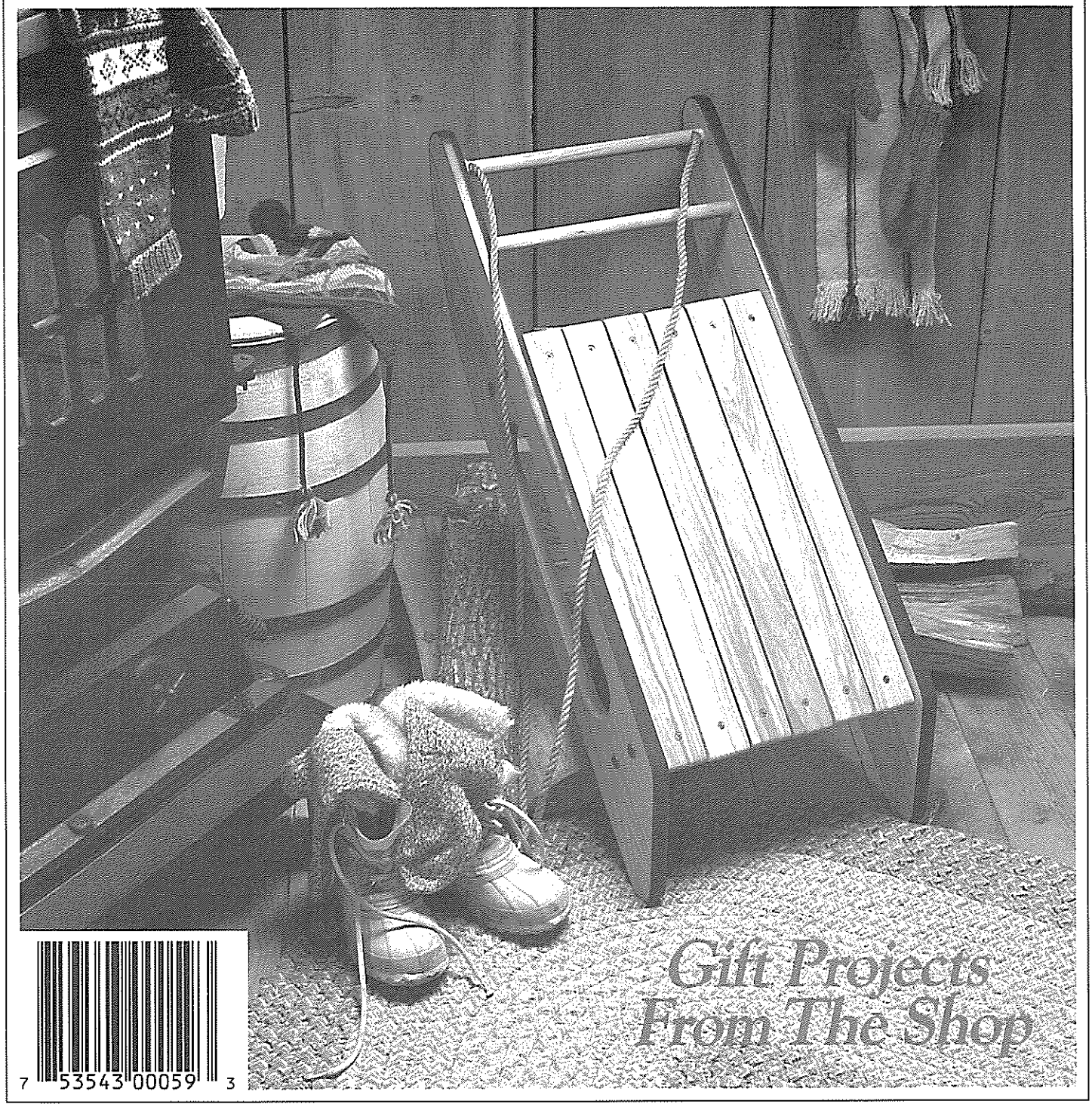
NO. 59 NOTES FROM THE SHOP

Woodsmith®



Gift Projects From The Shop

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Woodsmith

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Sawdust

ABOUT THIS ISSUE. We have tried to make it a tradition to devote one issue of *Woodsmith* to small projects — especially as Christmas nears. The challenge is to come up with ideas that make nice gifts, yet are fun to build too.

The projects I like best are those that offer a challenge I haven't tried before. Since I'm not a skilled (or frequent) turner, the ornaments in this issue caught my eye immediately. As soon as Ken (our project designer) showed me his prototypes, I was in front of the lathe, ready to try my hand at them.

It was frustrating at first. My hands did not follow the curves and shapes I saw in my mind's eye. But that changed faster than I thought it would. In short order, I was cranking out ornaments, and having a great time.

I didn't stop there. Three of the ornaments have a little carving added. Again, with a little practice I was chipping away and thrilled with the sense of instant accomplishment.

In both cases, I can't profess to be anywhere close to an expert. But I had fun, and the finished ornaments will make great gifts.

PROJECT SUPPLIES. A year ago, we started a new service. We offered a kit of parts for the classic roadster shown in *Woodsmith* No. 51. When that issue came out, I wasn't sure what the reaction would be to this new service.

Up until then, we listed a number of mail-order sources for the hardware and various parts needed to build the projects in *Woodsmith*. (This information is shown in Sources, page 24 of every issue.) But we ran into two problems.

First, we couldn't find mail-order sources for some of the parts needed for some of the projects (like a small piece of Plexiglas needed for the roadster).

The other problem was more serious. A few of the companies we listed went out of business or stopped carrying the products we had listed.

We thought the best way to solve both problems was to offer the supplies directly through *Woodsmith*.

Since then, we have had thousands of requests for project supplies. To help fulfill all those requests, Leslie Gearhart has joined us. Leslie has done a remarkable job of tracking down sources and ordering the products we needed.

In addition to getting the supplies needed for the projects in the past eight issues, she has been working to find the hardware for a few of the older projects. We have added hardware kits for three of these older projects. (For more on this, see Sources, page 24, and the Project Supplies listings on the protective cover.)

800 NUMBER. In the past we have only accepted orders by mail for the project supplies and back issues. Now we have an 800 (toll free) phone number to accept Master Card and Visa orders.

If you would like to order any of the back issues or project supplies, just give us a call at 800-444-7002. Jackie, Lisa, or Pat will be happy to take your order. However, ordering by phone is only available 8:30 to 4:30 Central Time, Monday through Friday.

FULFILLMENT SERVICES. For the past ten years we handled all of the subscription orders here at *Woodsmith*. But the circulation has grown so much that it was taxing our ability to handle it efficiently.

This past summer we began talking to a subscription fulfillment company, Kable News of Mount Morris, IL. The folks there have a very professional organization, yet they also offer personal service and have been delightful to work with.

In short, Kable News is now handling all of our subscription and renewal requests. (We still process the back issue and project supplies orders.) If you have a question about your subscription (or renewal), you can call them at 800-435-0715 (In Illinois, 800-892-0753). Just tell them you want information about *Woodsmith*, and they'll get you to the right person.

NEW FACES. As we began the search for another editor to help with the writing chores for *Woodsmith*, it became clear that we were looking for someone with a particular mix of talents. We needed someone who loved woodworking, knew how to do technical writing, and could work comfortably on a variety of computers. (All of the writing is done on computers.)

We found Kent Buckton. In addition to being an avid woodworker, Kent has the writing skills we were looking for. Over the past 10 years, Kent has produced many technical publications on subjects ranging from computer software to diesel engines.

Kent adapted quickly to our mix of woodworking and writing. His first morning here, we put him right to work on a project for the next issue. He had a quick introduction to the shop (where he built the project). By the next day he was back in front of a computer, writing the article.

It's good to have Kent here. I'm sure it will help speed things along in our quest to get back on schedule and stay there.

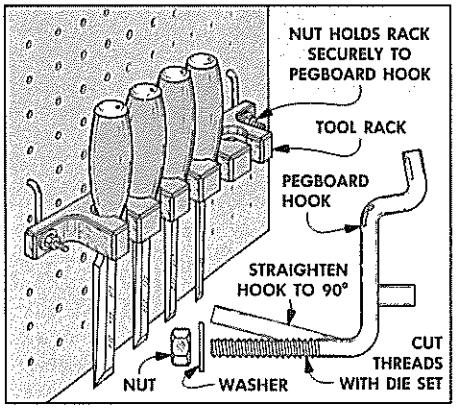
NEXT MAILING. The next issue of *Woodsmith* will be mailed during the week of December 26, 1988.

Tips & Techniques

PEGBOARD TOOL RACKS

I made a wooden chisel rack with "ears" on both ends to hang up on the pegboard over my bench, but the wood rack was shaky and wobbly when it was fit over a couple of pegboard hooks. Whenever I pulled out a chisel, the rack and all the other chisels wanted to come with it. I knew I could design a sturdier rack.

I discovered there are a couple things that can be done to stabilize a rack like this. First, straighten the slight angle out of the pegboard hooks so they project out 90° from the walls. This helps the rack hang straighter on the pegboard wall.



The trick that really helped was to cut threads on the end of ⅛" pegboard hooks with a 6-32 die (To cut threads, go slow and use even turning pressure.) When finished, tighten a 6-32 nut and washer onto the hook. Now the rack doesn't rock on the wall. (Note: Use 10-32 or ¼-20 dies and nuts for ¼" pegboard hooks.)

Since making the chisel rack, I've used the same method for making holders for small tools such as screwdrivers, files, and spade bits.

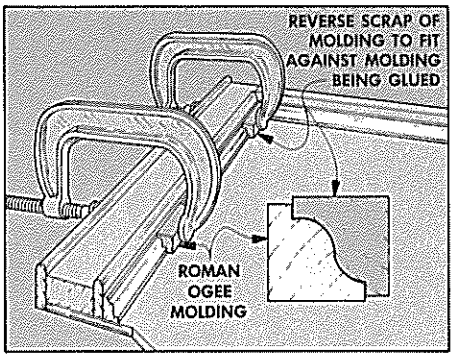
L. A. Jessen
Overland, Missouri

Editor's Note: Like all of the tips we print, I wanted to try this one out in our shop — but we didn't have a tap and die set. So I went to a local hardware store and was surprised to find that a basic tap and die set isn't that expensive. Sears has a 12 piece homeowner's set for under $12. I bought one with quite a few more sizes of taps and dies for under $25. Individual dies cost about $2 to $3.

And then the fun began. In addition to threading pegboard hooks, it's great to be able to add more threads to a carriage bolt or clean up some damaged threads. And we've even tried tapping into hardwood with some success.

CLAMPING ROMAN OGEE MOLDING

In *Woodsmith* No. 57 there were plans for a wall mirror that had Roman ogee molding around the inside. You mentioned that the molding profile makes it almost impossible to clamp the moldings in place so you held each piece with your fingers until the glue grabbed.



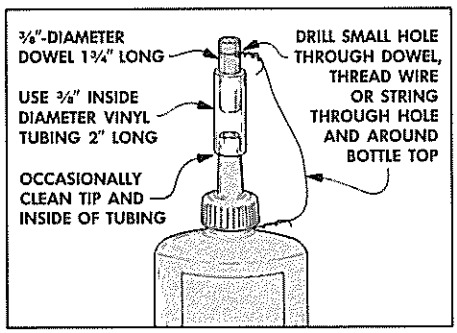
I discovered another solution to clamping the molding inside the frame. As you explained in the same issue (page 23), Roman ogee bits have two radii (a concave and a convex) that are the same. So if two pieces of the molding are reversed and put together, they "nest" into one another.

By cutting some short scraps of the molding and snugging them against the molding on the inside of the frame, you have a wide clamping surface on the back side of the scrap molding. Then hook your clamps around to the outside of the frame to hold the molding tight.

Benson A. Bowditch
Conway, Massachusetts

GLUE BOTTLE STOPPER

It seems the stoppers that come with most glue bottles either get lost, fall on the floor or get stepped on. I solved this problem by making my own stoppers out of vinyl tubing available at most hardware stores or building centers.



The inside diameter of the tubing has to be the same as the outside diameter of the glue bottle nozzle. (In most cases, ⅜" inside diameter tubing works fine). Cut the tubing to a length of 2". Then stick a short length of matching (⅜") dowel into the top end of the tubing.

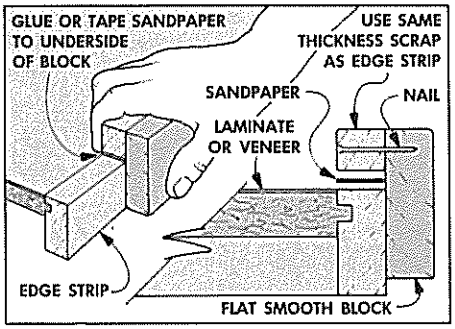
To keep the stopper from getting separated from the glue bottle, drill a small hole through the dowel. Then thread nylon fishing line, string, or some light wire through the hole and tie it around the bottle top.

Harold I. Stalder
State College, Pennsylvania

EDGE STRIP SANDING BLOCK

In the Shop Notes section of *Woodsmith* No. 56 you presented a method for bringing an edge strip flush with a plastic laminate or plywood top. No matter how careful you are, I think there is always some risk of harming the surface from either planing or scraping.

Here's what I feel is a safe way to bring the edge strips flush. After gluing the strips so they're above the surface a very slight amount, I make a sanding block to slide along the front face of the edge strip.



Nail a scrap piece of edge strip (the same thickness as the edge you want to sand) to a flat block. Next glue or carpet-tape sandpaper to the L-shaped sanding block. Then sand the edge strip with the sanding block riding on the front face until it's flush with the plastic laminate or plywood.

Jack C. Thompson
Binghamton, New York

SEND IN YOUR IDEAS

If you'd like to share a woodworking tip with other readers of *Woodsmith*, send your idea to: *Woodsmith*, Tips & Techniques, 2200 Grand Ave., Des Moines, Iowa 50312.

We pay a minimum of $10 for tips, and $15 or more for special techniques (that are accepted for publication). Please give a complete explanation of your idea. If a sketch is needed, send it along; we'll draw a new one.

Turned Ornaments

SIX WAYS TO SPRUCE UP A CHRISTMAS TREE

We couldn't think of a better way to get ready for Christmas than turning a few ornaments for the tree. We had a lot of fun coming up with a variety of shapes — but tried to keep the basic turning techniques to a minimum. This also kept the number of turning tools to a minimum. (I used a roughing gouge, a ½" gouge, a ¼" gouge, a ¼" parting tool, and a ½" skew.)

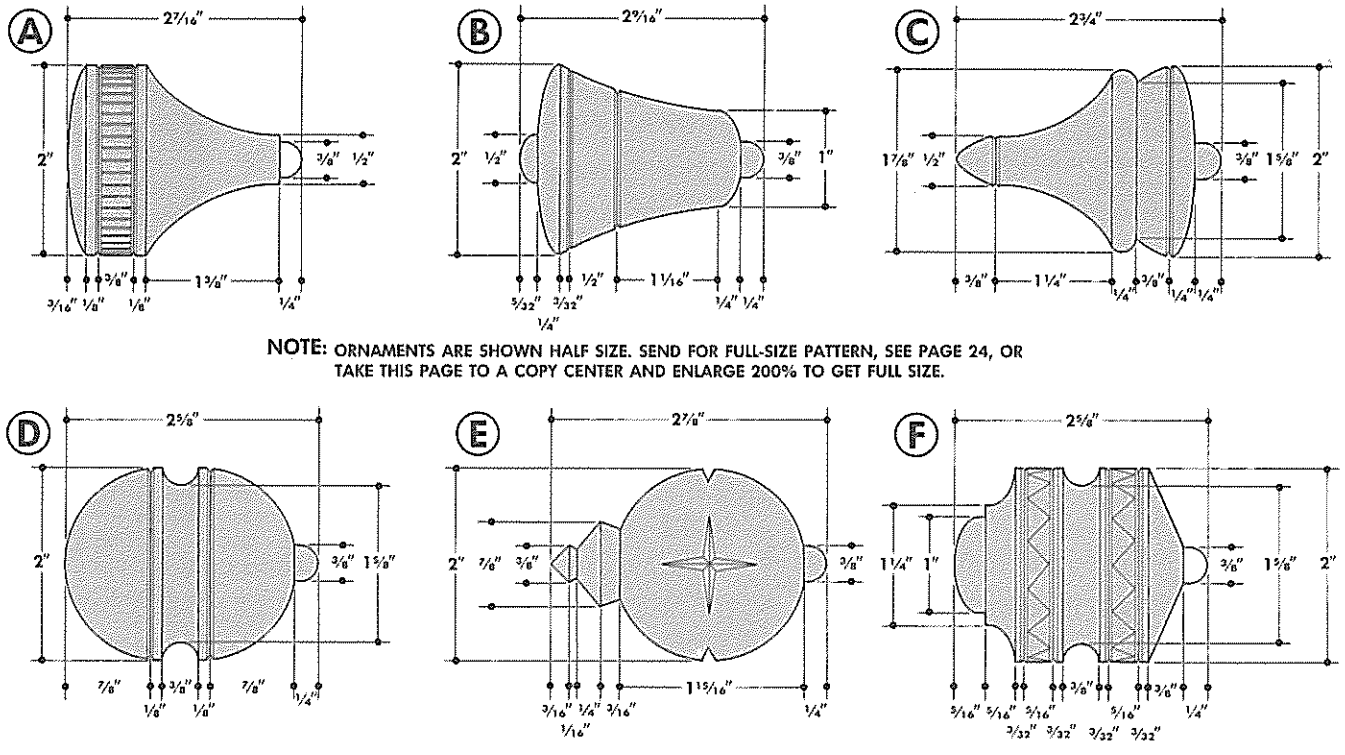
As for the wood, you need six turning squares 2¼" square by 4½" long. (See Sources, page 24.) After a little experimenting, we settled on basswood for these ornaments.

Basswood is light enough so you don't have to hollow out the ornament to keep it from bending the tree branch too much. If there's a problem, it's that basswood is somewhat soft, and tends to tear rather than cut cleanly, as harder woods do.

STEP-BY-STEP. The specific procedures I followed to turn the ornaments are shown on the next two pages. The techniques shown here are not necessarily the most common ones used in turning. Rather, we tried to show techniques we thought would be the easiest to use even if you're not skilled at turning. This generally means that we used scraping techniques as well as shearing techniques.

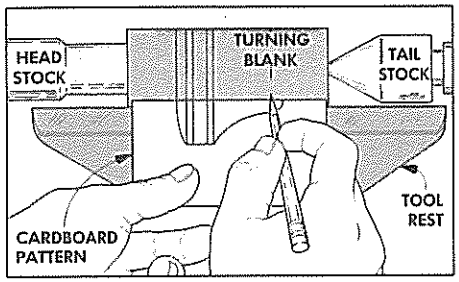
We chose to start with Ornament A to show some techniques common to most of the ornaments: how to turn the sweeping concave curve (used on Ornaments A, B, C), turning the gentle convex curve (on A, B, C), cutting the V-grooves (on A, B, C, D, F), and turning the button at the top (on all of the ornaments).

Turning the ornaments is only half the fun. I decided to add a little decorative carving on three of the ornaments, see page 7. When the ornaments were finished, I screwed a small screw eye in the top button to hang them. Then the ornaments can be painted, or just sprayed with clear Deft to protect them.

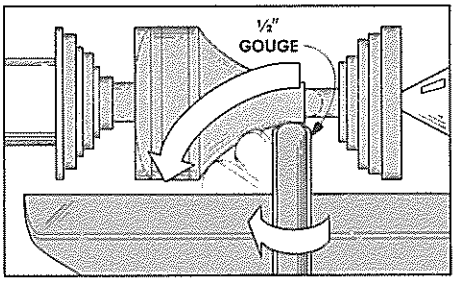


NOTE: ORNAMENTS ARE SHOWN HALF SIZE. SEND FOR FULL-SIZE PATTERN, SEE PAGE 24, OR TAKE THIS PAGE TO A COPY CENTER AND ENLARGE 200% TO GET FULL SIZE.

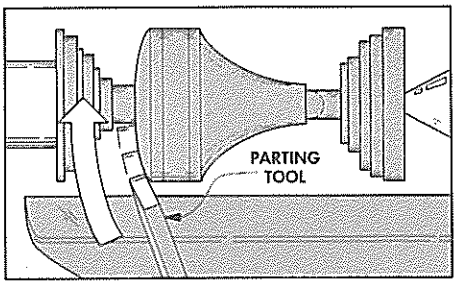
Step-By-Step



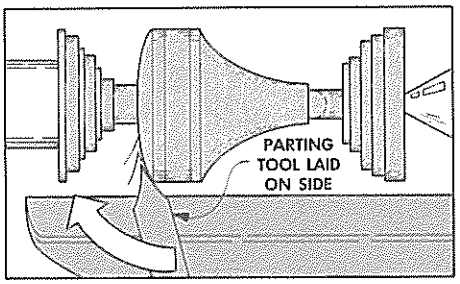
1 **ROUGH AND MARK OUT.** Each ornament starts out as a basswood blank about 2¼" square by 4½" long. Rough down the blank to a 2" diameter. Then mark the transition lines, (refer to Fig. 1 for dimensions). I marked the transition lines on a piece of cardboard and cut notches at each line to hold the point of the pencil. Finally, part down both ends, stepping the ends back so there's room to work.



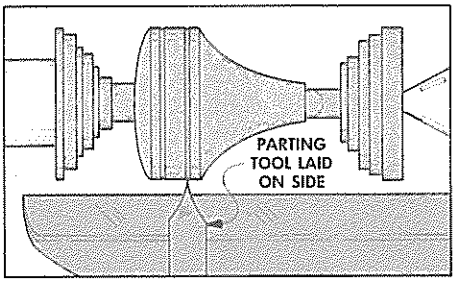
2 **TOP CURVE.** To turn the sweeping curve on Ornament A, I used a ½" gouge. Hold it straight in at the right shoulder of the blank. To get the sweeping shape, establish a pivot point with your left thumb. Then gradually swing the handle out from 6:00 to 4:00 while rolling the cutting end counterclockwise (to the left). The cutting end should roll over to about a 45° angle at the end of the cut.



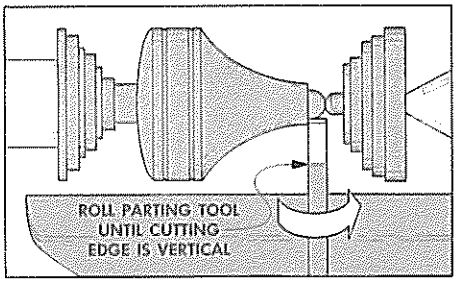
3 **ROUGH CURVED BOTTOM.** There's a very gentle curve on the bottom of the ornament. Although a skew could be used here, I found it easier to use a parting tool. Start with a whisker-wide cut. Then push in, increasing the width of cut while keeping the side of the tool rubbing against the stock. Gradually pull the handle around to the 6:00 position to end the cut. Only a few passes are needed to rough it down.



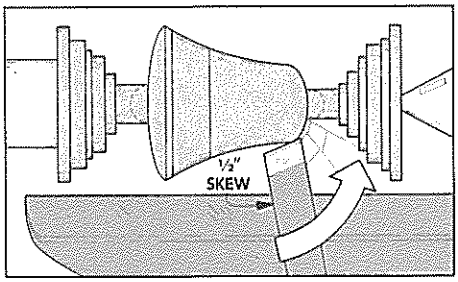
4 **SMOOTH CURVED BOTTOM.** It's difficult to cut the curve on the bottom and get a smooth shape, especially with a parting tool. It can be smoothed with a V-point scraper, however I chose an unorthodox approach. Since I was working with the parting tool anyway, I just rolled it over on its *side* and used the curve of the tool like a scraper to shape the bottom. (It may help to re-sharpen it to a long point.)



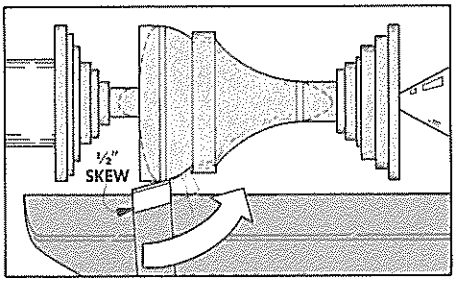
5 **V-GROOVES.** The band at the waist of the ornament has two V-grooves. These grooves are located ⅛" from the shoulder of the sweeping top curve, and ⅛" from the rounded bottom curve. I cut these grooves with the parting tool. Lay the tool on its side and push it straight in. Make the cut slowly. The V-groove only needs to be 1/16" wide — it's easy to get carried away and make this cut too deep.



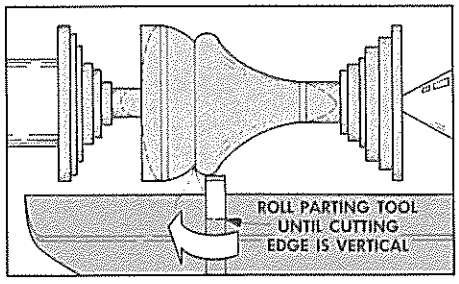
6 **TOP BUTTON.** Next, I marked the shoulder line for the button at the top of the ornament. Then part a 1/16"-deep shoulder, about ⅝" long. I continued with the parting tool to shape the half-round button. Starting at the shoulder, gently roll the parting tool to the right (clockwise) to cut the button shape. As the cutting edge reaches the vertical position, it will shape the top of the button.



7 **TURNING A BEAD.** Ornament B uses the same basic techniques to turn the sweeping curve, the rounded bottom, and the buttons. The only addition is to cut the curve (bead) at the top that blends into the button. You could use a skew with shearing action. However, I found it easier to hold the skew flat on the tool rest, and cut the bead with a scraping action by moving the handle from 6:00 to 4:00.

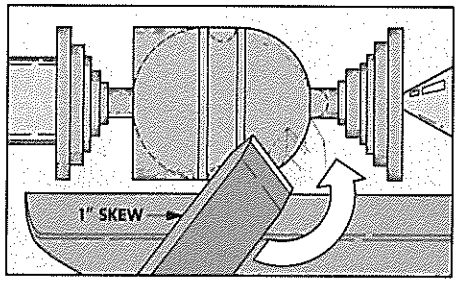


8 **WAIST BEAD WITH SKEW.** Ornament C is sort of an inverted version of the first two. However, I mounted it with the bottom end on the right, because it was easier to turn the sweeping curve. Next, I cut in a bead at the waist. Again, I used a skew with a scraping action. Hold the skew flat on the tool rest. Then rotate the long point into the waist, moving the handle from 6:00 to 4:00.

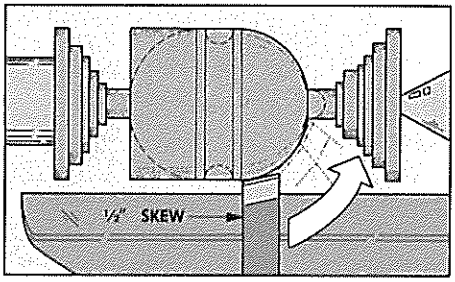


9 **BEAD WITH PARTING TOOL.** A second small bead is cut to complete the waist. This bead can be scraped with a skew, but I used a parting tool. Start with the parting tool straight in and roll it to the left until the cutting edge is vertical and cuts a crisp waist line. To complete this ornament, use a skew to scrape an elongated bead at the right end (Step 7), and turn the bottom as in Steps 3 and 4.

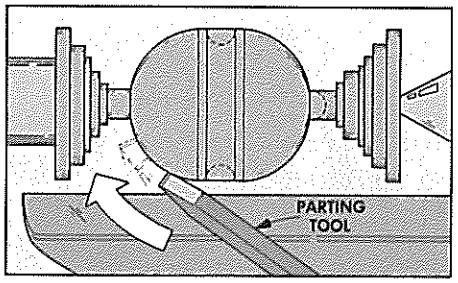
Step-By-Step



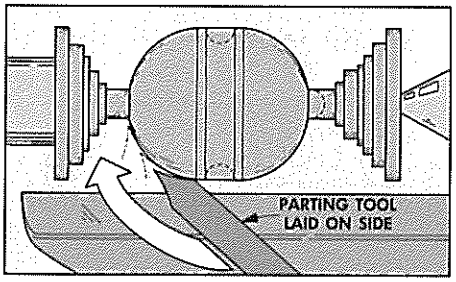
10 **TURNING A BALL, SHEARING.** One of the most difficult shapes to turn is one of the simplest — a ball. Besides developing the actual technique, you have to develop an eye for the shape. The fastest way to turn a ball is to use a 1" skew with a shearing action. This is more difficult than it looks. You have to keep the bevel riding against the stock and rotate the tool so you don't "catch a corner."



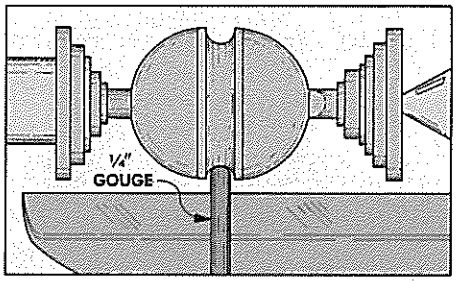
11 **TURNING A BALL, SCRAPING.** An easier approach is to use a scraper to shape the ball. Or, you can use a skew in a scraping position. Turn the skew on its side and hold it flat on the tool rest with the long point leading around the end of the stock. Slide the skew around the end, while keeping the center of the cutting edge on the curve. It's slow, but less-risky than using a shearing cut.



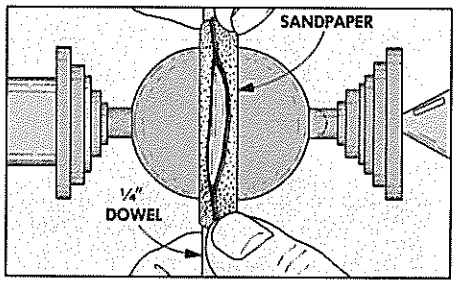
12 **TURNING A BALL, PARTING TOOL.** Both of the previous methods are awkward when turning the left end (if you're right-handed). If all else fails, grab a parting tool. (In fact, I find it much easier to use a parting tool on both ends.) Start at the waist, with just a hairline cut. Then push the parting tool around the curve pressing its side against the stock, and gradually increasing the width of cut.



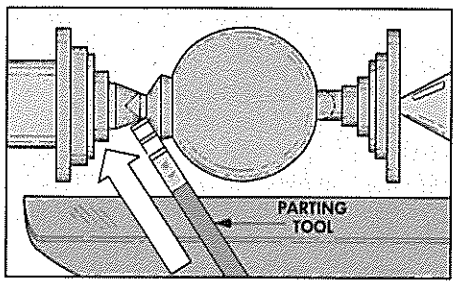
13 **SMOOTH BALL, PARTING TOOL.** It's rather easy to rough out the basic shape of the ball with a parting tool. The tool is very forgiving so you don't have to worry too much about technique, and can concentrate on visualizing the shape of a sphere. (Look at the top edge.) Then to get the final shape, I roll the parting tool on its side and use it as a scraping tool to smooth the ball to shape.



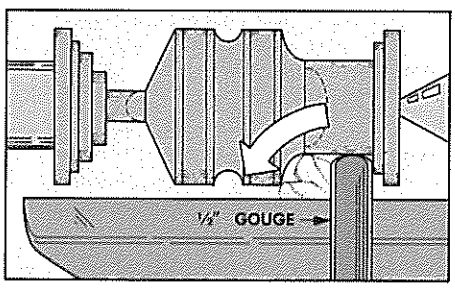
14 **SMALL COVE.** Ornaments D and F have a small cove at the waist that is cut with a small (¼") gouge. The motion is the same as shown in Step 2. Stick the gouge straight in the center of the cove. To cut the left side, roll the cutting end counterclockwise (to the left) and move the handle from 6:00 to about 5:00. For the right side, go back to 6:00 and roll clockwise while moving the handle to 7:00.



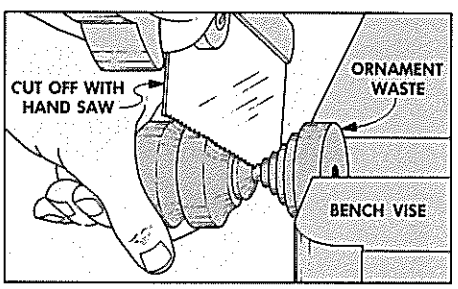
15 **SANDING COVE.** I don't have any reservations about using any tool that will get the job done. In the case of the cove, I found it difficult to get such a small cove symmetrical — there's not much room to play around and correct mistakes. So I turned it down to rough shape and finished it with a strip of sandpaper wrapped around a ¼" dowel. This gave me the exact shape I wanted.



16 **SHOULDERED BEADS.** Turning Ornament E is difficult because you have to get a perfect sphere. As the left side is turned, stop short to create the angled shoulder at the bottom of the ornament. Since I used a parting tool, this decoration starts right where the parting tool leaves off. Then two more shoulders are turned at successively steeper angles (about 4:30 then 3:30 positions).



17 **SHOULDERED COVE.** Ornament F begins as a cylinder with a cove at the waist. Then a shouldered cove is cut at the bottom. (Tip: Since I'm right-handed, I found it easier to turn this cove with the ornament mounted "upside down" — so the cove is on the right.) Complete the ornament by parting off a shoulder below the cove and turning the large button. Then cut V-grooves and a button on top.



18 **FINAL STEPS.** All ornaments are turned down to about a ⅛" diameter at both ends (enough to hold it on the lathe). Then sand with 150 and 240 grit sandpaper. Remove the ornament from lathe and saw waste off ends. I used a knife to completely shape the ends and sanded them smooth. Three ornaments have carving (see next page). Then to protect them, I sprayed on a coat of clear Deft.

Carving the Ornaments

I couldn't resist. Although the turned ornaments shown in the previous article can stand on their own without any further decoration, it takes just a few strokes of a knife to add a unique accent to three of the ornaments. Even if you've never done any carving before, this is easy.

Ornament A has a series of vertical notches extending between the two V-grooves that were *turned* around the bottom band. On Ornament E, I added four stars around the middle of the ball. And on Ornament F, I cut in a zig-zag pattern on the two waist bands. (Refer to drawings on page 4.)

CARVING KNIFE. All of these cuts are made with the same tool — a shaping knife with a sheepfoot blade. This type of knife has a straight cutting edge with a back that curves to a point at the end of the blade, see Fig. 2 below.

Although you can buy a carving knife for this project (see Sources, page 24), this type of blade is sometimes found on pocket knives. It's also the basic shape of a Stanley or Sears utility knife which could be used if you want.

LAY OUT THE PATTERN

After the ornaments are turned and sanded, I marked out the carving pattern by drawing the stroke lines with a pencil.

ORNAMENT A. The layout on Ornament A is easy. Just draw a series of vertical lines between the V-grooves on the bottom band of the ornament, see Fig. 1 on page 4. To get the spacing right, I wrapped a strip of paper around the ornament and marked a point to indicate the circumference, see Fig. 1, below.

Unwrap this strip and mark a series of lines about ⅛" apart. The spacing may not work out perfectly. Adjust the spacing on the last few lines to complete the pattern.

ORNAMENT F. The zig-zag pattern on Ornament F is also laid out between the V-grooves on the waist bands. Again, wrap a strip of paper around the ornament and mark the circumference. Then mark off equal sections about ¼" wide on the paper. Transfer these marks to the circumference of the ornament to indicate the points of each zig-zag, refer to Fig. 4.

ORNAMENT E. The star on Ornament E is marked by drawing two crosslines 1" long on the center of the ball. Then sketch the crescent-shaped curves between the ends of the lines.

CARVING

After drawing the layout lines, I used the knife to cut V-grooves at the lines. One of the advantages of using basswood is that it's very easy to carve.

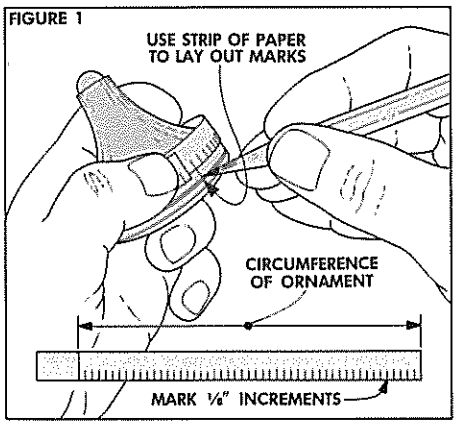
The cutting stroke is the same on Ornaments A and F. Just poke the point of the knife in at one of the V-grooves (the grooves that were *turned* on the band). Then draw the knife toward you cutting a slight crescent (curved) shape to the opposite V-groove, see Fig. 2.

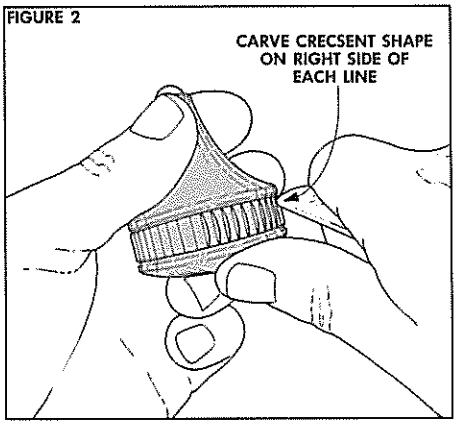
I made this cut on one side of all the lines first. Then I turned the ornament end-for-end to make the second cuts, see Fig. 3.

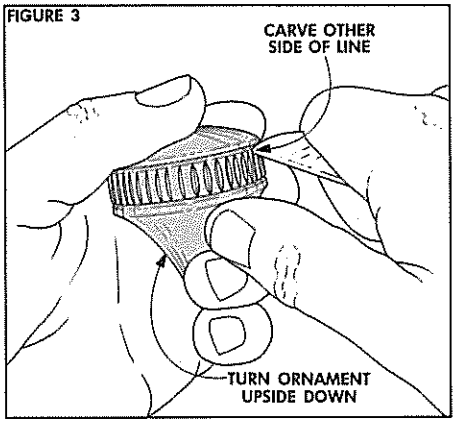
The cuts should be made in one continuous cut, slightly less than the depth of the turned V-grooves. Try to make each cut in one motion. It's very difficult to go back and "clean up" a cut — it almost always gets worse rather than better.

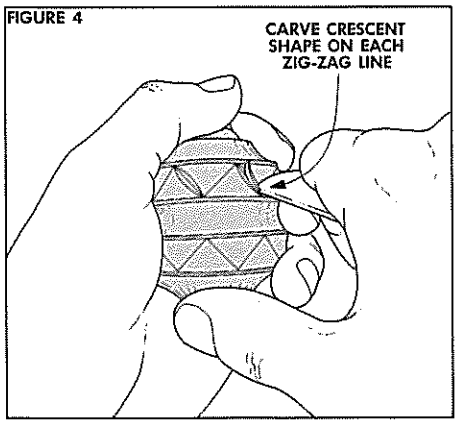
The same type of cut is made on Ornament F, except the shape of the carved lines can be more of a crescent shape, see Fig. 4.

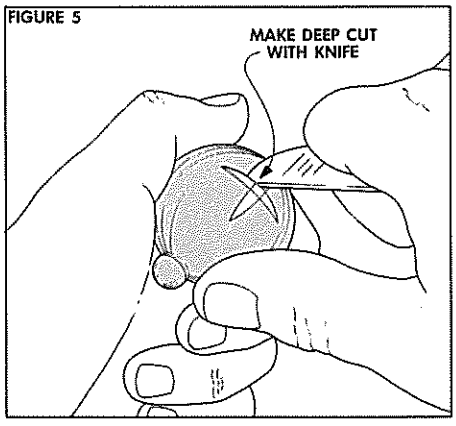
When carving the stars in Ornament E, don't be shy about the depth of the cut. The knife has to go in quite deep. Make the first cuts on the waist of the ornament (horizontal on the ornament), see Fig. 5. Then make the second cuts vertical on the ornament, see Fig. 6. This sequence will help prevent chipping out the corner where the cuts meet.

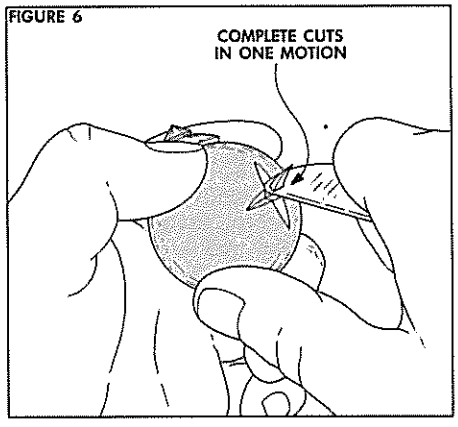












Display Case

A SHADOW BOX FOR SMALL TREASURES

After turning the Christmas ornaments shown on page 4, I decided to design and build a display case for them. But as soon as I was done, I had requests for more of these cases (at different sizes) to display everything from thimbles to figurines.

The case shown is made of ½"-thick walnut for the frame and ¼"-thick basswood for the dividers. (See Sources, page 24.)

THE FRAME

I started by making the outside frame. Each frame piece has a large rabbet on the inside face (cut almost across its width) which holds the glass front, see Fig. 1.

CUT THE PIECES. Since it's easier to cut the rabbet on two long pieces than four short pieces, I began by cutting two pieces of ½" stock to a finished width of 2¾" and a rough length of 18".

RABBET. To cut the rabbets, set the saw blade ⅜" from the fence and raise it 2⅝" above the table, see Detail in Fig. 1. (This will leave a ⅛" x ⅛" lip at the top.)

MITER TO LENGTH. After the rabbets are cut, the two long workpieces are cut in half and then mitered to finished length to produce two side pieces (A) and the top and bottom pieces (B), see Fig. 2.

Shop Note: If you try to miter the pieces with the outside (good surface) up, they won't sit flat on the saw because of the rabbet. To solve this problem, I slipped a scrap of ⅛" Masonite under the workpiece and into the rabbet, see Fig. 3.

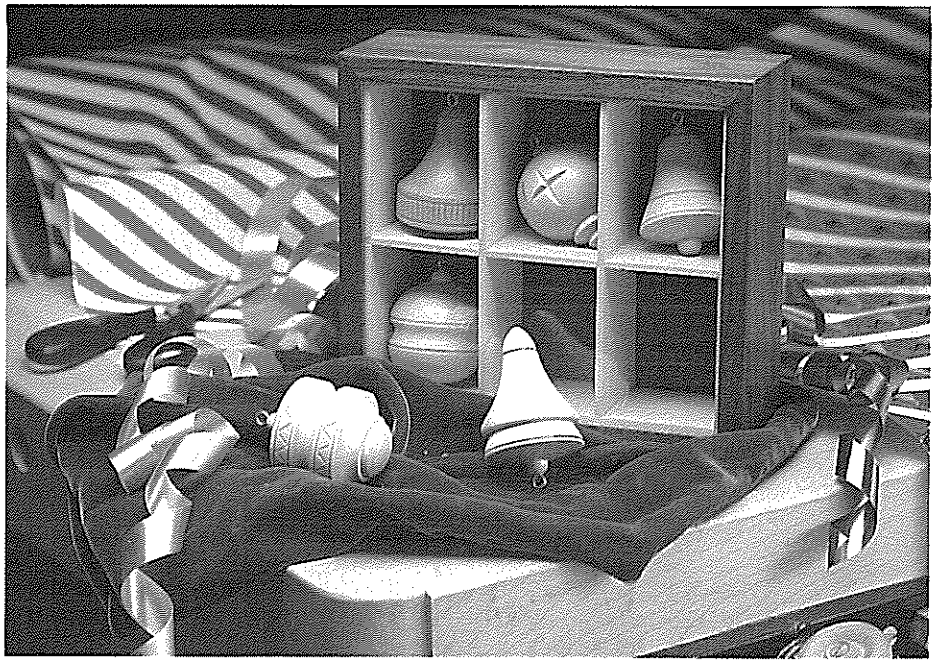
ASSEMBLY. Now the frame can be assembled. To keep the frame square, cut a piece of plywood to the *exact* length of the inside miters. Then clamp the frame around the plywood, see Fig. 4. (Put wax paper behind the corner blocks to keep them from being glued to the frame.)

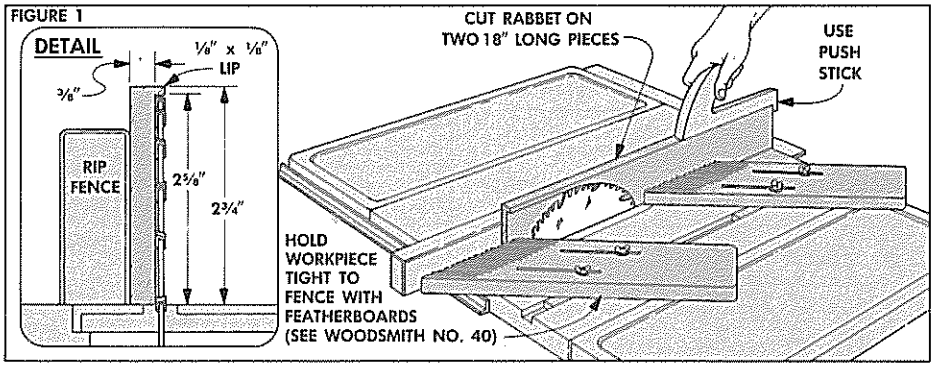
BACK. After the frame is assembled, I edge-glued a back panel (C) from ¼" stock. (You could use ¼" plywood.) When the blank is dry, plane it flat and then cut it to fit inside the frame, see Fig. 2. (Note: If using solid stock, cut the back about 1/16" narrower than the opening to allow for expansion with changes in humidity.)

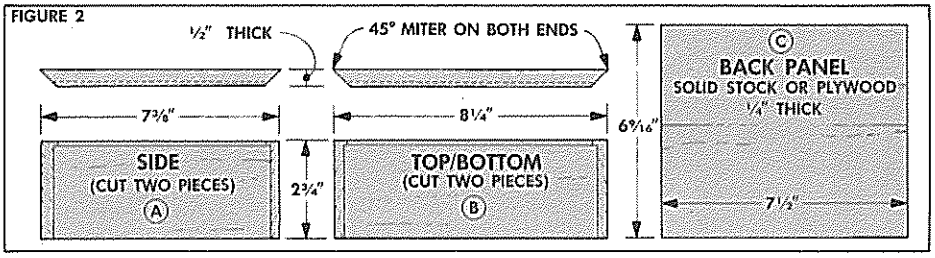
EGG CRATE DIVIDERS

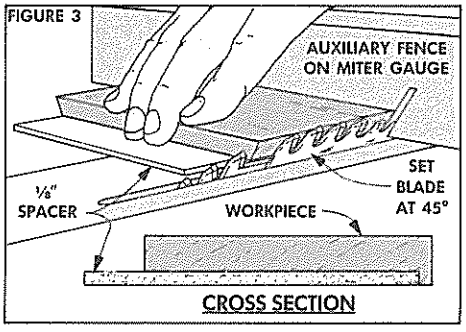
The "egg-crate" dividers that partition the frame consist of three center dividers and four outside pieces, refer to Fig. 7.

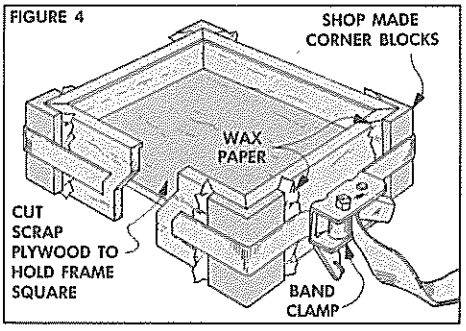
TEST KERF. Since the center dividers (D and E) interlock in saw-cut notches, the thickness of each center divider must equal a single saw kerf. To determine the width of the kerf made by your blade, cut a test kerf in a piece of scrap.











RESAW TO THICKNESS. Now resaw the stock for the dividers to thickness to match the kerf. Resaw enough for two vertical dividers (D) (rough sizes 2½" x 7") and one horizontal divider (E) (2½" x 8").

Shop Note: To allow for planing and sanding, it's best to resaw these pieces slightly thicker than the kerf. They should fit the test kerf *after* sanding.

RESAW OUTSIDE PIECES. The four outside pieces (F,G) of the egg-crate are made thicker (¼") because half of their thickness is hidden behind the ⅛" rabbet on the frame. (When viewed from the front of the case, only ⅛" thickness will appear.)

CUT TO SIZE. To make these ¼"-thick outside pieces, start by cutting two vertical outside pieces (F) to roughly 2½" x 7" and two horizontal pieces (G) 2½" x 8".

To determine the *final width* of *all* the dividers, measure the depth of the box from the bottom of the lip to the back edge (2⅝"). Then subtract the thickness of the glass (⅛") and the thickness of the back (¼"). In my case this meant cutting the dividers 2¼" wide, see Fig. 5.

LENGTH. Now *all* the pieces can be cut to final length so they fit snugly *inside* the frame, refer to Fig. 8. This is 6⅝" for the vertical pieces (D,F) and 7½" for the horizontal pieces (E,G).

END NOTCHES. Next, I cut notches in all of the pieces to assemble them. These notches are cut exactly half way up the width of each piece. Start by cutting ¼"-wide end notches in all the pieces to match the thickness of the outside pieces (F,G).

To cut these end notches, set the fence as a stop ¼" from the *outside* of the blade and the blade height equal to half the width (height) of the pieces (1⅛"), see Detail A in Fig. 6. Then make a pass at the end of the pieces. (Note: You can cut a number of pieces at once.) To finish the notch to ¼" wide, push the ends against the fence and make another pass.

CENTER NOTCHES. Next, I cut the center notches on the opposite edge of the end notches. That is, the pieces should be turned so the end notches are on the top edge when the center notches are cut.

On the shorter vertical pieces (D,F), cut a notch centered on the length (in my case, 3¼" from the end, see Fig. 5). On the horizontal pieces (E,G), cut a notch 2½" from each end, see Detail B in Fig. 6.

FINAL ASSEMBLY

Before putting all of the pieces together, I finished them with two coats of tung oil. Then I cut a piece of glass to fit the frame.

Now, slide in the egg-crate pieces. (If the thickness of the stock matches the width of the notches, the pieces should push together without glue, see Fig. 7.)

To hold the back panel in place, I screwed two metal turn buttons into the back edge of the frame, see Fig. 8.

FIGURE 5

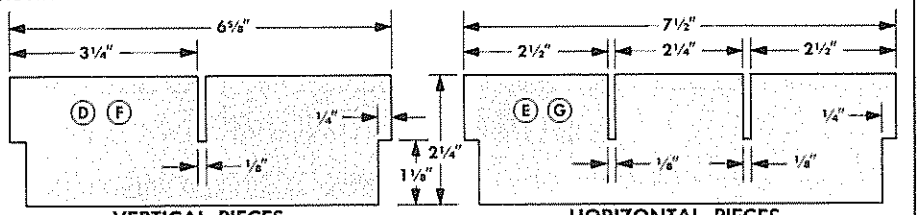


FIGURE 6

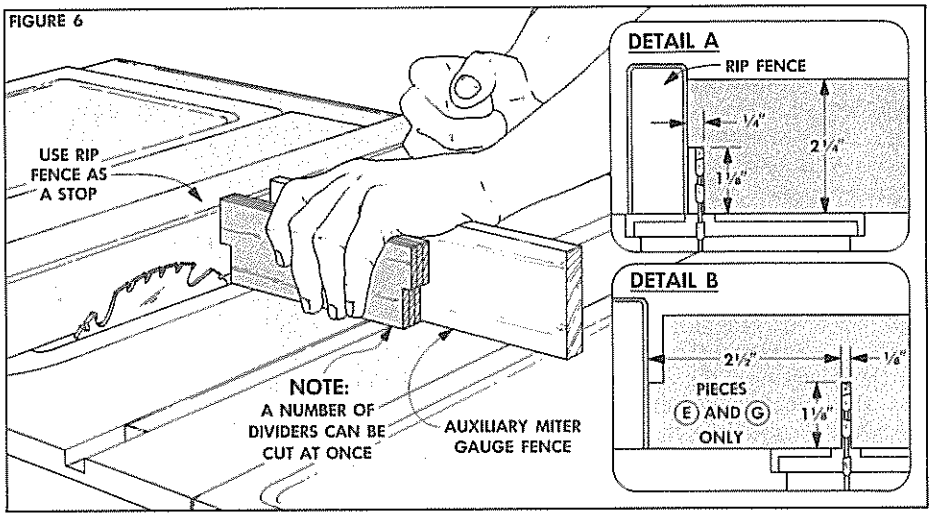


FIGURE 7

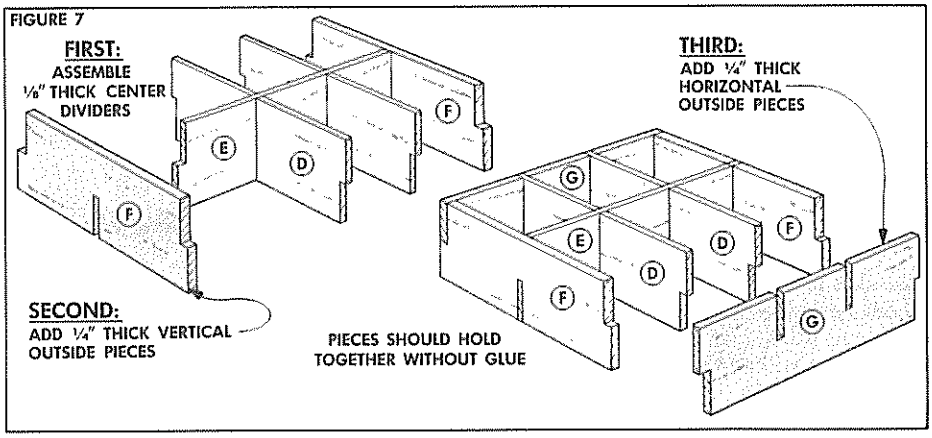
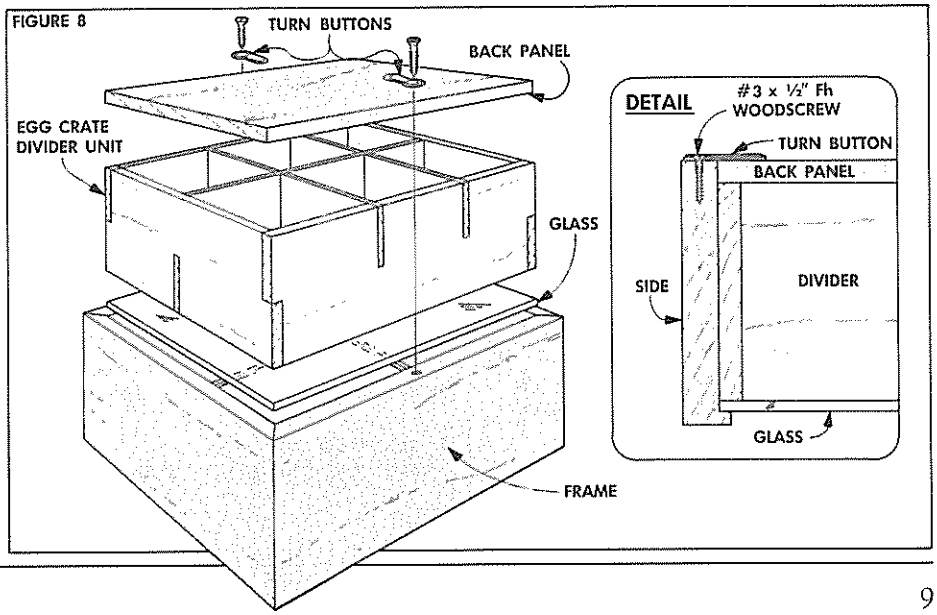


FIGURE 8



Kid's Sled

BUILT FOR SNOW, SHOW AND GO

A good sled is like a fine sports car. You feel like it's part of you as you slide down hill. Even though our sled doesn't have a fancy steering mechanism or flexible runners, the kids will find it runs like a sports car for fast maneuvering down the slopes.

This subject of speed brings me to a topic that received some discussion in the *Woodsmith* offices. Given the right hill and the right snow conditions, this sled is fast. Dave's kids (our low-budget test pilots) praised its speed. Dave, forgetting his own youth as a thrill seeker, got the chills.

We don't encourage using this sled on hills with trees or other immovable obstacles. For young children, this is a pull sled, not a coasting sled.

The line between the use and abuse of anything isn't fine. It's obvious what's fun and what's foolhardy. This sled is a lot of fun when it's used intelligently. Used recklessly, it can be dangerous. But, so can sliding down a hill on a conventional sled — or even on a piece of cardboard.

One other thing to keep in mind: all sleds are meant for coasting on snow, not ice. The plastic trim on our sled's runners makes it especially good, even in powdery snow. But, unlike the steel runners on commercial sleds, this plastic won't bite into ice. So, steer clear of icy spots before you lose control of your steering.

MATERIALS

The sled is made of solid ash - the same wood used since the last ice age for dog sleds, snowshoes, and skis. Ash has been popular for winter transportation because it stays flexible even through hourly freeze/thaw cycles.

FASTENERS. Instead of using rawhide thongs to lash the parts together, we used knock-down furniture fasteners. On these fasteners the shank is threaded to screw into a steel cross dowel nut. This design lets them be retightened without stripping the holes. During the summer the sled can be broken down and packed away.

RUNNER EDGING. The runners have strictly modern trimmings. We covered the edges with vinyl T-molding — the table edging that's commonly used on inexpensive plywood and particleboard furniture. This trim makes the runners slick and abrasion resistant. And the T-molding is easy to replace if it's worn or damaged.

MAKE RUNNERS

The sled consists of two runners (A) connected by two cross braces (B) and six slats (C) that are screwed to the cross braces to form the seat. I began by cutting the runners from 4/4 (¾" to 13/16" actual) brown ash, 6" wide by 36" long, see Fig. 1.

RUNNERS. The runners (A) form the sides of the sled. To cut them to shape, begin by laying out the profile, see Fig. 1. Since the position of the 45° angled cuts on the rear of the runners is determined by the arcs of the circles that form the corners, I drew the circles first.

CORNERS. The two rear corners, as well as the nose of the runner, are made by drawing 1" radius circles. Locate the front circle and lower rear circle right at the corners of the workpiece, see Fig. 1.

Next, to locate the upper rear corner, measure in 5" from the end and square a line down from the top edge. Place the point of a compass on this line and draw a 1" radius circle so it touches the top edge of the workpiece. Then draw a line tangent to the upper and lower circles. When the waste is cut off, the angle of the rear end of the runner will be about 45°.

MATERIALS LIST

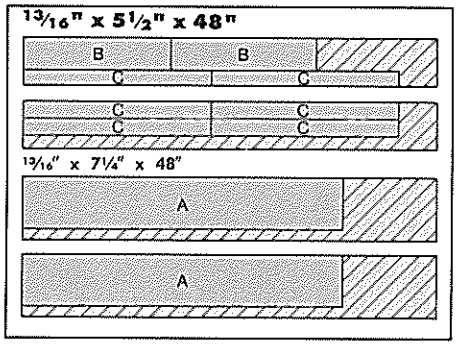
Overall Dim: 6"h x 15⅜"w x 36"l

A	Runners (2)	13/16 x 6 — 36
B	Cross Braces (2)	13/16" x 3 — 14
C	Seat Slats (6)*	½ x 2 — 20¾
D	Dowels (2)**	¾ x 14¾

* RESAW TO ½"

** CUT FROM ONE ¾" x 36" DOWEL

CUTTING DIAGRAM



FRONT EDGE. The curve at the front of the runner is made by drawing an arc with a 17⅞" radius. The center point of this arc is 12" back from the front edge of the sled and 17⅞" up from the bottom edge. After drawing this curve, cut to shape and sand smooth. Then use it as a pattern to lay out the curve on the opposite runner.

MORTISES

When both runners are cut to shape, blind mortises are made on the inside faces for the cross braces. There are two sets of mortises. Those in front are round holes for the two dowel handles. The other mortises are rectangular for the cross braces that support the seat slats, see Fig. 2.

ROUND MORTISES. The round mortises are ¾"-dia. flat-bottomed holes for the dowels. To bore these holes, first mark their locations centered 2" and 6" from the front of the runner and ⅞" down from the top edge. Then use a ¾" Forstner bit to bore the holes ½" deep.

RECTANGULAR MORTISES. To make the rectangular mortises for the cross braces (B), begin by using a combination square to lay out their positions, see Fig. 2. (Note: The width of the mortise equals the thickness of the cross brace.) Next, remove most of the waste within the outlines. I roughed it out with a ¼" straight bit in a router set to cut ⅛" deep, see Fig. 3.

After most of the waste is removed, clean up the edges and the corners of the mortises with a chisel, see Fig. 4.

CENTER CUTOUT

Now the center of each runner can be cut out to provide a good hand-hold and lighten the sled's weight.

POSITION CIRCLES. I made the cutout by cutting away an area of waste between two 1½"-radius circles centered on the width of the runners, see Fig. 1. Position the center of the rear circle 9½" from the rear of the sled. Then scribe the forward circle 11" in front of the rear one.

CUT OUT CENTER. After drawing both circles, scribe top and bottom lines to connect them, then cut out the waste with a sabre saw, see Fig. 5.

ROUND INSIDE EDGES. Now the inside edges can be rounded to provide a comfortable hand grip. To do this, I used a router with a ½" round-over bit set to cut 5/16" deep, see Cross Section in Fig. 5.

RUNNER SLOTS. While I had the router out, I cut the slots for the T-molding that goes around the perimeter of the runners. To do this I used a 1/16" slot cutter bit.

Begin by practicing on a scrap piece the same thickness as the runner stock. Adjust the bit until it cuts a slot *exactly* centered on the edge. Then cut the groove all the way around the runner, see Fig. 6.

Shop Note: The pilot on the slot cutter automatically makes a ½"-deep groove.

FIGURE 1

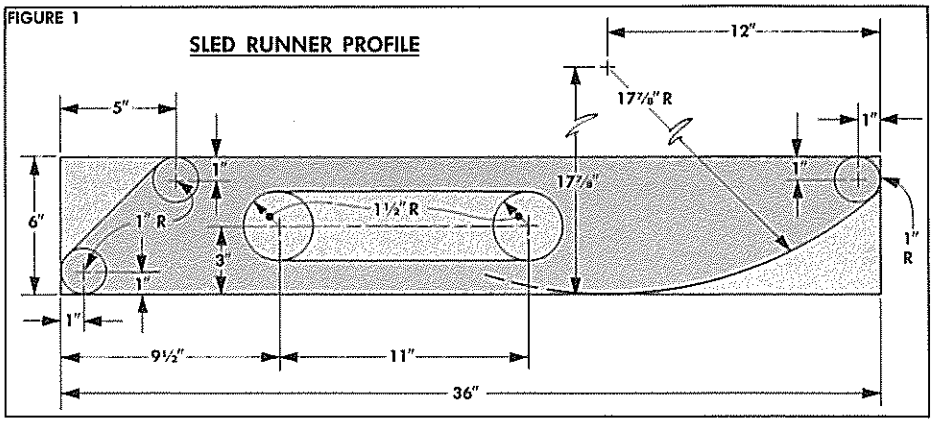


FIGURE 2

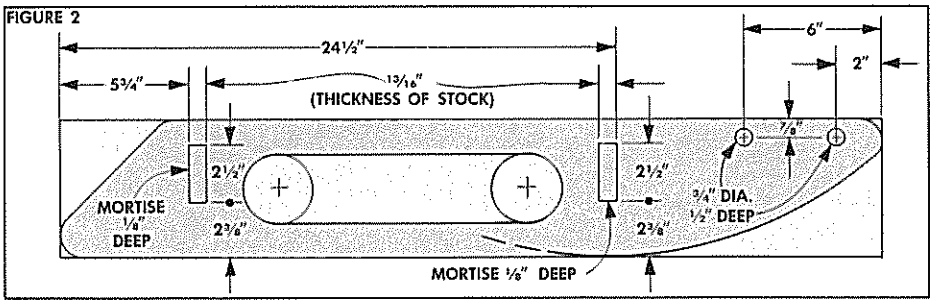


FIGURE 3

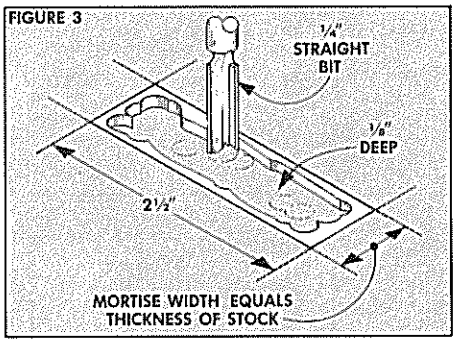


FIGURE 4

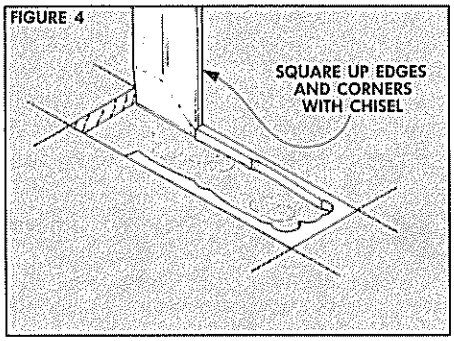


FIGURE 5

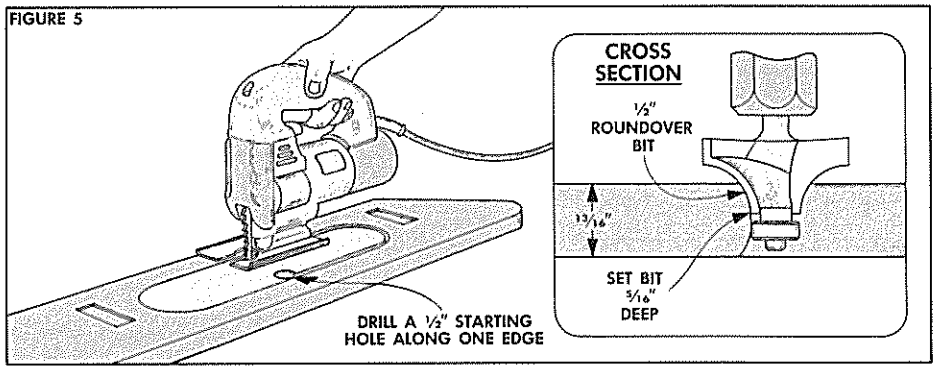
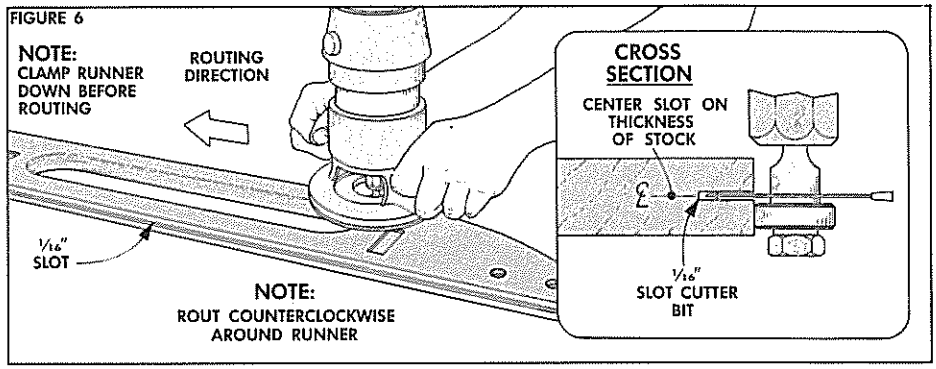
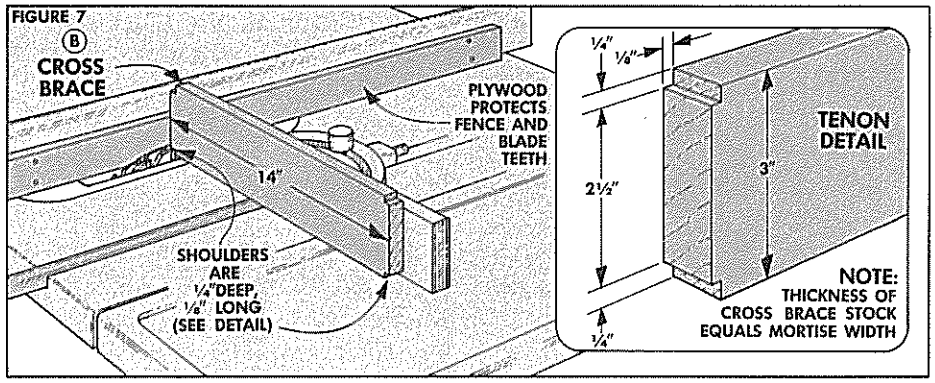
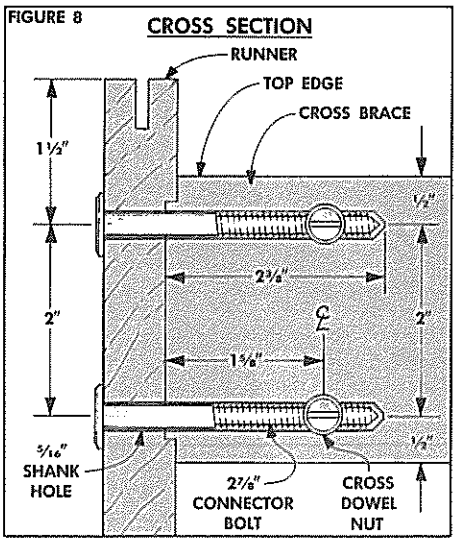
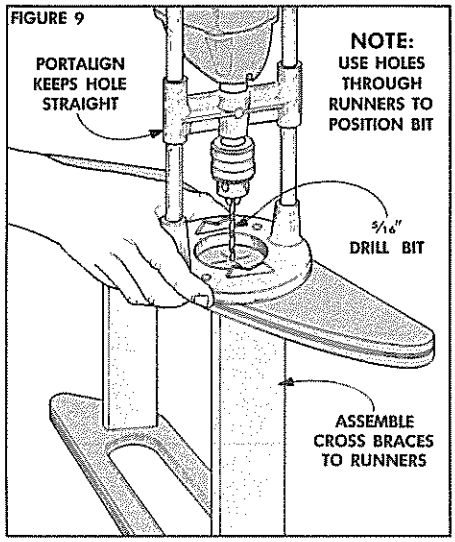


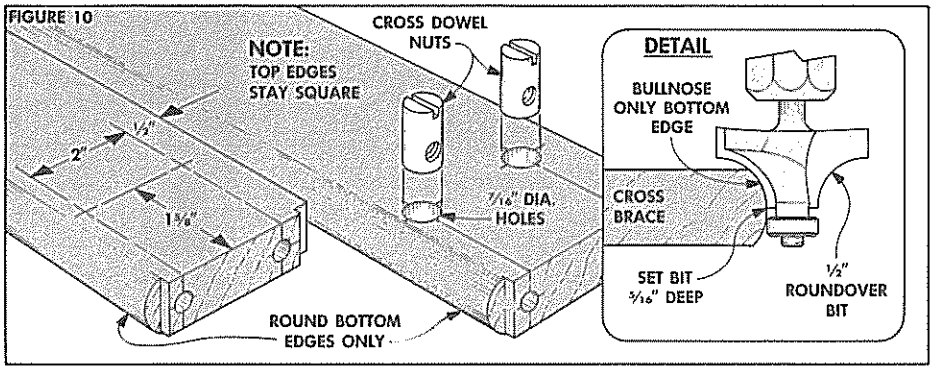
FIGURE 6

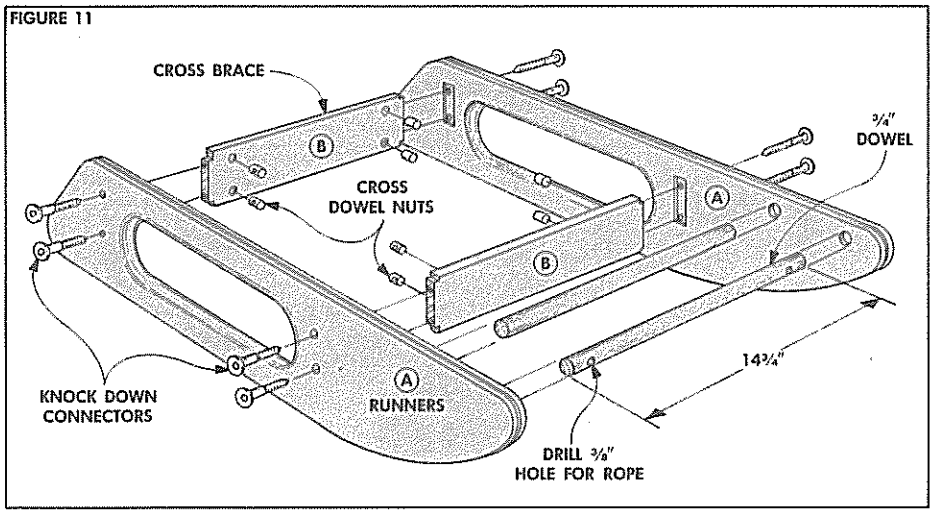












SEAT SUPPORTS

After the runners are finished, the cross braces (B) that support the seat slats can be made. These braces also are 4/4" brown ash, 3" wide by 14" long.

TENONS. To join the cross braces to the runners, simple tenons are formed by cutting ¼" by ⅛" notches on the top and bottom edges producing 2½"-wide tenons to fit the mortises in the runners, see Fig. 7.

I cut these notches on the table saw using the miter gauge for support. Since the fence is used as a stop, I fastened a scrap of ¾" plywood to the side of the fence to protect it from the blade.

KNOCK-DOWN FASTENERS

After cutting the tenons, the cross braces are ready for the knock-down fasteners, see Fig. 8. To do this, three sets of holes have to be drilled.

HOLES IN RUNNERS. The first set of holes goes through the runners for the body of the bolts, see Fig. 8. To locate these holes, square a line from the center of the mortise. Next, mark the hole positions 1½" and 3½" down from the top edge of the runners. Then drill ⅝" holes from the outside into the mortise.

END HOLES. Now the holes for the shanks of the bolts can be drilled into the ends of the cross braces. To do this, I temporarily mounted the runners to the braces. Then I used the holes in the runners as guides and drilled ⅝" holes 2⅜" deep into the ends, see Fig. 9.

NUT HOLES. Finally, the holes for the cross dowel nuts can be drilled on the back face of the cross braces. To do this, scribe lines centered on the end holes and continue them across the inside faces of the braces, see Fig. 10. Then bore the 7/16"-dia. holes centered 1⅛" from the ends of the braces. (These holes are 11/16" deep.)

PROFILE EDGES. Next, I rounded over the *bottom* edges of the cross braces, see Detail in Fig. 10. (Leave the top edges square to support the seat slats.)

FRAME ASSEMBLY. The sled can be assembled at this point. First cut two ¾"-dia. dowels 14¾" long to fit between the runners and bore a ⅜" tow rope hole 1" in from each end. Then tighten the fittings.

A PLACE TO SIT

To make the seat, begin by ripping six slats (C) from ½" stock (or resaw 4/4 stock to ½" thick) to 2" wide by 20¾" long.

DADOES. To help hold the sled square and rigid, the seat slats have dadoes on both ends that fit over the cross braces. You have to make sure these dadoes are spaced to match the distances between the two cross braces. To do this, I cut the dado only on one end of all the pieces first.

SET DADO BLADE. To cut the dadoes, set up the dado blade to match the thickness

of the cross braces (13/16" in my case), see Detail in Fig. 12. Next, use the fence as a stop by setting it 1" from the dado blade, see Fig. 12. Then cut the dado 1/8" deep across the end of all the pieces.

OTHER DADO. To position the dado on the other end of the slats I set the slat on edge over the cross braces with the dado exactly aligned over one brace, see Fig. 13. Then, I marked the position of the other brace on the bottom of the slat. Next, reset the fence and cut the dadoes.

ROUND ENDS. Before fastening the slats to the braces, the ends of the slats are rounded on the router table, see Fig. 14.

FASTEN TO BRACES. The slats are fastened to the cross braces using No. 8 x 1" brass Fh woodscrews. Begin by drilling 3/16" countersunk shank holes centered over the dadoes on each of the slats.

After the shank holes are drilled, position the slats on the braces with 1/4" space between the slats. (I used scraps of 1/4" Masonite to maintain the spacing between the slats and the outside slats.) Then drill 3/32" pilot holes into the braces.

SCREWS. Brass screws are used because they won't rust or corrode. But, they're weaker than steel screws and sometimes break where you're tightening them. To alleviate this problem, I tighten a steel screw into each hole first to cut the threads. Then I back it out and tighten the brass screw in place.

Note: The ends of the screws that go through the two outside seat slats are positioned directly over the knock-down fasteners. To keep them from running into the fasteners, I cut off the ends so the overall length of the screws was about 5/8".

RUNNER STRIPS

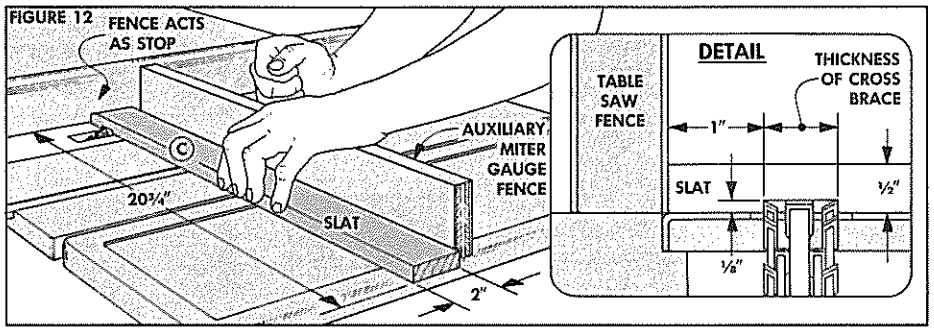
Now all that's left is putting on the runners. To do this, start the plastic molding in the groove on the top center of the top of the runner, see Fig. 15. Then stretch it while pressing it in place until you come to the curve at the nose of the runner.

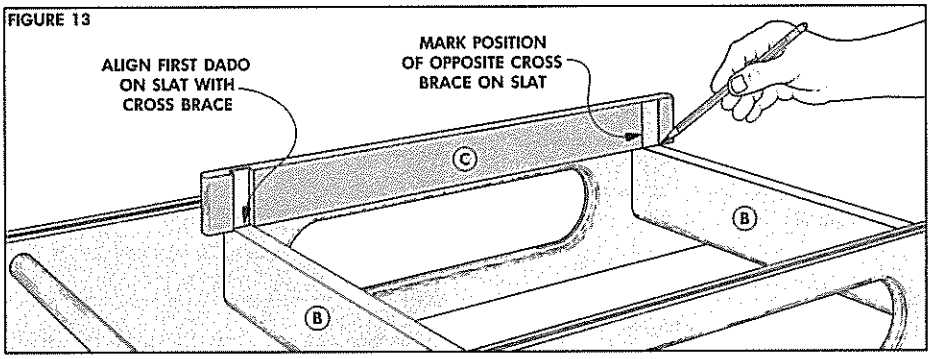
FRONT CURVE. To make the tight curve at the nose, the "T" part of the strip has to be notched so it won't buckle. To do this, cut V-shaped notches about 1/4" wide where they join the bottom edge, see Detail in Fig. 15.

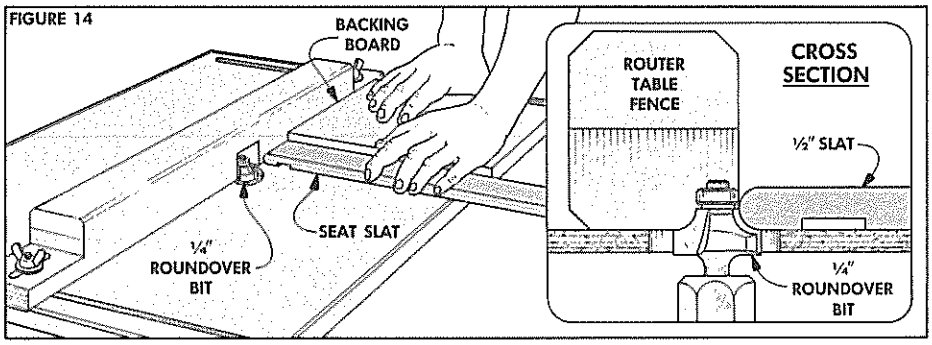
After cutting the notches, press and stretch the T-molding the length of the bottom of the runner. When the bottom rear corner is reached, more notches will be necessary to make this bend. Then bend the T-molding up the angled rear end and cut one more set of notches to make this bend.

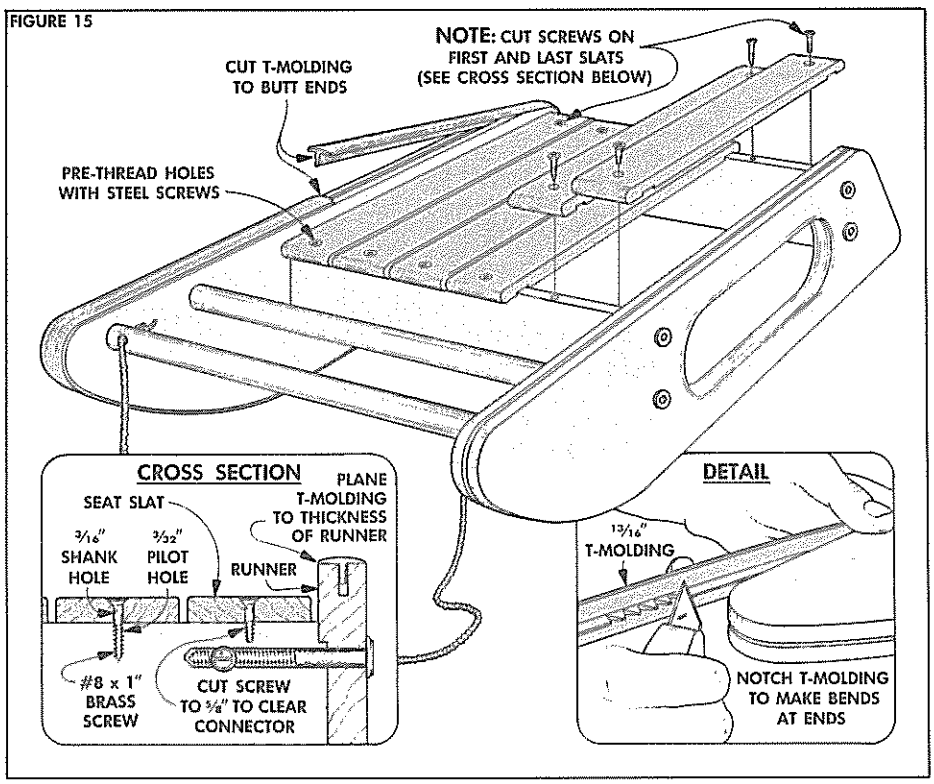
END. Finally, press in the strip along the top of the runner and cut off the end so it butts tightly against the starting end.

FINISH. Since this sled will be used in weather unfit for man or beast, it deserves a tough, flexible finish. I laid on three coats of marine spar varnish.







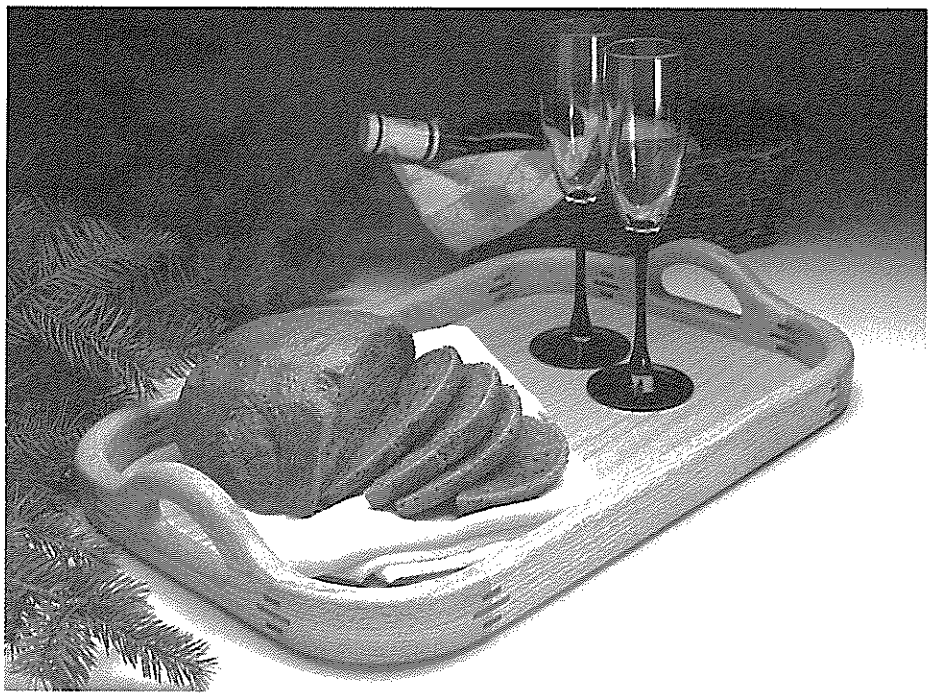


Serving Tray

CUTTING CORNERS A ROUNDED WAY

Sometimes the best reason for building a project is to test out a new technique. That was my approach as I started to work on this serving tray. The tray didn't seem as important as having the chance to try out a corner joint I hadn't used before.

The technique involves cutting a radius (or rounded) corner, without bending it. That in itself isn't too difficult. But the challenge is to join this corner piece to the other frame pieces. That takes some planning ahead on how the corner pieces are laid out and cut. (Note: A detailed article on making the corner pieces is on page 18.)



CORNER PIECES

To make the corners (A) for this serving tray, I started by laminating two pieces of 4/4 stock (¾" to 13/16" actual thickness) which will produce a blank 1½" to 1⅝" thick, see Fig. 1. (Or, you can use a piece of 8/4 stock.) Cut this piece to a width of 4 7/16" and a length of 29".

CUT BLOCKS. To cut out the four blocks needed for the corner pieces, begin by cutting off the end of the blank at a 45° angle. Then cut off four *triangular*-shaped blocks, see Fig. 1. To make the square blocks, cut the "ears" off two corners of the triangles to get blocks 3⅛" square. (I cut off the "ears" on a band saw.)

LAY OUT THE CORNERS. Now the curved corners can be laid out on the blocks. The easiest way to do this is to tape the four blocks together. Then use a compass to draw two circles, see Fig. 2.

The outside circle has a radius of 3". The inside circle is drawn so the corner pieces have a thickness equal to the stock thickness you want to use for the tray sides. (I used stock that was 13/16" thick so the radius of the inside circle is 2 7/16".)

SIDES AND HANDLES

After drawing these circles, I cut the stock for the tray's sides and handles. The two sides (B) are 11¾" long, see Fig. 5. These side pieces are cut to width so they equal the *thickness* (height) of the corner block (1⅝" in my case).

The pieces for the handles (C) are cut to a length of 6", see Fig. 5. Since the handles rise above the level of the corner pieces and the sides, these pieces are cut extra wide (tall), to a height of 3½".

GROOVE AND SPLINE JOINTS

Now the joints can be cut to connect all the pieces. I used a decorative version of a spline and groove joint. This requires cutting grooves in the mating ends of each

FIGURE 1

ROUGH BLANK CORNER BLOCKS

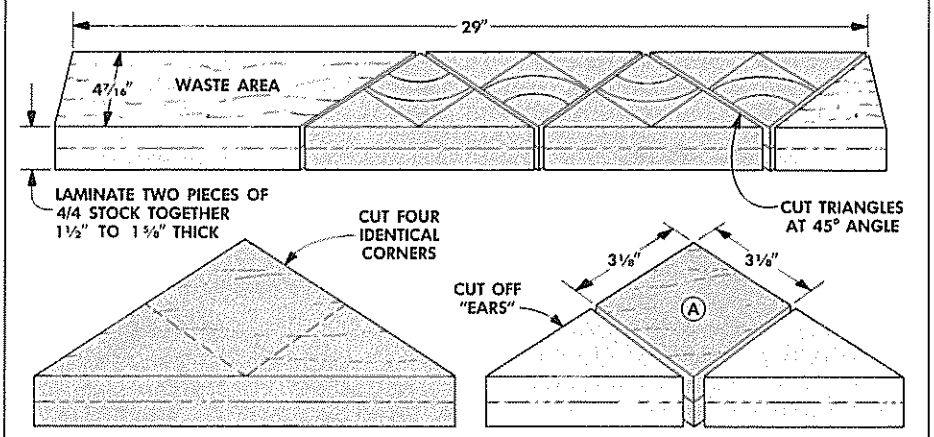
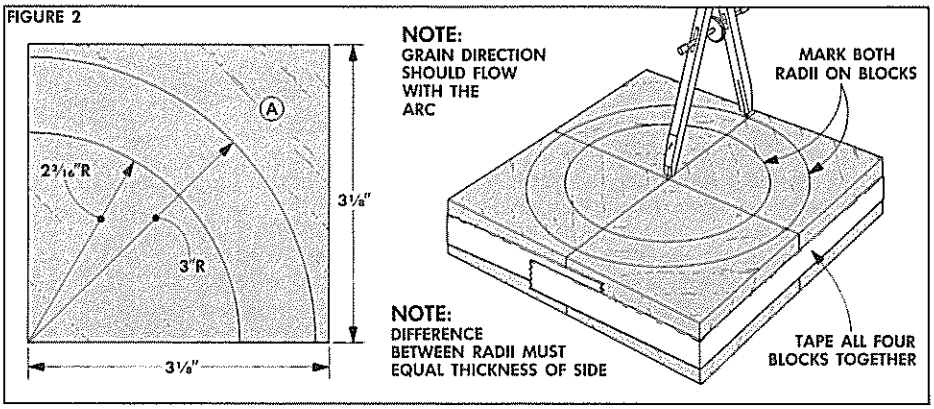


FIGURE 2



piece, and then cutting splines to fit the grooves.

GROOVES. To show off the joint, I cut a set of three grooves in each piece — two shallow grooves with a deeper groove centered between them.

To cut the shallow grooves, set the blade to a height of ¼". Then position the rip fence so it's ⅜" from the inside of the blade, see Detail in Fig. 5.

Shop Note: I used a rip blade to cut these grooves. All the teeth on a rip blade are ground flat across the top, which produces a flat-bottom groove.

CUT GROOVES IN CORNERS. When the saw is set up, hold the corner block firmly against the fence, and cut a shallow groove in one edge of each corner block, see Fig. 3. (Make sure the groove is cut on an edge where the ends of the curve are drawn.) Then rotate the block and make a second cut in the other edge where the other end of the curve is drawn.

CUT GROOVES IN SIDES. Next, matching grooves are cut in the ends of the side pieces (B). Here, I used a 2x4 block to support the piece while it's pushed through the blade, see Fig. 4. Make this cut on both ends of the side pieces — making sure the same edge is against the fence for both cuts.

Shop Note: Since this entire procedure requires working with the same edge against the fence for all three cuts in each piece, I marked the *outside* (top) edge of all pieces with an "X", see Fig. 5. When I was ready to make the cut, I checked to make sure the "X" was out, (away from the fence), refer to Figs. 3 and 4.

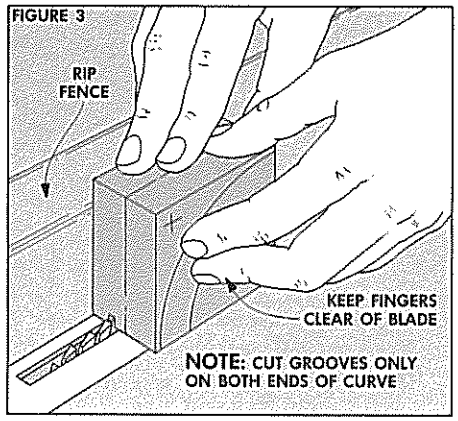
CUT GROOVES IN HANDLES. With the saw still in the same set-up, make this same cut in both ends of the two handle pieces (C). Again, I used a 2x4 block to support the handle as the groove is cut.

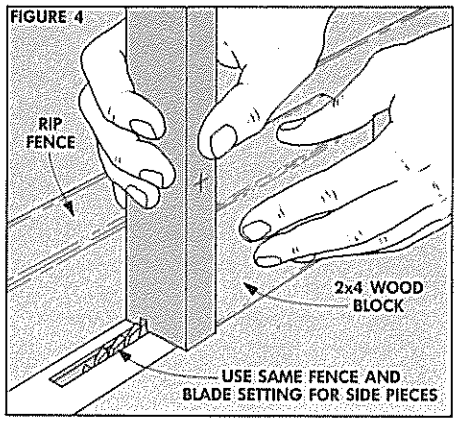
SECOND GROOVE. To cut the other shallow groove, it would seem easiest to simply turn the pieces around (so the opposite edge is against the fence) and make the cut.

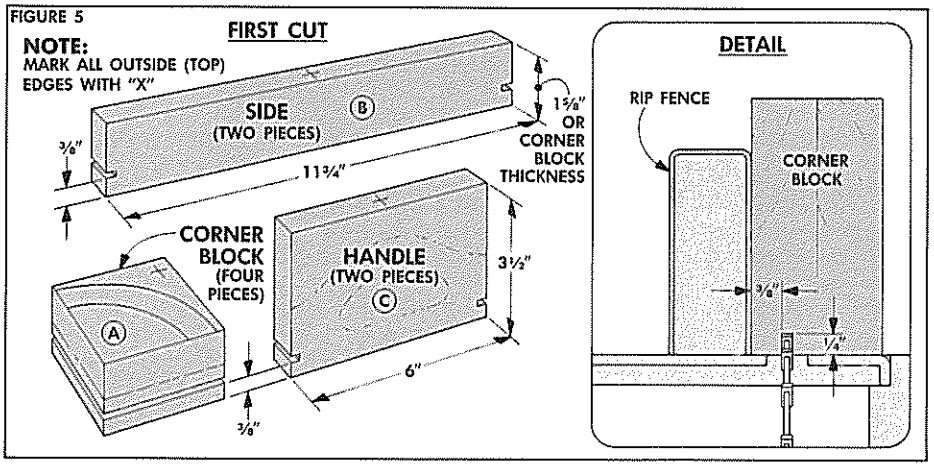
This would work fine on the corner pieces and the sides, but not on the handle since it's wider. Instead, you have to adjust the rip fence so the measurement from the *outside* of the workpiece to the *outside* of the blade is ⅜", see Detail in Fig. 6.

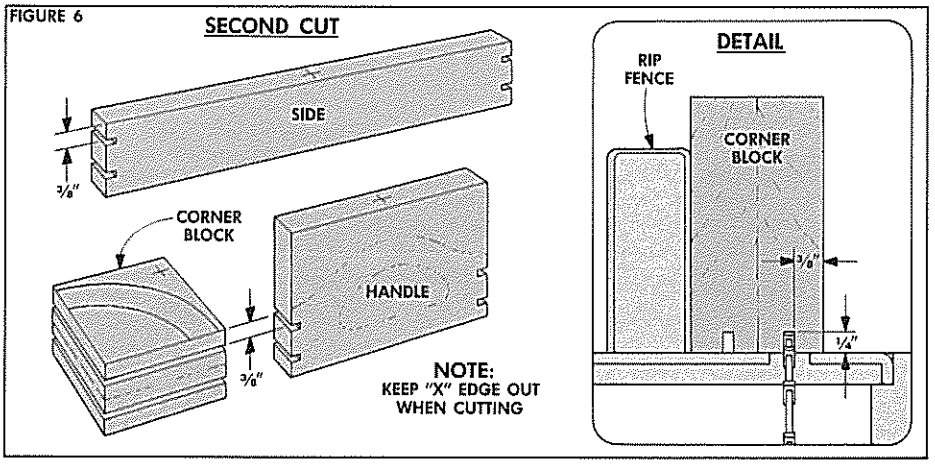
CUT GROOVES. When the fence is adjusted, make the second set of shallow grooves in the ends of all the pieces (corner blocks, sides, and handles). When you're done, all of the pieces should have two shallow grooves as shown in Fig. 6.

CUT CENTER GROOVE. The last step is to cut the deeper center groove. Raise the blade to a height of ½". Then position the fence so the blade is centered between the first two cuts, see Detail in Fig. 7. Make this cut using the same procedure on all pieces, keeping the "X" edge out.









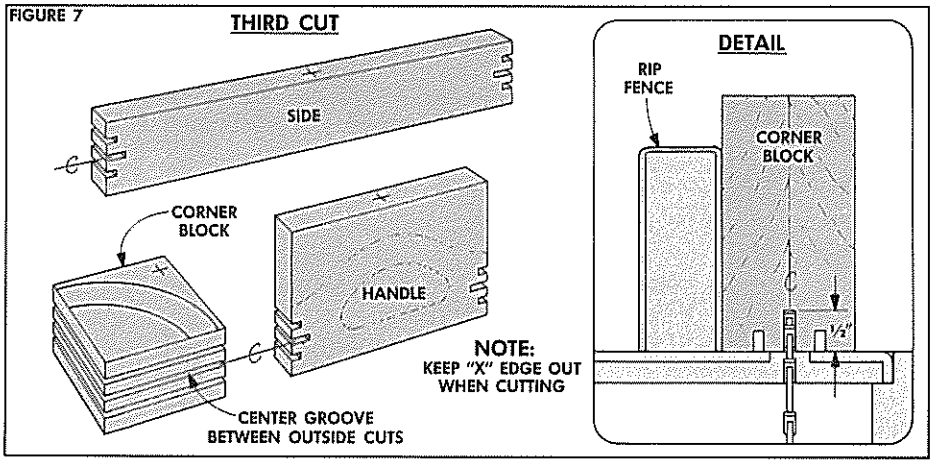


FIGURE 8

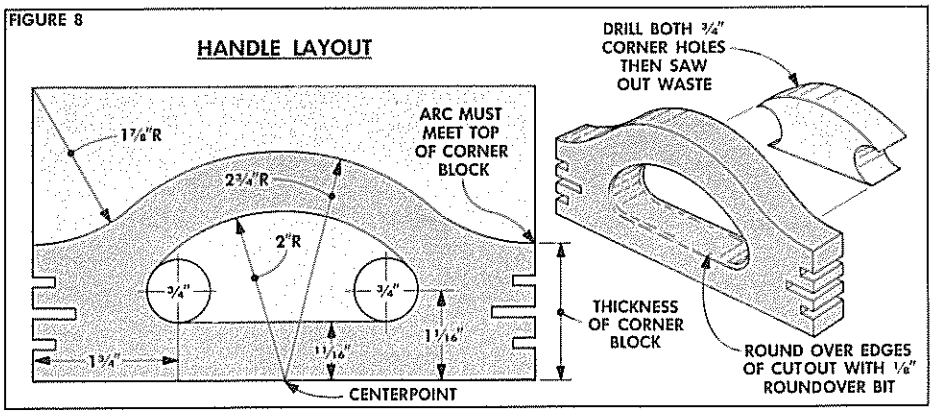


FIGURE 9

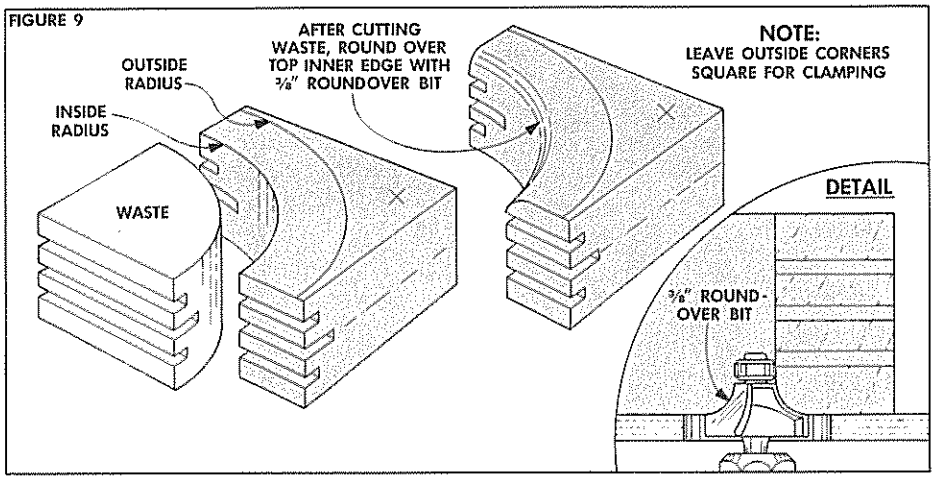


FIGURE 10

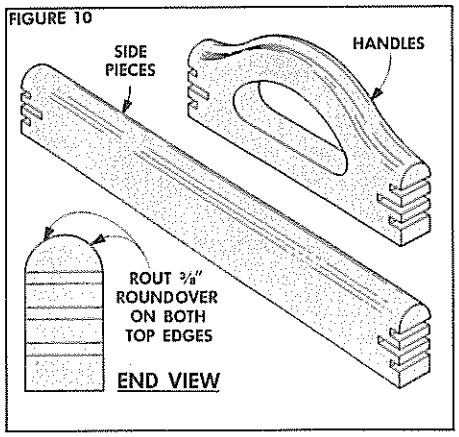


FIGURE 11

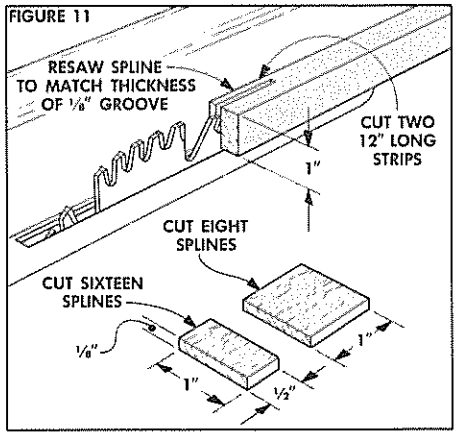
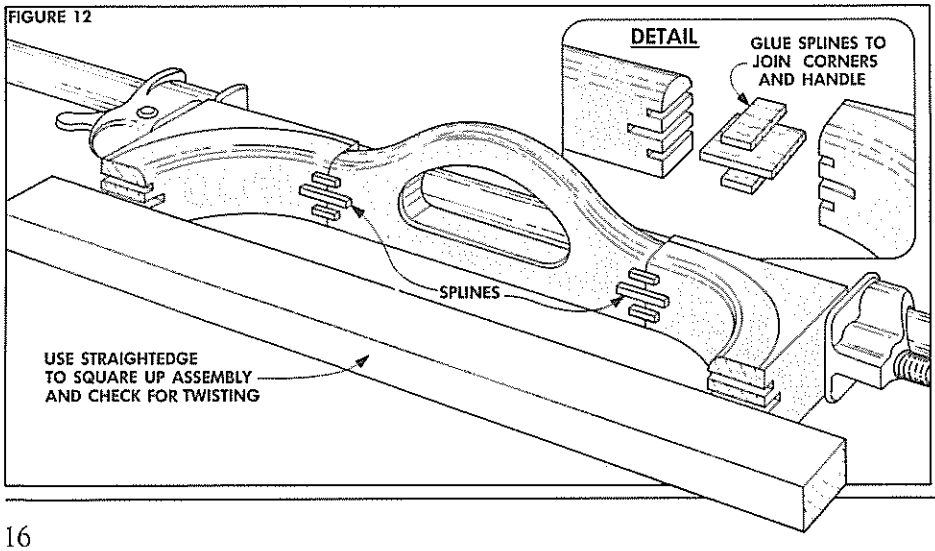


FIGURE 12



THE HANDLE AND CORNERS

After the grooves are cut in all the pieces, I cut the handle to final shape. The inside of the handle is defined by ¾"-dia. holes at each end, see Fig. 8. Then a 2"-radius arc is drawn to connect these two holes.

DRAW CURVES. The outside of the tray handle is shaped by two intersecting curves. One is a 2¾" radius drawn from the same center point as the radius for the inside of the handle. This curve intersects with two 1⅞"-radius curves drawn from each top corner of the block, see Fig. 8.

CUT OUT HANDLES. After the curves are drawn, drill the ¾"-dia. holes. Then cut out the center of the handle with a jig saw or sabre saw and sand the edge smooth. Next, round over these inside edges with a ⅛" round-over bit, see Fig. 8. Also cut the top outside edge of the handle to shape and sand it smooth.

THE CORNERS. After the handles are shaped, I cut the *inside* radius of the corner pieces on a band saw, see Fig. 9. Then sand this edge smooth with a drum sander on a drill press. (However, leave the outside corner square. It's used as a clamping surface during assembly.)

ROUND OVER EDGES. Usually I would wait until after assembly to sand and round over the edges. But in this case, you can't round the top inside edges of the tray because the handles will be in the way.

I rounded over the top edges of the sides and handles with a ⅜" round-over bit mounted on the router table, see Fig. 10. Also round over the top inside edge of the corner pieces, see Detail in Fig. 9.

ASSEMBLY

In order to join the pieces, you have to cut three splines for each joint, see Fig. 11. The splines can be cut from the same wood to match the tray stock, or from contrasting (darker) wood to highlight the joint.

For greatest strength, the splines are cut so the grain runs perpendicular to the joint line. I cut the splines by resawing (ripping on edge) ⅛"-thick strips (to match the width of the grooves), see Fig. 11. The width of these strips should be enough so the splines extend out from the sides of the frame about ⅛" to allow for some shifting during glue-up, see Fig. 12.

BEGIN GLUING. After the splines are cut, assembly can begin. First, glue the splines to join two corner pieces and one handle. Then clamp this unit together, see Fig. 12.

As the clamp is tightened, make sure the ends of the corner pieces do not twist. They must be square so they can be joined to the side pieces. (I placed a straightedge against the ends of the corner pieces to check for square, see Fig. 12.)

ADD SIDES. After the two end units are glued up, add the sides. This is where it can be tricky to keep the whole frame from

twisting. The best approach is to place the clamps on a smooth level surface, see Fig. 13. Then put the frame in position and *push down* firmly against the clamps. Tighten each clamp a little at a time, making sure the frame doesn't twist.

COMPLETE CORNER PIECES

When the glue is dry, you can complete the corner pieces. First, use a band saw to cut off the outside corner, see Fig. 14.

FILE INSIDE. As these cuts are made, the band saw automatically trims off the spline's excess on the outside of the tray. Use a file to remove the excess on the inside. Then sand the inside and outside edges of the tray frame.

ROUND OVER CORNERS. All of the tray's top edges were rounded over before assembly, except the outside edges of the corner pieces. Rounding over these edges is awkward. I held the tray frame vertically on the router table and slid it in an arc into a ⅜" round-over bit, see Fig. 15.

THE TRAY BOTTOM

The last step is to add the bottom. Here you have a few choices. The bottom can be made out of hardwood plywood to match the tray frame stock. Or, it can be made of a fancy burl or exotic veneer that's laminated to plywood or Masonite. Or, it can be made from plastic laminate (see page 24) laminated to plywood or Masonite.

ROUT RABBET. However, before getting to the tray's bottom, a rabbet has to be cut on the bottom edge of the frame. To cut this rabbet, I used a rabbeting bit on the router table, see Fig. 16. Set the bit to a height of ¼" and rout the rabbet around the entire inside perimeter. (See page 23, for another way to do this.)

Shop Note: The depth of the rabbet (shown as ¼" in Fig. 16) is actually 1/16" deeper than the final tray bottom thickness to allow room for the cork pads.

MARK OUTLINE OF BOTTOM. After the rabbet is routed, the tray bottom can be cut to fit. Place the tray frame on the tray bottom. Then mark the outline of the rabbet, see Fig. 17.

Shop Tip for plywood bottom: If you're using hardwood plywood, cut it to width and length (on the marked lines) on a table saw to get a smooth cut. Then sand the corners round on a disc sander.

Shop Tip for laminated bottom: If you're laminating veneer or plastic laminate, see Shop Notes, page 23, for some tips on cutting the laminate to match the bottom.

FINAL STEPS. After the tray bottom is cut to shape, fasten it to the frame with brads. (If plastic laminate is used, it helps to drill pilot holes for the brads.) Then glue the cork pads to the bottom, see Fig. 18. Finally, I sanded the tray with 240 grit sandpaper and applied two coats of polyurethane varnish.

FIGURE 13

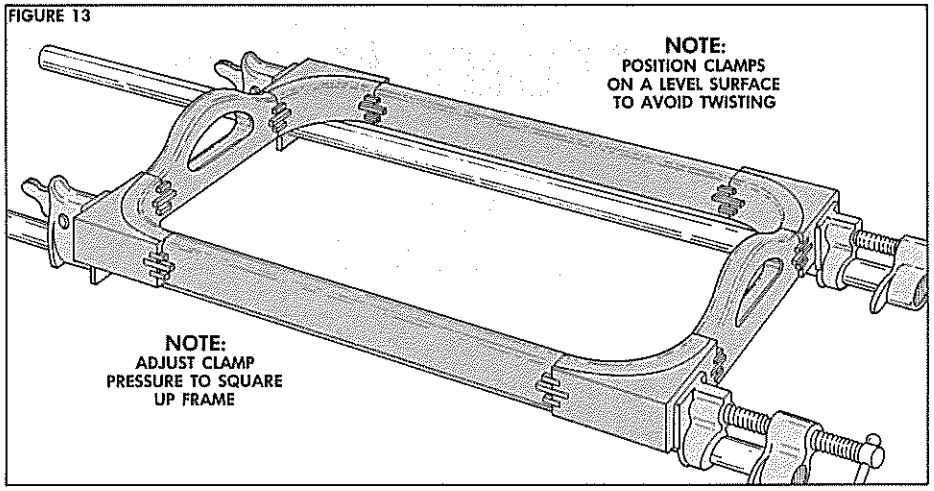


FIGURE 14

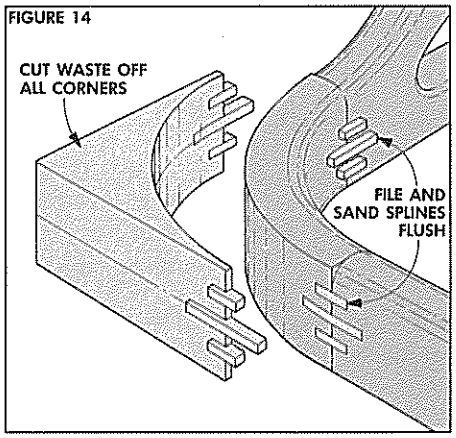


FIGURE 15

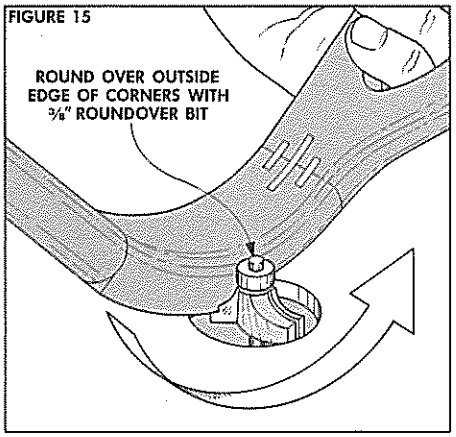


FIGURE 16

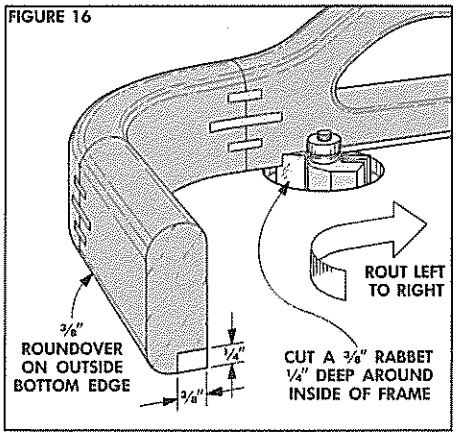


FIGURE 17

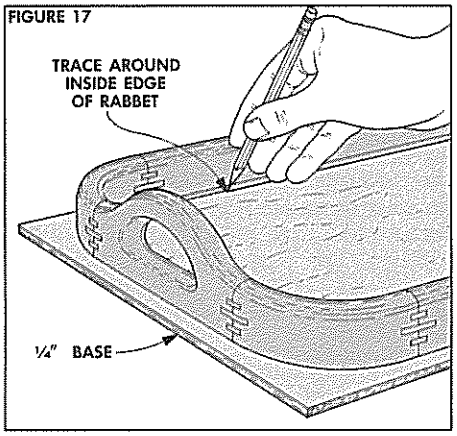
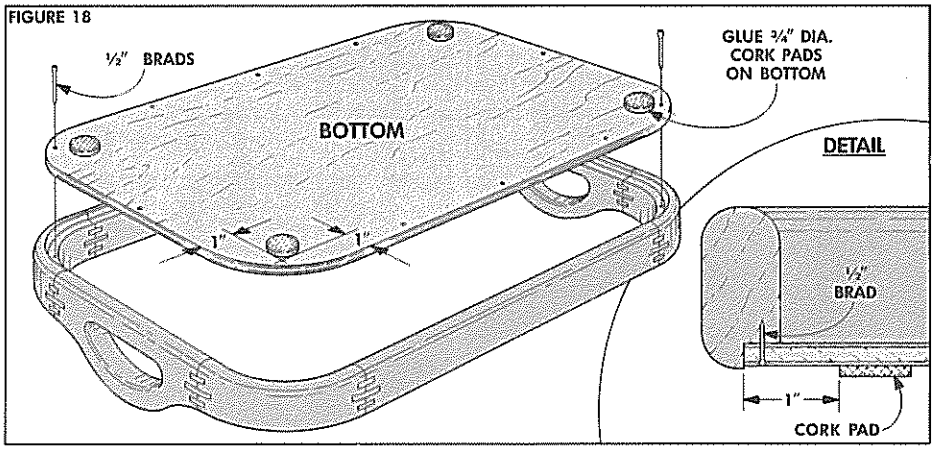
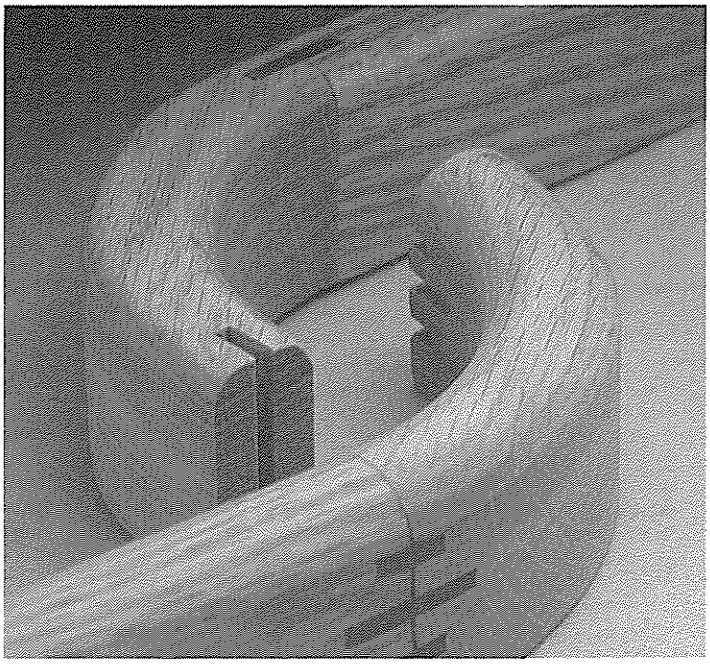


FIGURE 18



Cutting Round Corners

STEP BY STEP



The easy way to make the rounded corners for the serving tray and clock is to lay out the radii on a piece of stock and cut out the corner on the band saw. It may be the easy way and it doesn't use much wood, but I don't think it's the best way to cut corners.

PROBLEMS

The problems with using this method have to do with the direction of the grain. Since the corner makes a 90° turn, there is an area where the grain cuts directly across the narrow width, see Fig. 1. If there's stress on the corner, it might crack at this point.

A WEAK JOINT. There's another problem — the joints connecting the corner pieces to the sides are weak. On one end of the corner piece, end grain joins end grain. On the opposite end, side grain joins end grain. Neither of these joints is very strong, and visually the side to end grain joint breaks the project's overall grain flow.

90° CORNERS. Okay, so why don't you lay out the corners so the grain cuts *diagonally* along the corner piece, rather than across it? That's just what I did, but there's a problem here too. To form a rectangular or square project, the ends of the corner piece have to be *exactly* 90° to one another. The best way to make clean, smooth cuts at 90° is on a table saw or radial arm saw, not on a band saw.

In short, to make the corner pieces, I went through a more difficult process, used more wood, but ended up with four attractive, strong corners.

MAKING THE BLOCKS

I cut the rounded corners out of square blocks, see Fig. 2. The square allows the two ends of the corner piece to be exactly 90° to each other *and* there's a flat clamping surface for assembling the tray or clock, refer to Step 7 on the opposite page. But to get the grain running the correct direction I turned the square blocks 45° and cut them from a larger blank, see Fig. 2.

To determine the size blank to cut these blocks from, first you need to know the desired outside radius of the corner. (As an example, we will use the 2⅛" outside radius for the clock. The serving tray has a larger 3" outside radius).

LAY OUT SQUARE. Draw a square on paper with each side of the square being equal to the desired outside radius (2⅛") *plus* ⅛", see Fig. 2. (The ⅛" gives extra room for cutting.)

WIDTH OF BLANK. After the square is laid out on paper, measure diagonally across the square. This gives the *width* of the blank that the four corner blocks can be cut from (3³⁄₁₆" for the clock and 4⁷⁄₁₆" for the serving tray).

Note: The exact width of the blank can be calculated. Start by adding ⅛" to the desired radius (2⅛" + ⅛" = 2¼") and square the sum (2¼" x 2¼" = 5.06). Then multiply that figure by 2 (5.06 x 2 = 10.12). Now, find the square root of your answer (square root of 10.12 = 3.181 which is equivalent to 3³⁄₁₆"). This figure will equal the width of the blank.

LENGTH OF BLANK. To determine the *length* of the blank, multiply the width dimension times 5 and add 7" to allow room for the kerfs and some extra to hang onto when cutting, see Fig. 2.

FIGURE 1

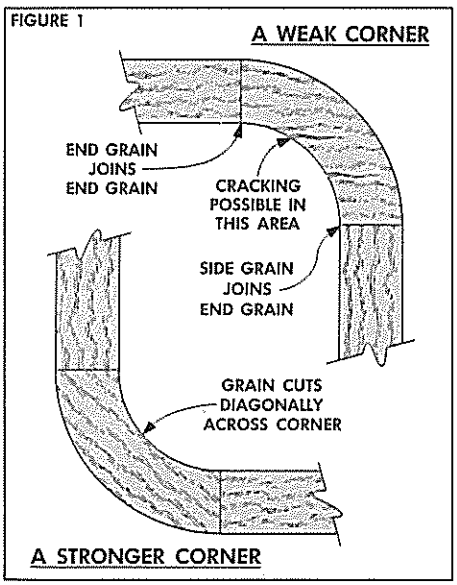
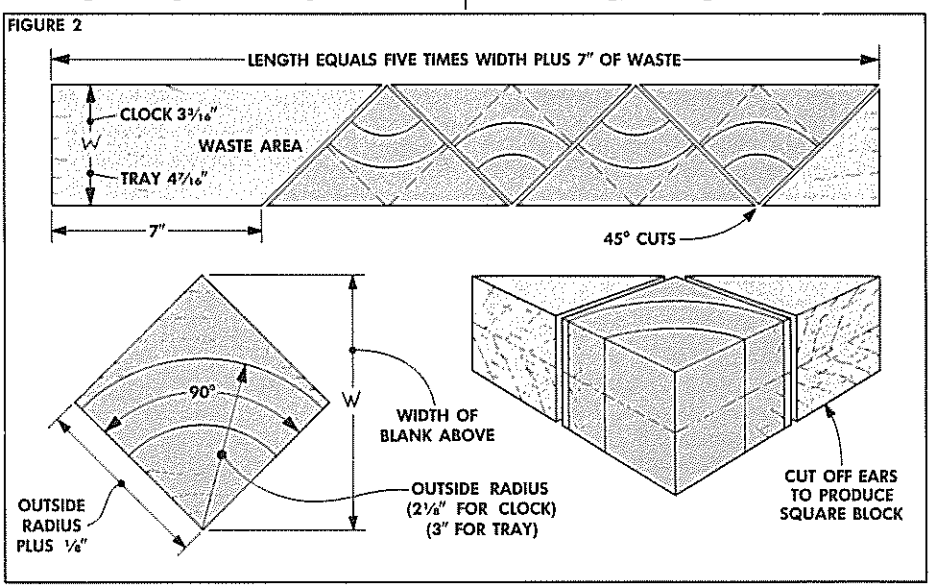


FIGURE 2



CUTTING THE BLOCKS

Once you know the blank's width and length, cut it to size from 8/4 stock, see Fig. 2 on the opposite page. (Or, laminate two pieces of 4/4 stock.)

CUT WASTE. After the blank was cut to size, I started cutting out square blocks to produce the corners. (The square blocks start as triangles, then the "ears" are cut off to produce a square, see Fig. 2.) To make the blocks, start by cutting a 45° angle off one end, see Step 1.

Shop Note: When using the table saw, screw an auxiliary fence to the miter gauge. Then clamp the workpiece to the fence so it doesn't creep, see Step 1.

CUT FIRST TRIANGLE. After the first cut is made, flip the blank upside down and align the heel of the cut end with the saw blade, see Step 2. Now cut off a triangle, see Step 3.

CUT REMAINING TRIANGLES. Use the same procedure to cut off three more triangles. Always line up the cut on the heel of the previous cut as in Step 2.

CUT THE SQUARES. After cutting four triangles, I cut the "ears" off to produce four square blocks. I found it easy to make the cuts on the band saw, see Step 4.

To do this, clamp a stop block to the miter gauge so the distance from the blade to the stop block equals the desired outside radius plus ⅛", see Step 4. Now, stand the triangle on edge and cut the "ear" off one side. Then cut the "ear" off the other side to make a square block.

THE RADII

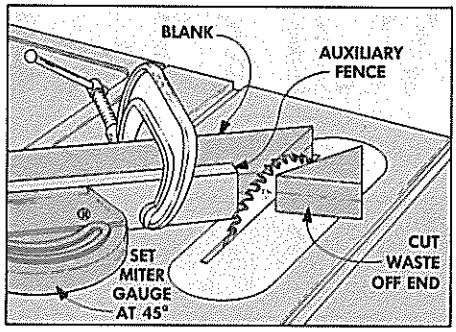
Once the blocks are square, tape the four blocks together and lay out the inside and outside radii with a compass, see Step 5. The distance between the two radii must equal the stock thickness you use for the side pieces. So, if you use 13/16"-thick stock for the sides, make the distance between the radii 13/16".

CUT KERFS. Depending on the project, there are a few more steps involved with cutting kerfs and splines. To cut the kerfs for the clock, see Figs. 2 to 3 on page 21, and for the serving tray, see Figs. 3 to 7 on page 15.

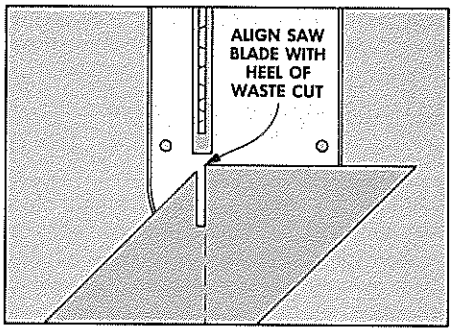
CUT INSIDE RADIUS. After the kerfs are cut, then cut out the inside radius of the corner piece, see Step 6. The outside radius is cut after assembly.

ASSEMBLY

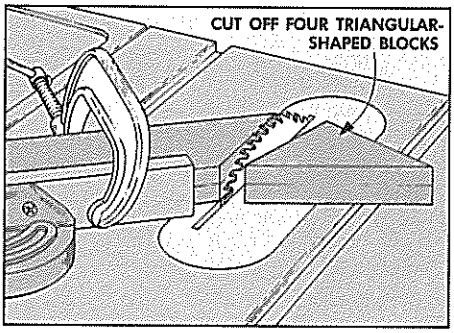
To assemble the pieces, I started by connecting two corners to a straight piece by gluing splines into the grooves, and clamping the pieces together. The outside radii haven't been cut yet, so it's easy to clamp across the corners, see Step 7. After the glue is dry, assemble the other pieces, then cut off the outside radius of each corner piece and sand smooth.



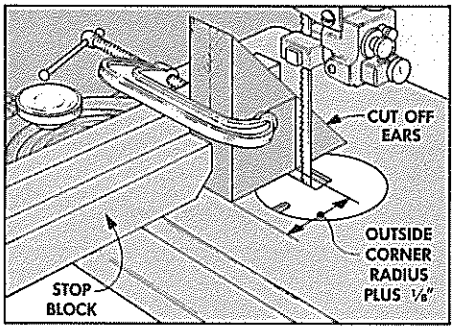
1 *First, attach an auxiliary fence to the table saw miter gauge and clamp the blank to the fence. With the miter gauge set at 45°, cut the end off the blank.*



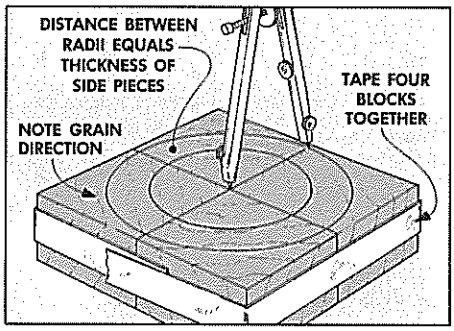
2 *Next, flip the blank over so the opposite edge is against the fence. Then align the blank so the blade cuts right at the heel of the waste (first) cut.*



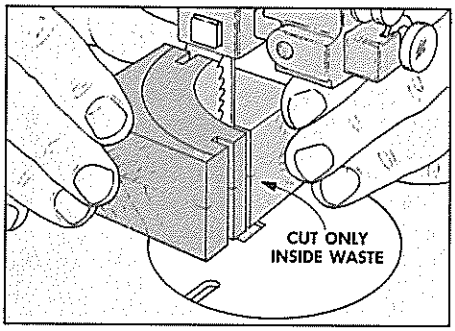
3 *After the blade is lined up, cut off a triangular-shaped block. Then, continue this process (flip blank over each time) until four triangles have been cut.*



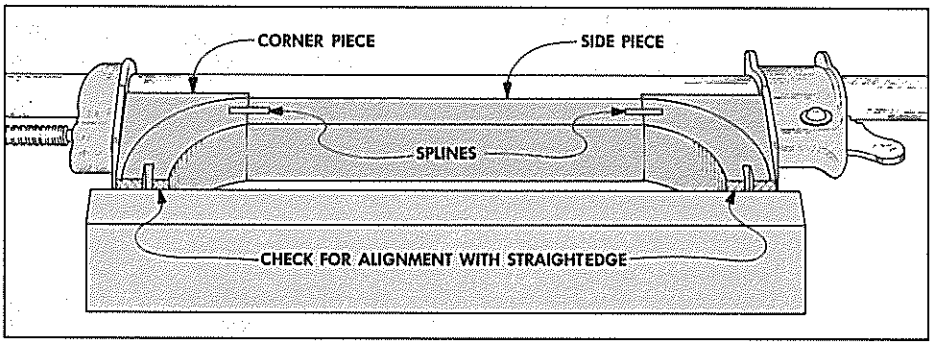
4 *To make a square block, cut the triangular "ears" off with a band saw. Clamp stop block so each side of square equals the desired radius plus ⅛".*



5 *Tape the four square blocks together with masking tape. Then draw the inside and outside radii of the corner piece on the blocks with a compass.*



6 *After kerfs have been cut to join the corner pieces to the side pieces (see clock or serving tray article), cut out the inside radius on the band saw.*



7 *When assembling the corner pieces to a side piece, clamp across two corners with a pipe clamp. Align the clamp heads so equal pressure is directly in line with the side piece. To check if the two open ends of the corner pieces align, hold a straightedge across the ends or stand the assembly up on a flat surface.*

Wall Clock

GREAT FRAME AROUND THE CLOCK

Building the frame around this wall clock was only half the fun. The other half was seeing the different "personalities" the clock took on when I changed the color of the face.

The face on the first clock I made was red plastic laminate — perfect for a recreation room. White laminate would fit a kitchen, and glossy black has a modern look for an office. (To order these three laminates and the other parts for the clock, see page 24.)

But before deciding on the final color of the face, I made the frame with it's rounded corners. (There's a detailed step-by-step article on making the corners on pages 18 to 19.)

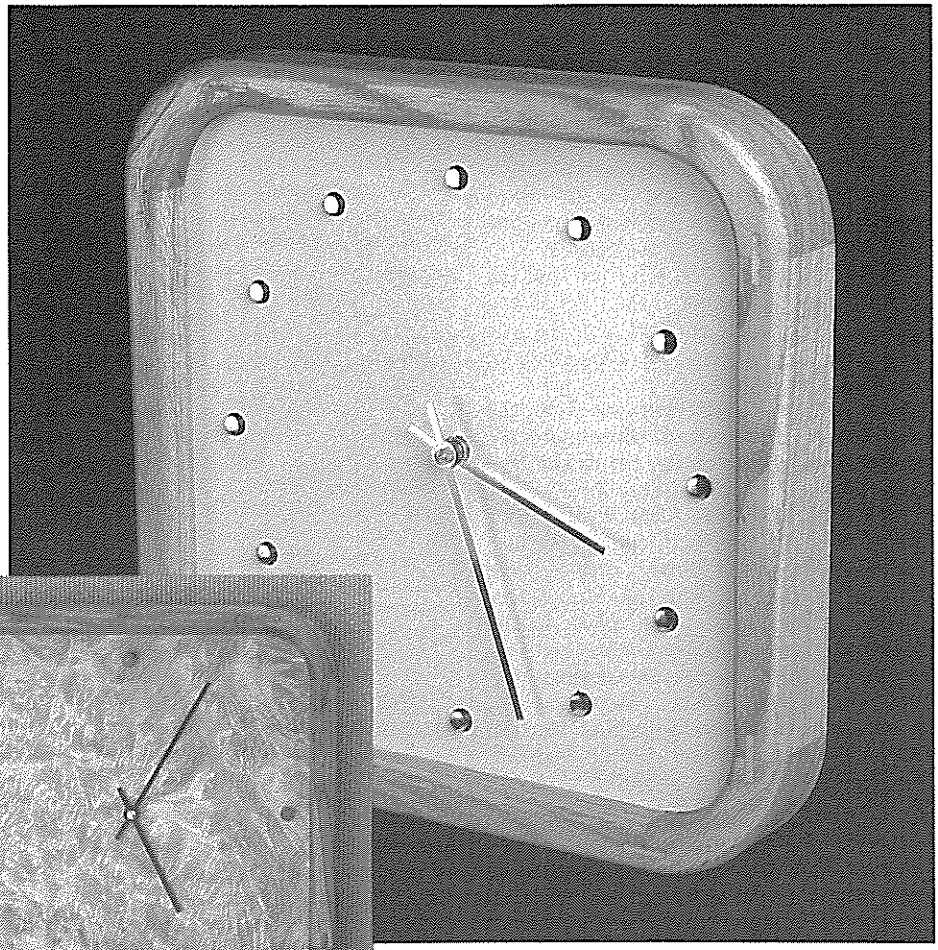


FIGURE 1

ROUND CORNERS

The first step in making the corners is to laminate two pieces of 4/4 stock (¾" to 13/16" actual thickness) together to make a long blank, see Fig. 1. (Note: You could also use 8/4 stock. Just so the completed thickness is 1½" to 1¾" thick.)

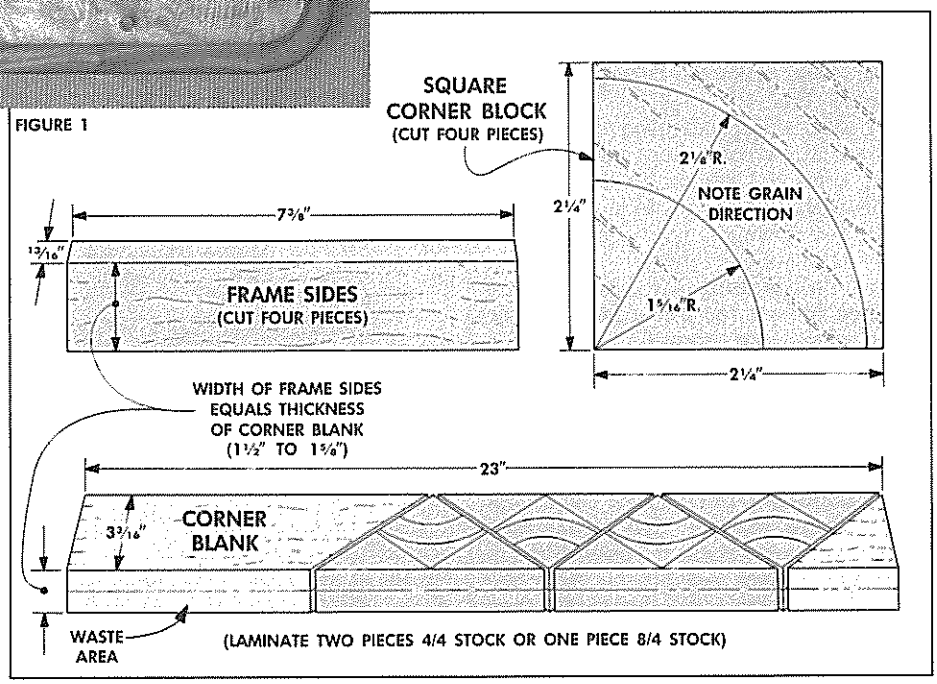
CUT TO SIZE. After the glue dries, cut the blank to a finished width of 3 3/16" and length of 23", see Fig. 1. (The blank is this size to get the grain in the right direction and provide clamping surfaces. This is all explained on page 18.)

CUT FOUR BLOCKS. To get the four blocks for the corners, start by cutting a 45° angle off the right end of the blank. Then cut off four *triangular*-shaped blocks, see Fig. 1. Now to make *square* blocks, I cut the "ears" off two sides of the triangle with the band saw.

DRAW RADII. Next, the round corners can be laid out by drawing radii on each block. To do this, I taped all four blocks together and drew two circles (refer to Step 5 on page 19). First, draw a 2⅛" outside radius. Then, draw the inside radius so the thickness of the corner equals the thickness of the stock you plan to use for the frame pieces of the clock. (Since my frame stock was 13/16" thick, I marked an inside radius of 1 5/16", see Fig. 1.)

FRAME PIECES

Before cutting the corners to their final rounded shape, I cut the four frame pieces. The width of these pieces must equal the thickness of the square corner blocks, see Fig. 1. After cutting them to width, cut all four pieces to a uniform length of 7⅜".



GROOVES

Now the joints can be cut to join the frame pieces to the round corners. I used a spline and groove joint here. This requires cutting grooves in the mating ends of each piece and gluing a spline in the grooves.

CUT GROOVES. To cut the grooves in the frame pieces, raise the blade to a height of ⅜", see Detail in Fig. 2. Then position the rip fence so the saw blade is centered on the thickness of the frame piece.

Once the blade is centered, cut a groove in both ends of all four frame pieces always keeping a common face against the fence, see Fig. 2. (When making this cut, I backed up the workpiece with a 2x4 block, or you could use a tenoning jig.)

GROOVE BLOCKS. The grooves in the corner blocks have to match the grooves in the frame pieces. To do this, hold a frame piece against the end of a corner piece so it aligns with the radii lines drawn. Then transfer the groove location onto the corner block, see Fig. 3.

Now, move the table saw rip fence so the saw blade lines up with the groove lines. Then cut the grooves in each corner block, see Detail in Fig. 3. (Note: If the grooves are cut slightly off center, you can always redraw the corner radii.)

SPLINES

Next, I cut splines to fit the grooves. For the strongest joint, the grain in the splines should run the same direction as the grain in the frame pieces. (When making the splines, I used the same kind of wood, but you could use a contrasting wood to emphasize the splines.)

CUT SPLINES. To make the splines, set the rip fence so the distance from the blade is equal to the width of the groove, see Step 1 in Fig. 4. Now make two cuts on *both ends* of a 4"-wide block.

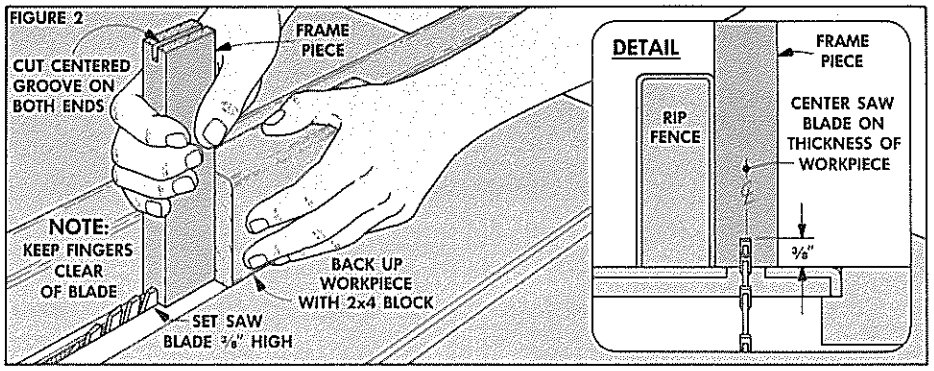
Then, to cut the splines off, set the fence so the distance from the outside of the blade to the workpiece end equals ¾" (that is, the combined depth of the two grooves), see Step 2 in Fig. 4. Finally, trim the splines to a rough width of 1⅞" with a chisel.

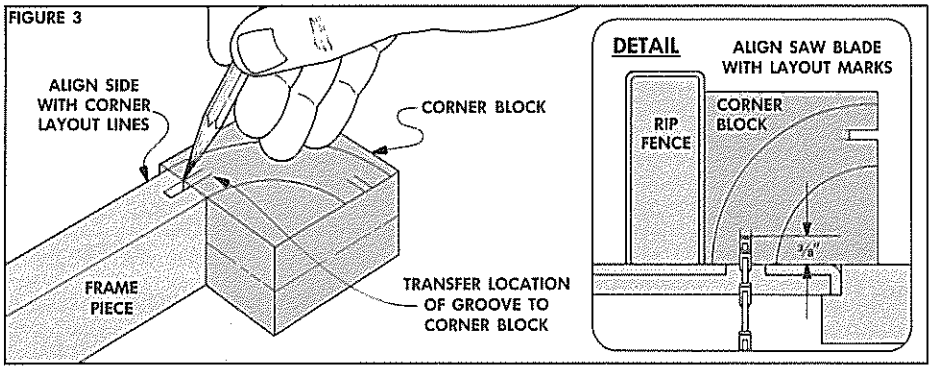
ASSEMBLY

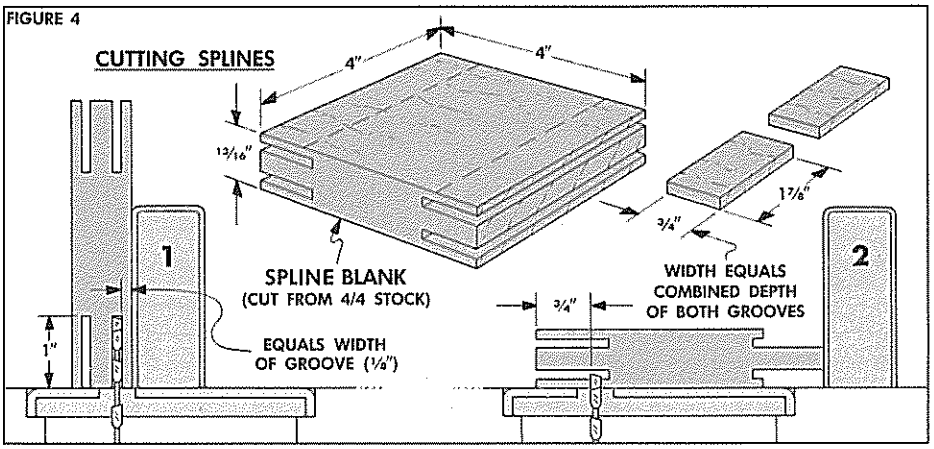
There's one more step before assembly. Band saw the *inside* radius on each corner block, see Detail A in Fig. 5.

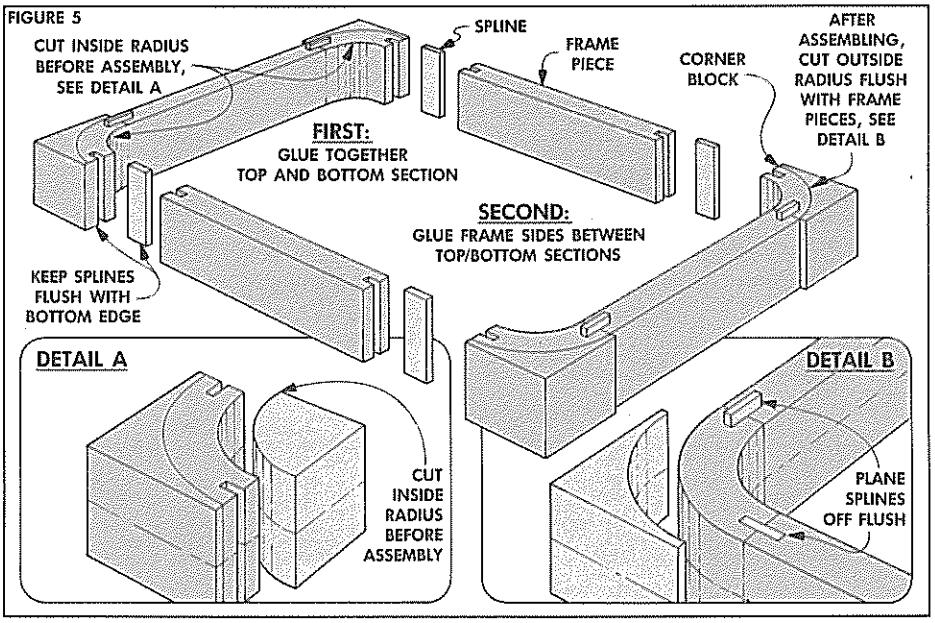
GLUE UP ENDS. Now the frame can be assembled. Start by gluing and clamping two corner blocks to a frame piece. Then glue and clamp the opposite side and connect these two sections to complete the frame. When the glue is dry, plane the splines off flush with the top of the frame.

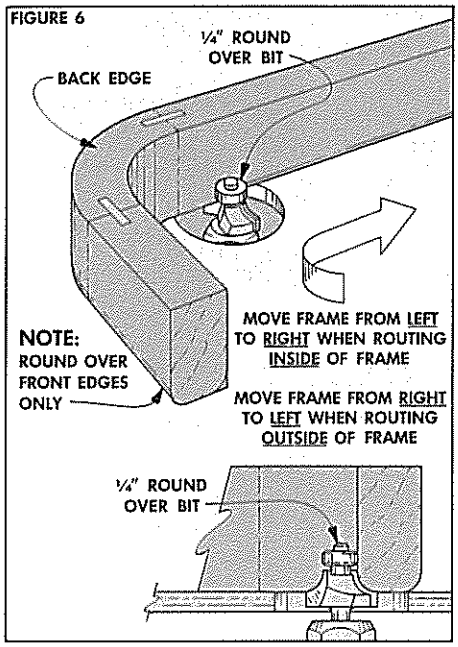
CUT OUTSIDE RADIUS. To complete the basic frame, cut off the outside radii on the four corner blocks (see Detail B), and then sand the inside and outside radii smooth.

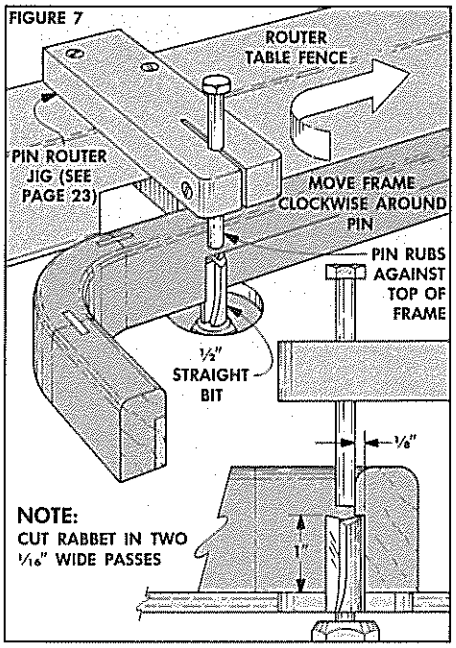


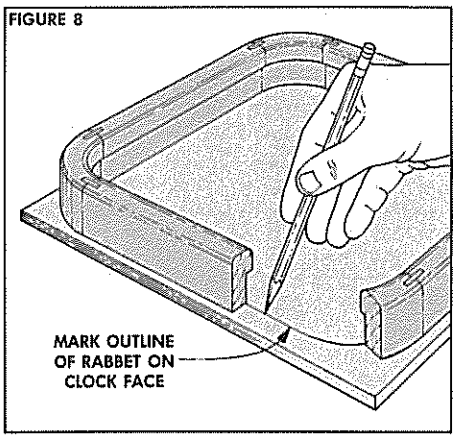


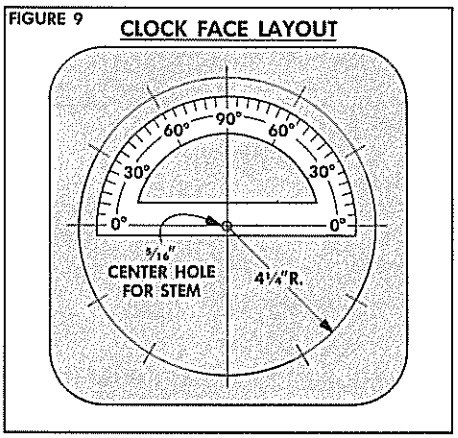


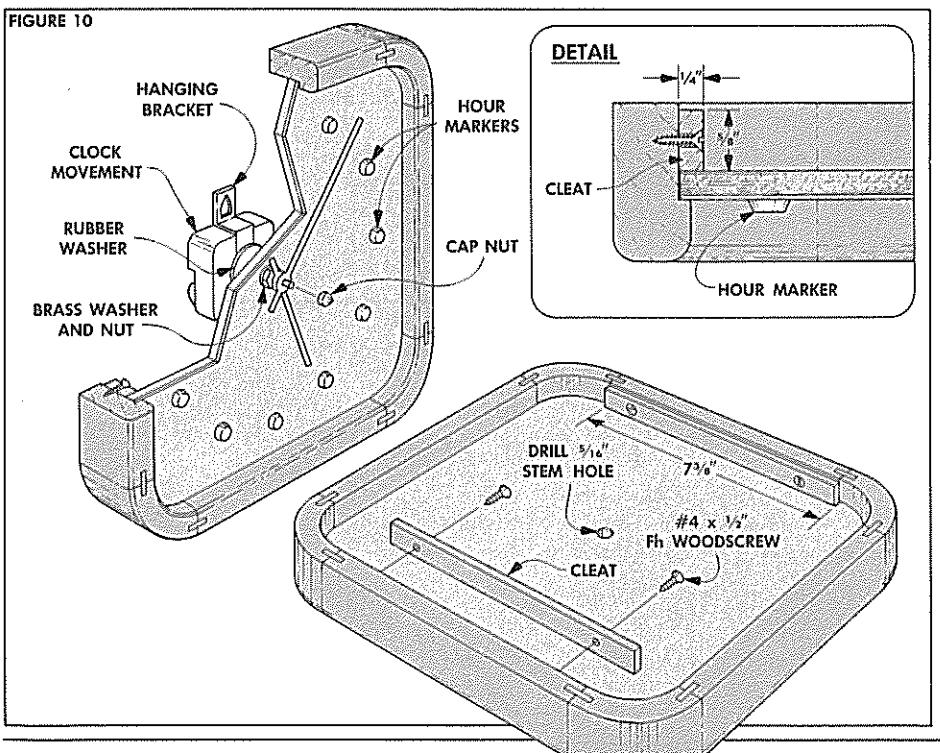












FINISHING UP THE FRAME

Before you begin work on the face, there are a couple more steps on the frame.

ROUND OVER FRONT EDGES. First, round over both front edges of the frame with a ¼" round-over bit, see Fig. 6.

RABBET BACK. Next, rout out a ⅛" rabbet 1" deep on the back inside edge of the frame to accept the face. To do this, I used a pin-routing jig on the router table, see Fig. 7. (For more on the jig, see page 23.)

CLOCK FACE

After the rabbet is routed, the clock face can be made and cut to fit.

MAKE THE FACE. I made one face out of ¼" plywood, then I tried a couple more with plastic laminate or burl veneer glued to ¼" Masonite. (Note: Laminate or veneer can be glued to the Masonite either before or after the face is cut to fit the rabbet, see Shop Notes, page 23.)

The only thing critical here is that the completed face material must be *less than* ⅜" thick. This allows the stem on the clock movement to stick out the front, and the ⅝"-thick movement to fit behind the face.

MARK AND CUT OUT FACE. Once the face material is cut slightly oversize, place the clock frame on the face and mark the outline of the rabbet, see Fig. 8. Now cut the face to width and length on a table saw. Then sand the corners round on a disc sander until they fit the rabbet.

CENTER HOLE AND MARKERS. Before mounting the face, I laid out a center hole and the location of the hour markers, see Fig. 9. (Note: If you order the clock parts from *Woodsmith*, a face template is included, see page 24.) To lay out the face, start by finding the center point. Then draw a 4¼" radius circle with a compass.

Next, mark the locations of the 12, 3, 6, and 9 o'clock markers on the circle, see Fig. 9. Then, use a protractor to mark out the rest of the markers at 30° intervals. After the hour markers are laid out, drill a 5/16" center hole for the stem.

FINISH. Before fastening the face into the rabbet, I finished the frame (and the face if it's not plastic) with tung oil.

ASSEMBLE FACE TO FRAME

When the finish is dry you can mount the face into the frame with cleats, see Fig. 10.

GIVE IT THE WORKS. After screwing the cleats down to hold the face in, mount the works in the back with the hanging bracket between the movement and the face.

MARKERS AND HANDS. The only thing left is to add the hour markers and the hands. On page 24 we've given sources for gold-colored markers in both dots and dashes. You could also make hour markers from dowels, plugs, or screw hole buttons.

Now, add the hands and the cap nut. Then it's time to hang up your new clock.

Shop Notes

SOME TIPS FROM OUR SHOP

A DEEP RABBET

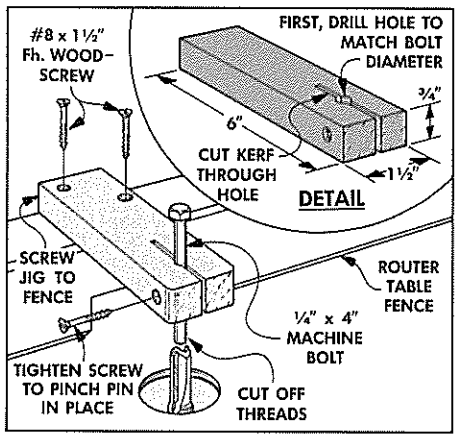
When I was building the wall clock, I had to rout a ⅛"-wide by 1"-deep rabbet in the back of the frame to hold the face. The problem was how to cut a rabbet that size *after* the frame was assembled?

Note: Before it's assembled, you can cut the rabbet on the straight pieces with a table saw. But the round corner sections have to be cut with a router, so you might as well wait until the frame is assembled.

NO RABBETING BIT. I usually cut rabbets with a rabbeting bit mounted in the router table (such as on the serving tray, see Fig. 16 on page 17). But most rabbeting bits cut a ¼" or ⅜"-wide rabbet, and you need a ⅛"-wide rabbet cut 1" deep into the back of the clock frame.

PIN ROUTER. For the rabbet in the back of the clock, I added a jig to my router table and turned it into a pin router. It's simply a pin held in a wood block directly above a straight bit. As the pin follows the curved and straight sections around the *inside* of the clock frame, the bit below cuts a uniform rabbet. The width of the rabbet depends on the location (relationship) of the bit to the pin, see drawing on right.

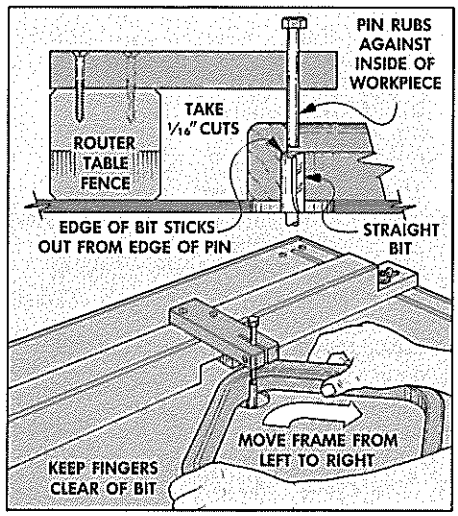
To make the pin router attachment, cut a piece of scrap to a width of 1½" and length of 6". Then drill a hole near one end to hold the pin. Since I used a ¼" x 4" machine bolt with the threads cut off as a pin, I drilled a ¼" diameter hole.



To make the pin height adjustable, don't glue it in permanently, just "pinch" the pin in place in the hole. To do this, first cut a saw kerf in through the hole, and about 1" beyond. Then tighten a screw across the kerf, to hold the pin in tight.

SETTING UP. After the jig was built, I screwed it to the top of the router table fence, and then set up to make the cut.

The important thing here is the relationship between the pin and the router bit. To cut a rabbet, the cutting edge of the bit must stick out from the edge of the pin. (Since the pin is attached to the fence, it's easy to move the pin slightly by moving the fence.)



To cut the ⅛" rabbet in the back of the clock frame, I mounted a ½" straight bit in the router table and raised it 1" above the table. Then adjust the pin (by moving the fence) so the bit takes a very light (1/16") cut. (That is, set the edge of the pin 1/16" in from the cutting edge of the bit.)

CUTTING THE RABBET. Usually when I cut a rabbet, I make a light scoring pass *backwards* first to prevent chipout on the top edge of the rabbet. But I wouldn't recommend it here. The bit is taking a deep (1") cut and it tends to grab and pull the wood through. So instead, I just made a couple of light (1/16"-wide) cuts in the correct direction to get the ⅛"-wide rabbet.

But there's something else to consider here. Typically you push the workpiece across the router table from right to left. It's different with the pin router. Since the workpiece is *behind* the bit, you have to *pull* the clock frame against the pin and then move the frame from *left to right* (clockwise around the bit). This keeps the frame moving against the rotation of cut.

ANOTHER USE. Shortly after I used this jig for the clock frame, I found another use for it. I used the jig to clean out a rabbet on an old picture frame to accept my favorite picture because the existing frame rabbet was too small. When doing this, *make sure* all metal objects, nails, screws, lead points and bits of glass are removed before cleaning out the existing rabbet.

CUTTING LAMINATE/VENEER TO SHAPE

There are a couple of options for the materials on the bottom of the tray and the face of the clock. You can make these pieces out of ¼" hardwood plywood. Or you can glue plastic laminate or wood veneer to the top of a ¼" Masonite or plywood substrate.

Cutting plywood to fit the rabbet in the tray or clock frame is no problem. But there are a couple of ways to approach a plastic laminate or veneer-laminated piece.

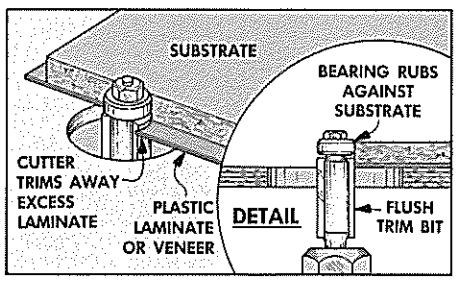
You can first glue the plastic laminate or veneer to the substrate, then cut both together to fit the opening. Or you can cut the substrate first to fit the opening, then glue on an oversized top layer and trim it to match.

GLUE FIRST. The "glue first, then cut to fit" approach is probably the easiest, but there are two disadvantages. First, sometimes the edge of plastic laminate and veneer will splinter or crack out slightly when it's being cut.

Second, this approach only gives you one chance at cutting the material to fit the opening. If you should cut undersize, you've wasted not only your substrate, but the top layer which may be an expensive veneer or your last piece of laminate.

CUT FIRST. The approach I took on these projects was to first cut a substrate of inexpensive ¼" Masonite (or plywood) to fit the opening. If it didn't quite fit, I cut another until I got one that did. (Since the openings have round corners, sometimes it takes a couple pieces to get a good fit.)

Once you get the substrate to fit perfectly, glue an oversize piece of laminate or veneer to the top. Then mount a flush trim bit on the router table and set the ball bearing on the bit to rub against the Masonite, see drawing. The cutter will trim the laminate or veneer perfectly flush with the Masonite and leaves a smooth surface.



FLUSH TRIM BITS. These router bits are typically used by countertop installers. Most cost between $15 and $20, but you can get a small one from the Sears catalog (No. 9 Y 25413) for only $9.49.

Sources

CHRISTMAS ORNAMENTS

This is the full-size pattern for the ornaments.

Ornament Pattern, Order No. 759-113

DISPLAY CASE

Since it's difficult to find clear walnut and basswood, we are offering all the wood needed for the display case, planed and sanded to the thin dimensions needed.

Display Case Kit, Order No. 759-310

This kit includes:

- (2 pcs.) 1/2" Walnut, 2-3/4" x 18"
- (2 pcs.) 1/4" Basswood, 2-1/2" x 16"
- (1 pc.) 1/8" Basswood, 2-1/2" x 23"
- (1 pc.) 1/4" Walnut Plywood, good two sides, 7-3/4" x 7-3/4"
- (2) 1" Brass Turn Buttons with 1/2" x #3 Fh Brass Woodscrews

SLED

The hardware needed for the sled is available as a package.

Sled Hardware (Brown) Order No 759-410

This package includes:

- (14 ft.) T-Molding, fits 1/16" slot, 13/16" wide. Brown color. (See next listing for Red color T-Molding.)
- (8) Joint Connector Bolts, 2-7/8" long
- (8) Cross Dowels, 9/16" long, 13/32" diameter, to fit bolts above.
- (14) Brass Fh Screws, Phillips Drive, #8 x 1" (2 extra screws provided)

Sled Hardware (Red) Order No. 759-420

This kit has all the same components as No. 759 410 except the T-Molding is red color.

WALL CLOCK

The components needed for the wall clock are available as four packages. All packages include one Quartz Movement and a paper template (to help locate the hour markers). Then choose the package that has the Hands (brass or black) and the type of Hour Marker (dots or dashes) you want.

Wall Clock, Order No. 759-610
(Brass hands, dots)
Wall Clock, Order No. 759-620
(Brass hand, dashes)
Wall Clock, Order No. 759-630
(Black hands, dots)
Wall Clock, Order No. 759-640
(Black hands, dashes)

You can also order a piece of plastic laminate for the clock face separately.

Clock Face, Red, Order No. 759-650
This is one piece of Wilsonart brand plastic laminate, 12" x 12", Red color.

Clock Face, White, Order No. 759-660
This is one piece of Wilsonart brand plastic laminate, 12" x 12", White color.

Clock Face, Black, Order No. 759-670
This is one piece of Wilsonart brand plastic laminate, 12" x 12", Black color.

ORDERING INFORMATION

To order project supplies, call the toll free number 1-800-444-7527. Customer service is available from 7AM to 7PM Central Time, weekdays only. Use your VISA, MasterCard or Discover Card.