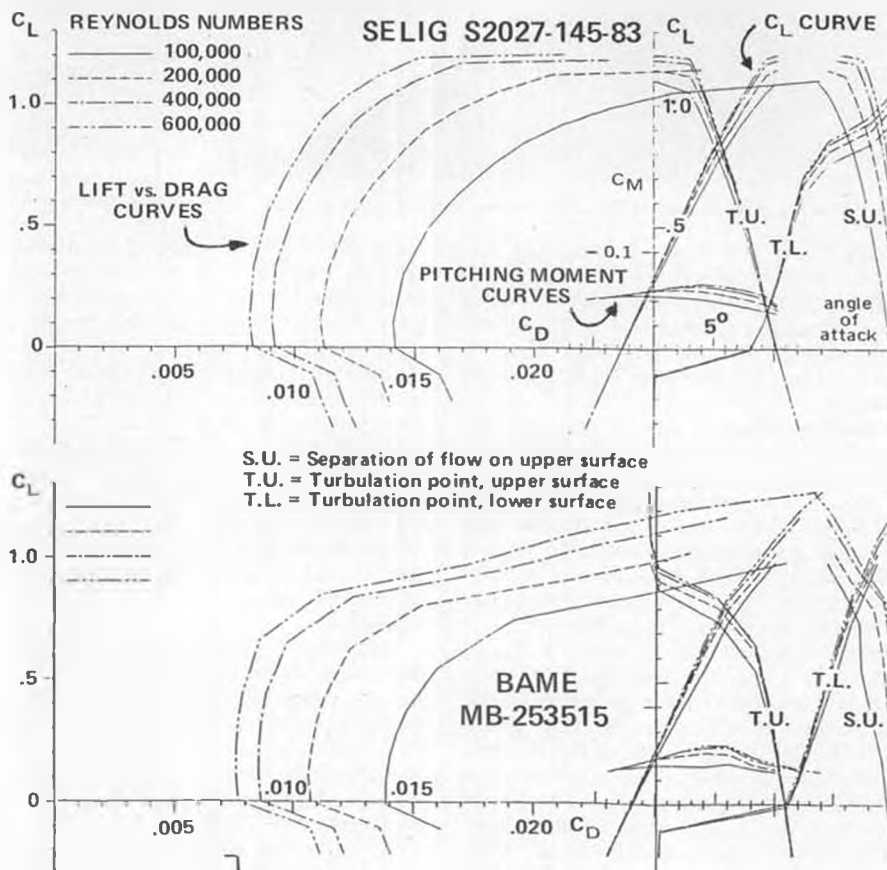
The *Virgo II* follows European design

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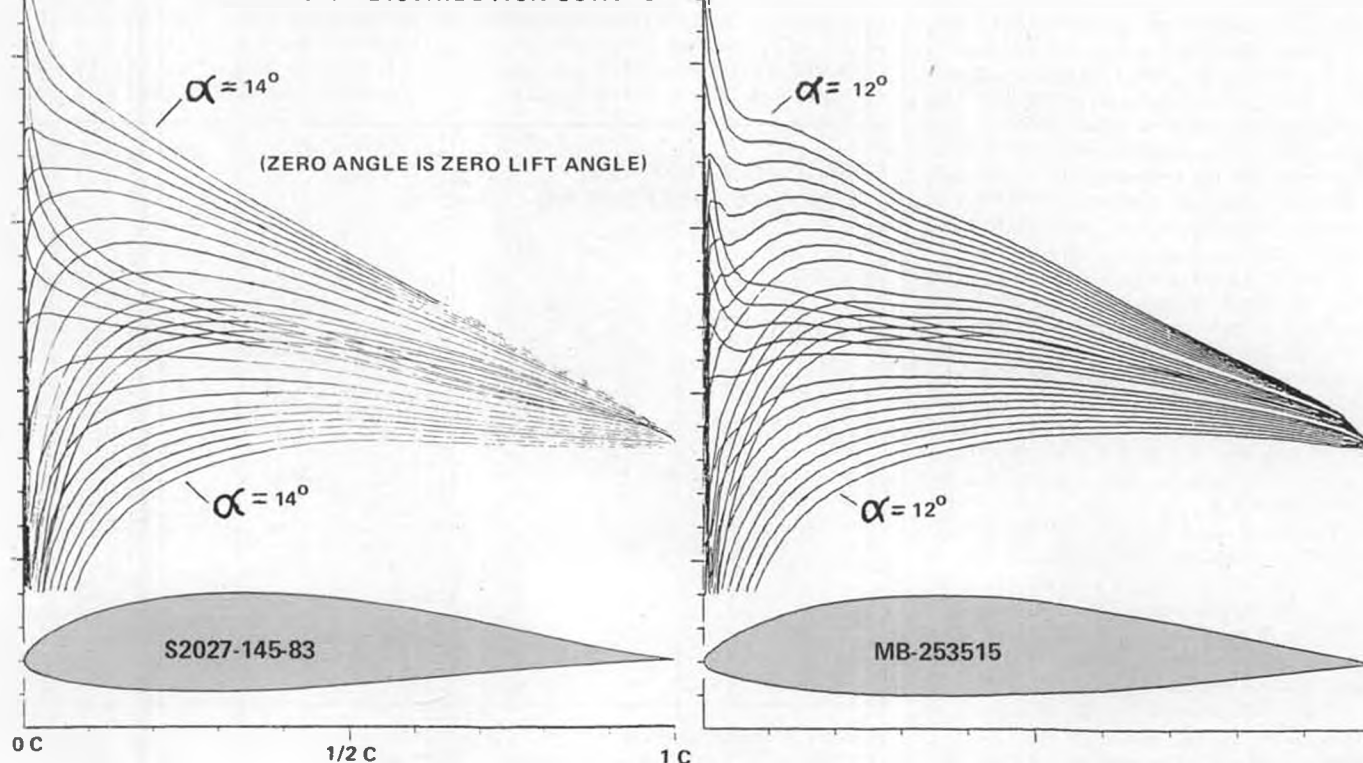
AIRFOIL OF THE MONTH: S2027-145-83

This month's airfoil was developed by Michael Selig (University of Illinois) after he ran the Michael Bame MB-253515 section through the Eppler computer program and found irregularities in its velocity distribution curves. As you can see, the flow was straightened out, and the increase in efficiency at high C_L is quite obvious. The new section is called the Selig S2027-145-83 (the 145 means 14.5% thick). If you would like to use this excellent airfoil, send Mr. Selig an SASE to the address below:

MICHAEL SELIG, 1801 George St., Lawrenceville, IL 62439. (Effective May 1, 1984)



VELOCITY DISTRIBUTION CURVES



Wyndigo Aerobatic Mini Sailplane

By PETE ROEHLING . . . Here's a great little slope ship that'll blow your summertime blahs 100 yards downwind! *Wyndigo* only demands two-channel operation, but **WHAT** it can do with those two channels!

• Those of you lucky enough to have seen a hot pilot wring out his SR-7 in a strong wind know what it's all about. You keep wishing that you could get that sort of performance out of something that would fly in light air conditions. I set out to design just such an aircraft, and succeeded beyond my expectations. I was so pleasantly surprized and captivated by this slope machine's performance, I named it the *Wyndigo*.

I went small and light to get a low frontal area and wing loading. I gave it a home brewed, semisymmetrical section with a very sharp entry to get good penetration and stall; I mixed in a low aspect ratio wing and a short tail moment to ensure good response. I must admit that I evoked the *Wyndigo* with a bit of the old, "If it looks good, it'll fly good," philosophy. Imagine my enchantment when it all worked!

The *Wyndigo* is meant for winds between six and 20 mph, and in that range, you won't find a plane more fun to fly. She rolls faster than my SR-7, flies inverted quite nicely, and her instant response and forgiving stall make landings a downright pleasure. Its only weakness is that the wing section will not permit outside maneuvers to be as tight as inside ones. You've gotta pay *something* for that floating ability folks!

The day of the "vest pocket" aerobatic sailplane seems to be upon us, and as you can build 'em faster and cheaper, plus carry, fly, and land one almost anywhere, I'm all in favor of the idea!

Which brings us to one last fact. Due to the *Wyndigo*'s small size and instant control response, it is *not* a beginner's airplane. It will be upside-down and



The *Wyndigo* (a legendary Indian flying monster which has never been seen) rests on a sunny mountain slope overlooking Lake Arrowhead in Southern California.

heading for that final excavation before your average floater begins to respond to the rudder. However, the *Wyndigo*'s total lack of bad habits means that anyone with a reasonable amount of aileron time can fly it. Just treat it with respect until you get used to the idea that it will respond more quickly than anything you've flown before without

an engine . . .

I'm a hate-to-build but love-to-fly sort and the *Wyndigo* is that sort of airplane. It's designed to build fast and cheap. In fact, the prototype was built mostly from leftover scraps! I am known as a slow (read "lazy") builder, but even I had the first one in the air in less than a week.

The *Wyndigo* was designed around the new 'mini' radio systems, but it will swallow a standard size Futaba four-channel receiver with careful fitting. You will also need two mini servos and a standard 250 mah battery pack.

The lower you can keep the wing loading, the better your *Wyndigo* will fly. Use light woods, forget the word *fiberglass*, and go easy on the amounts of glue you use. If your *Wyndigo* weighs in at more than 17 ounces you built it a bit too strong!

As you will see on the plans, the construction is conventional. Experienced builders can almost skip the instructions.

WING CONSTRUCTION

Cover the plans with waxed paper to prevent them from becoming a part of



The *Wyndigo* is small enough to fit into the back of a sports car, if that's what you drive these days! No need to disassemble it either. Check out the car's license plate . . . now that's what we could call fanaticism, but we won't.



At home in the country or the city, almost any slope will do for the Wyndigo.



The author waits for traffic to clear before tossing his ship into the wind.



The fuselage can be made wider or narrower to accommodate different radio systems. Here we see a Futaba S33 servo working the elevator. Note wire nose skid at right.

the airframe. Pin the sub-TE and the bottom spar to the plans. Glue the ribs to them with cyanoacrylate (CA) glue. Add the top spar, and rib and tip braces with CA. Fit and glue in the shear webbing. Use Titebond or thick CA for the shear webbing and the center section TE, which comes next.

When dry, lift the wing from the plans and sand the leading edge of the ribs to ensure that they line up perfectly. Now glue on the leading edge with Titebond or thick CA. Use tape to hold it in place (Titebond) until dry, or hit the CA with accelerator (Hot Shot, Zip Kicker, X-cel). Next, sheet the center section with 1/16 hard balsa, and glue on the tip blocks. Shape the leading edge and the tip blocks with a wood rasp and sandpaper. The leading edge should be knife sharp! Do not round it off!

When the wings are ready to join, sand the wing roots with a block to get a perfect joint. The wing must be perfectly flat (no dihedral) on the bottom, and the sub-TE should be in a straight line from tip to tip. Now, glue in the wing lining plugs. Use epoxy, Titebond, or thick CA. Join the wings with a minimal amount of glue, and wipe off the excess from the outside before it

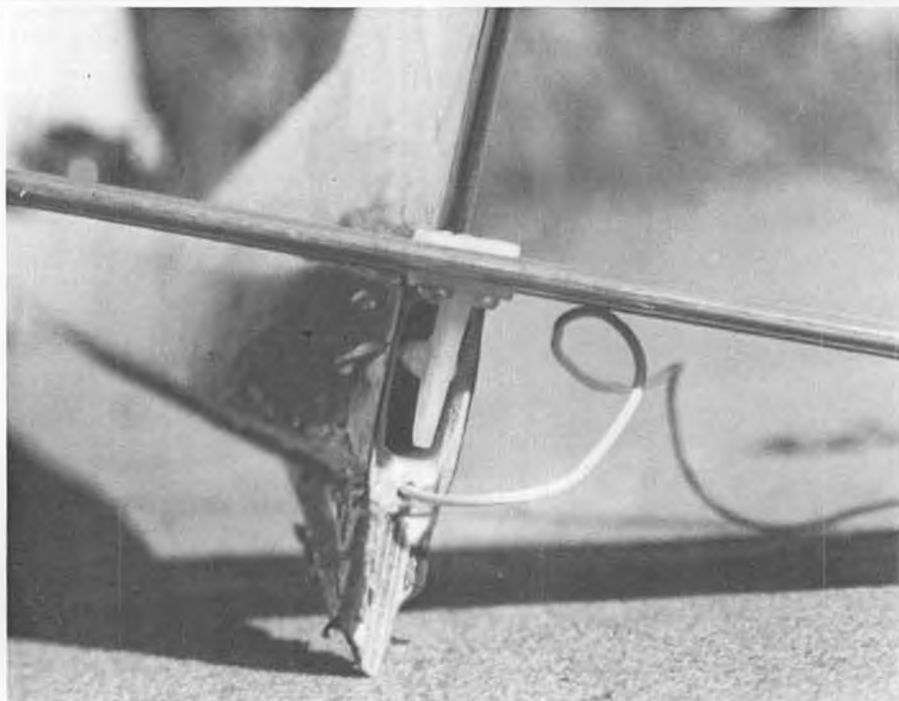
sets.

The aileron servo cutout is made just aft of the spar. Glue a small chunk of ply to the sheet behind the cutout for the servo hold-down screws. The front screws go into the bottom spar.

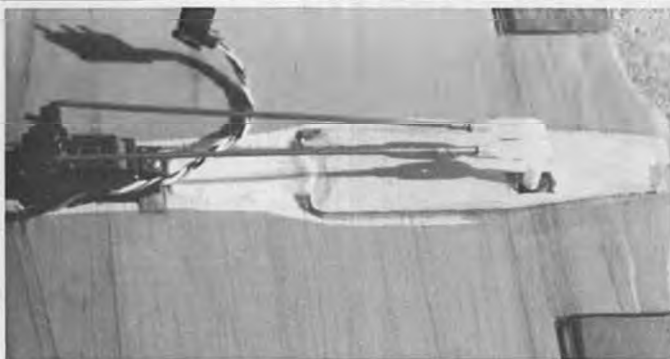
Glue on the bottom wing root brace, next, making sure that it is centered and that the aileron control horn holes are centered on the joint between the TE and the sub-TE. Glue on the tip skids.

At this point, you must install the aileron control horns. I used a Du-Bro 1/2A set to save weight. The tubes are buried flush with the top of the wing, and run straight down the TE/sub-TE joint. When the horns are in and working smoothly, epoxy on the circular top wing root brace. Avoid getting any glue into the works!

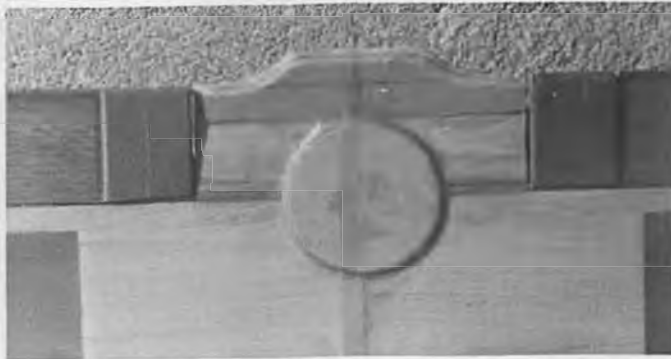
Cut the ailerons to length, leaving 1/16-inch clearance at each end. Sand the aileron leading edges to a 45° angle to allow for aileron action, and line up and drill the holes for the control horns. Fine sand the wing and ailerons to prepare for covering, but do not cover either until the wing and fuselage have been mated, and the wing fairing block has been added and carved to shape. After covering, the ailerons are hinged



Clean antenna installation is possible if a small tube is built into the fuselage bottom. The elevator control horn and clevis are in line with the fuselage center for efficiency.



The ailerons are set up with their actuating servo buried in the wing. Note plywood reinforcement of the wing's center section.



Top center section of the wing. Plywood disk covers up aileron torque rod hole, strengthens TE, keeps rubber bands off balsa.

on top, using tape or Monokote.

FUSELAGE

Cut out the sides and the ply nose doublers, laminating them together with epoxy as indicated on the plan. Make sure you make a right and a left side! Cut out the ply bulkheads F-2 and F-3, and epoxy them to the right fuselage side. Now, set the right fuselage side (with bulkheads) bottom side down on a flat surface and epoxy the left fuselage side to it. Make certain that the sides line up, both front to back, and top to bottom! Add the 1/4-inch triangular corner braces and the wing saddles at this point. (Yes, I know it's harder to do it this way, but it's also much stronger and costs no weight.)

Add bulkhead F-1, holding things together and straight with large rubber bands. Taper off the 1/4-inch triangular corner braces toward the rear until you can pin a chunk of 1/4-inch square balsa between the rear edges of the sides. This will later be removed to provide an exit for the elevator pushrod and the antenna tube. Glue on the fuselage bottom with Titebond or CA, and trim it to size when dry. Now is the time to install the wing hold-down dowels. If you can't stand the sight of exposed rubber bands, there is ample room to use nylon hold-down bolts.

Next, we install the elevator pushrod



A knife-edge fly-by reveals the sharp, clean lines of the Wyndigo . . . fighter-like silhouette.

and antenna tubes. Use a small amount of epoxy and microballoons to glue the tubes tightly to the fuselage sides in the area of the aileron servo, providing clearance for the servo arms. You may now remove the spacer from between the rear fuselage sides.

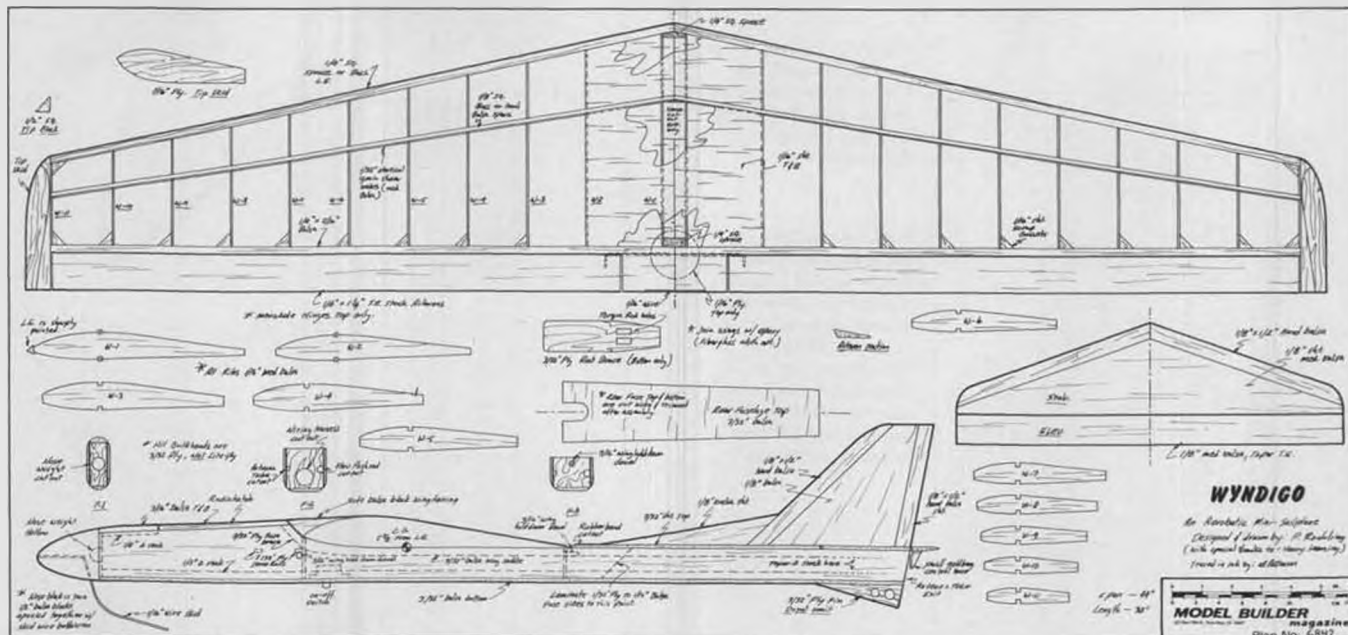
Glue in the 1/8-inch triangular corner braces flush with the top front of the sides. Now, glue on the top front fuselage and hatch as one piece, gluing only the portion you wish to permanently remain! The hatch will be cut off after shaping.

Sand the front of F-1 flat to mate up with the nose block. The block is

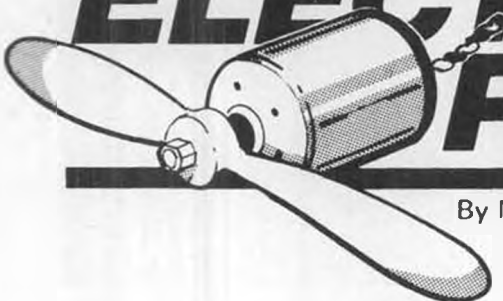
laminated together from two 1/2-inch balsa blocks with the nose skid between them. (Yes, the skid is ugly, but it will save you many a boring minute of patching up dings. If you always land on soft, deep grass, go head and leave it out.) Glue on the nose block with the skid facing downward. When dry, carve and sand the fuselage and nose block to a streamlined shape.

Now, cut the hatch loose from the front fuselage top. Epoxy in the servo rails and the ply fuselage braces that go diagonally, just forward of bulkhead F-2.

Continued on page 101



ELECTRIC POWER



By MITCH POLING

• Never promise that you will write about something "in the next column." I did so, but due to the Astro contest, plus testing an electronic throttle and a Keller motor, I didn't get around to it! So in the next column, I will talk about the new crop of batteries. I hope!

LEISURE KELLER 25/12

This last month has been fun. I have been flying my float plane with the Keller 25/12 motor and the Jomar throttle, and have found this to be an absolutely delightful combination. I have mentioned the Keller 25/12 before, but only briefly. It is available from Leisure Electronics, along with the larger Keller, the 50/24. The 25/12 is equivalent to an Astro 15. It weighs nine ounces, and runs on 12 to 14 sub-C cells.

It is a very versatile and tough motor as it can handle huge currents without overheating (up to 30 amperes). In fact, the saying is that "you can't bust 'em." If the motor is stalled, something else will give, but not the motor!

The Keller has this ability for two reasons. One is the brushes; they are very large, and the commutator is large as well. This gives lots of area to dissipate heat, and lot of area for current to pass through. Brushes have been the limiting factor on most motors, but not the Kellers. The brush holders have large brass caps on them as well to act as heat sinks. I have never gotten the Keller motors more than mildly warm in my sport flying, and they give me all the power I need for float plane use.

The other reason for the Keller motor's ability to handle current is the armature: it is wound conservatively, i.e. it's not a "hot wind." It can be stalled without burnout. This also means that it will turn large props at 10,000 to 12,000 rpm, which is just right for the sport flier. If you want screaming rpm, you can add more cells than the recommended 14 maximum, but I am not particularly competition minded, so I have not.

The numbers I get running a 12-cell

Sanyo yellow sub-C pack and using a digital AccuTach are: 11,300 rpm for a Top Flite 8x4 nylon at 11 amperes; and 9900 rpm for a Top Flite 9x4 nylon at 16 amperes. These current drains are low compared to other 15-size motors on the market which commonly draw 25 amperes, so the flight times are good, from six to eight minutes . . . longer if you have an efficient plane or a glider. My float plane is hardly efficient, so I get about six to eight minutes using the 9x4 prop.

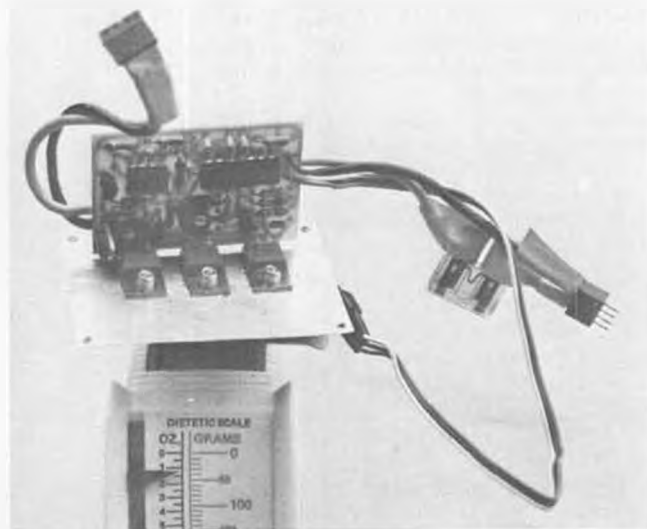
The prop holder, by the way, is one made by Leisure, and it is excellent. You do not have to drill out the prop to get it to fit. In fact, the center post is just small enough that you may want to build it up with some wrappings of masking tape. I did, and it centers the prop perfectly.

The motor in the air is a delight, it has the most "even" power of any motor I have flown, with the whole run being very consistent. In fact, it got me spoiled for anything else. I grew very accustomed to being able to do touch and goes, ROW's, and easy taxiing back to shore even at the end of the battery run . . . Then I flew another type of motor. What a difference! The run was hot at the beginning and absolutely "dead" at the end, with barely enough power to get the plane back to shore. I much prefer a consistent power run throughout. I give the Keller 25/12 an "A" for performance and construction.

Can a motor be this perfect? Well, almost! When I first got the motor, it felt "gritty", and I took it apart to see why. There were tiny metal particles all



LEFT: The Jomar SC-1 electric throttle tips the scales at just over 1/3 ounces less the wiring harness. Diode cuts down the radio noise generated by the electric motor. It is wired between the motor leads.



ABOVE RIGHT: The SC-1, ready to fly, now tips the scale at just over 1-1/4 oz. The SC-1 is very lightweight.

BELOW RIGHT: High flex wire for easier motor installations from three different sources . . . (L to R): Wilshire/Graupner, Astro Flight, SR Batteries. Author likes the fine wire of the SR and Wilshire offerings.





BEFORE: Emil Socher, Saltspring Island, British Columbia, sends these photos of his canard sport plane, *Diablo*, made from German plans. Uses Astro Challenger 05 with seven sub-C cells.



AFTER: Emil discovers the vulnerability of the canard! On the 12th flight, either disorientation or radio problems caused the crash. The model was easily repaired. Note *Brigadier* Old Timer, with tail wheel!

through the motor, so I cleaned them out with a paper towel. Dave Katagiri goes one step farther on his, he uses masking tape on a stick to pick up any elusive particles.

I have talked to other Keller owners, and this seems to be a common experience. Apparently, the motors are drilled out after assembly, and the chips from the drilling are left inside. Why, I don't know. It doesn't seem to bother the motors, so most fly with them as is. However, if you use a fuse, it could blow if a particle jams temporarily between the armature and the magnet. This may have been what happened to Dave ...

unfortunately, just when he needed the power the most ... at the bottom of a spin recovery. The motor survived without a scratch, even though it was the first to arrive at the scene of the accident. Herr Keller does build them tough!

Keller motors are easy to take apart for cleaning. All you need to do is unscrew the brass brush caps (pliers are handy), remove the brushes, then remove the three screws that hold on the magnet case, and you are done! While you are looking around in the motor, check out the clearance between the magnets and the armature ... incredible! There is

hardly enough clearance to pass a piece of paper through; that's close tolerance!

You might also note that the mounting holes in the front are aimed right at the armature! Do not use long mounting screws on the Keller; I use 1/4-inch screws. You could damage the armature if you use screws that are too long. They are metric, and unfortunately, none come with the motor. You can retap the holes for US standard threads. If so, do not run the tap farther than 1/4 inch into the motor to avoid striking the armature and windings.

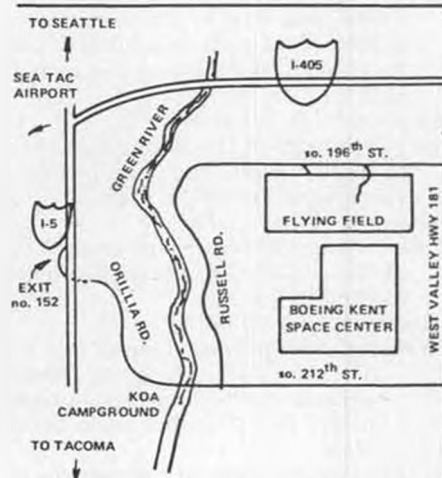
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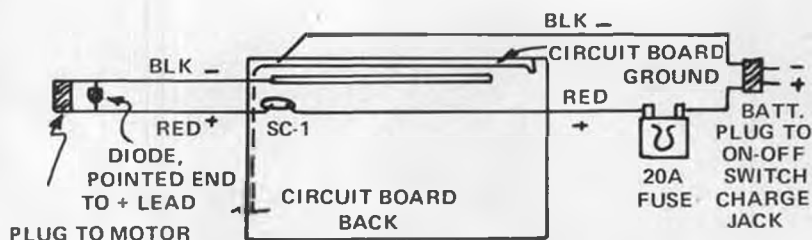
Achtung! This is a Keller 25/12. It is an excellent electric motor. The author uses it to power his *Aqua Sport*. Uses 12 cells, 9-4 prop.



Keller 50/12 imported by Leisure from the FRG. Premier motor in Europe! See text.



Boeing Hawks flying field, site of Fly-In.



SC-1 WIRING FOR ASTRO HARNESS



Howard Doering removes his *Tercel's* hood and prepares him for an early morning hunt. . . . Thermal hunt, that is!

By HOWARD DOERING . . . Kraft Systems new KraftKit *Tercel* is a little charmer! You can fly this model hand launched over flat fields or slopes and really have a blast!

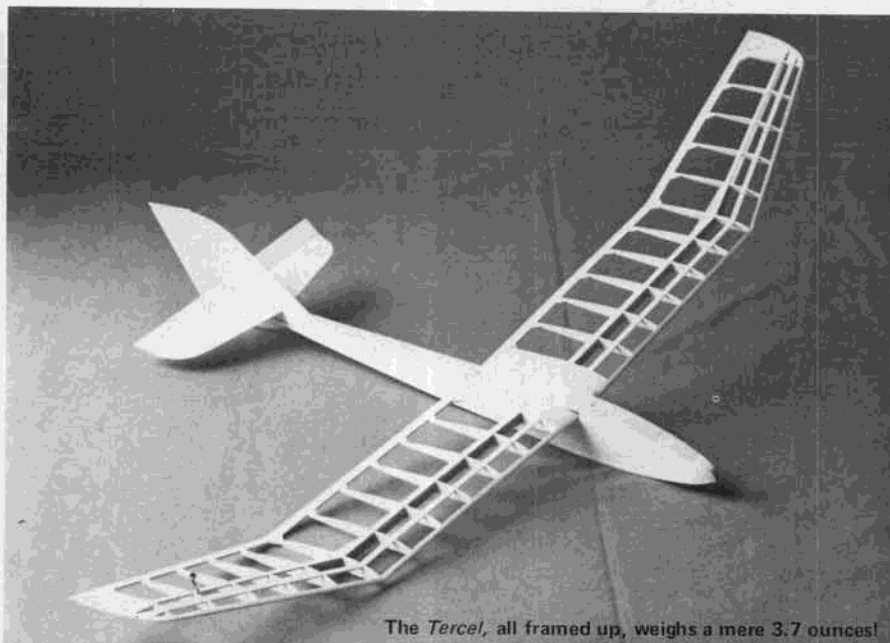
• R-R-R-Ring. . . R-R-R-Ring. . .
Howard: "Hello."
Bill: "Hello Howard, this is Bill. How would you like to do a magazine article? All ya gotta do is build this kit for review, take pictures and write it up?"
Howard: "Uh, I donno."
Bill: "I thought of you because you like to build models and take pictures. The kit is a 'Tercel' by Kraft."
Howard: "What's a *Tercel*?"
Bill: "A small, hand launched R/C glider, and after you build it you get to keep it!"
Howard: "OK, I'll do it."

Webster's definition: Ter•cel (tur's'l) *n* . . . third: Said to be so named because a third smaller; a male hawk, especially the male peregrine.

Initial examination of the exterior of the sealed 3-3/8 x 4-5/8 x 27-7/8-inch box revealed the identity of the de-

KRAFTKIT TERCEL

A 50-inch R/C hand launch ultralight sailplane and highly maneuverable slope ship.



The *Tercel*, all framed up, weighs a mere 3.7 ounces!

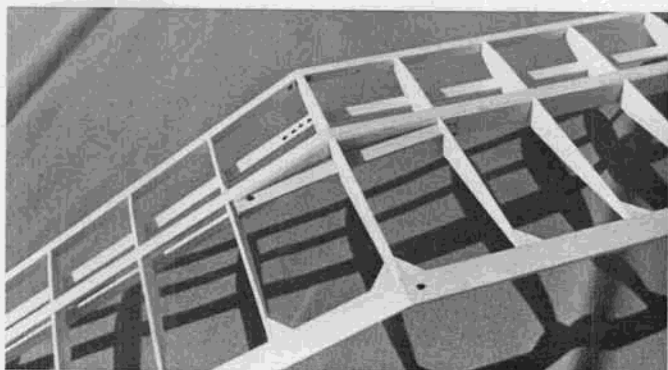
signer, Don Doerfler, the specifications of the glider, and a boast of its performance capabilities. Yes, this model is about one-third smaller than a two-meter ship with its 50-1/2-inch wingspan. My job was to see if this kit lives up to its namesake.

Inside the box were: a) a set of nicely rolled plans; b) an instruction booklet; c) bits and pieces of wood; d) two screws in a clear plastic bag; e) shaped tail feathers; f) some stripwood all rubber banded together; g) some small rec-

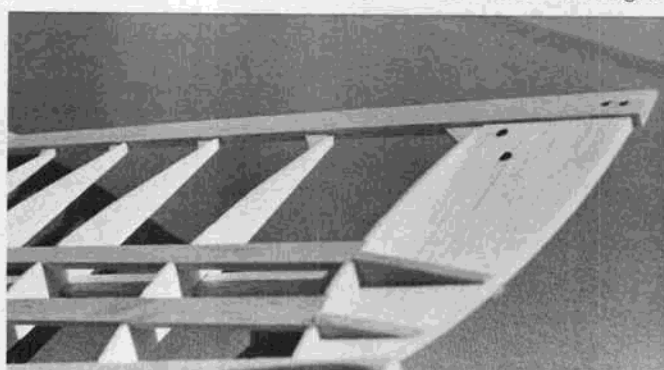
tangles of 1/16 balsa; h) two shaped fuselage sides; and i) two sheets of die cut ribs.

After unrolling, inspecting, and contemplating the plans, the wood was checked off against the list on the last page of the instruction booklet and aligned over the plans. Everything was there and seemed to fit properly except one part: the nose block. It had the grain running vertically. (Hmmm, must be for shock absorption on spot landings.)

Most of the wood miked out slightly



The polyhedral break is braced by an unusual arrangement. A plywood strip spans two rib bays. Mysterious dots explained in text.



Close-up shot of the trailing edge to rib mismatch on tip panel. A razor plane and a sandpaper block carve TE to shape.



Proper falconry equipment was designed for the *Tercel*. Gee, what some modelers will do for attention at the flying field!



Oh, those eyes! The author's *Tercel* really does resemble its namesake... now if it only had the built-in thermal sensor of a hawk....



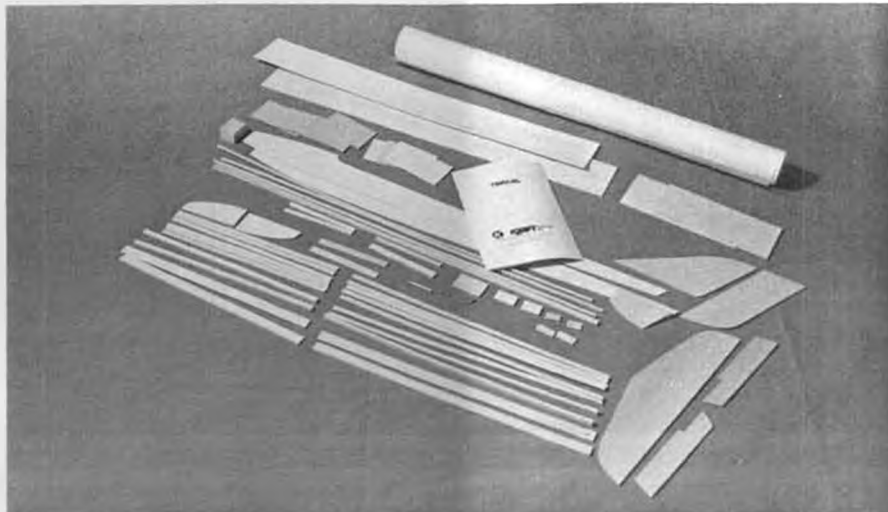
The grain of the stab's balsa was excellent. The elevator joiner was a bit too short.

oversize. The 1/8 x 1/2 TE stock was substantially oversized, varying between .140 to .152 thick at the front. This caused minor problems later in construction. I picked the two hardest fuselage stringers for the bottom longerons. The bottom fuselage stringers were too short, and one of the other stringers had wind stress and cracked upon slight flexure. It also was tapered end to end and had a step in the middle. It was relegated to be fuselage braces.

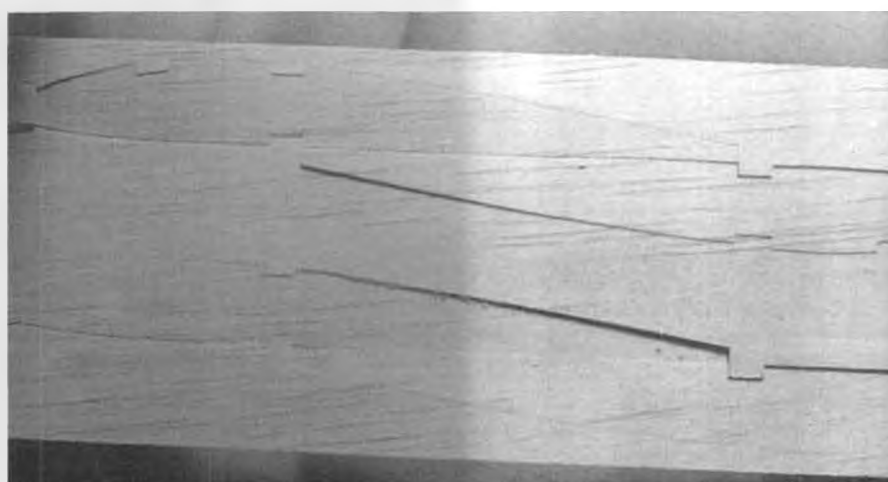
The wing center section sheeting rectangles were B/C grain, just a bit stiff for such use, but quite strong. One main panel leading edge stick was badly warped and was replaced. The fuselage top and bottom sheeting was A grain and quite soft. B or B/C grain would be a better choice for us rough landing types. Balsa weight and grain selection for all other pieces was excellent for their end use.

Die cutting on the wing ribs was excellent as a light sanding on the back of the sheets was all that was required to shake most of the ribs out. After the ribs were removed from their sheets, the total weight of the *Tercel*'s pieces, ready to be assembled, was 3.4 ounces.

Let's see now, under 12-ounce advertised weight, less 3.4 ounces, leaves 8.6 ounces maximum for glue, covering, radio, and balance weight... sure sounds easy with a micro receiver and



This is what you'll find when you open your *Tercel* kit... lots and lots of balsa wood! After the ribs were punched out of the die-cut sheet, they weighed a total of 3.4 ounces.



Die-cut ribs nearly fell out of the sheet wood after a light sanding.

two micro servos.

Now, let's see how this little bird goes together.

FUSELAGE

Step One says to glue the longerons to the fuselage sides; however, the bottom longerons are too short as mentioned previously. No problem, you just splice in a couple of inches left over from the excess top longeron material. Only one question remains; should the splice be at the front or the rear of the fuselage? My decision was easily made when I tried to warp the longerons to fit the nose curvature. It proved much easier to angle the spliced end slightly, and thus the splice was put at the front. Anyway, the sides got their longerons and verticals.

I tapered the rear ends of fuselage halves (Step No. 4) next, then went to Step No. 2. Though Step Nos. 2 and 8 in the instructions suggest cutting Bulkhead Nos. 1, 2 and 3 to the desired width, the plans advise the builder to add material to these bulkheads if larger servos than those shown are to be used. Contradictory, but no loss, as I was building a stock model per the plans. I had to omit Step No. 5, mounting the



The author quickly became hooked on hand launching the *Tercel*. Photo by Vern Miller.

Continued on page 84

Simply Scale

By CLIFF TACIE

Cliff Tacie's byline has appeared frequently in recent issues of *Model Builder Magazine* as he has free-lanced major R/C Scale events in both the US and Canada. This month, Cliff joins *Model Builder* as a regular contributing editor.

• Scale modeling is intended to be the primary subject of this and future columns. Many questions can be asked by myself and all of you out there in the modeling fraternity. What is scale? Why fly scale? What are the different approaches to scale modeling? Just what is this facet of the hobby/sport of aero-modeling all about?

I believe the answer is that scale just doesn't mean exactly the same thing to each and every one of us. To me, scale is a way for me to approach that elusive little devil that we all come up against in flying model airplanes ... realism in flight.

As a young boy, and now as an "older boy," airplanes have always held a complete fascination for me. I love to watch them fly. I can sit for hours on end at airports just watching all the different types of commercial and private aircraft make their takeoffs and landings, watching their graceful turns in a traffic pattern. I thrill to the aerobatics at local air shows. Seeing a *Super Stearman* roaring through four-point rolls and slow motion snaps, a *Citabria* kicking the tail over in the final vertical movement of a hammerhead, or watching the little *Pitts Specials* pointing their noses upward into vertical rolls only to come to an eventual halt and to slide backwards, their propellers singing, into the billows of air show smoke their powerful engines are spewing. Have you ever seen a Boeing 747 or a C-5A *Galaxy* land, appearing in its incredible slowness to be ready to fall out of the sky at any moment, and yet proceeding to a gentle touchdown that barely squeaks the tires? This, to me, is what it's all about.

I'm often asked, as I love airplanes so much, why do I fly the models? Why don't I learn to fly the real thing? It's really quite simple. The sights and sounds I've just described are available only to the spectator! I like to watch airplanes, and this hobby of flying models gives me exactly what I want. I have the thrill of controlling my model through its graceful (sometimes) flight, and I have the visual satisfaction of seeing and hearing the airplane in its various attitudes at the same time. Who could ask for more?

As this is my first column, I suppose I should run down my list of credentials for you. Only problem is, the list just isn't long enough for a run! Just a few short strides would probably do the job!

Anyone who knows me will tell you

I'm really not an "expert" builder, nor do I profess to be. However, if I do say so myself, I construct a respectable looking model. The scale "purist" could easily find fault with my building techniques and accuracy, but I derive a great deal of personal satisfaction from the building and flying of my models, and that's what I'm looking for from this hobby.

I like to build kits as well as challenging myself with the more demanding rigors of scratch building. I prefer the simple subjects, homebuilts and light planes, and I know how to document them properly in the eyes of most judges and how to present a pleasing and realistic flight demonstration for them. As a result, I've been fairly successful on the contest circuit, having won a first here and there in major competitions, and usually managing to come in up in the top five or so places.

I've had the privilege and honor of being on the 1982 US Stand Off Scale Team, finishing seventh in a field of 25 at the Scale World Championships in Reno, and I'm again privileged to be the team manager of the 1984 US Scale Team (R/C and C/L) which will be competing in Paris, France, July 2 through 8 of this year. The high point of my modeling career has been taking first place at the 1983 Westover Nats in Precision Scale (F4C) with my *Spezio Tuholer*.

As I said before, I'm no expert, but hopefully you'll find my approach to this area of our hobby to be interesting, informative, and enjoyable.

HOW TO MAKE REALISTIC WINDSHIELDS

How many times, in your observations at scale contests and rallies, have you seen windscreens and canopies that look like they've been glued on as an afterthought to the construction of the model? It's true, it's a nasty job, this windshield business, but somebody's gotta do it!

There are easy ways to construct realistic windscreen frames for open cockpit models such as *Stearmans*, *Fly Baby's*, *PT-19's* and *Spezio's* so that they look like they do on the full-size aircraft and fit precisely the way they should.

To make the windscreens for my *Spezio*, I used a method which has been used by some local modelers on their quarter-scale *Fly Baby's*, and seems adaptable to many aircraft. The basic idea of using a 1/32 plywood "base" would probably work well on canopies also.

The object of our construction is to



Model Builder's newest contributing editor poses next to his *Spezio Tuholer*, carefully

complete a windscreen frame which is realistic, can be glued or screwed onto the top of the fuselage, and fits perfectly!

The first step, of course, is to have the top of your fuselage sheeted, and the cockpit opening cut out. Now, using masking tape to hold it in place, wrap a piece of 1/32 plywood sheet over the top of the fuselage in the area of the windscreen making certain it is completely flush with the fuselage sheeting. This 1/32 plywood sheeting is going to end up being the base of our windscreen assembly.

Next, a template should be cut out of heavy paper or file folder stock. The template will be in one piece with the side frames to be folded rearward against the fuselage. This template will probably not be perfect the first time, so cut and trial fit it until you have a reasonably good fit on the 1/32 plywood sheeting. Once you're satisfied that your template frame is as close to a good fit as you're going to get it, use the template to draw the frame outline in one piece on a sheet of 1/16 plywood or 3/32 plywood as the model size dictates. Using your jig saw, cut out the frame allowing a little extra on the bottom edges for trimming to an exact fit.

Now that the frame is cut out, the sides



PT-19 model seen at the Kitchener Waterloo Scale Rally. Windscreen is typical.



placing his trusty Airtronics radio in plain view. See text for construction tips!

will be bent rearward. Turn the frame rear side up, and using a small triangular file, score the bend line into the uprights approximately halfway through the plywood. Plywood is nice for this, because the dark/light plies in the sheet allow you to observe that you're grooving down to an equal depth.

Once you are satisfied that the grooves are sufficiently deep, wet the frame in the area to be bent with a solution of ammonia and water. Take your time, and you'll end up with a nice corner that won't crack on the outside of the frame.

With the sides of the frame now able to bend back, position the frame onto the 1/32 sheet you have wrapped around the fuselage at the cockpit area. Tape it

in place, and run a bead of slow curing cyanoacrylate (Hot Stuff Super 'T', Super Jet, or ZAP-A-GAP CA+ are good) along the inside edge of the bends, curing it with a shot of accelerator. Do not glue the frame to the sheeting yet! With the sides now glued into position rearward, remove the frame from the sheeting and trim the bottom of the frame for a good fit. The frame can now be positioned back in place on the sheeting and glued to the sheeting using slow curing cyanoacrylate and accelerator once again.

Next, fill in the fillet between the frame and the base sheeting using a "filled" epoxy mixture. I mix micro-balloons or epoxy filler material with five-minute epoxy for my fillets. Not enough time to work you say? The secret is to mix the filler into a small puddle of part A first, then add part B. Smooth the fillet with a wet finger and allow to cure.

Once you're satisfied with the cured fillet, sand it smooth and take the 1/32 sheeting/windscreen frame off of the fuselage. It will conform perfectly to the shape of the fuselage. Trim the 1/32 sheeting to within 1/8 inch or so of the frame fillet, and you now have a basic windscreen frame that we will eventually glue onto the fuselage.

The frame should now be sanded and finished with your favorite method. I like sanding sealer and a dope finish. After painting, (that's right, we still haven't installed the windshield mate-

rial), screws and rivets can be simulated by applying drops of Wilhold R/C-56 glue in the appropriate areas on top of the finished frame. If it's a screw, when the R/C-56 gets milky colored around the edges, impress the slot pattern, regular or phillips, with a tiny jeweler's screwdriver. It will now cure to this shape. The R/C-56 dries clear and takes on the color of the material beneath it. It can be touched up with paint if you like. I usually paint the screws silver first, and then apply the finish color with a dry brush over that to give a worn look.

The windshield material to be glued to the inside of the frame should now be cut to shape. I use .020 to .030 acetate or butyrate sheet cut to the shape of the frame and glued to the inside of the frame using (again) R/C-56.

Once you've completed finishing your model, you can glue your completed windscreen assembly to the fuselage with R/C-56 (it dries to a flexible hold and withstands vibration and knocking around). The end result is a windscreen that looks correct on the model and is not fragile. Good work!

★ ★ ★

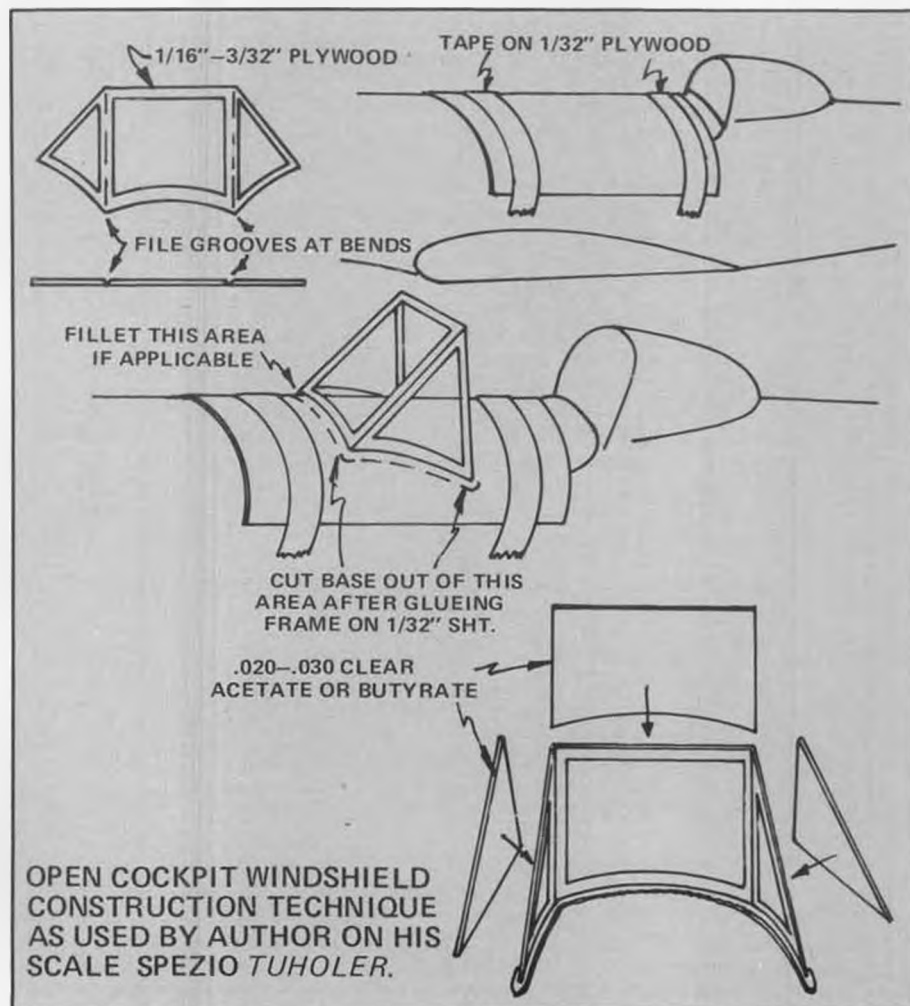
As a final note, I'd like to extend my apologies to the Flying Dutchmen for misspelling their Kitchener Waterloo Scale Rally in a previous article. Anyway you spell it, it spells F-U-N!

Keep it scale and simple!

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



Author's Tuholer. Windscreen is made from 1/16 ply on 1/32 ply base. Sig screws used.



The Douglas DC-1

Part One



The DC-1 awaits its first flight, July 1, 1933.

Photos courtesy of McDonnell Douglas Corp.

The Douglas Commercial Model 1 began the era of swift, economical, and comfortable air transportation. . .

By NICK KARSTENS . . .

Attention scale modelers! Here's a real classic for your enjoyment. Three-view drawings are available for the DC-1 from MB.

• In early 1932, TWA sent out letters and specifications to a number of aircraft manufacturers for the design and manufacture of an all metal monoplane with three 500 to 550 horsepower engines, to carry 12 passengers and have a gross weight of 14,200 pounds, and to be able to fly over the mountains at a cruising speed of 150 mph with a range of over 1000 miles. Douglas responded with a design team that would become legendary through the industry.

After much effort, and many hours on the design board, in conferences, and trying new ideas, the Douglas design was accepted by TWA. The final design incorporated only two engines as they felt that this airplane could equal or surpass the specs for a trimotor. Cabin space and comfort were prime considerations, so a



The final configuration of the Douglas DC-1.

deep fuselage was designed with the wing completely under the cabin floor. This left an unobstructed, 16 inch wide aisle down the length of the cabin. Heating ducts as well as adjustable cool air nozzles were provided. The seats were comfortably upholstered and had controlled reclining backs which were reversible a la the street car. A spacious lavatory, compared to the state of the art of 1932, was at the back of the cabin as was the buffet, from which the cabin attendant served food.

The multicellular wing design was based on the Northrop wings as were the well designed wing to fuselage fairings. The outer wings were attached to the center section wing by bolted butt joints. Wing flaps were the split type: full span for the center section, and from the wing joint to the ailerons on the outer wing panels.

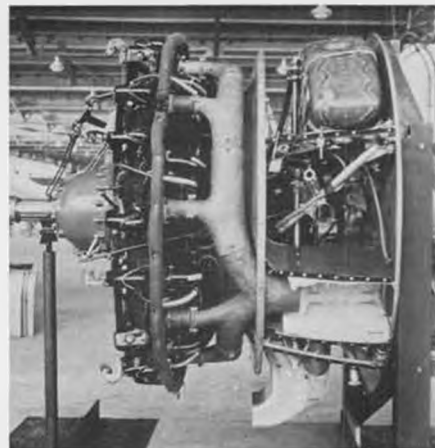
When the landing gear was retracted, half the main wheels extended below the nacelles (a safety factor in case of a wheels up landing). Originally, the gear relied on an over center geometry and

hydraulic pressure to prevent gear collapse, however, several gear collapses later, a down latch became mandatory. It wasn't until 1950 that the wheels were completely enclosed in nacelle doors on the Super DC-3.

Concluded next month



The DC-1 takes on passengers at Grand Central Air Terminal, Glendale, California.



Two Pratt & Whitney Hornet engines powered the DC-1. One unit is on a test stand here.

GENTLE LADY LITE

By DAN RUTHERFORD . . .
MB's "R/C Auto News" editor
delves into the mysteries of
making light things lighter as he
modifies his Carl Goldberg *Gentle Lady*
into a gas powered, R/C
Free Flight model . . . Uh, how's
that again?

• It was just about a year ago that I started (finally) to fly RC seriously. I hauled down an Andrews *QuikRay 500* that had been built two years previously, and I learned to fly with it. I knocked out a *Warlock* in the .40 size, ditto for a *Hot Canary*. I flashed on the usual junk-flying, but quickly came to see that precision flying is where it's at . . . even switching from Mode II to Mode I, thanks to Eloy.

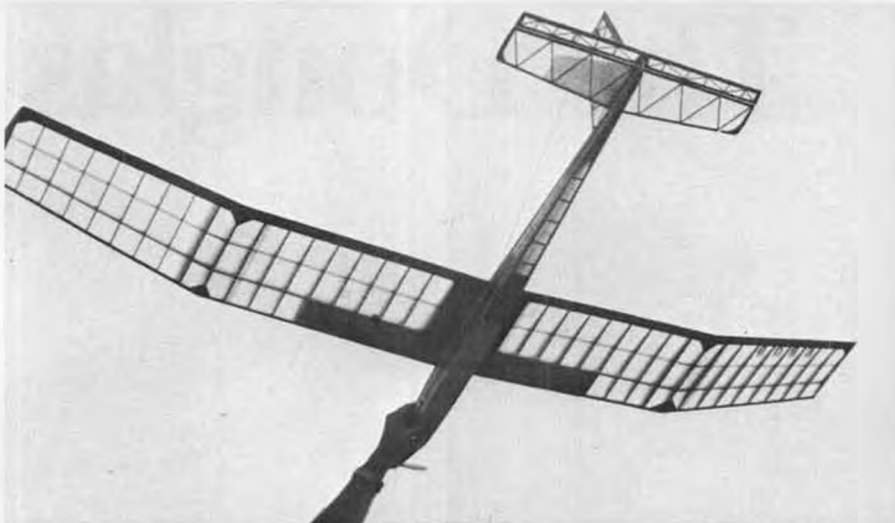
I was having great fun, but I could see that something I had previously enjoyed

trying to say, that will have to be my consolation.

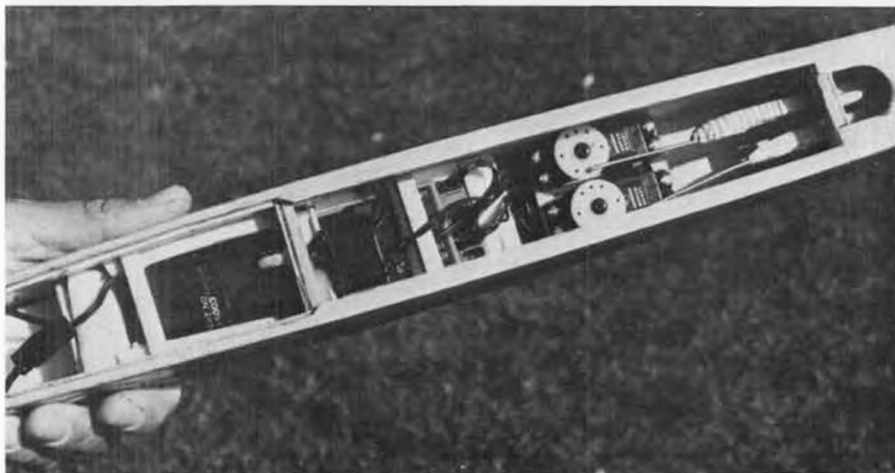
With that vision lingering in the back of my mind, I was invited to fly at what we call "John Smith's Field" a private, small flying site. One of the guys pulled out a small motor glider to fly . . . and hey! It was pretty neat! It was all wrong for my tastes, actually, what with its mild .049 on a power pod, solid, single color covering, no effort made toward light construction, CG too far forward, etc., but it would power up nicely, even if it

however, designed to be usable by a wide skill range of modelers, flying them in a wide range of weather conditions, and launched in any of several different ways. In particular, hi-start launches require strength (read weight) in the wing that I would not need.

I wouldn't need this strength because I had made up my mind to build a single-purpose glider. It was to have a honkin' TD .049 for power, a pressure fed carb to ensure decent engine runs, a lightened structure throughout for the



The author's completed *Gentle Lady Lite* is a work of art against a sunlit sky. Fuselage mods include the installation of a T.D. .049 engine, elimination of sheeting in tail boom.



Guidance of the *Gentle Lady Lite* was provided by an Airtronics radio system. The internally mounted on/off switch is activated by a 1/16 wire key which is guided by tubes in fuse sides.



The noisy end of the GLL houses a "worked" .049 which spins a Kelly fiberglass prop, KK needle assm., Fourmost mount, pacifier tank.

was missing. Finally, I came to the realization that, for me at least, the flying of relatively fast RC models was a lot like playing video machines. I was enjoying punching the models around the sky, daring the ground, listening to the howl of well tuned motors pulling hard and so on, but there was no inclination (or time!) to just sit back and watch the models fly around! You know, the basic enjoyment of flight's sake.

Then one day I envisioned this lightly loaded and lightly built structure just gliding by over my head. Sun was shining through its translucent covering. Well, do you know what I mean? If not, words fail me . . . The FF guys know what I'm

didn't get excessive altitude. And then there was that floating glide . . . Ah, yes, that was what I had been missing!

As it turned out, the model was one of Carl Goldberg's kits, the *Gentle Lady*. On the way home, I remembered that one was stored someplace at the house as Carl used to send me a sample of all his new kits. All it needed was to be built. For my purpose, it also needed some serious weight reduction, but that just made the planning and building more enjoyable.

Now, before you get the wrong idea, the *Gentle Lady* and a whole bunch of small glider kits really aren't over designed for their intended uses. They are,

slow, floating glide, a for-real tissue and clear dope covering, and a two-channel radio system as a necessary evil. (I may have really wanted a new FF model, but I didn't want the chasin' to spoil the watchin'.)

While the *Gentle Lady* is by no means a stout design intended for launching with strong winches, or even super-duty hi-starts, for my purposes the wing could stand some serious lightening. The stock inboard panels have bass wood spars which I replaced with medium balsa; the outboard panels received very light balsa spars. The wing tips, small though

Continued on page 94



PLUG SPARKS

By JOHN POND



1. Here's a truly hard to beat combination: a *Playboy Senior* and a *Super Cyclone*. Bill Roseberry, SAM 31, shows us his rendition. Fruciano photo.

• While most of the country is wading hip deep in snow, an ironical note is struck when this columnist receives a report from Arizona of a well attended Old Timer contest held at Buckeye Airport on January 14 and 15. This meet is now held annually in conjunction with the South Regionals.

According to the report submitted by Dick Bringgold and the accompanying photos taken by Sal Fruciano, the weather was a split wind Saturday and a simply gorgeous day on Sunday. The Free Flight events turned out to be somewhat of a disappointment, but on the other hand, the entries in R/C Old Timer were up 82% over last year!! Also noted was that ignition powered models were in a ratio of three to one over glow powered versions. This is directly due to the amount of motor run allowed for ignition, double that of glow! You can put a McCoy 60 powered model pretty darn high in that time!

Leading off the parade of photographs is Bill Roseberry, a SAM 31 member who ended up as the Sweepstakes winner. As can be seen in Photo No. 1, Bill is holding a *Playboy Senior* powered with a *Super Cyclone*. It seems like this is about the best combination of motor and plane whether it is free flight or radio control. Great flier!

Former SAM 49 President Chuck Patterson comes in for some attention in Photo No. 2 with his *Super Cyclone* powered *Peerless Panther*. Not many modelers realize it, but low wing models, especially with radio control, fly as well as any higher wing pylon.

In making a selection of an Old Timer model for radio control, stability is not the problem. As a matter of fact, you want a model that is actually *unstable* as

a free flight. Take the case of the *Cumulus* by Ben Shereshaw. This design could never stand any power as a free flight, but what a winner it is in the R/C circles!

Point in case is that with a very stable model, all controls are resisted by the stability of the design, hence, some over controlling results when attempting to turn or dive the model. This is important when setting up the glide pattern. You don't want to waste precious altitude in getting the right attitude! (No pun intended.)

Another reason for the construction of the *Panther* is the West Coast SAM Champs to be held in the middle of May wherein all low wing models are given a 50% bonus in flight times up to a maximum flight. That should make a few low wing models turn up!

Photo No. 3 shows Marv Simpson of



2. "Doc" Patterson cranks the *Super Cyclone* in his low wing *Peerless Panther*. Otto Bernhardt holds the hot item. (Fruciano)



3. The *Long Cabin* as faithfully reproduced by Marv Simpson, SAM 31. O.S. .40 Four-cycle "motoates". (Fruciano)

SAM 31 (the Cactus Chapter) with a *Bob Long Cabin* powered by an O.S. 40 four-cycle engine. Bob Long's design, based on a club design known as the "Old Box", is probably the simplest and best flying cabin model around. One of these



4. This 1934 shot of a revised *Old Box* design by Mel Haines was lost at the Junior Birdmen contest that same year.

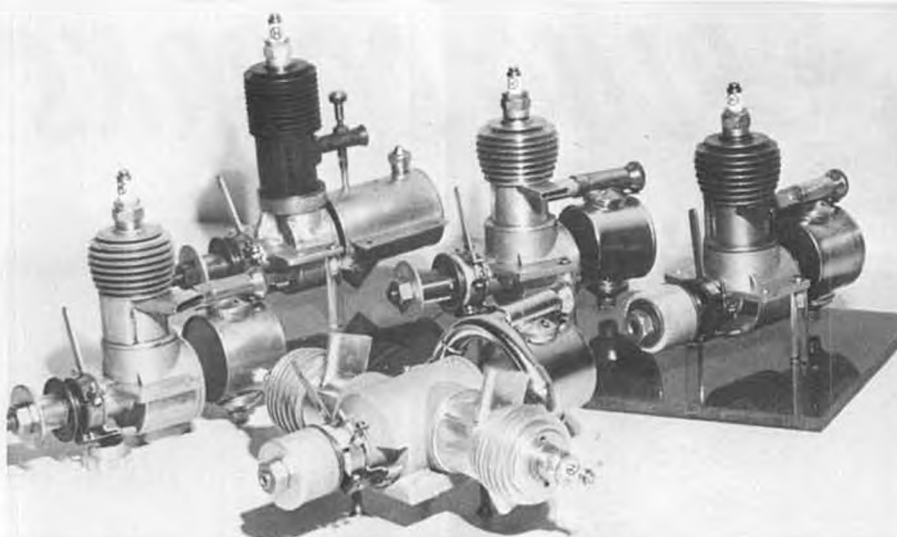


5. Mike Hood, Blythe Calif., poses with his *Lanzo Bomber* powered by a Super Cyclone. SAM 31 "Buckeye" meet. (Fruciano)

days we are going to do the *Old Box* (see Photo No. 4) just to show the reader the derivation of the Long model.

It doesn't take much moxie to see the same force setup, moment arms, wing area, etc., in the *Long Cabin* and the *Old Box*. This parasol model was lost at the Junior Birdmen Contest at Lakehurst NAS in 1934 and was never seen again. This particular model was the creation of Mel Haines. One of these days, this is another project we will have to do a recreation on!

The *Long Cabin* has been so popular that even the Stephen Kowalik design of *Miss Delaware* evolved from this fine flying design. To make the model perform properly, the modeler must build it to fly, not to crash! In other words, keep the model light! That Clark Y airfoil is a great one for model airplanes, but when



6. The Herb Wahl collection of Hurleman engines. Left to right are the Twin Exhaust Mk III, Hurleman Aristocrat 60 "A", Hurleman Twin, Hurleman 48 Mk I, and Hurleman 48 Mk II. A three-view of the Engine on the far left is below.

you load the wing too heavily, the Clark Y simply does not have the lift characteristics of "undercambered" airfoils such as RAF 32, Eiffel 431, etc.

Photo No. 5 depicts Mike Hood who came over from Blythe, California, to fly his *Lanzo Bomber* powered with a Super Cyclone. This good flying design was barely nosed out by another good model, a *Lanzo Record Breaker* as flown by Otto Bernhardt using a McCoy 60 for power.

In presenting the results of the models that won, the writer notes that a *Red Ripper* flown by Bill Roseberry won the Class AB Glow event. Lest the reader get the idea that this is a fluke, and the *Ripper* is a poor flying model, not so! The original design by Jerry Peebles was a 1940 model that cleaned up in the Ohio-Canadian areas. (MB plan No. 280-O.T.)

As Dick Bringgold says, "It is ugly enough to be an Old Timer". Don't let the looks fool you! A careful look at the force setup of the model will reveal this has all the traits of a hot pylon model. This is one of those designs that has



9. Frank Darriel with his *Stick Stick*, a Caldwell Johnson rubber stick design that was 20 years ahead of its time. Photo taken in 1943.

languished in the background because no one was attracted to the unusual lines of this model. Anyway, let's take a look at the results:

CLASS AB GLOW

- | | |
|---|-----|
| 1. Bill Roseberry (<i>Red Ripper</i> /Torp 29) | 859 |
| 2. Bruce Augustus (<i>Buzzard</i> /O.S. 40 FS) | 334 |
| 3. Edward Piggott (<i>Simplex</i> /Veco 19) | 140 |



8. Matt Basta with his very successful Forster 29 powered *Brooklyn Dodger*. Photo taken at the Tullahoma meet.



7. The famous Cleveland Balsa Butchers in 1952. Reich, Korda . . . you name them!



10. Jack DeFond in a familiar pose, handing the High Points trophy to Bruno Markiewicz. Photo taken at SAM Champs, 1979.

CLASS C GLOW

1. Bill Hempel (Quaker Flash/Wehra 40) 1123

CLASS AB IGNITION

1. Gordon Davies (Playboy/Torp 29) 1123

2. Ray VandeWalker (Miss Philly/OR 29) 855

3. Charles Patterson (Playboy Cabin/Torp 29) 753

CLASS C IGNITION

1. Guy Lane (Playboy/Anderson 65) 1320

2. Dick Bringgold (Playboy/Orwick 64) 1271

3. Charles Patterson (Playboy/Cyke) 991

ANTIQUE GLOW

1. Bill Roseberry (Unknown) 1503

2. Norm Baker (Lanzo Bomber/HP 40) 1109

3. Bill Hempel (Quaker Flash/Wehra 40) 395

ANTIQUE IGNITION

1. Otto Bernhardt (Record Breaker/McCoy 60) 1562

2. Mike Hood (Lanzo Bomber/Cyke) 1004

3. Ray VandeWalker (Cumulus/O&R 60) 993

TEXACO

1. Marv Simpson (Long Cabin/OS 40 FS) 3509

2. Charles Patterson (Anderson/Cyke) 2563

3. Ray VandeWalker (Cumulus/O&R 60) 1888

1/2A TEXACO

1. Bon Angus (Eastern States Champ) 1513

2. Gordon Davies (Comet Mercury) 1327

3. Guy Laine (Kerswap) 1272

SWEEPSTAKES WINNER: Bill Roseberry

In conclusion, a quick summary of the results shows that Playboys and Lanzo designs are still dominating the field. In that line, it is interesting to note that certain designs are popular in different areas. For example, the Cumulus is the only model that wins the Antique event in Texas. The M-G wins heavily in the eastern area, whereas the Dallaire Sportster and Anderson Pylon design win



12. Sten Persson launches a 1946 Landegren Special at the Swedish Nationals. Very good looking Nostalgia era model.



11. Nisse Gustavsson holds his breath as his Improved Wakefield, a Burd/Korda design, takes off into heavy winds. Very reasonable ROG considering. (Pond Plan No. 40G1)

almost all the Antique and Texaco events in northern California.

The selection of competition models can be compared to Darwin's theory of evolution wherein only the best of the species survive! This is very evident on the west coast where eleven major contests are held every year, not to mention the numerous club contests. It doesn't take very long to weed out the also-rans! (Boy, this sure sounds funny after reading the preamble in the SAM "Official Rule Book." wrf)

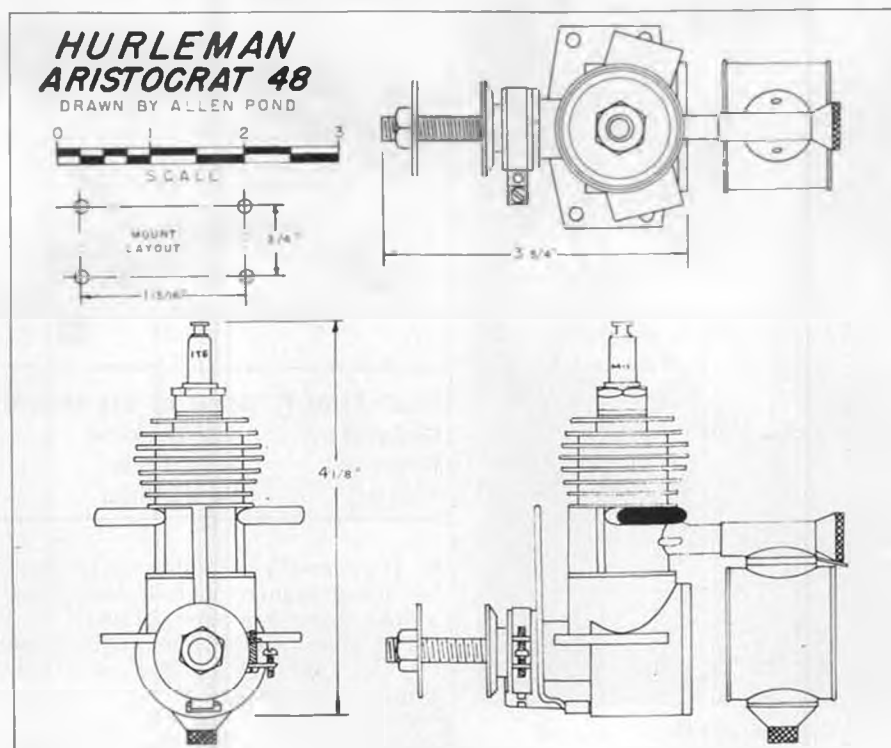
ENGINE OF THE MONTH

For this month's engine, we are greatly indebted to Herbert Wahl for not only the engine, but an excellent historical

background and photographs (of which we were unable to use but one at this time).

For those "Johnny-come-latelys," Herb runs a motor manufacturing business known as "Herb's Model Motors." Located now at Box 61, Forksville, PA 18616, Herb has been turning out all sorts of Brown Jr., Hurlman, and Ohlsson engines. To this day, this writer has yet to hear a complaint about Herb or his motors. Herb is simply one of those custom engine producers who will not sell an engine unless he has personally run it! That is one heckuva lot of engines!!

The engine we are featuring this





13. Lennart Hansson braves the inclement weather to fly his Dela Mater designed *One-and-a-Half*, a US model.

month is the Hurleman engine that was given to this writer at one of the O/T reunion banquets by the "boys" as a token of their esteem. This engine has been treasured to the point where it rarely sees the daylight. It has yet to be run! The engine box is carefully filed at the "home office" along with the balance of the others. This box is covered with the autographs of the donors!

When writing to Herb for information on this particular engine, this columnist was greatly surprised to find that this was the fourth engine to be named "Aristocrat." To back up a little, when Bill Brown decided to produce a few engines, he arranged with Hurleman (who ran a local machine shop) in Philadelphia to produce a group of forty engines. These are popularly known as the Brown "A" engines that have sand

14. Bob Parkes and Eric Patterson are a couple of Australian Old Timer enthusiasts who frequently enjoy flying their *Clipper* (Eric Patterson), and *Red Zephyr* (Bob Parkes).



15. Sal Taibi built two NEW ones, a 7-foot *Powerhouse* and a Class A *Diamond Demon*. Of course, Sal designed them over 40 years ago!



cast crankcases, thin mounting lugs, etc.

As a side note, the company name, Junior Motors, was a takeoff on General Motors, then the acknowledged leader in engines and automobiles. At the time of the company's formation, Hurleman was offered the position of head of manufacturing. Hurleman declined, feeling that he could produce engines as good or better than the Brown Junior.

In 1936, Hurleman began to make his own engines, a carbon copy of the

Brown with the major difference being the bypass embossed with the Hurleman marking. Although there never was a lawsuit between the two firms for infringement of design, Hurleman decided to develop a different engine using his very successful Hurleman timer. This was the timer you put on your Brown Jr. to make it run properly!

In 1938, Hurleman came out with his

Continued on page 87



16. R. G. Wilson in 1946 with a scaled Aeronca from *Air Trails* plans.

Scrappy



OLD TIMER Model of the Month

Designed by: Jesse Davidson
 Drawn by: Al Patterson
 Text by: Bill Northrop

- The ever-elusive "Center of Gravity" has done it again, though we thought for a while that it had been located!

This month's Old Timer comes from the May 1939 "Phineas Pinkham Handbook," alias *Flying Aces*. In typical *Flying Aces* lingo, Ray Heit's five-foot span "Scrappy" is described: "Boy, oh

boy! What a beaut! You're dern tootin' she is... yep, everything from a simple, wide spread landing gear to a corking paint job."

OK, very nice, but the end of the eighth paragraph says "... make the battery box as shown on the plan. Cement and pin in place permanently directly under the center of gravity." **WHAT CENTER OF GRAVITY?!!** (Ten deep breaths to calm down). Anyway, we'd suggest balancing the model at the main wing spar.

"Scrappy" features a bent aluminum engine cowl, which looks kinda neat in the photos, but we question its ability to keep the engine from overheating. If you go for it, better take some extra time to cut and form louvers.

The tail surfaces should lend themselves handily to R/C. Just use two 1/4 x 1/2 spars instead of one 1/8 x 1/2, and add hinges. The "V" in the elevator portion should be widened a bit to clear rudder movement.

In case you hadn't noticed, "Scrappy" bears an understandable likeness to another well known and larger Ray Heit design, "Scram" (MB plan No. 576-O.T.)





By JOHN SMITH

• Just prior to writing this month's column, I received a nice letter from a Tetsuro Horio of Tokyo, Japan. (See Bill, there are more than 32.2 people reading my column!) Mr. Horio wrote of his interest in Pylon Racing and his desire for more information. He seems to be interested in all forms of racing: Formula I, Q-500, and Quarter Midget. He is also interested in joining AMA.

Also received a letter from K. Fluney of Ontario, Canada, who expresses an interest in Formula One-40, and would like to know where to get a *Denight Special* kit. The following list was made up last year by Pete Reed, so some of the prices may not reflect a year's worth of inflation.

A GUIDE TO FORMULA ONE KITS LITTLE TONI

A complete kit. Fiberglass fuselage and foam wing. All hardware, sheeting, and wheels. Good instructions. \$135. Prather Products, 1660 Ravenna Avenue, Wilmington, CA 90744.

POLECAT

Violet design. Fiberglass fuselage, foam wing. Templates for wood. Good plans. Isometric drawing. May offer wood later. \$90.00. Jeff Bertken, 31123 Via Colinas, No. 1106, Westlake Village, CA 91362; (213) 991-5948.

LR1A

Fiberglass fuselage, wing cores, wheel pants. No wood. Ed Allen's design. \$80.00. Paul Stenberg, 17463 Fairlee Road, San Diego, CA 92128.

DENIGHT

Fiberglass fuselage, foam wing, wheel pants, cowl. All wood except wing sheets. \$95.00. Gary McPike, 28925 Park Heath Drive, Agoura, CA 91301.

PITTS PELLET

Jerry Small design. Fiberglass fuselage, cores, all wood except sheeting. \$90.00. Ritch's Hobby, 11042 Waxwing, Houston, TX 77035; (713) 729-3446.

MIDGET, MUSTANG, MINNOW, AND RICKEY RAT

Foam wing. Wood fuselage. All wood and hardware. Jack Stafford Models, 1211 Beatrice Street, Culver City, CA 90230.

450 MUSTANG

Sig Mfg. Co., 401 S. Front Street, Montezuma, IA 50171.

POLECAT

Complete kit less wheels and axles. \$130.00. Dave Laymann, 5600 North Freeway, Houston, TX 77076.

I believe that all of the above kits are still being manufactured and are available either directly or through your local



A balanced prop is a must... use a balancing tool designed for this purpose. Note which blade falls, and opposite blade until the prop balances horizontally.

hobby dealer. A phone call or letter will get you whatever information you need from the manufacturer. Some of these kits, as you can tell, are fiberglass fuselage with foam wings; some are all balsa. All of them can be built to the four-pound weight minimum of the Formula One-40 rules if you are careful with your building techniques, and cover the wings and tail assembly with a plastic film covering.

RACING NEWS

As we are still in the throes of winter here in the Northeast, there is still no racing activity. This article is being written in February, but will not appear in print until June or July when the racing here will be in full swing. The racing calendar for 1984 is made up, and there will be more than enough activity

for even the most fanatical "Pylon Plasterers." In southern New England alone there are ten Q-500 races and four Formula One-40 races.

To the rest of you in the East, and for that matter, in the rest of the country, I can't write about racing in your area unless I know about it. So, if you want the rest of us to hear what's going on in your area, send me results, ideas, and pictures (black and white prints preferred).

I had a talk with AMA President John Grigg at the WRAM Show in New York about Q-500 racing at the NATS. He is all for the idea, but feels it is a little late for '84. However, if a suitable site is found for the '85 NATS in Chicopee, Massachusetts, then Q-500 can be an unofficial event at the NATS. Before this appears in print, I will have talked to him again. So, stay tuned to **Model Builder**. You read it here first!

TOOLS OF THE TRADE

Two issues back, we covered the different ways to skin foam wings for your Q-500 and Formula One-40. This was primarily intended for the newcomer to racing although there might have been something in there for you more experienced racers. This month I would like to talk about several products that could be of great benefit to all of us.

The first is a good prop balancer. Without one you will never get the full potential from your engine. Also, all the vibration that is created by your unbalanced prop will be transferred back to the receiver and servos shortening their life, and causing your servos to move erratically. To effectively transfer the motion of the piston and connecting rod to the prop, we need as little vibration as possible. Vibration is wasted energy.

There are many good balancers on the market, but one that caught my eye is sold by Tower Hobbies. The BJ Prop Balancer is simple, effective, and above all economical.

The second product that all serious racers should have is a good tachometer. Again, there are other good ones on the market, but one that I found convenient to use is the Digital Mini-Tach by

Continued on page 91

Tower Hobbies
Digital Mini-Tach
is a nifty hand held
device for checking
your engine's revs.



CHARGE MASTER

By ELOY MAREZ . . . MB's "Electronics Corner" columnist reviews the Ace R/C Charge Master multi-output charger. As a first electronic device kit, it can't be beat for simplicity or usefulness.

• There should be no doubt as to the importance of properly charging the Ni-Cd batteries by which your R/C system is powered. Not to do so will definitely lead to a shortened life, not only of the batteries themselves, but unfortunately, also to the much more expensive airplane they help to control.

Batteries, and their proper care, are probably the most written about subject in R/C. In some cases, this seems to have done some good. At least, it lead some of us to not take them for granted, to arm ourselves with good quality cells to begin with, to assure ourselves that they are being properly revived as recommended by their makers, and to periodically test their condition and quality with instruments designed with just that purpose in mind. Such instruments include the Ace R/C Digipace capacity tester, and the Voltmaster expanded scale voltmeter.

Unfortunately though, this mass of information has not been able to prevent or eliminate a certain amount of confusion when it comes to *charge rates* and terminology. Because the Ace R/C Charge Master, the subject of this review, is the first commercial R/C Ni-Cd charger to offer us a true "trickle" charge rate, I would like to review the subject of rates briefly. As it stands now . . . and this is no doubt brought about by the widespread use of Ni-Cds for electric power and the requirement for charging at other than overnight rates . . . many R/C'ers currently think of "trickle" charging as anything less than that which makes the wires glow a pale red.



The Charge Master is compact, self-contained, and versatile. It may be programmed for specific needs. A 500 mah pack shown for size.

Before we actually get down to some of that "figures and formulas" stuff which nobody really likes, but which is essential to a discussion of this type, let me state unequivocally that I did not invent the rates which I will be describing . . . neither did Ace R/C, or Kraft, or Futaba, or General Electric, or Sanyo! The fact of the matter is that the electronics industry is blessed with

something we don't even have a glimpse of in model manufacturing: standardization. And it is not only a national, but an *international* thing. You can design a printed circuit layout using a sample transistor you bought from a company in California's Silicon Valley, and if for production reasons you opt to buy one

Continued on page 92



The printed circuit board for the charger contains a small number of components. As components are large with wide spacing, it's easy!



The Charge Master is capable of simultaneously charging all the Ni-Cds in two transmitters and four receivers. This makes it a very useful and versatile electronics device to own.

PRODUCTS\$ IN USE



MRC's The FROG

The Frog is great fun, whether or not you're into off-road racing.

• It seems as if everything imaginable has been modeled, and with so many advances in RC technology the last few years, virtually all models have been operated by radio control. I thought the Dirty Racing Team had taken things to the extreme when we built an RC pumpkin for trick-or-treat season. However, now you can build and operate, even race, a radio controlled *Frog*! And this little guy won't even give you warts... a few goose bumps possibly, but no warts....

Ah, but you cheated and first looked at the pictures accompanying this article, right? So there's just no fooling you. I'll have to admit that this *Frog* is the latest off-road vehicle from MRC/Tamiya, those folks who started a whole new category in RC modeling, that of racing off-road cars on the weekends, and/or doing a number on the neighborhood landscapes during the week.

As you should already know, about three years ago, MRC released the Tamiya *Sand Scorcher* (VW "Bug" bodied) and the *Baja Buggy*. Using experience as a long-time participant in the marketing of hobby items, I suspect MRC had not a clue as to how popular these vehicles would be. Sure, they were (are) very scale-like in appearance and operation, but you can also say the same thing about the tanks and road cars MRC imports and distributes.

The kicker was that a few farsighted and ready-to-try-anything individuals in Southern California started racing the *Sand Scorchers* and *Baja Buggies*, not

just in a backyard impromptu session, instead, at purposely constructed tracks, one of the first being located just up the street from *Model Builder's* offices. And that really did it, establishing a new modeling category and firmly entrenching MRC/Tamiya as the leader in off-road. (Incidentally, this is a role which they take seriously, making their commitment to the off-road scene with beautiful, full-color ads in this and many other magazines, merchandise donations for many off-road races, outright sponsorship of several "biggie" off-road championships each year, action packed videotapes supplied to model shops, and so on.)

Along with establishing a new RC category, which I can't help but point out has been filled with people who had previously been totally unaware of RC modeling as a whole. (I just can't let this opportunity slip by, even though it will totally screw up my sentence structure... Please notice that it is one thing to come up with something "new" in RC that ends up only being participated in by people who were already in RC, and it is quite another thing altogether to slip in something that really is new and that draws in thousands who never before had even held a transmitter.) MRC also inadvertently started another cottage industry that supplies many hop-up, beef-up, go fast, el tricker parts to the off road racers. This fact of life should not be construed in any way to mean the original cars were lacking; rather, the folks racing off-road started doing stuff

that surely made the Tamiya engineers blanch. Seven and eight-cell packs were slipped in; big, powerful motors were bolted on; the tracks began featuring monster jumps where these 1/10-scale buggies would grab some real air; permanent tracks meant equally permanent (and immovable) barricades around the track; higher speeds, more power to the rear wheels, and landings from sky-shot jumps were simply over powering the chassis and suspension components.

MRC/Tamiya was not oblivious to these things, nor were their eyes shut to the competition coming out with new cars, competing with them in a market that had been their exclusive domain. It was time for a new design: toss out a few of the strictly scale features the racers didn't care about anyway, pull out a clean sheet of paper, and get the design team working overtime.

One of the results of this clean sheet approach is the *Frog*, billed by Tamiya as a "1/10-scale R/C off-road high performance racer". Probably the most easily noticed feature is the new frame. It is a part which is molded from some trick ABS resin. It is a two-piece affair, split longitudinally, and most of the car is simply bolted to this frame with the gearbox sandwiched in at the rear.

While it looks plenty strange at first, one quickly begins to appreciate how logical such an arrangement actually is. The rear suspension is trailing, pivoting on a chassis mounted bushing. It is simple and easy to service. It allows the

rear tires full contact, due to the fact there are no camber changes throughout the full travel. For-real, oil filled, functional shocks control rear wheel compression and rebound. These are not wimpy, for-looks-only shocks; they are designed to let the piston operate in oil only (as opposed to an air/oil mix, widely known to be a wildly inconsistent damping medium), and the shock rod piston is even valved for more resistance to compression, less on rebound, using a "flapper" valve. (I really should have taken a picture of the shock internals, in fact, I would have had we not been thrashing to get this article in on time.)

The gearbox is a light, well sealed affair that can be fitted with three different gear ratios (supplied in kit). It features ball bearings for low drag, and even has a gear-type differential as standard equipment. The drive train from the gearbox to the wheels is via half shafts, and these are sealed against crud and sewage with neat, molded rubber boots.

At the front end, a sturdy bumper bolts on and is easily replaced if need be. Just in back of the bumper is the front end arrangement, and it is a little surprising to see that there is no shock fitted. However, when running the *Frog*, the front end seemed to stay on the ground well so the lack of a shock evidently doesn't hurt performance.

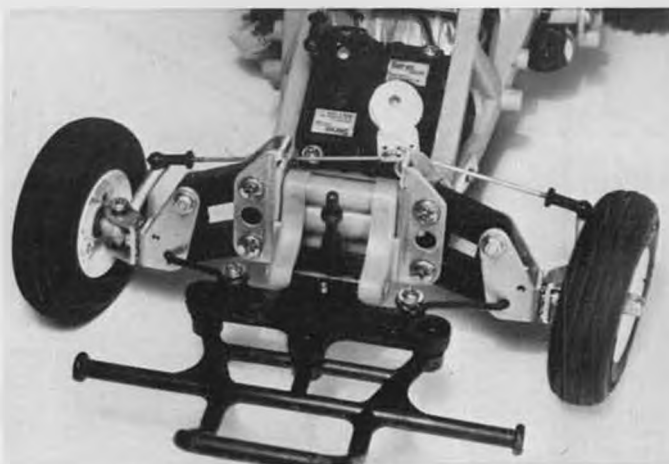
An interesting feature here is that a relatively simple form of progressive springing is incorporated. Pushing down on the front, you can feel the resistance of the spring build very slightly, and then in the last quarter-inch or so of travel, resistance to further compression of the spring gets a lot stiffer quickly. Of course, this is to prevent completely bottoming the suspension, a real no-no in any kind of suspended racer. Although it may be a minor point, and while there isn't any bump-steer in the normal range of the suspension's travel, there is just a little of it in this last quarter inch of travel.

Bump-steer is any right or left deflection of a front wheel through the travel of the front suspension . . . it can be very difficult to eliminate, especially when dealing with long travel suspension systems. In the case of the *Frog*, it simply results in a little more toe-in of the front wheels which will tend to make the car more drivable in a situation severe enough to collapse the front suspension in the first place.

Speaking of making the car more drivable, which translates into "dialing the car," the caster of the front end is quickly adjustable. Add caster (move the top of the kingpin back) to get more power-on steering, take some out to get the car to turn in better. Each track and driver wants something different, with this front end, at least you are offered the chance to try different caster settings.

Rubber is important; that's the stuff that feeds all the power to the ground as well as keeping the car from going

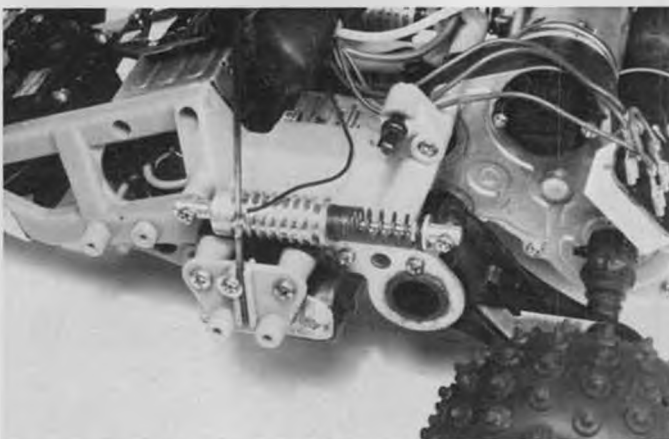
The *Frog's* front end is a clean and strong design. It features adjustable caster.



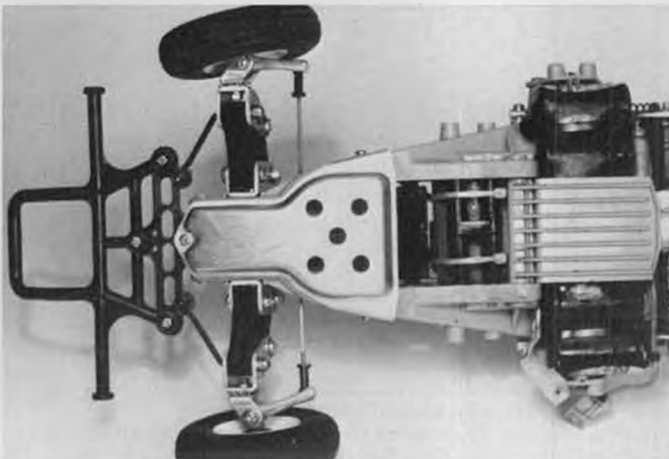
An RS-540 motor hangs off the right side of the gearbox. Note the rubber boots which seal the half-shafts from the horrors of creeping grunge. Also note the rubber spikes on those tires! Lots of bite for sure!



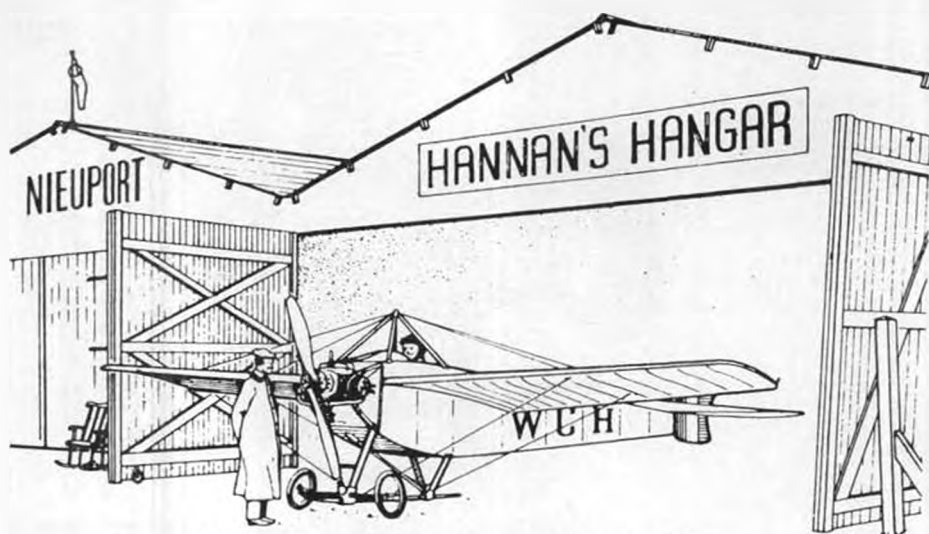
Lay-down rear shocks are a functional design, complete with internal valving and a progressively wound spring for smooth ride on most surfaces yet resistance to bottoming on the nasties.



The *Frog's* belly shows the bash pan in the front, and access hatch (hinged) in the rear to facilitate battery removal.



Continued on page 68



"Obfuscation dulls your perspicacity."

• Our lead-in line this month, purportedly from a Chinese fortune cookie, is via Chuck Sievers. Perhaps it is a suitable introduction to our first topic, basic flying models?

SIMPLICITY IS THE SOLUTION

We continue to receive letters encouraging greater accent upon less complexity in modeling. Although we are still waiting to see photographs of the prewar Japanese wire and silk dime store flyers, we have heard from people who remember them fondly.



The Cambridge Cuckoo, a Texas Bostonian demonstrating Dick Johnson's humor!

Jack P. Swaney, of Las Vegas, Nevada, adds: "There was another unique concept during most of the 1930s. These were the all cardboard and paper jobs advertised as 'crash proof.' The span was 12 inches, and everything except the motor stick was made of a hard, plasticized material resembling dark manila stock. Even the propeller and three-dimensional wheels were formed from the stuff. The wing had no dihedral; consequently, the rudder slot was offset for a right turn. They sold from 10 cents to 15 cents (depending upon 'hard times') and were produced by Western Manufacturing Company of Los Angeles. Yes, they really flew, especially if you left the oversize landing gear off. And, carved replacement props really pepped them up."

S.B. Pell shares his views on simplicity: "Although I tend to shy away from organized fun, I like the idea of the FUN FLYERS outlined in your March article. Having started with ROGs in the Cub Scouts before WW-II, I still find fascination in the basic flying machine in all its low, medium, and high tech forms."



The late Ron Warring, one of England's most famous designers and authors. Photograph courtesy of Ron Moulton.

"I believe that apart from the expense of so many facets of our hobby, the complexity and lack of wonder about flight is what accounts for the apparent lack of kids picking up model aviation. Every nine year old knows what makes a 747 fly: enough power, enough wing, and enough money. Show him (or her) a Pennyplane or Easy B and he sees immediately that two of those elements are missing, and with encouragement, he will feel a need to find out why. Best of all, the building job is within his ability, and he will have his end result in a short time. I hope FUN FLYERS brings a lot of us out of the woodwork."

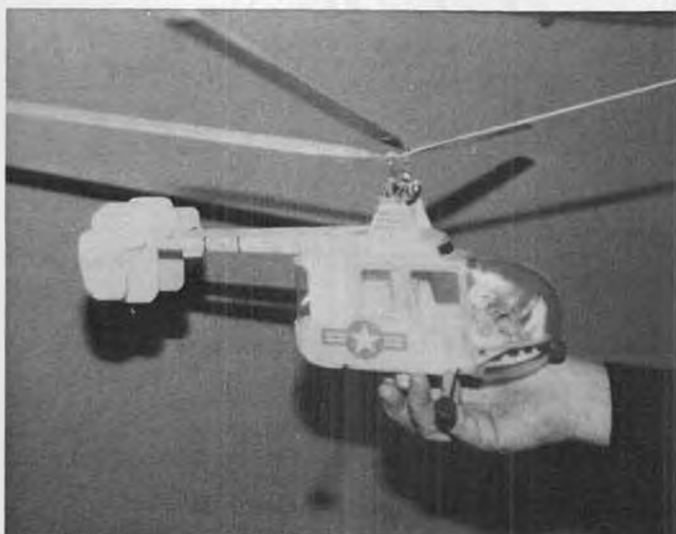
Dr. Cyrus J. Stow adds this: "Those sharp little Bantom foam models are quite nice . . . I bought a few to give to my grandchildren, but I kept a couple for myself . . ." Stow feels there is a market for simple, functional, and inexpensive kits, not only for free flight, but control line as well. He feels that although schoolyard flying may not represent megabucks for business folks, some thought must be given to encouraging future generations of model builders.



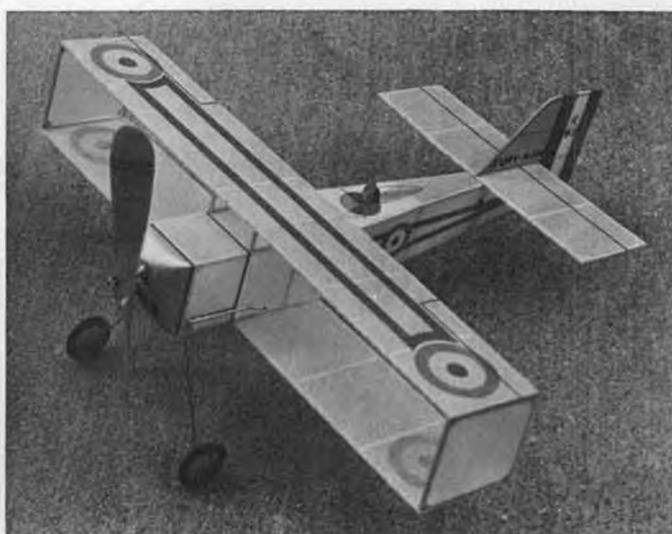
John Blagg explains his Hergt monoplane to Geoff Clarke (right), columnist for the British SAM newsletter. Alan Callaghan photo.



A selection of the wierdo entries in a French "Flying Fool" model competition. Note fascinated youngsters. Photo via Georges Chaulet.



Let's see more scale helicopters like this rubber powered F/F Scale Kaman K-43, by Emmanuel Fillon. Photo via Georges Chaulet.



Sherman Gillespie decorated his *Far-Man* simple model in British Hawker markings . . . transforming it into *Fury-Man*.

And don't underestimate the potential volume . . . Bob Peck, of Peck-Polymers, estimates some 20,000 *Stringless Wonders* have been marketed over the years!

REALLY LOW ASPECT RATIO WINGS

While watching Olympic ski jumping on television, it occurred to me that skis must be the shortest span, longest chord "wings" ever flown. Of course, the body of the skier contributes lift also, and one program showed skiers undergoing wind tunnel testing.

Typical durations of these "flights" appear to be only in the four to six seconds range. Surely this could be improved through the application of aerodynamics expertise?

REGARDING EXPERTS

Georges Chaulet explains that there are two kinds of modelers: One is totally flexible in thinking, trying his hand at all manner of flying machines. By contrast, another may confine himself to a narrow discipline, such as microfilm models or R/C pattern. This can lead to becoming the perfect specialist who learns more and more about less and less, until finally he reaches the point of knowing everything about nothing!

THE FLYING FOOLS

Chaulet also filled us in about a novel indoor meet conducted near Paris in December. One event was "Vol Circulaire Incontrolé", for rubber powered models flying around pylons with the object of attaining the maximum number of laps within five minutes. At the start of each race, a countdown would send each flyer to his model. Allowing for landings and rewindings, perhaps four or five flights could be accomplished. As six pylons were provided, six contestants were in action simultaneously, lending a high degree of excitement to each heat!

The winner, Phil Lepage, chose a clever approach. His model was equipped with an eight to one gear box, which enabled his entry to fly much longer, and it achieved 51 laps during the allotted time.

For the "Fou Volant" (Flying Fool)

event, rules were wide open, and the air was filled with strange objects, such as a flying hat, a miniature hot air balloon, ornithopters, a rubber powered jet, and at least four model helicopters, including the seldom seen SCALE variety. Emmanuel Fillon flew these 'copters . . . two bell *Iroquois* and a Kaman synchrocopter. Although duration was short, stability was good. It was a rare opportunity for experimenters!

The ultimate winner of the Fou class was Georges Chaulet who kept the

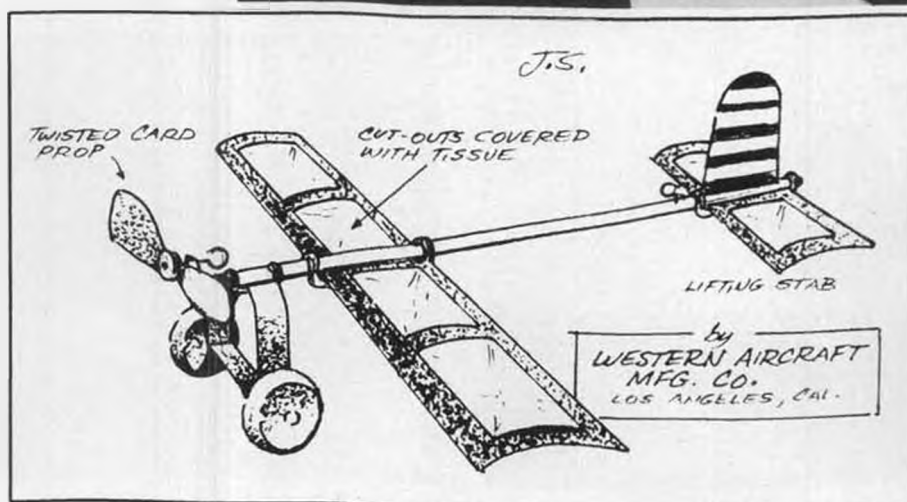
crowd amused with his marvelous assortment of aerial oddities, including his flying hat, which actually levitated from his head!

DEPARTURE TIME

Likely the most difficult task faced by magazine columnists is composing obituaries. And, as one grows older, the sad duty arises more frequently and assumes more personal meaning. Three are absent from roll call this month:

Continued on page 72

Eric Erickson, former US Air Force pilot, now an interior designer, launches his Bristol monoplane during a Burbank, California contest. Mel Duke photo.



Jack Swaney's charming sketch of the prewar Western Aircraft Company ROG.

TENTH ANNUAL Astro Flight Champions

By BILL STROMAN . . . Part Two of the Astro Championships report deals with the Free Flight portion of the classic event held annually in the Southern California area. For Part One, see page 12.

• This was the tenth annual contest of this type, and each year it seems to get bigger and better. As I ran the free flight part of the Astro Champs, I will give you a report on this facet only and leave the rest to Mitch Poling. Mitch will be handling the myriad of R/C and C/L events. (Control line electrics you say? You bet, the turnout was bigger than expected.) It might interest you to note that we had more entries in free flight this year than any other. But enough of this, lets get on with the contest.

It was not my best day . . . I woke up with a temperature of 102, and had a touch of the flu that is going around Southern California. When I got to my truck, the fog was so thick that one could only see about 100 feet. As I drove the 20 miles to Mile Square Park (site of the second day's activities), the fog lifted a little, and so did my hopes. At eight a.m., one could see about 500 feet around and 150 feet up. Needless to say, I was not swamped with entries.

We all admired each others models, did some test gliding, and by nine a.m., it was clear! Now things seemed to pick up, some scale models were flown for officials and actually did well. This seemed to encourage the duration fliers, and soon all one could hear were calls for timers. Scores were written down in haste.

Let me tell you about some of the models. The duration models are becoming more varied in design and performance. The precontest flier had

stated that we would have three-minute max flights. I cut this to two minutes as the wind was blowing toward the golf course next to us, and we didn't want any models landing over there. This seemed to be a good choice, we didn't lose any models, and no one got a string of three maxes. . . . But I ramble on.

Jim McDermoth had a design called the *Hummer 3*. This model had a polyhedral wing of about 36 inches span with about a seven-inch cord. It was powered with an Astro 020, the climb was good, and the glide was very flat. I'll try to get Jim to draw up some plans for us, perhaps for a magazine article.

Joe Tschirgi's model, *O.D.*, is also a tractor design. It has about a 48-inch span and is powered with an Astro 035, (I think). It too has polyhedral wings, and a higher aspect ratio than McDermoth's. Joe has streamlined the fuselage to the point that only one .014 wire protrudes to activate the timer. Joe's model has a good climb, a very large circle (100 feet or more), and a slow, flat glide. Joe's model was one of only two models that had two maximum flights in the contest.

Jim Ogg had a *Satellite 350* with a cobalt 05 motor. This model really climbs fast, almost straight up, and glides very flatly. Jim would have placed higher in the contest, but he had his stab cock sideways during the DT. This, of course, caused the model to spiral in from about 150 feet up. As bad luck would have it, it crashed on the pavement and did extensive damage to the motor and the model. We sure were sorry to see this happen to such a nice person and such a nice model.

John Maher had the other model that had two maximum flights of two minutes.



Bill Warner poses with his *Aero-Torpille*. Pusher arrangements are easy with electric power.



Barnaby Wainfan flew this original design, the *Circuit Board*. Note DT flap deployed.

He flew a *Country Boy* with an 020 Astro engine. I didn't get to see John's model fly; I was judging the scale model flights, and missed some of the duration flights. I did get to see John's model, however,



Kim Waddell launches her *Kay Cee* model in Junior Class Duration. (Roy Waddell photo.)



Mac McKinkin built this magnificent McDonnell *Doodlebug*. Although it was a little under-powered with an Astro 020, Mac won a larger 035 at the raffle . . . maybe next year . . . ?

hips PART II



Jim McMahon poses with his wild looking *Marshonet*. Jim found the plans in the *Flight-masters* newsletter. Excellent workmanship.



First place in Scale went to this Dormoy *Bathtub*. Hands and model are Roy Mayes'.

and I was impressed with his fine craftsmanship.

I have saved the first place duration modeler and model for last. This was Barnaby Wainfan's *Circuit Board*. As some of you may know, I like to build and fly unusual designs in scale, so Barnaby's model really caught my attention. This was a 40-inch span flying wing with about a 10-inch cord. It was powered with an Astro 020. (Please keep in mind that I'm guessing at most of these sizes, and may be a little off on some.)

The *Circuit Board* has polyhedral, but no sweep back of the wings. It is what you would call a flying plank. The climb was very fast, and in a rather tight circle (maybe 30 or 40 feet at most). It transitioned very well, and the glide was in a larger circle of maybe 75 feet . . . very flat and stable. I'm sure that Barnaby is going to publish this one, so look for it in the magazines soon . . . well, in about six months at least.

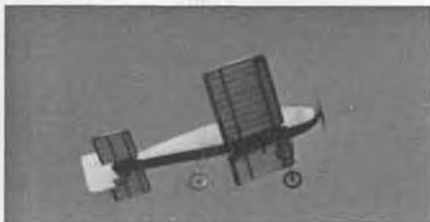
As I stated before, the performance has improved this year. Look at the results and you will see that there is only



Addie Naccarato's *Clipper 020 Replica* took third in that event. Tony Naccarato's wierd looking *Ro-Dan* duration model finished 7th in Open Duration. Mother/son team flies in all events, runs CL contest. (Pat Waddell pic.)



Bill Warner's Lee-Richards No. 3 monoplane floats by on its landing approach.



Ferrel Papic's Bleriot No. 7 monoplane climbs into the gray morning sky. Third in scale.

one second separating first place and second place . . . then only 11 seconds between second and third place. When one considers that these are the total of three flights each, it is obvious that the quality of flight is very high indeed!

The 020 Replica is an event where we put an Astro 020 (or this year, an Astro 035) in a scaled down model of an Old Timer design (prior to 1942). This is a good way to start electric power free flight as the wing areas are about right, and the models are usually quite stable.

Jim McMahon won the event with Sal Tabi's 020 *Powerhouse* (MB plan No. 374-O.T.). Jim's plane was powered with an Astro 020, and had a Tomi timer for the 25-second motor run.

Jim McDermoth placed second with an 020 *Stratostreak* (Pond plan No. 39C6). This is a very popular design as it has a very fast climb, is stable in both power and glide, and has about 300 square inches of wing area.

Addie Naccarato brought a *Clipper* (Pond plan 39B2) that was made to her usual fine standards, and flew well. We seemed to lack modelers in this event



Kim and Cynde Waddell display trophies and model, the *Kay Cee*. These girls were a big help to the CD as they timed many models.

this year. How about you building one and flying it next year? Who knows, you might bring home a trophy and a prize!

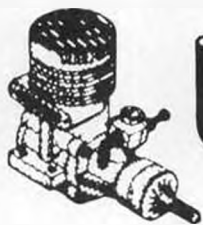
The junior event had only two modelers, Cynde and Kim Waddell. They both flew a *Kay Cee* design. This is an enlargement of Jim McDermoth's *Truant* that was published about two years ago. The word is that Jim plans to publish this one too. To give you an idea of how well it flies, Cynde was the only modeler at the meet to get all three two-minute maxes; good going Cynde!

I just checked the scores, and found that Kim was second highest in the entire contest. These two girls will be in Junior class for one more year. If any of you out there are under 16 and want to place in a contest, or just want to fly power models, there are few forms of power that can beat electric power. The advantages are: it starts instantly, you don't have flip the prop to start it (no cut fingers), the model stays clean (no messy fuel to wipe off), it's quiet, and therefore can be flown near populated areas.

We tried something new this year in the static judging of the Scale event. Each contestant voted on all the models entered, this was totaled, and the highest amount of votes got first in Static and so on. Then, the flights were totaled, the two were added together, and the final results were known. The voting worked out very well! The only thing I didn't know at the time was that the contestant was to put his or her plane at the top of the list, thus saving the contestant the responsibility of judging his or her own model.

Continued on page 69

FUEL LINES



JOE KLAUSE

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MORE ON IGNITION PROPELLERS

In the March column, I was brash enough to suggest prop sizes for Old Timer ignition engines. Although I used a preferatory caveat about having foot-in-mouth disease, I would not at all have been dismayed if some modelers had responded that I was AFU (all fouled up). To my surprise, no one did, and an amazing number replied quite positively. In fact, most of them talked of how similar their prop/engine experiences have been. Some reminisced, and others sent priceless prop charts from forty or so years ago. Thanks guys; I am most indebted to you. Let's share some of your information with other readers.

Bob Nichols, of San Bruno, California, and I have something in common. Our first gas engine model was the U-Control Baby Shark. Although you may be suspicious, that's the reason I'm excerpting from his letter, you still just might enjoy

some of his nostalgic comments.

"In 1946/47 I was stationed in Boca Raton, Florida, where we had a very active group of modelers using a clubhouse the Army had supplied for us. It was a single story, tar paper barracks in which we met, built, and bench ran engines . . . I will never forget the time that one of the guys brought in the (at that time never before seen) McCoy .60. Well, about four or five of us immediately gathered 'round to watch this beast be fired up for the first time. As it was raining, we ran the engine in the clubhouse with the windows open. The McCoy was fitted up with a nine-inch diameter, 14-inch pitch X Cell prop. The X Cell looked like two toothpicks attached to a hole. When that McCoy started, it created a sound that none of us had ever experienced before. I was looking over the shoulder of one of the bystanders and noticed that the prop

was bending forward about half an inch at the tips. I started yelling, to no avail, just as the individual on the needle valve leaned her out about another quarter turn. The next sound was an explosion that was heard over the exhaust, as both prop blades snapped off at the hub. The engine, with only the spinner and prop hub, took off like a banshee until the points began to float, cut out, drop back, and then take off again. Inside that building was a sound beyond description, until someone recovered enough to shut off the ignition. That little episode did convince me that I should stick to class "B" engines . . . I'll stray from props for a short story about one of the fellows who had a scale German V-1 Buzz Bomb with a Dyna Jet engine, on U-Control of course. What we didn't know was that the fuselage was slowly becoming fuel soaked (that's raw gas as you know). One day, about the second lap after takeoff, she blew up. Now that's scale. . ."

Getting back to props, the accompanying chart comes from Gordon Coddington. It was published in the February 1941 issue of *Model Airplane News*. This ought to stir up a bit of controversy, conversation, or what have you. If you compare the prop recom-

Continued on page 70

MODEL AIRPLANE NEWS - MODEL AIRPLANE ENGINE DIRECTORY FOR 1941

NAME	CLASS	WEIGHT IN OZ		DISPLACEMENT IN CUBIC INCHES	BORE	STROKE	CYCLE	PORTS	RATED HP	RPM MIN-MAX	FUEL PARTS		PROPELLER		TYPE OF MOUNT	TYPE OF GAS FEED	MINIMUM WEIGHT OF PLANE IN OZ
		BARE	FLYING								GAS WHITE	OIL SAE-70	DIAM	PITCH			
AJAX	C	6.5		363	3/4	13/16	2		1/6	500-8000	3	1	13	7	BEAM-RADIAL	SUCTION	29.0
ALTERNATE FIRING TWIN	C		19	326	5/8	17/32	2	4	1/5	500-8000	4	1	14	8	BEAM	SUCTION	26.1
AVION MERCURY	C	19.5	28	153	1-1/4	1-1/4	2		3/4	500-3800	4	1	20	10	BEAM	SUCTION	122.4
ATOM	A	2.0	3.5	097	1/2	1/2	2	9	1/101/8	250-17500	3	1	10	6	BEAM	SUCTION	7.76
BANTAM	A	3.2	7.1	165	19/32	19/32	2	3	1/8	500-8000	3	1	10	6	BEAM	SUCTION	13.2
NEW BANTAM	A	3.2	7.1	199	656	590	2		DISC VAL	250-9350	3	1	9-11	6-7	BEAM	SUCTION	16.0
BARKER A	C	12	18	69	15/16	1	2	3	1/4	1000-7000	3	1	15	10	BEAM	GRAVITY	55.2
BARKER B	C	12	18	69	15/16	1	2	3	1/4	1000-7000	3	1	15	10	BEAM	SUCTION	55.2
BARKER C	C	10	16	152	9/16	5/8	2	4	1/8	500-8000	3	1	9	6	BEAM	SUCTION	12.4
BAT	A	3.3	8	291	7/8	625	2	3	1/7	900-8000	3	1	10-12	6-7	BEAM	SUCTION	23.3
BROWNIE E	B	3.5	8.75	291	7/8	625	2	3	1/7	900-8000	3	1	10-12	6-7	BEAM	SUCTION	23.3
BROWNIE C, B, D	C	6.5	21.5	6	7/8	1	2	4	1/5	500-7000	3	1	14	8.5	BEAM	SUCTION	38.0
BELMONT	C	9	22	564	7/8	15/16	2	4	1	8600	4	1	14	8.5	BEAM	SUCTION	45.1
BULLY (PHANTOM)	B	4.5	8	276	3/4	5/8	2	2	1/7	300-7000	2.5	1	11	7	BEAM	SUCTION	22.1
CHAMPION	C	10	21	6	925	9	2		ROTARY VAL	500-12000	2.5	1	13-16	8	BEAM	OPTIONAL	48
CYCLE SUPER	C	72.5	20	647	15/16	15/16	2		VALVE	1000-7300	3	1	13-14	6-8	BEAM	SUCTION	51.6
DENNYMITE	C	10	21	563	9	9	2	4	1/4	500-6500	3	1	13-14	7.5-8	BEAM	SUCTION	45.0
DEMON	A	3.5	8	152	9/16	5/8	2		1/4	250-12500	3	1	10-12	6-7	BEAM	SUCTION	12.7
DRAGON	B	5.5	11	211	5/8	11/16	2	2	1/7	500-6500	4	1	10	6	BEAM	SUCTION	16.9
DRIMMIE IO	C	8.5	18.5	5	7/8	1	2	4	1/5	500-10000	4	1	14	8-10	BEAM	SUCTION	48.0
DWIGHT	A	4.5	9	255	11/16	11/16	2		ROTARY VAL	500-10000	2.5	1	11	8	BEAM	SUCTION	20.4
ELF SINGLE	A	3	6.24	097	15/32	9/16	2	4	1/14	7500	4	1	13-14	8-9	BEAM	SUCTION	7.76
ELF TWIN	A	3	8.75	198	15/32	9/16	2	4	1/7	7500	3	1	13-14	9-11	BEAM	SUCTION	15.52
FEENEY A	C	15	24	118	1-3/16	1-1/16	2		DISC VAL	300-9000	2.5	1	10	6	RADIAL	SUCTION	94.4
FEENEY B	C	13.5	22.5	914	1-1/16	1-1/32	4		VALVES	300-9000	2.5	1	10	6	RADIAL	SUCTION	73.1
FEENEY C	C	12	21	617	15/16	7/8	2		VALVES	300-9000	2.5	1	12	6	RADIAL	SUCTION	49.4
FORSTER SUPER 99	C	15	25	997	1-1/16	1-1/8	2	4	1/2	AT 6000	10	1	15-18	6-10	BEAM	SUCTION	79.8
FORSTER 29	B	5.75	10.75	297	7/8	6/22	2		ROT VAL	125-9400	4	1	11-12	6-7	RADIAL-BEAM	SUCTION	23.96
G.H.G.	C	10	20	518	15/16	3/4	2	4	1/5	300-7000	5	1	14	8	BEAM	SUCTION	41.45
GNAT	A	4.5	8	157	9/16	5/8	2	4	1/10	AT 7500	3	1	10-12	6-7	BEAM	SUCTION	12.7
GWIN AERO	C	7.25	10.75	45	7/8	3/4	2	4	1/5	AT 8500	2	1	13	6.5	BEAM	SUCTION	36
HURLEMAN	C	6.7	21	46	7/8	13/16	2	4	1/5	500-8000	4	1	14	8.5	BEAM	SUCTION	36.8
HUSKY JV	A	2.75	6	192	5/8	5/8	2	4	1/8	250-8000	3	1	11	8	BEAM	SUCTION	15.34
IMP G-9	C	9	14	565	7/8	15/16	2	4	1/5	300-7000	3	1	13	7.5	BEAM	SUCTION	45.2
JAMES	C	8	22	647	15/16	15/16	2	4	1/4	AT 7000	4	1	13	7.5	BEAM	SUCTION	51.8
KAYDET	A	4	8	163	5/8	17/32	2	4	1/7	500-8000	3.5	1	10-12	6-7	BEAM	SUCTION	13.05
LITTLE DYNAMITE	C	6.5	21.5	375	7/8	7/8	2		ROT VAL	125-6000	3	1	14	8.5	BEAM	OPTIONAL	41.0
MARVIN	A	5	8	140	9/16	9/16	2	3	1/10	250-12000	4	1	9	6	BEAM	SUCTION	11.2
MAY SILVER KING	C	7	12.5	454	15/16	7/8	2	2	1/5	800-12000	3.5	1	13	6	BEAM	SUCTION	35.3
MADEWELL	A	4	8	140	9/16	9/16	2	4	1/8	500-8000	3	1	9	4	BEAM-RADIAL	SUCTION	11.2
MEGOW	A	3.5	6.5	192	5/8	5/8	2	4	1/7	200-10000	4	1	9	4	BEAM	SUCTION	15.4
MINIATURE	A	2	4.5	104	33/64	1/2	2	2	1/12	300-3500	4	1	10	8	BEAM	SUCTION	8.32
MM	B	4.5	11	292	23/32	23/32	2	4	1/7	500-8000	3	1	11.5	8.5	BEAM	SUCTION	23.39
OHLSOHN 19	A	4.75	8.5	197	11/16	17/32	2	3	1/7	500-7000	3	1	9-10	5	BEAM-RADIAL	SUCTION	15.8
OHLSOHN 23	B	5	9	232	11/16	5/8	2	3	1/6	500-7500	3	1	10-11	6	BEAM-RADIAL	SUCTION	18.4
OHLSOHN 60	C	10	19.5	617	15/16	7/8	2	3	1/4	500-7500	3	1	14-15	10	BEAM-RADIAL	SUCTION	49.4
O.K. TWIN	C	16	33.5	1209	9	9.5	2	3	1/2	500-5500	4	1	18-20	10-12	RADIAL	GRAVITY	96.7
O.K. DELUXE	C	72.5	18	616	9	9.69	2	3	1/5	500-10000	3.5	1	14-15	8.5-10	BEAM-RADIAL	SUCTION	49.3
O.K. STANDARD	C	7.75	18.5	604	9	9.5	2	3	1/5	500-10000	3.5	1	14-15	8.5-10	BEAM-RADIAL	SUCTION	48.3
O.K. SPECIAL	C	7.25	18	604	9	9.5	2	3	1/5	500-10000	3.5	1	14-15	8.5-10	BEAM-RADIAL	SUCTION	48.3
O.K. 25	B	3	14	493	9	7.75	2	3	1/5	500-12000	3.5	1	13-14	8	BEAM-RADIAL	SUCTION	39.44
PRICE MIDGET	B	3.5	7.5	24	11/16	21/32	2	3	1/5	500-7500	2.5	1	11	8	BEAM	SUCTION	19.2
PERKY	A	3		191	39/64	5/8	2	4	1/8	700-12000	3	1	10	7	RADIAL	SUCTION	15.28
REBEL	B	4.5	8	23	5/8	3/4	2	4	1/7	350-5000	3	1	10-11	6-7	BEAM	SUCTION	18.4
RANGER	B	3.8	7.75	292	69	282	2	4	1/6	250-10750	4	1	13	7	BEAM	SUCTION	23.4
SKY CHIEF	C	10	14	526	7/8	7/8	2	4	1/5	1800-9000	4	1	14	7	BEAM	SUCTION	42.1
SYNGRO ACE	C	10	21	564	7/8	15/16	2	4	1/5	AT 10000	4	1	13	7	BEAM-RADIAL	SUCTION	45.1
SYNGRO BEF	A	3.75	8	124	1/2	5/8	2	4	1/8	1000-8000	4	1	13	6	BEAM-RADIAL	SUCTION	9.76
SYNGRO B-30	B	5.5		292	13/16	9/16	2	4	1/4	AT 10000	2	1	11	8	BEAM	SUCTION	23.36
TIGER AERO	B	7.25	10.75	299	7/8	3/4	2	4	1/6	100-8000	2.5	1	11	8	BEAM-RADIAL	SUCTION	25.92
TORPEDO	B	4.75	8.5	232	11/16	5/8	2	4	1/7	AT 6500	4	1	10	6	BEAM	SUCTION	18.56
TROJAN	B	4	9	232	11/16	5/8	2	4	1/7	AT 6500	4	1	10	6	BEAM	SUCTION	18.56

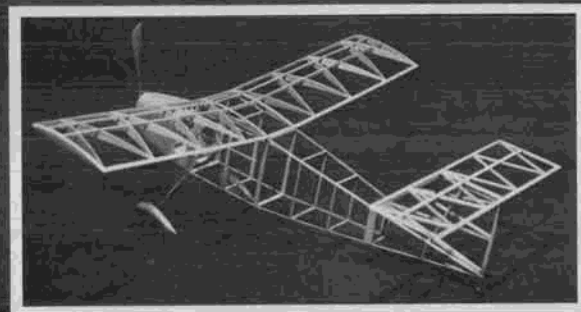
MANUFACTURER'S FIGURES FOR BORE AND STROKE HAVE BEEN USED TO CALCULATE THE PISTON DISPLACEMENT BY MEANS OF THE FORMULA $CU = (0.7854) B^2 S N$, IN WHICH B = BORE, S = STROKE, AND N = THE NUMBER OF CYLINDERS

NOTE: ALL ENGINES LISTED IN THIS DIRECTORY ARE BLOCK-TESTED BEFORE SHIPMENT

JESSE DAVIDSON

Boston Tea Partly

By WALT MOONEY . . . Perfesser Peanut invents yet another Bostonian West model for all of us F/F modelers to enjoy. Lightweight structure and warp resistant flying surfaces are a few of its features.



• The *Boston Tea Partly* is a relatively simple Bostonian that is designed with wing and tail structure that tends to resist warping by means of the diagonal ribs in the flying surfaces. It flies quite well, indoors and out. One consequence of this is the fact that there are no pictures of the author's complete model available. The author's model, the one that is shown as a skeleton, flew out of sight during an official flight in the San Diego Orbiteers versus Scale Staffel Bostonian Challenge on February 19, 1984, before he got around to having the finished model photographed.

The finished model with the red, white, and blue color scheme was constructed by Pete Glor. Although Pete's model turned out a little heavier than necessary, 38 grams with its rubber motor versus the 14 gram minimum allowed without motor, it also flies very well. It has recorded a 38-second official flight indoors under a less than twenty-five foot ceiling at a Scale Staffel flying session. Pete built his model for our traditional Fourth of July Bostonian meet, hence the color scheme and the license numbers on the model.

Another successful flying *Tea Partly* was made by Lenn Riddle who made a tricycle landing gear version by mounting the main gear one upright further aft, and adding a nose landing gear one bay forward of the main gear position shown on the plan. This model also flies very well and makes particularly smooth takeoffs and landings.

Keep your model as light as possible by using lightweight balsa, lightweight tissue, the thinnest plastic for windows, balsa wheels, and going easy on the dope.

The only thing much different about the structure of the *Tea Partly* than that of the ordinary Bostonian is the use of diagonal rib structure in the flying surfaces. These result in an amazingly stiffer structure. As a consequence, it's important to build the tail surfaces on a flat building board to prevent built-in warps. I like about an eighth of an inch of washout in each wing so the tip of the trailing edge of the wing should be blocked up this amount above the building board while constructing the wing.

The tail mid spars are added on both sides of the basic flat tail structure after it is removed from the board.

The wing dihedral starts on each side of the flat center section which is just as wide as the fuselage.

The fuselage is a conventional box made by building both sides directly over the plan. The sides are removed from the plan and carefully separated from one another using a thin blade. Cement them together at the aft end, and then add the cross pieces for the top and bottom of the fuselage, working forward bay by bay to the front end. The top and sides of the most forward fuselage bay are covered with 1/32 sheet balsa after adding formers 1 and 2 to the forward two cross pieces. The bottom of the forward two bays is covered with a solid balsa part carved from quarter-inch balsa sheet.

The nose block is made up from three pieces of quarter-inch sheet balsa. The forward two are carved after assembly to a shape simulating the forward end of an inline engine cowl. The aft piece is made to be a snug fit into the front end of the

fuselage box. Drill a hole through the noseblock to accept one of the Peck-Polymers small nylon thrust buttons. Install your selected propeller, and add a carved spinner if desired.

Bend the landing gear wire to the shape shown, and securely cement it in place in the fuselage. Use lightweight balsa wheels and install wheel pants if desired.

If your wheels are an eighth of an inch thick, the wheel pants can be made up using two pieces of 1/16 sheet balsa for the sides and a piece of 3/16 balsa for the center of each pant. Carve them to the shape shown in the top and side view, and carefully round off all the corners for a smoothly streamlined shape.

Fill in the bottom of the last fuselage bay with 1/32 sheet to support the thin wire tail skid.

A short piece of 1/16 diameter aluminum tubing is used for the rear motor peg.

Cover the model using lightweight tissue. Use any color scheme you desire. Outdoors, a brightly colored model is easier to find.

Indoors, Pete Glor was using a loop of 3/16 flat rubber that was twenty inches long for his 38-second flight. I was using a loop of 1/4 flat rubber the same length on my last outdoor flight.

You'll note in the pictures that Pete was using a drag flap on the left wing to tighten the flight circle and keep the model from hitting the basketball court walls.

The model should balance with the centerline level when supported halfway between the spars. Have fun at your *Tea Partly*.

THE LEADING EDGE IS 3/32 SQUARE

THE FRONT SPAR IS 1/20 SQUARE

THE REAR SPAR IS 1/16 X 1/8

THE TRAILING EDGE IS 1/16 X 3/16

WING PLAN

ROOT RIBS &
TIP RIBS ARE
CUT FROM
3/32 SHEET

ALL OTHERS
FROM 1/32
SHEET

WIRE
LANDING GEAR
PATTERN

NOSE BLOCK IS THREE THICKNESSES OF 1/4 BALSA, SPINNER IS OPTIONAL.

GIVE EACH WING TIP 3/4 INCH OF DIHEDRAL

DIAGONAL RIB PATTERN

FUSELAGE

TOP VIEW

ALUMINUM TUBE REAR MOTOR PEG

TOP OF COWL IS COVERED WITH 1/32 SHEET

ALL FUSELAGE CROSS PIECES ARE 1/16 THICK

A SIX INCH DIAMETER
PROPELLER IS THE MAXIMUM
ALLOWABLE. PLASTIC
COMMERCIAL IS OK.

ROOT AND TIP RIB PATTERNS ARE SHOWN
IN THIS SIDE VIEW

VERTICAL

TAIL

FUSELAGE

SIDE VIEW

FUSELAGE

LONGERONS
SQUARE.

ARE 1/16

ALL UPRIGHTS
THICK.
ARE 1/16

ALL TAIL PIECES ARE 1/16

THICK EXCEPT THE MID SPARS
WHICH ARE 1/64 THICK MODEL RAILROAD BASSWOOD.

SIDES OF NOSE ARE
COVERED WITH 1/32 SHEET.
BOTTOM OF NOSE IS CARVED
FROM 1/4 BLOCK.
USE LIGHT WEIGHT (BALSA)
WHEELS. WHEEL
PANTS ARE
OPTIONAL.

USE .025 DIA. MUSIC WIRE FOR THE MAIN
LANDING GEAR AND .015 FOR THE TAIL
SKID. ALL STRUCTURE IS MADE FROM
SOFT LIGHT WEIGHT BALSA UNLESS NOTED
OTHERWISE. USE LIGHT WEIGHT
TISSUE TO COVER THE MODEL,
USE DOPE SPARINGLY.

MAKE WINDOWS AND
WINDSHIELD FROM THIN
CLEAR PLASTIC.

HORIZONTAL
TAIL

*The
Boston
Tea
Partly*

*A
WESTERN
BOSTONIAN
BY*

*Halt
Mooney*

Free Flight

By BOB STALICK



• It's June . . . tra la, tra la! Your outdoor contest season is in full swing; the Nats are only two months away; the FAI Finals are only three months away . . . and you didn't do half of the things that you had planned to do when you put your models away last winter. Don't fret, you are in good company. I didn't either, and neither did several other fine free fliers that I know. Well, it's not too late. It's amazing the amount of building and testing you can get done when you put your mind to it. Today, you will find two very interesting building and flying tips that could put you in the winning circle at contest's end. But first, the usual features.

JUNE THREE VIEW: FRANK NEWQUIST'S FAI POWER NO. 5

I flew against Frank at the Hart's Lake Semifinals last September. He is a tough man to beat . . . and I didn't do it. Frank lives in Newport, Oregon . . . a beach town. The way the story goes, Frank does quite a bit of his test flying on the beach, at low tide, in the evenings when the wind is low. Wherever and whenever he does it, it has paid off with good performing models. Frank describes his No. 5 as follows: "There is no fancy engine cowling or fiberglass front end on this model. The only unusual feature is the assymetrical wing. I tried this on

my last Wakefield design and thought it worked very well, without a VIT. It's easy to trim under power and in glide. On the power model, the right inboard panel is 1.5 inches longer than the left inboard panel. Both tips are the same length. Both inboard panels are flat . . . no wash-in or wash-out. I think the longer right inboard panel helps eliminate the need for wash-in for powered flight, and it also has a favorable affect on the glide with a right/right pattern. The short nose, long tail moment, and light tail make for a good flying efficient model."

JUNE DARNED GOOD AIRFOIL: BENEDEK 8452 B

I have always like the Benedek series of power model airfoils. My favorite is the 8353 B/2, but this month's offering is very similar. It does, however, have a slightly thinner top camber (0.2%), and minimally less undercamber. These two features make it ideal for the newer style of faster FIC models. Using a sheeted structure will make it strong enough for the usual applications. I recommend it highly as a power model airfoil.

JUNE MYSTERY MODEL

Well now . . . what have we here? Swept forward wings, swept forward stabilizer. And why? My guess is that the designer had in mind something unusual which would allow him to sell the plan to a magazine so that it could be published, and he would become rich and famous. Not unexpectedly, the designer credits the swept forward surfaces with improved performance and the like. Shown on the plans from this vintage model is that powerhouse engine, the Royal Spitfire .049. Enough hints!! If you know the answer, drop a line to Bill Northrop at **Model Builder** and end up the proud recipient of a year's subscription. You gotta be first in line, though.



Phil Hainer, DBA Flite Rite Models, shows us his latest 1/2A model, the *Air Express 330*. Actually, what you see here is the prototype for a new kit. The model has a great glide, beautiful lines . . . and more info next month!

EZ THERMAL POLES

For years, I have been using a thermal pole system that is easy to put together, cheap to purchase, and easy to carry and assemble. The accompanying sketch lays out the details. The aluminum TV masts are the lightweight variety from Radio Shack, and sell for \$3.99 each in five-foot lengths. The number of mast sections that you buy determines how high the mylar streamer will be off the ground. I use five sections. On the tip of the top section, I have mounted an old radio antenna that telescopes another four feet. The net result is a streamer that is 29 feet off the ground! I have mounted a C/L clip and swivel to the top of the antenna in order to remove the streamer easily, and to keep it from winding itself into a silver string.

The system used in the sketch (and in my practice) to mount the TV masts firmly into the ground is a metal stake with a piece of water pipe welded to it . . . into which the bottom mast slides. A simpler method would be to obtain a metal stake that fits inside of the bottom mast. This stake would then be pounded into the ground, and the mast assembly slid over the top. In the 12 years that I have used this system, the mast has never been blown over or collapsed . . . and it is the highest thermal streamer



Greg Davis, Vancouver, BC, kept claiming the author wouldn't print his picture in *Model Builder*. This proves him wrong! The model that Greg is lofting is the *'El N Gane*, a 1/2A Nostalgia ship. Power is supplied by a Thermal Hopper engine. Engine run is controlled by a length of coiled fuel tubing, just the right size.



Like father, like son. Josh Chamberlain winds his P-30 in preparation for a flight at the Harts Lake Prairie 1984 Misery Meet. Ken Chamberlain, Josh's dad, watches with a warm smile!

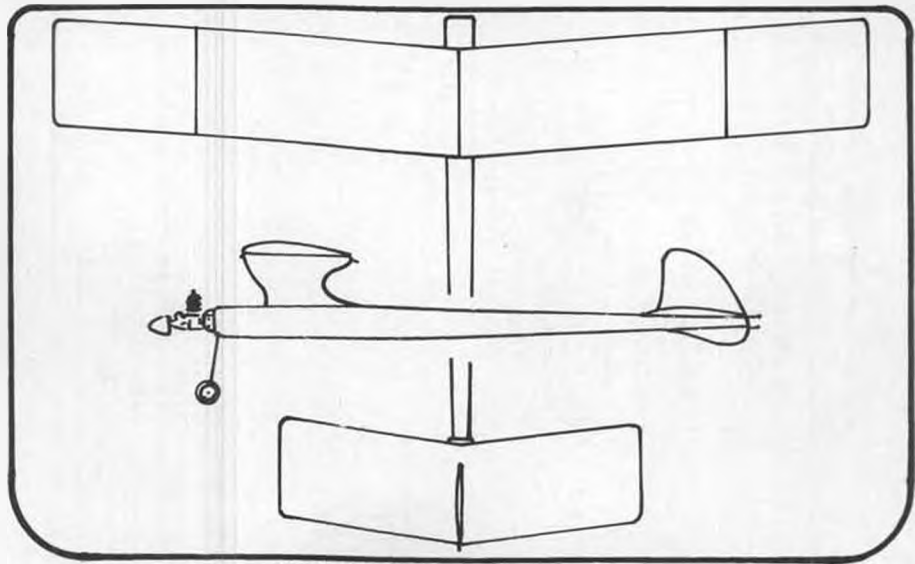


Gene Bartel likes 'em BIG! This is the *Witch Hawk* by Jim Clem. About 1100 square inches of wing area keeps the wing loading down. Would you believe there is a 1400 sq. in. version in Gene's workshop?

location on the field. Place it well upwind of the launch area, and you can not only check wind direction, but also the slightest thermal activity that comes through.

STAB MOUNTING SYSTEMS

In my 25 years of model airplane activity . . . nearly all free flight . . . I have used about three different stab mount-



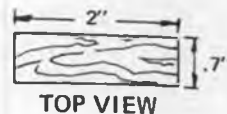
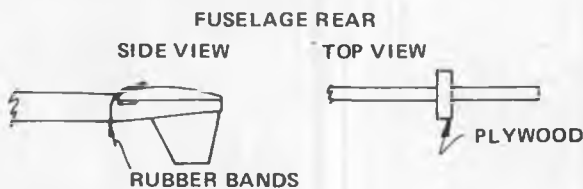
JUNE MYSTERY MODEL

ing systems. Derivatives of the three systems abound, but all do the same kinds of things. See sketch for the details of the following systems.
STANDARD "NOSTALGIA"
ERA SYSTEM

This stab mount system can be found on many older free flight designs. *Ramrods*, *Spacers*, *Stardusters*, and others of the vintage feature this system. The standard Nostalgia system does what it's supposed to do: it keeps the

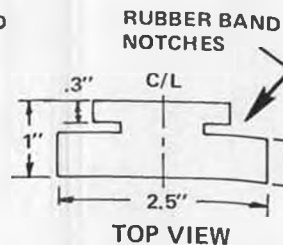
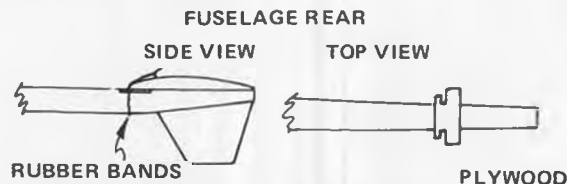
STAB MOUNT DETAIL SKETCHES

(1) "STANDARD" STAB MOUNT



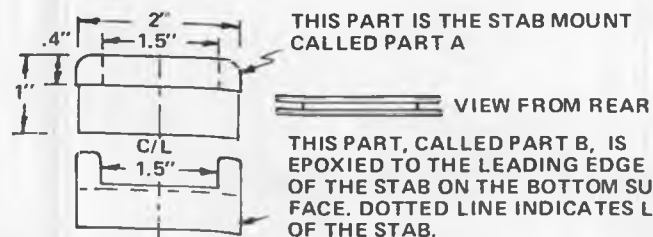
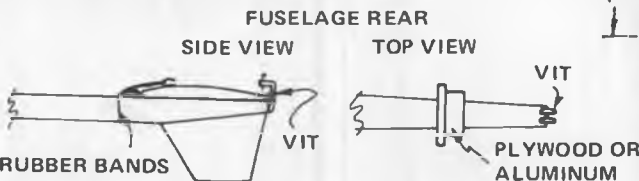
THIS MOUNT IS SIMPLY A PIECE OF 3/32 PLYWOOD APPROXIMATELY THE STATED SIZE - FOR 1/2A OR SMALL A GAS MODELS *

(2) S.H.O.C. MOUNT



THIS MOUNT IS SHAPED AS ILLUSTRATED FROM 3/32 PLYWOOD FOR 1/2A OR A SIZED MODELS, NORDICS, AND WAKEFIELD. LARGER DIMENSIONS FOR LARGER MODELS.

(3) OLOFSSON STYLE MOUNT



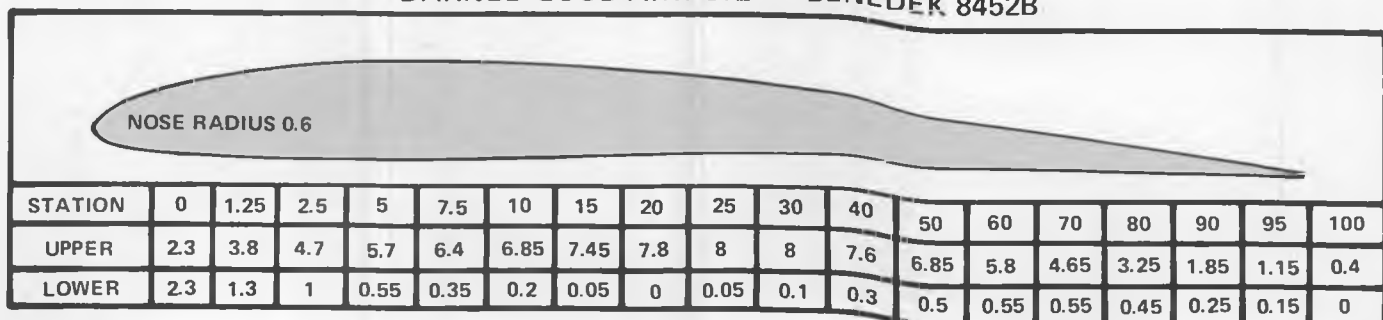
THIS PART IS THE STAB MOUNT CALLED PART A

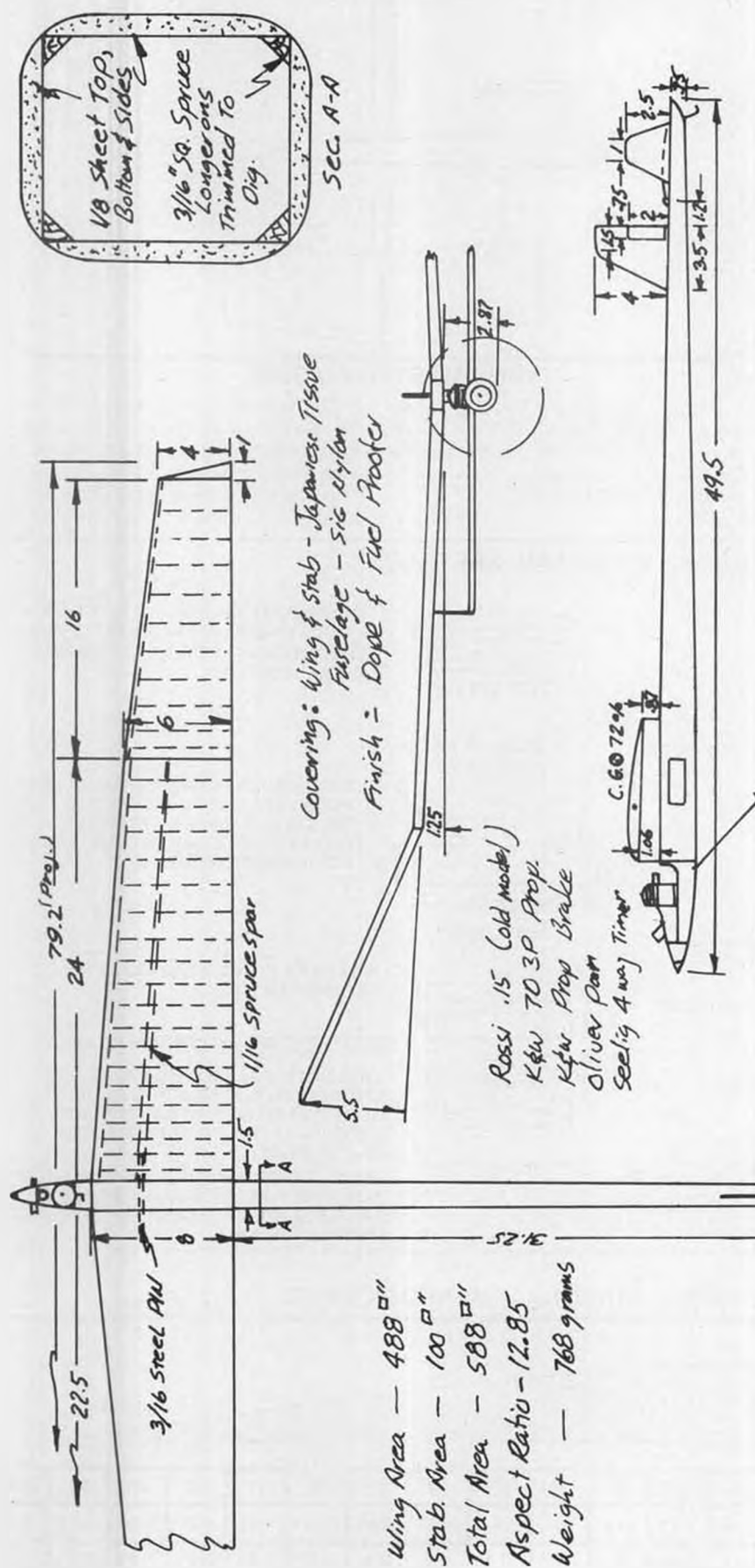
THIS PART, CALLED PART B, IS EPOXIED TO THE LEADING EDGE OF THE STAB ON THE BOTTOM SURFACE. DOTTED LINE INDICATES LE OF THE STAB.

THE OLOFSSON MOUNT IS MADE FROM 1/16 SHEET ALUMINUM OR 3/32 PLY. PART B SLIDES INTO PART A. FOR 1/2A MODELS OR FAI.

*All mounts shown should be enlarged to fit larger models

DARNED GOOD AIRFOIL - BENEDEK 8452B

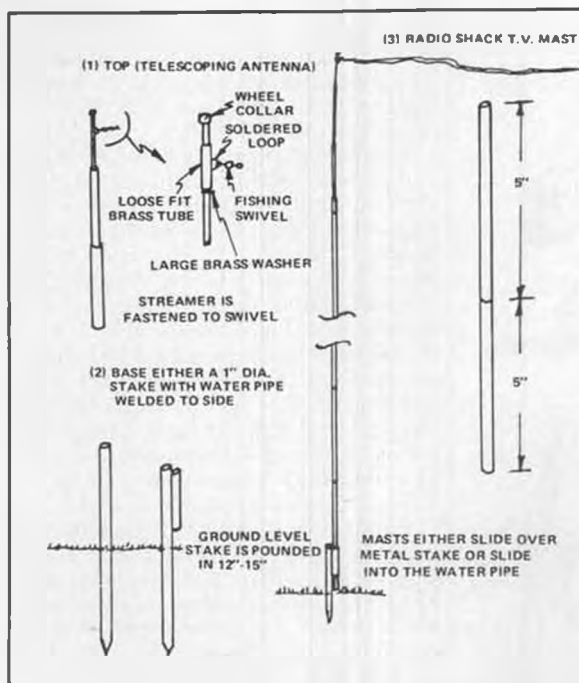




Wing Area — 488"
 Stab. Area — 100"
 Total Area — 588"
 Aspect Ratio — 12.85
 Weight — 768 grams

FAI POWER #5

Frank Neugeist 12-81



EZ THERMAL POLES

(1) This detail shows the swivel assembly at the top of the old radio antenna (telescoping type). The top "bottom" of the antenna is clipped off and a brass washer is soldered in place about 3 inches down from the tip. A piece of brass tubing, about 2 inches long is inserted from the top so that it rests against the soldered washer and moves freely around the antenna shaft. A loop of wire is soldered to the brass tube, and a wheel collar is affixed to the top of the mast to hold everything in place. A fishing swivel is affixed to the loop, and a mylar streamer is clipped to the end of the swivel using a fishing swivel snap (for easy removal). The antenna mast is either clamped to the side of the TV mast using an automotive hose clamp, or by using a short length of metal tubing which fits over the TV mast.

(2) This detail is the anchoring device. The stake can either be a piece of one-inch water pipe by itself, or a metal stake with a piece of water pipe welded to the side. In the first case, the TV mast slides over the pipe. In the second case, the TV mast slides into the pipe which is welded to the side of the stake.

(3) TV masts come in five-foot lengths. I find these the easiest to store and transport to meets, but the sections could be longer if desired. As the mylar streamer from FAI Model Supply is 20 feet long, it is important to have four sections of TV mast as a minimum. This will keep the streamer from fouling on any ground based objects.

stab from moving fore and aft, and if keyed, it keeps the stab from moving from side to side. Great, right! Well...

The problem with this system, for me at least, was that if the model landed hard, or came to a rapid stop against a tree or something immovable... the leading edge of the stab was forced into the fuselage at the center section. The result was a broken leading edge or a split open fuselage. I spent time beefing up the leading edge of the stab, and then had to beef up the fuselage area where the stab leading edge came into contact with it. First, I used spruce, then I used plywood. Then, I discovered...

THE SHOC MOUNT

This mount was promoted by Mel Schmidt, and it is named after his model club, the Sky Hoppers of Orange County (SHOC, get it?). The SHOC mount is held in place by the rubber bands that are used to DT the stab. The DT line holds the trailing edge in place. Keys on either side keep the stab from making any side-to-side motion.

Now, when the model comes to an abrupt stop, the result is broken rubber bands, not a broken stab or fuselage. For most applications, the SHOC mount is ideal... and I use it extensively.

THE OLOFSSON STYLE MOUNT

I don't think that Lars Olofsson actually developed this mount system, but his was the first one that I had seen in detail, so that's my choice for its name. The Olofsson mount is used to firmly anchor the stab from any sort of movement: fore and aft, or side to side. It uses a plywood to plywood or metal to metal pivot point to minimize damage in quick stop situations. It's use should be limited to models with VIT systems, as most other models don't need to have the stab in the exact same location from flight to flight as is the case with F1C or similarly equipped ships.

I hope you can use one of the newer mounts on your latest creation. I think

that you will find yourself with fewer problems if you do.

BULLET BOB'S BITS 'BOUT FREE FLIGHT

Last month, I mentioned the difficulties that newcomers to our sport, have in trying to understand just what we're talking about when we use certain technical terms. I encourage each of you who is new to the F/F hobby to drop me a line care of **Model Builder** with your puzzler. I promise to use your suggestions in this part of the column, and I won't embarrass you by using your name unless you say so. Here are a couple that have been asked of late:

9% RAMROD AIRFOIL

This is the airfoil featured a couple of months ago in this column. It is named after the airfoil used on the *Ramrod Free Flight Power* design of the mid-1950s. The 9% means that it is nine percent thick at the highest point of the profile. For reference, if the airfoil has a chord of six inches, an airfoil that is 10% thick would be 0.6 inches at its highest point.

OLOFSSON STAB MOUNT

This is featured as a sketch in this month's column. It's one way to mount a stabilizer to the fuselage so that it is held in place firmly so that no shifting is possible either fore and aft or side to side.

More next month??

NATIONAL NOSTALGIA RULES

The national Nostalgia rules were developed over the space of a year by a collaboration of two modelers, Ralph Prey and Harry Murphy, for the purpose of establishing a set of guidelines for the 1984 SAM Champs and the Reno AMA Nats. If you plan to attend either of these events, these are the rules you will be flying under. You would be wise to get a copy right away so that you don't show up with a model that's ineligible. (P.S.: I've been assured that my Wen-Mac powered *Spacer* is eligible.)

What follows is a reprint of the an-

nouncement which appeared in *Model Aviation* (April 1984). It is a summary only; you should still send for the exact rules.

"Any free flight, gas-powered model airplane design that was produced and marketed in kit form or had plans published in a commercial publication during the period January 1, 1943 through December 31, 1956 is eligible to fly. Scaling of designs up or down is permitted; however, the contestant shall produce full-size plans of the original design, full-size plans for the scaled models, and the appropriate scale factor. It is intended that all models be constructed in accordance with original plan instructions, with particular attention to the wing/stabilizer/rudder/fuselage planforms and engine thrust line locations. This also includes wing and stab airfoils.

"Any production diesel, glow, or ignition engine that was advertised in a commercial model publication prior to the year 1957 is eligible. Also, any pre-1963, plain-bearing-crankshaft engine of loop-scavenged design shall be permitted, with the exception of all Cox front-intake engines. However, all post-1963 Cox reed-valve, rear-intake engines, the Cox TD .010 and .020 engines, and Fox plain-bearing Stunt engines shall be permitted. No Schnuerle-type engines or those incorporating ABC piston/cylinders shall be eligible.

"Nostalgia Gas classes are based on engine displacement, as follows: 1/4A—0 to .025 cu. in.; 1/2A—.026 to .050 cu. in.; A/B—.051 to .300 cu. in.; C/D—.301 to .650 cu. in.

"Models must weigh a minimum of 100 oz. per cu. in. of displacement for the engine being used (1/4A and 1/2A models are exempt).

"Two models are permitted per event.

Continued on page 104



By FERNANDO RAMOS

Free Flight Scale



Peck-Polymers new Stinson Sentinel Busy People kit (one of four to choose from).

• For the first time since **Model Builder** has been represented at the IMS Hobby Show, I had an opportunity to attend. For years we have had the MAC Show out on the West Coast, and the last time I attended this trade show, I was sorely disappointed. This was not the case with the IMS Show. There were many vendors, who were actually selling their products. Boy! What I could have purchased with a healthy bankroll, oh well. Surprisingly, everything wasn't R/C. There were a few items of interest to the free flier as well.

One item that I purchased is an extension for the Ni-Starter or Tork Starter. This clever device fits on top of the glow plug with an extension lead to a remote power input jack for the Ni-Starter. The input jack can be hidden anywhere on the fuselage. This, of course, is for engines which are fully cowled, and access to the glow plug is

non-existent. The cost is \$4.95. It will fit most glow plugs. Weights is negligible.

PLANS AND MORE PLANS

Prolific plan producer, Dave Diels, is at it again. (He must draw in his sleep!) He sent me three new plans recently. One is the Grumman Bearcat at 1/24-scale, giving it a wingspan of almost 18 inches. Another is a Peanut model of the Neuport Triplane. The third plan is of the Grumman Tigercat: a slick model which can be flown either by rubber or CO₂. This is also 1/24th scale, giving it a wingspan of 25-3/4 inches. The prices for these plans are \$3.75, \$2.50, and \$4.00 respectively. They are an exceptional buy to say the least.

If you order a catalog (one buck), you'll find 40 different plans listed, and he also will include a survey of what you would like to see drawn up. Dave would also like to get some feedback to see if scalars out there would be interested in

printwood, partial kits, complete kits, or canopies. This last item would appeal to many, including myself. No doubt about it, canopy forming is a pain! Vive le biplane! His address is P.O. Box 101, Woodville, Ohio 42469.

Speaking of plans, Paul Plecan has just completed another plan packet, with two outstanding designs. One is the Page Navy Racer, and the other is a neat Sperry Messenger. The former is drawn at one-inch-to-the-foot scale, giving the model about a 31-inch span. The Messenger is an odd ball scale of 1-5/8 inches to the foot, giving it a 32-1/2-inch wingspan. Those modelers who enjoy schoolyard scale will particularly enjoy the Messenger. It is a natural for two or three-channel R/C. Needless to say, it is also ideal for F/F glow power or rubber power... an exceptional design.

Paul has five different plan packets available. The cost for all five is \$18.00, single packs sell for \$5.00. Unfortunately, I don't remember which drawings are in each packet, but believe me, they are worth having. Paul's address is Paul Plecan, 3723 Polk Street, Riverside, CA 92505.

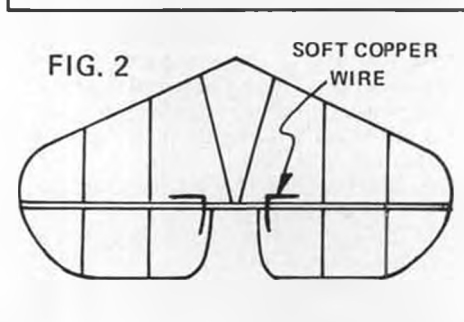
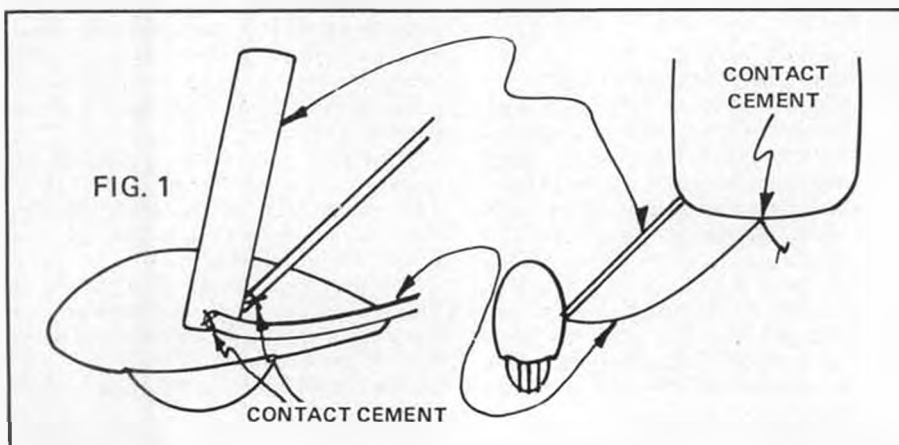
RAMOS SYSTEM OF MODEL BUILDING

One of the most frustrating situations for this scale modeler is that there are at least 100 airplanes I want to build, and *right now!* I'm an impulsive builder. Something in an airplane catches my eye, and off I go chipping away at the balsa. Then a contest will crop up, and I get the feeling that what I'm building isn't suitable for competition. So, off I go starting another desirable machine. What happens to the first one? It may sit for months or years before I get back to it, but I usually do. My barn is loaded with such projects.

I suppose that in reality, I prefer framing a complete model to covering and finishing one. I guess some of us need a certain amount of motivation to get projects completed. Many of my modeling friends are just the opposite. They start a model and go through until it's finished... how boring! To be honest, I prefer to build at least three airplanes at the same time. The progression of each design keeps me motivated through the final stages.

One rationale for not feeling guilty about leaving a model sitting on the shelf for months is that it was a learning experience. I learned from that syndrome, and it causes me no mental anguish to hear visitors ask, "Why don't you finish some of these projects?"

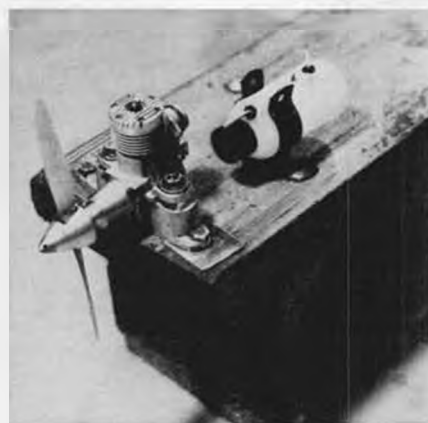
Continued on page 71





Control Line

By MIKE HAZEL
PHOTOS BY THE AUTHOR



This is how to properly run an engine . . . use a test stand with sturdy mounting hardware. Note metal plates under metal mount.

• As I mentioned in the last "Control Line" column, our family was busy moving into another house. Two months have past, and all I have done is build a new workshop. New workshops look so clean when they haven't been used yet! Onward. . .

CONSTRUCTION DEPARTMENT

Referring to the photos, you will see two uses for easily fabricated fiberglass tubes. I am sure that many other uses can be employed. I doubt the method described here regarding F/G tube fabrication is original, but it was new to me when I invented it. (How many times was the wheel invented?) Here is the construction sequence:

First of all, find either a broom stick, a large dowel, or something similar which matches the desired diameter of the tube. Next, make two full wraps with wax paper on the stick. This must be longer than the desired length of the F/G tube. Secure the ends with wraps of masking tape.

Next, you have to cut some F/G cloth to size. Cut the cloth to the dimension that will equal the length of the tube; allow some extra, as it is easy to trim. Now, take a small strip of paper and tightly wrap it around the stick. Cut it with a razor blade where the opposite ends overlap, and you have a pattern that equals one wrap on the stick.

Both examples pictured were made with two inner layers of two-ounce weight cloth, and one outer layer of lightweight cloth, such as 3/4-ounce. This combination gave adequate

strength without excessive weight, and a smooth outer surface. This can, of course, be modified to suit your needs.

Next, mix up some resin. K&B polyester resin works very well. Now, apply some mold release to the wax paper wrapping. Lay the first layer of cloth on the wrapped area, and wrap it around with a resin laden brush, wetting the fibers as you go. If your piece of cloth was sized accurately, the ends should just about butt together.

Wrap the second layer of cloth around the first so that the ends meet 180 degrees apart. Repeat with the resin. The top layer of cloth can be oriented in almost any direction. The exterior surface will be smooth and free of runs if you brushed on the resin evenly and the material was well catalyzed.

To remove your tube, peel off the masking tape and slide the whole works off the stick. The wax paper will easily pull out from the inside, leaving a smooth surface. Presto! One fiberglass tube. Make sure the assembly is well cured before removing. Now you can trim it to length, and smooth it with sandpaper if necessary.

CONTEST TRAIL DEPARTMENT

There are some noteworthy dates you should circle on your workshop calendar. If you live in the west, you already know that many CL enthusiasts make an annual pilgrimage to Eugene, Oregon, for the NW Regionals held over the Memorial Day weekend. This yearly affair keeps getting bigger and better. I have to admit that my personal involve-

ment here may make for some bias.

Anyway, whether you are a competitor or spectator, the 27 events plus other special activities should hold your interest for the two days. The contest site is at the city airport, and you can literally get off a plane and walk over to the flying circles. For more information, contact John Thompson, 1411 Bryant Avenue, Cottage Grove, OR 97424.

On the same weekend throughout the nation, there are three more large traditional meets. They are: the Rebel Rally in Jacksonville, Florida; the Texas State Championship, in Houston; and the Midwest Regional Championships, in Sugar Grove, Illinois. Check your AMA contest calendar for details.

Combat aficionados already know by now that the annual Bladder Grabber will be held in the Seattle area on July 7 and 8. This meet features triple elimination Fast Combat, and \$5,000 worth of awards. Here's your chance to be a combat "pro." For more information, contact Howard Rush, 8817 NE 137th, Kirkland, WA 98033.

Another contest to look forward to of course, is the AMA Nationals, taking place August 5 through 12. I suppose that calling the Nationals a contest is like calling the Pentagon a government office.

The location this year is in Reno, Nevada, which will offer participants and partners several other things to do and see. I recommend that all west



The author details a method of making fiberglass tubes quickly and easily in the text. This tube holds a bladder fuel tank.



The fiberglass tube can serve as an exhaust duct for tuned exhaust pipes and mufflers. Gives a finished look to the model.

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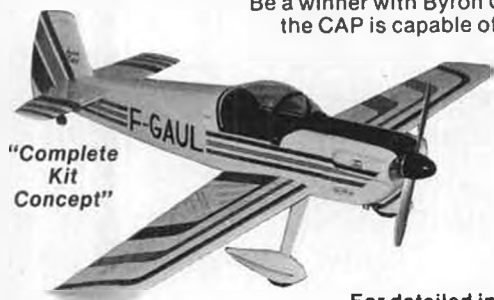
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coasters attend this year, as it will never be more centrally located on the "left" side.

ABOUT THE SIZE OF IT DEPARTMENT

Have you ever laid awake late at night, wondering why there are so many engine sizes? There's no question that there are a lot, not even counting the more recent entries in the field for the large RC birds. Somehow it would seem to be more efficient to have fewer sizes. Not spreading out the product line to a given market size should have the effect of lowering costs, what with mass production and all that good stuff.

However, the American way is to first create a "need" to increase a particular share of the market, especially if it involves big ticket items. By the way, this will be a future topic, relating some contradictions of the hobby industry and control line flying . . . but it will have to wait until the coals are hot. Besides, we were talking about engines.

Anyway, many sizes have developed to simply fit competition rules. On the other hand, some competition rules

have been made to fit existing engines. Don't you think that some of the existing engines have odd, or uneven sounding sizes? Why didn't the early manufacturers start off with a nice, even .50? This is exactly one half cubic inch, for those of you less adept at math. This size range has had a .46, .49, .51, .55, .56, .59, and who knows what else. Look at this lineup of sizes, which includes past and present manufacturers: .049, .099, .19, .29, .49, .59. This looks like gas pump pricing! Also have you wondered why an .049 is called 1/2A, when it really isn't half of anything?

Another funny one is how the combat rules allow for a .36 engine. Sometime back in evolution, this size was allowed even before it existed. Rat was the same way, except that the .40 size existed, but was not common.

Of course, the argument will come up that many sizes are "even", when referenced by metric standards, which is true. The funny sounding .29 (which usually is really a .30) falls into the 5 cc category. This makes the .60/.61 size

convert into a nice round sounding 10 cc. Which brings up the question . . . where did the .65 size for competition come in? Was this to allow for existing products, or just a generous tolerance?

One change that did make some sense was when the CL class A was reduced from .19 to .15. This was to conform to the international standard 2.5 cc competition size.

All of this is semi-whimsey. If we ever get it straightened out, we can then work on the funny numbers coming from Detroit.

Jumping into another subject, what engine sizes do you feel make the most sense? Big, small, medium, all?

From my rulebook on Cloud Nine, the sizing is somewhat different than presently used. There are only three competition size classes listed. They start with Class A, which is .09 (1.5 cc), followed by Class B and C, which are .21 (3.5 cc) and .40 (6.5 cc), respectively.

Taking this selection down to earth, I believe it would fit in very nicely with current competition classes. Doing this would also reduce the number of classes that now exist. I don't know about you, but methinks there are too many at present. Remember when racing just meant rat race?

A lot of splinter events and classes have simply diluted CL contest activities with respect to number of entries per given category. A reduction of this spread should concentrate numbers, and create a more healthy competition climate.

A legitimate concern of consolidating sizes would be that of possible elimination of events or classifications that are designed to be of entry level status. The answer here is to take care of entry level events on a local basis. I am a firm believer that genuine sport and beginner type events have no place in the rule book.

My reasoning for this last statement is that higher skilled competitors will always outclass the novice in the long run. Official rule book status for an entry level event simply accelerates the process of performance development, which in turn changes the color of the event in short order. I repeat, keep these kinds of events local or regional. Now let's get back on track.

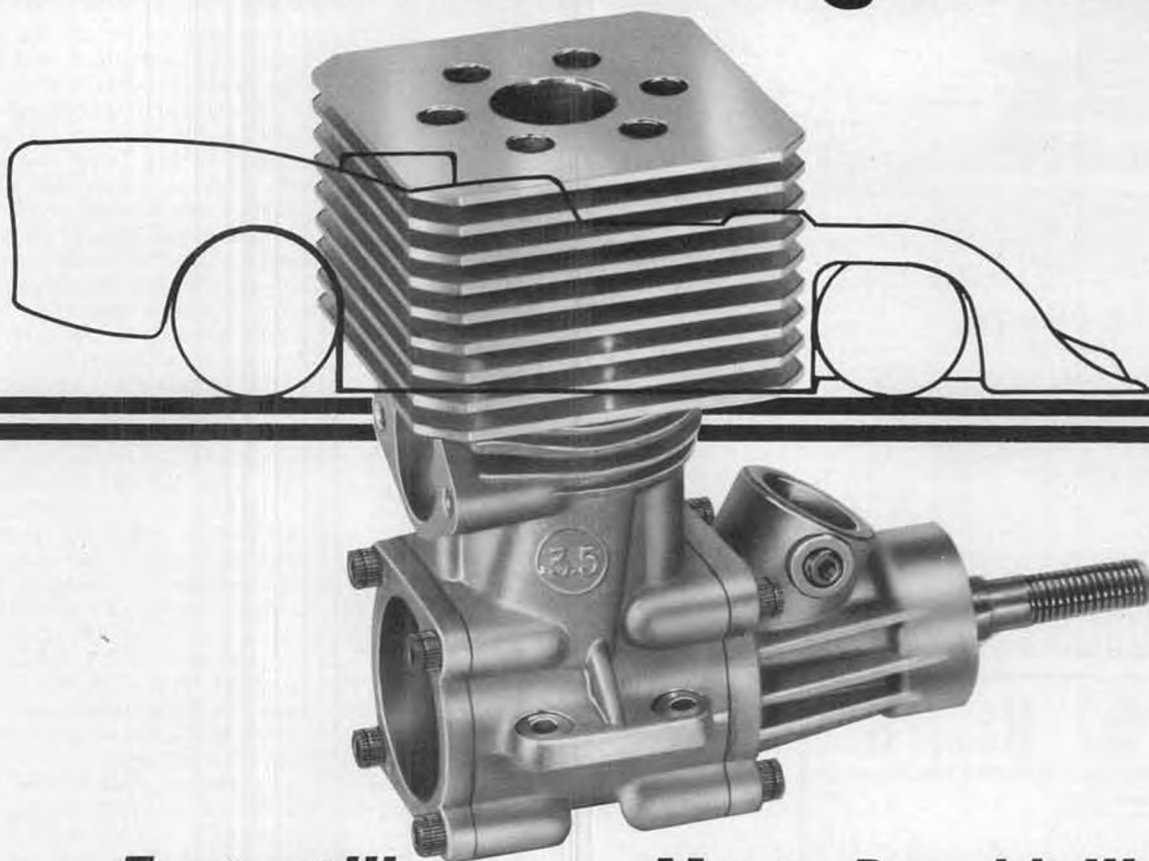
Next point of discussion: why these three sizes? Firstly, you will note that the two larger sizes are what can be called development classes. The .21 size is popular with the car and boat enthusiasts. The .40 has been popular in the aircraft faction for a long time. Several highly competitive units are available in either of these sizes.

Now, you may point out that the .09 is not a development class, and right you would be, but that would not take long to change. There are some high quality motors manufactured in this size, so there is something to start with.

Another consideration is that if the international standard size is reduced someday, the .09 will most likely be the size.

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respect to bitty bore enthusiasts, the .049 size engine has some drawbacks. Most conventional models of this size are too easily affected by the wind, not making them very suitable for the novice. A size a little larger should be less fussy to operate.

For those who still feel a need for .049 sizes events, refer back to the local rules discussion.

Now then, how would these classes fit all the events we now fly? The stunt and scale types would be virtually unaffected. The speed section would be a total rewrite. How nice, just A, B, C, and Jet. The present 1/2A and A would compromise into one, and the current B would be downsized. A .40 event already exists, and the D class could just be dropped. Macho types could still fly jet.

The racing section would also be a major rewrite. The .40 is in use presently for Rat, but the other sizes are not used. With these three sizes, there would exist a real event selection possibility, if each size was split somehow into novice and advanced categories.

What about combat? The .09 size would offer much the same benefits as the present 1/2A class, such as reduced cost, and crash damage resistance. The .21 might be a good size for a "slow" type event. A .40 would be wild with current technology, so some restriction could be thrown in for this size.

The .21 size would also be a natural for carrier, as there are some groups flying a .15 class for fun. Of course, the .40 size class already exists.

I will stop the fantasizing at this point, lest the gods of conformity and non-change bestow some brimstone upon me. I am not really serious about what I have written, but some of it makes sense. Such sweeping changes are never likely, understanding that the masses have their own interests and investments.

All of this discussion very handily leads into the next subject. Namely, that it is time to start making the first move in the rules changing game for the '86-'87 season.

The deadline for making a basic rules proposal is September first of this year. Thoroughly review the section titled, "Contest Board Procedures" in the April 1984 *Model Aviation*. This will tell you everything you need to know, except why rules cannot stay the same.

When considering any modification of rules, please keep in mind the following basic, but important criteria. Firstly, will any changes make equipment obsolete? This is a concern for both the participant and the manufacturer. Secondly, will the change enhance participation? If you have any questions, contact your district contest board member. He is listed in the previously mentioned publication.

BITS AND PIECES DEPARTMENT

The Precision Aerobatics Model Pilots Association (PAMPA), seems to have revived. I recently received a copy of the new newsletter, "ProStunt News," after a long absence of PAMPA literature. If you are interested in stunt flying, then send \$7 to: PAMPA, 329 Lincoln Place, Brooklyn, NY 11238. You will find that much of the information in the PAMPA newsletter is also relevant to sport flying, and CL in general.

I received a nice letter from Cyrus Stow, of Conyers, Georgia. Besides sharing some of his insight regarding the present and future of aeromodeling, he tells of his work on a large electric CL craft. This is an area that has not yet had a lot of development. Anybody else out there working with electric power for CL? Keep us posted, Cy.

It seems that the control line fraternity has always been number one in two-cycle development, but it has overlooked other power alternatives. Hey, besides trying little electric motors, why not use modified chain saw engines for huge models. What a concept. Why it could revolutionize modeling! Think of it. Huge quarter-scale size models on 200-foot wires, swinging 22-inch props! Control line quarter scale would give new meaning to *macho*, as only a *real* man could have fun flying something like this.

Sissies could always group together, and fly using a community handle, so as not to feel left out of this new wave. I think I will start hacking on a 12 inch alloy bellcrank, just as soon as this smelly can gets capped...

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Pattern Continued from page 17

5) Our last conclusion is that you will be better off using a model designed specifically to take advantage of the four-cycle engine's characteristics than trying to rehash an existing design.

I would like to share with you some ideas we have developed so far. Maybe you have some other ideas which will work with them . . . maybe you have better ideas! Whichever the case, here they are.

A) Mount the engine solidly in a mount arrangement which will absolutely stop crankshaft whip. If you don't, the engine will beat your servos to death!

B) Avoid inverted engines or upright engines. The side mount setup is easier to handle.

C) Strong, well balanced propellers are a must. Don't play around with chipped, cracked, or weird grained props. Also, don't smash the prop hubs with undersized spinner cutouts. These engines produce much power!

D) Don't be afraid to try a fixed gear model. Photo No. 6 shows the lightest set we know of. It's wire with a ply/balsa stiffener. Photo No. 7 shows it from the top.

E) Airfoils are worth experimenting with. Photo No. 8 shows the airfoil (symmetrical) for the horizontal sta-

bilizer hinged at 50%. Effectively, we now have a variable camber airfoil. Think about it. It is very effective at low airspeeds and requires minimal travel. It is even more effective than a stabilator in my opinion.

F) Make the model easy to fix or adjust. In Photo No. 9, arrows show the two 4-40 threaded rods which hold the tailfeathers together and fix them solidly to the fuselage.

G) Use large ailerons. Photo No. 10 shows the underside of the wing, and gives you an idea of the percentages we feel can work very well.

Look carefully at your present model. Is it designed for the type of flying you want to enjoy? If your evaluation is negative, you probably are ready for a model which sounds as good as it looks!

Enya/Zirol . . . Continued from page 23

doesn't think that World War I is quite over yet.

The two ships are the *Eindecker* E-111 and the *Morane Saulnier* N. Both ships use balsa and Lite Ply construction and have 55-inch wing spans. Both airplanes make excellent fun-scale projects for the sport flyer and are suitable for WW-I events like Rhinebeck. I chose the *Eindecker* . . . there's something about a nice, round tail . . .

Construction is really simple. There's no instruction booklet, however, the plans are clear, and there's lots of text on them. The fuse sides are full length Lite Ply with die-cut lightening holes aft of the wing saddle area. More Lite Ply is used to double the nose section. The fuselage top and bottom are sheets of 3/32 balsa, cross-grained. Ply bulkheads are used up front with balsa bulkheads in the rear. This is basically a strong, lightweight box which builds fast and, with the quality of the die cutting, needs very little sanding to finish off.

The vertical tail surfaces are flat stock, while the horizontal stab is built up to provide a lightweight, thicker airfoil shape.

The cheeks in the front are made of the supplied ABS plastic as is the cowl. The four-cycle engine necessitated the use of a long engine mount (Kraft 40 Long) which wouldn't fit in the cowl (too short). The problem was easily dealt with by extending the rear of the cowl with a piece of 3/4-inch wide ABS. As it turned out, I needed more nose weight at the end of the project, and I also felt that the ABS cowl was a little weak. The combination solution was to fiberglass the inside of the cowl using 3/4-ounce glass cloth and resin.

The landing gear is 1/8-inch music wire all prebent, but you must solder it together. I used Sta-Brite low temperature silver solder, and the results were

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just fine. The finished landing gear is simply held to the fuse bottom with clips.

Wing construction is simple and easy with two 1/4 x 1/2 spars and plywood joiners. Most modelers seem to need the addition of ailerons, but believe me, there is no need.

The aircraft was covered with World Engines World-Tex. This is an iron-on material which goes around curves easily and has a fabric look. It works and handles with ease, and I'm going to use it on a 1/4-scale Cub for my next project.

After the first scare, the plane flew with little effort and was a joy to fly. In preparation for the first flight, I checked the balance point, which was right on the mark, started the engine, and set the



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idle. The weather conditions were ideal, and there was very little wind. I gave it gas, and even though there is no tail-wheel, it took off straight as an arrow. As it started to climb out I gave the rudder a little right, and there I was, in knife-edge flight. A touch of left, and I found myself in opposite knife edge. Needless to say, all of this occurred at an altitude of no more than six feet. After landing(?) the Eindecker, which took place 75 yards away in the weeds, I put on a new prop and removed the cowl which was slightly damaged. I went from full rudder throw to about 3/4 of an inch each way. All flying after that went fine. Even at half speed, it performed realistic stall turns, loops, and big, round barrel rolls.

The engine, even though it was in an inverted position, ran smoothly with more than enough power. The balance point is important, so don't fly until you get it on the mark or a little forward. I used a six-ounce Kress Technology tank which fits perfectly, and placed the 500 mah battery pack wrapped in foam, on top, tucking it forward to the firewall. This makes a perfect nest for the pack due to the way the center section of the wing is built with the cockpit.

I found the combination of airplane and engine a good marriage, a pleasure to build and fly. I hope you will too. •



R/C Autos . . Continued from page 47

straight when you want it to turn. Up front are the ribbed type favored by serious off-road racers. Out back is a set of the most impressive looking knobbies imaginable. If these things won't get a bite, you're racing in slime.

The body of the Frog (you wouldn't believe the number of puns I've been resisting) is another indication that MRC/Tamiya is very serious about this car. They gulped hard and tossed out any ideas about including a hard shell, super detailed number, and instead included a light Lexan number with the Frog. To do the job right, they even die cut a semicircle for motor clearance, and die cut the upper, inboard cutout for the front suspension. It's a little detail, but you can't imagine how much this helps in trimming the body properly. **ENOUGH DISSECTION ALREADY, TIME TO BUILD MR. FROG. . .**

To the uninitiated, the Frog may appear a little complicated, but building it is no problem at all. MRC/Tamiya supplies directions and a method of identifying each and every part that is so effective that it would be hard to imagine anybody having trouble building the racer. In fact, going in, I was already familiar with MRC/Tamiya building instructions, and regarded them as a challenge to find at least one wrong item.

Surprisingly enough, I was rewarded almost instantly with a call-out for 4 x 12mm, self-tapping screws (common to A2 and C3 for those following along, page three in your hymnal) where 4 x 8mm screws were supplied and are the correct fasteners. From then on, everything went perfectly, at least it did until I finally realized C1 and C4 (upper and lower links for the front suspension), are *not* mirror-image parts as I had assumed.

With the car almost ready to run, I was getting quite desperate to find just one more little error, and I was finally rewarded when it was discovered that the speed control end of the supplied (and prebent!) pushrod fouled a small rivet on the speed control board. The offending Z bend had to be ground slightly to allow it to clear the rivet.

And so, while I am known as a real picker of nits when reviewing kits, I almost feel defeated when all I can come up with are two inconsequential snivelings when dealing with a piece as complicated as the Frog. It takes lots of bucks and tremendous thought to come up with instructions this complete, not to mention engineering the car so that all the parts *fit* properly, but MRC/Tamiya has accomplished what would seem to be an almost impossible task. **PLAYING LEAP FROG. . .**

WHAT ELSE?!

One of the claims made for the Frog is that the mass balance of the racer is such that it jumps well. (I'm still resisting puns.) So we blasted that sucker off flat-toppers, over peaked jumps, down fall-

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away jumps... If there was a drastic elevation change we ran the *Frog* over, up, and down it. Sure enough, it does jump well, flies fairly level, lands properly, and with all that trick suspension going 'boing' at the right times, even a crossed-up landing generally comes out OK. Of course, everything has its limits, and when we got really ridiculous with the size and shape of some of the jumps, the *Frog* would come down on its front bumper, resulting in the predictable forward roll type of crash that is so crowd pleasing.

Out in plain ol' dirt, the *Frog* is just terrific. It has enough power to promote hangin' it out, a differential to tame power delivery just enough to keep the car drivable while it is doing its thing sliding through the corner, and a suspension system that allows you to actually put the car where you want it instead of letting it drive you all the time. Ricocheting from berm to berm might be all giggles for awhile, but soon you want the car to go where you point it, and in my admittedly limited experience with off-road racers, the *Frog* does this better than any other I have driven.

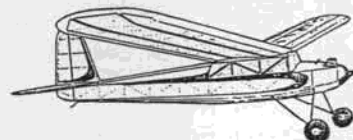
Typically, my race car reviews are not complete until the DRT actually races the individual cars in question. We are taking a pass this time, however. As already mentioned, time is really short for getting this article in to **MB**. The one weekend we had the car running, there were no off-road races being staged in this area, so we'll have to do a follow-up

of some kind a little later on. For what it's worth, I am aware of the off-road scene, and what is required to do well. I don't see the *Frog* as being a limiting factor in my first race, I just need to figure out the quick way around the track, and then drive it!

So, even though this particular *Frog* has not had the acid test of head-to-head competition (oh, gag me with a frog liver, can you imagine what a for-real frog would taste like after an acid test?), the package as a whole is just super. The *Frog* is great fun, whether you want to try off-road racing, or you are simply looking for a new home for that spare two-channel radio. The *Frog* is an O/R car that will give pleasure from the first time you open the huge box to the last roostertail of dirt you throw as the sun sinks out of sight. The *Frog* off-road racer is money well spent.

Astro Part 2... *Continued from page 51*

Roy Mayes had a very well done Dormoy *Bathtub* replica, that is, the model was a scale model of the *replica* of the original plane. All the rigging was there, as was the dummy engine, right down to the hose clamps on the rubber hoses! I wish you could have seen the flight! It rolled about 50 feet, had a slight rotation, and climbed out to a nice, stable flight. As the motor slowed, it lost height and smoothly landed on the runway. The model got 99 points out of



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a possible 100, very well done indeed!! The only model to match these flying points was Ferrell Papic's Bleriot No. 7 Monoplane.

Bill Warner placed second with his 1911 Paulhan-Tatin *Aero-Torpille*. If you think that is a mouthful, you ought see the model. It is a pusher monoplane with the prop at the rear of the fuselage. The wings are elliptical in dihedral, and the fuselage is round in section. The full-sized plane was one of the first to exceed 100 mph and was powered with a Gnome rotary engine.

Gene Wallock had made a Corbin *Super Ace* model of about 48-inch span. He had originally put a radio in it, flying it R/C for a while, but he removed the

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radio to fly it in this contest. It flew so well that he said that he will never put a radio in it again! This is a good scale subject for an Astro 035 with a geared prop. If you want to try it, John Pond has plans for it that can be modified for electric power very easily. By the way, it placed third in Scale Flight to give you an idea of what it will do.

Bill Warner also entered a Lee-Richards No. 3 Annular Wing Mono-

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plane, (good grief, where does he find these planes with such long names!). I mention this model for four reasons. Firstly, it is a good looking model. Secondly, it flies like a bird (that is, if that bird had round wings). Thirdly, it draws the attention of every photographer at the event, whether it's on the ground or in the air. The fourth reason I mention it is that Bill entered two models in one event. As scale director of District Ten, I received an unsigned letter that a modeler had entered two models at the Flightmasters Annual last year. We on the west coast allow this with the understanding that only one model shall receive a trophy in each event. This gives all entrants an even chance to obtain a trophy, and yet allows one to fly as many models as he or she wishes in each event. Why put this in a magazine??? As I said, the letter was unsigned, and I would like the person to know that I do read my mail, and that this is the reason we allow multiple entries in our events.

As I mentioned at the beginning, I was really in bad shape physically to run a contest. If it hadn't been for Roy and Pat Waddell running the table, and Kim and Cynde Waddell timing models, (along with many others), this event wouldn't

have been possible. I can't thank you enough, it sure makes one glad to have such good friends.

Bob Boucher donated many prizes (mostly motors) for the contest. These were given out by drawing the names of all who entered from an Astro Flight charger box (what else?). I think that all contestants had a great time, each seemed pleased with their prize, and many of us learned something new in electric free flight, but then, that's what contests are all about, right?

The results are as follows:

OPEN DURATION

1 Barnaby Wainfan	Circuit Board	333
2 J. Maher	Country Day	332
3 Joe Tschirgi	O.D.	321
4 Jim McMahon	Powerhouse	297
5 Jim McDermoth	Hummer 3	294
6 Lynne Wainfan	Zicky Zolt	227
7 Tony Naccarato	Ro-dan	116
8 Jim Ogg	Satellite 350	94
9 Roy Waddell	Webster Webfoot	87

JUNIOR DURATION

1 Cynde Waddell	Kay Cee	360
2 Kim Waddell	Kay Cee	341

020 REPLICA

1 Jim McMahon	Powerhouse	272
2 Jim McDermoth	Strato Streak	252
3 Addie Naccarato	Clipper	85

SCALE

1 Roy Mayes	Dormoy Bathub	
2 Bill Warner	Aero-Torpille	
3 Ferrell Papis	Bleriot No. 7 Monoplane	
4 Bill Warner	Lee-Richards No. 3	
5 Gene Wallock	Corbin Super Ace	

Fuel Lines . . . Continued from page 52

mendations on the 1941 chart with those I listed in the March issue, you'll notice that the latter are decidedly "less prop." However, remember that this latter list is a consensus of what current Society of Antique Modeler (SAM) flyers feel is best. It should also be noted that there are considerable differences between the props of today and those of over forty years ago.

Subsequent to compiling the March list, I've had sufficient input to conclude

that most of the modelers today prefer the Top Flite Super M 12-6 prop for the Super Cyclone. While this is only one example, the 1941 list seems to suggest that at that time a fair amount more diameter and pitch was the trend for engines of around .60 cubic inch displacement. This is pretty much representative of the differences for all engines between then and now.

Certainly, the subject of ignition props has not been completely exhausted, but what information has been provided here should provide a good basis for flight operations. Your added comments will be most welcome.

If anyone wants a bit more nostalgia, send me a stamped, self-addressed envelope, and I'll return a Xerox copy of the 1935 drawing of the recommended propeller design for the Brown Junior motor. Bob Scarsdale of Park Ridge, New Jersey, sent it to me. Thanks Bob.

Guys, take care . . .

F/F Scale . . . Continued from page 60

Often I'll start a project or test an idea for this column. Once that has been accomplished, the project is set aside indefinitely. The problem is that the indefinitely postponed projects are taking up too much space! You know what? I don't care! I love modeling, big or small, and as long as I can glue or weld a couple of parts together, the happier I am.

Presently, I'm preparing for the Flying Aces Nats! Due to my commitment of building another full-size Marquat Charger, I don't have the time to start another fresh project. Instead, I dusted off a model which I started a couple of years ago. It's all framed it's ready for the installation of the pendulum device for the ailerons, and then it will be ready for covering. So, you see how my system works!

PRACTICAL SCALE LANDING SCALE

A model's landing gear is one of its most important structural members. To me, there is nothing worse than a rigid landing gear. On a hard landing, the fuselage can be broken up severely, destroying weeks or months of work. Therefore, I try and make all of my landing gear installations free to move in case of a bad landing. Sometimes, a design will not always lend itself to this type of movement. Some airplanes have landing gears that are so heavily braced that it's too much work to make them into "working" gears. Such is the case on the model I'm describing. To make matters worse, it's a rubber model. A rigid landing gear on a rubber powered model is particularly bad news because rubber models have such light structures. They usually can't take much of a prang.

My model has a main gear leg with a trailing arm (see Figure 1). It also has a "spreader bar" for lack of the proper term. If all of these parts were made from wire and were soldered together, and then were rigidly attached to the

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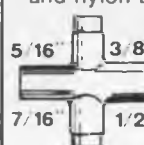
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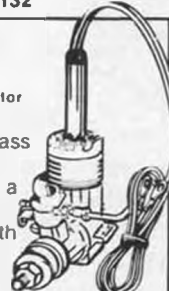
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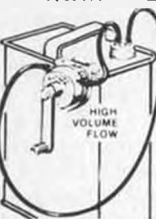
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fuselage, you can see what I mean. My solution may be simplistic, but sometimes this approach works a whole lot better than being clever!

The main gear was made from wire and mounted onto the fuselage in the usual manner. This model has wheel pants, so they were also carved and mounted. Now the simple part! The trailing arms of the gear were made from balsa and sanded to shape. Several of these were made as spares (I'll explain this momentarily). The spreader bar had a curve to it, so it was made from laminated basswood. All parts were fitted and painted with Floquil. Both the trailing arms and the spreader bar were attached to the main gear and fuselage using Pliobond contact cement. Care must be taken to use only enough cement to do the job. This stuff is really messy, and it can botch up an otherwise great model.

At this point, you might be wondering why not use regular adhesives or Zap? The contact cement provides good adhesion, but more importantly, it provides flexing at the joint. Didn't I tell you it was simple? Why the spare trailing arms? These are the most likely to crack or break in a rough landing. If this should happen, the spare is ready to "contact" in place.

Pliobond and other comparable contact cements are yellow in color. There's another good product used by model railroaders, called Goo. This, however, is a very dark brown in color. Maybe come of you may know of one that dries clear. Another possibility is to use the clear silicone rubber, but I don't believe that it holds as well. At any rate, maybe I've given you something to think about.

ADJUSTABLE F/F SCALE EMPENNAGE

Many times when tackling a rubber scale model, I have to decide whether I want to build separate parts for the stabilizer and elevators, or just build a

single unit. The advantage of separate units is twofold. Firstly, it looks more scale (obviously), and secondly, they can be made moveable for trimming purposes. On smaller models with tails made from 1/16 stock, this may not be a good idea. So, how can these be made moveable without going through all the hassle of separate parts? (See Figure 2.) What I do is cheat a little. I glue in a small piece of copper wire as shown in the sketch. This in turn allows the elevators to be adjusted (inboard only) without cracking the structure. Give it a try. It beats ungluing the tail and inserting wedges here and there to get the adjustments you need!

A rudder can be rigged similarly, but I don't feel that it is necessary. Most rudders can be tack glued into place, the model can be flight tested, and then it can be permanently attached when the flight pattern is satisfactory.

BUSY PEOPLE KITS

As I was finishing this article, the latest release from Peck-Polymers crossed my desk.

Peck-Polymers has come out with a completely new series of easy to build all balsa profile models. The kits are called "Busy People Kits" as they require very little time to build. Everything is pre-fabricated and only requires glue.

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The models are rubber powered, have 15 to 16-inch wingspans, are profile type models, and meet the rules for FAC No-Cal contests. The first four of the series are the Citabria Champion, Stinson Sentinel LS, Cessna Aerobat, Zlin 50L.

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For the complete Peck-Polymers catalog, send \$1.50 to Peck-Polymers, Box 2498, La Mesa, CA 92041.

Hannan Continued from page 49

TED HANNAN, my father, passed away in February at age 78. Although not directly involved in aviation during most of his life, he had known several early aviators because my grandfather had owned a strip of land adjacent to the Billings, Montana, airport. During World War II, Ted had served as a B-17 tail-gunner, which left him with an appreciation for aircraft, but a dim view of war and politics. Later, he became interested in the audio business, and devoted much of his time and talent to quality recording of music. Meanwhile, his younger son, Mike, took up flying, and eventually became a corporate pilot. Ted's loss is a severe one, and his

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75th ANNIVERSARY

Not many magazines can claim 75 years of publication, but *Flight International* can. We received a copy of the milestone issue, thanks to Ron Moulton. Launched during 1909, the year of Louis Blériot's epic flight across the Channel, the magazine has documented much of aviation's history. The changes undergone are readily apparent, both in the aircraft and the publication, as is made clear by the inclusion of 16 pages reprinted from the first 1909 issue. A greater contrast could scarcely be imagined than the photo of a Voisin Boxkite in flight opposite a full-color photo of the Rockwell B-1B taking off.

Yet, historian Philip Jarrett puts matters into proper perspective with his article "So What's New?" pointing out that virtually every "modern" innovation has been tried long ago. The list would include many configurations currently being touted as new: canards, tandem wings, variable geometry surfaces, pusher props, extension shaft drives and asymmetrical designs are all truly ancient ideas.

Looking ahead, Professor John Allen and painter Frank Munger examine everything from ultralights to ponderous transports in their effort to predict future developments in "The Next 75 Years in Aerospace."

To us, however, it was Roger Bacon's tongue-in-cheek article which best summarized the attractions of the sky: "We know that levity is the antithesis of gravity. We know also that aviation is the defiance of gravity. Therefore, to a close approximation, levity is the spirit of aviation."

RUBBER STAMPS, ANYONE?

George Ardwin, of Aerostamps, 60 Ely Ave., Box 56, Sabina, Ohio 45169, offers a comprehensive array of rubber stamps expressly created for aircraft enthusiasts. These are just the tools to personalize your envelopes, and they encompass nearly every taste in flying machines. A brief sampling: Douglas DC-3, Curtiss P-40, Stitts Sky Baby, Ryan ST, Vought "Flying Pancake", Volksplane, De Havilland Autogiro, Dyke Delta, BD-4, Republic Seabee and well, you get the idea. One dollar will bring you an illustrated list. Please tell George that **Model Builder** sent you.

HIGH-TECH TRANSPORT?

Have you heard about the new dirigible for politicians? It's called the *Graft Zeppelin*.

BOSTONIANS BLOSSOM

Bostonian Class models continue to gain popularity, even in Nebraska, where Tom Winter calls them "Lincolnians."

An outdoor contest in California between the San Diego Orbiters and Scale Staffer clubs had a unique distinction: Walt Mooney, a member of both organizations, flew for both teams! (He won.)

PEANUTS IN GERMANY

Siegfried Glockner wrote to say that even though interest was limited at first,

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Flying Machines." If you remember the flying scenes with the Antoinette, Acro triplane and Eardley Billing, chances are you saw Wheeler in action. He was also a display pilot for the Shuttleworth collection aircraft at Old Warden, and until quite recently, maintained his own *Tiger Moth*. Wheeler was aged 80, at the time of his death.

RON WARRING. In January, one of the most famous and productive British model builders, Ron Warring, died. Long associated with *Aeromodeller*, he helped produce the highly regarded *Harborough* books, as well as an extensive series of his own volumes spanning interest from solid models through gas models and boats. He also managed to find time to participate in the production of kits and advertisements for several manufacturers.

As an active competitor, Ron specialized in rubber power, and was a member of England's Wakefield team during 1949, 1950, and 1952. In the words of Ron Moulton, "Ron Warring's work will become his own memorial, and, though he has gone to the great runway



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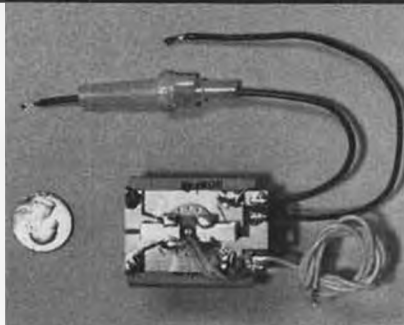
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A wooden building fixture is needed to hold the framework in place during initial construction. The building fixture should be 7-7/8 inches in width by 32 inches in length, and at least two inches in depth. I have a friend with a table saw who helps me make my building fixtures out of scrap pieces of plywood or particle board. Any type of wood can be used for making the building fixture. I draw lines across the building board where the frames will be placed.

Cutting the parts for the *Sprint 7.5* will be a fairly time consuming task. Let me offer a few suggestions dealing with cutting out the parts. As much as possible, use the factory edge when you need straight edges. This is especially

important on the sponson keel. It is important that the bottom of the sponson be flat. Something else to remember is to leave a little of the line marking the part. You can then sand the part down to the line. However, if you attempt to cut exactly on the former line and cut under the line, it is difficult to build the part back to the correct shape.

There are a couple of methods which can be used for transferring the plans onto the plywood. One technique is to use something like 3M's tacking spray and stick the plans to the plywood and then cut the parts from the plans. The paper can then be scraped off the part. This works very well, but you end up with no plans to build another model. Although I know **Model Builder** would be more than happy to sell you another set of plans, there is a technique which will allow you to recycle your plans.

Your nearest office supply or art store should have some material called tag board. This particular type of paper is not as thick as poster board, and it can be cut easily with scissors. If you stick the plans to the tag board you can then create a set of templates that can be used numerous times.

BUILDING THE FRAMEWORK

Construction of the *Sprint 7.5* begins with the joining of the sponson keels, cockpit sides, and cross frames. On your building fixture, mark a line 3/8 of an inch below the top surface and running the length of the building fixture. Do this on both sides of the building fixture.

This is a reference line for setting the sponson keels to the building fixture. Before beginning construction, cover the building fixture with clear plastic Saran Wrap or Cut-Rite waxpaper.

I like to use aluminum map tacks for all my pinning. The shank of the pin is not apt to bend, and it is possible to hit the head of the tack with a small hammer to drive the pin into the material.

Tack the sponson keels to the sides of the building fixture. The bottom of the sponson keel should align with the 3/8-inch reference line. Use the cross line for the first frame to align the two sponson keels so that they are perpendicular. The cross frames are now inserted into the notches in the sponson keels. Do not glue anything together yet. Next, the cockpit sides are positioned against the cross frames. Carefully check all the parts for proper alignment. When you are satisfied that all these parts are aligned properly, hit them with the super glue and accelerator. While the framework is still on the building fixture, attach the mid and top sheer pieces.

Remove the framework from the building fixture and place it on a flat surface. You should be able to place your finger on the transom and press the boat down flat and both sponson keels should touch the surface at the same time. If the framework is twisted, now is the time to attempt to remove the twist by gently, but firmly, applying pressure to the framework in the opposite direction of the warp. It is vitally important that the framework be straight. A warped hull is not going to perform as well.

With the framework removed from the building fixture, some of the stringers can be attached. The inside tunnel stringers can be glued to the frames and to the keel sponsons. The two pieces of 1/8 x 1/4 stringer material can be glued to form the tunnel keel. The bottom sponson sheet stringer can be glued to the frames and fitted to the front of the sponson keel. This stringer will need to be cut at an angle where it attaches to the front of the sponson keel.

Using a sanding block, sand the bottom edge of the 1/8 x 1/4 sponson sheer so that it is beveled even with the bottom of the sponson. Sand the sponson side mid sheer to accept the non-trip side piece. Use a straightedge laid lengthwise on the framework to check for any frames that might be too high. Any areas that are too high should be sanded to conform to the hull lines.

SHEETING THE FRAMEWORK

The bottom tunnel sheeting is applied first. Prefit each section prior to gluing. Check to make certain the sheeting is positioned tightly to the framework. I suggest coating half the tunnel bottom framework with a product like Hot Stuff Super 'T,' and then spraying the sheeting with an accelerator like Hot Shot. Carefully line up the bottom piece on the framework, and then just use hand pressure to apply the sheeting. If you're not that confident about your ability to

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correctly line up the sheeting, don't apply the Hot Shot until the sheeting is positioned on the framework.

The next parts of the hull to be sheeted are the sponson sides. Begin with the non-trip. Make certain the top edge of the non-trip conforms to the mid sheer line. Glue the non-trip in position against the bottom sheer and mid sheer.

Before gluing the sponson sides to the framework, it is a good idea to glue a strip of scrap stringer material along the top outer edge of the mid sheer. This stringer will provide a gluing surface for the butt joint of the sponson side and non-trip at the mid sheer. Cut these pieces to fit between the frames. The sponson sides are then glued in place.

Trim the excess sheeting along the top and bottom sponson sheers to conform with the angles of the next sheeting to be applied. The sponson bottoms are now glued to the framework. Remember that the sponson bottoms extend past the sponson keels 3/16 to 1/4 inch to create the sponson edges. Beginning at Frame 4, taper the sponson edge until it fairs into the sponson tip.

The hull should be sealed before the deck is applied. I use Hobby Pox II, a heat gun, and Rocket City epoxy brushes to seal my hulls. When heat is applied to the Hobby Pox II, the glue changes to the consistency of a paint. I drop a glob of epoxy in a compartment, hit it with the heat gun, and brush the epoxy around the compartment. This not only seals the wood, it also greatly strengthens the hulls.

The deck is the largest sheeting that will be applied. Because the sheeting is large, and proper alignment can take a little time and effort, I prefer to use epoxy to glue on the deck. However, we have to do a couple of things before attaching the deck. Glue the 1/8 plywood bow pieces in front of Frame 5. Cut down Frame 5 to where it is even with the bow pieces. This is shown on the plans. The 1/8 x 1/4 deck stringers

can now be attached to the top of the deck framework. The front end of these stringers will need to be cut at an angle allowing them to fair into the bow pieces.

Coat the top of the deck framework with epoxy, and apply a thin layer to the side of the deck sheeting that will be glued to the framework. Use masking tape, map tacks, and clamps to hold the deck sheeting in position while the glue sets. Lay the hull upside down while the glue sets. This will assist in keeping the epoxy on the frames and deck. After the epoxy has set, trim the excess sheeting.

INSTALLING THE TRANSOM MOTOR MOUNT

I have begun inserting the transom motor mount on my tunnel hulls. This is not a new idea. It does a couple of things that I believe are beneficial. It helps move the balance point forward (and this is usually something most tunnel boats need). It also brings the propeller closer to the back of the sponsons, and I think this improves handling.

Cut away Frame 1 as shown on the plans. The 1/4-inch transom motor mount is installed 2-1/2 inches from Frame 1. Glue the 1/4-inch transom braces in position against the cockpit sides. It's a good idea to glue a piece of 1/4-inch square material on the back side of the transom motor mount against the cockpit side and the mount. These braces are very important. Without them, a transom can be ripped out of the hull if you run over something.

THE FRONT COWL

The front cowl deck consists of two pieces of 1/8 plywood. These pieces cover the front cockpit deck between Frames 4 and 5. Glue front cowl Plate 1 and 2 in place. The 1/32 front cowl piece is installed next. Glue the front cowl former in position across the back edge of front cowl Plate 2. This is right over Frame 4. Glue a piece of scrap material 1/2 x 1 in front of the front cowl former and along the edge of the cockpit side. This will assist in gluing the front cowl

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piece in position. The back edges of the front cowl should extend 1/2 inch past the front cowl former. After the 1/32 front cowl is attached, the front cowl former can be cut.

Use clamps to position the 1/32 front cowl on the front cowl former. When the piece is properly situated, release one of the clamps slightly and glue the cowl to the cowl frame. Retighten the clamp and hit the glue joint with the

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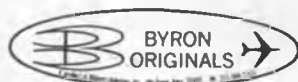
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accelerator. Repeat this on the other side of the cockpit. The cowl can then be glued to the front cowl plates. The front nose piece can be shaped from a small block of pine or spruce.

THE BACK COWL

Over the years, I've tried various methods of building back cowls for tunnel boats and various techniques for holding the cowl to the cockpit sides. The method of building and attaching the back cowl on the *Sprint 7.5* is closely associated.

Allen head bolts and blind nuts (4-40) are employed to keep the back cowl on the boat. On the plans, the locations for the blind nuts are shown. The blind nut

used on the front of the cowl will need a piece of scrap 1/2-inch square plywood glued in back of the front cowl former. This will provide sufficient material for the blind nut to set itself. The blind nut holding the back of the cowl is positioned in the 1/8 cockpit side.

Notice that the side of the back cowl overlaps the cockpit side by 1/2 inch. Position the back cowl side piece against the cockpit side and drill the holes for the bolts and blind nuts. Install the blind nuts and then lay a section of Saran Wrap over the back of the cockpit where the back cowl will sit. Bolt the back cowl sides to the cockpit sides. With the sides held firmly in position by the mounting bolts, position the back cowl frames and glue them to the sides of the back cowl. The Saran Wrap will prevent the back cowl framework from sticking to the cockpit sides. Glue the 1/8 x 1/4 back cowl stringer to the frames. To allow the stringer to bend between Frames 2 and 4, make cuts every 1/2 inch into the stringer. The cuts should only go 1/8 inch into the stringer.

The back cowl top can be glued to the back cowl side and stringer. The back cowl fin is now glued in place. Use 1/8 balsa wood to sheet the top of the cowl fin. Lay the balsa wood cross grain when sheeting the cowl fin.

THE TUNNEL RAMPS, FRONT AIR DAMS, AND BOW WING

These items are "add-ons" after

construction of the basic hull and cowls. I'm not all that convinced that the air dams make a big difference in the boat's performance. However, they do provide scale appearance and serve as part of the mount for the front wing. The tunnel ramps and bow wing definitely provide assistance in the handling characteristics of the *Sprint 7.5* and on most other tunnel boats I've installed them on.

The installation of these items is rather easy, and the locations are shown on the plans. The use of 4-40 bolts and blind nuts on the bow wing allows for adjustment. Build the tunnel ramps first, and then glue them to the hull. The ramps are spaced 1/4 inch out from the sponson keel.

THE RADIO COMPARTMENT

One-eighth plywood is used to make a top flange for the radio compartment. Use the pattern for the flange when making the radio compartment lid. Plexiglass of 1/8-inch thickness works well for making a lid. Before attaching the flange to the top of the radio compartment, drill the holes to mount the lid to the flange. Once again, 4-40 bolts and blind nuts can be used. Drill at least one hole in each corner and two holes equally spaced along the length of the lid. Bolts and blind nuts are preferable to screws because screws will tend to strip out after repeated opening and closing of the radio compartment lid.

NEXT MONTH WE'LL...

This should get you started on the *Sprint 7.5*. In my next column, I'll go into the areas of radio installation, motor rigging, finishing, painting, running, and trimming.

Jerry Dunlap, 119 Crestwood Dr. S.W., Tacoma, WA 98498.

Astro Part 1 .. Continued from page 15

seven cells, and a Keller 20/9 turning a 7x6 Taipan. It weighs 38 ounces, and flies like a Pylon job. Ken is an excellent pilot, and it was *pilots*, not planes, that won the Pattern event. I think we will see more of the Pattern style planes in the future, now that it is quite clear that they fly very well as electric.

In Pylon, Steve Neu took first, Steve Manganelli took second, and Rick

Schrameck took third. Steve flew his twin 05 plane that is a real veteran, it has been to three Astro contests now. Steve won by consistent flying; his was not the fastest plane there. Steve claimed his flying was off this weekend, but look at his placing! The rest of us should have such off days!

The plane that really made me sit up and look, though, was Steve Manganeli's original design, the *DC Tempest*. Both he and Rick had similar planes, and they were FAST! My feeling was that they easily averaged 70 mph, and both Rick and Steve could, and did, lap the rest of the field, sometimes more than once! Both used the Keller 25; Rick had the 25/9; Steve had the 25/SP6 turning a 7x6 Taipan, on seven Sanyo cutoff cells.

The *DC Tempest* has a fiberglass fuselage, weighs 40 ounces, and has 260 square inches of wing area. Note in the photo where the battery is located: in a string along the spine of the plane, above the wing. It's a clever and neat arrangement. It also solves the problem of having a large mass below the wing, which tends to make turns sluggish in the 05 size Pylon planes. For all-out 05 Pylon racing, these are the best planes I've seen.

In Scale, Clark Adams took first with his lovely *Monocoupe* built from an Astro kit. The radial engine alone was a work of art. It flew very well indeed with an Astro 05 cobalt motor using six sub-C cells, at 39 ounces. That is quite an accomplishment, both in building and flying.

Woody Woodward took second with his Astro Flight *Porterfield* powered by an Astro 15. This one is a veteran, and flies very smoothly and well.

Bill Young took third with his *Laser 2000* powered by an Astro 25 cobalt and 14 cells. It weighed 5-1/2 pounds, had 500 square inches of wing area, and had a direct drive prop. This plane flies very well, and in keeping with the full-scale version, it is fully acrobatic. Bill did a very nice job on the finish and detailing.

In Control Line Scale, Lon Tar took first with his F4U *Corsair*, John Goedel took second with his P47 *Thunderbolt*, and Eddie Pax took third with his FW 190. These are all veterans, powered by Astro 020s with four-cell packs in the fuselage. (Where else? Belt packs lose too much in the lines.) All have flown in several Astro contests and at the IMS shows where they do carrier landings indoors!

In Control Line Speed, Addie Naccarato won with her *Go Go Girl* using an Astro 05 cobalt motor with seven 800 mah cells. She flew an average of 60.2 mph. Carlo Goedel had the same setup in his original design, the *Electron*. It has the potential to closely rival the *Go Go Girl*, but had problems during the contest with its drop-off wheel carriage. Lon Tar entered his ME 109 scale model powered by an Astro 020, but did not finish the course. His average speed was about 30 mph. The Control Line Speed event looks quite interesting. I think the *Go Go Girl* and Carlo's *Electron* are pointing the way.

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I will not cover Free Flight, Bill Stroman will do that, but I would like to comment that the Free Flight contest is an absolute blast to watch. Those people have fun! The Open Free Flight event was very impressive this year with the models displaying excellent performance. But enough, I'll leave that to Bill.

Last, but not at all least, Bart Hibb's entry in the flying saucer division (which does not exist!) stole the show! Bart swears it is true scale, and he has a 1953 magazine report of alien flying saucers to prove it! Be that as it may, the saucer is equipped with an Astro cobalt 05 with belt reduction (2-1/2 to 1) turning a Rev-Up 11x6 prop. Power is supplied by eight sub-C cells. The saucer weighs only 44 ounces all up (only a 13-ounce structure!). How does it fly? WOW!!! You have to see it to believe it. I have NEVER seen such performance from an 05 before, and I have seen just about all of it. OUTSIDE loops, inside loops, rolls, you name it, it does all this at slow speed and close in, which makes it even more spectacular! Bart flew several times, and

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got applause every time! This one deserves to be written up as a construction article!

But enough, at the end of the day, Bob Boucher handed out the trophies, then the real prizes started. Every entrant had his name in the hat, and everything from switches to cobalt 40 motors were awarded. All entrants got something!

Thanks, Bob, for a great contest, and everyone is looking forward to the next one! •

BIG Birds . . . Continued from page 19

Fittings didn't impede fuel flow at any time. I don't know how much larger you can go in an engine before fuel flow is

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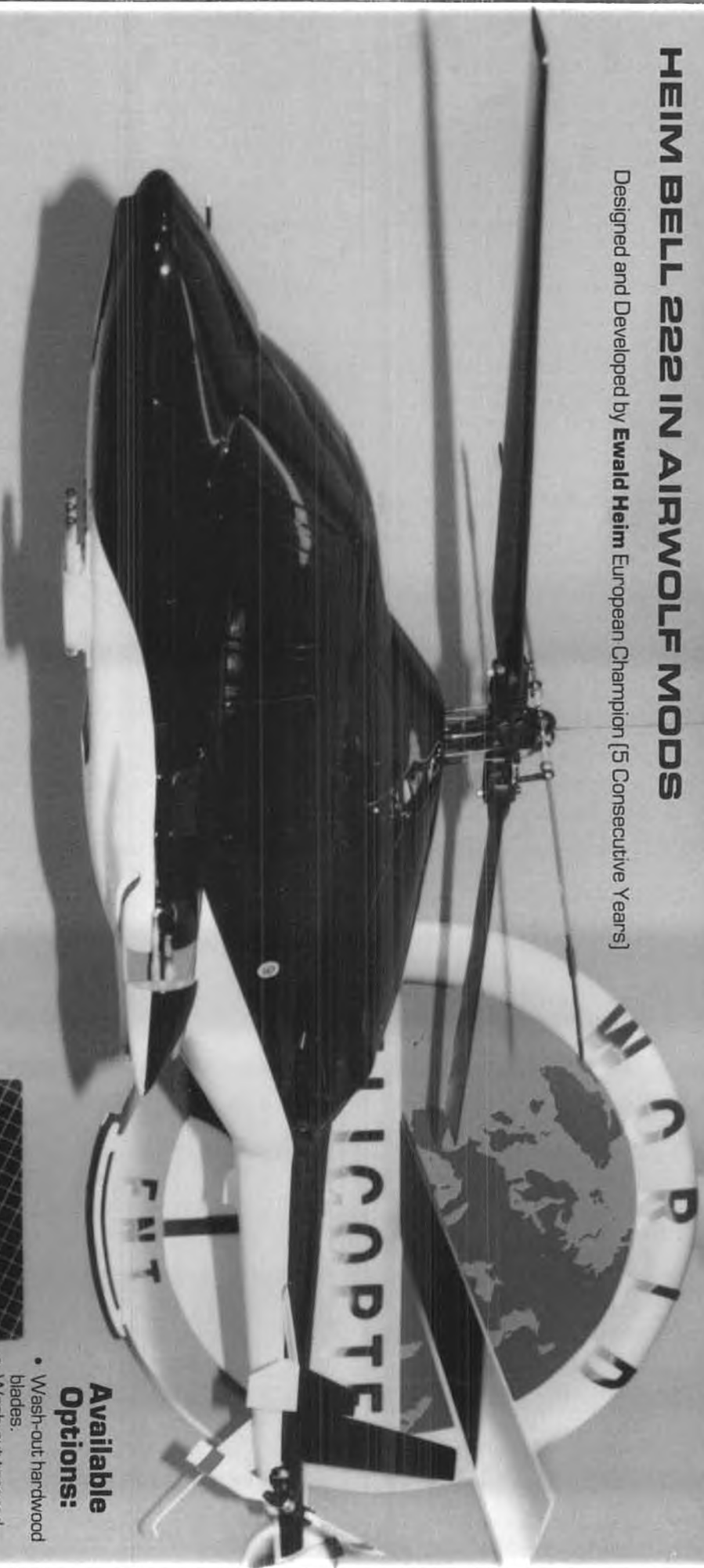
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adversely affected, so you're on your own there. Some testing on your engine stand might help, although I'll admit it's not the same as when the prop has a flight load on it.

By the way, these fittings are color coded red and green, which makes hooking them up pretty easy; not fool-proof, mind you... but it comes close to it. You've still got to use your eyeballs when hooking up or connecting anything. Make it a standard procedure to always use the red fitting for your engine to tank connection, and you'll eliminate any potential plumbing problems.

FIBERGLASSING WITH HOT STUFF

It's been almost a year since I've seen both of Satellite City's Hot Stuff videotapes, so I'd forgotten about fiberglass-

ing with CA... till somebody mentioned it. I shouldn't have been surprised that it worked so well; the biggest advantages over using resin or epoxy are speed and no smell. I glassed a wing center section and found it was ready for feathering in only 40 minutes. Beforehand, I thought the amount of Hot Stuff used would be prohibitive, but that isn't so. I reckon the cost is only a tad more than when epoxy is used, which is more than compensated for by the ease and speed of using CA glue. Here are the basics...

Firstly, you tack down the edges of the cloth with Hot Stuff. Do take those extra seconds to make sure that all the wrinkles are out. Then, starting on the bottom with the leading edge pointing down at a 45-degree angle, let the Hot Stuff flow in rows (horizontally) from trailing edge to leading edge. If you've got the wrinkles out, the CA will bond the cloth to the wing, and the difference in color will tell you whether or not some areas need more CA. Mist a little Hot Shot Accelerator on, repeat the Hot Stuffing on the topside... and you're all ready to sand (carefully) and feather the edges.

Don't be shy! Try this method and see for yourself that it really works... and works well... especially when you're pressed for time, or just feel too lazy to start screwing around with mixing up resin or epoxy. You're gonna be happy!

FOUR-STROKERS

Can't remember where I read it, but recently someone wrote that because four-stroke engines are so much more difficult to get running, beginners should start with the standard two-cycle glow engines. Now that's what I call a pretty lousy piece of advice, and a good indication that this particular individual shouldn't even be dealing with newcomers. He's forgotten that after years of learning to live with, and love, two-cycle glow types, he and most everyone else would naturally find it difficult getting used to another kind of engine. But the new guy won't have that problem because he has no prior knowledge about, or experience with, other engines to confuse him. So, because he doesn't have to "unlearn" anything, his learning curve for either a two or four-cycle engine should be the same.

Therein lies the big problem concerning these great new four-strokers; too many of us are trying to apply our two-cycle expertise to four-cycle engines. It's truly like trying to compare apples and oranges; the results are BAD! From the plethora of calls and letters from unhappy people within the past month or so, the problems encountered seem to fall into three basic categories: inadequate mounting, improper fuel... and under propping.

You shouldn't be using any kind of nylon mount for these BIG four-cycle brutes because they're heavier than their two-cycle cousins, and also sit farther out on their mount. They need to be much more solidly mounted to prevent vibration problems. There are only two ways to do this: use solid (maple) beam mounts, or use metal

mounts like CB's or Tatone's.

As for fuel . . . well, I'm still on my soapbox about "standard" glow fuel having way too much oil for four-stroke use. The Magnum seems to be the only engine that comes with worthwhile instructions about fuel. The Magnum people strongly recommend 8% oil content . . . which I've found out is actually a bit on the conservative side as my 91S does best with 6% oil. However, according to all other engine manufacturers, standard RC fuel is it . . . period. Now I can readily understand why these manufacturers might be fearful of those who suffer from acute "tweakitus," and they would insist on having a safety margin just for those jerks who'll tune an engine just right . . . and then can't seem to keep themselves from tweaking just that little bit more. (This is one reason why our regular glow fuel contains a minimum of 20% oil . . . to account for these tweakers.) However, it seems to me that at least twice the amount of necessary oil seems to be a gross over reaction to anticipated problems.

Here's a case in point. Ever since my review on the BIG Sig Cub, I've gotten *mucho* queries about how I got my four-stroke to run so well upside down. Some of the people have flat questioned my integrity, insinuating in no uncertain terms that because theirs are bears to start and to keep idling, that I must have not been straight-arrow about everything.

Well, up until last week, I could only guess about a solution . . . but now I know for sure. What happened was that on Thursday I stayed longer and flew more than I'd planned on doing, and ran out of juice. So, wanting to take advantage of the beautiful flying weather, I put the bite on the only other pilot there for six ounces of his petrol . . . and proceeded to spend the next 30 minutes cussin' and grumping. All of a sudden, my well-behaved Magnum became extremely hard to start, and equally hard to keep idling. I must have cleaned that %&?# plug at least a half dozen times . . . but in spite of all that plug cleaning and some very choice words to help, I never did get back into the air. My 12 volt battery gave up at the same time I did, so I packed it in. Of course, next morning the Magnum started right up using my home brew with 6% oil. . .

To me it looks like a basic case of "cause and effect." My engine started easily (only one zap of the starter) and ran well before and after trying the regular 20% oily fuel, and as the only variable in this accidental experiment was the use of the two fuels, I have to conclude that the excessively high oil content in the borrowed fuel was the culprit. So, much of the trouble these guys are having starting and running their four-stroke inverted must be due to the fuel they're using. I just happened to duplicate the problem by stumbling onto it.

Okay, now we finally come to . . . the under propping syndrome. What's hap-

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pening is that, with few exceptions, veteran RC'ers are trying to run their four-stroke with props they'd normally use on the same size two-stroke. We're so used to lots of noise and high rpm that we can't seem to help ourselves. And here, also, I feel that manufacturers are at least partially to blame. Although they do, generally, mention something about different size props for different types of aircraft, they also include in their instructions the engine's "practical rpm range" . . . which for the O.S. FS-120, for example, is 2,000 to 11,000. Because they can't relate to anything else but high rpm, people are eyeballing that upper limit and propping for it . . . or at least coming close to it, which puts them behind the power curve to begin with because in order to attain those high revs, they've got to be running with a prop that's too small to be effective. Then things really go to hell when they stagger off the ground and the prop starts to unload . . . all too often causing valve float when the engine's rpm



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exceeds the limits. And as if all this wasn't enough, failure to properly balance their props adds yet another problem . . . fuel foaming. It's no wonder so many guys have inconsistent and spastic running four-strokes . . . and in

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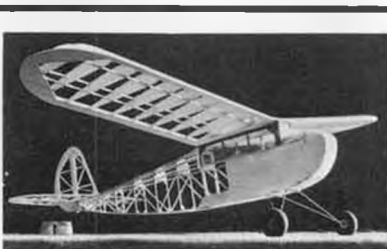
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many cases are ready to chuck the engine and go back to their dearly beloved two-cycle types.

Jim Smith, from Waco, Texas, was one of many who called about having engine problems. In fact, Jim was sort of calling for a few of his buddies, too; all of them were experiencing similar problems with two or three different size and makes of four-strokers. Jim called back earlier today to let me know that going up at least two inches in prop diameter "made a silk purse out of a sow's ear" for this bunch of guys. Of course, each of them is still going to have to try a few different size props to find the best match for his particular BIG Bird, but at least they're all in a better position for checking prop sizes. Also, according to Smith, all of the BIG Birds involved were sport and fun-fly types... not pattern or competition aircraft.

Don't be afraid of trying, and using, bigger props on your .90 and .120 four-stroke engines; it allows their higher torque to be useful. And to keep you from getting confused about the pitch of a prop, think of it this way: pitch can be likened to the gears in your car; the low pitch props do what low gears do... get you going fast, but they are limited in speed. Higher pitch props won't bite and give the acceleration that you'd get from low pitch props... but your top speeds will be increased. Remember, there's absolutely no substitute for experimenting with different size and

pitch props to find what's best for your bird. That's all part of the fun!

POLAR BEAR SQUADRON OF ALASKA

Otherwise known as IMAA Chapter 41, the Polar Bear Annual Midnight Sun Fun Fly will be held on June 23 and 24, from 2:00 p.m. Saturday till 2:00 a.m. Sunday. In case your calculator is at low ebb, that's 12 straight hours of flying fun. According to Polar Bear Prez Paul Caulkett, "At midnight we have a mass fly-by... but not to fear, we have 22 plus hours of sunlight then. Up here the 'olays' outlast the people and batteries." For more specific info, contact Paul at P.O. Box 262, Fairbanks, AK 99707.

IMAA '84 FLY-IN FESTIVAL

In case you haven't heard by now, the International Miniature Aircraft Association's '84 Fly-In Festival will be held at the Sepulveda Basin (Los Angeles County), from August 16 to 19.

It's strictly a fun and social get-together, with lots of flying (if you want to), and no competition or trophies to make anyone uptight. There'll be the usual Friday evening family style picnic with live entertainment, and a Saturday evening gala banquet with good food, music and dancing.

This will be "A Gathering of Eagles"... so plan on attending. I have Festival brochures on hand, so drop me a line, and I'll shoot one back to you (enclose an SASE, please).

THE PUGET SOUND ROCs

The Roc's flying club will not only hold its 2nd Annual BIG Bird Bash on July 21 and 22, but it is also hosting the 1st Annual BIG Bird Four-Stroke Fly-In on September 22 and 23. We've just started to fly at our new field, the "Roc's Roost," and it's a dandy. No tall lumber to intimidate anyone, and over 600 feet of runway to play with. There's room for campers and RVs (no plug-ins), and by the time summer rolls around, all the cow chips should be gone.

We haven't decided who is going to ramrod these affairs yet, but a letter to me will get you all the other information. And in regards to the July Fly-In... we do have a strict rule about engine noise: all well muffled two-cycle gas engines and all four-strokers are most welcome... however, no two-cycle glow engines are allowed unless they're converted to ignition or diesel. We've got a swell place to fly and want to keep it.

TIP OF THE MONTH

This one from Eeyore, Winnie the Pooh's donkey friend: "A surprise is what you don't expect... and sometimes worse!"

Al Alman, 605 168th St., East, No. 95, Spanaway, WA 98387. Now that most everyone is into nice flying weather, don't forget about taking some pix and sending them in. Have fun, but FLY SAFELY!

Tercel Continued from page 33

radio equipment, until later, as my radio hadn't arrived yet. The rest of the fuselage construction went smoothly

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and according to the plans and the instruction book.

WING

The trailing edges and bottom spars were laid out, and the ribs were glued to them using a cyanoacrylate adhesive. (Hot Stuff, Zap, Jet, etc., are fine.) The ribs for the main panels fit the spar, and the spar to trailing edge distance was exceptionally accurate for die cut ribs. However, the rib height at the trailing edge was somewhat undersize (measuring approximately .100 to .130) for the trailing edge stock. The calculated rib height at .520 inches from the trailing edge for an Eppler 205 airfoil is .105 inches (according to the book, *Airfoil Sections*, by John Malkin, rev. 1981).

A light sanding of a couple of rib noses resulted in good fit of the leading edges which were propped up, then "Super Jetted" in place.

The tip panel ribs didn't fix quite as well as the main panel ribs did. The easy thing to do was to slide the ribs inboard or outboard until the proper fit from spar to trailing edge was found. Mismatch to the plans was up to 3/16 of an inch, which is hardly noticeable in the framed wing and undetectable once it is covered.

The tip panel ribs were also thin at the trailing edge, but this is expected due to the airfoil getting smaller. The leading edges for the tips were then added.

Well, this got me through Step No. 18. Step No. 19 comes too early during construction, I think, as I broke a tip rib

at the trailing edge when I removed the panel from the building board to prop it up for attachment to the main panel. The tip panel was quickly placed back down on the board for the additional trailing edge gussets, Step No. 25, and the top spars, Step No. 21. Though adding the spars at this time makes fitting the poly breaks and polyhedral ribs slightly more difficult, the wing is more easily handled without fear of breakage.

The polyhedral joints were then completed per the instructions; shear webs, outer tips, center sheeting, poly braces, and the remaining gussets were added. This left the wing ready for final shaping.

I took my trusty spoke shave to the trailing edge to bring it down to rib height at the front edge and approximately .007 to .010 thick at the very rear edge, and then I roughed out the leading edge.

A little more juggling of steps was in order to prevent carving or sanding on the 1/8-inch dowel (wing LE to fuselage attachment dowel), thus, Step No. 24 was done after Step No. 28, final sanding.

Because leading edge shape is critical for proper performance, a leading edge template, or top and bottom airfoil templates, would be very helpful. As far as I know, no kit manufacturer includes them. I used the coordinates for the Eppler 205 airfoil from the book, *Airfoil Sections*, to draw templates of the main section on vellum. I then glued them to the side of a cut open and decurled

aluminum can. A No. 11 X-acto blade, guided by a straight edge and a French curve, easily sliced through the vellum and scribed the aluminum. It was then a simple matter to flex the aluminum to separate it into templates. The templates really help one check accuracy as airfoil sanding progresses.

In Step No. 24, I drilled the dowel hole by using a piece of 1/8-inch OD brass tubing with sharpened edges. This is much easier than trying to keep a drill bit centered on the glue joint of the root ribs.

The dowel was added, and the poly breaks were reinforced with some scraps of very light glass cloth and Jet adhesive. The razor thin trailing edge was then 'hardened' with Jet.

Ah, my airborne finally arrived. It consisted of two Futaba S33 servos and a Futaba FP-R4H micro receiver. Those tiny servos looked lost inside the rather diminutive fuselage. Oh no, the receiver doesn't fit! The connectors and crystal stick out too far. . . A minor widening of Bulkhead No. 2 and a slimming of the longerons takes care of the problem.

The ply wing saddle pieces were added, the sheeting was completed, the hatch was built, and nose block was added (with the grain correctly running fore and aft). A bit of scrap wood made up for the nose block being cut with the grain running the wrong direction. I removed the radio gear prior to final fuselage shaping to keep the dust out of the works.

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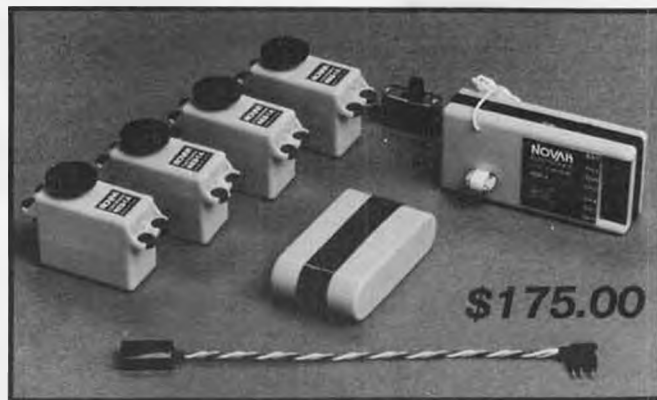
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TAIL FEATHERS

I didn't do Step No. 36 (cut lightening holes in tail). When joining the elevator halves . . . more encounters of the short kind. The elevator joiner spar was about 3/32 too short (see photo). Oh well, more scrap wood to the rescue (to fill the gap). With a little sanding, the tail was ready to cover; no, the model was

ready to cover. The all up weight was a mere 3.70 ounces, uncovered, which is only 0.3 ounces heavier than all the loose pieces. Not bad.

COVERING

I assembled the *Tercel* and gave it a looking over. It's the size of a large hawk. By golly, that will be my color scheme! As I took stock of my partial rolls of Monokote and daydreamed about color patterns for this little plane, my wife, Liz, brought me back to reality.

Liz: "Howard."

H.: "Yes dear."

L.: "I have to go to the floral supply."

H.: "Oh, what for."

L.: "I need some beads and stems for the Girl Scout Troop's craft project tomorrow. Do you want to come along?"

H.: "Sure. Then we can swing by the hobby shop for some more Monokote."

There I found myself standing in front of a rack of beads, sequins, and other craft stuff, bored as could be, when suddenly some small bags on the rack popped into focus. The bags contained eyes, big ones, small ones, cat's eyes, weird eyes, AND ones that looked just about like hawk eyes. Well now, just how big should the eyes be? The 21mm eyes looked about right, however, the only sure way to know was to make some full-scale sketches from memory. In the sketches, they appeared exactly the right size. This was the clincher, the *Tercel* had to have a hawklike color scheme.

Now to iron on this little guy's Super Monokote feathers. Olive was used to cover his underwing coverts, upper wing, upper tail, and body. Gray was chosen for the bottom color of his primaries, secondaries, head, and chin. Red seemed appropriate for the lower tail. A yellow beak, black nostrils, a red tongue, and a blue sky beak opening gave him a real 'ready to soar' look.

All of that covering added only 1.4 ounces to the plane, bringing the weight up to 5.1 ounces. With a 100 mah battery pack, the radio gear added another 4.1 ounces, which then brought the weight up to 9.2 ounces. Another 1.5 ounces was required to balance him. Total weight, ready to fly, was then 10.7 ounces, well below the "under 12-ounce weight" advertised on the box.

FLYING

Rudder and elevator throws were set at plus and minus 25° and 18° respectively. Off to the field for a few trial tosses. Control response at these throw angles proved quite lively, but loads of fun.

Long, downwind approaches are a cinch with superb L/D for such a small and light model. There is no warning mushiness prior to the stall. Stalls are a bit abrupt, but recovery is quick and controllable. After about an hour and a half of hand tossing, my arm was screaming "give up and go home."

No way, we were off to the slope for some real fun. The breeze was up enough for floaters to fly, but below the gale needed for the slope acrobatic ships. A grenade toss launch promptly put it up above the floaters.

A few passes and modest turns with the *Tercel* can make anything larger seem very sluggish indeed. It has astonishing speed and agility when flown at the max, but can groove well and almost slow down to floater speed. It also does good rolls, my most successful ones to date. In short, slope performance is truly grand.

Towline performance was tested with a 1/8 rubber Craft Air Up Start stretched only to about two-thirds of its max to prevent ripping the *Tercel's* belly out. Launches were fast and straight. Once off of the line, this little bird can make fairly fast tracks in search of thermals. As it enters a thermal, it will lift the tip nearest the thermal's center. One can then wrap it up tight on that tip to stay in even the tiniest thermal, but don't let it slow down too much or it will stall. "Down air" penetration is good if good speed is built up before entering the sink.

SUMMARY

Overall, the construction was easy except for the minor wood problems and instruction booklet inconsistencies. If these were corrected, the kit would be excellent. As for flight performance, it's truly a great flying little bird, but not for beginners.

With these things in mind, anyone with a couple of glider kits under his belt could build a good looking, fine flying model.

Oh, just in case you are wondering why those black dots are on the wood pieces in the photos, it is my way of identifying each piece. Each piece is logged in, measured with a micrometer for size, and inspected for weight and grain. It helps me to decide where that piece of wood can be used for the best strength and balance.

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Plug Sparks . . Continued from page 42

Hurleman Aristocrat 48 that faintly resembled the Brown. This was an entirely new engine with a very small exhaust stack. As Herb observed, a later model, the MK II, had a larger exhaust on the left side. The first model appeared in the June 1939 issue of *Model Airplane News*. The engine we are featuring was advertised directly after the war, having larger exhausts in the form of twin stacks.

According to Wahl, the Mk III was actually produced by another firm interested in the postwar boom of engine sales. After some research, an advertisement was found in the 1946 issue of *Model Craftsman* announcing that the Hurleman engine was back under the company name of J-B-L Instrument Co., Sycamore and Mill Road, Clifton Heights, PA. The price was advertised at \$20.00, less coil and condenser. However, this was only a short-lived effort as the glow plug sounded the death knell of still another engine.

Carburetion was another interesting feature consisting of the use of a sleeve carburetor rather than a needle valve. The knurled intake knob was not a choke, but it was intended to back up the sleeve to expose the fuel orifice. This was very effective, but extremely sensitive. The flared knob provided a flared intake that allowed low loss air entry and subsequent good fuel mixing.

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Probably the unique feature of the new series of Hurleman 48 engines was the "over square" cycle. With a 7/8-inch bore and a 13/16-inch stroke, this was years ahead of its time. Properly set up, this engine was a powerful 48!

The engine shown in the drawing illustrates a metal tank, but glass tanks could be had on request. In selling the engine, Hurleman provided the coil (of his own manufacture) called the Circle H, with a special mounting clip. The price at that time was \$21.50.

Hurleman also made the spark plug, a two-piece design with pointed electrodes which could be taken apart and cleaned. Very few modelers ever did this as spark plugs were cheap and readily available.

As originally described, the Hurleman was a .46 cu. in. displacement engine, weighing 6.7 ounces. Rated at 1/5 horsepower, the claimed maximum rpm was 8000 utilizing an 11-8.5 propeller.

For those who are interested, the Hurleman Aristocrat was made of steel, iron, bronze, and aluminum. The cylinder was machined steel, and the

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piston was an alloy iron casting, both being machined and honed to fit. The wrist pin was bronze alloy with a hardened and lapped connecting rod. The wrist pin was bronze alloy with a hardened and lapped connecting rod. The crankcase was aluminum, sand cast with a bronze main bearing.

The Hurleman timer, as mentioned before, was the exposed type with adjustable points. Kept clean, this timer was extremely reliable, just the ticket to replace that formed, spring steel timer employed by the Brown Jr. people.

Wrapping up this report, Photo No. 6 pretty well illustrates what this article is all about. Reading from left to right: (front) Hurleman Twin Stack Mk III, Hurleman Twin; (rear) Hurleman "A", Hurleman Aristocrat 48 Mk I, and Hurleman 48 Mk II.

30 YEARS AGO, I WAS...

I received the most interesting photos for the Cleveland Balsa Butchers from Matt Basta. Photo No. 7, taken in May 23, 1952, shows the following famous characters: (back row, left to right) George Reich, John Trebich, Marty Zugel, Jerry Kolb, John Volteslager (and son), Alan Vopal, and Dick Korda; (front row) Owen O'Malley, Matt Basta, and Walter Schultz. This pic was taken at the Wakefield eliminations of that year at the Akron, Ohio, airport.

Matt Basta, who sent in these priceless photos, has this to say about himself: "I finally finished the *Peerless Panther* using an Ohlsson 23. My original *Panther*

back in 1940 had a Phantom Bullet in it. I paid \$7.50 of my hard earned paper route money to a mail order house on the west coast.

"It was Bill Hale who was responsible for getting me back into the Old Timer movement, selling me such goodies as the Ohlsson 23 and a Forster 29, which I promptly installed in a newly built *Brooklyn Dodger*." (See Photo No. 8.)

"This model has proven to be quite successful, winning three firsts, one second, and one fourth attending only three meets a year! I like the Tullahoma and Huntsville meets at they require ROG. This I really like, as I can remember those four by eight-foot plywood sheets we used to take off of in 1940.

"I started building models in 1936, mostly 10 and 25-cent kits. With nobody around to teach me, this was the process of crash and learn (the hard way). At that time, I lived at East 116th Street, and Korda lived on East 116th St., but about six or seven miles to the north!! Leastways, it seemed that far when pedalling my bike to his home. That's when I learned of the formation of the Balsa Butchers.

"I spent my military time in the Navy from December, 1942 to March, 1946. I was able to build a couple of models (one was a *Scientific Flea*) while overseas. Coming back after the war, free flight activity was rather sparse. After losing a few models, I got into control line by first working for Ralph Steele on RB Specials.

"This led to Class B Speed using an RB Special with ignition (still have the engine). I became acquainted with Stan Sieminski, Al Stegens, Jess 'Speed' Ambler, and a host of others... enough to form the Cleveland Controliners with Elroy Davis as first president in late 1946. I can recall flying speed against Pappy deBolt on many an occasion.

"Christmas 1946 found me receiving a Hornet engine from my fiancée (later my wife) so that I could build Speed Ambler's *Dreamboat* for Classes B and C. At that time, Class D hadn't been started. In the fall of 1947, Stan Sieminski and I teamed with considerable success during 1948 flying with RB Special, Delong, McCoy 49, and Dooling 60 powered racers.

"After the 1948 season, Sieminski retired, and control line ceased to be fun without him. Besides, I was no chemist, and some of those fuel brews were pretty exotic. This led me back to free flight.

"Getting acquainted with Joe Elgin and reacquainted with Dick Korda in 1949, I started flying Joe Elgin's Wakefield design with the Balsa Butchers. About this time, a movement was started to resurrect both the Balsa Butchers (the east side) and the American Air Lines Gas Model Club (west side). The consolidation created the new Cleveland Society of Model Aeronautics, all this occurring in January of 1954.

"Speaking of 'prime movers' of the club, John 'Red' Hillegras was head honcho for the Balsa Butchers and Harry

D. 'Mac' McCall was the motivating force behind the American Airlines GMC. In an odd parallel, they both ran hobby shops and are now deceased.

"In July 1955, a new job change required me to leave Cleveland. This effectively ended my competition days until three years ago when my old buddies, Lewis Odum, Ed Aikmen, and Dave Brunch teamed up to reactivate me.

"The first year back, I was flying a lot of 30 year old stuff that was pretty pathetic, but I had FUN! Since becoming reactivated, the gang and I try to take in at least two F/F meets plus the Old Timer meets at Tullahoma, Huntsville, Lexington, and Wright-Patterson AFB.

"There isn't too much Old Timer activity in this area, so we are hopeful of forming a SAM Chapter and getting things rolling. With all the flying I do, I regard **Model Builder** as the best magazine around. Keep the Old Timer movement going with your 'Plug Sparks' column. This will encourage more people in our area to join in on the FUN!"

GEORGE ALDRICH SEZ

For some unaccountable reason, this columnist got the idea that George Aldrich was still hopping up motors, particularly the Old Timer types. Unfortunately, we mentioned it in the column, and the boys promptly jumped on George for any work they could get done.

George is pretty well upset now as he is not connected with any engine outfit, is not a source for engines or parts, is not a source for rework, and for that matter, *anything!* He has no engines for sale, and at the very least, for trade.

Aldrich sez since August 1983 he has barely had enough time to get his column out, let alone touch models. Sorry about that George! Know what you mean!

MODEL IDENTIFIED

Ever so often, this writer receives a letter and photograph asking for an identification. Photo No. 9 is a typical example of Frank Darriel's model taken in 1943. Forty years later is a long time to recall the model, but as can be seen, the photo shows a classic rubber stick model by Caldwell Johnson called the *Slick Stick*. Needless to say, Frank is busy building another one now that he has the plan!

TRENTON TERROR REVISITED

Every time this columnist goes out on a limb in a well meaning effort to aid someone, he promptly gets shot down. The writer, of course, is referring to the paragraphs written on Barney Onofrio crediting him with the original design of the *Trenton Terror*.

Not so, says Mickey DeAngelis, who is generally credited with getting the Trenton boys started on gas models in his workshop in the back of the hobby shop. In that respect, not enough credit can be given to Mickey for giving the boys a place to build.

The *Trenton Terror*, according to Mickey, was originally the *Miss Trenton*

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III, a series of designs originated by DeAngelis. The name, *Trenton Terror*, was devised by the editors of *Flying Aces*. At this time, Barney was pretty young, and as a beginner, he built the "standard" design, the *Miss Trenton*, so that all models could be powered with the same engine.

This was made possible by taking the Brown Jr. mount as it came, and installing it into a special mount devised by DeAngelis using only one bolt to hold it in place. Under this system, three or four fellows could fly their airplanes using just one motor. (Don't laugh fellows, things were very tough in 1934 to '36.)

Many of the guys, like Steve Vosa, built variations of the *Miss Trenton*, with Steve building a ten-foot, and later a 14-foot model. DeAngelis further states his *Miss Trenton Times* was built in 1936. It was a ten-footer that proved to be too slow for the windy weather conditions. An eight-foot version followed from which the smaller *Trentons* were derived. Some of the designs by Mickey DeAngelis are as follows: *Miss Trenton Times*, *Miss Trenton*, *Kloud King*, *The Sportster*, *Cloud Queen*, and the *Speedster*. Several variations have appeared, particularly the modern version of the *Kloud King* in the 1961 *Zaic Year Book*.

DeAngelis is well known among the early modelers: Sal Taibi, Jim McPhail, Roger Hammer, John Findra, Frank Ehling, and others. DeAngelis has won more than his share of trophies against some pretty tough competition.

As the boys improved, a few, including Carl Hatrak, dropped out of the Trenton Model Airplane Club and formed the Black Triangle Club. That was a long time ago, and this columnist wants only to remember the best of them.

OBIT NOTICE

Just as we were going to press, this writer received notice from Larrie Jackson of Cheyenne, Wyoming, that long time Old Timer supporter, Jack DeFond, died in his sleep on March 6.

Jack will be remembered for his early, large models that reflected excellent craftsmanship. Several of his well built models were featured on the modeling magazine covers. Jack's passing will be quite a blow to the modeling fraternity in the Cheyenne area. Larrie Jackson has indicated the next newsletter will carry a full article on Jack's career.

On such short notice, the best we could come up with in the line of a picture is Photo No. 10, showing Jack involved in the awarding of the SAM trophies. This shot was taken at the 13th Annual SAM Championships held in Salt Lake City in 1979.

SAM ABROAD GERMANY

Latest news from Gerhard Everwyn is that Friedhelm Mink wants to arrange an Old Timer contest for the summer of 1984. This may help SAM-D (D for Deutschland) get off the ground. In addition, some excellent publicity on SAM-D appeared in the 1981-82 Special Jubilee issue of *FMT* (*Flug + Modell-*

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Technik) in the form of an outstanding article on the Society of Antique Modelers.

October, 1983, found Mattaus Weedner describing a new flying model show to be held in the German museum in Munich. One of the lesser-known facts is that this museum has more old aircraft at the former airfield at Schliessheim. In addition, Mattaus published a 12-page article entitled "Model Aircraft Technology, Pioneer of Air Travel" in the October issue of *Kultur und Technik*.

Also of interest to modelers and flyers is the formation of a pilot's group within the union of German engineers. The group meets every month at the Rat-skeller am Marlenplatz. (Sounds like my kind of place, haw!)

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Finally, Walter Lorenz, of Hamburg, has proposed SAM-D should adopt a cutoff date of 1952 as the classic O/T construction had all but disappeared by then. Much organizing to do!

SWEDEN

Stan Persson, Palslyskegston 26, S-302 30 Halmstad, Sweden, writes to add to our report on the Swedish O/T Nationals. He also reports that the excellent newsletter, "Old Timers", is no longer being solely edited by Sven Olov-Linden. After ten years of unselfish work, the editorship has been put on a rotating basis among the membership. Stan has submitted the following photos:

Photo No. 11 shows Nisse Gustavsson and his Korda Wakefield (looks like the Burd version) in a classic ROG pose. Unfortunately, the gusty weather ruined his first round flight, knocking him out of first.

Despite his modesty, we are pleased to feature Photo No. 12 showing Stan Persson hand launching a 1946 Landegren Special fitted with a Swedish, 1946, 2.5 cc Komet diesel. Of interest is the fact the landing gear with wheel spats and the engine cowl have been temporarily removed. I'll bet this is a real beauty when fully assembled!

Some good info is the data indicating that 48 Old Timer models were entered and flown at the 1983 contest. Flying by the round system, the first two rounds were conducted in rather neutral evening air. The third round on the next day was a miserable affair with wet and windy conditions. Many who were counting on the last flight to pull them up in the standings were shut out by the weather.

To give the reader an idea of the weather, look at Lennart Hansson and what he is wearing in Photo No. 13. The model being flown is a "One-and-a-half" a Dela Mater design that appeared in the latest (1939) Zaic Year Book.

Lennart placed second in the 100 cm class.

Stan further reports his own troubles with his diesel powered model having a badly warped fin. But to even things out, he won the 30-inch rubber class with a *Clipper II*, a beautiful cabin design that flies as good as it looks. Stan also entered a *Miss New Yorker IV* (a Frank Zaic design). In spite of the three day roost in the tree tops after a trimming flight, he still placed third with the model still needing further trimming.

AUSTRALIA

With the Old Timer movement sweeping the nation, what better way to spend a Sunday then to go flying Old Timers? Photo No. 14 shows Eric Patterson with his *Comet Clipper*, O.S. 29 glow power. Eric is the manager of radio station 2AY in Albury. His buddy since 1937 is Bob Parker (right) with a *Red Zephyr* that he built back in 1938 (!). He was a tender thirteen years of age then. This 44 year old model has been restored to radio control flying and uses an O.S. 30 for power.

This photo was taken at the Wondonga Field in Victoria. This is the flying field of the twin cities, Wondonga and Albury, located in New South Wales.

READERS WRITE

Just received Photo No. 15 from Sal Taibi showing reproductions of his models that he had such success with long ago. In the background is his ever popular *Powerhouse*, this one powered by the new K&M Orwick 64. The smaller model in the foreground is a *Diamond Demon* utilizing the new Morrill Hornet A engine.

Sal reports the original *Powerhouse* won his first contest ever on February 12, 1939. To top that off, he won his second contest in April 1939 with a *Diamond Demon* and at the same time set a new national record. That's what this Old Timer game is all about: reliving

these glorious days of Old Timer models. Best part of it all is that it is FUN!

While on this kick, Randolph G. Wilson (51 Prudential Road, Worcester, MA 01606), sent me a neat shot, Photo No. 16, of his scaled up Aeronca in 1946 using *Air Trails* plans for a basis. Powered by an Ohlsson 60, this model turned out to be a slow, majestic flyer.

Randy presently runs a motorcycle shop in Boylston, Massachusetts, having given up his hobby shop quite some years back. This columnist always looks forward to the calendar from Wilson which always shows old time aircraft for each month. Neat!

THE WRAPUP

To end up on a heavy note, a letter from Jeff McCamant, 413 W. South Street, Marshalltown, Iowa 50158, is one of the best received yet (with some editing).

"I am an Old Timer nut at the ripe old age of 18. Out of 25 models, I have built 18 that are Old Timers. I have built many rubber designs as I felt the only guys who had engines were those guys who lived in California. To that end, I have always been interested in old engines, fully realizing their scarcity. One of the engines I wanted was a Baby Spitfire to put in a Claude McCullough *Fledging*, 'A 1/2A design around 1947.'

"One day, my dad came home with a chest of 'junk' equipment. The price was \$5.00. He mentioned there were a few engines in the box... oh boy! Opening the box, I immediately found a Cox .049. After admiring it, the next pick was a McCoy .049. Hm-m, not bad. What's the next crackerjack prize? A little, dirty engine that when wiped clean revealed the name 'Baby Spitfire'!! Just what the doctor ordered!!

"This was just too much. There were still more engines. The next engine in the grab bag was a strange looking motor with a black cylinder, a red anodized head, with different looking crankcase bolts sticking out of the back. Later research revealed that the engine was an Ohlsson .33 glow motor in excellent shape.

"But that's not the end of my tale. In the bottom was another engine bolted to a fuel soaked engine mount. Wiping it off, I discovered this engine was a McCoy .29, glow version. I don't know the vintage of this engine as yet, but feel it is one of the later McCoy engines for sport flying.

"What really blew my mind is when my dad inquired if the lot was worth five dollars. I immediately countered, 'Whereinell did you get these, and are there any more?' To this dad said he had found these at a garage sale at the end of the block... on my own street!"

As Jeff says, this find is most remarkable, as he has never run into anything like this before. This columnist is greatly pleased that Jeff has learned that you can find motors in your own backyard. This is a lesson to you, dear reader, to look around and always keep your eyes open for garage sales, auctions, etc. You never know what will turn up. Just the other

day, a James engine surfaced, and no one recognized it until I identified it. The scramble was on, but the point is that there are motors out there, if you take the time to look. AMEN! •

Pylon Continued from page 44

Tower Hobbies. This is a very compact, yet accurate tach.

You will never be able to tell what effect different prop sizes are having on your engine without one. The only way to tune your engine to maximum rpm is to use a tach. A wise man once said, "The human ear makes a poor tach." This is not a review of these products, but rather my attempt to inform newcomers to racing as to why they should have and use a particular device.

From time to time in this column, I will bring forth ideas, techniques, and products that can help all of us enjoy racing more, and hopefully, to get more of you involved.

WOULD YOU BELIEVE?


As promised in the previous column, here is the wildest racing experience I've ever had:

Last year after the '83 racing season had come to an end, Jean and I were out driving around one crisp, clear, fall night. We were headed south on Route 137, just enjoying the scenery and relaxing after a good meal at our favorite local restaurant, when around the bend in the road we came upon a huge sign all lit up in front of a paved parking lot at least several acres in size. There were hundreds of cars, perhaps a thousand, parked there. I slowed and pulled to the side of the road in front of the entrance. We just sat there and looked at each other. The sign read: PROFESSIONAL PYLON RACING.

We drove in and parked our car. At the rear of the parking lot was a large two-story building with a series of six glass doors as an entrance. This led down a slight incline to a ticket booth and a row of turnstiles. I bought both of us an admission token for \$1.00 each. We went through the turnstiles and were given a free racing program by one of several attendants standing at the entrance to the interior pavillion.

The pavillion was huge, maybe 50 feet wide by 300 to 400 feet long. It was beautifully decorated with the checkered flag theme and many photographs and murals depicting racing scenes. There were also lighted display cases full of the best finished Q-500 and Formula One-40 planes we had ever seen. There were signs explaining the rules of pylon racing, and at each end of the pavillion were a dozen betting windows where you could place a bet on the outcome of the race. Along the back wall were many concession stands separated by large glass swinging doors. At these stands you could buy everything from peanuts to hot dogs and beer.

Jean and I stood there in amazement and let our eyes take in the whole scene.



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We walked through the doors at the back that led to an outside pavillion at least as large as the indoor one. This whole area was lighted as bright as it would be at noon time. Out in front of the pavillion was a table flat grass field slightly elevated from where we were standing. At the edge of this elevated field was a chain link fence some 12 to 15 feet high with what we later learned was Kevlar netting going from the top of the fence to the edge of the roof of the building.

The entire outdoor pavillion was completely enclosed by chain link and Kevlar netting. Once outdoors, you could turn and face the building, and see that the whole top floor facing the field was glass.

The field itself was about 1000 feet long and about 400 feet wide. Set out on the field was the best pylon racing course I have ever seen. The pylons were about 18-feet high and cone shaped with a bright red and black checkerboard finish. The turn lights were mounted behind what looked like a dugout affair that had a chain link cover to protect the four signal people. These people sat in this concrete dugout with their heads about two feet above ground. The starting line was clearly defined by a paved pad of approximately 20 feet by 40 feet. There was a low angled display board off to the side of the starting line that had lane lights. This board gave each flier's color, his starting lane, laps, and cuts as there was no starter person on the race course. There was a retractable toteboard that gave information about each racer, amount of bet, odds, etc. It retracted before the start of each race, and reappeared after each race to give results. The tops of pylons two and three were open and protected by mesh so that the person inside could call cuts. Everything else seemed to be handled out of the way and off the race course.

Just at that moment there was an announcement over the loudspeaker system telling everyone that the first race would start at 8:00 p.m. I looked at my watch. It was 7:45 p.m. Jean and I hurried inside and went upstairs. This area was beautiful. It was all carpeted with a bar and about 150 tables and many

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more lounge chairs. Along the glass wall overlooking the race course were larger circular booths. Set around the room and suspended from the ceiling were 25-inch color TV sets that showed views of the race course at different angles than those one could see from the enclosed grandstand. There was soft background music playing. The lighting inside was subdued so as to give the best view outside.

Jean and I found a seat along the front and ordered drinks. Just then they announced the first race. The announcer gave the names of the four race teams and the names of the racers along with their recent performance. The outside toteboard rose out of the ground to show this information. It was also displayed on the TV screens. As each racer's name was announced, he stepped to a specific spot in front of the grandstands where a TV camera showed a full view of each pilot and his airplane. Then everyone walked out onto the race course. At this time all of the spectators were informed that there were only three minutes left to place a bet at the betting windows.

Jean and I were so fascinated by all this that we just sat there sipping our drinks, waiting for the first race to start. From inside the completely enclosed and protected grandstand, you could just hear enough of the noise of the engines to make your hair stand on end, but not enough that it bothered normal conversation.

The planes had been identified to Pylon No. 1, the engines were running, and everyone was tingling with anticipation for the green light to go on above each lane color. They were all off the ground in a perfect start and heading for the first pylon. We could see the entire course from our elevated grandstand seats. The planes flashed around the first pylon neck-and-neck... Just then my alarm clock went off. I awoke in a sweat. It was 7:00 a.m. and time to go to work...

Keep writing me with results of racing in your area: John G. Smith, 27 Fulton Street, Brockton, MA 02401. •



Charge Master . Continued from page 45

made in Taiwan, the package is the same size and the leads are spaced similarly. It's wonderful... wouldn't it be nice if all servos travelled the same amount and all throttles required the same travel?

Anyway, this matter of charge rates was set outside our own hobby and industry, and it is important to us simply to get us all into step. They, the charge rates that is, are all based on a percentage, or a multiple, of the individual cell's capacity, and referred to (for example), as C/10, or possibly, 3C. Battery capacity (C) is based on the amount of current draw it takes to fully drain a battery in one hour. Using our common 500 mah cell as an example, the C/10 rate then is actually 500/10, or 50 milliamps. The 3C rate is 3(500), or 1500 mls, which can also be stated as 1.5 amps. The rates also fall into categories, with names which are somewhat easier to digest than all those awful numbers. A chart is enclosed for easier at-a-glance understanding of these established Ni-Cd charging parameters.

Patience! We will get to Ace R/C's latest offering in another paragraph or so. Before we do though, I think it is important to state that all Ni-Cd cells are not created equal, especially when it comes to the higher charging rates. Not all of them will take a 20-minute charge without damage. Others may not sustain any actual damage at that rate, but might not charge to the same percentage of total capacity as yet another brand or type. The overnight rate will not cause any damage, and will rejuvenate all cells in good condition. The best rule of thumb is to follow the instructions furnished by the maker of the equipment your cells are installed in, or (of course) the instructions of the battery manufacturer, if available. The other "thumb rule" worthy of mention is that in general, those cells designed for and recommended for the shortest charge periods are also those that will perform better in rapid discharge uses.

All of these discharge rates and times are based on a hypothetically dead cell, one which has reached a low of 1.1 volts. With the exception of those batteries used for electric power, which are dump

discharged prior to charging, we are seldom (in normal use) dealing with completely discharged batteries. One can see that some over charging is bound to take place. From past experience, we know this is not instantly fatal to Ni-Cds, though what it costs us in shortened life we'll never know. The "trickle" feature of the Chargemaster, properly used, will eliminate some of that.

The "quick" (rapid) and "fast" charge rates as detailed in our chart are outside the capabilities of the Ace R/C Chargemaster, and thus, we will skip directly to the next highest rate, the "slow" (overnight) rate, which is also the highest rate at which the Chargemaster can be programmed. You might have also heard this referred to as "normal" charging, a term which has no doubt come about due to the fact that with almost no exceptions, all R/C system chargers work at this rate. With few exceptions, most of them work at the C/10 rate; again, for the average 500 mah pack, 50 milliamps for a ten-hour period. The fact that most radio system instructions specify a longer time, as much as 16 hours sometimes, takes into account the inherent current drop of most simple chargers used, and assures you of a full charge.

The "trickle" rates are not generally thought of as charging rates, though revitalization of a fully discharged battery will eventually occur. Trickle rates are those at which a battery may be maintained indefinitely, without fear of over charging. This is most often used to prevent the self-discharge that will occur with most batteries during periods of non-use. They will always be at 100% capacity (assuming good condition) under trickle charging. However, for best results, batteries should first be charged at a higher rate.

Though this is a standard charge rate for many industrial applications, such as those Ni-Cds used to power alarm systems, we haven't seen it used in R/C applications prior to the introduction of the Charge Master. It is an excellent feature of this new charger, and highly recommended for those of you who often get unplanned opportunities to go flying, or for those of you in the northern climes who are forced to store your equipment for months at a time. Trickle charging for the entire period will assure you that your batteries will be good in the spring, instead of mysteriously having gone bad as they often will if left forgotten and unattended. As an added safety, a capacity check and recharging should be done prior to any serious use of even these trickled batteries.

Now that we are experts on Ni-Cd battery charging rates, let's take a look at Ace R/C's new addition to its fine line of R/C system accessories. The Charge Master is a multiple output charger, intended to provide all your battery charging requirements in one package, able to charge two transmitter and four airborne batteries independently or simultaneously. It can be programmed

for overnight (normal) C/10 charge rates for 250, 500, 900, or 1200 mah capacity battery packs, in the "normal" position of the rate switches, and "trickle" at C/50 rates for the same batteries with the switches in that position. The 900 value, which might be a strange one to some of you, shouldn't be. It is intended for the high capacity SR Batteries, which if you haven't experienced, are well worth doing so. They provide 900 mah capacity with just a slight increase in size and weight over the average 500 mah pack.

The Ace R/C Charge Master, in common with most of Ace's R/C equipment and accessories, is available in both assembled and kit form. Both models of the Charge Master, assembled and kit, provide for proper rate programming for two transmitter batteries at 50 ma, three receiver batteries at 50 ma, and one at 120 ma. For other rates, resistors must be changed in the assembled unit, or simply properly installed in the kit as it is being wired. An easy to understand chart is furnished to help you pick the proper resistor values, and they are all common electronic store stock, no specials or low tolerance units are required.

I like to build my electronic equipment from kits, whenever possible. Not only do I save a few bucks here and there, but I know the equipment better, and feel that I can use it more efficiently (if possible), and I am better prepared to service it if the need arises. This is not to say that the Charge Master requires any previous electronic experience for assembly... if you can read, I would not hesitate to recommend it as one of your first kits. The instructions, including parts identification and placement on the large, uncrowded printed circuit board, are simple and clearly written. If you've never attempted such a project, try it, it's another source of satisfaction, and I promise you'll be wearing a big smile when you get a smokeless check-out.

Other than proper programming of the charge rates as mentioned, you'll also have to provide the proper plugs on the output cables to mate with your R/C system. If you have only one radio, or everything is of the same type and brand, this makes it all simple. If not, you may need to obtain the proper plugs from the maker or importer of your radio, and then wire them in place, paying particular attention (very important!) to polarity; the plus and minus! If you

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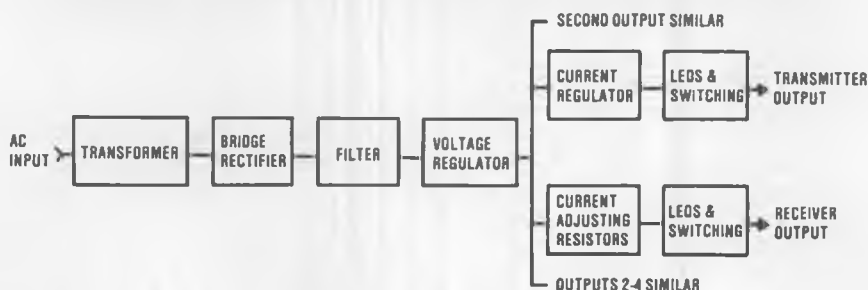
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have different types of systems, you can terminate the Charge Master outputs with short, polarized connectors, either Deans, or (as in my case) RCA audio jacks, and make up the required adapter cables from there to the battery sockets on your equipment. Ace R/C even provides you with small mylar labels which you can attach to the ends of the output cables to remind yourself of the type (transmitter or receiver) and rate of each output. Using adapter cables allows you to also use them with all associated equipment, such as your battery cycler, ESV, etc.

The construction sequence for the kit is clearly detailed in the instructions, and involves mounting components on the printed circuit board, adding the output cables, the mechanical assembly into the case, and the checkout. The latter is a simple procedure, and involves only the use of a meter to verify that you did in fact follow the instructions as outlined, and that both polarities and rates in both normal and trickle functions are correct. Once this is done, you can button her up and spend just a few minutes familiarizing yourself with the operating instructions.

For the technically curious, the Charge Master consists of considerably more than your average transformer and

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diode charger. It starts off with a transformer/bridge rectifier/filter supply, at about twenty volts, going then to a fifteen volt regulator to provide independence from varying input voltages and loads. For the transmitter outputs, independent current regulators, using a new LM-317 TO-92 regulators are used. For the receiver outputs, resistors are used to adjust the current outputs to the

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	0.02C	C/50	50
	0.03C	C/30	30
	0.04C	C/25	25
SLOW/OVERNIGHT	0.05C	C/20	20
	0.1C	C/10	10
QUICK/RAPID	0.2C	C/5	5
	0.25C	C/4	4
	0.3C	C/3	3
FAST	C	1C	1
	2C	2C	.5
	3C	3C	.33
	4C	4C	.25
	5C	5C	.20

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desired rates, resistance being added in all cases to reduce the charge current down to "trickle". The LEDs all have series resistors to maintain the current through them at a safe level, and they stay lit in both rates, with slightly lesser intensity in "trickle". A separate switch and LED provide for on/off and indicator functions.

To summarize, whether you obtained your ChargeMaster in either assembled or kit form, once it has been properly programmed to match your equipment's requirements, consider it the electronic equivalent of the original system charger when used in the "normal" function. The "trickle" function will provide you with fresh, ready-to-fly power at any time, provided (of course) that normal charging has already taken place before the trickle is activated. And it'll prevent deterioration of your batteries during extended storage. Sounds all very worthwhile, now, doesn't it?

The assembled Charge Master (Ace R/C No. 35K55C) is priced at \$46.95; for the bold, the kit, Ace R/C No. 35K55, is only \$36.95.

Hopefully, next month we'll be taking a close look at the Ace R/C Overnighter, another new product, similar to the Chagemaster, but designed for 12-volt DC operation. Keep tuned in! •

Lady Lite Continued from page 38

they are, were hollowed. Kit ribs were used only because it was a hassle to cut new ones as the spars run through the centers of the ribs.

Were I to build another *Gentle Lady*, wing structure from a FF model would be used with spar caps top and bottom, plus small tubulator spars between the leading edge and the upper spar. A major reduction in weight was made by tossing the 1/8 ply center dihedral braces, a couple of 1/8 ply spar braces, and the 1/16 ply polyhedral joiners. In their place went one of my favorite modeling materials: 1/64 ply. The 1/16 balsa sheeting in the kit was just OK; I substituted it with some real light stuff from the Rutherford Private Reserve.

With all of the lightening techniques

being employed, and being in a rush to build, unfortunately, I made a mistake in not weighing the ribs on a gram scale prior to installation and (evidently) got all the heavier ribs in the right side panels. The good news was that I discovered this before covering the wing, and using a hand held paper punch, I went crazy punching holes in ribs. No way was I going to add weight to a tip just to balance the wing!

The tail feathers feature lightweight construction built stock; the only modification made here was to make a built-up elevator, and to substitute a few pieces of wood. The fuselage is also fairly light as designed, still. I cut a long slot in the fuse sides aft of the wing and used stick construction top and bottom instead of the suggested sheeting. No provision, or structure, was made for the installation of a tow hook. The 1/16 ply fuselage bottom went in the scrap box, a replacement of 1/64 ply was used on the model. The fuselage doublers used were from very light stock.

Having decided on building a motor glider, along with lightening the wing structure to the point where hi-start launches are completely out of the question, an arrangement much better than simply strapping a power pod to the wing was easy to justify. Power pods may be a "quick 'n dirty" way to power a glider which is also used "clean" on a hi-start, but pods simply don't hold much fuel, and they tend to vibrate badly, throwing horsepower away in the process.

Fortunately, there is an excellent solution to the problem, thanks to Ralph Cooney of Fourmost Products. Fourmost makes this great little molded TD engine mount that is rigid, streamlined, and easy to install. Having settled on this type of mount, it was an easy modification to build a fuel proof compartment immediately behind the firewall, this compartment serving to carry a "pacifier" pressure feed tank. Realizing that many of you haven't the experience working with such a pressure system, and that others get big eyes just thinking about starting a pressure fed motor, I suppose a one-ounce nylon tank of

some kind would be your best bet.

For those who do know about high-perf TDs, this one is your usual piece: lapped crankshaft; fitted piston/cylinder using the high transfer port cylinder; Kustom Kraftmanship needle assembly; and a lightly cut glow head for more squeeze. The prop is a massaged Kelly 6-3 in glass (not glass-filled nylon, a real fiberglass prop). The motor normally is fed 50% nitro fuel.

With all of the lightweight tricks used in construction, it would have been a shame to slap a few square feet of plastic covering on the model, especially after discovering that Esaki (sic?) tissue was once again available.

Armed with Sig Lite-Coat clear dope, razor blades, a high quality brush, and a water sprayer, I rediscovered the enjoyment of covering with tissue. Sure, it takes more time. Yes, the covering can (and does) get punctured while out flying. But the completed job is very light, adequately strong, and with the model passing slowly overhead, the light coming through the covering is absolutely beautiful.

As you might suspect, with an all-up, ready-to-fly weight of 18 to 19 ounces (one scale says 18, another 19), this much modified *Gentle Lady* is a floater, nothing more, nothing less. It won't penetrate well into anything more than a breeze, and aerobatics are limited. However, what it does well, it does very well indeed.

With that fairly nasty TD howling, the usual run-and-throw launch is not required. All you have to do is flick it out with a bit of wrist motion, and it is immediately "on step" and climbing. Although it will hang on the prop and keep climbing, the most efficient way to gain altitude is to let it fly on the wing. If you keep the speed up, she gets really high on the 4-1/2 to 5-minute engine run.

How high? Wish I knew. Experienced glider guiders have watched it climb out and estimated the end of engine run altitude as 1200 to 1400 feet. I have no idea myself, but on a good run, I am having difficulty seeing the model, and there are always at least a couple of fliers who can't see it at all! It is high enough that you don't even want to hunt down a thermal for 10 minutes or so. In fact, the altitude gained on power is an excellent example of overkill in action.

Perhaps you can relate more to the model's dead air performance. Recognizing that there is no such thing as truly dead air out here in the real world, on the fourth flight of the model, prior to its being completely trimmed for max duration, it was flown on a midwinter day that was chilly, but not uncomfortably so. It was as close as I have seen to dead air . . . no breeze, not even any drift. Rick Cochran and I fired it up. The motor run was strong and 4 minutes, 23 second long. When the motor cut, I trimmed for a slow, circling glide (yeah, just like a FF!), set the transmitter down, and we drank coffee while perched on the tailgate of Rick's pickup. The TX


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wasn't touched until the model was down to about 30 feet of altitude (told you there wasn't any drift) and when it touched down, the stopwatch read 32-minutes-plus flight time.

While the objective was not to build a 30-minute glider, it is nice to have that much duration in hand. It gives you more time to lay back and watch your creation floating around, playing with air currents, all the while showing off its internals through the covering. And once again, I was watching one of my models fly just to be absorbed in the beauty of flight. The roarers are always there ready to go, of course, and I spend most of my RC flying time herding them around the sky, but a flying session simply isn't complete without putting the *Gentle Lady Lite* in the sky at least once.

Electronics . . . Continued from page 11

... and landing!

LIGHTWEIGHT RECEIVERS: 1984

Back in early 1983, our friend in Georgia, Fritz Mueller, sent in some interesting information about his experiments with small and lightweight receivers, which brought in several other letters on the subject. There was enough correspondence on the subject to convince me that a lot of interest in the subject exists. Unfortunately, not enough to exite any of the major R/C manufacturers, but then, most of these guys are tinkers anyway, and would rather roll their own.

Well, if your interests run in that direction, how does a crystal controlled superhet receiver, complete with crystal filter and AGC, at just about half an ounce, sound to you? It is called a "Millipulse", and I ran across it in the January issue of RCM&E (*Radio Control Models and Electronics*), the excellent English magazine.

As the name implies, it is a pulse system, the receiver ending up as a single transistor that switches on and off as the carrier is keyed. It uses a 455 KHz crystal filter, and the Ferranti, one chip, IF/Detector/AGC, ZN414 receiver IC which was also discussed in previous columns. It is a modern and quite clever

design, though slightly large (1-1/4 x 2-3/8 inches), which the author, a Mr. Geoff Andriesson admits was done simply for ease of construction. It looks like it could easily be compressed down to a board half that size.

Along with the receiver, which incidentally is powered by one, one-gram mercury cell, there is a very clever little actuator, powered by another similar cell. The actuator makes use of a fantastic little motor, claimed to start at .05 volts, and to have a no-load speed of 11,000 rpm on 1.2 volts ... at six grams (.22 oz) weight. The motor is equipped with a small pulley, which winds up a thread to which the rudder control horn is attached. The other direction of the rudder is actuated by a rubber band. Naturally, carrier "ON" gives you a turn in one direction, carrier "OFF" in the other, and equal "ON/OFF" signals will result in straight flight.

The whole thing is quite clever, the only drawback being that it is on 27 Mhz, but with a different oscillator and RF, it should work well on 72 or 53 Mhz. Most of the components are available here in the US of A, or will have domestic replacements. The motor for the actuator will probably take some research, though an address is given in England from which it (or a referral to a US source) could be obtained. Our friends on the other side of the pond are flying theirs in a 3/10 scale version of the 1938 *Scram* (MB plan No. 576-OT), which originally spanned 83 inches ... you figure it out!

As with similar items, copies are available for you upon receipt of an SASE, and in this case, a note signed by your mother that you promise to share the results of your experiments with the rest of us!

THE SUPER CYCLE NI-CD BATTERY TESTER

I received a letter from Ernest Kiszi-vath of Sebring Racing Hobbies, in Sebring, Florida, telling me about a defunct Super Cycle battery capacity tester that he has, and asking for information so he can attempt a repair job. Some information I have, and some I will have to solicit from you kind readers. But first, for those of you who might not be familiar with this item, it is the second

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such piece of equipment to appear on the R/C scene; the first one was called a Flight Life. The Super Cycle was manufactured by a now nonexistent company, Electrostar Systems, of Farmingdale, New York. If a schematic diagram was ever made public, or published, I was never able to obtain one.

Ernest suspects that the transistors in his possibly went bad due to a reverse polarity connection, something that solid state devices simply don't forgive. The markings on the transistors in his have been removed, and he asks for help in identifying them. By coincidence, I also own a Super Cycle; one with markings on four of the six transistors. I suspect that the last two in the string, those that I can not identify, might not be transistors, but some form of Triac (maybe an SCR or SCS). Anyway, if you have any schematics or parts ID info, or a unit with numbers of the unidentified devices, please let me know so that I can pass along the information. And hurry ... we don't want Mr. K flying around with questionable or unsafe batteries!

Knowing that the L.R. Taylor Power Pacer is similar in looks and operation to the Super Cycle in question, I decided this was as good a time as ever to find out the similarities, if any. I thus called this company, and spoke with the man himself, who informed me that the similarities are all superficial, the Power Pacer being a more modern and different unit. However, they are familiar



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with the Super Cycle and are able to service them to a point. The point being that timing motors and transformers are different from those in the Power Pacer and are not available, though everything else is. L.R. Taylor Company's decision to repair one or not is based on the cost compared to the price of a Power Pacer, which are currently available from discounters at less than \$50. Sounds reasonable to me!

To completely cover the subject, similar devices are presently being marketed by Ace R/C; F&M Electronics (41 Chestnut St., Seymour, CT 06483); Radio Controlled Models (RAM); and Tech R/C (formerly Royal Electronics, now located at Box 24593, Denver, CO 80224). Whichever you chose is your option, but I would like to stress that capacity testing with one of these units is certainly high on my list of recommendations, and will almost certainly at some time save one of your airplanes.

COX/SANWA IS BACK IN CALIFORNIA!

Owners of previously acquired Cox/Sanwa R/C systems, and those contemplating the purchase of any new equipment of that brand, can now address their inquiries to the original home of

that company. After a brief visit up to the northern climes, Cox Hobbies, Inc. is back in California, doing business on the same old corner.

It's new 1984 brochure features the products we have gotten used to seeing offered by Cox in the recent past; radios include two, two-channel systems, one with dual sticks and the other with a wheel, and a four-channel, dual-stick system. A statement in the brochure indicates that parts are available for all Cox products, including Cox/Sanwa radios, and one would assume service is also to be obtained there.

For complete and up-to-date information, address your inquiries to Cox Hobbies, Inc., 1525 E. Warner Ave., Santa Ana, CA 92705; (714) 546-2551.

LOCAL TECHNICIANS: DALLAS AND KANSAS CITY

A couple of months ago, I offered to list the names of local R/C system technicians who might be known to you readers as capable of doing repairs, and whom you would trust to work on your radios. I have a couple of recommendations to pass on to you.

From Keith Spies, in Overland Park, Kansas, we learned about Stanley Andrews, who does most of the service for the club that they belong to. Stanley has worked on Kraft, MRC, and Ace equipment for Keith, all to his satisfaction. Contact Stan at: 729 West 121st St., Kansas City, MO 64145; (816) 942-7416.

Paul Taylor, of Ft. Worth, sent in the name of Randy Wallace, of Cowtown. Paul claims a complete lack of problems with his radios after they have been worked on by Randy, and recommends him highly. Randy can be reached at 1248 Westmount, No. 209, Dallas, Texas; (214) 339-1718.

As I stated when I first brought up this subject, I firmly believe that for questionable or basket case systems, it is best to rely on the factory or importer. Generally, the technicians there have more experience simply because they

get more systems to practice on. Plus, and a big plus it is, they have exact replacement parts. Often, a trip across the country or a special part is not necessary in get a radio back in the air, and your local tech is the man to see. We can only hope that when one of them encounters a problem beyond his ability, for any reason, he will not decide to experiment ... with someone else's airplane!

THE DET-301, A TACHOMETER AND OPERATING TIME METER

An interesting electronic engine accessory has recently come on the market; it is the Model DET-301 Digital Engine Tachometer, designed for spark ignition, single cylinder, two-cycle, or two-cylinder four-cycle engines. In addition to the rpm, which is displayed on a daylight-visible LCD display, the DET-301 also displays the total operating time of the engine for one minute after the engine stops, and has an overspeed indicator, normally set at 11,000 rpm, which causes the display to flash when the engine reaches that speed. As an option, this overspeed point can be set so that it operates anywhere between 8,000 and 13,000 rpm. The top speed displayed is 20,000.

The DET-301 is small, as seen from the accompanying photo, and is designed for permanent installation somewhere on the engine proper; it gets its input from a short antenna, which is located somewhere in the vicinity of the high-tension plug leads, picking up some of the energy it radiates and in turn triggering the tach. Range of the DET-301 is 100 to 20,000 rpm, plus or minus 200 rpm, obviously on the high ranges. It is completely automatic in operation, having no on-off switch, and being powered by two lithium cells good for 2,000 hours of use. The weight is inconsequential to any engine/airplane with which it might be used: a minuscule 36 grams (1.25 oz). Even though permanent installation is intended, it can be used

like any other tach for preflight engine adjustments, and then removed. In this manner, however, the total engine operating time, which I think is interesting to know and keep track of, is not being recorded.

The DET-301 is available from Condor Hobbies, 17971 Sky Park Circle, Suite D, Irvine, CA 92712; (714) 250-1425. The price, postpaid anywhere in the US, is \$52.45. Be sure to tell them Eloy sent you!

Soaring *Continued from page 26*

trends and has the Eppler 193 airfoil section. It is a foam core winged model with balsa sheeting and fiberglass cloth finish (lightweight cloth). The fiberglass fuselage is homemade and aerodynamically very "slippery." Controls are: rudder, elevator, ailerons, and spoilers. The *Virgo II* sounds like a good, middle of the road F3B ship, nothing exotic, yet capable of doing the job.

The picture of Chris Tank shows his F3B model, the *Mystere*, an original design which resembles an aileron equipped *Sagitta 900*. No other information was given on this aircraft.

Well, now that the next F3B World Championships is scheduled for Australia, we expect to see more Kiwis, perhaps Chris and Warwick, participating on the world class level. Good luck, guys.

HOW TO USE THOSE NUMBERS

Last month, I said that I'd give you all a hint as to how to use the profile coordinates supplied with each airfoil of the month (with the exception of most of the Selig airfoils). Now, I realize that not all of you sophisticated modelers out there need this kind of instruction, but I've had at least four requests for a clarification, so here goes.

Eppler's coordinates and Selig's coordinates are worked out to the benefit of the computer. If you were to plot these points you would find yourself making dots at the trailing edge of the section and continuing on across the top of the airfoil's curve towards the leading edge. At this point (ha, ha) your plotting would carry you around the LE radius to the lower surface of the profile. From here you would work your way back to the TE. If you plotted the entire list of coordinates, you would almost not need a ships curve or French curve to join them as they would be very close together. Needless to say, you don't need to plot every point if you are doing this by hand. My recommendation would be to skip every other point. You will have plenty to work with, and the plastic curves will join them just as smooth as you please.

NACA coordinates are similar to Eppler's, but the top and bottom surface curves are both plotted from leading edge to trailing edge instead of a loop starting at the trailing edge. There is yet a third way of listing coordinates, and that is the simplified NACA and Quabeck method. These list one station point (X axis) for two ordinate points (Y axis). This



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method saves you 25% of the calculations because it eliminates the second set of station points. I prefer this latter method simply because it's less work.

How do you pick points, you ask? Well, it's really very simple. You see, the numbers are really percentages of whatever chord length you choose. For example, let's say that we want to plot out the points for last month's Quabeck HQ-1.5/9. *Surprise!* (Boy, do I hate surprises.) I just noticed that Dr. Quabeck uses decimal multiplicands instead of percentages. Oh well, this is actually a little simpler because the normal percentages have been converted for us already into a more usable form.

Let's pick a chord of ten inches. Ten is an easy number to multiply and perhaps you'll get the picture a little clearer by using it. The first number we are going to use is the first station, i.e. 0.000. We multiply zero times ten and we get . . . zero! That's the first point to plot. Now, draw a line from your zero out to another point ten inches away. The first point will be the leading edge of the section, and the second point will be the trailing edge. Are you still with us? Good.

The second row of numbers is $X = .005$, $Y_u = .009$, and $Y_l = -.006$. (Y_u is the upper ordinate, Y_l is the lower ordinate.) We multiply ten times .005 and we get .05. This is our first station (X point). Measure .05 inches from the LE "zero" point along the line you just drew a minute ago. (Man, if you can do that, you're a better man than I, Gunga Din.) At this station, we will draw the upper and lower ordinates (Y points). Multiply ten times .009 and we get the upper point, .09. This is almost a tenth of an inch above the reference line. We put it directly above our first station (X point) using a right triangle. This way we will know that it isn't to the right or left of

where it's supposed to be. Now, we repeat for the lower ordinate (Y point). Ten times $-.006$ equals $-.06$. This point goes directly under the first two at six one-hundredths of an inch below the line. That's practically the thickness of the pencil lead, and it's not very practical. (Now you see the wisdom of skipping some of these silly numbers!)

Anyway, you repeat this process all the way around the airfoil until you run out of numbers. When you are finished, besides being a little stir crazy, you will be ready to connect the points with the ships curve. Do this lightly with pencil first, then go over it in ink. *Voila*, you are done!

Of course, the easiest way to obtain airfoils is to buy one of the *MTB* books which I plug frequently. Inside each book are many drawings of each airfoil (up to 14 for some of them), and it is a simple matter to photocopy them as a first step to making ribs.

MAKING RIBS

There are three basic plan forms when it comes to designing a wing: constant tapered, untapered (constant chord), and a combination of the two for polyhedral wings or scale. (There are others, such as elliptical plan forms, but these three are the most common.) The easiest of these is, of course, the constant chord plan form because all the ribs will be basically alike. The tapered plan form is a little trickier.

The easiest technique for making ribs is to begin by making root and tip rib templates. These templates can be made out of 1/16 ply (fastest), thin sheet aluminum (slowest, but toughest), or thin sheet fiberglass (hard to find unless you make it yourself). I usually use the plywood; my designs are usually one-of-a-kind.

The best technique that I know of for tracing the shape of the airfoil onto the template material is to photocopy the

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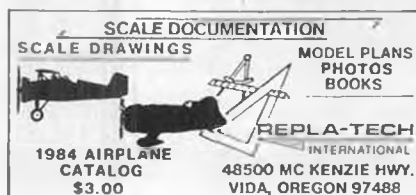
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airfoil out of an MTB book, using a Xerox or similar machine, and to transfer the image onto the plywood using a hot iron. The only tricky part to this method is to keep the paper from sliding around as you iron it . . . no big deal.

The next step is to draw onto the rib templates the areas where the 1/16 balsa sheeting is going to be. Again, use the ships curve for this, and be neat. Next, you should make the spar cap notches and any leading or trailing edge material allowances.

Once you have completed your two templates (root and tip), all you have to do is count the number of ribs in your wing design and cut a rib blank for each one. Of course, these rib blanks are going to be roughly shaped and a bit oversize, but we'll take care of that in a minute. Spray each rib blank on one side with a mist of 3M 77 Spray Adhesive so that the blanks won't slide around over each other, but can be separated easily. Align all the blanks in a stack with the root and tip templates on the outside of the stack. It will be easier to cut the spar notches if the spar notches on the templates are lined up over each other, so keep that in mind. Use a couple of C-clamps to hold the stack firmly together.

Begin cutting off the excess rib material by using any of the following tools: razor plane, X-acto plane, Stanley Surform, rasp, or even a coping saw. The trick here is to get the wood down as close as possible to the templates without actually touching the templates with the tool. From here, you take a sanding block with 320 grit paper, and you sand away the excess balsa until you just barely touch the templates all the way around. Be careful not to go too hard on the templates.

The spar notches are sanded in with a special tool which you can make rather easily. Take a piece of the spar cap material which you will be using in your

wing, about six inches long, and glue a strip of 320 paper to the side that will be facing down in your spar design. Glue a small handle to the upper side of the tool, and it is complete. Now all you have to do is sand in a set of perfectly sized spar notches in the stack of ribs. It's easy!

The last step in making your ribs is to unclamp the stack, separate the ribs, and sand the edges square. You've just finished one set of ribs for one wing panel. If your glider has more than one wing (ha, ha), you will have to repeat this procedure one more time.

AIRFOIL OF THE MONTH: SELIG S2027-145-83

This month, I want to share with you both a new airfoil and some insight into the meaning of the profile polars and velocity distribution graphs. Mind you, I'm no expert on the subject, but I think what I have to say is valid.

The airfoil of the month, this month, is Michael Selig's version of the Mike Bame 253515 airfoil. (See October 1982 MB.) Mr. Selig has "redesigned" the well proven Bame section and improved it (theoretically) by running it through the Eppler computer program and altering the shape of the leading and trailing edge areas to achieve a smoother and more energy efficient flow. Also, Michael made the section 1/2 of a percentage point thinner, making it actually 14.5% thick instead of 15%. The emphasis was placed on improving high lift performance. The resultant data show that this has been very well achieved.

Quoting from Mr. Selig, "This airfoil likely has a very soft stall as indicated by the smooth progression of the separation point on the upper surface. Close inspection of the airfoil reveals that both the upper and lower aft surface contours are concave rather than convex like the MB 253515 and the thick, low Reynolds number, Eppler airfoils. This convexity should not be neglected in constructing a wing using this airfoil. Also, no attempt should be made to sharpen the leading edge, as such a modification would lead to premature separation at the leading edge and ultimately lower the maximum lift achievable."

What is remarkable to see is the very

minute difference in drag at low C_L , and the very significant improvement in the lift curve at high C_L with greatly reduced drag. Both the turbulation point, and the separation point of airflow occur farther aft along the chord line at high C_L which contributes to this section's remarkable lifting abilities. (Indeed, the MB section turbulates at the leading edge above C_L 1.0.)

Anyway, I haven't forgotten my "insight" promise which I opened this section of the column with, so here goes.

C_L means coefficient of lift. C_D means coefficient of drag. Whenever you create lift, you create drag. Indeed, any time you push *anything* through a fluid (such as air) you create drag, whether or not it is generating lift. However, as soon as you start generating that lift, up comes the drag! I'll leave the "why" for an aerodynamicist to answer, but all you really need to know is that basic fact. Reading the profile polars will help you see the relationship.

Ideally, and unrealistically, the best airfoil you could find would be one that generated gobs of lift with no drag penalty. Basically, this polar would be a straight line extending vertically through the zero point along the C_D axis (line). If it only generated .005 C_D (which is very low) no matter what C_L you were generating, you would see another straight line "curve" extending vertically through the .005 on the C_D axis. Both of these ridiculous examples were given to show you what an increase in drag looks like in a polar. The curve moves to the right whenever the drag goes up.

Typically, the curves look like the letter U turned on its side. This is so because (from the top of the curve down) at high C_L you are paying the highest drag penalty (the curve is way over to the right). As you generate less lift, the curve comes back to the left in the direction of zero drag (which it can never reach). Eventually, the curve drops down to a point where the drag starts moving over to the right again (getting higher). In the airfoils presented this month, this occurs when lift is zero (the curve has reached the C_L equals zero line, which is also the C_D axis line). Some airfoils start gaining this drag above C_L equals zero, and some below it. What this says is that some airfoils start getting "daggier" before they approach zero lift (such as in a steep dive or very fast, level flight), some start gaining drag at zero lift (very near a vertical dive or a slow, arching trajectory at high speed), and some airfoils will let you pull negative lift before you start gaining drag (fast, inverted flight, or an accidental Z-launch during a zoomie).

Of course, visualizing C_L on the polars is very easy. The higher you look above the horizontal (C_L equals zero) line, the higher the lift you can get from a section. Below the C_L equals zero line, we encounter *negative* lift, the lower the curve, the more negative lift you get. Most airfoils do not generate much negative lift before the coefficient of drag goes sky high. Some airfoils just

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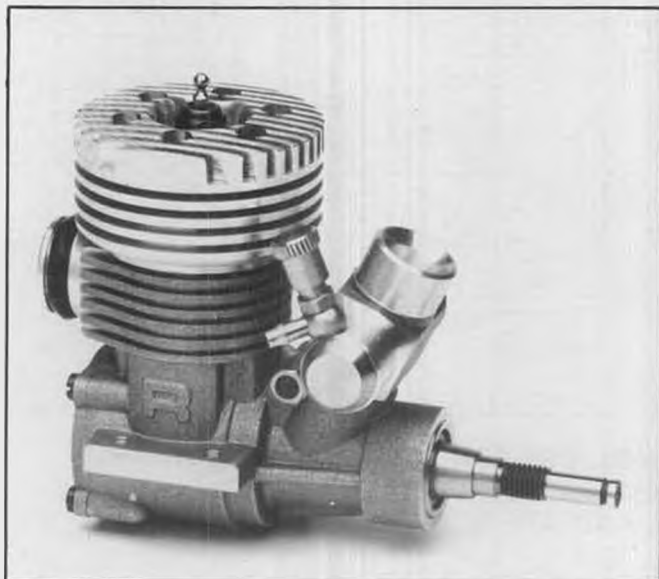
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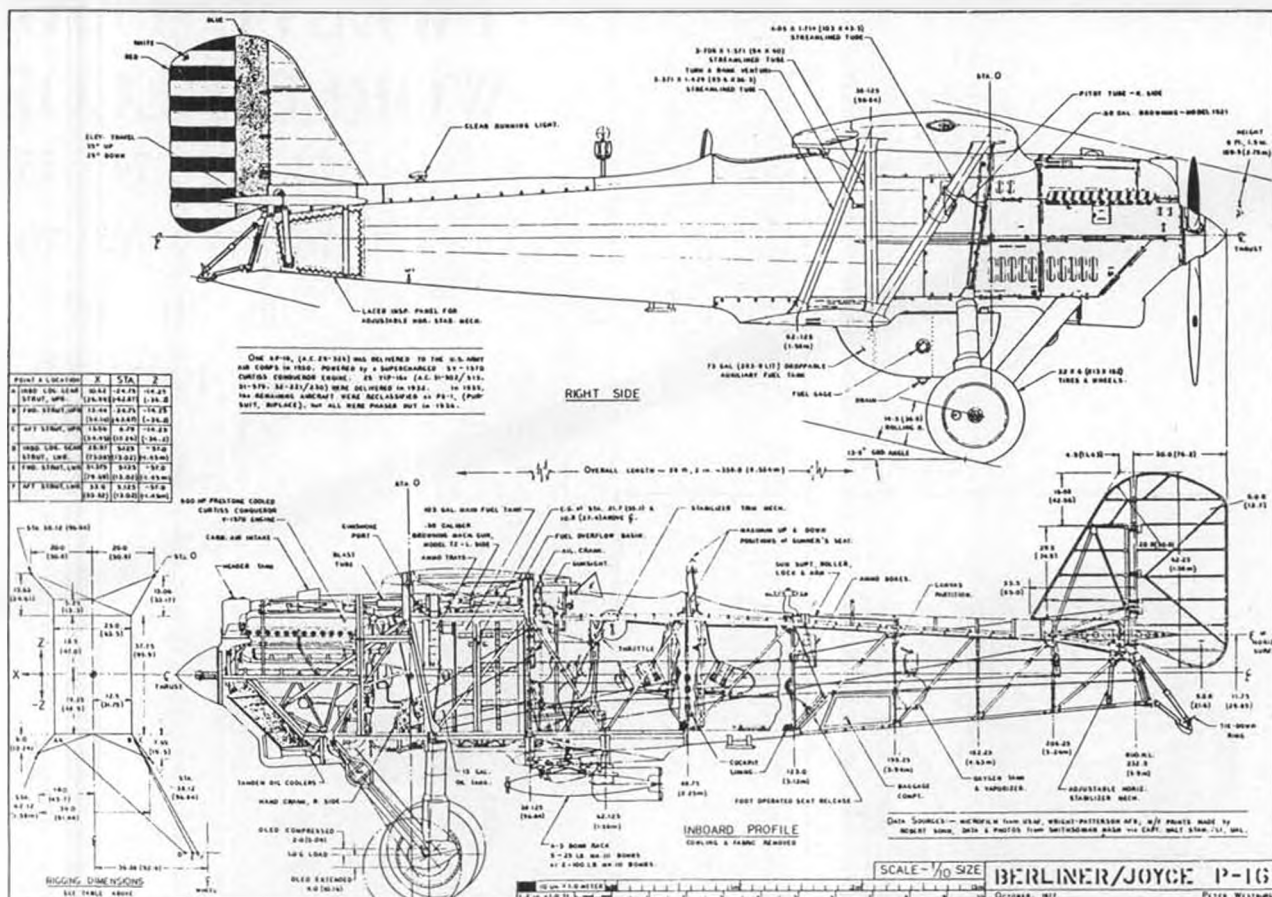
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give up and die inverted. These are typically high camber sections (they look arched or flat bottomed). Sections more tolerant of inverted flight are low in camber ("semisymmetrical" or symmetrical airfoils).

Summing up this lift-drag relationship, we can safely say that the farther the curve goes to the left for a wide variety of lift coefficients, the better the section. This is very generally true. Considerations and/or compromise enter the picture when one starts looking for "specialty" sections which yield significantly lower drag values over a narrow lift range. These are said to have "drag buckets" . . . but that's another subject!

Q&A FORUM

Keep sending those questions that you've been bugged by for this section of the column. I have a couple in the bag right now, but they will have to wait for next time . . . I'm over the space allotted to me right now.

CONTEST ANNOUNCEMENTS FOR JUNE

(See last month's column for an explanation of this part of the column.)

CALIFORNIA
PASADENA — June 24. Pasadena Soaring Society's annual SC² contest. Thermal duration events, three rounds. Site is the famous Rose Bowl. Contact Noel Milovic, (213) 795-1755, P.O. Box 745, Pasadena, CA 91102.

RIVERSIDE — June 3. First Annual R/C Hand Launch Glider Contest for gliders under 60-inch span. Events are spot landing (best one out of two), and two rounds of ten-minute slot (longest flight counts from unlimited attempts). Many industry supplied prizes. Preregistration \$2.50, registration at contest \$3.50, all fliers will receive free plan for 60-inch R/C HLG, the *Gnome*, designed by John Lupperger. Site: University Middle School, Riverside. Eight a.m. registration. Sponsor: Inland Soaring Society. Contact: John Lupperger, (714) 536-4973, 1304 Palm Ave., Huntington Beach, CA 92648.

There are 12 AMA sanctioned contests listed for the month of June in the April issue of *Model Aviation*, the official magazine of the AMA. Be sure you look these over every month so as not to miss out on any soaring contests in your area.

PROMISES, PROMISES

Well, I didn't have the space for Martin Simons' conclusions regarding two-meter sailplane designs, but I should have next month. Also, it's time for a little Q&A stuff next month. Mike Reagan's method of drag brake design will possibly be in next month, if not the following month . . . and much more . . . stay tuned.

Bill Forrey, c/o **Model Builder**, P.O. Box 10335, Costa Mesa, CA 92627. •

Wyndigo Continued from page 29

The radio hatch may be fastened in a number of ways. I used 1/32 ply tongues that reached below the fuselage top and the wing root. Velcro also works well, and tape is the easy way.

Use epoxy and microballoons to glue on the tail skid. Do not leave off the tail skid! *Wyndigo's* lateral stability suffers when you remove that much fin area. Anyhoo, most *Wyndigos* need tail weight, and the skid is where you epoxy it on!

After mating the wing and fuselage, epoxy the soft balsa wing fairing block to the top front of the center section sheeting, and carve and sand it to shape.

TAIL FEATHERS

I used 1/8-inch hard balsa for the leading edges due to its "weed cutting" ability, but you could just use normal 1/8 sheet for the entire assembly. Coat the tips with a bit of epoxy if you anticipate any inverted landings. Make certain that the tail surfaces line up squarely with the wing when you glue them to the fuselage. Hinge the elevator with tape or Monokote after covering.

COVERING

Any strong and lightweight covering material will work well. It's a good idea to cover the top and bottom surfaces with highly contrasting colors. Nothing can ruin your afternoon faster than losing track of which way is up. I use high-contrast stripes on my upper wing-tips to help prevent disorientation.

CONTROL SETUP

Aileron throw is 3/8 of an inch in both directions. If unsure of your ability to react quickly enough, start at 3/16 and increase as your skills improve. Differen-

tial aileron throw is not needed, and will only make inverted flight more difficult. The elevator servo arm should be skewed to give at least 3/8 up and 7/16 down elevator. The extra down elevator throw is needed if you wish to do outside loops, etc.

FLYING

Balance the *Wyndigo* 5-3/8 inches forward of the wing's trailing edge. Take your *Wyndigo* to your favorite flat field for hand launch trimming. Trim for a flat glide with a hard launch. Don't underestimate its floating ability; use a large field.

When everything is trimmed properly, proceed to the nearest slope and toss off into the wind. Use a bit of caution until you've gained some familiarity with it. Being small and light, the *Wyndigo* will get tossed about more than conventional aerobatics soarers, but the extremely quick control response means you have the ability to recover equally quickly. When you are accustomed to this, grab some altitude and start bending it around the sky.

Landing in smooth air is a joy. Just steer the glider in and flair out to burn off speed before touchdown. Or, come in high and snag it out of the air as it floats past you.

When landing in turbulent air, I prefer to come in quite "hot" on the downside leg, and pull a stand-it-on-one-wingtip pylon turn into the wind before touchdown. It might be a good idea to try out this approach with some spare altitude the first few times. . .

As mentioned before, the *Wyndigo* has no bad habits to speak of, but it does have one good one that is shared by few other sailplanes: the ability to make one laugh out loud while just stooging around the sky. •

Electric Continued from page 31

Well, I'll finish by saying that the Keller 25/12 right now is my favorite motor. If you want one, order it from Leisure Electronics, 11 Deerspring, Irvine, CA 92714. It is \$110. The Keller 50/24 (equivalent to a .35 glow) is \$150. No instructions come with the motors, so save this column for reference.

MODEL TECH BALSA READY BUILT



THUNDERBIRD

We are offering five different MODEL-TECH ARF aircraft. The Thunderbird (shown above) is designed to take an engine from a .19 to a .25. Weight, including engine and radio, is 3 3/4 pounds. Assembly took about 4 hours. We are showing it to you uncovered to let you see the quality in these kits. All of the kits in the MODELTECH line include wire landing gear, glass cloth for the wing joint, and motor mount. Look for the Thunderbird and the rest of the MODELTECH line at your hobby dealer. You can be in the air in a matter of hours and have a nice, all balsa model.

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The Aqua Sport, my float plane, is in the March issue of RCM. It would make a good plane for the Keller 25. Fly hydro with Keller!

JOMAR SC-1 SPEED CONTROLLER

Now for an item that goes together with the Keller like peaches and cream: the SC-1 electronic throttle from Jomar. (See product review on the SC-1 in the May 1984 Model Builder. wrf) Up till now I have been pretty half-hearted about electronic throttles, they weighed more than a servo and switch combination and took too much power away from the top end.

The Jomar SC-1 does away with all that. The photos show the story on weight: it is just over half an ounce with no wiring. With complete wiring it is still only 1-1/4 ounces. As for power, the SC-1 has it; it uses three MOSFET power transistors for minimum power loss. What is most unusual is that a schematic is included with the throttle, Joe Utasi (the man behind the name) believes in making information public. In fact, if you wish to build an SC-1 from scratch, Joe tells you how in an article in Model Aviation, and he will sell you the parts and printed circuit board too! I think most people will prefer to buy it already built, but Joe gives you all the options.

The throttle does not come with the external wiring necessary to fit it into your system; that you have to do yourself, along with fitting a heat sink. If you wish to have all this done for you, Mark Schwing at EMS, 6175 Palo Alto Dr.,

Anaheim, CA 92807, will sell you the throttle all ready to go. I don't know how much Mark charges for this; the bare throttle is \$49 from Jomar Products, 2028 Knightsbridge Dr., Cincinnati, OH 45244. Joe also offers the SC-2 for really big motors; it will handle up to 26 cells, 40 amps, and has options for external relays for brake and bypass (so there will be no rpm loss at all). This model is \$60 bare (no heat sink, no external wiring), and uses four of the MOSFET drivers.

However, back to the SC-1, and my experience with it. The schematic is really handy to have, from it you can see that you can easily add another MOSFET if you wish for even more power handling. I used my stock, three-MOSFET SC-1 with a motor that routinely uses 26 amps. It only got warm. In fact, the battery pack got a lot hotter than the throttle! So did the motor, for that matter. The rpm loss at the top is 300 rpm which is much less than for other throttles I have tried. They have lost as much as 600 rpm. I am flying the SC-1 in my float plane, and any loss of performance shows up immediately. With the Keller 25/12, the ROW went from excellent to good (30 feet to about 60 or 70 feet), and likewise, the climb went from excellent to good. I would compare it to the difference between flying with GE cells instead of the better Sanyo cells.

This is quite acceptable, but there is an easy way to recover the power loss! Switch to another prop! I had been using a "rare bird" Cox 9x4 which is no longer made (I think), and a switch to a Top Flite 9x4 restored all the performance. The Top Flite prop has more blade area than the Cox, so it draws a couple more amps of current, but with use of partial power in cruise mode, there is no loss of flight time. An increase of 1/2 inch in either pitch or diameter would also be enough to put you back to the original power level.

I also tried an extra cell in the pack. This increased the number of cells from 12 to 13. This gave me 500 rpm more than before, but the fuss and bother of charging the larger pack wasn't worth it to me. I went back to the 12-cell pack with the Top Flite 9x4, and I'm quite happy with it.

The throttle doesn't even get warm when running the Keller, which is only drawing about 12 to 14 amps. I used a 2 x 2-1/2-inch sheet of aluminum for the heat sink, and pop riveted the MOSFETs to that. This makes a light installation, and one that is mechanically solid. I have removed the heat sink a couple of times while tinkering with the plane, and have found that the easiest way to remove it is to drill out the rivet heads.

The heat sink is mounted in the windshield of the Aqua Sport to keep it high and out of the water. I have discovered that the throttle will not work if it gets wet from spray, though all it needs is to be dried out to get it back into action. One problem with this location is that the throttle is vulnerable if the battery pack should ever shift forward. The circuit board is at right angles to the heat

sink, and that sticks it right in front of the battery pack.

To help remedy this situation, I proceeded to bend the MOSFETs parallel to the board so that everything would be more compact. Well, in order to prevent accidental damage, I did damage! I broke a lead on one of the MOSFETs. No problem, I ordered a new one from Joe. However, don't you try to bend the MOSFETs unless you remove them completely from the board and then bend one lead at a time. Better yet, bend the aluminum heat sink to an L shape instead.

The wiring instructions that come with the control are satisfactory, but the wiring diagram that is shown is quite difficult to translate into an arrangement that will plug in easily to a variety of motors and harnesses. It just isn't set up so that you can switch around motors and batteries easily, nor does it include a fuse.

The diagram I'm including with this column does away with the difficulties. I developed the simple modifications because I can and do switch motors and batteries a lot. Note that the diode that Joe specifies on the motor is not on the motor in my diagram. It is now on the plug. This way the diode stays with the throttle when motors are switched... a real convenience.

I actually put the diode on the circuit board of my SC-1 with no problems, but if you notice radio problems with your setup, do like Joe says and put the diode on the motor.

In conclusion, this is the throttle that I like the best. It is very smooth, it has no funny hums or motor burps, it is light, it is efficient, and, best of all, it is fun! Try Jomar speed controllers, I think you'll like them!

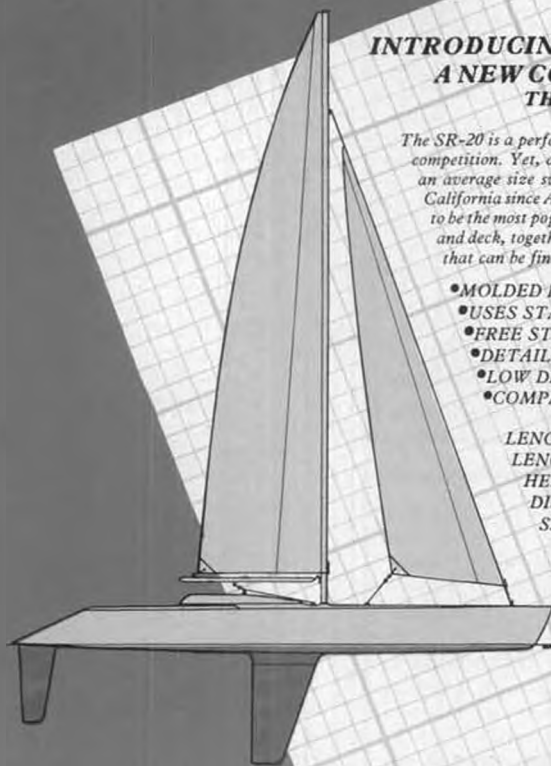
HIGH FLEX WIRE

One more product that goes well with all of the above is flexible wire. High flex wire is one of those things that you don't think about until you use it, then you can't be without it. I know, I am retrofitting all my wiring, I just can't stand the old, stiff wire anymore, it is just too awkward.

There are now three sources of flexible wire, Astro Flight, Wilshire Model Center, and SR Batteries. The photo shows the wires in comparison. The Astro wire has a rubber sheathing, the SR and Wilshire wires are vinyl coated.

The Astro wire is quite beefy and not quite as flexible as the others, though it is much more flexible than the 18 gauge extension cord wire I have been using in the past. It has 65 strands of the same diameter wire as the extension cord in a simple twist weave. Extension cord wire has 40 strands, so you can see that you get a lot more current carrying wire, besides more flexibility. This wire would be fine for anything up to a 40-size motor. A package of two, 1-meter lengths (red and black) is \$2 from Astro Flight, 13311 Beach Ave., Marina Del Rey, CA 90292.

The Wilshire wire is from Graupner



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and is a work of art! The conductors are as fine as baby hair, and subgrouped into seven subcables, one is a core cable, the others are arranged in a pattern of six around it. Beautiful! Each subcable has 53 strands, so there is a total of 371 strands!! At first glance, the Wilshire wire looks small because it is so compact, but it is built! I would rate it as capable of up to 40-size motors. It is ideal for 05 wiring too, because it is so compact and very flexible.

It is not listed in the Wilshire catalog, but it goes for \$1.85 for one meter of red wire and one meter of black wire. (Wilshire Model Center, 2836 Santa Monica Blvd., Santa Monica, CA 90404.)

Last, and not at all least, is the SR wire. It too is a work of art. It has seven subcables like the Graupner wire, but each subcable contains 37 strands for a total of 259. The individual strands are about the diameter of a human hair. It is very flexible, as much as the Graupner wire, and it is really hefty (though it doesn't look like it from the outside). The total, uninsulated diameter of the SR wire is half again more than the Graupner wire, and I would rate it right on up to 60-size motors. The wire is a delight to work with, it just seems to "lay" right in wiring.

The SR flex wire comes in yellow and in black for \$3 per ten-foot pack (5 feet of each color). This is the wire I turn to for my larger motors, and for many of the smaller ones as well. Try it, you will suddenly find that wiring can be fun

after all! Order it from SR Batteries Inc., Box 287, Bellport, NY 11713.

BOEING HAWKS FLY-IN

If you live in the Northwest, or even if you don't, the second annual Boeing Hawks Electric Fly-In will be held on June 30, with July 1 as a rain date. I will be there to run the on-field electric clinic, so if you have had problems with your electric plane, bring it! If you don't have problems with it, bring it anyway to try for the prizes. There will be prizes for Best Entry (contestants' vote), Most Aerobatic, Longest Flight, and Highest Speed (timed, two-way, 300-foot run).

The map shows you the way. If you are not familiar with Seattle, Washington, there are excellent maps at most convenience stores once you are here.

Seattle is a neat place for the family to visit too, I especially recommend the waterfront area with its harbor tours, trolley, ferry boat rides, and restaurants (the Spaghetti Factory is a real bargain). There is a KOA campground right by the Hawks field, and RV parking on the field.

Registration is at 9 a.m., and the awards are at 2 p.m. Registration is \$3 for the first plane, \$2 for the second plane, and the rest are free! The yellow/white frequency cannot be used, and 72.030, .080, .240, and .910 may experience interference, so try to avoid them. AMA membership is required to fly. Contact Bernard Cawley at 210 37th SE No. 43, Auburn, WA 98002, phone (206) 939-1778 for more information. It's going to be fun, see you there!

OOPS!

Last month, I talked about the ASL 4 charger, and I over did it! It normally will supply between three and four amperes of current, not twenty! So, to those who are in the know ... sorry! I have not used the charger, so I hadn't thought about the limitations of power handling. I plan to get one of these "new breed" automatic chargers, then I can give you a user's report from direct experience. From all reports, the ASL is excellent, even if I did manage to exaggerate.

READER PHOTOS

Emil Socher, of Saltspring Island, British Columbia, sent in photos of his canard pusher, the *Diablo*, built from plans which appeared in 1978 or 1979 in *Modellflug* (German) magazine. It flies five to six minutes on an Astro 05 cobalt motor with seven sub-C cells and an 8x4 prop. The plans called for a regular ferrite magnet 05, but Emil feels that the takeoff run is too long with a noncobalt 05 as it is about 200 to 300 feet. With the cobalt, it is off in 100 feet with an excellent climb.

It is fairly fast in the air, and turns are easy with aileron and elevator (no rudder). Unfortunately, either radio problems or disorientation caused a crash after a dozen or so flights. Emil liked the plane and felt it flew well. He also recommended that the nose wheel should be beefed up, landings have to be nose high or it will bend.

I would have liked to see this one fly, oh well. Emil is thinking of building the

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Aqua Sport next, perfect for the lakes on the island. Maybe we'll have an electric float meet someday!

Till next time, enjoy your electrics! •

Dear Jake Continued from page 7

Dear Jake:

What size escapement rubber should I use on my Formula 1 pylon ship?

—Racer in Rancho Verde

Dear Racer:

A pylon race of 10 laps requires 30 turns. As you will need enter and exit aileron commands for each turn, your escapement will have to operate 60 times per race. Let's call it 72 including takeoff and landing. About six inches of single strand, 3/16-inch rubber should be plenty.

As long as you've got that rubber in the fuselage, why don't you go one better and save the weight of the engine. If you connect the propeller to the system as well as the escapement you'll need slightly more rubber. At 23,000 rpm and roughly two minutes per race, you'll need an extra 46,000 turns in the rubber in addition to the 72 required for the escapement. About 32 strands of 1/2-inch rubber over the full fuselage length should do the trick.

—Jake

Free Flight . . . Continued from page 59

"Category I, II and III site-classes are recognized, with suitable engine-run limits and max-time limits.

"For greater detail, write to Terry Rimert, 367 Orange Ave., Baldwin, FL 32234. He requests that those desiring information should also include a self-addressed, stamped envelope with their letter."

THE END

That's it for **MB** F/F for June, 1984. Next month, some special features on the 1/2A gas model . . . featuring a quick to build contest ship that you can have ready for the Nats, and a sneak preview of a nifty new 1/2A kit.

In the meantime, wind 'em tight and throw 'em hard. •



Counter Continued from page 10

Pusher," issue No. 39, January 1984.

"In December, 1983, RAF granted St. Croix of Park Falls, Ltd. the exclusive rights to develop and market a radio controlled scale model of the *Long-EZ*. On December 13, Jim Schmidt, Manager of St. Croix's Model Aircraft Division, flew prototype demonstration flights at the Mojave airport for Mike Melvill who agreed that the model looks and performs much like the real thing.

"The kit, which will build up to a 1/5-scale replica of Mike and Sally's *Long-EZ* will be available in the spring and should retail for under \$100.

"To receive information about this product as it becomes available, you may contact Jim at the following address: Jim Schmidt, St. Croix of Park Falls Ltd., P.O. Box 279E, Park Falls, WI 54552.

"The 1/5 Stand Off Scale model *Long-EZ* was painted to look exactly like N79RA, and when it was in the air, it looked for all the world like the real thing. It flew very well. Jim really knows how to fly R/C models. Mike had not flown an R/C model in two years, but Jim allowed him a few minutes of "stick time" and Mike said it was a "blast"! It flew just like the real one, right down to the full aft stick, no stall condition, it even rolls much like a real *Long*. To watch it come in and land was quite a treat. Mike was able to take Jim for a ride in his *Long-EZ* and although Jim had never flown a light plane before, he was quite at home in it, and commented that it was just a big model!!

"As soon as St. Croix has the kits available, RAF plans to keep some in stock."

The vital statistics for the St. Croix *Long-EZ* are: wingspan, 62.6 inches; canard span, 28.3 inches; total wing area, 630 square inches; overall length, 40 inches; weight, 6.0 to 7.0 pounds; loading, 24 ounces per square foot; engine, .40 cross scavenged glow to .45 Schnuerle ported; wing construction, foam core, balsa sheeted; fuselage construction, balsa and plywood; radio, four to six channels.

★ ★ ★

We hope to clear up any rumors about

new or improved Quadras coming on the market with this affirmation: YES, production has started on a glow version (not ignition) of the 1983 Quadra 35, and it has been named the Q35X. Early tests indicate a 20% increase in horsepower! Conversion kits for existing Q35 engines should follow once the initial Q35X production run is complete.

Improved for 1984 is the Q50S, the larger or heavier giant model powerplant. Improvements include a built-in spring starter, and improved Schnuerle type scavenging. (See photo.)

Hold it there, buddy . . . there's more! The Q50S now has a glow powered twin sister . . . the Q50X! This big engine has so much power that the rumored Q100 is collecting dust at the factory. The Q50X is becoming a pacesetter.

Both the Q35X and the Q50X feature built-in spring starters, new prop drivers, and multifuel carburetors.

For further info on these new motors, you'd better contact Quadra Aero Engines, P.O. Box 958, Uxbridge, Ontario, Canada L0C 1K0, (416) 852-3500, telex 065-28053.

★ ★ ★

Wendel Hostetler's Plans has announced the release of its latest design, the *Turner Special*. The 1/4-scale model of the 1939 Thompson Trophy winner is constructed of balsa, basswood, and plywood. It has a span of 84 inches, a length of 70 inches, a wing area of 1275 square inches, a weight of 18 to 22 pounds, and a required power of two to four horsepower.

Special features of the flight proven design are: simplified box and former fuselage construction; full cantilever plug in wings; optional 75 inch 1/4-scale wing; complete cowled engine; enclosed rudder and elevator controls; authentic markings for decals, numbers, and color scheme; special flex action landing gear; removable forward hatch and tail cone.

Custom parts available from T&D Fiberglass include: epoxy glass outer and inner cowls; air scoops; wheel pants; landing gear fairings; tail cone; flex action landing gear; and molded canopy.

The plans include two 42 x 96-inch detailed sheets, and are available from: Wendell Hostetler's Plans, 1041 Heatherwood Lane, Orrville, OH 44667.

★ ★ ★

Free Flight modelers are familiar with Tom Hutchinson's *Zingo*, a rear finned, F/F model which was originally designed for the F.A.I. Power event. Although modern technology has made it obsolete for this event, it is still a top choice for AMA Class A or B Free Flight competition.

Campbell's Custom Kits, P.O. Box 5996, Lake Worth, FL 33461, (305) 968-1045, now has available a short kit for the *Zingo* which contains: ribs, wing tips, pylon, rudder, and firewall. All parts are machine cut. Plans are easily obtained from Carsten's Plan Service.

Campbell's Custom Kits products are available through dealers and distribu-

INDEX TO ADVERTISERS

Ace R/C Inc.	62	Hobby Shack	Cover 3	R.C. Sweitzer	95
Adventure Model Craft	86	Ikon N'wst	83	Repla-Tech International	98
Aeromarine Laminates Co.	96	Indoor Model Supply	72	Rick's Kits	93
Airtronics Inc.	3	Jersey Metal Spinning	91	Rocket City Specialties	88
Astro Flight, Inc.	64	K&B Manufacturing	65	Rossi of North America	99
Aztex Corp.	91	K&S Engineering	97	Satellite City	95
Beehive R/C Model Aircraft Co.	84	Kraft Systems, Inc.	69	Sig Mfg. Co., Inc.	4.5
Dave Brown Products	93	Kustom Kraftsmanship	89,96	SR Batteries	92
Byron Originals	64,76,78,83	Laminar Research	103	St. Croix of Park Falls	70
Bud Caddell Plans	75	Lehmborg Enterprises	78	Technopower II	70
Campbell's Custom Kits	69	Leisure Electronics	73	Teleflight Corporation	68
Charlie's R/C Goodies	90	Major Decals	87	Top Flite Models	79
Champion Model Products	82	Micro-X	74	Uber Skiver	1
Circus Hobbies	67	Midway Model Co.	75	VL Products	77
Eric Clutton	79	Miniature Aircraft Supply	80,81	Buzz Waltz R/C Designs	68
Condor Hobbies	Cover 2	Model Rectifier Corp. (MRC) ..	Cover 4	Peter Westburg Drawings	100
Jim Crockett Replicas	87	Walt Mooney	98	Williams Brothers	83
Dodgson Designs	82	Novak Electronics	86	Wilshire Model Center	62
Du-Bro Products	71	Octura Models	66	Wolff-Pak	72
E&L Manufacturing	74,75	Pacer Technology	63	World Engines	102
E.M.S.	79	Peck-Polymers	84	Nick Zirola	74
Fox Manufacturing Co.	70	Picco Engines	86		
Dick Hanson	107	Pitot Publishing Co.	76	HOUSE ADS	
Hobby Horn	66	John Pond O.T. Plans	94	Full-Size Plans List	106
Hobby Products Co.	78	Quadra Aero Engines	85	Modeler's Choice	104
Hobbypoxy Products	89	RAM	76	Win a Free Subscription	101

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PIETENPOL AIR CAMPER. Build a model from copies of the original 1933 plans, eight sheets. \$35. D.D. Pietenpol, 215 — 21st St. SE, Rochester, MN 55904.

FOAM. Buy directly from nearest US expanded bead foam manufacturer. Send \$2.00 for list. G.E. Ruff, 310 W. Broadway, Goldendale, WA 98620.

WANTED. Used Pica Jungmeister and Pica Waco in excellent flying condition. Good price paid. Include phone. Richard Wilson, P.O. Box 4814, Shreveport, LA 71104.

PLANS. Mini Paagan by Denny Davis. Nostalgia Third Payload at 1983 Nats! Postpaid \$4.00. Stephen Landy, 44 Chaplin Road, Newton Centre, MA 02159.

WANTED IGNITION MODEL AIRPLANE engines or parts circa 1930-46. Competitive prices. Tom Forsythe, 318 12th Ave., Box 141, New Glarus, WI 53574. (608) 527-2066.

GRUMMAN F8F-2 BEARCAT plan, 1/24-scale rubber free flight. \$3.75 postpaid. SASE for complete list. David Diels, Box 101, Woodville, OH 43469.

SPACE SHUTTLE 1/200th scale model information. Two 11x17 sheets showing shuttle, external tank and boosters. \$3.00 Postpaid. J.C. Brown, 21465 Detroit Rd. #122-D, Rocky River, Ohio 44116.

MODEL ENGINE REPAIRS. Cost efficient, two/four cycle. Many O.S. K&B, Webra parts in stock. Send SASE for details. River City Model Works, 7925 Oakwood, Ralston, NE 68127.

SAMS INTERNATIONAL INDOOR-FREE FLIGHT SUPPLIES. 43-page catalogue. \$1.50. SAMS, 2 The Drive, Blackmore End, Wheathampstead, Herts, England.

PLANS ENLARGED. — Blueprints to nine feet from your plan or book page. SASE for prices. Scale Plans and Photo Service, 3209 Madison Ave., Greensboro, NC 27403.

WILL PAY AT LEAST \$300 for any complete, original Elf. Also want other vintage ignition model engines and parts. Woody Bartelt, 1301 W. Lafayette, Sturgis, MI 49091, (616) 651-5431.

K&K HOBBY SUPPLY has all your discount! hobby needs. Our professionals will build your kit! Call or write for prices. Catalog \$2.50. P.O. Box 2641, North Canton, OH 44720. (216) 494-5065.

RADIO EQUIPMENT EXCHANGE. Box 561, Park Forest, IL 60466. We have listings of used radio equipment for sale. Send SASE for details. Minimum fees, escrows available.

SCALE DOCUMENTATION. — Photo packs, three-views, cutaways for 800 aircraft. Giant. Precision, Fun Scale plans. Eighteen page catalog. \$3. Scale Plans and Photo Service, 3209 Madison Ave., Greensboro, NC 27403.

CALIFORNIA MODEL IMPORTS mistakenly advertised that the R-22hp placed first in static judging at the Tangerine contest. In fact, the R-22hp placed second in static and second overall. We apologize for the error to the winner, Steven Mintz, who took first place in Static.

RADIO EQUIPMENT EXCHANGE. Box 561, Park Forest, IL 60466. List your used radio equipment for sale. No fee for listing. Escrow available. Send SASE for details.

SENSATIONAL CONTROL LINE STUNT KITE! Loop, dive, hover, and zoom! Tail, lines, and flight instructions included. 36 in x 44 in. \$19.95 plus \$2 UPS from Dyna-Kite Corp., P.O. Box 402, Chicopee, MA 01021.

SECOND PRINTING. *Model Airplanes and the American Boy* by Frank Zaic. 160 Magazine size pages of 1927-34 *American Boy* reprints. For me the book is sheer joy. Photos, over 40 plans. \$9.50 Postpaid. Model Aeronautic Publications, Box 135, Northridge, CA 91328.

ANTIQUE IGNITION ENGINE PARTS. Excellent reproductions of original timers, points, tanks, etc. Send \$1 for information and price list. Micro Model Engineering, 1301 W. Lafayette, Sturgis, MI 49091.

FORSTER IGNITION ENGINES. English and Chinese diesels, parts and supplies. Visa, Mastercard. Send SASE to M&G Engines, P.O. Box 6026, Denver, CO 80206.

COMBAT KITS. — National champions. Foam wing cores — standard and custom. Gotcha 400, Gotcha 500, and MORE. Send SASE for list. The Core House, Box 300A, RD #2, Palmyra, PA 17078.

WANTED. Old model airplane engines, spark ignition, glow and diesel. Kits and related items. Doug Beardsworth, 158 Grasslands Rd., Southbury, CT 06488. (203) 264-3197.

UNUSUAL RUBBER, CO₂, and Peanut Scale plans: HE-219, JU-87, Farman Goliath, and 30 more. Send \$1 for catalog to: Hought Graphics, 5460 Southbrook, Ft. Wayne, IN 46815.

FULL-SIZE PLANS SERVICE

MODEL BUILDER

All Full Size plans purchased from MODEL BUILDER Magazine include a reprint of the construction article, if building instructions were part of the article.

SEND TO: MODEL BUILDER PLANS SERVICE
BOX 10325, COSTA MESA, CALIFORNIA 92627-0127

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Price includes 3rd or 4th Class mail. For Airmail or First Class in U.S., add 25% of total order. For Overseas Airmail (includes Canada and Mexico), add 50% of total order. Remit by International Money Order or U.S. funds on Overseas orders. Postage paid for APO and FPO orders. Master Card or VISA accepted. Include card number, expiration date, and signature. Add 5% to credit card orders. Minimum order, \$5.00.

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No. 6841 SPRINT 7.5 \$9.00
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A 50-in. aerobatic slope glider for 2-ch. R/C. Light and agile. By Pete Roehling.

No. 684-O.T. SCRAPPY \$5.50
A 62-inch, high wing cabin model from May 1939 *Flying Aces*. By Ray Heit.

No. 5841 PT-1 FLOAT PLANE \$6.50
Semi-scale Consolidated PT-1 on floats. 4-ch R/C biplane, 42" span. George Wilson.

No. 584-O.T. R/C TLUSH MITE \$5.00
The 1938 *Mite* at 125%. Spans 62.5 in., 450 sq. in., for 020-05 elec. R. Wrisley.

No. 4841 WEEKEND WONDERS \$4.00
A pair of 1/2A, 2-ch., R/C flying wings, based on Ace "foamies" Bruce Tharpe.

No. 4842 BIG BIRD, THE E. T. \$5.00
Peck's Prairie Bird blown up to 50" span for electric powered R/C. By Larry Jolly.

No. 484 O.T. HI-CLIMBER \$3.00
A classic 30" span sport rubber model from Aug. '39 *Flying Aces*. Earl Stahl.

No. 3841 FABRE HYDRAVION \$15.00
RC Standoff Scale 1910 canard seaplane for .10 glow. 69 in. span. F. Reynolds.

No. 384-O.T. CLOUD CRUISER \$6.00
Parasol wing O/T from July '37 *MAN*, 72" span, looks scale-like. Harry Moyer.

No. 3842 HANG-IN-THERE \$4.00
Coupe d'Hiver FF model. Features rolled balsa fuse, folding prop. By E. Schick.

No. 2841 BITTY-BIPE \$5.00
A small, but exciting R/C sport biplane for .10 to .20 glow. By "Doc" Edwards.

No. 2842 VOLTS WAGON \$5.50
A 54" span, 430 sq" area, 05 electric powered, sport R/C plane. Woody Woodward.

No. 284-OT THE DIAMOND \$4.00
Rubber O/T with diamond fuse, 150 sq. in. wing, from Oct. '37 *AT*. Roy Wriston.

No. 2843 THE CRACKER JACK \$4.00
F/F Rub. or CO2 Scale, high wing home-built; 26" span, 86" area. Walt Mooney.

No. 1841 SUNRISE 2540 \$9.00
Mild-mannered, low-wing, R/C trainer for .25 to .40 glow engines. By Buzz Waltz.

No. 1842 OHM-Y-GOSH \$5.00
Sporty 05 electric Pylon racer. Wing area is 300 sq. in., span, 38 in. Dave Katagiri.

No. 184-OT 1/2A BRIGIDIER \$5.00
An 1/2A Tex. version of the Berkeley kit scaled to 82% for R/C. By Jim Reynolds.

No. 12831 NIEUPORT 11-C \$9.00
WW-I triplane for Standoff R/C scale, 4-channel, two-inch scale. By Frank Hoffer.

No. 12832 FAST EDDIE \$5.00
05 Electric pylon/aerobatic plane in 29, 34, 38-in spans; 3-ch R/C. By Bob Sliff.

No. 1283-O.T. KARASU \$2.00
Rubber powered, 19th century antique from Japan; 21" span. By Danny Sheelds.

No. 12833 VERVILLE AIR COACH \$2.50
F/F Rubber Scale Golden Age high wing monoplane; 26 in span. By Walt Mooney.

No. 11831 HAWKER FURY \$12.50
Classic British biplane in 1/4 scale, for Quadra or equiv. power. Don Prentice.

No. 11832 FLYING FLEA \$4.50
R/C scale model of original HM-14 'Pou de Ciel'. Span 44". By Randy Wrisley.

No. 1183-O.T. ARUP FLYING WING \$2.00
Flying scale rubber powered model from Sept. '36 *M.A.N.* By Gordon Englehart.

No. 10831 RUSS. MISSILE BOAT \$6.00
Missile-firing, scale Russian attack boat, OSA class. 2 or 3-ch. By Walt Musciano.

tors. If your local hobby dealer isn't very local, try contacting Campbell's directly.

★ ★ ★

New from J-5 Enterprises is a 1/6-scale Stinson Voyager, Model 108-2, designed for .35 to .40 engines. The kit features a 68 inch one-piece wing constructed from balsa, has functional balsa struts, 1/16 sheet balsa tail feathers, 3mm plywood sides and formers, formed landing gear, hardwood motor mount, built-up wood cowl, functional balsa and plywood wheelpans and fairings, instruction booklet and full-size plans. Balsa, plywood and hardwood parts are machine cut. The 5 to 6 lb. weight of the finished Stinson Voyager also makes it suitable for a .40 to .60 four-stroke engine. A five-channel radio is required, if flaps are used.

The 1/6-scale Stinson Voyager kit is available through your dealer or direct. For further information, contact J-5 Enterprises, P.O. Box 82, 220 Church Street, Belmont, Ontario, Canada, N0L 1B0, (519) 644-0375.

It's L.A. in 1984
FOURTH ANNUAL
International Radio Control
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FUN-FLY FESTIVAL
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August 16-17-18-19
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Enjoy Four Great Days of Relaxed Flying!

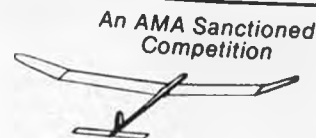
FESTIVAL INFO EAST-
□ Don Godfrey, IMAA President
91 Blackstone Avenue
Binghamton, NY 13903
Phone: 1-607-724-0115

FESTIVAL INFO MIDWEST-
□ Les Hard, Central Control
2909 W. Michigan Avenue
Lansing, MI 48917
Phone: 1-517-487-0653

□ Don McLean, Secretary-Treasurer
9610 Farmington Road
Livonia, MI 48150
Phone: 1-313-422-9448

FESTIVAL INFO WEST -
□ Walter E. Clark, Festival Co-Ordinator
5255-2 White Oak Avenue
Encino, CA 91316
Phone: 1-213-345-3910

When writing for FESTIVAL INFO send S.A.S.E. (Business size)



SKYSCRAPER SPRING '84 AMA & FAI FF MEET Galeville Army Air Field—May 26th & 27th



1/2A, A, B, C, D GAS - FIC FAI POWER -
FIB WAKEFIELD, FIA NORDIC A2, NOSTALGIA POWER
COUPE, P-30, HL GLIDER, EARLY SUNDAY A.M. UNLIMITED RUBBER



WRITE FOR FLYER WITH MAP, INSTRUCTIONS, NOSTALGIA RULES and MOTEL LISTING
Contest Director: Bob Lipori, 242 Loveland Road, Stamford, CT 06905

★ ★ ★

T&D Fiberglass Specialties, 30925 Block, Garden City, MI 48135, (313) 421-6358, has a whole bunch of new F/G parts to introduce this month, so let's get right down to it.

Photo No. 1 (left to right): *Super Cub* style cowl to fit Sig's 1/4-scale J-3; a CAP 21 cowl for Great Planes .60 to .90 size models; full length scale style cowl for Orlin's Fairchild 22; and a one-piece cowl with blisters molded in for Pica's new 1/5-scale WACO (it's one-inch longer than original for larger engines).

Photo No. 2 (L to R): Nick Zirol's DR-1 cowl; Dan Santich's "Ole Tiger" cowl; and the STARS Fokker D VIII cowl.

Photo No. 3 (L to R): Full length cowl for Ikon's *Super Cub*; three cowls for the *Aeromaster* (smooth round, round with WACO style blisters, and round with Jungmeister style blisters); and one-piece full length cowl for Pilot's new 1/5-scale PT-19.

Also available are canopies and wheel pants for any of the above mentioned models (where called for).

One dollar gets you the complete list of all T&D fiberglass products, landing gear, and canopies.

★ ★ ★

Royal Products Corporation, 790 West Tennessee Avenue, Denver, CO 80223, (303) 778-7711, has announced the availability of two new starters for internal combustion model engines.

The first is the new Jumbo Starter. The list of features includes: 12-volt operation; up to 2.5 cubic inch engine capacity starting; all metal case; aluminum drive cone with V-belt groove, standard; battery clips with long, 59-inch cord; simple thumb action strip switch; non-marring rubber drive cone (reversible for spinners or prop hubs); and built-in metal rest stand.

The Heavy-Duty model will handle engines up to .90 cubic inches of displacement. All features are identical to above model.

Any questions? Contact Royal Products at the above number.

★ ★ ★

Thirty-five Years at the Outer Marker is an interesting new book written by Holland L. Redfield, Chief Training Captain for Pan American Airways (retired). Its subject is as diverse as the author's extensive flying career. Barnstorming, WACO seaplanes, WW-II pilot training, Pan Am pilot training, every type of flying machine Pan Am used from Grumman Widgeons to 747s. There are enough entertaining stories in this book to keep any flying enthusiast engrossed for days!

There's only one place to get your copy of this fine book, and that's Pitot Publishing Co., Dept. F, Wunneweta Road, Box 941, Cutchoque, NY 11935.

★ ★ ★

Two new goodies from RAM (Radio-controlled Models) are bound to come in handy for scale modelers, sport fliers,

DALOTEL — TIPORARE — C.A.P.21

750
825



COMPETITIVE AIRFRAMES
for
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and boat or car enthusiasts. They are:

Real Strobe Light — RED 23. This is the smallest, lightest, safest, xenon strobe ever offered to the R/C modeler. The enclosed unit is 5/8 x 1-5/16 x 1-5/16. The encased flash tube is 1/4 x 1-1/8 on a ten-inch cord. Total weight is one ounce, under three ounces with two pen cells which will power the unit for over three hours.

Simple Throttle — RED 27. This is the simplest way to get two speeds forward (high and low), off, and two speeds reverse for your electric boat or car. Reverse speeds can be eliminated for aircraft use. Eliminates linkage by mounting directly to the servo. It is suitable for 02 to 25 electric motors. The system includes fuse holder and 15 amp fuse. The 1-1/4 x 2 board weighs one ounce.

Now that you know what, here's the where: RAM, 4736 No. Milwaukee Ave., Chicago, IL 60630, and hobby shops all over the place!

★ ★ ★

When contacting manufacturers featured in "Over the Counter," tell them you saw it in *Model Builder*!

Workbench . . . Continued from page 7

Kathy (Simone) Elson and illustrates our point. We would have had to yell "FIRE" in order to get a clear shot of the booth!

THANK YOU, HARRY

A model airplane can be many things to many people, but it's extra nice to come across one that's kinda special . . . a monument, if you will, to one who must have been someone special . . . Harry Edward Moyer.

We asked if anyone knew of his whereabouts when we published his "Cloud Cruiser" in the March '84 issue. First we heard from a person well known to pre-WWII modelers, Gordon Light, for many years the model editor of *Air Trails* . . . when modeling shared the magazine with full size aviation news and Bill Barnes adventure stories. Gordon, now retired and living in Maine (this guy's a living legend to me!) wrote to say that Harry was a super builder and a very generous guy in giving help to the beginners, and especially to Gordon.

when he was beginning in 1927! And then we received a letter from his son, Edward Moyer, who wrote to tell us that his father had a model shop at 612 Walnut Street in Lebanon, Pennsylvania up until 1970, and then passed away in 1979, on February 8, about the time of the year that this O.T. article must have appeared. Edward says Harry was a wonderful grandfather to his children.

And so, another small segment of modeling history comes to a close . . . or does it? Edward says he has model information gathered by his father that goes back to the '20s . . .

HOW MANY STONE?

Bob Randle, from Casper, Wyoming, is currently using a rather inaccurate kitchen scale to weigh his airplanes, and would like a recommendation for something better.

Good idea. Let's hear some feed-back. Give us your choice, with name and/or source, and the price. Bob is talking R/C models, so forget the 8-ounce-maximum postal balances that are so great for checking the weight of balsa sheets and strips.

THINGS TO DO

- The Fun 'N Fly '84 takes place at Burlington, Ontario, Canada, June 9 and 10. The show features ultralight demonstrations, model aircraft flying show, R/C car racing, beer garden, and door prizes. It is sponsored by the hobby and ultralight industries and associations, Channel 11 TV, Carling-O'Keefe, and other supportive businesses and groups. For more information, contact Frank Anderson at (416) 624-5922 days, or (416) 276-5278 evenings.

- The IMAA is having its fourth annual Fun-Fly Festival at Sepulveda Basin, Los Angeles, California, on August 16, 17, 18 and 19, 1984. In addition to four full days of fun flying, there is a pilots' continental breakfast on-site every morning, flying demos at noon on Saturday and Sunday, a family picnic on Friday, and a cocktail party / dinner / show / dance / acknowledgments / etc., on Saturday evening. For further information, contact Walt Clark, Encino, (818) 345-3910; Vick Martin, Encino, (818) 881-1058; Don McLean, Livonia, Michigan, (517) 487-0653; or Don Godfrey, Binghamton, New York, (607) 724-0115.

- The Second Annual Four-Stroke

Awards to
Fifth Place

EASTERN U.S. FREEFLIGHT CHAMPIONSHIPS

GALEVILLE ARMY FIELD—JUNE 23rd and 24th
8 A.M. — 4:30 P.M. BOTH DAYS

18 Events

1/2A, A, B, C, D GAS—FAI POWER—A-1, A-2 NORDIC—WAKEFIELD
HL GLIDER, EMBRYO, P-30, COUPE—EARLY SUN. A.M. UNLIMITED RUBBER
SCALE: PEANUT, RUBBER, WORLD WAR I, GOLDEN AGE—SPECIAL O.T. SPARKY EVENTS

JUNIOR, SENIOR, OPEN—OVER \$2500 IN TROPHIES and MERCHANDISE

WRITE FOR FLYER WITH MAP, INSTRUCTIONS, and MOTEL LIST

Contest Director: Tom Kerr, 7824 Lexington Ave., Philadelphia, PA 19152

PR Director/CD: Joe Wagner, 12 Cook St., Rowayton, CT 06853

Sponsored by the
Eastern FreeFlight
Conference

An AMA Sanctioned
Competition

Rally, sponsored by the Hamilton (Ohio) Hawks and World Engines, will be held on September 29 and 30, 1984, at Joyce Park, Hamilton, Ohio. For further information, and registration, contact John Maloney at World Engines.

• The **Big One** happens again this fall, the Eighth International Tournament of Champions, put on by Circus Circus Hotel/Casino, Las Vegas, Nevada, appropriately dated on the 7-11 of November, 1984. Nicknamed the "Hanno Prettnner Benefit" because this Austrian flier has won all previous tournaments, this contest is flown according to rules closely aligned with full-scale aerobatic competition. With the richest purse in aeromodeling history, this year's prize money totals \$125,000. Watch for a full page ad appearing in next month's issue of **Model Builder**, or if you can't wait, contact the office of Mel Larson, VP Marketing/PR, Circus Circus Hotel/Casino, Las Vegas, NV 89109, phone (702) 734-0410.

INDUSTRY NEWS

Riley Wooten, former national C/L combat champion, and now the owner and operator of Flite Line Products, Rt. 9, Box 437, Lubbock, TX 79423, phone (806) 745-6483, has just announced the purchase of inventory and the right to manufacture Mile High Models "Super Duper Joy Stick" and "Super Joy Stick 20" (spittin' image of Phil Kraft's famed Quik Fli), and Hornet kits.

Flite Line will also produce ZIA Models' "Delta Dart" and "KFIR" kits. These are all-balsa, delta jet-type R/C sport models for .35 to .51 engines.

WAR PAINT

Pettit Paint Company, producers of Hobbypoxy model paints, continues to develop mixing formulas to duplicate WW-II aircraft colors. The latest formulas are for Japanese Navy and Army Air Force colors.

On Navy aircraft, Light Gray N10 was used overall from 1933 through 1941. From 1942 until the end of WW-II, Black Green N1 was used on upper surfaces, along with the Light Gray undersurfaces.

Cockpit interiors and insides used a translucent blue primer, while on some, this was painted over in Gray Green N4.

Army aircraft were painted with various combinations of Dark Green A1 and

Light Gray A9, or one of these colors overall. Some also used natural metal undersurfaces. Formulas for all of the above are as follows:

LIGHT GRAY N10

16 Parts H10 White

13 Parts H70 Gray

8 Parts H55 Cream

1 Part H47 Bright Yellow

BLACK GREEN N1

6 Parts H33 Stinson Green

2 Parts H81 Black

1 Part H65 Bright Red

TRANSLUCENT BLUE PRIMER

5 Parts H24 Dark Blue

2 Parts H99 Custom Metalizer

1 Parts H33 Stinson Green

Use H06 or H02 Gloss Hardner with this formula.

GRAY GREEN N4

20 Parts H70 Gray

2 Parts H49 Cub Yellow

2 Parts H65 Bright Red

1 Part H33 Stinson Green

DARK GREEN N1

6 Parts H81 Black

4 Parts H33 Stinson Green

2 Parts H66 Dark Red

1 Part H49 Cub Yellow

LIGHT GRAY A9

28 Parts H10 White

10 Parts H70 Gray

6 Parts H55 Cream

1 Part H47 Bright Yellow

With all of the above formulas, except for the blue primer, mix an equal amount of H05 Flat Hardner for an authentic matte finish. The natural metal can be simulated by using H93 Silver mixed with H02 Gloss or H06 Quick Spray Hardner.

HELICOPTER BREATHES

As mentioned last month, but in case you were wondering, Ray Hostetler is going on an every-other-month schedule for an undetermined length of time, beginning this month. Consequently, you'll see his column again in the July issue, then in September, then November, etc.

SIMPLY SCALE

Other **Model Builder** column news is that Cliff Tacie, who has been doing several articles for us in recent months, has now become a regular. In fact, he has been so consistent with scale articles recently that even thought this is the first

official announcement of the fact, he has already been receiving mail addressed to him as the R/C Scale Editor!

And speaking of R/C Scale, we are trying to contact Bill Mikesell, of Elgin, Illinois. His Ryan FR-1 "Fireball" appeared in a photo with Eloy Marez's article on the One-Eighth Air Force Fly-In, as published in our August 1983 issue. In case Bill doesn't see this, would someone please ask him to report in.

ADDRESS CORRECTION

On page 63 of the March '84 issue, reference is made to the 1979 *World Champs Planbook*, in Bob Stalick's Free Flight column. However, Fred Terzian's address contains an error. It is 4858 Moorpark, not 4558.

AND MORE

While checking the above error, we noted an even worse one . . . there are no dimensions on Paul Lagan's "Kiwi 2C" Nordic A/2 as shown on page 64! Typed figures were to replace the hard-to-read handwritten dimensions, but hard-to-read would be better than no dimensions at all! If you're really interested in this one, send us a S.A.S.E. and we'll give you a *completed* copy of the drawing.

FINALLY!

Now that rules have been established for the free flight Nostalgia event, can R/C Nostalgia be far behind? Before it gets out of hand, we'd like to suggest the following simple rules.

1. All Free Flight Nostalgia rules shall apply, for model, engine, engine runs, etc. 2. Only rudder and elevator may be radio controlled. Engine cut-off to be by normal free flight methods.

3. Timer holds transmitter until a max has been accomplished.

4. Watch is stopped when and if timer hands over transmitter to flier at flier's request, if prior to a max.

WELL . . . ALMOST

The excited youngster had just been to his first ever radio control contest and was telling his family all about it during dinner.

"What kind of radios did they use?" asked his father.

"Well, there was a Jar, and a Tar, a Mercy, a Carafe, some Fruit Bars, a Serious, a Canyon, a Silver Heaven, and a couple of Hairtonics!"



RADIO CONTROL AEROBATIC AIRPLANE **LASER 200**

The EZ LASER 200 is our first .40 — .45 size EZ kit, and what better choice for this larger engine size than a world class aerobatic airplane? Leo Loudenslager's world famous airplane is accurately reproduced in all aspects, from its beautiful color scheme to its aerobatic ability. The LASER 200 is capable of the full F.A.I. and Aresti aerobatic patterns, and yet it exhibits stability that will make it a favorite sport plane!

Span: 55.75 in.
Area: 543 sq. in.
Engine: .40 — .45 2-cycle
.60 — .80 4-cycle
Radio: 4 channel req'd.

NO. 100986
LIST \$250.00

\$189.99

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Yes, you guessed it! We took the ever popular EZ SUPER BOX FLY-20 design and selected three popular pre-WWII camouflage and markings schemes to make three new BOX FLY type planes. They are the same great flying models, but now you can fly an American, British or German version. They are great for "just fun flying", club racing, or attach paper streamers for all out COMBAT contests. Order yours today and shoot holes in the sky tomorrow!

SPECIFICATIONS

Span: 49 1/2 in. Area: 425 sq.in.
Engine: .20 — .25 Radio: 4 ch. req'd.

AMERICAN NO. 101069
BRITISH NO. 101067
GERMAN NO. 101068

LIST \$120.00 **Choice- \$89.99**



CAVALIER-40

Span: 57 1/2 in. Area: 575 sq.in.
Engine: .40 — .45 Radio: 5 ch.
RETRACTS INCLUDED
NO. 101026
LIST \$320.00
FIXED GEAR TYPE
NO. 101027
LIST \$265.00

\$239.99

\$199.99



EZ DECATHLON 40

Span: 60 1/2 in. Area: 620 sq.in.
Engine: .40 — .60 2-cycle
.60 — .80 4-cycle
Radio: 4 channel required

NO. 101024
LIST \$250.00

\$189.99



CAVALIER-20

Span: 49 1/2 in. Area: 437.5 sq.in.
Engine: .25 Radio: 5 channels
RETRACTS INCLUDED
NO. 101000
LIST \$240.00
FIXED GEAR TYPE
NO. 101001
LIST \$200

\$179.99

\$149.99



SUPER BOX FLY-20

Span: 49 1/2 in. Area: 425 sq.in.
Engine: .20 — .25 Radio: 4 ch.

NO. 101073
LIST \$120.00

\$89.99



SUPER CHIPMUNK

Span: 51-1/8 in. Area: 408 sq.in.
Engine: .25 2-cycle
.35 — .45 4-cycle
Radio: 4 channels required

NO. 101008
LIST \$190.00

\$139.99



EZ CHRISTEN EAGLE

Span: 38 1/2 in. Area: 460 sq.in.
Engine: .35 — .40 2-cycle
Radio: 4 channels required

NO. 101055
LIST \$200.00

\$149.99



EZ 20H COMET

Span: 49 in. Area: 426.5 sq.in.
Engine: .25 Radio: 4 ch. req'd.

NO. 101028
LIST \$180.00

\$134.99



EZ-2000 GLIDER

Span: 78 1/2 in. Area: 625 sq.in.
Weight: 35 oz. Radio: 2 channel

NO. 100992
LIST \$175.00

\$129.99



EZ-1700 GLIDER

Span: 67 in. Area: 465 sq.in.
Weight: 29 oz. Radio: 2 channel

NO. 100990
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The FROG



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THIS IS THE FASTEST OFF-ROAD WE'VE EVER BUILT

SPEED

Right out of the box, the 1/10 scale Frog can outrun, out handle, and out perform many of the hottest "souped-up" buggies on the tracks today. To make one this good and this fast, we've created new materials, used new design techniques and re-engineered the off-track racing buggy concept. The result... not just the fastest off-road buggy kit we've made... but a leap forward in performance, durability and handling as well.

Intent on speed, we used a lightweight, highly durable Lexan (polycarbonate) body, and made our RS540 motor standard fare. We designed a chassis that would house servos, receiver and battery pack at the precise location for optimum center of gravity.

PERFORMANCE

Then we began to concentrate on control and positive handling. To do this, we equipped the Frog with new large differential gears for tighter turns, better handling. Then we invested the Frog with yet another dimension... interchangeable gear ratios... gears that can be changed on the spot, right in the pit area. This allows the savvy driver to change gears as track conditions dictate. Say you're running on a track that has many curves and very little straight-away. You can install just the right gear ratio for quick acceleration. However, as the dirt on the track becomes more churned up, it may be necessary for a quick gear change. Pull your car into the pit area, and within a few minutes you can be ready to run at optimum performance with precisely the gear ratio you need.



HANDLING

Next, we created heavy-duty, coil over, adjustable, oil-filled shocks to complement the adjustable trailing arm rear suspension. What these shocks do, is offer progressively increased resistance when the tire is forced up and less resistance when the tire drops to the road. The result is a new standard for road hugging racing traction... tighter cornering control. Unrivalled performance.

We could have stopped there... for these were the key elements of the Frog's leap forward, but MRC-Tamiya doesn't stop short of perfection... so we included four ball bearings in the transmission; glass filled nylon gears; and spiked rear tires with a small air hole for better grip and durability... excellent for dirt tracks; a new space age nylon bumper; a servo

saver with direct drive which decreases front end play and increases pinpoint steering control.

The Frog... It Lets You Compete On A Higher Level

Length: 16.14"
Width: 9.17"
Height: 5.9"
Weight: 2.4 lbs.
Gear Ratios: 1:8.5, 1:7.3, 1:6.7
Power: 6 volt or 7.2 volt MaH Battery not included
2 Channel, 2 Servo System Required

For maximum enjoyment and safety, read the complete instructions.



Model Rectifier Corporation
2500 Woodbride Avenue
Edison, New Jersey 08817