C/L stunt plan · strut how to · R/C boats

flying models

FLYING MODELS

1928-1978 flying models 50 FLYING ACES

SEPTEMBER
1978
47506
$1.00

Miss Philley
a FLYING ACES reprint

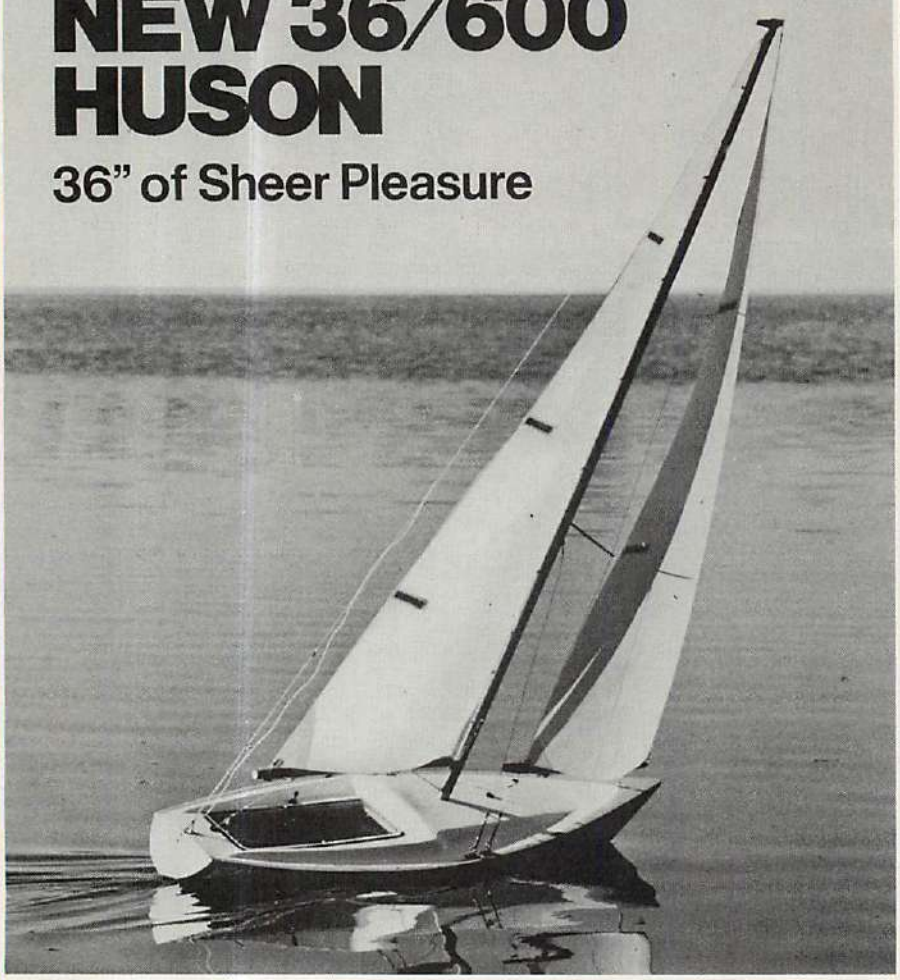
PHOTOGRAPHY: BOB HOECKELE

Dick Sarpolus' Magnum 80

0 71896 47506 09

Dumas' NEW 36/600 HUSON

36" of Sheer Pleasure



The new Huson 36, another addition to Dumas' RC sailing fleet, joins the Heritage 12 Meter (formerly called East Coast 12 Meter); 50/800 Bingo and Etchells 22; 36/600 Equation and 45" Star.

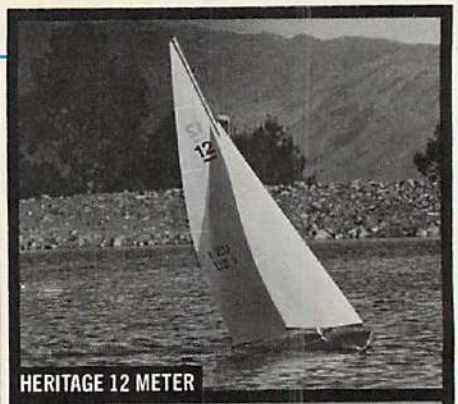
The Huson 36 is beautifully molded, rugged, easy to build fiberglass with wooden booms and mast, dacron sails and complete hardware. All you need to add is an inexpensive two channel radio and a Dumas sail control unit (3701).

Whether you sail for fun or the excitement of competition, you'll probably want to join the AMYA, a national organization dedicated to model sailing. Their quarterly newsletter will keep you up to date with all the happenings in model sailing.

Select one of the kits that appeals to you and you'll soon realize the sheer pleasure of sailing a Dumas boat.

dumas boats

DUMAS PRODUCTS, INC., 902 East 17th Street, Tucson, Arizona 85719



HERITAGE 12 METER

BINGO

ETCHELLS 22

EQUATION

45" STAR

HAROLD H. CARSTENS
publisher

DONALD J. McGOVERN
editor

Robert Hoeckele
managing editor
Robert Aberle
contributing editor
Edward Whalley
modeling news editor
Wayne M. Daniels
advertising production manager
Jan L. Harp
circulation manager
Phyllis Carstens
assistant to the publisher

Judy D. Lovas/office manager and bookeeper
Evelyn Scheck, Linda Jones, Gladys P. Chiriboga, assistants

Circulation: Jeanne Sipley, Joan Andrews, Judy Koester, Audrey Happel, Joanne McMickle

Catherine Streeter/dealer and reader service

Advertising Production: Janet Bodemann, Miriam Lee, David Case, Alice Crosbie.

Shipping: Greg Henderson, Jeff Kemmlein

A Matter of Trim

Some fellows get better performance out of a model than others. While a lot of ships will give up and slide in for a landing, a few will linger on in the blue and stretch all possible time from the hands of the stopwatch.

What makes one ship better than another? Maybe it's the attention to the "little things" that help. Things so picayune they don't seem enough to matter, yet face it, your aircraft is a streamlined form, gargling and gurgling along through a dense liquid medium. We don't think of it as liquid, but it is, at the speeds our models fly it becomes a power-gulping force to deal with and the trade-off is altitude for forward motion.

The "little things"? Well, a bow in the trailing edge adds a percentage point of drag, as does a tissue rip, the torn edge flicking in the slipstream. An out of balance prop? That robs you of power, so does a vibration in the wing, a padded wing saddle will help. Cowl removed, the airflow is disturbed. Aileron gap? More lost, it should be the absolute minimum possible. A trifle tail heavy, you're holding in a speck of down elevator to compensate, more drag to slow you down. Warps in the left wing? That creates drag, and causes a turn, you're dragging opposite aileron and rudder to compensate. Didn't bother with the wheelpants? Hate to tell you but a round wheel is more than double the drag of an airfoiled pant. To give you something of an idea, a hand stuck out of a J-3 Cub at 70 mph (as if for a left turn) subtracts a full two miles an hour from the airspeed. It becomes easy to imagine that if it had retracts airspeed might

flying models
including FLYING ACES est. 1928

september 1978/vol. 81, no. IX/494

aircraft features

r/c model boating

departments

on the cover

Dick Sarpolus' sleek new Magnum 80 was photographed by FM's managing editor Bob Hoeckele at Thompson Park in Jamesburg, N.J. where Dick flew it in a demonstration flight during a contest. The plane took off and after it had gone about 10 feet Dick applied up elevator and then full aileron. The ship proceeded to climb, rolling all the way, almost out of sight. This one is not for the novice or the nervous. Kodachrome by Bob Hoeckele.

FLYING MODELS is published monthly by Carstens Publications, Inc., Fredon Springdale Road, Fredon, New Jersey. Mailing address P.O. Box 700, Newton, New Jersey 07860. Harold H. Carstens, President; Johanne L. Carstens, Vice President; Robert R. Merkle, Treasurer; Phyllis M. Carstens, Secretary. Second Class postage paid at Newton, New Jersey, and additional mailing offices. Printed in the United States of America.

SUBSCRIPTIONS: In U.S.A., Possessions, and Canada: $10.00 per year, $18.00 for two years, $25.00 for three years. Foreign postage $1.00 extra per year. All communications regarding subscriptions and changes of address should be sent to: Circulation Manager, Flying Models, P.O. Box 700, Newton, New Jersey 07860. Please allow six weeks for change of address and be sure to include your old address label.

CONTRIBUTIONS: Articles and photographs are welcome. Contributors are advised to keep a copy of their manuscripts and illustrations. When requested, we will endeavor to return all material in good condition if accompanied by return postage. Payment is made upon publication. Flying Models assumes no responsbility for unsolicited material. The contents of this magazine must not be reprinted without permission of the publisher.

ADVERTISING: Main advertising offices: P.O. Box 700, Newton, New Jersey 07860. Phone: 201/383-3355. WEST COAST ADVERTISING REPRESENTATIVE: Joseph Mervish Associates, 4721 Laurel Canyon, Suite 211, North Hollywood, California 91607. Phone 213/877-7556.

go up 10 or 15 mph, less a bit for the added weight. Still, a net gain, and the same holds true of a model. We keep looking for the big things to improve upon, while all along it's the little things that rob performance. Hardly measurable in themselves, but ten ailments together total up to poor performance. In aviation you play the percentages. You take care of all you can and make calculated decisions on the rest. A power plane, engine-out glides about 8-1. A full scale sailplane can deliver 40-1 in glide ratio. It's a matter of drag, attention to the little things. When you want to win you have to build a better one.

Air Mail

readers' forum

FLYING ACES

With reference to your "Rambler" article, ex Flying Aces, and your request to "hear from us" at the foot of page 43. Please keep up the good work on reproducing these old Flying Aces plans and articles, they were mighty magazines in their day, and still are in my mind. I still have many of the old mags and your article prompted me to dig them out and do a little nostalgic brousing. The first one on the pile is dated December 1939, all faded and tatty, the plan in this issue is the "Heron" Gas buggy of 48" span and what a neat and classy little job it is. Even the Editor, Herb Powell, had a great sense of humour with the following footnote to the article "And if you by chance run into any difficulty, lets be "Heron" from you. (Haw-w-w-w-!)".

Anyway enough reminiscing, my purpose of writing to you was that some years back now a particular free flight gas job was mighty popular in my area (I built two over a period, from others plans) it was called "TeeDee" (or TD) I would very much like to build another one and have for some time asked around in an effort to locate this plan, still I have not been able to turn one up. I cannot remember now if this was a Flying Aces plan or not, if it was what would be the chances of seeing this reproduced in Flying Models? The TeeDee was a very stable flyer and I reckon with modern R/C equipment it would make a great model.

I am really looking forward to the next Flying Models to see what the next Flying Aces "Oldie" you reprint, keep it up.

WARREN P. RUSSELL
Cape Saunders Lighthouse
New Zealand

Re: *Heron Gas Buggy* reprint in the July 1978 FM page 46—where's the rest of the plan? There's no stabilizer, no landing gear etc? I enjoy your magazine very much, especially the old time reprints. How about running the *Gas Flea* and the *Petrel*? Two of many old time favorites of mine.

KEVIN BENNETT
Bayside, NY

In your July reprint of the *Heron Gas Buggy*, the tail assembly instructions say "Trace the stabilizer ribs from the plans—". No stabilizer plans or ribs are to be found in that issue. Was this omission also common to the 1939 FLYING ACES?

ERNEST P. LINN
Renton, Wash.

No, the omission is not common to the original FLYING ACES *article. Through an oversight it was not printed in the July issue of* FLYING MODELS *and we apologize. The missing plan pages will be printed in a future issue of* FLYING MODELS—*Ed.*

Tiger Moth

I am very interested in the German Practical Scale kit that Bill Wardlow of New Jersey used to build his Tiger Moth that appeared on the April 1978 cover of FLYING MODELS. Could you tell me how I can acquire this kit?

TOM NITZ
Muncie, Ind.

We think that it is still available through Techni-Models, 6130 Roy St., Los Angeles, CA 90042—Ed.

.049 Deisel head

I would like the address of the company that produces the Davis Deisel Development head for Cox .049 engines as described on pages 25 and 26 in the January 1978 FLYING MODELS. Thank you.

PHILIP E. JORDAN
St. Augustine, Fl.

Their address is: Davis Deisel Development, Inc., Box 141, Milford, CT 06460—Ed.

What is it?

On page 12 in the July issue of FLYING MODELS there is a subscription form. On that form are three pictures, the one on the left is of a twin engined airplane. Would you please tell me the name of that plane and where I can get plans for it? Also happy birthday.

DEAN McDANIEL
Mtn. Home, Ark.

The plane is a DC-3 and it appeared in a construction article as well as on the cover of the November 1977 FLYING MODELS. *Plans are available from Carstens Plan Service, P.O. Box 700, Newton, NJ 07860. Send $5.00 and order plan #CF-454—Ed.*

ROW

I read in the June 1978 issue of FLYING MODELS that Mitch Poling stated that he had not heard of Cox .020 powered planes that have ROWed. The Flightmasters in California have a scale ROW meet each year and in the last six years many of my models were powered with Cox .020 engines. I have had four scale models that placed well in these events that were .020 powered, one of which was published by FLYING MODELS, the Fabre Hydravion. However, I will agree with Mitch that an electric powered .020 would be very hard to get off the water, not impossible, but darn hard.

WILLIAM R. STROMAN
Norwalk, Calif.

WE'RE TAKING OFF IN NEW DIRECTIONS.

First off, we've changed our name. Dave Platt Models is now called Pica Products. That in itself is significant, but the big news here at Pica is the excitement of all the new ideas and products we're introducing.

Pica is improving and updating our existing line of kits. The Waco, the T-28, Spitfire and FW-190, all proven flyers and consistent contest winners, are undergoing renewal to keep them on top of advancing R/C technology.

We're expanding our line. Pictured above is the flagship of our new fleet of kits, the Duellist 2/40. The Rapier, an exciting new pattern ship, is just now coming off the drawing boards. Plus a whole series of new medium-sized kits is planned.

We've added a superior new fast drying glue and a revolutionary new type of filler. And we're going to introduce a group of custom R/C accessories in the near future.

We've got a new name and fresh new ideas. Now we're Pica Products, and we're taking off with innovations in modeling.

Duellist 2/40

Wing span: 67"
Wing chord: 14"
Total wing area: 795 sq."
Fuselage length: 54"
Stabilizer span: 27"
Verticle fin: 10-1/4"

Rec. engine: .23-.40
Rec. fuel tank: 8 oz.
Gear: Fixed or retract.
Channels: 4 (5 w/ret.)

Control functions: Ailerons, Elevator, Throttle, Rudder.

Construction: Balsa.
Plan sizes: 35" x 67"
Instruction manual and construction photos included.

Kit includes: Die cut balsa, shaped parts, hardwood, plywood, aileron torque rods, hardware and sample fillit.

Flying weight: 6-8 lbs.

The Duellist 2/40 has been designed as an easy-to-fly and safe handling twin engined R.C. model. Combining elegant appearance with simple structure, it's ideal for the modeler who has progressed through the usual trainers and pattern or low wing sport ships. As such, it offers a further level of enjoyment in the R.C. hobby, and a new accomplishment in flying skills to the builder.

PICA

Pica Products
Innovations in modeling
2657 Northeast 188 St.
Miami, Florida 33180

Turn the page for more Pica Products...

Timetable

coming events

CLUB SECRETARIES: Items for the FM Timetable are welcome. Submit items typed, double spaced and with necessary information plus contact for complete data and entry blank. Specify AMA, FAI, NAMBA, IMPBA, AMYA, ROAR, etc. Include information on rules and classes to be run. Items will not be picked up from club bulletins to be run, they must be sent to this column.

R/C BOAT CONTESTS

LANSING, MICHIGAN—August 5,6. IMPBA Offshore Classic Motor State hosted by the Lansing Model Boat Club at Riverfront Park. This is also the Deep Vee part of the IMPBA Internats. Contact: Stan Smith 3101 Boston Blvd., Lansing, MI 48910. 517/882-0907.

KENT, WASHINGTON—July 2-5. NAMBA Enduro, heat racing, Deep Vee, Scale, Hydro, OB tunnel hosted by District 8 at Kent Lagoon. Contact: Les Ruggles, 13417 S.E. 233rd St., Kent, WA 98031. 206/631-7083.

OKLAHOMA CITY, OKLAHOMA—August 5,6. NAMBA District 7 points, heat racing, Deep Vee and Outboard hosted by the Boaters of Oklahoma at Ghost Lake. Contact: Jerry R. Kimball, 6700 N.W. 27th, Bethany, OK 73008. 405/287-1602.

FLINT, MICHIGAN—August 7. IMPBA pre-internats record trials for those who need to qualify for internats hosted by the WMRBA at Thread Lake. Contact: Ron Ballard, 22445 Ryegate, Woodhaven, MI 48183. 313/675-6359.

FLINT, MICHIGAN—August 7-12. IMPBA Internats hosted by the Wolverine Miniature Race Boat Association at Thread Lake. Contact: Ron Ballard, 22445 Rygate, Woodhaven, MI 48183. 313/675-6359.

SPOKANE, WASHINGTON—August 12,13. NAMBA Dist. 8 points, heat racing, Deep Vee hosted by the Lilac City Model Boat Club at Riverfront Park. Contact: William Killian, 2526 Ella Rd., Spokane, WA 99206. 509/924-4588.

FREMONT, CALIFORNIA—August 12,13. NAMBA Dist. 9 points and heat racing hosted by the Model Mariners, Inc. at Kaiser Kove. Contact: Art Hammond, 6617 Spruce, Dublin, CA 94566.

EDMONTON, ALBERTA, CANADA—August 12,13. NAMBA Dist. 16 Championships Enduro, heat racing, scale, Deep Vee hosted by the Edmonton MBRA at Edcon Pond. Contact: Paul Omerzu, 15710-89th St., N.W. Calgary, Alberta, Canada T2N 1G9. 403/489-3494.

CALGARY, ALBERTA, CANADA—August 19-20. NAMBA Dist. 16 Championships Enduro, heat racing, scale and outboard hosted by the Buoy Busters of Canada at Lake Carburn. Contact: Douglas Sick, 1616-11th Ave. N.W. Calgary, Alberta, Canada T2N 1G9. 403/289-7578.

ONTARIO, CANADA—August 19-20. IMPBA Heat racing hosted by the Metro Marine Modellers at Island Lake. Contact: Chris Bridel, 33 Misthollow Sq., West Hill, Ontario, Canada M1E 4P3. 416/284-4083.

ANTIOCH, ILLINOIS—August 20. NAMBA Dist. 4 points, Deep Vee, OB hosted by the Zip and Zag Racing Team at Warren Kreuseher Lake, Rt. 2. Contact: Mary Bowen, 2224-20th St., ZXion, IL 60099. 312/746-3363.

BRISTOL, PENNSYLVANIA—August 22. IMPBA Time Trials hosted by the Del Val MPBA at Magnolia Lake. Contact: Nick Monti, 402 Swarthmore Ave., #A, Ridley Park, PA 19078. 215/487-0246.

MANSFIELD, CONNECTICUT—August 26-27. NAMBA Dist. 1 points and heat racing hosted by the Greater Hartford MBC at Mansfield Hollow Lake. Contact: Ed W. Amos, Jr., 92 Croft Dr., Manchester, CT 06040. 203/644-9981.

NIAGRA FALLS, ONTARIO, CANADA—August 26,27. IMPBA multi heat racing including outboards hosted by the Power City Model Boaters at Stamford Beachwood Golf Course Beaver Dams and Towline Rd. Contact: Derek Walton, 3854 Portage Green Dr., Niagra Falls, Ontario, Canada L2J 4B7.

COUNTRYSIDE, ILLINOIS—August 27. IMPBA Trophy Dash '78. Class racing AB,CD,EF Mono—AB,CD,E,F hydro—Scale hydro. 96 db noise limit. Hosted by Minute Breakers at Lake Ida. Contact: Skip Horstman, 1683 Westberg, Glendale Hts., IL 60137. 312/653-4781.

AKRON, OHIO—August 26, 27. IMPBA multi racing hosted

SPITFIRE MK-9

Still the best combination of looks & performance you can buy. Nobody ever designed a more elegant ship than the Spitfire. The model flies superbly and has won countless stand-off scale contests. The standard kit builds into a Mk. 9. Plan includes details for other Marks, like the beautiful Mk. 22. Kit features: Machined and diecut balsa, formed LG, nylon fittings, metal parts & mouldings. Two full-size plans: complete radio & retract gear installation shown. Isometric diagram & illustrated instructions make building easy and fun. Six-color accurate decals. Span: 65", Area: 714 Sq.", 4 to 6 channel, Engine: .40 to .60

T28-B

Plenty of dihedral (7°) for lateral stability. Radial cowl prevents speed buildup in a dive. Large stabilizer and long tail moment give wide CG position tolerance. Special airfoil and washout maintain stability down to a very low speed. Tricycle LG makes good rough-ground handling and easy landings. Bright color schemes help pilot orientation in flight. Large flaps incorporated in basic design. Over 700 sq. ins. for light wing loading even when loaded with options. Kit features: Our now-famous detailed plans (2 sets) showing flaps, retracts, RC equipment, etc. Beautiful 3-sheet detailed fuelproof decals. Machined & diecut balsa, formed wire Nylon fittings (flap hardware included), canopy and the best cowling ever put in a kit. Span: 65", Area: 710 sq.", 4 to 6 channel, Engine: .60

FW 190 D-9

The qualities that make a model a NATS winner are the same ones that Sunday sport-scale fliers look for. Exceptional appearance to start with, of course. The FW 190's stark and sinister shape has always excited modelers. But even more important are friendly flying qualities. Our designs have always emphasized safety at low speeds, and the FW 190 has inherited the ability to fly from 80-90 mph right down to a near-hover for landing. The wide-track gear makes it an ideal first "tail-dragger." Kit features: Full-size plans showing radio and retracting gear installation. Color schemes (and decals) for THREE different FW 190's. Separate 16-page instruction booklet with cutaway diagrams and in-depth flying hints. Diecut and machined balsa, nylon fittings, formed wire cowl, canopy, etc. Span: 65", Area: 730 Sq.", 4 to 6 channel, Engine: .60

THE WACO

We chose the Waco F-3 as our biplane flagship because it best represents the "Golden Era" of the 1930's, when flying was an adventure. Add to this, easy, snag-free building and safe, gentle flying—the result of the thorough kit engineering and careful prototype development that are features of all Pica Kits—and you have a satisfying building and flying experience ahead of you. Kit features: Top-quality diecut and machined balsa and plywood. Full size plans. Separate instruction book with isometrics. Decals. Injection-moulded (Not vacuum-formed) plastic cowl, cowl blisters, and wheel pants. Nylon fittings. Formed wire landing gear & struts. Span: 60", Area: 950 Sq.", 4 to 6 channel, Engine: good .40 to .60

GLUIT

Answers the need of builders for a fast-drying aliphatic glue that is truly sandable. Gluit dries in an average of 10 to 15 minutes, depending upon the thickness of application. The result is a strong bond, easy to sand, making it perfect for butting balsa sheets and planing wings. Wood joints are stronger when made with Gluit than with epoxy.

FILLIT

A brand new form of micro-balloon filler. It's concentrated, not "puffed-up," enabling it to be poured from a nozzle. This system allows you to accurately measure the portions to the precise density you desire. Fillit mixes readily with epoxies, polyesters, aliphatics, cellulose cements, in fact, use Fillit with any glue you wish. It forms a strong, ultra-light sandable solid. Even large wing fillets will cut down easily, quickly and smoothly.

pica
2657 N.E. 188th Street
Miami, Florida 33180
Telephone 935-1436

PICA PRODUCTS. INNOVATIONS IN MODELING.

by the Firestone MBC at the Firestone Country Club. Contact: Joel Horak, 674 River Rd., Canal Fulton, OH. 216/854-3086.

MIAMI, FLORIDA—August 26, 27. IMPBA 1/16 straight record trials hosted by the Gold Coast Racing Team at Lake Palmetto. Contact: Don Pinckert, 3265 Franklin Ave., Miami, FL 33133. 305/446-5358.

COUNTRYSIDE, ILLINOIS—September 2. IMPBA record trials hosted by the Minute Breakers at Lake Ida. Contact: Gary Preusse, 17 W. 323 Sixteenth St., Oakbrook Terrace, Villa Park, IL 60181. 312/279-2451.

FARMERS BRANCH, TEXAS—September 2, 3. IMPBA heat racing, deep vee hosted by the Dallas R/C BC at Lake Nitro. 1st Annual Dist. 7 Championship. Contact: Dave Edmondson, 5946 Ross, Dallas, TX 75206. 214/827-4502.

PORTLAND, OREGON—September 2, 3. NAMBA Dist. 8 Champ's, enduro, heat racing, deep vee hosted by the Rose City MYC at Lake Force, Delta Park. Contact: Dave Blacksten, 880 N.W. 6th Ave., Canby, OR 97013. 503/266-4185.

SAN DIEGO, CALIFORNIA—September 2, 3. NAMBA Dist. 9 points, heat racing hosted by the San Diego Argonauts at San Diego Model Yacht Pond. Contact: Dean Hughey, 9933 Paseo Montalban, San Diego, CA 95129. 714/484-1518.

BATAVIA, ILLINOIS—September 2, 3. NAMBA heat racing, deep vee hosted Fox Valley R/C BRC at the Batavia Boat Club on the Fox River. Contact: James Fraser, 423 W. Van Buren St., Batavia, IL 60510. 312/879-8139.

CHICAGO, ILLINOIS—September 3. IMPBA heat racing hosted by the Marquette R/C BC at Marquette Park. Under 95db. Contact: Randy Vitek, 5850 W. 55th Chicago, IL 60638. 312/735-5405.

COUNTRYSIDE, ILLINOIS—September 9, 10. IMPBA Class racing 96db limit hosted by the Midwest Council at Lake Ida. Pre-registration, free cocktail party. Contact: Gary Preusse, 17 W. 323 Sixteenth St., Oakbrook Terrace, Villa Park, IL 60181. 312/279-2451.

FLINT, MICHIGAN—September 9, 10. IMPBA Multi race (Can-Am) hosted by the WMRBA at Thread Lake. Contact: John Ford, 1761 Shawner Rd., Winsor, Ont., Canada. 519/735-3500.

EDMONTON, ALBERTA, CANADA—September 9, 10. NAMBA Dist. 16 points, heat race, deep vee and scale hosted by the Edmonton MBRA at Edcon Pond. Contact: Louie Omerzu, 15710-89th St., Edmanton, Alberta, Canada. 403/489-3494.

MELBOURNE, FLORIDA—September 9, 10. NAMBA Dist. 3 points, heat racing hosted by the Rudder Busters at the lake on Sarno Rd. Contact: James L. Green, 2680 Boyd Ave., Melbourne, FL 32935. 305/254-9653.

PALISADE PARK, NEW JERSEY—September 9, 10. NAMBA Deep Vee Classic hosted by the Racing Association of New Jersey at Overpeck Park. Contact: William M. Rausch, 1348 Belmont Ave., No. Haledon, NJ 07508. 201/427-8109.

SAN DIEGO, CALIFORNIA—September 16. NAMBA Scale hydro racing hosted by the San Diego Argonauts at the San Diego Model Yacht Pond. Contact: Todd M. Larsen, 5711 Water St., #3, LaMesa, CA 92041. 714/463-4725.

KENT, WASHINGTON—September 17. NAMBA deep vee and heat racing at Kent Lagoon hosted by the Seattle Model Yacht Club. Contact: M-errily Hornell, 2533 N.E. 24, Renton, WA 98055. 205/226-7454.

SPRING, TEXAS—September 16, 17. IMPBA heat racing, deep vee hosted by the Lone Star Model Boat Club at Spring. Contact: Scott McGuffin, 813 S. Pruett, Baytown, TX 77520. 713/427-5359.

INDIANAPOLIS, INDIANA—September 16-17. IMPBA Scale hydro heat racing and Class B outboard hosted by the Indy MBC at Dandy T Lake. Contact: David Lee, 4456 Beauvoir, Indianapolis, IN 46236. 317/898-7899.

COUNTRYSIDE, ILLINOIS—September 23. IMPBA Record trials for all boats hosted by the Minute Breakers Inc. at Lake Ida. Contact: Gary Preusse, 17 W. 323 Sixteenth St., Oakbrook Terrace, Villa Park, IL 60181. 312/279-2451.

COUNTRYSIDE, ILLINOIS—September 24. IMPBA Scale hydro race "Silver Cup 1978" hosted by the Minute Breakers, Inc., at Lake Ida. Contact: Bob Preusse, 432 Emery Lane, Elmhurst, IL 60126. 312/279-0124.

BUFFALO, NEW YORK—September 23, 24. IMPBA heat racing hosted by the Buffalo MPC at Delaware Lake Park, NY 198 and Elmwood Ave.

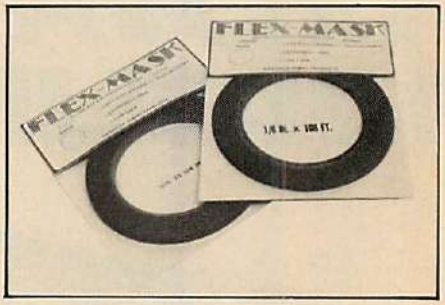
HAGERSTOWN, MARYLAND—September 23, 24. NAMBA Dist 1 points, heat racing hosted by the RCMB of B at Greenbriar State Park. Contact: Arlie Cooper Rt. 9, Box 129, Hagerstown, MD 21740. 301/797-0096.

SPOKANE, WASHINGTON—September 30, October 1. NAMBA heat race, deep vee, Sat. mono, Sun. hydro and deep vee hosted by the Lilac City MBC at Riverfront Park. Contact: Lloyd Peters, E. 628 Crown, Spokane, WA 99207. 509/489-4667.

FLINT, MICHIGAN—September 30, October 1. IMPBA Record trials (Sept. 30 10% only) hosted by the WMRBA at Thread Lake. Contact: Lou Torovich, 17641 Rowe, Detroit, MI 48205. 313/526-6909.

Flying Report

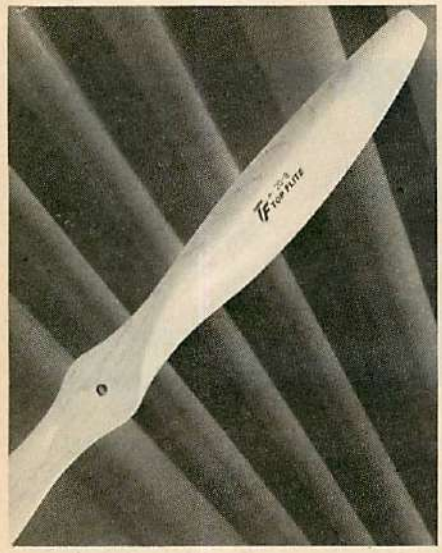
news and comment



ASTRO FLIGHT INC., *13377 Beach Ave., Venice, CA 90291.* The Californian is a high performance sailplane designed for two or three channel radios. A long 113 inch polyhedral wing gives positive spiral stability, quick roll response and a floating glide. Spoilers provide pilot control of descent rate and approach glide angle. The large elliptical stab gives hands off pitch stability and powerful pitch control making the Californian equally at home with expert and novice alike. The Beautiful, completely finished plastic fuselage, is very rugged to shrug off a beginners mistakes. Wing area is 850 sq. in. and retail price is $69.95.

KARODEN HOBBY PRODUCTS, *P.O. Box 434, Bergenfield, NJ 07621,* has introduced a long needed product called Flex-Mask. This is an ultra flexible masking tape which has the ability to lay flat around a ½ inch radius curve without wrinkling or bleeding under. It is extremely thin and has a low tack adhesive for minimum lifting of undercoats. With Flex-Mask you will no longer have to worry about how you will mask that fancy paint job. It is available in two widths, ¼ inch and ⅛ inch, both come in economical 108 foot rolls. Available at your hobby dealer or direct. ¼" $2.95 per roll, ⅛" $2.75 per roll. They have also introduced another new

product with Uni-Mask. Uni-Mask is a one piece filter face mask for general use around the shop. It is very effective in filtering out hazardous airborne dusts such as balsa, fiberglass, hardwood, glue, paint, etc. It is so light, cool and comfortable that it can be worn without even realizing it is on. Most modelers do not realize the hazards they are exposed to in the shop, and Uni-Mask will go a long way in protecting against some of them. Economically priced at $1.49 for a package of six.



TOP FLITE MODELS, INC., *1901 N. Narragansett Ave., Chicago, IL 60639,* is expanding its prop line to include a complete selection of low-priced, large props for today's bigger planes with large engines or reduction units. Crafted from rock-hard, straight-grained maple, Top Flite's new props are available up to 20" in diameter and in an assortment of pitches to meet your flying requirements.

Economically priced, the big props are suitable for R/C racing, sport scale, scale, and pattern flying. Each features accurate balancing, a high luster fuel-proof finish, true aerodynamic pitch and a highly efficient airfoil for maximum thrust. And because each long lasting Top Flite prop is made of rock-hard maple, you'll experience less splintering and nicking in virtually all flying conditions. Plus, regardless of the diameter and pitch, each prop is designed with the same dedication to craftsmanship

you have come to expect in all Top Flite props.

Sizes & prices		
16	x 4	$5.95
	x 6	5.95
18	x 6	6.95
	x 8	6.95
	x10	6.95
20	x 6	7.95
	x 8	7.95
	x10	7.95

Contact your local hobby shop for your choice of big props from Top Flite, or the latest up-to-date prop chart.

PICA ENTERPRISES, INC., *2657 Northeast 188 St., Ojus Branch, Miami, FL 33180,* has introduced a new manufacturing process that allows them to reproduce authentic markings on an incredibly strong and thin Mylar sheeting. Pressure sensitive for ease of application, the colors are fuel proof and fade proof. The decals will lay as flat as a painted marking. A rich assortment of styles are available ranging from World War One to current insignias. Look for new decals as well as other fine Pica Products at your favorite hobby store. Available in 2 scale sizes: large: for 1¾"-2" scale models; small: for 1¼"-1½" scale models.

MULTICORE SOLDERS, *Westbury, NY 11590,* has introduced a series of its solder creams in handy dispenser tubes, blister packed on a display card for the homeowner, hobbyist and do-it-yourself user.

It is a mixture of solder and flux with a creamy consistency that can be preplaced prior to the application of heat. As a result it can be accurately applied to any shape, in

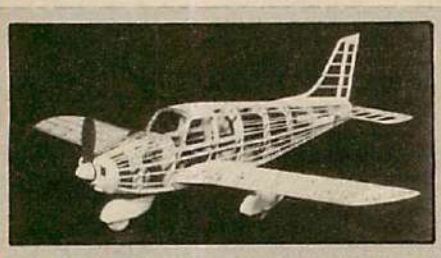
STERLINGS' SIZZLIN' STICK MODELS

Two More...Too Terrific!!

"6 Way Kits" . .

Kit E-15
Wingspan: 37½"
$19.95

P-61 Black Widow



The Beautiful Cherokee is manufactured by one of the greatest names in American Aviation, Piper Aircraft Corporation.

The Cherokee, a basic 2-seater with optional two family seats, is powered by a 150 hp. Lycoming engine and equipped with wheel speed fairings. Top speed is 142 mph.

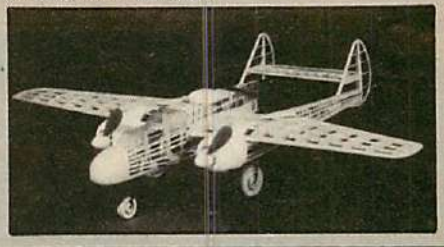
About The Kits:

Unique because such amazing scale detail is achieved with these kits that are relatively easy to build. They can be built many ways, such as: Rubber Powered (as supplied), Electric Motor, .020, .049 Engine Power. For Free Flight, Control Line, R/C (Single or 2 channel) or Static Scale. Any version makes a museum-like model. Frame members are accurately Die Cut from the finest quality Balsa Wood, and every part is numbered to insure fast and accurate assembly as clearly shown on the easy step-by-step plan. Highly detailed Plastic Parts simplify assembly adding a touch of realism-in-miniature. Covering material, formed wire parts, Wheels, Decals, Hardware that includes Control Line parts is a partial list of the contents of these fine kits.

Dry Kit. Rubber power material supplied. Other equipment not included.

The "Black Widow" pioneered the "eree" new manner of warfare in 1944—"night fighting".

The "Widow" became feared by enemy aircraft because they were never sure of her presence in the blackness of night flying, and knew of the devastating effect of the four 50 caliber machine guns coupled with four 20mm cannons.



Piper Cherokee

Kit E-14
Wingspan: 37½"
$18.95

STERLING MODELS • 3620 'G' ST. PHILA. PA. 19134

If no dealer available, direct orders accepted — with 10% additional charge for handling and shipping. (60¢ minimum in U.S., $1.25 minimum outside U.S.)

- ☐ Catalog of entire line of airplane control line model kits, R/C scale and Trainer kits, boat model kits, accessories, etc. 50¢ enclosed.
- ☐ "Secrets of Model Airplane Building" including design, construction, covering, finishing, flying, adjusting, control systems, etc. 25¢ enclosed.
- ☐ "Secrets of Control Line and Carrier Flying" including preflight, soloing, stunting, Carrier rules and regulations, Carrier flying hints, and control line installation instructions 25¢ enclosed.

No checks. Only U.S. money orders or currency accepted.

Name _____

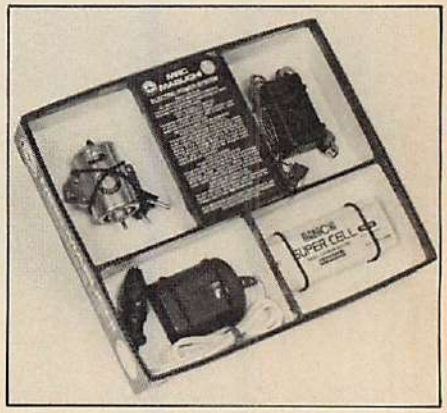
Address _____ City _____ State ____ Zip ____

Sterling MODELS INC. PHILA. PA. 19134 U.S.A.

the desired quantity, for neat joints that follow the contour of the metal parts being joined.

To use, just squeeze from the tube, placing the solder cream at the interface or between the metals to be joined and heat with a soldering iron, torch, hot plate or other suitable means. Because the material is tacky it will hold parts in place until the solder is melted eliminating the need for clamps, jigs or a second set of hands.

Available in 3 formulations for electrical soldering; general all-purpose metal joining; and a lead-free, non-toxic alloy for stainless steel, houseware and jewelry applications. Each tube contains 20 gms of material.



MODEL RECTIFIER CORP., *2500 Woodbridge Ave., Edison, NJ 08817.* Most modelers, and flyers in particular, have always been enamored with the prospect of electric flight. All at once it means clean, efficient and virtually noiseless power.

However, until the advent of the MRC-Mabuchi system, there have always been a number of drawbacks. There was a need for separate batteries for motor and radio. The chance of losing power in flight when the battery runs down and thereby losing the craft was always present. The need to recharge for long periods away from the field made electric inconvenient. Complicated wiring to assemble, and often a need to shop around for various components, made electric power bothersome.

The MRC-Mabuchi system for .09 models will put an end to all of that. Advanced technology in the form of a revolutionary CVR (cut off voltage regulator) as well as a fast charger (you can use your car's cigarette lighter) and special motor make electric flight (not to mention boating and car racing) a reality.

The system, which comes complete in one box (nothing extra to buy, no fancy wiring to conquer) consists of special purpose, high efficiency motor complete with prop drive nut; nickel cadmium 9.6 volt 600 mah battery pack with internal thermal circuit breaker and plug-in polarized connectors . . . with enough power for both radio and motor. Best of all it will fast charge from your auto cigarette lighter right there on the field . . . and with the MRC-Mabuchi charger (also included) it will do it within 25 minutes. The charger with built in ammeter (when used in conjunction with the rest of the system) has a cutoff to prevent overcharging. Perhaps the most important element of the system is the CVR. For one thing it allows the one battery to power radio,

AMERICA'S hobby center, inc.

146 W. 22nd STREET
NEW YORK, N.Y. 10011

ESTABLISHED 1931

'superstock' BRAND NAME SAVINGS

57" Wingspan
For .35 to .40 Engines
Fiberglass Fuselage, and Styrofoam Wing.

J.L. Modelcraft HARPOON
Sale 71.25

POWER BOAT COMBO
Can be Radio Controlled
63.95 SALE
With 2 Channel Proportional R/C Set 149.95
COMPLETE SET

Dumas PT-109 Boat .....
Dumas PT-109 Fitting Set .....
Dumas H59 Shafts & Stuff box .....
Dumas 549 Strut .....
Pittman Electric Motor .....
Pittman 7503 Gear .....
Pittman 7504 Gear .....
Pittman 20-311 Mtg. Bracket .....
Sterling 1-3/8" Propeller .....

COX Engines Sale

Standard R/C	
Tee Dee .010	20.95 ... xxxxx
Tee Dee .020	20.95 ... xxxxx
Tee Dee .049	14.19 ... xxxxx
Tee Dee .051	14.19 ... xxxxx
Tee Dee .09	15.95 ... xxxxx
Pee Wee .020	8.25 ... 9.99
Golden Bee .049	8.95 ... 9.99
Medallion .049	11.99 ... 13.95
Medallion .09	14.88 ... 15.95
Medallion .15	17.80 ... 20.95
QRZ .049 with Muffler	10.99

FOX ENGINES
Write in for our Low, Low Prices

FLASH IS U-C
14.95

FLASH .15 R/C
16.95

O.S. Engines
ALL O.S. Engines With Mufflers

SALE	
O.S.15 R/C	$27.95
O.S.20 R/C	29.95
O.S.25 R/C	31.88
O.S.30 R/C	37.95
O.S.40 R/C	49.95
O.S.60 R/C Schneurle	89.95

ENYA .19 MARINE
39.95
Water Cooled Head

SALE	
Enya .45 R/C	64.95
Enya .60 R/C	71.95

U-C MODELS Beginners Kits

Mustang

STERLING	SALE
S30 Ringmaster	4.49
S31 Mustang	4.49
S32 Ringmaster Bipe	4.95
S34 Spitfire	4.49
S35 Thunderjet	4.49
S36 Piper Cub	4.49
S37 Eindecker	4.49
S38 Shoestring	4.49
S39 Thunderbolt	4.49
S40 Cherokee	4.49
S41 Fokker D7	4.95
S42 Hell Cat	4.49
S43 Focke Wulf	4.49

Ringmaster

STERLING	SALE
Ringmaster .35	11.95
F-51 Mustang .35	12.95
Yak 9 .35	12.95

Lil Wizard

C.G. MODELS	SALE
Swordsman 18 .049	4.50
Lil Jumpin Bean .049	4.50
P-40 Flying Tiger	4.50
Lil Wizard .049	5.49
Shoestring .35	11.95
Cosmic Wind .35	11.95
Buster .35	11.95

Lil Satan

C.G. MODELS	SALE
Lil Satan .049	4.50
Jr. Satan .15	5.95
Voodoo .35	5.95
Double Voodoo .35	11.49

AMERICA'S HOBBY CENTER
146 West 22nd St., New York, N.Y.

Streak Trainer

TOP FLITE	SALE
Baby Flite Streak .049	3.98
Streak Trainer .15-.19	10.35
Jr. Flite Streak .15-.25	7.15

U-C MODELS

MIDWEST	SALE
Me 109 .15	11.45
Mustang .15	11.45
Warhawk .15	11.45
King Cobra .15	11.45
Me 109 .35	17.95
Mustang .35	17.95
Warhawk .35	17.95
King Cobra .35	17.95

Mustang

MIDWEST Profiles	SALE
Messerschmitt .049	4.50
Mustang .049	4.50
Warhawk .049	4.50
Aircobra .049	4.50

P-51 MUSTANG 35½" Wingspan for .15 to .25 Engines

TAIJET U-Control Model with Tank & Wheels
8.88

TAIJET 200 For .19 to .25 Engine R/C Airplanes
18.88 with Wheels

TAIJET 350 53½" Wingspan for .35 to .45 Engines with Wheels
24.95 R/C Model

Dave Platt Models

TOM CAT 30" Wingspan for .09-.15 Eng. Profile Models
7.95

PUSSY CAT 24" Wingspan for .049 Engine
5.95

Star Pro **SUPER LOOPER** 17½" Wingspan For .030 to .049 Eng. Profile Model
2.99
Ideal for Sport or Stunt. All sheet balsa construction.

K&B .201 R/C Schneurle with Perry Carb.
SALE 49.95

K&B .201 R/C Marine With Exhaust type Carb. SALE $52.95

BROWN JUNIOR CO2 Motor

Brown Jr. CO2 Single	$28.95
Brown Jr. CO2 Twin	34.95
Charger Unit	8.95
Spare Tank only	3.60
Copper Tubing (per foot)	.60
5½" Nylon prop for Engine	.29

SHARK CO2 ENGINE With Propeller & charging unit
SALE 15.95

CO2 Tanks	2¼cc ½oz.	2.75	
1¼cc 1/8oz.	3.75	6cc 1/3oz.	4.25
10cc ½oz.	4.50	20cc 1oz.	4.75

V.K. FOKKER TRIPLANE
47" Wingspan For .49 to .60 Engine
50.99

Sterling LANCER
62" Wingspan For .23 to .40 Engine FS-30
31.88

Sterling FOKKER D7
58½" Wingspan For .45 to .60 Engine FS-21
61.95

V.K. CHEROKEE BABE
53" Wingspan For .29 to .40 Engine
32.95

Sterling RIMFIRE
54" Wingspan For .29 to .45 Engine FS-27
32.95

Platt T28 TRAINER
65" Wingspan For .60 Engine RC-2
58.95

V.K. CORBEN SUPER ACE
56" Wingspan For .35 to .46 Engine
33.95

Sterling Supermarine SPITFIRE
64" Wingspan For .35 to .60 Engine FS-14
46.95

Platt SPITFIRE
65" Wingspan For .40 to .60 Engine RC-1
58.95

V.K. NIEUPORT
54" Wingspan For .45 to .51 Engine
50.99

Sterling LANCER SL62
62" Wingspan For .60 Engine FS-25
42.88

Platt FW 190
65" Wingspan For .60 Engine RC-3
58.95

Sig CITABRIA
69" Wingspan For .40 to .45 Engine RC-30
44.95

Sterling FLEDGLING
56" Wingspan For .23 to .40 Engine FS-29
29.95

Platt WACO F3
60" Wingspan For .45 to .60 Engine RC-4
58.95

Sig ZLIN Akrobat
70" Wingspan For .60 Engine RC-23
43.95

Sterling Piper Super CRUISER
72" Wingspan For .45 to .60 Engine FS-8
40.88

Stafford B-24 LIBERATOR
90" Wingspan For Four .15 to .25 Engines
149.95

Sig YAK-18
72" Wingspan For .60 Engine RC-16
58.49

Sterling F51 MUSTANG
66" Wingspan For .36 to .60 Engine FS-10
53.95

Sig CESSNA 150
65" Wingspan For .50-.60 Engine
54.95

Sig SUPER CHIPMUNK
65" Wingspan For .45 to .60 Engine KBRC-1
46.95

Sterling SE5a
40-3/8" Wingspan For .19 to .29 Engine FS-22
34.95

House of Balsa PIETENPOL
65" Wingspan For .19-.35 Engine
39.95

Sig RYAN STA
72" Wingspan For .60 Engine RC-27
58.49

Sterling King COBRA
70" Wingspan For .35 to .60 Engine FS-13
50.88

Jemco FAIRCHILD PT-19
50" Wingspan For .29-.40 Engine
47.95

V.K. SOPWITH CAMEL
56" Wingspan for .60 Engine
50.99

A-JUSTO-JIG
Full House Wing & Fuselage Jig
SALE 44.95

Build your wing and fuselage in less time. The unit rotates 360 degrees... Any position may be chosen for assembly, planking, gluing or sanding.

R/C We stock a full line of Radio Control Airplanes, Boats, Cars, Helicopters etc. If you do not see it in our ads, please feel free to write us for a price quote... R/C

	CANNON	E.K.	FUTABA	KRAFT	M.R.C.	PRO LINE	WORLD
SERVO TRAYS	Set (5 Pieces) $4.95	Single 1.25 Triple 2.49 Rx & 4 Servos 3.95	Single $1.25 Triple $2.50	Single $1.69 Triple $3.49	2 Tray $2.75	Same as Kraft	Single 1.50 Triple 2.95
SERVOS	CE3 or CE4 $32.95 Ea.	SM.. $33.95 MM.. $33.95	S-6, S-6L, S-7, S-7L, and S-11 $29.95 Ea.	KP-11, KP-12, KP-14, KP-15 $38.95 Ea.	$33.95	No. 11, No. 14, No. 15 $38.95 Ea.	S10, S11, $33.95 Ea.
RETRACT SERVOS	$41.95	$37.95	S8 $31.95	15H $44.95 16 44.95	$39.88	$38.95	S11R $37.95
SWITCH HARNESS		$5.98	$5.50	$7.95	$5.99	$6.95	$6.95
EXT. CABLES	$3.50	6" $2.25 12" $2.75	$2.75	$3.25	$3.25	$3.50	
CHARGER	$10.95	$9.95	$9.95	$14.95	$9.95	$14.95	$12.95
XMITTER ANTENNA	$4.95	$3.95	$4.95	$3.50	$4.95	$4.95	$4.95
RECEIVER NI-CAD PACKS	With Switch for Tiny.... $16.95	$15.50	$13.49	$15.99	$14.95	$21.95	$15.95

HANK 98
98" Wingspan (Formerly Hobie Hawk)
M/4-rel
91.95
Kit Form Only. Covering required

GRAND ESPRIT
134" Wingspan Optional Spoilers Airtronics
99.95

SUPER QUESTOR
80" Wingspan Airtronics
33.95

Astroflite ASW 15
100" Wingspan
44.95

ASW 17
132" Wingspan by Astroflite.
67.88

Competition EASY RISER
86" Wingspan
31.95

Craft Air SAILAIRE
150" Wingspan
98.95

Craft Air DRIFTER
72" Wingspan
18.88

Dodgson MAESTRO MKII
132" Wingspan
87.95

Dodgson TODI
76½" Wingspan
87.95

SQUARE SOAR
72" Wingspan Airtronics
17.99

Jetco EASTWIND
75¼" Wingspan
26.95

Marks Model WANDERER
72" Wingspan
17.99

LEGIONAIR 140
140" Wingspan
Legion Air
84.95

LEGIONAIR 100
100" Wingspan Legion Air
66.95

Sterling SCHWEIZER

Schweizer SGS-134
98½ Inch wingspan
33.95

Schweizer 1-26-D
70 Inch wingspan
29.95

Craftair SD 100
100" Wingspan
SALE 44.95

Dumas Boats Kits

Atlas Van Line

Size	SALE
Atlas Van Lines 18"	8.99
A. VAN Lines 40"	39.95
Miss Thriftway 18"	8.99
Thriftway Too 24"	12.95

HYDROPLANE Kit

Miss Unlimited 36"	21.95

Swamp Buggy Kits

Swamp Buggy 28"	23.95
Li'l Swamp Buggy 18"	10.29

Deep Vee Kits

Competition Deep Vee- White Unpainted Fiberglass

DV-20CF	30"	58.98
DV-40CF	40"	68.98
DV-60CF	45"	72.98

Drag'n Fly Kits

Drag'n Fly 40	36"	40.88
Drag'n Fly 20	20"	29.95
Drag'n Fly 60	44"	50.95
Vee Bottom SK	18"	12.95
Sk-Daddle 60	36"	35.88

PT-109 Kit and Fittings
$28.88
Kits

SCALE BOATS		
PT-109	33"	28.88
USCG 40' Utility	29"	32.95
USCG 44' Lifeboat	33"	40.45
Tuna Clipper	32"	33.95
Trojan Cruiser	31"	43.88
Little Shelley Foss	24"	30.69
Shelley Foss Tug	36"	51.88

DUMAS Kits
14.95
Lightning Sailboat

SAIL BOATS		
Star Class 30	30"	33.95
Star Class 45	45"	79.95
Habie Cat	14"	8.88
Gee Gee Sloop	22½"	13.88
Lightning Sailboat	19"	14.95

BOOKS For Ships Craftsmen

Anatomy of Nelson's Ship	30.30
Boat Modelling	4.50
British Aircraft Carrier	4.50
Bldg. Steam Eng. from Casting	4.50
Cardboard Ship Models	3.98
The Cutty Sark-Ship & Model	14.50
Famous Paddle Steamers	5.75
Making Glass Fiber Boats	4.50
Making Model Ships Fittings	3.65
Making Sailing Dinghies	1.75
Model Boat Propellers	2.55
Model Boilers & Boilermaking	7.20
Model Racing Yacht Constr.	6.85
Model Stationary & Steam Eng.	5.00
Modelling the Cutty Sark	4.45
Modelling the Revenge	5.25
Modelling Tudor Ships	1.98
Modern Ships	17.95
New Glassfiber Book	7.25
Period Ship Modelling	7.89
Power Model Boats	5.00
Plans Handbook No. 2 Boats	1.45
R/C for Model Boats	4.95
R/C for Model Yacht	6.50
Royal Navy Warship Drawings	7.95
Submarines Since 1919	1.95
Secrets of Ships in Bottles	2.89
Seventeenth Century Rigging	7.25
The Ship that Torpedoed her self	9.50
Simple Model Yacht	2.75
Techniques of Ship Modelling	12.75
Jackstay	3.25
Hose Book for Ship Model Bldr.	1.50
The Built up Ship Models	7.50
The Cutty Sark	17.95
The Gallery & the Galleon	7.50
The Ship Model Builders Assistant	8.50
The Seamen of the Seas	7.50
The Art of Rigging	8.50
The Baltimore Clipper	9.00
How to Make Ship Block Model	5.95
Drilling Machine	10.95
Experimental Flash Steam	12.95
Foundry for The Amateur	4.50
Gear Wheels & Gear Cutting	3.50
Grinding Machine	7.95
Hardening and Tempering	4.50
History of Machine Tools	10.85
How to Work Sheet Metal	4.70
Metal Turning Lathes	7.95
Milling in the Lathe	3.25
Screw Threads & Twist Drills	5.50
Sharpening Small Tools	4.35
Shaping Machine	8.50
Using the Small Lathe	3.50
Welding and Cutting	4.50

Order-By-Mail From America's HOBBY CENTER, 146F West 22nd St., New York, N.Y. 10011 ORDER by MAIL or VISIT OUR STORE

BOOKS

MODEL CAR RACING By Radio Control By G. Siposs

3.95

The World of MODEL AIRCRAFT by Guy Williams — 32 pages — Over 230 Illustrations

Sale 6.98

AMERICA'S hobby center, inc.

146 W. 22nd STREET NEW YORK, N.Y. 10011

ESTABLISHED 1931

'superstock' BRAND NAME SAVINGS

TOWLINE GLIDERS

Jetco THERMIC 36" Wingspan Kit G-7 — 3.95

Simpson's TALON 80" Wingspan Kit G-9 Jetco — 22.49

Midwest JETSTREAM Kit 303 — 48" Wingspan — 7.95

SINBAD 40 40" Wingspan Sig Models Kit FF-3 — 7.50

SUPER SINBAD 62" Wingspan — 12.95 Sig Models Kit FF-2

Star Pro SUPER CONDOR 72" Wingspan Towline or .020 Power — 7.95

Sterling CIRRUS 82-5/16" Wingspan Kit E-7 — 16.95

Sterling DIAMANT 74" Wingspan Kit E3 — 11.95

Sterling SCHWEIZER 2-32 42½" Wingspan Kit A-27 — 4.95

TRAVELER Sailplane 24" Span Term Aero Kit No.102 — 1.95

DRIFTY Primary Glider 18" Wingspan Term Aero Kit No.108 — 1.95

HAND LAUNCH GLIDERS

THERMIC 'B' 20" Wingspan Jetco Kit SG-4 — 2.50

Jetco THERMIC 18 12" Span SET of 2 Kit SG-2 — 1.78

RUBBER MODELS

SCIENTIFIC	Span	PRICE
160 Sky Master	36"	6.95
138 Piper Cub		
SCIENTIFIC	Span	PRICE
137 Miss America II	20"	3.95
138 Piper Cub	20"	3.95
139 Cessna 180	20"	3.95
153 Stuka		
SCIENTIFIC	Span	PRICE
152 P-40 Warhawk	18"	3.95
153 Stuka	18"	3.95
154 Taylor Cub	18"	3.95
155 Cessna 185	18"	3.95
156 F-51 Mustang	18"	3.95
157 Messerschmitt	18"	3.95
Foam Speedibilt Models Cessna 180		
MONOGRAM	Span	Price
Cessna 180	18"	4.00
Citabria	18"	4.00
Piper Cub	18"	4.00

RUBBER POWERED MODELS

E5 Citabria

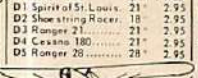
STERLING	Span	Price
E1 Curt. JN-4 Jenny	32"	12.95
E2 FokKer Triplane	23½"	11.95
E4 P-40 Warhawk	22"	11.95
E5 Citabria	33½"	11.95
E6 P.Super Cruiser	35½"	12.95
E8 Simson Reliante	21-3/8"	11.95
E9 Albatross D11-A	27½"	13.95
E10 P-26 Peashooter	28"	13.95
E11 B17G Flying Fort	28½"	18.95
A1 Fokker D7	24"	9.95
A Stearman PT-17	20"	8.95
A3 Beech Bonanza	22"	6.95
A4 P47 Thunderbolt	22"	6.95
A5 Nieuport 17	22"	9.95
A6 Stuka D.Bomber	24"	6.95
A7 Piper Cub	18"	4.50
A8 Mess. ME 109	18"	4.50
A9 Texan AT-6	18"	5.95
A10 Curt. Hawk P6E	16"	5.95
A11 Cessna 180	17"	4.95
A12 Bird Dog L-19	17"	4.95
A13 P-51D Mustang	24"	9.95
A14 F4U-5 Corsair	24"	9.95
A15 Zero	24"	9.95
A16 Fokker D8	21"	6.95
A17 S.E.5a	22"	9.95
A18 Ansaldo	19"	6.95
A19 Spitfire MK1	24"	8.95
A20 Focke Wulfe 190	24"	8.95
A21 Spad XIII-C	24"	11.95
A22 Piper Cub J-3	30"	8.95
A23 Eindecker E-111	25"	7.95
A24 Gt.Lakes Special	24"	9.95
A25 Aeronca C-3	36"	9.95
A26 Sopwith Camel	24"	9.95

D1 Spirit of St. Louis

C.G MODELS	Span	Price
D1 Spirit of St. Louis	21"	2.95
D2 Shoe string Racer	18"	2.95
D3 Ranger 21	21"	2.95
D4 Cessna 180	21"	2.95
D5 Ranger 28	28"	2.95

Fairchild Rancher

SIG MODELS	Span	Price
FF8 P. Super Cruiser	36"	8.95
FF9 Fairchild Rancher	36"	8.95
FF11 L-19 Bird Dog	36"	8.95
FF17 Stinson L.5	36"	8.95
FF18 Super Cadet	35"	8.95



Cabinaire

SIG MODELS	Span	Price
FF20 Cabinaire	22"	3.25
FF21 The 29'er	20½"	3.25
FF22 Sig Tiger	21½"	3.25
FF1 Sig Cub	24"	2.75

404 Cardinal

MIDWEST	Span	Price
404 Cardinal	20½"	3.98
405 Bird Dog	20½"	3.98
406 Citabria	20½"	3.98
407 Piper Cub	20½"	3.98

PP2 Miles M-18

PEANUT SCALE MODELS

PECK POLYMERS	Price
PP1 Pietenpol Air Camper	3.29
PP2 Miles M-18	3.29
PP3 Druine Turbulent	3.29
PP4 Stringless Wonder	2.49
PP5 Piper J3 Cub	3.29
PP6 Andreason BA4-B	3.49
PP7 Nesmith Cougar	3.49
PP8 Mustang	3.49
PP9 Zero	3.49

2 in 1 Kits — Peanut Scale Models

Monocoupe

STERLING	Price
P1 S.E.5a & Fokker D8	3.95
P2 Citabria & Monocoupe	3.95
P3 Waco & Interstate Cadet	3.95

RUBBER Model ACCESSORIES

PA-1 Nylon thrust bearing for 1-32" shaft. (4)	.49
PA-2 Designer kit for Small Models	1.25
PA-3 Peanut scale Decals	.25
PA-4 Designer kit for Large Models	1.75
PA-5 Rubber Lube 3 oz.	1.49

Tissue Paper in following colors Blue, Red, Orange, Gray, Green Light Yellow, Dark Yellow, Black, And White. Specify color Ea. .20

PECK Plastic Propellers.

PA-20 4½" (Brown)	.15
PA-21 6"	.25
PA-22 7"	.30
PA-23 8"	.40
PA-24 9"	.50
PA-25 4"	.15
PA-26 5½"	.15
PA-27 5½" prop & bearing	.25

PROPELLER SHAFTS

PA-28 1½" x 1-32" dia. (5)	.29
PA-29 2½" x 1-32" dia. (5)	.29
PA-30 2½" x 3/64" dia. (5)	.49
PA-31 1-8" Washers .050 hole	.49
Sterling Rubber Winder	2.95

RAZOR PLANER

Converts the Safety Razor Blade into a handy Planer — 2.95

GAS WELDING TORCH

REPAIRS: *Jewelery *Electrical *Electronic Work

SPEED INDICATOR VIBRA-TAC With Handy Carry Case

8.95 Speed Range 2,000 to 20,000 RPM

Glo Bee GLO PLUGS

RACING GB-1 Long or Short	3 FOR 4.49
R/C GB-2 Long or Short	3 FOR 3.39
SPORT GB-3 Long or Short	3 FOR 2.25

DeLUXE TORCH KIT No. 4000

CONTAINS TORCH, Flametips, Bench bracket, Flux, Brazing rods, Spark Lighter, 6 Micronex, 1 Butane, Welding Book & Instructions. — Sale 25.95

No.2100 BRAZING ROD KIT — 3.39

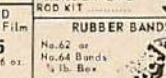
UREELY CONTROL HANDLE

10.49 Features Safety Lock. Most popular U-Control Handle in use today.... Allows you to let out or reel in your lines at a moments notice.

LIQUID Masking Film

4.95 16 oz. Easily masks letters, Insignia, Masks any finish or surface. Thin lines and curves. Leaves sharp clean paint lines.

RUBBER BANDS



No.62 or No.64 Bands ¼ lb. Box — Sale 1.19 Per Box

FOX R/C PLUGS

R/C Short or R/C Long — 3 FOR 2.50

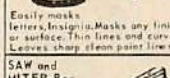
Standard Long or Short — 3 FOR 1.79

FOX FUEL FILTERS

SMALL 95¢ EACH

LARGE (Opens 6") TWO FOR 1.50

SAW and MITER Box Combination



2.49 Designed for use with Razor saw. Angle Guide 45, 60 & 90 deg.

INSTRUMENT DECALS

49¢ Pkg. 7 16" Scale — SALE 3 FOR 1.00 Over 40 Assorted popular instruments.

HOLD IT CLAMPS

SMALL (Opens 3") FOUR FOR 2.59

LARGE (Opens 6") TWO FOR 1.50

FUEL PRIMING BOTTLE

With Self Sealing Spout. Ideal for priming your Engine... Star Pro Prod. — 59¢

EPOXY BRUSHES

1 4 or 3 8" WIDTH 6 FOR 69¢

1 2" WIDTH 5 FOR 69¢ Star Pro

TAPS*** DRILLS*** DIES

SIZE	Tap & Drill	Die	O.D. Style
2-56	2.49	4.98	S.B. Adjust.
3-48	2.49	4.98	S.B. Adjust.
4-40	2.49	2.98	1" Non Adj.
5-40	2.49	2.98	1" Non Adj.
6-32	2.49	2.98	1" Non Adj.
8-32	2.98	2.98	1" Non Adj.
10-24	2.98	xxxx	xxxxxxxxx
4-20	2.98	2.98	1" Non Adj.

BIG WHEELS

(DuBro) Smooth INFLATABLE Type

4" Diameter	7.95
4½" Diameter	9.95
5" Diameter	11.95
5½" Diameter	12.95
6" Diameter	15.95

CENTURION

NEW — 36" Wingspan With COX .049 R/C Engine — SALE 44.95 — ARF Foam Airplane

Prather Products PHENOLIC MICRO-BALLOON FILLER

1 Pint 1.98 Light & Strong, Easy to Sand. Can be mixed with Resin, Epoxy, Dope.

ECONO KOTE

The Covering with the Built-in Finish. Fuel Proof, Lightweight, Fade Proof, and Puncture Resistance... 25¾" x 72" Colors: Yellow, Insignia Blue, Orange, White, Sky Blue, Red, YOUR CHOICE — SALE 3 ROLLS FOR 14.95

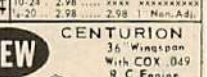
GAS LINE TUBING

SURGICAL or SILICON 3 Foot Pieces — Sale 98¢ 6 Ft. 1.69

TAIJET FA-200

35" Wingspan for .15 to .25 Engines U-Control Kit — 11.98 with Tank & Wheels

NEEDLE FILE Set



Assorted Shapes SET of 12 — 9.99

Sale Set of 6 FILES 6.29

READY-to-FLY Plastic Models

Scale U-Control Airplanes — Approximately 12" Wingspan

P-51D MUSTANG — Complete with .049 Engines, Fuel & Battery

Japanese ZERO — SALE 11.95 EACH

Messerschmitt — P-40E WARHAWK

F-99 JUPITER TJRB-0301 Flash Prod

Length 40" For .40 to .60 Engine For multi channel R/C Plywood & hardwood construction — 27.95

ZEPPELINS

Built up Construction, Tissue Covered Display Models.....

Star Pro Product — 6.95

GRAF ZEPPELIN 30 Inches Long — 7.95

U.S.NAVY ZEPPELIN 36 Inches Long — 5.95

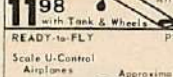
LOS ANGELES ZEPPELIN 24 Inches Long

MODERN TRAINER BOAT

23" Long Electric Motor or .049 powered Can be used for R/C — Plywood Kit — 7.49

Sport/Stunt U-C COMBO

Sterling F-51 MUSTANG 38" Wingspan — Pre fab parts. Built up wing



Profile Fuselage. FOX .36 — Order Combo X7 — 34.95

Stunt U-C COMBO

Top Flite NOBLER 50" Wingspan

FOX .36 — Very Popular U-C Stunt Model — Order Combo XA-8a — 39.95

U-CONTROL COMBO: Includes 3 Airplanes and One Engine....

18" Wingspan

All 3 Airplanes PLUS Babe Bee .049 Engine. Each model can be built in 30 Minutes.....

Order Combo XA 3 in 1

WEE CHINCH 2.95 — 13.99 — SUPER CHINCH 2.95

Do Do BIRD 2.95 — All Balsa construction. Airplane kits include: Bellcranks, Horns, Hinges, Pushrods, Elevator wire etc. Easy to follow plans..... — McCOY .049 7.29

Tamiya Kit Less Radio

Electric PORSCHE TURBO RSR kit Over 14" Long Two Forward, One Reverse Plastic Body, Delrin Gears. — 46.95

Dash 8 RACING CYCLE

15.4" Long. For 2 Channel R/C and .15 to .20 Engine — 49.95 Peerless Kit — Less Radio & Engine

RUBBER POWERED MODELS

103 Fokker D-7

GUILLOW	Span	Price
101 Nieuport	18"	3.95
102 French Spad	18"	3.95
103 Fokker D7	18"	3.95
104 British SES	18"	3.95
105 Sopwith Camel	18"	3.95
106 Fokker D8	18"	3.95

205 DeMavilland 4

GUILLOW	Span	Price
201 T.Morse Scout	24"	6.95
202 British SES	24"	6.95
203 Nieuport 11	24"	6.95
204 Fokker Triplane	20"	6.95
205 Dehavilland	27"	6.95
206 Rumpler CS	24"	6.95

303 Piper Super Cub 95

GUILLOW	Span	Price
301 Aeronca Champ	24"	4.50
302 Cessna 170	24"	4.50
303 P.Super Cub 95	24"	4.50
304 Fiesler Storch	24"	4.50
307 Piper Cherokee	20"	4.50
308 Beech Musketeer	24"	4.50
309 Cessna	24"	4.50

401 Mess. BF-109

GUILLOW	Span	Price
401 Mess. BF-109	24-3/8"	8.95
402 N.A.Mustang	27½"	8.95
403 Supermarine Spit	27.5"	8.95
404 Mitsubishi Zero	27.5"	8.95
405 P-40 Warhawk	28"	8.95
406 Focke Wulf	25½"	8.95

801 Sopwith Camel

GUILLOW	Span	Price
801 Sopwith Camel	28"	11.95
802 Cessna Skyhawk	38"	11.95
803 Stearman PT-17	28"	11.95

901 NA-T28D Trojan

GUILLOW	Span	Price
901 N.A.T-28D Trojan	16"	2.25
902 Cessna Bird Dog	18"	2.25
903 DHC-1 Chipmunk	17"	2.25
904 Skyraider	17"	2.25
905 P-51 Mustang	17"	2.25
906 Typhoon	18"	2.25

1001 Thunderbolt

GUILLOW	Span	Price
1001 P47D Thunderbolt	30¼"	16.95
1002 JU-87B Stuka	34¼"	16.95
1003 SBD-3 Dauntless	33¼"	16.95
1004 F4U-4 Corsair	30¾"	16.95
2001 P-38L Lightning	40"	24.95

Sterling BOEING FLYING FORTRESS B-17 39" Wingspan 3/8" Scale — SALE 514.95

Peerless 24" Wingspan TURBO COMMANDER

Twin rubber powered scale model with simplified mechanism, syncro mesh gears & flexible wire shaft. Syncronized twin propellers for longer flight. Die cut balsa fuselage & styrofoam wing and tail. Molded plastic parts, shock absorbing rubber nose section..... — 9.95

TEE BAR ALUMINUM EXTRUSION

Small: 11 Inch 1.69 Large: 22 Inch 2.89

RUFF STUFF — Self adhesive sandpaper. Make your own special sanding shape. EA 39¢

Medium * Fine * Super Fine

MINI SANDER

Adjustable Tension Hand Belt Sander — 1.39

MINI-Strips Replacement Sandpaper... 12 Sheets Fine..... 99¢ Per package. 12 Sheets Medium 99¢ 9 Asst Wetor Dry 99¢

RUBBER POWERED PLANS

Stinson L-5 by H.Struck. 33½" Wingspan	50¢
NA P-51 Mustang by E. Stahl, 25" Wingspan	50¢
Stearman 73 Trainer by F. Roberts, 18" Wingspan	50¢

3 FOR 1.39

Free Flight Models

FLYLINE Models	Span	Eng.	Price
1929 Monocoupe	22½"	.010	6.95
Bellanca Skyrocket	34½"	.020	9.95
Stearman C3B	35"	.049	13.95
Curtiss Robin	41"	.049	12.95
The Gen. Aristocraft	36"	.020	12.95

Radio Control COMBO

48" Wingspan — Midwest ARF Airplane

Cessna Cardinal with Famous Brand name 2 Channel System..... 2 Stick, 2 Servos PLUS FLASH .15 Engine — SALE 109.95

PLATT ACCESSORIES

1 8-32 Nylon Screws (4)	.29
2 Spitfire Bubble Canopy	2.50
3 RAF decals (large)	5.98
4 Color Cards	2.49
5 Spitfire painting	1.49
6 U.S.Navy decals (large)	5.49
7 Aircraft stencil decals	2.49
8 German WW2 decals (large)	5.98
9 German WW2 decals (small)	4.49
10 U.S.WW2 decals (large)	5.98
11 U.S.WW2 decals (small)	4.49
12 RAF decals (small)	4.98
13 German WW2 decals (B-1g.)	5.49
14 Waco cowl w/blisters	8.95
15 Waco wheel pants (set)	8.50
16 Civilian decal set	4.49

K&S TOOL SETS

421 TAP SET

With Interchangeable TIPS. Set Includes: Nos.0-80, 1-72, 2-56, 3-48, & 4-40 Taps. Complete with the Grip Collet Handle. — 8.95

425 Screwdriver set w/5 Tips 3.95
427 Nut drivers set w/5 Tips 3.95
428 Open end wrench set (5) 3.95
429 Phillips-Allen w/5 Tips 3.95

IGNITION ACCESSORIES

Condenser (Metal)	.50
Hi-Tension Wire with Clips	.25
Spark Plugs 1-4 & 2 Thread	3.00
Spark Plugs 3' 8-24 Thread	3.80
Austin Baby Timer	3.25
Austin Timerette	3.25
Austin Large Timer	3.25

FUEL SHUT-OFF TIMERS

Austin Fuel-Off Timer	4.65
Tatone Tick-Off Timer	14.20
Tatone Dethermalizer Timer	14.20

COX Electric Ready-to-Fly Plastic Models

Sale 10.99 EACH

5810 MARK 14 SPITFIRE
5830 MUSTANG RACER
5850 SPITFIRE RACER

Battery Operated Control Line Airplanes. Ready to Fly. Powered by Electric motor. Nicad battery included. (6 Volt Recharging battery NOT included) 15½" Span

NEW BOOKS

R/C Modelers Handbook of Gliders and Sailplanes. 196 Pages. 4.95
Airplane Model Building (Johnson) 141 Pages..... 1.50
How of the Helicopter..... 1.50
Ship Model Builders (Johnson), 301 Pages..... 6.00

MORGAN PLANS

R/C PLANS	Span	Price
100 Heath Parasol	90"	5.95
101 Stinson Voyager	101"	10.95
102 Grumman Widgeon	80"	9.95
103 Aeronca 7AC Champ	66"	4.95
104 Fokker E111	68"	4.95
105 PBY 5A Catalina	108"	14.95
106 Fieseler Storch	92"	13.95
107 Boeing F4B-4	60"	11.95
108 Curtiss Condor	82"	13.95
109 Grumman F8F	70"	13.50
110 Noorduyn Norseman	84"	14.95
111 Piper Skycycle	60"	10.95
112 Piper J-3 Cub	108"	13.95
113 B-25H Mitchell	71"	13.95
114 Mini Mamba		3.50
115 Waco UNF-2	60"	11.95
116 Mitsubhi Zero	63"	12.95
117 Gr. F6F-3 Hellcat	64"	13.95
118 Staggerwing Beech	64"	16.95
119 Beagle Pup 150	72"	12.95

U-C PLANS	Span	Price
200 Fairey Albacore	25½"	2.50
201 Gr. G44 Widgeon	40"	4.00
120 Gee Bee R-1	27¼"	4.95

FF PLANS	Span	Price
400 Mini Pet vateer	36"	2.95
401 Victory 100	100"	2.95
402 Scrap box Champ	72"	.50

Order-By-Mail From America's HOBBY CENTER, 146F West 22nd St., New York, N.Y. 10011 ORDER by MAIL or VISIT OUR STORE

AMERICA'S hobby center, inc

146 WEST 22ND STREET
NEW YORK, N.Y. 10011

"superstock" BRAND NAME SAVINGS

SINGLE CHANNEL COMBO
40" Wingspan
Jetco Piper Super Cruiser
R/C Single Channel Pulse System
Transmitter, Receiver and Actuator (Less Switch, Battery Box & Battery.
SALE 37.95
.049 Engine with Tank
R/C Single Channel Pulse System ONLY Sale 19.95

EK-logictrol 1978 MODEL
Complete Set Includes 4 SERVOS, SERVO TRAYS, RECHARGEABLE BATTERIES, BATTERY CHARGER, SERVO ACCESSORIES FREQUENCY FLAG, PLUS: ONE YEAR WARRANTY
7-CHANNEL SUPER-PRO
SALE 254.95

MOST FAMOUS BRAND NAME
6 Channel PROPO SET with 4 Servos
Complete Set Includes: Transmitter, Receiver, Four Servos, Nicad Batteries and Charger. Famous Brand. We are not permitted to Advertise the brand.
SALE 209.95

FLY with ELECTRIC MOTORS
Flight Systems include battery, motor by Astro Flight

ASTRO 02	$18.88
ASTRO 5	35.95
ASTRC 10	59.95
ASTRO 15	74.95
ASTRO 25	83.95

AIRPLANES FOR ASTRO MOTORS
BUSHMASTER For Astro 25 $34.95
ELECTRA FLI For " 10 19.29

K&B - VECO ENGINES

	SALE
K&B .61 R/C w/Pump	74.95
K&B .61 R/C	58.95
K&B .40 R/C F.I.	46.88
K&B .40 Schneurle	68.95
K&B .40 Marine R/C	74.95 59.95

ENYA .60XF R/C Schneurle
MRC SALE 109.95
MUFFLER for 60XF 12.98

O.S. ENGINES

	SALE
.10 R/C — Muffler	24.95
.40 R/C Sch — Muffler	69.95
.60 R/C Sch — Muffler	89.95

Cox CONQUEST .15 Standard R/C 44.95
44.95
NEW MUFFLER 7.95

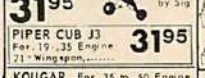
WEBRA ENGINES SALE

	R/C	Marine
Webra .20	37.95	44.95
Webra .40 Black Hd.	61.95	79.95
Webra .40 Speed	69.95	84.95
Webra .61 Speed	89.95	124.95
Webra .61 Black Hd.	78.45	94.95

R/C AIRPLANES

CLIPPED WING CUB
For .19 - .35 Engine
56" Wingspan
31.95 by Sig

PIPER CUB J3
For .19 - .35 Engine
71" Wingspan
31.95



KOUGAR For .35 to .50 Engine
51" Wingspan
37.95 by Sig

ME109 G-2 Messerschmitt
For .29 to .40 Engines
51" Wingspan
Jemco Model
47.95

CHEROKEE 65" Wingspan
for .40 - .60 Engine
by V.K.
50.99

CITABRIA
For .23 - .35 Engine
54" Wingspan
by Sterling
33.95

WACO 56" Wingspan
For .40 to .60 Engines
Scale R/C
Sterling
56.95

STINSON RELIANT
by Sterling
For .40 - .56 Engine
46.95 57-9 16" Wingspan

Famous Brand 2 CHANNEL SYSTEM

Features Dual Stick Transmitter, Receiver, 2 Servos, Tx & Rx Battery Case, Servo Trays and Hardware
Sale 74.95

Sterling F4U-1 Corsair
36" Wingspan
For .049 to .09
NEW
Sale 20.95

Cox OLYMPIC II
99" Wingspan
SALE 34.88

WIND DRIFTER
99.3 in. Wingspan
Craft Air
SALE 37.95

CIRRUS Peerless
118" Wingspan
SALE 64.95

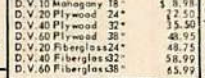
Glider HI-START Launch System
SALE 29.95 Craft Air
Replacement Rubber For Gliders with wingspan of 90" or less 12.99

Top Flite P-47D THUNDERBOLT
Kit #RC-19
60" Wingspan
For .50 - .60 Engine
58.95

R/C SPEED BOATS

DEEP VEE BOATS by Dumas

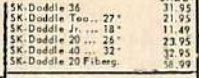
	SALE
D.V.10 Mahogany 18"	$ 8.98
D.V.20 Plywood 24"	12.50
D.V.40 Plywood 32"	35.50
D.V.60 Plywood 38"	48.95
D.V.20 Fiberglass 24"	48.75
D.V.40 Fiberglass 32"	58.99
D.V.60 Fiberglass 38"	65.99



SK-DADDLE by Dumas

	SALE
SK-Daddle 36	31.95
SK-Daddle Too... 27"	21.95
SK-Daddle Jr. ... 18"	11.49
SK-Daddle 20 .... 26"	23.95
SK-Daddle 40 .... 32"	32.95
SK-Daddle 20 Fiberg.	58.99

CAPRI R/C Cabin Cruiser
Pre-finished ABS Vacuum formed Plastic KIT
PEERLESS Length 33" Height 10½" Complete with 2 Electric Motors & Drive units.
59.95



Speed Boat Combo
DEEP VEE 10 by Dumas
Plus HJ Hardware COMBO R/CY4
28.95 With Cox R/C Engine .049 R/C

Sterling USS MISSOURI
For R/C SALE Length 55"
36.95
No. Fitting Set... $14.95

TUNA CLIPPER Length 37" Dumas
33.95

R/C HELICOPTERS

NEW
DuBro SHARK .60
259.95
For .60 Engines

HELI-BABY by M.R.C. Rotor Span 40" for .40 Engine SALE $199.95
TRI STAR by Dubro. Rotor Span 45" for .46 Engine SALE $188.95
ALOUETTE 2 Kavan 42" Rotor. For .40 Engine SALE $159.95
SUPER HELI BABY With Collective pitch. For .40 Eng. SALE $222.95
JET RANGER by Kavan Rotor Span 63" for .60 Engine SALE $309.95

ENGINE TEST Stand by Tatone
6.49 Made of Aluminum
With 4 oz. tank & fitting, fully adjustable.

SPRAY GUN OUTFIT by MILLER
AB-100 Shading Brush Kit
Air Compressor
Siphon type (external mix) Spray Gun
59.95
Air Air Hose Included
Pressure type (internal mix) spray gun

VARIABLE SPEED MOTO-TOOL KIT No. 381
DREMEL
Includes over 30 ACCESSORIES
SALE 48.60

DeLUXE MOTO SHOP PLUS ACCESSORIES And 30" FLEXIBLE SHAFT
Shipping Charges Collect
65.95 Dremel

R/C RACE CARS

CORVETTE Assembled R/C Car with Multi Control System ELECTRIC 12" Long
Less Batteries 46.95

Associated 1/8 Scale RC1 CAR Kit only 69.95
Sale 50
RC1 CAR Kit Plus: VECO 19 R/C & Futaba 2GA 2 Channel system w/2 Servos. 187.95

RC1 Car Kit Plus: VECO 19 R/C Eng. 98.95

Radio Control Assembled 8½" Long
C11 MERCEDES BENZ
Ready-to-Race Foward, Reverse with Left turn.... COMPLETE with BATTERIES 15.95

Peerless 12½" Long
Peanut DUNE BUGGY Kit with built in starter. Designed for .09 Eng.
63.88

SHERMAN M4 Tank 1/16 Scale Tank Kit
Complete With R/C System, Less Radio
174.95 98.95

LEOPARD Medium Tank for R/C. Kit includes Electric Motor and Clutch (Radio NOT Included) 124.95

ACCESSORIES

GLO PLUG STARTER With Hang on Connector PLUS BATTERY CHARGER BOTH FOR 9.49

Fusite Glo Bee Fire Plug Battery
High Ampere with adjustable rheostat for individual plug setting
18.99

by Sullivan Products HI-TORK ENGINE STARTER Operates on 12 Volts
SALE
STANDARD for Airplanes 24.95
De LUXE for Cars & Boats 27.95

HEAT GUN
SALE 19.49
Special Heat SEALING IRON with Special SHOE 14.49
SALE BOTH FOR 32.98

MEMO TIMER
SALE 8.99
Can be set from :0 to 60 Minutes. Ideal for warning R/C flyers when fuel is running low...

FAMOUS BRAND 3 CHANNEL SYSTEM
With 2 Servos, Nicad Battery and Charger. On 27 or 72 Mhz
SALE 129.95
3rd Servo with purchase of Set, $28.00 additional

SMOKE TRAILS ...Dense Smoke...Non Explosive...Non Toxic...No Residue
SALE 1.49 EA
12 FOR 14.95

HEAVY DUTY 12 VOLT WETCELL
5.5 Amp 14.95
6 Volt 4 Amp Wetcell 7.95
12 Volt Wetcell Charger 7.95
6 Volt Wetcell Charger 7.95

by M.R.C. CESSNA 177 CARDINAL
With ENYA .25 R/C Engine & Muffler. 55" Wingspan
SALE
Less RADIO 243.95
With RADIO 464.95

With 5 CHANNEL RADIO & 4 Servos, All Nicad Batteries and Charger
PIPER CHEROKEE
With ENYA .40BB R/C Engine and Muffler. 54" Wingspan
READY-TO-FLY FIBERGLASS MODELS
Less RADIO 271.95
With RADIO 489.95

RHOM Retract Gear System
Two Gear SYSTEM $58.95
Three Gear SYSTEM $79.95

Robart Reg. $15.95
SUPER PUMPER Works on all size engines
11.95

DAE POWER PANEL
14.95 With Meter
Has take off for Starter, Pump & Glo Plug.

CANNON
4 CHANNEL Deluxe SYSTEM
BRAND NEW 1976 SET. 72 Mhz.
Vinyl clad Transmitter, Sub miniature Receiver, 4 Full Power Sub miniature Servos, 500 MA Nicad battery pack With Xmitter Nicads & Charger.
194.95 SALE
U.S. Made System

ZAP Adhesive 1 oz. Giant size
SALE 2.99

Dual EXPANDER Scale For Receiver Batteries
18.95 SALE Craft Air

POWER PACER Check Batteries
SALE 49.95

R/C BOOKS — R/C DIGEST

Sale 1.00
8" x 11" 96 Pages

BOOKS

Basic of R/C Manual	4.50
Decade of Design No. 2	3.00
Model Plane Building A-Z	3.00
Air Age Gas Models	2.95
Scale Models by Wylam	2.50
Wylam Plan Book No. 4	2.00
Model Radio Control	4.95
Radio Control Handbook	6.95
Radio Control Manual	4.95
Advanced Radio Control	4.95
Radio Control for Modelbuilder	5.45
Radio Control for Model boats	4.95
Model Car Racing	4.50
Painting and Liming Models	5.75
R.M. Proper Book	7.95
Everything you should know about R/C Flying	3.95
The Crashless Way to Advanced Radio Control Flying	4.95
International Air Racing	2.95
Radio Control Manual 2nd Edit	4.95
R.C.M.& Digital Systems	3.95
Simple Single Channel R/C	5.45
Model Sail and Power Boating by Remote Control	4.95
Landsailing from R/C Models to the Big Ones	4.95
75-76 Aeromodeller Annual	6.50
7-7 Aeromodeller Annual	8.50
Aircraft in Miniature	2.95
Aeromodeller Data Book	3.00
All About Model Aircraft	4.95
Atlantic Wings	9.95
Building and Flying Scale Model Aircraft 3rd Edition	3.95
Challenge in the Air	6.95
Contest Line Manual	6.95
Electric R.C.T.P. Flying	5.95
Flying Scale Models	5.00
Making Glass Fibre Boats	4.50
Man Powered Flights	8.50
The Model Engine	2.95
Book of Airfoils	3.00
Warplanes of Yesteryear	5.95
RC Handbook Gliders, Sailplane	4.95

1937 YEAR BOOK Frank Zaic 3.75

1935-36 Zaic Year Book	1.75
1937 Zaic Year Book	3.75
1938 Zaic Year Book	4.00
1951-52 Zaic Year Book	4.75
1953 Zaic Year Book	3.25
1955-56 Zaic Year Book	4.00
1957-58 Zaic Year Book	4.25
1959-61 Zaic Year Book	5.00
1964-65 Zaic Year Book	5.00
Model Aeronautics Made Painless	3.25
Model Glider Design	4.25
Radio Contol Soaring	9.95
Radio Control for Models	6.95
Radio Control Primer	5.95
How to Make Model Aircraft	5.95
Handbook of Model Planes, Boats and Cars	3.50

KNOW YOUR MATERIALS

Adhesive	2.89
Balsa	2.89
Doping and Finishing	2.89
Hardwoods	2.89
Metals	2.89
Plastics	2.89
Plywood	3.00
The Modern Air Racers 1949-75	3.95
R/C Miniature Aircraft	4.95
Pylon Racing Book	3.95
Aircraft in Profile Vol. 10	16.95
Aircraft in Profile Vol. 11	18.95
Aircraft in Profile Vol. 12	9.95
New Glass Fibre Book	7.95
Plans Handbook-Airplanes	1.45
Plans Handbook-Boats-Cars	1.45
Plans Handbook-Lasers	1.45
Plans Handbook-R/C	1.45
For What It's Worth	2.50
For What It's Worth II	4.95
For What It's Worth III	6.95
The R/C Engine I	5.95
The R/C Engine II	6.95
Foam Wings	3.50
Flight Training Course	10.00
Flight Training Course II	10.00
Scale in Hand	3.50
R/C From the Ground	.25
For What It's Worth IV	6.95

'AHC'64 PAGE BOOKS

SIZE: 5½" x 8½"
YOUR CHOICE 98¢ EACH
Complete SET of 11 BOOKS 8.88

MODEL BUILDERS HOW TO DO IT BOOKS

A-1 Controline Plan Book	A-7 Control Liners Book
A-2 ABC's of Model Building	A-8 Data Handbook
A-3 Free Flight Plans Book	A-9 Control by Radio
A-4 Guide to Radio Control	A-10 Jets and Rockets
A-5 Gas Model Construction	A-11 Building and Flying Model Airplanes
A-6 Glo Engine Handbook	

CATALOGS & BULLETINS

160 PAGE MODEL AIRPLANE CATALOG Available Now
1.50
COMPLETE SET 3.99

- ☐ Model Ships (Wood Hull) 1.00
- ☐ Plastic Models Display ..... .50
- ☐ Model Airplane Catalog 1.50
- ☐ Model Railroad Catalog 1.50
- ☐ BULLETINS Newspaper
- ☐ 12 Issue Subscription 1.50

FREE DISCOUNT NEWSPAPER
AMERICA'S hobby center
146 W. 22nd ST. N.Y., N.Y. 10011

C.O.D. CHARGES
One charge $2.50 (plus Sales Tax) COVERS Delivery, Insurance Handling, & C.O.D. Fee

VISIT OUR STORE America's HOBBY CENTER, 146 West 22nd St., New York, N.Y. 10011

MAIL THIS ORDER BLANK NOW

America's HOBBY CENTER, inc 146 West 22nd St., New York, N.Y. 10011

$$ PRICES $$ LISTED ARE CORRECT AS OF JUNE

Quant.	Price Each	Manufacturer, Name and Description of item (Model No. if known)	Total
	1.50	160 Page Model Airplane, Radio Control & Boat Catalog. NEW!	
	98¢	64 Page AHC Handbook's (List Numbers)	
	50¢	If Insurance is Desired	
		Add Sales Tax	
		HANDLING FEE (All Orders)	$1.00

WE PAY POSTAGE

If your order is over $5.00 If your order is under $5.00 Please Enclose 25¢ for Postage & Packing

COD ORDERS ACCEPTED Continental U.S.A. WRITE or PHONE PHONE (212) 675-8922 ESTABLISHED 1931
RUSH ORDER TO

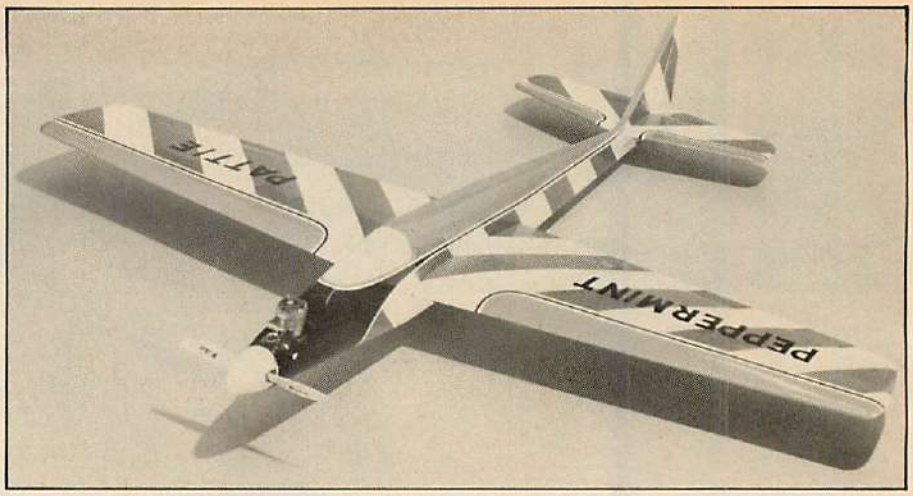
VISIT OUR STORE FOR UNADVERTISED SPECIALS TOTAL

HOW TO ORDER U.S.A.: APO, FPO, we accept Cash, checks, Money orders, foreign currency, unused U.S. Stamps. POSTAGE PAID on orders over $5.00. Add 25¢ if under $5.00 (exceptions noted). Every order Must PAY $1.00 HANDLING FEE. Visit our Store

OTHER COUNTRIES: Add 15% of total order for Postage. We will credit overpayments... Plus Special Packing-handling fee: $1.50. Invoice-Documentation: $1.00. Visit our Store

*** All Prices are Subject to Increase Without Notice ***

PRINT NAME and ADDRESS IN MARGIN BELOW F-978



motor and servos. This eliminates the need for a bulky extra receiver battery. It also eliminates the need for a separate fast charger for the radio. The CVR also monitors battery voltage and cuts power to the motor long before the voltage drops too low to operate the radio. This means you'll always have enough power for the receiver to glide your plane down. The CVR's servo controlled on-off switch also allows you to glide between periods of powered operation. Add one more thing . . . with other electric power systems you've always had to guess when to shut the motor off so as not to damage the batteries. With MRC-Mabuchi, the CVR automatically prevents deep discharge which could otherwise shorten battery life.

There are certainly more features. But most important, this system offers a true opportunity for you to enjoy electric flight as it was meant to be. The hassles have been engineered out. The package is complete and available at your hobby dealer. Suggested retail price $129.98.

MASTER KIT, *6 Fox Rd., Plainville, CT 06062* has introduced "Peppermint Pattie" . . . a sleek, high performance .15 powered plane. Great fun for the experienced sport and competitive flyer. Designed by "Nick" Damuck, Jr. for three or four channels. This little beauty will do most maneuvers of the Master's pattern. Kit features: matched balsa fuselage sides; select balsa wing sheeting; precision die cutting; hardware package; full size plans; and construction photos. Endorsed by Pete Reed of national pylon fame, for those modelers with a bit of experience who wish to have a "ball" . . . and go fast. Modelers are encouraged to see their dealers first. If unavailable, direct orders accepted. Kit price is $39.95. Dealer and distributor inquiries welcomed. This kit is not recommended for the inexperienced pilot

FM Clinic

tips from the staff

Seaplane Radio Hatches

F.P.: Is there any kind of problem gaining access to the radio compartment on a seaplane?

ANSWER: It deserves some careful thought. On high-winged aircraft where the wing is removed to reach the radio amidships, vast quantities of water can enter the fuselage in three ways: the windshield can be punched in if the model stalls into the water, the splash water can run down the dihedral angle and saturate everything and float spray picked up by the prop arc can be driven into the fuselage underneath the leading edge at the fuselage/wing juncture.

The cure is very simple. Design your fuselage in such a way that the wing center fits the fuselage as would the lid of a shoe box. In that way water droplets running down the wing's undersurface are deflected off and dribble away down the fuselage sides without having the opportunity to get inside. A deflection plate can take care of prop blast along the leading edge and a plexiglass (1/16" thick) windshield is recommended, with reinforcements behind it. Water impact on a windshield looks more like the work of a hammer, so don't underestimate it.

In general try to build a hatch cover for the top of the fuselage with drain holes to carry off water down the exterior siding rather than allowing it to enter. Do bag or box in your radio equipment and seal anything else with some soft plumber's putty or clay.

Thrust Settings

L.W.: What is the best way to achieve the exact degree settings desired when mounting an engine?

ANSWER: It is always hard to look at an engine sitting on the nose of a model and say "that's 1½ degrees right and 2 degrees down." Really, there's not much to measure against at that time in the proceedings. Better to built it into the model whenever the opportunity presents itself. Go back to the plan drawings. Most designers for some unknown reason set the firewalls straight up and down and at right angles as seen from the side view. Why? It is often known ahead of time that some angling of the thrustline will be required and a simple protractor can measure the degree or so desired. Rule this angle in on the top view, on the side view,

and allow for the changes it may require in the slant of beam mounts through various formers, or the lengthening or foreshortening that may be required on side doublers and sheet siding etc. You will end up with a firewall (and radial mount) or beam type mounts built into the aircraft at the proposed engine setting angle. It makes for a better aircraft, a little more assurance that you'll have the performance you hope for on the all crucial first test flight. Good luck with it.

Damaged Props

K.P.: Can you recommend any type repair for slightly split prop blades?

ANSWER: An unequivocal "no" on that. Discard all slightly damaged props. Further, even new props should be inspected after every flight. Rotation speed is too great to fool around with them. It's for your own safety, and the safety of others.

Pebbles in the Prop

G.H.: How can I avoid knicking the leading edge of my props?

ANSWER: Doubt you can completely, but you should make sure your starting/run-up area is free of all small pebbles. This may sound obvious enough, but the problem is more important than your prop's leading edge, it can be a hazard to your eyesight. Given good ground clearance with your landing gear, you still may pick up small stones with your prop as you rev up into the higher speed ranges. If you have ever had occasion to watch a full scale aircraft run-up over a puddle you may have seen a miniature tornado funnel form between puddle and prop tip, perhaps two feet in vertical height. If the aircraft continues to run-up, the puddle is consumed completely, all the water is drawn upward in the tornado funnel into the prop. I have seen this occur countless times with military aircraft on down to light aircraft. And with models. What is happening is that the prop tip of your model creates a tiny 2" high tornado funnel which picks the pebbles up, clips them with the prop tip (your knicks) and worse yet, propels them into your face. You've already felt the sand-blasting stings, but it can also plant a stone chip into your eye. What we're saying here is to do your starting and running up over the cleanest ground you can. Lay down a plywood slab even, but do avoid gravel type debris. If you don't believe it, just watch your prop tip over a wet spot. Your prop is lowering the air pressure and up the funnel it goes.

Nose Blocks

A.P.: Why are nose blocks often seen almost hanging loose from a rubber powered model? Why aren't they locked in place some way?

ANSWER: The balsa nose block usually found on a rubber powered aircraft is generally keyed in place (to prevent rotation) but made removable so that the model can be wound with a winder. This requires that the rubber be stretched several feet out through the nose, permitting the greatest number of winds to be packed into the motor. Rubber tension (when wound) holds the nose block very firmly in position, but as it expends energy the rubber does go slack. At the very end of the motor run the nose block could possibly fall free to dangle on the rubber an inch from the nose and this of course is not intended. The nose block should be a reasonably firm friction fit and

should stay in place for the entire flight. If wear has taken its toll perhaps a shim can be added to tighten it up a bit again. If however the model glides in and stubs the prop tip on an object, the pull-out nose block will pop free, together with the hand-carved prop assembly which greatly reduces the chance of prop blade damage and a bent prop shaft. Some builders prefer to secure the nose block a bit with a thin rubber band drawn across the nose, fitting into a tiny groove. Enough to keep it in place, but still free to pop out if the prop collides with the groundline.

T.E. Trim Tabs

W.A.: Why are small lengths of T.E. stock fitted to fins of F/F models?
ANSWER: To serve as trim tabs. They hold the setting. Trim the length.

Formers on a Keel

J.L.: What is a Step Keel? I have heard the term used in fuselage construction, but I don't know what it refers to.
ANSWER: "Step Keel" was a term used by the old Berkeley company to describe their structural assembly method. The keel was a central type sheet crutch notched for each former's position and diminishing in length toward the rear, or diminishing toward the nose and rear. This made it possible to slip pre-slotted formers onto the Step Keel, each stopping at the exact position they should be in. It is a neat and easy method for kit built aircraft and works well.

Seaplane Water Stability

F.L.: What is required in the way of wing floats to support a model on the water?
ANSWER: It varies. On a dead-calm day scale sized wing floats will balance a model nicely, while the same aircraft, crosswind on a breezy day, will probably swamp the leeward float and dip its wing into the lake. You have to allow enough bouyancy in the wing float design to stand up to some pretty strong crosswinds. The wind at this angle gets under your wing, raising it, and all you have as a righting force is the displacement of the wing float. Worse yet, many models seeking to minimize the veering tendency of a tip-mounted wing float position the floats nearer to the mid-point on the wing. While solving one problem they create another. At the mid-wing position, twice the leverage is required, meaning twice the bouyancy or displacement. I do not mean to make this an unsolvable problem, any reasonably large wing floats are quite adequate under most conditions. When the wind is really strong you will start to see your model heel over in the middle of a 360 degree turn-around on the water. If you don't like the amount, next time add a couple of cubic inches to the displacement.

Sponsons are sometimes used. You'll remember the Boeing 314 Clipper, and the Dornier flying boats. These work too on a model. I'd try for a low silhouette, wide sponson span, positioned just above the chine line, slightly airfoiled and dihedralled. Sponsons mounted too high will not be in contact with the water and will be totally uesless. Scale sized sponsons on a narrow-beamed hull (on a windy day) will probably not work well at all. On a full scale flying boat the pilot has an advantage in being able to deploy aileron while taxiing to counter crosswinds. We can too on most R/C ships, a good idea on seaplanes.

A FLYING CIRCUS OF GREAT AVIATION BOOKS FOR YOUR LIBRARY

2914—LZ-129 HINDENBURG, Robinson. Denied access to helium, the world's most advanced airship was doomed to a fiery death at Lakehurst. Paperbound $4.95

8162—FORD TRIMOTOR, Rice. The plane that put America in the airline business. Well written & illus. many pages, paper bound $4.50

8156—HANDBOOK OF AIRFOIL SECTIONS FOR LIGHT AIRCRAFT, technical data on wing sections representing most notable designs. 144 pages. $5.00

8158—AIRCRAFT HARDWARE STANDARDS MANUAL, engineering reference on aircraft "nuts and bolts." 142 pages $7.50

8164—STORY OF THE TEXAN. The AT-6 popular training plane. Covers development first to last model, illus. w/complete man't for AT-6, 60 pgs. $4.00

2902P—AIRLINERS OF THE WORLD, Morgan. There's plenty more to travel than 727's, Convairs, and DC-8's. Paper. Good reference $1.95

2911H—FIFTY FAMOUS AIRCRAFT, hardbound library edition. $3.50

8155—VOL III, SEAPLANES & MOTORS, WWI Spotters Manual, reprint of 1918 government manual document, 96 pages $2.50

2956-STUKA AT WAR, Smith. The most famous German aircraft of World War 2. Over 150 pix, 6x9 192p cloth $6.95

2964-AIRCRAFT '71. Photo album cov-pix, 7x10, 96p cloth $3.95

4110—PIONEER AIRCRAFT, Munsen. Early days of aviation $2.95

2925—JANE'S ALL THE WORLD'S AIRCRAFT, 1919. Over 1000 pix, plans, diagrams. Facsimile edition, 808p., 12-1/2x8-1/2" hardbound $25.00

9852—AIRCRAFT AVIATION ALBUM VOL. 6. Verville-Sperry R-3 racer, Cessna Airmasters, Beech 18 Twin, Grumman J2F, Bert Acosta, more. 56p, 8½x11, paperbound $3.50

9853—AIRCRAFT AVIATION ALBUM VOL. 7. Curtiss Tractors, Martin Stratoliners, P36 Hawk, XB-70 Valkyrie, more. 56p 8-1/2x11 paperbound $3.50

9856—HISTORICAL AVIATION ALBUM No. 10, by Paul R. Matt, including Curtiss PW-8, Aeronca C-1 through C-4, Laird-Turner LTR-14 and biography of Chas. Walsh. Softcover $5.00

2901—PLANES THE ACES FLEW, Morgan & Shannon. Brings back all the thrills of WW1 aerial days. Paper $2.95

2913P—THE LOCKHEED CONSTELLATION, Morgan. The famed triple rudder commercial job still used by the Navy for weather work. Plans. Includes the Presidential plane. Paper edition $2.95

4518—THE SAGA OF THE TIN GOOSE, Weiss. The plane that opened up commercial aviation. 288pp 5½ x8, 60 pix, hardbound $2.95

2928P—NORTH AMERICAN MUSTANG MK. I-IV. Markings and insignia including 48 in full color. AAS3. 7x10 paperbound $2.95

2931P—CURTISS KITTYHAWK MK. I-IV. Loads of markings, many in full color. AAS6. Paperbound 7x10 ..... $2.95

2932P—CURTISS P-40D-N WARHAWK. Loaded with views of squadron markings, many in full color. AAS7. Paperbound 7x10 ..... $2.95

8178—MANUAL FOR THE OLD OX-5 ENGINE OF JENNY FAME. A delightful little reprint on the engine that flew the Jenny. Covers operation, assembly, & repair of the 90HP powerplant, 20 pgs $2.00

8165—LOCKHEED P-38 LIGHTNING. Feared & revered fighter of WWII. Statistical study of its uses war, 78 78 pgs, photos $4.00

8166—HAWKER HURRICANE. The Hurricane made up 60% of Battle of Britain. Soft cover, 40 pgs $2.00

8167—CURTISS P-40 WARHAWK, 36 page manual. Brought to fame by the Flying Tigers, magnificent plane famous for its ruggedness. Used mostly in action against Japanese $3.50

8168—ME 262 STURMVOGEL. World's first jet fighter. Text made possible by captured documents from German files. 66 pgs photos, schematics full-page foldouts, pilot's notes $5.00

8169—REPUBLIC P-47 THUNDERBOLT, The Jug weighed more than 21,000 pounds, carried more gas than any other WWII fighter plane. Brought air superiority to Allies in Western Europe $4.00

2957—PICTORIAL HISTORY OF THE LUFTWAFFE, Price. Over 200 photos show how the Luftwaffe grew from nothing to a formidable force in only six years. Rare data. 212 pix, 186p., 6x9 hardbound $5.95

9832—CLEMENT ADER, Gibbs-Smith. His flight claims and place in history. Hardbound $5.85

2928H—NORTH AMERICAN P-51 MK. I-IV. Hardbound Library edition $5.00

8160—HELICOPTER DESIGN & DATA MANUAL. 12th printing, revised edition $5.95

8161—THE FLYING WINGS OF NORTHROP an historical study of flying wings $4.50

8175—X-15 RESEARCH AIRPLANE, Til now little has been published about the trainer for today's astronauts. Exciting reprint from the NASA collection, exc. photos $2.00

2940P—NAKAJIMA Ki.43, HAYABUSA I-III. Photos and markings, 8 color pages. AAS-15. 7x10 paperbound $2.95

2929H—SUPERMARINE SPITFIRE MK. I-XVI. Hardbound library edition $5.00

2929P—SUPERMARINE SPITFIRE MK. I-XVI. Packed with insignia and full color diagrams. 7x10 paperbound $2.95

2946P—SHARKMOUTH, VOL. 1. Photos and Markings, 8 pages in full color side views. AAS-21. 7x10 paperbound $2.95

2947P—SHARKMOUTH, VOL. 2. More Sharkmouth, color markings. AAS-22. 7x10 paperbound $2.95

2930P—NORTH AMERICAN P-51 B/C MUSTANG. More great Mustang markings and insignia. 7x10 paperbound $2.95

2926P—NORTH AMERICAN P-51D MUSTANG. Brief history, photos, 48 full color side views of markings, unit insignia. AAS 1. 7x10 paperbound $2.95

2926H—NORTH AMERICAN P-51 MUSTANG. Hardbound library edition $5.00

2930H—NORTH AMERICAN P-51 B/C MUSTANG. Hardbound library edition $5.00

2945P—NAKAJIMA Ki. 27. In photos, markings, many in color. 7x10 paperbound. AAS-20 ..... $2.95

2943P-MITSUBISHI ABM-ZERO-SEN. Japan's famous fighter. Pix, markings, many in color. AAS-18. 7x10 paperbound $2.95

2926H thru 2954H. AIRCAM AVIATION SERIES identical to paperbound series but in hard library reinforced binding for permanency. ..... each $5.00

2908—CIVIL AIRCRAFT OF YESTERYEAR, Munsen. A photo album of aircraft spanning half a century. 260 illus. $5.95

2937P—AVRO LANCASTER. Markings of famed British bomber, many in full color. AAS-12. 7x10 paperbound $2.95

2923—JANE'S ALL THE WORLD'S AIRCRAFT, 1909. Hundreds of photos, plans, diagrams. 12-1/2x8-1/2", 392p, hardbound $17.50

7217—FLYING FORTRESS, Jablonski. Acclaimed as the definitive work or WW II's B-17 bomber. Illus., 3 views, 7"x10½", 362p. hdbnd $12.95

2904—B-17 FLYING FORTRESS, Birdsall. Shows the differences of this famous bomber in varied sub-classes. Scale drawings. Paper $2.95

2942P—BOEING B-17 FLYING FORTRESS N44. Photos, markings of the famed bomber. AAS-17. 7x10 paperbound $2.95

2934P—SPAD SCOUTS SVII—SXIII. Fabulous photos show development of the Spad. Markings, many in color. AAS9 RAF, US, Italy, Japan, USSR, other. 7x10 paperback $4.95

2302—GERMAN AIRCRAFT OF WORLD WAR II. Turner. Introduction by Adolf Galland. Hard cover. Detailed information giving all technical information for aviation enthusiasts and aero-modelers. Color photos showing marvelous detail $10.95

2927P—REPUBLIC P-47 THUNDERBOLT. AAS2. Packed with group insignia detail, 48 in full color. 7x10 paperbound $2.95

2924—JANE'S ALL THE WORLD'S AIRCRAFT, 1913. Facsimile edition. More than 500 photos, plans, diagrams. 12-1/2x8-1/2", 314p., hardbound $14.95

8177—OPERATION MANUAL FOR THE PIPER J-3 CUB, Reprint of the entire service & operation man't for the "Volkswagen of the air." Special bonus drawings of construction in blueprint fashion on large heavy paper, size 17x22" $4.00

8179—MANUAL OF INSTRUCTIONS FOR THE CURTISS JENNY, WWI trainer and served as a barnstormer well into the 1930's. Many photos, 76 pgs $4.00

2301—BRITISH AIRCRAFT OF WORLD WAR II. Turner. Introduction by Douglas Bader. Superb color photos in beautiful detail. Lists tables of important marks; engines, spans, length, height, weight, etc. of each of the 49 aircrft. Biographies of each plane, hard cover $10.95

2939P—FINNISH AIR FORCE, 1918-1968. Treasure trove of aircraft, photos, markings, many in color. AAS-14. 7x10 paperbound $2.95

2911P—FIFTY FAMOUS FIGHTER AIRCRAFT, Groh. Data and illustrations of each type... Paperbound $1.95

2999—INTERNATIONAL 1969 AIR-RACING ANNUAL, Tegley & Berliner. History, photos, statistics, people involved in air racing. Records. 8½x11 96p, paper $2.95

9830—AERONAUTICS 1796-1855, Cayley, Gibbs-Smith-Historical treatise. Hardbound $5.40

2958—PICTORIAL HISTORY OF THE RAF, Volume 1. Taylor & Noyes. From 1918 to 1938. 6x9 hardbound, ... $4.95

2959—PICTORIAL HISTORY OF THE RAF, 1939-1945. The World War II period in 254p., 6x9", hardbound. Volume 2 ..... $5.95

8163—NORTHROP P-61 BLACKWIDOW, Rice, The terror of the night a big manual, well written and illustrated. $4.50

7552—AIRPLANES, MacFarlane. A good basic source $3.29

2950—MESSERSCHMIDT, Smith. Album coverage of the company that built 43% of Nazi Germany's military aircraft. 9x7½ 144p paper $3.95

3479-A PILOT'S METEOROLOGY, Cagle. 3rd edition tells all about weather, the flier's element. Hardbound $12.95

2936P — CONSOLIDATED B-24-M LIBERATOR. Photos and markings, many in color, of WW2 aircraft. AAS-11. 7x10 paperback $2.95

2967-FORGOTTEN FIGHTERS AND EXPERIMENTAL AIRCRAFT OF THE U.S. ARMY 1918-1941, Bowers. Illustrated look at 55 fighters that never saw service. 149 pix, 8-1/2x11 96p paper $3.95

8170—THE SUPERMARINE SPITFIRE, A reprint of the British original manual, undoubtedly the best fighter of the war $2.50

8171—de HAVILLAND MOSQUITO. Called the "Wooden Wonder," was one of the most deadly & fastest of the Allied airplanes. Built in 3 versions for 3 different deployments $2.50

8172—GUIDE TO PRE-1930 AIRCRAFT ENGINES, reprinting of a gem of a reference book on the old engines. 60 pgs $3.00

2917P—THE P-40 KITTYHAWK, MacDowell. The famous single engine prop fighter of World War 2. Plans, photos, data. Paperbd. $2.95

2913H—THE LOCKHEED CONSTELLATION, Library hardbound edition $5.00

8002—WINGED ROCKETRY, Sparks. The history of rockets from ancient China to World War 2 and the future. Hardbound $4.50

2935P—LOCKHEED P-38 LIGHTNING. USAAF, French, Italian, Chinese photos and markings, 48 in color. AAS-10 7x10 paperback $2.95

2944P—NORTH AMERICAN F-86A-H SABRE. VOL. 1. Photos and markings, many in full color side view. AAS-19. 7x10 paperbound $2.95

2748-ALASKA BUSH PILOTS, Satterfield & Jarman. Airplanes vs the wilderness and the people who fly them. Hardbound $12.95

2966-FORGOTTEN FIGHTERS AND EXPERIMENTAL AIRCRAFT OF THE U.S. NAVY, Bowers. More forgotten fighters that never went into production. 108 pix, 8-1/2x11 80p paper $3.95

2996—BUILDING AND FLYING SCALE MODEL AIRCRAFT, Musciano. Updated 3rd edition of an all-time classic. 245p 6x9 hardbound $3.95

2941P—REPUBLIC F/RF-84F THUNDERFLASH, THUNDERSTREAK. Markings and photos, 8 color pages. AAS-16. 7x10 paperbound $2.95

2303—CONCORDE (The Inside Story). Geoffrey Knight. Gives the inside information, from the revolutionary beginning to the final aircraft. 176 pgs, photos, hard cover $8.95

7706—AIRPLANE MODEL BUILDING, Johnson. Beginner's guide to model airplanes: getting started, tools, solid models, gas engines. C/L; clubs, instructions, etc. 60P 6x9 (1946) $6.00

2905H—B-24 LIBERATOR, hardbound edition. $5.00

2905P—B-24 LIBERATOR, Birdsall. Shows the development of this famed World War 2 bomber. Scale drawings $2.95

2903P—THE AT-6 HARVARD, Morgan. Probably the most famous trainer of all time, complete with scale drawings. Paper $2.95

2917H—THE P-40 KITTYHAWK, hardcover library edition $5.00

2965—FIGHTERS OVER THE DESERT, Shores & Ring. Fantastic volume on the air battles of the Western Desert. Commonwealth vs Luftwaffe. 256p., 7½x10, hardbound $8.50

8157—NORTH AMERICAN F-51 MUSTANG, truly the best fighter of the war $6.95

2915P—THE MESSERSCHMIDT BF-109. One of the most famous fighters of all time. Many rare photos, data, plans. Paperbd. $2.95

2915H—THE MESSERSCHMIDT BF-109. Hardcover library edition $5.00

2909—THE DOUGLAS DC-3, Morgan. Possibly the most famous one of them all and still flying. Includes military C-47 data. 95p. Paper $2.95

2910P—THE F-86 SABRE, Childerhouse. Fascinating data on the famed fighter jet with plans, photos. Paper edition $2.95

2910H—THE F-86 SABRE, hardbound library edition $5.00

2938P—BATTLE OF BRITAIN. Markings, photos of Hawker Hurricane, Supermarine Spitfire, Messerschmitt Bf109. AAS-13. 7x10 paperbound $2.95

2906P—THE B-58 HUSTLER, Robinson. Development of the SAC supersonic bomber built by Convair. Drawings $2.95

9803—OBSERVER'S WORLD AIRCRAFT DIRECTORY. Illustrated. Hardbound $5.95

2907P—THE BOEING 707, Schiff. The commercial plane that ushered in the jet age in the USA. Very complete. drawings $2.95

9831—AERONAUTICS FOUR-IN-ONE BOOK. Flying up to 1909, Flying since 1913, Power to fly, Aeronautica prints. Hardbound $3.50

2907H—THE BOEING 707, hardcover library edition $5.00

2933P—SUPERMARINE SPITFIRE MK. XII-24. SUPERMARINE SEAFIRE MK. 1-47. Marking, many in color. AAS8 7x10 paperbound $2.95

2903H—THE AT-6 HARVARD, hardbound edition $5.00

7262—FLIGHT MANEUVERS MANUAL, Haldon. How-to book showing 24 basic flight maneuvers; 4 advanced maneuvers recommended by FAA. Learn how the real ones operate. 500 illus. $4.95

2918—THE P-38 LIGHTNING, hardbound library edition $5.00

2918—THE P-47 THUNDERBOLT, Morgan. World War 2 single engine fighter in its many versions. Drawings. Paperbound $4.95

8176—PILOTS MANUAL FOR THE F-82 TWIN MUSTANG, This plane is actually two Mustang fuselages placed side by side $5.00

2921—WARPLANES OF YESTERYEAR, Munsen. Photo album covering the 1914-1946 period. Many rare, unusual, and exciting views. Clothbound $5.95

4118-FIGHTERS BETWEEN THE WARS, Munson. From biplanes to Spitfires, military aircraft developments in text and color drawings. Hardbound $3.95

8159—AIRCRAFT DETAIL DESIGN MANUAL, 3rd Edition by Dzik gives data on design and repair of light planes, 161 pages $10.00

2955P—BILL DEAN'S BOOK OF BALSA MODELS. Instructions for making 18 planes, gliders, boats, cars, kites, with full size plans. 64p., 8x11 ..... $2.95

2749-AIRSHOW PICTORIAL, Johnson. 350 photos capture thrill and excitement of airshows in US and Canada. Prop and jet. Statistics. 8-1/2x11-1/2 hardbound $17.95

8174—MANUAL FOR P-63 KING COBRA OF BELL AIRCRAFT. Larger & more powerful than its little brother P-39, King Cobra had greater firepower & laminar airflow wings. Just published, 72 pgs $4.50

7261—FEDERAL AVIATION REGULATIONS (For Pilots). Simonson. Govt. rules prescribing requirements for obtaining various pilot licenses. Operational flight rules for piloting an airplane in USA. 96p, 7x10, paper . $7.00

8173—THE BOEING FLYING FORTRESS. Provides the reader and modeler with the primary source material on the B-17. No other plane hastened the fall of the Axis more. 108 pgs, photos, diagrams $6.00

2906H—THE B-58 HUSTLER, hardcover library edition $5.00

BOATS

3317—MODEL BOAT BUILDING, Lozier. Four boat patterns, all made from cardboard. 48p., color illus., hard- $3.75

2920—JANE'S FIGHTING SHIPS, 1898. Magnificent facsimile edition of rare Jane's complete with schematics and technical details, 12½x8½, 232pp hardbnd. $14.95

2602—USS ALABAMA. Heavy modern battleship of World War 2. Text, photos, color charts, operational history and campaigns. 36p paper ... $ 2.50

2970—SHIPS AND AIRCRAFT OF THE US FLEET, Fahey. US warship handbook. Over 300 illus., paper. 9th edition, ... $ 7.95

7701—SHIP MODELS, VOL. 1. From earliest times thru 1700AD ... $2.00

7702—SHIPS MODELS, VOL. 2. Sailing ships from 1700AD $2.00

7703—SHIP MOVLES, VOL. 3. British Small Craft $2.00

7704—SHIP MODELS, VOL. 4. Foreign Coast craft $2.00

7705—SHIP AND AIRCRAFT FAIRING AND DEVELOPMENT $3.00

2922—JANE'S FIGHTING SHIPS, 1914. Over 3000 photos, silhouettes, diagrams. Facsimile edition. 624p., 12½x8½, clothbound. $19.95

7700—SHIP MODEL BUILDING, Johnson. Enlarged revised 3rd edition. 1000 illus., describes hull carving, superstructure how-to. 320pp. $6.00

2963-SHIPS '71, Parsons. Wide ranging album of ships from minesweepers to NATO. 83 pix, 7 dwgs, 7x10 cloth, 96p $3.95

2960-THE METAL FIGHTING SHIP, Archibald. Fantastic illustrations of metal hulled ships from 1860 to present. 350 illus., 9x12 240p hdbd $19.95

2962-JANE'S FIGHTING SHIPS 1939, McMurtie. Facsimile reprint 12x8, 550p cloth bound $29.95

2997—SHIP MODELING HINTS AND TIPS. Lt. Comm. Craine, unrivaled authority on model ships of every kind. Concise compilation of fifty years experience in the field. 5½x8½; 117 pgs, hardbnd illus $6.95

2998—HANDBOOK OF MODEL PLANES CARS AND BOATS, Bill Winter. Directions for making many model planes & boats such as Sopwith Pup, or a radio controlled gas engined hydroplane 6¾x9½, 104 pgs, cloth $3.50

2601—USS NORTH CAROLINA (BB55). America's 1940 vintage 40,000 ton battlewagon. Text, photos, color charts, operational history. 36p paper ..... $ 2.50

CARSTENS PUBLICATIONS — Dept. 5407
P.O. Drawer 700
Newton, New Jersey 07860

I am enclosing check or money order for $ ..... Please send me the books I have checked below. (If you do not care to cut magazine, print or type titles on separate sheet).

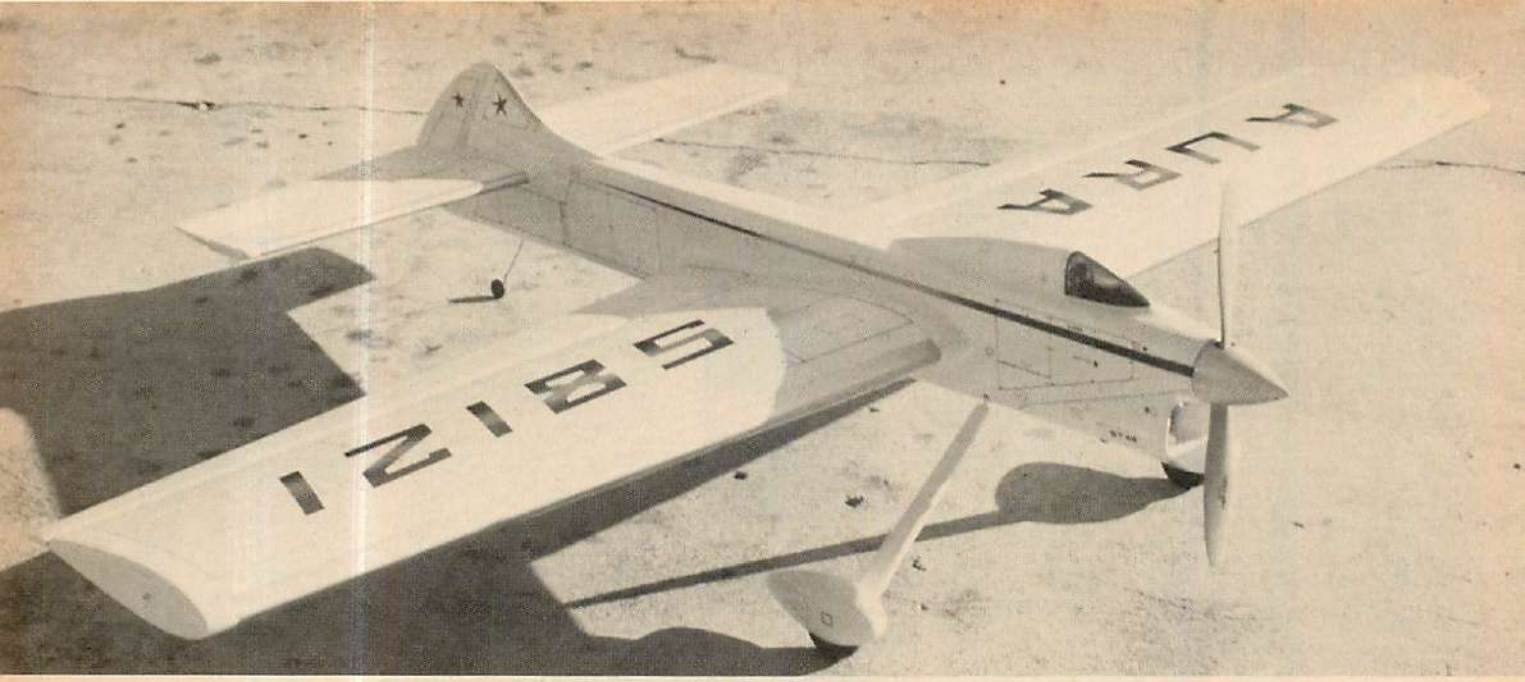
Name .....

Street ..... Apt. .....

City ..... State ..... Zip .....

Please add 25¢ postage on orders under $2.00

Please print or type legibly. N.J. residents add 5% sales tax.



AURA

Precision aerobatics with a stunt controline pits you against the best of ships. Here's a worthy contender/**Bill Bradford**

I remember insisting on a blanket cancellation clause for every resolution made last New Year's eve except for one I proposed: That the upcoming contest season would see us actively participating in Stunt at all contests within a reasonable distance from our home, say 5 or 6000 miles! Gene (my favorite pit-person) thought the basic idea was fine, but that perhaps we should limit the distance somewhat. I protested. She pointed out that the cost of a divorce could very well keep me at home rewaxing my airplane to an overweight condition. I partially conceded. We would now not consider any contest in Hawaii or Alaska (we live in California), but the rest of the U.S. was negotiable and, pesky interruptions such as earning a living and the like, would not deter our contest plans. She protested. I will spare you, dear reader, the ensuing complications. After all, Sunday sport flying is a lot of fun and there's practically no pressure involved. The fact remained, however, that for the one contest within a 25 miles radius of our home that I was finally awarded, a new airplane was needed. Thus, "Aura" emerged after much analysis of many current Stunt designs as well as relatively new aspects of the A.M.A. Rules for C/L Precision Aerobatics

Design Philosophy

To dwell somewhat on the above points, first of all; the basic design is suited to a .40 size engine provided the weight could be kept at 50 ozs. maximum for competition. Anything less than this would be all the better. It seems there are few, if any, overpowered Stunt ships. After pondering this for a time, the fundamental reason seemed to crystalize into a gross-weight vs. power-available situation, apparently brought about by trying to build too large a plane light, and then powering it with an inadequate engine. This is not a new discovery, but the way in which I was now approaching the problem was; at least from my own experience, a little different. The approach was like this: Why not begin by matching the engine displacement, expressed in whole ozs., with the gross-weight of the airplane, i.e., for a .35 size engine, aim for a 35 oz. all-up gross weight for the complete airplane. A .40 engine would power a 40 oz. airplane, and so on. Truly a Stunt fliers dream. I must be overlooking something. Further research revealed that the best Stunt ships usually stay within a plus 10 ozs. over the engine size in ozs., on their grossweight. Several of my best flying airplanes certainly confirmed this. There remained only to find the right way of implementing the idea into my building procedure for "Aura" since I was already observing traditional weight-saving methods in terms of light wood selection, using as little glue as possible and light finishing techniques. Apparently my lighter weight airplanes in the past-conforming to the above reference-frame of engine size plus 10 ozs.—were possible to achieve by not only utilizing normal weight-saving procedures, but also by reducing the overall bulk of the airplane itself. O.K., so I'm a semi-heavy builder. The concern was that Aura was the largest Stunt ship to date that I had attempted to build and it would be a shame to have the prototype soar way overweight. To power the design with an S.T. 46, in accordance with the above theory, it would have to come off the board at no more than 56 ozs., complete. My own personal limitations for producing a super-light Stunter would prohibit me from going to a wing-size of 700 to 750 sq. inches of area and, a long fuselage of approximately 43 or 45 inches as several of the current S.T. 46 powered Stunt designs now possess. At this time, I'm not convinced a Stunt ship needs to be this big anyway, so what this thinking ultimately boils down to is the following: Reverse the priorities by building a smaller airplane, and power it with a big engine!

Aura tries to satisfy these requirements. It has a 650 sq. in. wing, and a 41 inch fuselage. It weighs 56.5 ozs., thereby exceeding the parameters a little but fortunately, flies very well at this weight. One other item that should be mentioned as regards Aura's structure is that certain "large" elements of the bigger Stunters were incorporated into the design, for instance, the

horizontal tail-surfaces. This component is of 130 sq. inches of area; the elevator being 61 sq. It has a more efficient aspect ratio with a 25 inch span, and is rather bulky through the stab section. The reason for the thicker stab is that it helps in sharp cornering by simply "lifting" better; much the same way as thicker wing-sections produce greater lift. Also, a blunter L.E. is possible for the stab. This is desirable because the horizontal tail-section undergoes relatively larger angles-of-attack in a tight corner than the wing. Thus, there is a greater tendency toward stalling the tail, which is minimized with a blunt L.E.

It was also felt that "big" flaps would be an advantage, so the flaps are full span and 121 sq. inches of area. The only precaution here is to be sure and not exceed 30° up and down deflection of the flaps, as this can seriously increase drag during maneuvers and possibly stall the wing completely. 20% sections were chosen for the wing throughout and, they were plotted with a slight curvature aft of the maximum wing thickness point, which is 30% of the wing-chord without flaps. This combination also produces smoothness through maneuvers. As for nose and tail moment arms, a rather short nose was considered necessary due to the slight extra weight of the S.T. 46 and it's accessories. All total, the engine, muffler—which is the new S.T. extractor type—R/C 6.0 oz. plastic tank, four 6-32 mounting bolts, ¾" shaft extension, Rev-Up 12-5 prop and spinner weighed in at 16.25 ozs. It was a bit of a shock to start the project with over a pound of hardware even before cutting the first piece of balsa! With this in mind, a 9¼" nose moment-arm was selected to ensure adequate turning capability and C.G. placement. The tail moment-arm was fixed at 15⅜" to produce a fairly large ail-volume-coefficient, wherein lies good pitch stability and is another plus for sharp cornering. Part of the design pre-planning concerned itself with producing an airplane that came off the board noseheavy; this being preferred over tailheaviness which causes bad stalling characteristics and generally difficult corner-control, as regards bobbling and, placement of level flight following maneuvers. I knew that I could get away with a slight amount of tailheaviness with the large tail-volume and still have a groovy flying machine, but I didn't want to chance a super-tailheavy airplane which could demand an excessive amount of nose-weight to achieve proper longitudinal balance. As it all turned out, Aura was in fact, a little tailheavy right off the building-board, but it flew very well. A full pattern was flown on it's second flight without any trimming whatever.

Consider the C.G. shown on the plans as approximately the maximum aft position. Thus placed, the airplane has a slight tendency to bounce the bottom square pullouts, and is slightly oversensitive, although it tracks well through the round maneuvers. The slight tailheaviness allows a very sharp square corner either way, and you may prefer this arrangement. After some experimenting, the optimum C.G. location for all-around grooviness and general handling should be one inch forward of the plan position. You will find little change in the sharp turning radius and the reverse wing-over seems to improve, as will pull-outs and level flight. Also, the line-tension is very positive throughout the pattern. The above considerations are largely a matter of preference, so set the airplane up to suit yourself. Most of us have flown someone else's machine; one that is very competitive in the hands of it's owner-designer, only to discover that to us, routine straight and level seemed a bit awkward the first time around. Albeit, different strokes for different folks!

The Wing and Wing-Jig

An earlier design of mine; "Metaphor 2", appeared in the June '76 issue of FM. I will not dwell on the wing-jig, here, but instead will direct you to the above issue, as the text there, explains in detail the jig's set-up. The same jig was used for both airplanes. Also refer to the picture of Aura's wing in this article, secured to the jig, ready for covering with 1/16" balsa skins. This picture in itself, should be sufficient in detail to allow you to successfully utilize this type of jig and, at the risk of sounding cliche, worth it's nominal 1000 words! I will reiterate here, however, that by locating the jig-tube holes (refer to plans) as shown, installing the bellcrank unit and lead-outs is quite a simple matter, in that the jig-tubes themselves, can be twisted out of the center-section area, allowing access during this operation, while maintaining rigidity of the wing. The picture of the wing-jig also illustrates this procedure. I would recommend building the bellcrank assembly; complete with ⅛" ply, supports and leadouts attached, as a seperate unit before installing it into the wing.

Probably the most satisfactory use of the wing-jig comes when it's time to fully sheet the wing. With just a little care, the wing will emerge warp-free and perfectly straight. I would be apprehensive of fully sheeting the wing without the jig, as this is much too risky and problematic, in terms of obtaining a competitive wing.

The flaps may be cut from one ⅜"x4"x36" balsa sheet. The density of this wood should not exceed 5 lbs./ft.^{3}. If you have difficulty finding sufficiently light wood for the flaps, then fabricate them in the manner shown for the elevators, (see plans) using the hollowed ¼" balsa core and 1/16" balsa sheeting. If this method of flap construction is used, space the 3/32" balsa ribs in such a way as to produce 15 ribs per flap. Needless to say, the ¼" sheet chosen should also be as light as possible. Again, it is essential not to exceed 30° flap displacement, so be sure and use a large flap-horn, such as the Midwest 5" horn. The control set-up depicted on the plans will assure proper control surface movement. However, the farthest hole from the bellcrank pivot-point on the bellcrank itself—for attaching the flap pushrod—should be considered before permanently securing the control system, complete up to the flap-horn, only. This should allow some leeway for personal variances in control hook-up technique.

All in all, the completed wing without any finish, should not exceed 11.5 ozs. This would include the wingtips; complete in themselves, and all necessary wing hardware and, the fully sheeted wing ready for assembly to the fuselage. This would also include the airfoiled flaps and flap hinges. The wing-tips, complete, should not weigh over .5 ozs. each. If your component weights vary upward appreciably from the above av-

PHOTOGRAPHY: BILL BRADFORD

erages, it would be well to consider scraping the offending part or parts, and build new ones. I would think a total wing weight of 15 ozs. to be excessive for competition purposes. If the wing is not perfectly warp-free and straight when it is finished, discard it; even if it weighs only 8 ozs., and build a new one.

The Fuselage

Generally, the fuselage construction is very conventional and quite simple. It may prove helpful, however, to mention a few items pertaining to the fuselage as regards assembly sequence. First of all, the landing gear wire should be completely bent, faired, filleted and covered with "0-0" Silkspan before it is placed in the fuselage. The maple engine bearers, bulkhead F-1 and firewall F-2, should be built as a seperate unit; as an engine "crutch". The complete landing gear should be left removable on F-2 at this stage, because you will want to remove it during fuselage shaping, although it will be attached long enough to cut the gear access areas into the ½" bottom block. Do not attach the landing gear permanently to F-2 until just before you are ready to install the wing in the fuselage.

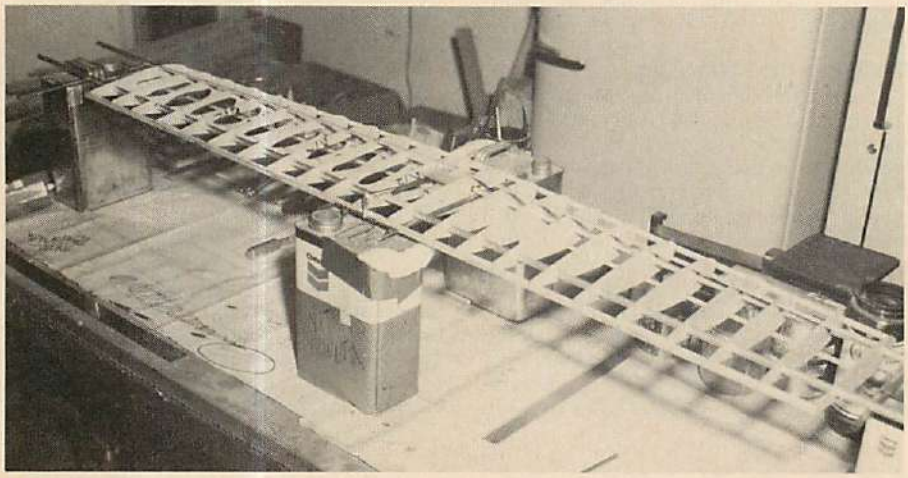
After cutting the 1/16" ply. doublers and gluing them to a ⅛" balsa fuselage sides, cut out the wing access areas on the fuselage sides, afterwhich they may be tack-glued back into place before shaping the fuselage. This will prevent unwanted fuselage distortion when the aft balsa bulkheads are being fitted into place. Use a solvent-release type glue for this, as it makes for easier removal when it's time to mount the wing.

You may find it easier to drill the engine mounting holes in the "crutch" unit before gluing this to the fuselage sides. Use 6-32 hex bolts and blind nuts for the S.T. 46. You will find it necessary to drill-out the engine mounting flanges to accommodate 6-32 hardware.

After the engine-crutch unit, fuselage sides, and aft bulkheads are assembled, cut and shape the 1" nose filler block by placing the engine in the mounts without the spinner, at first. Put the ⅛" ply. nose ring in place, and then install the spinner and spinner backplate. After preliminary shaping, epoxy the nose filler block to the nose ring and let dry. The engine and spinner can now be removed for shaping all fuselage blocks. The above will automatically set the nose ring to the 2° outside offset for proper alignment with the spinner backplate and, the shape of the nose section will have greater continuity.

Fill the entire stab-slot with a light piece of scrap balsa block, for shaping purposes. This can later be cut, to allow the stab to be inserted, and you will get a very nice fit on the rear portion of this block. Do not glue the rear portion of this stab fill-block permanently, until the controls are hooked up completely, and operating smoothly.

Cut and shape the vertical-fin and rudder as shown on the plans, observing the grain indications. Glue this up as one piece before shaping and then cut-out the rudder section. With the top block hollowed, and the ⅛" balsa spacers secured inside, install the cockpit and vertical-fin with the top block detached from the remainder of the fuselage. Also, fillet and cover these components at this time. It is a lot less cumbersome, this way; not to mention the much greater mobility for those of you who wish to detail your cockpit and, work for a beautiful fillet around the cockpit area. Be sure and seal-off the cockpit to prevent fuel and oil seepage and, for structural reinforcement of the nose-section. Also, drill a very small hole in the canopy—perhaps in one of the aft corners—to maintain ambient pressure inside, during periods of exposure to the sun. This also helps in the prevention of canopy deformation, especially if your cockpit detail is finished in darker colors.



Bill's "tin can" wing jig. Leading and trailing edges just clear the brass center-section support tubes. Spanwise jig tubes removed for bellcrank installation. Can tops are padded to prevent dinging the sheet.

It may be useful to mention various component weights for the fuselage at this point; all without finish, and being fully shaped and hollowed: The cowl and bottom block should not exceed .5 ozs. The top block, canopy, cockpit turtledeck, and with vertical-fin attached, should not exceed 1.0 oz.

The Powerplant and Fuel Tank

The S.T. 46 used in Aura was set-up by Mark Fechner, of Marks Model Engines, Salt Lake City, Utah. Mark has been actively flying Precision Aerobatics for 25 years, and has a vast knowledge of model engines in general. I can recommend his engine work with enthusiasm and vigor.

Although Mark will set-up any Stunt engine, his modifications to an S.T. 46 are a beautiful sight to behold. This work consists of re-chambering the cylinder-head for much improved Stunt characteristics. He machines a custom ring from special material that, with normal Stunt useage, will outlast the stock ring 2 to 1, and the fit must be seen to be believed. The ring end-gap is also carefully checked and adjusted. The stock venturi-insert is enhanced by adding 6 more holes to the existing 6 peripheral fuel holes and, altering the angle at which the 6 extra holes enter the choke area. The choke is also enlarged, slightly. This increases both fuel-draw and power. He will alter the venturi-boss for ½" spraybar height, too, if you wish, and supply a custom machined insert made to your specifications. The major components of the engine are then meticulously fitted with great care and accuracy, as the engine is being re-assembled. Following a bench-check and controlled break-in, the S.T. 46 is ready for the pattern.

You must fly this precisely fitted, jewel of an engine, to fully appreciate the improvement in flight performance and ground handling. It is truly an exciting experience. The four-cycle is extremely stable, and it pulls like a truck! With the custom-made muffler-pressure fitting, done for me by Mark, I can also adjust the run by changing the I.D. of the pressure orifice. My S.T. 46 seems to like a .078" I.D., however, this will vary with individual installations. Providing the engine is not abused by prolonged lean operation, it's service-life and reliability will be considerably extended by these modifications. Write to Mark at 4456 W. 3145 S., Salt Lake City, Utah-84120. Phone, 801-298-3498. The very nominal fee he charges for this work is worth every penny, and the service is good, too. By the way, if you are into Old-Time Stunt, he is currently re-building early ignition engines for this event, and will also convert glo-engines to ignition.

The Pylon 6.0 oz. "clunk" tank was set-up in the single-vent suction configuration with the inside end of the vent terminating at the top, front, inboard corner of the tank. The outside end of the vent was them plumbed to the existing pressure-tap provision, available on S.T.'s newer extractor-type muffler, which is decidedly quieter than the earlier version. Unless you

want to time-fill the tank each flight, the overflow vent is a little more critical on it's vertical termination point inside the tank, due to the fact that 6.0 ozs. of fuel will probably be too much for the S.T. 46 on a Stunt run. What this means is that if your inside overflow vent touches, or is very close to the top of the tank, you will undoubtedly fill the tank to it's full 6.0 oz. capacity, and will therefore be inviting an over-run, as my engine draws the very last gram of fuel from the tank, during the run, before it cuts-out. A simple method of adjusting the running-time down to a comfortable level, is by fabricating the tank-end of the overflow vent in such a way that it is about ¼" below the top inside tank-wall; the wall thickness being approximately 3/32". If you build the landing gear and tail-wheel assembly for the design as shown on the plans, the tank, as described above, will fill to about 5.6 ozs., which should be sufficient for most applications. My ship averages 6:45" with the above tank configuration; at sea-level, and I am running a steady 4-cycle throughout the pattern. If you find you need further time-adjustment on your runs, you may add methanol to lengthen the running time, or, add nitromethane and/or oil to shorten it, but do this by adding only small amounts at a time, and then flight-check the run with a stopwatch. Also, it should be remembered that if on one flight, you whip the airplane after engine-stoppage; so as to land in front of your pit-man, and the next flight you do not whip the landing approach, you may vary as much as 6 seconds between flights, which could possibly obscure the accuracy of your run-timing. In other words, if it becomes necessary to adjust the flight-time, make each landing approach the same, until you have the run where you want it. The remainder of the flight should be easier to duplicate, with the possible exception of the starting time.

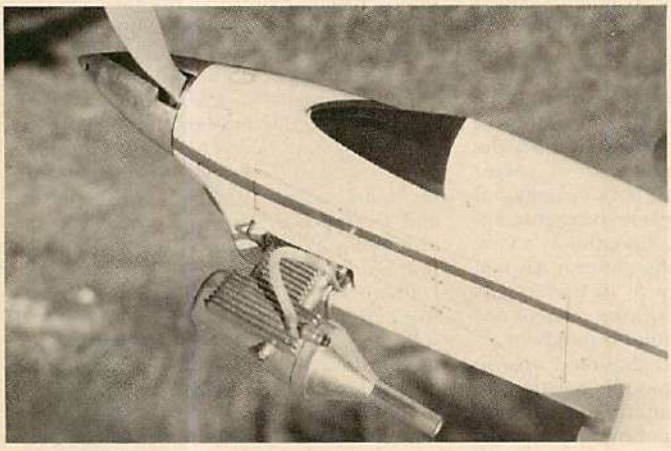
Finishing and Detailing

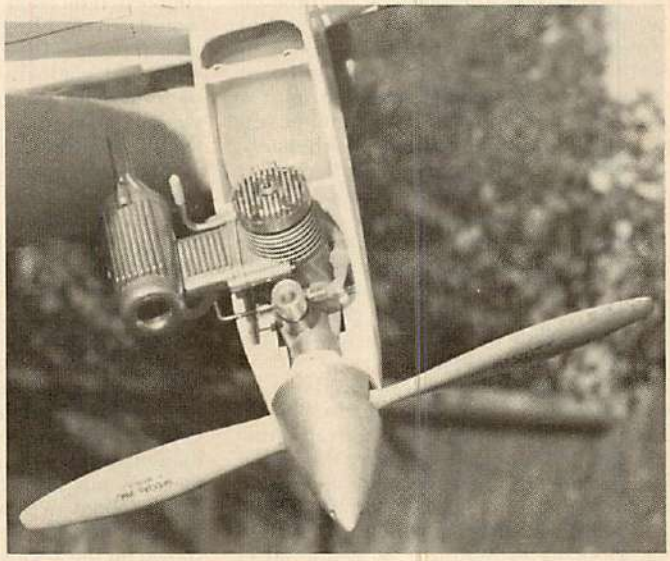
Considering Aura's relatively large size and bulk, and as with good wood selection, lightness must be jealously guarded as the finishing process begins. Unfortunately, not being a very jealous person by nature, my finished soared to 8.5 ozs. I think 7.5 ozs. of finish is certainly possible with good spray equipment. Aero-Gloss dope was used throughout, and the entire airplane was covered with "0-0" Silk-span. This was filled with the standard dope/talc method, however, only two coats of filler were applied, and sanded nearly completely away before further finishing continued. I use a rather thick first talc-coat, which adds; prior to sanding, about 3 ozs., on this airplane. Two ozs., at least, should be sanded off, and more, if possible. Take your time with the fillercoats. The second talc-coat was thinned to achieve a weight increase of only 1.375 ozs. and, this too was sanded thoroughly. I also add silver to the talc-coats, as this will allow the smallest flaw to be easily detected. After the talc-coats are sanded to your satisfaction, spray on a light coat of regular silver to provide a consistent base for your color, by avoiding light and dark spots underneath and, providing some protection from the ultra-violet rays of the sun, which have a deteriorating effect on dope and paper.

Aura's overall color is Swift-White, trimmed in red, silver, and blue. The ink-lines were applied with a Rapidograph drafting pen, using #0-0, #0, and #1 points. Vellum stencils were cut for the name and AMA number, and secured with rubber cement. Simulated de-icing boots, done in silver, were also used for an additional touch of trim on the L.E.'s of the vertical-fin, horizontal stab, and wing. The canopy was dyed a semi-dark green, using Tintex clothing dye and warm tap water. All lettering was done with Lettraset rub-on letters. Five Aero-Glass clear top-coats were then air-brushed over all of the above, allowing 24 hours drying time between each coat. Let the finish cure for about one month, and then wet-sand it with #600 wet-or-dry sandpaper to dull the top-coats uniformly, afterwhich the finish can be rubbed with a good polishing compound, such as DuPont 0761N. Now apply two coats of automotive cream-type wax, and over these, apply one coat of Lemon Pledge. A good time to accomplish your initial trim-flights on the airplane, is during the month waiting period, mentioned above.

I strongly advise using an air-brush for applying all coats after the talc fill-coats. This technique will tend to meter the color, trim and top-coats, thereby saving some weight, as well as minimizing the possibility of getting orange peel in the finish. The latter is an unsightly kind of grainy appearance in the painted surface that is difficult, if not impossible to remedy, once it's there. Airbrushing helps to eliminate this, by laying the dope down very smoothly, since it has to be thinned quite a bit to flow properly through the small airbrush orifices, which in turn, allows the dope to spread out well on the surface.

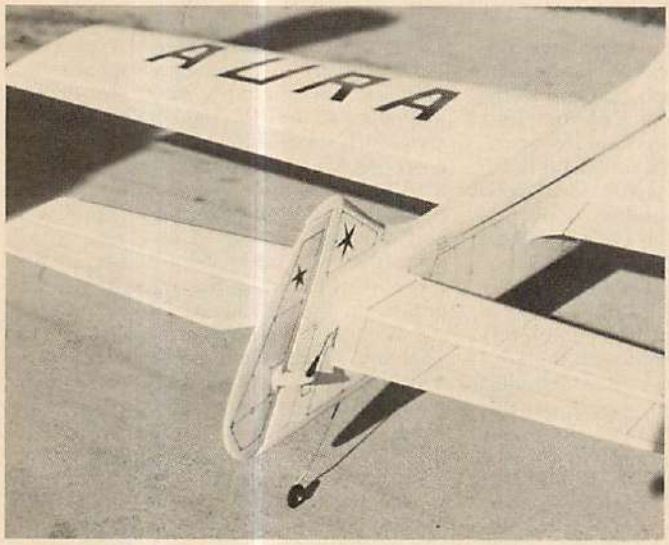
Before we leave the discussion on finishing, let me emphasize one last point: From the first to the last coat of dope applied to the airplane, allow a minimum of 24 hours drying time. 48 hours would be better still. The reason for this is to stack the coats, as opposed to having them merge together. I believe the advantages are obvious, in terms of lightness, and flaw reduction in the finish. This procedure does require patience, but the rewards are well worth it. If light sanding is required of any color-coats, accomplish this with #400 - #600 Wet-Or-Dry paper, used wet. I would not advise any sanding of the color-coats until they have dried for at least 12 hours, but in any event, wait the 24 to 48 hours between applications of the individual coats.

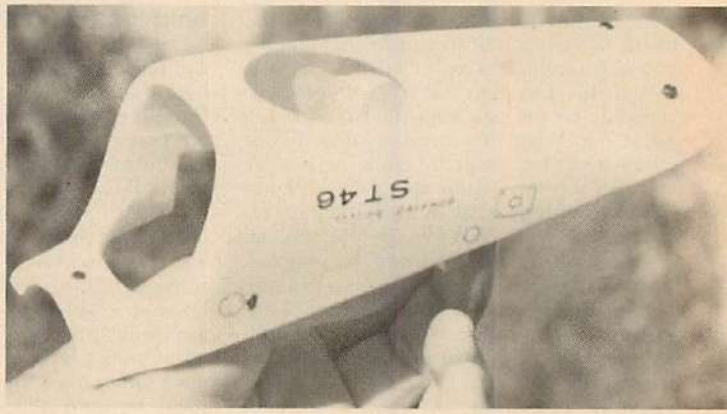




The Super Tigre Extractor Muffler proved very quiet, little power loss. Note pressure tap location. **Below:** Overflow vent capped. Fuel line filter should not touch engine, or inside compartment wall.

AURA





Holes for 4-40 cowl bolts are bushed with brass tubing and recessed inside. **At left:** Kwik-Link for adjustable/operable rudder mechanism. Note the rudder horn angle to thrustline for easier installation. Adjustability is available at the rudder horn and at elevator end (threaded rod). **Beneath:** A take-off.

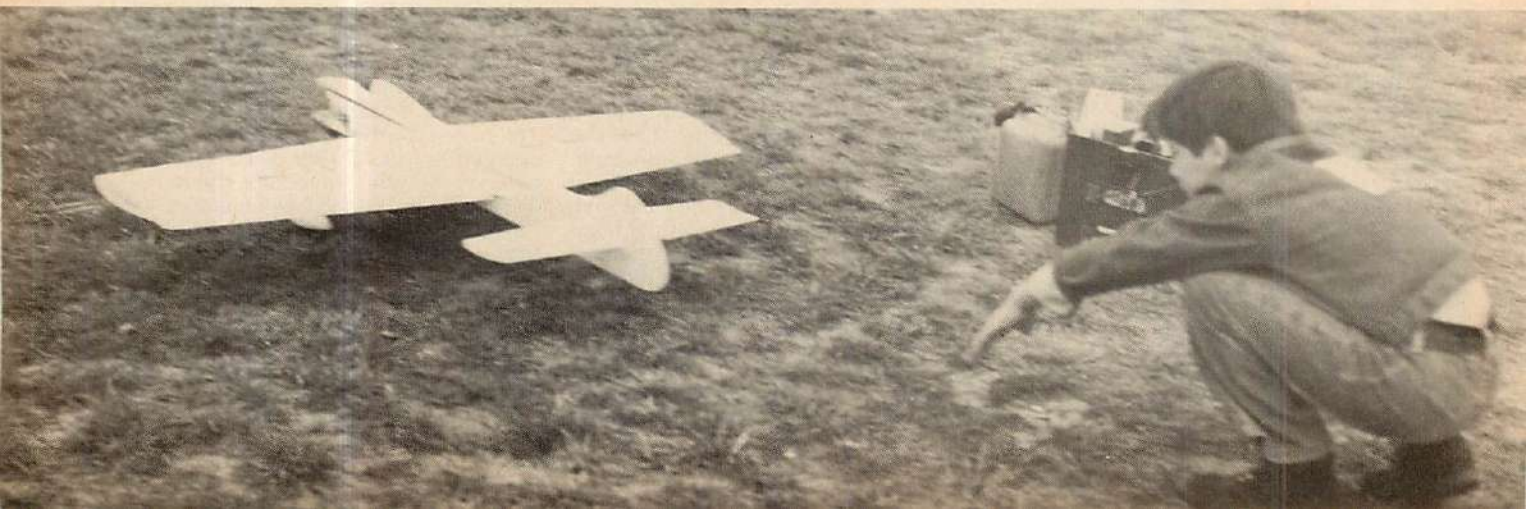
Trimming and Flying

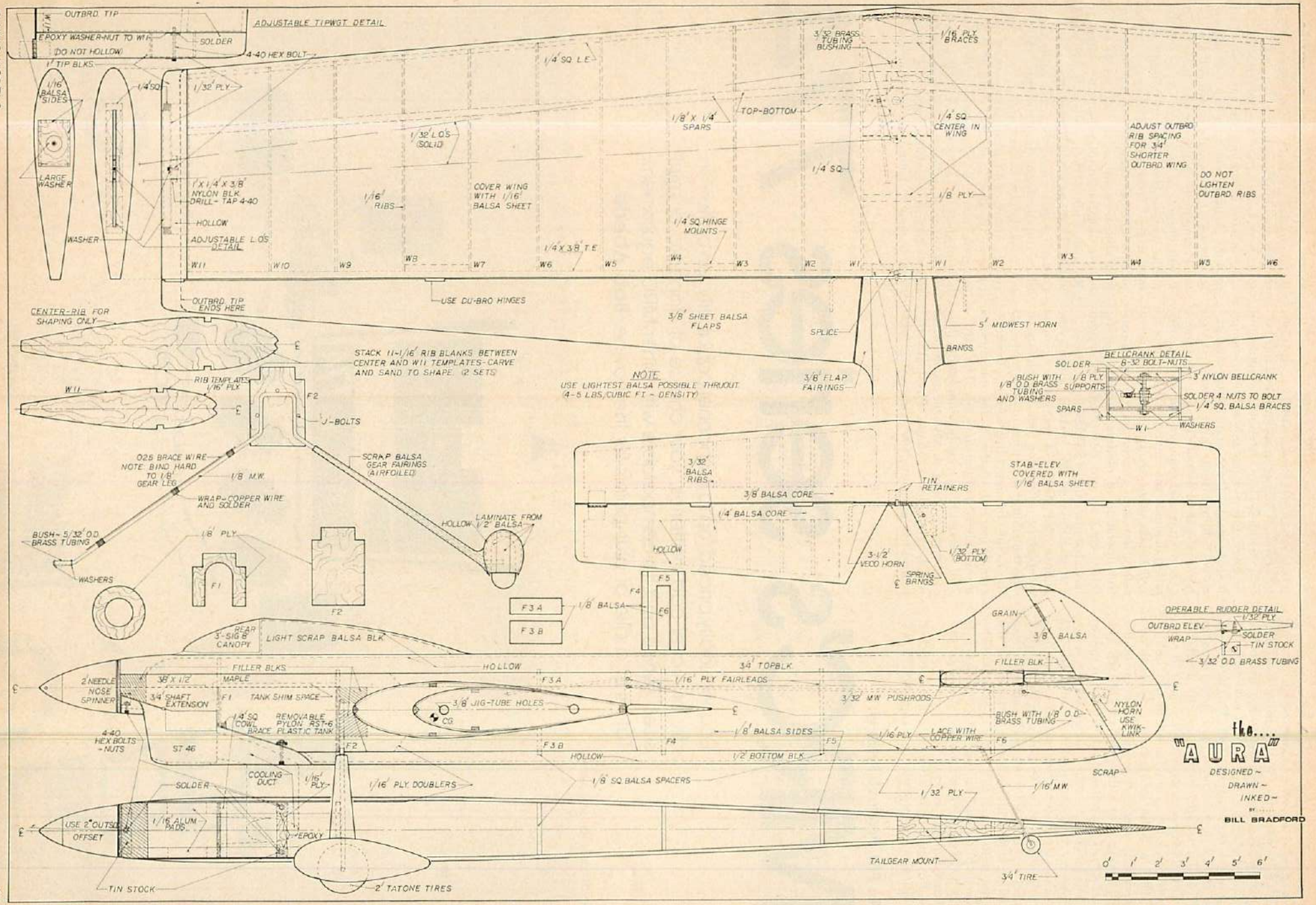
As was mentioned earlier Aura was able to fly a full pattern with bottom altitudes of 5 ft., on the second flight with no trimming required, other than 1 oz. of tip-weight, which was installed in the outboard tip while the airplane was still on the board. Actually, the first flight included most of the A.M.A. Pattern, but the maneuvers were flown out of sequence deliberately. For me, it would have been cardiac-city to fly the reverse wingover in proper order! Call it precautionary cowardice. My flying buddies thought that doing a full pattern on the second voyage was a little risky—and I would ordinarily agree—however, the airplane was flying very well, and that S.T. 46 sounded great, so, away I went! The flight was an unqualified success.

The design is currently being flown on 63' - .018" lines, and is turning a Rev-Up 12-5 prop. The airplane profits greatly from the operable rudder when using this rather large diameter prop, especially on Outside Squares. The rudder is set for ¼" outside offset for level flight, moving to ½" outside for full-down control and, ⅛" inside offset for full-up. The above dimensions are figured from the rudder hinge-line to the rudder T.E. Inside and outside square corners can be flown very tightly without the slightest indication of a wobble. Again, I would advise bringing the C.G. about an inch forward of the plan position, to start with, and gradually move it aft; if this is more to your liking, as you determine the various performance characteristics in flight. In either case, you will find the airplane responsive and groovy. After clocking many level laps; both upright and inverted, I find the airplane averaging approximately 50 m.p.h. To me, this is a very comfortable speed for the pattern. Also, at this speed, the appearance of the ship is deliberate and graceful during maneuvers, and the line tension is solid throughout.

The lead-out location depicted on the plans, is a good "all-around" position, at least in the part of the country that I reside. It would be wise to experiment with this, though, as no two airplanes fly alike. Move the lead-outs forward or aft in small increments; about ¼" at a time, and flight-check the new location. You will find the position shown for the leadout's to be useable from a calm-wind condition, up to about 8 knots of wind. Also, there is little tendency toward speed build-up in consecutive maneuvers, depending upon the wind velocity. Generally, the idea on adjusting the lead-out's is to move them forward a bit for windy days, and back some for calmer days. The practical range of the total adjustment would be about 1 to 1¼", which should include finding the optimum relationship between leadout rake and C.G. This latter item is important to performance, and can be found easily by trial and error, observing and feeling the airplane in flight, after a minimal re-positioning of the lead-out location has been made.

I hope you enjoy building and flying your Aura. It is a very competitive airplane if lightness, straightness, and good alignment are built into the basic structure during construction. The above, coupled with maintaining individual practice requirements, should yield many wins at any level of competition you may elect to fly; local or National. Perhaps even the World Champs! In whatever way you enjoy our hobby the most, good luck and happy flying. If you should have any questions or ideas about Aura, feel free to write me.





FULL SIZE PLAN AVAILABLE THROUGH CARSTENS FLYING PLANS

ORDER PLAN CF-482

An FM Product Review:

MRC's series 774

Economically priced, up to 4-channel capability, an option on dry or nickel-cad batteries, your choice of standard or mini sized servos and it's compatable with other MRC equipment. Totals to a pile of plus points for the novice/**Bob Aberle**

PHOTOGRAPHY: BOB ABERLE

Model Rectifier Corporation of 2500 Woodbridge Ave., Edison, New Jersey 08817, recently expanded their R/C equipment line to include a new economy priced four channel system. This new MRC system is designated as their model number 774. There are several options available with this new system which make it very attractive for a newcomer in our hobby. MRC will be marketing a special two servo/dry battery powered version of the 774 system for a list price of $179.95. The actual selling price of this particular option will make it an excellent choice for a beginner. A second option is an MRC-774 radio system with two servos, a rechargeable nickel-cadmium airborne battery pack and a dual output battery charger. This variation will still have dry batteries in the transmitter and will list for $210.00. The final option is a "full up" system which lists for $279.95. All three variations will be discussed in this review.

For our evaluation purpose, FLYING MODELS was provided a complete 774 system by Mr. Frank Ritota, MRC's Radio Control Product Manager. As supplied our system included a four channel transmitter and receiver, full rechargeable nickel-cadmium battery packs (both transmitter and receiver), four MR-60 mini servos, switch harness, a dual output charger, assortment of servo trays, a frequency flag and two detailed manuals, one covering the system itself and the other covering a complete set of safety standards concerning the radio control operation of models (airplanes, cars, boats, etc.). As just described this system has a list price tag of $279.95.

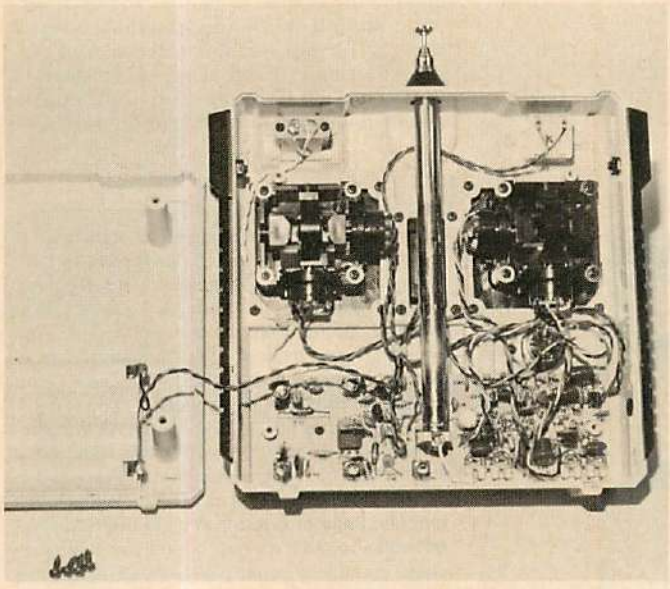
Regardless of the system option you choose, the MRC-774 transmitter comes completely set up for four full channels. The transmitter never has to be returned to the factory for upgrading to four channels, even if you only start with the intention of using only two of the channels. The MRC-774 transmitter is made completely (the case that is) out of an ABS plastic material which is molded to shape. Physically the transmitter measures 6⅜" wide x 6½" high (less antenna) x 2" thick and weighs only 1½ pounds total with batteries. Plastic hand grips have been added to either side of the case, making it comfortable and convenient to hold. A nine section whip antenna extends to 45" total length. It will collapse almost completely inside the case for storage. Power output, as measured on my equipment, was in the order of 550-600 mw. (milliwatts). Total current drain (using the nickel-cadmium batteries) is 130 ma. Our transmitter contained a full set of eight Sanyo nickel-cadmium batteries rated at 500 mah. Eight of these cells will give you a nominal voltage of 9.6. The batteries are all contained in a special box accessible from the rear (outside) of the transmitter case. If you took the dry battery option you would simply install eight alkaline type (A-A size) batteries in this same box. With dry batteries the nominal voltage would be higher (approximately 12.0 volts). A built-in voltage regulator handles the difference in the two voltage levels. Going from dry battery to rechargeable battery power requires no

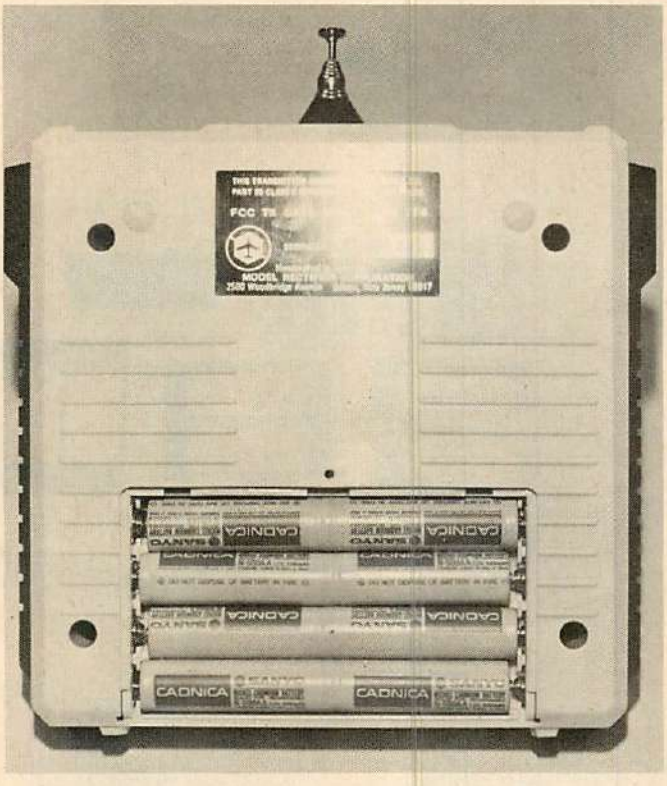
circuit modification at all. MRC has installed the necessary battery charging jack on all Model 774 transmitters (located on the front panel). A simple voltmeter provides a measure of battery condition employing a green/red (go-no go)meter

MRC control stick assemblies are quite unique. Especially for a system in this price category. You might classify them as semi open gimbal. Each stick is directly connected to a conductive plastic pot. The best feature of these control sticks is their spring tension adjustment. These adjustments are accessible from the front of the transmitter case. Using an Allen Head wrench, you can obtain a large degree of control over the stick motion. At one extreme the stick will spring back with force on the other end you can watch the stick slowly return to the neutral position. Better still, my servos followed this stick motion very closely. Stick length can not be adjusted, but is of an average and comfortable length. Trim levers are provided for each of the four channels. I was able to obtain approximately +/– 9 degrees of trim. The transmitter is normally supplied as a Mode II with the throttle ratchet on the left side stick assembly. If you want Mode I it will have to be provided by the MRC factory.

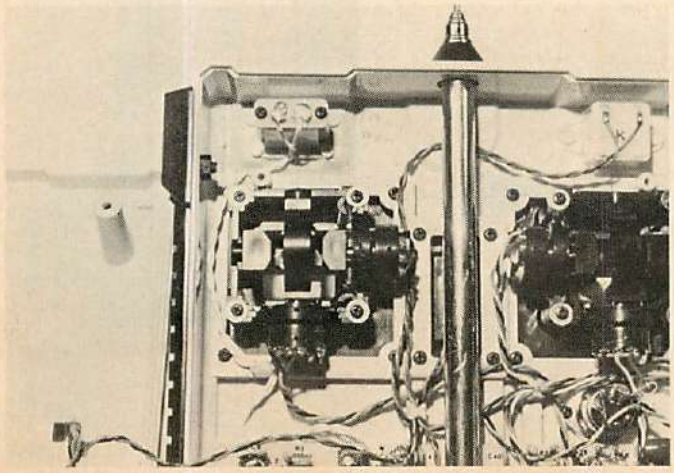
All of the transmitter electronics is contained on a single printed circuit board. One unusual item noted is that the crystal is mounted off the P/C board. In fact a two wire cable runs from the P/C board up to a crystal socket located at the top of the case. The crystal can be removed from the front of the transmitter case (actually located directly behind the frequency sign). Although this crystal can be easily removed you should not attempt to change frequencies on your own. If you want a single reason, it is not legal in the United States, on the 72-75 mhz frequencies. Actually there is more to a frequency change than simply changing a crystal. As a final note MRC states that the transmitter can be operated safely, for long periods of time, with the antenna collapsed (fully retracted). In other words you don't have to worry about burning out the R-F output transistor while doing extended bench testing or when hooking up controls in a new model.

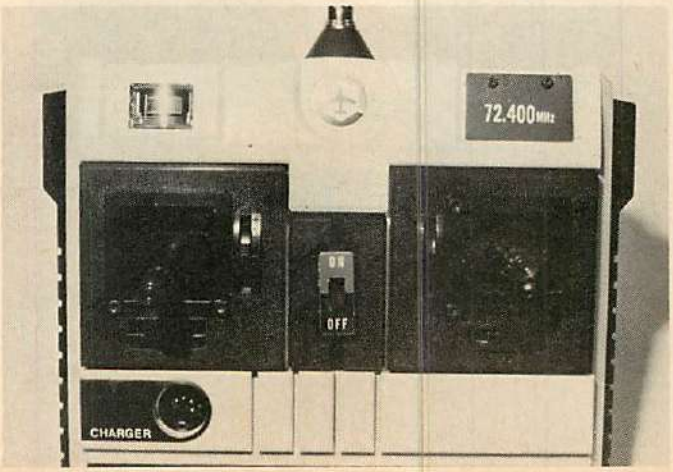
The MRC-774 receiver measures 2¼" long x 1⅝" wide x ⅞" thick and weighs 2.0 ounces. Case construction is a molded nylon. Regardless of the system option you choose the receiver still comes set up for four channel operation. Five individual cables, approximately 5" in length, exit from the case (one for each channel and one for the power input). The receiver antenna is color coded to the operating frequency (in this case orange for 72.40 mhz). The full color flag on the transmitters antenna, of course, would be white/*orange*. The connectors used throughout the system are the I.T.T. Cannon Centiloc types with gold plated pins. These connectors are keyed for proper polarity alignment. All pin connections are purely mechanical. You will not be able to solder these connectors should the need ever arise. All the receiver electronics is contained on a single epoxy glass printed circuit board. Basic design includes

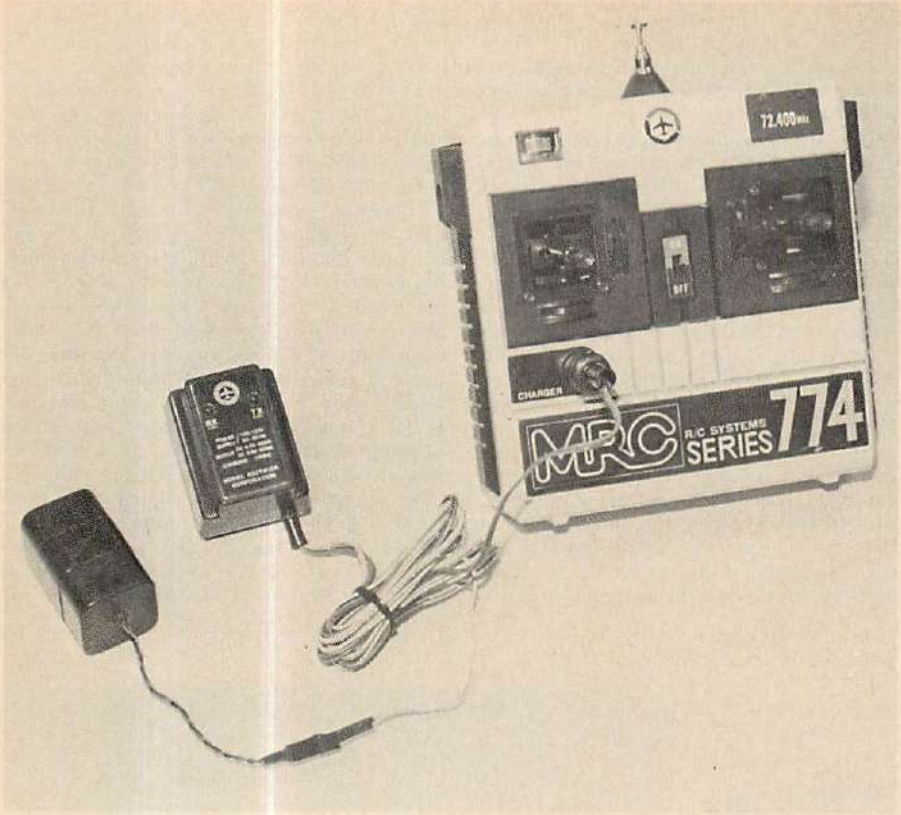




Inside of a MRC-774 transmitter. Single printed circuit board contains the electronics. Note the built-in battery box (left). **Facing page:** System with full nickel cadmium batteries. As you see it $279.95. **Right:** Rear of the transmitter showing battery box exposed. Seen here are eight 500 mah nickel-cad rechargeable cells (9.6 volt). You can also use eight 1.5 volt (A-A size) alkaline cells at a reduced cost, though more expensive in long run. **Below:** Crystal is at top to left of antenna. The stick tension is adjustable.

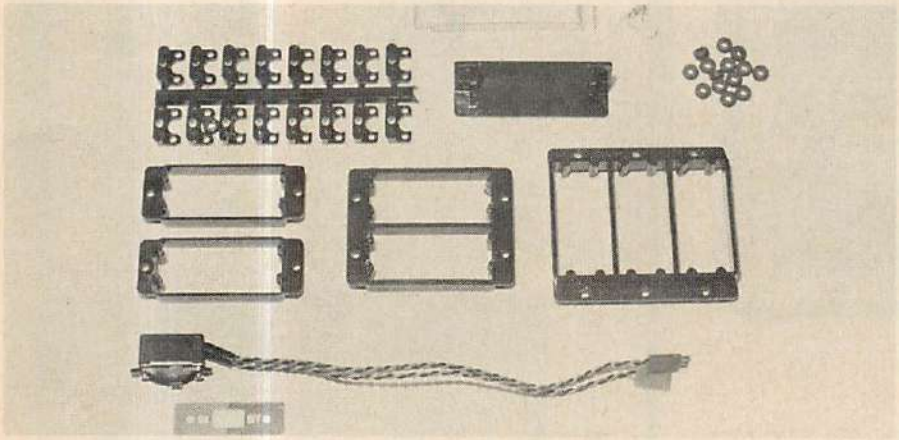


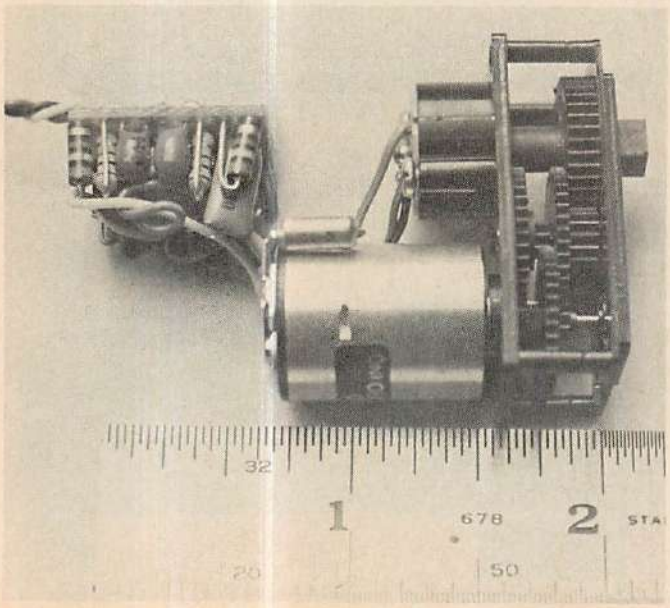


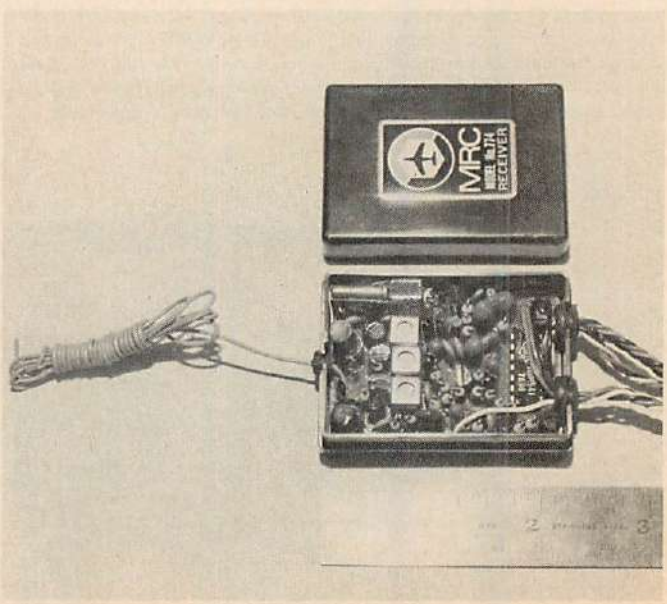


a double tuned front end, three I.F. transformers and a single C.M.O.S. I.C. in the decoder. Receiver current drain (as measured by me) was 6 ma without any servos connected. Some additional published specifications on this receiver are as follows: selectivity 3 db down at 6 kc, sensitivity 3 microvolts for full control and the A.G.C. dynamic range is 60 db minimum. This receiver will accept a nominal voltage input ranging from 4.8 to 6.0 volts. You may therefore use dry batteries or rechargeable nickel-cadmium batteries interchangeably without any circuit modifications. As in the case of the transmitter, the receiver crystal is also mounted in a socket. The modeler is cautioned again not to attempt to change frequencies on his own. This must be done only at an authorized MRC service center or the factory.

My particular system can equipped with the MR-60 servos which MRC calls their mini. The servo mechanics resemble closely the Dunham D-1 units in appearance. They measure 1½" long x 1½" high x ¾" thick (less output arm and mounting flanges). Weight of each servo is 1.4 ounces. Power output is rated at 32 oz. in. of torque and the travel time is claimed to be 0.6 seconds for full 90 degree rotation. Neutral time is 1.8 milliseconds. My servos produced an exact rotation of +/– 40 degrees (full travel of 80 degrees). I did notice a slight slow down of motion as the servo ap-







At top: Typical nickel-cadmium battery charging routine. Dual output charger, L.E.D. indicators. A regular C/10 (50 ma) current rate for a14-16 hour charge period. **Left:** An assortment of servo trays. Bob isn't sure if they all normally arrive as part of the deal. **Bottom left:** Inside MR-60 servo. The mechanics are basically the Dunham D-1 type. Weight is approximately 1.3 to 1.4 ounces. T.I. chip is used in this particular application. **Lower right:** Peek inside the MRC-774 receiver. All the electronics on a single P/C board. Three I.F.'s with a single C.M.O.S. integrated circuit in the decoder. Separate cables used for each of the four channel outputs. **Page at right:** Complete breakdown of MR-60 servo. As a no-cost option you could purchase the slightly larger, powerful MR-10 with this system. **Photo beneath:** All your airborne pack, MR-60 servos, it weighs 12.0 oz.

proached neutral from one side only. This was noted on all four servos and quite honestly would have little affect on the aircraft in actual flight. The MR-60 servo amplifier employs a Texas Instruments SN 28604 I.C. without the services of external output transistors. Electric motor is the usual 16 mm variety. Idle current was around 8 ma. On an individual basis the MR-60 servo lists for $44.95. As a no cost option you may also specify the MR-10 servo with your MRC-774 radio system. The MR-10 is slightly larger, measuring 1¾" long x 1⅜" high x ⅞" thick and weighing 1.7 ounces. Transit time is a little slower (0.7 seconds for full rotation). The MR-10, however, does employ the Signetics NE-544 I.C. in it's amplifier along with external output transistors. Output torque is slightly higher (35 oz. in.). The choice is still strictly up to the modeler. List on the servo is $39.95.

The receiver battery pack seen in the photographs, contains four 500 mah rechargeable nickel-cadmium cells. This pack measures 1¼" square x 2³/₁₆" long and weighs 4.0 ounces. If you took the dry battery option you would have received a case capable of holding four A-A size alkaline batteries. I believe that the dry batteries would weigh a little more than the 4.0 ounce figure (I did not have one of these packs for my review). A switch harness is provided with two 6" length cables. No charging jack is supplied with the standard system. MRC offers an optional switch harness containing a charging jack for $6.95. Since our system came with the rechargeable batteries it also included a dual output charger. This charger has L.E.D. indicators on both outputs. Charge rate is the usual c/10 (50 ma) for a 14 to 16 hours period.

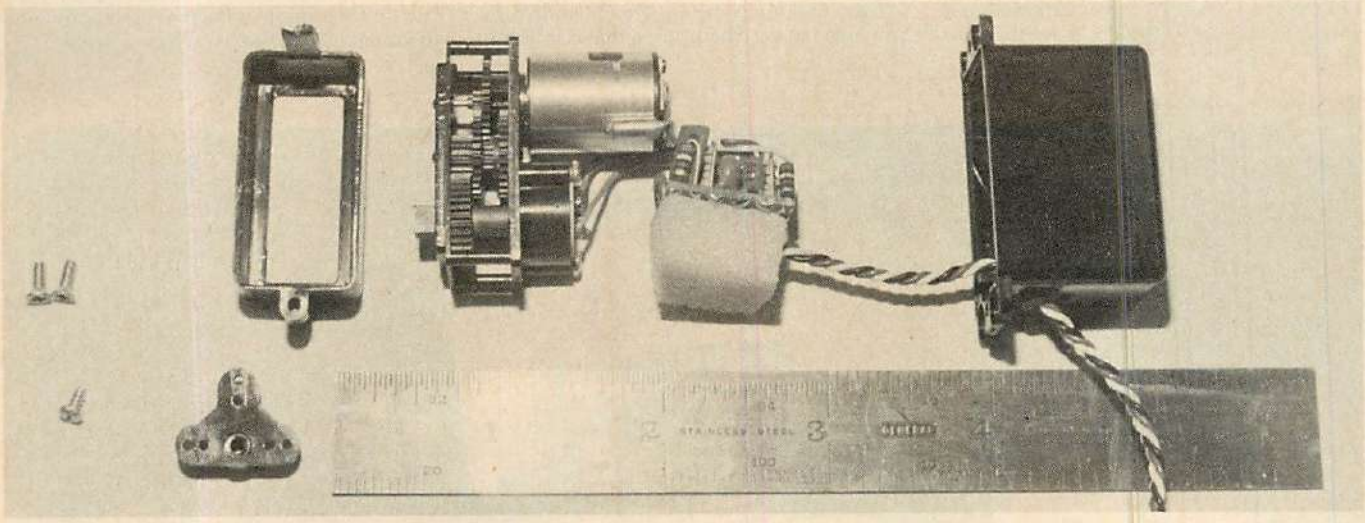
Power consumption wise the transmitter has the ability of operating for at least three hours. The receiver and four servos idles at only 38 ma (a very low drain!). Continuously pulsing two channels (two servos) quite rapidly the current drain averaged 200 ma. It is reasonable to assume that the full four channel airborne pack could provide at least two hours of flying time. With only two servos (as would be the case with a glider) this time could be extended further.

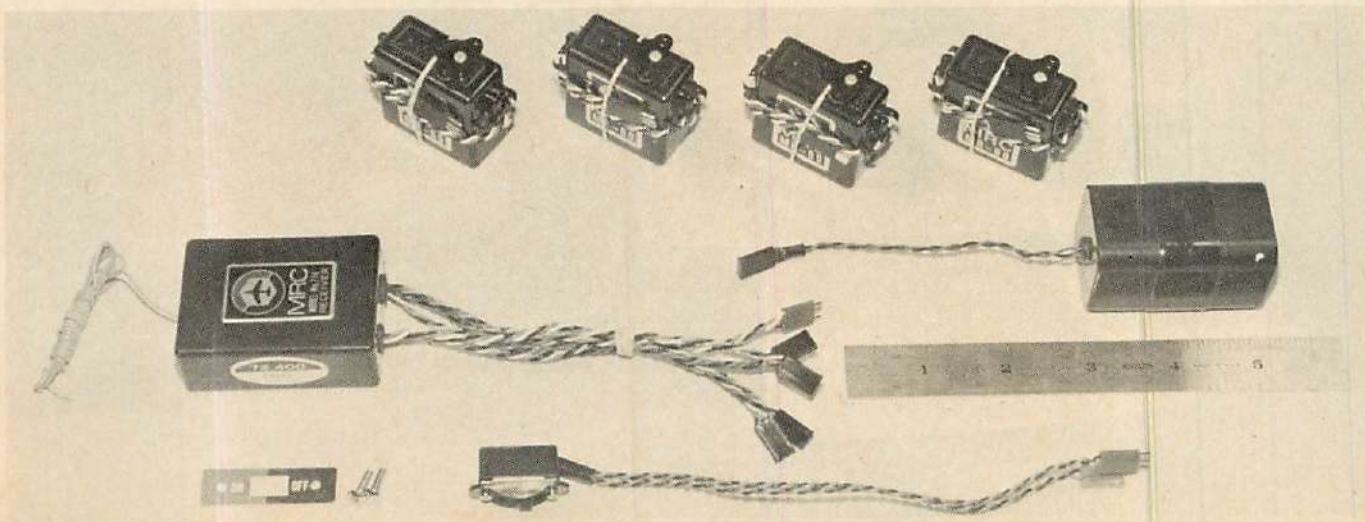
The total four channel airborne weight of the MRC-774 system (with nickel-cadmium batteries and the MR-60 servos) is 12.0 ounces. You could easily put this system in an .09 powered R/C model. Even with the MR-60 servos it would be a little too big for a full four channel .049 powered (½A) model. However, you could fly a ½A with only two channels. Weight in that case (with two servos) would be reduced to approximately 9.2 ounces. A further reduction in weight could be realized if a smaller battery pack were utilized. But recognize that the capacity would also be reduced accordingly.

From an overall standpoint I was well pleased with the performance of this radio system. It is ideally suited to the beginner for several reasons. First of all the initial investment can be minimized by purchasing the MRC-774 system with only two servos and dry battery power. If the interest is there, the expansion to four channels can be accomplished without any factory modification. Another plus for the beginner is the very thorough instruction manual and a special MRC handbook on safety instructions. Both of these MRC publications make exceptionally good reading for the beginner. Something that is lacking in so many other fine radio systems. Finally, if the modeler really gets interested in R/C he will find this economy system completely compatible with all other MRC systems right up to the top of the line.

MRC provides a one year limited warrantee on this system. The limitation being to the original purchaser and the proof of the purchase date. A $9.00 fee is charged to cover incidental expenses including postage and handling. MRC supplies all parts and labor under the terms of it's warrantee policy.

This is only one of many available MRC radio systems. As a matter of information MRC also imports the popular Enya and Webra model engines and a fine line of ready to fly model airplanes. A complete catalog is offered covering all of their modeling products.





An FM How to:

how to

There's something about building models that bugs all of us. For author **Howie Applegate** it was gluing on canopies so here's his solution . . .

Boy, do I hate glueing on canopies. How many times have you said that? The glue or epoxy squeezes out inside the canopy, or smears on the outside, or the seam is crooked or something.

Relax, here's an easy way to solve the problem. Make the canopy, or cabin, or windshield out of balsa and paint it. A solid canopy may not be such a bad idea. It then becomes an integral part of the airplane, or a removable section, as one might use on a sailplane.

I have been painting canopies for years and many people have asked, "How do you do that, it looks like glass?"

Here's how:

First, some basic equipment is needed. An airbrush, or a spraying device that can spray about ½" wide areas or less. A compressor (I use the Binks Model 34-2025 which is designed for airbrush work - it is small, powerful, and very quiet). And paint. Three colors - black, medium blue, and white. Butyrate or nitrate dope, urethane or epoxy all work equally well. Epoxy requires a little more drying time (approximately 10 minutes) between colors. You will also need something to spray, a canopy or a finished fuselage. In the event you are doing a cabin plane or a built-in greenhouse, as on a P-40 or a Stuka, the canopy should be prepainted with the finish color of the airplane.

It's time to get started. Step 1 is to mask your canopy or window frames and your fuselage so only the window areas show. Next, spray the unmasked exposed areas black. After the black has dried well (this is almost right away with dope, about 10 minutes with urethane or epoxy), spray over the black, permitting just a little black to show near the window frames. This is where the masking tape should be. Try for a fine spray, properly thinned. You should have adequate ventilation and a paint mask is recommended for your own well being.

Take five and examine your handiwork. You now have a canopy area that is all blue, except for the black edges. Spray a white mist over the blue, but not enough to cover it completely. The white pigmentation can be heavier in some areas and not as dense in others. The black corners or edges should still be visible.

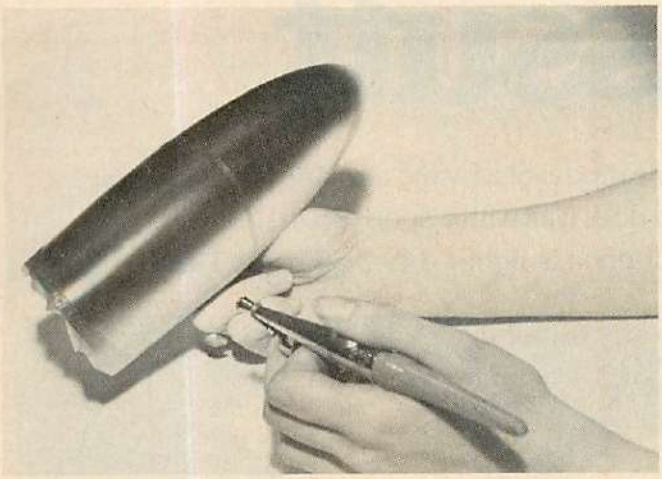
Next comes the most important and perhaps the most difficult bit of the operation. Set your airbrush for a very fine spray. Do not allow too much paint to pass through the airbrush. When you get the feel of it, spray light streaks of black over the white/blue areas. A criss-cross or a "V" pattern is probably best, but do not apply too much, a shadowy impression is enough.

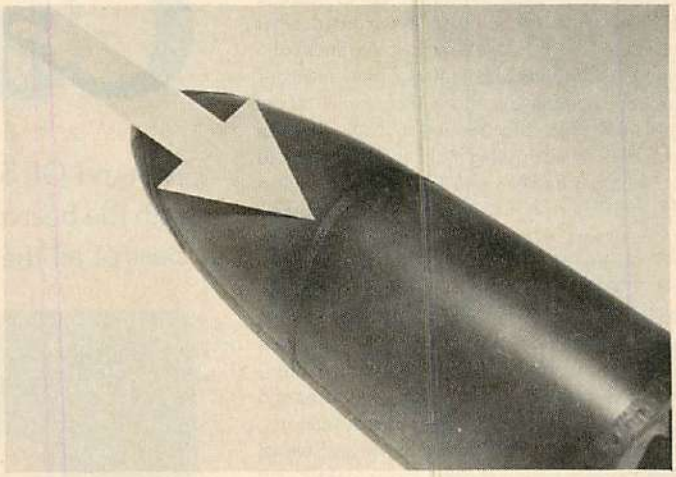
Remove the masking tape now and behold your masterpiece. Or whatever. If you are using dope for a finish, a coat of clear over the painted canopy will give it a nice shine and help keep it clean.

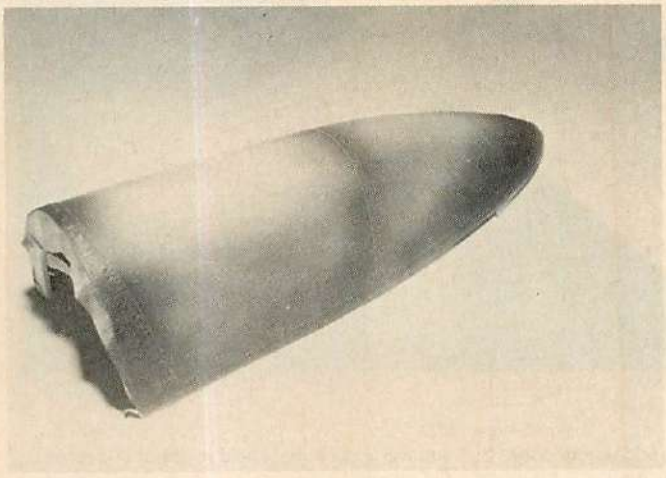
Trimming up a canopy is easy and rewarding. Naturally no too will come out exactly the same. Of course, if you blow it, all you need to do is paint it over again.

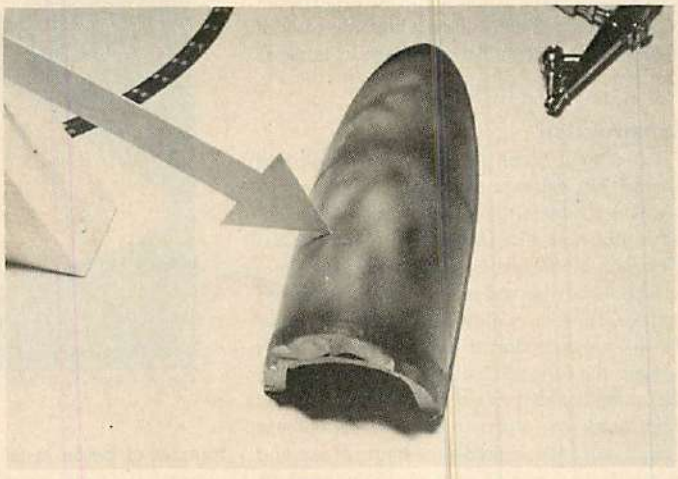
PHOTOGRAPHY: HOWIE APPLEGATE

paint canopies



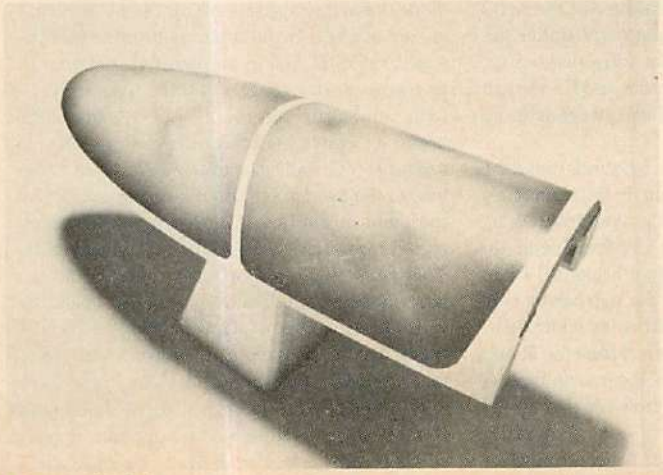


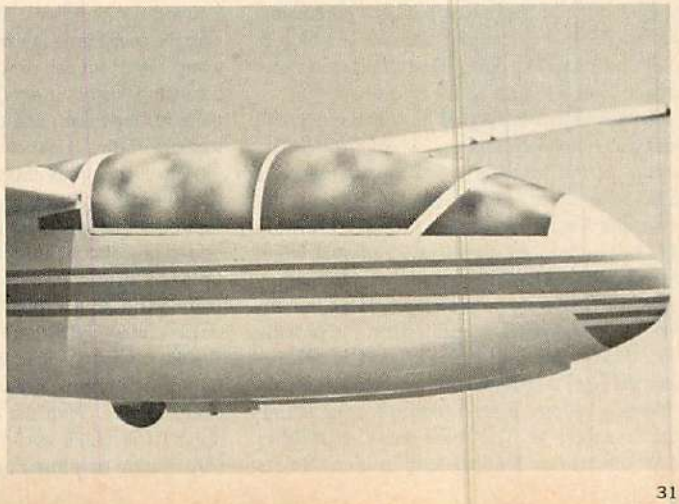




In any simulation of a transparent plexiglass canopy, a smooth and polished carving is a good place to start. Exposed wood grain isn't going to help the illusion. On facing page the basic equipment is displayed, the airbrush, air compressor, paint, masking tape and pre-painted canopy.

Photos display blue sprayed over the black. Arrow points to a window frame area where black paint should still be visible. White is next sprayed over the blue, allowing some blue to shine through. Arrow denoting black streaks over blue-white coats. A varied pattern. Base coat of aircraft on framing.

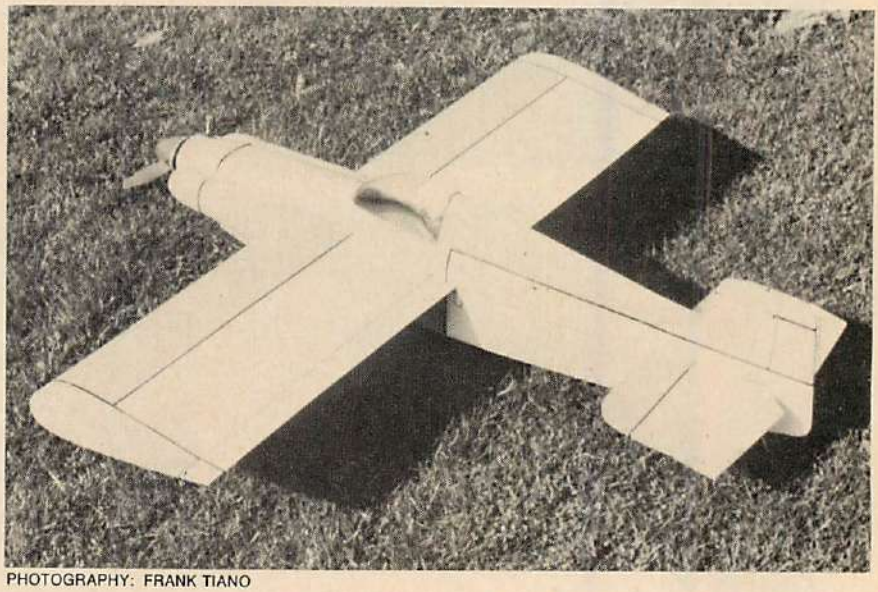




An FM Product Review:

Rev Model Product's Cassutt

A Stand-Off Scale model of a racing airplane that performs with the best and does it all with a sport .35 or .40. Best of all the kit price is right—$49.95/**Frank Tiano**



PHOTOGRAPHY: FRANK TIANO

Every modeler enjoys having a spare ship to just mess around with when he wants to relax. I'm no different than anyone else but I just couldn't get into the same airplane rut like so many of my buddies. I really wanted something a little bit different. Anyway, while at the WRAM show last year I got talking to Bob Vojslavek of Rev Model Products and he suggested that I try his new Cassutt, a sport scale racer-aerobatic ship. I took Bob's advice and ordered one as soon as I returned home and within a week I was the proud new owner of a Cassutt.

Before getting into the mechanics of building this ship, let me give you a run down on just what a Cassutt is. The ship is a sport scale model of a famous racing airplane that also was used for aerobatic competition. It's a fairly small model with a 46" wing span packing 512 sq. inches of area. With an all up weight of 5 lbs., it's intended for .40 sized engines and four channel radios. The ship features top shelf components throughout and is very, very simple to build. The fuselage and tail surfaces are balsa while the wing is a foam unit. The front cowl and matching cheeks are pre-formed of a strong ABS plastic. The landing gear is formed aluminum. The kit, which retails for $49.95, features full length, one piece fuselage sides, precision cut lite-foam wing cores and corresponding sheeting, clear plastic canopy, vacuum formed cowl, cheek cowls and wheel pants, formed landing gear, mylar decals, full sized plans and a very thorough instruction booklet and method sheet. A nice addition is a set of three views and a complete aerobatic schedule as per the real airplane.

Construction

Rather than break up the construction into three of four different categories, I'll attempt to give you a general idea of how simply this kit builds. Any novice can build the Cassutt if he has prior foam wing experience. However, the flying part should be reserved for the more experienced modeler. The foam wing is built just like any other with the one exception, there is no dihedral. After sheeting, the wing tips are added followed by the ailerons and related torque rods. There, that was pretty quick don't you think? The cores were perfectly cut and required a minimum of sanding for preparation and all wing sheeting was light and straight-grained. Amazingly, all sheeting did *not* have to be trued up before butt glueing them together. I used Foam-Tak contact cement from Custom Model Products for adhering the skins to the foam and used C.M.P.'s Quick Cure Epoxy for joining the finished wing panels. I particularly like the Foam-Tak cement because it's blue in color and sticks like crazy. Best of all, you don't have to wait a long time for it to dry.

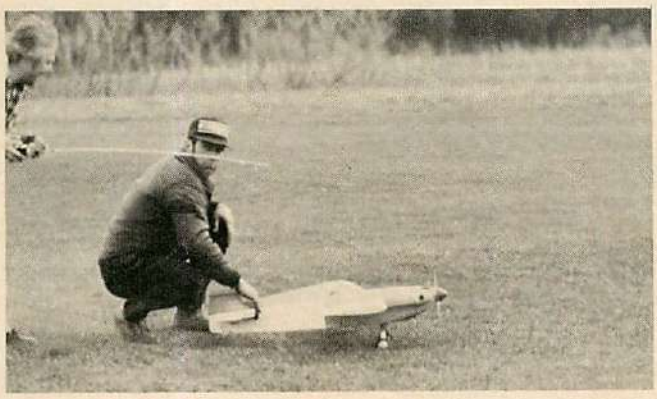
The fuselage is fashioned from two full-length sides with bulkheads and a plywood firewall. The bottom of the fuselage is flat and therefore is easily sheeted cross grained. The section that covers the wing is eventually fastened to the wing with two screws to allow easy removal when disassembling. The ABS cowl fastens to the forward fuselage and completely encloses the engine. The cheek cowls are added last and provide a good place for the engine's head to hide. A plywood plate is fastened to the forward fuselage underside to form a solid mount for the aluminum landing gear. The sheet balsa tail surfaces need only their leading and trailing edges rounded off before installing and you're done. If you really work at being slow, the entire fuselage will take about 10 hours to build. Most of the time will be spent joining the cowl halves and wheel pants.

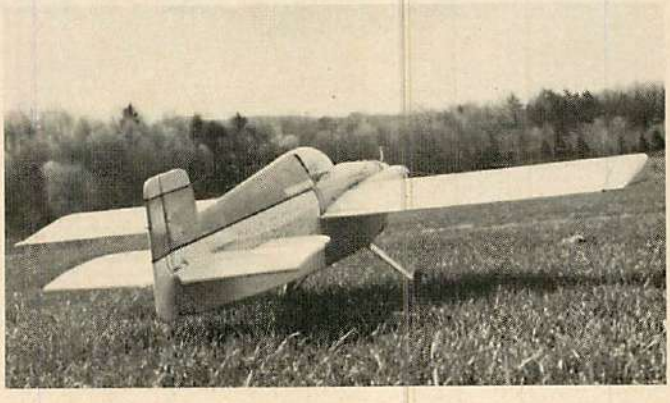
The battery pack from my MRC system fits very snugly under the Kraft 8 oz. fuel tank in the forward compartment. The balance of the radio gear fit easily into the compartment under the wing. Eight ounces of weight were needed for balancing. I used Super Coverite and RS Perfect paint for the finish. The total weight ready to fly was only 5 lbs, 3 ounces.

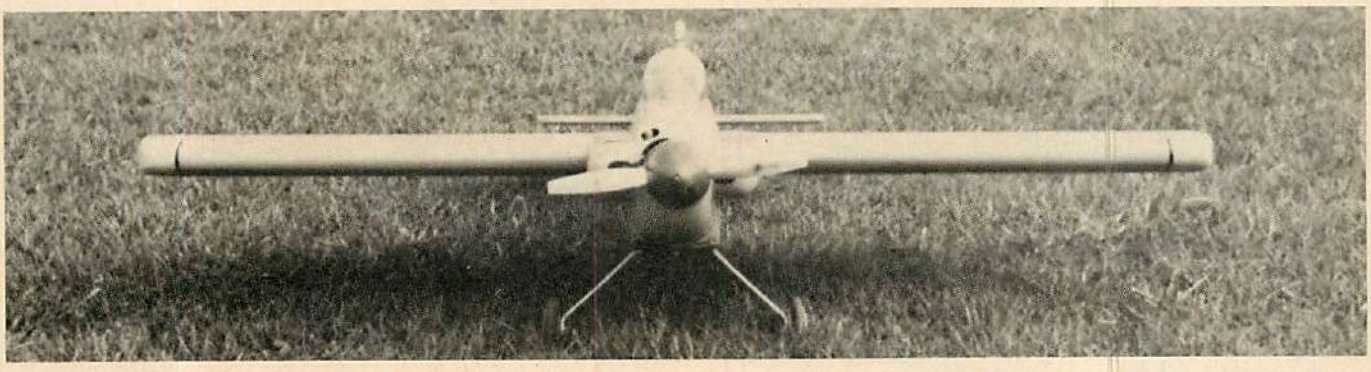
With such a small airframe, 5 pounds make the Cassutt seem quite overweight. In fact, I sincerely had doubts about how well it would fly. As an added precaution, I installed a Webra Speed .40 up front instead of the original Enya .40 I had planned on. As it turned out, the ship can be very docile and would fly very well on any sport .40.

I like the fast reacting ships so I took the liberty to set the control throws to the maximum on every surface. With the controls set this way, I don't think you'll ever find a quicker reacting ship outside of a true Formula I racer. The Cassutt will leave a grass field in about 30 feet using full throttle. Little or no rudder is required to make it track straight. On a paved runway I suspect that the little beast would become airborne in less than 20 feet. The Webra pulled the ship straight up for as long as you like and then some. Even doing rolls on the way up didn't slow the plane down any appreciable amount. After coming out of a split-S and roaring across the field the speed must hit well in excess of 100 m.p.h. To give you an idea on how fast the Cassutt reacts with maximum aileron throw, it's the only airplane I've ever had that will do a complete roll *before* you've had a chance to get the stick all the way to the right or left. By the time the stick is at the edge of the box, the ship had easily completed three rolls and is working on the fourth. Tom Clemente's motor drive Nikon could not keep up with the roll rate while he was taking the flight shots. The advantage of doing such quick rolls is that the ship never loses altitude and therefore one can show off a bit by doing those three rolls about 6 feet off the ground. Well, enough about rolls, let's talk about some other maneuvers. Elevator response is right now in a hurry.

THE CASSUTT from Rev Model Products is a very clean design. The Webra .40 is cowled in (**left**) neatly. Frank even flew it in a thunderstorm (**above**). Wayne Bonesteel launching (**bottom left**). Rear view shows off the sleek lines.







The ship will not snap if full elevator is applied at any speed and will do the tightest loops you've ever seen. The rudder is also quite effective but not to the degree of the elevator and ailerons. Rudder input at any speed will cause a drastic yaw but allows good knife-edge capabilities.

Because of its sheer speed during all maneuvers, there really isn't any trick that the Cassutt can't do in the hands of an experienced pilot. The nice thing about this design is that with the control inputs reduced, the ship's reactions become average for the less experienced pilot. Even with a sport engine the Cassutt will do the complete AMA or FAI pattern with ease although not quite as gracefully as a big pattern ship. It will perform well enough for stand off scale however.

If, after talking about zooming around the sky at Warp 6 has led you to believe that the Cassutt must fly fast to fly well, I apologize. In fact, the little plane flies very well indeed at slow speeds and shows no tendencies of any stall or other vicious trick. At altitude I throttled back and applied full up elevator and the ship just mushed before gently falling straight ahead. I presume that the generously thick wing has a lot to do with this. The Cassutt was never any more difficult to land than any other sport ship. You do *not* have to come in hot to complete a three pointer. Because of its symmetrical wing, the Cassutt flies exactly the same way inverted as it does upright. With a slight bit of down trim the ship can be flown hands off while upside down. Reaction time is also exactly the same in either position.

As usual, when I build a kit for my own enjoyment, I very rarely apply a scale type finish. This was no exception and of course, later on I wish I had because I could see definite possibilities for Stand-Off Scale competition. Even the sternest of judges would have to be impressed with the speed and grace with which this ship performs.

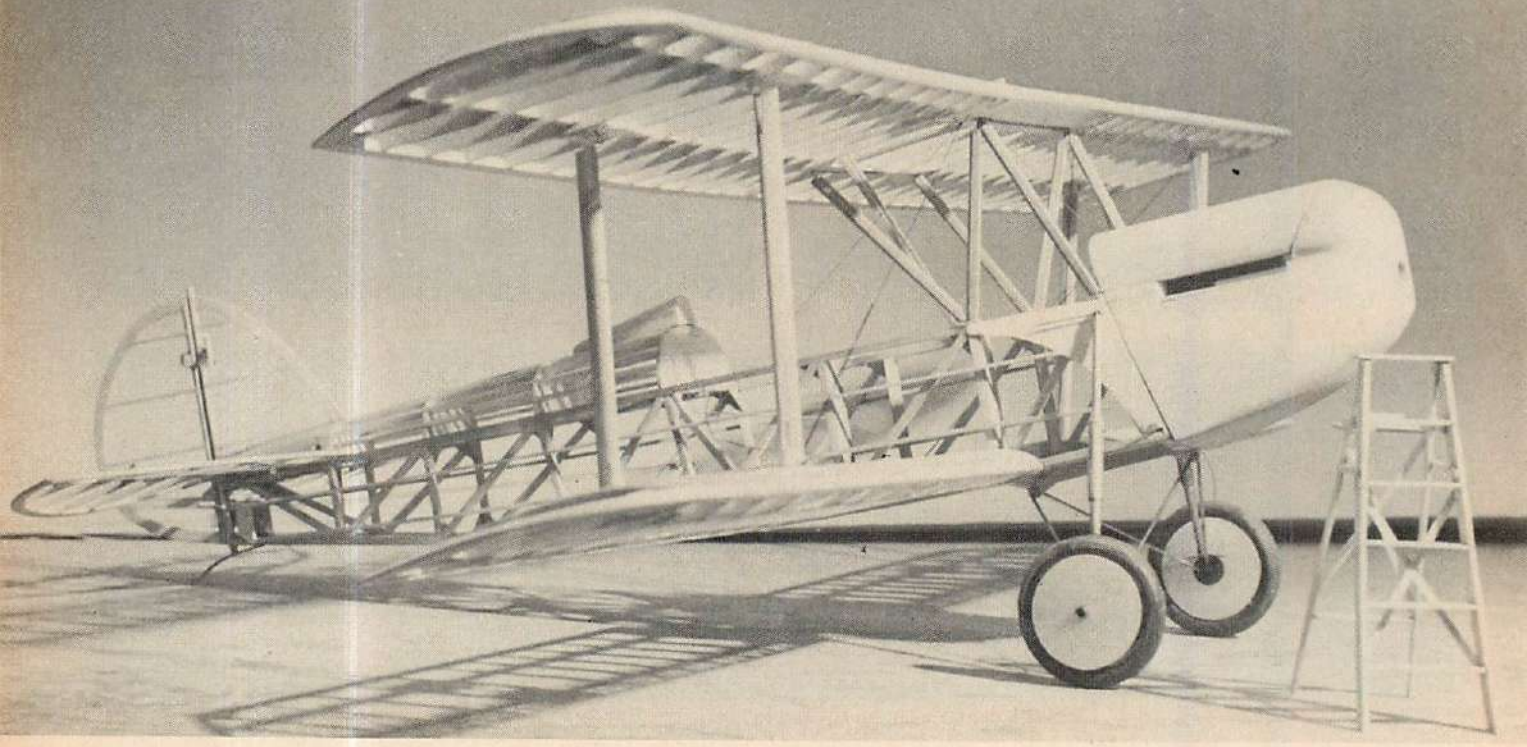
On the other side of the coin, so to speak, there are a few improvements I would like to see Rev make. These may seem trivial but these few modification to insure the longevity of the design must be done either by the manufacturer or by the builder. First, I would like to see a stronger material used for the cowls, cheeks and wheel pants. For anything but a paved runway these parts take quite a beating in even a gentle landing and should be reinforced somehow. Secondly, I think that the firewall and landing gear plate should be reinforced with some large triangle stock to provide a greater area for epoxy to bond to. Third, I'd like to see a better method for installing wheel pants and that goes for all manufacturers, everywhere. I'm sick and tired of making a ratty looking ship out of a doll just because the pants have become destroyed after a few flights. That's my three minor gripes; my pluses for this kit would exceed one hundred. At $49.95 it's a very good value. As far as quality of components goes, on a scale of one to ten, I'd rate this kit a nine. (Nobody's perfect) The instructions and plans are flawless as well as the construction methods. Just as a coincidence, the Rev Cassutt just happens to conform to sport pylon rules.

Well, that's it. A stamped, self addressed envelope mailed to Rev Model Products will net you a blurb sheet describing the Cassutt in detail with a picture of the finished kit as well. Their address is 430 Kay St., Unit D, Addison, Illinois 60101. If any of you decide, after reading this review, to purchase a Cassutt, I'd really be interested to know if the ship is not absolutely everything I said it is and then some.

An FM How to:

how to build scale cabanes and center section struts

On a sport ship, wire bracing for wings and landing gear simply has to support, but on a scale ship it also has to look right. Here's how to accomplish it/**Ned Kragness**



Center section strutting for biplanes and parasol monoplanes can be bad news for model builders. Structural adequacy and scale appearance seem incompatible and accuracy and alignment can be real problems.

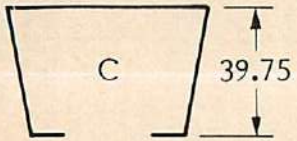
None of this need be true; rigid, strong, scale appearing strut assemblies can be easy to build. Much depends on how you go about it. As an example we will describe how to construct a cabane assembly for a 1/12 (one inch) scale Waco Ten. Spend one evening building it as a learning experience even if you don't build a Waco. The drawing is dimensioned in full scale inches, so you can build it to any scale.

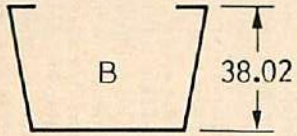
We will adopt full scale practice and use simple jigs. For the assembly jig cut a rectangle of ¼" ply which will represent the upper fuselage mounting surface. It should be ½" narrower than the fuselage upper surface width and from three to four times as long. It should be flat, corners square and have an accurate center line on it.

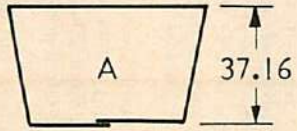
This assembly jig board is now equipped with holding strips located and glued to define the transverse fuselage attachment spaces, in this case, 24.6 scale inches apart. Hard balsa strips will do fine but must be accurately placed, and should be cemented with a piece of strut wire firmly gripped between them as a spacer. Next make very accurate layouts of the true shapes and lengths of the individual strut wire frames as shown on the drawing. Simple bending jigs can help a lot, in getting accurate lengths between bends. The drawing shows such a jib. The *amount* of bend can be adjusted later with fingers and pliers to match the layouts you made. When the frames are bent, they should be verified against the layouts and if more than one wire diameter in error, bend another frame. Any errors should be cause for rejection and a new bending job. Wire is cheap. Inaccurately bent wire will cost you a lot of lost time.

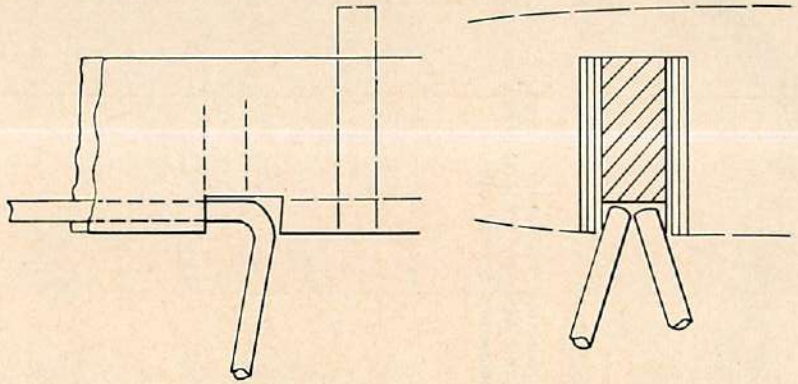
When all the frames are bent, bind and solder wire A at the center overlap, making the lower horizontal element about 1/32" short of the final desired dimension.

Now bend wires A, B, and the diagonal brace upper ends neatly together. You will find the top spreader can be worked slightly forward or aft by shifting the B wire up and down on the spreader. You will set in the exact stagger dimension at this time. Now bind the lower ends of the diagonal braces, to assure upper end alignment, flux and solder the upper joints smoothly. The lower diagonal brace wire ends are now readjusted for position and alignment, fluxed and soldered. At this time check the assembly for accuracy and symmetry, and adjust it one joint at a time, as necessary. I use Sta-Brite low temperature silver solder and the flux that comes with it. It works beautifully and if you use anything else, your problems are all your own. The binding wire is one or two of the fine individual wires stripped from old household extension cord, smoothly and tightly wound on the joints. You can now see why the jig board is nar-

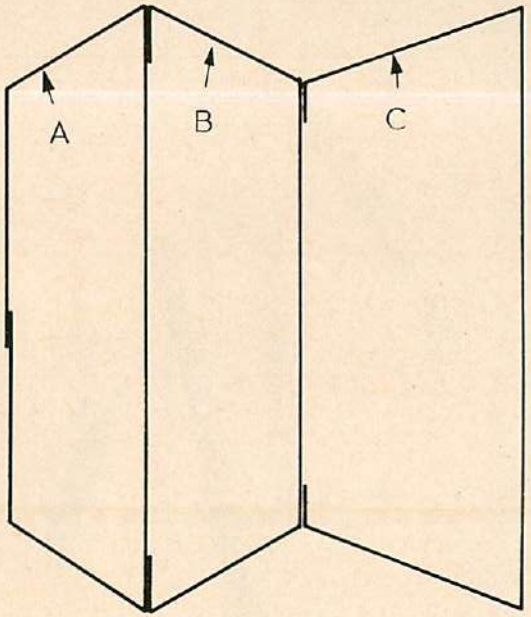


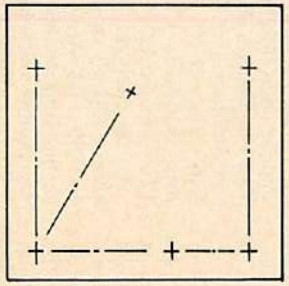


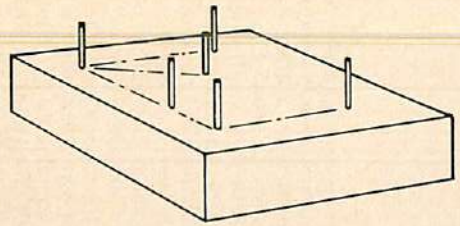




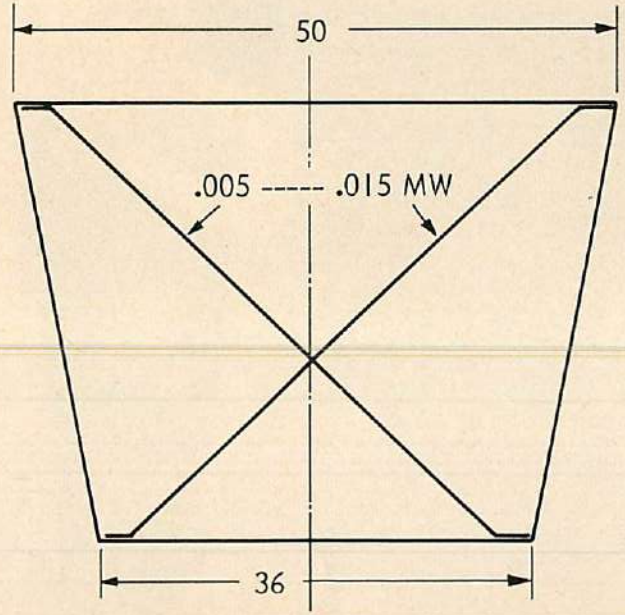
WACO TEN CENTER SECTION

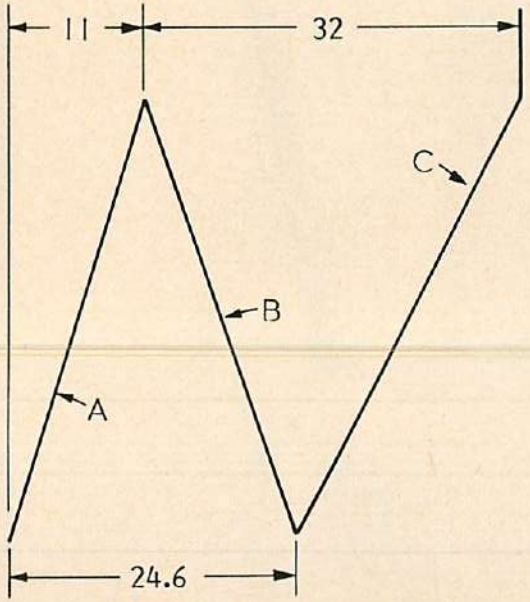


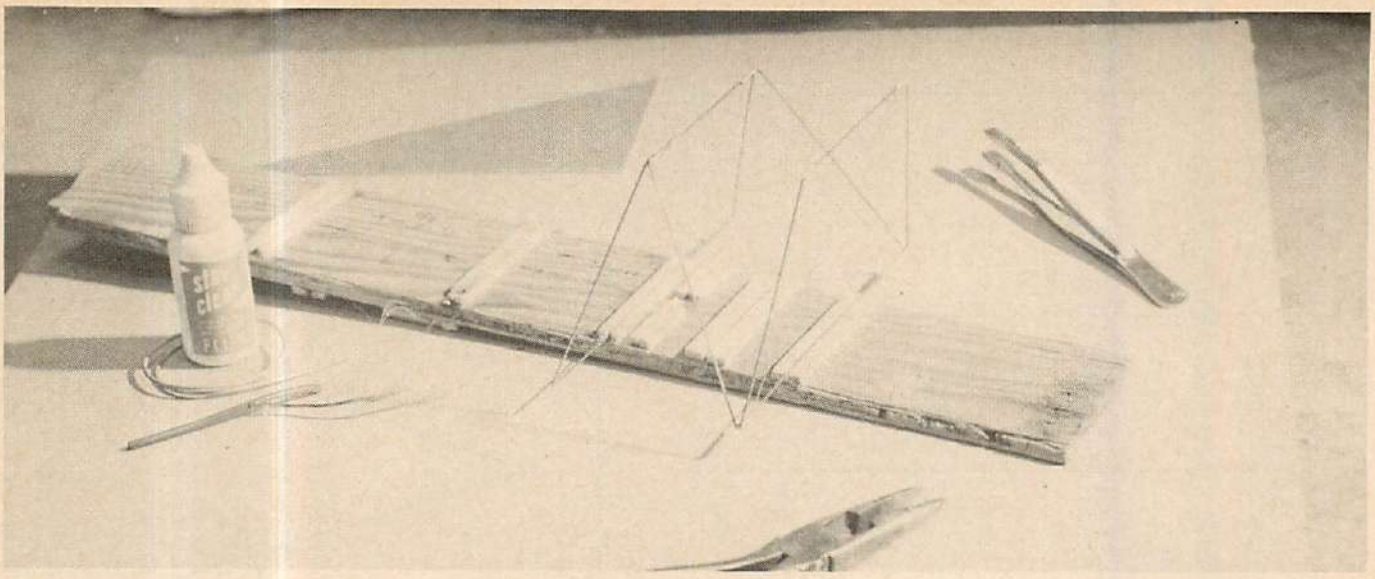


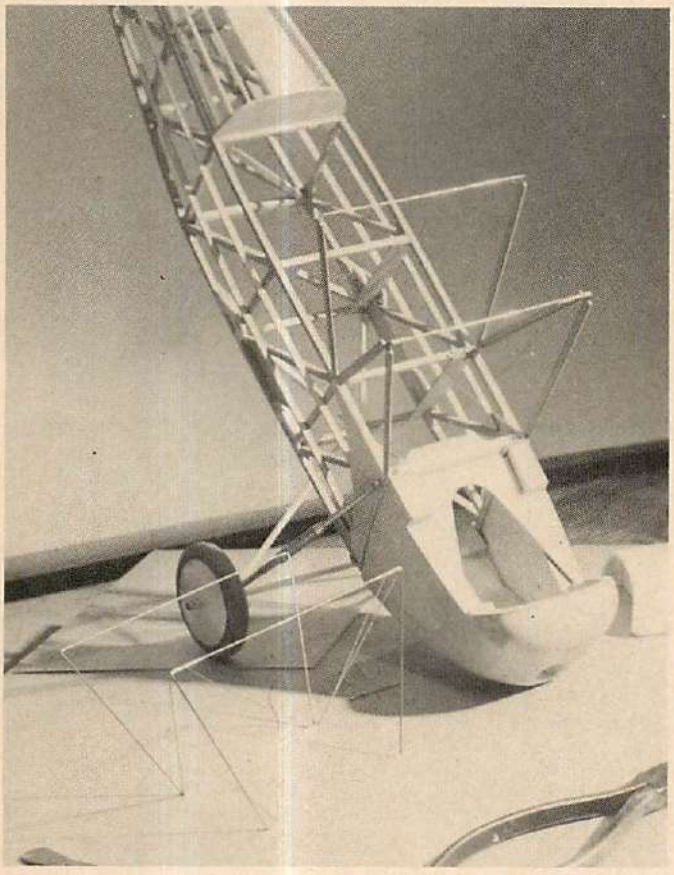


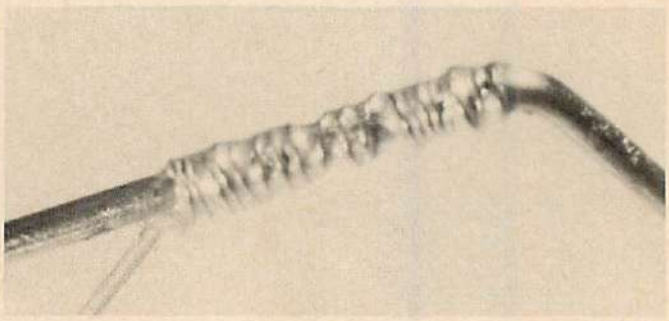
BEND LENGTH JIG



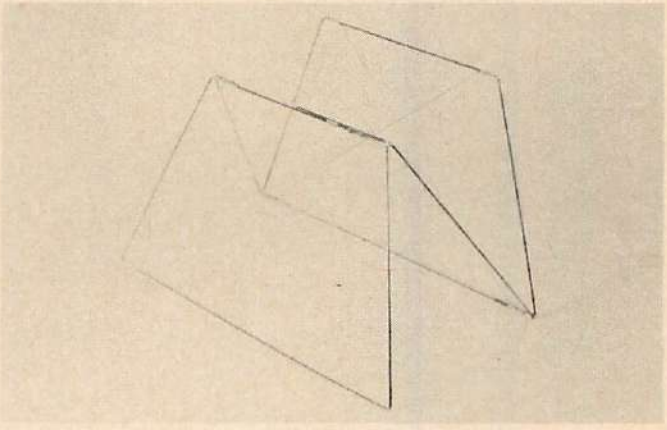








The only way to build anything absolutely accurately is to use a jig. This is a simple one (**top**). Wire wrap your joints and use Stay Brite silver solder (**above**). The cabane struts (**below**) and covered (**left**).



rower than the fuselage top—it exposes the joints for wrapping and soldering.

You should now measure from the jig board to verify accuracy of the final frame, and make further small corrections if needed; again one joint at a time.

When you installed the cross braces of .005 to .016 wire they may not have been made as tight as desired and necessary. A final solder joint adjustment will take care of this. Heat the splice joint on the lower cross member of wire A and slip the joint to increase its length just enough to tighten the cross wires. Everthing is now accurate, rigid, and ready to self-destruct from the flux residue unless you boil it in water for five minutes.

Your structure is great but wires don't look like struts. For 1/32 wire, I make streamline fairing in 12" stock lengths. You will need a 14" length of straight 1/32 wire, a metal straight edge, 1/32 and 1/64 plywood, and *both* Titebond (or other aliphatic resin glue) and Ambroid. Cut three strips of 1/32 ply 1/16 wide and 12" long and another three strips 3/16 wide. Cut six strips of 1/64 ply 3/16 wide and 12" long.

Using Titebond, glue one wide and one narrow 1/32 ply strip to one strip of 1/64 ply with the 1/32 wire separating them. Check against your straight edge and when nearly dry, remove the wire spacer.

When completely dry, clean out the groove, clean the wire and replace it in the groove. Cement a second 1/64 strip, this time using Ambroid. Now pull the wire out. Repeat this process to make two more flat ply tubes for 1/32 wire. When all are completely dry, sand to oval or streamline contour. From this streamline stock, pieces are cut long enough to cover each strut wire. Separate the Ambroid cemented side by using thinner, clean the groove, fit in place on the cabane strut wire and recement the 1/64 side cover on the wire.

The complete assembly is bound and cemented to the fuselage and to the wing spars. The spars are equipped with doublers to provide additional strength and to generate an under-wing trough with edges that will support whatever covering you choose. The detail on the drawing clarifies this.

Try your next cabane equipped aircraft this way. You'll like it.

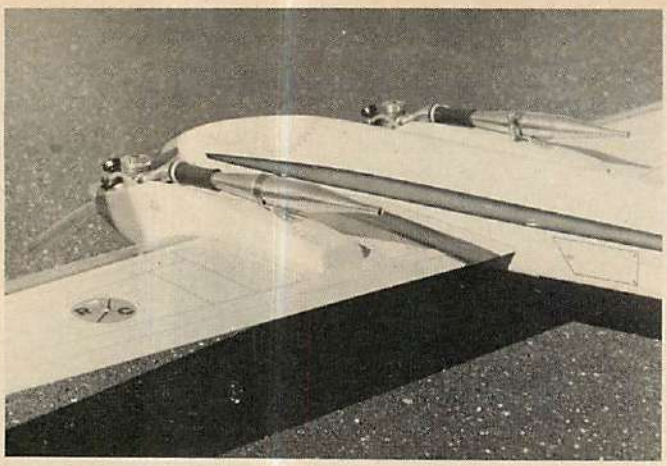
MAGNUM 80

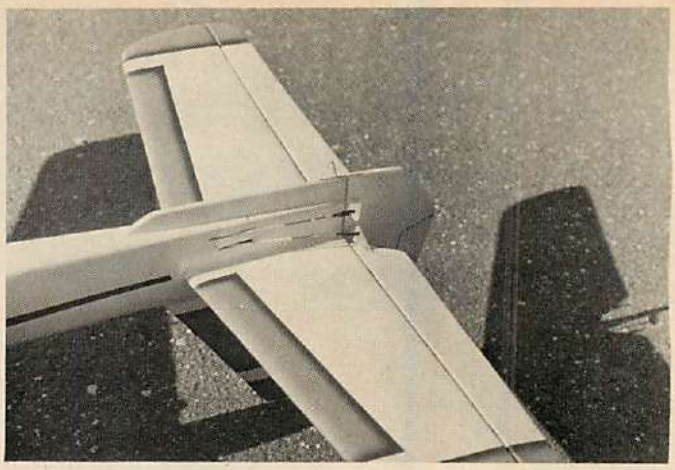
A competitive twin-engined ship that goes straight up out of sight. Two K&B .40's, new Perry carbs supply the incentive. Design meets AMA rules, a spirited performer/**Dick Sarpolus**

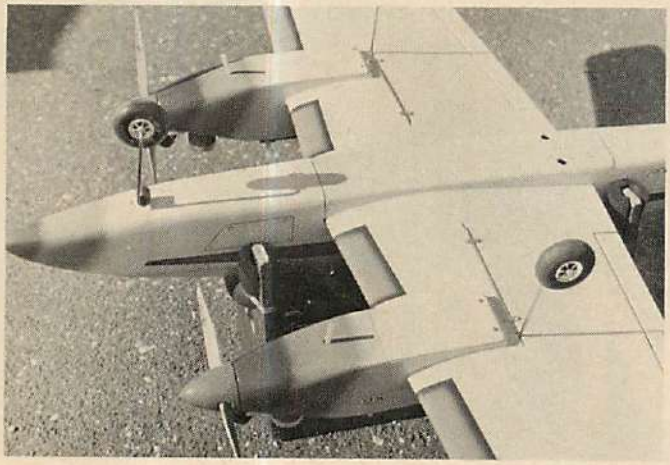
PHOTOGRAPHY: DICK SARPOLUS

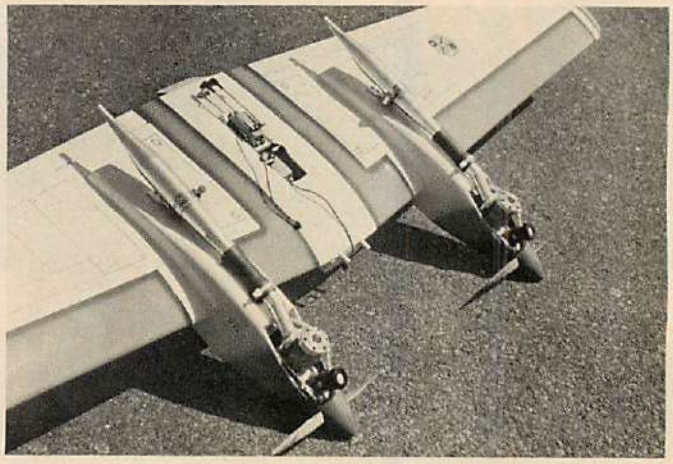
Twin engined models, although always intriguing, are not often seen on the flying field. There's no denying that they are more difficult to build and have more potential problems - but the sound and appearance of a twin are enough reward for the problems involved. I have wanted to build a twin for years but always put it off on one pretext or another. Trying to justify a twin for its performance improvement in a competitive pattern aircraft was hard due to the pattern category power limit of .60 - most .30 and smaller engines did not offer the power, idle, and reliability of .40 and larger engines. This is not true lately with the advent of better carbureted and better built more powerful smaller engines. I feel in general the larger the pattern aircraft, the better it will fly. When the Magnum .80 design was begun in 1977, the pattern engine limit was still .60, but I had decided to build a twin .40 powered large model just for my own amazement. In late 1977 the AMA announced rules changes permitting twin engined pattern aircraft to have a total of .80 displacement, with one engine limited to .60. (A .60 and .20 twin?) So now the Magnum .80 would be legal for competition.

Quite a few twin engined designs have appeared over the years, scale, sport type, and a small number of pattern types. My goal was to make a large, good looking model, utilizing powerful engines, and end up with a really competitive twin. Did I achieve the goal? Well, this model hasn't been flown in competition yet, but I believe it will be competitive with any existing pattern aircraft, and will offer the interest and thrill









Torsion type main gears soak up the jolts. All well tested design concepts, clean in planform, adequately beefed up. It could be modified for retracts. **At top:** Dick is wondering about a slightly enlarged nacelle for bigger tank? Tuned pipes add something wild to it all. Nothing tough to build on Magnum.

It's really a simple design, yet exotic in line and color. Nacelles build up quickly, soak up the vibration and stress. It's performance is astonishing. **At top:** Pushrods to the rudder and elevator exit neatly, transmit the motion without snaking around and losing servo power. Note ample tail area.

which can only come with a twin. In the end, it will always be the pilot, not the aircraft, which will win in competition.

I'd like to discuss the rationale behind this design. Powerplant choice was first, and for plenty of power, the K&B front rotor Schnuerle ported 6.5s were picked. The rear exhaust naturally led to the use of tuned pipe exhaust systems, and honestly the tuned pipes were used as much for their appearance as for any power gains. No attempt was made to cowl the tuned pipes, again for appearance. A complication was the necessity for the custom pipe adapters; of course the model could be built with any type of engine, the more standard side exhaust mufflers, or side mounted engines. It was felt that the K&B 6.5s would certainly provide plenty of power.

With that much power available, the wing was sized at a 6' 4" span and 790 square inches area. The wing is tapered of course, with an equal leading edge and trailing edge taper planform. The engine nacelles were placed fairly close to the center fuselage with adequate prop clearance, and were made with as little overhang as possible for more strength. The nacelles would be added to a built-up wing, with the leading edges notched for the fuel tank location. The nacelle's length worked out well with the fuselage for appearance and the completed model balanced perfectly with no added ballast required. Airfoil is full symmetrical naturally, 14% thick. Built-up conventional construction was used although I believe a foam cored wing would be equally suitable.

The fuselage is constructed typical of most pattern aircraft; balsa sides, plywood doublers, balsa blocks on top to permit streamlined shaping. The fuselage sides are curved somewhat toward the top to reduce the shaping work. Designwise, average moments were used to suit the large wing, the fuselage shape and canopy placement suggests the European style, and the frontal area is kept to a minimum. Side area is felt adequate for good pattern performance. The wing is located up into the fuselage, with the engines' thrust lines and horizontal stabilizer located fairly close above the wing. The rudder and particularly the fin area is large; this was felt desirable to insure good single engine performance. Anhedral is used in the stabilizer; being honest again, this feature was used primarily for its appearance, not because I was sold on any aerodynamic benefits.

I have seen so many good flying aircraft designs with different approaches and aerodynamic features that I would hesitate to say any particular design or feature was best or even better than any other; if the design suits the pilot and the pilot is good, he is going to win.

This plane is quick and easy to build. To

rush the project along, retractable landing gear was not used, although retracts could certainly be built in. Now I wish I had taken the time to do so. It is also designed for the easiest possible equipment installation. Engines were mounted on the new Kraft aluminum mounts and since the nacelles and engine cowls are small and only 2" dia. spinners used, the engines are easily accessible. The exhaust adapters on the engines are made from stock aluminum tubing and an ⅛" aluminum mounting flange, drilled and filed to shape. A friend heliarced the pieces together for me. The tuned pipes, by International Products, their .40 size pattern style, are mounted with an automotive hose clamp to an aluminum bracket, and connected to the adapter with rubber tubing. The stock K&B cross mufflers could be used for much less work.

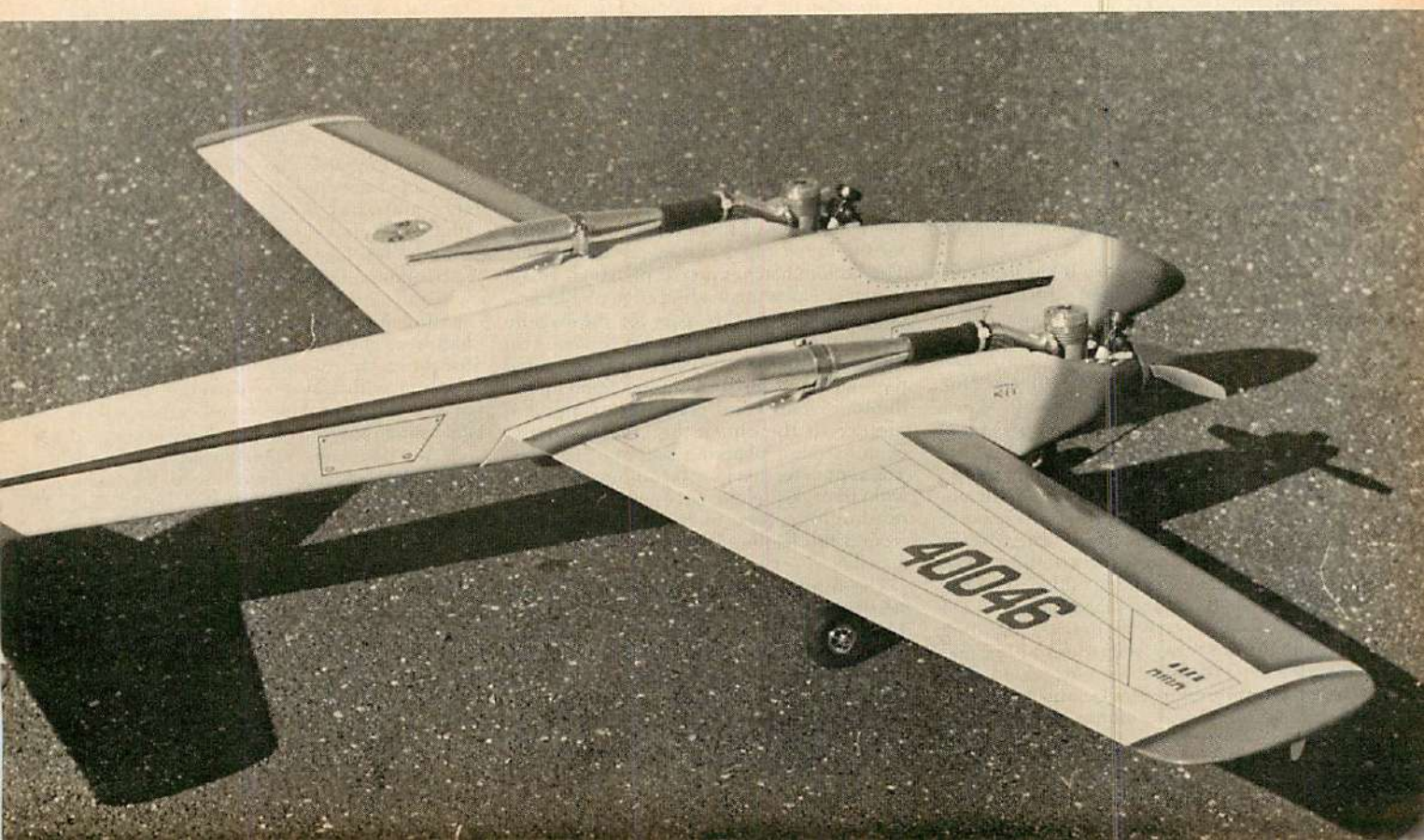
The throttle linkages are flexible cables in nylon tubing, built into the wing. The throttle and aileron servos are mounted in the wing, ailerons hooked up with the usual strip aileron linkages. Access hatches are on the bottom of the nacelles for the fuel tanks; the tanks are removable and the hatches being on the bottom result in a cleaner appearance. The fuselage houses the elevator and rudder servos. The elevator pushrod is a Y-configuration due to the stabilizer anhedral and swept forward hinge line. The batteries are packed ahead of the wing for balance. The wing is mounted with the usual two dowel pins and two ¼" dia. nylon bolts. Picking up the completed wing, with both engines and all equipment installed, is a shock due to its weight; it seems that something is wrong. But the fuselage, with so little equipment in it, is very light - the total model weighs about 8½ pounds.

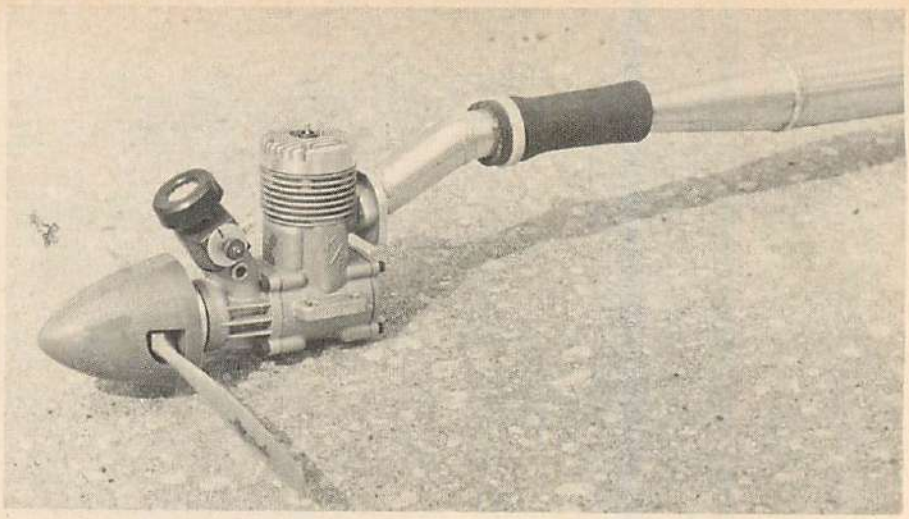
The power available is, to say the least, ample. Those K&B 6.5s are fantastic; the Perry carbs give a good, dependable idle and the power output is excellent. I have been using Zinger 10-6 props and Fox Missile Mist fuel with good results. I have not yet attempted to do any serious tuning of the exhaust setup; my thought is that mufflers must naturally be used, and any reasonably quiet muffler is going to cause some power loss - use of the tuned pipes, even if they aren't giving a power increase, should at least result in no power loss compared with unmuffled operation. The tuned pipes do give reasonably quiet operation, possibly quieter than many conventional mufflers. A comment on mufflers in general - I have spoken with several muffler manufacturers whom I find resent comments that really quiet mufflers are not available commercially. These manufacturers have offered mufflers that do an excellent quieting job, at the expense of some power loss, only to find that the modelers will not buy those mufflers. Any manufacturer, to stay in business, must produce what the customer will buy - so the most popular mufflers, which are believed to cause the least power loss, are the best sellers - and are not the quietest. Many modelers still seem to equate noise with power.

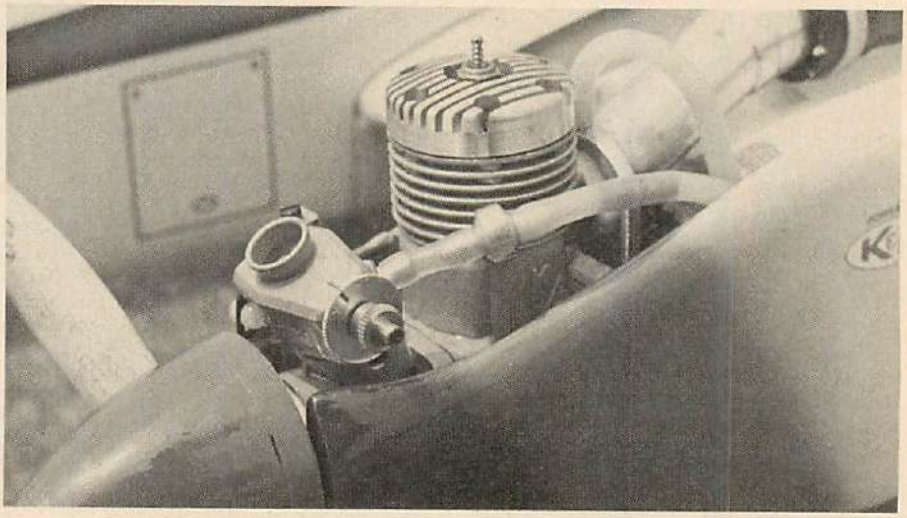
The first flight of this model was a real "kick" for me. After too much waiting for a reasonably calm day, we test flew it on a really windy day. I have test flown so many models that it's really not a nervous activity anymore, but must confess to some knee-knocking when the Magnum .80 left the ground. As hoped, it flies very well. A surprise is the ease with which it does four point and slow rolls; very little top rudder is required during these maneuvers. Another surprise was the very tight, quick snap rolls it is capable of. It will snap and spin very tightly, and will come out of a spin very quickly upon neutral control. With all the power available, it will climb vertically indefinitely - so maneuvers can be performed as large as you care to make them. The first two flights ended with single engine landings; no problem controlling the model, it came in like any typical single engine aircraft. The K&B 6.5/.40 Schnuerle, piped engines are so powerful and the model is so fast that I am sure it would fly fine with two average .40 or smaller sized engines. With the great sound of a twin engine installation and the performance available with this much power, again it makes it a real "kick" to fly.

Additional experience with the Magnum .80 has demonstrated it's single engine flying characteristics; it will fly very well on either engine. Turns can be made in both directions, I have done loops with one engine running, and the plane is docile on the landing pattern approach with either engine out. I attribute this to the large amount of fin/rudder area used and the fairly close together location of the engines. Both engines are mounted straight, no offsets used.

I did have a problem with the two engines used not coming up to speed at the same rate when the throttles were opened; one of the carbs seemed to be causing this difficulty. I spoke with K&B about this and obtained two new Perry carbs from them, unlike any I had seen before. The main carb housing has been enlarged and the needle valve has a new retention method which holds a setting positively; vibration does not back it out at all. With the new carbs, both engines come up in speed at the same rate. At the same time, I added a pressure tap to the exhaust manifolds, close behind the engines, to permit muffler pressurization of the fuel tanks. The engines do run very steady throughout an entire flight. I also obtained two Perry carbs with smaller throat diameters, which I intend to try to see if an even lower idle can be maintained. These powerful engines do burn a lot of fuel and if two .40s like this are used, the nacelles might be enlarged slightly to permit fuel tanks larger







Dick and his Magnum 80 opened eyeballs at the recent WRAM's show. And it flies better than it looks. There is no shortage of power aboard, good one-engine out performance. No offset in nacelles. **Top right:** The K&B mill with a tuned pipe, need a pair. Electric starters make it all practical. **Lower right:** The new Perry carburetor provided a smoothing touch, low speed idle and reliability.

than ten ounce capacity to be installed.

Regarding the speed of this model, it was timed once by the cooperative local police with their radar unit. On a level pass, into the wind, the speed was 109 mph. We tried some passes with a slight dive first, out of a split S; the plane was moving much faster, but the radar didn't lock on so we couldn't get another reading. Estimates are 120 mph plus; at any rate, it is quick. So far, I have had no problems with vibration, structure, linkage, etc. Control is responsive and smooth at all speeds.

Enough conversation; we'll get into construction of this aircraft. Start with the wing; when that is done, the rest is easy. If you wish to go with a foam core, I suggest as a source, Control Specialties Co., 205 Wood Ave., Box 268, Middlesex, N.J. 08846. Due to the weight on the wing, I would skin a foam core with 3/32" or even 1/8" balsa and possibly use a full depth plywood spar from the root out to the nacelles. Going with the built-up version, the ribs must be cut out first; the tabs on several of the ribs make it much easier to assemble them. The ribs are set up over the bottom spar, trailing edge, top spar, and leading edge added. Trailing edge and leading edge planking are added before removing the wing from the building board. On the other side, the trailing and leading edge planking are now added. The fixed landing gear blocks are reinforcements, or the retract mounts, should be installed now.The bottom planking is left off until the throttle linkages are installed.

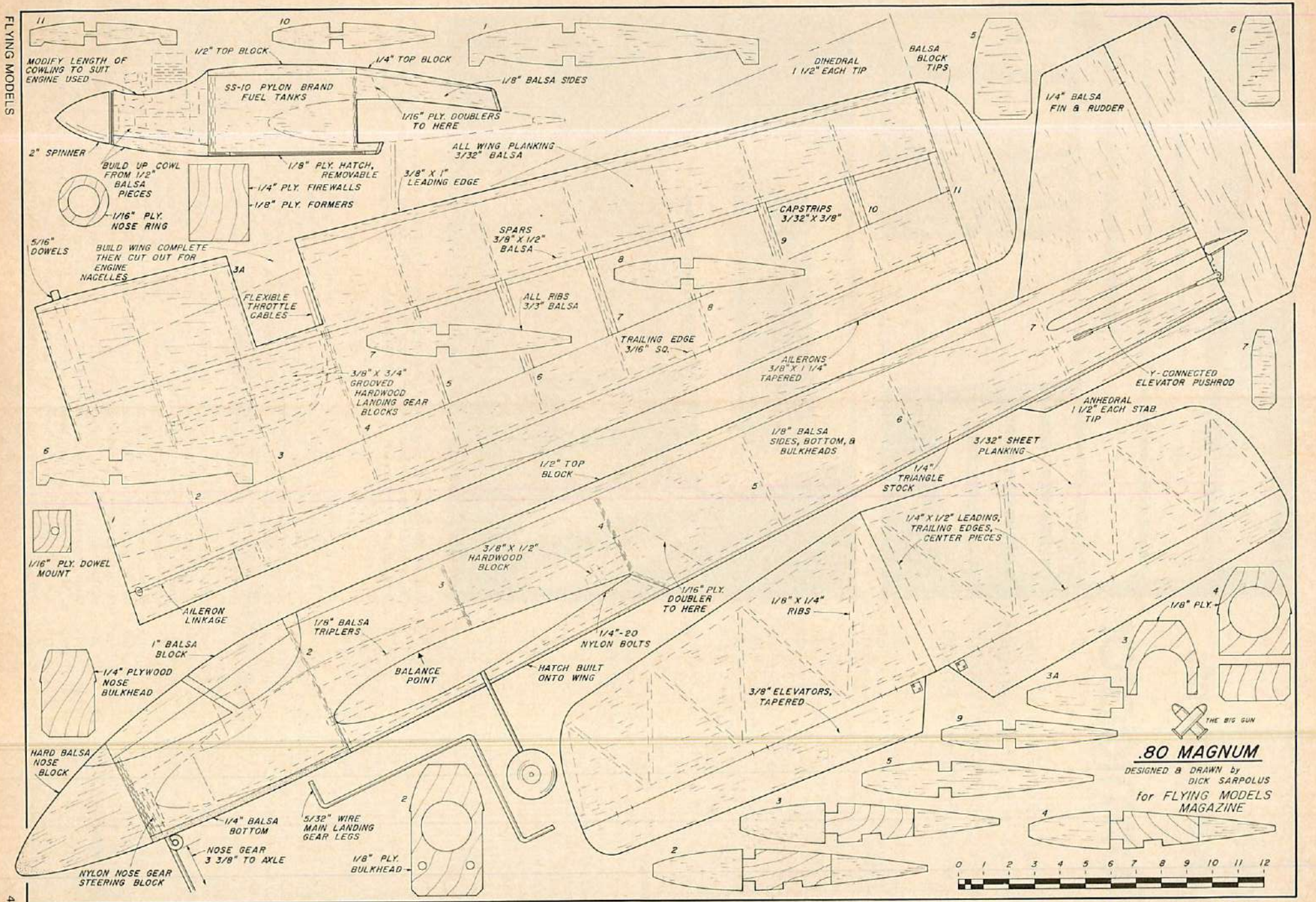
Work on the wing stops until the nacelles are built. They are easy, simply 1/8" balsa sides with 1/16" plywood doublers, 1/4" plywood firewall and 1/8" plywood bulkhead. The nacelle sides are parallel, the firewall square to them for alignment. The engines are installed on the aluminum radial mounts, bolted to the firewalls. The cowl blocks are added and faired around the engines. The nacelle top blocks are added and rounded, and a channel scooped in the tops for the tuned pipes if they are to be used. The bottom hatches are 1/8" plywood, keyed in place. The wing leading edge planking is now cut back to the spars for the nacelle installation. The nacelles are epoxied in place, and the throttle cables can be routed through the ribs to the center-section for the throttle servo. I did plank the wing completely to the tip, rather than end the center-section planking past the nacelles. The center-section joint is reinforced with 6" wide fiberglass cloth and epoxy; I also ran a reinforcing piece of 6" fiberglass cloth around the leading edge between the two nacelles.

The fuselage parts should be cut before starting construction; make your own kit. The plywood doublers are contact cemented or epoxied to the sides, and the triplers by the wing opening are epoxied in place. Since the fuselage sides are to be curved in along the top, I epoxy all the bulkheads in place first, attached only along the flat lower sections. Then the sides can be curved to meet the bulkheads, held in place with tape or rubber bands for gluing. The top and nose blocks are added and shaped. The nose gear, steering linkage, and rudder and elevator pushrods must be added before the fuselage bottom planking is attached.

The fin pieces are simply 1/4" balsa sheet, epoxied in place. The stabilizer is built up and sheet covered, the halves joined with the anhedral angle reinforced with fiberglass cloth and epoxy, then epoxied into the fuselage.

I completely assemble the entire plane, with all linkages, hardware, etc., before starting any of the finishing procedure. All hardware and linkages are then removed for finishing. On this model, all faces were covered with Silkspun Coverite, followed by several coats of clear dope, sanded, then gray automotive lacquer primer was sprayed on. Any dents or scratches were filled with spot putty and the entire model was well sanded. Another coat of primer, lightly fine sanded, and the plane was ready for the color coats. I used Sig butyrate for the colors, sprayed on. The trim and canopy were airbrushed, using a Bass unit which I am very pleased with after trying three or four other airbrushes. The panel lines were inked on with a number 3 drafting pen, followed with several coats of clear dope for protection.

That wraps it up; an exciting project for me and I hope for the interested reader. Try a twin for some real flying thrills!



.80 MAGNUM

DESIGNED & DRAWN by DICK SARPOLUS

for FLYING MODELS MAGAZINE

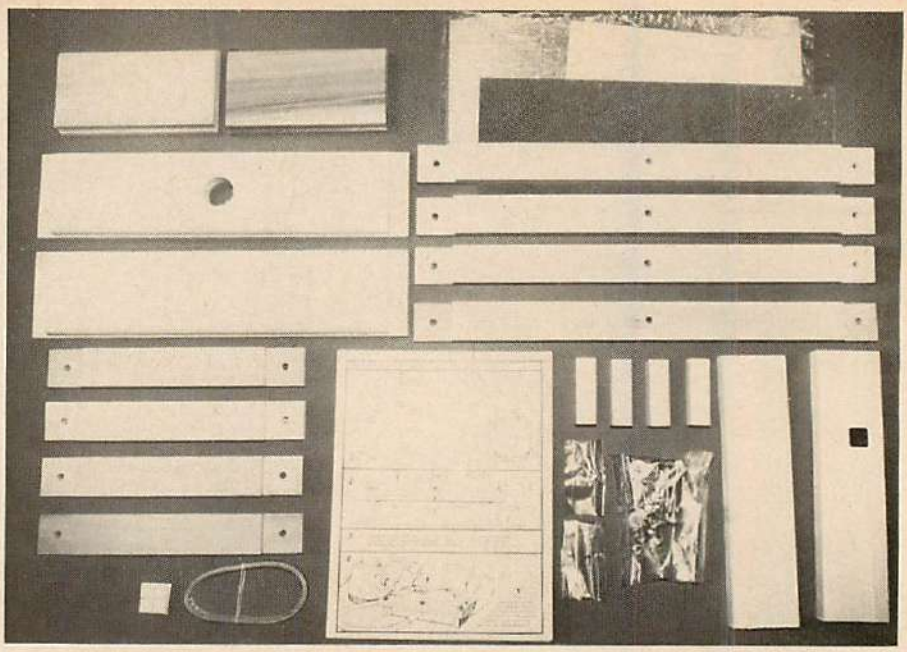
FULL SIZE PLAN AVAILABLE THROUGH CARSTENS FLYING PLANS

ORDER PLAN CF-483

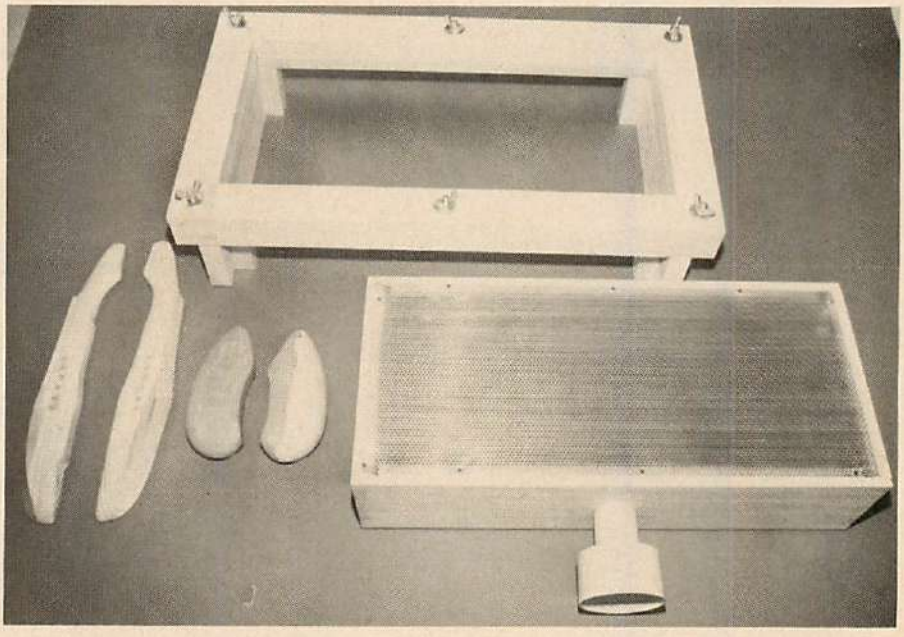
An FM Product Review:

Idea Development's Formicator

It's an inexpensive vacuum former in a kit. Assembles quickly. From now on you can mold your own/**Bob Aberle**



PHOTOGRAPHY: BOB ABERLE



Vacuum chamber is in foreground. Plastic shop vacuum attachment shown is not supplied with kit. Plastic sheet retainer frame is above, sample molds at left. **At top:** A complete parts kit for Ideal Development Formicator (vacuum former). $27.00 postpaid in U.S.A. Hardwood is precision cut.

Idea Development Inc. (P.O. Box 7399, Newark, Delaware 19711 - Area Code 302-737-0937) has recently entered the hobby manufacturing business with the announcement of their new Formicator, vacuum forming device. The idea of vacuum forming small parts from sheet plastic material is certainly now new. Through the years several vacuum forming units have been described in the model press. A particularly interesting article on the subject was presented by Gene Thomas, in the April 1976 issue of FLYING MODELS.

Idea Development has gone one step further and produced a complete kit which permits the hobbyist to construct his/her own vacuum former. The kit is complete in every sense and lists for $27.00 postpaid in the U.S. The only supporting equipment required are a standard household vacuum (preferably a shop type), a kitchen oven, plastic sheet material and, of course, the mold of your choice.

The Formicator kit consists of a complete set of pre-cut parts. Basic structure is a hard wood which resembles basswood. There are two major subassemblies. One is a vacuum chamber (actually a box) which measures 15½" long x 7" wide x 3¾" high. It has four sides, a masonite bottom and a perforated aluminum top. You assemble this with a few nails and some aliphatic glue. I did find that flat head nails were needed to hold the perforated aluminum top in place. The nails supplied (finishing type) passed directly through the holes in the aluminum (a minor problem!).

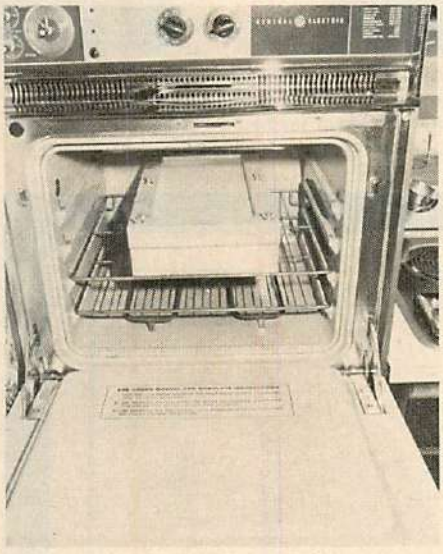
The other subassembly is the frame which holds the plastic sheet material while it is being heated and during the actual vacuum forming. The frame itself actually consists of two parts (each with outside dimensions of 18½" long x 10½" wide and approximately 1" thick). The plastic material is sandwiched between these two frames and held together tightly with ¼" dia. stove bolts and wing nuts. A firm grip on the plastic sheet is essential during the heating process. You are cautioned to use only an aliphatic resin glue such as Titebond or Wil-Hold for the assembly of these frames. Remember, the frames actually are placed in the oven. Elmer's standard white glue would easily melt at the 250 degree temperature while some other glues might conceivably catch fire. So please be careful with the glue selection.

The instructions supplied with the Formicator are excellent. There are several pages of step by step artist sketches showing the complete assembly. Assembly, by the way, took me less than one hour (excluding the glue drying time). In addition, Mr. Bob Lopshire of Idea Development, has provided some excellent application sheets describing the complete vacuum forming process along with suggestions on how to construct the proper molds. I can easily see many different types of hobby applications. For example: model railroading, arts and crafts, holiday decorations, and of course, numerous applications in model aviation and boating.

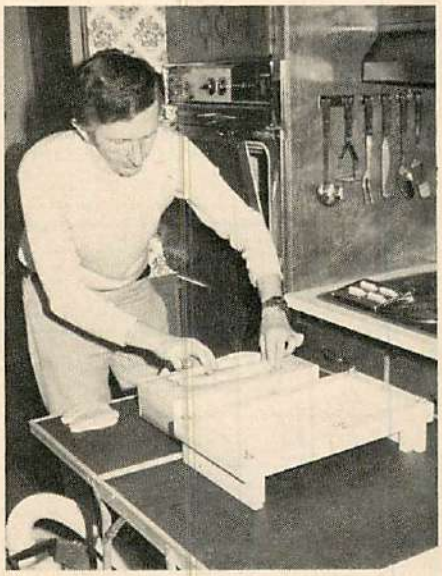
My first try at vacuum forming was reasonably successful. Like most new things you have to develop some of your own techniques based on practical experience. The instructions called for an oven temperature of 250 degrees, in the bake mode and you are cautioned to leave the oven door open. The trick then is to wait until the plastic sheet develops a "droop" of approximately 1 to 1½ inches. At that point the plastic sheet is at the correct temperature for vacuum forming. This should take (according to the instructions) around 3 minutes or so. Well I set the oven at 250 degrees and waited and waited. Nothing happened! After 15 minutes I got impatient. I opened the door completely and placed the oven in the broil position, which almost immediately caused the top heating element to glow a bright red color. Within 1½ to 2 minutes the sheet plastic had the proper "droop" and I proceeded to place the frame over the vacuum chamber. Form-



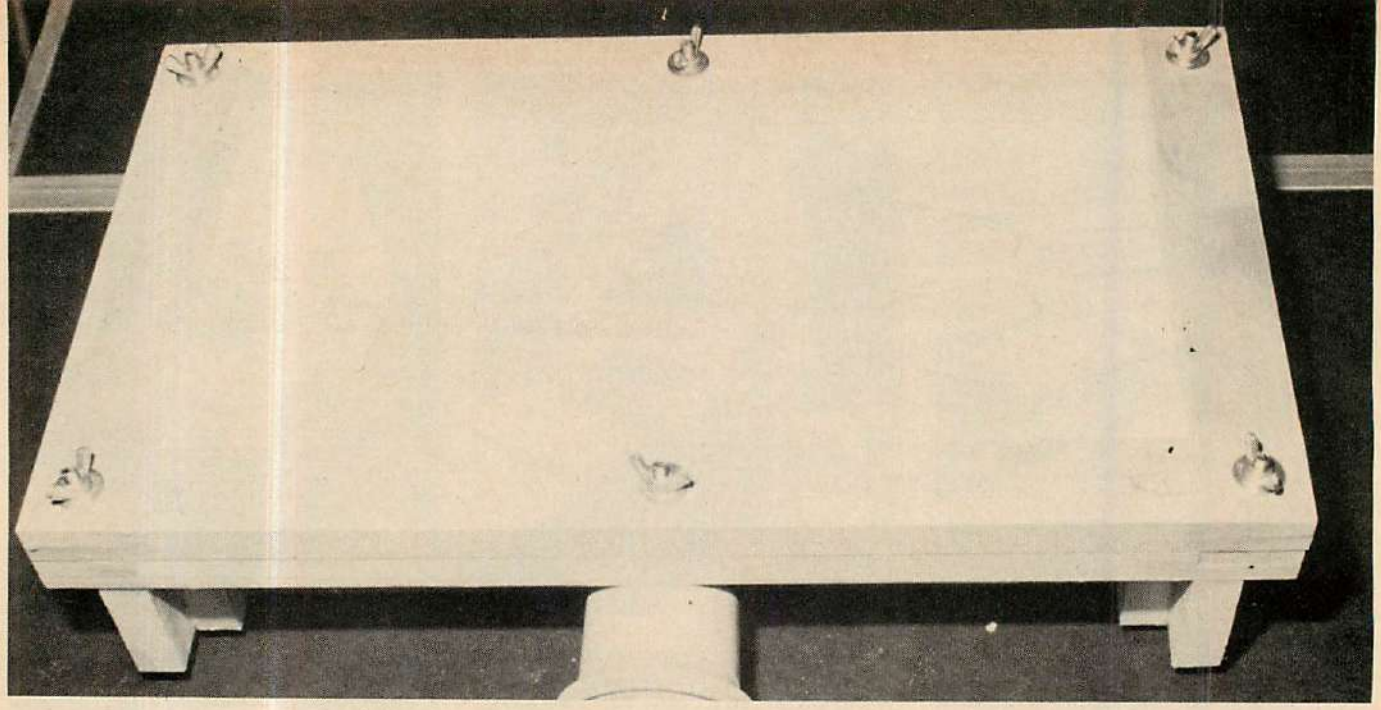




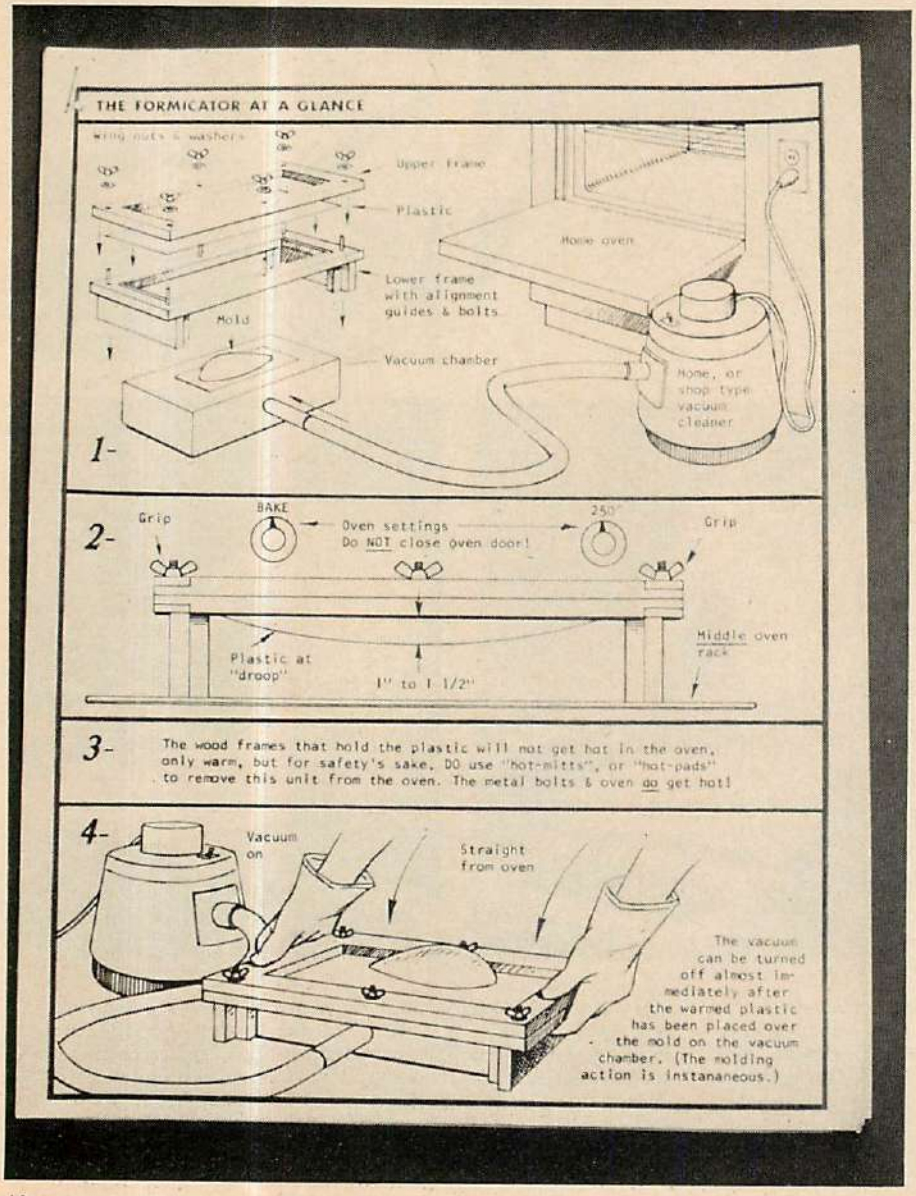




Across top, to bottom: Kitchen setting is essential, it must pass from oven immediately onto top of mold. There is no odor to contend with fortunately. Bob is seen separating the frame, getting ready to install the plastic sheet material. Next shot shows him putting the plastic sheet material into place. **Center row of pictures:** Plastic sheet is being sandwiched into position and made ready for the oven. Not as tasty as the turkey, but the same old oven. Heating up the plastic sheet. See the text for some special comment on this. Next Bob quickly drops the heated plastic sheet over the molds. Your vacuum should be turned on *just prior to this step.* Plastic will cool very quickly. Note the use of oven gloves. That frame and especially the metal bolts will get really hot. **Bottom row:** The finished molded product. In this case a new special fuselage for a "homebuilt" plastic model. In next shot Bob eyes the molded wheelpants for a .20 Stand-Off Scale. The mold preparation requires some special techniques as well. This is all discussed at length in the fine instructions provided. Final shot shows the results, the newly molded vacuum formed parts.



Wing nuts make a fast sandwich, holds everything tightly in position for molding operation. A shop type vacuum cleaner attaches like so. Molding procedures are easily learned by doing, opens up new possibilities for the modeler. **Beneath:** A sample of the very elaborate instructions provided with the kit.



ing takes place in a few seconds. You can turn off the vacuum almost immediately. I'm not sure whether the instructions were in error concerning the bake or broil oven settings. I simply could not get the necessary heat as originally instructed. If you try the broil position as I did, be careful, things happen real fast. I also learned in these first trial experiments that placement of the molds (when using more than one) on top of the vacuum chamber can be somewhat critical. Having them too close can cause a web to form between the molds. The effective molding area of this machine is approximately 7" x 15". You could possibly mold items as high as 4" off the vacuum box, but Idea Development recommends that you limit this to 3". Remember, the larger the mold the faster you have to get the heated plastic material from the oven to the vacuum chamber.

Another note of caution involves the actual choice of the plastic sheet material. You must use a product which is clearly marked as *butyrate*. Any form of cellulose or nitrate plastic should be avoided since they are highly flammable. Idea Development offers packages of ABS butyrate material in thicknesses of .020, .030 (usually the most popular thickness), .045, .060 and .090 inches. Each package of sheets sells for $13.00 (the actual quantity of sheets per package varies with the thickness, for example: 30 sheets of .020 and 6 sheets of .090). The sheets are all pre-cut to 8½" x 17" to exactly fit the Formicator (a real convenience!). The material supplied by Idea Development comes only in a color of white. You could use clear butyrate to form your own canopies. At the present time the best source of this clear butyrate material is the Sig Manufacturing Co. of Montezuma, Iowa.

The Formicator is actually a real fun type hobby tool. It is probably one of the few times that my entire family shared my hobby enthusiasm for a particular product. Everyone down to my eight year old daughter (with supervision) has been able to make a successful molded item. Your only limits are size and imagination.

1928·1978
flying models
50 CARSTENS PUBLICATIONS
FLYING ACES

From the August 1937 issue of FLYING ACES comes this very popular design by Maxwell Bassett called the *Miss Philley IV*. Although the publication date of 1937 qualifies her as an Antique the text really nails it down by stating that in May of 1933 Max made an unofficial flight with the design that lasted two and a half hours. The design also won the 1934 Texaco Gas Model event at Akron, Ohio. There is also a picture in the article showing the *Miss Philley IV* with a polyhedral wing, so you have your choice as to how to build this fabulous flying Antique.

Other articles that appeared in this issue included Hank Struck's Spirit of St. Louis, the fifth in his famous *Trail Blazers of the Air* series as well as the original FLYING ACES *Moth* construction article.

The mail in response to our reprinting these old articles and designs has been very rewarding for us here at FLYING MODELS. One of the things that surprised us was that all the letters weren't from old timers remembering the past. About half of them come from younger modelers "searching for the roots," as it were, of model aviation.

A word of apology from us is now in order. If you are one of the many modelers who have ordered full-size plans of some of these Old-Timers from our plan service and haven't received them yet, please bear with us. There has been some delay in having the magazine plans blown up to full size, which is opposite the way we normally handle plans, but they're being ironed out now and all will be available shortly.

a FLYING ACES reprint

Build "Miss Philly IV"

"The gas bug'll bite you if you don't watch out! You'll build a chug-chug plane and then you'll sing and shout!" We hope you will forgive this musical parodizing—but that's just the way we felt when we first saw Max Bassett's top-notch sky-scooter, "Miss Philadelphia IV." With the super-sweet original model, young Bassett won many a meet. "Miss Philly" herself is now enshrined for posterity in the Franklin Institute Museum—but here's your chance to build her exact counterpart.

By Maxwell Bassett

UNDOUBTEDLY, many of you model builders have been looking for plans for a gas model which can easily be built, and which will fly consistently and well. Here is just what you want—*Miss Philadelphia IV*—and the skeptical builder who needs proof of her ability must merely consider the performances of the original ship, and the records that it established.

In May 1933, *Miss Philadelphia IV* was launched from Camden Airport, N. J., and made a continuous flight lasting two-and-a-half hours (unofficial) over a total distance estimated at 180 miles—almost the distance from New York to Baltimore! She crossed three states—New Jersey, Pennsylvania and Delaware, and missed Maryland only by four miles. At times she reached an altitude of 8000 feet. For this flight, the ship of course carried an abundance of fuel in an oversize gas tank. Moreover, *Miss Philadelphia IV* also won many contests including the 1934 Texaco Gas Model event at Akron.

The original model is now retired, being "preserved for posterity" in a display room in Philadelphia's Franklin Institute Museum.

The Model

OUR *Miss Philadelphia IV* flies at a medium rate of speed, climbs at an unusually steep angle, and has good gliding qualities. But most important of all to the gas model fan, it is an easy model to build. An experienced rubber-powered model maker should have very little trouble if the usual care is taken. The wing, incidentally, is removable, hence the plane can be carried very conveniently.

The cost of your model should not exceed seven dollars. And if you are careful in buying your supplies, you may be able to build it for five!

Before starting construction, study the drawings and read the article two or three times, *thoroughly.*

The wing, tail and fuselage plans must be enlarged to full size. This can be done with a pair of dividers, or by taking measurements direct from the drawing and multiplying by the scale of the particular part.

The model has a wing spread of 84¾", and an overall length of 51". Ready to fly, with motor, batteries, and fuel, it should not weigh any more than 5 pounds.

In the original ship, I used a Brown Junior Motor, but, with a slight change in the motor mount, any similar motor of about the same size and weight will fly her just as well.

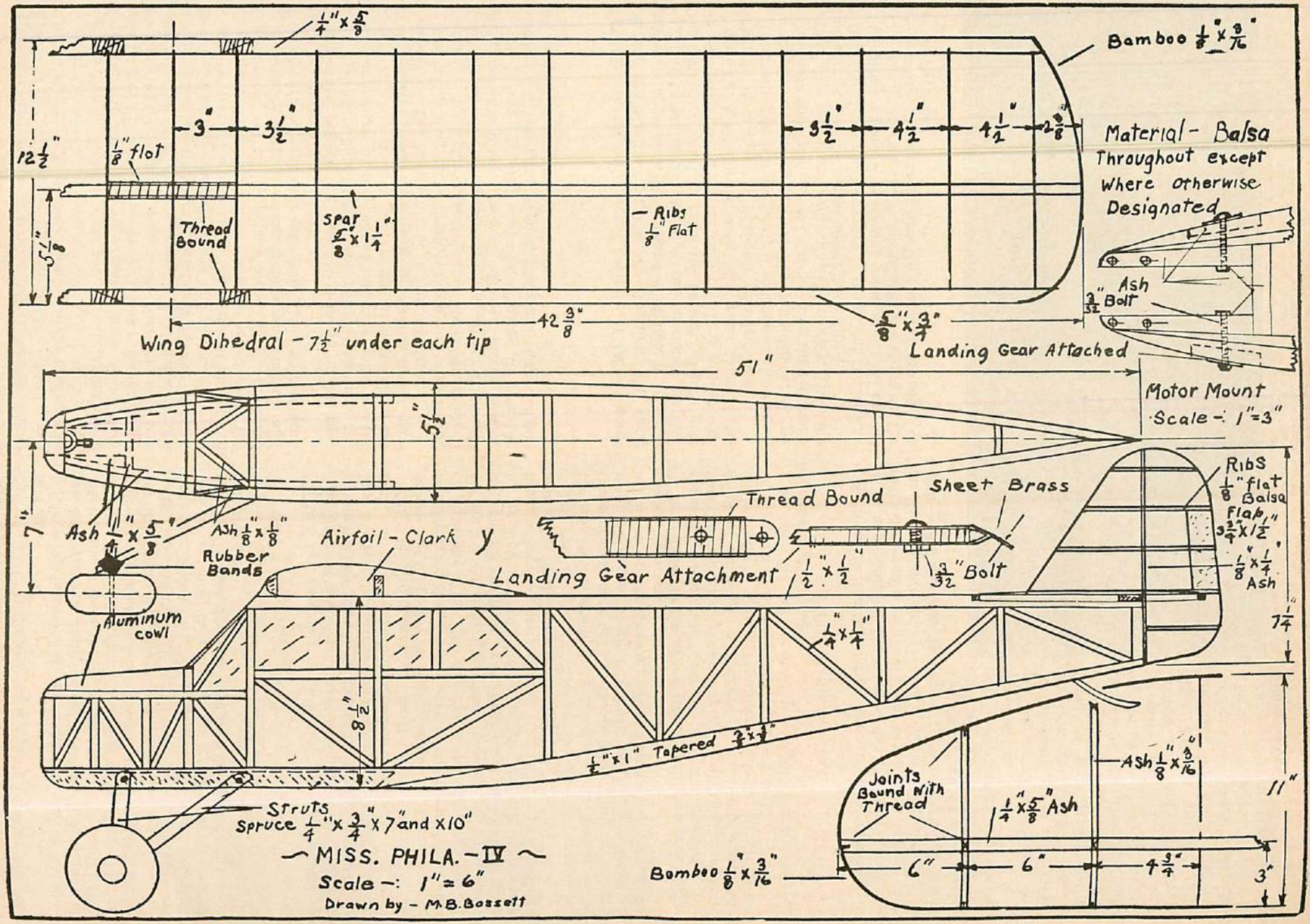
In building, *take your time.* Be sure every piece is perfect before going on to the next. Be especially careful that the tail and wing surfaces are absolutely true and are not warped during construction. Use plenty of cement—go over every joint at least once or twice, until you are sure each is perfect. Again, do not spare any cement, for strong joints make the strong ship!

Balsa is used throughout—except where otherwise noted—and should be of a medium or hard grade. Use only high grade materials. Poor or cheap stuff never has, and never will, make a championship model.

(Continued on second page following)

So neat, trim, and "lifelike" is Miss Philadelphia IV in this picture, that were it not for the size-comparison afforded by the presence of her young builder, Maxwell Bassett, it would be easy to mistake her for a full-sized modern ship. And it took a real plane four hours to trail and recover her on an epic two-and-a-half hour continuous hop from Camden Airport in 1933!

PLANS FOR THE "MISS PHILLY IV" GAS JOB



FUSELAGE

BUILD the fuselage first. Probably the easiest way is to start by forming the two sides or halves, and then putting them together by gluing in the cross pieces to make the complete fuselage.

Each builder has his own pet way of laying out a fuselage, but here is a way that I have found very satisfactory. Lay your upper and lower longerons on the drawings, and shape them to fit. There are no places where the wood must be curved in making the halves, but you must be sure that the joint in the lower longeron is well made, and strongly glued and bound.

All the vertical members of the half are placed and glued next. These are of 3/8" square balsa, while the angle braces are of 1/4" square stock. They are placed as designated in the drawing. Before removing the half from the drawing, go over each joint again with cement, to be sure they are all strong.

The other side of the fuselage is made in the same way, and then both halves are placed together, and bound and glued at the rear. From this point on, the upper and lower cross pieces are put in place. These are of 3/8" square balsa. Be sure to glue these firmly, particularly on the inside of the lower longeron.

The tail-skid is made from bamboo—or wire if you prefer it—and is glued securely into place. The celluloid windows should then be cemented in position. The windshield is made of one piece of celluloid, placed outside of the 1/8" by 1/8" ash supports. Finally, to give the fuselage a finished appearance, the edges of the longerons should be rounded off.

WINGS

THE wing is constructed entirely of balsa, except for the bamboo tips. Cut the ribs first. The wing section is approximately a Clark Y airfoil. It is 11 3/8" long (not including leading and trailing edges) by 1 1/2" deep. The spar is set in from the bottom, so it is only necessary to cut one slot in each rib. It is a good idea to place the ribs side by side, then sand them all together to form a set of perfectly matched ribs.

The main spar is made next. It consists of two halves, glued together in the center. The joint should be reinforced by two sheets of 1/8" flat balsa on the front and back of the spar, glued and bound thoroughly. The wing should have 7 1/2" dihedral under each tip.

This completed, the next step is to cut out the leading and trailing edges. The leading edge is of 5/8" by 3/8" balsa, and is planed and sanded to fit the curve of the rib section. The same is done to the trailing edge, of 1/4" by 5/8" balsa.

Next, the distance between the ribs is laid out on the leading and trailing edges, and 1/8" deep grooves are cut into them to form a strong joint between the ribs and edges.

The wing is assembled by making a half at a time—one left, and one right panel. The halves are made by placing the ribs on the spar and gluing them into place, along with the leading and trailing edges. Then the two halves are joined, and the wing is now complete except for the tips.

The tips are made of bamboo 1/8" by 3/16". They are bent over steam or other heat, and should be lashed as well as cemented into place. Finally, go over every joint *again* with glue, to make sure that all are well-cemented and tight.

TAIL

THE tail assembly is built right on the fuselage—a different procedure than is usually used. This is to eliminate any chance of changing angles in flight, or any incorrect adjustments that might cause a crash. Also, the tail can be built lighter this way.

Start by gluing and binding the main spar of the tail to the top longeron of the fuselage. Bend the bamboo to the correct shape, and fasten to the fuselage and ends of the spar. The ribs are inserted next. They are of 1/8" by 3/16" ash strips, which pass one on top and one underneath the main spar. They are held to the bamboo by drilling a 3/16" hole through the ash strips and binding together with thread. The ash strips are bound and glued to the main spar also.

The rudder is built in a similar manner except for the ribs, which are built of 1/8" flat balsa instead of the two-piece ash ones used in the stabilizer. Rudder adjustment is obtained by use of a small solid balsa flap, located as shown on the drawing. It is fastened to the rudder proper with soft copper wire.

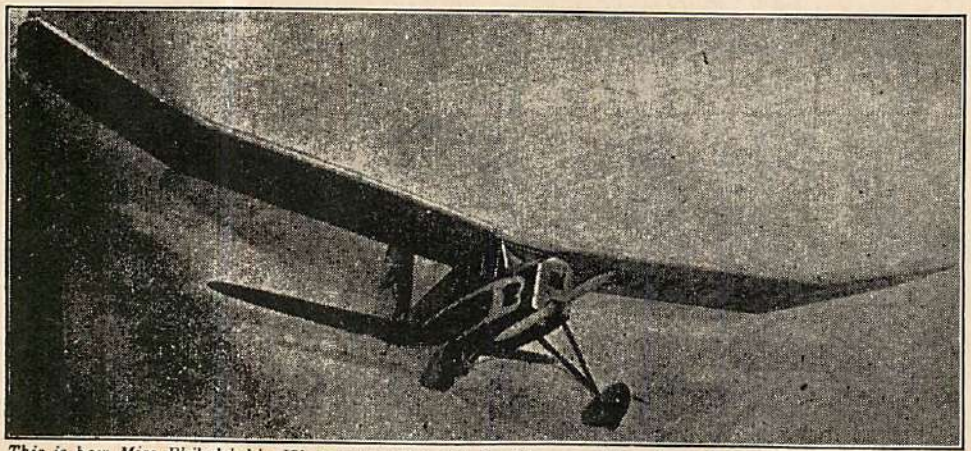
The rudder is set at 0-degrees with reference to the thrust line, and all adjustments are taken care of by the flap. The elevator on the original model had a negative angle of incidence of 2 degrees, which eliminated any chance of the ship not pulling out of a dive, and yet was not too great an angle to cause a stall.

Be sure the tail surfaces are neither warped nor out of line.

THE LANDING GEAR

AN extra tough landing gear is most essential in a gas model, for it must be able to take all the extra stress of a bad landing or crash. The landing gear on *Miss Philadelphia IV* is of wood, which makes a rigid gear—and if yours is properly mounted, wood would be very good on your model, too. Spruce struts, 1/4" by 3/4", are used, planed to a streamline section.

The fuselage fittings are brass strips 5/8" x 1/32" x 3", bent in the center. Two are used on each strut, one in front and one in back, as shown in the drawing, right center. A hole is drilled 3/16" from the top of the strip and a 3/32" bolt is passed through. This bolt is carried right through the lower longeron and motor mount, and holds the strut in place. Front and rear struts are held in the same manner.



This is how Miss Philadelphia IV appears when fitted with a special upturned-wingtip airfoil. Though not the original ship, this job differs only in wing design, hence you'll be perfectly safe in matching your model with this picture as you assemble the various parts.

The landing gear itself is of the split type. A piece of 1/16" piano wire is run from the bottom end of the front strut, to the center of the underside of the fuselage, where it is held with rubber bands. The wire is in one piece, and at the end of each strut it is lashed on, then turned outward to form axles for the wheels.

The junction of the rear and front struts is where the shock-absorbing quality of the landing gear is obtained. It is very simple, yet very efficient, and is made merely by binding the two struts together with heavy rubber bands. This allows the rear strut to "give" through the rubber, when a hard landing is made. (Bands shown in black on plan.)

Either hardwood or airwheels may be used, although the latter are to be preferred. The wheels selected should be about 4" in diameter.

Motor Mount

SHOULD the model have a poor motor mount, its flights cannot help but be poor, also. The mounting in *Miss Philadelphia IV* is of the *fixed* type, which not only allows greater strength, but is much lighter than any other type.

Ash wood is preferable, but any other hard wood such as hickory or oak, may be used. The two main members—which run along the inside of the lower longerons—are of ¼" x ⅝" x 16" ash. They should be glued firmly to each longeron, then bound. These two pieces take all the landing stresses and motor vibration, and also support the ignition system—so be sure and have them well secured. The rest of the mount is of smaller pieces, making the right bed for the particular motor and ignition system used. Details of our motor mount are shown in the drawings. All structural members of the mount are ⅝" deep.

The original model had a half-degree offset down and to the right, to compensate for the thrust, and the tendency of the motor to pull the plane into a power stall.

Using either clips or soldered joints, put in your coil, external switch, external booster connections—if you plan to use boosters—and then wire your entire job. Wherever possible, mount these so they are supported by the main members of the motor mount. Keep the spark and high tension wires away from all metal parts. And if you plan to use one, you should install your automatic timer at this time.

Covering and Cowling

BEFORE starting to cover your ship, see that all surfaces are perfectly true and that they are not warped in any way. And see that all sharp edges are rounded off and the wooden parts sanded, for these factors are of importance in the final appearance of your plane.

Use a good grade of silk or heavy bamboo paper, and cut out the various pieces to cover your ship. Thinned-out cement, or heavy dope, make good adhesive for silk, while paste is very good for bamboo paper. Paste also has the quality of sinking into both the wood and the paper fibre thus making very strong joints. Be sure to place the covering on evenly—an uneven piece will cause the surface to warp.

After the full covering has been applied, spray the entire ship with water to tighten it. Finally, apply your dope. This should be regular nitrate dope, similar to that used on real planes. Two coats of clear and three or more coats of colored are applied, depending on the finish desired. And a last, light coat of clear, quick-drying lacquer or varnish will put a dandy finish on the model.

The color scheme of our original *Miss Philadelphia IV* was yellow and blue. The wing, tail, and striping on the fuselage were yellow, and the remainder of the ship was blue. But of course, any color scheme desired can be used. It is best to have a dark body and a light wing, to furnish good contrast under varying conditions of light.

Since your motor should be of the air cooled type, the cowling is used for display and never for flying. It is made of aluminum, and fits over the top of the engine. No cowling is needed on the sides, as the fuselage fills in there. The top cowling can be held in place with either dress snaps or rubber bands.

Assembly and Test

PLACE the wing at such a point on the fuselage that the plane will balance when poised upon the fingertips, held beneath the wingtips, at about one-quarter of the distance from the leading to the trailing edge. The wing is tied in place with fresh rubber bands. Use plenty of rubber to do this, for if the wing should move while the model is in flight, the results would be disastrous.

Use a pine or a spruce propeller, with a diameter of 14" and a pitch of about 6".

After making sure that the model is all "in line," and that everything is balanced, test the model by gliding it. While doing this the prop should either be left off, or set in horizontal position.

For the "take-off," it is advisable to run with the plane, at the same time giving it an even thrust forward with the arm. Care must be taken to throw or release the model so that its nose is pointed level or slightly downward.

When the plane is adjusted so that it glides evenly and in a straight line, drop an eyedropper-full of gas into the tank—or, if you are using an automatic timer—adjust it for 5 to 10 seconds motor running time. Throttle the motor to its slowest running speed by retarding the spark and enriching the gas mixture.

Run the motor at the slowest speed that will fly the plane. If this advice is followed until you know just what to expect from your plane, you will avoid crack-ups and eliminate many of the headaches common to test flying. When flying *any* plane for the first time, always keep this rule in mind—*as the power and speed of the plane is increased, so also are all of its bad flying qualities.*

Never fly a gas model without having your name and address marked in a conspicuous place upon it, and never put more than a very few drops of gas in the tank unless you have a car at hand for an interesting five or ten miles cross country chase.

So here's wishing you many "Happy Landings," fellows, with your gas-powered *Miss Philadelphia IV*.

o o o

N. Y. Metropolitan Meet

GAS MODEL activities in the East were pepped up recently with a controlled flight gas meet sponsored by Polk's Model Craft Hobbies, Inc., and conducted by the Metropolitan Model League at Hadley Field, N. J. There were two events—duration and pay-load, each being limited to 40 sec. engine run.

Earl Dougherty placed first in the duration event, a flight of 4 min. 1 sec., being recorded for his model. Following him, were Frank Ehling, with 2 min. 15 sec., and Raymond Heit, with 2 min. 4 sec. The pay-load event was somewhat "suspended"—owing to a dearth of entries—but Dougherty did a good show with his model carrying a two-pound pay-load.

The directors of the meet were pleased to report to Flying Aces that no models were lost in the contest—credit being given to the controlling of the flights. One chap, however—not a contestant—half-filled his gas tank and turned the model "on its own" without even a timer, and it hasn't been heard from yet!

The M.M.L. feels that too great emphasis cannot be placed on the importance of pay-load contests in the gas field, as they feel that the problems presented in such events are much the same as those faced by the designers of standard aircraft.

Shreveport Show

THE Shreveport, La., Y.M.C.A. recently sponsored a hobby show for boys and girls of school age. The Byrd High School Model Airplane Club—also chartered as the 43rd Pursuit Squadron of the Flying Aces Club—entered thirty model airplanes, including one gas job. The squadron had a section of its own in the display hall—and won four ribbons altogether.

The 43rd is buying supplies for another gas model, which will be built by the club as a whole. Bill McClurken is secretary, and also serves as Keeper of the Log.

Jersey Mosquitoes

ONE of the strong new model clubs in the East is known as the Jersey Mosquitoes Chapter of the N.A.A., of Bayonne, N. J. There are forty-five members, all of them active. Thirty-five charter members. Frank Ehling is president, and John Kukowski is his "vice." Richard McNalley and Arthur Kennedy, respectively, are contest and corresponding secretaries. Ellis Cardanoo is treasurer. Ed Maher is sergeant-at-arms. The American Legion, together with a number of outstanding individuals in Jersey City and Bayonne, is sponsoring the group.

Flyin' things for fledglings

Earl VanGorder

Okay, just for the record - what is a "fledgling"? Well, Webster says it's "a young bird just fledged". So, now, you want to know what it means to be "Fledged"? Again, back to Webster who says it means "having been supplied with the feathers necessary for flight". I guess all that could be simplified by just saying that a fledgling is a beginner in the art of flying. And that's what this column is all about - to help all you beginners, of all ages, to participate actively in all the fun and relaxation that this sport/hobby of flying model aircraft can give you. We'll also try to help you avoid some of the pitfalls along your way to becoming an experienced modeler.

Now, I'm sure someone will be wondering why a modeler of over forty years experience is concerned about beginners. Well, I suppose part of it is just plain selfishness. In that forty (plus) year period, I've accumulated a lot of the bits and pieces of aeromodeling including two ceiling-high racks of kits - many over thirty years old - as well as all sorts of engines, radio control gear, and accessories of all types. I suspect that I'll never get around to building and using all these items before it's my turn to leave this "vale of tears" for that "big hangar in the sky". And, that's where the selfishness comes in. If I can't complete the job, I want to make plenty sure that there are some dedicated modelers around to keep things going. I know, too, that there are thousands of other experienced modelers who feel the same way. So relax, gather around, and let old Van fill you in on some of the things that are happening..... good things, being done with the fledgling in mind.

One of the hottest new items taking the country by storm is the Miniprofile program. You see, there is a wide experience gap between the usual beginner's stick-type flying model and the regular flying scale model. This makes it difficult (if not a complete turnoff!) for a new modeler to advance from a first project. There just has been no place to go - not until now, that is. But, now Miniprofiles fill that gap by making available to new modelers simple, but realistic, rubber powered models that really fly, and fly well. A variety of low cost, easily built kits are on the market now and it's a dead certainty that more will be coming along. Already, two of the major manufacturers in the industry, Sig Manufacturing Co. of Montezuma, Iowa and Vintage Aero of Tenafly, New Jersey, are actively supporting the program. And, incidentally, I'll make you a small wager that more manufacturers will soon be getting on the bandwagon because you fledglings are very, very important people to the industry. In any event, this column will keep you advised as participation spreads.

Perhaps, one of the best things about the Miniprofile program is that it includes competitive events. Oh sure, competitive events in model aviation aren't exactly new - but unfortunately these events, in too many cases, have become the private preserve of the experts. Little chance of even participating - let alone winning - has been afforded to the beginner. Well, that's also a thing of the past because the Miniprofile contest rules are written in a way that prevents the use of expertise developed over the years and puts the beginner in a competitive position with the experts. Sound good? It is good, and in future issues, we'll go into more detail on some of these rules and exactly how they protect the beginners competitive opportunities. In the meantime, check with your local hobby dealer for the names and addresses of model clubs in your area. These clubs will be glad to know of your interest and will probably be happy to sponsor a Miniprofile contest. You could also make your interest known to your teachers if you are attending school. You see, a complete information packet including contest rules, instructor's guidebook and all pertinent information is available to clubs, schools, and other organizations who request it on their letter head from - Vintage Aero, 1 The Glen, Tenafly, N.J. 07670. They can also contact Mr. Glen Sigafoose at Sig Mfg. Co. Inc., Rte. #1, Box #1, Montezuma, Iowa 50171. Now, remember, don't get over eager and write for this packet as an individual. There's a fair amount of expense in preparing and distributing this material, so Sig and Vintage Aero must limit free distribution to organizational requests. So, do what I suggested, get to your local model club or make your interest known at your school.

Speaking of schools reminds me of another great new item that is available to schools, model clubs, and other clubs - like 4-H. Vintage Aero has put together a package of fifteen bulk-packed kits of their Mini Square Thing. The package also includes an Instructor's Guide, individual Certificates of Merit, and, would you believe - even contest prizes! All this sells for fifteen dollars - think of it, only one buck per student! Since Vintage Aero is a "wholesale only" company, the package is being made available to schools and clubs all over the country through their local hobby shops, and that's even more convenience for the school and club officials. While basically a simple machine, the Mini Square Thing flies well and is an excellent "first model" for the beginner. More importantly, it provides the "bridge" between the beginners first model and all of model aviation. It would be a relatively simple and natural progression for the club or school instructor to progress his students from the Mini Square Thing to Miniprofiles, larger size profiles, and on to full scale flying models. One of the nicest things about the programs we've been discussing is that they are liberally "spiced" with competitive events along the way which increases the fun and interest. And this is where all you fledglings, club officials, and teachers can help me. Through this column, I want to let all of you know what the rest of the fledgling crowd all over the country are doing. Obviously, I can't do that without your help, so here's what I'd like you to do. Send me (E.R. "Van" VanGorder, 10 Brothers Rd., Wappingers Falls, N.Y. 12590) information on your projects - where they were held, how many participants, who won the prizes, plans for your next event, etc. And send me photos (black and white glossy, please) whenever you can get them. Include names of persons in the photos. In return, I'll do something for you. I'll see that as many of you as space allows will get national publicity in this column.

We also plan to keep you advised of all new developments of interest to our "fledgling gang" and, from time to time, I'll be passing along hints, tips, and general advice on materials, construction kinks, tools, and available accessories to help smooth out the new flyer's progress.

I guess that's it for this session, gang. Time to close the hangar doors and let you get to the hobby shop and start tracking down your local model club - or maybe you'd rather start "bugging" your school teachers. In any event, watch for your next copy of FLYING MODELS so we can get together again. By then, I hope to have some word for you on some of the first contests and projects around the country. Be seein' you.

With Model Builders

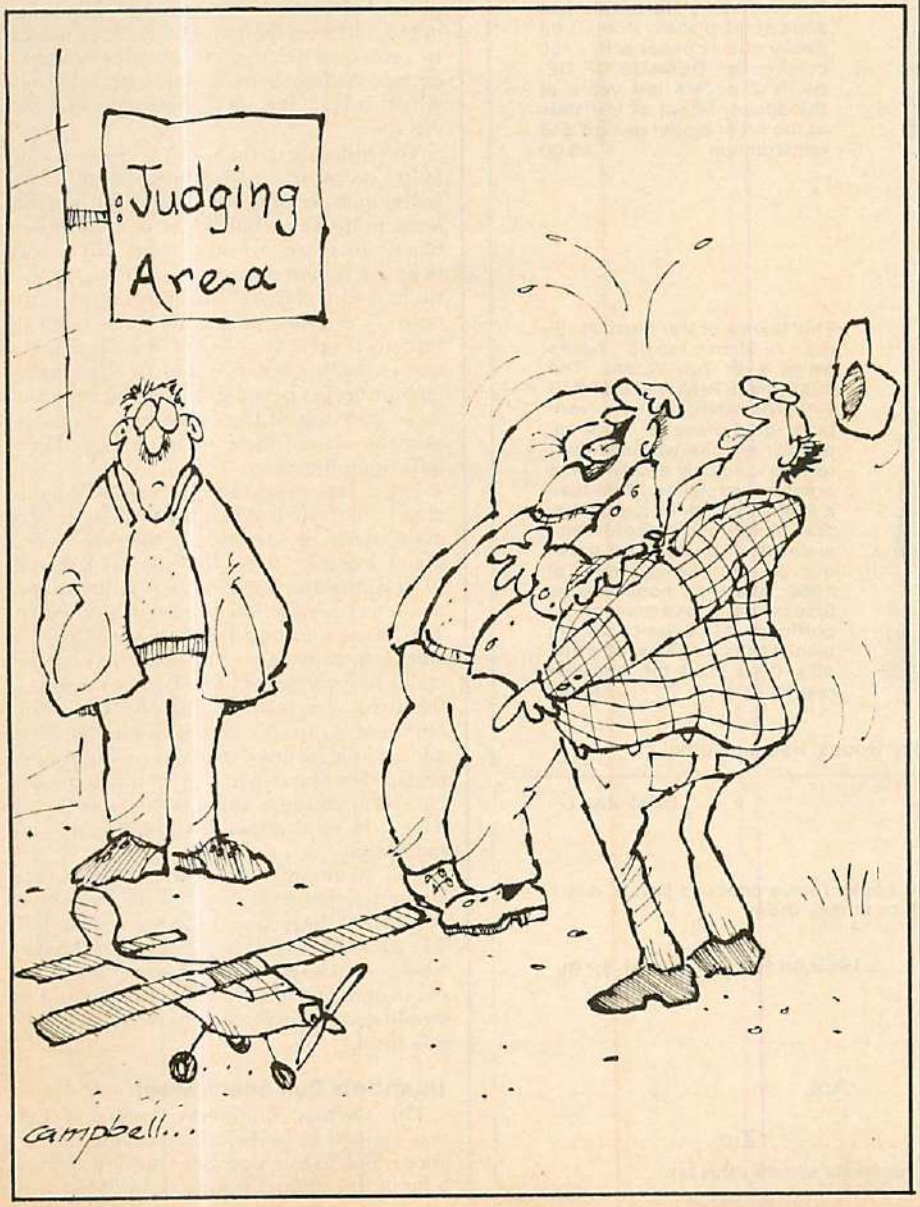
by Ed Whalley

Irate Householder Stomps Whitney's Satellite 1000

Keith Whitney of the Utah State Aeromodelers is no stranger to readers of WMB. He enjoys a well deserved reputation as a competitive Free-Flighter. If one of his ships went OOS, you can bet your boots the fault could be traced to an equipment malfunction. These things happen. And this is why contest sites are generally situated at some distance from populated areas. So when Keith's beautiful red and white Satellite 1000 disappeared into the blue over the Salt Lake Modelport, the happening could be properly termed an accident.

Usually, a guy can count on someone's returning his ship if they happen to find it. The amount of work needed to produce a fine flying model is pretty obvious and even the most cursory examination is enough to convince anyone of its value. The willful destruction of a magnificent 1000-square-inch model is an act of infantile vandalism. It was Keith's misfortune that, when his ship came down in the city, ten miles from the launch site, it fell into the hands of such an infantile mentality. The incident raises the question of what can and should be done about it.

Apparently, the ship glided into the side of the house and this disturbed the aforesaid individual. According to a neighbor who retrieved the pieces, the guy flew into a rage, stomped the plane, and stuffed the remains into his trash can. The witness subsequently rescued the remains and phoned Keith who, hopefully, was able to salvage his motor and accessories. The incident has prompted a flurry of concern among Salt Lake model



builders. They'd like to see something done about it.

A piece in the Dope Bucket questions what made the destruction of the plane "possible" and concludes that modelers have "dropped the ball" in the matter of building a good public image. And it equates the "toy airplane" label with the lack of respect shown for Keith's property. But I can't buy this; it might be a factor, but a minor one.

It's been a long, long time since the general public associated model building with ten-cent and two-bit Megow kits. And judging by what New England TV features and advertising indicate, building and flying models has supplanted playing golf as a status symbol. It's being pushed as an "in" thing among young professionals and social comers. And while a lot of doctors might be saving Wednesday afternoons for golf, it's an even bet that more than ever before can be found at the flying site on weekends.

The point is that "doing something" about incidents in which model planes are destroyed is an awful lot of trouble. It gets to be a question of about how bad one really wants to do it. If "educating" the public had any effect on the pathologically irresponsible, we'd have achieved a Utopian society a long time ago. As things stand, getting "justice" is often more costly to the aggrieved than to his oppressor. Even police officers are reluctant to prosecute what they consider "minor" crimes. Without getting philosophical about why this is so, it is an accepted fact of modern life.

The individual, then, can be excused for failing to push a matter in which the only individuals certain to benefit are those of the legal profession. But when one considers that Keith, like every other contest flyer, was licensed, insured, and engaged in an entirely lawful activity—in short, acting in an entirely responsible manner—the need to initiate legal action to set a precedent in cases affecting others of his class in similar circumstances becomes more apparent and more pressing. If the individual can't support the action, the onus of responsibility falls upon the class.

Legal action against the householder is clearly indicated. When he took possession of the plane, he committed a theft—possibly grand larceny; when he stomped it and stuffed it in the trash, he was guilty of the malicious destruction of another's property. The plane's hitting his house was hardly sufficient provocation for what he did: he could have collected for damages if any—the flyer was insured. But the fly in the ointment is this: it's a whole lot less trouble and a whole lot less expensive for the flyer to replace his plane than it is for him to prosecute. If anything is going to be done, it will have to be by an organized group—not by an individual.

The writer of the letter in the Bucket suggested that AMA negotiate for "a portion of an ABC Wide World of Sports episode." The idea is to dispel the toy airplane image. Starting a class action in the courts might get even more coverage at less cost. And it would zero-in on the real problem. What do you think?

Thumbers Run Silent Meet

The Thermal Thumbers' Annual at Taft was marked by some outstanding performances. Bob White and Jim Quinn provided a lot of the competition in the Rubber seg-

ments of this non-powered meet while Jack Moreland and Jas Kendy won in A/1. Competition was good despite mudslides which hampered traffic on the Ridge Route and delayed contestants both coming and going.

White picked up firsts in Wakefield (1223) and Coupe (539) and managed a third in Mulvihill (1114). He also got a second in P-30 and managed to proxy fly a Coupe for Pierre Chaussebourg. George Perryman beat Bob in P-30, 473 to 335. Irv Aker was third with 297. But Irv won big in Mulvihill. His 1429 blanked-out Andy Faykun with 1157 and White's third-place effort. Quinn hit for two in Coupe as he proxied Barney Boutillier's ship to a 525 second place and flew his own to a 507 third.

Jack Moreland won the adult A/1 event handily in 743 to finish ahead of Bob DeShields (704) and Scott Valentine (606). Jas Kendy took the Junior edition with a very creditable 704. Kendy also took the Junior segment of P-30 in 303.

Ray Berins dominated the Old Time events by winning OT Rubber in 754—squeaking by Perryman with 752—by winning Commercial with 500, and by taking a second in OT Wakefield with 473. Jim Quinn managed a third in OT Rubber, a second in Commercial, and a fourth in Wake. Jim's always a contender. Cliff McBaine was the Wake winner with 483.

In Handlaunch, Jim Batvik beat Jim Lueken, 474 to 419 in Open, and Bret Payne took the Junior edition with 93. Bret also took Mulvihill Jr. in 242. Everyone agreed that it was a well-run meet, but getting home was something else. People returning via the Ridge Route reported up to three-hour delays.

Combat Flyers Choose Pitmen

Via a somewhat complicated voting process, those Combat flyers on the U.S. Team have won the right to pick their own pitmen. Here's how it went: The majority of respondents agreed with the ballot format and also with the idea that only the team selection participants should vote. Since twelve of the ballots were from participants at the St. Louis finals, only these votes were counted. (There were twenty-one participants eligible.) Of these twelve, nine felt that the flyers should choose their own pitmen; three, that the alternates should be sent. Apparently, nine participants didn't care either way. At this writing, MACA has disbursed about $185.00 to each of the flyers and his pitman for fees and travel reservations. There is a limited amount left in the pitmen's fund which will be disbursed later along with whatever funding develops.

In the meantime, MACA is following AMA guidelines in setting up and gaining approval for the next Team Selection Committee. Paul Smith is in charge of this operation and has submitted a list of names for confirmation by District VP's. Assuming that the VP's approve the nominations for the TSC, the next step is a vote by the program participants. Paul is urging all FAI Combat flyers to send $5.00 to AMA and to register as 1980 program participants. Additionally, Paul has started a newsletter to keep participants abreast of developments. His address: Paul Smith, 323 North Walnut, #606, Lansing, Mich. 48933.

Pylon Draws 32 at Hadley

Pylon racing got underway in the Northeast on May 7th at Hadley, Mass., where there were twenty-two entrants in Quickie 500 and ten in Formula 1. Bee Williams reports that the meet was run with separate events for Standard and Expert in order to avoid a lot of two-plane heats. Lloyd Burnham had wins in Q-500 (Expert) and Formula 1 (Standard). He picked up 16 points and did 2:04 in the former; 14 points and 1:36 in the latter. Rob Wallace made 15 and 2:26 to win in the Standard edition of Q-500. And Bob Barkowski racked up 20 points and a time of 1:27.5 to take Expert Formula 1. Glenn Sicotte had the best time in Formula 1, 1:27.2. Sicotte and Larry Weddle, incidentally, had a real hot race going in Q-500 until they mid-aired off Pylon One and totaled both planes.

Aker Takes Sweeps At Max Men's 20th

The Max Men's 20th Annual at Taft was distinguished by a couple of firsts, some changeable weather, and some excellent flying. The meet was the first to use the new A/1 rules, and John Ferrer achieved the first maxout in P-30. Irv Aker won in C Gas and placed in four other events to take Sweeps, and his team, the Thunderbugs, outscored the nearest club in Team Challenge by 140 points—taking four firsts in the process.

Aker's win in C Gas was achieved by a 51-second margin over Ken Moser—854 to 803. Hulan Mathies was third. Irv also picked up three seconds—P-30, Coupe, and Mulvihill (Unlimited)—and a fifth in Wakefield. Also contributing to the T-Bugs' sweep were the wins by Ferrer in P-30 (540) and Coupe (511) and Joe Norcross's 741 win in B Gas. Jack Moreland contributed a third in A/1, and Don Mohr added a second in ½A; Bill Tracy, a fifth.

Other flyers turned-in some good times, too: Bill Valentine posted 830 to win in ½A; Ralph Prey, 900 in A Gas; Ed Carroll, 890 in Power; Andy Faykun, 900 in Mulvihill; Bill Humbert, 1260 to win handily in Wake; Bill Blanchard, 815 in Handlaunch; Steve Geraghty, 570 in A/1; and, Bob Isaacson, 1620 in A/2. All had clear-cut firsts.

Contributing to the competition were: Lee Hines, with a second in A/2 and a fourth in HLG; Mike Kerzie, with a third in ½A and a fourth in B; Bob White, with thirds (surprisingly) in Coupe and Mulvihill; and, Ray Harper, Jim Quinn and Hulan Mathies, all of whom had multiple placings. Young Fernando Diez won the special A/1 Junior event.

Jackson Tops at Salt Lake

The long-delayed OT Meet at Salt Lake was finally held when the rains subsided, and Jay Jackson proved to be the top banana in the whole bunch as he pulled wins in Combined Rubber and .02 Replica. These, along with a hard-won second in Combined Gas, clinched the position for him. Mark Fechner nearly proved to be his nemesis, however, as he posted wins in Gas, 30-Second Antique, and a third in Replica. Mark took the Gas class with five straight maxes; Jay, his second, with four. Other notable performances were turned-in by Noal Hess, who came second in .02, and Carter Watts, who pushed the winners in Replica. Nicki Fechner posted a creditable 5:09 to place third in Gas.

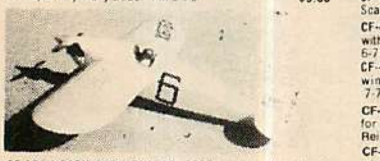
Ray Cole Gets Blue Max

Chances are that you've never heard of the Blue Max award. It's one of those things that a lot of clubs throw out half in fun and half in

Carstens plans

R/C SCALE

CF-9 AERONCA CHAMP. 51" wing. 049 to 09 engine. Familiar sports design $3.00
CF-13 NORTH AMERICAN P-51 MUSTANG. 099 powered single R/C or UC. By Bob Buragas $3.00
CF-17 B-25 MITCHELL BOMBER. Dandy World War 2 vintage bomber for R/C. By Nick Ziroli. FM 12-70 $5.00
CF-36 LOCKHEED U-2. Prop or glider spy plane. 72" wing. Semi-scale. By Robert Trishin. FM 2-66 $3.50
CF-51 ALPAVAIA RF-3. French sportplane. 63" span. 09 mil. By O. Kampen. FM 9-66. R/C $2.00
CF-52 CURTISS JN4D JENNY. 42" wing for single channel R/C. By Nick Ziroli. FM 9-66 $1.50
CF-53 AVI 205. Argentinian sportplane. 44" wing. R/C or rubber, scale. FM 9-66 $3.00
CF-57 SPAD SV-2. World War I fighter. By Paul Palanek. FM 5-64. 09 mil. 43" span. R/C $3.50
CF-64 GYPSY MOTH, DEHAVILLAND. 68" wing. 60-71 biplane. 3 sheets. By Elmer Nowac. R/C FM 4-62 $4.00
CF-66 WACO N. Tricycle gear biplane. 09-15 R/C with 40" span. FM 1-67. By Nick Ziroli $2.00
CF-81 FOKKER D-VII. 60" span R/C World War I biplane. 1/8th scale. 61 mil. Nick Ziroli. FM 6-67 $3.00
CF-83 GRUMMAN AG-CAT. Duster biplane 1/12th scale for 35-40 CL. 2 shts. By Bob Adair. FM 6-67 $3.00
CF-85 BEECHCRAFT STAGGERWING. 52½" span biplane for 60 R/C. Bryce Petersen. FM 7-67 $3.00
CF-89 FAIRCHILD PT-19. Low wing Army trainer. 62" span for 49 R/C. Gene Rogers. FM 8-67 $4.50
CF-93 FOKKER DR-1. WWI triplane for 53-61. 48" wing. R/C. Bryce Petersen. FM 9-67 $4.00
CF-97 MORANE SAULNIER "N". 1915 version, near-scale. 55" span. 35. Nick Ziroli. FM 10-67 $3.00
CF-104 S.E. 5. Famed British WWI fighter biplane. 52-1/2" span. 61 mil engine. FM 1-68. By Nick Ziroli. R/C $3.50
CF-109 FALK RIVETS. Goodyear Racer. 1st at '67 NATS. FM 2-68. By Joe Foster. R/C $3.50
CF-114 EINDECKER E-111. German monoplane. 55" span, uses 35. Nick Ziroli. FM 3-68. R/C $3.00
CF-122 EL BRONCO. R/C sport tail dragger for 61 mil with 68" span. By Wally Zober. FM 9-70 $3.00



CF-126 HEATH BABY BULLET. 1928 racer by founder of Heath Co. 56" span R/C for 46 to 60. Nick Ziroli. FM 7-68 $3.00
CF-143 VIGILANTE. Semi-scale R/C similar to Navy AJ-3. 51" span with 45 to 60 pusher. Nick Ziroli. FM 11-68 $3.00
CF-146 AMERICAN EAGLE. 1929 scale biplane R/C. For 40-56 mil. 56" span. By Tom Collins. FM 12-68 $3.00
CF-154 P-47 THUNDERBOLT. Near scale WW-II fighter with 45 engine R/C. By Nick Ziroli. FM 3-69 $3.50
CF-159 JUNKERS CL-1. 56" span World War I model with Enya 45 engine. By Jim Burgholzer. FM 5-69 $3.50
CF-163 FW-190-A3. Near scale R/C, retractable gear. 54" span, 45-56 engine. Nick Ziroli. FM 6-69 $3.50
CF-170 MARTIN MARAUDER B-26. R/C twin 45 scale 72" wing. By Joe D'Amico. FM 8-69 $5.00
CF-173 DEMOISELLE. Dumont's pioneer airplane. 3"=1' scale. Zundel & Signorino. RC. FM 1-70 $7.00
CF-174 BLACKBURN ALL-STEEL. 1915 near scale R/C for 29 mil. By Vern Zundel. FM 9-69 $5.00
CF-183 GRUMMAN F8F BEARCAT. 52" span R/C. 40-52. Semi-scale by Nick Ziroli. FM 2-70 $3.50
CF-184 INSTANT AZTEC. Twin Super Tigre 29s power VK Cherokee R/C conversion. B. Petersen. FM 2-70 $3.00
CF-188 MORANE SAULNIER. 1/6 scale model of French sportplane. 57" span. 49. Ziroli. FM 3-70 $3.50
CF-200 VOLKSPLANE. 57" span R/C for 45, popular home build craft. By Gene Rogers. FM 7-70 $3.50
CF-215-DEPERDUSSIN. 1911 vintage craft with 56" span. R/C scale. By Vern Zundel. FM 10-70 $5.00
CF-223 PFALZ D-111a. R/C 2" scale World War I biplane. 60 mil. By Alan Spievak. FM 6-71. 3 sheets $10.00
CF-227 A.V. ROE BIPLANE. 1911 standoff 2" scale R/C for 19-35, 60" span. By Frank Noll. FM 7-71 $7.00
CF-245 TIGER MOTH. Slow flying oldtime bipe for 23 mil inverted with 43" span. Don Foster. FM 11-71 $2.00
CF-251 NESMITH COUGAR. Eyeball scale R/C 54" span, 40-60. Simple. Stan Hines. FM 2-72 $5.00
CF-273 GRUMMAN F4F-4 WILDCAT. RC semi-scale, 45" span, OS Wankel 30. Nick Ziroli. FM 9-72 $3.50
CF-286 B-17G FLYING FORTRESS. Four Webra 20, R/C. 1st in '72 NATS flight achievement. Tom Cook. FM 1-73 $7.00
CF-287 WINDECKER EAGLE. R/C scale 69" span, 61 Webra, Kraft radio and retract gear. Ralph Jackson. FM 2-73 $7.00
CF-308 SKYHAWK. Navy Douglas R/C semi-scale A4-D5. 39" span. 40-60. Stan Hines. FM 9-73 $3.50
CF-311 BUHL BULL PUP. Classic R/C Semi-scale with 76" span, 4-ch radio, 60 engine. Vern Zundel. FM 10-73 $7.00
CF-313 BOEING-STEARMAN PT-17. Stand-off scale R/C for 40 to 60. Nick Ziroli. FM 11-73 $3.50
CF-319 PIPER CHEROKEE ARROW. Scale R/C of popular sport design. 60" span. Don Condon. FM 1-74 $3.50
CF-321 TAUBE. Stand off scale R/C with 84" span. German WW1. 2 sheets. Nick Ziroli. FM 1-74 $7.00
CF-324 GRUMMAN F6F-3 "HELLCAT." Stand Off Scale R/C for Enya 60 and 59" span. Don Williams. FM 2-74 4.00
CF-326 BRISTOL M1B. World War I stand-off scale monoplane. 52" span with 40 engine. Tony Eck. FM 3-74 $3.50
CF-328 CULVER "V". Stand-Off Scale post War classic. 51" span. 29-35 engines. Stan Hines. FM 4-74 $3.50
CF-331 MOONEY M-18. 69" span stand off scale R/C for Fox Falcon 60 with Goldberg Retract Gears. Stan Hines. FM 5-74 $ 3.50
CF-333 HENRI FARMAN. 1910 antique stand off R/C scale ship for 40-45 mil 2" scale. 47" span. 3 sheets. Vern Zundel $10.00
CF-334 1920 DAYTON-WRIGHT RACER. ½A Pylon or Stand-Off Scale R/C. 30" span. Cox Tee Dee 049. By Bob Aberle. FM 6-74 $2.50
CF-339 BARLING NB-3. 33" span Stand-Off Scale open cockpit monoplane for 010 to 020 engines or rubber power, pulse radio or F/F. Hurst G. Bowers. FM 7-74 $2.00
CF-341 HANRIOT HD 1. WWI R/C Scale biplane. 56" span for Ross Twin or 40 to 60 engine. Tony Eck. FM 8-74 $3.50
CF-348 AERONCA L Stand-Off Scale R/C with 72" span for 45 to 60 engine. Bruce Lund. FM 10-74 $5.00
CF-349 HIPERBIPE. R/C Stand Off Scale. 45" span for 40 engine. Stan Hines. FM 11-74 $3.50
CF-350 CURTISS ROBIN. R/C Scale monoplane. 61½" span. 45 engine. Bill Antoine. FM 11-74 $5.00
CF-357 STUKA JU-87 Stand Off Scale R/C for 60 engine. 64" span. Tony Eck. FM 1-75 $3.50
CF-364 EAA HEADWIND. Brilliant stand-off scale R/C for 15 engines. 48" span. by Al Wolsky. FM 4-75 $2.50
CF-373 LINCOLN SPORT. 020 powered 30" span scale classic for pulse/light R/C or F/F. Hurst G. Bowers. FM 6-75 $2.00
CF-375 FOCKE WULF 190D-9 Stand-Off Scale R/C. 62" span, for 60 engines. Tony Eck. FM 7-75 $6.00
CF-377 YAK-9 R/C Stand-Off Scale for 60 engines. 61" span. Dan Reiss. FM 8-75 $3.50
CF-386 GRUMMAN SKYROCKET Stand-Off Scale R/C twin engine experimental. 56" span and two 29-40 engines. Nick Ziroli. FM 10-75 $3.50
CF-380 BD-6 Stand-Off Scale R/C for 19 to 35 engines. 56" span. Bob Aberle. FM 9-75 $3.50
CF-389 HEINKEL He-162 Stand-Off Scale R/C with 55" span for Scozzi 40 Turb-Ax 1 ducted fan. Nick Ziroli. FM 11-75 $5.00
CF-391 SOPWITH PUP Stand-Off Scale R/C WWI biplane with 59" span. 60 engine. Jerry Puleo. FM 12-75 $5.00
CF-396 DEWOITINE D-510 Stand-Off Scale R/C with 69" span. 40-60 engine. Alan Spievack. FM 2-76 $3.50
CF-397 JUNGSTER II Stand-Off Scale R/C EAA Homebuilt with 50" span. 19-29 engine. Al Wolsky. FM 2-76 $3.50
CF-400 HAWKER HURRICANE Mk-1 R/C Scale with 61" span for Ross 61 engine. Tony Eck. FM 3-76 $5.00
CF-403 P40 "WARHAWK." R/C Stand-Off Scale, 56" span, 60 engine. Dan Reiss. FM 4-76 $3.00
CF-406 BOULTON-PAUL DEFIANT R/C Stand Off Scale fighter. 60 engine, 60" span. Dan Reiss. FM 5-76 $3.50
CF-407 BIG "GERE SPORT." 60 powered 54" span Stand-Off Scale R/C biplane. Dr. J. Makovich. FM 6-76 $3.50
CF-413 FARMAN 400 MONOPLANE 020 powered light R/C or F/F. 38" span. Hurst G. Bowers. FM 8-76 $2.00
CF-418 MONOCOUPE 90A Stand-Off Scale R/C classic with 72" span for 45 engine. Frank Dellamura. FM 9-76 $6.00
CF-425 DEWOITINE D-520 R/C Stand-Off Scale WWII fighter for 60 engine. 62" span. Dan Reiss. FM 12-76 $3.50
CF-431 GRUMMAN KITTEN G-63 48" span R/C Stand-Off Scale ship for 40 engines. Bob Aberle. FM 2-77 $3.50
CF-434 NAKAJIMA KI-84-1a HAYATE 54" span Stand-Off Scale R/C for 60 engines. C.S. Hines. FM 377 $3.50
CF-441 BERG O. AVIATIK D-I Austrian WWI SOS R/C Bipe with 40" span for 35 to 40's. Frank Dellamura. FM 6-77 $3.50
CF-446 FOKKER T-2 Stand-Off Scale R/C with 66-inch wingspan for 40 to 60 engines. Don Martin. FM 7-77 $3.50
CF-452 DOUGLAS A-1H SKYRAIDER Stand-Off Scale R/C for 60 engines with a 58" span. Rolled plywood fuse. Dan Reiss. FM 10-77 $3.50
CF-454 DC-3 SOS R/C twin for two 45 engines with a 96" wingspan. Tony Lombardo. FM 11-77 $5.00
CF-462 CP-65 PORTERFIELD COLLEGIATE SOS R/C ship with a 74" span for 35 to 45 engines. D.B. Mathews. FM 2-78 $5.00

RADIO CONTROL

CF-158 BOONDOCK BIRD. R/C trainer with 52" span for 15-19 and Hallco gear. McGovern. FM 4-69 $3.00
CF-2 RAVEN. 54" RC ship with fat fuselage, holds PREY glider releasable in flight. Single channel RC. 09-19. By Don McGovern. FM 4-65 $3.00
CF-4 FAIRFIELDER. Low wing R/C design. 67" span. 45 R/C. Phil Ostilio. 2 sheets. FM 2-62 $5.00
CF-5 CITATION. Multi R/C by John Roth. 63" span, 35-45. High wing, fast assembly. FM 8-62 $5.00
CF-7 RIDGE HAWK. Proportional R/C trainer. Fun ship. 72" span. 19-35 power. John Tudor. FM 8-63 $5.00
CF-11 RIDGEHOPPER. 15-19 high wing. 58" span. Trike gear. R/C single. FM 10-62 $5.00
CF-12 GENIE. Single R/C fat fuselage with 59" span. Don McGovern. FM 2-64 $5.00
CF-21 SKYLINER. Class III R/C. 45 shoulder wing design. By Marty Meyer. FM 9-65 $5.00
CF-22 TEMPO. Class III multi winner. 68" wing. By Phil D'Ostilio. FM 6-65 $3.50
CF-32 MARK 8. Class 3 multi design R/C 67" wing. 60 engine. By Paul Foster. FM 4-66 $3.00
CF-35 TOUCHDOWN. R/C low wing sport model for small fields. 42" wing. 049. By B. Petersen. FM 4-66 $2.50
CF-42 LUCKY 2. Class 2 R/C 60". 45. By Gene Rogers. FM 7-66 $3.00
CF-48 PATRIOT II. Low 62" wing class II, 61 mil. Bosch airfoil, proportional R/C. Joe Foster. FM 8-66 $3.00
CF-50 B.I.R.D.S. SPECIAL. Class III R/C. 60 mil. Uses any standard foam wing. By Dallas Moran. FM 10-65 $3.00
CF-54 KOBRA II. Class II RC hi-stab with 60" wing. 29-35 competition model. Gene Rogers. FM 10-66 $3.00
CF-72 DEFENDER. Class II parasol wing. 65". Removable tray for R/C gear. 45. Gene Rogers. FM 4-67 $3.00
CF-77 PIRATE III. Twin tail mid-wing. 60" wing. 45 mil. By Nick Ziroli. FM 5-67 $3.00
CF-100 SKIPPER. 31" span sport flyer for single channel 1/2A and small R/C. By Vince Micchia. FM 12-67 $2.00
CF-105 BANTAM KOBRA. Small proportional R/C with 23 power. By Gene Rogers. FM 1-68 $4.00
CF-110 X-103. Sport & experimental for Hallco R/C 103 gear. Elevators & ailerons. 23. Ziroli. FM 2-68 $3.00
CF-116 DEVASTATOR. 66" span multi-contest with Enya 60 R/C. By Gene Rogers. FM 4-68 $3.00
CF-117 TRIDENT. All weather R/C trainer for 61. Land, water, skis. Wally Zober. FM 4-68 $3.00
CF-134 PROFILE MUSTANG. R/C equipment is buried in foam wing. 45. 56" wing. By Sterling Models. FM 10-68 $3.00
CF-137 TIGER TWIN. 62" span trike geared design for two 23s. R/C. By Gene Rogers. FM 10-68 $3.00
CF-138 JUNKER KLUNKER. Put a 45 to 60 in this Zober design. Looks German. World War I. FM 10-68 $3.00
CF-151 URCHIN. Small R/C sport tail-dragger for 23 and mini-gear. By Gene Rogers. FM 2-69 $2.00
CF-156 VIXEN ACROBATIC. 40" span biplane with inverted 23. R/C design by Gene Rogers. FM 4-69 $4.00
CF-161 SNIPE. R/C sport flyer. 68" span with 56 engine. By Wally Zober. FM 5-69 $3.00
CF-165 BOOMERANG. Big acrobatic Bipe. 58" span. 60-61 R/C. By Wally Zober. FM 3-67 $4.00
CF-175 VERT-A-GO. Rocket assist R/C VTO with 38" span uses 19 engine. By Nick Ziroli. FM 9-69 $3.00
CF-180 ACCELERATOR. R/C sport design for land or water. 50" span for 19-29. By Gene Rogers. FM 12-69 $2.00
CF-187 SWINGER .2. R/C stunt with coupled flaps & elevator, foam 63" span wing. 45. Jack Sheeks. FM 3-70 $3.00
CF-206 RAIDER. 56" span for 40 and larger. MRC Digital. By Jack Sheeks. FM 3-71 $3.00
CF-216 DEE-KAY SPECIAL. Formula II R/C pylon racer. 57" wingspan. Dave Gierke. K&B 40. FM 5-71 $3.50
CF-220 BRAZEN RAVEN. 84" multi pattern R/C. Super Tigre 60. 4 sheets. Dave Gierke. FM 5-71 $9.00
CF-229 RAMPANT. Toledo R/C Pattern Class Winner. 60 mil, wing retracts in tandam. 62". Jerry Worth. FM 7-71 $7.00
CF-236 BANSHEE. R/C design for full AMA or FAI patterns. With Webra 61 and Pro Line gear. By Jim Martin. FM 9-71 $3.50
CF-237 SHOESTRING. 57" semi-scale for Fox 35 mil. By Paul Simons. FM 9-71 $3.50
CF-238 BEHEMOTH. Giant 14' T Tail craft. Takes 29 to 60. By Humphries. FM 9-71 $3.50
CF-239 INDY 500. A maneuvering R/C monster that'll deliver pattern performance. Jack Sheeks' original has 61 Merco and EK Logictrol. FM 10-71 $3.50
CF-249 INTIMIDATOR. RC pattern ship for 60. 7-1/2 lbs. By Marty Meyer. FM 1-71 $3.50
CF-252 D.D.T. Sport R/C design easy and cheap. 15-23. Jack Sheeks, Jerry Caldwell. FM 2-72 $2.00
CF-255 XP-400. Formula II and FAI Pylon Racer. 56" span. 40. Dave Gierke. FM 3-72 $3.50
CF-256 SPRINTER. Sport R/C V tail two channel 42" span for 049 to 15. By Gene Rogers. FM 3-72 $2.00
CF-261 ASTEROID. R/C sport. 61" span. K&B 40. Dick Johnson. FM 4-71 $3.50
CF-266 DREAMER. R/C sport biplane with 38-1/2" upper span. 37-1/2" lower with 40 engine. Don Foster design. FM 6-72 $3.50
CF-269 FAIMEISTER. 65" span R/C pattern ship, 61 powered, retract landing gear. Bob Caplan design. FM 7-72 $5.00
CF-270 ESCAPADE. R/C tail dragger with Goldberg retracts. 60 engine. Gene Rogers. FM 8-72 $3.50
CF-272 JOEY. 64" span R/C. 60 engine. Ply and foam construction. Dick Sarpoulus. FM 8-72 $3.50
CF-289 ME-109. ¼ midget pylon racer 39½" span. Super Tigre 15 with Blue Max R/C. Jack Sheeks. FM 2-73 $2.50
CF-281 SEA VIXEN. 64" span pattern twin boom for 60 power R/C. Jack Sheeks. FM 11-72 $2.50
CF-282 TYCHO 400. Altimeter equipped R/C trainer with Enya 45. Orbit R/C. span 62". McGovern. FM 12-72 $3.50
CF-293 BLUE FLAME. Open pylon racer R/C, 54" span, 505 sq. in. Super Tigre 40 ABC. Dave Gierke. FM 4-73 $3.50
CF-298 MOONROCK. R/C Pattern Delta with 44" span, 46" length. Enya 45. Lou Cubillos. FM 5-73 $5.00
CF-299 GULL. 66" span R/C sport for easy flying. Fox Eagle 60 and MRC 710 radio. Unusual wing. By Dick Johnson. FM 6-73 $3.50
CF-303 TAILGATER. R/C pattern ship. 63" span. Webra 61. Pro Line radio. Rcm air retracts. D'Ostilio. FM 7-73 3.50
CF-310 NORTHERN EAGLE. R/C Pattern. 58" span. 40-51 mil. Dave Gierke. FM 9-73 $3.50
CF-345 DESPERADO. R/C flap equipped 60 powered sailplane with 99" span. For Ross Twin Opposed 60 engine. Gene Rogers. FM 9-74 $5.00
CF-340 LIT SPECIAL. ½A R/C Pylon Racer for Cox Tee Dee 049 with 31" wingspan. V.A. Caluori. FM 8-74 $2.00
CF-367 "NOTHIN' SPECIAL." ½A R/C V-tailed pylon racer with 27" span. Bob Aberle. FM 5-75 $2.50.
CF-383 FLICON R/C Pattern Trainer using Falcon wing kit. 40 to 46 engines. Vince Calouri. FM 9-75 $3.50
CF-405 76 SPECIAL Quarter Midget R/C trainer with T-tail. 15 engine. 36" span. Bob Aberle. FM 5-76 $3.50
CF-410 CANNONBALL Micro-size R/C pylon racer for 020 engine and Cannon Tiny R/C. 22" span. Bob Aberle. FM 7-76 $2.00
CF-415 REVISION "A" Single or two channel R/C trainer. 049 engine, 44" span. Howie Applegate. FM 8-76 $2.50
CF-417 SUPER WHIPLASH R/C Sport Pattern ship with 54" span and 40 engine. Dick Sarpolus. FM 9-76 $3.50
CT-420 SUPER SPAD R/C sport bipe with 38" span for 19-30 engines. Gene Weaver. FM 10-76 $3.50
CF-426 WREN R/C Sport biplane for 15-19 engines. 38" an. Norman Rosenstock. FM 12-76 $3.50
CF-429 INDY RE-TRAINER Sport R/C with a 50" span for 30 engine. Jack Sheeks. FM 1-77 $2.50
CF-435 CHECKERS 64" span R/C Pattern Trainer for 60 engines. Jarold Schmidt. FM 4-77 $3.50
CF-437 THE BASIC BIPE 48" span R/C Sport Biplane for 60 engines. Dan Reiss. FM 4-77 $3.50
CF-438 REISS' ROOSTER R/C Sport Biplane for 60 engines. Dan Reiss. FM 5-77 $3.50
CF-442 LIL' EAGLET 010 Sport R/C with 22" wingspan for mini radios and Cox 010. Bob Aberle. FM 6-77 $2.00
CF-451 DOUBLE TROUBLE Pattern Biplane for R/C and 60 engines with a 54" wingspan. Dick Sarpolus. FM 9-77 $3.50
CF-455 BI-BABY R/C Sport Biplane for 29 to 40 engines. Jack Sheeks. FM 11-77 $2.50
CF-456 THE ACE THREE-TEN 3-channel R/C trainer with a 36" wingspan for 09 and 10 engines. Bob Aberle. 12-77 $2.50
CF-458 THE CHALLANGER A twin-boomed 60 powered R/C pattern ship with a 62" wingspan. Bob Godfrey. FM 1-78 $2.50
CF-459 THE HUNGRY EAGLE An R/C duration model (looks like a F/F ship) for 40's with a 96" span. Dick Sarpolus. FM 1-78 $3.50

SAILPLANES

CF-1 SPOTTER. A/2 Nordic with 79" two piece wing. By Joe Bilgri. FM 4-65 $3.00
CF-14 SEAGULL. Giant 84" wingspread soarer R/C with supplementary 09-15 power. Don McGovern. FM 8-62 $5.00
CF-16 THERMAL QUEEN. Radio control soarer uses Eppler 385 airfoil. 144" span with light wing loading. By Carl Lorber. FM 11-70 $3.00
CF-20 LIL T. R/C 74" glider, rudder only with T tail. By Bob Hahn. FM 6-65 $4.00
CF-34 SCHWEITZER 1-26. R/C 1/6 scale glider with 67" sport canopy. By Dan Lutz. FM 4-66 $4.00
CF-41 SPECTRE WING. R/C flying wing. Thermal soarer with power assist. 15. 92". By McGovern. FM 6-66 $2.50
CF-44 CASTAWAY. Nordic A/1. 51" span. Low cost competition glider. By Joe Bilgri. FM 7-66 $2.50
CF-46 SLINGSBY SKYLARK 4. 119" span, high aspect ratio. R/C slope or thermal. Ira Achey. FM 8-66 $4.00
CF-65 FOAMIN'S BAT WING. R/C modern foam wing soarer. By Rolf McPherson. 72" span $3.00
CF-69 BONG BOOMER. FAI R/C glider, one time world record altitude holder. Maynard Hill. 136". FM 2-67 $4.00
CF-70 THUNDERHEAD. 54" span towline trainer. By Don McGovern $1.25
CF-88 SOAR SAM. A/1 Nordic for NATS, etc. 48" span. By Bill Dunwoody. FM 7-67 $2.00
CF-92 1931 NORTHRUP PRIMARY TRAINER. 72" span R/C glider. By Walt Kessler. FM 8-67 $3.00
CF-99 PEREGRINE. 89" span A/2 Nordic with fibreglass fishing rod fuselage. By Ken Whiting. FM 10-67 $2.00
CF-101 RAINBOW. 100" span R/C power & boom design with power assist, 15 mil. FM 12-67. McGovern $3.50
CF-102 HYPODERMIC NERDEL. A/2 Nordic with 47" span. By D. Mathis. FM 12-67 $3.00
CF-108 LA MILA. '66 NATS winner. Hand launched. By Maj. Mel Allen. FM 2-68 $1.25
CF-112 DANCER R/C Glider, pod and boom, V-tail soarer for thermals. Carl Lorber. FM 3-68 $4.00
CF-118 ENILWOT. A/1 Nordic easy to build with under-slung rudder. By Dick Mathis. FM 4-68 $1.25
CF-120 AMERICAN CROW. A/2 Nordic. 77" wing. Different approach to competition model. Mathis. FM 5-68 $2.00
CF-127 NORDIC EXTRA LARGE. 113" span. Pod with fibreglass boom. By Chet Lanzo. FM 7-68 $3.00
CF-139 MOLLYMAWK. Superstreamlined 108" R/C thermal soarer. Carl Lorber. FM 10-68 $3.00
CF-142 PTERODACTYL. Hand launch lightweight glider. 20" span. By Tom Peadon. FM 11-68 $1.25
CF-148 TRI-BELLE. RC glider, slope, thermal, power. 105" span. By Marley Michaelis. FM 1-69 $3.50
CF-152 TUMBLEWEED. A/2 Nordic. 74" two-piece wing for windy weather. By Dick Mathis. FM 2-69 $2.00
CF-166 GAGGLER. R/C soarer. 117" span. Pod and boom design. By Carl Lorber. FM 11-69 $3.00
CF-169 MISKEET. 149" R/C glider with fibreglass fuselage. By Harley Michaelis. FM 7-69 $3.50
CF-176 SCARAB A/2. Nordic FF with 79" span. Fibreglass fishing rod fuselage. By Dick Mathis. FM 10-69 $2.00
CF-179 U S KID, ZING, FLASH. Three hand launched 18" gliders by Bays, Mathis, Peadon. Great fun. FM 7-70 $3.00
CF-189 INVADER. 15-35 powered sailplane 73-1/2" wing. By Gene Rogers. FM 4-70 $3.00
CF194 HALF MACH. 120" span thermal or slope soarer. Optional power, R/C. By Carl Lorber. FM 5-70 $2.50
CF-201 PRANCER. 12' R/C thermal or slope soarer with fibreglass fuselage. By Carl Lorber. FM 2-71 $4.50
CF-205 HYSTERIA 1000. Class C FF 84". 40. 1000 sq. in. wing area. By Mathis. FM 3-71 $7.00
CF-207 GOB. A/1 Nordic with Jedelsky type construction. By Mel Allen. FM 4-71 $2.00
CF-208 SABRE SOAR. 125" span R/C soarer. Eppler 385 airfoil. By Neil Liptak. FM 4-71 $3.50
CF-209 ATHENA. 80" span Nordic A/2. Glass fuse. Open class winner '66 NATS. Roger Simpson. FM 3-67 $2.00
CF-233 LEAD ZEPPELIN. Sleek A/2 Nordic free flight, 88" span. Tom Hutchinson. FM 8-71 $2.00
CF-243 YANKEE SOAR. 16 ft. span makes it easier to find thermals. Neil Liptak's R/C soarer. FM 10-71 $4.50
CF-244 GAMBIT. A/2 Nordic. Benedek 7457 airfoil, fibreglass rod fuselage. By Kit Bays. FM 11-71 $2.00
CF-250 POACHER. A/2 Nordic FF. 77" span. A beautiful soarer. By Don Chancey. FM 1-72 $2.00
CF-264 THERMAL HOPPER. 120" span FAI R/C sailplane. British design with rudder, elevator, spoilers/towhook controls. Geoff Dallimer. FM 6-72 $3.50
CF-275 QUASOAR. R/C soarer with 146" wingspan. By Neil Liptak. FM 9-72 $6.00
CF-276 SPIRIT OF FREEDOM. Graceful 118" radio controlled soarer. Harvey Michaelis. FM 10-72 $3.50
CF-280 ILLUSION. 120" span R/C wing soarer for towline, winch, slope. Hal Cover. FM 11-72 $5.00
CF-292 BANZAI. Giant 50" span catapult glider by Mike Atwood. Free flight. FM 3-73 $3.50
CF-306 UNDERDOG. Handlaunch glider design by Harry Kruse. 19" span. FM 8-73 $1.50
CF-314 THERMUS. Catapult glider. 36" span. Bob Adair. FM 11-73 $1.50
CF-317 LONG ISLANDER. R/C soarer for slope or thermal. 100" span. Bob Aberle $3.50
CF-337 WILD BLUE. 100" span slope & thermal soarer that fits into a suitcase. Don McGovern. FM 7-74 $3.50
CF-343 FACE SAVER. Handlaunch Glider for tough wind. 16" span. Larry Kruse. FM 8-74 $2.00
CF-359 "SPORT PRO" 100" span R/C soarer with 605 sq. in. area. Harley Michaelis. FM 2-75 $3.50
CF-369 "BOMMEL" 114½ R/C soarer with full wing flaps. Peter Keim. FM 5-75 $4.00.
CF-372 THE WEIRD ONE 119" R/C canard soarer by Dick Sarpolus and Arnie Pederson. FM 6-75 $3.50
CF-378 OCHROMA PYRAMIDALE Nordic A/2 with 70" span. Dave Linstrom. FM 8-75 $2.00
CF-379 EYESORE 116" R/C flying wing soarer with 19 power pod. Don McGovern. FM 8-75 $7.50
CF-385 "98.6" R/C soarer with 98.6" wingspan and a normal disposition. Howie Applegate. FM 10-75 $3.50
CF-401 BACKLASH Catapult Glider with 24½" span. Larry Kruse. FM 3-76 $2.00
CF-408 "DESPERATION." A/1 Nordic glider. 48" span. Bruce and D.B. Matthews. FM 6-76 $2.00
CF-424 BOOMER BUM 78" span Nordic A/2 competition glider. Joe Sloc Slovacek. FM 12-76 $2.50
CF-412 LARS Low Aspect Ratio Sailplane R/C, 74" span. Dick Sarpolus. FM 7-76 $3.50
CF-422 THE HIGHTAILER 100"-span R/C soaring glider by Howie Applegate. FM 11-76 $3.50
CF-443 MOJAVE A/2 NORDIC An A/2 Nordic Free Flighter with an 85" span. Dick Mathis. FM 6-77 $3.50
CF-448 OGAR A SOS Polish powered glider for 049 engines with a 72-inch wingspan. Howie Applegate. FM 8-77 $2.50

R/C SEAPLANES

CF 6 SCAVENGER. Amphibious R/C flying boat for 35-60 engine. 77" wing. Don McGovern. FM 8-62 $5.00
CF-30 SKIPJACK. R/C 35 seaplane with one large float, two smaller. 50" span. Paul Hook. FM 1-71 $3.50
CF-63 PIRANHA. 74" span seaplane for 56 eng. R/C proportional. FM 12-66. By McGovern $4.00
CF-75 DORNIER DO-18KI. 66" span R/C. 19-29, twin engines in tandam, flying boat. By A. Swanston $7.00
CF-76 SEA HORSE. R/C seaplane, twin float amphib. for 45. 67" span. FM 5-67. McGovern $3.00
CF-86 MAKO MONSTER. R/C seaplane. 45 mil. Another McGovern original. FM 7-67 $4.00
CF-94 UNSINKABLES. Foam floats converts big models to ROW. Gene Rogers. FM 9-67 $2.00
CF-123 KOOKABURA. 72" span seaplane for 45 R/C. Willem Arts. FM 6-68 $4.00
CF-132 GRUMMAN WIGEON. R/C scale flying boat for 45 twin. Oscar Weingart. FM 9-68 $5.00
CF-150 MORAY MONSTER. 72" R/C flying boat with retracting floats for 60. Don McGovern. FM 1-69 $5.00
CF-168 SCAMPI. 63" span flying boat for 56 R/C. From Holland. Willem Arts. FM 7-69 $3.50
CF-171 ENSIGN. 60" span R/C float plane uses Enya 45. Gene Rogers. FM 8-69 $3.00
CF-199 SAVOIA-MARCHETTI. Twin hull C/L semi-scale of 1933 flying boat. Make it R/C. Sarpolus & Shubel. FM 9-70 $5.00
CF-211 EDO FLOATS. Semi-scale floats for ROW craft. Convert your land plane. By Aarts. FM 3-67 $1.50
CF-247 LAKE BUCCANEER. Semi-scale R/C flying boat, 15-19 pusher. By Dave Ramsey. FM 12-71 $3.50
CF-263 MADGE FLYING BOAT. 3 channel R/C for 29-45 mil with 57" span. Brent Reusch. FM 5-72 $4.00
CF-290 FALCONEER TEAL. R/C semi-scale amphibian 71" span. 45-60 eng. By Don Prentice. FM 3-73 $5.00
CF-361 SEAWEED R/C seaplane with 65" span. 60 engine. Bob Aberle. FM 3-75 $7.00
CF-393 VIKING Record setting R/C seaplane for 35-60 engine. 77" span. Bryce Peterson. FM 1-76 $3.50
CF-450 THE SEE BEE ½A camera plane for R/C with a 42" wingspan. Dave Katagiri. FM 9-77 $2.50

R/C BOATS

CB-1 GLEN-L SPORT FISHERMAN. 39" R/C boat for electric power. By Jerry Dunlap. FM 7-74 $3.50
CB-2 EZ-Vee 32" wood deep vee for 29 to 40 engines. By Jerry Dunlap. FM 9-74 $2.50
CB-3 FOAMY. 19 powered balsa and foam ski boat. William C. Young. FM 11-74 $2.50
CB-4 "POLYWOG" extended bow. 19-powered R/C run-about. Jerry Dunlap. FM 2-75 $2.00
CB-5 FM AIRBOAT. 26¾" long water-rudder R/C airboat for 15 engine. Jerry Dunlap. FM 4-75 $2.50
CB-6 QUARTER CRACKERBOX 24" wood mono for 15 engines. Jerry Dunlap. FM 8-75 $2.00
CB-7 DEEP VEE DAY CRUISER 36" wood deep vee R/C racer for OPS 40 engine. Jerry Dunlap. FM 2-76 $2.00
CB-8 GREY GHOST 45"-long wood competition deep vee for 60 engines. Robert Staat. FM 11-76 $3.50
CB-9 GREY GHOST 40 A 38" deep vee for 40 engines. Bob and Wally Staat. FM 2-77 $2.50
CB-10 MISURI A 26" long Electric scale German one-man tugboat. Gerald Julian. FM 3-77 $3.50

ORDERING INSTRUCTIONS: Only C series plans are available including some not listed here. For building instructions refer to issue of FLYING MODELS in which article originally appeared. Issue reference is given with most listings. See back issue ad for complete list of back issues currently available. For issues not available, order from dealers specializing in back dated magazines.

CF-352 FIELD KIT. 2 inter-related field boxes to fit compact cars. Bob Aberle. FM 11-74 ..... $5.00

CF-467 WING INCIDENCE INDICATOR An easy to build tool for better flight results. Jerry Smith FM 1-76 **$2.50**

OLD TIMER

+45 HALF-SIZED SCRAM. Old Time replica, July 1938 Flying Aces from original 1938 design by Ray Heit. Free Flight for .020 engines with a 40-inch wingspan. D.B. Mathews. FM 7-77 ..... $2.50

CF-460 SCRAPPY A reprint of the original 1939 Flying Aces plan suitable for R/C assist Old Timer events. FM 1-78 ..... $5.00

CF-463 RAMBLER A reprint of the original 1939 Flying Aces plan suitable for Antique category OT competition. FM 2-78 ..... $5.00

CF-474 RED RIPPER A reprint of the original 1940 FLYING ACES plan suitable for Old-Timer competition. FM 5-78 ..... $5.00

CF-466 DRAFTEE A reprint of the original 1941 Flying Aces plan suitable for Old-timer competition. FM 3-78 ..... $5.00

CONTROLINE SCALE

CF-10 FOKKER D-VII. 33" span WW1 fighter biplane. CL .049-.09. Paul Del Gatto. 2 Sheets. FM 6-64 ..... $5.00

CF-23 SPIRIT OF ST. LOUIS. 46" scale UC. Lindbergh's plane. By Paul Palanek. FM 12-66 ..... $2.00

CF-33 SEA VIXON. Royal Navy jet fighter. 35. 56" wing. C/L scale. With prop. By Jack Sheeks. FM 4-66 ..... $2.00

CF-40 EXTENDED GEE BEE. C/L semi-scale lengthened for better flying. 35" sport. By B. Miller FM 6-66 ..... $2.00

CF-71 LOCKHEED HUDSON. 41" span twin. 19 powered. Scale CL World War 2 bomber. Paul Palanek. FM 4-62 ..... $3.00

CF-84 CURTISS HAWK 75. CL scale 36". 35 French radial engine P-40. Palanek. FM 8-62 ..... $3.00

CF-87 RYAN SC. Semi-scale CL 51" wing. 35 mil. By Jack Sheeks. FM 7-67. Sleek $2.00

CF-106 FOCKE-WULF FW-190. 50" span CL profile WW2 fighter. 35-45 mil. By Jack Sheeks. FM 1-68 ..... $2.00

CF-130 BELL P-39 AIRCOBRA. 56" CL stunt. By W. Simmons. For .35 mil. FM 8-68 ..... $3.00

CF-167 MESSERSCHMIDT ME-109. Near scale 48" span combat CL design for .35 mil. Vince Micchia. FM 6-69 ..... $3.00

CF-185 MESSERSCHMIDT ME-109. Semi-scale CL 52" span for .35 engines. By Jack Sheeks. FM 4-70 ..... $3.00

CF-186 RYAN PT-20. C/L stunt with 55" wing. .35 engine. Famed 2-place trainer. By A. DiMezza. FM 3-70 ..... $3.00

CF-195 MUSTANG P-51. Controline stunt for .35. semi-scale. By Joe Berry. FM 8-70 ..... $2.00

CF-197 F-86D SABRE JET. C/L stunt 54" span with .35 mil. By Bob Lampione. FM 6-70 ..... $3.50

CF-210 MESSERSCHMIDT ME-262. Semi-scale CL .55" span. Single inverted & throttled .35. By Vornolt. FM 67 ..... $2.00

CF-212 STUKA JU-87. Famous German WW-2 dive bomber. C/L for .40 mil. By Jack Sheeks. Semi-scale. FM 7-70 ..... $3.50

CF-228 CHANCE VOUGHT F4U CORSAIR. 62" controline scale. 59-.60 engines. 1-1/2" scale. By Ira Kulp. FM 7-71 ..... $5.00

CF-241 SKY FLY. 2" scale replica of Anton Cvjetkovic's popular homebuilt for CL. Takes .40 mil. Roberts flight control system. By Bob Adair. FM 10-71 ..... $3.50

CF-248 F-14 TOMCAT. CL stunt Navy fighter. 56" span. .35 mil. Vic Macaluso. FM 1-72 ..... $3.50

CF-297 F-105 THUNDERCHIEF. 57" span stunt controline semi-scale for OS Max .40 mil engine. Bob Hunt. FM 5-73 ..... $3.50

CF-354 BOEING F4B-3 Profile C/L biplane, 34" span for .29 to .36 engines. Joe DeMarco. FM 12-74 ..... **$2.50**

CF-395 TYPHOON Semi-Scale C/L Stunter. 56" span, ST .46 engine. Steve Ashby. FM 1-76 ..... $3.50

CF-414 AT-9 JEEP Semi-profile C/L for twin .30's. 56½" span. Jack Sheeks. FM 8-76 ..... $2.50

CF-428 GRUMMAN S-2G TRACKER 63½" span Controline Scale for two .35's or .45's. Steven A. Hall. FM 1-77 **$3.50**

CF-433 HANRIOT-BICHE H-110 PURSUIT Controline sport scale for .35 engines. Wingspan is 48". Dick Sarpolus. FM 377 ..... $3.50

CONTROLINE

CF-3 COMBAT P-38. Profile fuselage u-control craft, twin tail. 29-.35 engines. Zirolli FM 4-65 ..... $2.00

CF-18 JAGUAR. Controline sport for .29 to .40. A fun ship by Fast Richard. FM 12-70 ..... $3.50

CF-24 SHEIK. Controline stunt, inverted gull wing, twin rudders. 35, 53", by Jack Sheeks. FM 6-65 ..... $2.00

CF-28 WHIRLWIND 1. Twin engine profile scale CL. For two .15 to .19. By A.B. Swanston. FM 6-65 ..... $2.00

CF-29 RIVETS. Sport profile C/L Goodyear for .15. 26" span. By Vince Micchia. FM 1-71 ..... $2.00

CF-38 STRAFER. Midwing sport, twin rudder, 40" 45 C/L. By Don McGovern. FM 2-66 ..... $2.00

CF-43 SUPERSONIC STUNTER. Very clean design, swept back 62" wing. 35-.45. Bernard Ash. FM 7-66 CL $3.50

CF-49 ENYA DEMON. 54" span stunt CL. flaps. Racy looking for full pattern on .35. Jack Sheeks. FM 8-66 ..... $2.00

CF-58 LADY FINGER. Goodyear racer. 41" 41" span. By Ira Achey. for .09 eng. FM 11-66 ..... $2.00

CF-59 CHIZLER. Slow stunt pattern flyer CL. Uses Fox 35 engine with shaft extension. 50" span. By Dick Mathis. FM 11-66 ..... $2.00

CF-62 TALON. CL stunt with inverted .35. 56" span. By J. Kostecky. FM 12-66 ..... $3.50

CF-67 SWINGER. Swept wing CL stunt 51" span .35 mil. FM 1-67. By Jack Sheeks $2.00

CF-74 MITSUBISHI ZERO. 40" span profile scale CL for .19-.40 combat or sport. Nick Zirolli. FM 4-67 ..... $2.00

CF-78 EXCALIBER. CL stunt, 51" span, semi-profile for McCoy .40 or similar. FM 5-67. Mathis $2.00

CF-90 STARLIGHT. CL stunt. 56" wing for hot .35. By Charles Mackey. FM 8-67 ..... $2.00

CF-95 PIPER CHEROKEE 140. Semi-scale profile. Easy. By Dick Mathis. FM 9-67 ..... $2.00

CF-98 MAG JET. 44" profile stunt for .29 .35, fast building. By Vince Micchia. FM 10-67 ..... $2.00

CF-103 FOXEY. Twin boom sport for .049-.051 mil .30" span. By Bob Adair. FM 12-67 ..... $1.50

CF-111 NOVI III. 51" span stunt C/L 1st at '67 NATS. By Dave Gierke. FM 2-68 ..... $3.00

CF-113 GRUMMAN TIGERCAT F7F-1. CL profile with two .15's. By Bob Adair. FM 3-68 ..... $2.50

NEW PLANS

CF-482 AURA A stunt controline ship with a 56" wingspan for .46 engines. Bill Bradford. FM 9-78 ..... $3.50

CF-483 MAGNUM 80 A twin .40 powered R/C pattern ship with a 76" wingspan. Dick Sarpolus. FM 9-78 ..... $3.50

CF-484 MISS PHILLEY IV A reprint of the original 1937 FLYING ACES plan suitable for Antique competition. FM 9-78 ..... $5.00

CF-471 THE SLIVER R/C pod and boom soaring glider with a 110" span for slope or thermal flying. Dick Sarpolus. FM 5-78 ..... $3.50

CF-472 HOLY SMOKER FAI .15 competition F/F. 59" wingspan for .15 engines. Joe Slovacek. FM 5-78 **$3.50**

CF-473 P-61 BLACK WIDOW Twin Controline stand-off scale for .049 engines. 34" span. Michael Beaulieu. FM 5-78 ..... $3.00

CF-468 RYSON ST-100 CLOUDSTER Stand-Off Scale R/C motor sailer for .09 .10 engines with a 73½" span. Howie Applegate FM 4-78 ..... $3.00

CF-469 CARE Stunt controline ship with a 51" span for .35 engines. Jack Sheeks FM 4-78 ..... $3.00

CF-470 EVIL WAYS Class A-B contest Free Flight ship for .15 to .23 engines with a 60" span. Mike Hallum Grady Turner $3.50

CF-119 BOOMER. Twin boom stunt, profile for .35 mil. By Vince Micchia. FM 4-68 ..... $2.00

CF-121 FREEDOM 45. CL stunt with 45" span. Foam cored wing, 45 mil sheet covered. Jack Sheeks. FM 5-68 **$2.50**

CF-129 NOVETTE. Swept 48" wing sleek stunt CL design, profile, OS Max .35. Norm Dion. FM 7-68 ..... $3.00

CF-134 SPITFIRE STUNTER. Semi-scale CL 49-1/2" span, .35 engine. By Jack Sheeks. FM 9-68 ..... $2.00

CF-140 COYOTE. Long lean CL stunt for .35-.40. 54" span. By Dick Mathis. FM 10-68 ..... $3.00

CF-141 FURY. Stunt C/L, Fox .35 engine, trike gear, full span flaps. 54" span. By Don Bambrick. FM 2-67 ..... $3.00

CF-144 WINDER. CL combat, 42" span, high speed, for .35. By Terry Prather. FM 11-68 ..... $1.50

CF-147 FORMULA S. 55" span CL stunt. 2nd at Olathe NATS. By J. Kostecky. FM 12-68 ..... $3.00

CF-149 TORINO. 53" span CL stunt, with .35 mil. Modern. By Jack Sheeks. FM 1-69 ..... $2.50

CF-153 SCOTSMAN. 54" span C/L stunt swept wing design with full flaps for .35. Jack Sheeks. FM 2-69 ..... $2.00

CF-160 KING COBRA. C/L .35 slow combat with 48" span. Vince Micchia. Maneuverable. FM 5-69 ..... $2.00

CF-162 PEGASUS. C/L stunt 630 sq. in. 57" span McCoy .40 eng. By Bob Howard. FM 11-69 ..... $3.00

CF-164 KNIGHT. T tailed CL stunt, 52" span, .35 mil. By Jack Sheeks. FM 6-69 ..... $2.50

CF-172 HI-LO. 51" CL stunt trainer. Fast building for beginners. Uses .35 mil. By Paul Palanek. FM 9-69 ..... $2.00

CF-177 KAWASACKI. C/L Controline combat profile for .35. By Vince Micchia $2.50

CF-181 TEAR-A-LONG. Combat CL, small and compact, for Cox .15. By Fast Richard. FM 12-69 ..... $2.00

CF-192 NOVI IV. 55" span controline stunt for .35 mil. FM 5-70. By Dave Gierke $3.00

CF-203 OLD GLORY. Stunt controline 53" span, .35-.40. By Jack Sheeks. FM 2-71 ..... $2.00

CF-213 MYSTERE II. C/L stunt with 55" span, 29-.40 mil. Sensitive. By Jim Van Loo. FM 10-70 ..... $3.50

CF-219 MANGLER. 29-.40 controline all wood sport profile .36" span. Fast Richard. FM 5-71 ..... $2.00

CF-225 VULCAN. CL stunt. Optional foam or build-up wing 56" span. Fox .35. By Bob Lampione. FM 6-71 ..... $3.50

CF-231 MAGISTER. CL profile trainer of French training ship. Fox .35 powered. FM 8-71. By Jack Sheeks $2.00

CF-246 STUNT MACHINE. 2nd Place '71 NATS in a sleek .35 pattern CL. Gene Schaffer. FM 12-71 ..... $3.50

CF-257 DOUGLAS SKYRAIDER. Semi-scale stunt C/L for .35. By Don Typond. FM 3-72 ..... $3.50

CF-258 IRON BUTTERFLY. FAI combat C/L with 33" span by Fast Richard. FM 3-72 ..... $2.00

CF-259 UNITED. Stunt CL for .35, 53" span. Bob Lampione. FM 4-72 ..... $3.50

CF-167 BE-WITCHED. Twin boom stunt controline, 51" span for McCoy .40. Jack Sheeks. FM 7-72 ..... $2.50

CF-262 TIGER MIRAGE. FAI C/L team racer for .15 diesel 33" span. Dave Kelly. FM 5-72 ..... $3.00

CF-265 WARHAWK STUNT. C/L stunt ship for .35-.40 mil with 56" span. By Bill Simons. FM 6-72 ..... $3.50

CF-277 FLY BABY. Semi-scale controline stunt ship, 57" span, .40 McCoy powered. Jack Sheeks. FM 10-72 **$2.50**

CF-283 PINTO. ½A stunt CL for Cox Tee-Dee .049 with 34½" span. Dick Mathis. FM 12-72 ..... $2.50

CF-291 MONGOOSE. Slow combat CL 40" span, .35 mil. By Fast Richard. FM 3-73 ..... $2.50

CF-295 CITABRIA. Profile stunt for .29 to .40 mil. Dick Mathis. FM 4-73 ..... $2.50

CF-301 PLUM CRAZY CASSUTT. Goodyear Team Racer .26 wingspan powered by K&B .15 or other. By Matt Smith. FM 6-73 ..... $2.00

CF-302 VOLUNTEER. 53" stunt controline. McCoy .40. Jim Lynch. FM 7-73 ..... $3.50

CF-303 HURRICANE. Stunt controline with 49" wing and Fox .35 engine. Jack Sheeks. FM 8-73 ..... $2.50

CF-309 EXCALIBUR II. CL profile stunt ship for .40 mil. 51½" span. Dick Mathis. FM 9-73 ..... $3.50

CF-312 U-Z STUNTER. C/L ½-A spy plane stunt ship for O.S. Max .35 .50 span. Joe Adamusen. FM 10-73 ..... $3.50

CF-315 SPIDER. Slow combat controline .42 wingspan uses Fox .36. Lou Woolard and Mike Tallman. FM 11-73 ..... $2.50

CF-316 MISS DARA. C/L stunt with 49" span for Fox .36 engine. Dennis Duvall. FM 12-73 ..... $2.50

CF-322 GENESIS. Stunt Controline winner with 52" span for .35 engines by Bob Hunt. FM 2-74 ..... 3.50

CF-327 P-26 STUNTER. Stunt controline by Jack Sheeks for .35 to .60. 61" wingspan. FM 3-74 ..... $2.50

CF-329 TALON STUNTER. C/L Stunt T-38 with 52" span for O.S. MAX .35 Stunt engine. Dave Reed. FM 4-74 **$3.50**

CF-332 HEINKEL HE-219. Profile twin controline for two .15 engines. 35" span. Joe DeMarco. FM 5-74 ..... $ 2.50

CF-335 ERCOUPE. Profile C/L for .19 to .40 engines. 53" span. Dick Mathis. FM 6-74 ..... $2.50

CF-338 SUNSHINE. C/L Stunter for .35 engines. Andy Lee. FM 7-74 ..... $2.50

CF-342 CLIPPER. C/L Slow Combat, 5 35½" span for .35 engine. Wm. Wiley. FM 8-74 ..... **$2.50**

CF-344 BISHOP. Stunt C/L for .35 to .46 engines. 56" span. Jack Sheeks. FM 9-74 ..... $2.50

CF-347 MACCHI 202 C/L Stunter ST .46. 58" span. Dennis Duvall FM 10-74 ..... **$2.50**

CF-355 METAPHOR I Stunt C/L for .35 engine with 47" span. Bill Bradford. FM 1-75 ..... $2.50

CF-358 P-51B STUNTER C/L mustang for stunting with 60" span and .60 engine. Jim Vornholdt. FM 2-75 ..... $3.50

CF-363 SCORPIO C/L Stunter. 60" span. .46ST engine. Bill Simons. FM 3-75 ..... $3.50

CF-365 PANIC. Stunt controline for Super Tigre .46 mil engine with 51" span. By Jack Sheeks. FM 4-75 ..... $2.50

CF-368 "SKYFIRE" ½A C/L stunt profile for Cox foam wing, 28" span. Larry Renger. FM 5-75 ..... $2.00.

CF-371 ASTARTE Precision C/L Stunter with 63" span and .45 engine. John Hagen. FM 6-75 ..... $3.50

CF-376 MATADOR Fast Combat C/L for .35 and .36 engines. 42" span. Rich "von" Lopez. FM 7-75 ..... $2.50

CF-388 SUNDANCE C/L Stunter with 55" span for .40 engines. Chris Lella. FM 11-75 ..... $3.50

CF-392 MISS JILL Profile C/L Stunter with 52" span, for Fox .35 engine. Jack Sheeks. FM 12-75 ..... $2.50

CF-398 BEARCAT & ZERO Two Profile C/L with 29" span for .09-.15 power. Joe DeMarco. FM 3-76 ..... $2.50

CF-404 SQUIRREL. C/L Stunter, 53" span. .35-.40 engine. Jack Sheeks. FM 4-76 ..... $2.50

CF-409 "METAPHOR II" C/L stunter with 52" span and .35 engine. Bill Bradford. FM 6-76 ..... $2.50

CF-411 TRAGER C/L Navy Profile Carrier. 32" span. .15 engine. Russ Brown. FM 7-76 ..... $2.50

CF-421 THE TORCH 54" span C/L stunter for .35 engine. Dick Sarpolus. FM 10-76 ..... **$3.50**

CF-423 DAZZLER 40 C/L Stunter with 56" span for OS Max .40S. Dave Rees. FM 11-76 ..... **$3.50**

CF-444 THE WILD GOOSE Canard controline stunter with a 48" wingspan for .35 engines. Dick Sarpolus. FM 7-77 ..... $3.50

CF-447 GENESIS 46 MK III Controline stunter, 60" span for .46 engines. Winner of 1976 Nats. R.W. Hunt. FM 8-77 ..... **$3.50**

FREE FLIGHT GAS

CF-15 RAVEN. 1/2A competition ff .049-051 48" parasol wing. By Fast Richard. FM 11-70 ..... $2.50

CF-19 TIME MACHINE. Free flight 1/2A .049 to .051 with 49" span. By Don Chancey. FM 12-70 ..... $2.50

CF-25 WARRIOR 74" span sport design for 15 engine $2.50

CF-26 GNAT. Free flight $1.00

CF-31 SKYSTREAK. Free flight for .29-.35 but adapts to .23 to .40. FM 1-71 ..... $3.50

CF-39 CENTURION. FAI '65 NATS winner. FF 15. Record 34'45" duration. By R. Simpson. FM 6-66 ..... $2.00

CF-45 ROCK-IT-A-GO-GO. Jetex powered contest ship by P. Crowley. FM 7-66 ..... $1.50

CF-47 CARAVAN. 24" span 1/2A free flight easy build. By Joe Bilgri. FM 8-66 ..... $2.50

CF-56 DROP OUT. X-15 style Jetex powered. By Don McGovern. FM 10-66 ..... $1.50

CF-60 HEAT SEEKER. Mk III rocket FF. 28" span. Jetex power. By Ken Whiting. FM 11-66 ..... $1.50

CF-61 TRIGGER. 1/2A contest FF. High thrust line for Cox .049-.051. By Dick Mathis. FM 12-66 ..... $2.00

CF-80 PANDEMONIUM. 1/2A FF with 48" span. Neat design by Fast Richard $2.00

CF-82 WILD GOOSE. FF contest 1/2A engine. 36" span. unusual airfoil. By Bill Cowee. FM 6-67 ..... $2.00

CF-107 TEXAS EAGLE. 77" span FF contest Hi-thrust for K&B .40. By Dick Mathis. FM 1-68 ..... $3.00

CF-115 SOLITAIRE. 1/2A contest FF, for FAI with 44" span. By George Murphy. FM 3-68 ..... $1.50

CF-125 LIL SPOILER. 1/4A FF contest design with 32" span, .020 engine. By Bob Adair. FM $1.50

CF-128 HYBIRD. 60" span FF contest class A with .15 or class B with .23. Bob Adair. FM 7-68 ..... $3.00

CF-131 FIRE FLY. Sport flyer for Jetex 50 Hellcat jet engine. Rocket design. Reid Simpson. FM 8-68 ..... $1.50

CF-133 JALAPENA. FF contest 48" span hi-thrust for FAI .049. By Dick Mathis. FM 8-68 ..... $2.00

CF-135 EAGER EAGLE. Class C FF with 90" span. 40 power. William Harding. FM 9-68 ..... $3.50

CF-145 HYSTERIA 600. 63" free flight with 15 engine. By Dick Mathis. FM 1-69 ..... $3.00

CF-157 C-NECK MYTH. FAI FF design with 62" span. .15 engine. By Reid Hull. FM 4-69 ..... $2.00

CF-178 ONE GRAND. FF class C .80-1/2" span, 1000 sq. in. .40 rear rotor engine. Dick Mathis. FM 2-69 ..... $3.50

CF-191 LASER CHASER. FF 1/2A 48" span with Warren truss multi-spar wing on pylon. Kit Bays. FM 4-70 ..... **$2.00**

CF-196 MIGHTY MOUSE. 1/2A FF payload. 34" span. for former PAA event. Uses .020. Dave Linstrum. FM 8-70 ..... $2.00

CF-218 TORNADO. 48" span 1/2A free flight competition Tee Dee .049. Reid Simpson. FM 5-71 ..... $2.00

CF-221 LIMEY 1/2A POWER. High climbing FF contest design to British formula .049. Dave Linstrum. FM 9-70 ..... $2.00

C-222 GO-CARGO. 48" span free flight for Cox Tee Dee .020. FM 5-71. By Dave Linstrum $2.00

CF-224 BURRITO. FF for A-B with 65" span. 23 mil. By Tom Hutchins. FM 6-71 ..... $3.50

CF-242 LIPSTICK C. Al Vela's class C freeflight for .40 mil with 80" span. Union jack construction. Formidable climb trajectory. FM 10-71 ..... $5.00

CF-253 RAMBUNCTIOUS 1040. Class C free flight 1040 sq. in. for .40. Fast Richard. FM 2-71 ..... $5.00

CF-254 RAMBUNCTIOUS 480. Class A/B free flight for .15. 23 mil. 56" span. Fast Richard. FM 2-71 ..... $3.50

CF-268 EXCELSIOR FAI. 1972 FAI Power Nats 1st Place winner free flight. 64" span. K&B or Rossi .15. Seelig Timer. D/T. auto timer. Dave Rounsavalle. FM 7-72 ..... $2.50

CF-271 ZINGO. FAI power free flight for .15 mil engine. Tom Hutchinson. FM 8-72 ..... $2.00

CF-278 DANDYLION. Nifty powered free flight for .049 mil with 36" span. Fast Richard design $2.00

CF-279 PEARL. 450. Class A and FAI power free flight for .15 mil (K&B). Bill Chenault. FM 11-72 ..... **$3.50**

CF-285 SIROCCO 46" ½A contest free flight. Vic Cunningham Jr. Cox .049. FM 1-73 ..... $2.00

CF-288 EXCELSIOR C SPECIAL. K&B .40 free flight B-C power. For 29-.40 2shts. Dave Rounsavalle. FM 2-73 **$4.00**

CF294 20/20. 20" span hand launch glider, 20" length. Larry Kruse. FM 4-73 ..... $1.50

CF-323 MEDICINE MAN. ½A Free Flight Power for .049 engine with 44" span. Jim Clem. FM 2-74 ..... 2.00

CF-351 THROWBACK. F/F Sport. 29" span. .020 engine. Larry Kruse. FM 11-74 ..... $2.00

CF-318 MAXI-PEARL. F/F Power for Classes B-C-D for .29 to .40 engines. 86" span by Bill Chenault **$4.00**

CF-325 STAR SEEKER. Class A-B contest free-flight for .19 - .23 engines. 52" wingspan. Mike Hallum. FM 3-74 **$3.50**

CF-330 JUBILEE. Competition F/F with Old-Timer looks. 74" span. 29-.23 engines. Dick Mathis. FM 4-74 **$2.50**

CF-346 STANDARD Scale type for rubber F/F or .020 and lightweight R/C. 36" span. Hurst G. Bowers. FM 10-74 ..... **$2.00**

CF-362 BAD MEDICINE ½-A F.F. 43" span .045-.051 engine. Mike Ransom. FM 3-75 ..... **$2.00**

CF-381 PARFAI F/F FAI Power. 15 engine. 61" span. Chuck Markos. FM 9-75 ..... $3.50

CF-382 SHINGLESHIP F/F cedar seaplane with 14" span for Cox Tee Dee .010. Henry Sherrerd Jr. **$2.00**

CF-387 ETRICH TAUBE Free Flight Scale antique with 32" span. W.R. Stroman. FM 11-75 ..... $2.00

CF-402 DeHAVILLAND DH-10. F/F Scale. 49½" span, two Astro Flight .020 electric motors. W.R. Stroman. FM 4-76 ..... **$2.50**

CF-416 1910 FABRE HYDRAVION F/F scale seaplane for Cox .020 engine. 35" span. W.R. Stroman. FM 9-76 **$2.00**

CF-419 HELLA-PENO ½-A-A competition F/F with 47" span for .049-.051 engines. Joe Slovacek. FM 10-76 **$2.50**

CF-427 deHAVILLAND DH-6 18" span CO_2 scale Free Flight. W.R. Stroman. FM 1-77 ..... $2.00

CF-449 VALKYRIE MODEL A NO. 1 Free flight electric scale for the Astro Flite .02 motor. 37" span. W.R. Stroman. FM 9-77 ..... $2.50

CF-453 COUNTRY BOY 650 Competition Free Flight for Classes B and C. Engines from .20 to .41. Jim Clem. FM 10-77 ..... **$3.50**

CF-457 FANTASY CO_2 sport free flight with a 21½ wingspan. Larry Kruse 12-77 ..... **$2.00**

RUBBER

CF-37 MIRAGE. Wakefield free flight rubber 51" wing. Top USAF contest winner. By R. Simpson. FM 2-66 ..... $2.00

CF-55 SAM-PAN. Unlimited rubber design 54" span, tubular fuselage. By Dunwoody. FM 10-66 ..... $3.00

CF-68 SKYSCRAPER JR. Unlimited rubber. 36" span. FM 1-67. By E. Hatschek $2.00

CF-73 COMPA-NARD. 300 sq. inch unlimited rubber pusher Canard. By K. Johnson. FM 4-67 ..... $2.00

CF-79 MICHELLE. 53" Wakefield. 40 grams rubber. By Roger Simpson. FM 5-67 ..... $2.00

CF-91 SOUTHERNER. Unl. rubber, folding prop, high aspect ratio wing. 52" span. Simpson. FM 8-67 ..... $2.00

CF-96 MINI. Coupe D'Hiver 33" wing. FF rubber. By Joe Bilgri. FM 9-67 ..... $2.00

CF-124 PSYCHEDELIC TWINS. Rubber. Two plans for indoor flying. Unusual planform. Walt Kessler. FM $2.00

CF-155 ISLANDER. 55" span unlimited rubber for FF competition. By Bob Adair. FM 3-69 ..... $2.00

CF-182 TUBBY T. Great FF rubber by Dave Linstrum. FM 270 ..... $1.50

CF-193 LITTLE LIM. Coupe D'Hiver unlimited rubber uses old Wake motor. Dave Linstrum. FM 5-70 ..... $2.00

CF-202 BUCKER JUNGMEISTER 22" wingspan rubber scale biplane. John Blankenship. FM 2-71 ..... $3.00

CF-217 SPERRY MESSENGER. 20" span rubber semi-scale biplane. John Blankenship. FM 5-71 ..... $2.00

CF-260 CHANCE VOUGHT KINGFISHER. 18" span rubber scale. FM 4-72 ..... $2.00

CF-274 LUCKY PIERRE. 37" span rubber powered Coupe D Hiver. By Don Typond. FM 9-72 ..... $2.00

CF-296 FOCKE-WULF 190 D-9. 17½" span rubber flying scale. By Preston Bruning. FM 5-73 ..... $1.50

CF-300 TWIN FIN. Unlimited rubber design for 16 strands 6mm rubber. 47½" span. By Bob White. FM 6-73 **$2.00**

CF-304 WHIPPET. 36" sport rubber design by veteran Ted Strader. FM 7-73 ..... $2.00

CF-320 BEAU COUPE. 48" span Coupe D Hiver rubber. Bob White. FM 1-74 ..... **$2.00**

CF-336 deHAVILLAND 80A "PUSS MOTH." Rubber scale design by Ray Booth. 24" wingspan. FM 6-74 ..... $2.00

CF-356 2 +2 UNLIMITED Unlimited Rubber F.F. with 45" span. Jim O'Reilly. FM 1-75 ..... $2.50

CF-360 AVRO 511 "ARROWSCOUT" 24" span rubber F.F. George Meyer. FM 1-75 ..... $2.50

CF-366 DRAFT DODGER. 50" span unlimited rubber design by R.J. Dunham. FM 4-75 ..... $2.50

CF-370 "WACO 10" AND "TAPERWING" Two 27" rubber scale biplanes. George Meyer. FM 5-75 ..... $4.00.

CF-374 AMERICAN EAGLE Rubber Scale biplane. 22½" span. George Meyer. FM 7-75 ..... $2.00

CF-384 LUSCOMBE PHANTOM I 23½" wingspan rubber scale classic monoplane. George Meyer. FM 10-75 **$2.00**

CF-390 TUBESTAKE Unlimited Rubber F/F with 50" span. Jim O'Reilly. FM 12-75 ..... $2.50

CF-394 RYAN BLUEBIRD 27" span. Rubber Scale monoplane. George Meyer. FM 1-76 ..... **$2.50**

CF-399 SCORCHER Competition Jetex 50 F/F with 30" span. Stan Chilton. FM 3-76 ..... $2.00

CF-430 LOCKHEED WASP-VEGA 5 "Winnie Mae" 30¾" span F/F Scale for Hytork 48 Electric motor. George Meyer. 2-77 ..... **$2.50**

CF-432 THE WINTERHAWK 42" span Coupe d'Hiver, rubber powered. Jim O'Reilly. FM 377 ..... **$2.50**

CF-436 JUNGSTER II 20" span Rubber Scale biplane. George W. Meyer. FM 4-77 ..... $2.00

CF-440 THE BANDIDO Rubber power d sport free flight 18" span. Stan Chilton. FM 5-77 ..... $2.00

CF-461 JEANNIN STAHL TAUBE 1914 WWI Free Flight scale for CO_2 or rubber power with a 23" span. W.R. Stroman FM 2-78 ..... **$2.00**

ORDERS UNDER $2.50: please add 25¢ handling and postage. Orders $2.50 and over are sent postpaid

CARSTENS PUBLICATIONS, INC. Dept. 1410
P.O. Drawer 700
Newton, New Jersey 07860

I am enclosing check or money order for $ ..... Please send me the plans I have checked below. Give plan number and name. If you do not care to cut magazine, print or type legibly on separate sheet

NAME .....

STREET .....

CITY ..... STATE ..... ZIP .....

Orders outside USA, add 50¢ per plan set. Please print or type legibly. NJ residents add sales tax.

FM CLASSIFIED ADVERTISING

CLASSIFIED ADVERTISING: 25¢ per word, minimum order $3.00. Count all initials as words. Ads payable in advance. Fourth consecutive insertion of same ad is free, upon request. We must have home or business address for all ads using PO Box number. Ads must be received in Newton not later than 10th of the month, three months preceding date of issue, i.e. June 10,1978 for Sept.1978 issue. Send all ads to: Classified Ads Dept. FLYING MODELS MAGAZINE, PO Box 700, Newton, NJ 07860. Ads sent to other departments may be delayed or lost. Classifications are available. All ads set in designated 7 point type with capital letters lead. All ads are accepted subject to the approval of the publisher.

FLYING MODELS SUPPLIES

FOKKER EV, WWI fighter, 84" span complete with engine, winner at Toledo and WRAM show. For price or picture, call or write Mark Minnig, #50 Farmbrook Drive, Old Bridge, NJ 08857. 9-78

BRITISH DIESEL ENGINES, P.A.W., M.E.D.C., E.D., Indian Mills, C/L and R/C. R/C conversions available. Diesel fuel. Veron and Performance rubber and R/C scale kits. Aeromodeller plans, Handbooks, Annuals. H.H. Catalog and Diesel Handbook $2.00 ppd. Hobby Hideaway, Dept. FM, R.R.#2, Delavan, IL 61734. 11-78

AERO HOBBIES - Rubber and CO2 specialists - kits, rubber, accessories from Peck, Vintage Aero, R/N, Classic, Moorehouse, Micro-X, Sig, Lee's, Keil Kraft, Flyline and others. Catalog 35¢ send to: Aero Hobbies, Box 115, East Glastonbury, CT 06025. 11-78

WE ARE CLOSING OUT our entire inventory of Kavan merchandise. You can save from a lot to a fantastic amount on everything in this line. Big Bash Hobby Shop, "D" & Tioga Streets, Philadelphia, PA 19134. TF

GUARANTEED TWIST DRILLS. #50 through #80. $1.50 brings 2 drills, any size, plus particulars. Arvid Anderson, Frederic, Wisc. 54837. 3-79

HAMILTON STANDARD HAND POLISHED aluminum propellers 13", 11" and 9", $6.50 each, $18.00 full set. Wick, 31 Hollister St., Dundee, NY 14837. TF

PLANS

Gee Bee "Z" 2"=1' plans used by Granger Williams $9.00. Gee Bee R-1 2"=1' $14.00. Monocoupe 110 Clip-Wing 2"=1' $8.00. 1940 Culver Cadet 1"=1' $6.00. Hall Racer ½"=1'=13" span $2.50. All construction parts plotted on these plans of established scale accuracy & detail. Just add your own control system for RC, CL, or FF. Ppd./Vern Clements, PO Box 608, Caldwell, ID 93605. 9-78

MODEL PLANS NEW CATALOG-UPDATED. Scale plans R/C, U/C, F/F. Send 25¢ for postage and handling to new address. Hobby Helpers, PO Box 217, Glenville Station, Greenwich, CT 06830. TF

BOATS

SOUSA'S R/C BOATING, Specializing in R/C Boats and Supplies. Catalog $2.00, 9 Wheeler Ave., Melrose, Mass. 02176. Open Eves. 7-10. 662-7237. 10-78

U.S. CANADIAN, GERMAN, SPANISH; Static ship period model kit Italian plans: fittings. Catalog $1.25. Modelismo Naval, 82 S. Rodriguez St., Santa Paula, Guaynabo, P.R. 00657. 9-78

SOUSA'S R/C BOATING, Specializing in R/C boats and supplies. Catalog $2.00. 9 Wheeler Ave., Melrose, Mass. 02176. Open eves., 7-10. 662-7237. 12-78

NEW SPANISH LLAM DIESEL ENGINES and Zoom Diesel Engines. British Diesel engines = P.A.W., M.E., E.D., Kingcat, D.C. C/L and R/C. R/C conversions available. Diesel fuels, Veron and Performance Kits rubber and R/C scale kits. Aeromodeller plans, Handbooks, Annuals. H.H. Catalog and Diesel Handbook $2.00 pp. Hobby Hideaway, Dept. FM, Delavan, IL 61734. 11-78

MODEL YACHTSMEN - proportional control conversion for "probar" or any SCU. . . . "R.C." spinnaker control. . . . Plans $2.00 each, both $3.50. Rainbow, Box 796-F, Westbury, NY 11590. 12-78

FOR SALE

CLUB DECALS - Screened on self-adhesive Mylar. T-Shirt Iron Ons also available. For details send stamped self-addressed envelope. Inky Industries, 10436 West Rae Ave., Milwaukee, Wisc. 53225. 12-78

BUSINESS OPPORTUNITIES

MAKE DURABLE BUILDING PLASTIC easily. Waterproof, Fireproof, economical. Bays Laboratory, Rt. 1, Box 168, Cedaredge, Colo. 81413. 9-78

CRAFTS

IS THE WIFE BUGGED about that nifty new Stuka kit you gave her for Valentine's Day? If she tolerates, but doesn't groove on our hobby take a look at something that's right up her alley - *CREATIVE CRAFTS* magazine. Crafts are all the rage today and six times each year *CREATIVE CRAFTS* can bring the best of the craft world to your lady. There's miniatures, fibre crafts, ceramics, needlework, decoupage, egg craft, decorating ideas and much more. Great for beginners or advanced crafters. So order a gift subscription - it's only $6.00 per year or $10.00 for two years in the U.S. and Canada. Add $1 per year for other countries. Carstens Publications, Creative Crafts Circulation Mgr., PO Box 700, Newton, NJ 07860. TF

WANTED: FLYING ACES MAGAZINE, First issue Volume 1. Must be in at least reasonably good condition. Also other issues of Volume 1. Advise price and condition. Write Harold H. Carstens, Publisher, Flying Models Magazine, PO Box 700, Newton, NJ 07860. TF

Flying Near Airports? Be Careful!

Free Flight or Radio Control flying near airports, or in any situation which might involve the possibility of models being in the vicinity of full-scale aircraft operations, must be avoided—or conducted so as to eliminate any dangerous situations. Models should not be flown in the proximity of full-scale aircraft operations unless the flyer has someone else with him for the sole purpose of watching for full-scale aircraft and supervising the flying so as to prevent accident possibilities.

PROTECT YOUR RIGHT TO FLY!

Safe Flying Is No Accident!

earnest. Making these presentations adds a little zip to an otherwise dull meeting. The DCRC bunch has a whole slew of them which they recently bestowed on appropriate recipients. Cole got his for having the most mid-airs (8) of any member. A lot of people got into the act.

George Steube presented John Judy an award for the Most Folded Wings and then turned around and gave George Younce the Most Improved Junior award. Ed Fitzwater presented Fred Fisher with the Prop Buster award for "holding his finger in a spinning prop longer than any other member." And John Corbin came on to make a number of other presentations: Ed Chidakel got the Screaming Eagle; Bob Snyder, the Endurance (two planes totaled in a single weekend); and, Mayo Smith, the Best-Dressed Flyer. Charlie Calvert then presented John Preston with "a perfect Quarter Scale."

Calvert next presented the Past Presidents Award to Fred Nielson, and Ray Smith discussed the requirements for the Al Montzka Award. Mrs. Margaret Montzka presented last year's winner, Bill Cavanaugh, with a permanent plaque; and Bill then made the official presentation of the Award to this year's winner, Mike Winter. It all goes to show you that you can mix a little fun in with the serious—right?

Winners Told at SE Regionals

Thirty-eight contestants flew five complete rounds at the CSRA Southeastern RC Regionals at Augusta to end the well run meet by 2:00 p.m. and see everyone off for home, awards in hand, by 3:00. The entry reflected a fine turnout from clubs in Georgia, the Carolinas, Alabama, Florida and Tennessee. The host Augusta club provided a total of eight judges with several backups.

Winners in the various events included: Pop Curtis (Star Novice); Lamar Gilbert (Novice); Dave Hoppes (Advanced); Dan Ramsy (Expert); and, Larry Nash (Master). Mike Powers took Scale with his P-47 Thunderbolt in a close contest with George Dixon's J-3 Cub. The Frank Cochrane Memorial (team event) was won by the Lake Guntersville R/C Flyers of Alabama. The award was made on the basis of percent-proportional achievement, and the LGRCF scored 78% of the maximum possible team score. Four teams were eligible in this event. Teams consisted of three flyers.

One of the highlights of the meet was Dixon's spectacular handling of his J-3. He did a 120 to the left, followed by a 120 to the right, right after takeoff and only six inches off the deck--and never strayed off a 25-foot runway. (Thanks to Glenn Fields and the SCRAM Bulletin)

FF Demos in Seattle Kingdome

According to the Bat Sheet, Howard Phillips was finally successful in getting the Seattle Sounders and Kingdome brass to audition a FF demo in the huge facility. About 40 members of the Boeing Hawks and the Kent Strat-O-Bats converged on the dome in mid-April with a representative sampling of most non-gas FF ships. How did the brass react? They loved it. They were fascinated by the strange, silent ballet performed on the astroturf under the half-lit dome as Jim Walters circle-towed an A/2 in tight quarters and Roger Micheals put up a Pennyplane for an 8:00 flight. Other guys flew P-30's, HLG's, Coupes, Scale Rubber, you name it—it was like bringing the whole world of

Free-Flight into a theatre, a spectacle akin to the first Wild West Show. The soccer brass and the Kingdome impressarios quickly arranged for a repeat performance that same evening between the preliminary game and the warmup period. Some 29,000 fans thus viewed the first Indoor Free-Flight Demo in history on April 15, and they loved it, too. More are being scheduled.

Short Snorters

• The Batsheet also reminds us that 1978 marks the 50th anniversary of the Wakefield event—just like FM, eh? Well, ol' Unc'l Eddie's marking his 25th year with this great little mag. Order-up one of the beautiful shoulder patches and help us all celebrate.

• The Montgomery County (Md.) department of Recreation and Planning met with the DCRC Board and briefed them on proposed changes in the Gude Park layout. Apparently no changes are planned which will affect the flying site. DCRC has a maintenance agreement with the county on their McMAP field, and they also lease a site in Columbia.

• In case you haven't heard, Bill Atwood, the motor man, died on April 28th. Bill was working with Cox on a .40 which may never see the light of day. Cox has reportedly shelved the project. In addition to his great line of engines, Bill was also noted as a fine Indoor modeler. His end came after a short illness. He will be remembered as one of the game's all-time greats.

• Bee Williams reports that PRO is continuing to gain members and that plans are proceeding apace for an all-PRO meet at Westover AFB later this year. Interested? Contact Mrs. Williams at 347 Southwick Rd., Westfield, Mass. 01085.

• Ever hear of the Great Trash Can Event? It's held once in a while. The latest on record took place at the Bladder Grabber meet up in Redmond, Washington. Greg Hill flew up from San Diego to win this one. He planted a ship dead-center in the deadly barrel located on the edge of the circle. Ten guys tried; but ol' Greg won in this one-attempt-only event. He lost a ship, but he won an R/C car and radio. (Note: the event is usually scheduled at the end of the program)

• The Illinois Valley R/C boys are readying for their annual Fly-In Breakfast at the Streator Airport. They recently completed another annual—their regular exhibit at the Peru Mall. This year they had 25 planes on display. Incidentally, the Illini have been delayed by the extremely bad weather in their efforts to get the new field on the Nature Preserve site ready. Rolling and seeding operations have now been completed.

• Got a copy of the new AMA Rule Book, and must say that the format and overall production seem eminently practical. It's obviously intended for handy, in-the-toolbox reference and a limited life. It carries a 75-cent price on the cover. Ironically, it's now time to initiate rules-change proposals for 1980. The new book is "good" for '78-'79.

• Looks like Carrier will be added to the events at the Maine meets this summer. George MacArthur reports that work on the carrier is moving right along. The big one is scheduled for August 20th. Write him at 22 Orlando St., Portland, Maine 04106.

• The Birmingham R/C Club has just held a restricted barbecue (restricted to actual flying members only) to celebrate the current season. The idea is to get the guys who do the work together on the site to iron-out the wrinkles before they can become crimps in the program. It's an eyeball-to-eyeball, flying and talk session combined with ribs, beans, and suitable beverages. Outings for families and friends come later in the season.

• We hope to bring you a report on that California 500 Stunt Club meet in Clovis. The meet isn't sanctioned—either by WAM or AMA—but it promises to be one of the best Stunt meets on the Coast. The Sunday meet will be preceded by a Saturday-night banquet, and some of the best flyers are expected to attend. The meet will be flown Novice, Advanced and Expert, and there'll be a Half-A event.

• Out in Lodi, California, Lanny Shorts and Arlie Preszler put on their annual demo at Lockeford School. (Must be their sixth or seventh) Anyhow, the entire school is let out for the happening, and our two heroes play hooky from their work in order to do it. This year they flew five-inch and regular HLG's, a rubber-powered ornithopter, a four-engined Lancaster, a Stunt exhibition and a Combat match. They also fielded an R/C Aeromaster and fired an Honest John rocket. But this wasn't all. The dauntless duo dragged out an electric-powered R/C car and staged a driving competition for teachers-only while the kids shouted their approval. Good show!

• What makes a club successful? Is it size and prestige? The DCRC has had its share of famous and near-famous members. It also runs to around 300 members. Is success to be measured in terms of a financial statement? Some clubs—the Southern Alameda County SACRATS for example—have about ten grand in the bank. Can success be gauged by public acceptance and official cooperation? The Illinois Valley boys—among others—have a fair share of both. Is it longevity? Quite a few clubs go back thirty years. What do all of the above clubs have in common? What is the success ingredient?

• We don't get too many reports on FAI Team Race meets, but Patty's Pinkie reports on one this spring in Union, N.J.—the Flying Bucks Spring Thaw. A total of ten teams showed with about two-thirds of the current U.S. Team among them. The team of Joy/Allbritten took first in 4:15.2. Nelson/Dodge came second in 4:39.5, and Van Sant/Van Sant were third/third in 4:58.8. There were two other same-name teams in the field, too: Friday/Friday and Denny/Denny. These finished fourth and eighth, respectively. The temptation to pun is nearly irresistible.

• Down in Houston, the Line Winders ran Slow Slow Rat (no pun) at their spring Fun Fly. They also ran regular Slow Rat. Bill Lee took Slow in 6:00 even to beat Larry Hoffman and Larry Miller (6:08.5 and 6:31.0). Ron Schark turned 9:29.8 to take Slow Slow. He beat Kyle Tinlin and Bob Jackson (10:19.1 and 10:48.1).

Flying Tigers Dominate Combat

The annual WAM Fun Day at Crown Memorial Park in Alameda featured eight classes of Combat. The Flying Tigers club accounted four first places, five seconds, and four thirds in these events. In ½A Open, it was Rich von Lopez, Ed Bridant and Gary Kearns—all Tigers—in that order. In A Open, it was Bridant, Jo Hsu Wu, and Kearns—all Tigers and in that order. Lopez picked up another first in BC Expert; Bridant, another in Slow Expert. Contributing

seconds were also Rich DeMartini (BC Fast Advanced), Mate Hagstrom (BC Slow Beginner) and Jo Hsu Wu (BC Slow Advanced). Other third places went to Jo and Bridant in BC categories. Talk about your specialists!

In other flying, the Carpenter family took a number of places in the Economy events. Scale winners included Millard Hampton, Don Hollfelder, Don Chandler and (surprise!) Ben Sasnett. (Ben and Patty dropped down for a visit) The Margaridos, Frank Hunt, and Jose Martinez turned some hot times in Speed, and the M&M Team turned 168.31 to win in B Expert. In Stunt, Ted Fancher took BC Expert with a score of 523. In the Advanced and smaller engine classes, it took better than 450 to win. Some of those making it were Dan and Gary McClellan, Bill Fitzgerald, Brian Marshall, Al Montiel and Gid Adkisson. Vic Garner, Ernie Reece and Gary Buffon continued their private war in Ten Mile, and others like Bob Boling, Bill Cave and Ed Jacobs took a few. Sasnett managed another first in Slow Rat and took home a trophy.

Trophies at the Fun Day have traditionally been unique creations. But the event directors are running out of ideas. So someone has suggested that medals be struck for the annual affair. Thus, only the date would have to be changed on each year's crop of awards. It looks like WAM is getting ready to exchange the idea of collector's item trophies for the idea of developing a medal collection. Either way, Fun Day is an institution that'll be around for a long time. Come to think of it, with a card featuring about 70 event categories, medals aren't a bad idea.

Third Annual Atlanta Miniature Offshore Classic

The Atlanta Coca Cola bottler and the Metro Atlanta Model Boat Club joined forces again for this annual Georgia success/**Dan Vincent**

On the weekend of March 18-19, 1978, the Metro Atlanta Model Boat Club hosted their third annual I.M.P.B.A. Atlanta Miniature Offshore Classic race for deep vees. The race was held at Stone Mt. Park, near Atlanta, Georgia. The race was sponsored by the Atlanta Coca Cola Bottling Co., and FLYING MODELS magazine. Heat race prizes were donated by several manufacturers and local hobby dealers.

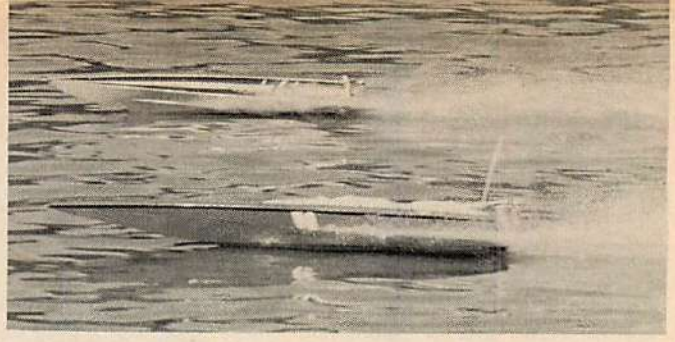
One hundred boats were entered in this popular South Eastern race, which had an impressive number of well known competitors present. For many of the racers, this event marked the start of a new boat racing season.

Heat races were fifteen minutes, using a Le Mans type start. Only the boats which were racing each particular heat were allowed on the starting line, and engines were started after the sound of the starting horn. From the moment the horn blew, the race was on! A manditory pit stop was required of each boat within the first ten minutes of each heat.

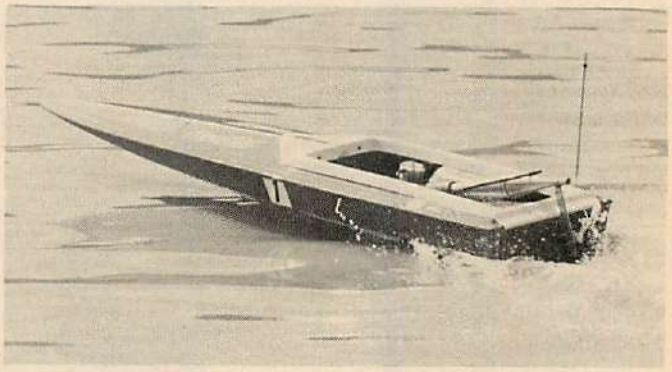
The many spectators seemed to favor the thundering .60 boats, and the racers put on a real show for the crowd. The .60 class had a wide variety of hull designs such as; Dumas, Ekim, 3-D, Sightler, Wardcraft, and a few I did not recognize. The O.P.S. .60 was the most popular engine used in this class, and

Atlanta's Channel 2 news tapes a segment for their newscast featuring local Stone Mountain boater Mike Whitley (**above**). Fred Gimbel of Baltimore is launching a .20 boat by 3-D (**below**).

PHOTOGRAPHY: DAN VINCENT



Doug Floyd, the High Point winner, is shown here inspecting his .60 Sightler boat after completing a 43½ lap heat **(left)**. Dave Field's Sightler boat (foreground) and Rip Holdridge's Wardcraft dueled many laps.



Winners in the .60 class were (l to r) B. Gettle 5th, Mike Whitley 4th, Rip Holdridge 3rd, Fred Gimbel 2nd and Doug Floyd 1st **(left)**. Dave Field's .60 Sightler hull **(above)** was painted in Coca Cola colors. A great sponsor.

Contest director Harry Jones with sons Dean and Dale. Both boys ran identical boats by Dumas with K&B outboards.

Atlanta Miniature Offshore Classic III

Name	Total laps	Home
Class A (.20)		
1. R. Kyanko	87	Md.
2. Jay Smith	86½	Fla.
3. M. Janes	78	Md.
4. H. Stewart	57	Fla.
5. A. Cooper	52½	Md.
Class B (.40)		
1. R. Holdridge	97	Tex.
2. J. Smith	94½	Fla.
3. D. Floyd	94	S.C.
4. K. Kaler	91½	Md.
5. N. Dicks	83½	N.C.
Class C (.60)		
1. D. Floyd	126½	S.C.
2. F. Gimbel	105½	Md.
3. R. Holdridge	102	Tex.
4. M. Whitley	95	Ga.
5. B. Gettle	92	S.C.
1978 Overall High Point		
*Doug Floyd	220½	S.C.
Rip Holdridge	199	Tex.
Jay Smith	181	Fla.

*Doug Floyd also won the 1977 Atlanta Overall High Point Trophy

clearly dominated the big boats.

In the second heat race on Saturday, Doug Floyd, (1977 Atlanta High Point winner), brought the crowd to their feet when his O.P.S. .60 powered Sightler boat streaked around the course for a total of 43½ laps. Doug backed up his first heat performance with 43 and 40 laps in his final two .60 heats. Doug Floyd was the only competitor to turn more than 40 laps in any class.

Bad luck, which is always a part of racing, seemed to affect the .40 class the hardest. Doug Floyd, Fred Gimbel, Mike Whitley, and Herb Stewart, are a few of the racers which were involved in collisions with their .40 boats that either eliminated or severely limited their accumulation of laps. The .40 class was won by Rip Holdridge with a Wardcraft boat which showed tremendous acceleration on the straights. K&B and O.P.S. were the two most popular engines in the .40 class.

The .20 class was very close, with R. Kyanko (3-D boat) taking first place over Jay Smith (Stewart boat) by a half lap. Herb Stewart, who is always a threat in the .20 class, had trouble getting his O.P.S. 3.5 on the pipe, and discovered, (after the race was over) that the new liner he had just installed in his engine was ported for race car use. The Jones boys, Dean, (age 13) and Dale, (age 11) entered their K&B outboard powered Dumas CF-20 boats in the .20 class, and surprised many people who previously thought that only inboards can be competitive in the .20 class. The majority of entries in the .20 class used the K&B 3.5, with the O.P.S. 3.5 also very popular.

The Metro Atlanta Model Boat Club can be proud of their annual deep-vee race, and they are looking forward to an even bigger Atlanta Miniature Offshore Classic IV.

Limits of R/C hydroplane performance in straightaways

How fast can a hydro go on a straightaway course? Well, it depends on a lot of things. The author takes a look at them carefully and precisely for us/**Ed German**

Every model hydroplane speed freak wants to make his boat as fast as possible, or even break records. The straightaway 40 hydro record was held by John Ackerman (77.002 mph) using a 6.5 cc K & B engine. Bob Finley wrote of his clubmate and himself in FM (September 1977) that they both use slightly modified stock engines obtaining about 2.25 horsepower on 70% nitro. This past year, Don Pinckert's Gator set a new 40 hydro record, among others, at 77.319 mph with a similar engine.

As a newcomer to the model boating world, I've become interested in building fast boats and, necessarily, what makes them fast. I've read all I can get my hands on, built hulls, listened to other boaters. Everywhere tips are advanced as to what makes a fast boat: "Finish the hull smoothly", "Make it light", "Use an Octura prop of pitch-------", "Offset the drive shaft to compensate for engine torque", "Sand the piston to------", "Streamline the entire hull", etc. Are all these suggestions correct? Which one is the most important? How can I break the speed record besides in my daydreams? On which part of my boat do I spend my limited pocket money?

Well, I don't pretend to know all the answers to the above questions. I do know that all the suggestions quoted are legitimate ways of enhancing boat speed. However, there is a means to assess what is important and where you can have the most success in improving the speed of your boat. Good workmanship, of course, must be used.

What we can do is examine the physics of hydroplane essentials and obtain a "feel" for important parameters such as weight, hull size, water drag, air drag, horsepower and engine efficiency. We can gain some insight into where we should spend our time and

Fig. 1a

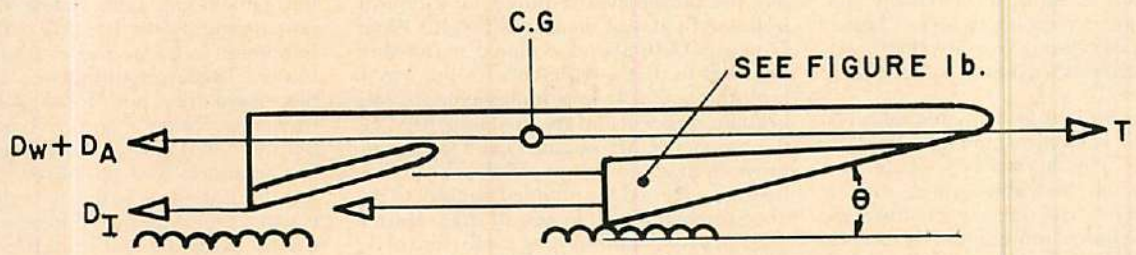


Fig. 1b

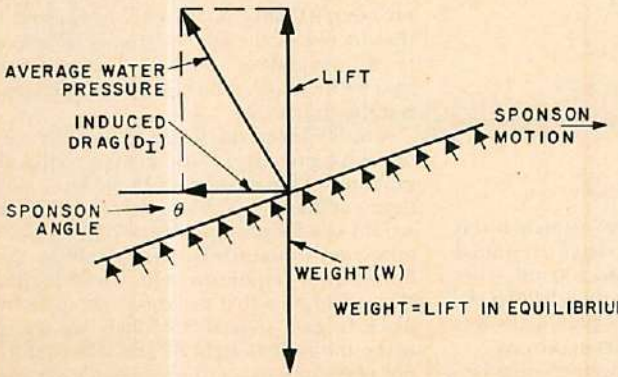


Table 1. Relative and Absolute Horsepower Losses Versus Terminal Velocity (C_W=.1)

Terminal Velocity (mph)	Air To Water Drag Ratio (%)	Induced Sponson To Water Drag Ratio (%)	Propeller Output Horsepower	Drive Shaft Output @ 75% eff
30	2.195	90.80	.2024	.2698
40	2.195	51.07	.3810	.5080
50	2.195	32.69	.6548	.8731
60	2.195	22.70	1.0478	1.3970
70	2.195	16.68	1.5836	2.1115
80	2.195	12.77	2.2861	3.0482
90	2.195	10.09	3.1792	4.2389
100	2.195	8.17	4.2866	5.7155

money; namely, where our efforts will pay off, if at all, besides the satisfaction of building and running a nice hull. The laws of Mother Nature are unbending; we cannot violate them or go around them. If we understand them, we can take advantage of them or reduce negative effects as much as possible.

To these ends, the rest of this article is devoted. We shall find that the most important factors in straightaway hydroplane speed racing of present day hull designs are engine horsepower and underwater hull and hardware drag. Reasonable attention to the hull area out of water (which is most of it) makes it a relatively small contributor to overall drag. Horsepower is an obvious quantity; we shall mean here the horsepower that is delivered from the drive shaft into the propeller. Any shaft inefficiencies (frictional or otherwise) are assumed to be included in the horsepower. Propeller inefficiency is another matter and will be taken into account later by simply using a correction factor. Propeller design is a subject unto itself. Underwater hull and hardware drag includes induced sponson drag, fin drag, rudder drag, drive shaft and universal drag and any other that may be present (hopefully none).

An unexpected result, to the author at least, was the long run needed in the straightaway prior to reaching the timing buoys. If 93%, or more, of the maximum speed of the hull is to be obtained, 500 to 900 feet must be provided for present hulls.

A "characteristic distance" is found for a hull that depends basically on the hull weight to drag area ratio; not on horsepower. More horsepower merely produces a higher "terminal" (maximum) velocity that is approached within 93% over the characteristic distance.

In fact, the weight to drag area ratio is a basic measure of modern model hydroplane performance. The horsepower of modern engines is such that overcoming drag is more important than merely pushing the boat weight when planing at speeds attained today. The ability of a modern hull to reach its maximum speed rapidly is controlled by the weight-to-drag area ratio, not the horsepower-to-weight ratio as often quoted.

In straightaway racing, the weight-to-drag area ratio is not quite as important as in oval heat racing. We must only accelerate to maximum speed (or nearly) and go past the timing buoys. It is not necessary to accelerate up and down rapidly. The weight-to-drag area must be adjusted so that the run to the buoys is within radio range on the course(s) we intend to race upon.

Important problems that will not be addressed are in the "technique" area; means of obtaining the "best" values of the various boat parameters. It is enough for this single article to identify the relationship between them and "good" values. Furthermore, such important items as boat balance and stability will not be discussed. We are after the "hard core" parameters that govern boat performance in straightaway racing.

The propeller of the boat provides thrust T, the force pushing the hull through the water. At terminal (maximum) velocity V_T, the thrust is balanced by the drag forces through the water. As we shall find later, the hull never gets to terminal velocity; it merely approaches it closely after a sufficient run. We shall account simply for the propeller inefficiency and drag by merely using a percent loss from engine horsepower. Two basic kinds of drag can be distinguished: "profile drag" and "induced drag". Profile drag is that due to the hull moving the air or water mass out of the way. Induced drag occurs when list if generated by the sponson angle of attack. Figure 1 shows the model used in calculating boat performance.

Drag forces are the profile air drag D_A, the profile water drag on underwater hardware D_W, and the induced sponson drag caused by lifting the boat out of the water, D_I. The required horsepower out of the propellor, neglecting propellor inefficiency for a moment, to arrive at terminal velocity is

$$HP = \frac{(D_A + D_W + D_I)\, V_T/550}{550} = \frac{(\frac{1}{2}(\rho_A C_A A_A + \rho_W C_W A_W) V_T^2 + W \tan\theta)\, V_T}{550}$$

where

ρA = air mass density
= 2.378×10^{-3}
ρ_W = water mass density
= 1.95 slugs/ft³
C_A = hull air drag coefficient (dimensionless)
A_A = hull area above water in direction of motion in ft²
C_W = water drag coefficient (dimensionless)
A_W = underwater hardware area in ft²
W = boat weight in lb
V_T = terminal velocity in ft/sec
θ = sponson angle with water when planing (submerged part)

Engine horsepower HP_E, in turn, is calculated from

$HP_E = 100\ HP/EFF$

where

EFF= Efficiency of propellor in percent (usually 75-85%).

The method of arriving at the formulas above is given in the Appendix.

With these preliminaries out of the way, we can get to the "good stuff". Let's calculate the horsepower required for a typical hull used today. I measured my .40 Wing Ding (by Octura) and assigned reasonable numbers to drag coefficients for the way I built the boat. Obvious improvements will become apparent and are, no doubt, used by the top racers. My engine is cowled to improve its drag coefficient and the above (not below!) water edges rounded slightly to reduce separation and hence air drag. Here I used an overall hull air drag coefficient of .1. Underwater, I assume things are "reasonably" clean. We shall find out what "reasonable" implies. Let's choose a drag coefficient underwater of .1: the universal is streamlined a bit, the rudder edge is sharpened along with the skid fin and the strut is rounded a bit. Hopefully, most of the drive shaft is lifted out of the water with the surface drive. Those of you familiar with aircraft and boat drag coefficients, will not find my values particularly unusual. Other parameters of the Wing Ding are measured directly with ease.

For my boat, then

C_A = .1
C_W = .1
A_A = 18 square inches of hull above water
= .125 square feet
A_W = 1 square inch below water (sponsons not included)
= .0069444 square feet (1/144)
W = 6.75 lbs of hull weight
θ = 10° of average sponson angle (front and rear)
EFF= 75% Propeller Efficiency (A "guesstimate")

Let's see what these numbers mean in terms of horsepower for the hull to have a terminal velocity over a range of 30 to 100 miles per hour (one mile = 1 statute mile = 5280 feet). At 30 mph the hull is barely planing as it is sitting relatively down on its sponsons.

In Table 1 various hull performance factors are computed for different desired terminal velocities. Calculations can be formed on a scientific calculator or a computer. Figure 2 is a plot of those values which graphically displays the quantitites involved. Immediately, important aspects of straightaway hull design become clear.

High speeds require large horsepower. K & B or OPS 6.5 CC marine engines and others can be coaxed to give in the neighborhood of 2 to 2.25 horsepower with high nitro. My Wing Ding will have a terminal velocity of about 70 m.p.h. However, this velocity is not achieved fully on most courses, as we shall see. Air drag is but a modest 2.2% of the predominant water drag; not much to be gained by spending a lot of time and money on further streamlining. The Wing Ding above water is pretty good as is. Induced drag which is proportional to the hull weight and sponson angle (approximately) becomes a much less important contributor to terminal velocity as the terminal velocity increases. The velocity square law of drag enters rapidly as speed increases. As hull terminal velocity varies from 30 to 100 m.p.h., the induced drag decreases from 91% to 8% of the water drag. At about 2 horsepower, my hull has an induced drag that is 17% of the water drag. Some (small) headway can be obtained by reducing the hull weight and changing the sponson angles. Of course, oval racing performance of the Wing Ding may suffer as the rear sponsons are primarily the ones that must be adjusted. And oval racing is where Wing Dings excel, so you may not want to pay the price. Reducing hull weight is difficult if you've already built the boat. It must be considered at the very beginning of construction.

We've identified the effects of various hull parameters. Let's change the most important one: water drag. We call it the most important factor as modern engines seem limited in power output for a given displacement. The hull is the place for us to look for "easy" improvements. Furthermore, we have borrowed an idea from the engineers and scientists; change only one thing at a time so that we can observe its isolated effect. Let's reduce the water drag coefficient to .05 and keep the underwater frontal area at 1 square inch (or keep the drag coefficient at .1 and reduce the area to ½ square inch). The rest of the hull is identical to that in Table 1. Now we have the new numbers in Table 2 and also shown in Figure 2.

With this one change in our hull we see that a 2 horsepower engine will now put our boat in the 80 to 90 m.p.h. class. Obviously, working on the underwater drag is worthwhile! A factor of two reduction in drag increases the boat terminal velocity by about 20% so we see that increases in boat speed are bought dearly. A factor of 2 in drag reduction increases the speed by only 25% even for a "weightless" hull. The same can be said for increasing the horsepower and leaving the drag as is.

A reduction of the wight to zero (an obvious impracticality) is illustrative of the importance of the drag force. In the last case (a drag coefficient of .05) a zero weight hull would need 2 horsepower at 75% propellor efficiency to attain 90 mph compared to 2.35 horsepower requirement for a 6.75 lb. hull. We quickly see that weight is not an "easy" place to gain speed. Obviously we should make the hull as light as possible, but it is not necessary to sacrifice strength obtained by a few ounces of epoxy or reinforcements. Nothing would be gained. A pound is worth some effort; a few ounces lost using heavier

Fig. 2a horsepower vs. speed

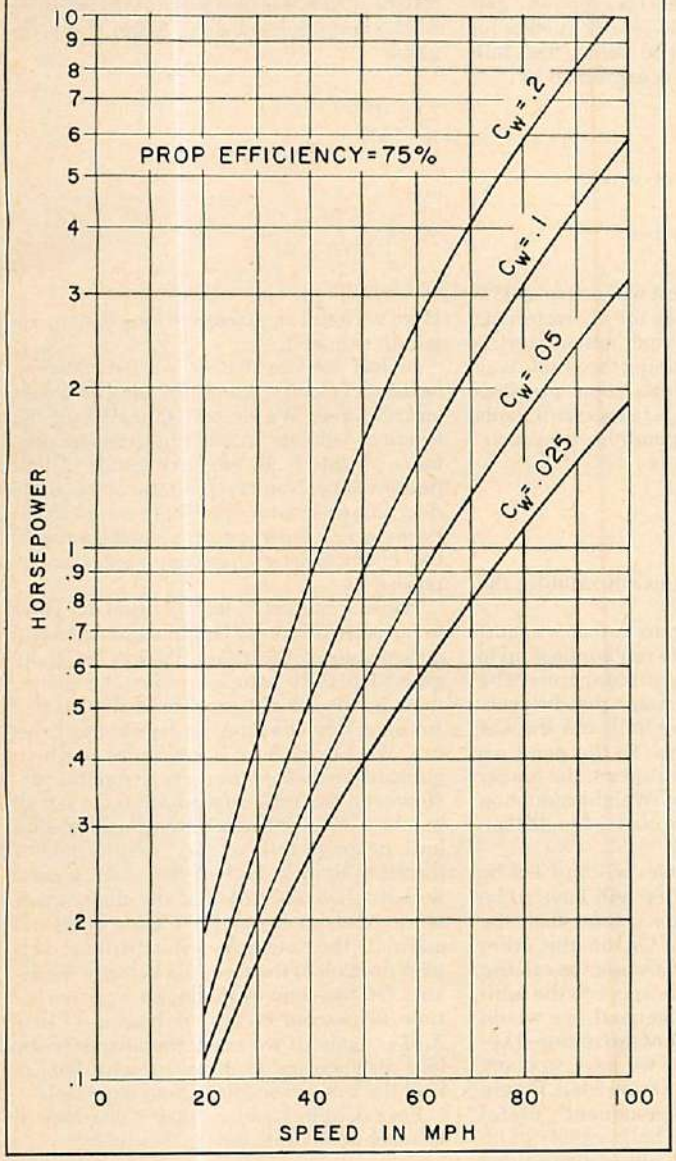


Fig. 2b horsepower vs. speed

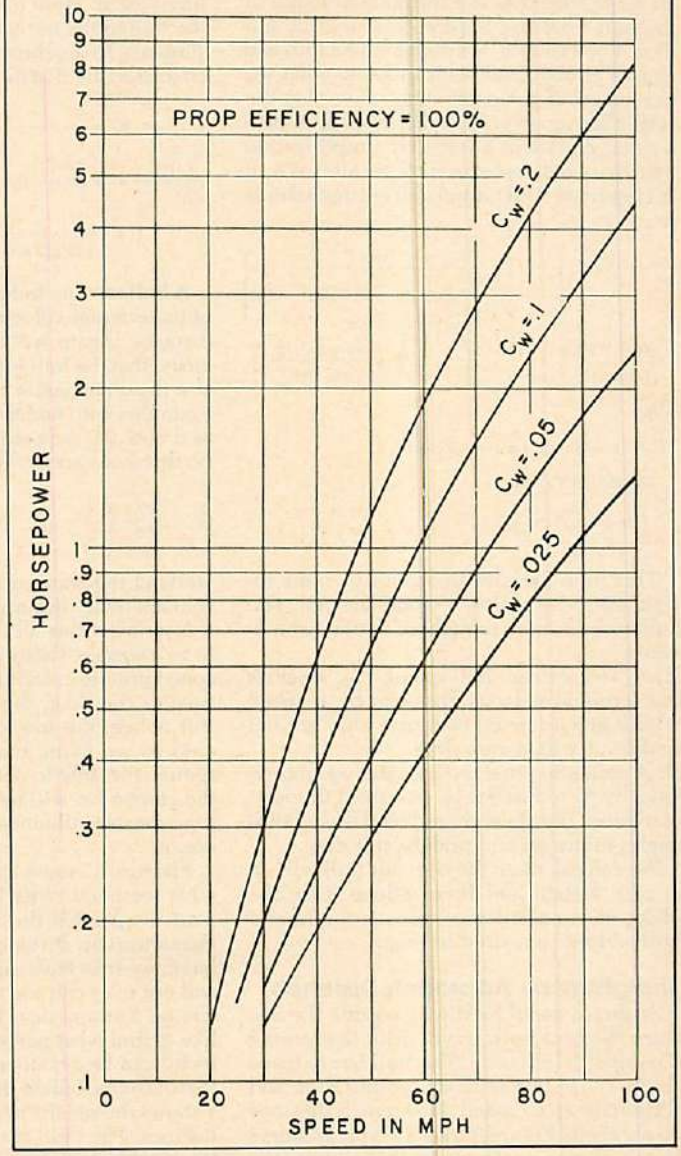
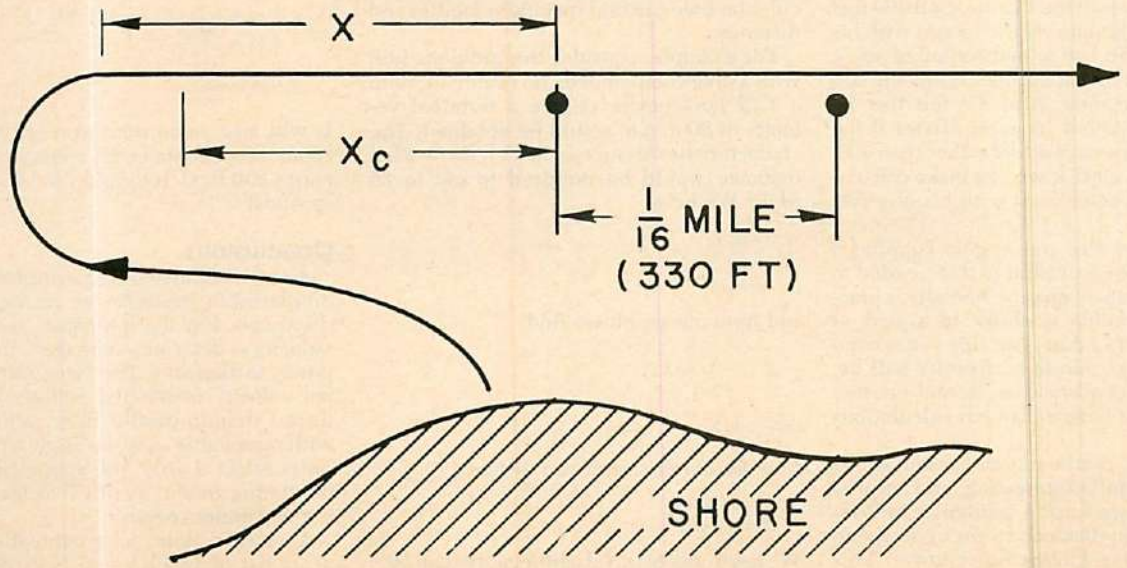


Fig. 3 typical straightaway approach



servos can easily be reconciled.

Sometimes it's of interest, and instructive, for us to calculate the terminal velocity of the hull from the horsepower, weight and drag. For example, we might have a hull and engine already and want to know what we can expect of it. Go get yours. Inverting the earlier horsepower formula is the solution to a cubic equation; a mess! A simplification that gives good *approximate* results for A, B & C engines with tunnel and outrigger hulls is:

$$V_T = V_{TO}\left[1 - \frac{1}{3}\frac{W\tan\theta}{\frac{1}{2}[\rho_A C_A A_A + \rho_W C_W A_W]\,V^2_{TO}}\right]$$

$$= \frac{\text{Zero Weight}}{\text{Terminal Velocity}}\left[1 - \frac{1}{3}\frac{\text{Induced Drag}}{\text{Profile Drag}}\right]$$

with

V_{TO} = Zero Weight Terminal Velocity

$$= \frac{550\ HP_E \times EFF/100}{\frac{1}{2}[\rho_A C_A A_A + \rho_W C_W A_W]}$$

This little formula also gives us some insight into what makes a "good" design. The hull speed can be thought of as two components:

(1) A "weightless" hull speed, V_{TO}, which is the terminal velocity that can be reached with a given horsepower and only air and underwater hardware drag.

(2) A correction that reduces the weightless velocity. It reduces it by one-third the ratio of induced drag (weight reduced by sponson angle) to the air and underwater drag.

We can calculate the best our hull will do at zero weight and then reduce it by the effect of one-third the sponson angle and hull weight compared to drag.

Straightaway Approach Distance

So far, so good! Next we examine the distance the boat must travel prior to entering the timed 1/16th mile. The hull has to leave shore, get in line with the timing zone and accelerate up to speed. How much distance do we need? Figure 3 shows a typical course layout. If we choose too short a course (big pools), the hull will be far from terminal velocity entering the timing zone. On the other hand, long courses (big ponds) are difficult to come by and radio range becomes stretched.

Don Pinkert told me that he used 400 feet of approach when he set the record with his .40 "Gator". He had a total course of about 1130 feet; 400 feet at each end plus the 330 feet of timing zone. Also, he felt that he could have traveled 15 m.p.h. faster if the approach had been 600 feet rather than 400. We shall find out that we can make calculations in rough agreement with his observations.

Let's assume that our engine supplies a constant thrust equivalent to that needed to attain the terminal velocity. Actually, a practical engine builds in thrust to a peak at about maximum r.p.m., but this is too complicated for our purposes. Results will be, then, a little conservative. Actual courses should be a bit longer than our calculations will show.

After some mathematical calculations (Appendix) a quite interesting, and surprising result showed up. A particular hull requires a certain distance to get up to speed regardless of the engine horsepower. This length is the "characteristic distance" of the hull determined by the ratio of weight to effective drag area (the drag coefficient times area). More (or less) horsepower gets the hull to the terminal velocity quicker (or slower). In mathematical terms, the hull characteristic distance is expressed by:

$$X_c = \frac{W}{\frac{1}{2}\rho_A C_A A_A + \rho_W C_W A_W)^*}$$

*Quantities were previously given except g. It is:

g = Acceleration of gravity
= 32.172 ft/sec²

A hull starting from rest will arrive at 93% of its terminal velocity in the characteristic distance. Again we assume, rather capriciously, that the hull is planing the whole way at a fixed maximum thrust. In our previous examples with underwater drag coefficients of .1 and .05, the corresponding characteristic distances are:

X_c = 303.2 ft., C_W = .1
X_c = 593.7 ft., C_W = .05

Halving the water drag nearly doubles the characteristic distance.

Now what this all means is that we must have a sizable distance to run our boat up to speed prior to entering the timing zone. The smaller the drag, the greater the distance. But notice, the low drag hulls are the fast ones as we found earlier. So the more we reduce the drag to obtain speed, the longer the course we will need. Weight reduction has a greater influence on course length than speed.

Practically, some courses will just not be what we need. What price will have to be paid in speed if they are shorter than the characteristic distance? Or, on the other hand, we may have all the water we can use and our eyes can see a fly speck at the horizon on a sunny day. In general, we would like to find what percent of the terminal velocity can be obtained if we have so many feet of course before the timing zone. Figure 4 shows the results in an emminently useful manner. The ratio of the hull velocity of interest to the terminal velocity is given along the bottom of the graph. To the left we read the fraction of the characteristic hull distance that must be traveled to reach the velocity. Knowing the terminal velocity and hull characteristic distance from earlier calculations, we can find specific velocities and distances.

For example, consider the previous hull with a drag coefficient of .05 (Table 2). With a 1.72 horsepower engine a terminal velocity of 80 m.p.h. would be obtained. The characteristic distance is 593.7 ft. Now what distance would be required to get to 65 mph? We have

$$\frac{V}{V_T} = \frac{65}{80} = .8125$$

and from our graph we find

$$\frac{X}{X_c} = .53$$

or $X = .53\,X_c$

Now for our characteristic distance

$$X = .53 \times 593.7 = 314.6 \text{ ft.}$$

We have only to travel a little more than 50% of the characteristic distance to attain 81% of the terminal velocity.

Let's do one more example. What characteristic distance is needed to get to 99% (.99) of the terminal velocity. Again, from the graph

$$\frac{X}{X_c} = \frac{200\%}{100} = 2$$

or

$$X = 2X_c = 1187.4 \text{ ft.}$$

Here we need an extremely long distance to get up to speed.

In fact we see that as we get closer to terminal velocity, extremely long distances are required. We do arrive at 93% of the terminal velocity in one characteristic distance so this is an effective gauge of hull performance. Namely, the ratio of weight to drag area determines how big a course that is necessary. A short course, a small fraction of the characteristic distance, wastes horsepower!

While we are at it, let's petition our clubs to measure off (don't laugh) a thousand feet either side of the timing blocks for those guys that really reduce the drag. Of course, most ponds are not capable of this kind of running, but let's properly lay out those that can. We can pick up a few miles per hour going to the end of the course to start the run. However, the turn might limit us to say 40 m.p.h. For an 80 m.p.h. terminal velocity hull, or graph tells us this is equivalent to traveling to only 16% of the characteristic hull distance. We still need the other 84% or more! Also, on our graph (Figure 4) we can calculate the time from a standstill to whatever fraction of the terminal velocity we desire. On the right of the graph we have the time in percent of the "normalized" time X_c/T_T. Again, if we know the characteristic hull distance and terminal velocity, we can find the time in seconds from our graph.

For example, how long does it take for hull to reach 93% of its terminal velocity?

$$\text{From the graph } t = \frac{165\%}{100} \times \frac{X_c}{V_T}$$

and our previous examples

(V_T = 80 mph = 117.3ft/sec, X_c = 593.7 ft)

$$t = 1.65 \times \frac{593.7}{117.3} = 8.35 \text{ seconds}$$

It will take some time to reach the timing zone; but once its in the zone, it will go the entire 330 ft. (1/16th mile) in less than 2.81 seconds!

Conclusions

A means of assessing performance of hydroplanes in straightaway racing has been discussed. For the most part, the terminal velocity is determined by the ratio of horsepower to drag area. The "weightless" terminal velocity is affected slightly by the induced drag-to-profile drag ratio. Weight, with reasonable sponson angles, is a second order effect. Lastly, the approach length to the timing zone is a critical factor in obtaining maximum speeds.

As a final note, an examination of this years list of IMPBA and NAMBA records (FM Apr. 78/Feb. 78) proves quite interest-

ing. Table 3 is a condensation of these lists. Record speeds don't seem to match the formulas. The jarring discrepancy is the clustering of speeds in displacements ranging from .22 to .670 cubic inches. Horsepowers range approximately from .75 to 4.0; but speeds only transition from 65 to 77 mph. A plausible explanation is that course lengths are too short; characteristic distances of the hulls are longer than the approaches with a resulting waste of horsepower. This has been Don Pinckert's experience and probably that of many others. Most people would not be able to tell that speeds are slowly increasing at the end of the characteristic distance and that the course is too short. I'd like to hear the experiences of other racers. Let me know!

Appendix

Horsepower Equation

Units: lb./ft./sec.

At terminal velocity V_T

Thrust = Drag

or

$$T = \delta V_T^2 + W \tan\theta$$

and

$$\delta = \frac{1}{2}[\rho_A C_A A_A + \rho_W C_W A_W]$$

The propellor output horsepower is

$$HP = \frac{TV_T}{550}$$

Speed and Characteristic Distance Relation

Equation(s) of Motion:

$$\frac{m\,dV}{dt} = \text{Thrust - Drag}$$

m = mass in slugs

W = weight

= mg

$\text{Drag} = \delta V^2 + W \tan\theta$

$$V = \frac{dX}{dt}$$

X = Distance

Solving the differential equation(s):

$$\frac{V}{V_T} = \tan h\,[\delta g V_T t/W]$$

$$X = X_c \ln[\cosh[\delta g V_T t/W]]$$

with

$X_c = W/\delta g$

= characteristic hull distance

Eliminating the time from the speed and distance equations:

$$\frac{V}{V_T} = 1 - e^{-2X\,X_c}$$

Fig. 4 distance and time to velocity

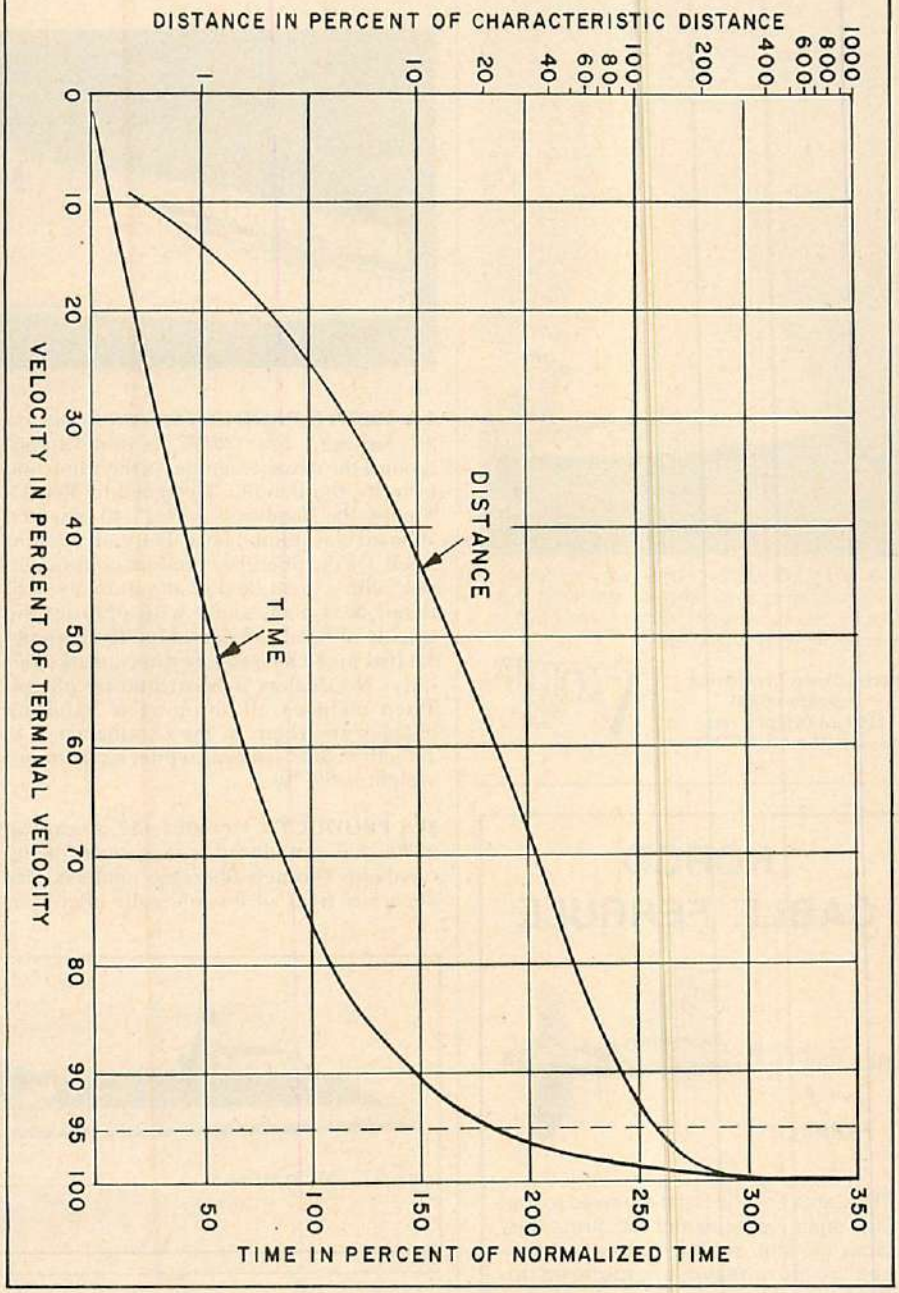


Table 2. Relative and Absolute Horsepower Expenditures Versus Terminal Velocity (C_W=.05)

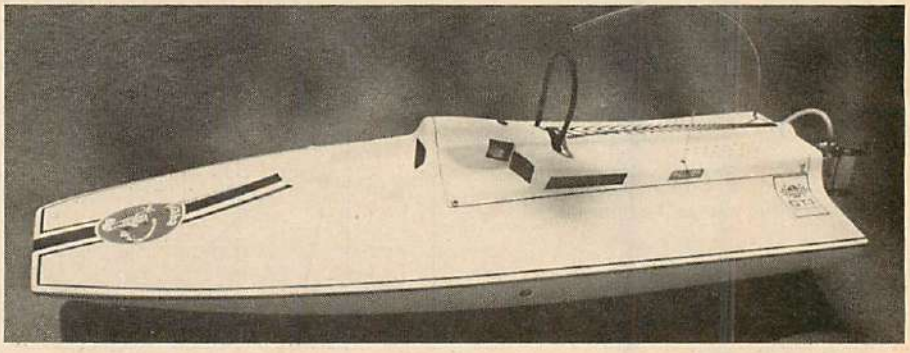
Terminal Velocity (mph)	Air To Water Drag Ratio (%)	Induced Sponson To Water Drag Ratio (%)	Propeller Output Horsepower	Drive Shaft Output @ 75% eff
30	4.39	181.6	.1500	.2000
40	4.39	102.1	.2567	.3423
50	4.39	65.4	.4121	.5495
60	4.39	45.4	.6283	.8378
70	4.39	33.3	.9175	1.2233
80	4.39	25.5	1.2919	1.7225
90	4.39	20.2	1.7635	2.3513
100	4.39	16.3	2.3446	3.1262

Table 3. 1/16th Mile Hydroplane Records, December 1977

I = IMPBA
N = NAMBA

Displacement CM³	Displacement IN³	HP	MPH	Class
1.64	.1	.75	31.142	I-A
3.6(3.5)	.219	1.50	65.78/64.89	I-B/N-A
5.0	.3		68.182	I-C
7.5	.458	2.25	77.002/77.31	I-D/N-B
11.0	.67	4.00	78.397/76.5	I-E/N-C
22.0			82.72	N-D
30.0	1.83		78.671	I-F

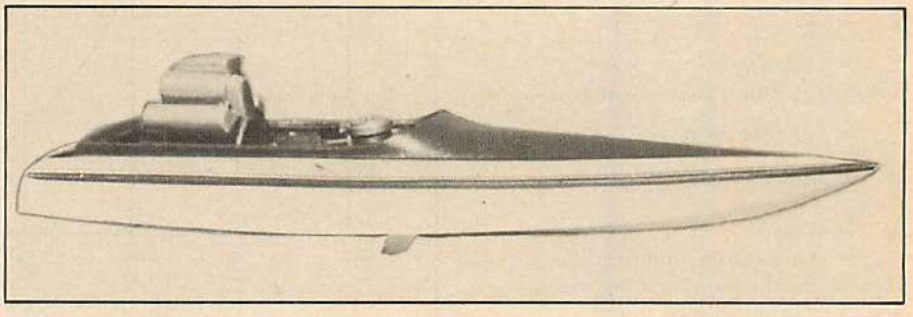
Letter Rip!



LA MONTE PRODUCTS, *2058 Princeton St., Sarasota, Fla., 33577,* is proud to announce the newest member of their fine line of boats, the Bandito. Designed by Ron La Monte, the Bandito is a 31½", 40 powered inboard class tunnel boat. The craft features a full 1½ oz. fiberglass lamination throughout, with a great deal of attention given to detail & styling, along with offering the quality of handcraftsmanship. The Bandito kit lists for $49.95, factory direct, mail order only. No dealers or distributors, please. Price includes all shipping & handling charges anywhere in the continental U.S. Length is 31½", color is white, ready to run weight is 8½ lbs.

JVS PRODUCTS, *P.O. Box 452, Anza, CA 92306* has introduced a new scale racing runabout. This new fiberglass model is a far departure from what is normally offered in the industry, it comes with a fiberglass radio box and a simulated 427 Chev. engine to add a touch of realizm to a well designed, beautiful mono racing hull.

The Scale "K" is thirty six inches long, eleven and one half inches beam, and weight is a fraction under four pounds. Made for engines .35 to .65 c.i. it comes bonded together with engine stringers and keel batten installed. Speed and handling are excellent while ease of set up make it ideal for the beginner, the performance make it a must for the expert competitor. The Scale "K" comes with two tone gell coat finishes in most metal flake and solid colors at no extra cost. Excellence in workmanship prevails throughout this model and at last here is a mono which looks like a real boat. For more information contact J.V.S. Products at the above address. The JVS Scale "K" sells for $89.95.



22 easy ways to build museum-quality wood ship models.

SCIENTIFIC

Our 50th year

The famous ship model fleet from Scientific is designed to make assembly easy. All feature pre-carved wood hulls and decking, hardwood masts and yards, precision cast metal fittings, rigging cordage, antique cloth sails, wood display stand and pedestals, and easy-to-follow, step-by-step instructions.

Send for complete color catalog 25¢

At your hobby dealer or order direct adding $1.50 post. & handl. (N.J. residents add 5% tax) from:

Quality Hobby Kits Since 1928

SCIENTIFIC MODELS INC.
340 MF Snyder Avenue, Berkeley Heights, N.J. 07922

Kit 165, Sovereign of the Seas Clipper, 24", $29.95

Kit 166, USS Kearsarge Gunboat, 27" $34.95

Kit 163, Cutty Sark Clipper, 23", $29.95

Kit 164, Bluenose Schooner, 24", $29.95

Kit 167, Flying Cloud Clipper, 14", $14.95

Kit 168, Eagle, USCG Ship, 13", $14.95

Kit 169, HMS Bounty, 14", $14.95

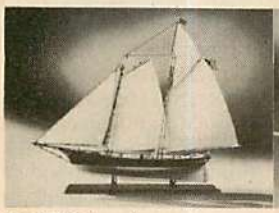
Kit 170, USS Constitution, 15", $14.95

Kit 171, Sea Witch Clipper, 28", $29.95

Kit 172, Baltimore Clipper Pirate Brig, 23", $29.95

Kit 174, Cutty Sark Clipper, 15", $14.95

Kit 177, Golden Hind, 20", $29.95



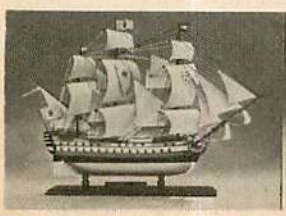
Kit 178, America Schooner Yacht, 17", $19.95

Kit 181, Robert E. Lee Steamboat, 25", $39.95

Kit 182, Thermopylae Clipper, 31", $59.95

Kit 183, Charles W. Morgan Whaler, 18", $29.95

Kit 184, Spanish Galleon, 20", $34.95



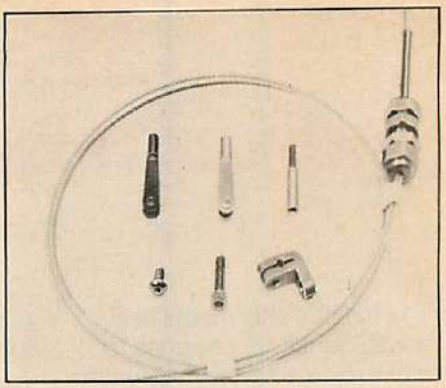
Kit 185, Man'O War, 17", $29.95

Kit 186, Cutty Sark Clipper, 12", $9.95

Kit 187, USS Constitution, 12", $9.95

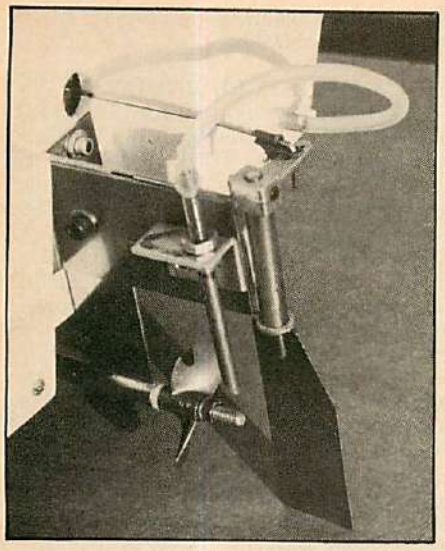
Kit 300, USS Constitution, 28", $49.95

Kit 301, Santa Maria Flagship, 20", $19.95

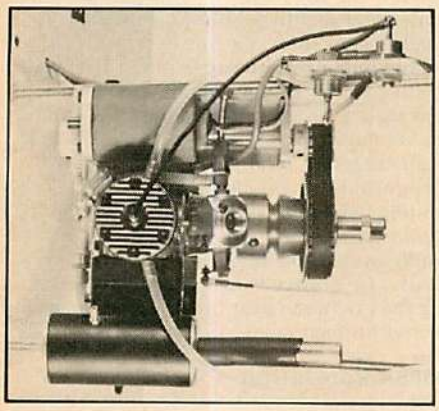


K&B MANUFACTURING, *12152 Woodruff Ave., Downey, CA 90241* has made available their Exhaust Throttle linkage kit for the K&B 3.5 outboard engine. It comes complete with all the parts necessary to hook up from the throttle linkage to the servo. Included are easy to follow, step-by-step instructions, a complete list of parts and an illustration showing the entire hook-up. All parts are called out and identified. Available at most hobby shops.

DUMAS PRODUCTS, INC., *902 East 17th St., Tucson, AZ 85719.* Sure to enhance the popularity of the Star 45 class (an AMYA one design class), this new Dumas fiberglass Star 45 made its debut in January. The new model offers the ease of fiberglass construction with the proven sailing performance of its wooden predecessor (which is still available). An excellent R/C model sailboat for the beginner, the new Dumas Star 45 can also be a very competitive racing boat for the serious racing sailor. The complete kit, which will be on dealer's shelves by May, includes a fiberglass deck and hull for the modeler to join; wood to shape mast, boom and jib club; rudder; keel; keel weight; hatch; dacron sales; complete fittings standing and running rigging. The Dumas-Probar sail control unit #3701, any two channel proportional radio and a 6 volt battery (not included) is all that's needed to be sailing.



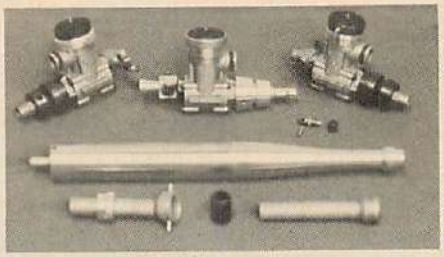
STEVE MUCK'S R/C BOATS, *6003 Daven Oaks, Dallas, TX 75248,* has introduced a new stern drive hardware assembly kit for the Lil Dolphin boat kit. The stern drive hardware set converts the Lil Dolphin #55 to an inboard installation. The kit includes motor mount plate, engine bearers, stainless steel drive and rudder brackets, strut with Oillite bearings, stuffing box, Teflon tubing, rudder, water pickup, engine cable collet, flex-cable assembly with drive dog, thrust washer and propeller nut.



EASTCRAFT SPECIALTY PRODUCTS, MARINE DIVISION, *709 Longboat Ave., Beachwood, NJ 08722,* has introduced, after three years of development, and testing, their Lectra-Starter system that enables you to start your boat remotely while it is in the water, that goes for stalled engines in the middle of a race too. All systems are equipped with a patented clutch assembly which disengages when the engine starts, allowing it to run up to full speed with no power loss.

The complete system package includes all hardware, mechanical, battery and all electrical components. The system requires no extra parts and is easy to install. It features bolt on installation and fits entirely into the model. It is also completely waterproof and is activated by simple servo operation, no extra servos are needed. One battery does it all, no additional glo-plug circuit is needed. 25 to 50 starts can be expected. It is light enough for a .20 boat but powerful enough to start the highest compression engines. It can also be transferred from boat to boat easily.

There are six systems to choose from: 201-B/LT for .15 to .30 engines $84.95; 201-B/STD for .40 to low compression .60's $89.95; 201-B/HD for high compression .60 features heavy duty gears and motor $94.95; Roper engines $109.95; O&R engines $119.95; Quadra engines $129.95. Battery charger is $9.95. For more information contact Eastcraft at the above address or call them at 201/240-3882.



PRO LINE ELECTRONICS, *10632 N. 21st Ave., Suite 11, Phoenix, AZ 85029.* Minimal power is needed to vary speed and direction of D.C. motors with Pro Line Electronics' new electronic speed controller. A linear proportional controller with modern CMOS logic and quad comparator IC's gives proportional and bidirectional control with no mechanical linkages, servos or contacts to service. Fail-safe circuit insures zero speed should transmitter or receiver signals stop. Electrical ratings are dependent on the cooling technique . . . with water cooled heat sinks: maximum 25 amps, 15 amps continuous. Without heat sinks 10 amps continuous. Maximum switchable voltage is 30V. DC. Receiver battery drain is less than 20 ma. For complete details, write Pro Line Electronics at the above address.

BILL'S MINIATURE ENGINES, *1325 Coral Drive, Memphis, Tennessee 38116,* has imported the newest entry into the high powered Class E (IMPBA), Class C (NAMBA) engine for model boating. They are available in .60 cu. in., .61 cu. in., or .65 cu. in. and ringed or ABC. There are two pipes available, muffled or high nitro; also there are liners with non-piped timing and a mini pipe offered. Rated at 3½ horse power at 24,500 RPM this exceeds anything offered in the U.S. at this writing. The granddaddy of them all is the R65RV Marine ABC with muffled pipe and auto mix carburetor at $214.00. Another possibility would be to buy a R65RV Speed ABC and add the pipe, carburetor, flywheel, water cooled head, and U joint of your choice.

The ABC Marine comes with a water cooled head, while the ringed version has a water jacket around the case to cool the liner and case. The ringed piston is a single ring approximately .050" thick, located in the conventional location and will take more nitro and propolene oxide than any ABC. (Ask a good speed flyer.)

The crank is stepped and runs on a 7MM front and 12MM ball bearing at the rear. The crankcase is rugged and the mounting lugs are extremely thick with a good radius which should resist breakage. There is an automix carburetor provided which will allow you to use an extra servo to change the needle settings while running. The pipe extension on the marine engines is water cooled and should enable you to keep a pipe much longer than previously.

This is not the first time Rossi has been involved in boating. The old side port loop scavaged engines ran competitively until the schnuerle ported OPS 60 came along. It even exceeded 70 m.p.h. in the early 1970s. Cesare and Ugo Rossi both move slowly but acutely when it comes to a new engine. Rumor has it that this engine was in the works over three years before shown publically. In Europe they are quickly becoming the engine to beat in tether cars as well as enduro boat racing.

IMPBA Roostertail

The racing season is in full swing with all types of activity taking place. Please consult the FLYING MODELS Timetable in the front of this magazine for the races in your area.

The Indy Unlimited has just been completed with your president getting a little lucky. I didn't believe it either. The top ten

places were as follows: 1, Len Skwiera; 2, Robert Saunders; 3, Conrad Cupit; 4, Jim Fetters; 5, Mike Bryan; 6, Don Bilsky; 7, Dee Hughey; 8, Rip Holdridge; 9, Randy Vitek; 10, Leroy Peterson.

Several significant things took place which are worthwhile mentioning so that other clubs can put them into practice. The Indy club ran 400 boats from 9:30 am to 7:00 pm on Saturday. A number of good practices were the main reason that this could be accomplished.

1. Two pits were set up, one odd and one even. All heats were numbered one through seventy five. If your heat number was odd you went to the odd pit and if even to the even pit. All you had to do was to remember your heat number and you knew where to go without consulting anyone.

2. Each driver received a booklet with all heats posted.

3. The pits were entirely fenced off with only the drivers of the heats allowed in.

4. A special spectator area was set up without any cars or dining canopies in the way to block anyone's view.

5. The judges sat on two tennis judges seats on top of the drivers stand with a clear view of the course. They were also right next to the drivers so that they could be properly notified of all penalties.

6. The transmitter impound was located in the pits. No transmitters were allowed out of the pits. All dead boats were turned off in the retrieve boat so that the next heat got underway as soon as the retrieve boat hit the shore.

7. All judges were prescheduled for four heats so that there was no delay in obtaining them.

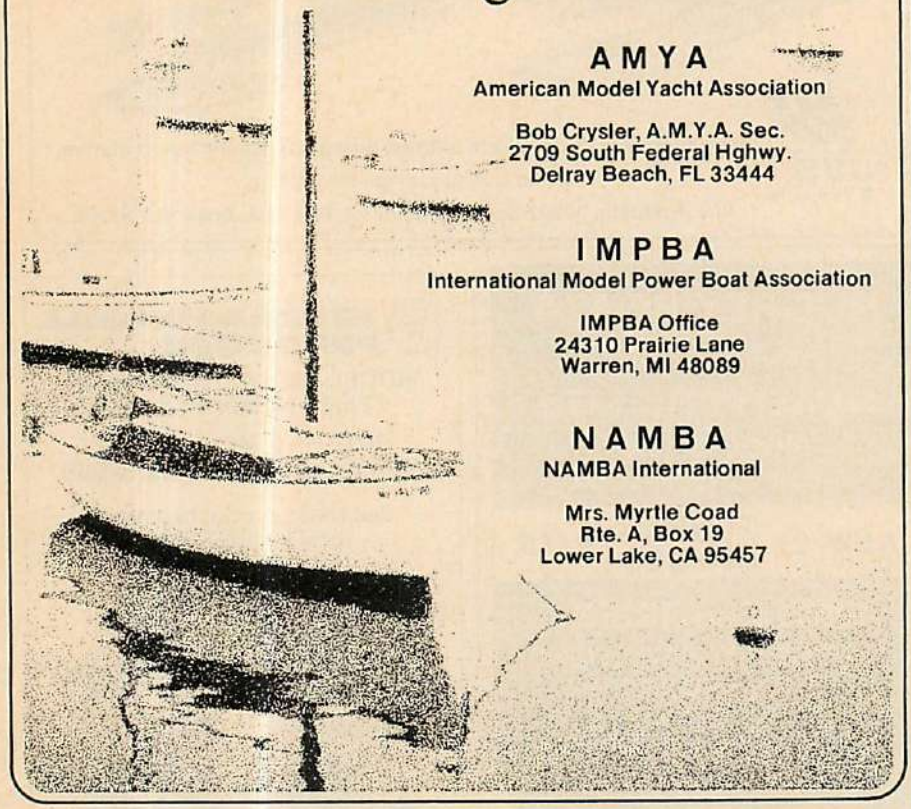
8. Each individual was responsible for checking his score for accuracy within two heats from the time he ran. This eliminated all discrepancies as soon as possible.

All of the above practices aided greatly in being able to run the race smoothly and without time being a problem. All 5 heats of racing were comlete by 1:00 pm in the afternoon on Sunday. There will be a feature article on the Unlimited in a later issue of FLYING MODELS. Be sure to look for it.

I would like to mention to all the IMPBA clubs that a new shipment of safety nets has been received and is now available. They have worked excellently in the past and have saved many times their value in preventing injury and damage to boats. Please consult Pat Bridge for the exact price.

This may be your last chance to sign up for

R/C Model Boating National Organizations



A M Y A
American Model Yacht Association

Bob Crysler, A.M.Y.A. Sec.
2709 South Federal Hghwy.
Delray Beach, FL 33444

I M P B A
International Model Power Boat Association

IMPBA Office
24310 Prairie Lane
Warren, MI 48089

N A M B A
NAMBA International

Mrs. Myrtle Coad
Rte. A, Box 19
Lower Lake, CA 95457

the 1978 Internats. You can be assured of having a great time with the Wolverine Miniature Race Boat Assocaiton (WMRBA) putting on the show. These people are very well organized and will show you a full week of great racing. The pond at Flint is one of the longest in the country and should show us some exciting speeds. The National Championship events start on Tuesday and Wednesday August 8 and 9 with the straight-away and oval trophy trials. The 10th, 11th and 12th will be three days of exciting multiboat racing. The finishing touch will be a great banquet on Saturday night.

By the way, don't forget the Offshore race being held at Lansing on August 5th and 6th. This is only 40 miles away from Flint so be sure to make it.

This is also your last opportunity to get your nominations in for the IMPBA Presidency. This is an important election and you and your club should give it your immediate consideration. I am grateful to those of you who have asked me to run for another term but I must refuse since I have a number of important matters which are going to require my full attention. Thanks guys! For those of you who have complained about too much of the leadership coming from Indianapolis and the Midwest, this is your opportunity to speak up or hold your peace!

This is the last call from our districts for nominations for the Hall of Fame. Please coordinate this through your District Director since each District is only allowed two nominations. A short write-up should accompany the nomination. The voting and presentation will take place at the 1978 Internats.

Well, 'til next month, have a great summer and remember, people are the best part of this hobby—LEONARD SKWIERA, *President IMPBA.*

FLYING MODELS MAGAZINE RECOMMENDED HOBBY CONSULTANTS

DEALERS: WRITE FLYING MODELS MAGAZINE, P.O. BOX 700, NEWTON, NJ 07860 FOR FULL INFORMATION

COLORADO, COLORADO SPRINGS
R/C planes, systems, accessories
We build & fly what we sell
U-C, FF, Rubber, Sig Balsa, etc.
CUSTOM HOBBIES
2408 E. Platte Ave. 634-7400

COLORADO, PUEBLO
Large Stock HO, HOn3, N trains, accessories
Best Lines Brass Imports
Airplanes, RC Gear, Cars, Boats
D & S PAINT CENTER, INC.
715 W. 12th St. 544-4714

CONNECTICUT, BETHEL
Alco, Balboa, Hallmark, Gem, LMB, NWSL, PFM, Suydam, Westside brass imports, Marklin, scratchbuilders supplies.
BETHEL HOBBY SHOP
Bethel Plaza 743-7088

CONNECTICUT, BRISTOL
#1 in Conn. Radio & U-Control. Complete Ass't. AHM, AFX, Lionel, Tyco, Repair Serv. Radio Control Ground School on Premises.
BRISTOL HOBBY CENTER
541 Farmington Ave. 583-7273

CONNECTICUT, BRIDGEPORT
R/C, U/C Speed equipment
Royal Radios, H-B, MEN & all major brands
Weekdays 6-9PM, weekends 9-6PM
SOUTH END HOBBY'S
110 Norman St. 366-5320

CONNECTICUT, NORWALK
We Fly Radio Control
Complete Line Model Airplane Supplies
Custom Ordering
AL'S HOBBIES
54 Chestnut Hill Rd. 846-9090

CONNECTICUT, TRUMBULL
Conn's #1 R/C boat dealer
All Hardware & Radios
J.U.S. 3-D & Futura Glass Hulls
HOLINKO HOBBIES
115 Hurd Rd. 268-7489

DELAWARE, WILMINGTON
All gauges, Model Supplies. Brass Engines, New & Used. Expert repair service. We trade/buy Used Trains. "Del. largest hobby dealer."
HOBBY HOUSE, INC.
Midway Shopping Center 999-0144

FLORIDA, CAPE CORAL
Planes, Boats, Trains, Cars, Crafts Parts & Service. If we don't have it, we will try to get it. Mon-Sat. 9-7, Sun: 12-5:30
A & J MODELS, INC.
Coralwood Mall 542-8858

FLORIDA, FT. MYERS
Southwest Florida's Most Complete Hobby Shop
Mon-Thur 9:30-6, Fri 9:30-8, Sat til 5.
HOBBY WORLD
3920 Cleveland Ave. 939-2255

FLORIDA, LANTANA
Specializing in R/C Boats New/used boats, engines, R/C systems, fittings
"If I don't have it, I'll get it"
LIBERTY NEWS & HOBBY SHOP
121 So. 3rd St. 586-4367

READERS—
If your local dealer does not stock this magazine, or if he continually runs out before you can obtain your copy, send us his name and address and we'll make sure he receives an ample supply.

FLORIDA, ORLANDO
Full Line Hobby Shop
Located in Parkwood Plaza
Open 10 AM to 7 PM, Mon-Sat.
SUNSHINE HOBBIES
3223 West Colonial Dr. 298-4130

HAWAII, HONOLULU
Hawaii's only R/C & U-Control Specialists
Planes, Boats, Cars
Complete selection of hardware & radio gear
THE HOBBIETAT
1423 Tenth Ave. 737-9582

ILLINOIS, ANTIOCH
HO & N Gauge trains, ships, cars, planes
Science Access. for all. If we don't have it, we'll try to get it.
THE HOBBY BARN
Rte. 83, ½ Mi. So. of Antioch 395-4080

ILLINOIS, GREENVILLE
R/C, Planes, Boats, Free Flight, Rockets
HO Trains, Tyco Service, X-Acto, Dremel.
Hrs: M. T. W. Th. & S. 9:30-5, Fri. 9:30-8
WILL-O'-TH'-WIND
603 Harris Ave. 664-3353

ILLINOIS, CHICAGO
Complete R/C Boat Headquarters
Octura, Dumas, M. Specialties, Bishop
Planes, Trains, Doll Furn., Plastic Kits
HOBBYS-A-PLENTY
4075 N. Milwaukee Ave. 777-6559

ILLINOIS, CHICAGO
Boats, Planes, Trains,
Steam Engines castings, Lionel & Amer. Flyer
Try us first this time
SIMONSEN MODEL SUPPLIES
3060 N. Lincoln Ave. 327-1565

ILLINOIS, CHICAGO
Hundreds of Books, Tools & Engines
Complete Line of Model Airplane Supplies
Mon-Fri 12-9 Sat 9-6 Sun 1-4
STANTON HOBBY SHOP, INC.
4734 N. Milwaukee Ave. 283-6446

ILLINOIS, PALATINE
Complete choice of R/C & U Control, Planes, Boats, Cars, Gliders, Rockets & More. Open 7 days: Mn-Fr til 9, St 9:30-5:30, Sn. 12-5
HOBBY HUT
1228 W. Northwest Highway 991-0610

ILLINOIS, PARK RIDGE
Over 100 different brass locos, HO, HOn3, O, N, Traction, Lionel, Flyer New & Used
We trade or buy in any gauge
BILL'S HOBBY & COLLECTORS' SHOP
106 Main St. 823-4464

INDIANA, BREMEN
R/C Plane Specialists - Complete Inventory
HO & N Gauge Trains - Check our prices
Sat. 10-6, Weekdays 1-8, Closed Wed. & Sun.
HEUBERGERS' HOBBY SHOP, INC.
3 blks. N. of US 6 on Ind. 331 546-3807

INDIANA, INDIANAPOLIS
Your one stop Plane, Boat & Car Center
Located Eastgate Shopping Center
Daily 10-9, Sat. 10-6, Sun. aft. in winter
TOM METZLER HOBBY CENTER INC.
7150 E. Washington St. 357-1617

INDIANA, INDIANAPOLIS
Planes, Boats, ⅛ Scale Cars
We service what we sell
Open 7 days
WESTSIDE HOBBIES
5235 Rockville Rd. 244-3297

INDIANA, LAFAYETTE
Airplane Kits & Parts
Radio Control Gear — U-Control
Power Boats, Fittings, Service
WEBER'S HOBBY SHOP
522 Main St. 742-2045

IOWA, MARSHALLTOWN
Sterling, Top Flite, Goldberg, Sig, X-acto, Cox HO, N gauge trains & complete craft dept.
Mon. 12-9, Tues-Fri. 10:30-5:30, Sat. 9:30-5.
HOBBY CRAFT SHOP
118 W. Main St. 752-0809

PLANE MODELERS:
Others may come and go, but your local hobby retailer is in your neighborhood 52 weeks each year to serve you with supplies, materials and kits. He is always ready to help you.

IOWA, PELLA
Visit our new store
Radio Shack Dealer
Mon.-Fri. 9-6, Thurs. to 9, Sat. 9-5
KEN'S PHOTO & HOBBYCRAFT
608 Union 628-4770

KANSAS, WICHITA
Airplanes
And
Accessories
THE MODELER HOBBY SHOP
1726 S. Hillside 681-2941

KENTUCKY, LEXINGTON
R/C, C/L, Planes & Boats
Only 3 mi. from 1-64 & 1-75
A Complete Hobby Shop
X-CELL MODELS INC.
347 Eastland S.C. 254-2406

LOUISIANA, NEW ORLEANS
Tenshodo, United, Gem, Cal-Scale, Etc. Daily 9:00-6:00 for your HO kits, tools, books, parts, supplies, etc. Closed Wednesdays.
HUB HOBBY SHOP
2618 S. Broad St. 822-3914

MAINE, BRUNSWICK
R/C, U/C, F.F.
Trains, Kits, Tools & Supplies
S & T Games, Miniatures, Crafts
BALDWIN'S, INC.
46 Maine St. 725-5440

MARYLAND, BALTIMORE
Baltimore's complete hobby shop. Over 20,000 HO items. Lower Prices. Open M-F 12-8:45, Sat. 10-5:45PM
CITY WIDE HOBBY SHOP
7715 Hartford Rd. NO8-9200

MASSACHUSETTS, MELROSE
Specializing in R/C Boats & Supplies
Most Complete Line in New England
Open Evenings: 7-10, Mon-Fri.
SOUSA'S R/C BOATING
9 Wheeler Ave. 662-7237

MASSACHUSETTS, SHARON
South Shore's finest hobby store.
You can get it here. O, HO, S, N gauge.
Open daily 12 noon to 9 PM.
SHARON HOBBY
124 E. Foxboro St. 784-5724

MICHIGAN, EAST DETROIT
Radio Control, Plane Kits, Engines
Boats & Fittings
Dremel, Unimat, Etc.
JOE'S HOBBY CENTER
17900 E. 10 Mile Rd. 773-8294

MICHIGAN, DEARBORN
Radio Control, Plane Kits, Engines
Boat & Fittings,
Dremel, Unimat, Etc.
JOE'S HOBBY CENTER
7845 Wyoming Ave. 933-6567

BOAT MODELERS:
When you are traveling between patches of blue water, take along a copy of FM and check out hobby retailers away from home. You'll meet fine people who stock interesting products.

MICHIGAN, FARMINGTON
Radio Control, Plane Kits, Engines
Boats & Fittings
Dremel, Unimat, Etc.
JOE'S HOBBY CENTER
33419 Grand River Ave. 477-6266

MICHIGAN, GRAND RAPIDS
Scale & Tinplate O — S — HO — N OP layouts. Auth. Lionel — AF — Tyco — AHM — PFM Sales & Service Open 9:30-9 except Sunday.
CARL A. MEYERS HOBBY HOUSE
2136 Plainfield Ave. N.E. 363-8347

MINNESOTA, MINNEAPOLIS
Specializing in R/C Boats,
Historical Scale Ships
Fitting & Hardware
MODEL MARINE PRODUCTS
3015 E. Franklin Ave. 341-4087

MISSISSIPPI, LAUREL
Your Complete Airplane Shop
Fox Engines, Enya Engines, Sig Planes and Parts RC Boats, Cars: Ace RC Dealer
HOBBY CORNER
1534 N. 1st Ave. 649-7378

NEW JERSEY, EAST RUTHERFORD
Most complete RR Headquarters
O, HO, N ga. Equip., Radio Control.
Plane Kits, Engines, Boats & Fittings.
PAUL'S HOBBY SHOP
540 Paterson Ave. GE8-0192

NEW JERSEY, FRANKLIN
R/C Kits - Components and Accessories. If we don't have - we'll do our best to get it. Hrs. 10-6, Fri. til 9, Sund 12-4, Clsd. Mond.
NORTH JERSEY HOBBY SHOP
52 Main St. 827-4044

NEW JERSEY, JACKSON
R/C Boats, Planes, OPS & K&B eng. hrdwre. & access. Futaba & MRC radios, dist. for Scotglas Boats. Open 7 days.
JACKSON HOBBY SHOP
West County Line Rd. 364-3334

NEW JERSEY, JERSEY CITY
Model Hobby Needs, Loco Repairs
Plastic Models R.C. & U.C. Planes & Boats
Military & Historical Min. Ships & Access.
CAMPBELL'S HOBBY CENTER
61 Baldwin Ave. 432-6373

NEW JERSEY, MADISON
R/C Boats & Planes, Complete Bldg. Supplies, Sig Models, OPS Engines, K&B Products OS Max Engines, Open eves. til 9
NASSAU HOBBY
233 Main St. 377-7099

NEW JERSEY, NEWFIELD
Specializing in R/C airplanes, boats, cars Kraft, MRC, Cox, Futuba and many others. We accept trade in and do our own repairs.
THE HOBBY PLACE 358-3685
Rte. 40S area Willow Grove Rd. 881-1171

NEW JERSEY, OAKLAND
Airplane Dept., Rubber, U/C, R/C, plastics, Trains, Lionel, HO, Brass, N plus accessories boats, kits, rockets, dollhouse line, AFX etc.
RICH'S HOBBYTOWNE
350 Ramapo Valley Rd. 337-5300

NEW JERSEY, PRINCETON
Radio Control Boats & Planes
Complete Building Supplies
Sig Models — OPS Engines
NASSAU HOBBY
142 Nassau 924-2739

NEW JERSEY, RAMSEY
One of the largest selections of R/C equipment, kits & accessories, plus a knowledgeable staff to help
HI-WAY HOBBY HOUSE
Rt. 17 327-0075

NEW JERSEY, TRENTON
Largest Selection of R/C Fiberglas and Wood Boats, Marine Engines Radios and Hardware 9-9, Mon-Sat.
S&M MODEL MARINE SUPPLIES
1019 Melrose Ave. 394-8985

NEW JERSEY, WEST ORANGE
U/C & R/C Cars, Boat, Airplanes
Doll House Kits, Plastic, Crafts,
Most Complete R/C Car Shop in NJ
THE 'LIL' HOBBIE HOUSE
414 Main St. 731-7227

NEW YORK, BROOKLYN
R/C, U/C Planes, boats, cars and supplies HO, N gauge trains, plastic model kits, AFX, racing, rockets, etc., etc. Open 7 Days.
A HOBBY HUT
2835 Nostrand Ave. (Nr. King's Hy) 338-2554

NEW YORK, DEER PARK
The One Stop Hobby Shop, Plastic, Wood, Flying, Rocket, RR Kits, Accessories & Much More, 3000 Book Titles.
T&M HOBBY & BOOK CENTER
1723 Deer Park Ave. 242-5326

PLANE MODELERS:
Others may come and go but your neighborhood hobby dealer is ready and willing to serve you fifty-two weeks out of every year. He needs you as much as you need him, so use this directory to find him and pay him a visit.

NEW YORK, ELMIRA HEIGHTS
R/C Planes, Ships & Cars, HO, N Trains Everything in Craft, Slot Cars, Rockets Open daily 10-5, Thurs. & Fri. 10-9
HOBBY HUT
127 W. 14th St. (Cor. College Ave.) 733-2607

NEW YORK, ELMSFORD
Specializing in Radio Control
Open 'til 9 during the week.
Repairs Available.
ANDY'S HOBBY SHOP
36 E. Main St. 592-5176

NEW YORK, FRANKLIN SQUARE
On, HO, HOn3, N scales — kits, parts and repairs. Lionel, AF, Tenshodo, United Balboa, LaBelle, Old Trains. Open Mon. & Fri. Eve.
TRAINS
81 Franklin Ave. 354-4470

NEW YORK, MAMARONECK
All ga. Train Sales, Serv., Repairs.
Slot Race Cars, Plane Kits, Used Collector Trains at low prices. Parts & Service
BOB'S HOBBY & SLOT RACING SHOP
120 Mamaroneck Ave. 698-4655

NEW YORK, NEW YORK
R/C Planes, Boats, Engines
Motors, Accessories,
Everything for flying or boating
AMERICA'S HOBBY CENTER
146 W. 22nd St. 675-8922

NEW YORK, NEW YORK
HO, Arnold-Rapido, AF, Marklin, Sales & Serv. Radio Control Equip., planes, boats, crafts. Daily 9-9, Sun. and Hol. 11-7.
D & Z HOBBY MART
625 8th Ave. BR 9-5869

NEW YORK, RIDGEWOOD
Model Railroading in "N," HO, O, 9 to 6
Model Planes, Ships, Cars, Rockets
Crafts, Science Center, Tools, Fr. 9-8
NAGENGAST HARDWARE
68-02 Fresh Pond Rd. 821-0958

NEW YORK, ROCHESTER
All makes N ga. Trains & Access.
HO — Brass Imports — Dremel & X-Acto Tools
Hobbies-Crafts-Coins-Aurora HO Slot Cars
CARL'S HOBBY HOUSE
1310 No. Clinton Ave. 266-4706

NEW YORK, STATEN ISLAND
RC Cars, Planes, Boats — UC — FF — Rockets
Fuel — Parts — Instruction — Service
Mon-Fri. Noon 'til 8. Sat. 10-6
BROWNIE'S PRO & SPORT HOBBIES
122 Bennett St. 727-2194

NEW YORK, SYRACUSE
Central R/C Hq. for EK-MRC-Sig-FF-UC
Complete line planes, engines, rockets, trains
Conv. Located Rt. 11, Rt. 81, Thwy. Exit 36
CENTRAL HOBBIES, LTD.
Ponderosa Plaza 455-1321

NEW YORK, UTICA
All Gauge Railroad Trains, Kits & Repairs
R/C Planes, Boats, Rockets & Supplies
Mon-Sat 11-5:30, Mon & Fri til 9
A & J HOBBY HOUSE
20 Auburn Ave. 735-1815

NORTH CAROLINA, CHAPEL HILL
Mid-Atlantic's leading hobby center
Scratchbuilding goodies. Brass locos.
Repairs. Open 10-9 Mon.-Sat.
BILLY ARTHUR, INC.
University Mall 942-5562

NORTH CAROLINA, RALEIGH
Train specialists with a large selection
N, HO & O Scale RTR, Kits & scratch supplies.
Brass, Books & Lionel.
THE HOBBY SHOP
2020 Cameron S.-Cameron Village 833-1123

NORTH CAROLINA, RALEIGH
Complete stock for Model Railroaders.
Kits, tools, supplies — Domestic & Imports.
HO & Arnold-Rapido N ga.
NORTH HILLS HOBBY SHOP
125 N. Hills Rd. 787-6101

NORTH CAROLINA, SALISBURY
"Piedmont NC's Largest Hobby Shop"
Controline Models — Kits and Built-up
10 AM-9 PM Mon-Fri. 10-6 Sat.
CHARTREUSE CABOOSE HOBBIES
Towne Mall 633-1120

NORTH CAROLINA, WINSTON-SALEM
For the Finest in Hobbies
TINY TOWN
Thruway Shopping Ctr. PA 5-8971

OHIO, CINCINNATI
O — S — HO — TT — Hn3
Complete Repair Service in Our Roundhouse
Open Mon.-Fri. 4-8 Sat. & Sun. 12-8
HOWARD'S HOBBY HOUSE
Cincinnati Union Terminal 421-4004

OHIO, CLEVELAND
Large stock HO, N ga. trains. Domestic & Foreign. Also kits, parts, supplies, scenery, paints, wood tools, books mag.
NATIONAL HOBBY, INC.
5238 Ridge Rd. 749-2450

OHIO, COLUMBUS
Sig Super Tigre, Enya, Cox, K&B, McCoy
Guillow, Sterling, Veco, Top Flite,
Midwest, Balsa, Parts & Accessories
HALL'S HOBBY SHOP
2753 Winchester Pike, Berwick Piz. 231-8742

OHIO, MANSFIELD
Flying Model Supplies, Model RRing, Lapidary equipment, precision tools, Art Supplies, photography & Photo finishing.
TOP FLITE
15 N. Main 526-4426

OHIO, NORTHFIELD
Complete line of Kraft, Pro-Line, Expert, Cox/Sanwa, Futaba - kits of all kinds Rockets, trains, crafts, M-F: 10-8, Sat. 10-6
HOBBY HUT, INC.
105 E. Aurora (Rt. 82) 467-6116

OHIO, PROSPECT
Most Complete model airplane
Supply Co. in Central Ohio. Free-Flight, U-Control & R/C, Bi-Plane Headquarters
LIGHTHOUSE HOBBY SUPPLY CO.
507 E. North 494-2110

OKLAHOMA, BROKEN ARROW
Planes, R/C, U-Contro., Free-Flight, Rockets, O, HO, N gauge trains, AFX Roadrace
Books, Tools, Craft Supplies, Corgi Toys
S&S HOBBIES AND CRAFTS
108 S. Main 251-0330

OKLAHOMA, MIDWEST CITY
Planes, Trains, Crafts, Rockets, Science
OS — Super Tigre — Enya 6" Balsa
RC planes & engines, tools, etc.
KELLER SPORTS & HOBBIES
1430 N. Key Blvd. 732-1100

PLANE MODELERS:
Others may come and go, but your local hobby retailer is in your neighborhood 52 weeks each year to serve you with supplies, materials and kits. He is always ready to help you.

OREGON, HILLSBORO
R/C Planes, Systems, Accessories
Ships, Cars, Crafts — many plastics
10 to 6 Daily — Open Sundays
HILLSBORO HOBBIES
351 E. Main St. 648-3788

OREGON, MILWAUKIE
RC — Free Flight — Line Control
Boats, Cars all skill levels
Books, tools, supplies. Open Tues.-Sat.
TAYLOR MADE HOBBIES LTD.
3620 SE Concord 654-1192

OREGON, PORTLAND
Portland's favorite Hobby & Craft Shop
RC, Ukie, Freeflite, Rubber, power boats
Open 10-9 10-6 Sat., 12-6 Sun.
TONY'S CRAFTS & HOBBIES
4454 N.E. Cully 288-4004

PENNSYLVANIA, BATH
Trach R/C Hobbies
R/C Air Planes, Boats & Cars
Rockets, Plastics, Crafts
TRACH R/C HOBBIES
RD #1 759-4603

PENNSYLVANIA, LANSDALE
Large Stock of R/C, U/C and F/F
Airplane Kits — Engines — Hardware
Radios — Also R/C Boats & Cars
PENN VALLEY HOBBY CENTER
837 W. Main St. 855-1268

PENNSYLVANIA, MONROEVILLE
Planes — Boats — Cars — Trains
Radio Control — Crafts — Artist Supplies
Photographic Equip., Sales & Rentals
LORESKI'S INC., YOUR HOBBY HDQRTRS.
"Miracle Mile" 372-5155

PENNSYLVANIA, MOORESTOWN (BATH)
Specializing in R/C Hobbies
Plastic Kits, Rockets, Crafts
Books, Tools, & Full Line Accessories
TRACH R/C HOBBIES
RD 1 759-4603

PENNSYLVANIA, SCHUYLKILL HAVEN
Aircraft, Railroad, Rocketry
Wood & Plastic Kits, Special Orders
Daily 12-8, Sat. 10-8, closed Sun.
FENNELL'S HOBBY SHOP
Rt. 61 & Memorial Drive (RD#1) 366-1700

PENNSYLVANIA, WILLOW GROVE
R/C Equipment & Supplies
Boats, Cars, Planes, Trains
Repairs on all trains & R/C Equip.
JC R/C HOBBIES
23 Easton Rd. 659-0770

RHODE ISLAND, WARWICK
Specializing in R/C Planes & Supplies
Futaba Radios, Boats & Fittings
6:30-10, Eves, Sat. 10-5, Sun 8-10
RAY'S R/C HOBBY
5804 Post Rd. 884-1330

SOUTH CAROLINA, PAMPLICO
R/C Kits, Fittings, St Engiens
Parts, Service, Kraft R/C Equipment
100'x2600' Flying Field
GRAHAM MODEL SUPPLY
Rte. 1, Box 134 493-5087

TENNESSEE, NASHVILLE
R/C Boats, Cars, Planes, Motors, Marine Engines, Sport & Competition Accessories
A Full Line Hobby Center
THE TOY MART
113 Gray Lynn Dr. 883-1648

TEXAS, HOUSTON
Complete line R/C and U-Control
Planes, Cars, Boats,
All Your Model Needs in One Place
TRAINS & PLANES
9737 Westheimer 977-1420

TEXAS, SAN ANTONIO
Buy 'Em Where They Fly 'Em
DICK'S HOBBY SHOP
Terrell Plaza Center 512-826-7941

TEXAS, SAN ANTONIO
Specializing in R/C airplanes with largest selection in Southwest. Also boats, cars & rockets — Open Mon-Sat 10-7
HOBBY CENTER INC.
3439 Fredericksburg Rd. 735-4218

UTAH, SALT LAKE CITY
Authorized Kraft, RS and World Dealer
Radio Repair Service — All makes. Open 7 Days a Week — if we don't have it we'll get it
FOOTHILL MODELERS SUPPLY
1625 Foothill Dr. 583-4940

VERMONT, MIDDLEBURY
Northern New England's "Most Complete Hobby Shop" RC, CL, FF, Boats, EK-Logictrol World Engines, Sig, OS Max, Super Tigre etc.
MIDDWAY SHOP
57 Main St. 388-2922

VIRGINIA, FALLS CHURCH
Guillow's, Goldberg, Scientific Control Line Models & R/C Models Plus Ships, Trains, Cars, Circus Wagons
CORNISH & SONS MODEL WORKS
402 S. Washington St. 241-1380

WASHINGTON, MOSES LAKE
R/C & U-Control planes, boats, cars.
Complete line of hardware & radio gear.
Daily noon-9:00, Sat. 9:00-5:00
WILLIAMS MODEL & HOBBY
1711 Pheasant 765-7333

WASHINGTON, SEATTLE
HO & N Trains & Accessories, Plastic Model Kits, Balsa, Planes & Boats, Model Rocketry
Open Thurs. evenings
CAMPUS HOBBY CENTER
4738 University Way LA5-2222

WASHINGTON, SEATTLE
Specialist In Kits & Parts for:
Boat - Planes - Electric Cars
Remote Control - Hobby Tools
INTERLAKE HOBBIES
1406 N. 80th 525-6757

READERS—
If your local dealer does not stock this magazine, or if he continually runs out before you can obtain your copy, send us his name and address and we'll make sure he receives an ample supply.

These and hundreds of other year round hobby dealers are fun to visit in your travels.

CANADA

ONTARIO, TORONTO
Model Planes, Boats, Cars
Radio Controls,
Tools and Materials
CAL'S HOBBIES
1626 Bayview Ave. 484-8173

QUEBEC, MONTREAL (ST. EUSTACHE)
Full Selection R/C & U Control planes, boats & cars. Complete stock of supplies. HO & Lionel Trains. All Crafts & Arts Supplies.
ALEXANDER'S
Place St. Eustache 627-2460

QUEBEC, MONTREAL
Radio Controls for Planes — Boats, etc.
Boat Access., Balsa Wood, Plastic Models,
This store is run by Modelers who can help.
CARL'S R/C HOBBY SHOP
6056 St. Hubert 273-6008

QUEBEC, ST. LAMBERT
Planes for U-Control, FF & radio
Trains, Slot Parts, Boats, Balsa,
Mags. Definitely no charge for advice.
ST. LAMBERT HOBBY SHOP
444 Rothesay Ave. 671-8727

advertising index for September 1978

LEARN TO FLY RC THE SIG WAY

WHY RUDDER CONTROL?

Some expert fliers think beginners should learn to fly by starting with an aileron-controlled model. Maybe this will work out if an instructor pilot is available to make the takeoffs and landings and stand by every minute of a flight, ready to take over if the student gets disoriented, until his pupil gets skilled enough to manage by himself. But this process takes a lot of flights. Most beginners do not have someone willing or able to spend so long a time with them.

We think a stable, rudder-controlled model is a lot less likely to get a novice into trouble from overcontrolling or not controlling. If the flier freezes up momentarily and can't decide what to do next, a flat bottom sectioned, high wing model---like the Kadet---will right itself, or partially do so, if the sticks are allowed to snap back to neutral, giving him time to think. Most aileron-controlled models need immediate and proper corrective control movement to make them recover, an automatic reaction that a beginner has not yet developed.

Many club instructors and hobby dealers have told us that two or three check-out flights on a Kadet are sufficient to allow a student to practice fly and learn without constant attention. And we know of modelers in isolated areas, with no one to help them, who have taught themselves to fly with the Kadet.

So remember---you may dream of darting around the sky with a sleek P-51, but first you must have some flying time with our boxy buddy, the dependable Kadet. It's the standard trainer-nationwide!

STEP 1 BASIC: Start With Rudder Control

BALSA RIB WING

KADET

Designed by CLAUDE McCULLOUGH

LENGTH: 42 In.
WING SPAN: 57 In.
WEIGHT: 4 Lbs.
ENGINES: .19 - .35 Cu. In.
FOR 3 CHANNEL RC EQUIPMENT

$34.95

SIG KIT RC-31

KIT NOW INCLUDES BEGINNER'S CHECK LIST AND FLYING HINTS.

STEP 2
INTERMEDIATE: Progress To Ailerons

BALSA RIB CONSTRUCTION WING FEATURING BUILT-IN WASHOUT

SIG KIT RC-39

New!

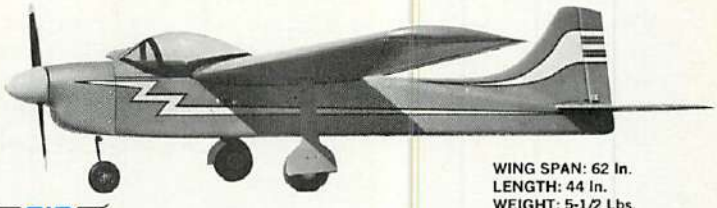
WING SPAN: 55-1/2"
ENGINES: .29-.40

KAVALIER $39.95

Designed by CLAUDE McCULLOUGH

or

LARGER SIZED MODEL - FOAM CORE WING WITH BUILT-IN WASHOUT



SIG KIT RC-32

WING SPAN: 62 In.
LENGTH: 44 In.
WEIGHT: 5-1/2 Lbs.
ENGINES: .40 - .50 Cu. In.

$39.95 # KOMANDER

Designed by CLAUDE McCULLOUGH

When the student pilot feels secure flying the Kadet and can handle it capably, he is ready to take the next step. The Kavalier has a special wing design, calculated to make this transition easier. The precise amount of incidence change required to help eliminate tip stall is automatically incorporated as the wing is built in the usual way on a flat surface. In addition to this aid to stability, differential movement aileron horns are furnished in the kit, providing less down and more up travel on the ailerons. Adverse yaw in turns is reduced by this simple method and controllability of the model is greatly improved. Find out what smooth flying really is with the Kavalier.

Specially designed for novice RCers who want to move up from simpler models or prefer to start with an aileron controlled airplane. The built-in stability, coupled with good maneuvering and aerobatic ability, allows rank amateurs and low-time fliers to do a creditable job. Piloting boners that would clobber other airplanes are readily forgiven by the Komander. It will fly right down to the full stalling point without snap rolling or falling off on a wing. This enables slowed down, nose-high landings to be made. Coupled with the shock absorbing qualities of the wing mounted gear, the superior ground handling characteristics make this a fine performer from rough or grass fields.

STEP 3
ADVANCED: Move Up To Aerobatics

FOAM CORE WING WITH WASHOUT

SIG KIT RC-35

$44.95

KOUGAR

Designed by CLAUDE McCULLOUGH

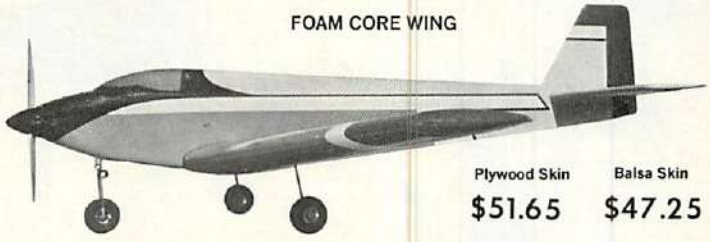
ENGINES: .40 to .50
WING SPAN: 51 In.
WING AREA: 550 Sq. In.
LENGTH: 45-1/2 In.
WEIGHT: 5-1/4 Lbs.

After some flying time on the Kadet and the Komander, the student will be ready for this sleek stunter. The Kougar is a carefully tailored design that will do every stunt in the book-even the lomcevak - and yet is not difficult for low-time pilots to handle. The wash-out incorporated into the foam wing allows the model to be slowed down to a walk for the landing approach and flared onto the runway in a main-gear first touchdown without undue stalling or snap rolling tendencies. The large amount of wing area for the 51" span keeps the wing loading low and aids handling characteristics. The Kougar is highly recommended as an introduction to low-wing flying and AMA pattern competition.

STEP 4
EXPERT: For The Graduate Flier

SIG KIT RC-29

FOAM CORE WING



Plywood Skin $51.65
Balsa Skin $47.25

WEIGHT: 6-1/2 - 7 Lbs.
ENGINES: .45 - .60 Cu. In.
WING SPAN: 67 In.

KOMET

Designed by MAXEY HESTER

In the Komet, Maxey Hester has created a pattern ship that meets the requirements of the most demanding competition flying, yet is equally at home at a Sunday afternoon sport flying session. As in the Kougar, construction is speeded and appearance improved by a formed plastic top made from ABS plastic that is easy to glue and easy to paint. It carries no load and serves only as a streamlined fairing on top of the rugged balsa box fuselage. Featuring a foam core wing, this big kit takes only a short time longer to build than one of the so-called ARF (almost ready-to-fly) types and results in a durable aircraft with lower wing loading and higher flight performance, at a lower cost.

See your dealer first! To order direct, add $1 postage under $10, postage free over $10. No C.O.D.

PLACE YOUR ORDER NOW FOR SIG'S LATEST COMPLETE CATALOG - NO. 39 - $2.00 POSTPAID

SIG MANUFACTURING CO. . . . . Montezuma, Iowa 50171

A fresh idea for the sport flier

4 channels designed precisely for his needs

New Look . . . New Technology . . New Price Range: Our engineers were given the latitude to take a fresh approach to designing a 4-channel sport flier's radio. They were told not to cut corners and create an economy 5-channel like others have. This one was to be built from scratch. The result: MRC's 774 with features that make it strikingly different and more advanced than any system in its price range.

Fresh Appearance: To begin with the 774 looks different. Its unique size is just right to the touch . . . with contoured side plates for your palms. A ribbed bottom and finger-grip back make for a balanced feel and sure grasp. Modern yet functional.

Sound Engineering. Less evident, but just as new, are the smooth and responsive semi-open gimbal sticks . . . a novelty for the sport flier, long an essential in more expensive sets. The sticks also have external tension adjustments to let you set the response to match your preferences. And there's a voltage regulator for ease of operation on 9.6 volt nickel cadmiums or 12 volt dry cells. Advanced servos have a Signetic NE544 IC and two output transistors to amplify power. Even the receiver is state of the art, including C-Mos circuit decoder for low current drain and added reliability. You'll find the 774 compatible with all MRC servos. Unlike some others on the market, this 4-channel lets you interchange servos as the need arises. In short, our engineers have created what may well be the prototype for every new sport radio to come . . . including an amazingly low-key price range. Available with 2 servos and battery holder for dry cells or complete with 4 servos, nickel cadmium battery and charger. Send $1.00 for MRC's 1977 Color Model Aircraft Products Catalog.

MODEL RECTIFIER CORPORATION/2500 WOODBRIDGE AVE./EDISON, N.J. 08817