

# 1/2A ARROW

Designed for the double ball bearing PAW .049 diesel engine, this 254-sq.-in. model opens new vistas in 1/2A competition.

■ Barry Baxter

RECENT ADVANCES in 1/2A engine technology are rapidly squeezing out the venerable Cox Tee Dees in modeling competition. Hot-rod Shurikens and CSs delivering high performance at high rpm have broadened our expectations about what an engine can do. And not only Speed, Racing, and Combat fliers are benefiting. Stunt and sport fliers have discovered, in the double ball bearing PAW .049 diesel, an engine that provides excellent Stunt performance for one-third the price of a Shuriken.

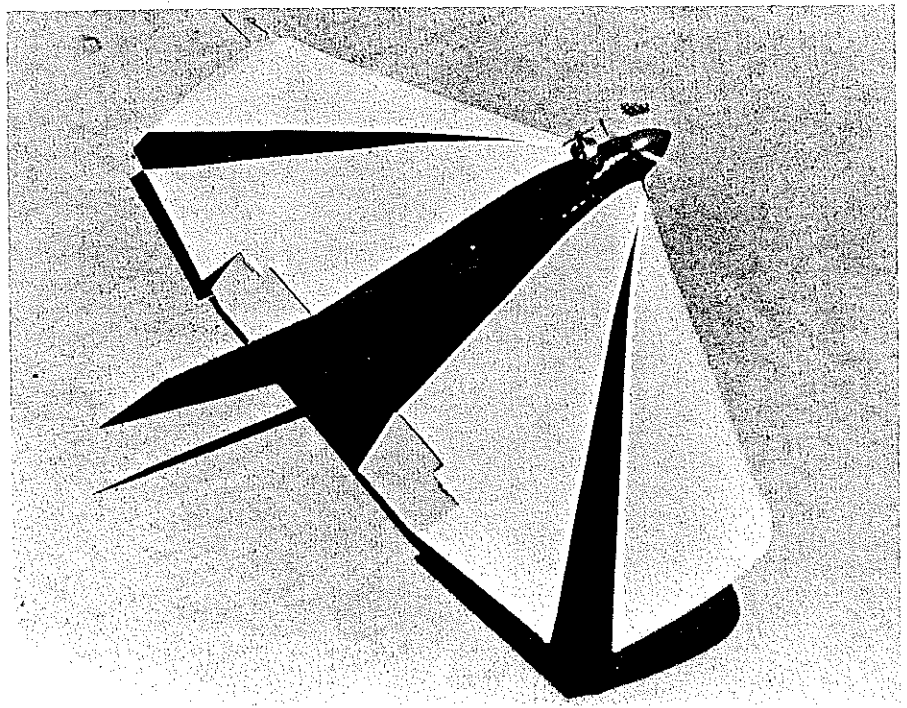
The PAW .049 is far more consistently smooth running than the Cox Tee Dee. It's also remarkably easy to start and simple to adjust for maximum power.

That's where the 1/2A Arrow comes in. I designed this model to take full advantage of the PAW .049 diesel's strengths. The engine swings a 7 x 4 propeller easily and pulls the 254-sq.-in. airplane through the pattern with authority.

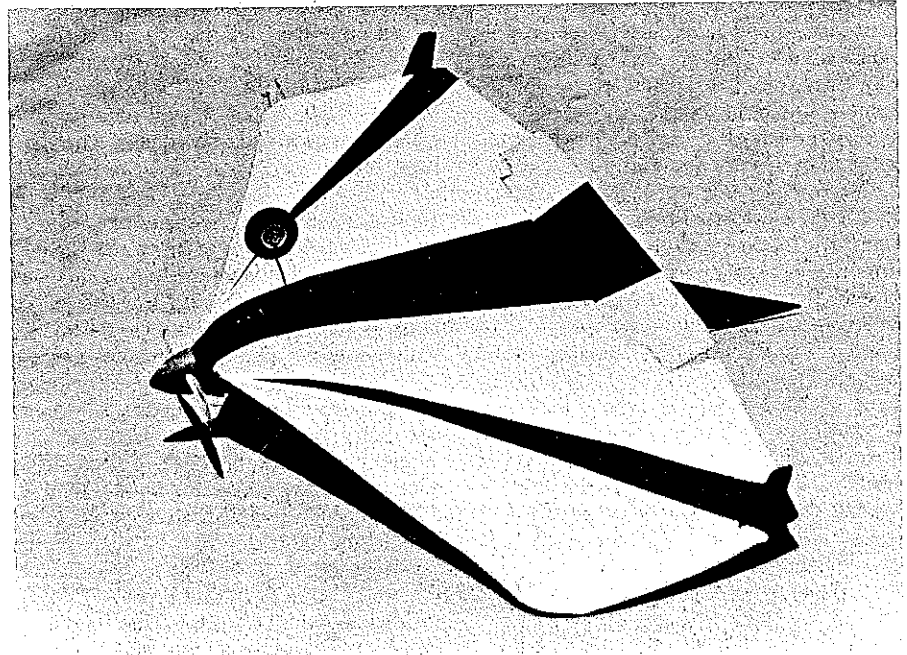
The PAW .049 can be ordered from Eric Clutton, 913 Cedar Lane, Tullahoma, TN 37388. The cost is about \$70, which is excellent for a double ball bearing engine. It's available in both Control Line Scale



The author with his watershed 1/2A flying wing. He needed a large wing to offset the extra weight of the PAW .049 diesel. The PAW takes you through the entire pattern on a single run, an obvious competitive advantage.



Above: Our author finished his flying wing design to striking effect in yellow MonoKote with black MonoKote Trim Sheet sunbursts. The fuselage, fin, and sunburst pattern were painted Black Baron black and edged with white trim tape. Clear Black Baron keeps the tape from lifting. Below: A look at the underside of the model shows the landing gear and tip skid setup.

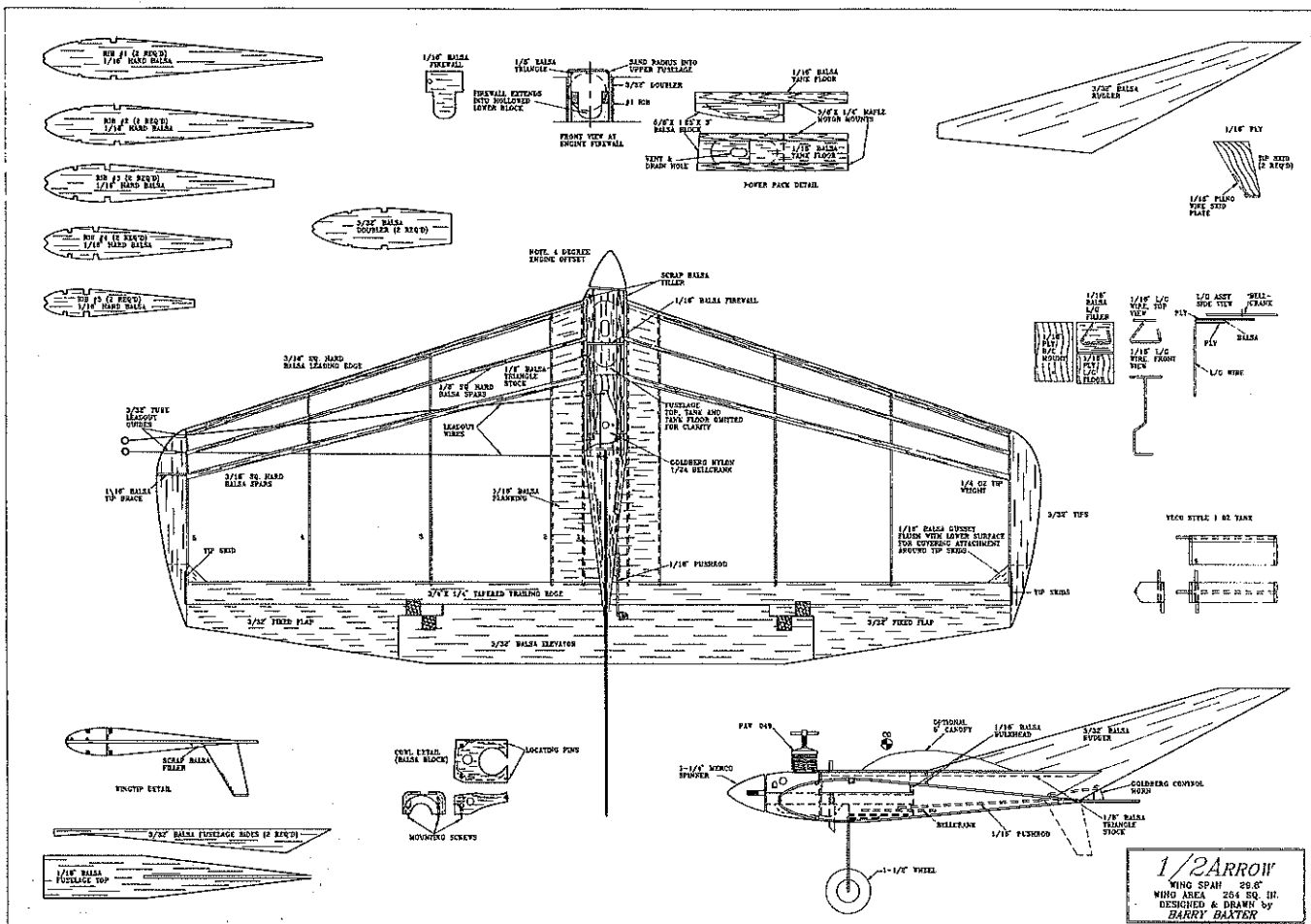


and Radio Control Scale versions from .049 to .35, and offers outstanding idling characteristics for either application. A PAW .35 has won Stunt at the British Nationals for the last three years.

The .049 was first tried in a 200-sq.-in. Stork, a profile Nobler look-alike that was successfully built for the Tee Dee. The Stork has flaps but employs a rather thin airfoil, and the 2 1/2-oz. engine's extra

ounce of weight and lower speed exposed the airfoil's deficiencies. Loops became amazingly wide.

Obviously, a large-area wing was needed to carry the weight of the PAW and diesels like it. Inspiration came from two 1950s-vintage Bill Netzeband flying wing designs, the Half Fast Combat and the Fierce Arrow Stunt. The flying wing has proven the most efficient way to gain



maximum wing area for the least weight, and these early designs still perform admirably in Old-Timer competition. This 254-sq.-in., 10½-oz. ½A model does credit to the genre—and marks a watershed in ½A Stunt competition.

When Stunt contests were dominated by Tee Dee-powered models, it was the flier who made it farthest through the pattern before the engine quit who usually won. The PAW .049-powered ½A Arrow makes incomplete patterns a thing of the past—unless you fly Stunt the way I do and forget a maneuver or two. A more common problem will be overruns. This engine barely sips fuel and will run about 10 minutes on an ounce of juice.

I use Red Max Fuel, available from FHS Supply, Inc., 239 Bethel Church Rd., Clover, SC 29710. The company mixes it to my recipe of 35% ether, 20% castor, 1.5% amyl nitrate, and the balance kerosene. This brew has worked quite well for me in all diesel sizes. The current nitro shortage gives diesel fuel the additional advantage of availability at a stable price.

Because of their slower, higher torque characteristics, diesel engines deliver a power band that lends itself much better to Stunt flying than do high-rpm glow engines. Most current engines have to be modified to provide this sort of power.

On its first flight the ½A Arrow exceeded my highest expectations. The only flaw was a slight twist in the wing, and that was

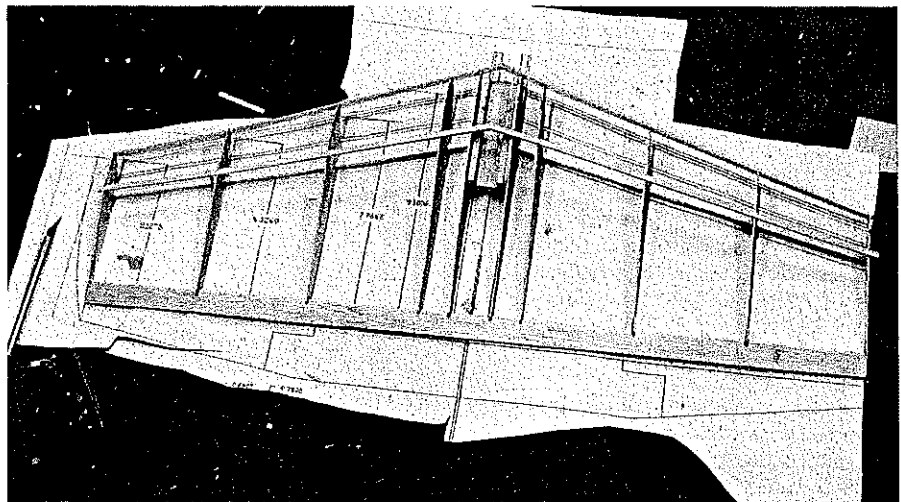
removed with a heat gun. Test flown at sea level and again at 5,000 ft., the model flew the pattern at both altitudes. At high altitude, however, the 7 x 4 propeller was too much for the little engine, and it lost rpm through the maneuvers. Substituting a 7 x 3 propeller would have made the engine more efficient at that height.

The PAW .049 starts and runs at the same compression setting, so little tuning is required once the initial settings are found. For high-altitude operation, the compression screw was turned in about

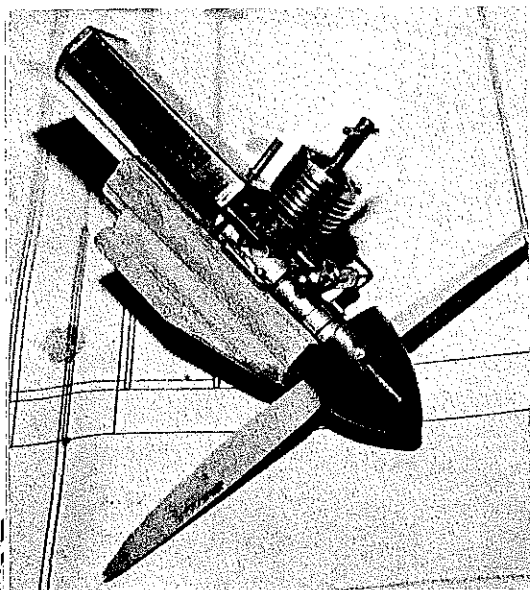
one-eighth turn and the needle valve was adjusted to a leaner setting.

### Construction

Building a model—or indeed a full-size craft—from a working drawing is fraught with difficulties. I usually build the airplane, then draw the results. This time I did it the other way around; and, sure enough, I had to make changes. This led to some peculiar building techniques. I've since worked out a more efficient method than that shown in some of the photos and



The basic wing planform under construction. Use the power pack assembly to space the No. 1 ribs and doublers. Note that the spars and leading edges reach the centerline.



The fully assembled power pack before the lower cowl block was shortened to fit the redesigned nose. The model was originally designed with a much longer nose.

the plan. It's described in the instructions that follow.

Begin by cutting out all parts to make a kit.

**Wing.** Be sure to use  $\frac{1}{16}$  hard balsa, at least for the No. 3 and 4 ribs. Since these ribs are unsupported for a good part of their length, they tend to become distorted when the covering material is shrunk. Draw engine mount reference lines on the doublers to ensure alignment when the mounts are installed.

Assemble the wing planform, allowing the leading edge and  $\frac{3}{16}$  spars to join at the centerline. They will be trimmed back later. Leave the No. 1 ribs and doublers loose until the power pack assembly and bellcrank mount are ready to install.

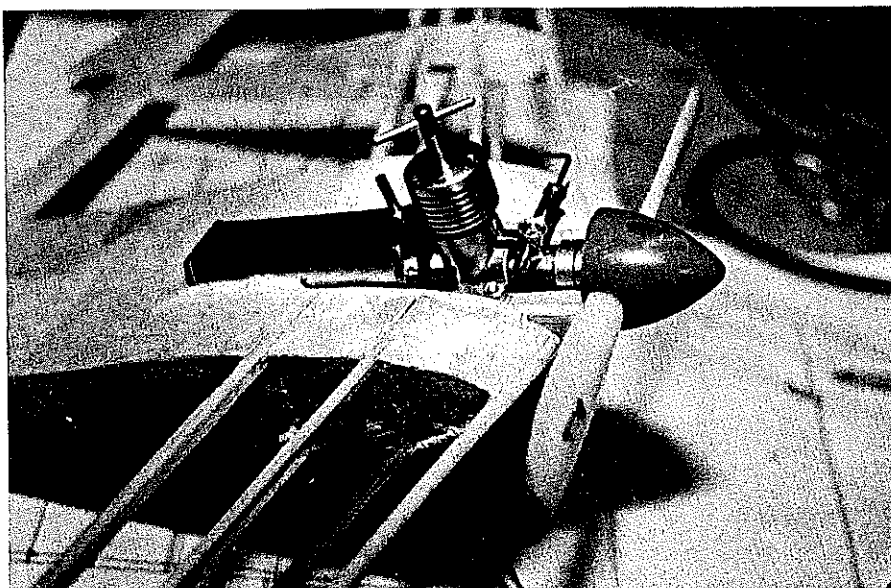
Install the fixed flaps and the wing tips, including the fairings and gussets for the tip skids. Add the  $\frac{1}{4}$ -oz. tip weight. Make sure the flaps are aligned with the chord line of the wing.

**Engine mounting, power pack, and landing gear.** Make the belly block either from a  $\frac{3}{8}$ -in. balsa block, or by laminating a  $\frac{3}{8}$ -in. and  $\frac{1}{4}$ -in. sheet together. Assemble the power pack by gluing the engine mounts to the belly block. Check that the engine mount blocks are parallel and the correct distance apart.

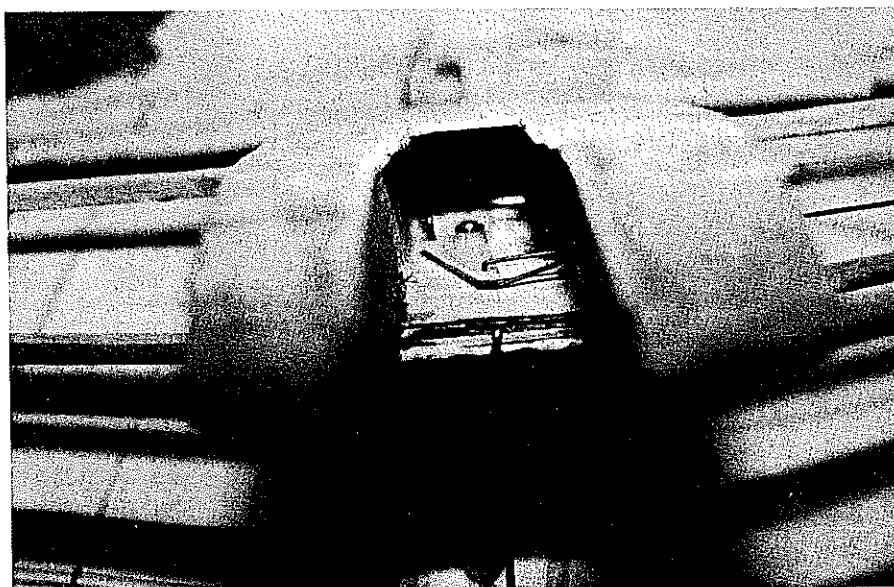
Bend the  $\frac{1}{16}$  landing gear wire to the shape shown, and assemble the landing gear sandwich. Slide the landing gear and power pack assembly into the wing assembly. Align the No. 1 ribs and doublers, and glue them in place. Cut out the lower spar, and glue the landing gear sandwich in position. Install the Goldberg nylon bellcrank, .020 piano wire lead-outs, and lead-out guides.

Cut away the leading edge spars in the wing center section, and install the power

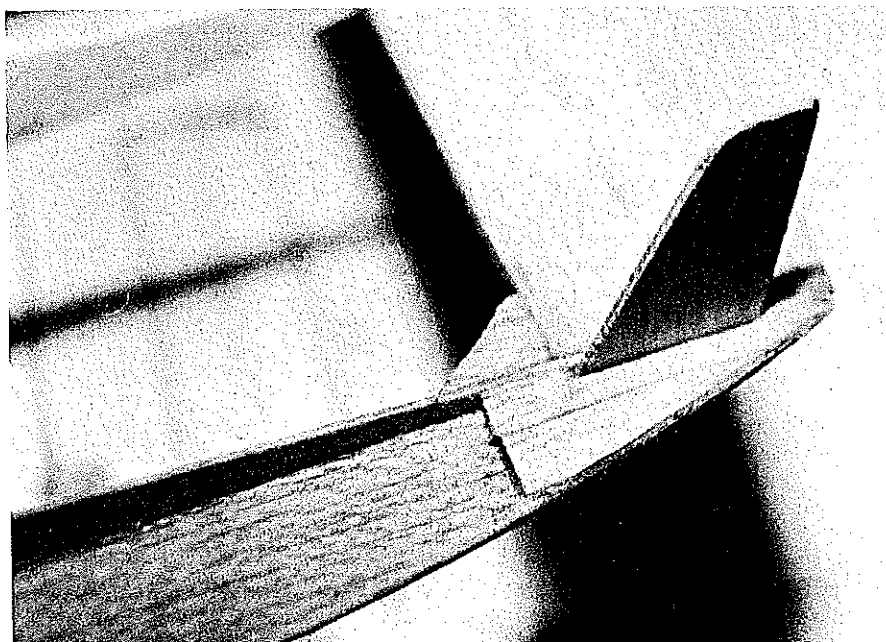
*Continued on page 144*



Engine and tank installation is complete except for the addition of the firewall.

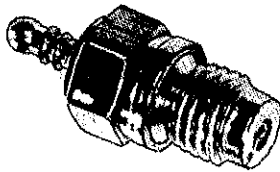


The landing gear sandwich has been glued in place, and the bellcrank has been installed.



Tip skid detail showing the fairing and triangular gusset.

# WE MAKE "MIRACLES" EVERY DAY!



**FOX 2-4 Cycle  
Special Glow Plug  
40702—Miracle Plug**

A totally new concept in glow plug design. Instead of using an idle bar, the MIRACLE PLUG is built with a pre-combustion chamber. The important thing to you is that this glow plug retains heat better than any other glow plug that we know of.

Try one, notice how much smoother your motor responds to throttle commands. Also, you will probably be able to fly with less nitro fuel. Try that low nitro fuel that wouldn't rev-out before. Tests also show reduced fuel consumption in many cases.

**WARNING!!!** Your motor will probably idle faster so re-set your throttle . . . Otherwise you might not be able to land.

Hard to believe . . . Of course! But check out our MIRACLE PLUG — Just in case. You'll love it!



5305 Towson Avenue  
Fort Smith, AR 72901  
(501) 646-1656

the July column was simply to invite reader feelings about the EAA.

The idea for posing this query to all of you came from a few of you readers, incidentally. In particular, some past reader letters and comments questioned the function and value of that organization. Some felt that the EAA focused only on the interests of a very few E-fliers, namely those specializing in the highest possible Electric performance, and as such they may not be representing the interests of most E-fliers at the AMA.

My July column intended only to ask for your feelings about this and whether it matters to you or not. The attendant question was whether it's time for a change in the EAA. At that time, I

promised to pass along the results of this survey, and that is what I'm now doing. Your loud and clear lack of response is, in my view, a very strong message to the EAA. 'Nuff said!

With this, the final column for 1991 ends. Please do enclose a SASE with any letter requesting a response. And do have a good Electric fall season!

## RC Helicopters/Jolly

*Continued from page 53*

crankshaft, the PLT allows you to retighten the prop nut without removing the engine from the machine. The PLT is a quality unit and comes with explicit instructions for its use. I must warn you that if you over torque the prop-nut, you could cause serious damage to your piston and connecting rod, so be careful and take it easy.

On the other hand, the PLT looks much safer and it is certainly more desirable than stuffing a dowel into the exhaust port of

your engine—something I've witnessed other fliers doing on their Concepts. On Board Systems can be reached at 7210 Jordan Ave., Suite D37, Canoga Park, CA 91303 818/999-3952.

BCNU

## 1/2A Arrow/Baxter

*Continued from page 56*

pack assembly, making sure the engine mounts are aligned on the wing chord and butted up to the landing gear sandwich assembly. Build up the sides of the engine mounts with scrap balsa so that the nose can be faired into the spinner.

Install the 1/16 wire pushrod; add the tank floor and bulkheads. Plank the upper and lower center section. Install the fuel tank.

**Tail surfaces.** Hinge the elevator. I used Goldberg nylon hinges. Rather than merely cutting a slot in the elevator and trailing edge, I cut shallow notches in both surfaces where the hinges would be mounted. After installing the hinges I filled the notches with Model Magic.

Install the control horn (included with the bellcrank), and attach the pushrod. Glue on the fin. Add the fuselage sides, triangular fillers, and top.

**Engine installation.** Note the engine offset. I've been experimenting with a concept much in favor with foreign Combat fliers, who use a good deal of engine offset—but no rudder offset—in a straight airframe. The straight fin keeps the airframe aligned with the flight path, and the offset thrust maintains line tension. The combination works as well on this model as it does on the foreign designs, judging from the strength they are showing in international competition.

Each set includes two 3"x1 1/2" overall labels, one 3"x1 1/4" 1/2" label, with picture three overall.

**ONLY 125 SET \$4.90 plus P&H**

**DO NOT touch power on without authorization.**

**WARNING**

**UNAUTHORIZED POSSESSION OF THIS AIRCRAFT LABEL SET IS A VIOLATION OF FEDERAL LAWS AND CAN LEAD TO PROSECUTION UNDER LAW.**

**AIRCRAFT/RADIO I.D. LABEL SETS**

Identify your aircraft per AMA safety rules! Self-stick labels are easy to apply, permanent. Send check for one set \$1.25 plus 35 P&H (\$2.20) or six sets \$4.80 plus 1.00 P&H (\$5.90) to Balsadust Enterprises, PO Box 76, New York, NY 10021.

PINS PATCHES

*Luran Emblem Co.*

CUSTOM ENAMEL PINS & EMBROIDERED PATCHES MADE TO YOUR DESIGN

(303) 667-4940

PO Box 1615 Loveland, CO 80539

No Gear Modification Needed!

**Snow Skis**

Tracks Great On Icy Surfaces!

These durable skis are made of lightweight aluminum and feature a unique steel spring that holds the ski rigid in flight plus elevates the axle above the ski so that no modification to your current gear wire is needed. You can go from wheels to skis in seconds. The sides of the main skis also have a special edge that allows excellent tracking even on icy surfaces. They are available in three sizes and can be ordered as trikes or just the mains. To order please send check or money order. In MN add 6% sales tax. In Canada send U.S. money order. FREE SHIPPING. Allow 2 weeks for delivery. Phone inquiries after 1:00 CST.

	20-30 Trike	24.00	Mains	21.00
<b>NORTHERN MODELING PRODUCTS</b>	40 Trike	28.80	Mains	24.00
	60 Trike	32.00	Mains	27.20

P.O. Box 21181, Columbia Heights, MN 55421 • 612-781-7333



Make the cowl from a solid block, or use laminated pieces. Carve and sand it to shape. Sand the rest of the model to the cross sections shown, paying particular attention to rounding the leading edge spars. The cowl is held on by small wood screws at the front. Keep the rear alignment pins short so that the cowl can be removed with the prop and spinner in place.

I used a 1 1/4-in. Merco spinner, which can be difficult to find on this side of the pond. If you can't locate the Merco, reshape the nose to accommodate a 1 1/2-in. spinner. Extra scrap material will be required on the right side of the engine mounts to fair in the larger spinner; don't reduce the engine offset to accomplish this.

Perhaps one of the spinner manufacturers will soon begin making spinners under 1 1/2 in. There ought to be a good market for them, particularly because of the availability of the newer 1/2A engines.

**Covering and finishing.** Choose your covering material carefully. Many of the plastic heat-shrinkable materials will shrivel up from diesel fuel. I've tried several with poor results, and have had good luck only with MonoKote and Micafilm. An alternative is to use old-fashioned dope finishes over the covering material of your choice. Fuelproof paint is not required.

Cover the model, and install the tip skids.

I installed the canopy after the first few flights. I cut a 3/32-in. slit from the rear of a Sig five-inch canopy. The slit followed the centerline far enough to clear the rudder, and the aft portion of the canopy was positioned on either side of the rudder.

**Flying.** Balanced at the center-of-gravity (CG) location shown on the plan, the 1/2A Arrow will be stable yet highly responsive. Moving the CG aft makes the model a bit twitchy.

Performance is excellent, with no surprises. I fly the plane on 35-ft., .012-in. lines. It's an outstanding Stunt flier. For the ultimate in high-speed performance—and a great Combat machine—leave off the upper fuselage section and landing gear, and add a Shuriken.

If you prefer even more torque, drop a DC Sabre .09 diesel into the mounts. Move the firewall rearward to accommodate the longer, heavier engine, leaving the nose length unchanged to maintain the CG—and enjoy the extra power.

Diesel engines have begun to catch on with the country's RC fliers; Eric Clutton is having difficulty maintaining inventory of the RC versions. The Control Line fraternity won't be far behind. If you're interested in ease of operation, fuel economy, and good, smooth, "torquy"

# "I'LL FLY WHAT I FIX!"

Special Fast Turnaround Now Available - CALL!

- Frequency Conversion From \$40.00
- Includes Crystals and Certification

## "RCD" AM & FM 7 Channel Receiver

Special, exclusive, on 6 meters - .....\$79.95  
(TX conversion available!)

Full 1991 Specs! Rx alone 72/75 mhz - .....\$69.95

Order -

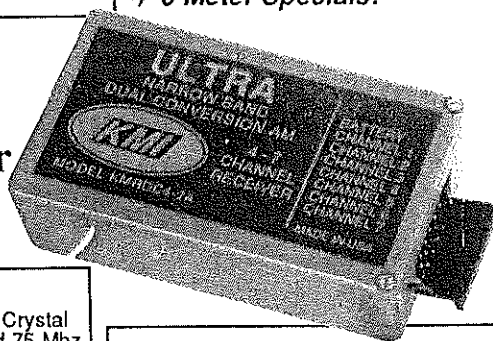
Model RCD100 Futaba 'G' AM .....	\$69.95
Model RCD150 Futaba 'J' AM .....	\$69.95
Model RCD200 Futaba 'J' FM .....	\$69.95
Model RCD300 Airtronic AM .....	\$69.95
Model RCD150KB Kraft K-Line "B" .....	\$69.95
Model RCD150JR JR AM .....	\$69.95
Model RCD150TH Tower 500 .....	\$69.95
Match tuned to 'Gold' 1991 Tx .....	\$74.95
Tuned and aligned with updating Tx .....	\$79.95
Tuned and aligned with Tx frequency change ...	\$89.95

## Service For -

Ace, Cirrus, EK,  
Futaba, Heathkit,  
Hobbyshack, JR, KGL,  
K-Line, KO Propo, Kraft, KSE,  
Logitrol, Novak, Royal,  
Tower Hobbies,  
World Engines

- Spectrum Analyzers
- Calibrated Test Instruments
- Large Inventory of R/C Parts - Crystals!
- 6 Meter Specials!

## Call Today! Ultra Narrow Band AM Receiver



Model KMRDCA-7A - Years in the developing - but worth the wait!

### Features:

Dual conversion • Dual AGC • Dual Crystal and Ceramic Filters • 50, 53, 72 and 75 Mhz • Connectors for all Kraft styles, Deans, World & specials

### Specifications:

- Size: 2.75" (70mm) x 1.65" (41.5mm) x .825" (20.5mm)
- Weight: 1.65 oz.
- Working Voltage: 3.8 - 6.0 VDC
- Temperature: -10° to +120°F
- 10 Khz spacing
- Bandwidth: +/- 8.5 khz at 60db down.
- 30IP; +3db
- Image: 60db down

### List Prices:

Exceeds AMA Rx Guidelines	
4 Channel .....	\$94.95
5 Channel .....	\$99.95
6 Channel .....	\$104.95
7 Channel .....	\$109.95
For Pro-Line Units add \$10.00	
Dealers Discounts available	
Rx Trade In - \$5-\$10	

- Send a Self Addressed Envelope for Brochures
- UPS, U.S. Mail, Federal Express and C.O.D.
- Shipping Charges Extra
- Mastercard and Visa Accepted



## Kraft Midwest Inc.

115 E. Main, Northville, MI 48167

(313) 348-0085 FAX (313) 348-4175

power, diesels are the way to go.

For 1/2A Stunt competition or sport flying, the Arrow is hard to beat. Power it with a diesel, and stand ready to be amazed by how carefree small models can be both to operate and to fly. □

## AMA/NFFS/Murphy

Continued from page 14

While still not widely used or readily available, the new CS and Shuriken racing engines copped the first three places in this event. The models used had wing areas in the 300 sq. in. range, and the added power was evident as they seemed to jump away

at launch at a much faster rate than we were accustomed to with the Cox engines.

Ed Keck utilized a CS engine set up by Galbreath to win with Robert Dunham II and Jean Paillet following with Shurikens in second and third place. Jean had lost his first Shuriken on a test flight at the last Nationals. Would you believe the finder returned it in perfect shape to the AMA trailer during this week? Some guys have all the luck! Jim Troutman lacked just three seconds to max out to win the Junior age division.

Steven Landy stopped Warren Kurth's string of consecutive Nationals wins at four, as Steven established a new Category III record in the .020 Payload event.