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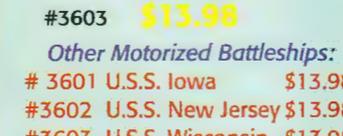
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**On the Cover:** Leo Loudenslager and his Laser 200 dazzled air show crowds for some 20 years with his superlative flying and the plane's ability. We dedicate this issue to the man and his machine and the impact it had on our hobby. **Photo:** Rich Kolasa. **Inset Photo:** Brad Shepherd's .60 size Laser 200 gets ready for some more aerobatics. **Photo:** Brad Shepherd

# Today's best kit engineering takes you to the beginnings of commercial flight.



When the Douglas DC-3 debuted in 1935, it marked a milestone in commercial aviation. Suddenly, flying was popular and practical. Production ended 11 years later, but the DC-3 lives on in this Gold Edition kit. If you've never built scale or flown a twin, it's a great place to start!

Top Flite's DC-3 handles like an advanced sport plane, with large aileron, rudder and elevator surfaces for easier piloting. Each engine functions independently and is aligned to help you stay in control if one engine quits—the right engine has 4° of right thrust...the left engine, 3° of left thrust.

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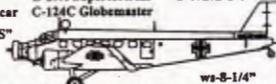



PHOTO: FRANK PAMELLI

Anyone who follows air shows knew this scheme, the fabulous *Laser 200* in its Bud Light colors. It was the plane and the pilot who helped popularize a whole class of models and style of flying.

**H**istory is very rarely direct and made on purpose. It is so much more often the unique combination of person(s) and circumstance. Sometimes history is a bane, sometimes it is a blessing.

If this sounds somewhat cryptic, then let me explain. One of the most vital recent trends in the R/C segment of our hobby has been the IMAC event, a marriage of scale airframes, Pattern geometry, and a dash of showmanship. But it might never have happened if not for a certain blessing of history.

That very beneficial turn of history's wheel of fortune revolves around the *Laser 200*, the aerobatic monoplane that Leo Loudenslager flew to fame and acclaim, and very justifiably so. If it were not for the plane, all those Extras, Sukois, CAPs, Staudachers, etc., might not have been. If not for the man, the spark of inspiration he struck may not have created the inimitable style of flying so very imitated in this event.

So we have dedicated this issue to the

man and his plane because of what he did for our hobby, and because of what he meant to anyone who ever thrilled in the ballet of an aircraft in the air.

We give you several stories: the development of the plane, something of the man, a review of the enduring 1/4-scale Lanier *Laser 200*, and the excellent plans for Brad Shepherd's .60 size *Laser*. And last but not least a report on the Sussex Airshow and the Laser Invitational Model Fun Fly. These last are Leo's enduring legacy to the model and the full-size world.

None of this would have ever been possible except for another one of history's beneficial turns. It so happens that the *Laser* story all occurred in *FM's* back yard, Sussex Airport, where the *Laser 200* was born and lived for 20 years. Some of the people who were instrumental in creating the plane still live right here. Some have moved away but were more than eager to help tell this story, and they are the ones who really wrote it

continued on page 8

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with their reminiscences and shared photos.

Susan Loudenslager, Leo's former wife, was more than gracious in giving some background information on the development of the plane and how Leo got to his pinnacle. Jim Roberts, his very good friend and partner for so many years, was so very happy to help tell his story. Bud Storms, who helped engineer the plane, patiently sat with me a whole morning to tell me the story of how the *Laser* first came to be. Mike Stendor, Leo's mechanic for ten years, explained the perpetual task to keep the plane flying and improve it.

The bane of history was the tragic accident that took Leo's life last year. There is one other fact to history. A catalyst is always needed for its blend of people and circumstance. And in all this story that very potent catalyst was the man himself, Leo Loudenslager. Certainly he wasn't a saint, but he was a hero. To so many he was Leo.

### In the Hall

Through all the almost 25 years he wrote for this magazine, Bob Aberle achieved much. And it was recognized by the awards he received: the prestigious Howard McEntee award from the WRAM Club, the tongue-in-cheek but coveted Walt Billet Loving Cup, the induction into the Vintage R/C Hall of Fame. This past September, another award came his way, one that he really hoped for and richly deserved: induction into the Academy of Model Aeronautics Hall of Fame.

In a ceremony during the Gathering of Eagles affair at AMA headquarters in Muncie, Ind., this past September, Bob and twelve other deserving members were officially presented with plaques honoring their achievement in the world of modeling and making them members of a prestigious group that include people like Dr. Walt Good, the father of modern R/C, Jim Walker, Earl Stahl, and others who made modeling history and help make aviation modeling itself.

Bob was joined by George Buso, Maxey Hester, Joe Kovel, the late Vern Kriebel, Austin Leftwich, William Netzeband, Frank Parmenter, Len Purdy, Art Schroeder,



In recent years, electric flight, with planes like his e-power pylon racer, has been Bob Aberle's main focus, adding another facet to the long, illustrious modeling career that brought him into the AMA Hall of Fame.

Keith Story, George Steiner, and Jack Albrecht in receiving the award, and joins some other notable former *FM* contributors like Maynard Hill, Nick Zirolli, and others who are now in the Hall.

On the strength of all the technical articles he wrote every month for *FM* during that time his recognition would have been well-deserved. But he also chaired the R/C Frequency Committee during a critical time for radio control, and guided the effort that brought us and protected the current 50 R/C channels we use today.

As usual, Bob wasn't idle while there. He brought his camera as well as his plane, so look for a future article about the Gathering, and the new Celebration of Pioneers. Former *FM* Editor, Bob Hunt, was honored with one of the first, new Pioneer awards.

Congratulations Bob, you have deserved it, we're glad you're in! And a very hearty thank you from all the readers you have helped through the past. —FRANK FANELLI

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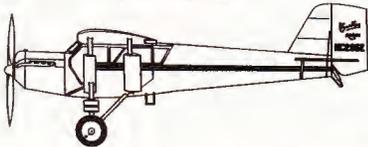
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We expect the monument to be granite with a replica of Leo's plane, and a plaque of his accomplishments, etc. We had hoped to have this completed by now but just didn't make it. We hope all of you who remember Leo will help us complete this project proudly.

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# fm clinic

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**Q:** When using my small diesels in C/L there was no problem with fuel feed, but now with R/C models it would be ideal to use a plastic tank with a clunk. How can I accomplish this in a practical manner since silicone tubing is not right for diesel fuel and neoprene tubing is too rigid to move around with a clunk. I have used metal tanks with diesels, even self-built, but they were only used for high wing planes and smooth flying. Should I build a fighter, I'd like it to "rip up the sky" and I'm wondering if this is possible. — VITTORIO CAPPAGLI

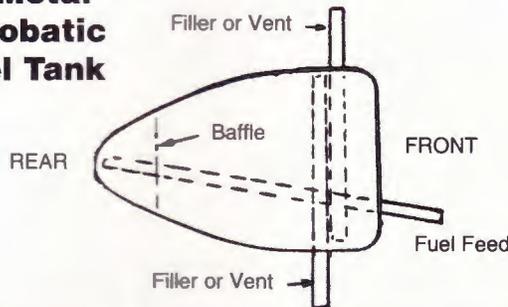
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continued on page 12

## All Metal Aerobatic Fuel Tank



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ARTWORK: ERIC CLUTTON

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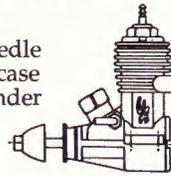
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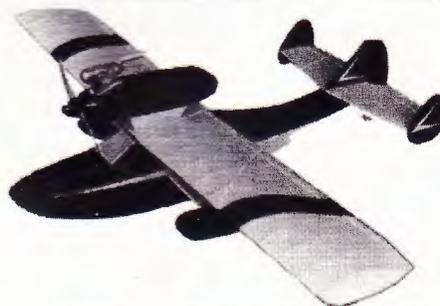
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# fm clinic

continued from 11

## Future friendly

**Q:** Are there any non-toxic or more "simple" alternatives to using nitrate or butyrate dope on freeflight models? I have heard that some modelers spray Krylon™ clear as a tissue sealer (acrylic?). After returning to the hobby after 17 years, I am a little uncomfortable with using a product that says "Warning, this product contains a chemical known by the state of California to cause birth defects or other reproductive harm", (disclaimer printed on a can of Pactra Aerogloss).

— VIA INTERNET

**A:** There are no absolutely non-toxic coatings that will seal tissue, shrink it and also make it waterproof. However, Liquitex® Acrylic Varnish is water soluble and quite non-toxic. If applied carefully (spray very light coats and allow to dry between coats) it makes a fairly good tissue sealer. Liquitex® is available in most art stores and is made by Binney & Smith, the Crayola people.

Other good coatings that are less toxic than dope but still contain solvents are: Krylon™ Kamar Varnish #1312 (matte) and #1311 (clear). The best system when using any coating containing solvent, either brush or spray, is to work in a well ventilated area. For apartments, open the bathroom window wide, close the door and dope for only a few minutes at a time. For private homes, do the same in the garage. 3M makes some good masks for the purpose too.

— DON ROSS

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**BRODAK MANUFACTURING AND DISTRIBUTING COMPANY, INC.**, 100 Park Avenue, Carmichaels, PA 15320, is pleased to announce its AF-2S Grumman Guardian, a high-performance, semi-scale Navy Carrier plane. The AF-2S Grumman Guardian design reflects Brodak's commitment to high-quality engineering, top-quality materials and attention to detail. It has a 42 1/2-inch wing span, a wing area of 407 square inches and an overall length of 30 inches. This design will accommodate engines from .32 to .36, depending on your performance preference. The AF-2S Grumman Guardian kit includes a set of full-sized plans and illustrated step-by-step assembly instructions that

*continued on page 14*

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include many helpful building tips. Like all Brodak kits, the AF-2S Grumman Guardian includes Select AAA balsa. The pre-shaped fuselage is made of 1/2-inch balsa stock and is



complemented by a balsa canopy, die-cut rubs and tail surfaces, and die-cut plywood doublers. Also included in the kit are a pre-bent landing gear and clamps, maple motor mounts, pushrod retainer, nylon control horn, and a complete set of fuel proof decals. This kit #CLP-39 costs \$59.99 and is available at hobby shops near you. For more information call 724-966-2726.

**ROBIN'S VIEW PRODUCTIONS, P.O. Box 68, Stockertown, PA 18083**, has just released their newest video entitled "Randy Randolph's Texas Tips." Randy's articles in FLYING MODELS, Model Airplane News, Model Aviation and Radio Control Modeler have explained to modelers of all types how to construct simple fixtures, how to engineer strong and simple structures and how to

save money by adapting common household and hardware items for model building use. Through his monthly "Small Talk" column in FLYING MODELS magazine, Randy imparts all sorts of unique modeling information in a friendly and casual style. Now you have the chance to meet Randy and have him show you in person some of his favorite R/C

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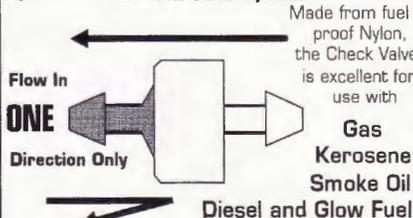
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building Texas Tips. These tips range from making very simple but useful balsa squaring fixtures to clever methods of fabricating your own formed windshields and low weight, low cost, custom wheels. Randy shows us how to use Rare Earth magnets as cowl holddowns, and explains a way to bend brass and copper tubing without crushing. He shows us how to modify the common clothes pin for a variety of clamping duties in modeling. how to make your own ultra-

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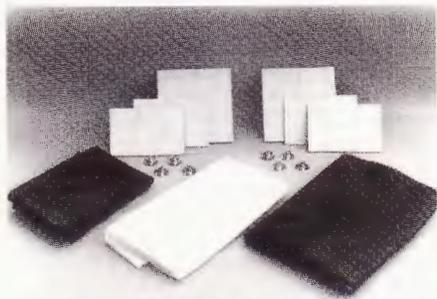
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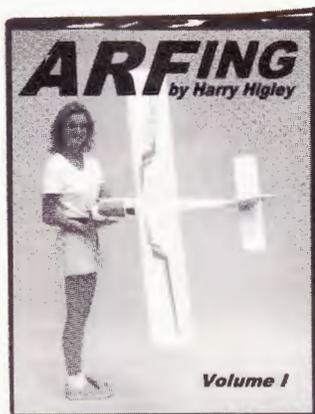
sharp and inexpensive modeling knives; 14 of Randy's favorite tips in all. This video has a running time of 57 minutes and is priced at \$13.95 plus \$3.00 Priority Mail postage, and is available direct from Robin's View Productions. For more information call 610-746-0106; fax 610-746-9638. Visa and MasterCard orders are welcome.

**ART'S HOBBY**, 42015 Ford Road #164, Canton, MI 48187, has eliminated troublesome foam wing gear mount problems including cracked wing sheeting, foam softening and gear shedding from poor landings, with the introduction of their Ultra-Strength



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**HARRY HIGLEY & SONS, INC.**, 433 Arquilla Dr., Glenwood, IL 60425, announces an early November release date for their latest book entitled "ARFing". Volume I is 115 pages, contains 850 photographs and



explains everything about Almost Ready to Fly airplanes for new and sport modelers. Eighteen modern ARFs were built and flown for ARFing, and the book contains detailed surveys of these. Dozens of new ARF assembly techniques and tips make an ARF easier to complete, stronger, and fly better than a standard kit. The latest and most popular models, engines and equipment receive special emphasis. Improvements are also suggested for more traditional ARFs. More volumes to follow. For more information write to the address above or call 708-755-8774.

*continued on page 16*

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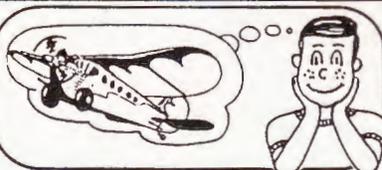
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**DUMAS PRODUCTS, INC., 909 E. 17th Street, Tucson, AZ 85719**, introduces the 30-inch wingspan laser-cut Stinson Reliant SR-10 Rubber Powered flying model. The kit features over 80 laser-cut parts and has a suggested retail price of \$36.95. Kit #301 in-



cludes color peel and stick decals, 9-inch plastic prop, F.A.I. Tan II rubber, vacuum molded parts, and light weight colored tissue. See your retailer or call 1-800-458-2828 for a complete information packet on their entire line of airplane kits.

**GREAT PLANES MODEL DISTRIBUTORS, 2904 Research Rd., Champaign, IL 61826**, introduces the Top Flite Douglas DC-3. This is an expertly engineered scale R/C kit that's ideal for the sport pilot who wants to get into twin-engine flight. Even modelers who have never before assembled or flown a twin-engine model will enjoy this plane. The interlocking frame builds flat on the plans, and the round fuselage requires almost no time-consuming carving or shaping. Precision-formed ABS parts add such scale details as a tail cone, cockpit top, engine nacelles and wing fairings, and parts and instructions are included for impressive touches like split flaps and a scale rudder. The kit comes with 5/32" wire landing gear, but will also accept optional semi-scale retracts that have been specifically designed for this model by Robart. For military buffs, extra decal markings are included to create the C-47 version of the Douglas DC-3. Specs: wing span, 82.5 inches; wing area, 750 square inches; weight 8-10



pounds; wing loading, 24.6-30.7 oz./sq. ft.; fuselage length, 55.5 inches; requires two 2-stroke .25-.40 cu. in. or two 4-stroke .40-.52 cu. in. engines, 4-8 channel radio with 6-9 servos. Suggested retail price of the Gold Edition Douglas DC-3 is \$349.99. Douglas DC-3 Retracts retail for \$159.99. For more information call 217-398-6300 or visit their Web site at [www.top-flite.com](http://www.top-flite.com).

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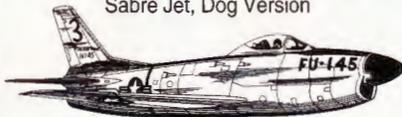
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### Vogue scratch builder

Thought you might like to see a snapshot of the *Robin Hood I* built from the plans you sent me a few months ago.

With an old B.B. .25 it really moves along and I have enjoyed flying it a lot. It has attracted quite a bit of attention in a club full of kit and ARF flyers with very few scratch builders.

R.N. BATTERSON, JR.  
Powhatan, Va.

### Cover girl

I am a retired photographer having worked in aerospace for fifty years plus. One of my pet peeves is the terrible photos that at times appear on model magazine covers.

I just had to drop you a line on your September '98 issue of *FLYING MODELS*. Without a doubt the picture of the little lady with the

*Cruise 40* is the best model magazine cover I have ever seen. I am also amazed with the 47-inch length of the model and she is smaller. What a little doll.

WHITEY PRITCHARD  
Boulder Creek, Calif.

### Buzzard's revenge

Kudos for bringing Dave Thornburg back into model writing again! And in a review of the updated *Bird of Time* yet. Hope he will become a regular. I bought a kit when the new version had been recently released and will follow the article in building it. I am still trying to use all the information from "The Old Buzzard's Soaring Book".

BILL BOWERS  
via Internet

### No ifs, ands, or buts

Don Srull knows his stuff. He proved that in his article about *Skipper II* in the October issue of *FLYING MODELS*. Micro R/C is new, unknown to many, judged iffy by others. Don changes that. He says where to get the ingredients and tells you what they can do—as simple as that. A complete article, no questions left open. I am sure that many will build that plane. Tell Don that we want to see more articles like

*continued on page 22*

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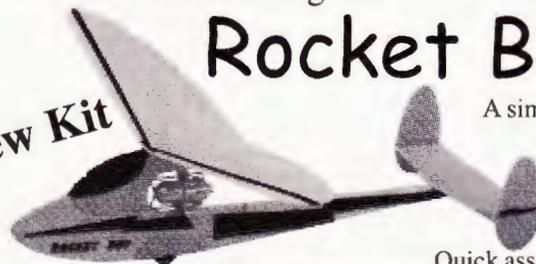
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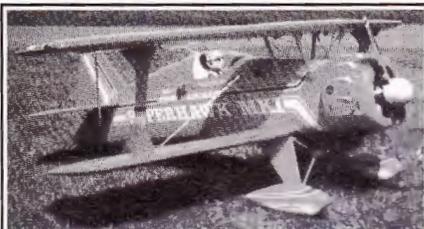


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Designer and Builder

### Eddie A. Aircraft Original Scale Classics

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## A Keystone delight

I am sending you a picture of my winter project (a year and a half). I drew up the plans from a small three-view, using proportional dividers. The wing span is 80 inches. The powerplant is a Super Tiger 3000. The propeller is an 18-6, all-up weight is 25 pounds.



This aircraft is a highly modified "Leoning Keystone Commuter" with a lot of my own modifications. The struts are all aluminum with hand filed end fittings. These are all riveted to the hollow streamlined tubing. All the wing wires are made up of Proctor Co. flat stock that I have had in my supplies for about a hundred years, at least! The ends are silver soldered in place. The ship has a complete cabin interior with instrument panel simulated roll and pleated upholstery on the four seats, seat belts, and buckles. The control wheels are made up of aluminum and mahogany, and then turned. The ship has an adjustable stabilizer, ground adjustable. She

is complete with seven lights, two in the cabin area. A strobe, which the real and original aircraft would not have had, as strobes were not invented.

All hatches work and are sealed against water entry. It has entry stairs, with anti-slip strips on each. The landing gear is only ground adjustable. However, the Olea is hydraulic for shock absorption. The gear folds to the up position with the simple removal and replacement of a single lock pin on each side of the fuselage.

The dummy engine is made up of "Williams Bros." cylinders and attached to the nacelle and cowl with silicone rubber plus bolts. This helps to take care of some of the single cylinder vibration from the "ST 3000". She looks great on the water taxiing. So far the take-off attempts have been foiled by rough water.

FREDRICK E. PIERCE  
Seattle, Wash.

## A Bee for effort

This is to tell you how much I appreciated the pictures of my *Lazy Bee* in the October issue of FLYING MODELS, and on the cover too. Your photography is no less than excellent. Anyone that can catch Keith Tucker's *Lady Bug* in flight has to be good, because it is only a 19-inch wing span. Four of the five *Bee* pictures on page 26 were from our club, so on behalf of them I want to thank you for the coverage.

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PHOTOGRAPHY: BRAD SHEPHERD

The Magnum .75 gives this 66-inch aerobat (above left) that extra umph for the unlimited vertical maneuvers. Simple cut-away cowl isn't hard to fash-



ion. A "Y" shaped pushrod connects the two elevator halves (above right). Rudder, in this case, is set up push-pull. Tail wires are optional.



Not much can be said that hasn't already been said by some of the well known authors of full scale aviation activities about the exploits of Leo and his *Laser*. The rendition offered here fills a spot in the medium-sized engine category with readily available model supplies resulting in a light sport/aerobatic model that is inexpensive to build, maintain and fly.

Frank Fanelli no doubt has a good story in this issue with a memorial to one of the greatest aerobatic pilots to engage in the sport. I will give some personal thoughts on my memory of meeting Leo and I have to include his flying buddy, Jim Roberts, who was always there with him. At one of the national IAC championships, flown in Sherman, Texas, I had the pleasure of talking with both men and looking over their aircraft. The accusation was made by some that Leo was too aloof, not mixing it up with the other flyers. Maybe so, but if one could see him retire to the hangar that his mount was resting in to concentrate on the next schedule, they would understand

why this man went all the way to a world championship, beating the best there was.

His was a total concentration focused on perfecting the art of aerobatics, and it was done in an airplane that he developed for that very purpose. Jim, on the other hand, was a guy who in his outgoing personality and constant smile was very approachable and patiently answered all questions. I suspect that is why these two made a great friendship.

Jim also had a *Laser* built for his use in competition; there are a few minor differences that are evident; cowl bumps are a different shape, wing tips were slightly rounded, paint scheme is different and I suppose there are others that are not visible. While this article was also done as a tribute to Leo, Jim's *Laser* can be built from these plans.

One other thing about Leo's that may not be well known is the fact that his *Laser* was nicknamed *Beautiful Obsession*, another way of showing his undying determination to be the best in the world.

A .60 Size Replica of Leo Loudenslager's:

# LASER 200

R/C Design & Construction By Brad Shepherd

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In honor of the legend, this special airplane has been rejuvenated for the more popular class of engines.

---



Brad's .60 size *Laser 200* was developed with the co-operation of Steve Teerlinck at Linck Models. A combination of light weight design and proven airfoil technology together make this Loudenslager rendition a true performer. Vinyl Graphics and custom hardware package for this version of the *Laser 200* is available through LINCK Models.

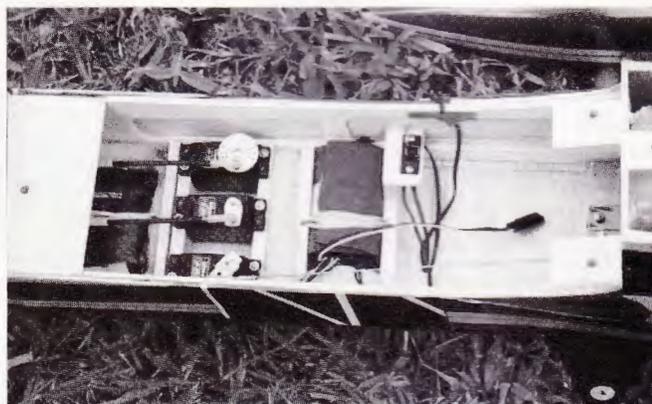
# Brad Shepherd's Laser 200



Wing is initially framed upside down. Using a long metal ruler (above left) helps to check for straightness of the leading edge. Building of the removable cockpit can be completed after the wing is solidly mounted (above right). 1/8-inch balsa



doublers stiffen the box sides. Individual aileron servos are mounted at about the center of each wing panel (below left). Radio compartment area includes the receiver mounted in front of the servos (below right) while battery is secured aft.



## Building the Laser

It is time well spent studying the plans after receiving them and comparing them to the photographs in the magazine. It takes about three hours to cut out the parts. If your choice is to save the plans, make tracings of the parts, using light tack spray contact cement, place the tracing on the respective wood and cut out. Lay out the engine mount on F-2, drill the mounting holes, and install 6-32 blind nuts. This procedure is done first, as the position of F-2 will be determined by the engine type and size to be used. Four strokes require a further aft position than a .65-.90 two-stroke, so make this determination now before the ply doublers are cut out.

**Wing.** Since the wing is built in one piece and upside down, start by splicing two 1/4 x 3/8 x 36-inch pieces of hard balsa at the center line, using a 15° scarf joint. Pin down firmly over the plans as the top spar. Then pin 1/4-inch jigs in place. Pin the ribs, top down, for one panel onto the spar, slip the 1/2-inch servo lead tube into the holes. You can make these out of regular letter size paper. Pin down the ribs for the remaining panel, slipping the tube in place as you go. Check the fit of the bottom spars in the rib slots, and trim where necessary.

If all looks well at this point, glue all joints with CyA. Check the trailing edge of all ribs with a straight edge, and trim any rib that is too long. Then glue the 1/4 x 3/8-inch trailing edge in place on the ribs. Cut two pieces 33 inches long by 1/8-inch thick, that taper from 5/8 inch wide to 3/8 inch wide for the inner lead-

ing edge pieces. Check the nose of the ribs with a straight edge to confirm their trueness, and trim any rib that is too long.

Pin the 1/8-inch inner leading edge to rib #1 and rib #10, then check with a straight edge. Pin the inner L.E. to rib #5 making sure it is still straight and glue it with CyA. Repeat the process with the other panel. Glue the 3/32-inch shear webs to the spars. Use a small plane and long sanding block to shape the inner L.E. to the rib curvature for a good fit of the 3/32-inch sheeting. Cut the 3/32-inch leading edge sheet to shape leaving a little excess over the inner L.E. for removal later.

Aliphatic glue in one of those Sig mini-glue guns comes in very handy when attaching the leading edge sheeting, and also the T.E. sheet over the ribs. The method of choice used on this sheeting is to run a bead of aliphatic on each rib, run a bead of slow setting CyA along the spar, then run a bead of this CyA along the 1/8-inch inner L.E. piece. Lay the sheet down at the spar juncture then roll the sheet over the ribs before the spar glue takes hold, pin the sheet to the 1/8-inch leading edge, roll it back over the ribs and using the straight edge hold the sheet down over the spar for a few moments till the glue sets.

## Brad Shepherd's Laser 200 at a glance

Wing span	66 inches
Fuselage length	53 1/2 inches
Airfoil	symmetrical
Wing area	709 square inches
Stab area	168 inches
Finished weight	7 1/2 pounds
Wing loading	24.4 ounces per square foot.
Power required	.61-.80 two-cycle .65-.91 four-stroke
Radio requirements (ail, elev, rud, pwr)	4 channel minimum 5 standard servos

Sand the  $\frac{1}{4} \times \frac{3}{8}$ -inch trailing edge piece to conform to the camber of the rib then glue the  $\frac{3}{32} \times 1\frac{1}{2}$ -inch T.E. sheet in place along with the cap strips and servo frame. Remove the wing from the bench, turn it over and pin it down at the center section. Shim the T.E. and tip ribs per the plan. Glue the bottom leading edge sheet, trailing edge sheet and caps in place. Relieve the R1 and R2 ribs,  $\frac{1}{8}$  inch behind the spars to install the long dihedral brace. Cut the  $\frac{1}{2} \times 2$ -inch tapered trailing edge stock to length inside the ailerons, and glue in place. The L.E. of the aileron stock is trimmed to wedge shape and the hinges installed. Last, glue the outer  $\frac{1}{8} \times \frac{3}{8}$ -inch leading edge and contour it to its proper shape.

**Fuselage.** Lay the fuselage sides out on  $\frac{1}{8}$ -inch medium balsa sheet using the thrust line as a bench mark. A ball point pen works well for this job. When sides have been cut out, glue the doublers to them. Remember to make a right and a left side. Glue the  $\frac{1}{4}$ -inch square strips in place, and also the  $\frac{1}{8} \times \frac{1}{4}$ -inch along the top edge as per plans. Pin former F5 over the top view of the plans. Be sure you overlay the plans with wax paper.

Lightly score the sides at former 5 location and crack, so the sides can taper to the tail. Pin the sides down at F5 and check alignment. Insert F3 and F2 formers into the slots of the doublers, check the sides with a 90 degree triangle, then pull together with rubber bands. Run thick CyA along formers where they meet the sides, and glue the tail post. Double glue the formers with epoxy.

Install formers F6 and F7 and the  $\frac{1}{8} \times \frac{1}{4}$ -inch top longeron to the formers. Glue the  $\frac{1}{4}$ -inch balsa horizontal stab anchor plate to the fuselage. Cut the  $\frac{1}{8}$ -inch turtledeck sides and glue in place on the formers and  $\frac{1}{8} \times \frac{1}{4}$ -inch side longeron on the side. It will be necessary to sand the longeron slightly to get a good fit of the side sheet.

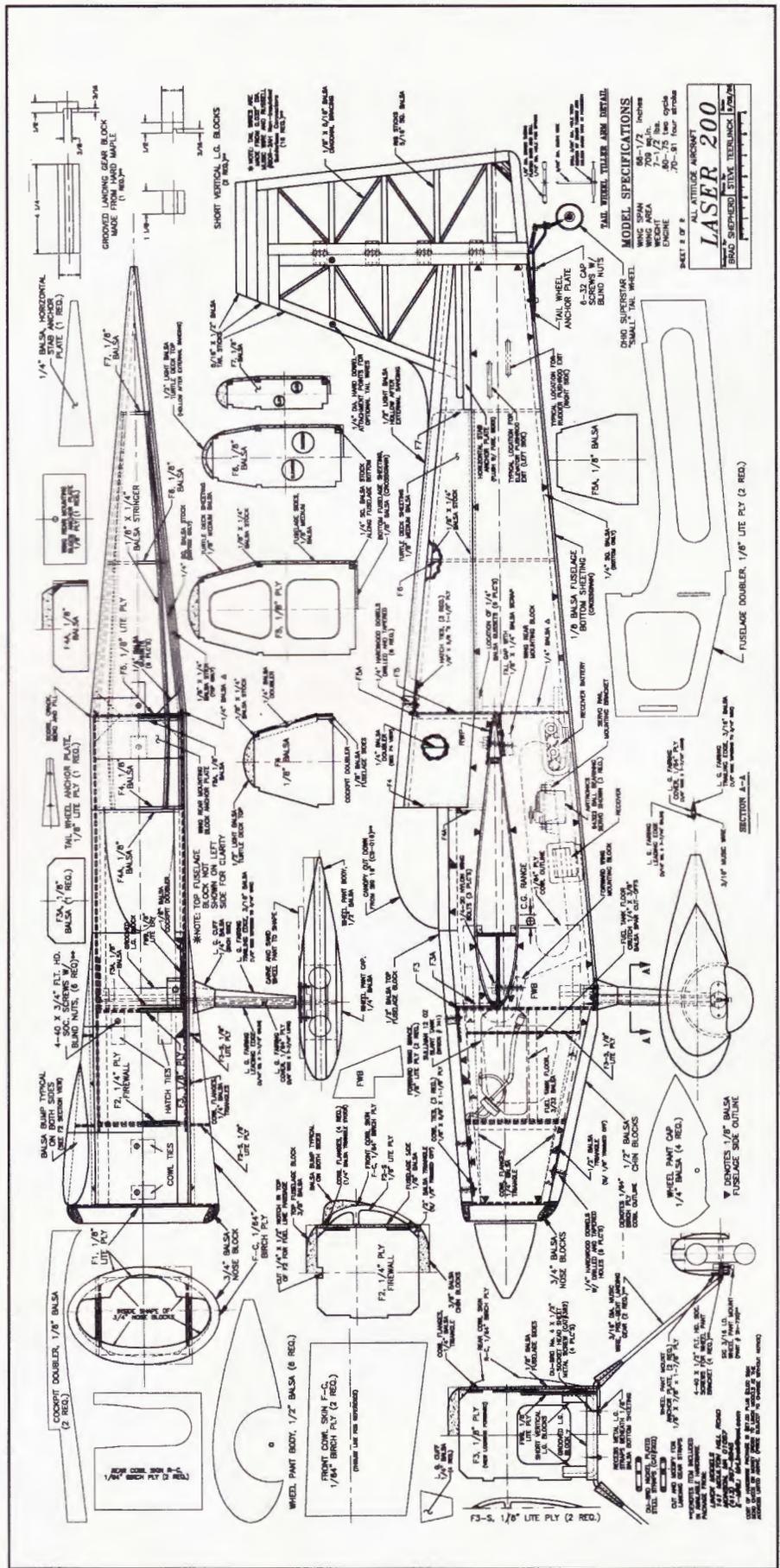
Sand the top of the turtledeck side sheet flat on top to accept the  $\frac{1}{2}$ -inch (or two  $\frac{1}{4}$ -inch) thick top of the turtledeck, then glue the top to the sheet and formers. Rough sand to a round shape, but leave the top flat at the juncture of the fin and do not sand too much from the side where the fin will go. That will be done later after the fin is fitted.

Cut the side away in front of F2 to allow the engine to be installed. Install the engine and mount. Assemble your choice of tank and piping to suit your preference; glue the tank floor in place and install the tank with silicone glue. Install the throttle pushrod.

Glue  $\frac{1}{2}$ -inch triangle stock in place, then the  $\frac{1}{2}$ -inch thick top and bottom front planks. Sand the front of these planks square and mark center lines on the face of the planks, and then align and glue F1 in place. Glue F2-S and F3-S in place, check with a straightedge and trim where needed. Check the fit of the  $\frac{1}{64}$ -inch ply cowl skin pieces, trim it to fit over all the cowl formers. Take time to do a good job of fitting before any gluing. You might want to try making paper templates before you do this.

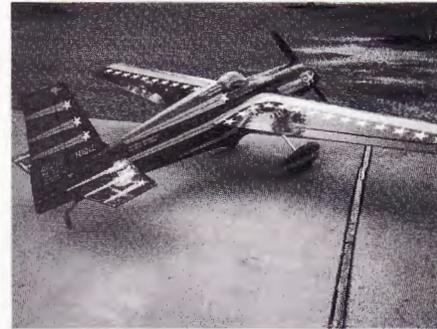
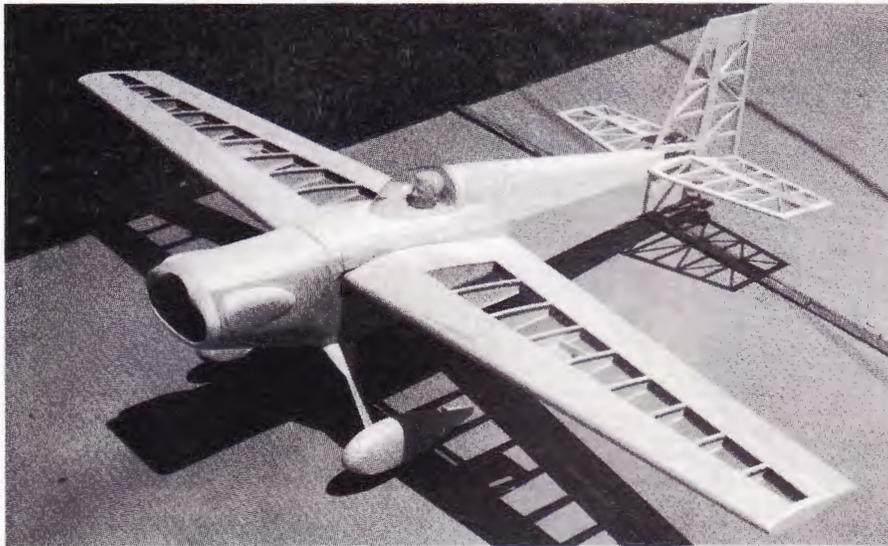
Brush slow dry epoxy inside of the  $\frac{1}{64}$ -inch cowl skins and on the fuselage sides under the cowl and on the formers. Then pin the cowl in place, and repeat for the other side. Glue the wing hold down blocks in place.

Place the wing in the saddle and drill the holes for the mounting bolts. Glue the  $\frac{1}{8} \times \frac{1}{2} \times \frac{3}{4}$ -inch lite ply hatch ties in place fore and aft. Place poly sheet over the wing in the fuselage, cut two cockpit doublers from  $\frac{1}{8}$ -



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# Brad Shepherd's *Laser 200*



This color scheme was the original paint that was applied in 1975 to the just finished *Laser*. Linck Models has a vinyl graphics package for this specific model, and also has a custom hardware package that takes care of the hard-to-do items like the bubble canopy, the landing gear, plus other assorted convenience hardware items. Check the text for Linck's address.

**Laser in the bones** details major points of construction and the finished shape of the balsa cowl bumps. Sig 16-inch canopy is cut down to fit. Balsa and ply fairings cover the  $\frac{3}{16}$ -inch music wire landing gear struts.

inch medium balsa and glue in place along the inside of each fuselage side. Check fit them in place, and sand where needed for a good fit between the formers and wing curvature. Check fit the formers for the cockpit section, trim where needed, then glue the cockpit sides on.

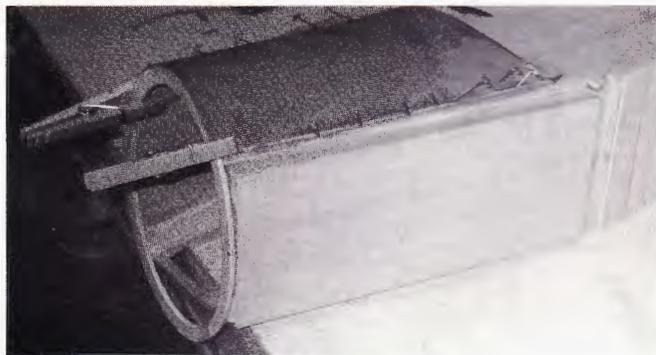
Glue the  $\frac{1}{2}$ -inch top blocks in place and drill holes for the hold down screws; remove the cockpit section and install blind nuts on the hatch ties. Bolt the cockpit section in

place and shape its top blocks with a small plane and 60-grit paper. Make a tracing of the side shape of the cowl at F1 and transfer it to the face of the cowl bump block. Use a gouge, or knife, to first rough shape the inside of the bump to the curve of the cowl. Take 60-grit paper and place it over a round object with a diameter of roughly  $1\frac{1}{4} \times 1\frac{1}{2}$  inches and sand to fit over the location on the cowl side; this will take a little patience.

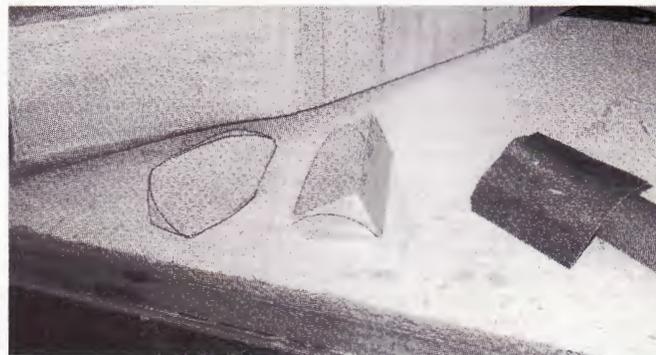
The tail surfaces are built directly over

the plans as shown. If the desire is there to build the model for Sport Scale competition it will be good to inlay the  $\frac{1}{4}$ -inch dowels at the location in the horizontal and vertical stabs. These will make solid anchors when installing the tail section wires. If the model is to be flown as a Sunday flyer, or in IMAC competition, the tail surfaces are strong enough to eliminate the wires and make it a little easier to clean the surfaces.

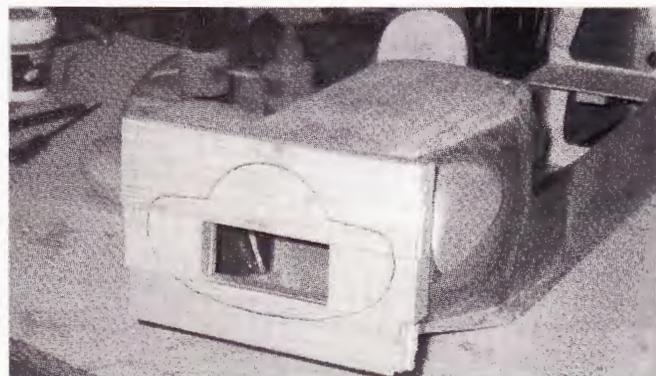
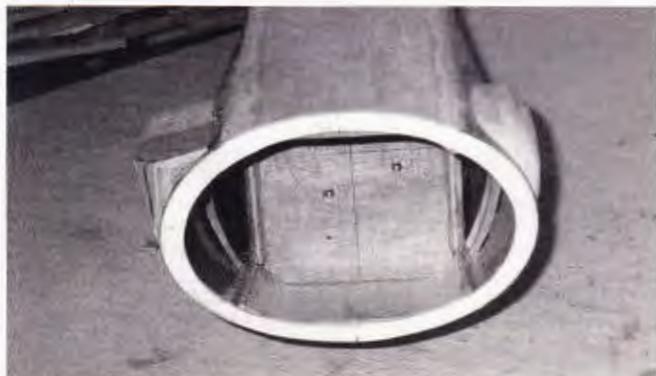
The canopy is cut from the front section of a Sig 16-inch canopy, the number is CS-016. Shape the fuselage top just aft of the canopy as shown on the plans to fit the canopy cir-



The all-wood cowl is simpler to build than it may appear. Once the cowl ring is installed, two layers of  $\frac{1}{8}$ -inch ply is attached to  $\frac{1}{4}$ -inch tri-stock and  $\frac{1}{8}$ -inch ply sub formers (**above left**). Then the  $\frac{1}{2}$ -inch balsa, top and bottom, fuse planking is blended into them. Referencing the plans, cowl bumps (**above right**) are shaped,



and sanded out of balsa blocks. The trial and error technique is strongly needed here. Once the curve of the cheek is matched, both bumps can be rounded and smoothed to equal shape (**below left**). The  $\frac{3}{4}$ -inch nose block is then glued to the nose ring (**below right**). Inner cowl shape is distinctive to the *Laser 200*.



circumference fairing the cut into the sides. Finish shaping all the top blocks referring to the pictures for final shape. Install the landing gear blocks and drill the holes to accept the gear. The gear is bent to fit the shape on the plans. Sheet the bottom of the fuselage, then shape the bottom.

Install the front cowl blocks onto the F1 former and carefully shape the blocks to conform to the pictures. Using a razor saw, cut away the removable portion of the cowl for engine access. A Williams 1/4-inch scale Sportsman pilot head is glued in place followed by gluing the canopy on. The prototype model shown is covered in Metallic Blue MonoKote and the graphics are from Kirby's Kustom Vinyl Graphics (available through Linck Models).

The model was flown with a Magnum .75 two-stroke engine which gives good performance. Some of the medium size four-strokers would be suitable for work in IMAC competition, so decide which engine is to be used before cutting the doublers from lite ply. A good .65 engine is satisfactory for all-around sport flying.

Linck Models (141 Moulton Hill Road, Monson, MA 01057) has the graphics package and a kit of hardware parts for sale to prospective builders, so give Steve a call at 413-267-9545 or drop him a note requesting the "goodies" (email: MrLinck@aol.com).

### Flying

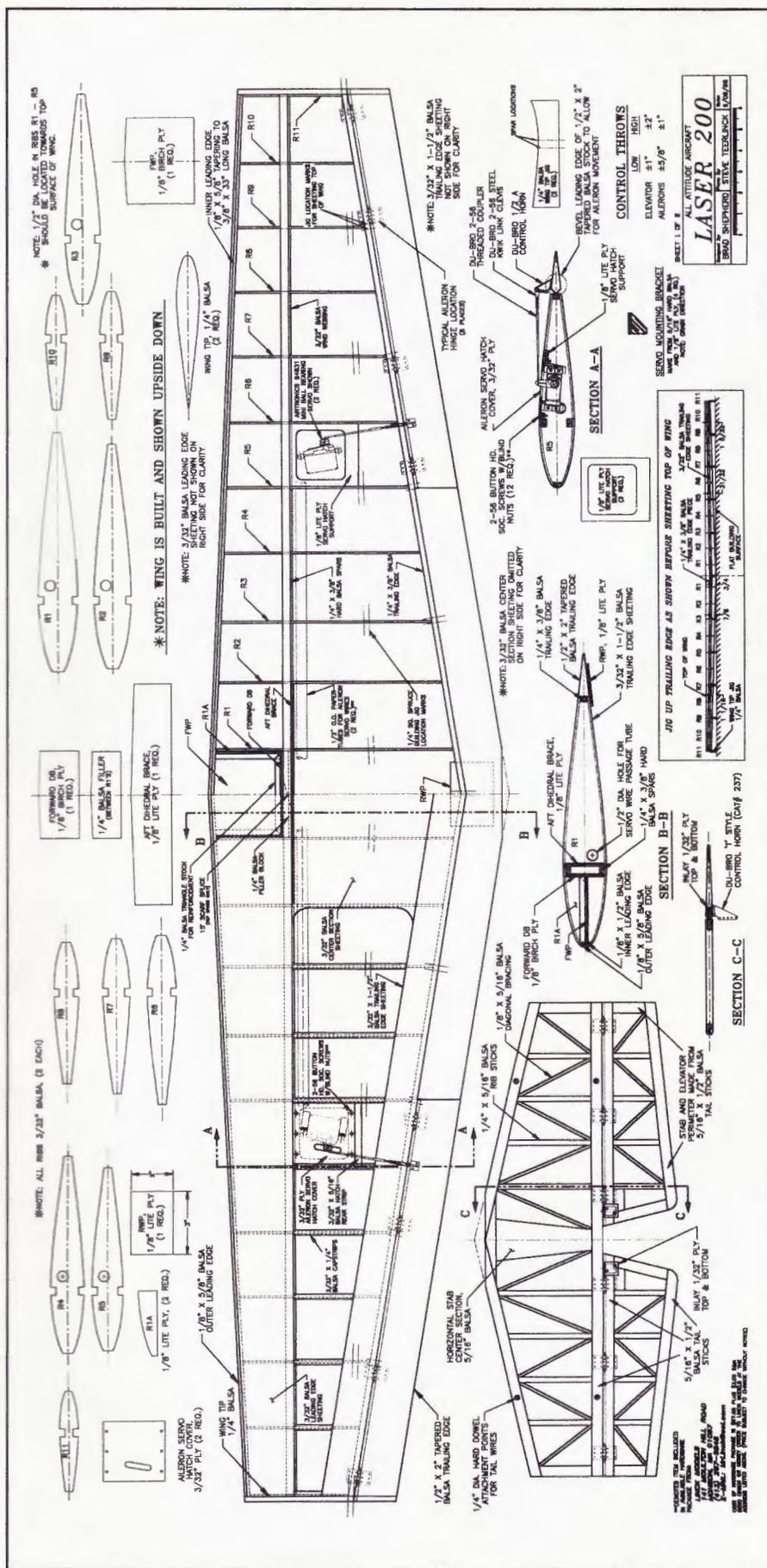
After a wait of a few weeks for the weather to moderate from the above century mark that had been the norm for our part of the country (Texas), I arrived at the field at day-break. I unloaded all the gear, fired up the Magnum .75 and did some taxi testing while waiting for good buddy, Gerald Merks, to show up for some flight shots. The model handled well on the grass, straight runs were solid, and the turns were easily made. So, I taxied back and shut down.

When Gerald arrived and the camera was checked out, the engine was fired up again. Trying to get the wad of cotton out of my mouth and the butterflies in my belly settled down, I headed into the slight breeze and advanced the throttle. The model acted like it was on rails, and so far all was okay. It tracked about 100 feet and up it went. I continued the climb, and made a turn back. The controls were very responsive, but I had to trim a little down into the elevator. I checked low speed with the throttle backed off, then made several passes doing some rolls, checked the loops and the snap on top.

The model is extremely responsive in all attitudes just like the plane that Leo flew and will be a good candidate for IMAC flying for fellers that don't fly giants. I made several passes for Gerald to get some flight shots and then put it in the downwind leg for a landing. The engine flamed out on base leg, and the model kept right on flying as I turned for final. The glide slope was gentle and positive, and the model touched down about 25 feet past us with a nice three-point. It was decided my old nerves had enough for one day, not wanting to push my luck any further.

I would not advise setting the throws up for test flying the same as you would for unlimited aerobatics. Be conservative until a few flights have been accomplished. This is a model for those with experience flying advanced aerobatics as it will fly just as Leo flew the big one to everyone's delight. Have fun!

FLYING MODELS



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PHOTOGRAPHY: MICHAEL RAMSEY

Farmer Brown (a.k.a. Roger Lehnert) gets his first ride in a stock J-3 *Cub* (above), when all of a sudden the airplane gets away without its instructor. Air Combat Canada team of Paul Molnar (above right) and Paul Ransbury put on an impressive display of combat tactics and aerobatic maneuvers in a pair of matched Extra 300Ls.



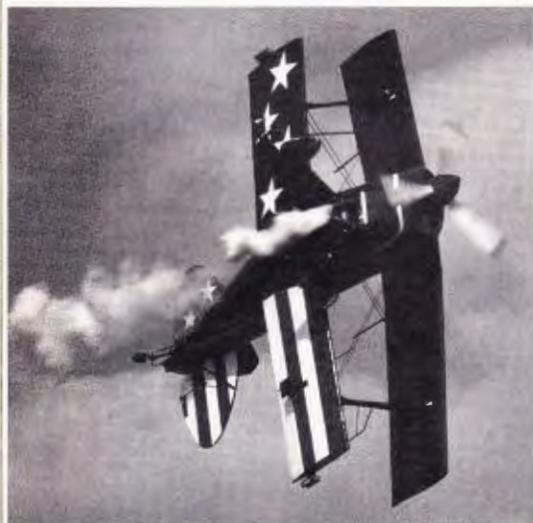
**T**he air show itself has always instilled a sense of awe and inspiration, and is an attraction that for generations, and for generations to come, will continue to excite and dazzle. Twenty-six years ago, a tradition began that set a precedent for all other air show productions to admire.

Nestled in the northwest corner of New Jersey is an historic and quiet little town called Sussex. Out there it's mostly cozy villages, rolling hills, and farmland (yes, I am still taking about New Jersey). Within a valley just south of Jersey's renowned ski resorts is a modest 3500-foot runway at Sussex Airport, home of the Biggest Little Airshow in the World. The late Leo Loudenslager, for nearly twenty years, called Sussex Airport his home base, along with other aspiring aerobatic competitors who continue to advance their skill and train others under their wing.

It's an event looked forward to year after year, not just because of this publication's involvement with the R/C Air Show/Fun Fly that precedes it, but because of the envi-

# Biggest Little Air Show

By **Michael Ramsey** in the **World**



Jim Leroy in his 400 horsepower Pitts S2S *Bull Dog* (above) performed mind bending stunts in true showmanship fashion. Steve Coan, Sailplane Aerobatic Champion (at right), flew his custom made *Windex Extreme*, the world's fastest sailplane.



Aviation excellence unfolds at this country airport. The 26th anniversary showed it still earns its reputation as one of the best.



**Warbirds of the heavy metal era!** Ed Shipley in his P-51, Steve Snyder in his F-86 and Dan Dameo in the FG-1D, paraded together in a special tribute, the Heritage flight (above). Thousands of hours are devoted in maintaining these nostalgic masterpieces. Boasting its massive radial engine and cavernous fuselage, Mike Schloss rides past show center piloting the ever rarer Douglas Skyraider (at right).



**With its freshly painted exterior,** this Grumman TBM Avenger rests on the tarmac at show center. Pilot Gene Culp always thrills the crowd with this one.

ronment in which the show is held. At this air show, aviation doesn't seem to be the intangible sport just for the rich or lucky. The compact arena of this little airport allows the entire audience to be right on center stage.

Performers enjoy coming to the Sussex Air Show because they really get a chance to show off. At shows hosted by larger airports, military demonstrations often can drown out the daring and coura-

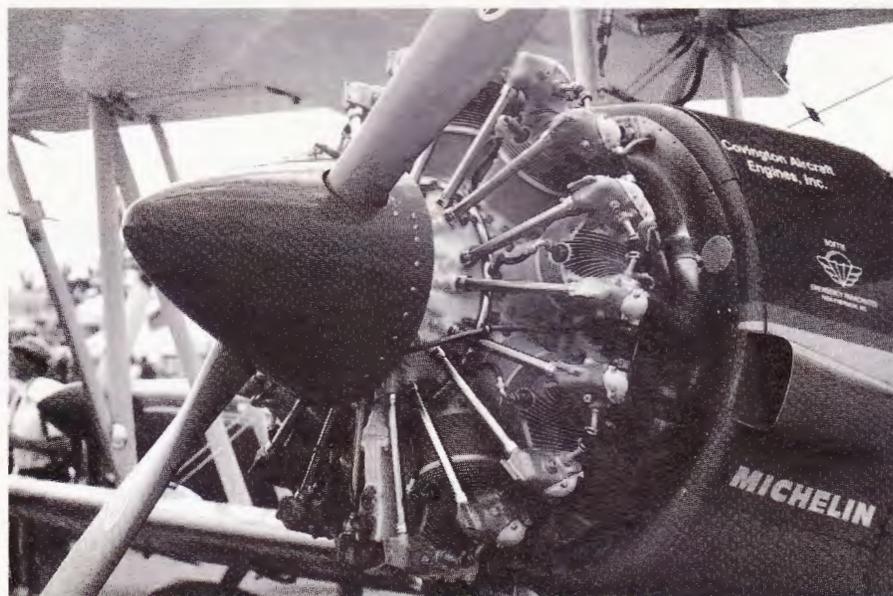
**For a bit of international flavor,** this Russian L-39 Albatross jet trainer was demonstrated by owner/pilot Allen Smith III. The plane was just recently restored, and did an impressive job of displaying typical fighter jock maneuvers.



geous routines of talented performers wheeling smaller aircraft. At Sussex, the playing field is leveled, and the stage is set just for them. Because of the unique terrain around the airport, fields, hills, and nearby forests act as stage props which acrobats use to awe and thrill their audience. Performers have found a relaxed atmosphere at Sussex, and often take the opportunity to step out and try out some new tricks.

It's good to get to these shows early. Before the performance entertainment begins, aircraft are constantly arriving. Support of the Experimental Aircraft Association is impressive. Aircraft literally flood the east half of the runway. Many of these aircraft are open for viewing, and nearly every home-built type of aircraft is represented. From the state of the art in composite structured commuter, sport, and aerobatic aircraft, to the ultra simple wood and fabric designs; they are all on display to enjoy.

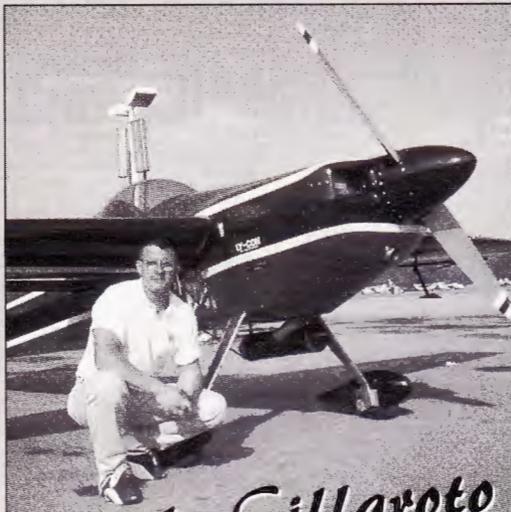
For modelers, it's a rare opportunity to compare full size structures and building techniques of these one-to-one scale replicas with reduced versions of fancy. Building techniques are strikingly similar. Aside from metallurgy, it's interesting to find that our models haven't fallen far from the tree.



**Mr. Airshow, Gene Soucy,** rushed the Sussex Airport mechanics to put the new Pratt and Whitney (above) in his Show Cat. Like the barnstormers of old, Gene rolls and loops the modified Grumman biplane with Teresa Stokes, America's #1 Wing Walker (at right), holding on tight. This year marked their tenth anniversary as a show team.



# Biggest Little Air Show in the World



**Angelo Cillaroto**  
and his LASER 230

Getting started in aerobatics certainly has its hurdles. It takes courage and focus, not to mention a dream. Angelo Cillaroto has a story to tell. He grew up in a house on a hill that has a perfect view of the Sussex Airport. He couldn't help but be captivated and found himself spending countless hours at the airport. I'm sure Leo Loudenslager had a lot to do with his interests in aerobatics.

In 1989 Angelo performed for the first time with his Pitts 180 to great applause from the crowd. Since then Angelo has added a long list of accomplishments, including managing his own business, marriage, second

officer flight status with a regional charter, plus the purchase of several aircraft, including the *Laser 230*.

He bought the airplane not long ago from Michael Goulian. The airplane boasts most of the philosophies behind the original *Laser* (lighter is better), but includes a few revisions to suit the builder's taste. The heart of this thoroughbred, apart from its pilot, is the Ly-Con 230 horsepower 4-cylinder engine. The cowl has been modified to suit, but the simple fixed pitch propeller is retained. Its *Excaliber* wing was built by Jon Staudacher, and it features a wood and composite structure, with large ailerons.

How does it fly? It's a crisp ship with lots of gusto. In the footsteps of his mentor, Leo Loudenslager, and with the help of his coach, Angelo is looking forward to moving up to Advanced next year, and competing on a regular basis. History has a habit of repeating itself, and I know everyone at the Sussex Airport can't wait to rehang the banner that reads "Welcome Home National Champion".



O.K. it's not an airplane, but it sure tries to be. Kenneth High Jr., in his 25,000 h.p. Super ShockWave, '57 Chevy, Jet Truck raced against airshow planes down the runway, belching smoke and flames all the way.

Museum, New England Air Force, and the individual owners preserving part of history have made it possible for these flying museums to be on display regularly.

Thanks to Paul Styger, Sussex Airport Manager, there are always lots of surprises throughout the three-day show. Military fly-by's are normal. This year, the Good Year Company helped open the show on Friday with their blimp. Though it was probably luck, no expense was spared in providing the great weather enjoyed every show day.

At one o'clock the show began, and the action was non stop. The aerobatic demonstrations are all original. Mixing up the full bag of entertainers (and to just do a bit of paraphrasing), there was sky diving, wing walking, a Russian jet demo, knife edge spins, aerial combat, a Warbird parade, a 400 horse power Pitts S2S (Whoa!), 300 mph flight speeds achieved by a glider, a landing and take-off of a *J-3 Cub* from a moving vehicle, Farmer Brown's first ride in an airplane, opposing knife edge passes from take-off, and a drag race between a rocket powered truck and any pilot who would challenge it. An aerial artistry mecca.

Still to this day, the Air Show is likely the most sensational display of human ingenuity available. A tremendous amount of effort is dedicated every year to making the Sussex Air Show a more precedented success every year. Much of its support is from within the community, and as modelers, we too are committed. Its future continually requires our nourishment, even though the Sussex Air Show is an event long looked forward too. See you there in '99.

Wing-tip to wing-tip, potential aircraft to model abound. This is a great place to find an inspiring color scheme for a *Bonanza*, *Skylane*, or... Nearly every warbird still flying today has at one time been represented at this show. The enduring pride and sacrifice of the Yankee Air Force, Mid Atlantic



An impressive air show team, Jack Knutson and Sammy Kademenos, perform synchronized routines in their Extra 300Ss as The Firebirds (above). Offered, as perhaps, a more economical aerobat, the 4-cylinder, two seater Extra 200 has just recently become available (at right). Mersa Singl ordered hers sight-unseen and thinks the roll rate is more than adequate.





PHOTOGRAPHY: MICHAEL RAMSEY

IMAC Northeast representative Marguerite Gargiulo and husband Vincent (above) performed a choreographed routine with their respective Cass Models 1/8 scale *Laser 200's* (at left).

# Laser Invitational

## Sussex Air Show R/C Model Fun Fly

By Michael Ramsey



John Tanzer took a break from his sport-scale Tanzer series to design and scratch build this Roper 3.7 powered, quarter scale Sopwith/Blackburn *Baby*. Word has it *MAN* got the scoop on this one. A dream to fly on land or sea.

For the last fourteen years, Carstens Publications and *FLYING MODELS Magazine*, has been proud to support the R/C Model Show and Fun Fly, held the opening day of the Sussex Air Show. With the help of the Top-O-Jersey R/C Club, the event continues to draw a record number of modelers to this weekday event.

For the most part, Sussex Airport is closed for the day to usual airport traffic, so that the freshly paved runway can be enjoyed by the R/C pilots. Everyone is treated, however to the occasional pause in open model flying so the arrival of some full size air show performers can be accommodated. What modeler wouldn't enjoy a front row seat right on the runway as a Yankee Air Force B-25 touches down in front of the R/C flight line.

Except for the frequency pins and flight stations, the flying is pretty non competi-

tive. More seriously though, a static competition held at around noon time, offers modelers an opportunity to win one of four one hundred dollar prizes donated by Paul Styger, Sussex Airport Inc. Manager.

The idea is for the modelers to come out and support the Air Show and have a good time, while welcome spectators watch the events as they unfold. Registered pilots are welcomed with a free pass to the full size Air Show, and perhaps even an opportunity to meet some of the Air Show acts that might be on scene.

In fact, that is how the Fun Fly got the name Laser Invitational. Back in the days when Leo Loudenslager used to hangar his plane in Sussex, Leo would be thrilled with the model replicas of his aircraft, and enjoyed, for a change, admiring his *Laser* from the ground, rather than from his cockpit. To return the favor (or silence the crowd) Leo

would hop into his bird and perform a special show.

The weather for this year's modeling tribute was, to say the least, spectacular. As an annual courtesy and all day activity, teams of volunteers man a buddy box trainer to offer smiling newcomers a chance to fly an R/C airplane for the first time.

In the static display competition, Best Sport Plane went to George Schmauch with his Pica *Duellist*, Best in Scale went to Mike Garzi with his F6F *Hellcat*, Best *Laser* went to Gus Perez for his modified Lanier RC 1/8 Scale *Laser 200*, and Pilot's choice went to Tom Tesla for his AT-6 *Texan*.

This year's Fun Fly set an amazing attendance record with over 150 pilots representing a wide variety of model aircraft. See you next year! And if you want, you can bring your *Laser*.



A multitude of aircraft abounded at this year's Fun Fly. This pilot, more than once, performed inverted landings with his modified Tower Hobbies *Uproar*, powered with an O.S. .40LA.

# Old Timer Topics

By Jim Alaback



PHOTO: JIM ALABACK

Bill Noonan's original design Curtiss-Cox triplane shows the luminous, semi-translucent aluminum finish he achieves on white tissue. It's a mix of aluminum powder and dope. Text has more details.

**A** club newsletter that I have subscribed to and enjoyed for many years is *Max-Fax*, published by the D.C. Maxcuters of the Washington, D.C. area. The club mixes old-timer and flying scale interests and lists some of America's outstanding modelers among its members and newsletter contributors.

The July-August, 1998, issue of *Max-Fax* has a list of "Twentieth Century Classic Designers" and their models. The list was prepared by Allan Schanzle, the editor for that issue. The list is based on designers having 15 or more flying scale rubber model plans published in the model magazines prior to December 31, 1942 and, to some extent, their contribution to the spirit of the Flying Aces Club. Allan says that other designers perhaps could or should have been included. He also notes that the list is based on Allan's own magazine collection and is not necessarily complete.

The eight designers on the list are: Alan Booton (30 plans), Jesse Davidson (15), Paul Lindberg (44), Earl Stahl (20), Henry Struck (19), Herb Weiss (18), Bill Winter (20), and Avrum Zier (18 plans). Each of the designers' published flying scale rubber models is listed, giving the aircraft manufacturer and aircraft name, model wingspan, and magazine title and date.

Looking over Allan's list I felt a sudden urge to build *one of each*. But it will take a while. Complete or not, there is a total of 184 plans on the list!

Allan and the Maxcuters have kindly given me permission to offer you a free copy of their "Classic Designers" list. Just send a stamped, self-addressed envelope with your request to: Jim Alaback, 12366 Nacido Dr., San Diego, CA 92128.

To join the D.C. Maxcuters and receive

their bimonthly newsletter, send your request and payment of \$15 for one year, to: Stew Meyers, 8304 Whitman Dr., Bethesda, MD 20817.

## Loutrel/GHQ Sportster

The *Sportster* was designed by Louis P. Loutrel. Its original power was an engine of his own design and manufacture. The engine was a contemporary of the first Brown Junior, and was about the same size and power rating, 1/2 hp. Typical of the time, the *Sportster* was a big model with a wingspan of 75 inches and 960 square inches of wing area.

The Loutrel *Sportster* became the third gas model plan ever published in the model

magazines. That was in the July, 1936, issue of *Model Airplane News*; the two earlier ones had been the *K-G* in April and May, 1935, and the *Turner Special* in May, 1936. The *Sportster* plan was drawn for Loutrel by Julius Unrath. The full-size plan is available from John Pond, P.O. Box 90310, San Jose, CA 95109.

The *Sportster* was kitted by the G.H.Q. Model Airplane Company in New York City about this time in 1936. By coincidence, the *Sportster* was not only the third gas model plan to be published, but also the third gas model kit to be advertised in the model magazines; the two earlier ones being the *Cyclone Chieftain* and the *Bunch Scorpion Major*. The *Sportster* kit was still being listed in the 1941 G.H.Q. catalog.

G.H.Q. also took over the manufacture of the Loutrel engine in 1936. Initially it was advertised as the "G.H.Q. Loutrel," but later just "G.H.Q." It stayed in production until the early years after WW II.

Dick Mayerat of East Aurora, NY, has sent the picture shown here of the uncovered structure of a Loutrel/GHQ *Sportster* he built several years ago. The model was set up for radio control and used a K&B 40 glow engine. That sounds like a lot of power. However, under radio control, it seems that antique gas models can be successfully, if not very realistically, flown with much more power than they had originally.

Another Loutrel/GHQ *Sportster*, built by Don Blackburn of Amarillo, Texas, has demonstrated its ability to handle a lot of power (a hot Ohlsson 60) when flown with radio control. The picture shows Don's *Sportster* model rotating out after take-off and on its way into a spectacular climb.

## Silver tissue paper

At the present time I don't know of any



PHOTO: HAL STEWART

Hal Stewart's Hillson-Praga *Air Baby* is designed for the Society of Antique Modelers' Half-A Scale Duration events. Hal says he has had the model up for over ten minutes. Plan is available. See text for details.

supply source for silver Japanese tissue for models. But there are some options.

Dick Mayerat of East Aurora, N.Y., wrote to call my attention to a silver tissue paper that is sold by Hallmark greeting card dealers. I checked local Hallmark dealers here and found the tissue available in many colors, including silver. It is sold in a flat, clear plastic packet about 5 by 11 inches which contains three folded sheets of tissue, labeled size 20 inches by 2½ feet. The list price for the three-sheet packet is \$2.25.

The Hallmark silver tissue weighs 1.8 grams per square foot. (The old Japanese silver model tissue I had weighed 1.3 grams.) The Hallmark tissue is domestic, not Japanese, but it has a more uniform and lustrous silver finish than I can ever recall seeing with silver model airplane tissue. Dick Mayerat says, "I did a test with the silver tissue. It water-shrinks and ... I put on one coat of Sig Lite-Cote dope and am pleased with the results."

Another option is silver-doping white tissue paper. Famed model designer Bill Noonan of San Diego uses a tiny pinch of aluminum powder (you can get it in art supply stores) in clear dope which has been thinned to spraying consistency. Applied with a spray gun, the silvered dope dries to a translucent silver sheen on the model—more in keeping with the spirit of "stick-and-tissue" construction (if that is your goal) than any pre-colored silver tissue that I have seen.

### Hillson-Praga Air Baby

Hal Stewart has now designed fifteen different and interesting R/C Half-A Scale Duration models which meet the Society of Antique Modelers' contest rules. This event is for models of pre-1943 airplanes powered by any Cox reed-valve .049 engine, using the Cox fuel tank of nominal 5cc capacity, such as used on the Cox Babe Bee or Texaco Junior engines. Unlike many SAM events, the model itself can be of either pre-war or current design. Flight rules are the same as for the SAM Half-A Texaco event.

Hal's latest R/C Half-A Scale design is a 1934 Hillson-Praga E-114 *Air Baby*—a rare bird that seems to have a lot going for it. It's a Czech design that was built in England in 1934, using a license-built, two-cylinder Aeronca-type engine. The *Air Baby* bears a general resemblance to the American Aeronca C-3 *Master*, but has the advantage of using a cantilever wing which eliminates the Aeronca's profusion of wing bracing wires and the associated pylon structure above the cabin.

Here is Hal Stewart's description of his model: "The Hillson-Praga E-114 *Air Baby* is my latest Half-A Scale Duration model. Finding a picture, data and a small 3-view in Underwood's book *The Lightplane Since 1909*, I kept looking at it and finally did some analysis and determined it had all the attributes for a good flying model. The maiden flight of my model bore this out.

"The configuration is clean, low drag, and the model steps along nicely under power, resulting in a good climb-out. It was a bit sensitive to the rudder under power, which is corrected by using a long control horn and limiting the rudder throw. The glide was very satisfying, the model easily controlled with trim only. It seemed to have no inclination to return to earth (with no thermals). Unfortunately



PHOTO: JIM ALABACK

**Don Blackburn's** radio-controlled 1936 Loutrel/GHQ *Sportster* shows its climb-out when powered with a hot Ohlsson 60 engine. Even by today's standards, it was a fair sized model at 75-inch span.

we did not time the flight but it was up for a long time—way over ten minutes. Obviously I am very pleased with my little Hillson-Praga."

Hal scaled his model to a 45-inch wing span, which gives a wing area of 275 square inches. The SAM rules require a wing loading of 8 ounces per square foot, so a minimum model weight about 15¼ ounces is required.

Hal sells the Hillson-Praga plan for \$6.75, postpaid. Hal also has a catalog of all 42 of his old-timer type plans which costs \$1.00 postpaid. To order the *Air Baby* plan or a catalog, write: Hal Stewart, 8198 Speach Drive, Baldwinsville, NY 13027.

### Scientific Models and Walt Musciano

Walt Musciano of Lodi, N.J., is known for his prolific output of model designs for the magazines, but perhaps less well-known is the fact that he was also the principal model designer for Scientific Models after WW II. From his long association with Scientific founder John Frisoli and his inside knowledge of Scientific operations, Walt has written an extensive illustrated article on the founding (in 1929) and subsequent history of Scientific.

The article will be published in the December issue of the Kits And Plans Antiquitous (KAPA) *Kollector* newsletter. A year's membership in KAPA includes four quarterly issues of the *Kollector*, edited by Lou Buffardi. Dues are \$8.00 per year in the U.S. (US \$10 in Canada, US \$13 elsewhere). Send your membership request with dues payment to: KAPA, 1788 Niobe Ave., Anaheim, CA 92804.

Like many old-time modelers, Walter Musciano continues his interest in model and full-scale aviation today. He is now working on plans for a ½-size R/C Heinkel He.51 model for FLYING MODELS, and on a book about the full-scale bent-wing *Corsair* for Schiffer Publishing. His progress on both these has been slowed, however, by the long recovery period from a spinal injury received in a car accident.

Walter Musciano is a member of the AMA and KAPA Halls of Fame. He has also been the guest of honor in 1997 and 1998 at the Musciano/Scientific Commemorative Contest sponsored by the Northern Virginia Control Line Association near Washington, D.C.

Keep your letters, newsletters, and photos coming. For a reply, please enclose a self-addressed, stamped envelope. Jim Alaback, 12366 Nacido Drive, San Diego, CA 92128. ☐

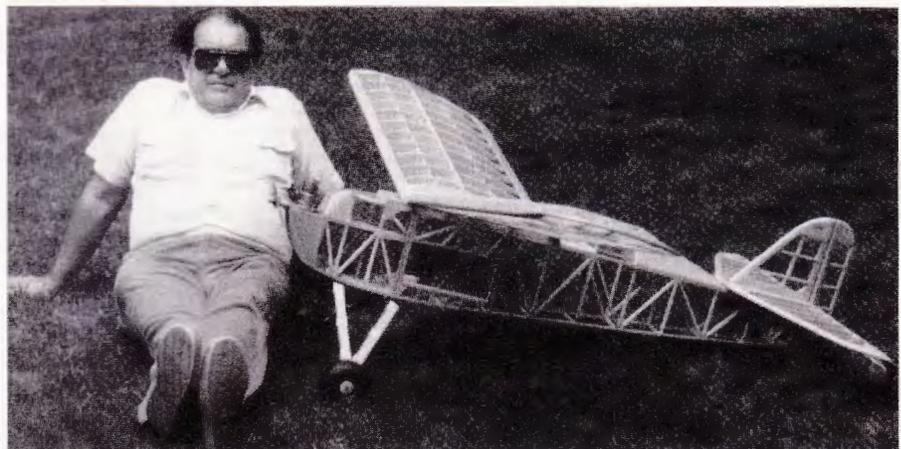


PHOTO: DICK MAYERAT

**Dick Mayerat** with his 1936 Loutrel/GHQ *Sportster*, when it was under construction, showing the antique gas model's framework. He eventually used a K&B .40 and R/C assist in the model.

# Small Talk

By Randy Randolph

**W**hile shopping with my wife in the sewing/craft department of a WalMart store, I saw a 3½ ounce tube of cement called “Bond 527.” Frankly, I can see no difference between it and Duco or Ambroid (other than the color of Ambroid). If you are like me and use a lot of model airplane cement in a lot of places where there is no possibility of contacting glow fuel, this stuff is for you. The price is less than half that of those mentioned and it is thick enough to need a little thinning with acetone, which makes it even less expensive! We old timers love the fragrance of model airplane cement in the shop.

On the subject of old timers: every so often I mention the name Dereck Woodward. For those of you who are unfamiliar with Dereck, I thought I'd take a minute or two and tell you about him. He is a Brit, who retired from the RAF and migrated to this country a few years ago. Dereck is very well known as the author of the popular “Weekend Pilot” series that has appeared in *RC Model World* for a long, long time, as well as other English and American publications circulated all over the world. The first three

pictures represent some of Dereck's work and give you an idea of what kind of a guy he really is!

The good thing about Dereck, other than his funny accent, is the fact that he truly is a small airplane man! Even though he has slipped over the fence and built the occasional .40 powered airplane now and then, he is truly a died-in-the-wool small airplane man. Some ten or fifteen years ago he and one of his fellow contributors, Peter Miller, started the Small Model Association (SMA) in Britain where it became quite popular. It was the SMA that prompted me, along with Joe Wagner to found SMALL, the Small Model Airplane Lovers League!

Whereas the SMA is a “Non Organization” with “Non Members,” SMALL is totally organized, copyrighted and ruled by its by-laws which state that it will have no rules! Although it has no rules, it is governed by a Precept. That Precept dictates that any and all power sources may be used to power a small model airplane as long as such power source is no larger than a .26 cubic inch displacement glow engine. The single exception is .36 c.i.d. for Control Line operation. Now you know the true history of SMALL.

## A question answered

A question about the PAW Texaco .09 was raised on the SMALLnet a while back and brought out a few words of wisdom from Dave Larkin (e-mail dslarkin@igs.net).

“The ‘Texaco’ PAW's are available only (as far as I know) in .09 and .15 sizes. These can be ordered with and without mufflers. As far as I knew the only mod from a standard engine was the fitting of a (non-R/C) small bore carb—at least that was all I requested when I asked PAW to do these engines. However, the current Texaco engines I have in stock (0.09s) have a single ball race and a single exhaust layout just like the 0.049 Joe described.

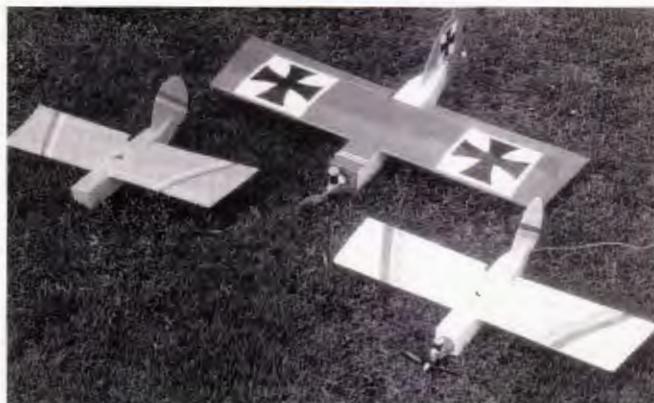
“But that .049 is not a ‘Texaco’. It is a ‘Classic’. As you recall SAM rule makers/voters are not very flexible on the subject of allowing diesels in the half-A events, so if we fly those events we normally have to put up with cantankerous needle valves and Cox engines, in the interest of ‘leveling the playing field’.

“The only exceptions of which I am aware are our ‘Bob Gordon’ event at the Eastern Canada Open in Gananoque in August, and in Florida they have an Open ½A Texaco event.



PHOTOGRAPHY: RANDY RANDOLPH

This is one of Dereck Woodward's “simple models” (above left)! An O.S. .25 powers the 3-pound model. A bunch of *Little Bits* (above right), one .046 powered, and the ¾ scales with .02s. Tony Mizzan's twin *Lazy Bee* (below left). The



two Speed 280s were just barely enough to fly the airplane. Tony's 40-inch span “winter airplane” (below right) flies beautifully with an AP29 on six 600 mAh cells and a 6-inch prop in cold weather, but in the summer it needs a little more urging.



"The PAW .049 'Classic' was an engine developed as a Mills 0.75 (0.046 cu. i.n) substitute. In other words it was de-tuned to make it as easy as possible to start and adjust, the attributes for which the Mills is so rightly famous. Of course this does make it a very economical engine to use. And, as (unlike the Mills) it does not have sub piston induction, an R/C throttle can be fitted successfully. I have several of these, and those I sold are very popular with their owners, because they are such sweethearts to handle.

"I brought some in with two ball races, just for the heck of it, and also had quite a few specially-made, bored-out 0.060 capacity. I flew my water/land *Tomboy* for some time with a PAW 100 (0.060) Classic and a 9-4 prop. It went well and was very quiet.

"It would appear that the current Texaco engines (at least the 09) have the same porting system as the Classic. I don't have a 0.15 in stock at the moment, so can't vouch for that, but I'll ask Gig Eifflander or Eric Clutton at the next opportunity. As for a 0.19 Texaco PAW—I've never heard of one. But that doesn't mean they don't exist, PAW is not very good about keeping their representatives abreast of current developments, and there could be an 0.19 out there that I don't know about. Again, I'll ask. (Incidentally they now make a stranded control line wire as well as engines.)

"It is sad that the 0.049 and 0.060 Classics are no longer made, though I might have one or two left, but it has to be said that the current PAW 0.049 and 0.060 Mk are so user-friendly that some of the rationale for the Classic has disappeared. When my *Herr Aqua Star* kit arrives, I intend to fit a PAW 0.06..."

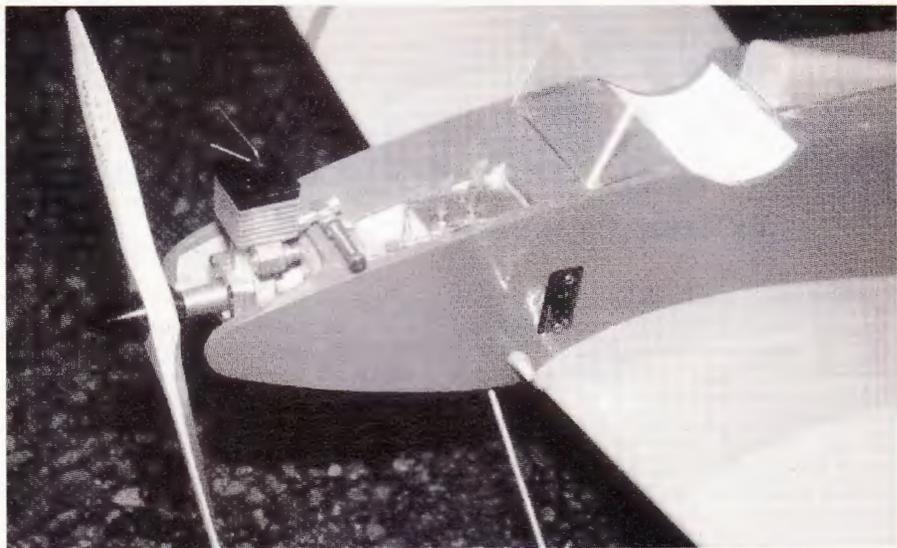
### An insidious phenomena

Sooner or later everyone who uses rechargeable batteries will run into the problem of Black Wire corrosion. Here are some definitive answers about the problem from Red Scholefield (e-mail Red's R/C Battery Clinic redscho@gnv.fdt.net):

"The black wire syndrome is an occurrence in battery packs (Ni-Cds) where the negative wire becomes corroded (turns from shiny copper to blue-black). This is the result of either a shorted cell in the pack, the normal wear-out failure mode of Ni-Cds, or cell reversal when a pack is left under load for an extended period.

"The sealing mechanism of an Ni-Cd cell depends to some degree on maintaining a potential across the seal interface. Once this potential goes to zero, the cell undergoes what is called creep leakage. With other cells in a pack at some potential above zero the leakage (electrolyte) is "driven" along the negative lead. It can travel for some distance making the wire impossible to solder and at the same time greatly reducing its ability to carry current—and even worse, makes the wire somewhat brittle.

"A switch left on in a plane or transmitter



A Pfeffer .06 cc side port diesel powers this *BeeTween*. Dereck says it is short of power, but a delightful engine anyway. Dereck, by the way, created Britain's SMA along with fellow conspirator Peter Miller.

for several months can cause this creepage to go all the way to the switch itself, destroying the battery lead as well as the switch harness.

"There is no cure. The affected lead, connector, and/or switch harness must be replaced. This leakage creep takes time so periodic inspection of the packs, making sure that there are no shorted cells, insures against the problem. The cells should also be inspected for any evidence of white powder (electrolyte mixed with carbon dioxide in the air to form potassium carbonate). In humid conditions this can revert back to mobile electrolyte free to creep along the negative lead.

"Some 'salting' as this white powder is referred to, does not necessarily mean that the cell has leaked. There may have been some slight amount of residual electrolyte left on the cell during the manufacturing process. This can be removed with simple household vinegar and then washed with water after which it is dried by applying a little warmth from your heat gun..."

Red is one of the real experts when it comes to batteries and his advice is always good!

### From the Alps

This column has mentioned Tony Mizzan before and we like to think of him as our Switzerland connection. Tony writes for the Italian magazine, *Modelissimo*, and among other things does kit reviews for that magazine. Like a lot of us SMALL members, he likes electric power and the picture of his twin *Lazy Bee* is an example. The one pictured is powered by two Speed 280 motors spinning 4.5-2 Cox props. It is also powered by one Speed 400 motor with a 5-3 or 6-3 prop. He reports the performance is marginal with the 280s but just fine with the 400. Overall weight is about 17 ounces. Tony also writes:

"... I am partly known in Italy to be in the small model gang. I design and build small models of necessity—they do cost almost nothing and are quite inexpensive to fly. Some years ago I had to go small for the simple reason that I was bringing some models to fly at each of my work sites. If too big they were not allowed as hand carried luggage on planes, or could not enter into my Puch Haflinger 4-wheel drive field car. A Haflinger is the only non-amphibian car

which can cross a rice paddy or a monsoon drenched muddy field!"

Tony allows that they had a heat wave in Switzerland this summer! I wonder if it could have topped the weather here in Texas?

### Like minds

A short while back I mentioned the fact that the old Goldberg *Lil Rascal*, scaled up a bit, would make a good looking small R/C airplane. It seems that Dave Thornburg had been thinking the same thing and sent me a copy of the original plans for that long out-of-print airplane. Dave is really one heck of a guy. If you didn't read his article about the *Bird of Time* in the September issue, go back and read it. While you're at it, pick up a copy of his book "Do You Speak Model Airplane?" too. Dave writes with a flair that is entertaining, informative and very readable! He is one of the real pros in this field dominated by us amateurs!

### One last thing

Before leaving I must tell you of the fun I have been having with a *Herr Aqua Star* seaplane. It is a very nice, gentle and very controllable airplane when flown from water with its wing floats attached, and a very clean and frisky airplane when flown from land with the floats removed. This is truly an all-terrain airplane! Herr's new *Star-Cruiser* for 1/2A power looks like a winner too! Good for you, Tom!



The new *Herr Aqua Star* is at home on land as well as at sea. This one is sitting in the middle of a Texas lake that dried up in this summer's blistering heat! Norvel's .061 Big Mig is a perfect power source.

# R/C pattern

By Dean Pappas

**H**aving just put a new plane in the air, a few things have come to mind, about the nature of "making friends" with a new airplane, and then trimming it out (first you make friends with it, then you try to change it!). To begin with, it takes a while to trim out one of these Pattern machines, even when working from other peoples' observations of the same design. Patience counts, and that's a problem when *all* you want to do is get back to solid practice.

Secondly, a re-discovery: I *really* enjoy figuring out how to get the last bit of performance out of a new plane. Just this last Saturday, I found myself blotting out the entire world, just concentrating on figuring out the trim characteristics of my new *Prophesy*. It's going to be a good airplane. That part of trimming is a lot like serious practice. When you are doing it right, there is a high level of concentration. That kind of effort always pays off. An impeccably set up airplane is not only a joy to fly, it's also true that having such a plane is one of the things that separate our precision aerobatics event from merely "3-D-ing" about.

So much for an opening observation. This month, I would like to talk about YS four-cycle engine setups, a little bit about their exhaust systems, and then talk about the relationship between the judges' guide and maneuver descriptions. Judging by the talk that I have heard, the Pattern community and NSRCA are sneaking up on revising the way we train judges. It's exciting, a little confusing, and this Winter/Spring will also be time for almost everyone in the country to re-certify as NSRCA judges, as a result of the new AMA rules.

As you may remember from last month, I had been experimenting with a larger volume pipe/muffler on the YS 140 four-stroke. As I reported, the results were favorable,

with the reduced back pressure improving throttle linearity, horsepower and noise quality. It seems that a few other experimenters out there have discovered that the header pipe is also a major source of restriction. They had also reported a drop in running temperatures with a bigger diameter. This was with the stock muffler/pipe.

The drag racing experience says this: if you put bigger diameter exhaust headers on the engine, you may have to run the mixture richer (not a problem for us, we adjust it almost every day) and you don't need as much camshaft duration in order to get horsepower. A bigger diameter header more completely pulls exhaust gases out of the cylinder, and cold mixture in. As a matter of fact, you may even throw away some fresh mixture with the exhaust. The exhaust valve likes the temperature reduction. The reason for describing this interaction is that the YS cam is, in general terms, a rather mild one. An exhaust header the same diameter as the exhaust valve is "about right".

The experimenters were all in the five-eighths inch diameter neighborhood (for practical reasons). I suspect that a seven-sixteenths inch (11 mm) header will be just about right. The other thing that the race car taught us was the accordion style header material is *bad*. The exhaust wants to flow in a smooth piece of pipe.

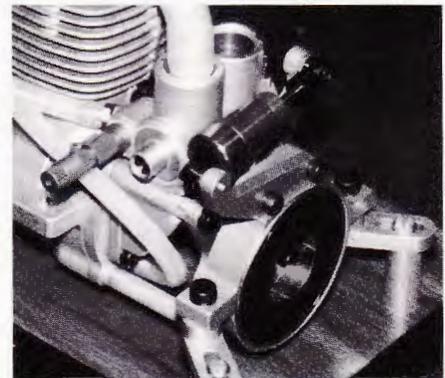
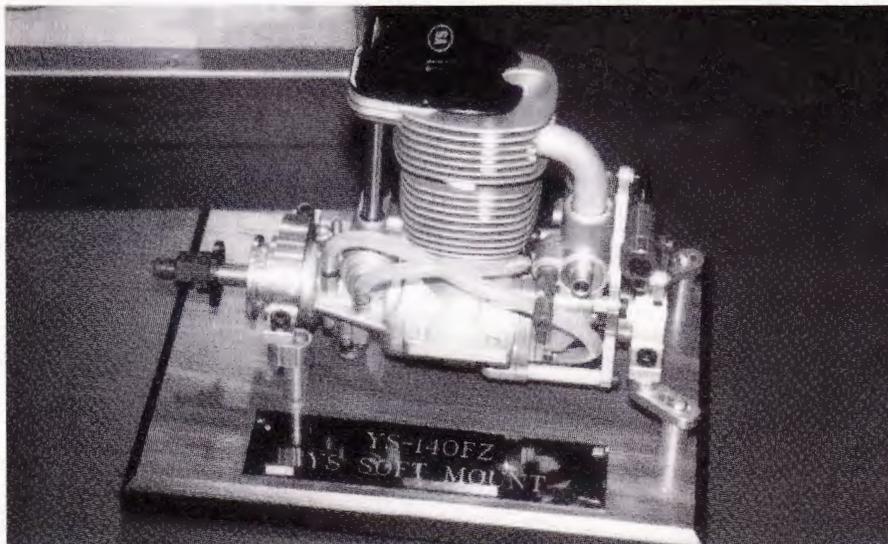
We will try to keep you all appraised as to what goes on on the exhaust front. Meanwhile, Hattori has released a new pipe, very similar in appearance to the #675 item that was discontinued a year or so ago: the new #692 has a one and three-eighths inch diameter like the earlier "big" pipe, and has similar mounting lugs. The new item is longer than the old one, although I haven't seen one. I assume that most of the length is taken up in the first "expansion chamber". That should give the benefits we talked

about without being a packaging problem, like the 140 two-stroke pipe I am using.

According to Futaba USA, the new pipe should be in the country just about the time you read this. A Futaba part number (necessary for ordering) does not yet exist. Rick Mattie, at Futaba USA, also tells me that the copper washers that go under the header, in order to protect the cylinder head are now in stock. The other thing this washer does is help prevent breakage of the little flange on the header.

As you may have heard, YS is introducing a new 140 four-cycle, the 140 "L" (for limited). Word is that it will turn the same props as the "FZ" about three-hundred rpm faster, and has the new YS soft mount built-in rather than included. Pictures, in the European press from the European Continental Championship show that the center boss of the rear engine mount is cast directly into the carburetor housing. One supposes that the screws that hold the carburetor on are bigger, now. Also, the carb housing has a boss cast-in for one end of the damper. On top of all this, there is supposed to be either more compression, or more boost. Reports from the EC said that the engine was *not* temperamental, or harsh sounding. The price tag will go up. I guess it depends upon how well the Yen is defended in the monetary exchange market.

The care and feeding of these engines (exhausts aside) is an area of needless mystery. The problem is that there is a fair number of people out there who have engines that run, and run reliably, but are not as strong as they might be, or that have inconsistent idle speeds. The scenarios that are the most important to address go like this: 1) The engine has always run well, but after half a season, or so, it is down on power. You just can't get the same rpm numbers that others claim with the same props, and



PHOTOS: MICHAEL RAMSEY

Here is the Y.S. 140 FZ with the optional vibration-dampening mount, as it was introduced at the '98 Toledo Expo (at left). The shock absorber (above) is an integral component of the mounting system in removing the bang out of the tremendous shaking around these motors typically do at idle.

even if you do, the “grunt” in the vertical up lines just isn’t there. 2) The engine runs great, but the regulator requires periodic “leaning out” and the transition gets rich or unpredictable especially when the engine is loaded with a big prop. 3) If you set the needle valve a bit rich, everything is fine, but a little bit more, and all of a sudden, the fuel economy gets horrible, even though the engine runs just fine.

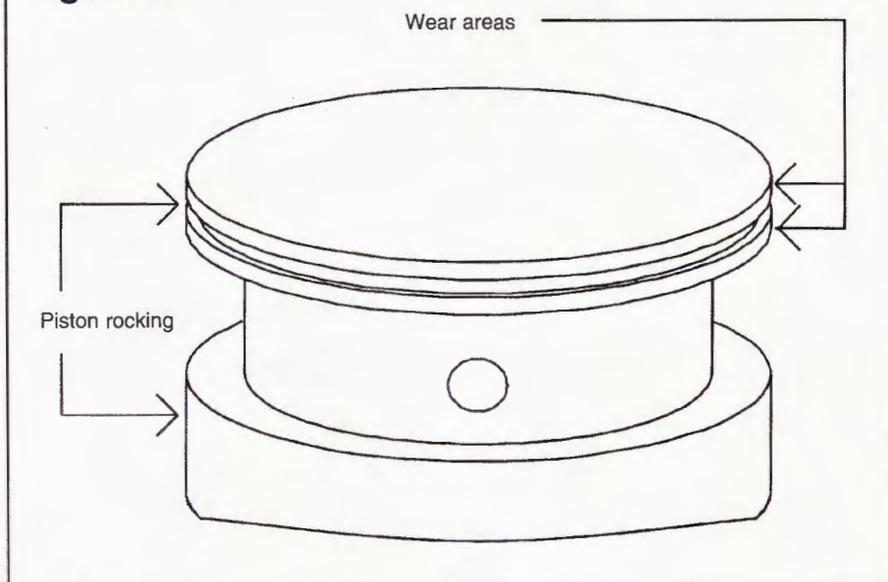
Any of this sound familiar? The pressure fed YS has some unique characteristics. To begin with, as the piston and its ring wear out, a small amount of combustion pressure gets into the crankcase. Up to a certain point, the fuel pressure regulator can take care of it. Beyond that, things get silly. This situation can occur pretty easily if one of two things happen: the first is not enough lube in the fuel, the second is running leaner than necessary in order to get a tiny bit of extra performance.

YS recommends twenty percent lubricant, and I am here to tell you that they are not lying. Back when I ran the earliest “FS” versions, and my modified “AC” versions, fifteen percent synthetic oil was good enough to get two full seasons of flying out of a piston, ring, and liner. Of course, this was accomplished by *never* setting the needle valve lean. My AC’s were modified by putting the old FS piston in them. The YS piston is hourglass shaped (Figure A). This means that the only areas that contact the cylinder wall are two narrow bands at the top and at the bottom of the piston. That’s not much area, compared to the earlier FS piston, with straight sides. This reduction is for good reason, that’s how the crankcase volume was reduced and the boost increased, but the price was the need for lots of oil, and a shortened wear life under certain conditions.

Overly large propellers are a problem, but everyone seems to be apprised of that, now. The FZ 140 actually has camshaft timing that does not like to be run at less than eight-thousand rpm, on the ground. I am sure that this is intentional. Heavy loads lead to piston rocking. The rocking is what wears the bands at the top and bottom of the piston, and as a result, the ring does not sit squarely against the cylinder wall. That means compression loss. This is the reason that the “grunt” goes out of an engine, before it can easily be determined to be worn-out. It is also the reason why the real good running compression does not come back, after many re-builds. Was the ring replaced, or the piston and the ring. You want to replace both.

A lot of people set the needle valve by peaking and then opening the needle in order to back off a set number of rpm. I tend to hear two-hundred to three-hundred, for this figure. I suspect that this amounts to running leaner than necessary. I have always started from a definitely rich setting, and worked in very slowly, until the rich gurgling has stopped. I am sure that this is more than a quarter turn away from peak, and in most conditions, it is closer to half a turn open from peak. The reason that I avoid running anywhere near a peaked needle setting is this: a glow-ignition engine does not fire at a well-defined point of the crankshaft rotation. It fires pretty early, but takes a while to get burning strongly. Every so often, the mixture fires quickly, or earlier, because tiny temperature variations control this behavior.

**Figure A**



ARTWORK: DEAN PAPPAS

**Leaning the Y.S. motor too much**, or running fuel with less than 20% oil will cause the motor to break down sooner than you might think. Because the middle of a Y.S. piston is of a smaller diameter than the top, very little surface area is left to keep it stabilized during its ride up and down the sleeve. Rocking can occur causing the critical (minimal) areas above and below the ring to wear away, significantly reducing the normal life expectancy of the piston, ring and sleeve.

If a glow-ignition engine is set anywhere near peak, and the compression is high enough, then there will be pre-ignition. Pre-ignition puts *huge* rocking loads on the piston, and that’s what leads to the short wear life referred to in scenario #1. The horsepower loss is perplexing, as the engine runs fine otherwise, and may even be its “old self” when the weather cools. Adding nitro in order to make up the deficit just makes the pre-ignition problem worse. I have heard engines with the “horsepower depreciation” problem referred to as being cooked.

If the engine has been run gently, and the compression is at the end of its life, then scenario #2 will fit better. Scenario #3 is just a fact of life with a crankcase pressurized engine. The regulator makes it much better than it would otherwise be. I can remember crankcase pressurized Fox .36 on *Flite Streaks* suddenly quitting because I’d got the needle a few clicks too rich. They would quit as if falling off of a cliff. One click too rich ...

I noticed the economy with my #1 engine reduce when I took it out of the ten-pound, fourteen ounce *Ariel*, and put it into a nine-and-half pound *Prophecy*. Of course I set the needle just a little richer, I didn’t need that last bit of power! The result: an engine that used to barely finish two patterns on twenty ounces would burn fourteen ounces out of a sixteen-ounce tank. An eighth of a turn on the needle got the economy back. That’s probably the ideal needle setting, because it’s where I had enough to pull the heavier ship.

Running too close to peaked, on a regular basis, subjects the whole engine to “pinging” or pre-ignition. It is this writer’s opinion that even the valve seats get beaten up, and don’t seal under running pressure, as well as they might. The rear crankshaft bearing loosens up under this kind of shock loading, and that has to add a lot of drag to crankshaft rotation. In extreme cases, the crank-

shaft moves enough to break teeth on the camshaft. Long before breakage, there has to be a lot of friction going on.

Running the engine hard just “takes to top off” of it. I would recommend twenty or twenty-five percent nitro, and no more, with the stock compression. Try to keep the ground rpm in the mid eight thousands: this means a 15–12 or 15–13 narrow prop. Both props are big performers, without resorting to nitro. Enough about engines.

### A brief word on judging

A lot of talk among those involved with the NSRCA Judge Certification Program centers on making the book more explicit, and relying less on the judge trainee “connecting the dots” between the general section and the many possible downgrades for all the many maneuvers. There are also missing pieces to that general section. A workable definition of what is *recognized* as the maneuver in question is needed. Another way of stating this: “How many points does an eight-point roll have to have, before it is no longer an eight point roll?” Hey! That sort of begs the question. The AMA rules for the Controline Stunt guys actually recognize *any* break from level flight (at the appropriate time in the pattern) as a maneuver attempt, and reward it with a non-zero score. Out of forty, they would award a ten. I guess they would do the same with a flopped Stall Turn. Maneuver centering falls into this category: the simple calculation described in the general portion of the judges guide is too much work for all but well-practiced judges, and as a result people are requesting guidelines for centering downgrades based on the individual maneuver descriptions. It sounds like a whole lot of memorization to me, but I’m sure it will also work.

What’s your opinion? Let us know, either here, at **FM**, or on the Internet Forum. See you next month ...

**T**hank a cracked spar for the *Laser 200*. It was the monoplane that topped the almost complete dominance of the Pitts Special biplane in American IAC (International Aero Club) competition, and ultimately in air shows. It was the airplane and pilot that sparked aerobatic monoplanes of all types, full-size and their R/C counterparts in just about every size from freeflight peanut up to 40%+ scale.

That fortuitous crack was discovered in the wood spar of Leo Loudenslager's Stephens *Akro*, the plane he had been using in aerobatic competition from 1971 through 1974. Pecking away at it in the hope of a simple fix, he found that major surgery would be in order. The choice was almost a foregone conclusion. Build a new plane.

He hadn't been that satisfied with the Stephens' performance and response, even though he used it to fly to first place at his first aerobatic meet, a local event flown in Brookhaven, N.Y. in 1971. Probably sometime during that 4-year period, he began concocting a formula for the plane that could win him the National Championship. The failed spar gave him the excuse to try it out.

One of the very first flights in the newly completed *Laser* (at right, top) sometime during the early Fall of 1975. This was the original blue scheme, minus some of the detail added later. One of the rarest sights at any air show was two *Lasers*, performing at the same time (below). It occurred on an annual basis at the Sussex Airshow, held at the Sussex Airport where both Loudenslager and his friend Jim Roberts based their planes. Roberts built his in 1978. He didn't use plans, but measured Loudenslager's inch by inch.

## Leo Loudenslager's Beautiful Obsession



**Written By: Frank Fanelli with Jim Roberts,  
Mike Stendor and Bud Storms**

It was a dream that came true, and in the process,  
had a profound effect on the world of modeling.

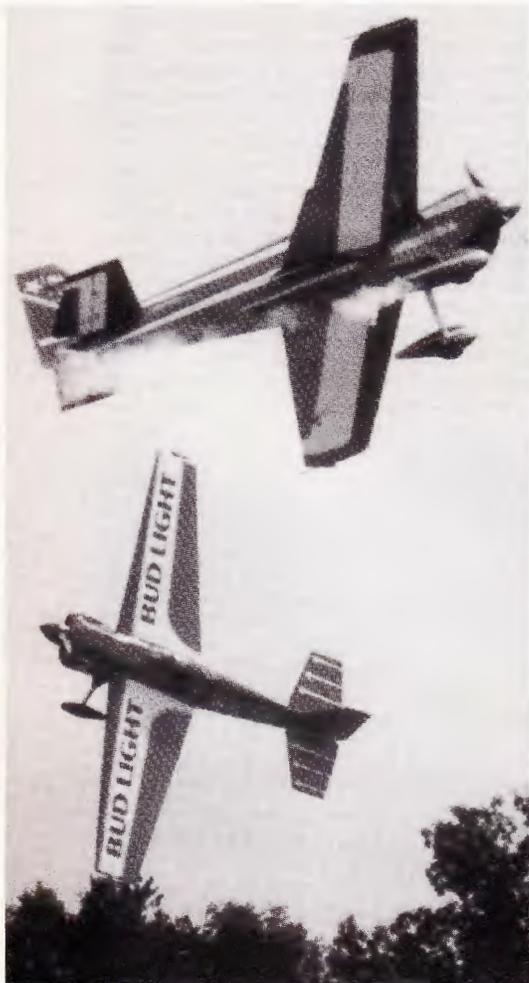
After the crack was discovered in February 1975, he brought together the crew that helped build the new plane by the summer of 1975, and baptize it with its first flight in September 1975. Jim Roberts had been his friend and partner in the Stephens, and was also competing. Bud Storms, a lifelong aviation enthusiast, modeler, and engineer, was recruited to draw up the necessary shapes and ensure the structural integrity of the plane. Joe Oshinski Jr. was the engine man.

The formula went something like this. Keep the Stephens wing, with its NACA 23012 airfoil, but modify it slightly by moving the high point of the camber forward a

little. Lighten, lighten, lighten, and lighten some more. Finally, modify the tail surfaces for some more muscle and stability.

Some have charged that the *Laser 200* was nothing more than the original *Akro* modified. But the only thing that was used of the original 10LL (the FAA aircraft registration Loudenslager used) was its tail cone, and even that was modified. His *Akro* now resides disassembled in John Neumeister's garage, ready for restoration. In fact, the first *Laser 200* shared only the wing design of the *Akro*, and a portion of the fuselage frame, aft of the cockpit.

The main design target was to literally



A 1/8 scale *Laser* sits beside the real one at Sussex Airport. Though he wasn't a modeler himself, Leo did judge several TOC's. His wife, Susan, said that when he saw so many *Laser* models, he felt like he was being cloned.



**Jim Roberts** (L) and **Leo Loudenslager** (R) were good friends (above) from the time they met at Rochester Airport in 1968. They shared an interest in aerobatic competition and air shows and were at first partners in the original *Laser* until Jim built his own in 1978, and both started flying air shows (at right).



build the plane around Leo. With only the bottom half of the rear fuselage frame complete Bud Storms fashioned a fabric cockpit seat and sat Leo in it. Then they measured what it would take to put a canopy only an inch above his head, and the offset distance around his shoulders. With these measurements they were ready to fabricate the turtledeck behind the cockpit.

Storms drew up the top turtledeck former just behind the headrest, and figured the rear turtledeck former just forward of the vertical fin. Then he figured the intervening formers between them, much like you would do for the ribs in a tapered wing. He drew them on some plain wrapping paper, again not unlike what some modelers do. Aluminum angle was used to fashion the ribs. As he says, it worked like a dream because everything fit the first time and nothing had to be changed.

By the way, if you ever look for the original *Laser* plans, there aren't any. Outside of the former drawings, everything else was sketches drawn primarily by Loudenslager, with some by Jim Roberts and Bud Storms. As a matter of fact, when Roberts decided to

build a companion *Laser* in 1978, he simply measured every last detail on Loudenslager's plane, and wrote it down on a yellow legal pad.

Then they had to fashion the canopy. It started life as a pure acrylic bubble, but was sawn in half and a lightweight frame put around it. Compared to the bubble canopy of the *Akro*, the new *Laser* canopy was seven times lighter. The *Akro* canopy weighed 26 pounds, while the *Laser* canopy was only 3½. And not to mention the cleanup in drag, so the plane won on both counts in this area.

More airframe dieting came in the form of the turtledeck formers, the fuselage stringers, the tail group, the forward fuselage, and most especially the engine. Each turtledeck former had lightening holes depth drilled only part way to shed a little weight, but not decrease strength. Some very thin, probably 0.015, 7075 T6 aluminum skin was recruited to skin the turtledeck because of its hardness and strength compared to its light weight. But it wasn't easy working with this stuff. It was so hard they had to anneal (soften with heat) every

spot where they had to drill for a rivet. In time each drill hole would re-harden.

On the *Akro*, the tail was 49 pounds. When the tail on the *Laser* was finished, it had been pared down to 21. And, it had also been reshaped. The vertical and horizontal stabs had more area added for more stability as well as maneuverability. Plus the hinge line on the *Laser* was changed. Wherever possible, all over the aircraft, each frame tube was assessed for its load carrying requirement, and if possible, replaced with a smaller diameter, lighter tube.

The engine was the biggest weight offender, and Joe Oshinski Jr. went to work on the Lycoming AEIO-320. First, all the optional engine accessories were deleted, like the starter motor and generator. Then every last piece of extraneous aluminum was shaved off. Lobes where accessories would be mounted were pared off. The oil sump was replaced with a flat sheet of aluminum.

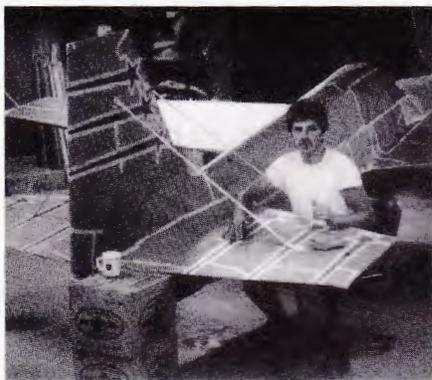
Aerodynamically the plane needed to be as clean as possible. The cowl area especially was a target for a makeover. Some nondescript spare engine cowl was located, and elected to



After the loops, snaps and rolls were over in late October 1975, these five men became the U.S. National IAC team (above) that went on to compete in Czechoslovakia for the world title. From L to R they are: Bob Carmichael, Leo, Kermit Weeks, Chip Melton, and Henry Haigh. It was Loudenslager's first national title, and he leads the team (at right) from Sussex Airport on their way to Kennedy. Weather detained them at Sussex until a break got them enroute. Once there, the planes were disassembled and shipped in a 747.



# Leo Loudenslager's Beautiful Obsession



Loudenslager periodically tore down the plane in the off season to check it out. Mike Stendor came on board in 1982 as his mechanic (above) and designed the first Bud Light scheme he is applying. Mike said the tear-downs were necessary because Leo went through a fair share of G meters. The Lycoming AEIO-320 engine (at right) was more than the advertised 200 hp because it had been "tricked out".



be the basis for the *Laser's* front end. The goal was to make the front area as small as possible, and tightly wrap the cowl around the pared down engine. The only thing that didn't fit were the cylinder heads, which accounts for the characteristic cowl bumps.

Even though the wing was sheeted with wood, there were very mild, almost unnoticeable sags between the ribs, something similar to the rib "bumps" on MonoKote covered, unsheeted model wings. To fix the problem, a lightweight slurry of epoxy and microballoons were troweled on the wing skin between the wings, and then pared away with a large squeegee.

Most of this transpired in the basement and garage of Loudenslager's Sussex County, N.J. home. When things began to take larger shape, they moved to a hangar at Kobelt Airport in Wallkill, N.Y. but unfriendly airport management forced them to consider another place, and so they ended up at Sussex Airport where the story of the *Laser's* rise in aerobatic history began, and contributed to what has also become probably the best and most important small air

show in the country, the Sussex Airshow.

By the time of the first flight in September 1975, the plane weighed 840 pounds, compared to the *Akro's* 856-pound empty weight. It had a 100-square foot wing, with a loading of 10 pounds/square foot, and could cruise at 170 mph compared to the *Akro's* 155. The first flight was almost anti-climatic, going so smoothly without any glitches.

That last sentence is a gross understatement. The U.S. National Championships took place in Texas from October 22-26 that year, and with a plane only a little more than a month old, Loudenslager won the first of his seven National Championships, and launched the legend of the *Laser* and himself.

It was intensive practice over the flat onion and sod farm fields of Pine Island, N.Y. that prepared him, as well as the coaching of Roberts and Storms who observed from the fields below. Sussex Airport was a short drive away, and they would meet there after each flight to critique the performance.

The plane continued to evolve, in a variety of ways, though nothing major. The aerodynamic aileron spade balances were added

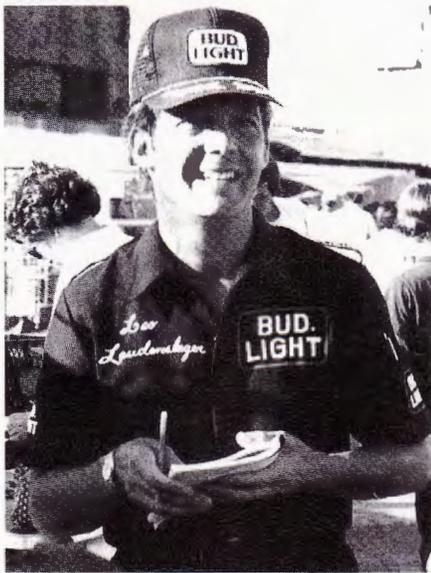
within a year and designed and built by Storms. Later on, Leo changed the ailerons to the configuration on Jim Roberts' *Laser*. They had a thick leading edge which protruded above and below the camber of the wing's trailing edge, and helped re-attach the airflow to the wing, besides rolling the plane much more quickly. Plus they were longer.

Not long after the first Championship, wing tip smoke was added. Mounts for the smoke grenades were attached, and a lanyard was run into the cockpit, to pull the pin on the grenades. The aerodynamic spades continued to evolve until the articulated design of later years. Of course the paint scheme changed also from the original blue with gold trim, to the first Bud Light scheme, then to the later one.

And how did the *Laser 200* get its name? Well, the 200 is easy to figure, referring to the Continental O-200 engine, but the "Laser" came from an early Canadian air show fan who remarked that the plane's flight and speed made it look like a blue light laser. The rest is aviation and modeling history, much to the delight of millions of people. **C**



Rolled out of the garage at Loudenslager's New Jersey home in 1975 (at left), the welded fuselage was ready for covering. Maintenance was meticulous on the aircraft, because it was a literal question of life and death. Only the best methods like the multiple clamping (above) of glued wood parts were used.



## Mr. Aerobatics

— By Frank Fanelli  
with Susan Loudenslager

**T**he road to World Aerobatic Champion didn't start where you might expect it to. It really started with yacht racing in Columbus, Ohio.

As incongruous as that sounds, it was the racing that fired up the competitive streak in Leo Loudenslager. And his father, so supportive of his son, nurtured the spark. It seems that this supposedly land-locked area had a whole series of man-made lakes that fostered this race. Leo's whole family was involved, but it was his father who really kept the fire stoked.

From that point, the turn to aviation probably occurred sometime during his stint in the Air Force. He was a mechanic on B-52s during the mid-1960s, and caught the flying bug when he saw his first air show. He joined the base's flying club and started taking lessons.

From that point on, his single-mindedness took over. His goal was to compete in aerobatics and earn a living at aviation. He took over the graveyard shift, working at night on the B-52s. During the day he worked at a local gas station to pay for flying time and additional ratings.

Somewhere along the line, he also man-



Nothing was left to chance before a performance, and Leo often walked through the entire sequence (above) in a rehearsal before he flew. The first aerobatic aircraft he competed with, a Stephens Akro (at right) just couldn't do what he wanted. This plane still exists but is in need of restoration.

aged to find some time to work at the local base FBO. By the time he was 21—and now out of the Air Force—he was pretty much running the FBO, had all his ratings, and was ready to get on board with an airline.

Doing his research before applying, he discovered that college was a requirement, and though a very impatient student—school had bored him, and he left high school early—he went back to a community college to get his Associate's degree.

You get some idea of the intense focus of the person when you consider this time in his life. School, still working at the gas station, still working at the FBO.

At 22, in 1968, he applied to American Airlines, without the benefit of military pilot training and experience, but he was hired, probably one of the youngest pilots ever hired by a major airline.

One goal was fulfilled, the airlines. But the other, aerobatic competition was still smoldering. He began talking with the late Margaret Ritchie, who with Clayton Stephens was developing the Stephens Akro, and eventually built the one he started to compete with in 1971.

During this same time frame he met Jim Roberts, a fellow American pilot, and the two became partners in a shared goal of aerobatic competition. Jim picked up a Stits Playboy, and the two of them, now based in the New York area, moved to Greenwich, Conn.

The planes were hangared at Waterbury-Oxford airport, in south-central Connecticut, but the flak started almost right away. Neighbors in this posh rural area began complaining about the noise of their practice flights. The airport management was none too friendly to their plight, and eventually told them to leave.

That was 1973, and the search began for a friendlier atmosphere. One place high on the list was the area just west of Warwick, N.Y. It was a very flat floodplain of the Wallkill River, and grew onions and sod. Crisscrossed by the geometry of the fields, it was a perfect practice site. Sparsely populated, away from airways, and near several small airports, it looked like the ideal place.

And it was. It was then that Loudenslager launched on the Laser 200, met Paul Styger, the owner of Sussex Airport, and based the plane there for almost 20 years until he moved to Tennessee. It was here that he helped Styger launch the Sussex Airshow,

probably the premier small air show in America. He helped Styger recruit the who's who of aerobatic aviation.

Names like Scholl, Franklin, Poberezny, Hilliard, Hoover, Brown, Boesch, Roberts and so many other air show icons showed up here not singly, but as a group! A small air show like this could expect only one, maybe two at the most headline acts, but here everyone was a headliner.

It was also here that the string of seven national championships, and the one world championship began.

Mike Stendor came on board as Leo's mechanic in 1982, and attests to the person. In Mike's words, Loudenslager was totally focused, but that never detracted from his humanity. Despite that intensity he was never one to browbeat if things didn't work out. His only comment would be: "Well, we've got a problem, let's solve it."

As long as you had his confidence, he accepted and praised your performance. Stendor was the one who basically designed the first Bud Light paint scheme on the Laser, and had pretty much painted it before Loudenslager ever saw it.

Walking into the hangar late one night, after an extended airline trip, Loudenslager saw the plane for the first time. His comment: a broad smile, and "Cool!"

Air show demands put an end to his aerobatic competition, and eventually he bought his own airport in Tennessee, and moved planes and family there. It was a more central location from which he could more easily ferry the Laser to air shows all around the country. It was here that a new design started to take shape, something that would even more faithfully follow what he felt an airplane should and could do.

Even there he always came back to Sussex, and missed only one year there, 1996, because the Budweiser sponsorship demanded that he perform that same weekend at a much larger, major show.

But, he was due back at Sussex in 1997 and was only a week away from flying his new plane, the Shark, when he had the traffic accident that at first left him paralyzed, and ultimately led to his death in August of 1997.

Around Sussex, he was the hero, and for many good reasons. His accomplishments obviously, the person he was, and the enjoyment he brought to so many who watched his dance in the sky. **CC**





PHOTOGRAPHY: ROY CLOUGH JR.

The Flying Flea becomes...

# Flea Flight

By Roy Clough Jr.

**F**unny how some things turn out better than you have any right to expect. I mean considering where it all started, so I've got to tell you a story:

Way back in the '30s, in the days when FLYING MODELS was FLYING ACES and Phineas Pinkham and Phillip Strange vied for attention with rival aeromodel-fiction magazine *Air Trails'* hero Bill Barnes, an absolutely loveable little airplane burst on the scene. The brainchild of Henri Mignet, a clever French designer, *Le Pou du Ciel* captured the hearts of model airplane fans and home-builders everywhere. English speakers quickly transliterated its name, literally, "Louse of the Heavens", to "Flying Flea."

I had to have one.

At fourteen, nothing is impossible. Working only from magazine three-views I quickly sketched out how I'd go about building my own *Flea*. A trip to the sawmill up the road for basswood, spruce and plywood left me broke. Then, with no pocket money for movies or soda fountains in the near future, I had plenty of time to start building.

Designer-builder Mignet had written a comprehensive book detailing exactly how to go about duplicating his wonderful machine. To me this was an unaffordable luxury. I

Have your hamburgers and fly them too—their trays that is! This little electric freeflight builds from meat tray foam.

## Flea Flight at a glance

Wing span top	22 $\frac{1}{2}$ inches
Wing span bottom	18 inches
Fuselage length	11 $\frac{1}{8}$ inches
Total wing area	163 $\frac{1}{2}$ square inches
Wing chord, top and bottom	4 inches
Finished weight	3 ounces
Wing loading	2.2 ounces per square foot.
Motor required	HiLine Mini 6 or equivalent
Power required	3 to 4 110 mAh cells



could sure as heck build model airplanes that flew. Something big enough for me to buzz around in was just a matter of nailing and gluing bigger sticks together until they matched the three-views!

My version of the fuselage was pretty much boxed in when disaster struck. It came in the shape of one of my Dad's buddies from WW I naval aviation days. Pete occasionally stopped at our garage on The Daniel Webster Highway. He would drink near-beer from the cooler with the big chunk of ice floating in it and reminisce with Dad about F5L and HS2L flying boats. He showed immediate interest in my project. Flattered by his attention, I dragged out my sketches and rattled on. I didn't shut up until I noticed he was looking very serious and biting his lip.

"What do you figure to use for power?"



Power can come from a HiLine Mini 6 motor, or from one of Ken Bassett's little motors swinging a 6-inch plastic prop available from HiLine (above). If any thrust angle is required for trimming, the motor mount can be tilted to the required setting. To help form the curvature of the bottom front end (at right), the inside surface of the sheet needs some triangular kerfs to allow the piece to bend more easily. They can be carefully cut in with a single edge razor, or they can be sanded in with a fine triangular file.

FLYING MODELS



In this right side view you can see the two charging jacks on the side of the fuselage (at left). To "switch" the motor on, one lead from the motor is placed over the rear jack to complete the circuit. Besides rounding the leading edge of the wings and a slight taper sanded into the trailing edge, the wing is essentially flat. The considerable dihedral is more noticeable in this head-on view (above). Despite its unusual planform, the plane is exceptionally stable.

I told him a friend was loaning me an Excelsior motorcycle engine. Somebody had already fitted it with a propeller hub for an iceboat. I'd mount a surplus prop from Carl Ort's York, Pa., warehouse or whittle one out by hand. Pete shook his head. He turned to my Dad and said, "That damned thing might even get off the ground. If it does it'll either spin or tuck under. Make the boy take an axe to it."

Well, got to tell you. When my Dad said "knock it off," you knocked it off. So much for the great *Flying Flea* project. A couple of years later—after *le Pou* had dug a few graves across Europe—by tucking under just as Pete had warned, I felt better about Dad's judgment.

Still, the beautiful simplicity of Henri Mignet's concept always lingered somewhere in the back of my mind. Once in a while I'd get the *Flea* hots and make a few sketches of alternate wing and control arrangements that retained the basic "right" look of that cute little original *Flea*.

One day in the 1980s, looking at a picture of an *Easy Riser* hang glider I was inspired.

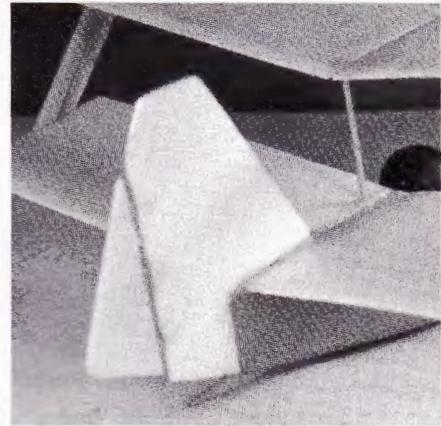
Those of you who build biplanes are familiar with the usual practice of rigging a degree or two more incidence into the lower wing. This differential, called "decalage," helps the tail surfaces balance out biplane thrust and drag forces.

If however, we give a biplane considerable stagger, and reverse the usual decalage so that the lower wing operates at a negative angle to the upper, then the normal pitch-down moment can be nullified and a "tail-less" biplane becomes possible.

With this in mind, I sketched out a *Flea* look-alike and assembled a non-flying model to see how it felt in three dimensions. I used light and strong styrene foam deli trays to build my little mock-up. A couple of control line model wheels were just the right size. Their weight was unimportant. It wasn't supposed to fly anyway. The finished job looked rather cute. I made a mental reservation to get at it someday, set it atop the



# Flea Flight



Before you finally glue the rear top wing cabane strut in place (at left), test glide the plane and use the strut to adjust the model to a power-off, straight-ahead glide. Once you get that, glue the cabane in place. Lots of ways to set an adjustable rudder (above). Use aluminum hinges from soft drink cans, or some bell wire. Tweak the tab for a climbing counterclockwise turn under power. The tail skid is a teriyaki skewer.

bookshelf in my study and forgot it.

A couple of years later, the roof leaked. Clambering around asphalt and nailing down shingles, I contemplated the gentle downward sweep of my back yard. When I went in out of the heat for a drink, I picked up the *Flea* ship, hefted it, and decided the heavy wheels made it balance about right. Why not? I took it up to the roof and not expecting much, gave it a toss. Straight as an arrow, it glided the hundred-foot length of my back lawn.

Well, it was no longer a mock-up, but a gliding model. If I swapped the weight of those heavy control-line wheels for an electric motor and battery, it should fly just great. I did, and it did.

## Construction

Plans are pretty well detailed. That leaves mainly tips for "how-to." Deli tray material is universally obtainable with your next pound of hamburger. You can wash used trays carefully, or maybe get a few clean ones for a smile and a thank you at your supermarket meat counter. Trays come in several sizes and colors. Size codes like ("10S") are often molded right in the center of otherwise smooth, flat areas of the trays. If this bugs you, razor-cut out the numbers, overlay the hole on the smooth part of another tray, and cut a plug to fit. Color can make interesting color schemes with contrasting triangle, square, diamond or circle patches.

If you are the patient type, epoxy, or some

of the new "tacky" craft glues will do the job, but odorless CyA, which will not melt styrofoam, is neater and faster. When you need to splice between two pieces, say for a wing, you can get a rock-solid joint by using a strip of  $\frac{1}{32}$  balsa in the seam and wicking in CyA.

There are many small electric motors that will fly this 3-ounce, one square foot wing area plane. Use a battery of two to four 75–110 mA cells.

Adjust for good straight-away glide, with just a hint of mush, power off, by moving the rear top wing cabane strut up or down before gluing it solid. Give the battery small charges at first. Tweak the rudder tab until, with a full charge, the plane climbs steadily in hundred-foot counter-clockwise circles. 



Aliphatic or epoxy glues can hold everything together, but the foam compatible, odorless CyA adhesives will really speed building.

Styrofoam delicatessen trays make terrific building material for small models. Light, strong and easily worked with a sharp razor blade it sticks best with UFO CyA glue.

The fact that some of these trays have size codes molded right in the middle of them is no problem because it is easy to cut the printing out and insert a smooth piece.

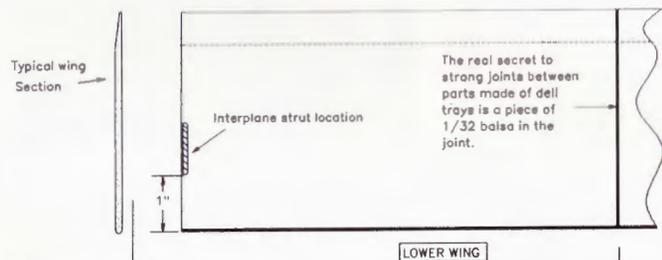
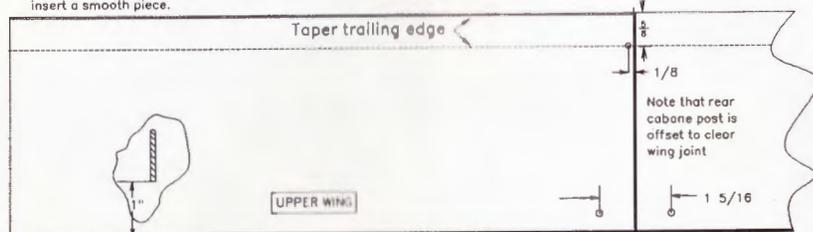
Since these trays come in various colors you can work patches into attractive color schemes.

Flea Flight weighs in at 3 ounces and its 146 square inches of wing surface gives it an enviable wing loading despite its relatively 'heavy' and rugged construction.

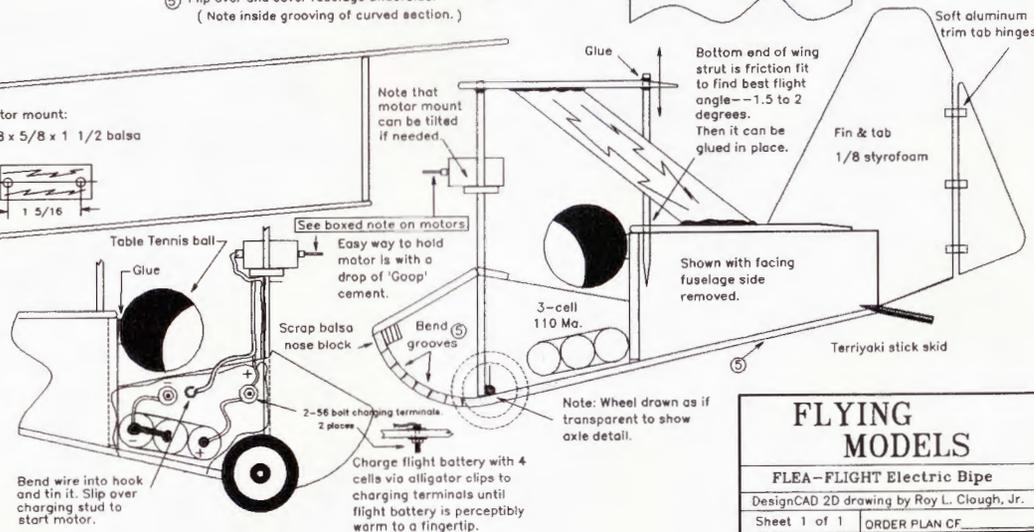
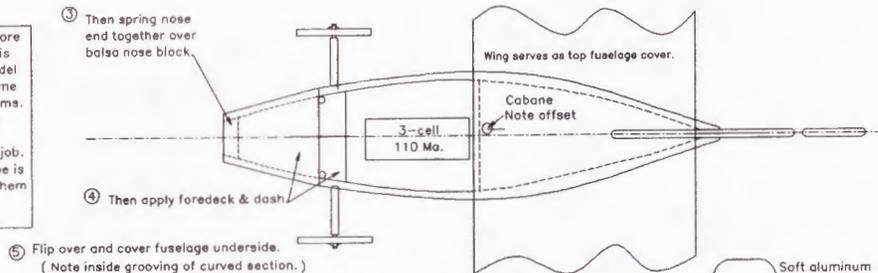
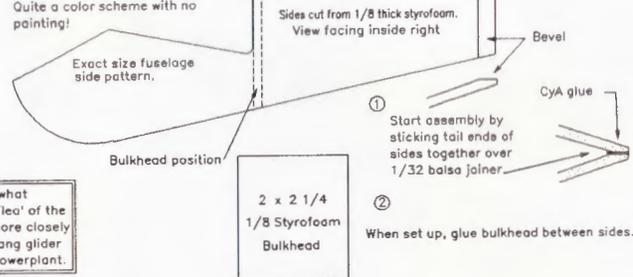
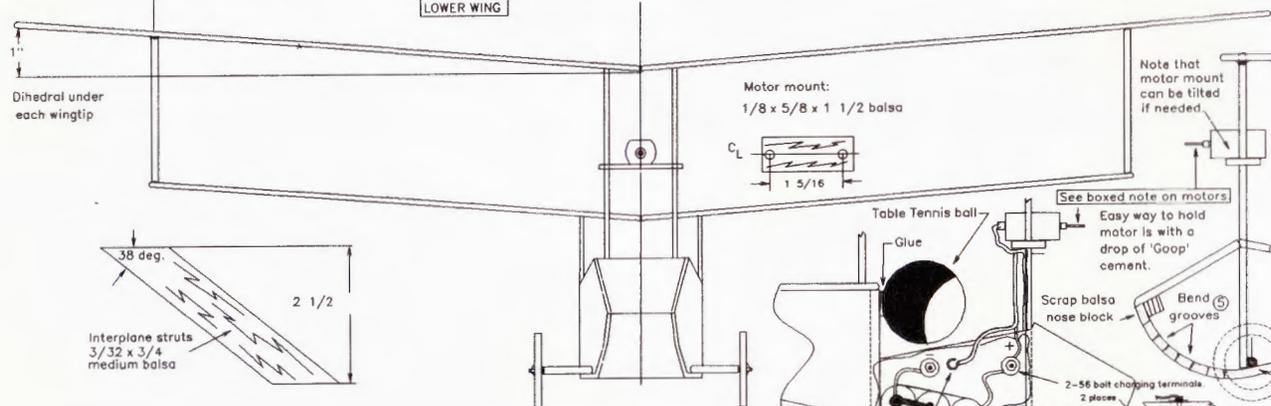
'Flea Flight's' wing section is totally flat except for top-tapered trailing edges and round noses. Cambered wings might give a little more lift, but these flat surfaces prove very stable for a 'tailless' airplane that depends on 'incidence'—the difference in incidence of the two wings to produce a nose-up dive recovery couple.

Despite its more than somewhat resemblance to the 'Flying Flea' of the 30's, 'Flea Flight' is much more closely related to the 'Easy Riser' hang glider which was later fitted with powerplant.

The original 'Flea Flight' used blue trays for fuselage, white for the wings with a yellow rudder tab. Quite a color scheme with no painting!



There must be a dozen or more small motors suitable for this plane. Some are sold as model aircraft powerplants and some are available as 'surplus' items. I like the HiLine Mini Six, but several other firms offer motors that will also do the job. A good cell size for this plane is 110Ma. Use from 2 to 4 of them depending on your motor selection.



**FLYING MODELS**

FLEA-FLIGHT Electric Bipe

DesignCAD 2D drawing by Roy L. Clough, Jr.

Sheet 1 of 1 ORDER PLAN CF

**A**s a power source for small freeflight models it's hard to beat a rubber band. The power to weight ratio is better than anything else. It's cheaper than anything else (except gliders). Its mechanics are easy to understand—you wind it one way and it unwinds the other. If it stops working there are only two things that can be wrong—it's bunched up or it's broken. Only two things can fix it; un-bunch it or replace it. And there is a vast amount of collected experience on its use; there were rubber powered model airplanes before the Wright Brothers learned to fix bicycles.

To put the rubber band to work you need a propeller (catapults and ornithopters are for another time). There are a large variety of inexpensive mass-produced plastic propellers available, and for the most part they work pretty well. However, there are a number of compelling reasons to make your own.

You can make propellers any size or shape you want. You can make them short and fat to clear the floats on a seaplane, or shorter and fatter to make a ducted fan for a jet. You can make them curved to mimic the prop on a WW I fighter or square tipped for a modern turbo-jet. You can make them left handed for counter-rotating twins or right winding pushers. You can make them high pitch or low pitch. And you can make 2, 3, 4, 6 or as many bladed propellers as you want.

You can modify home made propellers in the field. If nose weight or down thrust won't get your model to fly, a smaller propeller will. You can trim a bit at a time off your home made prop with a scissors, or stick a different blade into the hub.

Last, but hardly least: they're fast, easy, and cheap to make. And, I'm going to show you how.

#### Plastic cups

First, to make plastic-cup propellers, you need plastic cups. Originally they were made from yogurt or cottage cheese containers. They still are. I prefer to use the 32-ounce cups from the supermarket deli take-out. They come in clear or white, which you can easily paint or use as is. Some clear cups, notably the ones Chinese restaurants use for take-out soup, are much thicker and brittle and unusable for props.

After my wife tired of buying a ¼ pound of potato salad in a 2-pound cup she offered to buy the cups, and they were glad to oblige her. Eventually she found a wholesaler that catered to small stores and bought a two-foot stack of cups for 6 cents each.



An FM How-to:

*Make your own...*

# Plastic Propellers

By Tony Peters

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Two-blade, three-blade, four-blade, or five, this easy method will give you the prop you want for your freeflight gem.

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ARTWORK & PHOTOGRAPHY BY: TONY PETERS

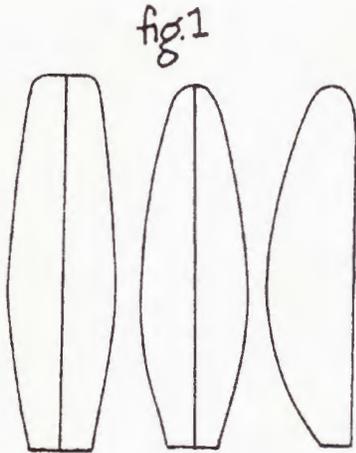
Using this method, you can also design a pusher prop like the four-blade on Tony's Dornier DO-212 (above left). The prop is set up "left-handed" so it can



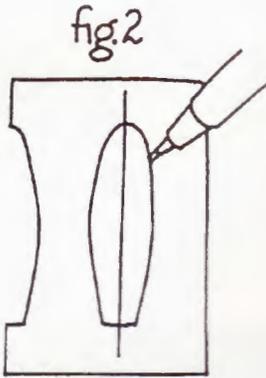
be wound in the usual direction. The hub on variable pitch props can also be simulated, as on this Alexander Eaglerock C-7 *Bullet* (above right).

## Blades

Next you have to make a pattern on light-weight cardboard. I use the back of my old business cards since I seldom make a blade longer than  $3\frac{1}{2}$  inches. The widest part of the blade should be  $\frac{1}{3}$  of the way from the hub, and any shape you like. If you have a picture of the full-sized plane you're modeling, try and make an inflated "cartoon" ver-

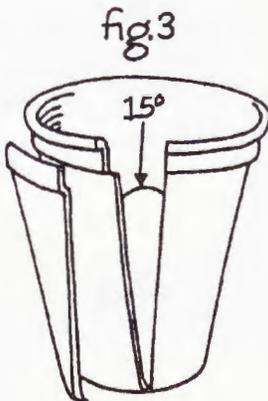


sion of the prop. **Figure 1** shows some common shapes. To make a symmetrical blade, first draw and cut out only half of the blade. Then, on a center line, trace both halves, and cut the complete pattern out (**Figure 2**).



I write the name of the model on the pattern, so I can make a replacement or a new prop for a similar model.

The blade is going to be cut from the cup at a  $15^\circ$  angle (**Figure 3**). To facilitate this,



cut a wedge from the cup that runs from the lip to the base. (If you're going to make a left-handed prop, you'll need a wedge going in the opposite direction.) The ridged lips on all the cups I've ever seen are pretty much the same, and you can use the wedge—lined up with the cup's lip and base—to draw the centerline for the prop on the cup with a *water-based* pen. Now lining up the line on the cup with the center line on the pattern, trace the outline of the pattern onto the cup with a



A clear plastic prop in the radome pulls the plane and is just about unnoticeable when the model is flying. The scale props are dummies, and set to an almost feathered angle to reduce drag.

*permanent* marker (**Figure 4**). The hub of the prop should be at the *bottom* of the cup, which is the thickest part. This makes the hub stronger and concentrates the weight closer to the prop's axis. Cut the prop out, inside the marker lines, with a scissors and clean up the edges with a sandpaper block.

If you're going to spray paint the prop, leave some of the cup at the hub so you can tape it to a piece of cardboard (**Figure 5**). Before you spray the props, wash them with soap and water to remove the center line (that's why you drew it with a *water-based* pen) and any oil from your fingers. You can spray them black, brown for wood, or silver for metal. Masking off the tips will leave them white, and you can add colored stripes with strips of colored tissue stuck on with a *water-based* glue. A spinning prop with white or colored tips looks lovely in the air.

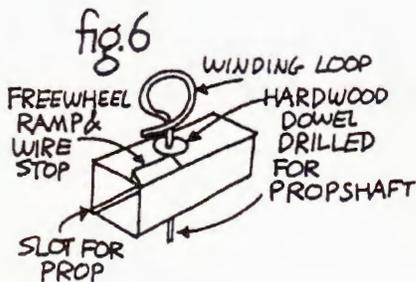


This General *Aristocrat* needs a short fat prop to clear the floats. The clear acetate sub-rudder compensates for the additional side area of the floats.

# F/F Plastic Propellers

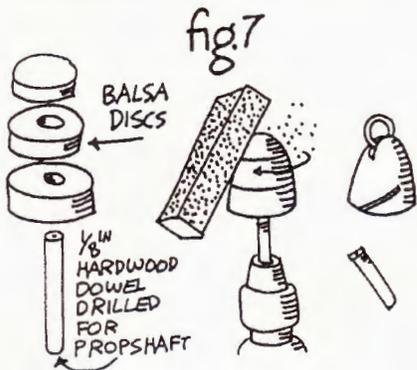
## Hubs

Now we have to attach the prop blades to the model. Making your own propellers allows you to mimic the wide variety of hubs that are used on full-sized airplanes. From everything I've read and heard, the jury is still out on the advantages of free-wheeling props for small scale models, and they are certainly unnecessary indoors. So, beyond a simple ramp where it's convenient, I don't bother with them. If you enjoy fiddling with that sort of thing see Don Ross's "Rubber Powered Model Airplanes" Chapter 9. (If you don't have it, *FM* will sell it to you. See page 76 for the Book Hangar ad.)



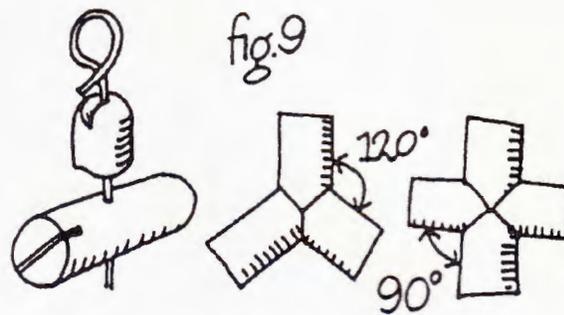
**Figure 6** shows the simplest hub, which I use on "propless" (like jets) models with clear plastic blades.

To make a spinner I assemble a stack of balsa discs on an 1/8-inch dowel drilled to ac-



commodate the prop shaft (**Figure 7**). You could use a metal or plastic tube. After sanding to shape, cut off the excess dowel, cut a slot for the winding hook, and slots for the prop blades.

**Figure 8** shows a hub for a simple prop, a wooden one or an early metal prop without



pitch control, cut from a hardwood dowel.

Hubs for "controlled pitch" propellers (**Figure 9**) can be made from dowels of various sizes, to be chosen on the TLAR (That Looks About Right) principal. For a two-bladed prop, the prop end and hub are drilled as shown. The top of the hub is notched for free-wheeling and the base is sanded concave and glued to the prop end using the wire prop shaft to align the two parts. For multiple blades the prop ends are sawed or sanded to the proper angle (120 degrees for three blades, 90 degrees for four) and the hub is added at the junction.

## Pitch

Adjustable pitch props aren't difficult to make with plastic blades. However, a prop that is easily and subtly adjustable is very likely to become easily and subtly *unadjusted*, and little by little your model flies worse and worse. Who needs it? However, if you want to try it, Chapter 8 of Don's book will tell you how to make adjustable pitch props. The same chapter will tell you how to determine the *exact* proper pitch for your prop.

I usually set the pitch of my props at 35° or 40° at the hub: 35 degrees for smaller props and 40 degrees for bigger ones. Occasionally I change the pitch by cutting new slots in the hub, usually as a last resort when I'm reducing the size of the blade. I have

tried any number of fixtures for placing and cutting the slots in the hub, and looked at many more. None of them are simple to make, flexible, and easy to use. (If you have designed a better mousetrap, please share it with us.) I use either of two methods.

For spinners, I cut a wedge of masking tape on a protractor and use the tape to



mark off the angle on the hub (**Figure 10**). For a two-bladed prop, line up the tape with a line drawn through the prop shaft hole. For a multi-blade prop, draw three or four lines on a piece of paper, center the hub on the intersection of the lines with a pin through the prop shaft hole, and mark the hub as in **Figure 11**.

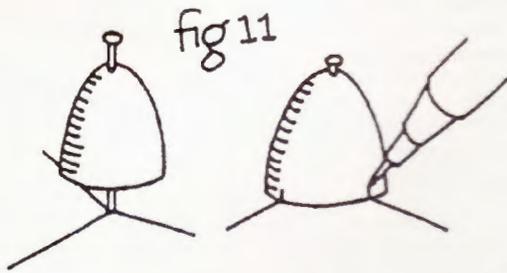
For "metal" propellers, I pin the hub



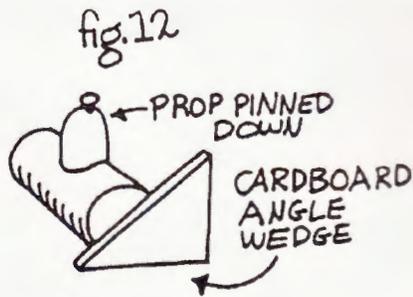
Plastic props can be doctored with paint to make them look more scale as with this Farman F-370. The spinners on these models are made from balsa, that is chucked in a drill, and sanded to shape.



Nice thing about this method is that blades like those on this WW I Albatros B-II can be cut to a scale type outline.



down—make certain that the pin is at right angles to the work surface—and use a cardboard wedge to mark the angle (Figure 12). The line must pass through the center of the



hub. I've made a simple device to find the center of a dowel. It's a small plastic triangle with a triangle cut out of the center. I've taped a piece of plastic bisecting the inner triangle on the top (Figure 13). With the dowel under the plastic and against the inner triangle, draw two lines in two different

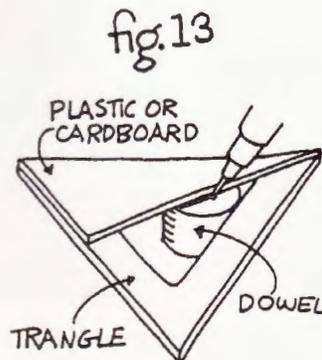
directions. The lines will meet at the center of the dowel. Cut the slots with a fine saw or, for the balsa hubs, a razor. Try and get the cuts straight, aiming at the prop shaft. After 15 or so years of making my own props, I've gotten pretty good at it, but I don't always get it right. Even if the blades aren't perfectly in line, the prop will probably work okay, and you'll do it better next time.

#### Finally

I don't permanently glue the blades to the hubs. I like to be able to get them out to change them (by now I have an enormous collection of blades in my flight kit to try out), or to replace them if they tear or bend. Indoor flying isn't for sissies! Roughen the ends of the blades with sandpaper and glue them into the hubs with thick

white glue. It takes a little while for the glue to dry, but you brought more than one model, didn't you? And with your handy-dandy home made props you have all sorts of fancy propellers to pull (or push) them through the air.

Keep 'em flying...



Here's the P5M-1 Marlin in flight. Note the functional prop with the clear plastic blades is unnoticeable, while the dummy scale props are clearly visible and spinning.

# Fan Facts

By Ivan Munninghoff

Since this issue of *FM* should be hitting the stands in early November, there's still time for you to make plans to attend the tenth anniversary of the Arizona Jet Rally. As I said last month, this event draws jet guys from California to Colorado to Texas and the excellent facilities make flying any sort of jet a pleasure. This year's event promises to be not only longer (November 20 through 22), but there will also be a special period set aside for electric jets—each morning from 0700 to 0900 they'll be the only ones allowed to fly. Noise problems, you know! And of course the electron-burners will be allowed to fly the rest of the day as well. I already know nearly a dozen EDFs are planning to be there.

## Charging ahead

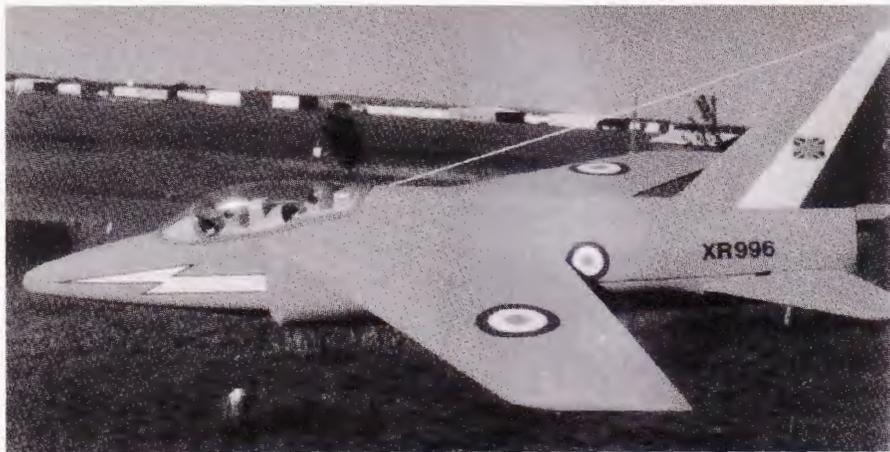
I've been pushing the issue of electric jets (EDFs) over the past year, and for those of you who have maintained an interest in this new and rapidly expanding portion of our hobby, you'll be glad to hear that the January issue of your favorite airplane magazine (no, *this* one, *FLYING MODELS*, silly!) will be a special edition emphasizing electric jets. Stand by!

As a sneak preview of what's going to be in that issue, I've included a photo of my Robbe *Gnat*, which has already flown (and very well, too!) and will be a major kit review/bash in that issue. There'll be an article or two on the excellent Kyosho T-33, as well. And who knows what other pearls might be in there. So, EDF fans, prepare to enjoy.

## Electric Turbax

Robert Wagoner of Tucson, Ariz., has found a way to put a big Aveox motor in one of Jet Hangar Hobbies' Turbax I fan units. On twenty-one cells, the five-inch fan turns almost 22,000 rpm, which is very close to the performance with a glow engine. The system is currently flying, and Bob Ruff, one of the lucky folks to have flown it, says it burns up the sky.

On the other end of the spectrum, Robert



PHOTOGRAPHY: IVAN MUNNINGHOFF

**A new EDF Fan!** Our author's successful Robbe FO141 *Gnat* has logged time aloft. Features all molded, modular foam construction. Kit includes detailed instructions, plus a stock fan and motor. Flies on three channels.

has also found a tiny fan (less than two inches in diameter) that'll generate six ounces of thrust on a Speed 300 motor. Indoor R/C jets are just around the corner.

Robert is also the proud owner (and distributor) of a really cool *Rafale*. It's designed around two of the small but potent WeMoTec Minifan 480's. I have not personally seen one fly, but I'd guess the performance will be excellent with two of these little fans screaming.

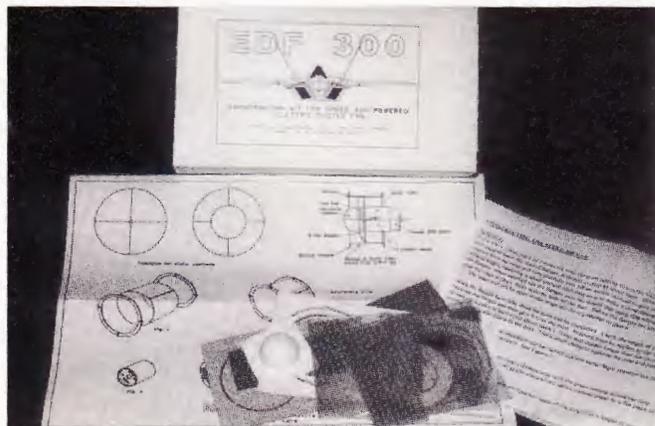
Robert's projects (and there's a *bunch* of 'em) can be seen at [www.ejets.com](http://www.ejets.com).

## On-line jet stuff

One of the reasons folks read model magazines and jet stuff in particular, is that they want to know more. Knowledge is power, they say, and a fan enthusiast can never know too much about the intricacies of our great hobby. Therefore, it's time to pass on some worthwhile advice. I've mentioned this before, but it's worth repeating.

Everybody knows the Internet is a veritable gold-mine of information on lots of subjects, and about the best place I've found for information regarding R/C jets is one called, cleverly enough, *rc-jets*. It's a "list," which means that you subscribe to it (by simply sending an e-mail to [rc-jets-on@lists.kid-source.com](mailto:rc-jets-on@lists.kid-source.com)), and the system will hook you up and send you a copy of the guidelines), and then you're in constant touch with a couple of hundred kindred spirits, some of whom know a *lot* about jets. The current main discussion topic has to do with trying to get good performance out of a smaller fan system (like about four inches) and what that fan's design ought to be. It's fun, and it's informative. Of course, like any forum, there's useless stuff there, too, but there's good stuff for everyone.

I know of no sites or lists specifically oriented to electric jets, but there is one list that caters only to electric airplanes and which contains quite a bit of useful EDF in-



PHOTOS: ROBERT WAGONER

**Robert Wagoner, of the Electric Jet Factory,** is introducing many pioneering efforts in the EDF realm. One of his products is this ducted fan unit designed for a Speed



300 (above left). On twenty-one cells, Mr. Wagoner has found a way to get 22,000 rpm out of a JHH Turbax 1 fan unit (above right) powered with an Aveox motor



**Old adversaries!** The F-86E *Sabre* Jet (**above left**) gave the performance edge in speed and performance that aces in the Korean conflict were looking for in order to



compete against their foe flying MiG-15s. You can tell this MiG-17 (**above right**) apart from a MiG-15 because the "17" has three wing fences, over the "15's" two.

formation. That's the E Zone, run by Jim Bourke in Dallas. You can go to their web site, [www.ezonemag.com](http://www.ezonemag.com), for instructions on how to get on the list. Again, there's lots of good information there.

### Small fans

One of the current hot topics on the rc-jets list described above is the issue of high-performance small-diameter fans. There's a lot of discussion about how the new K&B .48 DF engine is going to work. Larry Wolfe, of Jet Hangar Hobbies, has a prototype, and he says that he's getting nearly two thousand more rpm out of it than out of the standard K&B 7.5 in the same Turbax I setup. That's the equivalent of almost two more pounds of thrust! If the new .48 is willing to tolerate even higher rpm, perhaps a shortened fan (Turbax, Dynamax, BVM, or other) might actually put out yet even more thrust and be able to do it a smaller airframe. The consensus on the list is that .91-engine performance should be available in the smaller planes with the smaller stuff.

### Cavanaugh jets

Speaking of Dallas, I had the opportunity to visit the Cavanaugh Flight Museum there. They're on the Addison Airport (4572 Claire Chennault, Dallas, TX 75248, 972-380-8800). This is a neat little museum (a few more than thirty airplanes), but all the planes are in great shape and well presented in a clean and well-lighted facility.

They've got ten jets (an F9F-2B *Panther*, an F-86E *Sabre* Jet, an F-104A *Starfighter*, an F-4C *Phantom II*, an F-105 *Thunderchief* (parked outside), a MiG-21 *Mongol*, two MiG-17s, a MiG-15 UTI, and a TS-11 *Iskra*). Some of these are not the typical jets you see every day, and you can get close enough to them that you can get some pretty good detail pictures, should you be considering modeling one of them.

The museum's lobby also has a better-than-average collection of aviation reference books, so you might find that hard-to-get scale documentation there. I'd recommend a visit to Cavanaugh Flight Museum, if you

happen to be in the Dallas area. Enjoy the pictures.

### Soapbox

Do not relax your vigilance concerning what tricks the AMA might have up its sleeve regarding all sorts of jet issues. You never know....

### Wrap-up

I'm not so proud that I'm unwilling to beg for input to this column. One of these days, faithful readers, you're going to tire of reading about my exploits, and you're going to want more. And one of these days, I'm going to run out of exploits to report. To forestall either of these events, I will repeat my request for tidbits of information from you to include in this column. Even a picture of your latest jet would be appreciated. Good grief—didn't your mother ever tell you to share?

To shamelessly steal a phrase I found on the net—may all your jets avoid "spontaneous disassembly." **CC**



**Jets worth modeling!** The hangar queens get to hide indoors at the Cavanaugh Air and Space Museum. This cherry MiG-15 UTI (**above left**) sits real close to the ground. A model of this, or of the TS-11 *Iskra* (**above right**) would make good



grass field flyers with short rugged retracts. Outside Cavanaugh, what a monster. The F-105 *Thunderchief* (**below left**) had lots of guts in the Vietnam era. The little F-104A *Starfighter* (**below right**) didn't see much action, but she sure did move.



# Electric Flight

By Don Belfort



PHOTOGRAPHY: DON BELFORT

Walt Bub and Bill Griggs prepare to launch Walt's MiG-15 EDF (above left). The prototype launcher uses four bungee cord strands and pulleys to catapult the ship



to light (flying) speed. Chris True's MiG-15 (above right) gets flight times over three minutes. Modified Offshore Electronics plans; WeMoTec 480 and Astro 035.

Since I won't have the chance to wish you Happy Holidays next month, let me do that now. The best to all of you. This installment will be my seventh, which in the bi-monthly game, is the start of my second year. I thank everyone for their contributions and ask you to keep them coming.

**Safety note:** The use of a cooler to help cool down a battery pack is not new, but use a cooler without any conductive objects inside. I recently experienced a situation where an exposed strap-soldered seven-cell pack lay on top of a soda can in a cooler. A shorted pack could ignite a car or camper on fire in an instant.

## New project

I always like to have some type of project going for those rainy days when suddenly time avails itself. Gus Morfis Plans (4709 Green Meadows Avenue, Torrance, CA 90505-5507) has the *Batty*, an Me-163 look-a-like. I chose it as a chance to try the elevon feature of my transmitter. This is a very quick building design which would be a good, first scratch-building project for those experienced with fast aileron and elevator ships.

Mine has been hand launched but a bungee hook was installed from the start for reliable and fun launching. Some of you may have seen its drop-off undercarriage which has worked all but one time. Locating it at the c.g. made the flight survivable (at Mid-America). Lastly, with the CD's permission, a 15-second smoke bomb lights off as the bungee does its thing.

Flight speed is high, rolls are fast and loops big but she slows down for landings. I know I'm always making Speed 400 projects but this design could easily be scaled up to something big that would darken the sky. The vitals on my version are: wing span 28¾ inches, wing area 179 square inches, weight 16.5 ounces, 6-volt Speed 400 on 7-cell 500 AR's spinning an APC 5-5.

## Mid-America Electric Fly

It happened July 11 and 12. Mother Nature smiled down on the CDs, Keith Shaw and Ken Myers, for a perfect weekend of E-flying at the spacious facilities provided by the Midwest R/C Society. This year's registration swelled to over 80 pilots with vendors-o-plenty ready to outfit you for your next project. The biggest limiting factor for the pilots was a five plane maximum in the air at one time.

The skies were filled day and night. Awards were given for a wide variety of models ranging from most beautiful to best jet. The only requirement for the competition was to complete a flight. Chris True continues to pursue EDF models with his scratchbuilt MiG-15, which is bungee launched and was flown many times over the weekend. Keith Shaw and Dave Griffe

performed demo flights at lunch break with each of their new giant scale WW I projects completing flawless flights. It was interesting to note how quiet Keith's Fokker D-VIII was running the new Max Cim one-quarter scale brushless motor turning a 26-16 prop direct drive.

As the formal flying for the day ended, the traditional pot luck picnic began with plenty of good food. The winds became still, and slow fliers and F/F models took to the air. When the sun went down, the lights and glow sticks came on. The night sky was filled with models past 11:00 p.m. A gas .60 powered helicopter, totally light equipped including the rotor, gave a 3-D acrobatic demo by Howard Kendall in total darkness. Telling you this guy is good would not be doing him justice—he was incredible.



David Elias of Jupiter, Florida was the man to beat this year at the Nats. His flap-equipped Foote *Westerner 750* is powered by an Aveox Flo competition motor, geared 3.7 to 1, drawing 65 amps on zapped cells.

It was my all-time longest flying outing and a great time. Sunday's weather was a picture perfect repeat of Saturday. All fliers, both novice and expert, followed the safety rules perfectly and it was commented about how few mishaps occurred. Over upcoming issues we will bring you photos of many of the models.

### Voltaire's Fun Fly

Voltaires of Central New York 11th Annual Electric Fun Fly took place July 18 and 19. This had been my home club before I transferred to Ohio. Lucky for me my wife's family is still living in town, which makes the 600-mile trip possible.

The meet is hosted by the Grenadiers Flying Club and includes both paved and close mowed grass runways with above average air space. The meet events were both demanding and fun. Going one-on-one with other fliers for most loops or rolls can teach you how to fine-tune a model to a specific task by changing your prop or battery. For those less adventurous, the chicken event may be for you. Trim your plane for an orbiting flight path and put down the transmitter until you have to take it back; longest hands-off time wins. Winds kept chicken flights in the 2-5 minute range.

Demos on cell soldering and pylon racing were conducted. About 75% of the aircraft were larger than Speed 400, with large, brushless equipped scale models filling the sky. I'm always opened to new launch methods and Walt Bub's launch rail system successfully launched his MiG-15 and Tony Fiore's T-33 from Kyosho.

Lunch was provided both days and ice water was available free all weekend. Over the years the Voltaires have put on a very good fun fly, but this year it should be noted how many Voltaires flew and competed in events with many new projects being successfully flown.

### E-Nats

If you want competition, this is it. No throwaway rounds, just three flights per event and the competition is fierce with many places being decided by a point. It all happened August 2-4. *Model Aviation* will have a complete list of the standings.

If you're planning to get involved with this type of competition, the sailplane event seems to need brushless power while O.T. can get by with a light weight design and a hot cobalt motor. This year's O.T. event had some new ideas put to work. David Elias of Jupiter, Florida decided to add flaps to his Foote *Westerner*. This gave him the spot landing bonus most of the time. His ship was brushless powered which never left him low on altitude.

Dave is meticulous on the care and handling of his equipment, which adds to the repeatability of his performances, something we should all try to follow. Dave received the Grand Champion award for his efforts.

Speed 400 pylon had nine entrants, which was up from last year. It was conducted after the second day's flying was over, led by Tom Hunt. Most aircraft were *Switchblades* or *Skats* with pilot skill being more of a factor than the plane. This year, races were close with planes changing the lead in many races. Pilots were pushed to the edge and beyond. I never flew so low.

A thank you to all who helped run this



**Gus Morfis Plans' Batty** is a great "stand way off scale" project good for the first time scratch builder who can handle a fast ship. Note the smoke bomb fuse at rear. Launched via bungee, the gear is designed to drop away.

event where each racer needs three support persons. We were there past 8:00 p.m.

Speed 400 scale: there were six competitors in this new Demo event. It should be noted that 50-60 spectators made the early morning event to catch some stills and video. Yes, I did fly the BV-141 twice, including loops. 1/2A sailplane and Texaco O.T. concluded the Nats in fairly breezy weather. A big thank you to all who made the E-Nats happen, NEAC and AMA. I wish the best of luck to the new president and treasurer of NEAC: Ralph Weaver and Glenn Poole, two great people who will do a great job.

### Watts new

APC Products, 1222 Harter Ave., Woodland, CA, 95776, 408-654-9227, has Speed 400 pylon props in sizes 4.75-4.75, 5-5, 5.5-4.5. They fit the Graupner spinner/prop hub without modification. The weight and amp draw of the 5-5 is almost identical to the Graupner 5-5 with excellent performance in my *Skat*. APC has also released a line of slow flyer props sizes 8-11-inch diameter with pitch sizes 3.8-4.7. These are super light weight and may offer improved performance over gas props which you may be using on geared Speed 400's and smaller set ups.

I tried the 9-4.7 (9.5 g) instead of an APC 8-6 gas prop (18 g) which I normally use. The amp draws were very close together at 7.8 amps each, but performance with the 9-4.7 slow flyer yielded longer flights and rock steady landings and take-offs. This test was done on a 7.2 volt Speed 400 mated to a Graupner 2.33:1 gear drive on a 7-cell 500 AR pack. The best news of all? The above mentioned APC electric props go for \$3.98 each list, which makes experimenting very reasonable. Fred Burgdorf of APC welcomes comments and suggestions which you may have after using these new products.

A word of caution: whenever changing prop size or pitch, please use an amp meter to verify that you are staying within the motor's operating range.

Great Planes Kyosho T-33: current street price \$159.99. I mentioned last time this model was seen at Toledo but there was a lack of information available at that time.

Heather Rose of Great Planes made good on her promise to send the rundown on the *Shooting Star*.

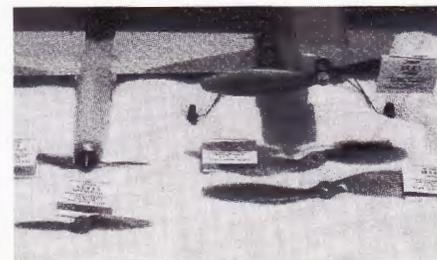
Specifications: wingspan, 46 in. (1170 mm); wing area, 302 sq. in. (19.5 sq dm); total weight, 2.3 lb. (1040 g); wing loading, 17.6 oz./sq. ft. (54 g/sq dm); fuselage length, 35 in. (890 mm); includes: LeMans AP29L motor, ducted fan unit. Requires: 3-channel radio w/mini servos, small Rx, Ni-Cd, speed control w/30A (min) capacity, 8.4-9.6V, 1700 mAh Ni-Cd battery and charger.

Any flier with a few ARFs under his belt, and who is intrigued by the excitement of ducted fan flight, will enjoy the ease of assembly and stable flight of the T-33 *Shooting Star*. Electric power makes this plane easier to handle and less expensive than glow engine-powered ducted fan models.

The tough, light styrene foam wings and fuse arrive virtually prebuilt, with a special smoothing process that enhances their appearance. The wings also feature a durable plastic coating.

Dummy wingtip tanks and "Thunderbird" decals help to capture the look of the USAF's original T-33 (note: tanks should be removed before flight). This kit cuts customer costs by including a motor and a ducted fan unit. Both are also available separately. Light wing loadings and a Clark Y airfoil deliver smooth, stable flight, without the need for a high-start or catapult for launching.

Fly safely, Don Belfort, 8250 Twin Cove Ct., West Chester, OH 45069.



**APC Pylon and Slow flyer props.** Many sizes for Speed 400 and smaller setups. All list for \$3.98 each. These props are usually found to be more efficient than glow props. RPM's and current draw are about the same, but flight performance is much improved.

# CrossFiles

Notes from the workshop

By Don Ross

**F**irst on the agenda this month is Peck Polymer's new catalog. Most of you know Peck's fine Peanut scale kits. My own Andreason BA4-B has survived about ten years of banging into walls and ceilings in a variety of indoor sites. It still does 30 seconds of knife edge turns off an ROG. Sandy Peck has considerably expanded her line to include just about anything the small scale or sport modeler needs to complete a project—kits from West Wings, Aerographics, R/N and others, CO<sub>2</sub> and electric motors as well as tools, materials and plans.

The *Rocket Boy* is Peck's own 14-inch span design for Jet-X. It's an all-sheet, simple glider that can be flown catapult as well. With 51 pages and hundreds of items, you won't go wrong sending \$4.00 to: Peck Polymers, P.O. Box 710399, Santee, CA 92072.

Jake Larson writes that 56 years ago he built five or six Comet *Phantom Flash* models and none flew. Now he has returned to the scene and built the *Flash* at 16-inch span and the *Firefly* at 25 inches. This time he dry covered and did not shrink the tissue, thus avoiding warps. Both planes flew "right off the board" making Jake a very happy camper. The *Flash* is \$9.98 and the *Firefly*

is \$14.98, both with \$4.50 S&H from Campbells Custom Kits, 7233 Signature Lane, San Antonio, TX. 78263. Send Lee \$2.00 for a complete catalog.

I'm going to write a bit more about indoor flying in future columns and Michael Morrow's line of plans is a good place to start. Mike has developed a series of more than 35 No-Cal plans including many WW II and Golden Age racers. These are very light models that utilize rolled tube motor sticks and light construction to stay in the 4-5 gram range. Many can exceed 3-minute flights if built carefully. His P-39Q unlimited racer has done 5:58 at the Kibbie Dome. Mike also offers sets of "you-paint-em" and full color decal sheets to really enhance scale appearance. He carries Peanut plans, scale drawings and materials. Send \$2.00 to Michael Morrow, 1327 44th Ave SW, Seattle, WA 98116.

The old Megow *Pirate* is our report for this month. No kit available but plans for the *Pirate* (cabin) and the *Prowler* (stick) available from Aerodyne, 1924 East Edinger, Santa Ana, CA 92705. Plan #146 @ \$5.00 + \$2.00 S&H. The *Pirate* is a neat, twin tailed, single wheel, 31-inch span sport model. Easy to build with sheet balsa fuselage sides, con-



PHOTO: A.A. LOBERG

Al Lidberg continues to produce some small, nifty Old Timer kits. His latest, the *Viking* kit, is a sure winner for any of you nostalgia buffs who want to get into small electric R/C.

stant chord wing and stab, sheet rudders and flat bottomed airfoil.

The original plan calls for the stab to be slung under the fuselage but this makes a DT hard to install. Just cut the fuselage sides to accommodate a top stab and eliminate the cutout on the bottom. Make sure the stab bottom is parallel to the thrust line when cutting. The model weighs 85 grams



PHOTO: COURTESY PECK POLYMER

Peck Polymer's *Rocket Boy* (above left) brings back memories of squadrons of Jet-X models zipping skyward. Jake Larson's *Phantom Flash* and *Firefly* from Campbell (above right) are a cinch for rubber to electric conversion using a rub-

PHOTO: MIKE MORROW

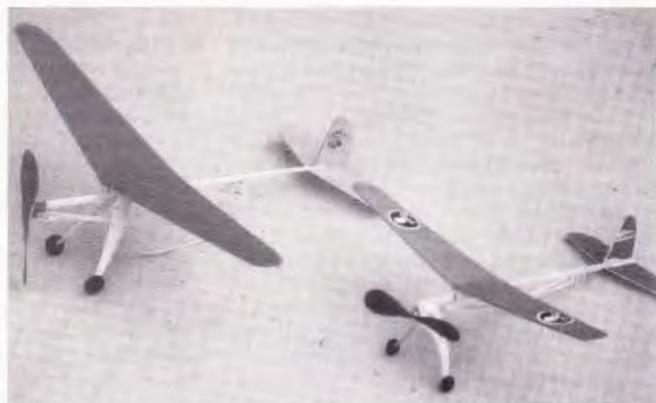


PHOTO: JAKE LARSON

ber band transmission. The appearance of Mike Morrow's P-39Q (below left) certainly improves a lot with panel lines and tail ID. Just switch fuselages to change the *Pirate* (below right) from cabin to stick. Note all the lightening holes.

PHOTO: DON ROSS



including 25 grams of rubber (eight strands of  $\frac{3}{32} \times 26$  inches long) and a Superior 12-15 free wheel prop. It will probably fly even better with a folder. Covered with tissue with the c.g. about  $\frac{1}{3}$  chord and a bit of down and right thrust, this one flies right off the board. Rich Gorman has lost his twice OOS so far.

Remember the Jack Armstrong card models that appeared during the 30s and 40s? Phil Koopman has greatly improved on the idea. He offers beautiful CAD designed WW II flying models in full color in both "Dime Weight" (comes from the nose weight needed) at about 8-inch span and Micro Models at 5-inch span. These are "cut and fold" and include the P-40, *Dauntless*, Japanese Aichi Val and the Nakajima besides the *Zero* and *Hellcat* shown.

He also has monochrome sets of the well known "Rigby" series from the same era. Most of these models actually fly and the interesting thing for you computer buffs is that you can download a sample from Phil's Web site. If you like the sample and order the full book, Phil will send you a code that will unlock the pages for downloading. What won't they think of next?

For us retreads, SASE to Phil at: Phil Koop-



PHOTO: MATT MCCARTHY

Look at that crisp graphic detail on Leo McCarthy's Pitts Special. He uses a mix of photo copy and ink jet printing on tissue to get it so precise. Really adds a lot of pizzazz to the models.

man, 2805 Hunt Club Lane, Orlando, FL 32826, for a price list. His web page is: <http://users.aol.com/pkaeronaut/pkaero.html>.

Next month Leo McCarthy will report on his Herr Pitts Special with lots of scale details. Leo uses a mixture of direct photocopying on tissue for the B&W stuff and drawn, colored, copied, cut and glued for the multi colored company logos and such.

Jake Larson sends us a pic of the bare bones Rich MacEntee's 54-inch span Taylor-

craft. Weight is 72 grams with Trexler wheels. Looks like it's going to be a real floater at that weight. I'll have a pic of the finished model in next month's column.

While at Geneseo for the FAC Nats, I stopped by at the Golden Age display. They are still putting out very light scale kits of many favorites. The bare bones Me-109 shown illustrates their "Engineered for Flight" philosophy. Spans of their 33 kits range from 18 to 30 inches and they have



PHOTO: DON ROSS

Phil Koopman's paper *Zero* and *Hellcat* (above left) come from CAD layouts, far superior to the old cereal carton models. Ken Bassett's RS2 (above right) has been scaled up slightly from the *FM* plan to accommodate electric power. The

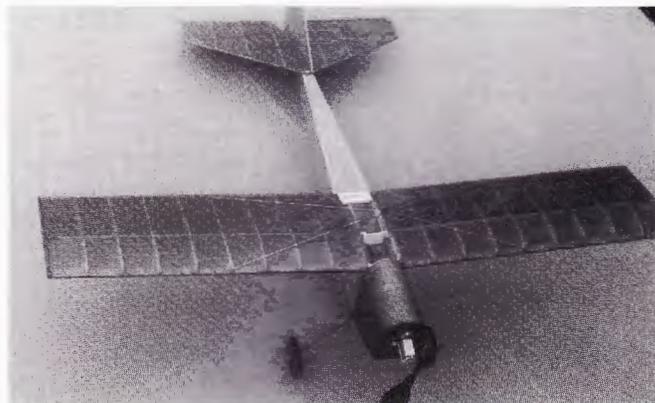


PHOTO: KEN BASSETT

bare bones of Rich MacEntee's 54-inch Taylorcraft (below left) show the skill level of a real craftsman. The Golden Age Me-109 (below right) is a sure flyer with generous dihedral and stab area. Light wood will make flight trim easy.

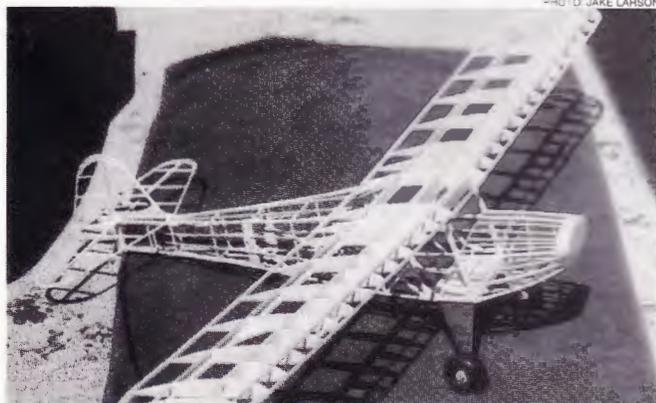


PHOTO: JAKE LARSON



PHOTO: JIM FIORELLO

## Cross Files

many rare ones. If you are looking for a Vickers Supermarine Schneider Cup racer on floats or a Lockheed Vega, they have a plan or kit. Their catalog shows pictures of each model to help you choose. Send \$3.00 to Jim Fiorello at P.O. Box 1685, Andover, MA 01810.

Our Maestro of Miniatures, Ken Bassett of Micro Flight, has Air Hog compressed air motor kits at \$32 + \$3.95 S&H. The kit includes motor and tank, sheet foam model and pump ready to fly. The motor and tank detach easily for mounting on your own model. Ken's RS2, blown up to 19 inches from an FM plan, uses the KP00 from K&P which Ken also handles along with winders, adjustable nose buttons and his own line of Kenway motors and accessories. Send an SASE to Micro Flight, P.O. Box 889, Hackensack, NJ 07840 for Ken's catalog.

I'm sure there are some of you out there who remember twin pushers. Loren Dietrich is shown winding his Don Burnham design with a special stogie he designed for that purpose. This design won a national contest in 1930. Loren has also been reducing some classic rubber flyers like the Earl Stahl *Hi Climber* to 24-inch span for backyard flying. He reports that these are perfect for those twilight sessions in the backyard. Models this size are good candidates for conversion to electric power with a Kenway or KP00 motor. On two or three cells of 50 mAh capacity, they will circle overhead for about a minute and land almost at your feet.

Al Lidberg has considerably expanded his line of fine flying, scaled-down OT kits including favorites like the *Buzzard Bomb-*



PHOTO: LOREN DIETRICH

An "A"-frame twin pusher model like Loren Dietrich's goes back to the beginning of model aviation. He is winding both motors at the same time with a modified egg beater and his special stogie.

shell and *Brooklyn Dodger*. All are 19-23 inch span with both mini sets and full kits for CO<sub>2</sub>, rubber or electric power. Al sells three kits in a set, \$21.00 PP for a semi set and \$35.00 PP for a full kit set. He has just

added the scaled down OT Cleveland *Viking* for FAC electric replica. The *Viking* has a 29.8 inch span and can be flown with a Hi-Line Mini-6, VL HY-70 or 120 size CO<sub>2</sub> motor. It is \$24.00 PP and, Al says is easy to trim and can reach 250-300 feet on a 60-second climb. Send \$2.00 to Al at A.A. Lidberg Plan Service, 1008 E. Baseline, Suite 1074, Tempe, AZ 85283 or check his website catalog at <http://members.aol.com/aalmps>

Bill Northrup, former *Model Builder* magazine publisher sent me his listing of more than 800 full size plans from the magazine, most with article reprints. The 20-page price list is \$2.00 PP. For \$5.00 you can get an illustrated catalog and another \$2.00 will bring Bill's "Scratch Builders Almanac" with more plans for planes and boats. This is worth it just for the nostalgic read. Bill Northrup's Plan Service, 2019 Doral Court, Henderson, NV 89014.

Another swell collection of plans, pics and stories has just arrived from Bill Hannan. His new, Volume 2, *International Models & Modelers* is 26 pages of plans and 3-views of some favorite oldies like the Velie *Mono-coupe* and the Miles M-18 or the Dornier Libelle 1 *Flying Boat* (a great small electric F/F project). At \$10.95 + \$2.50 P&H this is a good deal. Send a buck to Bill at Hannan's Runway, Box 210, Magalia, CA. 95954 for his complete catalog.

Tony's tip this month is a big help for anyone building a golden age cowling with those great rocker arm bumps. His technique will allow you to make the bumps to exact scale by just choosing the right size strip. Use  $\frac{1}{16} \times \frac{1}{8}$  for peanut scale and  $\frac{3}{32} \times \frac{3}{16}$  for 24-30 inch span.

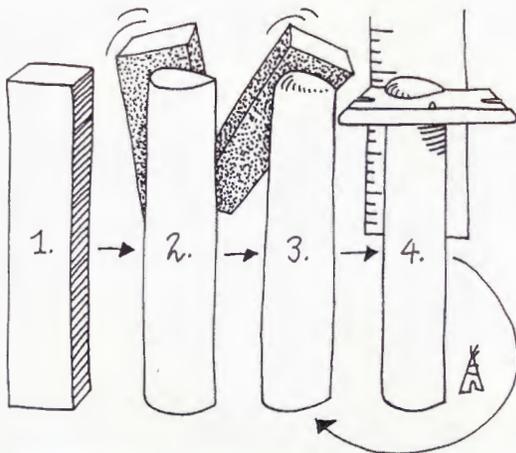
Rumor has it that a certain sun belt retirement community much frequented by model flyers is considering changing its name to Viagra Falls.

ARTWORK: ANTONY PETERS

## TONY'S TIPS

### Mass Production Cowl Bumps (or air scoops, or gun breech blisters...)

1. Cut a strip of balsa the width and thickness of the plan view of the cowl bump.
2. Sand the strip to the plan view shape.
3. Round the top.
4. Cut off the finished bump. Go to step 3.



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Length: 59.5" Weight: 12-13lbs Control: Min 4

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Scale: 1:8 Engine: 4x25 (2st) Wing Span: 104"  
Length: 68" Weight: 13lbs Control: Min 4



**HELLCAT**  
Span: 51" Weight: 5-5.5lbs  
Length: 39" Engine: 40 (2st)



**ZERO SEN**  
Span: 60" Weight: 5-5.5lbs  
Length: 43" Engine: 40 (2st)



**HURRICANE**  
Span: 57" Weight: 5-6.5lbs  
Length: 42.5" Engine: 40 (2st)



**FOCK-WULF FW190**  
Span: 56" Weight: 5-5.5lbs  
Length: 43" Engine: 40 (2st)



**MESSERSCHMITT Bf109**  
Span: 56" Weight: 5-5.5lbs  
Length: 42" Engine: 40 (2st)



**HAWKER SEA FURY**  
Span: 52" Weight: 5-5.5lbs  
Length: 43" Engine: 40 (2st)



**SPITFIRE MK IX**  
Span: 56" Weight: 5-5.5lbs  
Length: 43" Engine: 40 (2st)



**STUKA**  
Span: 60" Weight: 5-5.5lbs  
Length: 46" Engine: 40 (2st)



**MESSERSCHMITT Bf110**  
Span: 71" Weight: 8-8.5lbs  
Length: 58" Engine: 2x30-45 (2st)



**BEARCAT**  
Span: 52" Weight: 5-5.5lbs  
Length: 38" Engine: 40 (2st)



**CORSAIR F4U-1**  
Span: 52.5" Weight: 5-5.5lbs  
Length: 41.5" Engine: 40 (2st)



**B25 MITCHELL**  
Span: 71" Weight: 8-8.5lbs  
Length: 54" Engine: 2x30-45 (2st)



**MOSQUITO T111**  
Span: 71" Weight: 8-8.5lbs  
Length: 58" Engine: 2x40 (2st)



**HARVARD**  
Span: 56" Weight: 5.5lbs  
Length: 43" Engine: 40 (2st)



**VULTEE VALIANT BT-13**  
Span: 60" Weight: 5-5.5lbs  
Length: 48.5" Engine: 40 (2st)



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Length: 48.5" Engine: 40 (2st)



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Length: 41.5" Engine: 40 (2st)

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LANIER RC'S

# LASER 200

*With this deadline fast approaching, and the kit still unbuilt, FM asked Vic Macaluso to work the magic of his quick building skills and put this Laser together. Vic obliged, and when done turned it over to Frank Fanelli to set it up and fly it. Here are Vic's comments.*

**L**anier's 1/4 scale Laser 200 is definitely not a new kid on the block. It and its bigger 1/3 scale sibling have been around for years, now one of the few Laser kit offerings still available. Once upon a time Laser kits of all sizes abounded, but these two still endure, very much a testament to their excellent quality and their original designer, Bob Godfrey.

The kit is primarily wood, with some plastic parts to ease construction. Its design,

## An FM Product Review:

By Vic Macaluso, with Frank Fanelli

Still one of the most potent aerobatic models around, despite its age. Perfect for IMAC competition with the Webra 1.20.

based on its competition heritage, follows the philosophy of the real Laser 200: keep it light. The fuselage is not even a complete box. For sake of easier construction, the wings have foam cores and are sheeted with 1/16 balsa. An 11-page instruction booklet, with step-by-step construction sequence is provided. Though there aren't any construction photos, the two plan sheets are both very well drawn, with plenty of text that

provides all the information you will need to build and set up the plane.

All the necessary wood is provided in the kit, as are the plastic parts. These include the two-piece cowl, the one-piece turtledeck, the landing gear cuffs, and the canopy frame. Hardware is not supplied, but the plans clearly specify almost every nut, bolt, and hinge you'll need. Don't forget the flying wires for the tail surface also. They are re-



PHOTOGRAPHY: VIC MACALUSO & MICHAEL RAMSEY

Flying characteristics of the model (above) are as crisp as the real aircraft. Tracking is excellent, and the corners on a square loop are extremely tight. With the Bisson Pitts style muffler there's little power loss, and cowl cutouts are minimal (at right). TruTurn's 3-inch CO3100 spinner was used over the Menz 16-8 prop.



The flying wires are critical on the *Laser* (at right), and cannot be left off. Sullivan's #546 cable system provided all the fittings and cable necessary for wires above and below. Mounting the ABS wheel pants is relatively easy (below). The DuBro #140 axle goes through the bottom hole, and a small 4-40 screw above it goes into a blind nut to keep the pants from rotating. Works well, even on a rough field.



quired! Sullivan Products has a good wire set, their S546.

Since the wing is a foam core, that is provided. It is also a plug-in style wing so the only real hardware provided is that for the aluminum spar tube, and the fiber wing socket tube. Thankfully the socket tube holes have been pre-cut, so that won't be an issue. Holes for the aileron servo cables are not pre-cut so you'll have to drill (I used one of those long 1/4-inch drill bits, did it by hand, then progressed to a 3/8 bit, and finally a 1/2-inch bit) out to the servo bays (also pre-cut). Though I didn't line these tubes, you might try some plain white paper, rolled into a tight tube, then slid into the cable tunnel.

This plane has been engineered to be built light. There isn't a whole lot of sheeting, with the exception of the foam cores. The fuselage could be best described as an incomplete box structure with some elements of stick frame construction. Let me elaborate only a little, but let the pictures really tell the story.

The fuselage can best be described as a central "box" structure open on the top. It then has a bottom fuselage and a top fuselage structure built onto it. From the firewall back to the trailing edge former, F3, the central "box" has the two ply sides and a ply bottom. But, the top is open right from the



firewall back to the beginning of the turtledeck. The plastic engine cowl seals the top of the fuselage back to the cockpit area at F2. Then the cockpit/canopy seals the wing spar/radio compartment.

It brings up the issue of fuel-proofing the forward open "box" of the fuselage. Back to F2, all the wood, inside and out should be fuel proofed, with either paint or thinned epoxy. The engine cowl piece will sufficiently seal the front area from the radio compartment area. It wouldn't hurt, though, to stuff some tissue around the fuel tank, since the tank protrudes through a cutout in F2 back into the radio area.

Aft of the cockpit, the fuselage translates to ply sides, the plastic one-piece turtledeck on top of the sides, and a frame/longeron construction on the bottom. It is important to the integrity and strength of the structure that joints mate well here. Sloppiness will weaken the structure. In the case of the turtledeck, make sure the fit of the mating surface to the top of the fuselage sides has no gaps. Best choice of adhesive, by the way, for these plastic to wood joints is Pacer's Canopy Glue. This turtledeck will give the



True Red UltraCote covered most of the model and was matched pretty closely by the new True Red UltraPaint (above). Model Graphics' Rapid-Tac and plastic squeegee were invaluable for applying the excellent Model Graphic vinyl details (below).



rear fuselage plenty of strength and rigidity only if it fits well.

There isn't much of a saddle for the horizontal stab to sit on, and the vertical stab is butt glued to the horizontal. The end of the plastic turtledeck slips around the leading edge of the vertical stab and gives some support, but it's the flying wires that really add the strength to this tail group.

Continuing on the same issue of strength, it's time to look at the nose section. The firewall is sandwiched between the ply sides, and bottom of the forward fuselage "box". It's the usual butt glue joint, with some triangular stock as reinforcing gussets. But, as in this case, there will be some hefty powerplants hung on that firewall, and the instructions call for pinning the firewall. This is a reminder not to overlook this step. It's important.

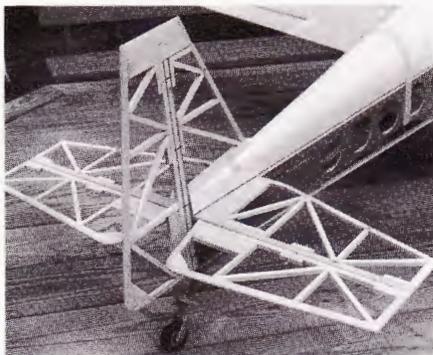
With the plug-in wings, alignment is critical. The ply fuselage sides come stapled together, with the tube holes cut already. Be-

## Lanier's Quarter Scale Laser at a glance

Wing span	72 inches
Fuselage length	56 inches
Airfoil	symmetrical
Wing area	865 square inches
Stab area	180 square inches
Wing chord	15 1/2 inches
Weight as tested	10 pounds, 4 ounces
Wing loading	27.3 ounces per
Engine required	.90 to 1.20 two-stroke .91 to 1.50 four-stroke
Radio requirements (ail, elev, thr, rud)	4 channel minimum 6 servos

Distributed by: Lanier RC  
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# Lanier Laser 200



Key to the Laser's performance is its lightweight construction. All that open framework on the tail follows the philosophy and also shows why the flying wires are so necessary.

fore you separate the sides, you'll have to drill the seven lightening holes aft of F3. I left the seventh one, by the tail, out because I was concerned about its strength. A 2¼-inch hole saw will make this step easier. As long as you build that central fuselage box square, the tube, guaranteed, will be accurately aligned in all axes.

More for the sake of convenience (I had one hanging around) I used a large Klett (from Carl Goldberg, 4734 W. Chicago Ave., Chicago, IL 60651; 773-626-9550) tailwheel instead of the arrangement shown on the plans.



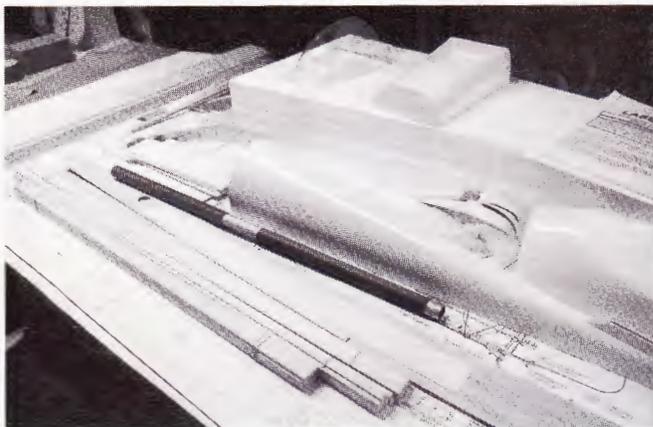
The engine cowl pretty much shapes the whole front of the model. It's made from two pieces of thick ABS plastic and is secured to the airframe with four 6-32 socket head bolts. Cockpit and turtledeck are also ABS.

They call for a tiller arm strapped to the bottom of the rudder. I feel that will tear out too easily in any hard landing. I do have to admit, though, that the Klett is way out of scale, and leaves the plane sitting on its gear in an almost nose level attitude. But, I feel it will save the tail and stand up to some of those rough field, less-than-perfect landings.

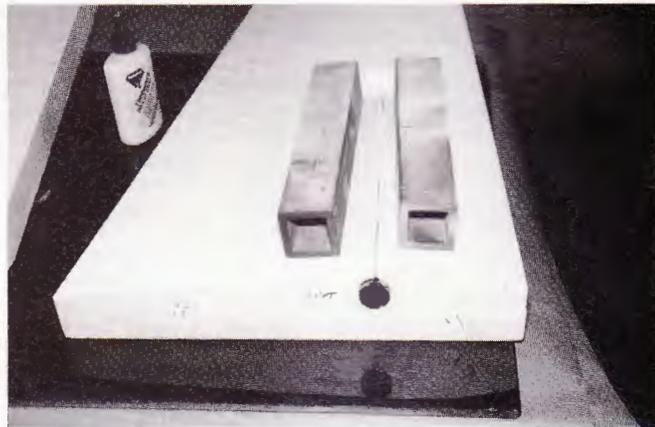
Having mentioned landing gear, it's a good time to say it was easy to install, and so were the plastic wheel pants provided. These are not quite scale. The back end is squared off, and the real Laser had pointed

ends on the pants. Plastic cuffs, purely cosmetic, were provided as a scale item for the place where the gear meets the fuselage. These didn't fit the gear. The opening for the gear leg was much too wide, so I left them off. I suspect that these were intended for the larger ½ scale Lanier Laser.

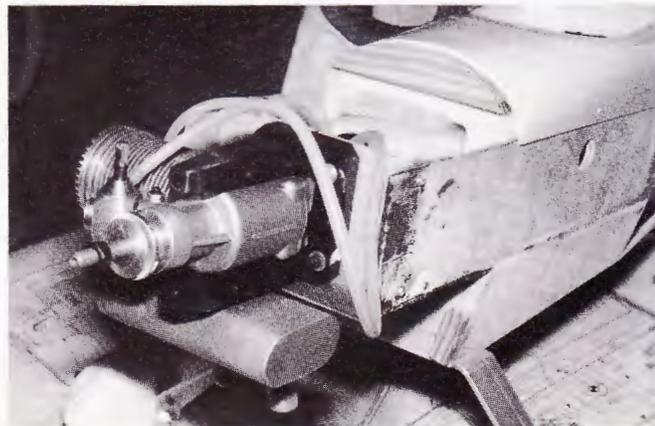
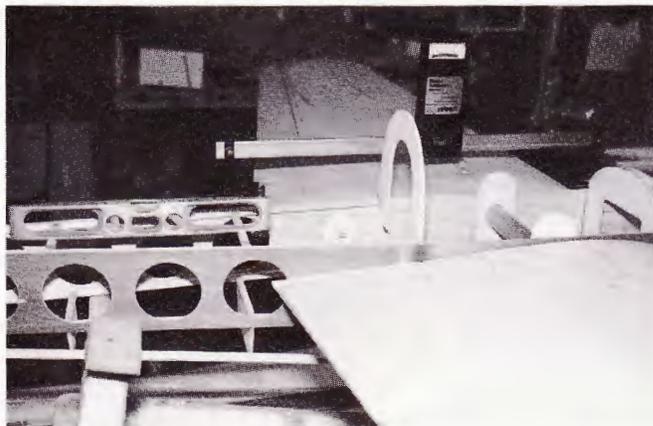
In the interest of lightness, the wood parts of the model were covered in Ultracote. Your major investment will be for three rolls of Tru Red UltraCote. That will take care of the majority of the airframe. The underside of the wing will require



Lanier's kit of the ¼-scale Laser provides everything to frame the plane (above left), minus any hardware. The phenolic wing tube socket is glued into the predrilled tunnel in the wing (above right). Tunnel for the servo cables must be



drilled. With the wing plugged in, and the anti-rotation pin allowed to float (below left), the incidence is set, and the disc is glued in to lock the setting. Length of the firewall can be adjusted to suit the engine used (below right).



either black or Corsair Blue UltraCote.

Obviously, the plastic parts needed paint and Carl Goldberg now has UltraCote matching spray paint. Application of the new UltraPaint paint is easy. Lightly, and I do mean lightly, scuff up the plastic with some 400-600 Wet-O-Dry paper (you know, the black stuff for automotive and metal use) in preparation. Color match of the paint to the covering is fairly good, though the red I used was slightly darker than the UltraCote film.

The one problem that cropped up was the incomplete cure of the paint on the plastic parts. It was still soft two days after painting. This, I discovered from Larry King at Goldberg, was due to the catalyzing process of this epoxy paint. I painted the plane in my air-conditioned workshop, and it just so happens that ambient moisture in the air is the catalyst for this paint. That accounts for the very slow cure. You are much better off spraying two light coats of this paint, to let the first coat catalyze and cure, before spraying the second coat. Goldberg says that the second coat can be applied about 2-3 hours after the first.

You won't need much since UltraPaint has a lot of pigment and is very opaque. You can spray it over other types of paint. And also you don't really need a primer because it is so opaque.

Part of the attraction of the *Laser 200* are the very colorful paint schemes that adorned it in the 22 years it flew. Since *FM* splurged and provided the Model Graphics (121 Cove Drive, Hemphill, TX 75948; phone 409-787-2875) Bud Light scheme for this 1/4 scale *Laser*, I was only too happy to spend the extra time to apply them. Don't get the idea that applying these excellent graphics is quick and easy. It is work, because it demands careful attention to placement and laying them down. But they are a wonderful product. The adhesion is excellent, they don't have to be fuel proofed, and they have some stretch for very slight compound curves. They are also very thin, only 0.002 inch (2 mils) thick, leaving them hardly noticeable. Model Graphic's *Rapid Tac* fluid really helped in positioning the graphics before squeegeeing them into position.

Can't forget Scale Model Research (3114 Yukon Ave., Costa Mesa, CA 92626), who supplied the documentation photos for this particular scheme. It might help you to know that there are three paint schemes for Leo's plane, and one for Jim Robert's *Laser*. Leo's started with the original blue scheme, then went to the first Bud Light scheme in 1982, and ultimately the last Bud scheme painted in 1996. The photos they supplied helped immensely in supplementing the Model Graphics placement sheet.

### Over to Frank

Vic did a superb job building and finishing the plane. He also installed the servos and some pushrods. It was my job to set up the gear and fly the plane, so let's get to the setup first.

Lanier supplies the *Laser* with 1/4-inch ballsa sticks for the pushrods, and Vic had installed them. Don't even think about using them unless you intend to wrap them with fiberglass to stiffen them. Dave Brown Products' fiberglass pushrods were substituted.

Since separate servos were used for the elevator halves and for the ailerons, a computer radio was about the only way to go to facilitate the mixing required, and JR's XP8103 system proved itself again in this

## A closer look at the Webra Speed 1.20

The advantage that this Lanier RC 1/4-scale *Laser 200* will have, will be that it will have power to spare boasting the Webra Speed 1.20. We've always thought that the *Laser 200* had crisp aerobatic qualities above any other design that preceded it, and with that, the *Laser* has remained competitive in the IAC contests, and now with the latest RC craze IMAC pattern aerobatic competition. This is an airframe that deserves and will well manage the power of the Webra.

The cast aluminum engine comes out of the box very clean. Casting of the aluminum parts is quite smooth, exterior machining is fine, bright, and very smooth. Since this engine has such a wide range of

applications (sport, scale, competition, etc.), it comes without a muffler, though there are many aftermarket mufflers available, from pitts style, to pipes. The front end of the engine is matched with a Promix Competition, twin needle, carburetor. The sleeve and piston set-up uses an aluminum piston with a cast iron dikes ring, that rides inside a steel sleeve. The instructions with the engine deal with general safety rules, starting and run-in procedures, and general tuning tips for adjusting the wide variety of Webra carburetors available. However vital information such as recommendations for propeller, fuel, or glow plug to use are not listed. As it turned out, finding a good set-up came fairly naturally, as the engine proved to have no bad habits.

For the initial run-in, the 1.20 was mounted to a American Hobby Products engine test stand, upright with the fuel tank set at the carburetor center line. A Hangar 9 standard two-stroke (hot) glow plug was secured, and a Menz 16-8 propeller was used to start.

The first five minutes were run at 4,000 rpm set rich at three turns out, at low throttle. Second tank, with the throttle fully open, was set rich at 8,200 rpm for 2 minutes, then run at a peak needle setting for 30 seconds at 8,900 rpm, then turned back to rich again for one minute to cool down, then shut off. This procedure was repeated until the lean run time was increased to 1 1/2 minutes. After burning about 30 ounces of fuel, the engine was ready to fly in the airplane.

The low speed needle was adjusted, and it idled all day at 2,100 rpm. The transition from low to high was very good. The engine burlbes a bit in the mid-range, even with the low speed needle tweaked as much as possible. The high speed needle could be set between 2 1/4 and 2 1/2 turns out. With the Hangar 9 glow plug, the motor seems very happy. An O.S. #8 (hot) was tried but seemed to weaken the high speed



performance. Any long reach, hot style, two cycle plug would work fine. An O.S. type F, and K&B's new FS plug worked well. All testing was done with a Bisson Pitts style muffler installed.

After a little over 45 minutes of bench time, the engine still wasn't quite broken-in. Complete break-in wouldn't be expected for another hour or so of running. In the air is the best place to finish the break-in so that it can unload, and the piston could be polished to a perfect fit.

The engine hand started right out of the box, and every time afterwards. Even at the flight line an electric starter was almost never used. There didn't seem to be much kick back in the engine so hand starting was very comfortable. 18% to 20% oil mixture in the glow fuel is recommended, and nitro content up to 15% is probably overkill. For one of the 10-ounce tanks, burned on the bench, Sig FAI fuel was tested, and the engine really seemed to like it.

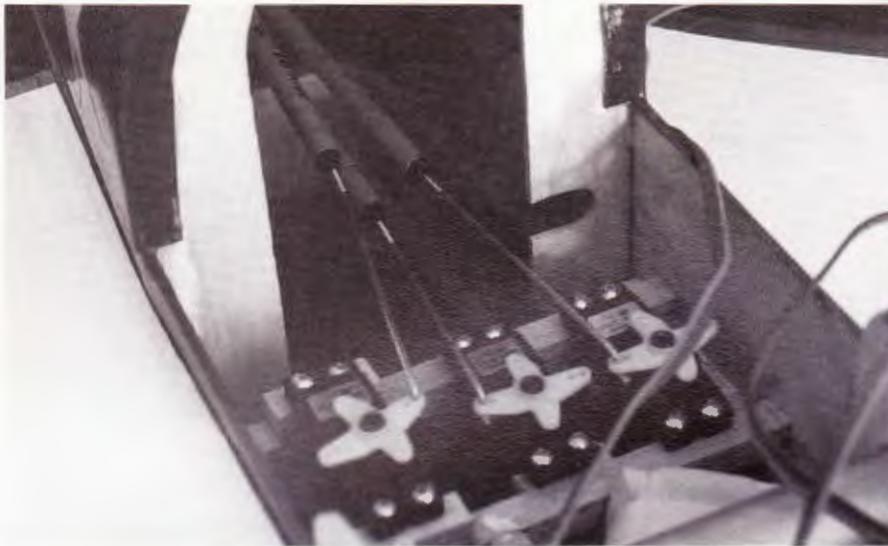
A Menz 16-8 propeller used during the bench run was the only prop tested, mostly because the results were so satisfactory. Best max rpm on the ground was tached at 9,000.

With the engine mounted in the airplane, running was more of the same pleasurable experience. During the first flights, Sig FAI fuel was used. Though the airplane is significantly over powered, a concerning rpm drop was noted in the extended vertical lines. Bumping up the nitro content of the fuel cured the motor straight away.

### BASIC SPECIFICATIONS

Bore(mm): 30 Stroke(mm): 27  
Disp.(cc): 20 Weight w/o muffler (oz): 31.7  
H.P.: 3.2 Prop thread: 8x1.25  
RPM range: 2,000-11,000  
Normal propeller: 16-8  
Glow plug: K&B 1L, Enya #3, O.S. type F  
Rec. Fuel: FAI, and up to 10% nitro

# Lanier RC's Quarter Scale Laser 200



**Use good stiff pushrods!** Since the elevator pushrods cross, one elevator servo (at the left) is shimmed higher than the other on the far right, so there isn't any interference. Note difference in arm angles for equal throws.

capacity. This is the fifth plane on this very versatile transmitter. For sport applications there's no reason why a single elevator servo couldn't be used with a "Y" pushrod (see Dean Pappas' column on these in the April '98 *FM*). The aileron servos were hooked up with a "Y" harness.

JR's new 2721 UltraTorque metal gear, ball bearing servos were used for the elevator, and are mounted at the outer sides of the servo rails. The right elevator servo was also mounted a half inch higher so that the two elevator pushrods can cross. The rudder servo, a JR9011, sits on the rails between the elevator servos, and runs a single pushrod.

In mixing the elevator, Flap (Channel 6) and Elevator were used. Since the 8103 has six programmable mixes, you have to select one that will allow the master channel trim to direct the slave channel. On the 8103, only programmable mixes 5 and 6 do this. Slave channel rate also has to be adjusted on the mix so that you get matching throws on the elevator halves.

With the mechanical setup I now had (outer hole in the servo arm, third hole from the control surface on the horn), elevator throw was about 1¼ inches. This was in excess of the recommended one inch. Bubba Spivey of Lanier says it's best not to exceed that dimension, so I dialed down the throw on the elevator dual rate to 73% in the high rate position to get the one inch throw, and then to be conservative on the first flights, dialed down the low rate to 55%, which gave about ¾ inch throw.

Mechanical linkage on the ailerons (servo arm outer hole, third hole from the surface on the horn) was right on for the ¾ inch travel required from them. The servos, by the way, were JR 9011s. The rudder took a little bit of adjustment though, to get equal travel each way. The pushrod came off the servo at an oblique angle resulting in the unequal throw. First the sub trim was used to get a better 90 degree angle, and then the travel adjust was set to give equal throw both ways. The rudder can be maxed out, to just about bang each elevator half at 1½ inches. I was a little more conservative than that.

Balance the *Laser* right on the wing tube

arm. Simply wrap some string around the tubes to keep the canopy on the wing in the area of the cockpit and hold the plane up. Bubba Spivey says to make sure the nose drops slightly. If it seems level, it may actually be a little tail heavy. In any event, it's a good, conservative place to start, and as it turned out later, didn't hurt the flight performance. Lateral balance required an ounce of weight stuck to the left wingtip and it balanced perfectly.

With all this taken care of, it was time to fly. The Webra 1.20 started easily, one or two reverse flips, and the Menz 16-8 prop was turning. Problems with a muffler continually coming loose were traced to the exhaust gasket. It would crush more with the heat and vibration of the engine and the retaining screws kept loosening. The cure was to eliminate the gasket, and the screws stayed tight. Other screws came loose also, so it is wise to Loctite everything you can up front, even the wheel pant anti-rotation screws.

With mixture set properly, all screws tight, and rates set at low, it was time for the first flight. Taxiing in high grass was a

bit of problem with the small (2¾-inch) scale wheels. Use a larger size. Moving onto the freshly mown runway, the *Laser* tracked fairly straight, though some right rudder was required. Because of the stance of the model, with the Klett tailwheel, the plane literally flew itself off the runway. I didn't have to use any elevator. And it did it at only half throttle.

There were some minor trim adjustments a few clicks of left aileron and a few more of up elevator before the plane flew straight and level, hands off. The Webra pulls the plane very well at only half throttle, and many of the preliminary maneuvers were flown at that setting. Full throttle was used only for vertical maneuvers.

How did it fly? It is one of the best I have ever flown. It tracked without correction through inside loops. Rolls were fast, axial, and required little or no elevator or rudder input. Snaps were fast, and ended as soon as the sticks were released. Stall turns were towering and positive. The real gem was the square loop. The corners were so tight and quick, you could have been drawing them with a triangle. There wasn't a burble from the wings, and the fuselage didn't hunt. All this with low rates no less!

Switching the ailerons to high rate, the rolls became even quicker, and the point rolls and snaps violently athletic though still very controllable. Finally elevator was switched to high rate. Response, obviously was quicker and crisper, with only a slight tendency to break. Landings were an absolute joy. In the calm air, the plane flew a steady final with the Webra at its lowest idle, and settled on all three with only a breath of up elevator.

It's a shame there wasn't more time to fly it, and report on different setups, i.e., changing throws, moving the c.g., trying exponential, etc. But just the way it is, this is a plane worth having and holding on to for a good long time. It helps make a good pilot look great, and it is thoroughly responsive. Its flying characteristics remind me very much of Loudenslager and his *Laser*. It is as crisp and athletic as his style was, and like the real plane is capable of flying the way you want it. C



Model Graphics has the trim scheme for all three versions of the *Laser 200*, from the early blue paint to the two Bud Light versions. They also have Jim Roberts' trim scheme. This is the last Bud Light paint scheme.

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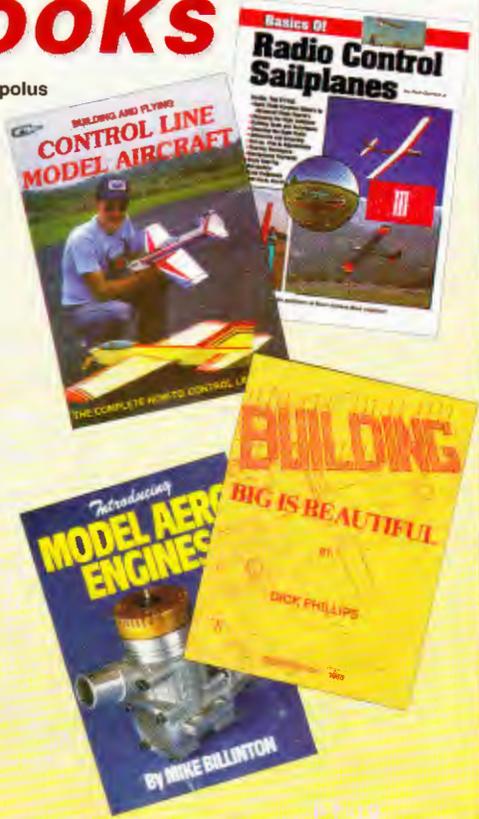
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An *FM* Product Review:

By Bob Boswell

YELLOW AIRCRAFT'S

# A-4 Skyhawk

An enduring fan classic gets new life with a makeover. All new molds with excellent detail, plus better performance.

Since *FM* has already reviewed the earlier version of the A-4 (see the June, 1990 issue), and most of the construction is identical, I would like to devote most of this review of the revised kit to the changes and improvements, and their effect on construction and performance. The first change you will notice is a new, highly detailed fuselage. The clarity of

this detail is very good, one of few examples whose panel lines are free from ragged edges.

Most of the scale air scoops and access panels are also detailed, as is a separately molded glass canopy frame. This provides better mounting as well as a more rigid assembly. Another welcome change is the larger engine hatch cover with an integrally

molded lip. This helps the hatch to retain the proper shape as well as make it easier to install a reliable retention system. The method described in the instructions works well; just be sure at least 1/4 inch of the spring loaded locking pin extends through the lip in the fuselage. More on this later.

The last obvious change is the inlet lips themselves, which are now molded as part of the fuselage. Instead of sliding the inlets through an opening you carefully cut the fuse gluing the inlets fast and manually shaping the lip. You simply butt the front edge of the new inlets up to the rear edge of the inside of the lip and glue the two together by pouring resin between the inlets and fuselage and stand the whole thing nose down until cured.

Well the gluing operation is a piece of cake, but the fitting of the inlets to the inlet lips is a lot easier said than done. Careful trimming with numerous trial fittings in between is necessary to achieve an accurate fit. The extra time taken here will be saved when blending in the joint later. I would like to see the manufacturer add a small lip on the inlets that would slip behind the inlet lips to aid in alignment as they are fitted together. I also recommend the builder paint the inside of the inlets before installation as this is much easier than trying to work in the confines of the fuselage once installed.

I also elected to install some sound suppression on the inlets. Acoustic foam was obtained from AeroLoft Designs. This foam sheet was faced on one side with a fuel proof material which was hot stuffed around the edges over tiny holes (.062) spaced about a 1/4 inch apart in a cross hatch pattern. This noticeably reduced inlet noise in flight.

Probably the most significant change in the kit is to the inlets themselves. The new inlets are about 3 1/2 inches shorter which results in the single heaviest component, the power package, being moved the same distance forward of the c.g. The additional space created behind the fan permits the use of 11-ounce saddle tanks at the c.g. rather than the fuel tank between the inlets as before, which required constant trim adjustments as fuel was consumed and nose weight reduced.

The splitter plate has also been molded all the way back to the face of the fin and the spinner is taken out of the airflow to reduce turbulence. With the fuel tank now absent from between the inlets, the starting probe can be inserted through the canopy opening, eliminating the need for a special opening or utilizing the nose gear opening which was somewhat awkward.

The wings and stabs are identical to the earlier kit, pre-sheathed with a high quality grade of balsa. Landing gear blocks, leading and trailing edges are already installed, and the gear and servo cutouts are precisely routed to eliminate most of the normal wing construction. Yellow Aircraft offers two wing sizes, a sport wing with a 44-inch span, and a 40-inch scale wing. As with my last A-4, I chose to use the 40-inch wing. About the only thing left is to mount the servo and retracts of your choice and hinge the control surfaces.

The fin is molded as part of the fuse and the rudder is built up as before. The manufacturer also supplies all the necessary wood, precut to proper size to complete the airframe. One note here on the bulkheads: the instruction manual cautions the builder

## A-4 Skyhawk at a glance

Wing span	40 inches
Fuselage length	57 inches
Airfoil	semi-symmetrical
Wing area	920 square inches
Stab area	178 square inches
Weight	11.2 pounds
Wing loading	28.4 ounces per square foot
Engine required	.77 to .91 DF two stroke
Fan unit required	J.M.P. Dynamax
Radio requirements	5 channel minimum
(ail, elev, thr, rud, gear; opt. flaps, fuel mix)	10 servos, standard & mini

Manufactured by: **Yellow Aircraft**  
203 Massachusetts Ave., Lexington, MA 02173; Phone 781-674-9898



PHOTOGRAPHY: BOB BOSWELL

The size is the same as the original Yellow A-4 and you still have the option of choosing the 44-inch span sport wing or the 40-inch span scale wing. The graphics on Bob's plane were a mix of paint and ProMark.

to trial fit each bulkhead before gluing, and while the fit was generally good, I did find some areas where a slight amount of material had to be removed to achieve a better fit or to prevent a bulge in the fuselage or a minor gap filled. Ideally they should be fitted so there is no more than a very slight resistance when placed in position so no distortion is created in the fuse.

the last *Skyhawk* I built, and their addition was a welcome sight.

Since all of the glass components are manufactured with polyester resin, a word of caution is appropriate. The instruction manual devotes a full page to bonding the various materials together. It should be studied

Flight performance, especially in the takeoff is much better than before with the revised inlet system. Noise levels are also less with the addition of the optional sound suppression foam for the inlets. Inclusion of the optional flaps help slow the approach.

well as certain types of glues will not adhere well or at all to polyester, especially if it is not prepared properly. My preferred technique of prepping glass parts is to wipe down the area to be bonded with acetone, and sand well with 40 or 60 grit paper. Then just before I apply the adhesive, I wipe it



Two of the new details, besides the molded-in panel lines, are the scale refueling probe (above) and the glass canopy frame. Glass work on the kit is very good, as are the pre-sheathed foam cores (at right).

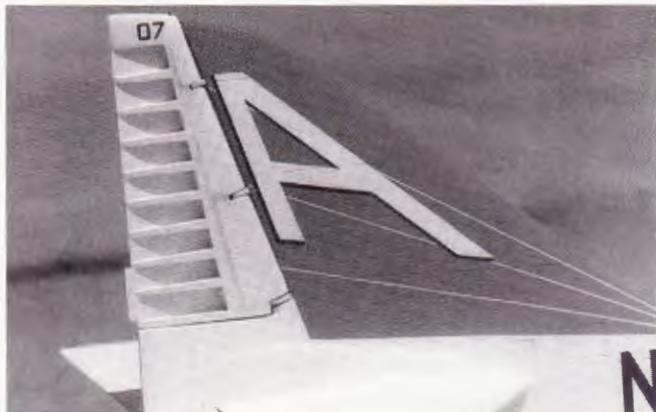
The method for retaining the canopy is still a problem, so here's my method for doing it. I used two 1/8 dowels protruding from the rear of the canopy which slide into mating holes in the fuse and a small screw countersunk into the forward frame to lock it down.

If the builder so desires, a plug-in wing option is available and the installation is detailed in the instruction manual. I was also pleased to find a small package of detail parts molded in glass. The talents of the mold maker is excellent. These tiny accessories included pitot tubes, position lights, AOA indicator, gun gas deflectors (referred to as fuselage steps in the instructions), antennae, cockpit floor with ejection seat, and an all glass refueling probe. I can tell you I spent many hours manufacturing these scale detail items on



Chief improvement to the updated *Skyhawk* kit is the molded-in vertical fin on the fuselage. Inlets have also been redesigned and significantly improve airflow. Molded-in detail, like panel lines is quite good.

# Yellow Aircraft's A-4 Skyhawk



Unlike the earlier *Skyhawk*, the vertical fin (above left) is now molded as part of the fuselage, increasing its rigidity immensely. Note some of the detail molded into



the fin, just above the horizontal stab. The elevator servo is nested at the base of the vertical stab (above right), giving a very short pushrod that eliminates flutter.

once again with acetone. The acetone softens the resin for a few minutes and seems to promote better adhesion.

One adhesive I find works very well for a multitude of applications is "Zap-A-Dap-A-Goo" by Pacer Technologies. It grips polyester with such tenacity I decided to install all of the bulkheads including the fan mounts by applying a small fillet to both sides of each bulkhead, then gently pushing the fiberglass away from the bulkhead, allowing some "Goo" to wick in between the two. Once cured I tried to separate the bond by pulling on the bulkhead, but it wouldn't budge. I was satisfied it would hold as well as any other method I've tried and possibly add some vibration dampening in the process.

The full-size *Skyhawk* utilizes split flaps inboard of the ailerons to improve slow flight characteristics. Unfortunately I didn't get the opportunity to test them on my first A-4 so I decided to install them on this airframe also. Since their construction is not detailed in the manual, I started with three view drawings to determine their actual size and location. By scaling the drawing, the flap outline was transferred to the underside of the wing and cut about half way through the thickness of the wing with a sharp X-Acto knife. Then working from the trailing edge a razor saw was used to separate the flap from the wing. A piece of 1/64 ply was then glued onto the exposed foam of the top of the flap and the bottom of the wing. The flap was

hinged along the bottom surface and a control horn was attached on the centerline of the landing gear pod. I sunk a mini servo into the bottom of the wing under the gear pod just aft of the retract unit. This provided a totally concealed drive method, yet still serviceable when the pod was removed.

The finish was applied using an automotive basecoat-clearcoat system. All balsa surfaces were first glassed using 3/4-ounce cloth, then primed and sanded. Since the fuse already had panel lines, the wings and stabs were detailed to match. My favorite method is to lay down 1/64 chart tape using a three-view for panel line location, then build up the surrounding area by lightly spraying on several coats of primer. When dry, the primer is sanded until the tape shows through, then the tape is carefully removed. I find the tape is easier to remove if it is done as soon as possible, otherwise some of the tape's adhesive is left behind.

Next the base color is applied, then the trim colors. Finally, the markings are applied. The larger markings such as the stars and bars and larger lettering were painted on using masks I cut from frisket paper.

The smaller nomenclature, rescue arrows and warning triangles were dry transfers done by Jerry Caudle of Pro Mark. I have used Jerry's markings on several of my other scale aircraft and have been very pleased with the results. I find they transfer from the backing sheets much easier than most dry transfers and because of the epoxy ad-

hesive he uses, they are fuel proof and require no clearcoat if sealed with a warm—only warm!—covering iron. They can also be clearcoated if so desired.

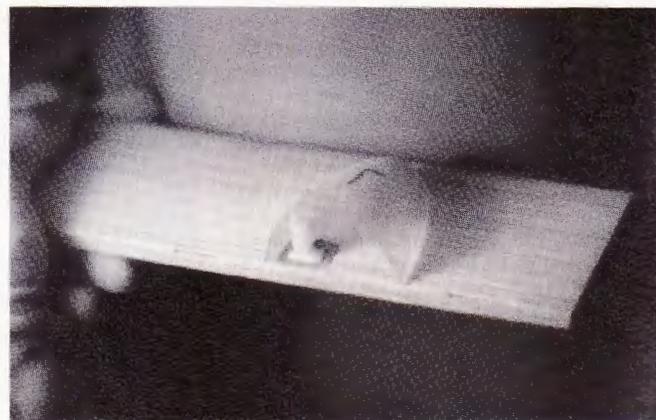
Once all the markings were finished, I applied rivets using a pencil and a template I made to give me the proper size and spacing. The panel lines were also highlighted using the pencil and an airbrush. Finally the clearcoat was applied and left to dry before final assembly.

For power I chose the Jet Model Products' Dynamax fan with an O.S. .91 and a BVM pipe. Fuel was delivered via pitot pressure and controlled with in-flight mixture valve. During assembly, I found one of the Spring Air retracts had a slow leak. After inspecting it, I found some damage to one of the cylinder end caps. I had picked up this set of gear in a swap shop and they had apparently been involved in a crash. I called Spring Air and explained my problem and inquired if I could get parts. They said send the faulty gear back and they would repair it at no charge. In two weeks the gear was back and in the *Skyhawk*. I was very impressed by the manner in which Spring Air stood behind their product and would not hesitate to purchase another set of their retracts.

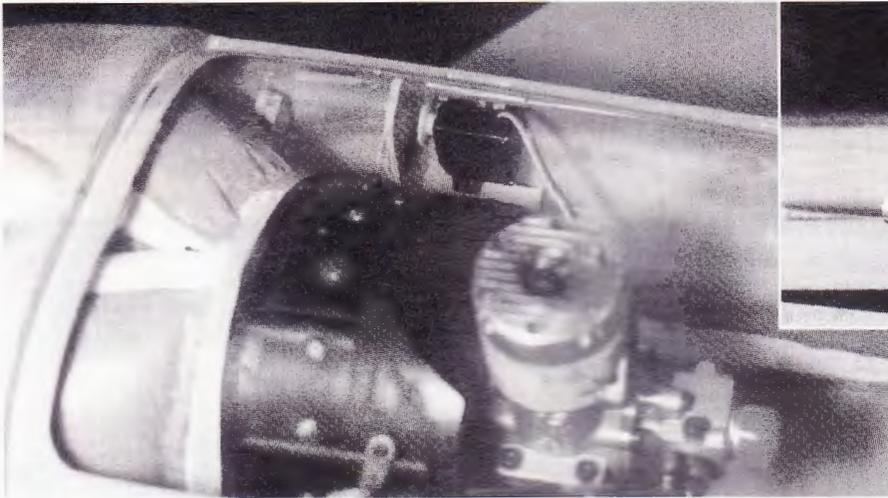
One deviation I made from the instructions was in servo placement. The manual calls for the elevator and rudder servos to be mounted to the fuselage sides opposite the fan with Nyrod™ installed between the servos and flight surfaces. I installed the



The underwing retract pod houses the pneumatic retracts, as well as the flap servo bay aft of the retract cutout (above left). Outboard is the servo bay for the



ailerons. Installation of the optional flaps is very easy. The aft end of the retract pod conceals the flap horn (above right) with a straight run to the servo.



This view of the inlet and fan unit (at left) show the sound suppression foam CyA'ed to the inlets. The servo shown is the mixture servo. Forward of it, though not installed yet is the rudder servo. Head-on view (above) shows the minimal cross section of the forward fuselage and the inlets mouths.

rudder servo there and used the Nyrod™, but moved the elevator servo to the base of the fin. It was inverted above the tailpipe using a short connection to the supplied elevator joiner wire. With this setup the elevators were absolutely rigid, but as I suspected the rudder exhibited  $\frac{1}{4}$  inch of free play to either side.

With everything installed, checked and double checked, it was time for the test flights. Fueled up and with the mixture set slightly on the rich side, I taxied downwind for about five hundred feet, turned and pointed the nose back into the wind. As I advanced the throttle, I noticed something different about this A-4 over the old version I had. It was accelerating very rapidly and in about three hundred feet appeared to be moving fast enough to rotate. I eased back on the stick and held the input and watched as the wheels broke ground ever so gently.

Holding a shallow rate of climb, I flipped the retract switch and cleaned up the gear and started a turn. Acceleration was still good so I increased the angle of climb, completed the turn, and let the sticks go to center. I found I needed only two clicks of aileron trim to maintain level flight. A few passes for the camera and I was ready to check the roll and pitch rate. The roll rate is incredible. Set on low rate with approximately  $\frac{5}{16}$  aileron travel in either direction the A-4 will roll three revolutions in about a second! Although this seems quite fast the *Skyhawk* was still very smooth with smaller inputs with no tendency to over control it.

Pitch is much less responsive, needing about three times the deflection of the ailerons to feel comfortable. This *Skyhawk* definitely exhibits more performance than the old version as a very respectable loop is possible without bleeding off much airspeed.

With about five minutes of flight time elapsed it was time to start setting up for some approaches. This landing would be with flaps up. I set up with a long downwind leg carrying about one-third power through base. As I turned final I gradually brought the power back to idle maintaining a steady descent. The A-4 does not seem to bleed off speed rapidly and was a bit hot on this approach so power was brought up and a second attempt was set up, identical to the first but power reduction taking place a little sooner.

This time the approach was picture perfect, a very constant descent rate and at about two feet from touch down, a little elevator was added to bring her down mains first then the nose.

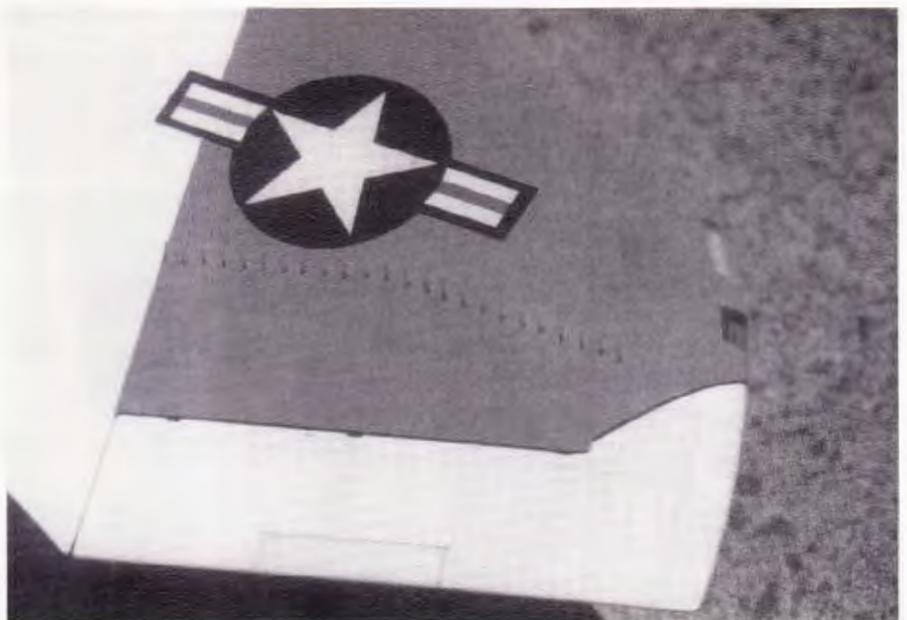
The second flight was much like the first. High speed low passes were impressive as the new inlets have brought the speed up to 122 mph as clocked on the JPO speed traps. I have flown three different examples of the earlier kits including the one previously reviewed in *FM*, and I think anyone who has seen the earlier version fly will agree that its speed was not much over 100 mph. Vertical was lacking unless a cheater hole was employed to get more air into the fan.

About half way through the second flight the hatch cover blew off. I immediately reduced power and prepared myself for some drastic trim changes. There were none; it was if the hatch cover was still on. Since I had not tried the flaps, I decided to shoot this approach with the flaps deployed. At altitude they were slowly opened until about 30 degrees of deflection was achieved. I no-

ticed the nose pitch down and added a little more up elevator and began my approach.

After turning final and reducing power as before, the *Skyhawk's* descent rate was increased with the flaps down. By the time I was at three feet I could see I was running out of elevator so I added power and climbed back to altitude where this time I retrimmed for level flight with the flaps down which required almost all of the trim input. The second attempt was much better, but required the addition of a little power to slow the descent as the A-4 was flaired. Subsequent flights demonstrated that with power on, flaps down, in a nose high angle of attack, the *Skyhawk* can be landed at very low speeds, but seemed to exhibit a little more lateral stability in a flatter approach with no flap. One thing is for sure, they will reduce the airspeed in a hurry so if you elect to fly with them be sure to have power input ready.

In summary, I can honestly say the revisions in the new kit have greatly increased performance as well as enhanced the *Skyhawk's* appearance. **CC**



As extra scale detail, Bob added these scale vortex generators, which he machined from some K&S brass angle stock. The navigation lights were ground and sanded from colored acrylic plastic stock, then clear coated.

# CA stunt

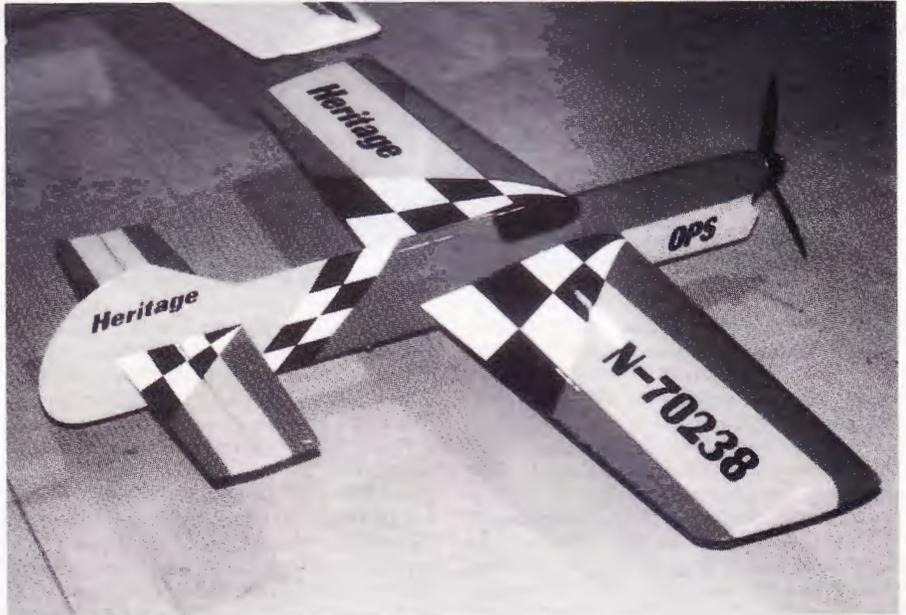
By Allen Brickhaus

**N**ow that I have begun using the Randy Smith PA-61 instead of the PA-40 I was using, I moved up to the .018-inch diameter stranded lines to follow rule guidelines and safety. I was very happy with the 40s of AeroProducts, but wanted the greater power of the .61 for the larger than normal planes I chose to fly.

I had used some Sullivan series .018 lines but Bill Rich suggested that I try the newer, same-sized lines made available by Stellar Specialties. Bob Pitkin points out in his catalog that the source of the .018-inch lines is a company that produces deep sea fishing lines. Bob mentions that the bronze color (although harder to see in grass in the pit area) comes from the commercial fishing industry that demands camouflaged line to increase their catch. The Sevenstrand Company caters to that market and has for over 60 years. They describe their current product as "Toothy Critter Wire". This is the same wire that is provided to the motion picture industry for "stunt" work. This wire is usually "painted" out of movie scenes with the aid of computer enhancement when used in this manner.

The cables, and the other sizes that are available, can be purchased in three configurations: "Ready to Fly", "U-finish-M" and "U-Wrap-M". Prices of course vary according to the amount of prefinished work that is provided by Bob and his company. For example, the .018 inch lines in the Ready-to-Fly request cost \$12.75 per set. The U-Finish-M version (marked at 68 feet) cost \$9.75 per set and the U-Wrap-M (also marked at 68 feet) cost \$6.75 per set. Shipping costs are usually \$1.00 per set in the US. They are all shipped on a 4-inch red plastic reel. If you desire the 5-inch Brodak reel, add \$5.75 to the cost of each set that you order.

When ordered in the Ready-to-Fly series the ends are wrapped per AMA safety guidelines. Stellar Specialties claim that these cables are lighter in weight and produce less air



PHOTOGRAPHY: ALLEN BRICKHAUS

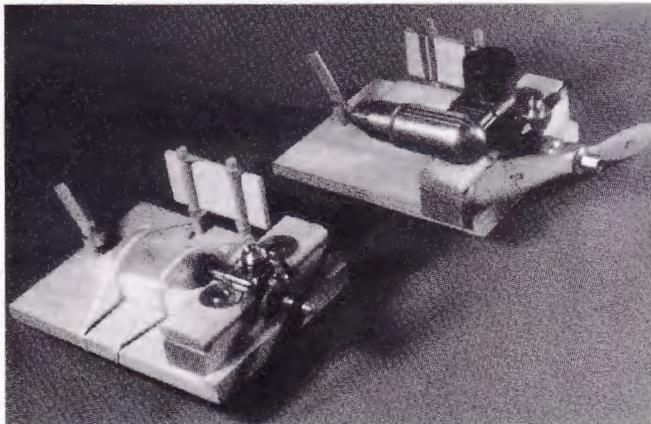
drag than earlier lines. In most cases the results will be greater line tension and less tip weight. Flights on my new *Mr. Brickhaus's Opus* prove out the point of the claims in the catalog and I have purchased four sets for various planes in my Stunt squadron. These lines give excellent "wet weather" service and will not bind when clean and slick.

Any lines can be ordered with staggered lengths and the ends can be color coded for the "Stunt impaired" and safety conscious flyer. Standard eyelets are 1/8-inch I.D. but 3/16-inch are available on request. Write Bob at Stellar Specialties, 3101 Sweitzer Street NW, Uniontown, Ohio 44685 or phone at 330-699-9295. Bob can be e-mailed at [stells@aol.com](mailto:stells@aol.com) or

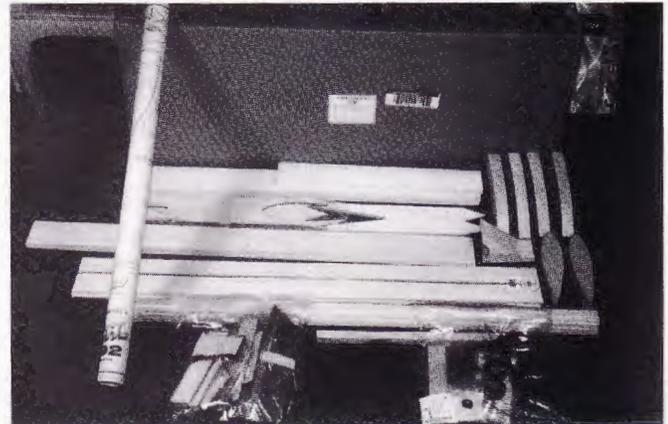
called toll free at 800-995-0182. Bob has many other products and those can be gleaned from his very nice catalog. Give Bob a call and "has he got a line for you".

## Better engine test stand

We will follow through with a discussion of American Hobby Products series of four "Better" Engine Test/Run-up Stands. In my March column I covered the AHP Dyna-Torque dynamometer and they have provided me a Mark 2 Deluxe Test/Run-up Stand. Model experts including Clarence Lee, Dave Gierke and Harry Higley use and recommend that a Test/Run-up Stand is a common-sense approach in caring for and properly setting up



Two AHP MK-2 Special test stands are set up (above left) for a 1/2A on the left and a .60 engine on the right. This is a safe and efficient way of breaking in or



running a new engine. Windy Urtnowski's *Cardinal* kit (above right) includes laser-cut parts and many accessories to assist you in building a fine Stunt plane.

today's precision model airplane engines.

Experts state that "running up" an engine on the ground in an airplane allows it to ingest dust, sand and loose particles of dirt, causing premature wear! I agree with the experts and have used the new stand by American Hobby Products and have enjoyed the working capabilities of the stand. I would recommend it to anyone needing a new or replacement stand for engine "break-in or run-up" procedures.

AHP acknowledges that their stand allows the modeler free use of his hands and provides space to: a) learn about your engine's starting temperament; b) adjust and set engine idle with freedom of access; c) test which glow plugs best operate with each engine type; d) measure performance with various prop/pitch combinations; e) investigate fuel and oil content effects on engine performance; f) hold engines during disassembly which avoids slipping screwdrivers and injury; g) check out rebuilt or repaired engines or repaired engines; and, h) control break-in of new engines.

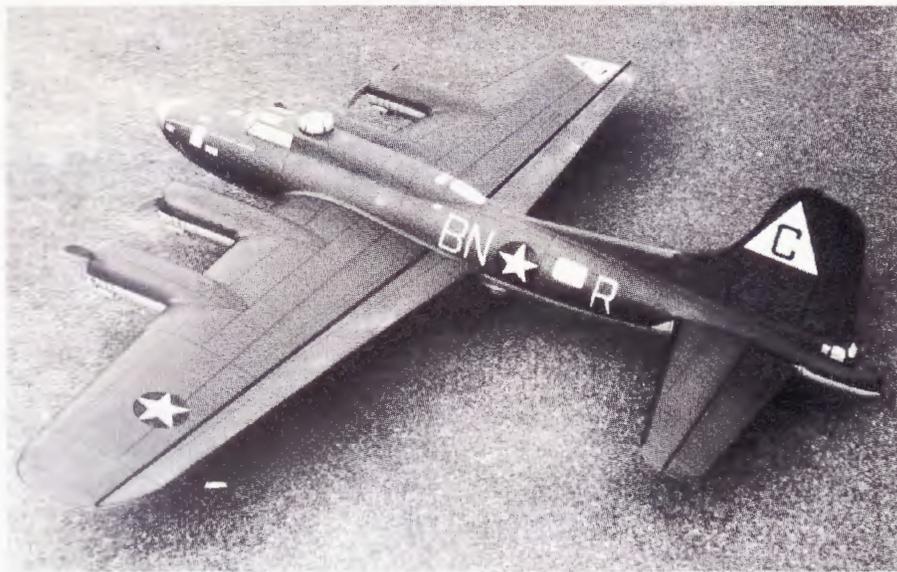
These test stands include superior features not found on other industry offerings, such as: below the mount locking hardware (does not interfere with muffler or throttle), vibration isolation, height adjustable tank mounting and the infinitely variable "Toggle Throttle" control. Their four "sizes" include the MK-2 Standard (.10 to .90 cubic inch) for \$24.95, their Jumbo Deluxe (.60 to 2.0 cubic inch) at \$34.95, the MK-2 Deluxe (.10 to .90 cubic inch) for \$29.95 and the Mighty (1.8 to 5.0 cubic inch radial gas burners) for \$74.50. All prices are retail. The deluxe units feature birch ply bases, Sullivan fuel tanks and fittings, pushrods and clevis.

Units can be ordered direct from any hobby store or write to: American Hobby Products, 12 West Hill Circle, Reading, MA 01867 or call 781-944-8316. Their newest offering is the MK-2 Special for \$21.95. AHP can also be faxed at 781-944-3585. Surely any one of these five choices can satisfy your engine break-in procedures.

### The father of modern Stunt

Robin's View Productions has made a new tape available to the "Stunt freaks" of the world, which is the reason I have one in my possession. Bob Hunt has spot-lighted a guru of Stunt, George Aldrich, in several interview sessions and caught him at work in his engine shop. George is probably most well known as the designer of the *Nobler*, but his credits also include the *AG-1 Duster*, a full series of *Streaks*, the *Junior Nobler*, a lesser known .35 powered *Magnum* (no cousin of the Sig version) and other less publicized combat and sport models.

No other Stunt model (*Nobler*) can come close to the competition record of this design, but there is more to this man's story. In 1957 George designed the aerobatic pattern that we still fly in AMA and FAI competition today! The scoring may differ in the



Paul Walker's B-17 Stunter flew at the 1995 Pasco, Washington Nats. The four OS Max 20s really do a fine job of pulling the very scale-like pattern plane through the AMA maneuvers.

two patterns, but the series of maneuvers is the same as set up in 1957. George and his friend Russ "The Bear" Snyder put on tape one of the finest "bull sessions" on Stunt anywhere on video.

Bob has caught quite the essence of George, his life and his accomplishments. This video is well worth purchasing and viewing for now and for years to come. The first run of 100 videos are autographed by George himself. This outer sleeve autograph is well worth the effort to be first in line to buy this Robin's View Production product.

This video of *George Aldrich, The Father of Modern Stunt* is available through Bob Hunt at Robin's View Productions, L.L.C., PO Box 68, Stockertown, PA 18083 for \$19.95 plus \$3.00 shipping and handling or phone 610-746-0106 or fax at 610-746-9638. You will enjoy these 102 minutes over and over again.

### Art Weber price changes

The prices of Art Weber's plans have changed since my June 1998 column.

Rather than detail the prices, please give Art a call at 414-783-4079. You can also write him care of 17560 Windemere Road, Brookfield, WI 53045.

### Windy's pleasing Cardinal kit

Windy Urtnowski is offering his 1992 *Cardinal* in kit form. I was able to open and peek at its contents. The wood was very carefully selected for its purpose and was precisely cut to fit. Plans are excellent and many accessories are provided in this full kit. This "Big Jim" Greenaway based design is well thought out and has a very successful record in the East coast area and wherever it is flown. The model is worked out to fit muffled .51 to .60 engines and .40 to .61 piped motors.

The kits are readily available for \$179.95 plus shipping and handling. Write Windy Urtnowski, 93 Elliot Place, Rutherford, NJ 07070 or telephone 201-896-8740. Windy's turn-around time is very short. You should have one in your hands quickly after placing your order with him.



Fox's 50th Anniversary .35 is on sale for \$150.00. Fox plans to build only 500 copies, so get your order in now. Fox Manufacturing Co., 5305 Towson Ave., Fort Smith, AR 72901, phone 501-646-1656.

# CA Combat

By Phil Cartier

**F**or the past five years Dick Howe has generously sponsored the biggest Slow Combat only meet in the country. With top prizes of \$1000 for first place and top of the line engines through as many as eight places, it's attracted the best flyers from all over the country. This year was no exception. 37 of the best showed up to fly some hot Slow Combat. The results were classical, with long matches, lots of chasing, and lots of wreckage falling everywhere.

I went to help Roy Glenn and Louis Lopez with their pitting. Roy did great, following up on his win at the East Coast Super Slow Champs with a third place. His only losses were to the first place winner, Mike Willcox, and second place, the ever present Dick Stubblefield. That made us feel pretty good. Louis was out of practice and had a good time. I had a great time getting some one-flip starts to get our man into the air first.

A contest like this wouldn't be possible without judges. Contest Director Allen Goff once again organized the operation flawlessly. He was ably assisted by his daughter, Jini Helfert, who kept the scoreboard and matching up to date and her husband, Don, who led the team of judges. Bob Jetmore, Mike Abernathy, and Dave Decker counted cuts. Mack Henry and Larry Skelley did the circle marshalling. Several other people, whose names I didn't get, also helped count cuts and time at various points during the contest. They did a great job trying to keep track of some really wild matches and handling a number of protests.

Slow Combat is something else. The first 5+6 rounds had around 80% midairs. Later,



Fluker vs. Colombo, with a simultaneous launch. About two seconds after this shot they wrapped lines and Fluker eventually went in, losing the match.



PHOTOGRAPHY: PHIL CARTIER

1998 R.W. Howe Slow Championship judges that made it happen appear L to R: Dave Decker, Allen Goff, Don Helfert, Jini Helfert, Mack Henry, Bob Jetmore. Not pictured were Larry Skelley and Mike Abernathy.

for a couple of rounds, the matches were very clean with few close calls and no midairs. Towards the end the midairs picked up again. Most often the planes would launch nearly simultaneously. The pilots would kind of feel each other out for about a minute with some open maneuvers, feints, and close passes. Then one guy would tuck in around a loop and start chasing. The guy in front would start some figure eights, wingovers, and "S's".

Depending on the pilots, the lead flyer might give a good fake and they'd switch places. About a third of the time the lead flyer would pull a few tight maneuvers, give a fake, and pull right in front of the other pilot, feeding him the whole streamer. Another third of the time, the chasing pilot would make a great anticipation move and get a 2-3 foot cut.

The rest of the time the fake would be too good, or the trailing pilot wouldn't even see it, and they'd hit. If they didn't hit early, the match would continue with the chasing, fakes and trading places. This would go on until either one pilot had a clear win, usually two cuts to one, or both pilots were going for the knot. When that happened they would often start chasing closer and closer until they finally hit.

One of the highlights of the contest was the match up between Krystal King and Skyler Skelley for the Junior-Senior trophy. These two young kids—they both are around 11 years old—did some great flying. In addition to flying each other, Allen Goff also put them into the draw with the open flyers. They both did a great job, outflying a bunch of the older folks. Krystal ended up in fifth place overall, beating a number of older flyers with some good clean flying and nifty cuts.

Pat Willcox—that mean old man—finally put her out in about the tenth round with some really wiley old Combat flyer tricks. Pat got up first. When Krystal got up about 15 seconds late, she surprised Pat like she did a number of other flyers. She got the first cut and went into a whole series of defensive eights. Pat's motor started to go lean and he had a heck of a time chasing her. Everyone thought he'd lost it. His pit crew yelled for him to put it in so they could get a better setting.

Finally, he got a good cut, kind of flopping his plane over into her streamer and taking a couple of feet. Then he tried the run and hide routine and managed to keep away for another minute with his motor sagging more and more. Krystal tried to chase him and did a lot of eights, finally snagging a kill, putting her ahead again. Pat's plane sagged even more while he nursed it around. Finally, with over two minutes to go he surprised her coming out of a figure eight and got a clean, go-ahead kill. Then his motor sagged even more, and for the last two minutes the plane would barely stay in the air. They both got a round of applause for a well-flown match.

Skyler and Krystal had an excellent, five-match flyoff for the Junior trophy. Krystal won the first two matches pretty handily and things looked grim for Skyler. But he came back in the third match with a nice 2-1 cut win. The fourth match went his way too and it looked like Krystal was losing her edge. In their fifth match they got off with a simultaneous launch. After trading cuts, Skyler turned the wrong way, and Krystal got the go-ahead cut which was followed almost immediately by a midair.

A few other matches really caught my eye. Late in the game Mike Willcox and Richard

Stubblefield flew. They are both wily flyers with great reflexes. Early on Richard gave a great fake coming straight down out of a wingover and flew into the ground. Michael followed him straight in. That does not happen often. Earlier on Ted and Kurt Carlson had to fly each other. They flew a very long match, very clean, with only a couple of close calls. Kurt got a kill early on. Ted came back with a cut and a kill.

### Equipment trends

Engine wise, the Nelson 36 was the only engine used. For some reason, speeds were distinctly slower than a few years ago. Maybe it was the weather or bigger planes, maybe lack of practice, or maybe people are just getting cheap. 10% nitro fuel is much less expensive than 50% and much easier to run. George Cleveland turned in a couple of flights that were well above average in speed. Otherwise, most people seemed to be going about 85-90 mph.

Planes showed some quite diverse design. The most popular by far was the McKinzie Slow from Medzlik Modelbau. At times it almost looked like a one-design contest. This design has about 450 square inches and weighs about 14 ounces, less engine and tank. Mike Willcox had plenty of his superlight design. This ship has about 520 squares and weighs around 12 ounces. Mike uses a fairly low aspect ratio, 48 inches in span. The only problem is that it doesn't hold up well to hitting the ground. Since Mike hardly ever hits the ground by mistake, it doesn't matter though for him. Several folks used higher aspect foamies with about 550 squares and 52-54-inch span with weights in the 13-15 ounce range, less engine and tank. These would definitely outturn the ready-built planes.

Several people came prepared to try and make a comeback with balloon tanks and didn't make it. Nobody got anywhere using the balloons or even a non-standard metal tank. The only tanks that worked were the wedge tanks with a chicken hopper, mostly from GRW. The Minors used similar homemade, sturdier tanks effectively. Lee Liddle was able to get decent runs from a balloon tank, but had to run short tanks and lost several matches due to the time needed to refuel and restart. Apparently the balloon tank is just too touchy for consistent performance. Ed Bryzys also tried the small tank approach with his big, billboard-sized barn door planes. He couldn't make it work either, losing several matches when he had to pit.

The safety issue of shutoffs came in for a lot of discussion. They will be required next year. Roy Glenn used a shutoff for every match with no problems. Roy's design is a very simple, line-pull operated, music wire pinch-off. The Mears also used centrifugal, swing-weight shutoffs for most matches. They had some trouble with the shutoff trip-



In early action at the R.W. Howe Slow Champs, Ray Kryza (with streamer) got a kill on Dick Stubblefield. Stubb came back with two cuts but the match was finally reflown due to a protest over the pit crew.

ping on launch. Several matches really demonstrated the need for shutoffs. Fortunately no one was hit or injured. The first cutaway went all the way across the circle and crashed near some of the contestants cars. In the second one, the plane went straight into the pit crew standing on the edge of the circle. That was a close call, although no one was hurt.

The weirdest one occurred in a match between Chuck Cline and David Owen. Chuck was robbed. He got up first. David got a cut, but his plane went slack on the lines and started barrel rolling across the circle.

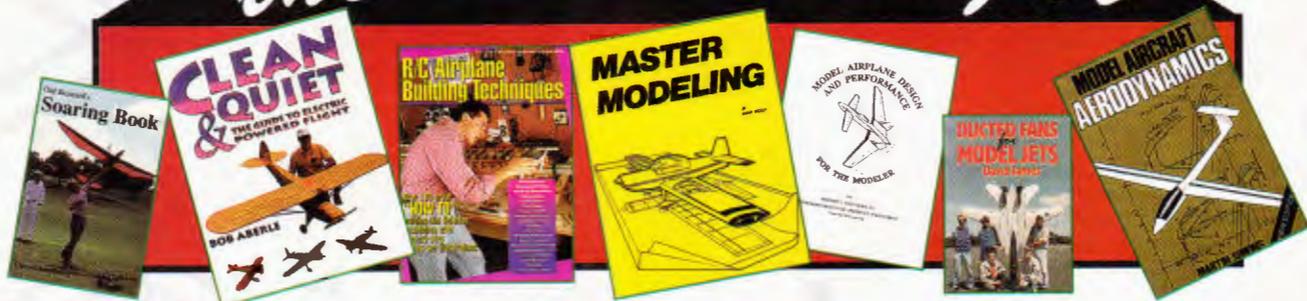
Chuck managed to keep out of the way until David's plane broke off the lines, did a loop over the circle, and cut right through his lines. The judges gave Owen the match due to the cut, but everyone missed this call. He should have forfeited when his plane broke the lines since there was no collision.

You can put in your two cents worth on these controversies and other Combat issues. Join the Miniature Aircraft Combat Association and help build the sport. Dues are \$15 US (overseas dues are higher). Send the dues to MACA, c/o Gene Berry, 4610 89th Street. Lubbock, TX 79424. 



Here is the standard line up of the winners: Mike Willcox, first; Richard Stubblefield, second; Roy Glenn (MACA President), third; Pat Willcox, fourth; Andy Minor, fifth; Dennis Cranfill, sixth. Kneeling in front are Junior winners: Krystal King, first place (3-2) and Skyler Skelley, second place (2-3). One match made the difference.

# the Book Hangar



## Choppers

**BASICS OF R/C HELICOPTERS (A11044)** Tradelius. Expert advice on all the basics of engines, gyros, tools, installation, adjustments, and flying. Illustrations. 127 pgs.; Sftbd. ..... **\$18.95**

## Electrics

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**ELECTRIC MOTOR HANDBOOK (A11550)** Boucher. A good technical treatise for those serious about understanding the electric systems used today and their applications. Includes chapters on basic principles and their applications, motor timing, propeller selection, speed controls and Astro motors. 86 pgs.; Sftbd. .... **\$14.95**

**FLY ELECTRIC (A11098)** Chinnery. An up-to-date overview of electric flight technology that will benefit both the beginner and the experienced modeler. Illustrations. 128 pgs.; Sftbd. .... **\$9.95**

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**FLYING MODELS - RUBBER, CO<sub>2</sub>, ELECTRIC & MICRO RADIO CONTROL (A11530)** Ross. The companion to Don Ross's popular *Model Airplanes* opens the world of electric power, CO<sub>2</sub>, micro R/C and even compressed air, to the beginner and expert alike. Become a better than average builder, flyer, and competitor. 240 pgs.; Sftbd. .... **\$19.95**

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**BASICS OF RADIO CONTROL SAILPLANES (A11078)** Gornick. This book is a good overview for those who want to get acquainted with R/C soaring. Deals with slope, thermal and aerobatics. Illustrated. 76 pgs.; Sftbd. .... **\$12.95**

**BUILDING AND FLYING RC SAILPLANES AND ELECTRIC GLIDERS (A11097)** Motazed. Here is an up to date guide on flying sailplanes and electric gliders with building tips you won't find in any other kit instructions. Illustrations. 88 pgs.; Sftbd. .... **\$11.95**

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**SOARTECH #8, AIRFOILS AT LOW SPEED (A11501)** Selig, Donovan, Fraser. All the airfoils and plots that came from the three author's landmark wind tunnel research project are in this book. A book for the serious soaring pilot only. 398 pgs.; Sftbd. .... **\$20.00**

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**SUMMARY OF LOW-SPEED AIRFOIL DATA, VOL.#2 (A11504)** Selig. After three years of effort that was generously and widely supported by the hobby's soaring community, Michael Selig, et. al. plus SoarTech have published Vol.#2. 292 pgs.; Sftbd. .... **\$25.00**

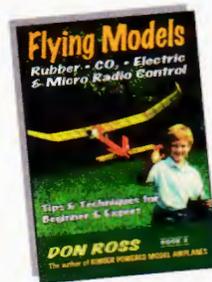
## Tips & Techniques

**ADVANCED GUIDE TO RADIO CONTROL SPORT FLYING (A11409)** Pratt. This guide is written as an encyclopedia of advanced tips, tricks, and handy things to know for the sport model airplane builder and flyer. It includes clearly written instructions that make it easy for you to improve your skills. 150 pgs.; Sftbd. .... **\$9.95**

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## FLYING MODELS

# Spotlight



## FLYING MODELS

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by Don Ross

This book is a tour de force, a real handbook of modeling. While its primary focus is freeflight modeling, there's plenty of info for those who are getting into small electric R/C. The information is practical and concise, with loads of illustrations and some very valuable tables of information. There are 15 chapters covering topics like props, gears, vacuum forming, sheet foam construction, covering techniques, electric power, tissue covering, rubber motors and more. Easily a book for novice or expert.

Order #A11530 **\$19.95**

**BASIC RADIO CONTROL FLYING (A11087)** Boddington. New to R/C flying? This book introduces you to selecting the proper plane, getting it ready, and then flying it. Illustrations, text, and photos. 63 pgs.; Sftbd. .... **\$12.95**

**BASICS OF RADIO CONTROL AIRPLANES (A11091)** Randolph. Using plenty of photos and clear easy-to-read text, the author lays the foundation for understanding what's needed, how it's used, and what works in radio control. 82 pgs.; Sftbd. .... **\$12.95**

**BASICS OF RADIO CONTROL BOAT MODELING (A11077)** Finch. This book covers everything from gas powered to electric boats; R/C electronics, two stroke engines, hull construction, racing, modifying, propellers, drive systems and more. 71 pgs.; Sftbd. .... **\$9.95**

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**COVERING R/C AIRPLANES (A11006)** Stille. Faye Stille's exact techniques for making an ordinary covering job an award-winning show stopper. Well illustrated. 53 pgs.; Sftbd. .... **\$12.95**

**CUSTOMIZING R/C AIRPLANES (A11002)** Stille. Not only novice modelers, but advanced scratch-builders, will benefit from the unique ideas and building methods presented in this unusual book. 165 pgs.; Sftbd. .... **\$14.95**

**DESIGN & BUILD YOUR OWN R/C AIRCRAFT (A11090)** Kenneth L. Smith. An abbreviated overview of the most important factors in model design. This book covers planform, thrust lines, dihedral, incidence, and trimming of aircraft. 86 pgs.; Sftbd. .... **\$10.95**

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By Larry Kruse

"The bad thing about experience is that it teaches you stuff you didn't want to know."

—ANONYMOUS

I had the television in my shop turned on the other evening as I was trying to finish up an Old Time Goldberg *Interceptor* for .020 Replica flying. There I was, working on an airplane that had been designed, kitted, and flown before I was even a gleam in my father's eye. As I tinkered with the airplane while half-listening to the current debacle going on in Washington, D.C., (that well-known island surrounded by reality), it occurred to me that I had in my hand an object of inestimable value, particularly as I contrasted it with the evening tumult spewing from the tube.

The *Interceptor* first flew successfully over 50 years ago and it will continue to fly successfully as long as anyone cares to build one. It will never change, lose percentage points in public opinion polls, or be reviled for its behavior. It is what it is. Its success—past, present, and future—is attributable to the fact that it flies by submitting to laws that are not made by man, laws that are not subject to the wiles of the "spin doctors", laws that are immutable and of such purity that they began with creation and will continue to exist as long as the concept of time continues to exist.

Unlike the furor and turmoil that surrounds most of our culture's daily activities, our models carry aloft on every flight a bit of timelessness, a small part of something larger and more permanent than themselves. We, as their creators, are privileged to share in that essence. There is some comfort in that.



PHOTO: FRED WUNSCH

Pete Azure is justifiably proud of his Howard DGA8 built for FAC Jumbo Scale competition. Pete is one of the outstanding flyers in the Cloud Buster Model Airplane Club in Royal Oak, Michigan.



PHOTO: ERIC MARSDEN

From our friends "across the pond" in Great Britain, the Rev. "Bill" Bailey, former Grumman *Wildcat* pilot, admires Pete Antram's free flight *Wildcat*, powered by an 8cc DC Merlin diesel.

## News from the kitting world

The well-traveled Lee Campbell of Campbell's Custom Kits, has moved within a stone's throw of the Academy of Model Aeronautics modeling Mecca in Muncie. (Say that three times quickly without getting your tongue tangled!) By the time this reaches you, he should be back in business as one of the few high-volume competition F/F kit manufacturers left in this country, much deserving our patronage for his quality products. His new mailing address is Campbell's Custom Kits, P.O. Box 3104, Muncie, IN 47307. We wish him well in his new location.

While this column does not wish to function in the manner of the infamous Internet "Drudge Report," there is enough substance to the rumor that the Canadian firm, Easy-Built Models, has folded to advise you to snare any kits you may have been coveting that remain on hobby dealer's shelves. At the same time, another rumor (totally unconfirmed, by the way), suggests that the EasyBuilt assets have been purchased by another prominent modeler or modeler(s). We will wait and see what transpires.

## Indoor NoCal Pylon Races

Indoor NoCal Pylon Racing actually began in Australia a number of years ago and has been exported to Japan where it is enjoying a great deal of success in the capable hands of the Shonai Peanut club of Nagoya. Jiro Sugimoto is one of the more active members of the club and is our correspondent for the explanation of the event.

Models are 13-inch NoCals of famous racing planes and are set up to fly to the left. Since it's a speed event, we'll assume (even though Jiro doesn't say so) there is no weight minimum, which means that anyone can build a competitive model. The course is composed of two pylons with fishing rod tops, which are about 10 feet high. They are set about 15 feet apart with the "Start" line placed half way between the pylons. Six to seven flyers compete at one time, beginning with a mass launch from the "Start" line.

After the mass launch, each new flight has to begin at the "Start" line and only complete laps are counted. The total elapsed time is 15 minutes for a race. The flyer with the most laps wins. Usually, with the hurry-up flight regime of chasing the plane, winding, and re-launching, eight or nine flights is the norm. Jiro didn't indicate how many laps are average for a race.

In addition to the flyer, each team has a pit crew of one for counting the laps and helping get re-wound and re-launched. One can imagine all of the excitement with that many colorful planes in the air, all of the chasing and maneuvering, and all of the potential for humorous calamity and collisions. Sounds like great fun! I'd be pleased to run any photos anyone has of this intriguing event. Thanks to Jiro, Tom Hallman, and Tim Hayward-Brown for providing the details.

## New publications

The Thirty-First Annual Report of the National Free Flight Society, popularly known

as Symposium 1998, has just been issued and is available for purchase from Fred Terzian, 4858 Moorpark Avenue, San Jose, CA 95129-2132. Checking in at a hefty 196 pages, the new Sympo covers a broader spectrum of the technical aspects of freeflight than any of its predecessors. And yet, editor Dan Tracy has managed to provide relief from the typical frenzy of formulas by including some armchair reading in the form of articles such as Henry Nelson's advice on engine care and break-in, and Charlie Stiles' provocative "Build or Buy".

Parsed out into six major sections, articles are grouped into categories such as "Science", "Propulsion", and "Electronics" for easy reference. Supplementing the six major sections are the traditional NFFS Hall of Fame nominations and the "Models of the Year" presentations. Worthy of note, MOY chair Bob Perkins and his committee elected to honor 14 models, one model component, and one gadget this year instead of the traditional "Ten Models of the Year" format.

In all, the 1998 Sympo is a watershed edition, worthy of anyone's bookshelf as a compendium of useful and interesting free flight topics. The price for this year's book is \$25 for NFFS members and \$5 more for non-members, postpaid to your door.

Another new publication for your consideration this month comes from Bill Hannan and the crew (Joan) at Hannan's Runway, Box 210, Magalia, CA 95954. Continuing Bill's newest series, *Models & Modelers Vol. 2*, follows the popular format of model plans, 3-views, photos, cartoons, whimsy, and sage observations. Included in this softbound 26-page booklet are a dozen 3-view drawings of rare and unusual craft (a Martinsyde *Semi-quaver*?); 75 photos of modelers and their models from all over the world; four model construction plans from noted designers such as Ulises Alvarez and Walt Mooney;



PHOTO: BOB SCHNEIDER

**Long-time modeler**, Bob Schneider, built this great looking Stinson SR-8 and finished it in Diana Cream and Maroon dope. Bob says he can't wait until the weather clears for its first test-hop.

and tributes to departed aviation personalities, their creativity and their craft.

Priced at \$10.95 plus \$2.50 surface shipping in the USA, Canada, and Mexico, this little volume is a "must have" companion to the classic Peanuts and Pistachios series of the last decade. I should also mention that Bill will send you a very nice 16-page illustrated catalog of the products launched from his Runway for a buck in this country and two dollars overseas, and, should you order *Models & Modelers*, I'm sure he'll throw in a catalog for free. Heck of a deal, isn't it?

#### Barrie's plans

One of Canada's truly outstanding modelers, Barrie Taylor, has been laid up with shoulder surgery these past few weeks, but has put his down time to very good use. He is now producing two NoCal plans of his designs, both proven winners in competition, and offering them to the modeling public at a very nominal cost.

One of these, constructed as a 5-6.2 gram ship, is the ubiquitous Lacey M-10, which has a ton of wing area and very simple structure. Laid out using 1/16 and 1/32-inch balsa structure for building ease, the Lacey has flight trimming tips on the plan and should prove to be a very popular NoCal rendition of the design.

The other sample plan Barrie sent me was the unusual Heinkel He 119, a German gull-winged fighter of WW II, built as an "unlimited" NoCal, i.e., no weight minimum. This ship, too, has a very generous wing area and a long fuselage, so it should be a threat, even when built to a heavier weight. The thing I like about both of these designs is that there is nothing esoteric about them. The motor sticks, for example, can be laminated from two pieces of 3/32-inch square and suggested markings for a more realistic appearance are right on the plans.

Barrie indicates that two additional plans, one for the Romanian I.A.R. 80, and one for a huge Yokosuka MXY-7 Ohka *Baka* suicide aircraft, are both in the offing and should be available by the time you read this. Each of his plans is \$3.00 with \$2.00 postage for up to five plans in the U.S. and Canada sent to Barrie Taylor, 2 Thackeray Ave., Winnipeg, Manitoba Canada R3K OH1.

Once again we've run out of space (and according to Editor Frank—time!), so we'll pick up things up again next month with good building tips and a couple of new high tech items to help you in your quest for modeling perfection. Until then, my address for correspondence is 1204 S. Mansfield, Stillwater, OK 74074. **CC**



PHOTO: ERIC MARSDEN

**Another British diesel powered craft**, this time a semi-scale REP Type L (above left), was the choice of Eric Marsden for his 1.5cc DC Sabre engine. Eric says the model features closed loop adjustable rudder and elevator for flight trim-



PHOTO: OSCAR SMITH

ming. FAC'er Oscar Smith really cranks out some good looking and good flying aircraft on a regular basis. His all red Jumbo Scale *Citabria* (above right) is a good example of his craftsmanship and attention to detail. Model spans 36 inches.

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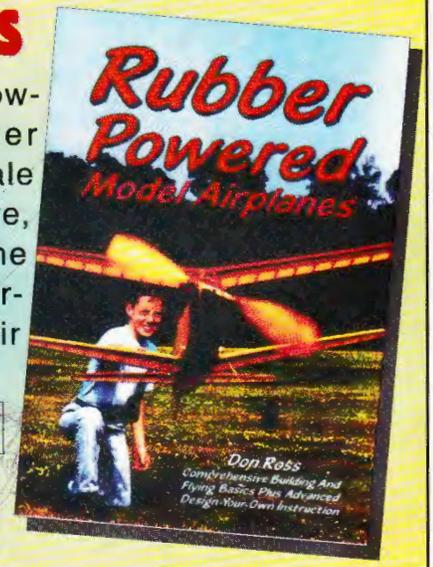
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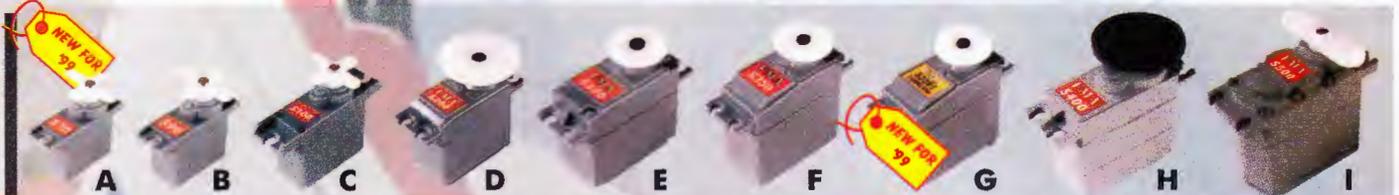


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C S100	MICRO BB	1.06 X 0.97 X 0.50	0.49	GEAR	25.0	ALL	\$21.95	GEAR
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D S300	STANDARD BRONZE BUSH	1.60 X 1.50 X 0.80	1.48		41.7	4 VOLTS	\$10.95	
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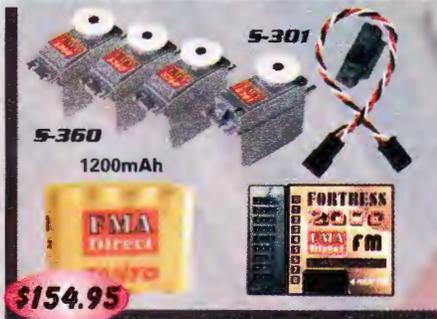
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