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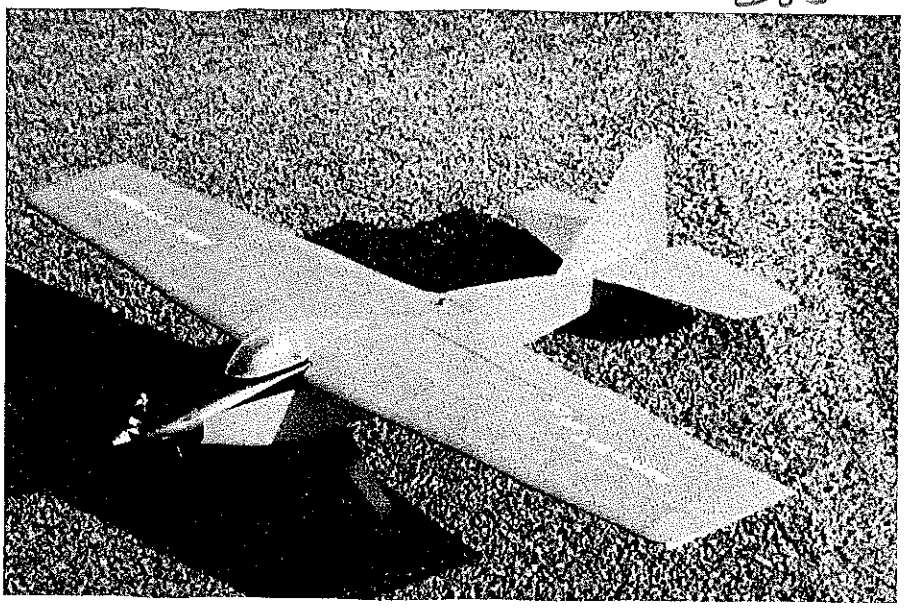
AKRO BAT JR.

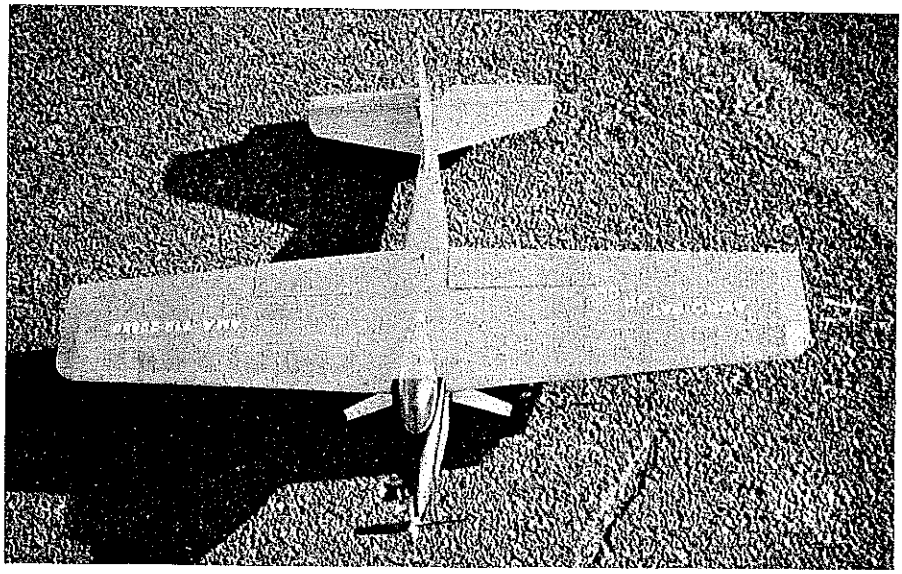
This sleek little Sport Stunt model takes ½A CL Aerobatics to new heights of performance. It's a great way to try out the latest and best in ½A engines.

■ **Design: Bill Winter**

■ **Text: John Hunton**



Above: Clean good looks and spectacular aerobatics capability are hallmarks of Bill Winter's designs. This CL Sport Stunter is great for practicing the AMA pattern. Model is covered in Japanese tissue with black trim, vinyl stick-on lettering. Below: Overhead view showing the rhythm of the ribs, pleasing lines, needle-pointed nose. A single screw holds the wing on, but most of the stress is taken by a dowel that runs from the front of the wing to the plywood key former. The canopy is attached in two parts, with the joint overlapped.



DESIGNED to take advantage of the newest and best in ½A engines, this Control Line Sport Stunter flies as well as its good looks suggest. For less than maximal but still adequate performance, the Akro Bat Jr. can also be flown with the Kustom Krafts-manship Cox engine.

Sporting his winter beard and Australian hat, the author gives scale to his diminutive CL Sport Stunter. Bill originally designed the airplane for .40 RC, but it looked so good that the author suggested this ½A CL rendition first. The hat? After years of flying models in the sun, the sun looks back.

Bill Winter and I have updated two of Bill's classic RC designs during the past few years. The RC Special was published in *Model Aviation* for March and April 1990, and the Cloud Niner (a revision of the Krackerjac) will appear in *RC Modeler*. For the Cloud Niner we extended the flight envelope on the low velocity end by using flaperons and split flaps. We decided to carry the idea further for our next project by stretching the performance envelope on the high-velocity end while keeping the low-end gains. In other words, the new model should have exceptionally wide performance capability.

Collaborating with Bill has been rewarding. He's a thoughtful man with superb design talent, and everything he turns out has that magic touch. For this latest project, in no time at all Bill had produced sketches of a short-coupled shoulder-wing model with the distinctive lines and proportions that are his trademark. To test the design I volunteered to execute it in a ½A RC version. At the drawing board, I found myself visualizing a Control Line Sport Stunt model instead.

"Why not?" was Bill's response. He suggested scaling down the empennage and lengthening the nose. Otherwise the lines remained the same. We dubbed the model Akro Bat Jr.

One of my models took first place at last year's Northern Virginia Control Line ½A Stunt contest, but aesthetically it's sort of blah. I couldn't imagine people wanting to build it. With Akro Bat, I could. But would it look as good in 3D as it did on paper? And how would it fly?

Two weeks later, we had our answer. This little model makes high-performance ½A CL flight a reality. Equipped with maneuvering flaps for tight squares, Akro Bat does it all—inside loops, outside loops,

squared loops and verticals—and looks good doing it. Bill really pushed back the performance margins with this one.

Fly it with the Kustom Kraftsmanship Cox engine, which has plenty of reliable power if set up as noted later. Or go for full performance with the potent new Shuriken and Chinese-made CS engines, which zoom it through the sky so fast it's scary. Tests were run on 35-ft. .012 braided lines; longer ones will be needed to fly full Stunt with the Shuriken.

In addition to providing good engine accessibility, the Fourmost engine mount adds streamlining and simplifies construction. A removable wing, borrowed from RC technology, gives easy accessibility to the controls and fuel system.

This model combines full pattern capability with ½A compactness and economy. And the adjustable line tension features and smooth, positive controls make it an excellent choice for beginners.

Construction. Akro Bat Jr. is unusually easy to build for two reasons. First, accurate fuselage alignment is automatic once you've installed the plywood key former and the landing gear mounting plate. Second, because the top spar is flat and (like the bottom one) continuous, the wing is built flat on the workbench rather than in the air.

Fuselage. Cut the sides from medium balsa, taking care to cut the key former slots accurately. Be sure to make both a right side and a left. Cut the doublers from medium-soft wood, the formers from relatively firm stock. Cut out the plywood parts.

Install the doublers and longerons on each fuselage side. Slip in and glue the key former; position and install the landing gear mounting plate. The fuselage is now in accurate alignment. Hint: Strengthen these critical joints by sprinkling them with baking soda, then soaking with CyA (cyanoacrylate glue).

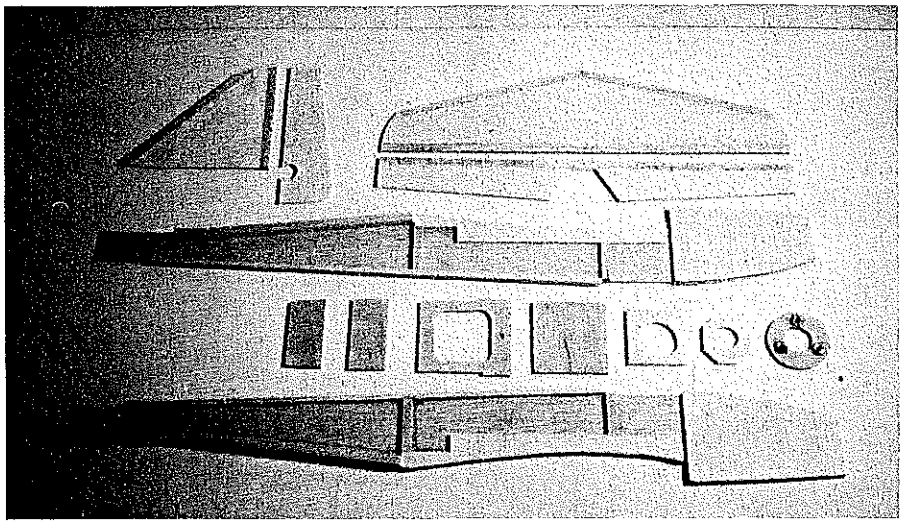
To complete the structural assembly, glue the sides together at the rear and install the front balsa former. Install the remaining formers and the interior parts. Block sand the fuselage flat on the top and bottom, then add the front and rear top and bottom sheeting.

Carve and block sand the nose quarter panels to conform to the front former. Install the quarter panel sheets. Flatten the nose accurately with a sanding block, insert blind nuts, and install the front plywood firewall.

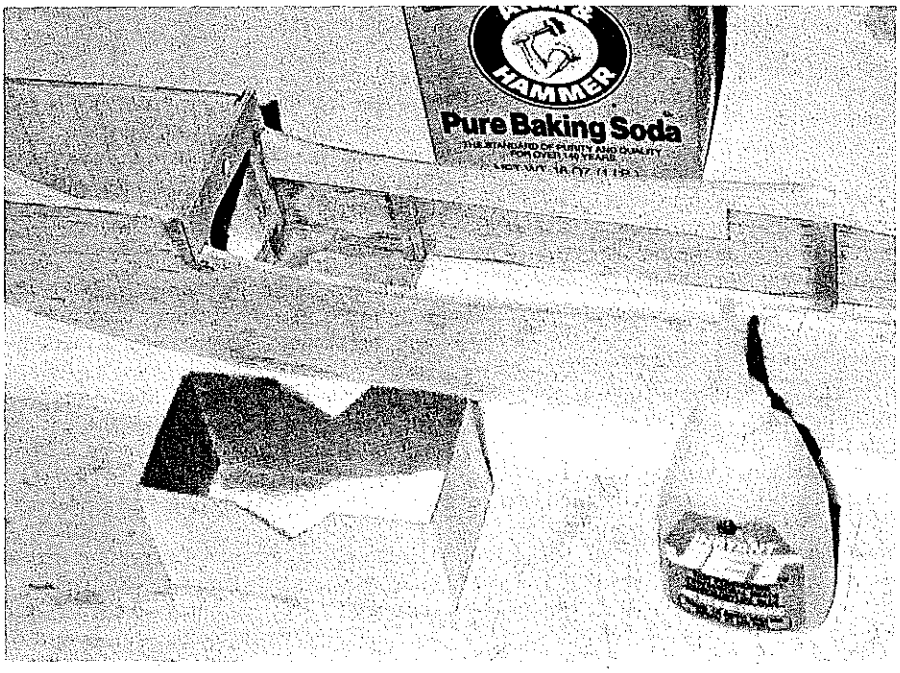
Finish sand the fuselage. Before installing the empennage, drop the tail skid into the rear panel, sprinkle with baking soda, and apply CyA.

The wing is built topside down. Lay the plan on a flat board the full length of the wingspan, and cover it with waxed paper. Use firm balsa for the spars. The top and bottom spars are continuous from tip to tip.

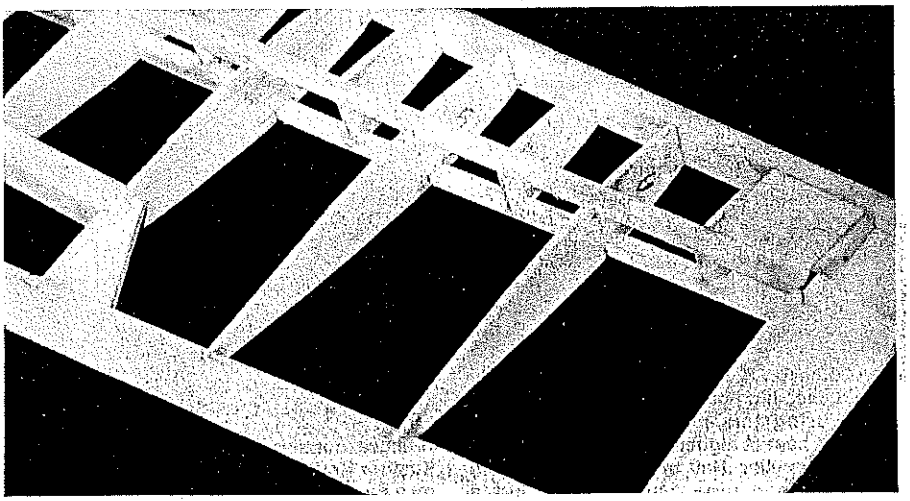
Pin the top spar flat to the building board, letting it extend to where the second panel



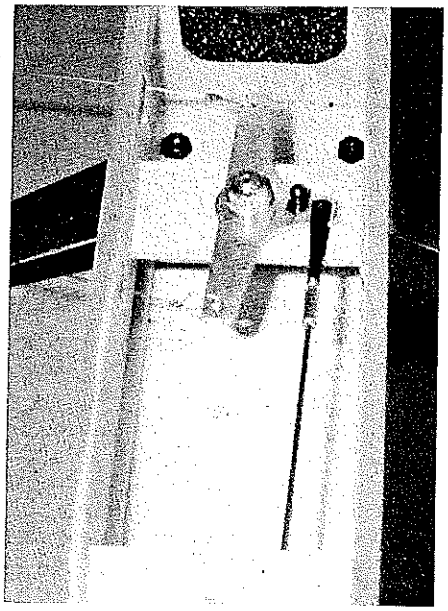
The major structural components of the fuselage and tail. The fuse sides are preassembled with longerons. Building the strong, lightweight tail is easier than it looks.



Installing the key former and the landing gear mounting plate brings the fuselage into accurate alignment. Pulling the tail halves together removes any twist. Assembly is simple and can be done off the board. The author strengthens important joints by sprinkling them with baking soda to make a small fillet, then soaking with thin CyA (cyanoacrylate glue).



Close-up of the wing before covering. Both the top and bottom spars are continuous from tip to tip. Since the upper spar is also flat, the wing is built flat on the board, not in the air.



The removable wing allows good access to controls and the fuel tank. Flaps are actuated via the ball link on the cut-down 3-in. Perfect bellcrank, permitting easy removal and installation of the wing.

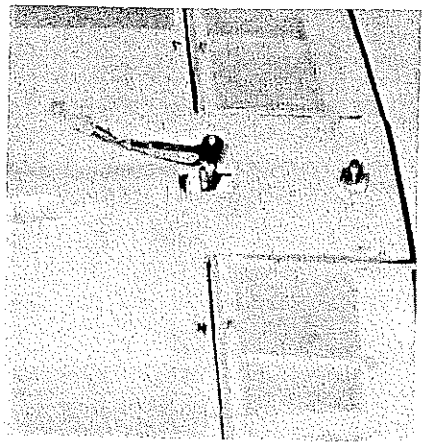
will be built. When the first panel is complete, remove the plan and spray it with WD-40 to make it transparent. Reverse the plan, and build the second panel over it.

Add the top spar doubler. Cut out and position the ribs. Slip a support member onto the plan to support and align the ribs as shown, and glue them to the spar.

Because the lines and controls are external to the wing, assembly is easier than for most Stunt models. The wing can be completely assembled and finish sanded before cutting the flaps loose. Cut the trailing edge parts to length. Notch them, and glue the trailing edge to the ribs. Install the partial bottom spar and the bottom spar. Glue on the flap spars and flap leading edges, and add the remaining flap rib parts.

Trim the leading edge to proper depth and install it. Add all the half ribs and tip parts.

Sheet the wing assembly. Install the outboard wing tip weight box. Trim the leading edge with a knife; shape it carefully and symmetrically. Smooth the wing with a



The RC aileron linkage hooked up and used to actuate the flaps. With internal reinforcement as shown, removing material to help the ball link clear the wing is no problem.

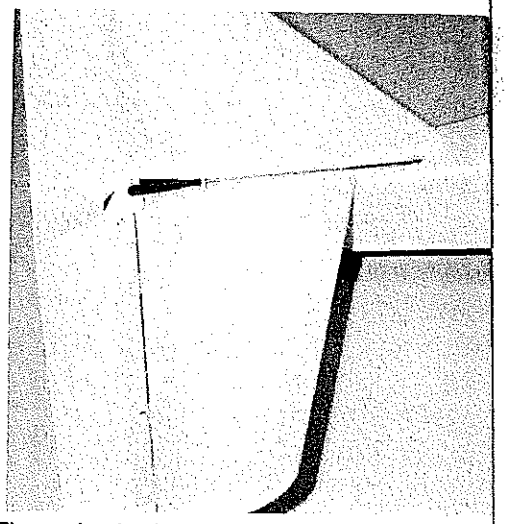
long, flat sanding block. Cut the flaps loose, and provide at least 1/32 minimum clearance at each end.

Empennage. The tail is designed for strength and light weight; assembly is less difficult than it looks. Cut the cores from soft balsa, then edge them with firm balsa. Block sand the tail flat. Round the leading edges, and taper the trailing edges if desired.

Final assembly. Install the engine mount and landing gear on the fuselage. Fit the wing to the fuselage, taking care to form a neat, tight joint. It's a good idea to mark the wing leading edge plywood from the hole in the firewall for accurate drilling. After covering the tail surfaces and fuselage and removing the covering where jointing occurs, mount the tail (with the wing in place) to check that it's properly aligned to the wing.

Controls. Cut down a Perfect 3-in. bellcrank to access only the inner holes (approximately 2.3-in. lead-out spacing). You'll also be using the inner pushrod hole (approximately 0.6 in. from center). Drill for a ball connector to fit inside the pushrod (approximately 0.45 in. from center). Install the connector. Use a 2-56 RC pushrod with clevises; install it so that the adjustable pushrod end links with the elevator horn.

Use .020 minimum lead-outs from the



The pushrod exits forward of the stabilizer and hooks, has an adjustable RC link to the horn, mounted on top of the elevator.

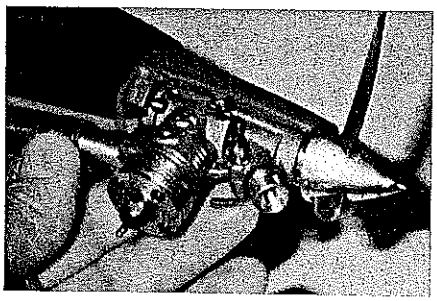
bellcrank. Wrap the ends tightly to prevent snagging on the fuselage side and to allow the outer eyes to pass through the adjustable lead-out guide. Mount the elevator horn on top of the elevator. The flap linkages are RC aileron links rigged to exit the bottom of the wing. Cut one link short, install both in the wing, then solder or glue them to operate in unison. Add the clevis. Use an RC pushrod to connect the flap linkage to the ball link on the bellcrank.

Finishing. You'll probably want to cover this model with heat-shrink materials. In that case follow the instructions included with the materials.

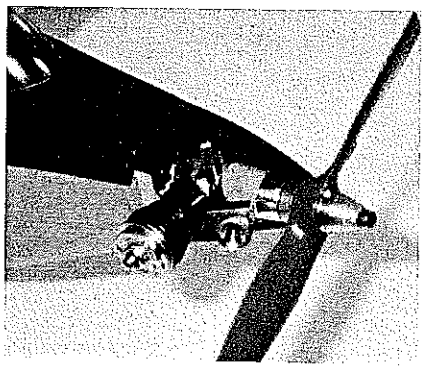
The prototype was covered with Japanese tissue for several reasons. It's light, easy to use and gives a colorful, taut, attractive result.

Prime all surfaces with nitrate or butyrate (we used Sig spray butyrate), and smooth them with fine-grade sandpaper. Repeat this process. When everything is sealed and sanded smooth, cut tissue for all the parts, allowing ¼ in. for overlapping.

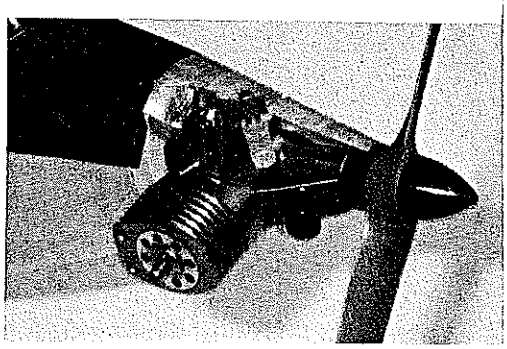
Apply unthinned dope around the perimeter of the parts to be covered. Spray the tissue with a fine mist of water, then adhere it quickly before it's soggy. (If you've mistakenly selected wrapping paper rather than



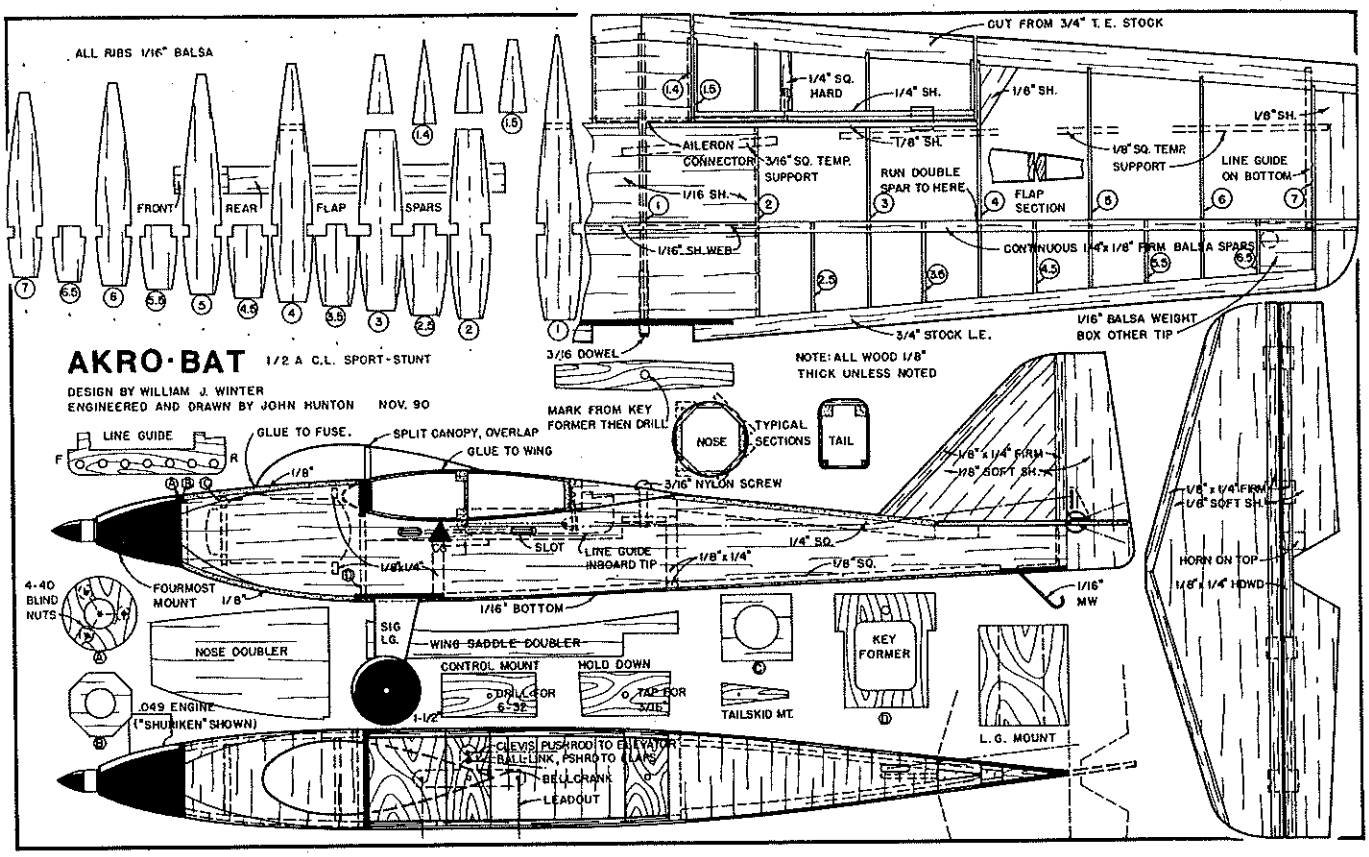
The Chinese CS engine, one of the recently introduced, high-powered ½A engines that really bring this model to life. The CS operates best at higher rpm—hence the one-bladed propeller. Half of a 5 x 3 prop works well. A tuned pipe can be used, but a minipipe at about 3 ½ in. works well and is less sensitive than the tuned pipe.



A more conservative power setup is the Kustom Kraftsmanship Cox engine installed on a Fourmost mount and turning a 5 x 3 Cox propeller. With a pressure backplate this engine gives reliable performance.



The fabulous Shuriken on a custom metal engine mount that is interchangeable with the Fourmost mount. This engine offers another magnitude of power in ½A flying and holds a setting from beginning to end. A thinned-blade 5 x 3 prop is ideal.



Japanese tissue, you'll know it at this point—the paper will fall apart.)

Lay the tissue in place, pulling out any noticeable wrinkles. Seal the edges with dope. Cover both sides of the part you're working with, dry it thoroughly, then spray it with clear dope for added strength. Spray or brush all parts with clear butyrate (use thinned dope for brushing). When the dope has dried completely, sand everything with fine paper. If you sand through the tissue, touch it up with a felt-tipped pen of similar color.

Apply additional coats of dope to strengthen and seal the surface. Add the AMA number and decoration. Be sure to use strong hinges, and pin them for a secure grip.

Canopy. Trim the canopy to fit the model. Cut it in two, and attach the front half to the front fuselage and the rear half to the wing. Trim off enough of the rear canopy to slip it into the front part. With the wing in place, glue on the canopy first at the front and then at the rear.

Rigging. Developing a good margin of stability and line tension depends on several important factors:

• Rudder offset: This provides an outward angle of crab. Ample rudder offset is shown on the plan.

• Line guide: An adjustable line guide is shown. The farther back the lead-outs, the greater the outward crab angle; and the more crab angle, the tauter the lines. Start with plenty of crab angle, then reduce it for maximum efficiency. You may need more crab on windy days.

• Balance point: Make sure the model balances either at the center-of-gravity shown or farther forward; add ballast if necessary. Don't attempt to fly a tail-heavy airplane. For better control response, move the balance point rearward by increments.

• Wing tip weight: A weight box is provided. Again, start with more weight than necessary, say 1¼ oz., then reduce it to match conditions. Seal the box with plastic tape.

• Elevator deflection: Maximum should be 20 degrees.

Engines. While a standard Cox TD .049 provides adequate power, you'll need a pressure fuel system for complete reliability. Don't use the timed pressure port on the stock Cox (cut off that pressure teat and forget it). A stock Cox requires at minimum a pressure backplate from Kustom Kraftsmanship (KK), but the best combination is a complete remanufactured KK Cox with pressure backplate, 72-turn needle valve and undrilled venturi.

A Cox plug is the most reliable choice. Modified ones are available from Kustom Kraftsmanship for added power.

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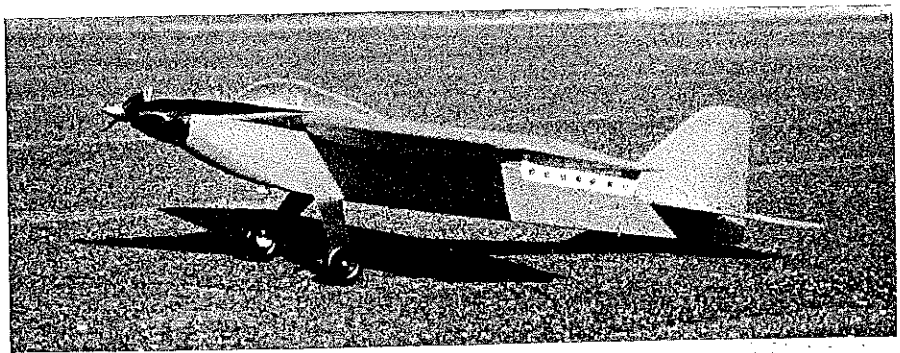

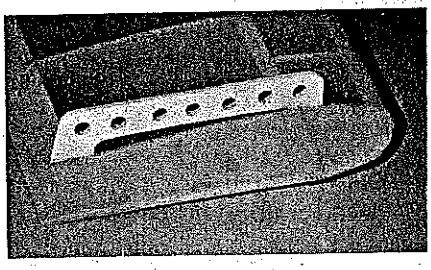

Left: Side view of Akro Bat showing the adjustable lead-out guide. The prototype was flown using the third and fifth holes from the front. With 1 ¼ oz. of wing tip weight in the outboard weight box, line tension was excellent—although the outer tip dipped a little during square maneuvers. Start with 1 ¼ oz., then remove weight to match conditions. Right: The lead-out guide lets you vary which holes you use. For first flights and windy-day sessions, run the lead-outs toward the rear of the wing. On calm days, run them farther forward.

Movies/Filippova

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The RC Junkers had about 10 feet of wingspan and weighed about 14½ pounds when equipped with the Russian 10cc Raduga serial engines. The engines were modified, of course. As you know, Soviet-made serial engines usually aren't of the highest quality.

Mikaelian was an exacting producer. He has vivid impressions and memories of the war and wanted the movie to capture them. He told Konstantin and Sergei how to fly the Junkers so they'd appear exactly as he remembered.

The producer's idea was to show two of the Junkers flying by each other and dive-bombing a trench where a Russian soldier stood guard. The models were expected to fly side by side very close to each other. If you've flown RC models, you know how hard *that* is to do. Also, since the cameras couldn't move, it was up to the pilots to maintain the specified trajectory. Any little mistake in flying directly to the trench would ruin the take. The film showed a Soviet soldier guarding the trench. Explosives buried close to the trench detonated when the bombs hit the ground.

Another problem was to sequence the bombing as precisely as Mikaelian wished. He wanted the planes to dive down and eject the bombs at regular intervals one after the other. It took a lot of experimenting and changes in each model's special control mechanism to get this right.

To do everything as the producer wanted, Konstantin and Sergei made more than 20 flights together before the cameras rolled. Then they flew the bombing scene over and over, producing an hour's worth of film for a scene that lasted a minute in the finished movie. But the shooting was finished—or so we thought.

One morning Mikaelian announced that he'd come up with another idea—he wanted to show how the bombing appeared to the soldier in the the trench. So the crew had to be moved south again in search of summer, this time to the city of Tashkent.

As Konstantin told me later, the shooting at Tashkent was an absolutely terrible experience for him and Sergei. To create the effect Mikaelian wanted, the two modelers had to stand side by side with a cameraman and throw the bombs *down to themselves.* And the operator had to watch the bombs hurtling down to precisely where he was!

There were six bombs, each about 10 inches long and made of metal. And they reached a speed of 120 mph. The modelers cooperated bravely, but of course nobody wanted to be killed. They stayed by the camera and threw the bombs down as precisely as possible, directly to the camera. The bombs landed extremely close, probably only about eight inches from where they stood. Fortunately, nobody was killed. Mikaelian was satisfied with the scene, and the filming was over at last.

Each collaboration on a movie project brings something new and interesting for Konstantin, Sergei and Vitaliy. Their last assignment was for a movie called *Afghanistan Brake*, about the recent war in Afghanistan. The film was jointly produced by Lenfilm and an Italian company, with Vladimir Bartko as the producer.

The modelers' job was to build two Soviet MI-8 Helicopters. The planes were intended not as flying models but to be blown up in the movie. Yet the construction had to duplicate the full-scale MI-8 exactly both inside and out, because the producer wanted the explosion to look as realistic as possible. With a fuselage length of about 8.3 ft., the Helicopters were fairly large.

As it turned out, only one of the models was needed. It blew up so realistically that the other Helicopter was left intact, ready to be used in a future movie about the Soviet-Afghanistan conflict. That could be years away, of course, when the Afghanistan war has become just a bad dream.

What would the movie industry do without models and modelers? Konstantin, Sergei and Vitaliy hope to continue their teamwork for years to come. □

Akro Bat/Hunton

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It's critical to use only Cox fuel in Cox engines. If incompatible fuels are used, the engine will perform normally after start-up,

then start behaving as if the setting were wrong. Use Cox racing fuel if it's available (try Tower Hobbies). Also, use a 5 x 3 Cox propeller.

The recently introduced Shuriken brings a new dimension of performance to 1/2A engines. The Shuriken considerably out-turns the Cox and is remarkably durable. Unlike the Cox, which will go over the hill if it gets a little lean (probably for metallurgical reasons), this little ABC jewel will run and run.

The Shuriken will fit into a modified Fourmost mount. Use the smallest venturi option available. The Cox 5 x 3 prop works fine, but in an engine designed to operate at around 30,000 rpm a thinned-blade 5 x 3 works even better. This state-of-the-art 1/2A engine can be ordered from BV Competition Engines, 1163 Country Club Rd., Indianapolis, IN 46234.

A third engine option is the Chinese CS. Heavier than the Cox or Shuriken, the CS develops optimal power at higher rpm. A cut-down Cox 5 x 3 prop (perhaps to 4½-in. diameter) is required, as is a pressure backplate. The CS is now available in the United States. Use the sport version unless you want to fool with a tuned pipe.

Flying. The 2-oz. fuel tank shown will sustain long flights. If you're new to flying, use a half-filled tank to begin with. Position the model so that it will break ground on the downwind side of the circle. Keep it low until you've built up enough speed to be certain the engine won't sag. Correct any tendency to bank in or out. Check that the wings remain level in inverted flight.

Once the model is fully trimmed, you're ready to begin maneuvers. Try the AMA Precision Aerobatics routine. It's a good way to have fun while honing your flying skills. □

CL Aerobatics/McMillan

Continued from page 64

focus, you need to place this in proper relationship to the overall length of the wing and get the size appropriate to the other parts of the plane. Note here, again, that we are not trying to get everything to the same scale. Rather, our goal is to get the shapes and relationships correct within the bounds set early on with good moments and