

Cardinal Stunt '89

With the classic lines of a 1960s Stunter and the proven aerodynamics of a Patternmaster, this CL design is a winner through and through.

■ Windy Urtnowski



IN the history of the Stunt event, only four ships have been awarded 20 appearance points, rendering them perfect airplanes in the judges' eyes.

The first 20-pointer was Gene Martines's awesome Mariner. That was followed six years later, in 1986, by "Ski" Dombrowski's Lacemaker. Then in 1988 came Jim Casale's Columbia and my own Cardinal. I'm honored to be part of such a small group of artists.

For the Cardinal, I wanted the classic lines of a 1960s Stunter, the proven aerodynamics of a Greenaway-designed Patternmaster, the built-up construction of an all-wood airframe, bulletproof controls for all-weather flying, and the dead-reliable engine characteristics of a "Big Jim" SuperTigre .60 Hemi.

I also wanted—and installed—wing-mounted gear for pavement landings and fuselage-mounted gear for those East Coast rough-grass shoot-outs.

With a wing displacement of 1,980 cubic inches, the Cardinal is ideal for the SuperTigre .60 engine. There's no need to



Big picture: The author with the '91 version of his 20-appearance-point CL Stunter, one of only four such ships ever to have won the maximum appearance points. Above: Top five finishers at the 1991 Nationals. The Cardinal (second row, right) finished a strong second in some extremely nasty wind.

CL Cardinal '89

Type: CLPA

Wingspan: 62 inches

Recommended engine size and type: SuperTigre .60

Expected flying weight: 60-70 oz.

Type of construction: Built-up

Type of covering/finish

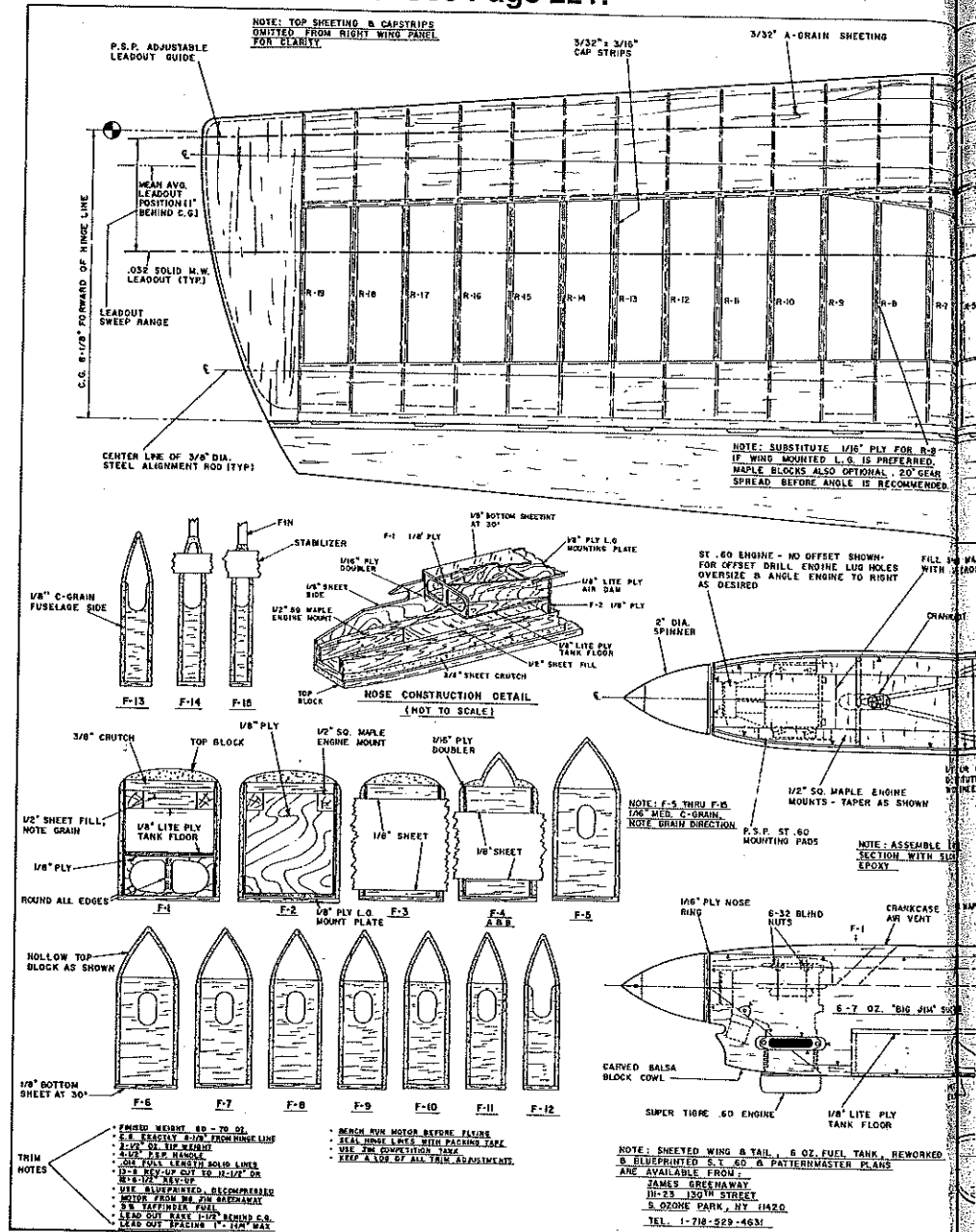
recommended: Silkspan (wing and tail surfaces) and tissue (fuselage); talcum-and-dope; clear coat buffed with Gorham silver polish and Final Shine.

build the model entirely from punk wood or to use a thin finish. (*Editor's note: Punk wood is very soft, lightweight balsa.*) Build the nose solid, don't cheat on the finish, and that wing will create enough lift to carry a bulletproof airframe through years of contest-winning service.

Cardinal airframes typically go for thousands of flights without a stress crack. The original Cardinal airframe survived a midair with an Old-Timer Stunt ship that wandered into the circle at the June 1990 Garden State Circle Burners contest. (The pilot of the OTS model never realized he'd almost destroyed a work of art.)

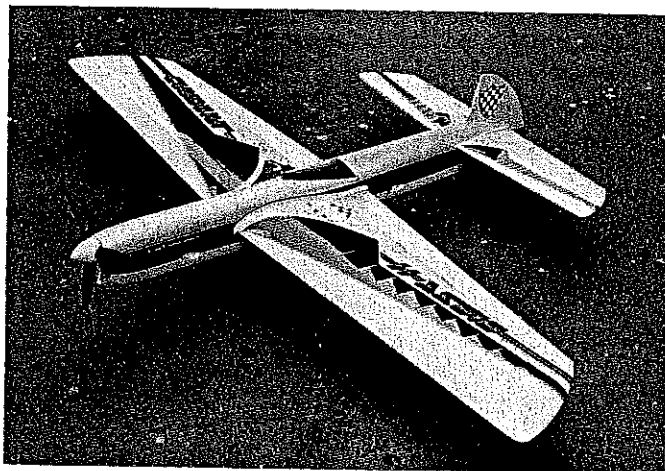
With hundreds of Patternmasters built, the design numbers have been proven over time. That's what makes the Cardinal special. After 2,000 flights with this type of ship, I've learned the numbers to get such a model 90% bench trimmed even before its lines have been attached. The center-of-gravity is the most important thing to get right before you fly. Locate the CG eight to 8 1/8 in. forward of the flap hinge line.

Make a stand by anchoring two pencils in a wooden block with the erasers pointed straight up. Space them wide enough apart to straddle the fuselage width. Place the Cardinal on the stand, and balance the model precisely. Turn the model over, and

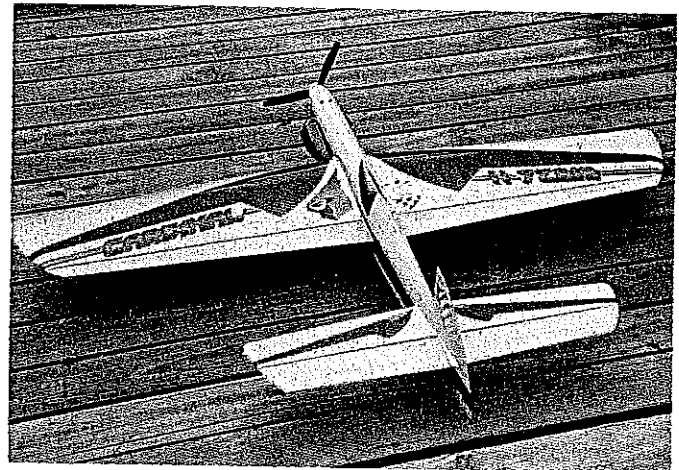


suspend it by holding the tail wheel and one prop blade. Put a gram scale under the outer wing tip, and add lead to the tip until the

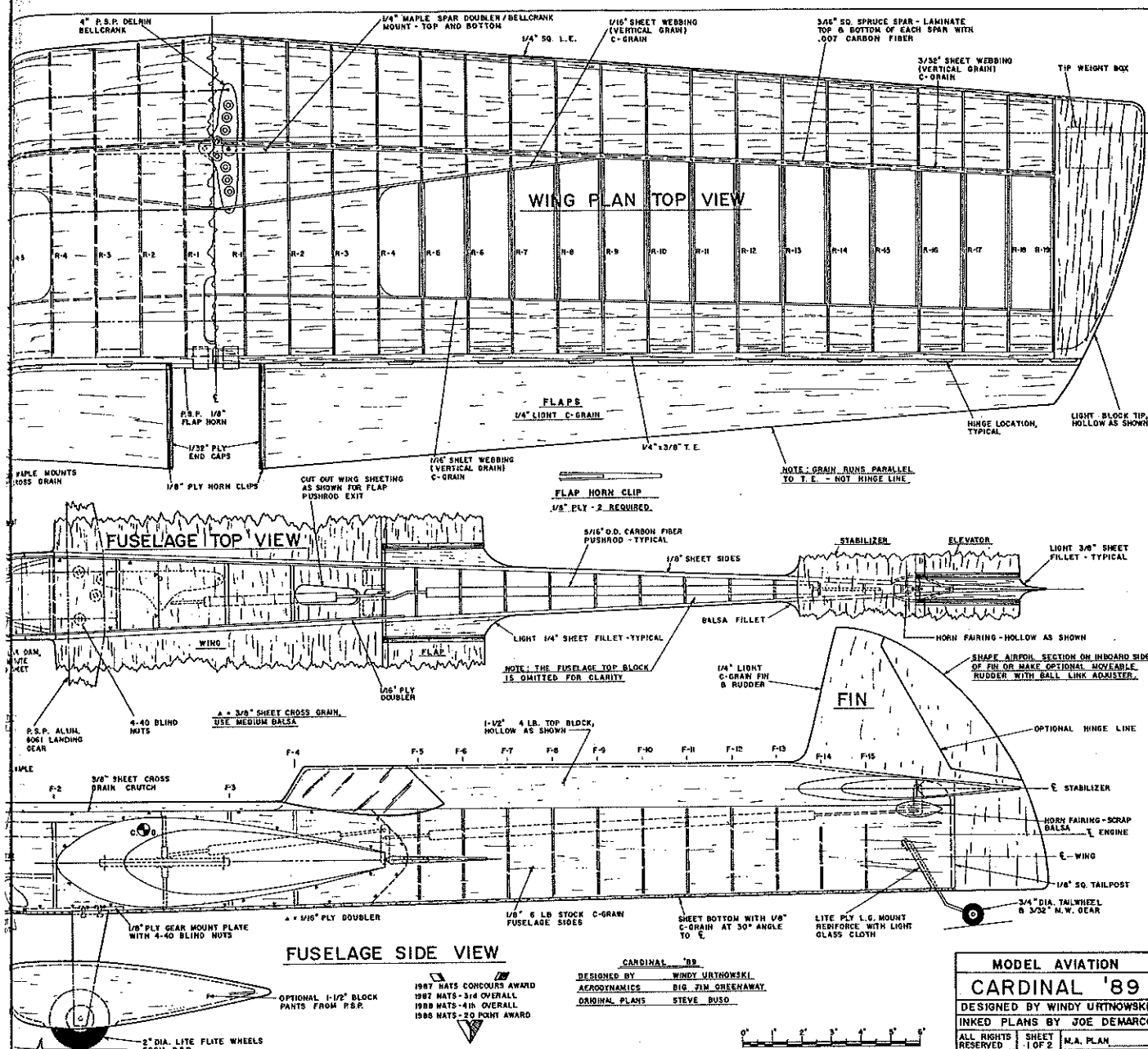
scale reads 2 1/2 oz. If you're using .018 braided lines instead of solid ones, keep adding lead until the scale reads 3 oz. Set



Cardinal '89. Urtnowski has experimented with many color schemes, each with a characteristic mirrorlike finish.



Concours-quality ships are made during the finishing process. Two polished final clear coats add luster.



MODEL AVIATION
CARDINAL '89
 DESIGNED BY WINDY URTNOWSKI
 INKED PLANS BY JOE DEMARCO
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the average of the two lead-outs at 6½ in. forward of the flap hinge line—in other words, 1½ in. of lead-out rake. Use 1¼ in. of rake for solid lines. These ballpark numbers ensure good performance.

Once bench trimming has been completed, run the engine twice with the plane on the ground, tighten all bolts, clean the fuel line filter—and you're ready for some very competitive flying on your first day out. All the guesswork has been eliminated from this program.

A Greenaway engine and fuel tank will give you years of hassle-free flying and consistent engine runs.

Don't drill lightening holes in the engine mounts or substitute parts in the nose in a mistaken attempt to make it lighter. The fuselage will weigh 10 to 10½ oz. when properly built, and it won't self-destruct halfway through the season. Years later, you'll appreciate the wisdom of this type of engineering. Nothing is more frustrating

than a model that begins to self-destruct just when it's trimmed out and the Nationals is only a few weeks away.

A list of sources for the required hardware is included on the plan. Don't use .35-size control parts or compromise the design with inadequate hardware.

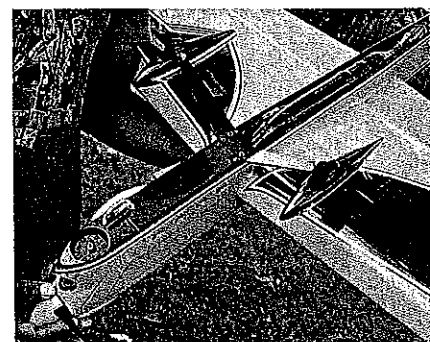
I flew the Cardinal prototype at the 1987 Nationals, using the model as a test bed for Craig Gunders's experimental exhaust systems. The ship battled Lincoln's heavy winds to take third place and won both the Sheeks Innovation Award and the Concours d'Elegance. I built two more Cardinals in 1988 and 1989, and used them to develop tuned pipe systems for the SuperTigre .60.

The evolution of the tuned pipe system is well documented in a set of videotapes, available from Pro-Stunt Videos, 9 Union Ave., Little Ferry, NJ 07643.

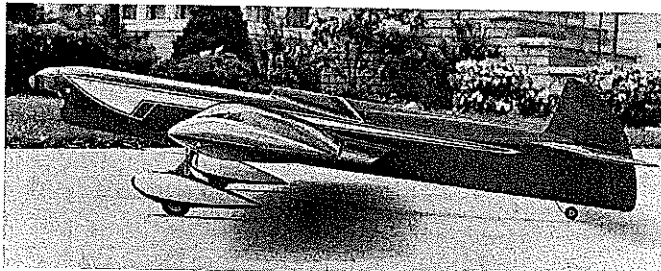
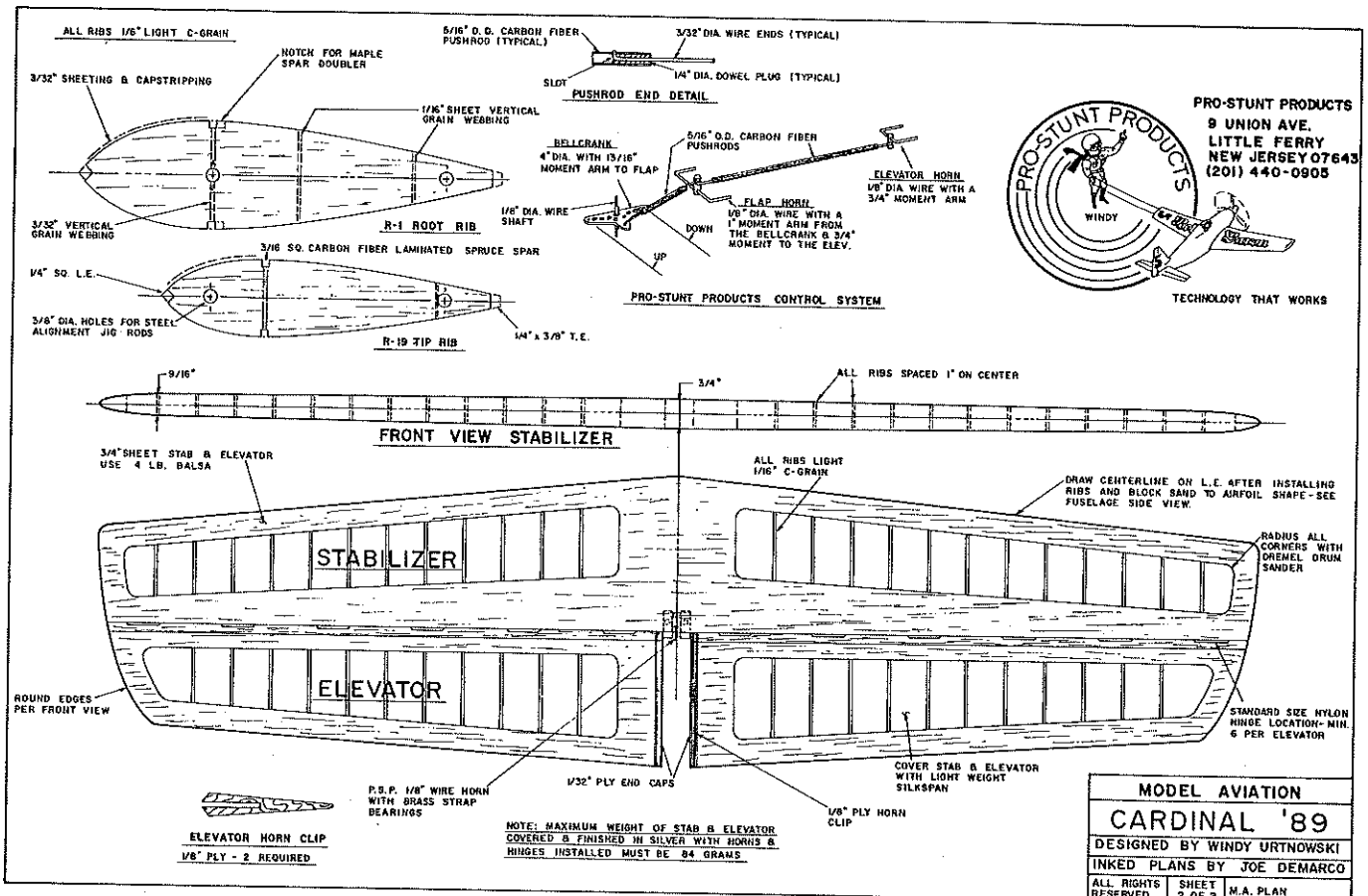
Several Cardinals have been built with modifications such as clipped wings and flat

wing tips, but none seem to have flown better than the ones built strictly to print. I've flown nearly every Cardinal built, and they've all performed well.

If this is your first .60-powered ship, don't try to come up with any cute inventions aimed at a superlight design—



Pro-Stunt Products custom made the exhaust system. "Big Jim"-style nose has air outlets on the fuselage side.



Left: Pilot's eye view of the Cardinal's rakish lines. Right: Art school grad Urtnowski ink-lined the cardinal's head freehand using a drafting pen. Letraset press-on letters spell out the model's name and other remarks.

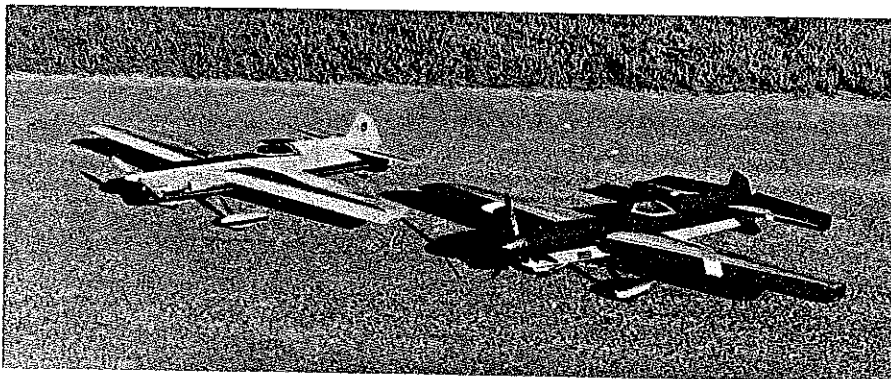
Swiss-cheesing the engine mounts or doublers, for instance. The nose construction guarantees consistent runs with a .60 engine. If you choose foam wings, reinforce the wing center with fiberglass; don't skimp on strength.

Construction

Wood selection: If possible, use only C-grain, 4- to 6-lb.-density wood for the wing ribs, fuselage sides, tail feathers, and formers. Use A-grain sheeting for the wing. Use lightweight blocks for the wing

tips and the fuselage top block.

Even if some of your wood isn't up to standard, the Cardinal won't disappoint you. Greenaway did a professional job in working out the aerodynamics, and he deserves most of the credit for the unbelievable success of this design. The Cardinal is truly a classic.



Wing: Make two plywood rib templates. Stack-cut the rib blanks with one template at each end. Run bolts through the rib stack, and clamp it securely. Carve and sand the ribs to final shape.

I built the wing on a homemade jig using 3/8-in. rods. After completing the basic framing, I added the leading and trailing edges and the cap strips. The wing tips are hollowed-out blocks. The bellerank mount is similar to that used for foam wings.

Much of the wing and tail construction follows traditional techniques used for the Nobler, which are familiar to advanced builders. Less experienced builders may

Many Cardinals have been built. Dave Midgley's are among the prettiest and best flying. Both use molded fiberglass wheel pants from Pro-Stunt Products.

want to check out the thousands of hints and tips in the Nobler construction videotapes available from Pro-Stunt Videos.

As an alternative, foam wings for the Cardinal are available, sheeted or unsheeted, exclusively from Big Jim Greenaway. Call (718) 529-4631 for Big Jim's latest prices on wings, tanks, and engines.

Build the stabilizer and elevator using the lightest wood available.

Cover the wing and tail surfaces with silkspan. Add unscented talcum powder mixed with clear dope for a silver luster. The dope will harden while you're building the fuselage. Be fussy—fill every nick in the silver *now* for a flawless, glasslike finish.

Fuselage: Begin by building the engine crutch. Place aluminum pads on the engine mounts, and attach both mounts to the engine with the correct offset. Fill in the area between the mounts with 1/2-in. cross-grained balsa. Remove the engine, and build the body around the crutch.

Use epoxy on all nose construction.

Carve and hollow the top block.

Sand the fuselage to final contour. It's a lot easier to do this now than to wait until the wing has been installed.

Place the fuselage parts on a perfectly flat table, and align them on their centerlines. A machinist's rule comes in handy for this task.

Cover the fuselage with tissue, adding the dope-and-talcum-powder mixture for a silver luster.

I used Sig finishing products exclusively for this model. They provide a beautiful finish while adding minimal weight.

It's during the finishing process that Concours ships are made or lost. Sand out every flaw, and fix every ding. Keep at it until the model looks machined from a billet of solid aluminum.

Since I chose a translucent color coat—candy apple red—the base had to be absolutely perfect. The 1987 ship used candy apple red over silver; the 1988 version had a pearl white undercoat.

After adding trim, lettering (I use Letraset), and ink lines, mix the clear coats as follows: two quarts Sig Litecoat, two quarts DuPont 3608S, one tablespoon Dave Brown Flexall, and three drops of fisheye killer. Spray on half this amount with the air pressure at 20-25 psi. Wait two weeks for the gases to completely evaporate, then sand to a dull satin finish with 600- or 1,200-grit paper.

Spray the final half of the clear coat, again at 20-25 psi. Wait at least six weeks, then sand with 1,200-grit paper. Buff with Gorham silver polish and Final Shine, then buff again in about six months. The mirrorlike finish will last for many seasons.

I also like to spray some Imron* around the nose section to protect it from droplets of raw fuel. (* Note: Safety precautions needed! Imron is not for amateurs. Inhaling fumes from Imron can lead to extremely serious health problems.)

Take your time, and work hard. You'll be rewarded with a front-row model.

Propeller: I've always liked big-diameter wood props on this design. The small, multibladed carbon props will give you a bit more cornering ability in the square maneuver, but at the price of faster airspeed. Start with a Rev-Up or Top Flite 13 x 6 full prop and the same size cut to 12 1/2 in. for windy conditions.

Tailoring the corner: My technique is to get the static balance at exactly 8 1/8 in. Test-fly the ship with the lines spaced 4 1/2 in. apart at the handle; you'll have 1 1/2 in. of overhang. To increase cornering ability, space the lines farther apart at the handle.

To increase the power-steering feel, shorten the overhang to 1 1/4 in. Somewhere in that range you'll achieve a super, tight turn at the corners and control response to suit your skill level. Do your fine-tuning at the handle, not by altering the center-of-gravity.

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(Editor's note: PAMPA is the Precision Aerobatics Model Pilots Association—a

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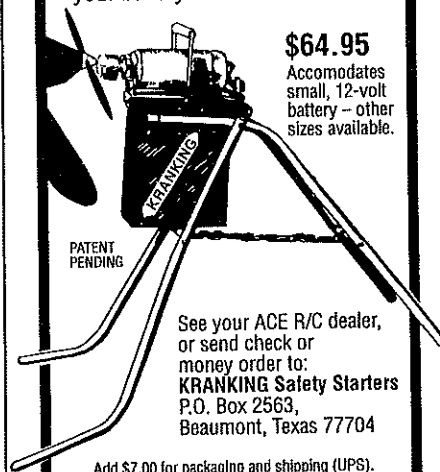
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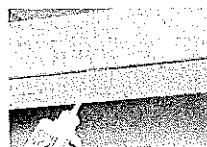
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supply company, but the cheapest alternative is a pair of automobile positive crankcase ventilation (PCV) valves sold for a dollar or two at any department store automotive section. Some hunting and experimentation will be necessary to fit your specific configuration of tubes and fittings.

The intake valve can be screwed directly into the spark plug hole, opening on suction created by the piston downstroke and closing under pressure of the upstroke. By soldering the intake valve to a half-inch copper pipe fitting, you can screw the outflow valve into the exhaust port, where the muffler used to fit. Threaded joints should be sealed with Mylar tape or silicone glop.

With the one-way valves installed, the assembly becomes an efficient air pump. Provided the motor is adequate and a suitably low-ratio belt-drive reduction setup is used, the pump will continue to work until something in the system explodes.

A regulator valve must be installed to either release excess pressure or shut off the power at a preset level. Both types are common and relatively inexpensive.

"Blowoff" safety valves are installed on water heaters, and pressure-sensing electric switches are universally employed on water system pressure tanks. With luck, a discarded but serviceable example of either can be found at the dump or on a plumber's scrap heap; otherwise, you'll have to purchase one.

A blowoff valve is a bit less expensive. Because it requires no wiring, it's also simpler. The drawback to using it, however, is that the compressor must be run constantly.

The pressure-sensing switch wired into the motor circuit is preferred, as it automatically cycles the motor to keep the reservoir tank full. These regulators are usually set for a range of 40-60 lb.; i.e., at 60 lb. the power is cut, and when the pressure falls below 40 lb. the power is turned on again. This range is fairly ideal for a modeler's needs, but the settings can be fiddled with by turning a set of adjusting screws.

No special tubing is required. Quarter-inch or 5/16 vinyl tubing secured with hose clamps withstands the pressure just fine.

Before being routed to the workbench, the air should be dumped into an accumulator tank to smooth out the pulses and form a supply reservoir. An empty freon tank salvaged from an auto repair shop dumpster will fit the bill. The nozzles on these tanks have a flare thread that does not match plumbing pipe fittings, but auto supply houses have adapters that mate flare, pipe, and tube fittings.

Dirt, oil residue, and condensed water blown through the lines can wreck a paint job and an airbrush, so a filter and drying device should be inserted downstream of the accumulator.

A ready-made water trap can be bought from any of the airbrush manufacturers, or a more effective (and less expensive) one can be arranged using chunks of foam rubber for filters and calcium chloride (CaCl) desiccant crystals, sold in hardware stores for drying out damp closets. When the CaCl becomes saturated, pop it in the microwave or toaster oven for a few minutes to dry it out.

Any airtight metal or plastic container will do as the filter canister—as long as it can withstand the pressure (*no glass!*). Hose nipples can be attached by soldering or epoxying.

The supply line to the workbench can be flexible vinyl, PVC plastic, copper, or iron pipe, ending in a stopcock or quick-connect fitting. A manifold with multiple ports can be rigged to allow simultaneous use of a sprayer, blowgun, or other tools. You might consider adding a pressure gauge for a final touch of class.

With luck and diligent scrounging, just about all the components can be found for free. A few bits and pieces of hardware will have to be bought, but the total price should remain under \$20. →

PARTS LIST

Qty.	Item	Cost
1	Engine block, 3-8 hp horizontal shaft	0
1	Appliance motor	0
2	Drive pulleys	\$3
1	Drive belt	\$2
4 ft.	2 x 12 wood base	0-\$4
2	PCV valves	\$2 ea.
10 ft.	1/4- to 5/16-in. tube: vinyl, rubber, copper, plastic	\$.10/ft.
11(?)	Fittings, reducers, adapters, as needed	\$.50 ea.
?	1/2-in. hose clamps	\$.50 ea.
1	Pressure switch or safety valve	0-\$15 0-\$8
10 ft.	#12 electrical cord	\$.20/ft.
1 ea.	Switch, outlet box, cover plate, plug end	\$1.50
1	Freon tank	0

RC Pattern/Staub

Continued from page 41

Steve Stricker, finishing in fourth place, knocked hard on the door several times to push into the top three, but received no reply. With at least 25 hard-core, extremely proficient pilots in the U.S., F3A gets tougher every year.

For most of the contest, the weather was cool and crisp with engine performance at its peak. The wind was very difficult, blowing almost straight out at about 20-25 mph.

The most curious thing was that even with this condition, many of the pilots were flying quite close; many suspect that styles from the World Championships, flown in October 1991, were the motivation for doing it. This writer satisfied his own curiosity about the subject on the last flight of the finals, when he decided to move his flight way in and received his best score of the contest!

More will be known about whether this is a widespread new propensity or just a vagary of the Nationals competition after N-PAC (the NSRCA Pan-Am RC Championships, to be held in Lawrenceville, Illinois, July 26-August 1), the next big RC Pattern event this summer.

Overall attendance was down for Pattern at this Nationals, and without opening up a can of worms, some believe this was because of the timing (the Nationals so early in the season), the economy (people not having enough money to attend), or the impending N-PAC competition.

In summary, the 1992 Nationals RC Pattern event was a great success, and congratulations are in order for all the winners, with much thanks to Tony Stillman and the AMA for a great contest. →

CL Cardinal/Urtowski

Continued from page 145

special interest group.) Send your dues of \$15 per year to Mike Keville, 6109 E. Ivyglen St., Mesa, AZ 85205. The bimonthly newsletter *Stunt News* offers many interesting tips.

If you build a Cardinal, please send me a photo to add to my album. With so many of the models built and flying well, Cardinal owners could benefit from exchanging information.

A very special thanks to Big Jim Greenaway for his help with every aspect of my Stunt program over the years. Big Jim is the one to call if you need advice or assistance with engines.

The Stunt event has changed little since its inception, and the classic lines of the great Stunt ships are alive and well. As timeless as a '55 Chevy, these vintage designs still arouse the artist in me. They make me wish I were young again. →

