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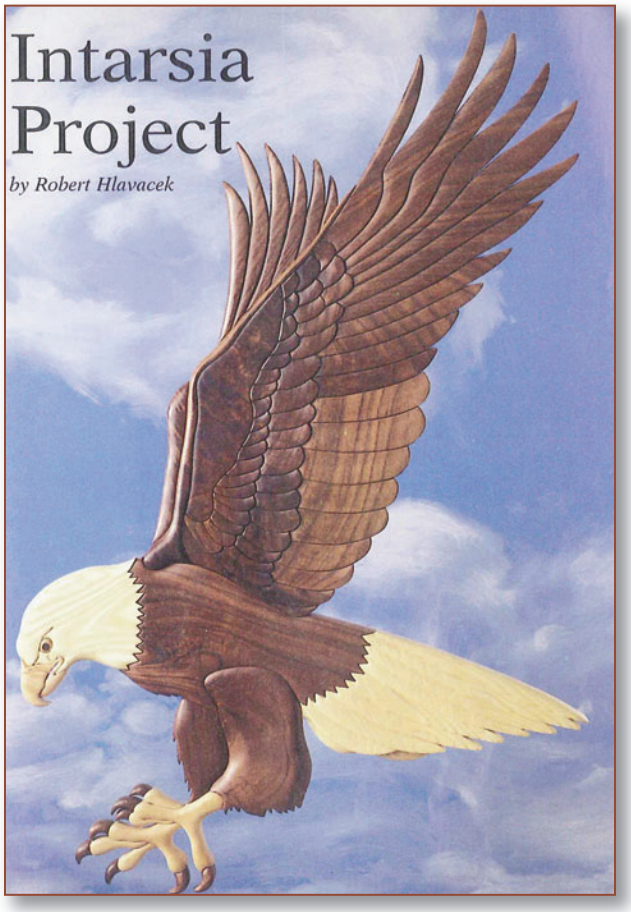
Classic Project

In this plan you'll find:

- Step-by-step construction instruction.
- A complete bill of materials.
- Construction drawings and related photos.
- Tips to help you complete the project and become a better woodworker.

Intarsia American Eagle



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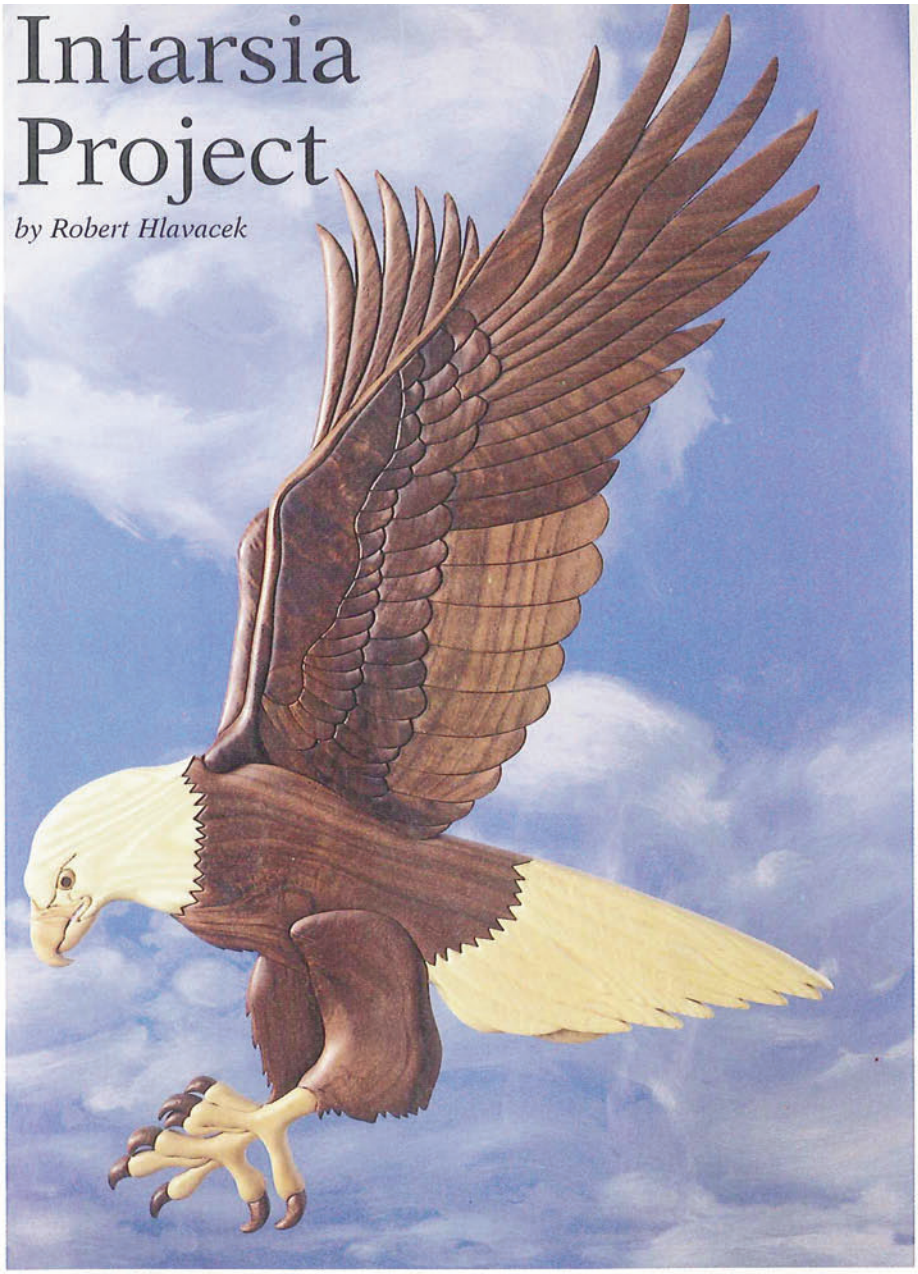
Intarsia Project

by Robert Hlavacek



AMERICAN EAGLE

Interest in intarsia, a technique where small pieces of wood are cut, shaped and assembled to form a picture, has been surging of late. It's not hard to understand why, when you consider that for only a few dollars in stock, plus a scroll saw and some sanding work, you can create a work of art that will leave friends and neighbors amazed.

When contributing editor Robert Hlavacek showed us his latest creation, this stunning American Eagle, we knew we had to share it with all the intarsia fans out there. If you haven't tried intarsia before, don't be scared off. The eagle is like other intarsia work—the only difference being that instead of ten or twenty pieces, there are a few more, 102 in all!

Before You Start

When doing a project using various natural woods it is easiest to begin by transferring the pattern to tracing paper. For a project this large you'll find it more convenient to trace it out in sections on smaller sheets of paper rather than working with the whole pattern on one large sheet. I've been using Bienfang Satin Design No. 147M Transparent Natural Vellum Layout and Tracing Paper in 9 in. by 12 in. and 14 in. by 17 in. sheet sizes. If you can't find Bienfang at your local stationer, any good quality tracing paper will do. When you need a larger piece of tracing paper just tape several sheets together with frosted tape and trace away.

For this project I wanted to eliminate the 1/4 in. plywood backboard which the pieces are normally glued to and instead make the pieces fit accurately enough to edge-glue one to the other. All gluing is done on a flat surface covered with waxed paper, using yellow glue and either 5 or 30 minute epoxy.

On the main wing, which contains 62 pieces, I suggest using 30 minute epoxy. It doesn't grab like the yellow glue and will give you additional time to position and adjust all the pieces. If the glue starts setting before all the pieces are in position you'll have a problem. Also, epoxy will bridge gaps, as long as they're not too large, and still hold everything together.

Don't let a big project like this discourage you. If you break it down into sections and concentrate on one area at a time, it's less intimidating. As you cut and fit each piece, use masking tape to temporarily hold the pieces together. When you finish one section put it aside and proceed to the next. Don't do any contouring until you have the whole project cut out and fitted.

The general procedure that's used to create the eagle is one where as one part or section is cut, it's used as a pattern to

trace and cut the matching piece. Your pattern may end up slightly different in some respects than the one shown, but this system eliminates a good deal of fuss. As you'll note on the pattern, parts such as the feathers, toes and talons are numbered. On the feathers, the numbers serve two purposes. Each set of numbers, such as 1–5 or 1–8, indicates parts cut from a separate board. And, by numbering the parts as you cut them from each board, you'll find it easier to assemble the parts back together. On parts like the talons, by numbering them you'll avoid confusion as to which talon goes to which toe come assembly time.

On the pattern are indications as to how much various sections of the eagle should be reduced in thickness. All the eagle parts are initially cut from 3/4 in. thick stock. After fitting, the individual sections are reduced by the amount indicated, such as 1/4 in. or 3/8 in. The thickness reduction is part of the contouring process, which is accomplished mainly with various drum sanders.

While on the subject of contouring, let me mention a useful addition to your sanding arsenal—flutter sheets. They're 2 in. by 6 in. cloth backed sheets that mount to an arbor and do a great job of removing the ridges left by your sanding drums. I've found that 100- and 150-grits work well.

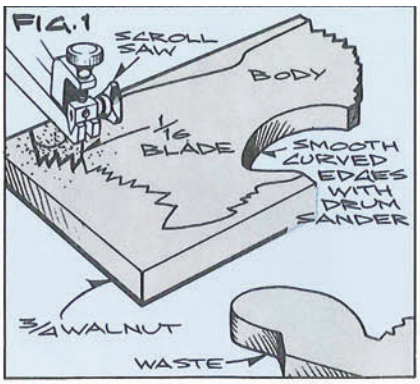
Refer to the sidebar on page 30 for details on how to best set up a flutter sander in your drill press.

Get To Work

The eagle shown is made from walnut and ash, with a few of the smaller parts from butternut and birch.

Start by selecting your wood for the most appropriate grain pattern and color. Don't buy select material—you're better off making this project from scrap lumber you may already have in your shop. You'll find some of the best wood for intarsia in the lower grades. The areas around knots offer some beautiful grain configuration. Move your pattern over the wood until it looks right (the tracing paper enables you to see the grain), then slip a sheet of carbon paper under the pattern and copy it to the wood.

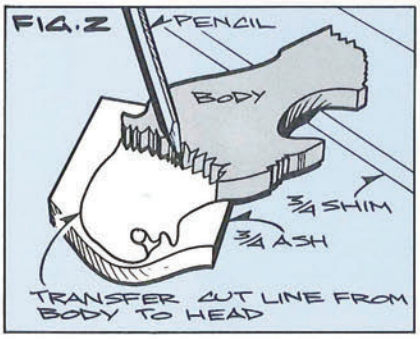
Step 1. Trace the body pattern to an appropriate piece of walnut, then cut it out (Fig. 1). Use a sharp 1/16 in. band saw



or scroll saw blade and work slowly. If you rush, the blade may flex and the adjoining pieces won't fit properly. As each piece is cut out, rub it over a hard-backed 100-grit sanding block. This removes the ragged wood fibers left on the bottom edges by the saw blade. This step insures that each piece will lie flat, an important point when later on you are using one section to trace the profile of an adjoining section.

Use appropriate size sanding drums in your drill press to smooth the cut edges. Sanding sleeves in fine 120–150-grit work good for this. Of course, you'll need an auxiliary table on your drill press when doing this shaping.

Step 2. Once the body is cut, next up is tracing the head pattern (less the beak parts). The eagle in the photo uses ash for both the head and the tail. Lay the body on top of the head where the two parts join, use a sharp pencil to mark your cutline (Fig. 2), then cut out the head. Take your time and cut accurately on this piece, since it is difficult to sand the jagged edge where the body and head meet. Accuracy is important, but perfec-

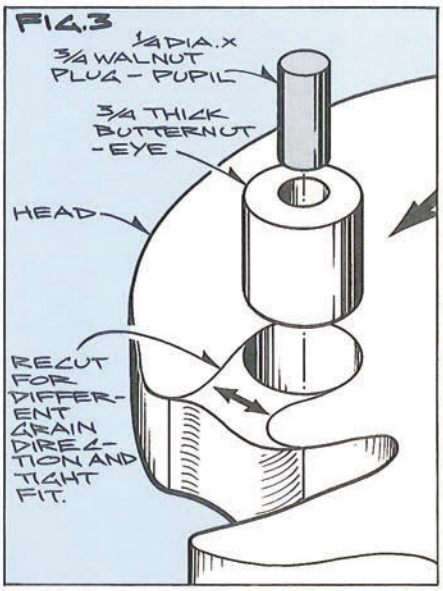


tion isn't necessary—the epoxy that you later use to join the parts mercifully fills any irregularities. This general procedure, of using the cut edge of one piece to draw an accurate cutting line to the adjoining piece, is the system that's used throughout the project.

Note that the small piece of wood below the eye is cut from the same section of wood as the head. However, don't use the cutoff from the head. Instead, re-cut the small piece of ash below the eye for a snug fit, and so the grain direction is slightly different than on the head (Fig. 3).

To make the eye, drill a 1/4 in. diameter hole in a piece of butternut, then glue a length of walnut dowel in the hole for the pupil. Position the head over the eye, trace the outline, then cut, fit, and tape the eye in place (Fig. 3).

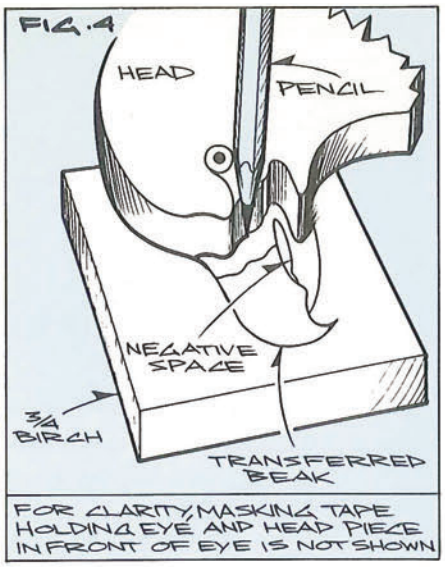
Step 3. I used a piece of birch near a knot for the nice grain configuration on the beak. Trace the beak profile, then position the head over the beak where they join to mark your line (Fig. 4), cut and fit.



There are two separate parts to the beak. One part is the nostril and lower beak section; the other part is the upper beak section. A narrow open area in the mouth provides a little negative space, which helps give the eagle his aggressive, lifelike appearance. Once the beak and eye parts are cut, use masking tape (on the back side), to temporarily assemble the beak, eye and head parts.

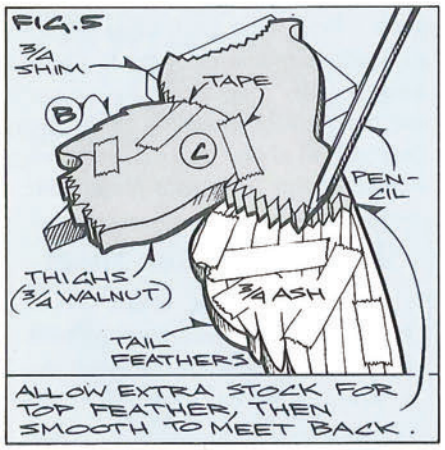
Step 4. Now that the head unit is completed, put it aside and finish fitting the body, thighs and tail. Trace, cut and fit the large thigh (C) to the body, and tape in position. Place these pieces over the small thigh (B), draw your cut line on the wood, then cut and fit. Use masking tape to temporarily assemble the thigh parts to the body.

The tail feathers can be cut individually or all from one piece of wood. Cut the feathers apart, leaving extra material where they meet the body. Then tape the



feathers together, position the back on top of the tail, trace your cut lines (Fig. 5) and finish cutting the tail.

Step 5. Next come the feet, comprised of parts that we'll call legs, toes and talons. The legs and toes are made from one piece of birch; the talons are walnut. Lay out the leg and toe parts on the section of birch, then cut out the leg at the top, where it fits to the thigh (Fig. 6). Also, cut out sufficient walnut blocks to

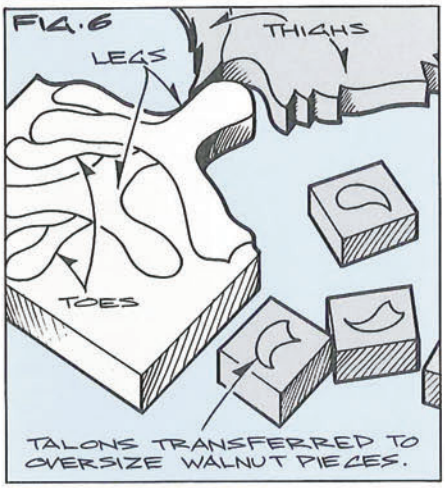


yield all the talons, and lay out the talon profiles on each. Once the leg is fitted to the thigh, put the body section out of your way and work on the remaining parts of the feet.

Step 6. Cut the feet apart and fit the talons to each toe. When fitting the talons, first place the toe over the talon, draw your cut line and cut out only the section where the toe meets the talon. Once you have a good fit, cut out the rest of the talon. By following this procedure you'll have more to hold onto when sanding the talon to achieve proper fit.

When I get to this point I like to finish the feet and glue them together so as not to loose any of the pieces. First, use a sanding drum to contour the legs, toes and talons. If you don't feel comfortable holding the small pieces for shaping, put a dab of hot glue on the end of a dowel and attach the dowel to the back of the piece to be shaped. You now have a handle. When you get the part shaped to your satisfaction, pry it off or use a knife to separate it from the dowel.

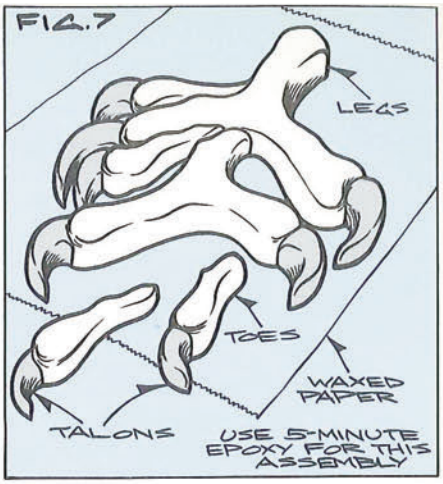
Next, lay a piece of waxed paper on a flat surface, mix up a little 5-minute epoxy and glue the toes, talons and legs together (Fig. 7).



Step 7. The wings are made up of 69 pieces. You can cut and fit each feather individually or cut several from one piece of wood, in which case it will be necessary to adjust for the material loss from the various saw kerfs. The adjustments can be made when you get to the top of the wing by making the last few feathers a little larger, or by making the wing a bit smaller. Remember, this is your original work of art—it doesn't have to match the pattern exactly.

Begin by cutting out piece A and smoothing the edges with your sanding drum. This piece is the foundation from which you will build the wing.

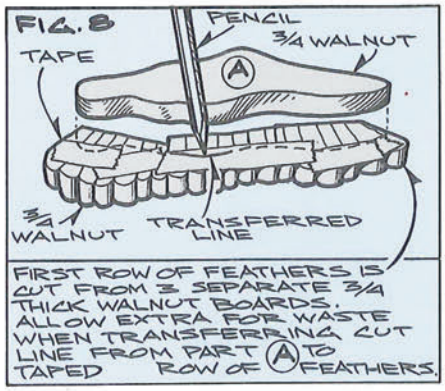
Select your wood and trace the first row of feathers. On the eagle pictured, I actually cut this group of feathers from three separate pieces of wood. Starting from the bottom, the first piece of walnut yields feathers 1 to 8, the second piece yields feathers 1 to 6, and the third piece yields parts 1 to 5 (see pattern). Cut the feathers between each group about 3/32 in. larger—this will compensate for the saw kerf loss between the feathers when several are cut from one piece of wood. But the 3/32 in. is just an estimate. Compare your work to the pattern as you



go, making the required adjustments to compensate for the saw kerf loss.

Do not cut off the edges of the feathers where they meet piece A. When you get the whole row finished use tape to hold the feathers together. Tape both sides, which will hold them rigid. Then place piece A in proper position over the first row of feathers and draw your cutting line (Fig. 8).

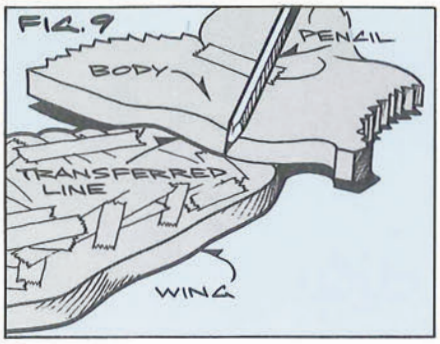
Step 8. Cut along your scribed line, then tape the first row of feathers to piece A. Use tape on both sides. Now go to work on the second row of feathers,



following the same procedures as you used to make the first row. Once the second row of feathers has been cut and taped, repeat the procedure for the remaining feathers. Also cut and fit pieces X, Y and Z leaving extra material (dotted line on pattern indicates this extra material) so the body can be positioned on top and an accurate cut line drawn.

Step 9. Position the body over the wing (Fig. 9), trace your cut line, then cut, fit and tape the wing to the body.

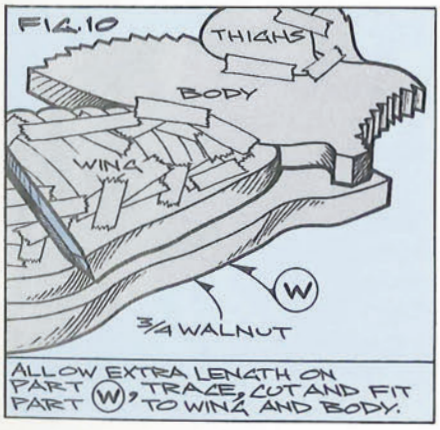
Next, lay out part W, cut its leading edge, and then position the wing and body assembly over part W to trace your cut line where part W meets the wing assembly (Fig. 10). Cut, fit and tape part



W to the wing. Repeat this same general procedure for the leading edge and six feathers, which are the only parts showing on the far wing. At this point your eagle should have all parts cut and fit, with masking tape holding the whole together. The only parts that have been contoured and glued together at this point are the feet (Fig. 11).

Step 10. For contouring, use your sanding drums, pad sander and flutter sheets to round over and shape the pieces. Start by contouring the lower pieces (the pieces that must be reduced in thickness). Then round over the adjoining higher pieces to meet the lower ones. This insures that the contours flow into one another.

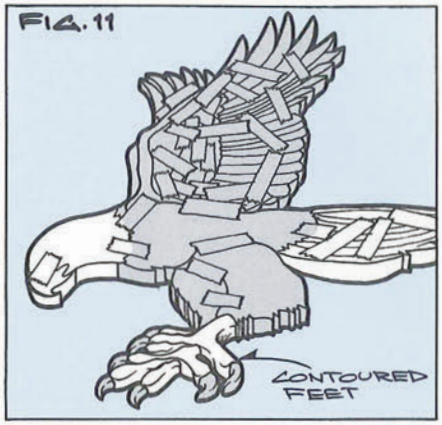
For example, when contouring the thighs, begin by reducing the thickness of thigh B by approximately 1/4 in. and rounding over the front edge. Position it next to the body and thigh C, draw a pencil line on the edges where thigh B meets the higher pieces (Fig. 12) and contour these higher pieces down smoothly. This is the general procedure for all contouring, always rounding the



higher pieces down to the lower ones. Obviously, you'll need to remove the masking tape that's holding the various parts together in order to do the contouring. Note that the back edge of the large thigh is tapered (see detail photo).

The front face of the tail feathers as well as the wing feathers should be shaped with a slight bevel, about 1/16 in., to give the appearance of an overlapping effect. The parts don't actually overlap, but the contouring achieves the desired visual effect. You can pick up much of the contouring by looking closely at the photo on page 27.

Step 11. After contouring and smoothing the beak, head, eye, body, tail feathers and thighs, you're ready for final assembly. Place waxed paper on your work surface (you'll need a good flat surface large enough for the eagle). Start the assembly by edge-gluing the eight tail feathers together. Then glue the tail assembly to the body. When dry, sand the back edge of the tail feather tips

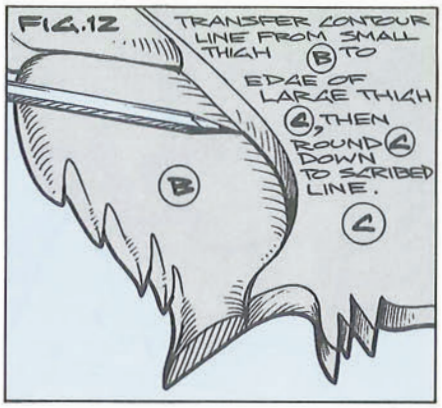


to taper them (see detail photo).

Glue the three small pieces to the tail, and then glue the thighs to the body. Take care not to use too much glue.

Where the fit of your parts is good and tight, regular yellow woodworking glue will be fine. But, for gluing small pieces like the beak, eye, etc., I like to use 5 minute epoxy. The epoxy is clear, so if a little squeezes out it's hardly noticeable. Continue gluing pieces until you complete the head, beak, body and tail. Do not glue the foot/leg assembly in place just yet, it will get in your way (remember, the foot/leg assembly was contoured and glued up earlier).

Step 12. Next up is adding the wing parts to the body. Lay out a large enough piece of wax paper on your assembly surface to accommodate the entire wing, then clamp the body to the assembly surface. Glue piece A to piece W, and when dry, place piece W in position by the body and clamp to the work surface. But do not glue part W to the body just yet. With the wing and body clamped to your work surface, you'll have a solid



base to work from. This is much easier than having everything shifting around when you begin gluing.

Step 13. Mix up a batch of 30 minute epoxy. Using a toothpick, apply a bead of glue to the lower half of the edges of each of the pieces as you assemble them. By keeping the adhesive away from the front, you'll minimize glue squeeze-out. If you get any squeeze out of glue between the joints, just wipe it off. Since the epoxy dries clear it won't ruin your finish like yellow glue would. Do not glue the wing to the body at this time.

When the wing assembly is dry, contour the back edge of the long feathers on the near wing (see detail photo). Next, glue the leading edge and six feathers of the far wing to the near wing. Lastly, glue the wing assembly and the leg/foot assembly to the body. Don't forget to give the back of the eagle a final sanding to make it presentable.

Tips for Flutter Sheet Setup & Use

Place pairs of sheets back to back (Fig. A), crisscrossing them to form a wheel (Fig. B), then repeat the pattern until you have 15 to 20 sheets on the arbor. Now tighten the nut to hold all the sheets together.

Secure the assembly in your drill press, making certain to tighten the chuck adequately. I operate my flutter sander at a maximum speed of 2300 rpm, and strongly suggest you do not exceed this.

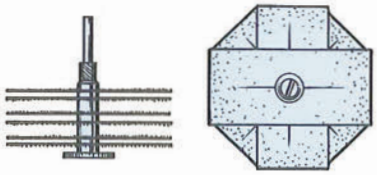


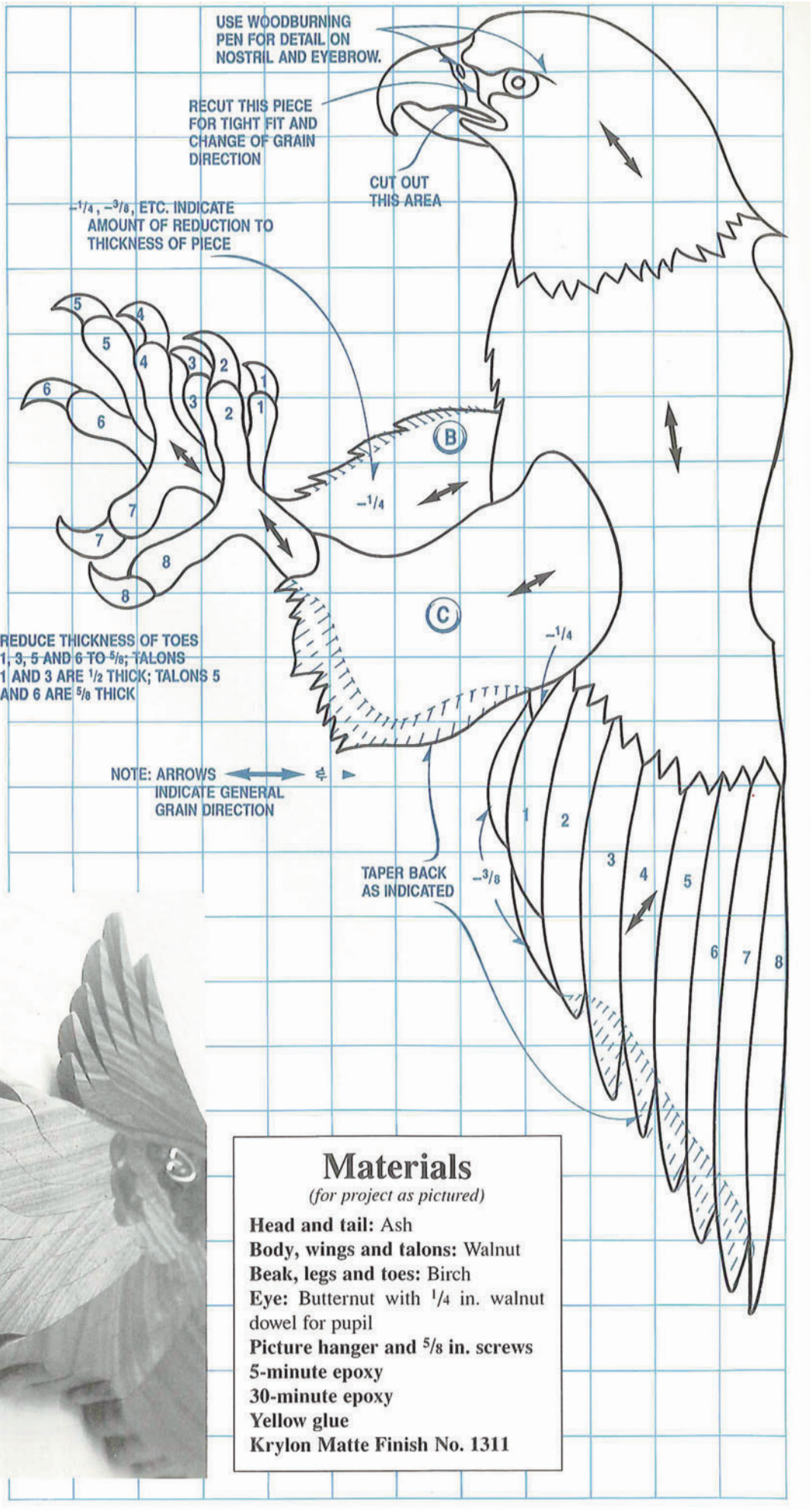
FIG. A FIG. B

Step 14. All that remains is final detailing and finishing. As noted on the pattern, a woodburning pen is used to add the nostril and eyebrow detail. Use a pen with a fine tip—you don't want to ruin your work at this point.

For the finish, first spray the back with three or four coats of Krylon Matte Finish No. 1311. Then attach a sturdy hanger with screws. Our pattern suggests a hanger location, but you should alter this if needed to achieve the proper angle. The eagle should look like he's about to snatch a prize trout from a pristine mountain lake!

Next, give the face of the project five or six light coats of Krylon. Sand lightly with 400-grit paper, dust off and apply a final coat. When dry, apply a little gloss finish to the eye, for a lifelike twinkle.

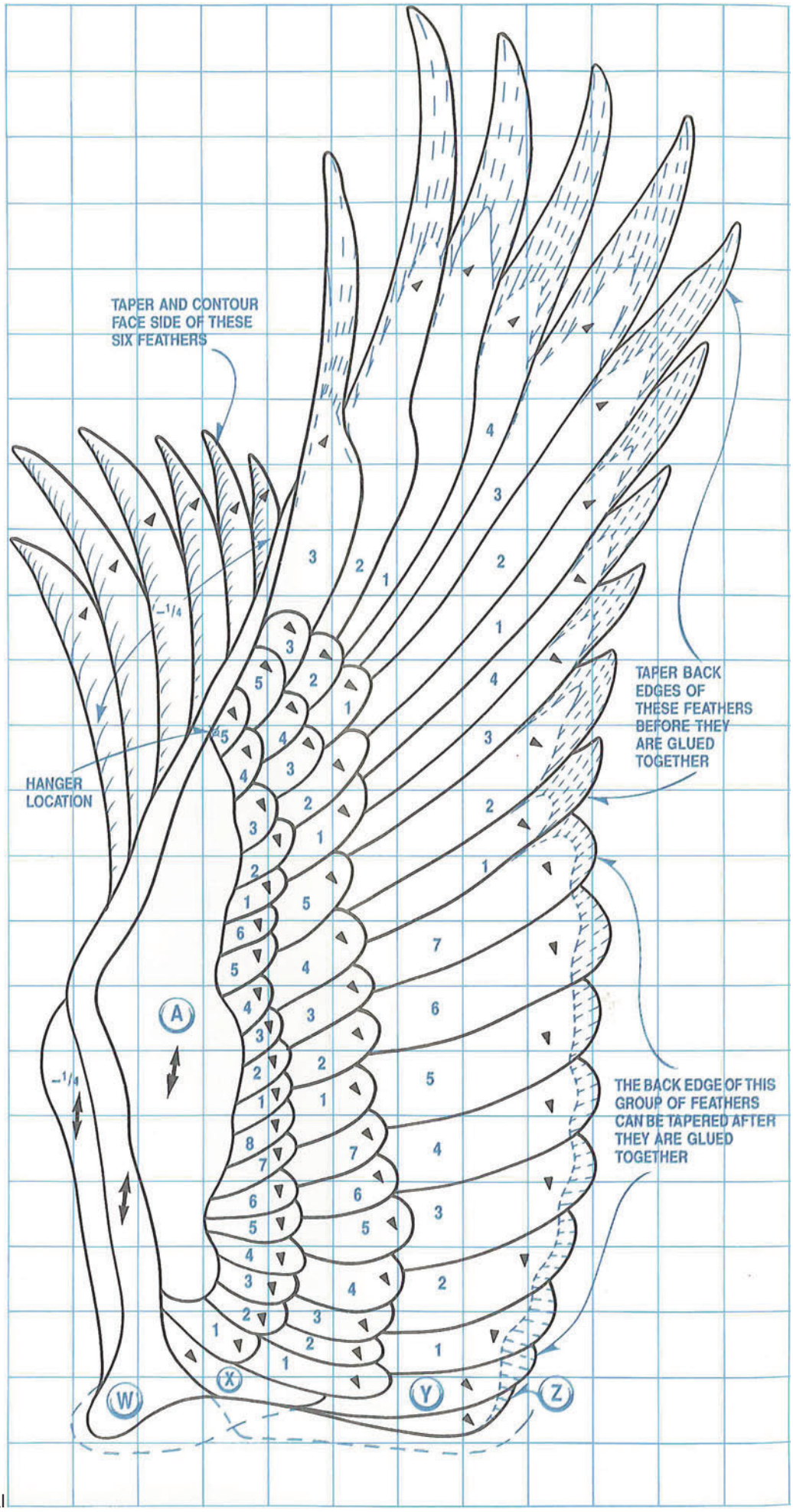
Hang your masterpiece, step back and admire your work!



Materials

(for project as pictured)

Head and tail: Ash
Body, wings and talons: Walnut
Beak, legs and toes: Birch
Eye: Butternut with 1/4 in. walnut dowel for pupil
Picture hanger and 5/8 in. screws
5-minute epoxy
30-minute epoxy
Yellow glue
Krylon Matte Finish No. 1311



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