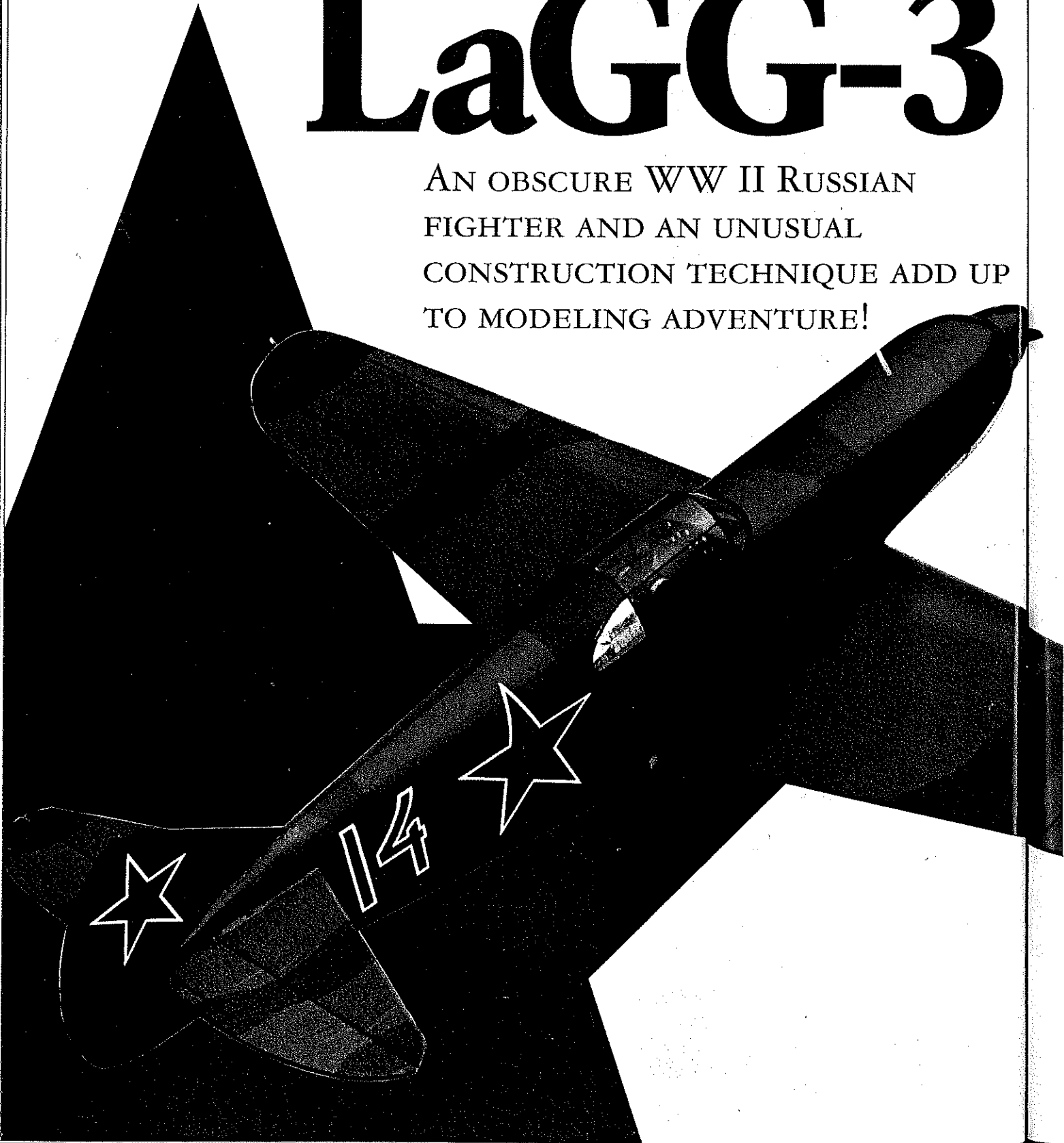


BY CHUCK FELTON

Lavochkin LaGG-3

AN OBSCURE WW II RUSSIAN
FIGHTER AND AN UNUSUAL
CONSTRUCTION TECHNIQUE ADD UP
TO MODELING ADVENTURE!





THE LAGG-3 was one of a trio of modern aircraft that the Soviets produced before and during World War II to replace their obsolete fighters. S.A. Lavochkin, V.P. Gorbunov, and M.I. Gudkov designed the aircraft, hence the name LaGG—from their initials.

Although outwardly conventional, the LaGG-3 was the only one of the world's new crop of streamlined monoplane fighters not to have metal stressed-skin construction. Since the Soviet Union faced difficulties at that time obtaining aluminum and other light alloys, the fighter was built mostly from birch plywood and pine.

A new technology called "delta wood" was developed, which consisted of layers of birch strips that were glued cross-grained, impregnated, and used in conjunction with a Bakelite plywood. The result was a neat, clean, maneuverable fighter that showed outstanding robustness and resistance to battle damage. On the other hand, it was inferior to other Russian fighters in all-around performance.

The first of these fighters reached the aviation regiments just a few months before the German invasion. More than 6,500 aircraft had been produced when production ended in September 1943.

My model of the LaGG-3 is inexpensive and simple in construction; I use 1/8-inch corrugated cardboard as the primary building material, which greatly reduces building time and cost.

The design makes use of cardboard's unique features: it can be used in large sections and folded. The wing is built from two big pieces of cardboard, with cardboard ribs and a single spar. The tail surfaces and fuselage are primarily cardboard, with little internal bracing required. The result is a model with a good scalelike appearance that can take plenty of punishment at the flying field.

Cardboard varies in weight, but any 1/8-inch corrugated will do. Sources for this material include box manufacturers and local shopping centers where you can find stacks of discarded boxes. Look for cardboard with brown paper on one side and a white finished paper on the other side. Having the white paper on the outside of the model results in a smoother finish and a neater appearance. The method of

folding the cardboard and using gummed paper tape to seal the joints and exposed corrugations is explained in the construction tips.

The model has a wingspan of 65 inches and a length of 58 inches. The bottom of the airfoil is flat with a curved upper surface because of the scoring and folding technique employed. Engines of .40 to .50 displacement can be used. The LaGG-3's size and stability make it a good sport-flying model.

CONSTRUCTION

Cut out all cardboard and wood parts, making sure to note the direction of the corrugations. Score and fold

Special Tips for Working With Cardboard

Before we begin, I have some special tips for working with cardboard.

Gluing: Use water-based glue such as white glue or Titebond. Don't use contact cement since parts cannot be shifted when you are gluing surfaces.

Folding: Score the fold lines with a screening tool, which is available at any hardware store. It has a handle with a 1 1/2-inch-radius wheel at one end that you run along a metal straightedge on the fold line.

Waterproofing: Making cardboard waterproof is simple, and you can do it to the raw material before you cut out the model's parts. Mix 25% clear polyurethane with 75% paint thinner; the latter can be the most inexpensive hardware-store variety. Brush the mixture liberally onto the cardboard sheet and allow it to dry for 48 hours.

This adds no appreciable weight to the material and renders the cardboard completely waterproof. In addition, when you cut the treated cardboard you will find that it is as crisp as wood and cuts sharply and cleanly.

Finishing: Cardboard provides a solid surface with no open areas to cover and is nonporous. The easiest finishing method is to apply two coats of clear dope, sand lightly between coats with 400-grit paper, and follow with three coats of colored dope.

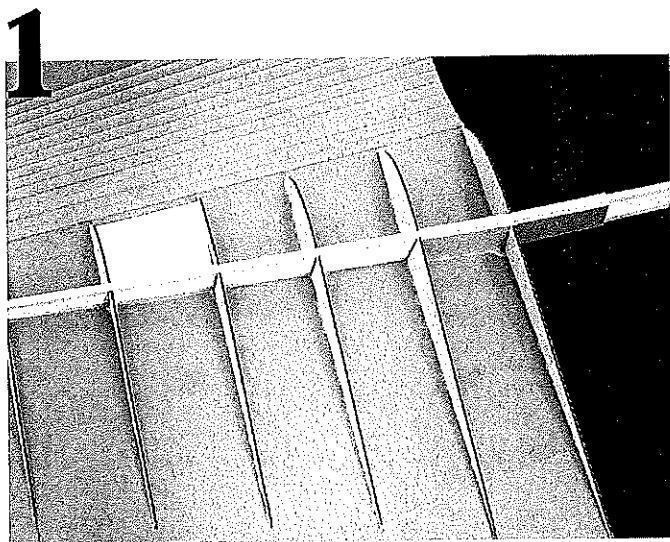
However, a wide variety of finishing materials such as Solarfilm, MonoKote, and vinyl paper can be used on the cardboard. With any of these coverings I recommended that you not dope the cardboard's surface; it will result in a better bond.

Covering the Edges: Cover all of the model's seams, joints, and exposed edges with strips of gummed paper tape. You can obtain a 1-inch-wide roll from a stationery store. To use it, cut a thin strip to length, dip it in water, and smooth it over the seam(s). *MA*

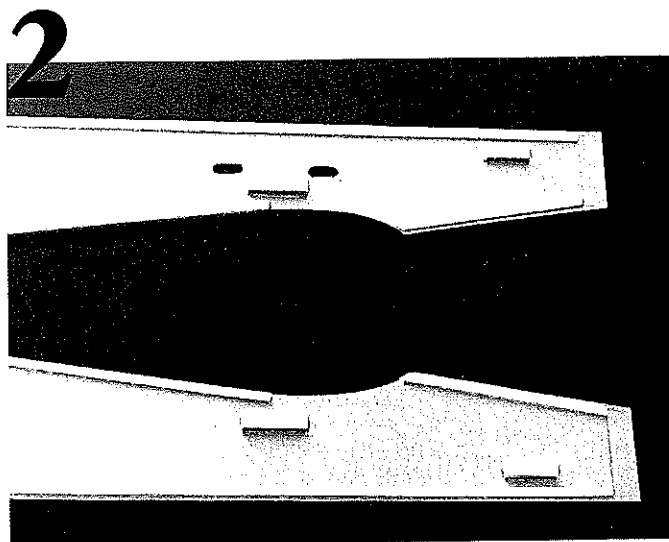
—Chuck Felton

cardboard parts as indicated on the plans.

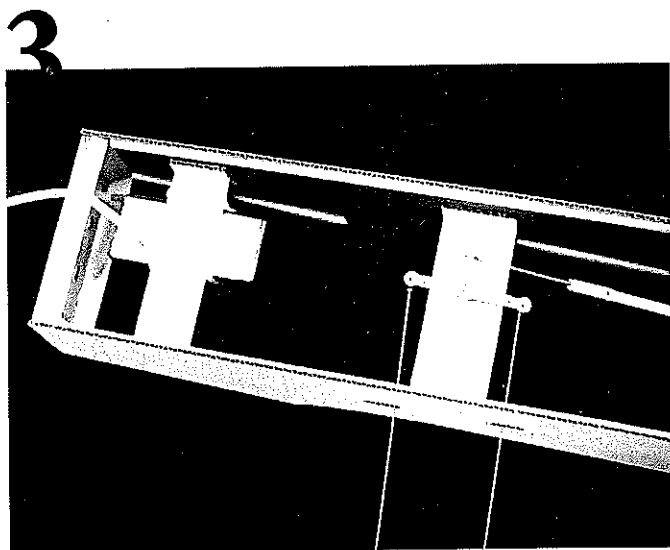
Empennage: The fin, rudder, stabilizer, and elevator are each made from two pieces of 1/8-inch cardboard laminated together cross-grain to give 1/4-inch-thick



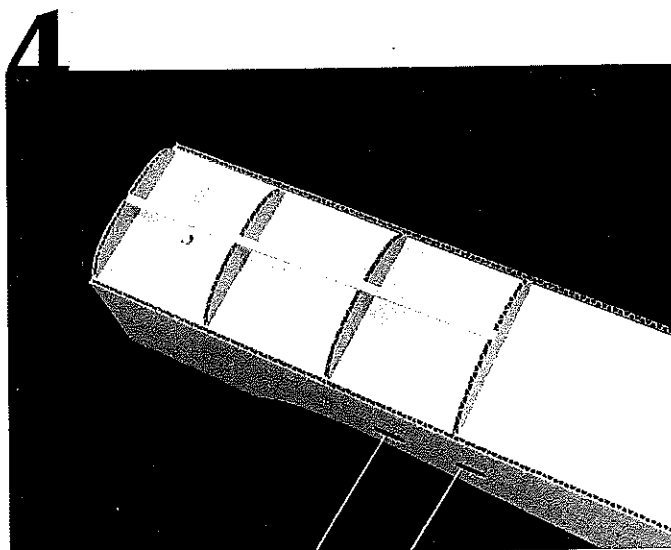
1 Wing has single spar, cardboard ribs, and leading edge folds to obtain curved upper surface. Note $\frac{1}{8}$ plywood gear mount.



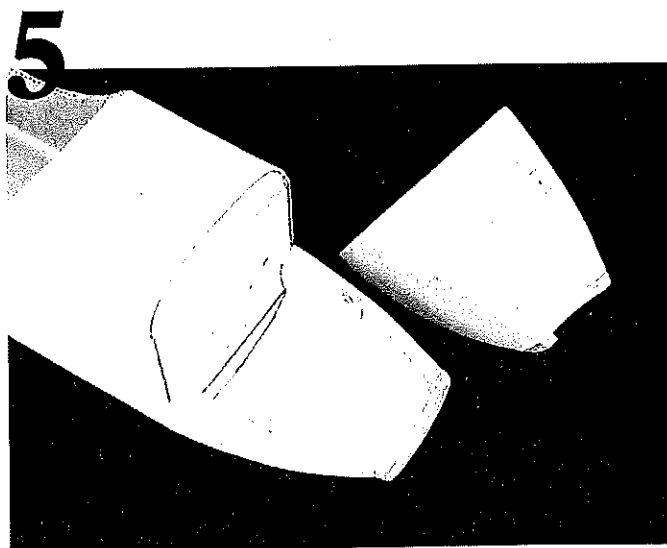
2 The fuselage sides are lined with balsa strips and have cardboard supports for the bellcrank and fuel-tank mounts.



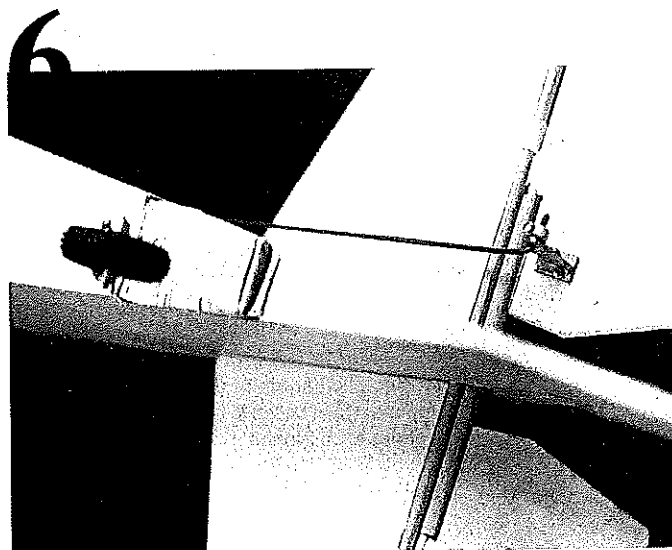
3 The fuselage sides have been joined to the firewall, and the tank and bellcrank mounts have been installed.



4 A cardboard fuselage top piece, cardboard bulkheads, and the single balsa centerline stringer have been added.



5 Carved-balsa cowl halves have $\frac{1}{8}$ plywood inserts with blind nuts to serve as cowl-attachment points. Clean work!



6 Edges of the tail components are capped with $\frac{1}{8} \times \frac{1}{4}$ balsa strips and rounded. Elevator joiner is $\frac{1}{4}$ -inch dowel.

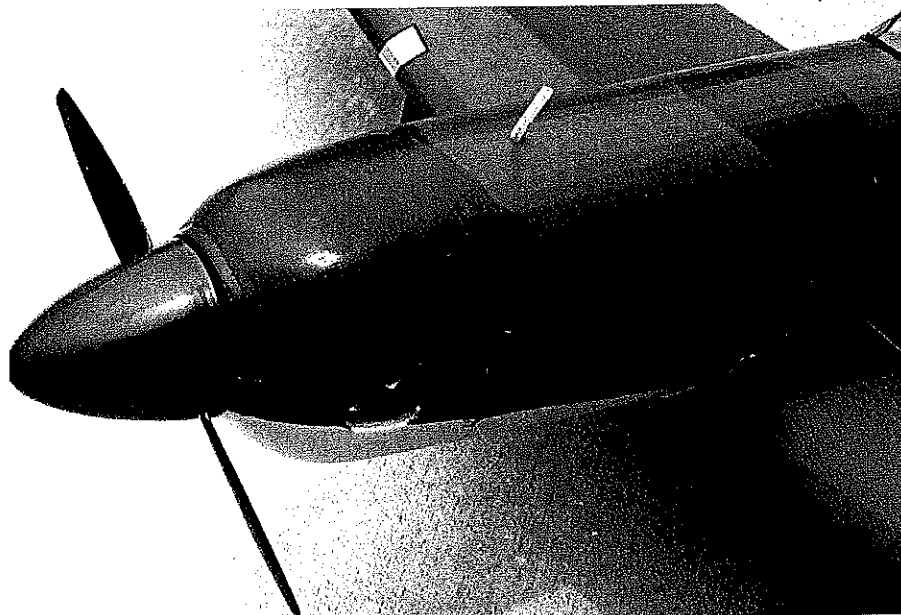
surfaces. Add a $\frac{1}{8} \times \frac{1}{4}$ balsa strip to the fin leading edge (LE) and round it off. Add $\frac{1}{8} \times \frac{1}{4}$ balsa strips to the stabilizer LEs and trailing edges (TEs) and round them off.

Glue the elevators to the $\frac{1}{4}$ -inch dowel. Add $\frac{1}{8} \times \frac{1}{4}$ balsa strips to the remainder of the elevator LE and round them off. Seal all raw edges with gummed paper tape. Hinge the elevators to the stabilizer with cloth hinges at four places.

1 Wing: Make the wing spar by capping each $\frac{1}{4}$ balsa spar with a $\frac{1}{4} \times \frac{1}{4}$ spruce strip top and bottom. Join the spar halves with $\frac{1}{8}$ plywood joiners front and rear at the centerline.

Glue the $\frac{1}{8}$ plywood gear mount into the bottom of each wing panel. Glue the right side of the wing spar onto the right-hand wing panel. Glue all cardboard ribs into the right wing. Add a cardboard doubler over the plywood gear mount between ribs W3 and W4. Glue a 1-ounce weight to the right wingtip.

Glue the left wing panel to the left spar in a similar fashion. Add the ribs and gear doubler to the left wing. Apply glue to the top of the wing spar, the top of the ribs, and the wing TE. Fold the top wing surface down and pin it securely in place until dry. Add the balsa tips to the wing. Make a line guide from $\frac{1}{8}$ plywood. Cut a slot in the left balsa wingtip, and glue the line guide in place. Cover the TE and all seams with gummed paper tape.



The finished nose section. Notice the tank fill line and the spinner fit. The camo paint job is extremely effective.

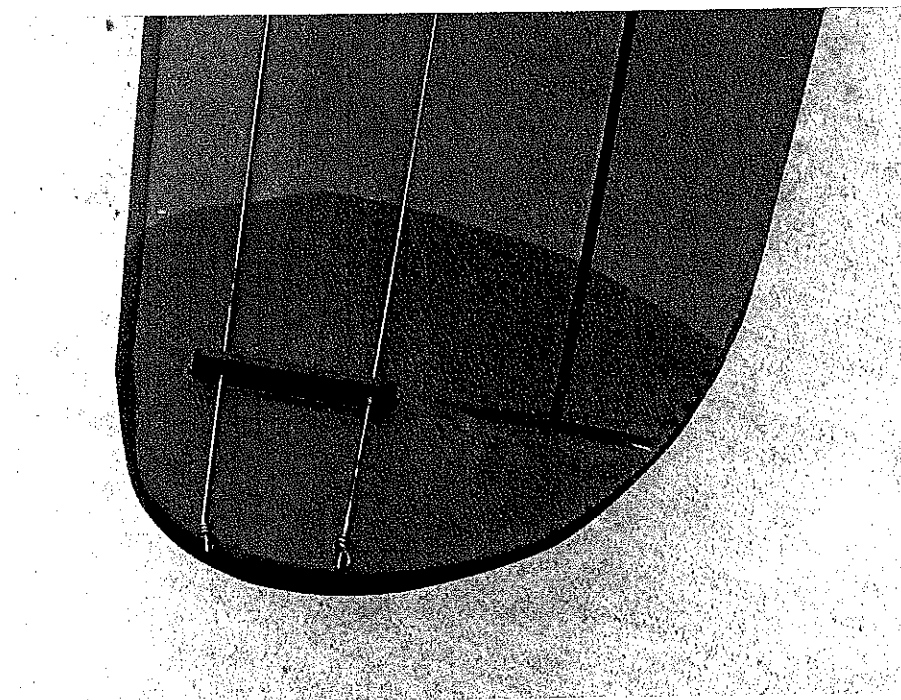
2 Fuselage: The fuselage edges are outlined with a triangular symbol on the drawing. Line the upper and lower edges of each fuselage side with $\frac{1}{8} \times \frac{1}{4}$ balsa strips, as shown in the fuselage side view. The strips are recessed $\frac{1}{8}$ inch from the fuselage edges. Bevel the strips at the aft end of the fuselage so that the cardboard sides will come together. Add cardboard supports to each fuselage side above the fuel tank and below the bellcrank.

Make the firewall, C1, from $\frac{1}{4}$ plywood. Locate the mounting holes for a KM-40 motor mount on the face of C1. Drill the mounting holes and install blind mounting nuts on the back side of C1. Drill a hole in C1 for a fuel-tubing exit. Line all four back edges of C1 with $\frac{1}{2}$ -inch triangular balsa for bracing.

3 Glue C1 to the right side of the fuselage. When dry, glue the left side of the fuselage to C1. Attach the fuel tank to the $\frac{1}{8}$ plywood support. You can attach the fuel tank to the support with rubber bands.

Make a pushrod from $\frac{3}{32}$ -inch wire and $\frac{1}{4}$ square spruce, and attach it to the bellcrank along with the leadout wires. Install the tank and bellcrank assemblies by gluing the plywood supports to the cardboard supports on the insides of the fuselage.

Glue the fuselage sides together at the tail. Glue F1 and F2 in place to cover the top fuselage. Be sure to bring fuel tubing fill and overflow lines out during all



The leadouts are external and go through a line guide that is attached where the wing meets the wingtip.

covering operations. Cover the bottom fuselage with F3, F4, and F5.

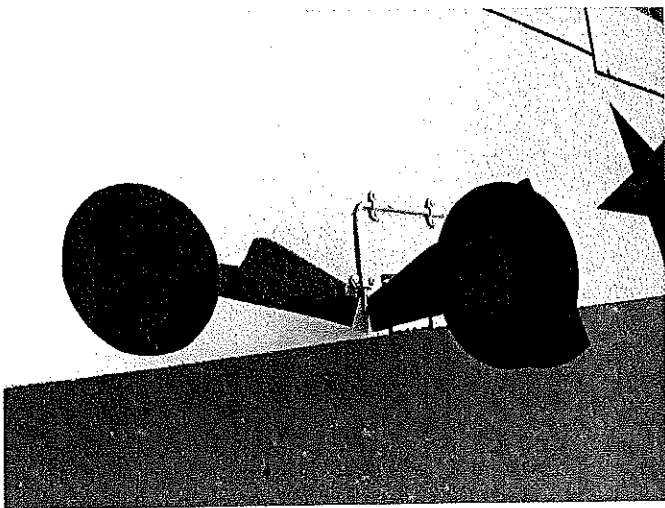
4 Add bulkheads A through K to the top fuselage, adding $\frac{1}{8} \times \frac{1}{4}$ -inch stringers. Cover bulkheads A through D with D1, bulkheads E through G with D2, and bulkheads G through K with D3. Add bulkheads L, M, and N, with stringer, to forward bottom fuselage, and cover with D4.

5 The cowl is built up from $\frac{1}{2}$ balsa sheet and hollowed out. The top half has the $\frac{1}{4}$ plywood C2 glued to the front. The

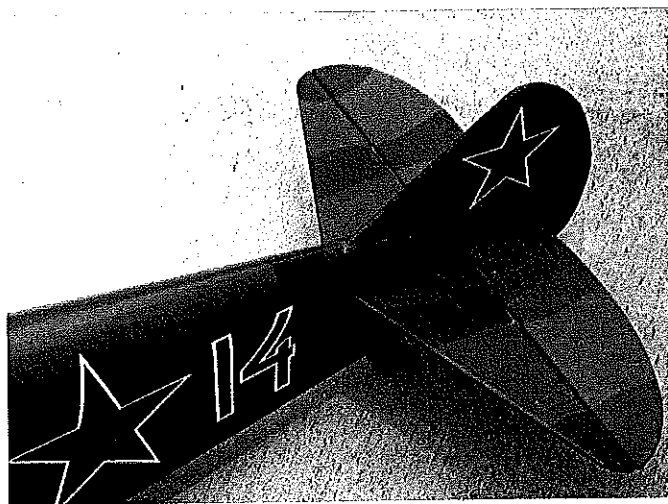
removable bottom half of the cowl has C3 glued to the front. Sand, carve, and hollow the cowl to shape. Add $\frac{1}{8}$ -inch rectangular plywood pieces to the inside of the top and bottom halves at the cowl sides, as shown in the cowl top and side views.

Install a blind nut on the inside of the top cowl plywood and run a 4-40 bolt through the bottom cowl to form the cowl attach. Permanently glue the top half of the cowl to the model's nose.

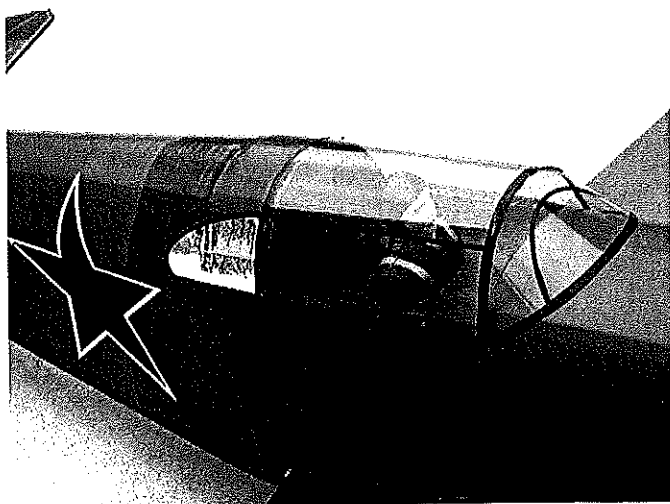
Test-fit the engine in the cowl and drill mounting holes in the KM-40 engine



The landing-gear struts mount to the plywood plates in the wing. Notice the simulated wheel wells.



It's hard to believe that this model is mostly cardboard. The tail section is neat and clean, with great paint detail.



A pilot adds to the model's realism. The canopy is simple to construct, and tape frame lines add to the effect.

mount. Use a shaft extension to give adequate spinner clearance. Cut holes in the cowl block for the cylinder head, exhaust, and needle valve. Apply epoxy to the inside of the cowl and the front of the firewall.

Glue the stabilizer to the fuselage. Add balsa block fairings at the stabilizer/fin intersection. Add the rudder to the fin with the TE offset $\frac{1}{2}$ inch to the outside of the flying circle.

Make the tail-wheel gear from $\frac{3}{32}$ -inch-diameter wire. Bend it as shown, place it on the $\frac{1}{8}$ plywood support, wrap it with nylon thread, and smear the thread with glue. When it's dry, glue it in place in the bottom fuselage cutout.

Make the main gear from $\frac{3}{32}$ -inch-diameter wire, as shown. Make gear fairings from $\frac{1}{8}$ plywood and attach them to the gear with nylon gear clips. Attach the gear assemblies to the $\frac{1}{8}$ plywood supports in the bottom wing with nylon gear clips.

Finish: Now is the time to paint and trim the model before final assembly. The color scheme is medium- and dark-green upper-surface camouflage and light-blue undersurface. Cut the red lettering and insignia from MonoKote. Make the canopy from thin plastic, and epoxy it to the fuselage. Outline the canopy with thin strips of MonoKote. Make the aileron outlines from Black MonoKote.

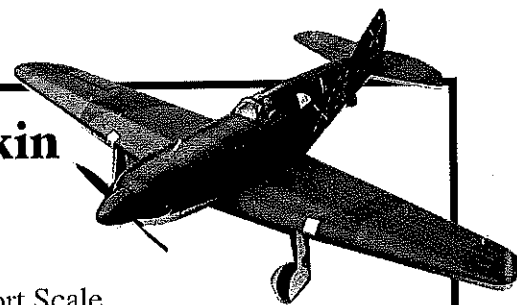
Final Assembly: Glue the wing to the fuselage. Make the air scoop from $\frac{1}{2}$ balsa and glue it to the bottom of the wing/fuselage. Add balsa exhaust stacks to both sides of the forward fuselage. Pass the leadout wires through the wingtip line guide and tie them off. Attach the nylon control horn to the elevator and hook up the pushrod.

Attach $3\frac{3}{4}$ -inch-diameter wheels to the main gear and a $1\frac{1}{2}$ -inch-diameter wheel to the tail gear. Add an 11 x 6 propeller and a $3\frac{1}{2}$ -inch spinner to the engine, and your model will be completed. Be sure to balance the model at the point shown on the plans.

If you have any comments, suggestions, or questions concerning the LaGG-3, please write to me at the following address or E-mail me, maybe with a photo of your completed cardboard model. *MA*

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Lavochkin LaGG-3



Type: CL Sport Scale

Wingspan: 65 inches

Engine: .40-.50 glow

Flying weight: 60 ounces

Construction: Cardboard, balsa, plywood

Covering/finish: Modeling paints,
MonoKote trim and insignia

