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June 1989 Vol. 93 No. 6/583 Aircraft features

24	Commando/Dr.D.B. Mathews	
	A 56% enlarged old time replica for SAM events	
30	Aerocraft's Aero Sport/Ron Farkas	
	An FM Product Review: A .40 sportster with racy looks	
34	Vintage Stunt Championships/Dick Sarpolus	
	A new stunt contest using old stunt airplanes	
38	Ryan ST/Tom Sandor	
	A rubber scale version of a 1930's classic	
44	National Soaring Museum/Bob Aberle	
	Second stop on the "Museum Trail"	
48	Glassing with Hot Stuff UFO/Vic Macaluso	
	An FM How-To: A light and comfortable way to finish a foam wing	
51	Sig Manufacturing's Kadet Senior/Dick Gibbs	
	An FM Product Review: An old favorite enlarged!	
54	Flyin' Things for Fledglings/Earl VanGorder	
	More news from the gang	
60	R/C Giant Scale/Frank Costello	
	Big stuff at the WRAM show	
62	R/C Pattern/Dean Pappas	
	Warm up your hand grinder for some engine work	
64	R/C Soaring/Herk Stokely	
	Lots of tips, techniques, and news for the glider minded	
66	WhirlyWords/Dale Hart	
	Helicopter happenings at the WRAM show	
68	R/C Sport/Dick Sarpolus	
	Radios, cowls, wheels and fins	
69	Fan Facts/Mike Kulczyk	
	The "Thunderchief" saga	
70	Electric Flight/Dick Gibbs	
	A variety of "current" subjects	
72	F/F Sport/Larry Kruse	
	The freeflighter's lexicon, a wood stripper, and more	
74	C/L Combat/Phil Cartier	
	How much does it cost to fly combat?	
76	C/L Stunt/Bob Hunt	
	What's in a name, and some nostalgia notes	
P	IC Model Boating	
-	o model boating	
80	MRP's Miss Budweiser/Don Bilsky	
	An FM Product Review: A mini electric "thunderboat"	
84	R/C Scale Boats/Bill Michaels	
	The proper lighting for a model tug boat	
86	R/C Sport Boats/Don Bilsky	
	The boating basics, and something new from Aeromarine	

Departments

5 Editorial 6 Flying Report

20 Airmail

- 88 Letter Rip
- 96 Classifieds
 - 96 Dealer Directory
- 78 Pit Report
- 96 Dealer Directo 98 Ad Index

On the Cover: Byron Original's Beechcraft Staggerwing sits on the apron awaiting its maiden voyage. Vic Macaluso built this one and used it as a test bed for his How-To on glassing foam core wings with Satellite City's new Hot Stuff UFO (User Friendly Oderless) adhesive. Photo: Vic Macaluso.

editorial.



Tom Sandor's Ryan ST reeks of that graceful beauty that seems to adorn examples of those nostalgic times in modelling. Tom's construction feature joins a wistful look at modelling "back then" as FM offers you articles on Vintage Controline, the *Commando* Old Timer, and another walk with Bob Aberle down the Museum Trail.

few months ago, the Chrysler Corporation presented a special television program about the life of aviatrix Pancho Barnes. Aside from being a very well done historical piece, the movie served as a showcase for some beautifully restored examples of the airplanes of the 1930's era. In one scene, a cross-country air race for women, the character playing Amelia Earhardt climbed aboard one of the most aesthetically pleasing airplanes of all time, the Ryan ST. This low-wing, panted beauty was polished to perfection, and brought back, to me at least, the reason for love affairs with air machines. Certain airplanes from each era, be it the past or modern times, evoke strong feelings of admiration from those who are smitten with the love of flight. May it always be this way. I'm sure Tom Sandor was having similar thoughts when he put pen to mylar and designed his rubber scale version of the Ryan ST which we are presenting as a construction feature this month (see page 38).

While we're on the subject of re-creating the past, take a look at Dr. D.B. Mathews' 56% enlargement of the old time Commando on page 24. The good doctor has sized this one for electric, too, and it should appear in these pages in a short while.

Continuing the nostalgic theme, Dick Sarpolus visited the Vintage Stunt Championships, held at the Whittier Narrows field, in February of this year, and reports on the unique meet which featured many of C/L stunt's most noted designers/fliers in attendance. George Aldrich even flew the *original* Nobler through several patterns. An outstanding turnout of contestants with an impressive array of the best designs from the "Golden Age" of control line signals us that this type of event is needed and wanted by those who compete. Nuff said.

Lastly, Bob Aberle continues his trek to the best Eastern aviation museums with his visit to Harris Hill and the National Soaring Museum. Situated in Elmira, New York's rolling hills, this institution is dedicated to preserving the heritage of soaring from its simple hang glider beginnings, through the war years with the development of troop gliders, to today's modern competition machines. — BOB HUNT



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6

JUNE 1989



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tor. Receiver for the 5 UAF system is the R128DF. This 8-channel, FM, dual conversion receiver is fully 1991/20kHz compatible. The 5UAF system is equipped with four S148 servos. Like all new Futaba components, the S148 servos are assembled using wireless (Surface Mount Technology) to eliminate vibration related damage and failure. With SMT, the micro-sized subcomponents are all mounted directly to the PC board. The new Futaba 5UAF is available at local hobby dealers. Check with them for additiobnal information, or contact Futaba at their address above.



ARGUS BOOKS, Wolsey House, Wolsey Rd., Hemel Hempstead, Herts HP2 4SS, England, has recently released Peter Holland's book entitled Moulding & Glass Fibre Techniques, as one of their Radio Control Handbook series. Included are chapters on Heat forming sheet materials, Basic glass fibre laminating, Mouldings, Integrated construction, fillets and finishing, rubber mouldings, Repairs with and to GRP (Glass Rienforced Plastic), Hints and tips, and an Appendix of useful addresses. There is an abundance of clear black and white pictures and many illustrations depicting the techniques covered. All in all a very well done book on this increasingly popular subject. The 66 page book retails for \$4.95. For more information, please write to the address above, or see your local hobby dealer.



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AIR AGE PUBLISHING, 251 Danbury Rd., Wilton, CT 06897, has recently published their newest hobby how-to book, Basics of Radio-Control Helicopters by Lt. Col. Paul Tradelius. A comprehensive, informative, and up-to-date book, it takes the helicopter newcomer through various phases of assembly and flying and teaches him time-proven expert techniques. Basics of Radio-Control Helicopters will guide the modeler from selecting the "right" helicopter kit and radio, through building the machine, right up to aerobatic flying. Internationally recognized expert, author, and pilot, Paul Tradelius takes you though it all with supporting illustrations and photos. Helicopter theory is presented in readily understandable terms. Autorotation, collective pitch, gyro stabilization, and other helicopter unique functions are all clearly explained. What kind of tools are needed, how to accomplish the inevitable repairs, even where to buy-it's all there. Cover price for Basics of Radio-Control Helicopters is \$9.95 and it's available at many leading hobby dealers, or direct from Air Age at their address above for an additional \$1.75 shipping and handling charge. Contact them at their address above for more information, or call 800-834-2900.



LARRABEE, Box 725, San Dimas, CA 91773, has introduced a three-in-one kit that contains very durable flying scale model gliders. Using high quality cardstock and laminated construction, the accent is on ease of assembly and excellent flying performance. The kit includes a cutting board, a display stand, and an assembly fixture to insure correct alignment of all parts. Well written and illustrated instructions help make building and flying a real pleasure. Cost is \$6.00 a kit which includes postage and handling. Contact Larrabee at their address above 714-599-2711 for more information or to order.



PHARIS MODELS, PO Box 804, Folsom, CA 95630, has introduced a kit of the 1939 Ace Whitman Albatross. This 36-inch span rubber powered model has original Ace Whitman Plans on two 18×39 inch sheets. The kit contains all the necessary strip wood, print wood, tissue, $9^{1/2}$ inch plastic prop, rubber motor, and modifications for a dethermalizer. Besides being reasonably simple to built, the Albatross sells for \$20.95, plus \$3.00 shipping per order. To order, or for more information, call Pharis Models at their address above 916-985-3569.









J'TEC, 164 School St., Daly City, CA 94014, now have available "Snuf-Vibe" Isolation Engine Mounting Kits and Isolated Engine Mounts. The Snuf-Vibe system comopletely encases the engine mounting bolts with neoprene rubber, in the engine mount and in the firewall for double protection. The Snuf-Vibe Isolated Engine Mounting Kits contain four (4) complete isolation sets and easy instructions for use with any cast aluminum or glass filled engine mounts. They are available in two sizes: JT-632SV (6-32 bolts) \$7.95, and JT-832SV (8-32 bolts) \$8.95. Also, in addition to there standard line of cast aluminum engine mounts, J'Tec now offers Snuf-Vibe Isolated Engine Mounts, drilled and tapped, and ready to install. These are available at \$5.95 extra per engine mount. When ordering, just add "CV" to the existing catalog numbers. For more information, please write to the address above, see your local hobby retailer, or call: 415/756-3400.



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NV 89450

SULLIVAN PRODUCTS, P.O. Box 5155, Baltimore, MD 21224, announces their new ShurLock Wheel Retaining Clips, which are said to be a reliable, vibration-proof replacement for wheel collars. ShurLock Wheel Retainers install with an easy push, and although the wheel is then securly locked on, a twist-and-tug will remove them. They are reuseable.

FOURMOST PRODUCTS, 4040 24th Ave., Forest Grove, OR 97116, announces their new Window Flange, a flexible black vinyl strip that is preformed to make a flange. As well as securing the window in place, the window flange provides a realistic black outline without the inconvience of tape. Window Flange installs easily on both contoured and rectangular windows with just a razor blade and CyA adhesive. Available in three different sizes: .150, .250, and .350 inches. These are sold separately in four foot coils for \$2.95 each.

HOBBY LOBBY INTL., 5614 Franklin Pike Circle, Brentwood, TN 37027 has recently imported the new Simprop Modular Airbrake Set. Each set contains ten individual units which can be linked together in sets up to five apiece to be used as spoiler or airbrake on each wing. Or, their short individual length (1% inches) will allow, for example, two of these to be placed on each side of the fuselage on a sport R/C plane as airbrakes. Each unit weighs only 5 grams and is made of a durable plastic that glues easily into wood or foam structures. The Simprop Modular Airbrakes are listed as HLSI0268 in the Hobby Lobby catalog.



If not available at your hobby shop, ORDER DIRECT for immediate shipment. Check, M.O., Visa, M.C., or C.O.D. SEND 25¢ or STAMP FOR ADDITIONAL INFO accepted. Add \$2.50 for UPS: \$2.00 for C.O.D. and 6% sales tax 164 School St., Daly City, CA 94014 (415) 756-3400 AND J'TEC CATALOG for Calif, resident, AIM AT THE STARS **BUILD YOUR** Learn the secrets of real. **OWN ROCKET** SOLID-FUEL **MOTORS! WE'LL** rocket con-SHOW YOU HOW! UP TO 80 struction, using **POUNDS OF** simple hand tools and read-**THRUST, FOR** ily available LESS THAN \$1.00 supplies. EACH! **INTERESTED?** Just send \$2.00 for a complete catalog, plus a working sample of an electric igniter ELEFLITE that YOU CAN MAKE CORPORATION YOURSELF, from ordi-**Department FM6** nary materials **11620 Kitching Street** around the house. Moreno Valley, CA 92387-9978 © 1984

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BIO-PAK ASSOCIATES, P.O. Box 2280, Farmingdale, NJ 07727, has introduced the Craftip snap off blade cutter, pen, and burnisher combination tool. This new tool saves time and simplifies craft and hobby work. The Craftip features a safe flip-over cap which covers the blade when the pen is used and covers the pen when the blade is being used. The cap can also be used as a burnisher. A pocket clip is also provided. For further information, please write to the address above, or call: 201/938-3000.



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LEISURE ELECTRONICS, 22971 Triton Way, Unit B, Laguna Hills, CA 92653, has introduced a new streamlined gearbox with extension shaft for sail planes. This allows the motor to be located back into the thicker section of the fuselage. By pushing the motor back, the designer also gains more freedom in the placement of the center of gravity. Leisure's streamlined gearbox and extension shaft is available separately (stock #6015), with stock motor (stock #503L), or with competition motor (stock #603XL). Already offered in the Airtronics Eclipse kit, the unit can easily be installed as a modification in other electric gliders. Check with local dealers for more information or contact Leisure Electronics at their address above (call 805-257-1443)

A.R.B. COMPANY, 8825 Roswell Road, Suite 613, Dunwoody, GA 30350, has introduced the Buddy System, an affordable new approach to training novice R/C pilots. The Buddy System is the first and only low-cost R/C trainer system designed to be installed in Futaba and Airtronics radios, using the same channel. The Buddy System can also be



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WATERLINE DISTRIBUTORS, INC., 905 North Harbour City Blvd., Melbourne, FL 32935, has released their Square Cut Tools. These tools have been designed to allow the modeler to cut clean square holes and slots in balsa wood. Square Cut Tools are offered in two sets. The Master Set contains five (5) pieces to cut 1/8 inch, 3/16 inch, 1/4 inch, 5/16 inch, and 3/8 inch, at a suggested retail price of \$16.98. The Builder's 3-piece set contains ³/16 inch, ¹/₄ inch, and ⁵/16 inch sizes, and the suggested retail price is \$9.98. The Square Cut Tools are manufactured in the U.S.A. from nickel plated steel. For more information, please write to the address above, or call: 407/ 254-0516.

BYRON ORIGINALS, PO Box 279, Ida Grove, IA 51445, has introduced their new Pit Pal field box. Made from injection molded, high impact polyethylene for light weight and durability, the Pit Pal comes completely assembled and requires absolutely no painting. It is fuel resistant and has no sharp corners that can gouge, scratch, or tear. Special mounting pads on the side of each handle are designed for mounting either a 12-volt



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PRATHER PRODUCTS, 1660 Ravenna Ave., Wilmington, CA 90744, has announced that their Prop Pitch Gauge, out of production for several years, has just been reintroduced. For those modelers who insist on getting the best performance from their en-



Scale scolding

I thought it was so funny I couldn't stop laughing. In your reply to David Zwolak's letter in the April FLYING MODELS Air Mail column, you state that "We always include a scale on our drawings." Just turn to the next page in that issue and see if you can find a scale on the plans of "Big Foot." I couldn't.

Hope you can see the humor in this. Seriously, it's always a good idea to include a scale on the plans that appear in your magazine for posterity's sake. Someday these plans might not be offered for sale and someone may want to build one from the magazine plan.

You're right, Carl. We'll try and be more careful!-Ed.

Big number

I'm trying to track down a construction article which I believe was published in FLYING MODELS in the late 1970's or early 1980's. There was a picture of this plane on the front cover, and as I recall it was powered by a geared engine.

If possible, I would like a copy of this article, and information on how to receive a set of plans for constructing it.

> FRANCOIS RIVARD Mississauga, Ontario

CT.

The plane in question was published in the November 1982 issue, and was called the "Big 1." George Buso designed this behemoth around the Webra .61 geared motor, and it featured over 1200 square inches of wing area. We saw this beauty fly and can say that it was extremely impressive. The plan for the "Big 1" is still available from Carstens Flying Plan service. Order plan number CF-613, at \$20.00. (This airplane was presented on

A complete listing of Carstens' plans is available for \$1.00 from Carstens Publications, P.O. Box 700, Newton, NJ 07860. Photocopy reprints of any FLYING MODELS article are available at a cost of \$.50 per page. -Œ.





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FLYING MODELS



JUNE 1989



Old Timer Replica: Commando By Dr. D.B. Mathews

Blow the original up 56%, add a .40 engine, and you've got a S.A.M. natural.

PHOTOGRAPHY: DR.D.B. MATHEWS

This project represents one of the more interesting motivational stories of my Old Timer designing. The very first R/C assisted Old Timer I built was a *Buzzard Bombshell* which was converted from free flight to R/C in 1973. The old *Bombshell* had been a delightful freeflight and served me well in the very earliest days of S.A.M. fun fly activities. Its venerable and well-used Enya .29 would consistently lift it to thermal flights and provide many thrilling chases down wind over hill and dale.

By 1973 those chases were becoming less and less thrilling as the slow but relentless progression of time made such activities more and more an "agony of the feet". I had flown (and that term is used advisedly) R/C back in the early 1950s using Windy Joe's, Rudderbugs, and Livewire Trainers. Then, as my two sons came along, I abandoned the tinkering with R/C and developed a strong interest in free flight in all its forms.

When those sons were no longer available to help in chasing and recovering, free flight began to become physically and emotionally burdensome. I was ready to find some other way to enjoy the beauty of a thermalling model without being compelled to travel well into the countryside to fly and spend interminable hours looking for the de-thermalised model in wheat fields, or worse.

Through the model press I became aware of several pioneering efforts at controlling the recovery phase of free flight with R/C units. Although the *Buzzard* cabin and empennage required some "boat in a bottle" construction techniques I managed to squeeze a three channel system in, and proceeded to have a delightful time.

Historically this was several years before any formal rules even existed for what has now become S.A.M. R/C Old Timer. S.A.M. at that time was a free flight oriented group interested in preserving the era of modeling



Each fuselage side frame is first built flat on the building board and then the front formers added (above left) while squares or draftsman triangles keep



them perpendicular. Almost complete framework of the horizontal stab (above right) shows the single elevator surface which the author favors.

preceeding WW II. The subsequent impact of R/C assist on this noble concept is not in the scope of this article.

So what does all this have to do with enlarging an Ontario Model Supply Commando? Well quite a bit really. As those who have built Bombshells can tell you, the construction of that design is both complex and rather heavy. Also, for pure competition use, it is a bit of a paradox. S.A.M. rules require 225 square inches per .10 cubic inch of engine displacement. The Bombshell measures out as legal for a .37 cubic inch powerplant. It would need to be enlarged slightly for a .40 cubic inch engine.

The Commando on the other hand, is in many ways a Buzzard but with a much simplified structure. The airfoil, moments, tail volume, etc. of the Commando are almost identical. Though kitted in a small 50-inch version as opposed to the Bombshell's 72 inches there is just too much similarity for the Commando not to be considered some sort of cross between the aerodynamics of the Buzzard Bombshell and the construction techniques and appearance of a Brigadeer.

Having built and flown a 50-inch Commando with great fun, I became intrigued with enlarging the Commando rather than the Bombshell. The ensuing model retains the excellence of the latter while being infinitely easier to build (and less expensive since very little sheet balsa is required) as is the Commando.

Additionally, this version of the Commando is unusually versatile. Powered with a .40 four stroke it has become a legendary trainer here in Wichita having been used as a Club trainer by Mike Tallman for over three years. When I still owned it, an ST .40 pulled it nearly vertical and to such heights that it almost insured max flights had it been used in competition.

So, if you'd like a model with all the flight virtues of a Bombshell but with a different and much easier to build structure let's take a look at how to build one.

Construction

Cyanoacrylate (CyA) is the primary adhesive used throughout. Aliphatic resins are used to laminate the various balsa outlines and five minute epoxy to adhere the firewall and wing joints.

All wood is balsa unless otherwise specified: use medium "C" grain sheet. The strip stock should be clear of knots and be of medium density. Adhesion to spruce can be enhanced if it is lightly sanded before assembly: this seems to remove some of the resins that have worked to the surface after milling and storage.

Wing. Develop a master rib of plywood and use this to stack cut ribs with a band or jig saw. This can easily be done by placing a piece of office type carbon paper under the plan and on the ply and then tracing over the outline with a hard pencil.

Notch the trailing edge stock with a razor saw or with the blade reversed in a jig saw. These add considerable additional wetted area for the CyA.

Pin the trailing edge to a flat surface, shimming it slightly. Repeat for the bottom two spars, then carefully place each rib over the drawing making sure it is at right angles to the building surface and directly over the drawing. Use the jig to set the angle of the center section rib.

Spot each joint with CyA, then add the top spars and leading edge, and tips. Remove FLYING MODELS



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Old Timer Replica: Commando





After the wing is framed and assembled, the ply dihedral brace is added by first using a doubled hacksaw blade to cut the center section ribs (above left) away from the rear face of the front spars. Then a plate (it must be the proper

length) of the 1/16 ply is inserted in the cut-out (above right) and marked with the angles of the brace profile. When the shape of the brace is cut, it is then clamped and glued to the ribs and spars (below left).



this panel from the board and repeat the sequence for the opposite panel. Be sure you are building a *right* and a *left* wing panel.

Block up each panel seven inches (an ACE wing dihedral jig is immensely helpful). Place the center rib flush with a flat surface and coarse sand in the angle. Repeat for the opposite panel. Finish the center section in the same manner, then join the panels with five minute epoxy. When cured, use two hack saw blades taped together to cut a slot from the center section ribs and the root ribs along the back faces of the front spars. Slide a sheet of 1/16 ply down through this slot and mark an outline with a pencil. Remove the ply and cut out the front dihedral brace. Epoxy this into the slots and repeat the technique for the rear brace. This gives a custom brace that will fit your wing exactly.

Fine sand the structure and cover with your favorite material. The unit has suffi-



There's plenty of "sticks" in the Commando's complete framework but the author claims that it's simpler to construct than a Bombshell.



cient strength for any of the heat shrink covering materials. Naturally silk could be used also.

Fuselage. Standard box-type construction is employed. One frame is built over the other using scraps of masking tape to prevent sticking. The fill sheet is best precut using the technique described for wing ribs.

It is a good idea to assemble the formers and cut out the firewall while the framework is curing. Remove the frames, and pop them apart using a table knife. Sand a bevel into the tail post area, then place the right side onto the drawing table and trial fit the bulkheads. Attach them with CyA making sure they are at right angles to the frame.

Install the left frame onto the assembly, again checking alignment before adhering. I prefer to leave the box on the board and jack up the tail post by one half the total width. Cut the cross pieces in pairs using the top view as a guide.

An alternative method is to remove the box and place it over the top view, then construct the framework from that position. In either case, just be certain the tail post is right on the midline and that the stab seat is level with the wing saddle.

Bend the landing gear over the drawing using a large vise grip plier and a bench vise. A cut-off wheel is also most useful here. If you make an error, do not attempt to rebend, just toss the wire and start again. The unit is held to the firewall with nylon clips. It is wise to use the prebent wire as a guide to drill the appropriate holes. The same applies to the engine mount. Speaking of which, I used Hayes long mounts with a .40 stroker well back and the .40 two cycle well forward to avoid major swings in the C.G. If your model is to use only one motor, adjust its position after final assembly.

Stabilizer. Although the *Commando* stab planform is very close to that of the *Bomb-shell* it at least has ribs rather than over and under strip. For simplicity's sake I usually place the elevator on half the stab and this has worked very well albeit a bit odd looking.

The construction involves techniques similar to those of the wing, but we just place blanks of sheet balsa in the appropriate places, then block sand the whole unit to air-FLYING MODELS foil and taper. For the builder who might be uncomfortable with that technique I have included rib patterns.

Rudder. The outlines are formed using pins on the perimeters. "A" (straight) grain light weight strip is soaked in ammonia water (one teaspoon of household ammonia to four ounces of water), coated with SIG Bond, or such, then carefully bent over the plan. The remaining framework is then built up. Note the sheet filler piece extends to the bottom of the stab through the slot.

Bevel the outside portion of the hinged surface and use your favorite brand. If you don't have one, consider the Easy Hinge from SIG.

Hook-ups and installations

Hard balsa pushrods or nylon tube-in-tube can be used. Just be sure the system is adequately braced against flexing, and runs without binding. Nylon horns and clevises are advised. The rudder rod will need some adjustments to pass out the slot in the fuselage top.

The tail skid can be bound to the ply plate with carpet thread and CyA or 1/16 inch nylon clips used if you can find them. Wheels need to be light if the model doesn't need the additional weight up front. The lightest and most durable I know of are the Lite-Flites from Dave Brown, although they look a bit



If you want a real smoker put a .40 2-cycle in the nose but a .40 four stroker like that in the author's plane (above) will give a more realistic, leisurely climb. Why hide all the lovely geometry of that framework (below). Cover the Commando with some translucent plastic film. Also is very light weight.

Old Timer Replica: Commando



Old Timer designs have been overlooked as good, sport primary trainers. They have excellent flight stability and recover quite easily if the student pilot should get scrambled. They also are potent thermalling machines!

strange. Trexler inflatable units are still available for an authentic look if you wish.

Since this is a duration model, a small tank is plenty. Keep it and the foam-wrapped battery and receiver well forward. Mount the servos on basswood strip held against the fuselage wall with scraps of light ply.

The dowel wing holddowns and windshield

are best installed after covering.

Flying

If a .40 two cycle is used, be aware that the *Commando 40* will be a real smoker. I'd suggest starting out with an 11-6 wide-blade prop and less than half throttle on the first flights, cause you're going to tend to go

straight up, very rapidly. As you get comfortable, use a normal 10-6 and be prepared to shut the motor off before the alloted engine run is used up. This thing can get very high in 20 seconds in the limited engine run events.

With a four cycle .40 the model will behave and fly in a manner much more realistically to the era represented. Climbs are more leisurely, the angle of attack more realistic, and the thing thermals just as well once it's to altitude. For that matter the sound is much more like a Super Cyk or O&R 60.

Needless to say this design would fly very nicely with a good .25 two cycle if the nose were ballasted to compensate for the lower weight.

If you have a desire to be competitive in S.A.M. events this design will hold its own with most any cabin design around. If, on the other hand, you enjoy nostalgic trips back into an era when skys were bluer, thermals more prevalent, and miles closer together, under power the *Commando* a bit and have a ball. There is something sort of neat about parking this thing with the ultra sleek gliders and thermalling away with the best of them. Causes some odd reactions now and again.!

Finally, as a sport model or trainer this design is superb. It has excellent built-in stability and if the student becomes totally scrambled, he can just release the transmitter (or set it on the ground for that matter) and let the model work out its attitude while the flyer works out his.

So build one and enjoy!

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An FM Product Review:

Aerocraft's Aero Sport

By Ron Farkas



PHOTOGRAPHY: FION FARKAS

Not just another "plain Jane" plane, this model offers some distinctive looks, good construction, and perky performance.

was first attracted to the Aero Sport by its appearance, a nostalgic combination of golden era racing airplane and EAA single place homebuilt. There's also a hint of old time U-control stunt. In this case the beauty proved to be much more than skin deep since the Aero Sport is easy to build, uses quality materials, and has great flying characteristics. It is manufactured by Aerocraft, PO Box 553, East Northport, NY 11731, retails for \$74.95, and is sold through local hobby shops.

The model is rather compact in size, with a length of 42 inches, wing span of 53 inches, and area of 609 square inches. Target weight for the Aero Sport is 4.5 pounds. The wing is built in one piece, with no dihedral. The attractive top decking and open cockpit conceal the fact that it is essentially a conventional shoulder wing design, with proportions equivalent to Aerocraft's Spirit model. The airfoil is nearly symmetrical, except for a flat section aft of the lower main spar, as a concession to building ease. A number of creative assembly techniques are employed which work very well, particularly due to the accuracy of the parts fit.

The Aero Sport kit consists of milled balsa, hardwood and plywood parts, die-cut ribs and both balsa sheet and strip stock. The main landing gear is preformed aluminum, and the tail wheel wire is pre-bent. A modest selection of hardware is provided, mostly nuts and bolts, plus aileron torque rods and a heavy gauge pre-cut celluloid windscreen. The rolled plan is clearly drawn and the layout is uncluttered. A supplemental drawing of the nose is provided for a four-stroke engine installation. The instructions consist of five typewritten pages of assembly steps, with a two-page materials list and a flyer with two photos of the completed model.

Construction

The brevity of the instructions and lack of construction photos are among the kit's few shortcomings. Some of the numbered steps contain several individual tasks that should have been listed separately, and there are some typographical errors. However the construction is straightforward for a reasonably capable builder.

The wing is really simple since it is built flat on the board and in one piece. The wing span is longer than standard length balsa, so all sheet and strip stock require splices. For good strength, Aerocraft instructs the builder to stagger the various splices so that they are not all in one area of the wing. All construction of the review model was accomplished using Carl Goldberg Models Jet, Super Jet, and Slow Jet cyanoacrylate adhesives.

A really novel feature of the wing construction is that the leading edge uses a tongue and groove fit into notches in the front of the ribs. So the first step is to glue a strip of balsa stock into a slot in back of the milled leading edge stock. Wing assembly then follows a typical sequence of bottom sheeting including capstrips, lower spar, ribs, leading edge, center section brace and top spar.

Aerocraft has milled an angle on the bottom edge of the lower spar so that it leans aft, and thus mates perfectly with the ribs when they are resting on the building surface. That's a nice touch. However, I found that the front of the bottom leading edge sheet should be shimmed up off the board while the ribs are being glued in place. Otherwise glue will harden in the small spaces beneath the ribs just ahead of the spar, causing a lump when the sheet is finally attached to the ribs later on. I noticed that the wing plan measured one half inch longer than the specified span. The small deviation in rib spacing did not really affect construction, but the manufacturer has told me that later kits have plans which are reproduced by a different process without any distortion.

The wing is completed by the addition of shear webs, a servo compartment, all top sheeting, capstrips, and milled balsa wingtip



There is no dihedral in the wing so the wing can be built in one piece (above left). Because of the straightforward construction, cyanoacrylate adhesives would make short work of the building. In this partially sheeted turtle deck as-



sembly (above right), note that the floor keys to the top edges of the fuselage sides and acts as an alignment jig to pull the two fuselage sides together at the tail. Technique is both accurate and strong.

pieces. The last phase of wing construction is the installation of the strip ailerons and torque rods. The torque rod control arms must lean forward in order to clear the turtle deck former while the wing is being attached to the fuselage. This angle is best made prior to gluing the rod bearings to the trailing edge of the wing. Note also that this will result in unwanted aileron differential travel (more down than up) so the builder should make a corresponding adjustment of the pushrod connections at the servo wheel (forward of the wheel's midpoint in this case).

The basic wing construction is about as fast as it can be in a built-up structure. The sporty top decking and open cockpit will not be added until after the wing is fitted to the fuselage. Therefore, fuselage construction is next on the agenda. The *Aero Sport's* designer has devised some clever ways to make the fuselage structure self-aligning. To begin, some subassemblies must be laminated, like the firewall, landing gear plate and side doublers. Then the firewall and formers are glued to one side, with the second side added to create the basic fuselage box. Next the landing gear plate is glued into place, which locks the forward fuselage section square.

At this stage of construction it is typical for the directions to have you pull the tail ends together and sheet the turtledeck. However, the *Aero Sport's* turtledeck is assembled and skinned separately, on its own laminated sheet floor. The floor keys to the fuselage sides and thus becomes an alignment jig for pulling the tail together. This method involves a few additional building steps, but the result is both stronger and more accurate.

While the top and bottom of the fuselage are still open, it is easy to line up the wing and drill holes for the leading edge dowels and hold-down bolts. Having done that, the wing is left in position while the top foredeck and cockpit section are installed. The cockpit parts are already milled to shape, and should first be assembled over the plan and then glued to the top of the wing itself. Final carv-



The graceful lines of the Aero Sport suggest a classic vintage look. Quality wood selection makes construction fairly easy.

Aerocraft's Aero Sport



It's a pretty tight fit for the engine as can be seen in this underside shot of the cowl (above left) so a removable cowl could make engine maintenance and adjustment more accessible. The radio compartment is right under the cockpit (above right) and though tight will fit the servos, receiver, and battery. You will





ing and sanding are then required to blend the cockpit contours, with the fuselage top.

One of the remaining steps is to make the cowl. The pre-cut blocks should be glued to gether, then tack glued to the firewall and carved to shape. I chose to install an Enya .40 R/C engine, inverted, to hide as much of the cylinder as possible and also have the muffler clear the fuselage. My cowl is removable, but it also could be installed permanently if you prefer. In either case the cowl will have to be a tight fit over the engine in order to preserve the contours of the nose section.

The completion of just a few more tasks will have the model ready to cover. The tail surfaces are glued in place and pushrods installed, followed by sheeting the fuselage bottom. The fuel tank hatch is mated to the fuselage bottom. The instructions recommend temporarily installing all of the equipment in the uncovered airframe, and checking for balance. Some ballast weight is expected to be required at the tail. Since I was installing a light weight engine, I bypassed this step and went ahead and covered the Aero Sport before balancing. Although it did turn out a bit nose heavy, the situation was corrected by moving the airborne battery back with the servos. However, a heavier engine would surely have required some weight to be added in the fuselage under the stab.

The final weight of 77 ounces is a little over the designer's target weight, yet the wing loading is still only 18.2 ounces per square foot. I covered the *Aero Sport* entirely with white Carl Goldberg Models UltraCote heatshrink plastic film. It was also used for the red and yelllow trim colors, by applying with low heat and being careful not to let air bubbles get trapped beneath the trim. The firewall, cowl interior and cockpit opening were all painted with white Hobbypoxy for fuel protection.

Attaching a curved windscreen to an open

cockpit model can be troublesome. This time, I cut a groove through the covering and into the balsa, and glued the windscreen in the groove with Super Jet adhesive. Then I masked off the area and smoothed on a paste of Hobbypoxy Formula II with microballoons. Before that hardened the tape was pulled off, leaving a sharp line. After painting to match the covering, it looked like a piece of metal framework. The final result



Ron chose the term "groovy" to define the Aero Sport's flying characteristics. He grades the roll rate as rapid but control response is good enough that it won't get away from you. Rudder gives crisp stall turns.

was both good looking and very secure.

Flying

The Aero Sport was test flown from a grassy field on a bitter cold breezy winter day. There was no problem whatever in getting airborne in a hurry, even with a rather mild .40 engine. Some right rudder was required, but only for the first few moments. After a bit of right aileron trim and down elevator trim it flew hands-off, and very groovy at that. With the control throws set according to the instructions, the performance is spirited indeed. Set up this way it turns on a dime and gives you a nickel change, yet it does not appear to be too sensitive for an accomplished flyer.

It is likely that the responsive maneuverability is a characteristic of the short tail moment, while the stability is enhanced by the rather long nose moment. This is an interesting design approach, and one that works out well in practice. I would discourage anyone from hacking a few inches off of the nose, in search of improved aerobatic performance.

The Aero Sport has a rapid roll rate. Inverted flight requires little or no elevator correction. Loops can be as open or tight as you like. It has sufficient rudder control for nice crisp stall turns, and without unwanted roll coupling. It is also capable of some spectacular tumbling maneuvers, like the ever popular Lomcevak plus some yet unnamed ones.

Slow speed stability has not been sacrificed for all this performance. The *A ero Sport* is very stable on landing approaches and can



Despite some pretty spirited performance, Ron claims that the Aero Sport can be dragged in for a threepointer and can almost hover in a breeze without any tendency to stall or snap.

be dragged in for a three-point landing or flown onto the mains. Also it can be hovered into a headwind for extended periods without stalling. A full stall may let a wing drop, but recovery is immediate upon releasing the elevator.

Before completion of this review model I had seen and flown two others. One had a

Webra Speed .40 and it went like a rocket. The other had an Enya .46 four stroke engine and it was much like mine, but with that lovely engine sound. All of the good handling characteristics were found in both of these models too. So, whichever powerplant is used, the weekend sport flyer or hot dog pilot should be satisfied with the *Aero Sport.* \subset



Vintage Stunt Championships

An aerobatic blast from the past!

By Dick Sarpolus



PHOTOGRAPHY: DICK SARPOLUS

Pretty gals, neat cars, vintage aircraft-what more could one want. In this nostalgic recreation of controline's past glory that's Michelle Keville on the left,

JoAnn Kelville in the center, and Patty Brigeman on the right posing with all these "blasts from the past"

blast from the past: back to the roots of our event. The Trailing Edge of technology, a gathering held in February 1989, in California of course (where else can you fly in February). This great meet brought out a number of the early stunt legends, along with many of today's top competitors. For this vintage flier from New Jersey, it was a real treat to spend a day in California watching the Golden Era aircraft in action. Directed by JoAnn Keville with some help from husband Mike (new editor of the PAMPA Newsletter), this affair had two categories of competition: Old-Time Stunt . . . per the GSCB rules, aircraft designs through 1952, flying the '51-'52 pattern, and Classic (Nostalgia) Stunt . . . designs through 1964, flying the current pattern.

This was a two day meet, with one round flown each day. Although the competition was important, the true attraction was the camaraderie and the presence of so many stunt notables, along with flying examples of the event's classic aircraft designs. I was only able to attend Saturday's festivities, and it was a day to remember. George Aldrich drove in from Texas, and naturally flew his Nobler through the pattern, gathering an appreciative round of applause from the knowing crowd. It's been a long time since I've seen any clockwise flying; Aldrich is one of the few still doing this.

George had a few other aircraft with him, historically important models. His Go-Devil, the Palmer design, ignition Orwick .64 powered, showed the small wing flaps which started such a revolution in design and flying. He also had an ignition Super Cyke powered Akro Bat, one of the early stunters with a larger wing area and thicker airfoil, again an important step in design development. I traded an Orwick .64 to George many years ago, and sure wish I had it today to use for some old-time flying.

I knew I was in the right place as I recognized most of the aircraft residing in the pit area. The Barnstormer (my first aircraft flown in AMA stunt competition), All American Senior, Madman, Dragon, Super and Super Duper Zilches, yes, a Fireball, plenty of old timers. And plenty of Nostalgia models; the Panther, Ares, Smoothie, Stuka Stunt, Skylark, even a Fierce Arrow.

I saw a familiar face from New Jersey; Lou Wolgast, who now resides in Tucson, was competing with his Reinhart 1950 Internats



OK, Stunt fans, what is that plane (above left)? None other than the Super Duper Zilch designed by Jim Saftig and kitted by Berkeley Models for many years in many sizes. Check out all that wing area and thin airfoil by today's 34



standards. If you really had your Stunt designs down you'd recognize this one (above right) as the Super Zilch, which Dick believes is the oldest, original Zilch with complete stick construction.

Winner. A look at the entrants list showed such competitors as Bob Whitely, Ted Fancher, Tom Dixon in from Atlanta, Kaz Minato, and many others. Also on hand were Keith Trostle, past PAMPA president, Paul Walker, Tom Lay the engine man, Ed Southwick the *Skylark* designer with a 28year old *Skylark*, and plenty of California stunt enthusiasts. Worthy of special attention is the attendance of Bob Palmer, true C/ L stunt innovator and designer of so many classic stunt machines. Palmer and Aldrich two of my heroes from the past, that's for sure.

This was the right place for a stunt reunion; southern California has always been a hotbed of top C/L activity. One judge looked familiar; sure enough, I still have the March 1971 issue of *MAN* with Tom Warden on the cover with his *Continental* stunter—and that photo was taken at Whittier Narrows, the site of this vintage meet, 18 years later.

One plane in particular shocked me; Kaz Minato's rendition of deBolt's All American Sr. Not yet born when deBolt was competing with this design, Minato set his version off with a high tech, new wave graphics finish that attracted plenty of attention. Was such a finish appropriate? I'm not so sure, but he brought deBolt's old timer right into the 1980's. I'll bet Hal would like this one.

A true classic is J.C. Yate's Madman, and there were several reproductions on hand, all super clean. The sound and fury of an unmuffled Orwick .64 running on gas-and-oil ignition was great; even the exhaust smell brought back memories. Also catching my eye were Fancher's trick colored tissue and clear dope trim on his Ares and All American.

There's a wide choice of aircraft designs available for Old Time Stunt competition, but selection of a particular model can depend on how seriously you view the competition. Some of the event's classic designs just aren't as well suited for top performance. I'd like to see the Jim Walker Fireball in action, as I remember Walker flying three at the same time at a past Nationals; but the aircraft wouldn't be pattern competitive. Many of the aircraft at this event were brought out just for fun and some sport flying; this was encouraged by the contest organizers, and helped the "reunion" feeling of the weekend. Several attendees had their scrapbooks on hand, and it was fun to see the photos of past stunt activity.



If there was ever a famous Stunt ship more revered than the George Aldrich designed *Nobler* (above), it would be hard to find. With its big wing, thick airfoil, and flaps, it set a trend and carved a big niche in Stunt history. That's the Grand Old Man himself (below), George Aldrich, with a Go-Devil.





For those with quick reflexes, the *Madman* (a J.C. Yates design) (above left) was just the ticket. This clean design could fly the pattern fast! This one has an Orwick .64 ignition engine sitting in the nose of the aircraft. Don Hutchinson FLYING MODELS



(above right) certainly enjoys his vintage aeromodelling, with two J.C. Yates designs, a *Madman* and a *Dragon*. The *Madman* is sleeker, but the *Dragon* has more wing area.

Vintage Stunt Championships



There was a time when MonoLine single wire strand control was used as an alternate to the two-line system, as shown in this picture (above left). "Back then" (when was that?) there was a trend toward scale Stunt designs like Don Still's classic *Stuka* stunter (above right). This classic looking *Skylark* (below



left) is 28 years old and belongs to the designer himself, Ed Southwick. The Kenhi *Panther* in the foreground **(below right)** is a great and interesting older design that came from a line of good Kenhi stunt kits.







Akro Bats, like this one, came from the stunt era of larger wing areas, thin airfoils, and no flaps. Looks like a Super Cyke engine up front.


The letters on the wing tell you what it is, the 1947 Trixter Barnstormer (above left) in its original classic version with the later movable wing flaps. A marriage of high tech, new wave graphics and classic design, Kaz Minato's nice deBolt All American Senior (above right) is a unique creation of the 1951 stunter. Of



later vintage, but still classics of their time, these Ares (below left) were the design of former Nats Champ Bill Werwage. Ted Fancher, another former Nats Champ, brought his own Ares (below right) with a nostalgic tissue and clear dope finish. It was another attention-getter.





Selection of the powerplant can also depend on your competitive attitude; the Fox .35 Stunt is of course a natural for many aircraft, and there are plenty of current engines to provide all the power wanted. But, it would be great to see more Orwick .64s, Super Cykes, Anderson Spitfires, OK .60s, O&Rs, etc., in action. I guess the engine collectors have driven the prices up to a point that most such engines just wouldn't be flown today, and the added weight of the ignition system would hurt performance.

Another vintage touch was provided by Tom Lay and Bob Whitely; they brought out their '57 Chevy Bel Air hardtops for atmosphere. Both cars are in absolute showroom new condition, and a photo session had the '57s serving as a backdrop for many of the aircraft. Love those fuzzy dice!

I always enjoy seeing the "old" pattern flown, with the earlier aircraft. It seemed a bit out of place to see some of those aircraft handling the current pattern in the Nostalgia event, but many of the planes can do very well. Judging by the Classic/Nostalgia class turnout, this category too will see plenty of activity in the future. If you're getting interested, there are two main sources of plans and information on the older designs: John Miske, 415 Clifton Blvd., Clifton, NJ 08028 for many OTS plans, and Tom Dixon, Suite 401, 1938 Peachtree Rd., Atlanta, GA 30309 for OTS and Nostalgia plans.

Based on the large turnout and enthusiasm displayed at this event, Mike and JoAnn are already talking about a follow-on affair for next year. Same basic format, with some added fun. Maybe a '50s party/dance on Saturday night? Plan ahead for the LA Vintage Stunt Champs in 1990!



Lou Wolgast is a well-known name in Old Time Stunt circles so it's no surprise when he came with a Red Reinhardt 1950 Internats Winner. What engine? Why a Fox .35 of course.

Ryan ST

A low-wing, "panted" classic. By Tom Sandor



PHOTOGRAPHY: JEFF KARP

he beautiful Ryan S-T is one of those "special looks" aircraft which caught my fancy as a kid. At the risk of dating myself, I shall never forget the scene in a Joe E. Brown movie in which this airplane appeared.

The comedian was flying a mailplane and was mistaken for a bandit pilot. Above and behind him appeared that silvery bird with those great "pair of pants", or landing gear. It was the flying policeman.

The pilot in the open cockpit, signalling the comedian to land, made this a memorable scene indeed.

Sleek and shining like a model turned from solid silver, the first Ryan S-T caught the attention and affection of the flying world in 1934 and has held it ever since.

Even the *Gee Bees* and all the others with similar type landing gear lacked the classic lines and charm of this superb beauty, the Ryan S-T. The S-T (for sport trainer) was an open, two place, tandem cockpit plane powered by a Menasco B-4 Pirate engine of 95 HP.

Construction

Study the plan drawing carefully. Note the order of construction by number. This is important so as to understand the lamination type fuselage of this model. Select four strips of $^{1}\!/_{16}$ inch firm balsa strips for the start. Laminate these over the side view of fuse-

lage, shown as black and white on the plan. Next check the plan for making the fuselage lamination templates. Those are the "rascals" that caused me a lot of home to give the model that realistic, winning look. Templates to make the bulkhead laminations are not as difficult as some might think. If you have never tried this, do it now. It makes a great looking model a lot lighter.

Carefully cut these ovals out of thick poster board or $\frac{3}{322}$ inch plywood, if you have a good jig saw machine. Draw the cross-lines on them accurately according to the plan.

Next, select a sheet of 3/32 soft, very light contest-grade balsa. Using a good metal straight edge, or balsa stripper, cut about 12 to 16 strips, $\frac{1}{3}$ inch wide for the laminations.

Now place all these strips in a large flat pan of warm water, and allow to soak for about ten minutes.

While waiting for this, using an old candle, wax all the ovals' edges by rubbing firmly with the candle. Next place a sheet of waxed paper on your work board. Now pin each oval firmly to your work board. When the 1/32 inch strips are ready, lift one at a time from the water, and do the following: squeegee the ex-



There's much more than a hint of the elegant beauty of the finished Ryan in this shot of the graceful framework parts. The wings and tail are standard construction while the fuselage uses laminated rings as formers.

cess water from each strip between your fingers and coat carefully with white glue.

Next, starting at about the 7 o'clock position on each oval template, carefully and firmly press the glued lamination around the template. Be certain the glue side is always outward from the ovals. Continue to wrap the $\frac{1}{32}$ inch strip around the oval until there is a thickness of at least $\frac{3}{16}$ inch on each finished lamination. Trim off the excess strip and place a pin at this location to hold until glue dries. Keep going until all the other ovals have produced their proper sized laminations. Allow at least three or four hours preferably overnight—to dry.

Remove the profile of the fuselage from the plan. Be certain that you have marked the locations for each laminated ring former first.

Check to be certain the laminated rings are firm and dry. Now coat each with clear dope. I use nitrate dope for all the work. It does not shrink the tissue on a finished model too tightly thus preventing warps. However, any type clear is OK for this stage.

Following this, return to the fuselage profile, and where the marks are placed, carefully notch $\frac{1}{6}$ inch (see fuselage laminated detail) cutouts from the inside $\frac{1}{16}$ fuselage strip, on the top and on the bottom, at every point where the ring laminations will go. This will then leave you with a $\frac{1}{16}$ inch finished outside stringer on the top and the bottom of the fuselage when all the rings are in place.

Now begin putting the rings in place carefully, beginning with locations No. A through I. J,K,L, and M are solid pieces. Next cut out all temporary cross braces.

Next begin the side stringers by placing and gluing left and right opposites at the same time. Space them about ³/₈ inch apart. Continue this throughout the assembly to be certain the oval fuselage will be nicely aligned. Check it now and then to be certain. You may have to shave off a bit of the rings here and there. Also a shim of balsa at low points, but you will get the knack of the thing as you go along. Just stay with it, as the finished product is a beauty to behold!

From formers No. D to No. \tilde{G} use $\frac{1}{16}$ inch thick soft sheet wood to form the open cockpits. The headrest is formed from soft balsa



The solid silver finish of the first Ryan ST helped make it one of those memorable aircraft for the author, who poses with the finished model (above). Assembly of the model (bottom) comes before the tissue covering so the gear wire and the wheel pants assemblies can be installed.

block, hollowed out. The noseblock is hollowed out also from soft balsa.

Wing construction is fairly straight forward. Cut the ribs from contest grade, light balsa, $^{1}/_{16}$ inch thick. Laminate with $^{1}/_{64}$ ply, the two sets of angled ribs where the landing gear slides through.

Complete the main wings, right and left, in the usual manner, being careful to note the following: the inside ribs, which line up with the fuselage sides for dihedral, should be made of soft light balsa, because of its 3/32 inch thickness. Also note the angled, doubled rib section (detail #4) which takes the main load of the shock absorbing landing gear wire and wheel gear itself.

Next complete the tail sections, stabilizer and rudder, as shown.

When the fuselage, wings and tail sections are all completed, carefully light sand all the balsa stringers, wing tips, spars and undersides of all ribs. Using thinned-down nitrate dope, coat the entire fuselage inside and out to prepare for tissue paper application.





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Ryan ST



Tom inserts the 3/16 braided motor into the Ryan (above left) and starts to pack in the winds for a flight (above right). The motor is 27 inches long with only four strands for the first test flights. First test winds, Tom says, should be





limited to 150 turns. An "S" hook at the end of the .045 prop wire attaches the rubber motor (**below left**). Bring your "runway" to your flying field and let your Ryan gracefully R.O.G. (**below right**).



However when tissue covering the model, do only the wings and tail section at this stage. Leave the fuselage uncovered until the landing gear is first installed.

Before making the landing gear, please observe the following. Make certain the wings are completed and fastened to the fuselage. Next check the exact distance between right and left wing ribs as indicated on the plan (detail #5). At this point, on your model, (not the plan) is exactly where your 90 degree angle bends will be to form the gear. Use .045 music wire and be sure to include the "V" sections in their right locations. The "V"s should center between ribs #1 and #2. Make two small balsa blocks (detail #6) ¹/₁₆ inch thick. Glue and bind with thread to the "V" sections, which should then fit perfectly between ribs #1 and #2 on both wings.

Complete the wheel pants (detail #6) using the lightest balsa possible. These must be kept very light so as to keep the finished model about 2 ounces or less without prop and rubber motor.

Use the outline of wheel cover pants and solid upper sections on the side view of the plan. The entire outline is cut out of $^{1/64}$ inch thick plywood. The rest is laminated from soft balsa. The two outside sections may be formed of balsa, then used to vacuform the inside portions of the wheel pants.

This was my own method of forming the FLYING MODELS gear. I would like to make an offer to vacuform anyone's set of wheel pants if you will form the two outside halves. Send these and include two dollars for postage, and I'll do the rest. Just make certain you get a good smooth finish on those wood surfaces.

To accomplish this, try some Dap putty. This sands very easily and leaves a velvety smooth finish. Special note: these wheel pants, of course, must be also coated with thinned down dope, before the final silver coat is applied. However, if you plan on the vacuformed pants, do not coat with dope as yet. This would create a problem in the vacuforming process.

Next try dry fitting all the wheel pant sections, as shown. Start with the outside wood sections, making certain to get those wheels on first. The thin plywood tops should fit up into the double ribs so as to freely "ride" through the wings as shock absorbers (detail #7).

Carefully slip the whole wood and wire landing gear arrangement through the fuselage area where the wings have butted up against it. There should be pre-cut holes there to receive it. The 1/32 inch ply section of the gear should slide through the double "V" ribs giving it a back and forward shock feature. This should also spring sideways in both directions, thus saving those precious wings during hard landings. This is a special feature of the model, and it really works. On one of my initial test flights, the model hit some tufts of high grass in a landing. The only damage was a slight tear on the lower wing behind the one gear. For this reason you must use elasticized thread on the model throughout.

Assemble the wheel pant inside half sections onto the outside portions and glue into place. At this stage the model should begin to have that Ryan ST charm in appearance. It was great to see that distinctive classic undercarriage making the airplane take shape. Temporarily slip the whole tail section on the model and you'll see what I mean. Great nostalgia as the look of the 30s is sitting right there on your table. Better yet, it flies even as great as it looks, as we'll see later on.

Before securing the tail sections, however, make certain to tissue cover the fuselage first. When this is done, note the area in the rear where the horizontal stabilizer's leading edge must pass through (detail #8). Cut out the tissue there on both sides. Now slip the stabilizer into position until the dowel section fits into the slot on the last bulkhead doubler "M" on the fuselage.

Apply glue carefully to the *dowel only* and secure it to the slot. Follow the instructions on the plan for securing the leading edge through the small openings provided. The stabilizer should fit snuggly onto the fuse-

Ryan ST





Those lovely large wheel pants are as characteristic of the plane (above left) as its silver finish. But, they must be kept as light as possible by making them from the softest, lightest balsa possible. The gear strut is actually a 1/32 ply

lage, and also be able to swivel up and down at the leading edge. Now you may glue the rudder onto the fuselage. Secure the tail wheel as shown on the plan. Using 1/8 inch diameter aluminum dowel cut out the small exhaust stacks and secure them onto the nose cowl left side only. The model should look about ready for the color at this point.

There are a number of options for painting the model. I used the simplest one in a choice of Aero Gloss Silvaire Aluminum spray by Pactra. This worked very fine with no notable weight added. With paper, carefully mask off the inside cockpit area and black wheels. Lightly spray on one coat. Let dry and hold it up to the light to check for thin spots. Lightly spray coat again, being careful not to get any thick, flowing build-up of the paint.

When completely dry remove the masking and paper. Add windshields by making little slots in the balsa sheeting and fit these into place. You may want to add all the black detailing such as lettering on the tail and main wings. Please note, (and I apologize here). You must add another #2 (NC-14223) to the license on the wings. Just a bit of oversight on my part. With all the inking in of the drawing detail I felt you would not mind my not erasing and doing it over again, since it is not vital to the overall construction specifications. Thanks!

The large wing letters were cut from black tissue. I outlined the letters first on white writing paper, and then placed this over the black tissue, taping both together.

I then proceeded to carefully cut the letters out using the top white sheet outline as a guide. This produced beautiful clean edged letters. These are applied to the surfaces with thinned down dope, being careful not to brush too heavily into the sprayed silver coat.

Complete the model by using elasticized thread for all the rigging as shown on the plan. I started all the rigging first through the small streamlined blocks above and below the wings, see (detail #9). Be sure to thread these blocks with elastic rigging before applying to the wings. The prop is a 10inch medium pitch made from balsa and thin

profile plate. The entire gear assembly has been designed to take some abuse **(above right)** and each gear "rides" a slot in the wing so there is some flex. Elastic thread forms the flying wires.

plywood construction with a free wheeling device. A carved balsa prop will also do.

Check the model now for any detail you may have overlooked. With the prop in place and no rubber motor, check for proper balance and the test glide. Keep the rudder straight. If needed, adjust the stabilizer to attain a nice long flat glide. Next install the rubber motor. The test rubber used was $^{3}/_{16}$ inch F.A.I. braided motor. Test your model first with four strands of $^{3}/_{16}$ inch rubber, 27 inches in length. Finally try longer, braidedrubber motors. Test wind only 150 turns. If the flight is good, next wind it up to 600 turns. If the model tends to stall, add more downthrust.

If the model flies well to either right or left, keep adding turns into the rubber motor for longer flights. Keep experimenting. If you have built the model light, the Ryan S-T, like the PT-22 of another article, should give you beautiful and realistic performances. I truly hope you will enjoy this one also. For further information write: Tom Sandor, 47 Lorrie Lane, Clifton, NJ 07012.



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FLYING MODELS

Bob Aberle's Museum Trails

Part II



PHOTOGRAPHY: BOB ABERLE

Second stop "on the museum trail" brought Bob to a soaring mecca, Harris Hill, NY. Besides the 16,000 square foot glider museum, the grounds also have

an airport and a picnic ground for visitors. One of the displays hanging from the ceiling is the 62 foot span Bowlus DuPont *Albatross*.

National Soaring Museum

There's ample opportunity to savor all aspects of the graceful, elegant sport of soaring and its past.

y next stop "On the Museum Trail" is the National Soaring Museum, located at Harris Hill in the Elmira area of upstate New York. This is a combination museum, glider airport, and a large picnic ground (for use in the summer months). The address of the N.S.M. is RD #3, Harris Hill, Elmira, New York 14903 (museum telephone: 607-734-3128 and airport: 607-734-0641).

If you are traveling from New York City, the distance is approximately 250 miles. You would take State Route 17 West (Southern Tier Expressway) and exit at #51-South. From that point you travel (up hill, of course) for about three miles until you come upon the museum/airport complex. The N.S.M. is open seven days a week (year round) from 10:00 AM until 5:00 PM. Adult admission to the museum is \$2.00.

The museum building is a modern structure of 16,000 square feet. It is claimed to house the largest exhibit of classic and contemporary sailplanes in the world. I visited the N.S.M. on October 15, 1988. At that time considerable work was going on to expand the exhibit hall even further. Inside the museum you first realize that you have entered at a second story level. Just past the reception area is a balcony which overlooks the entire ground floor of the exhibit hall. Hanging from the ceiling, at about eye level from the balcony, are at least eight or more full-size, large wingspan sailplanes. The far wall of the museum contains one very large window (two floors in height) which allows you to look out over the Harris Hill Park (picnic area). The N.S.M. is extremely well organized. Everything is neatly displayed and clearly identified. Most impressive!

Many of the full size gliders on display would make ideal R/C scale model projects. As you will see in the photos, several R/C models are featured in the exhibit. The first large sailplance to catch your eye, as you stand at the balcony level, is the Bowlus Du-Pont *Albatross* with a span of 62 feet. It was built in 1933. This particular craft won the U.S. National Soaring Championships (1934-35). The workmanship, with all the wood laminations on the fuselage, is reminiscent of model aircraft construction techniques.

At "center stage" is a reproduction of the Wright 1911 Glider No. 5. This glider started



It was this type of glider, the Wright Brothers' 1911 Glider #5 (above left), that started the soaring movement in America. It's a replica of the original glider which Orville Wright flew for 9 minutes and 45 seconds in 1911. Hang gliders, take note (above right). That's an adaptation of the 1897 Herring-Arnot glider,





actually a hang glider. Back in 1929 this Dagling Primary glider (below left), built by the Elmira Motorless Aviation Club, trained many of the local soaring pilots of the time. Hutter H-17 with a 33-foot span (below right) was built in 1939-40 from a basic Slingsby kit.



the world soaring movement when Orville Wright soared for a record 9 minutes and 45 seconds flight over the sand dunes at Kitty Hawk on October 24, 1911. It is the only known full scale reproduction of Glider No. 5 in the world. To the left of the Wright glider is the classical *Minimoa* with its characteristic gull wing configuration. This particular sailplane was built in 1936. The wing span is 56 feet. Just adjacent to the full scale soarer is a ¹/₅ scale R/C model constructed by Lawrence Reidy of Stanley, NY. It isn't very often that you can make a close-up comparison between a scale model and the real thing!

Let me give you a brief rundown on some of the other sailplanes that are suspended from the exhibit hall ceiling. First is the Schreder HP-18 which is a "V" tail high performance type in the 15 meter class, with a span of 49 feet

Second is the Mitchell "Superwing" U-2 (meaning "you too" can build it!). This is actually a flying wing, powered glider with a span of 34 feet, that was built in 1978. It's powered by a three bladed pusher prop turned by a koenig three cylinder, two cycle engine. This glider achieved an altitude record in its class of 25,933 feet.

Third is the Dagling Primary glider of 36 feet span, where the pilot literally sits on a forward rail or beam (out in the open). This Dagling was built by the Elmira Motorless Aviation Club in 1929. Through a lot of trial and error, and with the student taking many

FLYING MODELS

short flights, he could actually learn to fly. Fourth is the adaptation of an 1897 Herring-Arnot (Chanute type) glider which is a reproduction and last, a Hutter H-17, built in 1939-40 from a Slingsby kit.

On the ground floor of the exhibit hall are even more sailplanes, along with detailed displays, historical accounts, and some interesting sailplane accessory items. I found a beautiful Schweizer SGU 1-19 disassembled and mounted on a transport trailer. This glider (N91806), which was designed in 1944 and constructed in 1946, is of a high wing configuration with a span of 37 feet. In its orange and white color scheme it would make a perfect choice for a scale R/C model. The Schweizer factory, as a point of interest, is also located in the Elmira area, but at a different airport. I expect to visit that facility on my next trip.

An exhibit of motorless flight aircraft wouldn't be complete without a typical WW II troop glider. In this regard the N.S.M. has an actual fuselage section of a Waco CG-4A. There is a ramp that permits a close look at the "minimal" cockpit area of this glider. Also the rear of the fuselage is open, giving a good view of the entire interior. When you consider the construction of these military gliders you just have to give a lot of credit to the brave people that flew them (and flew in them) during the war years. A very excellent R/C scale model of the CG-4A hangs directly over the fuselage. Close by is another R/C scale model of a Schweizer TG-3 WW II training glider. As a modeler I'm always very pleased to see our R/C models so prominently displayed at the various historical aviation museums. Another interesting glider, that is shown in disassembled form on a transport trailer, is a 1956 design by William Briegleb (BG-12BD). This was a popular kit glider which involved about 1,000 hours of constuction time. Wing span is 50 feet. Another interesting scale model project for those willing to do the research and design.

Also of interest on the main floor display was a small green pickup truck which contains a power winch for towing gliders. It was designed by E. Paul DuPont and first appeared at Harris Hill in 1937.

In addition to all of the sailplanes on display, there are many specialized photo exhibits that include a wide variety of historical glider information as well. In an auditorium, located on the main floor, you can see an excellent film presentation on sailplanes. This is continuously run throughout the day.

Depending on your personal enthusiasm for sailplanes it could take you at least two hours or more to tour the entire museum and view the film presentation. Despite all the natural lighting provided by the large windows, I would still recommend ASA 400 film with flash for any picture taking . Both my color and black and white shots came out perfect, adding considerably to my museum

National Soaring Museum



That's an R/C scale model of the Schweizer TG-3 WW II training glider. The (2.4" = 1') model was built by Carl Groom of Tucson, AZ.



Directly above the full size *Minimoa* glider built in 1936 (above left) is an R/C scale model rendition of this classic glider. Some gliders were kit built aircraft like this Brieleb BG-12BD (above right) built by Robert Keller in three years (1969-72) and given to the museum in 1977. Gliders were used during World

War II as troop transports. This fuselage section (**below left**) of a Waco CG-4A troop transport has its aft end open for inspection. Hanging directly above the Waco fuselage is a beautifully constructed CG-4A R/C 1/12 scale model by Norman Poff of Washington, DC.





photo album.

Back at the reception area, on the balcony level, you will find a sales counter offering a variety of literature on all forms of sailplanes. I did not see a book offered describing all the aircraft on display in the museum. That might be a good suggestion for a future promotional item. In summary I'd have to say that the National Soaring Museum is a very impressive, well organized facility that is a real experience for both the casual observer as well as the serious enthusiast.

This would normally be the end of my trip report, except for the fact that when you visit the N.S.M. you are also at the "Soaring Capital of America". The airport at Harris Hill is adjacent to the museum. All year long, weather permitting, full scale glider flights are offered to any visitors. These rides cost \$30.00 per person for a Schweizer 2-33 trainer or \$40.00 for a flight in a high performance "T" tail sailplane. The flights will vary in duration from roughly 15 to 20 minutes, depending on weather conditions (thermal activity) and the number of people waiting for rides. I chose the Schweizer 2-33 for my first glider rider because you can sit directly in front of the pilot, with the wing behind and above your position. This provides complete frontal visibility and makes for some breathtaking photos. The tow plane for my flight was a Piper Pawnee (low wing agtype aircraft).

All I can tell you is that the mid-October foliage out over the beautiful Chemung Valley was magnificent. All of my glider ride photos are in color so I can't share them with you in this article. I suggest a slow film like



Powered by a Koenig three cyclinder, two cycle radial engine this Mitchell *Superwing U-2* is the only powered glider currently displayed at the N.S.M. The unique aircraft spans 34 feet.

ASA 100 (color negative) or ASA 64 slides, especially on a bright sunny day as I was fortunate to have. Looking back at the Harris Hill Airport from about 1,000 feet, gives you the impression of an aircraft carrier (on land). The runway is literally carved out of the top of the hill and is only 1,100 feet in length (paved portion). In fact when you take off under tow, just as you clear the runway you end up suddenly at 500 feet altitude, out over the valley. What a feeling!

As mentioned earlier there is also the Harris Hill Park available for family picnicking, in combination with your visit to the museum and the glider airport. This park includes outdoor grills and tables and a small amusement park for children. For you avid aviation buffs, this is the one place that the entire family can enjoy and no one will ever get bored!



Very much a modern aircraft, this Scheider HP-18 "V"-tail is a 15 meter class competition glider that spans 49 feet.

An FM How-To: Fiberglassing with Hot Stuff UFO[™]

By Vic Macaluso

Foam and cyanos didn't mix—once upon a time! Satellite City's breakthrough, user-friendly, odorless new formula opens up all kinds of new techniques with anything!

ight now you're probably saying, 'just what we need, another way to do something we already have 50 ways to do it!! The technique I'm about to show you is really not new but the materials used certainly are. We all know that about the two most incompatible materials in the modeling world are water-thin CyA (cyanoacrylate) glue and white foam (ie. Styrofoam®, Byro-foam® wings etc.). Several products (primers) are on the market that will allow you to glue wood to white foam using the very thick CyA's but this method is tricky at best and if not done properly will result in the white foam just disappearing! (I guess Einstein didn't know about CyA and white foam while developing his theories of matter and energy!)

Well gang, what would you say if I told you I could fiberglass a *white* foam (Byro-foam[®]) wing with 2-ounce glass cloth and *water thin* CyA glue with *no* primer or kicker of any kind being used to protect the foam? If you can stop laughing long enough to listen further, I'll also tell you that you can fiberglass an average sized wing (foam or wood) and have it ready for finish in less than two hours using the method I'm about to describe!

OK! So you think Macaluso has really "lost it" this time, but what-the-hell, you paid three bucks for this magazine anyway, so you might as well read on.

With so few guarantees in this life, I'll make you one that's for real. When we're done here, you'll see that this method really works and that there is no lighter way to



PHOTOGRAPHY: JOE CRISTIANO

Using the Byro-Foam wing from his Beech Staggerwing, Vic introduces us to a new method of glassing a foam wing with cyano right on the foam! The cyano is Satellite City's new foam compatible UFO[™] (water-thin), some Kick-it[™] accelerator, 2-ounce glass cloth, 3M's 77 spray adhesive, a sharp X-Acto knife, scissors, and some 220 grit sandpaper.

glass a foam wing.

Hold it right there! Before you rush down to your hobby shop and buy six gallons of "Brand-X" CyA, please be advised that as of this writing there is *only one* brand and type of CyA that will make this technique work! Satellite City, PO Box 836, Simi, CA 93062, has recently introduced their new U.F.O. line of cyanoacrylates. No, it's not from another planet! U.F.O.[®] stands for User Friendly, Odorless. Believe me gang, it is just that. Completely odorless, and free from the gas and fumes normal CyA's give off during use. In addition to being completely odorless, it just will not attack white foam. To prove this, I'm now going to put on this little demonstration for you. I'll just remind you that this method will work over any solid structure you might want to fiberglass. So go to the photos and let's begin.



Before and after. Weighed on the scale before (above left) Vic applied the glass, one Staggerwing panel with aileron goes 15 ounces. After the cloth was



applied with the UFO cyano, the very same panel was weighed again (above right) and came in at 16 ounces, a total gain of only one—yup, one—ounce.



Step 1, at left. To start the process, measure the cloth needed to cover the surface and cut it slightly oversize to be sure you don't get caught short. Handle the cloth carefully since any run will leave a gap that has to be filled.



Step 2, at right. Lightly mist some 3M 77 spray adhesive over the surface to be fiberglassed (*only* the side you will be working on!) and wait a minute or two for it to dry. Vic emphasizes the importance that it's a light mist. Not enough is *too much*!



Step 3, at left. Carefully and evenly place the cloth over the wing, being very careful not to leave any wrinkles. The use of the 3M 77 spray adhesive enables you to lift and re-position the cloth as many times as is necessary to get the cloth wrinkle free.



Step 4, at right. Being very careful and patient, lift and smooth the glass using a soft rag to get it totally wrinkle free. This and the previous step are the most critical to the success of this method. Sufficient care exercised here will insure a perfect finished job. Without the successful completion of this step, the following steps just *will not* work properly! Any piece of cloth that is not completely contacting the wing's surface will become a troublesome bubble when the cyano is applied

Fiberglassing with Hot Stuff UFO



Step 5, at left. Starting with the edges, dribble the UFO directly onto the glass cloth, allowing it to completely saturate the cloth and run onto any adjacent area. You can't oversaturate the cloth. It will only absorb so much cyano and the excess will wick into any dry adjacent area. It's this characteristic that makes this technique work so well.



Step 6, at right. When you're satisfied that the edges are completely saturated with UFO, hold the surface almost vertical and, starting at one end, proceed to apply the UFO in a smooth back and forth motion. Allow enough cyano to dribble onto the glass to completely saturate the cloth and run onto the dry area below it. Holding the surface almost vertical helps the cyano flow quite smoothly and easily over the wing. Continue with this until the entire surface has been saturated with the UFO and you're satisfied there are no dry spots.



Step 7, at left. By this time most, if not all, of the UFO will have "kicked" (hardened) but if any wet spots remain, a quick spray of Kick-it[™] accelerator will finish the job and allow you to proceed to the next step.

Step 8, at right. Using a sanding bar or free sanding (your choice), trim the excess glass away from the surface by sanding to the edges. This makes a very clean edge and prepares the leading edge and wing tips for glassing the opposite surface. When trimming the glass this way, be very careful not to gouge the unglassed foam. This will only give you more work later on with filler! When satisfied with your work on this side of the wing, go back to Step 1 and repeat the process for the opposite side of the wing. When both sides are finished, lightly sprayed primer coats are recommended. Any brushed-on primer will penetrate any unnoticed dry spot and attack and melt the foam underneath.



Sig Manufacturing's Kadet Senior By Dick Gibbs

When you look for a beginner trainer, it has to have special qualities. Here's one for .29-.40 engines.

An FM Product Review:

The largest of SIG's Kadet trainer series, the Kadet Senior qualifies in the author's estimation as a good primary R/C flight trainer.

R^{/C} trainers have been around ever since radio control equipment became generally available to the modeling public about thirty years ago. During that time it seems almost every year has produced a new batch of trainers and the process continues unabated.

So what's wrong with that? Nothing. Except that most of these trainers are good flyable sport models with ample (too much?) power that fly fairly fast and respond rather quickly to control inputs; this type of model is probably most suitable for developing the piloting skills of those individuals who, however ineptly, have at least learned to take off, fly about, and land without assistance. Possibly this type should be called a basic trainer.

So what's wrong with that? Nothing. Except that the beginner, by definition, has *never* flown, ineptly or otherwise! This person, the absolute beginner, needs a *primary* trainer which has enough power to do the job, is stable at speeds slow enough to allow the neophyte to make an error in judgement without crashing, and flies in a comfortable manner which helps the beginner to acquire confidence in his efforts.

So what's wrong with that? Nothing. SIG has one. It's called the *Kadet Senior*. Is the concept valid? The answer, after many flight sessions at the York Area R/C Club field, is an unqualified yes.

With a wingspan of 78 inches (1150 square inches) and fuselage length of slightly more than 58 inches, the *Kadet Senior* is the largest of SIG's *Kadet* series and utilizes building techniques unlike the smaller *Kadets*. Total weight is kept low by using "stick" construction rather than sheet materials and recommended engine sizes range from .29.40 two cycle, or .35.46 four cycle. Three channels of radio are required for rudder, elevator, and throttle. As designed, the *Kadet Senior*

FLYING MODELS

is fitted with tricycle landing gear and steerable nose wheel. The kit is SIG No. 58 and the suggested retail price is \$61.95.

The kit

The rather large kit box carries a sizable label showing a full color picture of the "clean-lined" prototype model. Inside, the box is fully packed with typical SIG top quality balsa, spruce, and plywood well selected for its intended use. Die-cutting is crisp and accurate and only a few parts need be cut from printed thick sheet balsa stock which is used in the nose area of the fuselage. Prebent wire landing gear legs are provided along with an extensive hardware package which includes the nose gear bracket and SIG aluminum motor mounts.

Two large, clearly drawn printed plan sheets are easily understood and contain many construction notes that are very helpful to the first time builder. To make things even easier, especially for the beginner, there is a twenty-eight page construction manual containing more than 120 good, clear photographs and drawings which take the builder step by step through the building sequences, suggested covering techniques, and hints for applying a painted, or doped, finish. Based upon all of the information presented in this manual, anyone should be able to complete the model successfully.

To further aid the beginner who has no access to help in the form of a flight instructor, the last couple of pages in the manual show, step by step, how to attempt that first flight. An additional aid is a separate booklet with illustrated examples of radio installations and even more bits concerning flying instructions. Modelers of all levels of experience appreciate information about the particular kit they are building but for the beginner the SIG manuals in the *Kadet Senior* kit are re-

ally a mini course in model building.

Construction

With the help of the construction manual and plan notes, the Kadet Senior builds up easily and reasonably fast. Anyone who has built an Old Timer will feel right at home with the Senior because the process is essentially the same; fuselage sides are built up over the plans with balsa strip and the sides are then joined together with strip balsa cross pieces. The area of the fuselage which supports the wing is further strengthened through the use of spruce strips rather than balsa. Additional strength is provided by using thin plywood in the window area of the cabin. Interestingly the rear of the fuselage does not taper to a point as is usual in most models but is left with a small rectangular opening through which the elevator pushrod passes in a direct line to the elevator control horn.

At the other end of the fuselage the motor mounts are set up to produce some right thrust for the engine which helps to keep take-offs straight. Hardwood trunnion blocks are supplied for mounting the main landing gear legs and these were installed according to plan. Since I prefer tail-draggers, additional landing gear blocks were located at the bottom of the fuselage in line with the leading edge of the wing so that the nose gear could be removed and the mains relocated if the urge to "tail drag" became overpowering. It did!

Fin, rudder, elevator, and stabilizer are all built-up surfaces and might appear a bit weak. Not so: especially when covered they are light and strong. The wing uses a minimum of sheet balsa covering, its strength being derived from substantial leading and trailing edge stock, a combination of spruce and balsa spars, and sheet balsa spar

Sig Manufacturing's Kadet Senior



The elevator pushrod has a straight run to the control horn through the open tail post (above). Despite its large size, a .40 4-stroke like this O.S. (below) is ample power because the Senior is so light.





Though the Kadet Senior is designed as a tricycle gear plane, it can be easily converted to a tail dragger by adding another, forward ply fuselage plate and moving the gear forward. Helps improve ground handling. 52

webbing. For its size the wing is quite light and strong.

The prototype Kadet Senior was covered with SIG light-weight silk which was clear doped with some color dope trim added. In response to my question concerning the suitability of SIG Koverall as covering material Claude McCullough, who designed the Senior, replied that a second model built at SIG was covered with Koverall and finished with Supercoat dope with a neglible increase in weight. For the more experienced builder either silk or Koverall painted with a dope, or Skybrite, would provide a beautiful, tough, long lasting finish.

Beginners, however, would probably find it easier going with an iron-on covering, and with that in mind, Solartex was applied and the surface sprayed with two coats of SIG clear dope. Iron-on films would also be suitable for the covering job and perhaps save a tad of weight as compared with fabric material.

Radio installation is extremely easy simply because there is so much space available in the cabin area. Standard size servos and flight battery pack were installed. Finally, the always reliable O.S. FS .40 four stroke was bolted to the engine mount and ACE light weight wheels attached to the landing gear. Completed, the Kadet Senior tipped the scale at six pounds, six ounces for a rather light wing loading of twelve ounces per square foot.

Flying

As mentioned in the preface of the construction manual, and confirmed by our own experience, the Kadet Senior should not be flown by a beginner in winds of more than ten MPH velocity. For experienced pilots, flying in windier conditions is not impossible but the Senior is really most enjoyable when flown in the low wind conditions for which it was designed.

For the beginner the SIG manual goes into detail for setting up the trike gear for nosweat take-offs or no-sweat landings by adjusting the landing gear wheel sizes. Using wheels which provide for a slightly nose-up attitude (with the model at rest on the runway) will allow take-offs to be made without any elevator input, but landings will call for a bit of up elevator to insure that the nose wheel does not make contact with the runway before the mains. With the reverse setup (nose slightly down), up elevator must be used to rotate and lift off for take-off whereas landings are accomplished with no (or very slight) elevator required. It's all in the book.

As mentioned earlier, the engine right thrust helps keep the model tracking in a straight line on take-off. And speaking of engines, there is not much point in using anything larger than those sizes suggested by SIG. A .40 stroker is just about perfect to allow the Kadet Senior to do what it was designed to do. On the grass portion of our field, take-offs require forty or fifty feet before lift-off, and on the paved runway even less

Full throttle climb is best established with a couple of clicks of up trim on the transmitter. Steep climbs just don't happen. With the nose high, airspeed bleeds off rapidly and the nose mushes down until flying speed is regained, very helpful for the student who finds the transmitter stick "welded" in the full up elevator position. Loops can be done only following a dive to pick up a bit of airspeed. The size of the *Senior* also aids the student because it is quite visible at high altitude which allows plenty of room for errors; in case of disorientation it is only necessary to release the transmitter sticks to neutral and the ship will recover on its own.

As with most three channel designs the *Kadet Senior* is not at its best when takingoff or landing in a cross-wind. However with the breeze on her nose during these manuvers she is a real lady. As the book says, take-off and land directly into the wind and if the breeze is more than ten miles per hour wait for a better day.

After many, many good flights with the trike gear configuration the nose gear was removed and the main landing gear legs remounted on the forward gear blocks mentioned earlier. Is the effort worth it? I think so. Ground handling is improved and I think that take-offs and landings are easier as a tail dragger but then I'm prejudiced.

Summary

SIG's Kadet Senior is a well behaved, stable, pleasant to fly model for both novices and experienced R/C pilots. All of the required materials and instructions necessary for completion of a successful project are here for the beginner. For the more experienced builder who has never tried "stick" type construction, this is a good one with which to begin. Claude McCullough and SIG Manufacturing Co. are to be commended for designing and kitting an R/C trainer that is really a primary trainer in the true sense of the word.



Chief mechanic Llloyd Williams (L) and test pilot Paul Williams (R) (above) conducted the "acceptance" flights of the Kadet Senior and their only "squawk" was the usual minor flight trim adjustments every model is subject to. Though large, the Senior gets up quickly (below) because of its light stick construction.







More news from the gang. By Earl VanGorder



PHOTO: MRS. W. POYTHRESS

Bill Poythress claims that his .010 tailless design flies "like a homesick angel". He's got a Cox .010 tucked on the back of the fuselage pod. Bill says he likes to experiment with unusual model types.

ell, troops, here we go again. It's time to gather in the ole hangar and swap a few lies. So, c'mon now, settle back, get comfortable, lay down the X-Acto knives and dope brushes, and let's have at it!

Generally speaking, it's been a rather dry month . . . that is, I haven't heard too much from the old gang. Well, as I'm writing this, it's very early March and you guys are probably at the building boards rushing to get that latest model ready for the Spring flyin' season, right?

Well, if that's your bag, let me get right to

the first item on my agenda and that is news of some Canadian contests which will, of course, interest those of you in the northeast U.S. and Canada, but one of them is a postal contest that can be of interest to everyone.

What am I talkin' about? Well, it's the Jimmie Allen 50th Anniversary "Postal Air Races". For this one, you must build the Jimmie Allen model from the Easybuilt kit (FF-68) according to the plan, using the materials in the kit. There are a few modifications allowed and I'll tell you, in a minute, how to find out about that.

This one sounds like a real fun type of af-

fair and, who can't wax nostalgic over a Jimmie Allen model?

Now, you can get a printed sheet with all the details to handle your own entry and go for the prizes, by dropping a long SASE to this address: Peter M. Mann, Event Director, 36 Sydenham St., Guelph, Ontario N1H 2W4, Canada.

This is a neat one since you can enter as many times as you wish. Be sure to get into this one for lots of fun from March 1st through September 30th.

In September of 1989, there will also be a neat event at the 34th Annual Eastern Canada Open. This is a 50th Anniversary Contest for replicas of Fred Bower's 1939 Wakefield model. Tell Peter to also send you a info sheet on this event when you write him on the Jimmie Allen thing.

Hey, gang, these Canadian neighbors are doin' all sorts of good things. Why not find out about 'em?

Now, on the subject of available products, I want to tell you more about our favorite source of scale documentation. We heard from Bob Banka at Scale Model Research and, would you believe, he has *again* expanded the inventory to cover over 400 new additions. Bob now sells over 2200 different Foto-Paaks with more than 60,000 photos in inventory. They cover everything, including Golden Age, Military, Civilian, Helicopters, Racing ... and, you name it!

Of course, as always, all photos are $3^{1/2}$ by 5, taken with the scale modeler in mind. Here's the way to get those precious details as well as making the judges love ya for your super documentation.

You can get a complete new catalog, listing everything in stock by sending only three bucks to the address I'm gonna give you. Oh, yes, you guys and gals in foreign countries



PHOTO: JOHN MORROW

You've already seen John Morrow's Mercury Chic when it was finished, but look at those fabulous bones (above left). John really goes all out to be faithful



PHOTO: LOU BUFFARDI

to scale detail. Lou Buffardi put this Guillow's B-17 (above right) together as a hobby shop exhibit. Plenty of bones in that model.

will have to add another \$2.50 to cover A/O postage.

Here's the address: Scale Model Research, 2334 Ticonderoga, Costa Mesa, CA 92626. I wouldn't kid you, troops, this is a real goodie!

Now, I've also been asked to tell you about the United States Indoor Championships. This will be held on June 1, 2, 3 and 4 at the University of East Tennessee Mini-Dome in Johnson City, TN. There will be 20 separate official events as well as a number of unofficial fun events.

Hotel and dormitory facilities are available and there are four full days of flying. That's to say nothing of the beautiful scenic and historic sites that abound in this corner of Tennessee, so bring the family and make a real vacation of it.

There will be two different banquets and you can have a ball! Want to get all the details? Easy ... just send a large SASE to this address for all the "poop" sheets: U.S.I.C., 1655 Revere Dr., Brookfield, WI 53005. If indoor is your thing, be sure to get in on this one.

Before we go to the mailbag, photos, etc., I do want to tell you—especially those of you interested in electric power—that V/L has come out with a new catalog. This is a source of power for all sizes of model and this catalog should be available on your bench for reference.

As I mentioned, the V/L line is very complete and you can find power sources for all types of models from free flights up to 30inch span and well into the larger R/C types.

Send a buck to Hank Fasola at V/L and tell him that "ole Van" suggested that you contact him. The address is: VL Products, Division of Vista Labs, 7871 Alabama Ave. #16, Canoga Park, CA 91304. If you're getting interested in electric power, look into this one.

Well, troops, let's move on to the old mailbag, cause we got a lot of goodies there this month.

A short time back, I showed you a photo of the neat model of the Mercury *Chic* that was done by John Morrow of Watertown, NY after a heckuva lot of research at the Curtiss Museum in Hammondsport, NY.

Well, I decided that you should also see the gorgeous bare bones of John's model. This job was not only scale in the final result but ... was scale *all the way!* Now, isn't that one of the prettiest sets of "bones" that you ever saw?

Also, I recently showed you a shot of old Iron Mike Midkiff's *Claude* and I told you that he had also done the plans for a Japanese *Tony*. Well, now I'm gonna show you a shot of Mike's finished *Tony*. A really beautiful aircraft. As usual, Mike makes all his plans available to all the gang for that one flat price of five bucks which includes the postage (How can you go wrong?). You can jump on your copy of the *Tony* plan by send-



Rene Gaid may have just gotten into scale but it sure seems like he's had plenty of good experience from the looks of his Nesmith Cougar. It's a good size since it spans 32 inches. Hope we see the finished shots.



"Pack in a bit too much rubber?"

FLYING MODELS

Flyin' Things for Fledglings



Besides the B-17 on the previous page, Lou Buffardi also scratchbuilt this

Heath Midwing (above left) from Peerless plans. Looks like it'll be a great flyer.

PHOTO: MIKE MIDKIFF

Van's old friend, Mike Midkiff, hit the target again with his Japanese *Tony* (above right), right up to his usual excellent calibre.

ing your fiver to Mike at this address: Mike Midkiff, 20007 Pinehurst Tr. Dr., Humble, TX 77346.

I got another "bones" shot for you that came from one of our Canadian friends. Rene Gaid, in Mississauga, Ontario tells us that he was a bit hesitant about free flight scale until he started checking into our monthly sessions. Then, the bug bit him and he decided to give it a try. His first attempt (quite ambitious, actually) is a 32-inch span version of the Nesmith *Cougar*. It's a doggone nice set of bones and we're all looking forward to seeing more of Rene's efforts, I'm sure.

We also heard from our old friend, Dr. Lou Buffardi, down in Louisiana (that's pronounced "Looz-yanna" if you're not a native). Lou has suddenly discovered the joys of scratchbuilding and is absolutely ecstatic about it. He built the neat Heath *Mid-Wing* from scratch from an old Peerless plan and couldn't bring himself to believe that his total cost was only about 25 cents! Yep, it all came from the scrap box and other leftover parts from previous crashes. Gotta tell ya, Lou, that you did a *super* job on your Heath and it's just gotta be a flyer!

Lou was also commissioned by a local hobby shop to do a Guillow B-17 *exactly* as per kit instructions for a display. He did this and I couldn't resist showing you a "bare bones" shot of his efforts. Man, O man! Look at all dem bones! Anyone want to try to guess the weight of that sucker? In any event, it's a heckuva neat construction job, Lou, and we're all proud of ya.

Now, I can't resist showing you a photo of an old buddy from my previous club...well, I shouldn't say previous because they did me the honor of making me a Life Member (did you say "what club", Chauncey?...why the Mid Hudson Modelmasters, of course.)

Bill Poythress is a bit like our friend, Al Backstrom, since he likes to experiment with unusual types. In the photo, you see him with his Cox.010 powered tailless type which he assures us "flies like a homesick angel". It's a really nice piece of workmanship, Bill, and don't be a stranger. I just *know* that the gang will be interested in any other rare birds that you come up with.

The last photo for this month came about in a rather strange way. When I was leaving England after my visit last November, I climbed aboard the 747 wondering who I would get for a seat companion. Well, that "seat companion" arrived in the form of one Dr. Colin Martin, a university professor in marine archaeology. Boring? Heck, no... the farthest thing from it.

It didn't take long to discover that Dr. Martin and I had a similar love for model flying machines! I'm here to tell you, gang, that that flight from Heathrow in London, to Boston—all seven hours of it—went so fast that I couldn't believe it!

We had a marvelous time swapping modeling stories and a new, and I hope, permanent friendship was formed.

Colin was going to Boston to participate in a seminar and got off the British Airways flight there, while I continued on in a struggle to finally find this "dot on the map" of my hometown of Tonawanda. I have since heard from Dr. Martin and he sent the photo of he, and his son, enjoying a flying session together. I hope to visit Scotland on my next visit to Britain and shall look forward to renewing a friendship. Hey, gang, can anyone who flies with his son be all bad?

Well, here we go again, troops \dots I had hoped to give you another newsletter update this month, but I've rambled on too long again. I'll really try to work it in next month cause I've got a couple of really good ones to tell you about. Okay, so you can hate me, but hang in there until next month and I guarantee it'll be worth it.

Gotta close the old hangar doors on another good bull session, but I'll be really lookin' forward to next month's get-together and in the meantime, don't forget to get those good black and whites to your old buddy at the same old address, 2 Holley Lane - #7 Tonawanada, NY 14150. Be lookin' to hear from ya. So long, now.



PHOTO: MRS. COLIN MARTIN

Those are the fields of bonny Scotland where Van says Dr. Colin Martin, enjoys flying sessions with his son Edward. Van met Dr. Martin in the skies high over the Atlantic on the way back from England.

BUILDING AND FLYING CONTROL LINE MODEL AIRCRAFT by Dick Sarpolus



Dick Sarpolus' Building and Flying Control Line Model Aircraft is a complete how-to manual on the popular mode of flying developed by the late Jim Walker in 1939. A history of control-line flying is followed by chapters on control mechanisms and hardware, flight training, engines for control line, aircraft construction and finishing, kits and scratchbuilding, competitive flying, building instructions for four 1/2 A models and three larger models, and a listing of control line organizations and suppliers.

This is a comprehensive manual for anyone who would like to get involved with control line flying., as well as for those who already are accomplished ukie experts.

Dick Sarpolus is a regular contributor to Flying Models magazine and other publications on a wide variety of model flying subjects and is a well known designer of model aircraft.

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By Frank Costello



PHOTOGRAPHY: FRANK COSTELLO

First testbed aircraft for Ed Booz' propane powered turbine jet engine (above left) is slated to be a giant scale BD-5J. Displayed at the '89 WRAM Show, Ed plans to commercially produce the engine in a four inch version. A unique and

he WRAM show in White Plains, NY is always held on the last weekend in February, a traditionally bad month for weather in the Northeast. Somehow the WRAMs always seem to be blessed with, if not good, at least decent weather. This year, true to fashion, a heavy snowfall, predicted for the Friday morning of the show, held off until Monday so we could get through the weekend. I'd like to know who the WRAMs know to get such divine cooperation.

This year's show was held back at the Westchester County Center, the traditional location since the first show in 1969. The past two years, the show was held in the main building of the Yonkers Raceway since the County Center was under a major overhaul, modernization, and enlarging program. Being back at the Center was a real treat, with much improved facilities, spotlessly clean, and with elevators making it easier to get around. Even the food was much improved.

Unfortunately, the trend in this year's show did not tend to lean toward Giant Scale. Helicopters and R/C cars appeared to be more prominent in 1989. What giant scale items were present were all of notable quality and uniqueness, so all was not lost.

The most impressive items I saw were in the engine category with the first commercially available true turbo jet leading the way. Designed by Ed Booz, the engine is made from all aluminum parts and will weigh in at about four pounds in the four inch production version. Ed had a five inch prototype at the show that was truly amazing. Video tape showed the five inch version running with a turbine speed of 46,000 to 90,000 RPM. The production model should reach speeds of 150,000 RPM.

Ed's choice of fuel for his engine is certainly unique. It runs on propane gas (not liquid) and Ed feels this is just as safe as any other fuel we take to the flying field if handled properly. He chose propane gas mainly for the fact that it maintains its own pressure eliminating the need for external support systems such as a fuel pump and batteries to keep the fuel flowing. A failsafe refueling procedure greatly reduces accidents in that area.

The first test flights of the unit will take



more economical approach to radial engines (above right)? Radial Engine Technologies is using six K&B .20 two cycle engines mounted to a planetary gear system to drive an 18-6 prop at 8150 RPM and produce 2.1 HP.

> place this spring in a scale BD-5J. Ed estimates that the production version should fly this plane at about 200 MPH. Ed also said he is going to be selective about whom he sells his units to since it's obviously not meant for the beginner. A smart move considering the basic knowledge needed to run this engine. Ed seems to have really done his homework on this one and I am anxious to see the finished result in a giant scale ducted fan. Congratulations Ed Booz.

Another noteworthy engine effort was the



Hangar One Hobbies rests in these able (?) hands, Bob Ernsbarger (L), Tom Wilkinson (C), and J.T. Adams (R). They appear proud to announce their very own new 1/3rd scale kit of the Pober Pixie parasol homebuilt. JUNE 1989



SIG Manufacturing's 1/3rd scale Spacewalker (above left) has grown very popular since it was introduced two years ago. It's a natural for the horizontally opposed O.S. FS-240 or the O.S. 320 4-cylinder engine. Justifiably proud of his



giant P-40 Warhawk (above right), Michael Maniatis hid the real OPS Maxi 30 powerplant under a carefully detailed dummy Allison engine. The cockpit was completely detailed too.

6-cylinder radial engine effort by Michael Goldowsky of Radial Engine Technologies. A unique approach to the radial engine concept, Mike has come up with a low-cost radial using off-the-shelf parts and existing technology. Six K&B .20 two cycle engines are mounted around a central shaft, driving it through a planetray gear system. There's no master connecting rod and easily replaceable components facilitate both maintenance and repair. At an estimated 2.1 HP the radial will turn an 18-6 prop at 8150 RPM.

Mike had his engine running many times during the show; it's quiet and smooth at all throttle settings and practically vibration free which makes it almost "unnoticeable". It's extremely easy to start also. Application for this radial is widespread. Practically any "round" engine kit on the market will be suitable, such as Proctor's Nieuport 28, Ziroli's Fokker DR I, or the new Royal Stinson Reliant. Contact Mike at Radial Engine Technology, 7 Greenwood Lane, Valhalla, NY 10595.

Some kits were also being presented for the first time at the show. ACE R/C showed their new 1.20 size Seamaster seaplane. Following on thier very successful Seamaster 40, this one uses the proven 4-120 wing and an out-ofthe-water T-tail design combined with a 1.20 four stroke pylon mounted engine for successful giant sport water flying. Tom Runge also displayed a future kit design, the 1911 Eastbourne. Look for this one around the fall of this year.

Hangar One Hobbies, those great people who bring you so many of Nick Ziroli's designs in kit form have one of their own this time, the Pober Pixie in third scale. Tom Wilkinson and his crew really put out a nice kit and their selection is getting better all the time. Look for a 40% scale Piel Emeraud at 126 inch span coming soon!

Byron Originals, those talented people from Iowa, displayed their new quarter scale Husky kit. A Piper Super Cruiser look-a-like, it nevertheless is a totally new airplane from the ground up. A full fiberglass fuselage and unique Fowler flap system makes this new Byron design a real pleasure to build. The high wing design is a first for the Byron people but has been enthusiastically received by the giant scaler (I even bought one myself). Look for an upcoming Ryan STA kit from Byron with a possible AT-6 Texan down the road in a few years. These people never rest.

SIG Mfg., also from Iowa, has made a big

hit in giant scale circles with their 1/3rd scale Spacewalker desig that now is almost two years old. Sales of the Spacewalker have been very high and are beginning to creep up on their legendary 1/4 scale Cub, one of the most popular giant scale kits of all time. The Spacewalker flies just as well as the Cub but certainly looks more "sporty".

The static display models seemed to carry the quality of giant scale to new heights. A beautiful B-25C by Bill Steffer of Schnectady, NY spanned 100 inches and was completely hand-painted. I heard rumors to the effect that this was the prototype for Nick Ziroli's new B-25 kit. Nick was showing a new set of B-25 plans and a fiberglass nose for a B-25 in his booth so I guess there's some truth to it.

P-40s were in abundance with no less than three giant scale Warhawks in the competition. Michael Maniatis scratch built his P-40 and added working cowl flaps and a completely detailed Allison engine that hides the real OPS Maxi 30 engine used for power. Mike, from New York City, flies in New Jersey with the Hackensack Valley Fliers.

World War I has always been my main in-

terest and this year the biplane was well represented. Dino DiGiorgio of Oakland, NJ showed his newly finished Sopwith Pup. From the Balsa USA kit, it has been modified by Dino to add all those extra scale details so important in a good scale ship. Squadron pennants, propeller driven generator, flashing machine gun, and cockpit detail added much to this already beautiful ship.

Thomas Kosewski scratch-built his Fokker D-VII from Joe Neito's 3-views. His excellent building and flying got him a place in the 1988 U.S. Scale Masters Championships where his D-VII took highest static score. It spans 88 inches with a Super Tigre 3000 for power.

One of the more spectacular scale ships this year was certainly the Handley Page 0/ 400 that John Goodrich brought all the way from Burlington, Vermont. At a scale of 11/4 inch to the foot, this WW I bomber spanned 125 inches and certainly qualifies as giant scale. Uses two O.S. .48FS Surpass engines to pull its 16 pounds through the air. This one will surely be a floater when it flies. John spent 18 months on research before he started construction which then took a year. c



Quick quiz: Is this Bob Banka of Scale Model Research before or after the WRAM Show? Bob's booth is always one of the more active and he's kept almost constantly busy answering questions from scale modelers about his treasure trove of documentation Foto-Paaks and three-views.



By Dean Pappas



PHOTOGRAPHY: DEAN PAPPAS AND BOB HUNT

You're looking at one of the chief culprits that robs some of your engine's power, the sharp corner formed at the intersection of the round lower crankcase and the gas passage up the side of the crankcase. Since the fuel/air mix is a gas and gases /ove smooth flows, a little rounding of the corner will help.

If a voirdupois, Bat Man! That's light! This writer has always been proud of the way that the Controlline Stunt building techniques he had learned badly as a kid have allowed him to build wing panels at weights of right around eight ounces. This weight includes gear mounting details, servo boxes, control horn mounting points, and hinges.

Well, everything that I have done has just been blown away. Just today I got to closely look over some wing panels made by Henry Piorun of High Performance Models (the address was in two months ago's column). They weighed five ounces and the work was immaculate! I can't see these things getting any heavier than six ounces even after servo boxes and all that. Makes me sick to think about it.

Okay, back to engines

Last month we "flowed" the header pipe in order to get some more boost out of that tuned pipe, this month we will actually attack the engine.

Before starting out, let me make the following disclaimer: Any and all of the procedures that will be discussed will void anything resembling a warranty on an engine. It has always been my position to tell people that high performance engines break, and there is no sense in crying about it. Still, some people think that high performance Pattern engines should last forever (sometimes, just to spite us, they do). This is like expecting the engine in a McLaren Honda to last like the one in a gently driven Civic.

This month, we will limit ourselves to aluminum. The gas passages in our engines are formed by the interior of the crankcase casting, and very often the mold designer does not agree with the engine designer as to what the shape and finish of the insides should be. This is even true when both individuals are the same person. The ideal shape just cannot be made in a die casting, and investment castings would just drive up the cost of these engines. In some of the high-dollar racing engines, we see this no-compromise approach. All we will do for this "stage 1" hop-up is to make the engine designer happier with the casting.

The first offender is the corner that is formed between the round crankcase section, and the gas passages that run up the sides of the engine (in the case of a side exhaust engine, up one side). The sharp corner restricts the flow, and provides a point for the fuel to condense and drip back into the bottom end. This messes up the transition, and possibly douses the plug when a slug of cold fuel finds its way into the combustion chamber.

The pictures illustrating this do not convey one thing; if you overdo it, the crankcase will become very thin in one spot. Just be careful.

The tools necessary for this cutting are a Dremel tool, and a collection of cutting burrs. There should be a picture of the bits that are commonly used.

All these cutting tools, when used carefully, produce a smoother finish than that of the original casting. This is good: while the local gasoline engine rebuilder will tell you that a little roughness is correct, alchohol fuel is different. A mirror finish is preferrable. No, I do not polish them, just smooth does fine. The tool for polishing is a very hard rubber wheel which is used with rubbing compound at high speed. I don't own the polishing tools, but someday...

Next is the shape of the bypasses that run up to the ports. The first problem is that the top edge almost never matches the port holes in the sleeve. You remember the sleeve, it's one of those pieces you took out when disassembling the engine in order to do this. You



Collect the Dremel cutting burrs shown and you'll be able to do a creditable job of reworking the gas passages. They will give you a smooth, finished surface—desirable in an alcohol-fueled engine.

also took the bearings out and put them in a clean place, no?

The way to get the tops of the bypasses to match the sleeve is to make up a bent scribe (I usually CyA a bent pin to a hard balsa stick) and with the sleeve in place, scribe along the inside of the intake ports. The scratch lines show where to cut to. You also will want to match the angle of the top section of the bypass cutout to any angle that is machined into the port. If the port is machined at right angles, then you want to make the top of the bypass round rather than tapered or square edged. The idea, once again, is to get the flow angled just slightly upward.

In my experience, it is better to get the two flank ports angled so that they point almost flat across the top of the piston, and the main port (the one across from the exhaust) pointed upward some. The idea is to both make the mixture swirl, and to make a good path for fresh mixture to get pulled through the engine and into the pipe. The more fresh mixture that gets pulled into the pipe, the more that can be packed back into the engine.

The next area to look at is the carburetor boss. You don't want to change the shape of



S&W Fuels' Stan Rauktis poses with his "product test" model, a Phillips Aircraft PA-2. One of the chief product tests is his own fuel and carbon fiber tuned pipes. The plane uses a Futaba 1024 and O.S. .61.

anything where the case meets the crankshaft, but any "steps" or corners where the carb and case meet are a Bozo no-no. The YS has a good corner at the back edge: very little metal has to be removed in order to make it better.

Next month, we will attack the piston and sleeve, and anything else that comes to mind.



Now that is a high tech, light wing from High Performance Models. It's a honey-combed wing for a Summit II. Weighs only 51/3 ounces per panel. FLYING MODELS

soaring

By Herk Stokely

had a letter from a reader who questioned a statement that I made in a recent column. The note that he referred to mentioned that a nose heavy model will tend to porpoise and stall. I brought it up because it's not intuitive that it would work that way and newer fliers are likely to try to correct that condition by adding weight to the nose rather than removing it. In fact, the writer said that he thought it worked the other way, and said that perhaps I could explain it better in the column. My recollection was that I had done a piece on that subject, but when I reviewed the file of old columns, I found that it has been over five years.

Dive trimming again

This particular concept can be applied to all models, whether they are free flight, R/C power, flying wings, canards, controlline, scale, or even full scale for that matter. Most people who don't know about it, sometimes don't get the balance of their planes optimized, and (very important for sailplanes) efficiency and handling qualities suffer.

Longitudinal stability

A plane uses dihedral in the wings to get lateral (or turning) stability. There is a dihedral effect for the longitudinal (diving/ climbing) stability as well. This "Longitudinal Dihedral" comes from the relationship between the wing incidence, the horizontal stabilizer incidence, and the location of the center of gravity. Very simply, if the wing is set with its leading edge raised slightly, and the plane trims out in flight with the stab leading edge slightly lowered, you can visualize a kind of dihedral between the two surfaces that'll stabilize the plane by making the nose come back up if the plane is tipped into a dive, thus Longitudinal Dihedral. It's not a correct technical term, but it does give the idea.

When the plane is too nose heavy, it takes a big, inefficient, download on the tail to balance out the nose heaviness in trimmed flight. That equates to too much longitudinal dihedral, and the plane is too stable in pitch. All of that down load comes from a downward lift on the stabilizer that produces unnecessary drag, and subtracts from the lift of the wing so that it has to lift more to hold up the weight of the model and counter the down load on the tail. That's why most sailplane fliers like to get the plane on the verge of tail-heaviness at thermalling speeds. If the plane is balanced perfectly, there's sometimes almost no download on the tail at all during slow speed flight. That means that the drag of the tail is at an absolute minimum, and the plane's aerodynamic efficiency benefits.

Balancing isn't always easy

The problem of finding the best starting balance point for a new model is not always simple. Even kit planes or models built from plans don't always work well when balanced according to the directions. I've seen magazine plans that don't even show the balance point. Probably the construction article told in detail how to locate the C.G., so the author didn't bother to show it on the plans. Of course, when you later order the plans, the article probably doesn't come with them so you're on your own to find the right C.G. to start flying with. Likewise, if you're designing your own model, obviously you have to decide where to set up the initial balance point.

You can use one of the excellent computer programs available that propose a starting point, or you can use one of the textbook or graphic methods available, or you can even just use your own experience to estimate it intuitively. However you find that starting C.G. position, you will find that it has to be further refined in flight if you want to get it just right for your specific plane, your flying conditions and for your flying style. Those first few hand launches can be scary, though, if you're not confident that the balance point is in a safe place. Try the free flight method. Make those first couple of hand launches over deep grass or weeds. Find something to cushion the landing enough to be safe.

Fine tuning—in flight

Once the plane is safe to fly, here is how to get the C.G. in the right place for you. With smooth air conditions, get the plane trimmed for slow minimum sink flight. Fly it around a bit and tweak the elevator trim till you are sure that the plane is flying just about as you'd like it for thermalling flight. Now use forward elevator to tip the plane into a shallow dive and ease the stick back to neutral. If the plane immediately pulls out of the dive and quickly zooms up into a stall, it is nose heavy. That's right. the excess up (elevator trailing edge up) trim needed to hold up the excess nose weight becomes more powerful as speed builds up in the dive and lifts the nose further than it should for a smooth recovery, and the nose pitches up into a stall or porpoising maneuver.

If the plane continues to dive without pulling up, perhaps even steepening the dive even though the stick has been brought all the way back to what was trimmed neutral the plane is *tail heavy*. In this case, the elevator trim needed for stable slow speed flight was too much down (elevator trailing edge down). The excess lift on the tail is needed to hold up or balance the tail heaviness. When the speed builds up in the dive, the lift on the tail becomes much stronger, and it causes the dive to continue steepening.

There are lots of other things happening besides just the speed build-up that affects what happens when you're dive-trimming a model. First there is the downwash on the tail caused by the lift of the wing. The wing makes lift by accelerating the air in a downward direction. The tail has to fly in this downflow behind the wing, and when the plane is flying at high lift (slow speed), the downwash is at its strongest and it helps hold the tail down (or the nose up, depending on how you think about it). When you put the plane into the dive, the downwash decreases, and some of the nose-up effect goes away. Also, the effective aerodynamic center (or neutral point) of the plane moves toward the rear, changing the stability characteristics of the plane.

Flying speed² is the biggest factor

All in all, though, the speed increase is the big effect. The lift on the tail (in an up or down direction) increases with the square of the speed, so a relatively small speed increase makes for a big change in the forces being produced by the tail. That means that trim on any reasonably normal plane will be dominated by the "Longitudinal Dihedral", or the slow speed trim position of the elevator.

Suppose that the plane porpoises when you try the dive trim maneuver. Since I said that means the plane is nose heavy, you should take some weight out of the nose, and retrim the elevator with a couple of hand tosses. When it seems to be trimmed right, launch again, fly around a bit to get the best thermalling trim, and try the dive maneuver again. This time it should pull out more gradually. The ideal balance is set when the pullout is smooth and gradual, and no stall occurs when the plane recovers; though all stable planes will go through some continuing oscillations.

Don't push too far!

Try to be reasonable about this. Pushing the C.G. back is good—to a point! It unloads the horizontal tail during thermalling, and makes the plane more efficient aerodynamically. It also makes the model more responsive, or even touchy on elevator control, and generally gives a feeling of lightness and better handling to the pilot. If however, you go a bit too far, bad things can happen when you retrim the plane for higher speed flying. Perhaps you are trying to penetrate on a windy day, or maybe you're working a cross country task where higher cruising speed is needed. Now your plane that pulled slowly out of the test dive on your earlier trim testing, becomes very touchy on the elevator, and may even want to tuck under or dive uncontrollably when you get it moving fairly fast.

What that means is that the Longitudinal Dihedral has become very small, and those other factors are taking over. Both of them tend to make the plane dive. The loss of downwash on the tail is the same as putting in just a bit of down elevator trim, and the aft movement of the neutral point makes the plane seem to be more nose heavy than it was. The result is that a plane that has its C.G. too far to the rear is very unpleasant to fly. So, test this too. After you get the plane balanced and flying just the way you like it at thermalling speed, feed in just enough down trim to pick up the speed to the point of good efficient penetration or cross country



PHOTOGRAPHY: HERK STOKELY

Here's the latest edition of the Selig-Champine stretched Gemini by Vernon Saunders. Wing span is 129 inches and the weight is in the 70-ounce range. The Selig 4233 airfoil is fully sheeted, and the plane is a formidable thermal competitor. Note the multi-sweep *Discus* type wing in this version.

flight. Fly it around a bit to make sure you have it trimmed the way you want it and then do the dive trim maneuver again. It should still pull out smoothly, though perhaps a bit more slowly than before. If it wants to keep diving, or tries to tuck under, put back some of the weight in the nose. It's not worth it to have a plane that flies on the ragged edge of instability all of the time, even if there is a tiny theoretical performance advantage. To me, good handling is half of the enjoyment of the model, and bad flying planes are no fun!

Obviously, none of this will work if you have limp control rods, loose linkages, or poor servos that don't come to the same neutral every time. You can fly and enjoy models like this, but Fine Tuning is out of the question. For really precision flying, you need excellent equipment and a very precise, careful installation.

C.G. effects on tow are surprising too

While I'm talking about locating the C.G. of a model, I might as well go on and mention that changing the C.G. location has an unex-FLYING MODELS pected effect on the way a model behaves during a winch type launch. I've seen people try to improve the way a plane acts on the winch by changing the C.G., and the effect here is intuitively backwards too. The incident I remember was with a guy whose model would stall on launch. The tow hook wasn't readily movable, and he did want to fly that day, so he tried to prevent the stalling by making the plane more nose heavy. The effect he got was just the opposite. Instead of stalling less on tow, it stalled worse.

What happens on tow during a winch launch is that as the line is taken in, it accelerates the plane toward the turnaround pulley on the other end of the field. The plane meanwhile is trying to climb on a circular path with the turnaround pulley near its center, so there is a big angle between the fuselage and the tow line during most of the launch. As the towline pulls the plane toward the turnaround, the heavier parts of the plane tend to stay on the path that they are following and the lighter parts tend more to be pulled in the direction of the line. If you can visualize that action, on an extremely nose heavy model, you can see that the nose will tend to stay on its upward path, while the lighter tail will be pulled toward the turnaround. That gives a strong nose-up movement, as far as the flight path is concerned, and the plane will tend to stall. A tail heavy plane obviously will behave just the opposite, tending to drop its nose as the winch line pulls in.

Move the towhook

Trim the plane for flight first, and then fix the launch problems by moving the hook. It's the only way. Start with the hook a bit forward, and slowly move it to the rear on successive launches, until you get maximum height and a good straight tow with no elevator input. Hauling back on the elevator during the launch should cause a properly set-up model to stall. If it doesn't, move the towhook back until it does, and then leave the elevator alone during launch. Actually, maximum launch height comes from having the hook so far back that you need down elevator trim on tow, but if you get distracted, and forget to retrim before the launch, the plane will stall and you might not catch it in time. œ.

whirlywords.

By Dale Hart





PHOTOGRAPHY: DALE HART

Choppers were really strong at this year's WRAM Show. Robbe Modellsport (180 Township Line Rd., Belle Meade, NJ 08502) has really been active importing the Schluter line and Vince Canzanece (above left) shows off the Schluter

Bell 222 body with *Junior 50* mechanics. For Gorham Model Products 23961 Craftsman Rd., Calabasas, CA), Gary Stonecypher **(above right)** shows the glass body of a Bell 222 fuselage for the popular Gorham *Shuttle*.

t is always the prerogative of a columnist to change his mind! I know I promised last month to talk about the choice of a first helicopter, radio, and engine but still being new to this game, I didn't realize that the WRAM Show was upon us (it was held in White Plains, New York on February 24 & 25) and so I had to switch gears this month. Next month, I promise—first choices!

I always think of the WRAM Show as a sign that Spring is on its way, and activities at the flying field will resume. Of course, for some brave souls (or crazy fools) the flying never ends, it just slows down a little bit. Either way, bring on the warm weather!

GMP was present with a full line of helicopter kits on display. They were showing a new rotor head for the Legend. It featured the usual GMP/Hirobo dampening system, but with new blade holders, pitch arms, and an underslung flybar similar to that used by several other manufacturers. They were also announcing the return of the ever popular Cobra Jet Ranger fuselage along with several fiberglass fuselages to fit the Shuttle, one of which was a Bell 222. The big news at GMP will have to wait till the Toledo Show, where they plan to show their newly designed lowcost, entry-level helicopter kit. It will feature fixed pitch to keep things simple, and will be powered by a .40 engine.

A new company by the name of Heli Tech Designs made their debut at the WRAM show this year. The company was founded by Koby Tigershtrom with the purpose of making the German WIK product line available to the American market. Heli Tech is starting out by importing several of the WIK fuselage kits, namely the BO-105 and BK-117 scale models, and also a sport model called the *Wikinger*. WIK makes a full line of accessories for Scale helicopters, including external and internal detailing kits and flybarless rotor heads that are an excellent copy of the full size design.

To complement the rotor systems, a line of fiberglass rotor blades are also available. For those helicopter enthusiasts not involved in scale modeling, a line of wood blades is being imported that come pre-weighted, balanced, and ready to cover. They are available with a symmetrical airfoil for .60 size helicopters, or with a reflex airfoil in a .50 size and a .60 size.

One last item of interest is a one piece tail rotor assembly. This unusual item is again copied after the full scale version. It consists of the two tail rotor blades and the mounting hub all joined together during manufacture with Kevlar strands. There are no bearings needed in this design, which eliminates a potential site for control slop and wear.

Hyatt Hobbies was at the show displaying a GMP Shuttle modified to be powered by an Astro Cobalt electric motor. An umbilical power cord was used to carry the electric from the power supply to the airborne helicopter. A video tape showing the model being flown in a gymnasium demonstrated the potential for flying indoors. It was suggested that the electric Shuttle would be an excellent prospect for a group purchase by a club. It could be mounted on a training stand to prevent crashes, and would then be the ideal helicopter for demonstrating helicopter flight to inexperienced pilots. Just think, no fuel, no starter battery, no electric starter, just turn it on and fly.

Miniature Aircraft USA had an impressive booth manned by Ted and Tim Schoonard. They were showing many new items, including a scale Long Ranger III designed from the factory drawings. The fuselage is constructed of fiberglass and Kevlar, providing a strong but lightweight structure. Intended mechanics are the X-Cell .60 or the newly released X-Cell .60 Custom kit, which features all of the popular hop-up parts available to satisfy the serious competitor.

Other new items available for viewing were

the new line of Kevlar Rotorsport Pro blades, specialty tools, and a full line of mufflers to fit practically any engine and helicopter combination. However, the big news at MAS is on the small size, .30 sized to be exact. The gentlemen at MAS have completed testing on their latest design, a 30 size version of the X-Cell. It has many of the features of the larger models, and uses many of the same parts, such as the rotor system. The Schoonards plan to demonstrate the X-Cell .30 at the Toledo show, and hope to be delivering kits by the end of May, 1989.

Rave's Manufacturing USA displayed their ever-expanding line of high quality accessories. A very popular item is the True Start system. This consists of a an extension that mounts onto the electric starter and an adapter that replaces the cone that is supplied by the helicopter kit manufacturer. The advantage to this system is the carefully machined hex shaft that makes a positive connection with the hardened steel socket bolt machined into the adapter.

This eliminates all slippage during starting, and also prevents damage to the canopy caused by the starter slipping off the cone on a conventional system. Several other specialty items were displayed, including head buttons, tools, and blade balancing tools. A new catalog is expected to be available soon. Also, if you are interested in Heim Helicopters, Rave's is the place to go. They had an Augusta 109 with working retracts on display at the booth. It was fun to watch the doors open to allow the retracts to move up or down, and then close behind them.

Robbe Modelsport, the importer of the Schluter line of helicopter kits, had a beautiful display of helicopters, including several scale models. The full line of kits has been updated for 89 with some minor refinements to the already excellent designs. The big news at Robbe is a new .60 size kit on the way. It's called the *Magic*, and will be avail-



Dave Hyatt's electric powered Shuttle (above left) can be flown indoors and is marketed by his Hyatt Hobbies (45 Marchwood Rd., Exton PA 19341). Koby Tigershtrom of Heli Tech Design (144-31 68th Drive, Flushing, NY 11367) imports the West German WIK Bk 117 scale helicopter (above right). Miniature



Aircraft USA (2324 North Orange Blossom Trail, Orlando, FL 32804) manufactures this Bell *Long Ranger III* fuselage (**below left**) for their *X-Cell 60* mechanics. Rave's Manufacturing (2005 Suite 1, Mt. Vernon Ave., Alexandria, VA 22301) showed working retracts on this Heim *Agusta 109* (**below right**).





able as a pod and boom kit or with fiberglass fuselage based on the full size Bell *Jet Ranger.*

Copies of the building plans were available for viewing, with arrival of the first kits expected shortly after the show. New features include a start system that engages only while starting, a transmission system new to Schlüter that allows for a constant tail drive during auto-rotation landings, along with other benefits. The wooden radio trav has finally been replaced by an injection molded plastic assembly (Yea!) which can also be retrofitted onto the Scout 60. The people at Robbe should have this part number memorized in no time. The Magic retains the proven main rotor and control system of the Scout 60. There are many other new features too numerous to mention here. Naturally, Robbe plan to show the Magic for the first time at the Toledo show in April.

East Coast alert

The Hudson Valley Airscrews will be hosting their second Helicopter event May 20 and 21, 1989 at Iona Island in the Bear Mountain State Park in New York. The event will feature fun fly competition events for all skill levels. Prizes will be awarded in each category. For information contact: Chuck Wildey, 104 Eaton Downs, Peekskill, NY 10566.

The Lehigh Valley Radio Control Society will be sponsoring its third annual helicopter event on the weekend of May 27 and 28, 1989. This year they plan to combine a fun fly and contest. Saturday's schedule will be Novice, Intermediate, and FAI events based on the AMA rule book. Sunday's schedule will be mostly open flying, with the exception of two rounds of AMA Scale in the early afternoon.

A new feature this year will be the Saturday night Banquet which will be open to all helicopter enthusiasts. The LVRCS Club would like to extend an invitation to anyone interested in attending their event, either as a spectator or participant, to join them for a weekend full of helicopter flying. The event will be held at the LVRCS club field, which is located near Easton, Pennsylvania. For further information, please contact Barry Wehrung, RD 1, Box 133, Ottsville, PA 18942.

Next month's column will deal with some of the choices that have to be made by the prospective helicopter pilot. We will start with the helicopter kit itself, and future columns will answer some questions about engine and radio choices.

Any correspondance can be adressed to Dale Hart, 624 Cedar St., Allentown, PA 18102.



Unfortunately, a bunch of nice helicopters on display at the WRAM Show hide Mike Robbins' first place winning Sikorsky SH-60B *Seahawk*. The model weighs 15 pounds, powered by a Rossi .60.



s R/C sport fliers, we may not care too much what goes on inside our radio equipment, as long as it works well and we can afford to buy it. We are aware, however, that our radio equipment has always benefitted quickly from technology advances in the electronics industry. Transistors soon replaced tubes and then the relays in our reed radios; and it was the transistor that made our proportional radio equipment practical.

When integrated circuits came along, they reduced the component count required in our receivers and servos, lowered the battery drain, increased reliability, and reduced size. More complex integrated circuits and microprocessors have increased the capability of our newer radio systems. A new electronics assembly technique may be one of the next changes to impact our equipment-this is surface mount technology (SMT).

The traditional method of assembly on our printed circuit boards has the leads of the ICs and the individual electronic components passing through holes in the board and being soldered in place to the printed circuit tracks. This technology is reliable and a reasonable amount of automation; automatic component insertion and flow soldering can cut the assembly costs. SMT has the leads of the ICs being soldered directly to the printed circuit tracks, on the same side of the board. No holes through the board, no leads protruding through the other side of the board.

A big advantage is space on the board; an IC surface mounted component will usually take up less space because the connection pins don't have to be as strong and so can be smaller. The soldered connection points can be closer to the IC than the older method would permit. With no component leads sticking through the opposite side of the board, chips can now be mounted on both sides of the board.

If it sounds like surface mount technology would be more difficult due to the closer spacing, yes it would; this means that even more automation will be needed for SMT. More automation makes for even lower assembly costs; but it also costs more to set up for SMT assembly. I imagine that the volume of production in our R/C industry would probably support the investment in SMT tooling; I believe that some of the newer Airtronics receivers are already using this type of assembly. In the computer industry, the leaders there are already producing SMT boards. The next innovation in our R/C gear may come in different assembly techniques. That's great, as long as we can benefit from smaller size, lower cost, or higher reliability.

Glass cowl for Sledge Hammer and Enticer

Scratchbuilders who build up their models from plans presented in magazine construction articles can often benefit from accessory items available for a particular aircraft. My Sledge Hammer design, Maloney 125 pow-





PHOTOGRAPHY: DICK SARPOLUS

You might want to consider this glass cowl from Fiberglass Master (above left). It simplifies building chores for Dick's Sledge Hammer (above right) and Enticer designs. Dick seems to think that for some obscure reason flat spots-which tend to develop on foam wheels- can hinder take-offs. So he came up with this simple device (below left) to keep the wheels of his PiK-15 off the ground. Rui Gomes is all smiles (below right) about his twin-finned Merlin. Not seen very often today, twin fins used to be popular.



ered and published in the October 1988 issue of FM (CF-786), showed an engine cowl section built of balsa, along with a suggested shape for a molded fiberglass cowling. Building up a plug for a fiberglass cowl, then making a mold of fiberglass or plaster, and finally laying up the cowl itself, is a good bit of work that I avoid when I can. For only one piece, you can carve a plug of urethane foam, lay up the fiberglass and epoxy resin over the foam, and when done melt out the foam with a solvent; but that too is some work. If you're thinking of building a Sledge Hammer, to make the job easier, a good fiberglass cowl section is now available from Fiberglass Master Inc., Rt. 1, Box 530, Goodview, VA 24095.

When I received one of the cowls from Fiberglass Master, I liked it so much better than my shaped balsa nose section that I cut off the section of my fuselage ahead of the firewall and replaced it with this fiberglass cowl. The advantage of the removable glass cowl is that it can be made to a more streamlined shape, fairing into the spinner and fitting tighter arround the engine, since it can be removed for access to the engine mounting bolts. The cowl can be trimmed to fit around a variety of powerplants. This one has a dual application-it also fits my Enticer design, published in the May 1987 issue of FM and now available as a kit from World Engines. Many kits don't include a removable cowl as the job can be done at less cost with balsa, but if you build an Enticer, a Sledge Hammer, or anything with a similar width fuselage and want the cowl, it doesn't cost too much, and it's a good quality item.

Keep your wheels round

I like and use the newer foam material wheels, for a substantial weight savings, particularly in the larger sizes. They do, however, have a minor drawback: if left standing in one position, supporting the weight of an aircraft, they will develop a flat spot on the bottom. This characteristic isn't solely found with foam wheels, as I've seen it happen with various wheel types. This isn't a problem in normal flying activity at the field, only when the model is stored at home. It's usually not a problem for me, as almost all of my aircraft are stored on wall racks or suspended from the ceiling. I couldn't do that with my latest model; just not enough room in the workshop.

The solution of course is to support the aircraft while keeping the weight off the wheels. Pictured here is a simple arrangement using two blocks of styrofoam joined by a cardboard tube epoxied into the foam. This device supports the landing gear just high enough to keep the wheels from touching whatever surface the aircraft is resting on. Easy to build at no cost and it solves the lumpy wheel problem.

Twin fin configuration

One design feature not often seen in full scale aviation or on our R/C designs is the use of twin vertical fins/rudders, out on the ends of the horizontal stabilizer. I can't think of any real benefit to this setup, and it introduces problems of building in adequate strength along with more complex linkage arrangements to move the rudders. Even so, the appearance can be appealing and certainly different. Pictured this month is a twin finned sport aircraft, the Merlin, built by Rui Gomes. Coupled with the open cockpit and taildragger gear, the styling is unique and the plane flies well. Rui has it powered with an OS .40, fitted with a tuned pipe. It's hot! The Merlin is constructed with a balsa fuselage and foam cored wing; it's a kit by Galaxy Models in England. I've seen several Galaxy kits now, and they're very nicely done. You can order kits direct from Galaxy and have them delivered air mail; pricing will depend upon the current rate of exchange, but I've found their kits quite reasonable even including the postage. For more info write to them at: Galaxy Models, 88 Catton Grove Road, Norwich, NR3 3AA, England. Œ



By Mike Kulczyk

bout a year ago, I decided on a project which would be my once-ina-lifetime endeavor. It was a model of an airplane which had a very warm hangar in my heart. An airplane, which to the best of my knowledge had not been "done" before and one which carried significant historic value. To make it even more personal, it was also an airplane I had flown when on active duty with the Air Force. By now you probably have guessed it, or you know what it is from some other source. In any case, the F-105 Thunderchief by Fairchild-Republic was the choice. It would be challenging to say the least, since the "big-un" had a notoriously small wing, was extremely heavy for a fighter, had tiny air inlets (at least for ducted fan purposes) and the landing gear is a mechanical nightmare. But so what? Faint heart never won fair airplane.

The model made its public debut last September at the Greater Southwest Ducted Fan Fly-In. It was not flown at that time due to it being incomplete. Even so, it did create a lot of interest and comment.

On 6 November 1988, the *Thud* got air under her wheels for the first time. Except for being slightly light in the nose, the flight was progressing smoothly with only minor trim adjustments being required. About three minutes after take-off the engine quit. Fortunately, we were doing the test flight at the Seguin Air Force Auxiliary field which allowed us to make a fairly decent dead stick landing without damaging the airplane—or so we thought.

The post flight analysis was that maybe we had launched with the engine a little lean. The mixture was richened a little, run-ups made and, with a number of heads nodding in the affirmative, we taxied back to the runway. The second takeoff was as smooth as the first and it began to look like we had a winner. Less than a minute into the second flight the engine quit again. Without making excuses, we missed the hard surface of the field by inches and wiped out the right main gear and twisted the wing some. What's wrong now?

When we pulled the cooling cap to check the engine, the problem became obvious. The cylinder head and cylinder were covered with oil. Since the oil could only have come from inside the engine, there must be a leak somewhere—like the head gasket maybe? Sure enough, the head bolts on the O.S. .77 were loose, and the aluminum head gasket deformed enough to leak head compression and cause the engine to quit. Rats...

The engine and fan were removed from the airplane and installed in a run-up stand. A new head gasket was installed, the head bolts were tightened and the engine was run. After the first tank of fuel we were able to get two of the head bolts to "squeak" slightly. Two more tanks of fuel were consumed with no further loosening of head bolts. Hey, we've got this baby knocked.

Repairs to both the airplane and landing FLYING MODELS



PHOTOGRAPHY: MIKE KULCZYK

With the butterflies (but not all the gremlins) under control, Mike Kulczyk taxies his beautiful scratchbuilt *Thud* to the "active" (above) followed by his personal "journalist" Russ Eppright. The *Thud* got airborne and flew beautifully (below left) after a prototypical long take-off roll (below left). Story is in text.



gear were completed in late December. On 2 January the *Thud* was airborne for the third time for an absolutely flawless flight. I was the happiest guy on the face of the earth. The following weekend we launched again for the purpose of getting familiar with the flaps. On a missed approach go around, the *?&ec*' engine quit again. This time we were flying at our club field, which forced us to dump it in the weeds. I was not a happy person. The damage was more than slight.

Examination of the engine revealed a head gasket failure just like the first one, and caused by the loosening of head bolts. What could be wrong?

We checked the fit of the bolts in the cylinder and found them to be rather loose, there was considerable wobble in the bolts as if they might be undersize in diameter. We then obtained a machinist's shop manual and found that for a 3.5mm bolt the diameter across the threads should be .1378 inches. The bolts in hand measured .132 to .133 inches. This fact was reported to the U.S. distributor for O.S. They allowed that this problem had not been brought to their attention before, but they would pass it on to O.S. for their information.

In the meantime, they forwarded a bolt set to me to try. The head bolts were measured and found to be in the same league as the originals except for being longer. I assume the longer bolts were for the "fat head" .77. This allowed me to cut the bolts to a length which would then help take advantage of the full depth of thread in the cylinder when installed with the "thin head". I then decided that the aluminum head gasket had to go.

The design of the installation on the O.S. .77 is such that there is no recess in the cylinder head for the gasket to rest in. The gasket simply sits on top of the cylinder and is held in place by the cylinder head. Should the bolts lossen even the slightest, the aluminum gasket just deforms and tries to force its way out between the head bolts. Not too good.

I fabricated new head gaskets from brass shim stock and stacked them to obtain the same thickness as the original aluminum gasket, .0015 inch. The engine was reassembled then, using Loctite on the head bolts for insurance. We have run over 60 ounces of fuel through the engine and there is not the slightest hint of the head bolts backing out.

As of this writing, I've not heard further from the distributor or the manufacturer as to whether the bolt size as measured is correct or if there was a bad batch of bolts at the factory or what. I'd be very interested to know. I've been told that other folks have seen this same problem. With all the .77's out there, maybe O.S. owes us one. It's kind of scary to hang a high dollar project on a marginal bolt.

Electric Fight



PHOTO: DICK GIBBS

Using Davey System's ammeter, an electric flyer has a good tool for determining the best motor/prop/ battery combo for electric models. Shown with Sermos connectors here, Molex and Tamiya are also available.

atest news, to me at least, of an allelectric club comes from western Pennsylvania thanks to Neil Rossi, vice president of the Westmoreland Electric Soaring Society (WES2). The club, with twenty-five members, is just over a year old and, in spite of the name, flies all types of electrics at Oak Hollow Park which is located in North Huntingdon. Neil says the site is a public park on one of the highest hills in the area which generates a lot of wave and thermal lift. Flights of 10-15 minutes are common, 20-30 minutes are realistic, and the longest flight to date is 40 minutes!

Most of the WES2 members also belong to other power clubs but all of them are convinced that "electric is the future" and work hard to promote the idea. Last summer, for example, they visited six local power clubs to show that electrics really work.

Monthly meetings are planned around specific modeling areas, e.g. covering techniques, which tend to keep meetings interesting and meetings are held the first Tuesday of the month at the North Huntingdon Municipal Building. Bob Markle is club president, Neil Rossi vice president, Guy Fusco is secretary and editor of the newsletter. The club welcomes new members and the annual dues are a reasonable \$8.00. If you're interested in joining forces with the WES2 send your check to: Neil Rossi V.P., 3947 Murry Highlands Circle, Murrysville, PA 15668.

In case you didn't notice ... the club meets in a *public building* and flies from a *public park* which indicates acceptance of their activities by the community. I wonder if the fact that electrics are *quiet* may have helped their cause?

And on the West Coast

The Boeing Hawks R/C Flyers and the Pu-

get Sound Electric Model Flyers will present their Seventh Annual Electric Fly-in June 24 & 25, 1989 at the Boeing Kent Space Center Field in Kent, Washington. Registration is at 9 AM and entry fee is \$5 for one day, \$10 for both days. AMA membership is required.

New events this year are Class A sailplane Battery Allotment (AMA event 609) 7-cell, and best multi-motor, with prizes to be awarded for both events. Other prizes for most aerobatic, best scale, longest flight, most impressive model, and even more. Contest Director Bernard Cawley says every participant wins soemthing on both days! In addition to the flying, there will be a special electric flight clinic by Mitch Poling. Those interested in this competition are advised that problem frequencies are CH 12, 14, 38, 42, 54, and 56.

For more information, and a handy map of the site area, contact CD Bernard Cawley, 29838 48th Ave. S., Auburn, WA 98001 (206-839-9157) or Ass't CD Ben Almojuela, 1941 6th Ave. West, Seattle, WA 98119 (206-283-3407). Looks like a fun time to me.

Motor break-in

Trying to fit a square peg into a round hole doesn't exactly apply to our electric motors but in one sense it comes pretty close. Most ferrite motors, when new, have brushes which are *flat* where they contact the *round* commutator and the contact area between the two can be thought of as a thin line of high resistance for the current in our power system. Prop a new 05 ferrite motor for 100 watts and the motor *will* run but there will probably be arcing at the brush faces, pieces of the brushes may flake or burn off, the commutator scored, and the motor will get hot, all of which degrade the efficiency and therefore the performance of our models. The useful life of the motor, under these conditions, is also greatly reduced. (It may not be the best analogy in the world but think of what happens to the fine wires in your electric toaster when you turn it on!) All of these nasties can be greatly reduced by providing more area between the end of the brushes and the commutator and we can do this by forming the shape of the end of the brush so that it matches the commutator as closely as possible. And this is easily done by simply running the motor without any load, i.e. no prop or gear reducer. (It should be noted that we are talking about ferrite motor break-in. Cobalts, at least Astro Flight's, are furnished with formed brushes and can be flown out of the box.)

Basically there are two types of ferrite motors for electric flyers and most beginners probably are first exposed to the can type motor (often supplied with kits) which has non-replaceable brushes permanently mounted inside the rear cover. The rear cover is crimped onto the motor case, is difficult to remove without breaking the crimp tabs, and is best left in place. The brushes are practically invisible when you peer through the ventilating slots in the motor case. The other type, usually more expensive, uses spring loaded, replaceable brushes which are mounted externally on the rear cover and are readily accessible. Since the can type motor brushes are not easily seen, the break-in procedure is largely a matter of faith, and manufacturer/importer's instructions. Times vary from 30 minutes to 10 hours of running time! For motors with accessible brushes it is only necessary to run the motor, remove and check the brush faces from time to time, and quit when they appear to be completely formed from edge to edge to conform to the shape of the commutator.

Some suppliers suggest a standard flight battery for motor break-in, using a freshly charged pack and running the unloaded motor until the battery is exhausted. Others recommend using half of the normal voltage and still others say stick with three volts. Run-in times, as mentioned earlier, vary all over the lot. I have discovered, the hard way, that using a direct-drive, can- type "05" motor out of the box, with seven cells and an 8-4 prop, will fly a model but not for long. One motor lasted for only 45 flights under this kind of abuse, at which point it lost power and became uncomfortably hot after a 30-second run.

Opening the case I found small pieces broken from the brushes and the commutator was scored so badly it looked like a file. With some care in break-in that motor should have been good for a couple of hundred flights at least. As individuals we will all settle on break-in procedures that suit us for whatever reasons seem valid. My particular approach is to use three Ni-Cd cells for all motor breakin, with individual runs of fifteen minutes, separated by cooling periods long enough to bring the motor back to room temperature. Can type motors get the treatment for at least one hour and preferably two. Motors with removable brushes remain on the breakin stand until the brushes are fully formed.

As a comparative test I broke in two Davey "075" can type motors. The first received the full bore, complete run from a 7cell 800 mAh pack and the second the fifteen minute, then cool down procedure for two hours. Both motors perform satisfactorily in the air but it's obvious that the second motor is more powerful than the first. Motor breakin *is* worth the time and effort it takes. The pay-off is better performance and longer motor life.

Some chargers aren't happy charging only three cells so I use an old 7-cell 800 mAh pack which I keep on hand just for breakingin motors. It is taped together and the cell ends are exposed so with a pair of jumper cords, fitted with small alligator clips, I can pick off any number of cells, from one to seven, which takes care of any voltage requirements I may have for bench testing "05" motors. And of course it's readily charged from household line current using an AC/DC charger.

And on to batteries

There's good news for electric scale and sport flyers with the introduction of 1250 mAh batteries from SR Batteries Inc. These packs are the same size and weight as Sanyo 800's but offer 50% more capacity, which translates into longer motor runs. The weather being what it was, namely lousy, I didn't have a chance to flight check the new pack but did set up a bench test rig to check them out using Futaba's MCR-4A receiver, a Davey ammeter, and an inexpensive "05" motor with a small prop. The MCR-4A has a built-in motor controller and a low voltage cut-off circuit which stops the motor when the battery pack has reached a predetermined minimum voltage. The drill was to run the motor at a constant 6 amps for one minute periods with cool down intervals between the runs. The 7-cell 800 mAh pack was good for 5 minutes, 24 seconds running time before the radio shut off the motor; the 7-cell 1250 mAh SR pack was cut off after 9 minutes, 58 seconds. In all fairness I must say that the 800 mAh pack was not new but the test does show that SR's new 1250 cells should do well where the usual (larger) 1200 mAh packs are used and at a considerable weight savings too.

And radios

Running the battery checks gave me the opportunity to check out the MCR-4A's battery eliminator circuit as well as the batteries. I knew it worked (because it did cut off the motor) but I was curious to know how long the radio would continue to operate the servos after the motor cut off. So (I felt like an idiot) after the motor died I operated the transmitter stick one full control movement every five seconds for ... 23 minutes! At



Otto Klein's Fairchild 24 underwent a metamorphosis from rubber power to electric when he put in a VL Hytork motor. He claims this Easybilt kit is now capable of 150 foot climbs on a partial battery charge.

that time the servos were still operating positively but I wasn't so I gave up. Plenty of reserve for sport and scale models and even electric sailplanes where the battery probably would not be used to the point of motor cut-off. No problem for electric Old Timers either since the max for Texaco events is 15 minutes and LER maxes are 7 minutes.

The more things change, etc.

In the "Model" section of the January 1989 issue of *Skyways* there is an article about the *Flying Pancake*, an unusual design for an aircraft with vertical take-off and landing capabilities designed and patented by Charles H. Zimmerman. Of interest to us is the fact that Mr. Zimmerman was using a free flight model of the design to demonstrate vertical flight capabilities in 1938. With electric power!

Skyways and WW1 AERO are two journals for people who love old airplanes (aeroplanes?) and especially useful for scale builders. Although each of the magazines contains a "model" section most of the material concerns full scale aircraft from 1900 to 1920 (WW1 AERO) and 1920 through 1940 (SKY-WAYS). A one year membership for either journal includes four issues and members contribute whatever they wish with a minimum of \$20. To receive both journals the minimum would be \$40. If you like photographs, drawings, and the history of the old birds from around the world contact World War 1 Aeroplanes, Inc., 15 Crescent Rd., Poughkeepsie, NY 12601, and enjoy!

And . . .

My thanks to everyone who has sent letters and photographs of their electrics. Your correspondence is a very real pleasure to me and a great help in deciding the content of our column. My address is 2570 Edgewood Lane, York, PA 17403.



On-ground adjustable flaps and ailerons give Woody Blanchard's R/C electric Storch *short* field (STOL) take-offs and landings. There are rumors that Guillows may kit the plane.





PHOTO: LARRY KRUSE

Now that is clever! Dan Pipes keeps the noseblock of his Peanut Alco Sport with a sheet balsa ring that slips into the motor crankcase. Pushrod valve covers on the nose clip on the engine cylinders, holding it in place.

66 P lunging directly in" is not a comfortable phrase for most F/F'ers, but it's the only way we'll get to all of this month's material—so read on quickly before it gets away.

A F/Fer's lexicon

Relative newcomer Stuart Van Dorn has proven in the past that he has a way with words and a sense of humor. After just over a year in the hobby he has developed some whimsical observations about the people who populate our favorite sport. With some slight liberties on my part, here are Stuart's perceptions:

Rubber Scale Flyers. Airplane encyclopedias. Sort of like having a set of *Britannicas* around to browse through. Generally like to be thought of as authorities on everything aeronautical ... more if they can get away with it.

Indoor Scale Flyers. Same as above only lighter.

Outdoor Endurance Flyers. Ever look at their legs? They don't smoke either. They also have more equipment than anyone else on the field: thermistors, mylar streamers, bubble machines, timers, and they usually turn towards Taft and kneel three times a day.

Indoor Endurance Flyers. You usually need a dictionary to understand what they're saying. They also whisper a lot. It seems they all have the same goal: to build an airplane light enough to fly just by thinking it will. Ever notice that these guys have large foreheads?

Sport Flyers. Somehow I figure one of these guys is gonna get a six-pack to thermal. Maybe not today, but soon.

Pistachio Flyers. These are the guys who

actually like to be frustrated. They are also the same guys who sharpen their fingers in pencil sharpeners. Usually have sharp wits, too... but psychologists widely regard this trait as a sign of a pending mental breakdown.

Peanut Builders. Well on the road to ruin. Gumband Flyers in General. A crosssection of America which somehow has something in common. Probably some place in their evolutionary make-up they were meant to be birds or balsa trees—no one knows for sure which.

NFFS raffle

At times F/F is risky enough, but the national Free Flight Society has added a new dimension of risk by announcing a "Free Flight Raffle" of a quantity of kits and supplies valued at over \$2000. Since the NFFS is a non-profit organization, it is soliciting donations on the basis of a minimum donation of \$1.00 per entry. The kits are up-to-theminute editions of planes like the Satellite, Shocker, Quaker, Spacer, Tilka Wakefield, assorted HLG's, various .020 Replicas, and some Nostalgia offerings. Building and covering supplies are also on the prize list.

You may submit as many entries as you like with a specified donation per "ticket". Each entry "ticket" should have your name, address, phone number, and zip code on it. All entries must be postmarked by August 7, 1989 with the drawing held on August 18 under the auspices of a registered seeing eye dog. Send all entries to NFFS, 1655 Revere Dr., Brookfield, WI 53005.

As is the case in all such enterprises, this raffle is void where prohibited by law and taxes are the sole responsibility of the winner. Send a SASE to Tony Italiano at the above address for a complete list of kits and merchandise.

Newsletters of note

The importance of newsletters to our segment of the hobby cannot be overestimated. They are the threads from which the fabric of free flight is woven. Two fine newsletters which have lately been drawn to my attention are one of the oldest—devoted exclusively to scale—and one of the newest aimed at general activities in the central part of the U.S.

Lin Reichel has been cranking out the *Flying Aces News* for a considerable period of time as the "house organ" of Flying Aces Club GHQ. Dealing solely with FAC scale matters, the *News* contains information, plans, and photos of FAC scale activities. To my mind, it, along with the D.C. Maxecuters fine *Max-Fax* newsletter, is the *must* publication for FAC. The *FAC News* will come to your mailbox every other month for \$9 sent to *Flying Aces News*, 3301 Cindy Lane, Erie, PA 16506.

TOPMAC is the acronym for Topeka Model Aircrafters Club, of Topeka, KS, so it stands to reason that *TOPMAC Topics* is their club newsletter. So it is. It's more than that, though, as Editor Jack Koehlar attempts to encompass news items, contest schedules, plans, 3-views, construction drawings, and F/F tech topics from throughout the central United States in a fairly voluminous format. The *Topics* are sent monthly for \$10 per year to Jack E. Koehlar, Editor, 3425 Arrowhead Road, Topeka, KS 66614.

Goldbach's wood stripper

I've gotten numerous letters on the photo I ran several columns back of Joe Goldbach's clever little wood stripper. The components of Joe's stripper are purely scrapbox items and will allow routine stripping of wood up to 1/8 inch square with sufficient accuracy for general building tasks. My thought would be that anything heavier than 1/8 inch might need a less flexible blade than the standard double-edged blade Joe uses, but for wood sizes smaller than 1/8 inch square, it is a neat little gizmo and a welcome bench tool. Be cause so many folks have written, I've worked up a cross-sectional sketch (Fig. A) which when coupled with the previous photo



PHOTO: CLIVE WIENKER

That *Island Flyer* is a real winner for Clive Wienker. His design spans 211/2 inches and was used for a model building class.

72


should be self-explanatory. The stripper shown is for 1/16 inch square wood. Don't be tempted to omit the celluloid "slide". It's very central to the unit's ability to work without binding or hanging up.

Campbell's newest

Lee Campbell's somewhat delayed '89 catalog of Custom Kits is now available starring three new rubber-powered offerings for Spring, two of which are by George Perryman, and the third by Earl Stahl. George's fancifully named *Fluddy Coop Speckled Bird* and Mulvihill *Super Maxer Speckled Bird* simply couldn't be designed by anyone else. Earl Stahl's *Gypsy* for OT Rubber Cabin has the pleasing Stahl lines that promise great flights in or out of competition.

Catalog #10 is available for \$2.00 from Campbell's Custom Kits, PO Box 5996, Lake Worth, FL 33466-5996. It's one of the most complete illustrated booklets of F/F kits and products anywhere and the service is always good. Tell 'em you read it here.

Tissue decals and more

Several columns ago, I featured Mac Mc-Junkin's method of making custom decals on tissue. Modeling friend Al Backstrom reminded me of another simple method of applying logos, numerals, and markings to models using a Xerox copier and tissue. The photo of the tail feathers of Al's Jumbo Curtiss Robin shows how well it works. All you need do is iron a piece of colored tissue flat and tape it to a piece of $8^{1/2} \times 11$ inch bond paper. Place it face up in the paper carrier tray of the copy machine and place the original logo or lettering you want copied face down on the machine's glass copy plate. A push of a button and it's instant decal already attached to the covering material! Obviously, color intensity, size, and location of the imprint on the tissue can be adjusted.

The only drawback I have found is that you must be very careful not to flood the tissue with thinner when you're covering open framework because the Xerox ink and toner will run. Any needed clear dope should be airbrushed on for best results.

Daniel Pipes, a promising F/F scale enthusiast from Memphis, TN, recently called my attention to a couple of items he's discovered to make life easier for F/Fer's. Dan suggests the use of a Scotch brand "Removable Magic Tape" for masking off areas on tissue covered models prior to painting with either brush or spray. If you haven't tried this stuff, you need to. It's amazing. Not only is it easy to handle, but its low tack allows it to be peeled back from tissue surfaces without even so much as a stretch wrinkle in the tissue.

I'm not sure whether it can be purchased in the smaller generic clear plastic dispensers or not. The roll Dan sent me was in a blue box marked #811 "Removable Magic Tape" intended for the larger dispensers. Throw away your masking tape. This stuff is the answer.



Using a Xerox machine and tissue, Al Backstrom made his own logos and registration numbers for his jumbo Curtiss *Robin* (above). Details for this technique are in the text. Bill Hannan's newest Peanuts and Pistachios, Volume Four (at right), is available from Hannan's Hangar, Box A, Escondido, CA 92025.

Another Dan Pipes discovery is the Micron "Pigma" pen. For the past several years I've been using "Sharpie" fine point pens for marking control surface lines on tissue covered models. No more, though. The "Pigma" pen is much like a fine drafting pen in that it's available in specific point sizes ranging from .005 on up. Its "micro pigment" ink makes the neatest waterproof lines you've ever seen. The smaller tip sizes are great for marking panel lines. The larger sizes, on up to .05, are perfect for aileron, rudder, and stabilizer separations. Micron "Pigma" pens are carried by many better art supply houses. Ask for Item #SDK by Sakuna Color Products Corp. of Japan. Thanks, Don, for two



great building tips.

The Dome is home

As a parting note, word has just been received that the 1989 AMA Nats Indoor site is the Kibbee Dome in Moscow, Idaho, approximately a two and one-half hour drive from the tri-cities area of Washington state which will be hosting the rest of the Nats. Why, you say? Because it has a 144 foot ceiling and unbelievable floor space. All right! A Category IV site for the Nats! I wonder if the Navy would like to get back into sponsoring the Nats again? Hmmmmm.

My address for correspondence is Larry Kruse, Box 1137, Liberal, KS 67905.



PHOTO: BILL BAKER

That's Bill Baker's "dawn patrol" fleet which his wife, Paula, so graciously holds. The Pacific Ace on the left and the Black Bullet on the right were both built from Schlueter plans and printwood kits.





PHOTOGRAPHY: PHIL CARTIER

Norm Liversidge used this and other *Gotcha 500s* at the '83 Nats. Once the biggest Fast ship around, the old 500 is now just the right size. With the newer motors, the speed and turning are just right.

Somebody just asked me the other day what it costs to get into combat. That's really a good question. In this day and age of rising prices and salaries that don't quite seem to keep pace, combat makes an excellent choice for a hobby/ sport. We have lots of excitement, thrills, and noise for not too many dollars. Compare to drag racing, R/C, golf, skiing, or other recreations, I think combat stacks up pretty well. Even spending top dollar on equipment really doesn't cost that much, and somebody on a budget can get by even cheaper. Starting from scratch, enough first class equipment for one event, Fast, Slow, FAI, or FAI will run about \$600-800.

First on the shopping list is engines. I'd recommend getting at least three identical motors. It takes much less time to set up planes and make repairs when the planes don't have to modified to suit different engines. Also, engines often check out the dirt. It saves a lot of wear and tear on the motor and you if cleaning it out can wait for back in the shop and doesn't have to be done before the next match. Dirt is the worst enemy of a combat motor, so take special care to keep them clean.

The current best engine choice for Fast and Slow is the Fox Mark VI. It offers plenty of power, good reliability, considering how roughly we treat engines, and a fair price. It comes direct from the factory. The older models, the Mark III, Mark IV, and Mark V all still work well, if they can be found. Mark IIIs work best for Fast. Mark IVs work well in either event. The Mark V works OK in slow. It needs careful fitting and a good break in to run well, but it can get up to speed. The plain bearing front journal soaks up a little power and tends to wear out from dirt, but plenty of fliers have gotten many good matches from them.

Almost any other engine will require quite a bit of work to find the combination of plane and prop to work well. I have seen or used recently the old G.21 Supertigre, O.S. Max .25 and .28, the Brat .28, Cipolla .36, Nelson .15, TWA .36, K&B 5.8, Hoffelt .36, and the O.S. .35 FP. The older or smaller motors require smaller planes and props. They don't have the brute horsepower of a good Schneurle .36. The rear exhaust engines and .40 conversions like the K&B and Hoffelt require special construction to handle the rear exhaust and more wing area to handle the extra weight. The average newcomer to Combat really doesn't need these hassles. But if you have them, by all means use them. Three fast/slow motors should run about \$240.

Super Slow has gained popularity as kind



Gary Crawford and Adams Cadmus show off their planes at the Gilroy Model Airplane Club airshow **(above left)**. Western Associated Modelers (W.A.M.) already use "sorta" mufflers to cut down on noise a bit. It's just for fun, guys



(above right) or so Steve Smith and Ken Manchester would have you believe. Somehow, every Combat match seems to turn out heavy duty, even when it happens at a "fun demonstration" like the Gilroy show.

of a local beginners event. Most clubs limit engines to the Fox .35 Stunt motor. Depending on the local rules, almost any sport .35 can be used if the planes don't go too fast. Check out what is popular locally. Box stock Fox .35s, the O.S. Max FP, and the old plain bearing ST .35 Supertigre all are similar in power and speed on a 9-6 or 10-6 prop.

For 1/2A the only motor available is the T.D..049. Check with your dealer for prices. Most places allow the .051 to be used also. Oftentimes the .051 is actually a little slower than the .049. It think they are running about \$30 a piece these days.

Try FAI Combat

FAI Combat doesn't seem to be real popular in most areas of the country. The rules can be a hassle because they place so much emphasis on staying in the air and all the penalties and loopholes. But several engines will work. The most popular is the Nelson .15 RV at about \$180 a copy. It requires almost no work to set up other than adjusting the head clearance. Other engines like the Cox Conquest .15 and the Nelson .15 FV can also work. They seem to require more tuning to roll at competitive speeds. They also weigh a little more and the front intake tends to collect dirt. Anyone really serious about FAI had better plan on spending a lot of time learning the ropes. The biggest problem is finding enough contests to practice at.

Planes are the easy part. There are many good designs available. Unfortunately, they all must be ordered through the mail. Local hobby dealers don't seem to carry Combat kits anymore. Two wood kits are still available, the Top Flite FliteStreak, and the Carl Goldberg Shoestring. For people who enjoy building in wood, these planes can both make competitive Slow planes. Just trim off every ounce of excess weight, beef up the nose, and use every available square inch of wing area. A number of foam wing and wood designs can be had through the mail. Depending on quality, amount of hardware, and shipping costs, they run about \$18-24 each. After building a few kits, the cost goes down because you can recycle parts like stabs, motor mounts, and controls. Building from scratch costs about \$10 a plane, including the hardware. Foam wing cores for the latest designs are available through the mail, or learn to cut your own. Purchased cores will run \$4-7 per set depending on size, how many are ordered, and shipping costs. Ready-made cores are nice because they make building a snap. I generally figure about 4-5 hours to build a plane once the cores are ready. Cutting wood parts for a wing or cutting cores will add perhaps 1-2 hours to the building time.

Check the table for a list of suppliers that I have put together. I've tried to be fair and impartial and include everyone who makes combat supplies/planes a regular business. This doesn't include engine rebuilders. If you know of any others, let me know and I will pass along the word.



Here's another shot from the archives. Loet Wakkerman tries to move in (above) for a cut on Fred Meiers. It was an all-Dutch finals for the World Champs with none of the Russians in attendance. Looks like a K&B .35 on the front of Ken Manchester's flapped Slow plane (below). Ken flew in the Gilroy airshow in Palo Alto.







PHOTO: WARD VANDUZER

Back down the memory trail around 1954 Harold "Red" Rinehardt won the Mirror Meet with his Stunt Wing powered by a Fox .35. Just to check your Stunt history memory banks, do you recognize the Tornado prop, or the Froom spinner? You can't see it but the elevators were balanced too. Rinehardt, who died in 1974, also designed the El Diablo, the Galloping Comedian, and the 1950 Plymouth International Champion.

owards the end of the construction phase of a new ship, the average stunt buff is faced with the single most formidable task associated with this event; picking a name! Now, you have to realize, I made that last statement with my tongue only part way into my cheek, because the name chosen for a new craft says a lot about the flier who created it. Stunt ships usually last a long time, and once a good design is settled upon, the normal procedure is to continue to grind out more of the same until the design becomes a series.

Certainly the name of the National Champion's airplane is as well known to the stunt public as his own, sometimes more. Stuntship names can be quite literal. For example, the Top Flite Tutor is designed for stunt training. The straightforward, no-nonsense design of Gene Schaffer left little doubt that it was looked upon as a tool by the designer when it was dubbed Stunt Machine. The aggressive Bill Werwage found a kindred spirit in the mythical Greek god of war Ares, and named his most famous design just that. In the 1960's, Charlie Lickliter drew a parallel between the fluid grace of this event with that of classical dance, and his Ballerina became one of the most beloved designs of the era. You get the idea.

Some have tried the clever approach, with names that have a dual meaning: Steve Buso's *Titlewave* leaves little doubt about what he's after. Others name their ships after their loved ones: Alan Seacat's choice of *Miss Laura* for his Goodyear racer look-alike insured him lots of practice time—with his wife's blessings. Shrewd move, Al!

The search for the quintessential stunt ship name has taken us to the limits of our solar system: remember Bob Palmer's Venus, or Denny Harkai's Uranus? It has taken us to the depths of the sea. Who can forget Lou McFarland's Shark 45 or Bob Gialdini's Sting Ray? Even Detroit got a visit: Jack Shiek's Torino rolled off the line, and onto FM's pages in 1969, and it was followed by the compact 1/2A Pinto from the drawing board of Dick Mathis only three years later. We've consulted the stars from time to time: Bill Simons' *Scorpio*, and *Gemini* designs certainly foretold of good fortune for him, at least on the Stunt trail. Even God's inspired word, the Bible, provided some guy named Hunt with the perfect moniker for a new line of stunters: *Genesis*, story of the beginning.

To list the names of even the more famous or significant stunters would take more room than this column format allows, and it would serve no purpose save that of reinforcing the idea that the name you put on the upper left hand lifting surface (the classic position) of your creation should have a personal meaning for you, and is deserving of a bit of time invested in thought.

New stuff

Our friend, and co-columnist, Windy Urtnowski is still branching out into new areas of product development for his Pro-Stunt Products company. The latest releases include a line of plans for stuntships from both modern times, and times past. We received a copy of plans for John D'Ottavio's Jerseyan which were inked by Tom Niebuhr. Not only are these prints an example of outstanding drafting talent by Tom, but also a lesson in stunt history.

He has included the complete story of the design, its contest record, and other pertinent facts, right on the plans! This makes these plans not only good reading, but a collector's must as well. The list of plans available include Windy's own Sweeper. This is the original version which featured "I" Beam construction. Also available are Bob Palmer's Skyscraper, Harold Price's Crusader, Bill Suarez' F-4 Phantom and P-38 Lightning, Steve Wooley's Argus, Les McDonald's Stiletto (Kit version.), Bob Tucker's Tucker Special (a personal favorite of mine), Windy's Cardinal, a .60 size Ares, a .60 size Argus, and a .60 size Nobler, which is enlarged 20% from the original. All of the plans available from Pro-Stunt Products come on top quality paper, rolled, and in a sturdy shipping tube which can double as a storage container. The



PHOTOGRAPHY: DICK SARPOLUS

Some people are so thoroughly committed to Vintage Stunt, they even buy cars to match the vintage planes. Tom Lay and his '57 Chevy are on the left, and on the right is Bob Whitely and his '57 Chevy.





Those "wimpy" flaps on this vintage Go-Devil (above left) were portents of things to come. This "macho" machine has an Orwick .64 ignition engine up front. Probably no other stunt plane will ever be as famous as George Aldrich'

Nobler (above right). With its big wing, thick airfoil, and flaps it set some trends are that are still followed today. The model became the trademark of former Nats Champ Bob Gieseke who still competes with one.

plans are priced at \$9.95. Windy says watch for more plan releases in the future.

Also available from Pro-Stunt Products is a molded 4-inch bellcrank. This unit is offered as either a bare part, or with center post and bushing assembly installed. Molded from DuPont Glass Filled Structural Nylon, this crank is priced at \$6.95 (bare), or \$9.95 (with bushing and rod). Write to Windy C/O Pro-Stunt Products, 9 Union Ave., Little Ferry, NJ 07643 for more detailed information, or call: 201/440-0905

While at the annual WRAM show in White Plains, New York, last month (Februarylead times you know), I stopped by Aerospace Composites Products' booth and spoke with our old friend George Sparr. Aside from the normal selection of composite products which we are becoming increasingly comfortable working with, George proudly displayed his new thin-wall aluminum pushrod which features a carbon fiber covering. This yields a super light, and extremely rigid unit. Just the ticket for those bullet proof control systems. The Aluminum/Graphite pushrods spec out to .250 (1/4 inch) outside diameter, weigh 16.22 grams, and are sold in 321/2 inch lenghts for \$8.00.

Also on display at George's booth was a complete line of carbon fiber, Kevlar, and fiberglass sheets, weaves, rods, and structural shapes which can be incorporated into your next stunter to make it stronger and lighter. Send an SASE for more information to: Aerospace Composite Products, P.O. Box 16621, Dept. F, Irvine, CA 92714, or call: 714/ 250-1107.

Remember when?

Elsewhere in this issue of FLYING MODELS you'll find an article by Dick Sarpolus on the Vintage Stunt Championships, held at the Whittier Narrows, California C/L field on February 18 and 19. This contest was hosted by the Knights of the Round Circle club, and was very capably Contest Directed by JoAnn Keville. JoAnn's husband, Mike (new editor of the P.A.M.P.A. Newsletter) held down the post of Administration Manager. Best as we can tell this means he was a "gopher" for JoAnn (just kidding, Mike). Old Time Stunt (G.S.C.B. rules), and Classic, or "Nostalgia" Stunt were the events flown, and from all reports I've heard, the contest was a smash hit. I'll not steal Dick's thunder with any more of an account here, and simply

suggest that you check the contents page for his report.

Contests of this sort are about the healthiest thing I can think of for an event that is in constant danger of taking itself too seriously. In fact I'd like to see this type of format carried even further with perhaps a contest using the old Mirror Meet pattern. For those of you not old enough to remember this East Coast classic, try to picture a pattern with so many maneuvers that it took three flights to complete! And, what maneuvers: Bollo Wingovers, where you had to do eight loops while performing a wingover; Point Down Triangles, Double Vertical eights, Three-Leaf Clovers, etc. In fact, this contest and its pattern is so interesting that John Miske and I are working up a column dedicated to it.

Another idea for a fun meet would be a free-style format in which you are judged on, say, 15 original maneuvers. This could be judged as a whole presentation, rather than by individual maneuver, in much the same manner as freestyle ice skating. Technical Merit, and Artistic Impression points could be given by either a group of judges, or better yet, your fellow competitors.

Perhaps we could institute a Biplane Stunt event, or a Speed Stunt contest (this has already been successfully tried by our Combat brothers). In Flushing Meadows, New York, a "Schlock Stunt" event was tried. The idea here was to do the most outrageous maneuvers. Sabre Dancing, and flip-flop loops and eights were the order of the day, and everyone had a great time.

At the Tournament of Champions R/C Pattern invitational, the competitors were handed an unknown sequence just moments before they flew. The competitors were seen reading the list of maneuvers while "hand flying" them to get an idea of the flow of the pattern. This would be a natural for the "Top Five" at the Nats to add a bit of zip. It would also show us who the fastest thinking fliers are. Just food for thought.

See you in a couple of months, till then fly stunt!



Ted Fancher's All American Sr. shows off a classic tissue/dope finish that was standard fare back in the days of yore. The translucent finish lets you see just how good a craftsman the modeler was.





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Pitort



MODEL RACING PRODUCTS, 18676 142nd Ave. N.E., Woodinville, WA 98072, is pleased to announce their latest ¹/10 scale stock car body, the ultra slick 1990 Lumina. This is Chevrolet's aerodynamic answer to the Ford Thunderbird, and is expected to dominate the Winston Cup NASCAR series when it hits the track this year. The MRP body, which is molded in clear Lexan, truely replicates the original, while giving the ground hugging performance needed for model oval courses. See your local hobby retailer, write to the above address, or call: 206/ 485-4100 for more information on this "Bow Tie" beauty.



MODEL RACING PRODUCTS, 18676 142nd Ave. N.E., Woodinville, WA 98072, tells us that their new VAN/AM GT custom van body will fit as a replacement on the MRP High Roller. The body can also be used on any other $\frac{1}{100}$ scale "monster truck" on the market. For a unique looking racer, simply mount this body on any $\frac{1}{100}$ scale on or off road chassis. The VAN/AM GT is molded in clear Lexan. For more information, please write to the above address, see your local hobby retailer, or call: 206/485-4100. introduce their latest design, the 2-wheel drive Turbo Ultima. Features include a special heavy-duty chassis, platinum shocks, special radio plate and shock towers, universal swing shafts, special linkage set, special aerodynamic body, hardened final pinion gear, ball differential, and chromed wheels. For more information, please write to the address above, or call: 217/398-6300.



COLORADO MODEL PRODUCTS, INC., P.O. Box 27118, Denver, CO 80227, has released their Trac-Kit. This kit is built from machine cut 1/4 inch thick mahogany plywood, and is designed to accommodate 1/10 and 1/12 scale cars in the upper compartment (221/2 inches long by 10 inches wide ID). The large drawer below (201/2 inches long by 10 inches deep by 5 inches high ID) easily holds your radio, charger, and any accessories or parts needed for a day's racing. The Trac-Kit has a suggested retail price of \$37.95 in kit form (Model #TKK-010), and \$54.95 in ready to finish form (Model #TKR-020). The kits are available direct from the manufacturer at \$25.95 and \$39.95 respectively. For more information, please write to the address above, or call: 303/987-0214.



DESIGN ENTERPRISE, Rt. 5, Box 10, New Richmond, WI 54017, is now shipping the Miter Magic fixture, which offers a different approach to angle cutting. The small unit $(2^{1/4} \times 3^{1/4}$ inch) unit is designed to be used with your razor saw. The saw remains constant in relation to the body, and the material is moved through the desired angles. The open construction eliminates wood build-up behind the pieces to be cut. The backing is covered with abrasive paper so the fixture remains stable when used. For more information, please write to the address above.



GREAT PLANES MODEL DISTRIBU-TORS COMPANY, P.O. Box 4021, Champaign, IL 61820, says that Kyosho is proud to



FLYING MODELS



PHOTO: COURTESY MR

Performance levels of electric boats keep right on rising and the new MRP Fast Electric Unlimited Hydro is right at the head of the trend. This scale version is patterned after the Miss Budweiser thunderboat.

An FM Product Review:

Model Racing Products Miss Budweiser By Don Bilsky

Electric performance has been raised a notch with this thunderboat replica.

t seems like that the more time that goes by, the faster the out-of-the-box electric boats run. When kit electric boats first started getting big, the fast ones were claiming 12 or 13 MPH. Then it was 18 to 20 MPH. Now MRP has one that will run about 28 MPH stock and has been blown over at 43 MPH using modified batteries and motor. Who'd would'a thunked it!

MRP, 18676 142d Ave N.E., Woodinville, WA 98072, just recently released its Fast Electric Unlimited Hydro that is a scale version of the Miss Budwieser thunderboat. The kit can be obtained unassembled or as a Deluxe kit requiring a small amount of construction. The Deluxe kit, the one I received, requires the installation of the radio, rudder, rear wing, cowl, turn fin, radio box lid and canopy. It comes with a full decal sheet to turn the boat into a beautiful replica of the full size Miss Budwieser. The hull is plastic as are all the parts.

Construction

With the Deluxe kit you'll start by installing the radio. The first step is to assemble the speed control. The instructions with the speed control give good detail and should present no problems even for the first time boater. The speed control is placed on one of the servos and installed using double sided sticky tape. The steering servo is installed the same way. It may take a few layers of tape to space it out from the side of the radio box enough for the push rod to fit inside the radio box lid. Make sure that whatever radio you use has small servos.

Mount the rudder next. Using the rudder transom mount as a guide, mark the mounting hole locations, drill the holes and carefully mount the piece that will hold the rudder. Make sure that it is straight up and down. Insert the rudder and press fit the pin into it to hold it in place. Center the output wheel of the servo so that it moves both ways equally. Feed the linkage wire with the "Z" bend into the outer hole of the wheel, 90 degrees from the centerline. Keep the linkage under the wheel and low to the radio box. Slide the short plastic tube onto the linkage wire. Bend the end of the wire 90 degrees downward to align it with the outer hole in the steering arm. Place the collar on the bottom of the arm and setscrew into place.

The turn fin mounts on the back of the right sponson (looking from the back of the boat). There is an index mark on the sponson that will show the angle the fin is mounted.



PHOTOGRAPHY: DON BILSKY

There are two kit options with the Miss Budweiser, unassembled or deluxe. In the deluxe kit, the pre-wired speed control is included and mounts directly to the top of a servo (above left) in place of the servo arm. Two battery packs are



required **(above right)** but don't come with the boat. Self-adhesive Velcro tape is used to hold the batteries in place. That makes it easier to move the batteries around to position the C.G.



The strut and drive line are already installed (above left). When breaking in the motors, you can apply a little lapping compound to the shaft, mixed with light oil, to smooth the shaft and tube. Helps improve performance. Already



glued in place on the transom is a reinforcing piece of plastic where the rudder mounts (above right). The pushrod that moves the rudder is held in place by a small collet and can be adjusted to provide more throw.

Mark the locations of the holes, drill and mount the fin. The leading edge of the fin is not sharpened so use a file and sandpaper to get a good edge on it before you run.

The cowling is held in place by a clip that goes through a post. The cowling post is mounted the a "U" shaped aluminum bracket. The bracket is mounted to the hull using machine screws. The bracket should be tight but still able to pivot fore and aft to ease access to the boat interior.

The radio box lid and canopy need to be trimmed using an X-Acto knife. The canopy is attached to the front of the hull over the driver using one screw. There is a dimple in the canopy to show you where the screw goes. The radio box lid is held onto the radio box with screws. With the lid in place, drill holes through it into the radio box for nine machine screws. Put your foam tape around the bottom of the lid and redrill the holes through the tape. The tape provides a waterproof seal.

MRP provides a nylon fiberglass reinforced high performance prop with the kit. It is mounted by threading one of the 5-40 brass mini-nuts onto the drive shaft. Next, thread the propeller onto the shaft with the notch toward the front of the boat. Last, thread on the second 5-40 brass mini-nut until it tightens against the rear of the prop. A drop of Hot Stuff on the prop nut will prevent the nut from loosening and the prop from coming off. The wing and wing fins are installed next. They need to be cut from their plastic sheet and trimmed. The fins are screwed into the deck of the boat. There are dimples in the fins and the deck to show you where to drill your holes. The wing is super glued between the two fins.

Two 6-cell, 7.2 volt battery packs are needed to run this boat. These are located on each side toward the rear of the boat. MRP provides self-adhesive Velcro strips to attach the battery packs to the inside of the hull. This will allow the packs to be repositioned easily to adjust the center of gravity. Normal center of gravity is a point even with the cowling post. In rough water move the batteries aft and in smooth water move the batteries forward.

The motors in this kit should be broken-in to reduce arcing and seat the brushes. Break in the motors by running them with no load at low voltage for about one hour. After breaking-in, use a light machine oil to lube the motor bushings and the motor mount bushing. The drive shaft can be broken-in at the same time by putting a little lapping compound on it while the motors are running. This will give you a smooth true drive line.

Finishing

No priming is needed before you paint the boat. Use either enamel or lacquer. If you are not good at painting, the hull comes colored red so you can apply the decals over it. The decals that come with the boat are marked for positioning. By this I mean that by each one on the sheet there are instructions as to where they go, i.e. Right wing support, Right front cowl, etc. The decals are adhesive backed and may be put on wet or dry. If you choose to put them on wet it will allow you to reposition them. Pencil marks will help position the decals, but be careful to place the marks where they won't be covered by the decal. If you do this you can't remove the marks. Use a soft cloth to work any bubbles out from the center.

Operation and performance

Before running the boat, charge the Ni-Cd batteries according to the manufacturer's instructions. Check to make sure that the prop and nut are tight, that there is no bind in the drive shaft, that the set screws in the coupler and gears are tight, that your linkages are correct, and that nothing is rubbing or binding the drive shaft, coupler or gears. Make sure that the radio is working properly and launch the boat. You will need full power to get the boat up on step. The boat will pull a little as it gets on step so you will have to steer it up.

The boat will surprise you when you first run it. The speed is much more than expected and the sound of the water slapping off the sponsons makes is sound like the full size thunderboats. As with many electric boats,



There is a mark on the rear of the sponson where the turn fin mounts (above left) to provide the correct angle. Don't overtighten or you'll strip the plastic. FLYING MODELS



Ride pads are included as an option (above right) for the kit. Don feels they should be used because they improve turning performance.

MRP's Miss Budweiser

this is not a rough water hull. It performs best in calm or light ripples. You'll get $2^{1/2}$ to 3 minutes running at full throttle. Now I know this doesn't sound like a lot compared to some of the other electrics but because of the speed it is to be expected. When the boat begins to lose speed, immediately bring it in to shore. If it loses too much power it will "plow" in the front and might not make it back. If the front of the boat tends to push through the turns you can add the ride pads that are provided with the kit. As a matter of fact, I'd add them anyway. They help give a cleaner break with the water.

After you have operated the boat, allow the battery packs to cool down before recharging. If you use more than one set of battery packs, allow the motors to cool before operating again. At the end of the day, dry the boat inside and out. Remove the batteries and radio box lid. If you have wrapped the receiver in plastic, unwrap it to allow any condensation to dry. Remove and lightly oil the drive shaft and then reinstall.

This boat will provide you with lots of exciting hours at the pond and will get many ooohs and aaahs from any spectators that happen to be nearby.



Besides showing a close-up of the cowling, this shot also illustrates some of the superb detail of the decal set which MRP provides in the kit. For those who don't like to paint, the hull comes molded in red.



PHOTO: COURTESY MRP

The new generation of electric boats need a little extra attention. You don't just Plop them in the "bathtub" and let them run. For maximum claimed perfor-

mance, the motors need some breaking in and the drive shafts need a little lapping. Better battery handling will also help performance.





By Bill Michaels



If you plan to "light" your tug for scale running lights, then you have quite a combination to consider as shown by the chart (above) which depicts some of the lighting used by a tug towing a vessel from astern. This scale ocean-going Navy tug (below) shows one of the deckhouse lights and the folded mast with its lights.



ast month I described the basic lights that a power driven vessel underway should show. This month, I'll describe the special function lights for some common modelling subjects: tugs, fishing boats, and warships.

Seeing as tugs are very popular with modelers, I'll start with them. Tugs are fairly complicated; they show different lights depending on whether they are towing astern (towline), or pushing alongside/ahead. To further complicate matters, the lights for pushing alongside/ahead are different for international and inland waters (with special lights for the Western rivers!). Table 1 summarizes the requirements.

A tug towing astern, shows standard lights, but replaces the foreward masthead light with either two or three masthead lights in a vertical line. Two are shown if the length of the tow is less than 200 meters (656 feet), otherwise three masthead lights are shown. (The length of tow is measured from the stern of the tug to the stern of the tow.) Also, a second sternlight, yellow in color (the "towing light"), is displayed above the white sternlight. Figure 1 shows the relative arrangement of a tug's lights. Notice that the tug's sidelights and sternlights are not visible at the same time.

Remember, the tug only shows the special lights when it is towing. When the tug has no tow, it shows the standard lights for a power driven vessel. When it adds a tow, it adds some lights. Also, the after masthead light is still required while towing, if the tug is over 50 meters in length.

To completely explain all the different possible lighting configurations for tugs would make for a very long and tedious column. The point I'm trying to make is that you need to be aware that there are differences. Often, judges at scale regattas are professional Sea Service people (Navy, Coast Guard, etc.) who would consider it a glaring error to see a Mississippi River Towboat showing lights for a tug in international waters.

Fishing boats are fairly simple compared to tugs. When their gear is in the water, they show a pair of all-around lights in place of the forward masthead light, mounted one above the other. For a vessel trawling, the upper light is green, and the lower is white. For a vessel that is fishing (but not trawling) the lights are red over white. (A boat with rod & reel gear out is not a fishing vessel!) The difference between fishing and trawling hinges on the gear used. Fishing is any means (except rod and reel) used to catch fish except trawling. Trawling is pulling nets and gear astern through the water. Like the tugs, the after masthead light is still required if the vessel is over 50 meters in length.

Like tugs, fishing vessels should only show the special lights when doing their thing, i.e., fishing. At other times, they should only show the lights for a power driven vessel underway. The real world, however, is not so

TABLE 1: REQUIRED LIGHTS FOR TUGS AND TOWS

neat. On the smaller boats, particularly, the crews aren't always concerned about what lights should be lit and when. I have seen boats that leave their green-over-white lights on all the time, including the time when the boat is at the dock. Maybe you can convince the judges that you're operating true-to-scale by violating the lighting rules...

In general, most civilian ships will show numerous deck lights in addition to the required running lights. The rules allow this, as long as the other lights are not like the prescribed running lights. Cruise ships, for example, are very brightly lit. Most ships, if they have deck or working lights, will not have any lit, forward of the pilothouse. This is so that the bridge personnel are not blinded by their own ship's lights.

Generally, warships show the same lights as other ships. They show standard running lights when underway, and standard towing lights when towing. They almost always steam at darkened ship, no deck or cabin lights are allowed to show. When operating in company, they may dim their running lights to half-bright. In wartime, of course, all lights are turned off.

This is all I'm going to cover on the subject of running lights. If you are interested in more information about the rules, any bookstore that has a nautical section will proba-

VESSEL	INLAND RULES	INTERNATIONAL RULES	
TUG TOWING ASTERN Length of tow < 200m	SideLights, SternLight Towing Light (2) Fwd Masthead Lts.	SideLights, SternLight Towing Light (2) Fwd Masthead Lts.	
TUG TOWING ASTERN Length of Tow > 200m	SideLights, SternLight Towing Light (3) Fwd Masthead Lts.	SideLights, SternLight Towing Light (3) Fwd Masthead Lts.	
VESSEL TOWED (Astern)	SideLights Stern Light	SideLights Stern Light	
PUSHING AHEAD/ ALONGSIDE	SideLights, SternLight (2) Towing Lights (2) Fwd Masthead Lts.	SideLights Stern Light (2) Fwd Masthead Lts.	
PUSHING AHEAD (Western Rivers)	SideLights (2) Towing Lights	N/A .	
VESSEL TOWED (Alongside/Ahead)	SideLights, Sternlight Yellow Fwd. Masthead Lt.	SideLights Stern Light	
Note: For all of the TUGS lis	sted above (except Western Ri ired if the tug is longer than 50	vers), After Masthead	

bly have at least one book on the subject. Also there is a publication entitled "Navigation Rules", published by the Coast Guard, that is available from the Government Printing Office.

Please send any comments, questions, or other column ideas to me at 31710 2 Court South; Federal Way, WA 98003.



PHOTOGRAPHY: ERIC GOLDSCHRAFE

Accurate lighting detail becomes practical in competition where judges looking at a ship like this Navy tug are professional Sea Service.





PHOTOGRAPHY: DON BILSKY

Reliable support equipment is just as important as a good boat, radio, and engine. For those running glow engines, the items above are the bare essentials to get you off and running. What does the spinning reel and tennis ball have to do with it? They become quite valuable if the boat dies offshore. With the end of the fishing line on the reel attached to the tennis ball, a good heave will help retrieve the boat.

ell, another month has rolled around and it's time for another column. Sometimes I have a hard time figuring out what to talk about and this month started off that way. Luckily, I went out to the club lake to do some running last Sunday and had someone ask me a question that sparked the information that follows. The question was, "Besides a boat, motor and radio, what else do I need to get started in boating?".

For those of you that are reading this and thinking about model boating I'll try to answer that question. Let's take for granted that you have already built the boat and are ready to run. The first thing you'll need is some fuel. The brand and nitro content are a matter of personal choice but let me tell you what I use. Red Max, available from FHS Supply, Inc., PO Box 9, Clover, SC 29710, is the fuel that has given me the best results. I've said this before, but look around the pond and see what other boaters are using and how their engines are holding up. If you still aren't sure then use the Red Max.

I run 40% nitro for break-in and racing. The fuel has plenty of lubricant and will not hurt the engine. The engines on the market today are built to run with high nitro fuels so don't be afraid of the 40%.

Once you have the fuel you'll need some kind of pump to get it into your tank. A squeeze bulb will work but a pump called the Six Shooter, most hobby shops have this, is a crank type pump and is much faster. I like electric pumps. I guess after 15 years of boating and lord knows how much fuel pumping I've gotten lazy. The electric pumps are fast and easy and also available from your local hobby shop. I use one from Indy R/C that is powered by four AA batteries. The batteries last about a season.

O.K. Now we've got the boat fueled. Now you'll need a starter and glow plug clip. My starter is a Sullivan Hi-Tork starter. It can be operated on 12 or 24 volts. I use this one because along with the small .21 size engines I also run some bigger ones that have a lot of compression. Sometimes 12 volts just isn't enough to pull the engine over. I switch to 24 volts to start these. You'll want to get two good sized motorcycle batteries and hook them up with a wire running from the positive terminal on one to the negative on the other. This way you can hook your starter cables up to one battery for 12 volts or switch one cable to the other battery and get 24 volts. Make sure the wire you use to connect them together is thick enough.

Your glow plug clip can be purchased at the hobby shop too. It is the same as the airplane fliers use. Some connect to a $1^{1/2}$ volt dry-cell battery and some use rechargeable Ni-Cd batteries. I use one manufactured by Glow Bee. It not only has Ni-Cd batteries but has a meter on top to tell me if the glow plug is good. To connect the power from the battery to the glow plug you use a clip. It pushes over the top of the plug. Some of them can be attached by twisting or pushing an outer ring and will hold on to the plug. This frees both hands for starting.

Well, well. So the engine is now started and you've launched the boat and are having one heck of a good time running. All of a sudden the boat dies. Now what do you do? At this point I'll tell you about the *most* important part of a boaters basic equipment. A cheap Zebco fishing reel with a tennis ball attached too it. You can hold the reel in one hand and throw the ball out over the boat. As you reel the ball back in it will catch on some part of the boat and you can pull it in. Without this very sophisticated piece of equipment you'll have to hope for a strong breeze to blow the boat to shore.

That's about all the basic stuff you'll need. Yes, you will need some tools. Pliers, screwdrivers, allen wrenches, glow plug wrench, WD-40, extra bolts, nuts and washers, glow plugs, Loctite, potato chips and soda, etc., but we can talk about this latter.

New from Aeromarine

Here's a couple of neat new things from the folks at Aeromarine. The first is a grease gun. You know. The thing that you've always wanted to grease those lower units on your outboards or struts on your inboards. It seems like you just can't find anything that works well in those little holes. Some guys have found some guns that are used on motorcycles but they are a little expensive. The



Irwin Pipes has introduced a new outboard pipe for .45 engines. It has all the good traits of their nitro pipe and is made from .035 aluminum. Don says that initial reports indicate a very good response.

one that Aeromarine has is just perfect. It's about an inch and a quarter in diameter and about seven inches long. The size is just perfect for carrying in your starting box.

The next item is a new rubber motor mount. It can be used in a lot of different boats but is probably best suited for the mono and catamaran hulls. It is made for .60 to .67 size motors. If you have ever heard a fiberglass hull running with a solid motor mount you probably heard a noise that was hard on your ears. With a rubber mount like this the noise is much better because the vibration is not passed into the hull. The mount uses two pieces of aluminum with four rubber pieces sandwiched between.

Irwin pipes does it again

Irwin Pipes, Rt 4, Box 198, Muncie, IN 47302, has introduced another dynamite pipe, this time for the outboard motors so popular with racers today. It is made of .035 aluminum and has all the good qualities of their standard inboard pipes. This not only means excellent RPMs but quick response over the entire RPM range. For those of you that run inboard engines you should try his other pipes. I've had super results and am looking forward to trying this new outboard version. See you next month. Don.



Two new Aeromarine Laminate products come in pretty handy. The rubber isolation engine mount for .65-.80 size engines is well-engineered while the grease gun is just the right size for lubricating lower units.



From direct drive electric R/C boats to 30cc gas powered R/C model boats, there are 24 Octura competition proven "X" series metal propellers available. Ranging from the X427 up to the X482 there is an Octura "X" series propeller for any engine class and boat class legal under IMPBA and NAMBA rules.

Last two numbers indicate propeller diameter in millimeters while the pitch is 1.4 times the diameter.

The only satisfactory replacement for an Octura propeller is an Octura propeller.







DUMAS PRODUCTS, INC., 909 East 17th St., Tucson, AZ 85719, has announced a new R/C racing catamaran named Skater 67. This new 40-inch long boat is a stand-off scale model of the 32 foot long original. With a narrow 13¹/₄ inch beam, the Skater 67 is said to be very fast on the straightaways, yet experiences very little deceleration in the turns. Three steps in each hull and two strakes per hull reduce drag and enhance overall performance. The deck and hull are hand laid-up fiberglass, which are joined and finished in white gelcoat. Factory installed engine mounting rails are ready for a Dumas 5-inch motor mount. Engine mounting pads are already drilled and tapped. The Skater 67 is Dumas kit #1436. Also available for the Skater 67 are running hardware kit #2352, and Dumas waterproof radio box #7031. For more information, please see your local hobby retailer, write to the address above, or call: 602/623-3742.





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JUNE 1989



HOBBY LOBBY, 5614 Franklin Pike Circle, Brentwood, TN 37027, announces that R/C scale electric boats like this 32 inch long Bugsier Tugboat are available from their new Catalog 13 at reduced prices. The catalog is free, just write to the address above, or call: 615/373-1444 and ask for it.



SULLIVAN PRODUCTS, P.O. Box 5155, Baltimore, MD 21224, announces their new Connectors and Tees fuel fittings (Part No. 486), and Stainless Steel Twist-Tie Clamps (Part No. 488). Both can be used with either glow fuel or gasoline. For more information, please write to the address above, or see your local hobby retailer.

BEARDSLEE'S PROP SERVICE, 31122 Saratoga Dr., Warren, MI 48093, is offering race ready (Beryllium Copper) model boat propellers from Octura, ABC, and Prather. These propellers come polished, balanced, and sharpened. Custom cutting and shaping is available on request. For more information, please send a SASE for a free price list, or call: 313/978-2237 to order.









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CARROLLTON, TX—July 1-2, Dist. 7/17 points: heat racing, OPC, scale, SPT 40, open cat. Hosted by Big 'D' Boaters, held at McGinnis Park Pond. Contact Brian Briggs, 2601 St. Alban, Carrollton, TX 75007; 214/466-2156.

CHINO, CA—July 9, Dist. 19 points; unlimited hydroplane. Hosted by Southern California Scale Thunderboat, held at Prado Regional Park. Contact Leonard Feeback, 7906 Spinel Avenue, Cucamonga, CA 91730; 714/987-0473.

CAMARILLO, CA—July 15-22, NAMBA NATIONALS; heat racing, outboards, unlimited, etc. Hosted by Camarillo Pond Rats, held at Camarillo Pond. Contact Don Scott, 1150 E. Ventura #1, Camarillo, CA 93010; 805/484-8634.

S. EL MONTE, CA—July 1-2, Dist. 19 points; OPC, outboard, rookié. Hosted by Sundowner Racing Team, held at Legg Lake. Contact Randy Meyer, 21600 E. Laurel Rim #B, Diamond Bar, CA 91756; 714/860-1296.

S. EL MONTE, CA—August 5-6, Dist. 19 points; OPC, outboard, rookie. Hosted by "R" Racing Team, held at Legg Lake. Contact Mark Grim, 26561 Union Street, Highland, CA 92346; 714/864-3127.

S. EL MONTE, CA—August 13, Dist. 19 points; unlimited hydroplane. Hosted by Southern California Scale Thunderboat, held at Legg Lake. Contact Leonard Feeback, 7906 Spinel Avenue, Cucamonga, CA 91730; 714/987-0473.

SAN DIEGO, CA—August 19-20, Dist. 19 points; heat racing, sport 60, rookie. Hosted by District 19/San Diego Argonauts, held at Model Yacht Pond. Contact Ray Edenfield, 4550 62nd Street, San Diego, Ca 92115; 619/583-3917.

SAN DIEGO, CA—September 2-3-4, Dist. 19 points; heat racing, sport 60, rookie, unlimited. Hosted by San Diego Argonauts, held at Model Yacht Pond. Contact Roy Edenfiel, 4550 62nd Street, San Diego, CA 92115; 619/583-3917.

SAN DIEGO,CA—September 16, Dist. 19 points; unlimited hydroplane. Hosted by Southern California Scale Thunderboat, held at Model Yacht Pond. Contact Leonard Feeback, 7906 Spinel Avenue, Cucarnonga, CA 91730; 714/987-0473.

SOUTH EL MONTE, CA—September 23-24, Dist. 19 points; OPC, outboard, rookie. Hosted by Alii Racing Team, held at Legg Lake. Contact Norm Teague, 8027 Genesta, Van Nuys, CA 91406; 818/987-3239.

CHINO, CA—September 30-October 1, Dist. 19 points; sport 40, sport 60, unlimited hydroplane. Hosted by Southern Califonria Scale Thunderboat, held at Lake Prado. Contact Leonard Feeback, 7906 Spinel Ave., Cucamonga, CA 91730; 714/987-0473.

NEEDLES, CA—October 7-8, Dist. 19 points; OPC, outboard, rookie. Hosted by Needles River Rats, held at Park Moabi. Contact Richard Hazlewood, 1807 Coronado, Needles, CA 92363; 619/326-4186.

LAS VEGAS, NV—October 14-15, Dist. 19 points; heat racing, sport 60, rookie. Hosted by Las Vegas Mini Mariners, held at Sunset Park. Contact Marc Dickens, 1244 Barnard, Las Vegas, NV 89102; 702/678-6485.

IMPBA EVENTS

HIALEAH, FL—May 6-7. RACING ASSOC. OF MIAMI. Amelia Earhart Park. "Third Annual Texson Challenge Regatta" District 3 Hi-Point Race. Classes for B, D Tunnel Outboard; B, D; E, F, Mono; B, D, E, F Hydro; Offshore; Scale; 40 Gran Prix. Scale Concourse. Pre-registration required. Contacts: Doug McNeely 305/247-7696; Bob Navar 305/235-1665.

ST. LOUIS, MO—May 6-7. ST. LOUIS THUNDERBOATÉRS. Chain-of-Rocks Pump Station Pond, 10450 Riverview Blvd. Check in 8:00 a.m. Sat. Classes for B, D, E, F Hydro; B, D, E, F Mono; 3.5, 7.5 Tunnel Outboard; Sport 40; 60 Scale (dist. pts.). Pre-registration required. Contacts: Rich Zimmerman 314/921-3824; Phil Barker 314/227-2088.

OXFORD, Mİ—May 7. OAKLAND/WOLVERINE MODEL BOAT CLUB. "District II Challenge" SeaRay Lake, Hwy M-24, north of Oxford. 8:00 a.m. start. Classes for B, D, E, F Mono; B, D, E, F Hydro; 3:5, 7:5, 11 cc Tunnel Outboard; 60 Scale; Sport 40. (3 rounds of racing) Open water Saturday 11:00 a.m. - 6:00 p.m. Pre-registration required. Contacts: Paul Senia 313/532-3391; Paul Dorchak 313/881-0784.

DETROIT, MI—June 10. OAKLAND/WOLVERINE MODEL BOAT CLUB. "Mini-Gold Cup" Lake Muskoday, Belle Isle Park. 8:00 a.m. 3 heats of racing for B, D, E, F, Hydro; 1/8 scale hydro; Sport 40. On Sunday, June 11, the 22nd consecutive running of the Unlimited Hydros' race (BIG boats) will be held on the Detroit River. Pre-registration required. Contacts: Eric Kouba 313/227-1288; Joe Wiebelhaus 313/ 751-4506.

LAGRANGE, IL—June 11. SUMMER THUNDER R/C MODEL POWER BOAT CLUB. Lake Ida at Sundown Meadow Forest Preserve, LaGrange Rd. 1/2 mile north of I-55. 10:00 a.m. Classes for B and D Tunnel Outboards. Contacts: Berny Peterson 312/227-0359; Ron Zaker, Sr. 312/ 636-7338.

DOWNERS GROVE, IL—June 11. TIMBERLAKE AMP EATERS. Barth Pond in Patriots Park, 55th St. & Fairview Ave. 9:00 a.m. Electric classes only: 0-1, 0-3. P, Q, S, T. One of few "Fast Electric" races in the country last year—prizes in all classes. 5 entries allowed per contestant. Preregistration required. Contacts: Jim Dunham 312/897-4145; Rich Pavel 312/963-4499.

OSHKOSH, WI—June 17. VALLEY R/C BOATERS. Winnebago County Park & Sunny View Rd. 9:00 a.m. for registration, race at 9:30. Classes for B, D Mono; B, D Hydro; Open; 3.5, 7.5 tunnel outboards. Contact: Tim Wenzel 414/233-1845.

MELBOURNE, FL—June 17-18. MELBOURNE RUDDER BUSTERS. Marl Pit #3, Sarno Rd. "Fifth annual Mid-Summer Race" Classes for 20, 40 Outboard; 20, 40, 60, F Mono; 20, 40, 60 F Hydro; Sport 40; 60 Scale. Preregistration required. Contact: Guy Kolmel 407/676-5557.

EVANSVILLE, IN—June 17-18. RIVER CITY RACING CLUB. "Little Thunder Regatta" Moutoux Park Lake, St. Joseph Ave. and Mill R4) 9:00 a.m. - 5:00 p.m. Classes for 3.5, 7.5, 11 cc Outboard Tunnel; B,D,E,F, Mono; B, D, E, F Hydro; Sport 40; 1/8 Scale Hydro. 10th annual event, many prizes, dinner included. Pre-registration required. Contact: Doug Clark 502/729-2053.

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WELLINGTON, OH—June 17-18. CLEVELAND MODEL BOAT CLUB. "Buckeye 880" Clare Mar Lakes. 9:00 a.m. Open water Friday. Classes for B,D,E, F Mono; B, D, E, F Hydro; B, D Outboard; 60 Scale; Sport 40; B, D, E, F Cata maran. Camping on site; water and electric available. Pre-registration required. Contact: Bill Deptowicz 216/282-2549.

OAK RIDGE, TN—June 17-18. EAST TENNESSEE MODEL POWER BOAT ASSOC. Clinch River, cove at River Mile 49.5. 9:00 a.m. "Atomic City Classic" Classes for 20, Open Mono; 20, Open Hydro; Stock 20, 40, 60 Tunnet; Mod. 20, 40 Tunnel. 6 rounds planned. Contact: David Groves 615/690-4993

HUNTSVILLE, AL—June 24-25. HUNTSVILLE MODEL BOATING ASSOC. "Mono-Mania Weekend" Brahan Spring Lake. 8:30 a.m. driver's meeting. Classes for B, D, E, F, Multi-Engine Monos. Pre-registration required. Contact: Mack Smith 205/232-9136.

DOVER, FL—June 24-25. BRANDON MODEL BOATERS. "Mid-Summer Championship" Dover Dist. Park, State Rd. 574. Classes for 20 stock & mod. Outboard; 40 outboard; 20. 40, 60, Open Mono; 20, 40, 60, Open Hydro; Gran Prix; 60 Scale; Offshore. Pre-registration. Contacts: John Castellano 813/949-7776; Shannon Stebbens 813/684-0794. (Entries go to S. Stebbens).

STOUFFVILLE, ONTARIO—June 24-25. TORONTO MODEL POWER BOAT CLUB. Standard Aggregate Gravel Pit. 9:00 a.m. Classes for B & D Outboard; B, D, E, F Mono; B, D, E, F Hydro; 60 Scale. Pre-registration required. Con-tacts: Terry Keeley 416/828-0138; Fred LeRiche 416/284-0384

MIDLOTHIAN, IL—June 25. ILLINI POWERBOATERS. "9th Annual Hydro Shootout" Twin Lakes (167th to Cicero) 8:30 -9:15 a.m. registration; race 9:30 a.m. Classes for B, D, E, F Hydro; 1/6 Scale (dist. points); B, D-E Tunnel Outboard. (Out-boards can't enter hydro classes) Contacts: Todd Tribbett 815/725-8426; Rex Plattner 312/532-8920.

MT. VERNON, IL—July 1-2. SOUTHERN ILLINOIS R/C MODEL BOATERS. Mt. Vernon Outland Airport. 9:00 a.m. Classes for B, D, E, F Mono; B, D, E, F Hydro; B D, E Outboard; 1/8 Scale; Sport 40. (Dist. points for Scale) Fireworks July 1, 9 p.m. at airport. Pre-registration required. Contact: Howard Williams 618/242-8521.

CINCINNATI, OH—July 1-2. CINCINNATI MODEL BOAT CLUB, "David Totten Memorial Race" Miami Whitewater Park. Classes for all gas models. Pre-registration required up to June 27. Contact: Bob Hubbard 513/232-6917.

LONDON, ONTARIO—July 8-9. THAMES VALLEY MODEL BOAT CLUB. "Summer Classic" Wellington & 401 Pond. 9:00 a.m. Classes for all models. Pre-registration required. Contact: J. Meadows, Jr. 519/471-2396.

LAGRANGE, IL-July 9. SUMMER THUNDER R/C MODEL POWER BOAT CLUB. "Thunder III" Lake Ida at Sundown Meadow Forest Preserve, LaGrange Rd. 1/2 mile north of 1-55. 9:00 a.m. Classes for B, D, EF Hydro; Sport 40; 1/8 Scale (bist, points); EF Offshore (clockstart, 6 laps, no pit stop, 1/3 mile oval). Contacts: Berny Peterson 312/227-0359; Ron Zaker, Sr. 312/636-7338.

FORT WAYNE, IN-July 15-16. DRIFTWOOD R/C MODEL BOAT CLUB. "Three Rivers Festival Regatta" Fox Island Preserve, 7324 Yohne Rd. Open water 8:00 a.m.; drivers' meeting 9:00 a.m. All classes, 3 boats make a class, district scale points on Saturday. Part of largest festival in Indiana. Contacts: Bob Rainwaters 219/447-4989; Bob Kensill 219/ 745-5383.

SLIDELL, LA—July 15-22. INTERNATS. SOUTHERN GEN-TLEMEN RACING ASSOC. SGRA Lake. 8:00 a.m. 3-boat limit per contestant, except for any additional classes of fered. All regular classes, to be run according to one-year trial format. Lake site only 25-min. from downtown New Or-leans. Pre-registration required. Contacts: Don Wagner 504/ 277-1923; Roger Hincks 504/242-4426.

LACROSSE, WI-July 15-16. LA CROSSE R/C MODEL BOAT CLUB. Pettibone Park Lagoon. Classes for B, D, E-F Monos; B, D, E-F Hydros; B, D-E Tunnel Outboard; 1/8 Scale Hydro (dist. points). 3-boat limit per contestant. Contact: Bill Coleman 608/784-1774.

KENOSHA, WI-July 23. BADGER MODEL BOATERS. Badger Lake, 118th Ave. 9:30 a.m. All classes offered. Contact: Clay Skebba 414/549-6634.

ELMIRA, NY-July 29-30. SOUTHERN TIER R/C MODEL BOATERS Big Flats Hydrobowl. Classes for 20, 40, 60, F Hydro; 20, 40, 60, F Mono; 60 Scale; Sport 40. Preregistration required by 6/30. Contact: Pete Forcier 607/562-3409.

WAUKESHA, WI-July 29-30. S.T.A.R.T. Fox River at Frame Park. 9:00 a.m. All classes both days; Scale on Sunday only. Contact: Scott Jones 414/466-1860.

SAGINAW, MI-July 30. SAGINAW BAY R/C BOAT CLUB. Sherman Rd. northeast of I-75 and Kockville Rd. intersection, Zilwaukee Township. Open water 8:00 a.m., racing at 9:00 a.m. Classes for B, D Tunnel Outboard; B, D, EF Mono; B, D, E, F Hydro; 1/8 Scale. Pre-registration requested. Con-tacts: Ralph Barthel 517/695-9145; Charles Dukes 517/631-6326 æ insert adapters \$6.60

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Aero Engineering	Great Planes / SuperTiare
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Aeromarine Laminates 89	
Airtronics 3	u
America's Hobby Center 24.23	
American Ir Aircrafts Co	High Sky
Associated Electrics 20	Hobby Lobby
	HODDY SNOCK
	Husseicran Boat Factory
Bindda Ontha	
Bladder Gabber	1
Dave Brown Products	Indoor Model Supply14
The Book Hangar	International Modeler Show
Bru-Line Industries, Inc	
	J
С	I&M Hobby 91
Campbell's Custom Kits	LIEC 43
Carstens Flying Plans	lomar Products 10
Cleveland Model & Supply	301101 11000013
Cox Hobbies	
Cressline Model Products 20	
Custom Models	K
	K&B Manufacturing
	K&S Engineering10
D	Kress Jets, Inc
Des Digines Hebbies	
Deviciet 44.40	
Du Pro Producto Inc.	M
	M.A.C.K. Products
Gene Dubois	Model Marine
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	MARC Show
	MARINE Specialties
E	Micro+Mark Tools
Empire Model Marine	Midwest Products, Inc
Ernst Manufacturing, Inc	Model Rectifier CorpCover II. Cover III
	Sid Morgan Vintage R/C Plans
F	
Elving Models 57 78 83 92	N
Flyline Models Inc. 78	Northoart Aoro Inc.
Futaba Inc. Cover IV	Nonneusi Aero, mo
	0
	Octura Models

P.A.W. Diesel, U.S.A.	.10
Peck-Polymers Polk's Model Craft Hobbies	12
Prather Products. Precision Boat Manufacturing.	.90 .88
Ram Radio Controlled	8
Repla-Tech International, Inc.	10
Precision Machining, Inc.	.93
, and the second s	
S Satellite City	7
Scande Research	.6
Sermos R/C Snap Connectors Shamrock Competition	.14
Sierra Nevada Models	12
SR Batteries, Inc.	.43
sidnger mierprises	20
T	40
Teleflite Corp.	.10
Tidewater Engineering & Machine Co	.90
Victor Model Products	
Y	
Yellow Aircraft & Hobby	.28
z	

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quick assembly, low weight and maximum ruggedness.

Tall isn't all

The Blackfoot's hefty ground clearance means it'll climb most any obstacle. And Tamiya's high output, high torque 540 type engine pumps plenty of ground thumping power. While the Blackfoot's heavy duty, coil-dampened suspension double wishbone in front, trailing arm in the rear — lets it effortlessly cut and dart with a nimbleness that belies its size.

Other creature features

Tamiya has engineered the Blackfoot with attention to quality and durability. Like a sealed gear box to protect the drive train gears from debris and moisture, differential gears for tight cornering stability and positive control on any type of terrain. And its one-source power from its BEC (Battery Eliminator Circuitry) gives you maximum space in the chassis with lower weight. For overall best performance we suggest you buy genuine, matched MRC-Tamiya ni-cads (not included).

The beauty at rest

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There's even a surface Attack 4NBL system on 75MHz. Supplied with three S148 servos and R114H receiver, this ground and sea outfit has



The ergonomically designed T4NBL transmitter features comfort contoured case and adjustable length control sticks.

what it takes for gearbox-equipped 4x4's and RC boats.

No matter which 4NBL system you choose, you'll also get our new four channel Attack transmitter.

Loaded with extras like adjustable stick gimbals, servo reverse switches and a rechargeable NiCd pack, the T4NBL transmitter also features a comfort contoured case and neckstrap for fatigue free operation.

