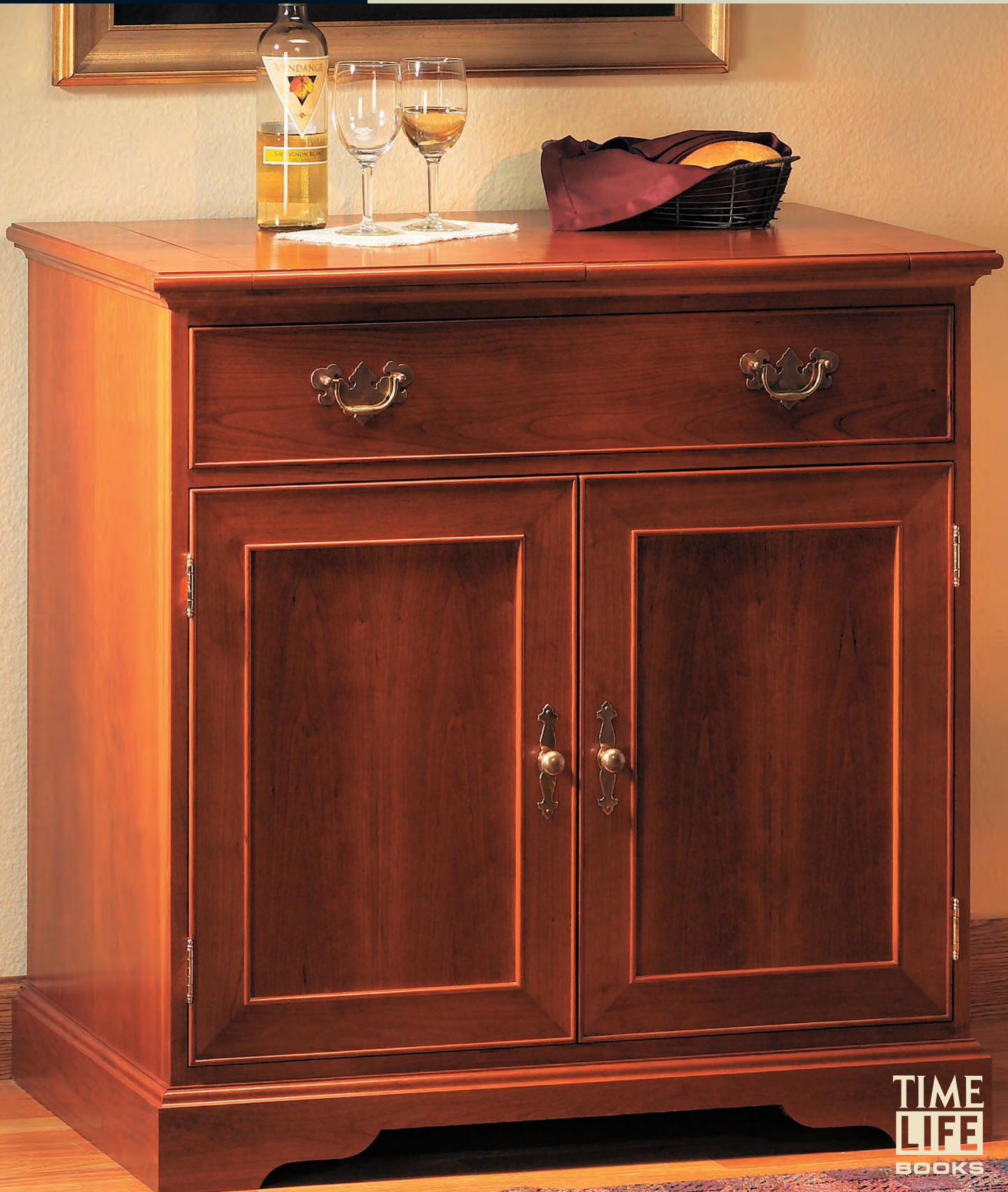


Woodsmith
CUSTOM WOODWORKING

Traditional Furniture



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SHOP SAFETY IS YOUR RESPONSIBILITY

Using hand or power tools improperly can result in serious injury or death. Do not operate any tool until you read the manual and understand how to operate the tool safely. Always use all appropriate safety equipment as well as the guards that come with your tools and equipment and read the manuals that accompany them. In some of the illustrations in this book, the guards and safety equipment have been removed only to provide a better view of the operation. Do not attempt any procedure without using all appropriate safety equipment or without ensuring that all guards are in place. Neither August Home Publishing Company nor Time-Life Books assume any responsibility for any injury, damage or loss suffered as a result of your use of the material, plans or illustrations contained in this book.

WOODSMITH CUSTOM WOODWORKING

Traditional Furniture

By the editors of *Woodsmith* magazine

Time-Life Books

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Mantel Clock



Chairside Chest



TABLES

Each table in this section offers a distinctive look for a different place in your home. In addition, each one has a variety of options for customization.

The curved-front table is perfect for a hallway or entryway, and can be built with your choice of leg and top details.

The cabriole legs and hand-polished top of the coffee table are easier to make than you might think. There's a way to make a set of these Queen Anne-style tables in a weekend. And the solid look of the bow-front end table can be lightened by building it with a single drawer.

Curved-Front Table

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Curved-Front Table

With curved panels and delicate inlays in the legs, this table may look like a complex project. But all you need is your table saw to bend the wood and a router table to create the inlay effect.



There's something about this Curved-Front Table that brings out the curiosity in any craftsman. How are the curved aprons made? Is a thick piece used and then cut into a curved shape? Or is it bent somehow? And how about the legs? You'd think some kind of fancy jig was used to get the inlays so tight.

Not at all. In fact, both of these seemingly complex woodworking tasks have simple solutions.

CURVED APRONS. The curved aprons of the table are made from plywood, and have a series of saw kerfs cut in back to allow the wood to bend. Since this

method is new to many woodworkers, it's all explained in the Technique article on page 15.

LEGS. The "inlaid" legs are another example of a simple solution to a difficult task — how do you inlay tapered strips on all four faces of each leg?

In what could almost be called a reverse inlay technique, I wasted away the wood from the leg to leave a raised "inlay" in the center of each face. Then, I glued thin strips of contrasting wood along each corner where the wood had been removed. It's that simple.

WOOD. I used solid cherry for the legs, and cherry plywood for the aprons

and table top. For the contrasting wood trim, I chose walnut. To build the inner case that the aprons are bent around, I used 1/2" fir plywood.

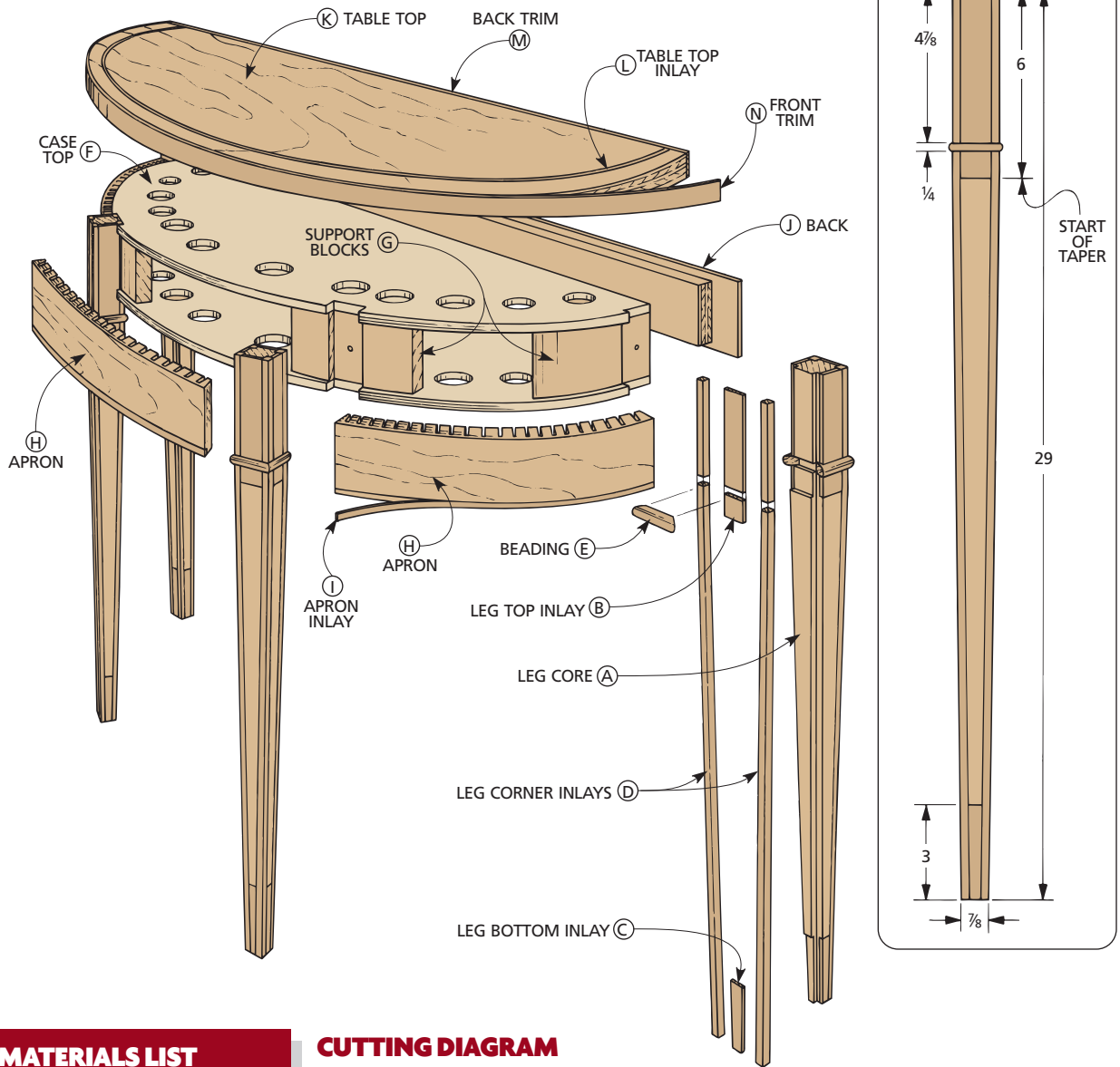
OPTIONS. Although I really like the look of the inlaid legs and the inlay on the top, this table can easily be built without these features. The Designer's Notebook on page 18 takes this idea a bit farther by using a solid wood top with an edge profile. The result is simpler, but still quite elegant.

FINISH. To finish the table, I wiped on one coat of a tung oil sealer and stain. After it had dried, I then applied two coats of a satin finish top coat.

EXPLODED VIEW

OVERALL DIMENSIONS:

36 $\frac{1}{4}$ "W x 14 $\frac{1}{8}$ "D x 29 $\frac{3}{4}$ "H



MATERIALS LIST

WOOD

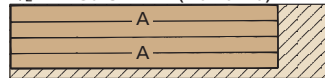
A Leg Cores (4)	1 $\frac{1}{2}$ x 1 $\frac{1}{2}$ - 29
B Leg Top Inlays (16)	$\frac{1}{8}$ x 1 $\frac{1}{4}$ - 6
C Leg Btm. Inlays (16)	$\frac{1}{8}$ x $\frac{7}{8}$ - 3
D Leg Cnr. Inlays (16)	$\frac{1}{4}$ x $\frac{1}{4}$ - 30 rough
E Beading (1)	$\frac{1}{4}$ x $\frac{1}{4}$ - 30 rough
F Case Top/Btm. (2)	$\frac{1}{2}$ ply - 12 $\frac{3}{8}$ x 33
G Support Blocks (4)	1 $\frac{1}{2}$ x 3 - 6
H Apron (1)	$\frac{3}{4}$ ply - 4 x 48
I Apron Inlay (1)	$\frac{1}{16}$ x $\frac{1}{4}$ - 48 rough
J Back (1)	$\frac{3}{4}$ ply - 4 x 32 $\frac{1}{4}$
K Table Top (1)	$\frac{3}{4}$ ply - 13 $\frac{7}{8}$ x 36
L Table Top Inlay (1)	$\frac{1}{8}$ x $\frac{1}{4}$ - 54 rough
M Back Trim (1)	$\frac{1}{8}$ x $\frac{3}{4}$ - 36
N Front Trim (1)	$\frac{1}{8}$ x $\frac{3}{4}$ - 54

HARDWARE SUPPLIES

- (16) No. 8 x 1 $\frac{1}{4}$ " Fh woodscrews
- (4) No. 8 x 2" Rh woodscrews

CUTTING DIAGRAM

1 $\frac{1}{2}$ x 7 - 36 CHERRY (2.6 Bd. Ft.)



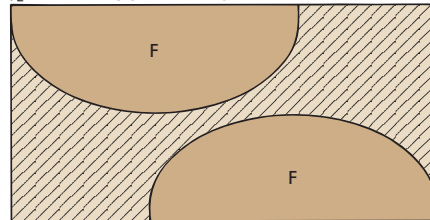
2x4 (1 $\frac{1}{2}$ x 3 $\frac{1}{2}$) - 36 (1.3 Bd. Ft.)



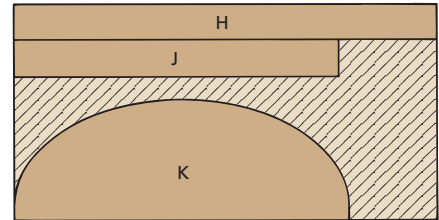
$\frac{3}{4}$ x 7 - 60 WALNUT (2.9 Bd. Ft.)



$\frac{1}{2}$ " FIR PLYWOOD - 24 x 48



$\frac{3}{4}$ " CHERRY PLYWOOD - 24 x 48



NOTE: ALSO NEED
24" x 48" SHEET OF
 $\frac{1}{4}$ " HARDBOARD FOR TEMPLATE

LEGS

Before starting on this table, you need to decide if you want to add inlays and decorative beading to the legs or not.

Either way, you'll start by cutting four leg cores (A), 1½" square and 29" long. (Refer to detail 'a' on page 9.) Then if you don't want the inlays or beading, skip to the "TAPER LEG CORES" paragraph below, and then skip to page 12.

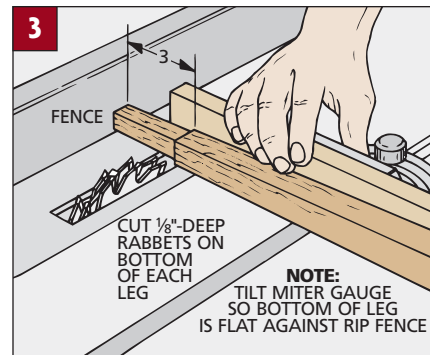
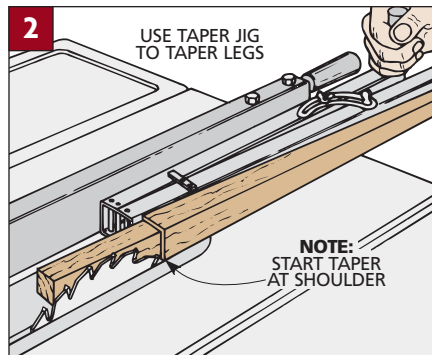
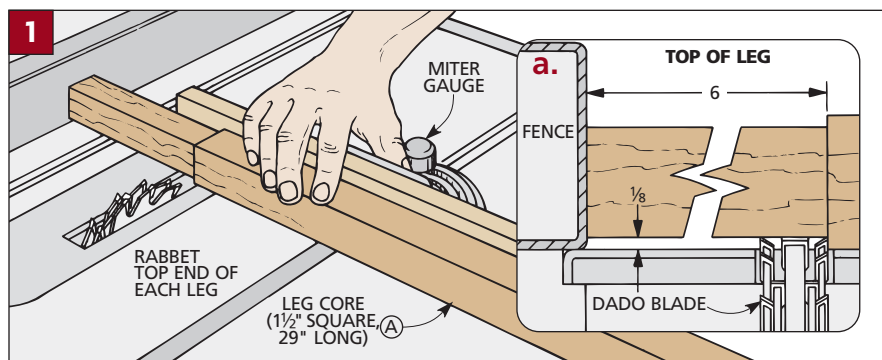
INLAYS. If you want inlaid legs, there are some cuts to make on the leg cores. Although the legs appear to be made from walnut with cherry inlays, I think it's easier to start with cherry cores and inlay walnut into the corners, tops, and bottoms of the legs.

TOP RABBET. After cutting the cores, cut a wide, shallow rabbet around the top of each leg for the leg top inlays (B) (Figs. 1 and 1a). To do this, I set up a dado blade in the table saw.

Using the rip fence as a stop and the miter gauge to keep the workpiece square, make the first cut to establish a shoulder on each face of the leg. When the shoulders are cut, waste away the remaining stock to the end of the leg.

TAPER LEG CORES. After the top rabbets are cut on all four legs, the next step is to taper the legs (refer to detail 'a' on page 9). I did this on the table saw using a taper jig set to begin the taper at the shoulder of the rabbet (Fig. 2).

BOTTOM RABBET. Once a taper is cut on each face of the legs, the rabbets can be cut for the bottom inlays. To do this,



position the rip fence 3" from the outside edge of your dado blade (Fig. 3).

Note: Since the leg is now tapered, you need to pivot the miter gauge so the bottom end of the leg is flat against the rip fence. Then, cut the rabbets as you did for the leg top inlay.

TOP AND BOTTOM INLAYS. With the legs rabbeted, walnut inlay pieces can be cut to fit the rabbets. Start by cutting enough stock for sixteen pieces of leg top inlay (B) and sixteen pieces of leg bottom inlay (C).

To do this, first resaw the stock so it's as thick as the rabbets are deep (1/8"). Then cut the pieces to fit the rabbets and glue them in place (Fig. 4).

Note: In the next step, you'll be cutting away the corners of each leg, so this inlay only needs to extend to the shoulders of the rabbet (Fig. 5a).

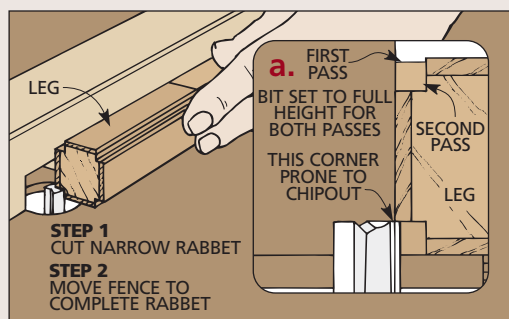
CORNER INLAY. The next thing to do is to rout a rabbet the length of each leg for each leg corner inlay (D) (Fig. 5). I did this on the router table. (See the Shop Tip at left for a way to do this without chipout.)

Now cut sixteen leg corner inlays out of walnut (D) to fit the rabbets (Figs. 5 and 5b). Then, glue the strips to the legs and sand them flush.

SHOP TIP Chip-Free Rabbets

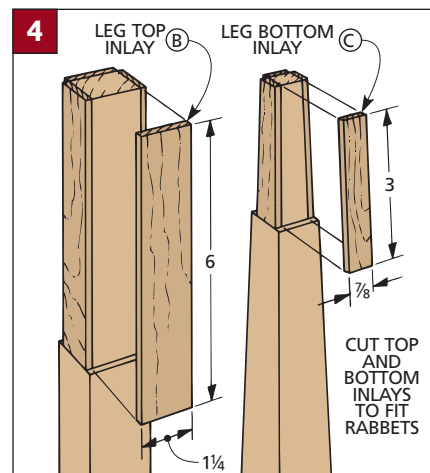
When using the router table to cut the rabbets for the corner inlays, the top outside edges of the rabbets are prone to chipout (see detail 'a' in drawing).

To prevent this, I cut each rabbet in two passes. On the first pass, I set the router table fence so only 1/16" of the bit was exposed (see detail 'a'). (The bit should be set at the full height of the



rabbet.) This scoring pass greatly reduces the chance of chipout on the face of the leg.

For the second pass, reposition the fence to make the cut to full width and depth.



BEADING

There's one more set of trim to add — the decorative beading between the flat section at the top of each leg and the tapered lower section.

ROUT DADOES. The beading fits in shallow dadoes cut near the top of each leg (refer to *Fig. 10*). I routed these dadoes on the router table (*Fig. 6*). You could use a table saw, but the chance of chipout is reduced if you use a router.

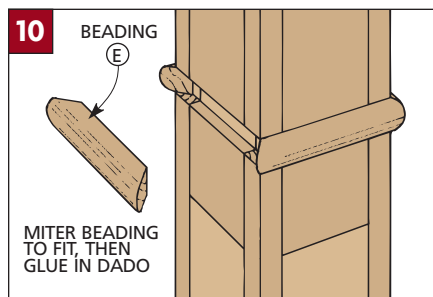
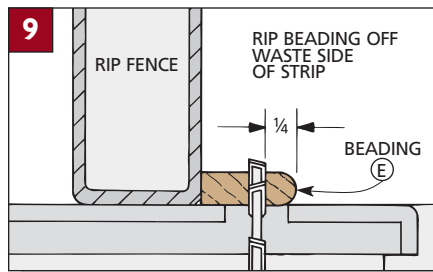
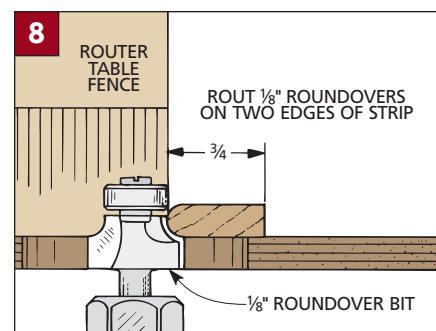
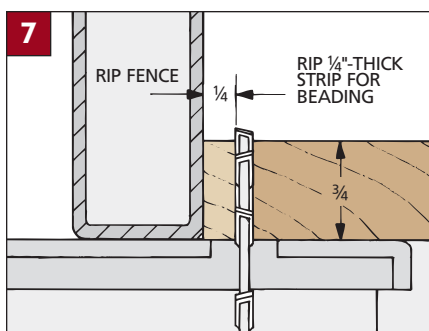
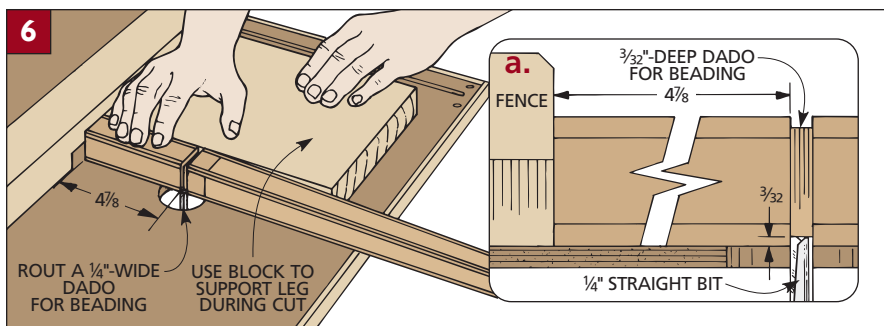
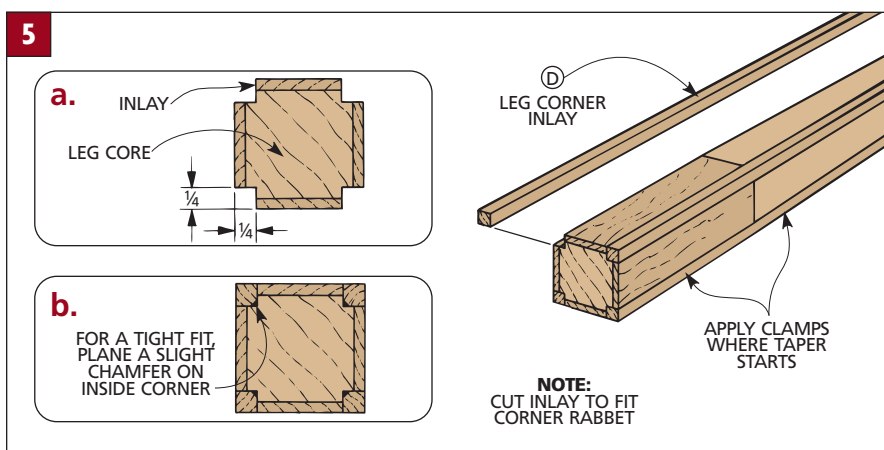
Start by positioning the fence on your router table $4\frac{7}{8}$ " from the inside edge of a $\frac{1}{4}$ " straight bit (*Fig. 6a*). Then use a board to back up the leg, and rout the dadoes (*Fig. 6*).

CUT BEADING. Once the dadoes are cut, the next step is to make the beading (E). Since the beading is small ($\frac{1}{4}$ " x $\frac{1}{4}$ "), it's safest to start with a wide piece and then cut the beading off the edge.

First, rip a strip $\frac{1}{4}$ " thick (*Fig. 7*). Then use a $\frac{1}{8}$ " roundover bit on the router table to round over both edges (*Fig. 8*). Now, the beading can be cut off the edge of the strip safely (*Fig. 9*). Position the fence to cut a $\frac{1}{4}$ "-wide bead on the waste side of the blade.

MITER BEADING. After the strips for the beading are cut, the final step is to miter sixteen pieces to length to fit in the dadoes on the legs (*Fig. 10*). I made a miter box that made it easier to cut and "fine-tune" these small pieces to final length (see the Shop Jig below).

Note: The beading should fit tight without clamps, but if they're loose, tape them in place until the glue dries.



SHOP JIG

Small Miter Box

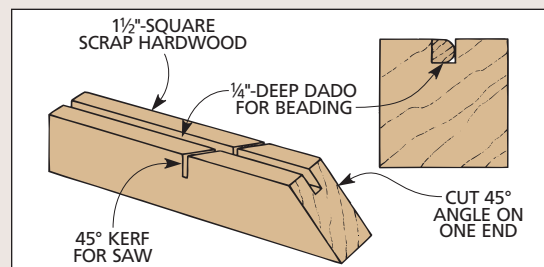
How do you accurately miter and trim small pieces such as the beading for the Curved-Front Table? The method I use is to make a miniature miter box with a 45° kerf to guide a hand saw.

To make the miter box, start with a scrap of $1\frac{1}{2}$ "-thick hardwood (see drawing). Then, cut or rout a centered groove the length of the scrap to hold your

workpiece. Next, lay out and cut a 45° kerf with a hand saw.

You can also trim miters with this miter box. To do this, cut a

45° angle on one end. Then position the workpiece so it extends out the angled end and chisel, file, or sand the piece for a perfect fit.



CURVED-FRONT CASE

Once the legs are completed, work can begin on the curved case. This consists of two pieces of plywood held together with four support blocks that will also help secure each leg (refer to *Fig. 15*).

TEMPLATE. I started work on the case by making a template to cut the case top and bottom. There are two reasons for this template. First, you only have to lay out one ellipse — even though there are three pieces on the table with this shape (two case pieces and the finished top).

Second, you can use the template along with a flush trim bit to cut identical pieces for the case. (For more about using a flush trim bit, see Shop Info on the opposite page.) Later, the template is used to lay out the top and add an inlay strip.

To make the template, start by laying out the ellipse dimensions on a piece of $\frac{1}{4}$ "-thick hardboard. (For details about doing this, see the Shop Tip on page 16.) To allow for the back legs and the inset back piece (J), lay out the centerline of the ellipse $1\frac{3}{8}$ " from the back edge of the hardboard (*Fig. 11*). Now draw the ellipse. Finally, cut the template out and sand the edges smooth.

CASE TOP/BOTTOM. The next step is to cut and trim the case top and bottom (F) from $\frac{1}{2}$ "-thick fir plywood (*Fig. 11*). To do this, trace the outline of the template onto the plywood. Then, rough-cut the top and bottom to within $\frac{1}{8}$ " of the pencil line (*Fig. 11a*).

Now the template can be used with a flush trim bit to trim the top and bottom pieces to finished shape.

LAY OUT NOTCHES. Once the case top and bottom are trimmed to size, the next step is to lay out four notches along the curved edge to accept the legs. You only need to lay out the notches on one piece. They will be cut after the support blocks are added later.

To locate the two center notches, make marks on the back edge of the case top, 7" in from each end (*Fig. 12*). Then use a square to transfer the positions up to the front edge.

Now, hold a leg on the mark and draw the thickness of the leg toward the inside of the top (*Fig. 12*).

The notches for the back legs are a little different. They're narrower than the front notches so the legs will stick out beyond the back of the case pieces (refer to *Fig. 17a*). This allows for the case back that's added later.

CLAMP HOLES. Next, a series of holes are drilled in both the top and bottom (F) to allow the aprons to be clamped in place later (*Fig. 12*). I used a $1\frac{1}{2}$ "-dia. bit, but this can vary depending on the size and number of clamps you use.

SUPPORT BLOCKS. Once the clamp holes are drilled, work can begin on the support blocks (G). These blocks act as spacers between the case top and bottom, and also as screw blocks for the legs (refer to *Figs. 16 and 17*).

Make the support blocks by ripping a piece of 2x4 to a width of 3". Then cut off four 6" lengths (*Fig. 13*).

Next, center a block under each of the middle leg notches that are laid out on the case. The other two blocks are positioned flush with the back edge for the rear leg notches (*Fig. 13*).

Now, trace the outline of the case onto the blanks. Then cut the support blocks to shape on the band saw.

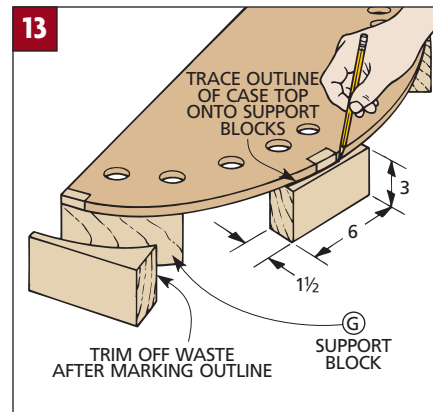
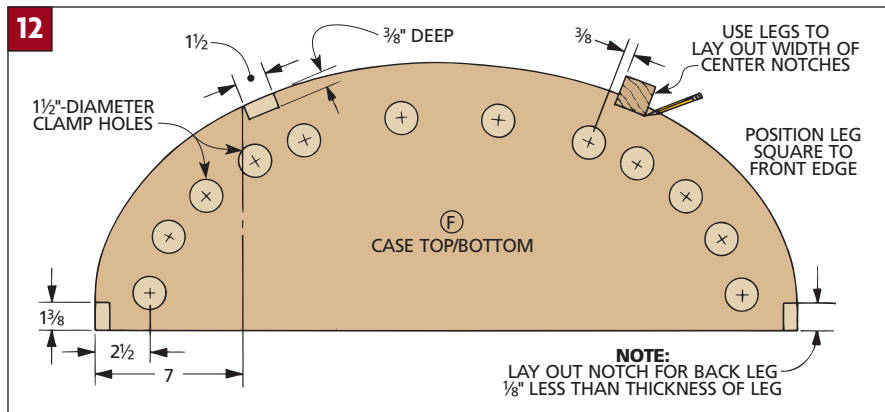
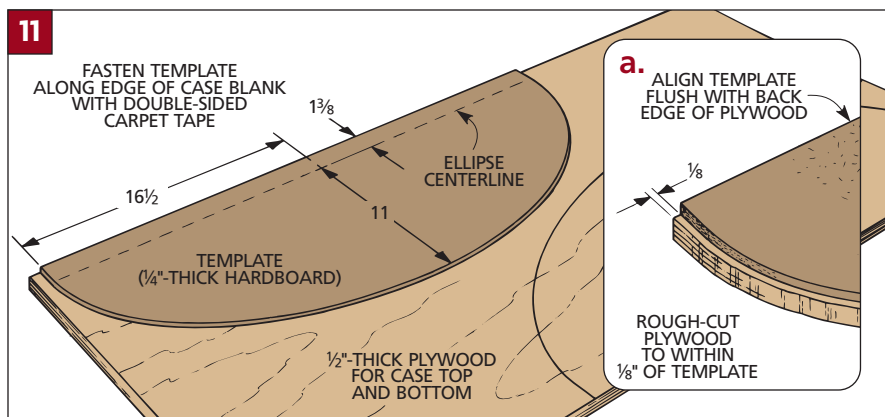
CASE ASSEMBLY

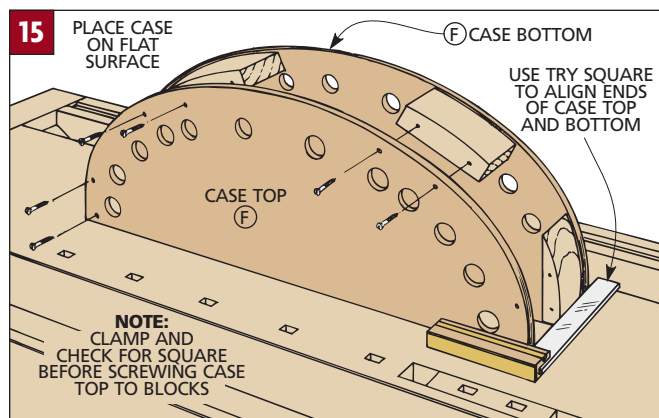
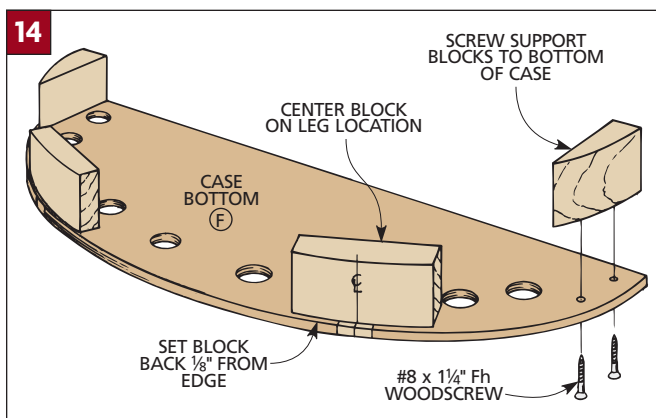
The first step in assembling the case is screwing each of the support blocks to the case bottom.

Since the aprons (added later) are glued only to the plywood top and bottom, I set the support blocks back $\frac{1}{8}$ " from the front edge of the case bottom (*Fig. 14*). When each block is in position, screw it in place.

TOP. After all four blocks are screwed to the bottom, the top of the case can be attached. Screwing it to the blocks is easy — but getting the top and bottom aligned with each other is not so easy. If the case top and bottom aren't square and aligned to each other, the aprons won't be square to the table top when they're glued on later.

To attach the top of the case, start by placing the case bottom assembly on





edge with the back edge resting on a flat surface (Fig. 15). Then, use a try square to align one end of the case top with the bottom. Once the top and bottom are aligned, clamp them together. Then, slide the square around the curved case slowly, checking to make sure the two pieces are square with each other.

If they're not square at each support block, you can shift the top or the bottom of the case to bring them into square. Once the case pieces are aligned properly, screw the case top to the support blocks.

Note: Countersink the screws into the plywood so the table top (added later) will sit flat on the case top.

CUT NOTCHES. After the case is screwed together, the notches can be cut $\frac{3}{8}$ " deep and to fit the legs (Fig. 12).

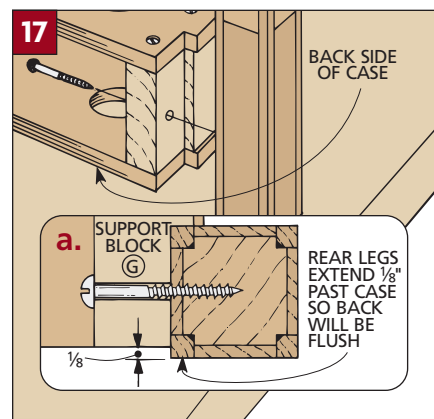
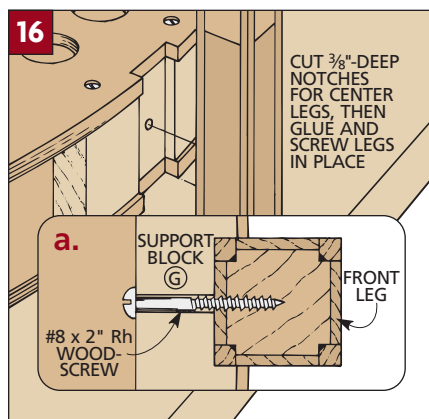
I cut these notches on the band saw by cutting the sides of the notch first and then removing the waste with a series of cuts. You could also use a hand saw to cut the sides and a chisel to remove the waste.

Whichever method you use, it's very important that the back of each notch (from top to bottom and from side to side) be parallel to the front edge of the case. If they aren't, this can cause a couple of problems.

First, the legs can twist and won't be parallel to each other. Second, the aprons that are added later won't butt up against the legs squarely. So, check the notches as you cut them.

ATTACH LEGS. Once all four notches are cut, the next step is to screw the legs to the case. To do this, start by drilling a $\frac{3}{16}$ "-dia. shank hole through each support block (Figs. 16 and 17). Center the hole in the notch.

The next step is to locate a pilot hole in each leg. To make it easier to do this,



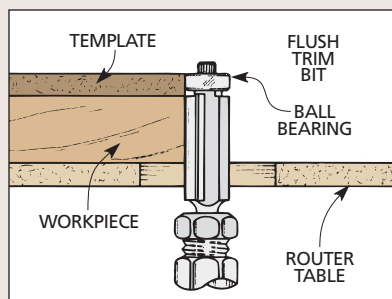
turn the case upside down and place it on a flat surface. Then insert a leg in a notch and hold it in place. Next, push an awl or brad-point bit through the shank hole so it leaves a mark on the leg.

SHOP INFO Flush Trim Bit

Flush trim bits are used with a template to produce an exact copy of the template.

A flush trim bit is a straight bit with a bearing on the end that aligns with the cutting edges of the bit (see drawing below).

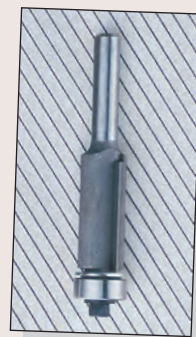
By running the bearing along a template, a workpiece can be cut to



the same shape as the template.

To use a flush trim bit, first trace the outline of the template onto the workpiece. Then you can cut the workpiece to rough shape, staying $\frac{1}{8}$ " outside the line.

Next, fasten the template to the workpiece with double-sided carpet tape or screws. Then adjust the height of the bit so that the bearing rides on the edge of the template (see drawing). Now you can rout the workpiece to final shape.



The next step is to make the apron that wraps around the front of the case.

CUT BLANK. The apron (H) starts as a strip of $\frac{3}{4}$ "-thick plywood, 4" wide and 48" long (Fig. 18). This blank will be cut into three sections later.

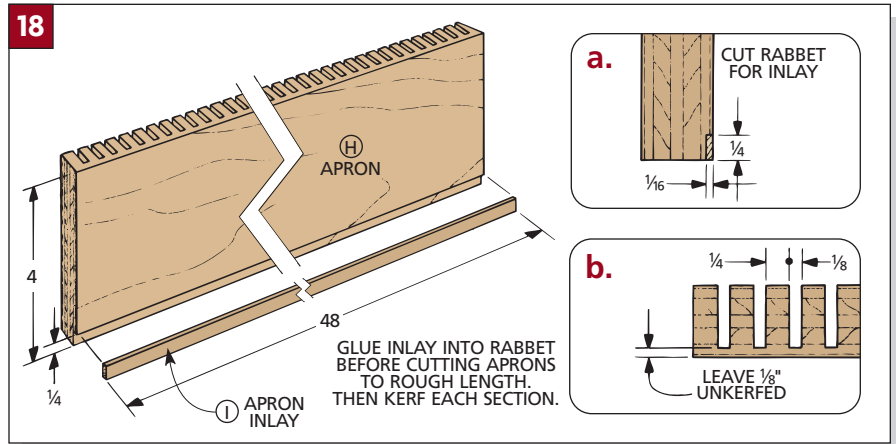
Note: The face grain of the plywood should run the length of the strip.

Before cutting the apron into sections, I added a walnut inlay (I) strip. To do this, rout a $\frac{1}{4}$ "-wide rabbet along the bottom edge (Fig. 18a). Then cut the inlay strip to fit the rabbet. After it's glued in place, sand the inlay flush.

CUT SECTIONS. Now the apron can be cut into three sections. To determine the rough length of each section, measure between the legs along the curved case. Then, to allow for the thickness of the plywood and for trimming later, add $1\frac{1}{2}$ " to each measurement. (I cut the two end sections 14" long and the middle section 18" long.)

KERFS. The next step is to kerf the aprons so they will follow the curve of the case (refer to the opposite page). I spaced the kerfs $\frac{1}{4}$ " apart (Fig. 18b).

To make it easier to get a tight fit where the aprons meet the legs, cut a



10° bevel on one end of each apron (Fig. 19a). Then to get an idea of the final length, curl the apron around the edge of the case and make a mark where the unbeveled end meets the leg (Fig. 19). Sneak up on the final length by taking light, 10° bevel cuts until the apron just fits between the legs.

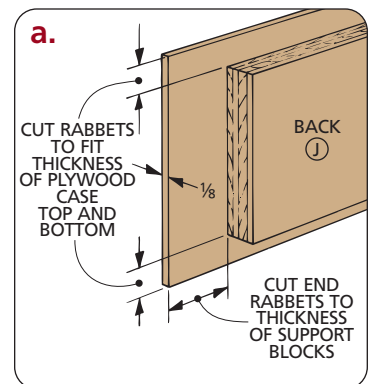
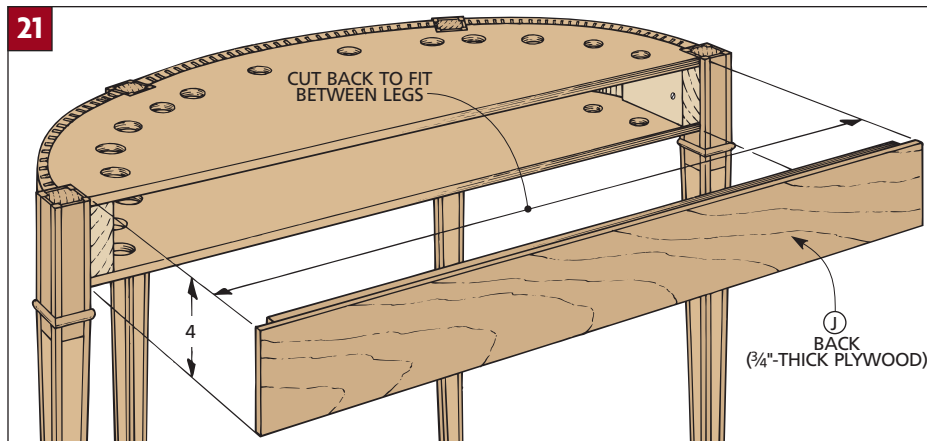
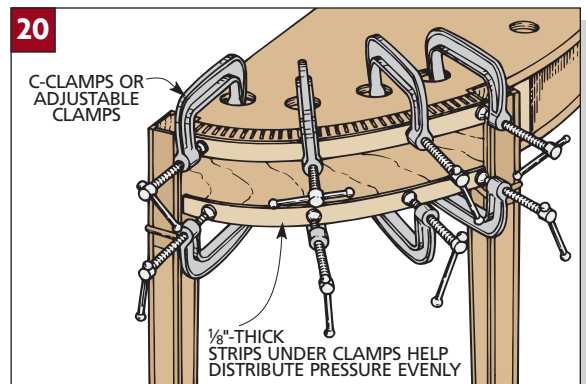
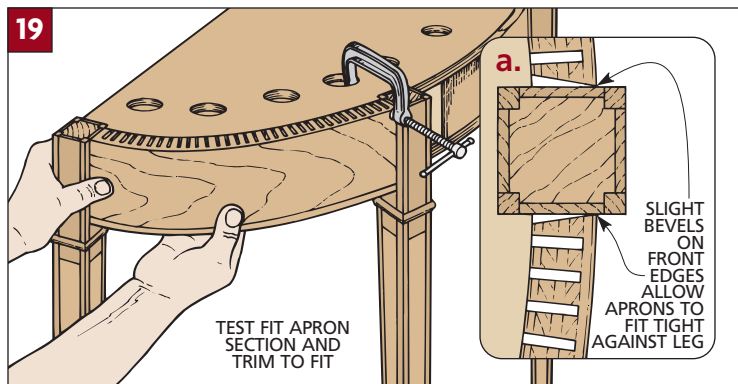
After fitting all three apron sections between the legs, they can be glued and clamped to the case (Fig. 20). I added clamping strips to protect the apron and distribute the pressure evenly.

BACK. The next step is to add the back. To determine the length of the

back, measure the inside distance between the rear legs (Fig. 21). Then measure the height (thickness) of the case to determine the width of the back. Finally, cut the back (J) to size.

RABBETS. Since the legs protrude $\frac{1}{8}$ " from the back of the case, you need to cut rabbets that leave $\frac{1}{8}$ "-thick tongues on the edges of the back (J). Cut the rabbets on the ends to match the width of the rear support blocks (Fig. 21a).

The rabbets along the top and bottom edges of the back (J) match the thickness of the plywood in the case ($\frac{1}{2}$ "). Finally, glue the back to the case.



TECHNIQUE Kerf Bending

Kerf bending is an easy way to bend wood. It's just a matter of cutting a series of grooves (kerfs) to relieve the back of the workpiece so that it will flex.

KERF DEPTH

When you cut kerfs for bending, you cut almost all the way through the workpiece (see photo and *Fig. 1*).

PLYWOOD. Kerf bending works on solid wood and even hardboard (which can then be covered with veneer). But

to save money and the trouble of veneering, I chose cherry plywood for the Curved-Front Table.

One reason plywood works well has to do with the ply just beneath the face veneer (*Fig. 1*). When kerfing plywood, you barely score this second ply. The web that remains consists of the thicker second ply and the thin face veneer.

By kerfing plywood *across* the face grain, the kerf runs with the grain of the second ply (*Fig. 2*). The face veneer holds it together and allows it to flex.

Once it's kerfed, hardwood plywood typically bends more easily than softwood (fir) plywood. The main reason is that the face veneer on hardwood plywood is thinner, so it's more flexible.

SPACING

The spacing between kerfs not only will affect the radius that you can bend, but also how smooth the bent piece will look. The reason is the "flats" that form over the ribs between the kerfs (*Fig. 3*).

As a general rule, the closer the kerfs are together, the tighter the radius you can bend. But more important, closely spaced kerfs provide a smooth curve. In most cases, I space the kerfs about $\frac{1}{4}$ " to $\frac{3}{8}$ " apart.

If you cut the kerfs close together, you may still experience flats to some degree — even if you can't see them easily. But they may become noticeable when you apply a finish.

SANDING. Small flats can be removed easily by sanding. But the wider the flat is, the more sanding you'll have to do. To allow the most control, I use a hardwood sanding block (not a power sander). Take smooth, gradual strokes following the contour, and constantly check the surface of the work. Stop



sanding as soon as all the flats disappear — don't over-sand. Since face veneers on hardwood plywood may be $\frac{1}{32}$ " thick or less, it's very easy to sand right through it (*Fig. 3*).

FINISHING

Any remaining flat areas will become apparent when you apply a finish. So first, I apply a light coat of sealer to the kerf-bent piece and examine it closely. To do this, I use a light at a low angle to the surface of the piece, checking once more for flats before applying the final coats.

I also recommend a satin finish rather than a high gloss. The reason for this is if there are any flats (even small ones), they'll show up more with a gloss finish than with a satin or matte finish.

KERFING JIG

A simple indexing jig will help you cut uniformly spaced kerfs.

To make the jig, drive a No. 4 screw near the bottom edge of an auxiliary fence fastened to your saw's miter gauge. Then cut off the head (*Fig. 4*). As each kerf is cut, just lift the board and place the kerf over the screw.

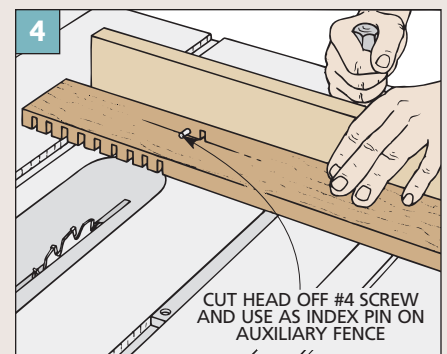
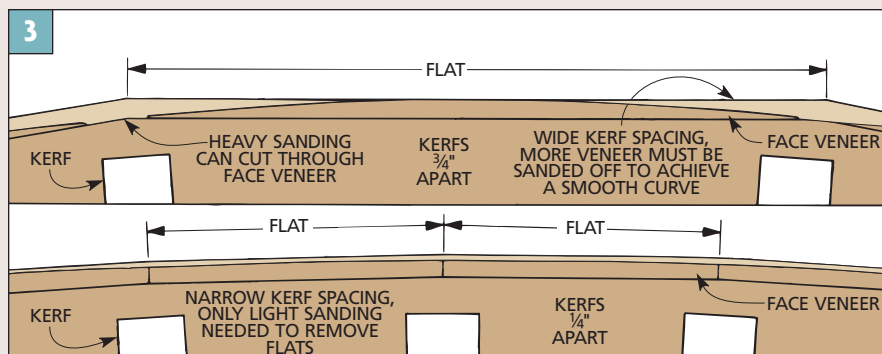
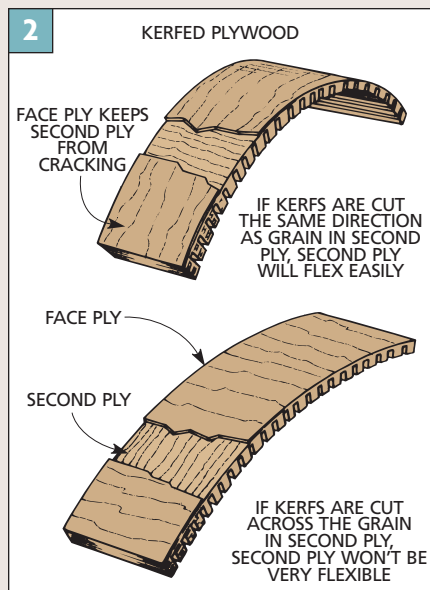
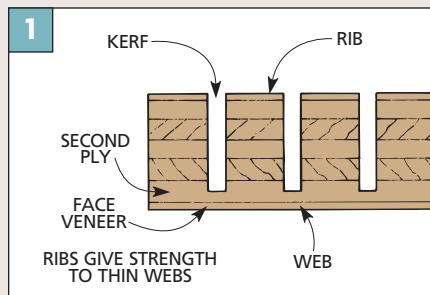


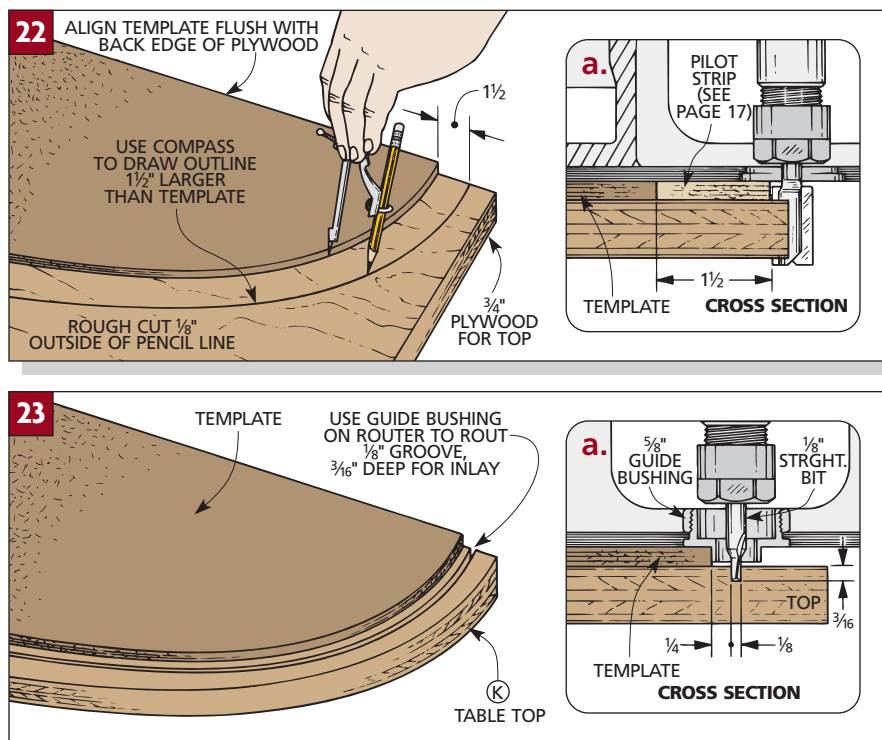
TABLE TOP

The last step is to add the table top. I made the top out of cherry plywood and covered the edges with strips of walnut. For an accent, I also added an inlay strip of walnut just inside the perimeter of the top.

TOP BLANK. Start work on the table top (K) by cutting a blank of $\frac{3}{4}$ "-thick plywood to rough size (mine was about 15" x 38") (Fig. 22). This blank is then cut into a half-oval shape so it will overhang the case by $1\frac{1}{2}$ " on each side and along the front edge.

To do this, you could make a new template that's $1\frac{1}{2}$ " larger than the one used for making the case. But there's an easier way — just enlarge the size of the original template onto the plywood blank by using a compass (Fig. 22). Once the layout lines are drawn, rough cut the top $\frac{1}{8}$ " outside of the pencil line.

That's great for getting the top to rough shape. But how do you use a router to trim the top to final shape without a new template? Simple. Use a pilot strip to position the bit the correct distance from the template (Fig. 22a). (For more on this, see the Shop Tip at the bottom of page 17.)



CUT GROOVE FOR INLAY. Once you've trimmed the top, the next step is to cut a groove for a top inlay strip (Fig. 23). To do this, leave the template fastened to the top (K). But this time, mount a $\frac{5}{8}$ "

guide bushing and a $\frac{1}{8}$ " straight bit in the router to rout a $\frac{3}{16}$ "-deep groove in the top (Fig. 23a).

INLAY. After routing the groove, an inlay strip (L) of walnut can be cut to fit.

SHOP TIP

Drawing a Partial Ellipse

Drawing a partial ellipse onto a hardboard template isn't difficult. All it takes to lay it out is a pencil, a piece of thin wire and a couple of nails.

Start by drawing a line $1\frac{3}{8}$ " from one edge of the hardboard, and as long as the length of the table top template (33") (Fig. 1). Mark one end of the line A, and the other end C. Now find the centerpoint and mark it B.

Now, draw a perpendicular line from the centerpoint (B). Make it the same length as the width of the table top (11"). Mark the top end of this line D.

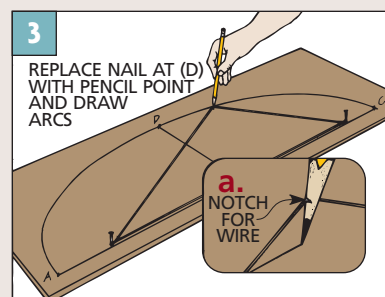
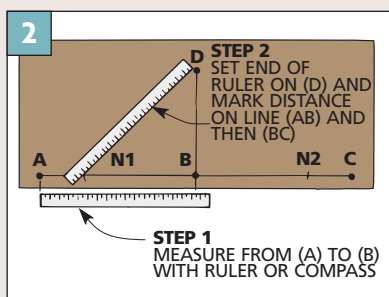
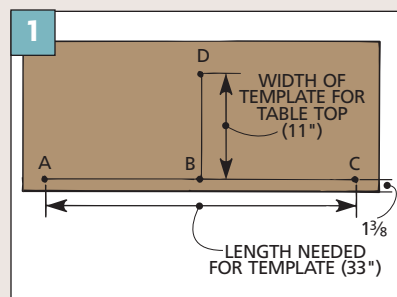
Next, locate two nail points. To do this, use a ruler or compass to find the distance from A to B (or B to C, which should be the same). Then measure this distance from point D to line AB, and also to line BC (Fig. 2). These are your nail points. Mark them N1 and N2.

So much for the hard part. The next step is to drive a nail or brad into N1,

N2, and D. Then loop a piece of thin wire (I used 32 gauge) tightly around all three nails and twist the ends together. (Don't use string — it stretches too much.)

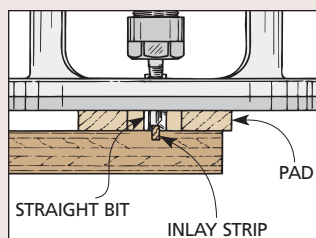
Finally, to draw the ellipse, remove the nail at D and replace it with a pencil point. Keeping the wire taut, draw an arc from D to A and from D to C (Fig. 3).

Note: To keep the wire from sliding, notch the pencil tip about $\frac{1}{2}$ " from the end (Fig. 3a).



SHOP TIP

Trimming Inlay Flush



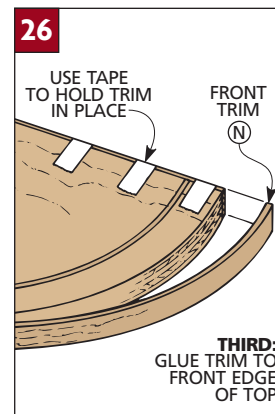
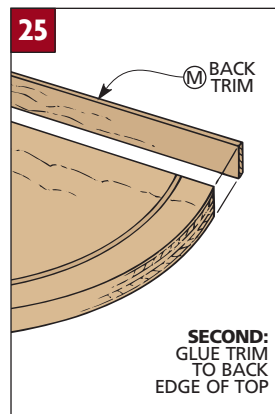
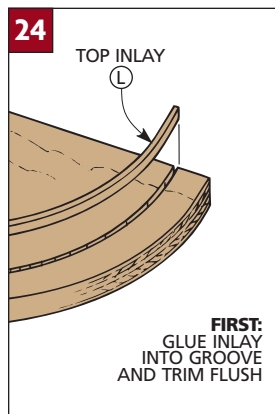
To trim inlay without chipout, fasten a pair of pads onto the router base with carpet tape so the bit straddles the inlay. Then adjust a straight bit so it *almost* contacts the table top. After routing, sand the inlay flush.

At the same time, I cut the strips for the back trim (M) and front trim (N) since they're all the same thickness ($\frac{1}{8}$ ").

Rip the top inlay to $\frac{1}{4}$ " wide and glue it into the groove (Fig. 24).

Note: To make it easier to glue the inlay in place, you may want to plane a slight bevel on each face of the inlay.

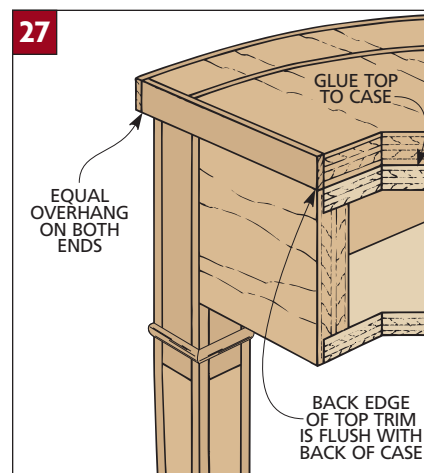
When the glue dries, trim the inlay flush with the top. The Shop Tip above shows a trick for trimming most of the waste using a router.



TRIM. The next step is to glue on the trim strips that hide the plies on the edges of the top. I glued on the back trim (M) first (Fig. 25). A few strips of tape will help hold the strip in place (Fig. 26). When the glue is dry, cut the trim flush with the ends of the top. Then, the front trim (N) can be glued on to overlap the ends of the back trim (Figs. 26 and 27). Again, trim it flush after the glue dries.

ATTACH TOP. Now the top can be attached to the case. Since both the top and the case are made from plywood (which won't expand or contract with changes in humidity), I simply glued the top to the case.

When doing this, position the top so the back trim (M) is flush with the back (J), and so that the top (K) overhangs an equal amount on both ends (Fig. 27). Then clamp the top in place.



FINISH. After attaching the top, I sanded the entire table and then wiped on one coat of an oil/urethane finish. I added two coats of a satin top coat once the oil had dried.

SHOP TIP

Router Pilot Strip

When it came time to make the top for the Curved-Front Table, there was a problem. I wanted the top to have the exact same elliptical shape as the case — only larger.

The best solution was to find a way to use the same template that I made for the case parts.

The technique I came up with is to tape a strip of wood to the base of the router (see drawing). This pilot strip keeps the router bit a uniform distance from the edge of the tem-

plate. And that makes the top the same shape as the template, but larger.

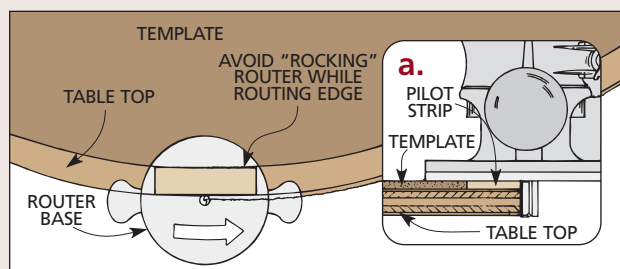
To make the pilot strip, cut a small scrap of stock $1\frac{1}{2}$ " wide and 5" long. The strip should be the same thickness as the template ($\frac{1}{4}$ " in my case).

Then fasten the strip to the router base using double-sided carpet tape. Position the strip so it just touches the edge of the straight bit you use for trimming (see drawing).

Now, to use the pilot strip, start by taping the

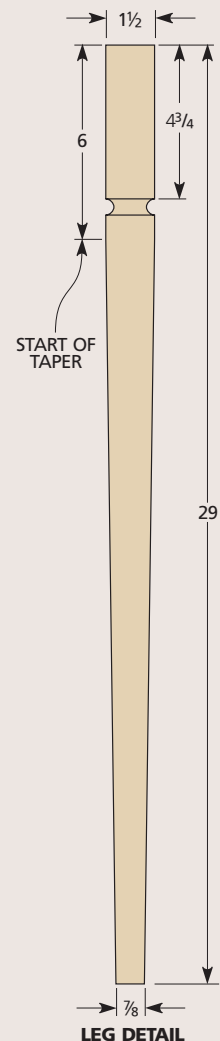
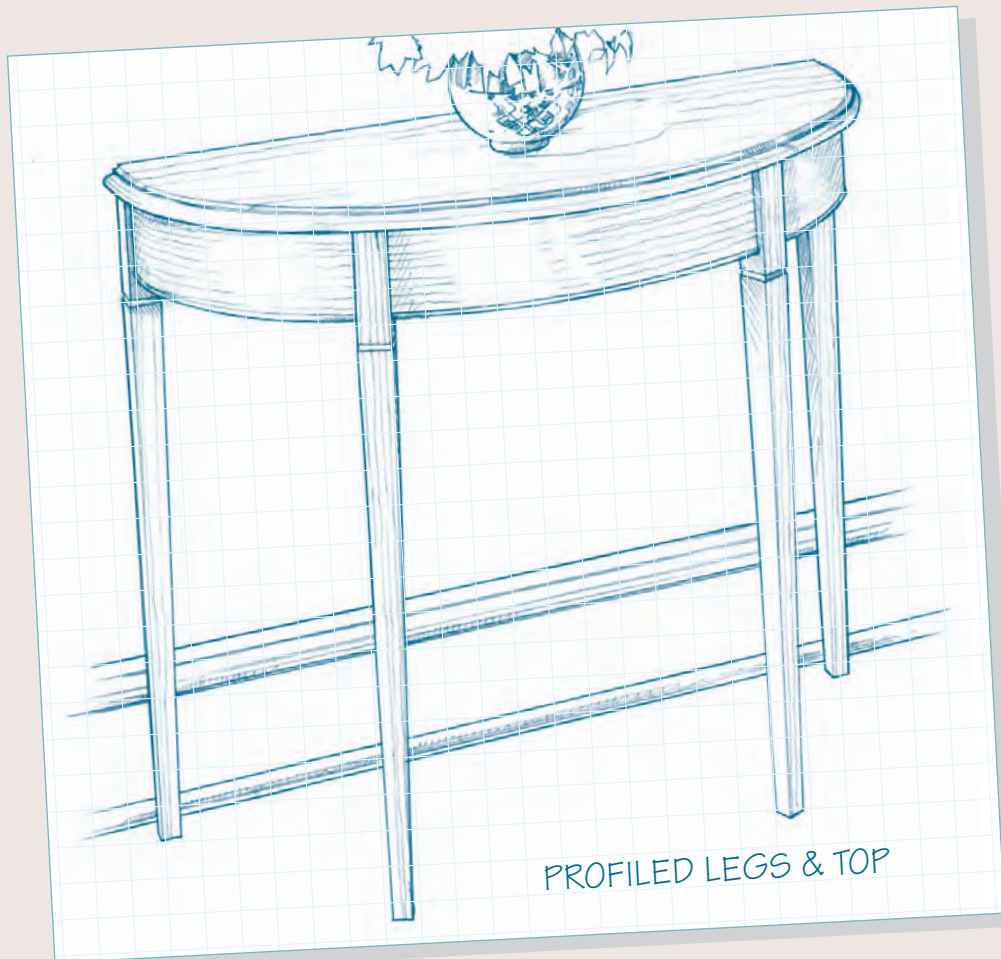
template in place and cutting the workpiece slightly oversize (refer to Fig. 22 on opposite page). Then set the router on the workpiece so the edge of the pilot strip rides against the edge of the template

(see drawing). Try not to "rock" the router along the template as you trim. Rocking will increase the distance between the table top and the bit. Clean up any unevenness with a final pass.



DESIGNER'S NOTEBOOK

Even though this table is built without inlays, it still has plenty of details. The tapered legs have cove accents, beads are added below the aprons, and the solid wood top features a classic edge profile.



CONSTRUCTION NOTES:

■ Construction of this table is largely the same as that for the regular Curved-Front Table. Begin by cutting the legs to width and length (see Leg Detail above). Then taper all four sides.

■ Instead of cutting rabbets or dadoes in the legs, a $\frac{1}{2}$ " cove is routed around each one (Fig. 1 and Leg Detail above).

■ With the legs completed, the case pieces can be cut to size and the case assembled the same way as the regular table. Then the legs can be attached.

■ Next, cut the aprons to width and kerf them to wrap around the table's front.

Note: Since they don't receive an inlay, don't rabbet the edges of the aprons.

■ Glue the aprons in place, then cut the back (J) to size and glue it to the case.

■ Then attach a blank to the top of the case with carpet tape so that the back edge of the blank is aligned with the back inside corners of two legs (Fig. 3).

■ Turn the table upside down. Then transfer the locations of the edges of the legs onto the blank (Fig. 4).

■ Next, use a compass to scribe the curve of the top onto the blank (Fig. 5). Repeat this process with the two remaining bead blanks.

■ Now the beading can be cut to shape. I used a bevel gauge to transfer the angle of the layout line from the blank to my table saw's miter gauge. Then I trimmed the ends of each blank.

Note: I cut the blanks a little wide of the marks so I could sneak up to the final width, testing the fit between the

MATERIALS LIST

CHANGED PART

K Table Top (1) $\frac{3}{4}$ x $14\frac{1}{8}$ - $36\frac{1}{4}$

NEW PARTS

O End Apron Beads (2) $\frac{1}{4}$ x $3\frac{1}{2}$ - 14 rgh.

P Front Apron Bead (1) $\frac{1}{4}$ x $3\frac{1}{2}$ - 20 rgh.

Note: Do not need parts B, C, D, E, I, L, M, N.

HARDWARE SUPPLIES

(6) No. 8 x 1" Fh woodscrews

BEADING

■ This table has beading (O, P) below the aprons. Start by cutting two blanks from $\frac{1}{4}$ " stock (Fig. 2).

legs until I had a uniform, $\frac{1}{4}$ " reveal along the front of the table.

■ The curved fronts can be trimmed to rough shape on the band saw. Then sand up to the lines.

■ The curved edge of each apron bead (O, P) is rounded over using a $\frac{1}{8}$ " roundover bit mounted in the router table (Fig. 6). Routing the first side is simple. But when making the pass on the opposite face, there isn't a flat edge for the bearing to ride on. To remedy this, align the router table fence with the bearing on the bit.

■ Before gluing the beading in place, the bottom of the case needs to be cut away so you can reach in later to screw the top on (Fig. 7). I used a jig saw to saw between the clamp holes, then sanded the edges smooth. To keep the back (J) rigid, leave a 1"-wide strip of the case bottom along the back edge.

■ Now you can glue the beading (O, P) in place below the aprons (Fig. 8). The ends of the beads should fit snug against the legs.

TABLE TOP

■ With the case completed, work can begin on the table top (K). Start by gluing up a solid wood blank to a rough size of $14\frac{1}{2}$ " x $36\frac{1}{2}$ ".

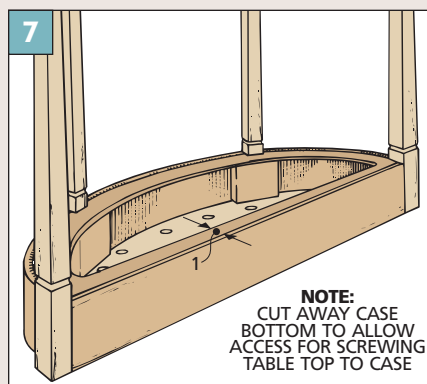
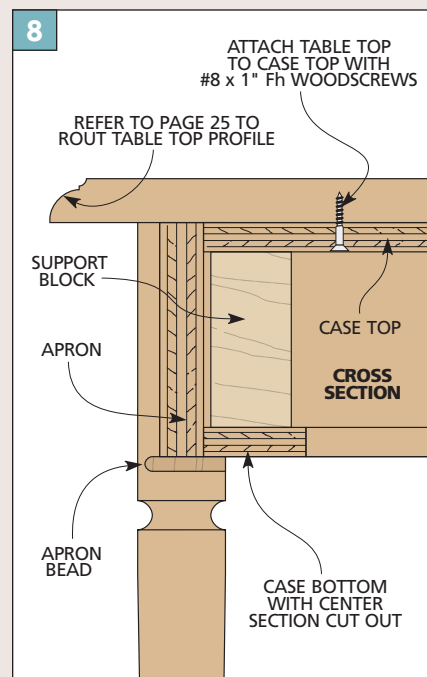
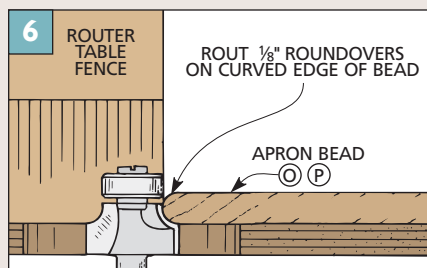
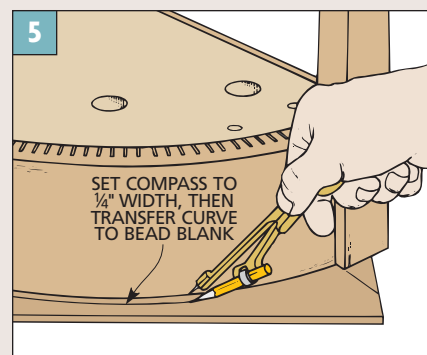
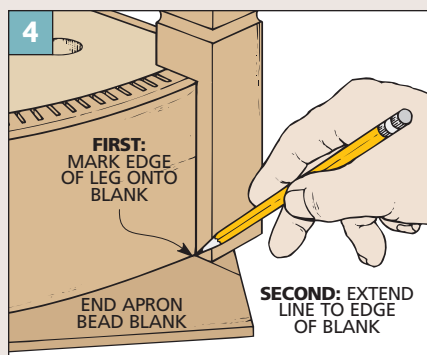
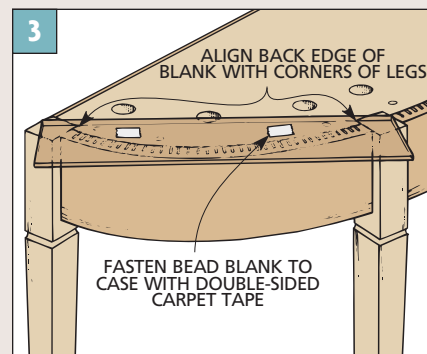
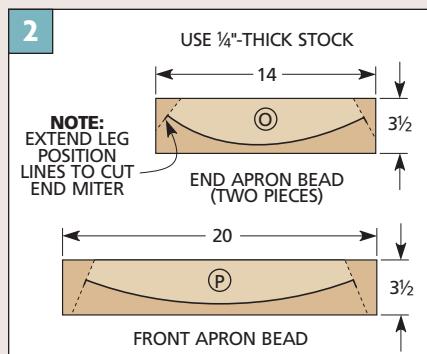
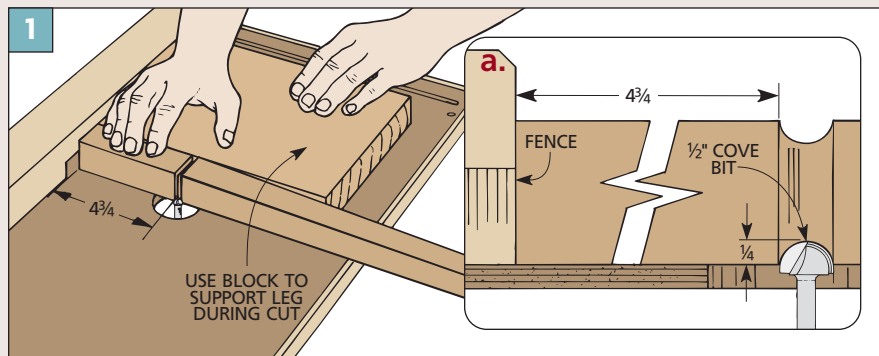
■ Once the blank is dry, the template used to shape the case top and bottom is needed to lay out the shape of the table top (K) (refer to Fig. 22 on page 16).

■ Before cutting the top to shape, fasten a piece of $\frac{1}{4}$ " hardboard to the bottom edge using double-sided carpet tape. (After this assembly is cut to shape, the hardboard will provide a wider surface for the router bit bearing when a profile is cut on the top edge of the table top.)

■ Now you can cut the table top and the hardboard to shape on the band saw.

■ Next, a profile is routed on the curved edge of the table top (Fig. 8). (The back edge is left square.) To avoid chipout where the end grain transitions into edge grain, refer to the "PROFILE" section and the Shop Tip on page 25.

■ Once the profile is completed, the top can be fastened to the case. Remove the hardboard, then place the table top on the case. There should be an equal amount of overhang on each side and the back of the top should be flush with the back of the case (Fig. 8). To allow the top to expand and contract, drill oversized shank holes through the case, then screw the top in place.



Coffee Table

Simply elegant and easier to build than you might think, this table is sure to become an heirloom. You can make the cabriole legs with just a band saw and some hand tools, or buy them ready-made.



This mahogany Coffee Table is in the elegant Queen Anne style. It features graceful cabriole legs, scalloped aprons around the base, and an oval top with a hand-rubbed finish. But don't assume that any of those features demand a lot of highly specialized skills or tools. They don't.

CABRIOLE LEGS. The legs are the most involved part of this table. But even so, it takes only three cuts on the band saw to give you a roughed-out leg. Then, with some handwork, you can bring it to final shape easily. To walk you through making them, there's a step-by-step article on page 106.

APRONS. The aprons that tie the legs together each have a scallop along the bottom edge. One template is all you need to lay out the profiles on both the front and side aprons before cutting them on the band saw.

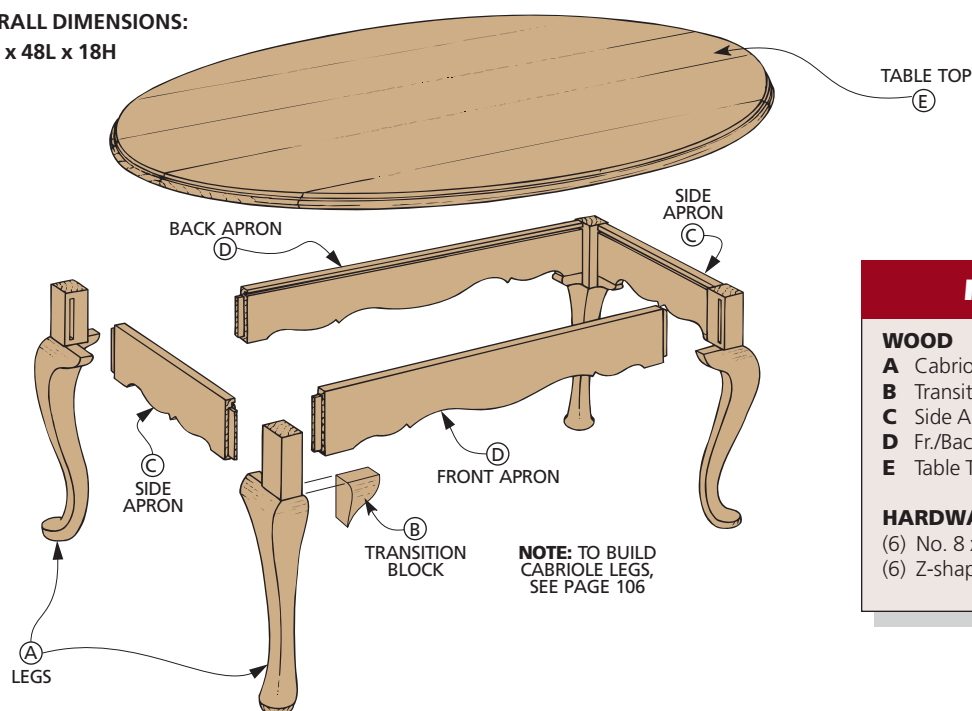
PRE-MADE LEGS. If you'd rather buy legs than build them, a variety of pre-made legs are available (see page 126 for sources). They allow you to change the look of the table easily, plus it speeds up construction considerably. In fact, the Designer's Notebook on page 28 offers a set of three tables with a simpler look. By using pre-made legs, the entire set can be built in just a few days.

JOINERY. Whichever version you choose to build, the aprons are fastened to the legs with traditional mortise and tenon joints. And since the table top is a solid wood panel, Z-shaped fasteners secure it to the aprons while allowing the top to expand and contract.

FINISH. Even if you purchased legs for the table, you can still show off a bit of handwork. The high gloss finish on the table top is the result of hand rubbing. Here again, no special skills are needed to handle this job. You can easily buff a mirror-like finish on the table top by following the steps in the Finishing article on page 42.

EXPLODED VIEW

OVERALL DIMENSIONS:
30W x 48L x 18H



NOTE: TO BUILD
CABRIOLE LEGS,
SEE PAGE 106

MATERIALS LIST

WOOD

- A** Cabriole Legs (4) 3 x 3 - 17 1/4
- B** Transition Blocks (8) 2 1/8 x 2 1/2 - 1 1/2
- C** Side Aprons (2) 3/4 x 4 - 14
- D** Fr./Back Aprons (2) 3/4 x 4 - 28
- E** Table Top (1) 3/4 x 30 - 48

HARDWARE SUPPLIES

- (6) No. 8 x 5/8" Rh woodscrews
- (6) Z-shaped table top fasteners

CUTTING DIAGRAM

3 x 3 - 22 TURNING SQUARE (4 @ 1.4 Bd. Ft. Each)



3/4 x 7 1/4 - 96 (2 Boards @ 4.8 Bd. Ft.)



3/4 x 7 1/4 - 48 (2.4 Bd. Ft.)



SHOP JIG

Leg Clamping Jig

After cutting cabriole legs to rough shape on the band saw, they still need to be filed and sanded to their final shape. To do this, you need a way to hold the leg steady that leaves room to work around it. My solution was a jig that attaches to a pipe clamp.

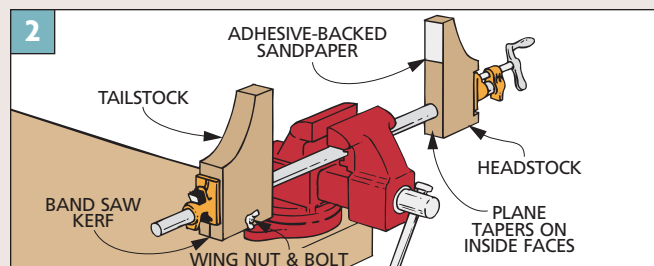
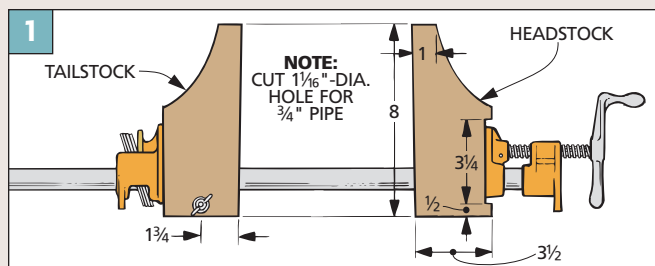
The jig pieces are 8" lengths of 2x4 stock with a hole bored through one end of each piece for the pipe (Fig. 1).

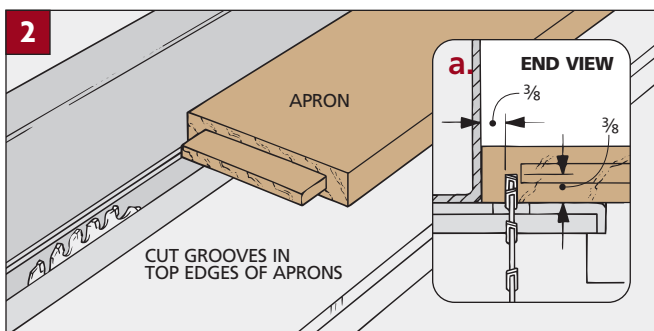
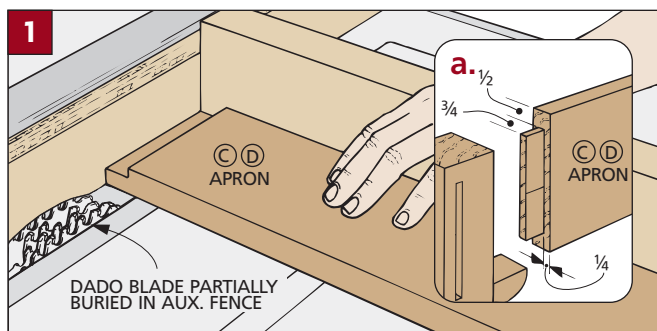
To keep the tailstock from swiveling, I cut a kerf along the bottom edge using a band saw (Fig. 2). Then I added a car-

riage bolt and wing nut. Once the jaw is set where you need it, tighten the wing nut to keep the tailstock from turning.

Keeping the headstock from moving is even easier. Just cut a notch in one edge to fit the jaw of the clamp (Fig. 1).

As the clamp is tightened, both the headstock and tailstock tend to tilt back. To compensate for this, I planed a slight taper on the inside edge of each piece. Finally, I added a piece of self-adhesive sandpaper to the inside face of each jaw to give it a better grip.





BASE

The base of the table consists of the cabriole legs at each corner and the aprons that tie them together.

CABRIOLE LEGS. The first thing you need to do is to make the legs (A). To do this, refer to the Technique article on page 106. Or you can buy legs already made (see page 126 for sources). If you prefer to use pre-made legs, see the Woodworker's Notebook below.

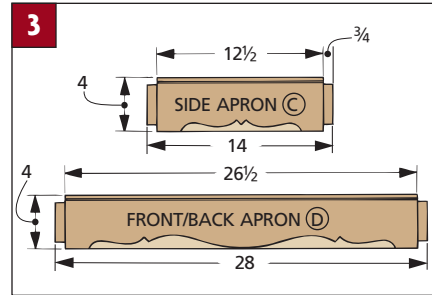
APRONS. When the legs are complete, the next step is to connect them with 3/4"-thick side aprons (C) and front

and back aprons (D). These pieces are all the same width and each will have a scalloped profile cut on its bottom edge later (refer to Fig. 3).

Before cutting the decorative profiles, I cut the tenons on the aprons to fit the mortises in the legs (Fig. 1).

To do this, I secured a plywood auxiliary fence to my table saw's rip fence. Then I used a dado blade to cut the tenons, centering each one on the thickness of the apron (Fig. 1a).

Then, after the tenons had been cut, I cut a groove on the top inside face of each apron (Fig. 2). These grooves



hold the Z-shaped fasteners used later to secure the table top to the base. This groove is simply a 3/8"-deep saw kerf that runs the length of the apron.

WOODWORKER'S NOTEBOOK

Ready-made legs save you time and effort, especially with this simple block to help drill the mortises.

DRILLING FACTORY-MADE LEGS

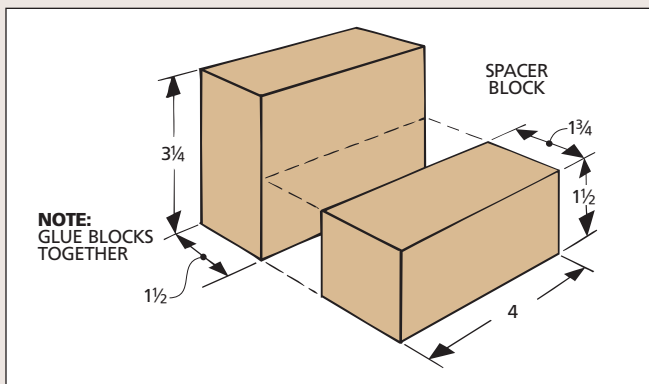
One option that will make the Coffee Table and the Jewelry Cabinet (pages 96-109) easier to build is to purchase the legs instead of making them (see photo at right). (For sources, see page 126.) But even pre-made legs will need mortises drilled in the corner posts to hold the stretchers and rails.

The shape of a cabriole leg will not allow the post to sit flat on the drill press table when drilling mortise holes. So to

keep the leg square, I made a spacer block to cradle it.

It's made from two pieces of 1 1/2"-thick stock glued together to form an L-shaped block (see drawing). It holds the cabriole leg up off the table and out from the fence (see photo below).

This way, the block keeps the face of the corner post square to the bit. And it also keeps the leg and fence aligned so the mortises are drilled in a straight line.



SCALLOPED PROFILES. Now the aprons are ready for their decorative profiles. The nice thing is, the profile is the same on both the side aprons and the front/back aprons, so only one template is needed to lay out both.

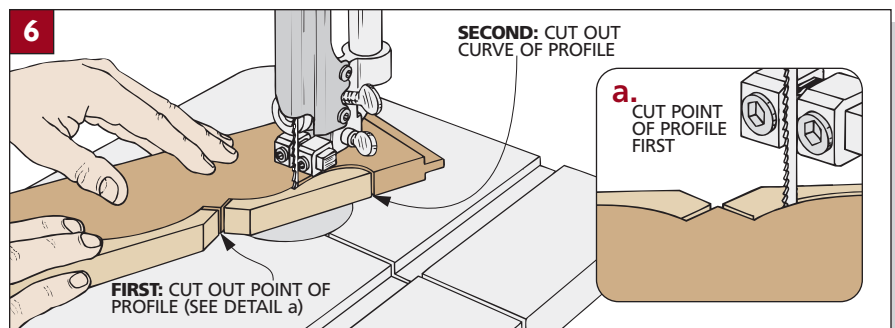
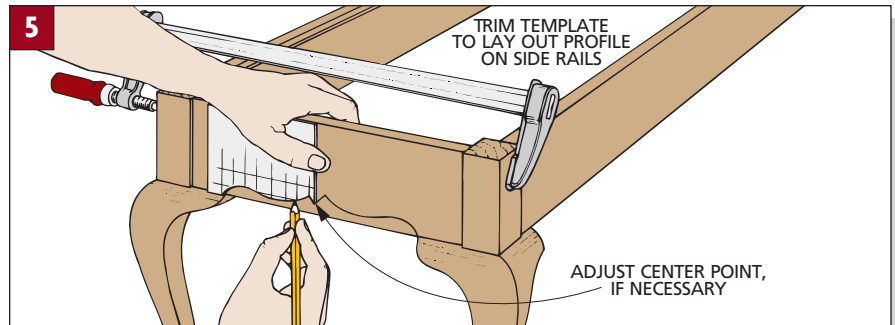
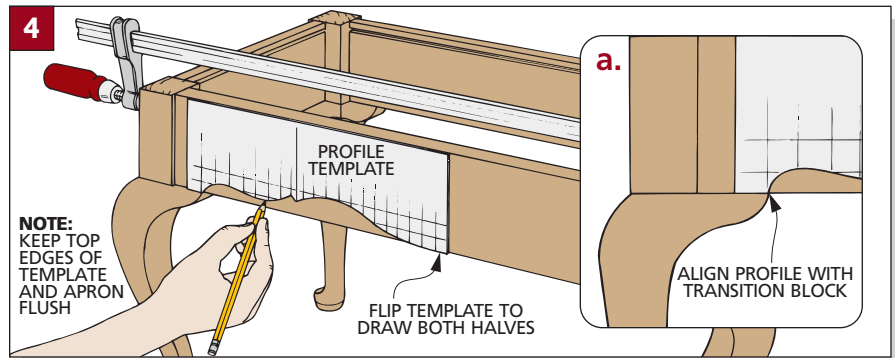
To create this template, you can lay it out on a sheet of paper using the simple grid and pattern shown below. Or to make things easier, you can buy a set of full-sized patterns from *Woodsmith Project Supplies*. This includes patterns for the cabriole legs, aprons, and top (see page 126 for information).

With the template complete, I began laying out the profile on the front and back aprons (*Fig. 4*). To do this, the base will need to be dry-assembled first. That's because the curve on the apron must start where the transition block on the leg ends (*Fig. 4a*). (It's also important to keep the top edges of the template and apron flush.)

Draw the profile onto the apron, then flip the template over and draw it again, starting from the other end. The lines should meet in a shallow curve at the center of the apron (*Fig. 3*).

The profile on the side aprons duplicates part of the profile on the front/back aprons (*Fig. 5*). So I simply trimmed off the template. As with the front/back aprons, the curve starts at the transition block, so you may need to adjust the centerpoint of the profile.

After the profiles are laid out, the scalloped edges can be cut. The important thing here is to get a clean, sharp corner at the "point" of the profile. To do this, I started by cutting the point of each profile (*Fig. 6a*). Then I cut from the ends along the curves to the point to remove the waste (*Fig. 6*). A narrow ($\frac{1}{8}$ ") blade in the band saw makes it easy to cut clean curves.



Finally, I glued and clamped the base together. After the glue dried, I sanded the scalloped edges smooth, making sure the joint lines between the transition blocks on the legs and the aprons were flush (*Fig. 7*). A dowel wrapped with sandpaper makes a good sanding block for this curved surface.

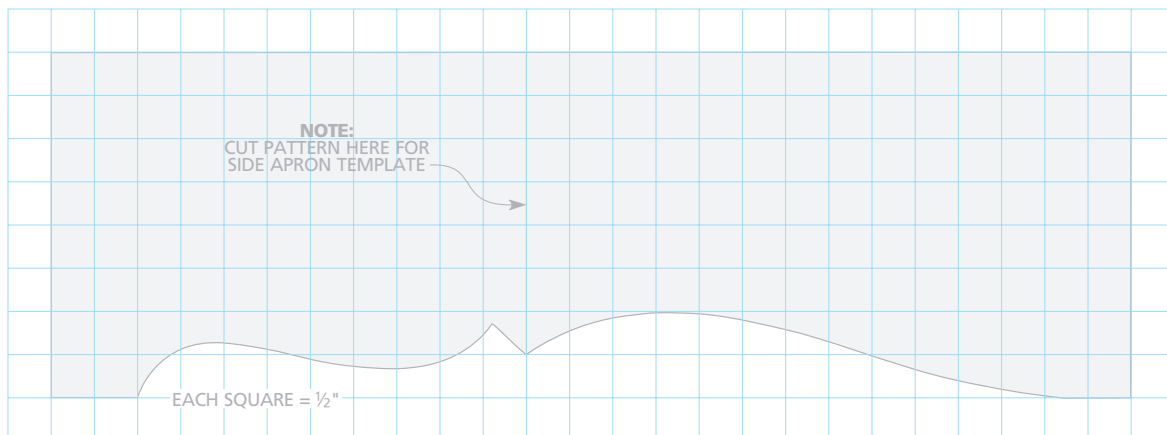
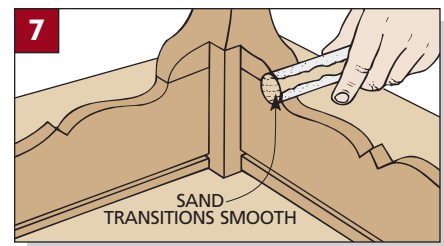


TABLE TOP

With the base complete, I set about to build the top. This is pretty simple, really. The top is just a glued-up mahogany panel cut in an oval shape.

PAPER PATTERN. The first thing to do is to create a paper pattern for the top (see pattern at right). Then I created a hardboard template from this pattern and used the template as a guide when cutting and routing.

The oval shape of this table isn't a true ellipse. So it has to be drawn "free-hand." The Shop Tip below shows you a way to do this.

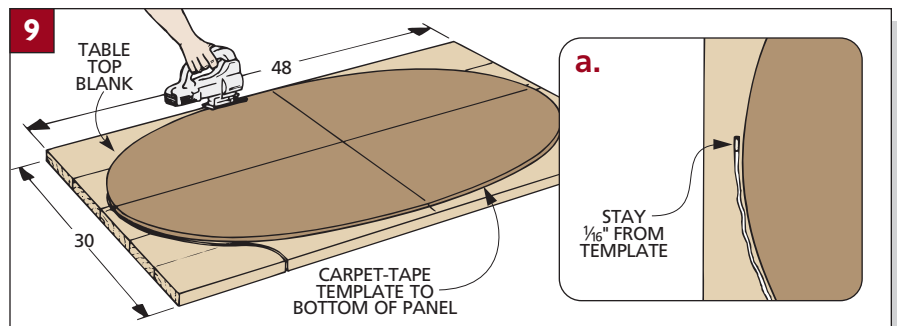
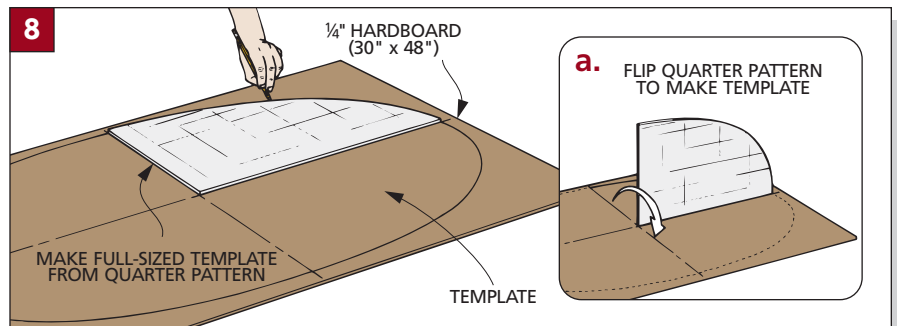
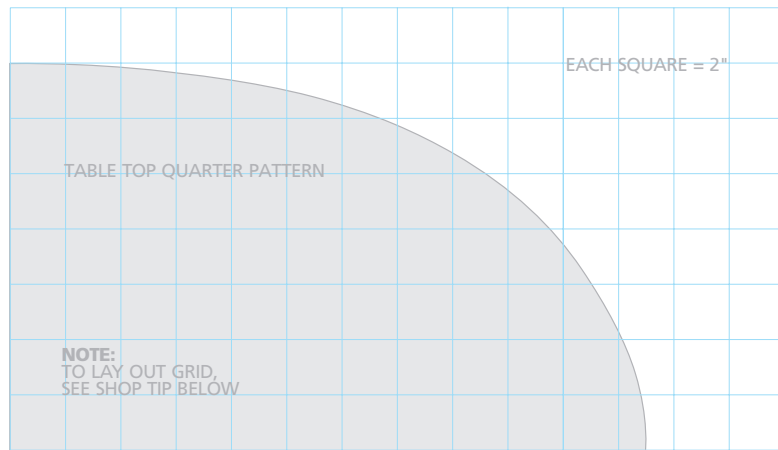
Note: There's no need to make a full pattern; a quarter pattern will do. And if you don't want to make your own, a full-sized quarter pattern is available. See page 126 for information.

HARDBOARD TEMPLATE. With the paper quarter pattern complete, I used it to make a full-sized template out of $\frac{1}{4}$ "-thick hardboard (Fig. 8). There are a couple of advantages to creating a hardboard template for this project.

For one thing, if you happen to make a mistake when cutting or sanding the template, it's no big deal. Hardboard is cheap compared to mahogany. And it's much easier to shape and sand a $\frac{1}{4}$ "-thick hardboard template than a panel made from $\frac{3}{4}$ "-thick solid wood.

Also, I was able to use the template to guide the router bits as I shaped the edge (refer to Figs. 10 and 11).

To make the template, I started by cutting an oversized blank (30" x 48")



SHOP TIP

Quick and Easy Grid



Here's a quick way to draw freehand curves by first creating a rough grid.

To make the grid, just hold a tape measure firmly with one hand and



"hook" a pencil on the end of the tape (left and center photos). A finger serves as a guide along the edges of the bench.



With the grid drawn, plot the points of the desired curve on the grid. Then just connect the dots with a smooth line (right photo).

and drawing centerlines on the top to create “cross hairs” (Fig. 8). Next, I drew the pattern on the blank, flipping it around the centerlines until the layout was complete (Fig. 8a).

When cutting out the template, I used a jig saw with a fine-tooth blade, staying $\frac{1}{16}$ " from the line. Then I sanded up to the line.

OVERSIZED PANEL. Now that the template is complete, the next step is to glue up a $\frac{3}{4}$ "-thick blank for the top (E). This blank starts out the same size as the template blank (30" x 48").

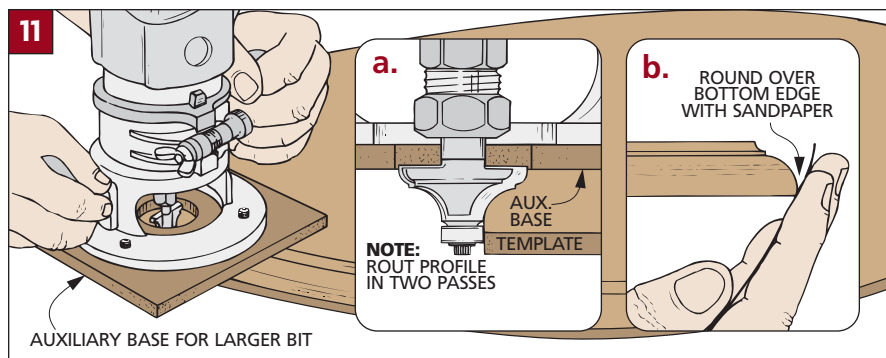
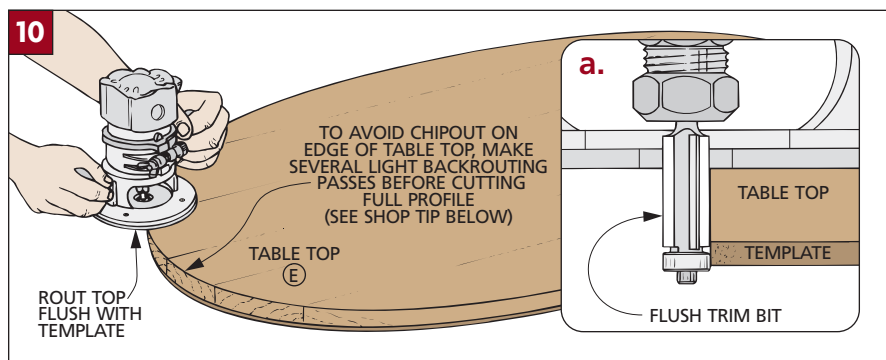
When the glue is dry, plane and sand the panel flat. Then use carpet tape to attach the hardboard template to the bottom face of the panel (Fig. 9).

TRIM FLUSH. Like the template, I cut the panel to rough size using the jig saw. But this time, to get the panel flush with the template, I used a flush trim bit in the router (Figs. 10 and 10a).

However, when routing the edge of the table top, you're likely to run into some chipout on the end grain. The solution is to backroute the edge. This means taking a number of *light* passes moving the router clockwise around the table top (see the Shop Tip below).

Safety Note: When backrouting, have the workpiece clamped securely to the bench, take *very light* cuts and keep your arms tucked into your body for better control of the router.

PROFILE. Next, I routed a profile along the top edge of the table (Figs. 11 and 11a). I chose a special bit designed specially for table top edges. (For sources of this bit, see page 126.)



Note: This bit didn't fit the opening in my router base, so I made an auxiliary base from hardboard (Fig. 11).

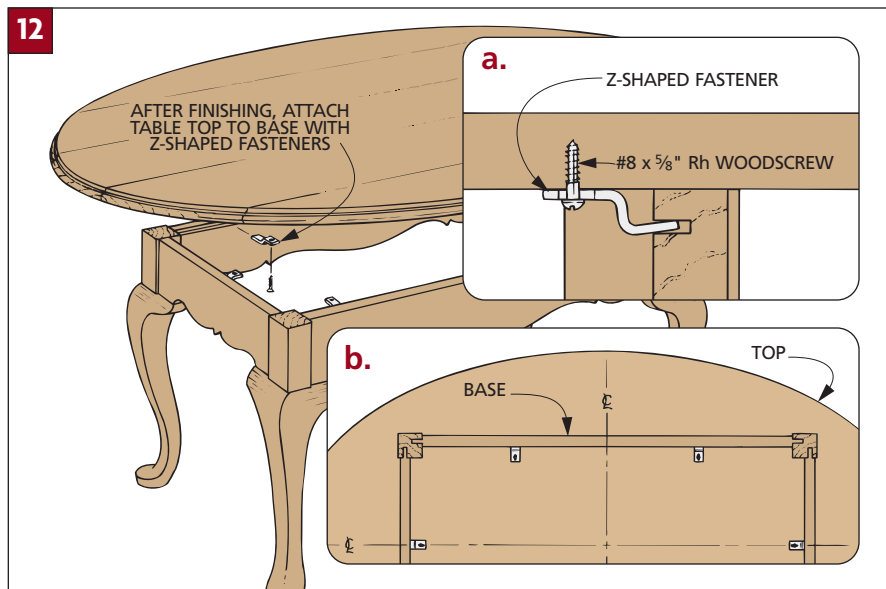
This profile also requires backrouting. In this case, the router will be easier to control if you start with only a small portion of the bit exposed and then lower it slightly between passes.

Once the profile was complete, I hand sanded the bottom lightly to remove the sharp edge (Fig. 11b).

Before attaching the table top to the base, I applied the stain to everything. (For some tips on staining end grain,

see the Finishing article on pages 26-27.) Then I applied a couple of coats of varnish to all the pieces. The table top received a third coat. This way, there's a thicker film of finish so you can “rub out” the table top to a high gloss. (Refer to the Finishing article on page 42.)

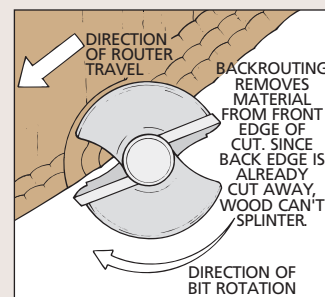
When the finish is done, attach the table top to the base (Fig. 12).



SHOP TIP

Backrouting

Backrouting can prevent chipout where edge grain transitions into end grain. The rotation of the bit will want to pull the router along, so keep a firm, braced grip and take light passes.



TECHNIQUE Staining End Grain

There's one finishing problem that doesn't get a whole lot of attention: end grain. Often after staining, the end grain on a workpiece will look much darker than the face grain.

Maybe the reason why this problem doesn't get much attention is that woodworkers have just learned to "live with it." Still, there are a few steps you can take that will prevent this from happening. But it helps to know why it happens in the first place.

OPEN PORES. End grain naturally looks a little different than face grain, and it also acts differently. The reason for this is that the end of a board is made up of open pores that work like a bunch of drinking straws. Whatever is put on the surface of the board won't penetrate very quickly. But any liquid substance (like glue or stain) applied to the pores of the end grain will be pulled deeper into the wood.

STAIN. Applying a stain to a hardwood panel presents special problems.



Because the open pores exposed on the end grain absorb more stain than the face grain on the surface or sides of the panel, the color at the end of the panel often appears darker — not what you want in a piece like the Coffee Table.

Getting the end grain to match the rest of the project is a matter of stopping the stain from penetrating so deeply. That way, all surfaces end up with about the same amount of stain. Fortunately, there are a number of ways to do this.

GEL STAINS

When you're staining a project with a lot of exposed end grain, the easiest way to get a consistent color is to use a gel stain. A gel stain is applied like any other stain — it's just a little thicker. So instead of spreading over the surface of a workpiece, a gel stain will just sit there, like a glob of pudding.

LIMITED PENETRATION. Because a gel stain is thick, it won't penetrate very deep into the wood, whether it's face

grain or end grain (see photos below). The result is that the end grain and the face grain end up with an even, consistent color.

You might think that gel stains are all alike; a magic formula that some finishing expert concocted. But while all gel stains are definitely thicker than regular liquid stains, they're not all the same. When it comes to end grain, the biggest difference is their thickness.

I've used some stains that were the consistency of a thick cream. Others were closer to being a paste.

Remember, what you want is a stain that's not going to seep into the end grain. So when choosing a gel stain, just keep in mind that a thick stain will tend to penetrate less and give you a more even color.

DRAWBACKS. Of course, gel stains aren't the answer in every situation. There are times when I want the stain to penetrate as deeply as possible. When I have a piece of figured wood, like bird's eye maple, I'm not going to use a gel stain because I want to highlight the contrasting figures of the wood. The gel stain isn't necessarily going to "hide" the grain. But it will even out the color more than I want it to.

The other time I don't use a gel stain is when I can't find the exact color I want. Here, I usually end up choosing a traditional (liquid) oil or water-base stain. As you can guess, this presents a challenge with the little "straws" in the end grain. But there are a couple of ways to address this problem (see the opposite page).



Apply gel with a brush. A gel stain is just a thick stain. Its thickness limits the amount it penetrates, so I usually work it into the pores with a brush.



Wipe off excess. After it's wiped off, you can see that the limited penetration of a gel stain means the end grain is the same color as the face grain.

LIQUID STAINS

When I work with a traditional liquid stain, I usually get a more even color if I do a little extra sanding on the end grain — to 600 grit instead of 220 (see photos at right). This works because you're burnishing the end grain. The pore openings are being polished so they're smaller and don't soak in as much stain.

CURVED SURFACES. With the Coffee Table on page 20, the stain with the color I liked happened to be a traditional oil-based liquid stain. The problem was the table was curved. In fact, this table threw me more than one curve.

For one thing, the cabriole legs have end grain at the top of the knees and the feet. So there's no "hard" corner where the end grain starts and the edge grain stops. So in this case, instead of sanding finer, and trying to blend the end grain



Sanded to same grit. When staining end grain, a regular stain will soak deep into the pores of the wood, darkening the ends much more than the face.



Sanded to finer grit. One solution to evening out the end grain is to sand it finer than the rest of the board. Here, I sanded the end grain to 600-grit.

with the face grain, I'd use a wood conditioner (see below).

But the oval top was a different matter. A conditioner applied to just the end grain on the narrow molded edge would seep into the face grain from the

ends. Even with conditioner applied to the face grain, this seepage would cause uneven staining. I didn't want light streaks around the edge of the table, so I went back to the sanding solution and sanded the whole edge to 600-grit.

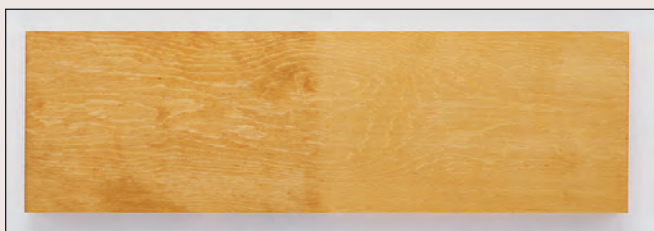
CONDITIONERS & SEALERS

What can be a little confusing about end grain is that it isn't just limited to the ends of a board. It can show up on the faces of some boards, too.

This is especially true of woods like pine, cherry, and maple that tend to have knots or wild, wavy grain. When these boards are surfaced, you often end up with a small patch of end grain on the face of the board (see drawing).

BLOTTING. When you apply a stain, these areas of end grain can turn into

dark blotches on the face of the board (see the left half of the board in the photo). But there are steps you can take before applying a stain to avoid this.



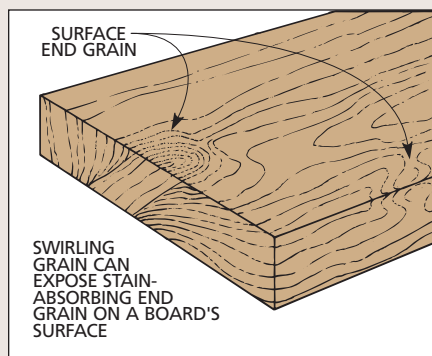
CONDITIONERS. One solution is to brush on a wood conditioner. This is an oil-based product applied immediately before the stain. It is used mainly to even out stain absorption on the surfaces of softwoods that tend to blotch, like pine or fir. The result is a more even color on the piece (see the right half of the board above).

In some cases, wood conditioner can also be used before staining the end grain of hardwood. This is especially helpful in getting an even color on the cabriole legs, since there is no sharp corner on these pieces to separate end grain from face grain. The end grain will

wick up more conditioner, allowing less stain to penetrate. The face grain areas absorb less conditioner so about the same amount of stain as usual is absorbed there.

Just brush a heavy coat of conditioner on the entire leg. After letting it set a few minutes, wipe off any excess and apply the stain.

SEALERS. Another way to prevent the end grain from soaking up too much stain is to apply a sealer (or a wash coat) before staining. This can be a thinned-down coat of finish or a one-pound cut of shellac. It is brushed on and allowed to dry before applying the stain.



TOP COATS

When it's time to apply a clear top coat (such as an oil or varnish) over the stain, end grain isn't nearly as much of a problem. The top coat penetrates just as deep, and in fact, you may notice that the end grain gets slightly darker. That's because oil and varnish tend to

add an amber tint to the wood anyway. But I've never thought this was objectionable, so I haven't gone to the trouble of sanding any finer.

EXTRA COAT. About the only thing you will notice about putting a clear finish on end grain is that it dries out a

lot quicker. That's because the pores in the end grain are wicking the finish away from the surface. Since the idea is to get an even coat of finish on the top surface of the workpiece, I sometimes end up applying an extra coat or two to build up the finish on the ends.

DESIGNER'S NOTEBOOK

By buying pre-made legs, you can put together an entire set of classic tables in a weekend. The simplified lines make it easy to cut the pieces and assemble this handsome set in very little time.

CONSTRUCTION NOTES:

■ This set of tables uses pre-made cabriole legs (Fig. 1). These legs are available from a number of mail-order sources (see page 126). The lengths of the legs I used for each table are given in the Materials List below. Depending on the supplier, the lengths may be slightly different, but you should be able to find legs that are close to the lengths listed.

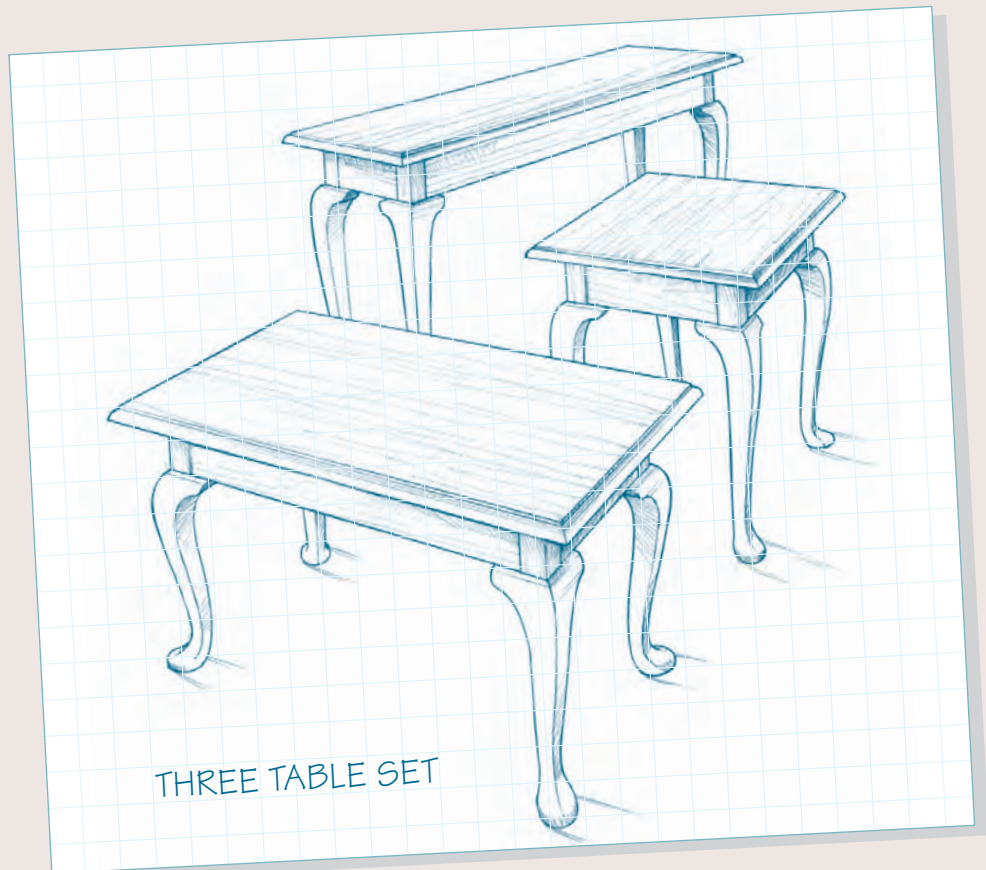
■ Once you have the legs, construction of a complete set of tables can move along quickly since the aprons are all the same width (4") and don't need scalloped edges. Once you're set up, rip the aprons needed for each table.

■ Each apron has a $\frac{1}{8}$ "-wide groove cut in its inside face to accept the Z-shaped table top fasteners (Figs. 1 and 5).

■ The joinery is identical on the legs and aprons for all the tables (Fig. 1). So once you're set up, you can drill out the mortises in all of the legs (refer to the Woodworker's Notebook on page 22).

■ Next, use the table saw to cut a test tenon on a piece of scrap. Once it fits the mortise in a leg, you can cut all the tenons on the aprons.

■ The edge treatment on each of the table tops is the same as that on the oval Coffee Table (Fig. 5). Since these table tops have 90° corners, chipout isn't as much of a problem as it is on the edge of



MATERIALS LIST

CHANGED PARTS FOR COFFEE TABLE

A Legs (4)	17 1/4 long
E Table Top (1)	3/4 x 21 - 36

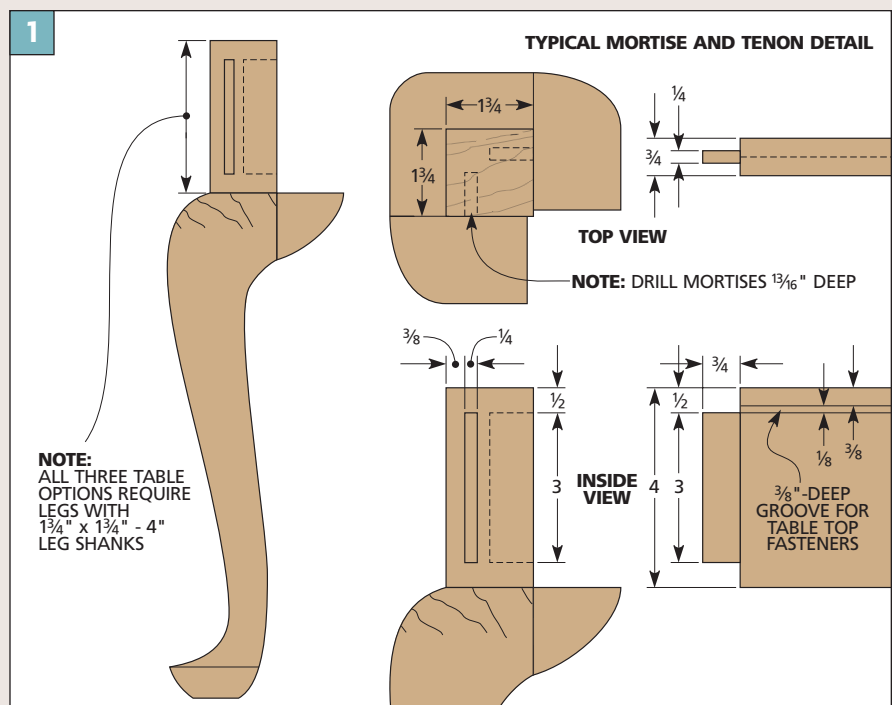
NEW PARTS FOR END TABLE

F Legs (4)	21 1/4 long
G Side Aprons (2)	3/4 x 4 - 13
H Frt./Bk. Aprons (2)	3/4 x 4 - 19
I Table Top (1)	3/4 x 20 - 26

NEW PARTS FOR SOFA TABLE

J Legs (4)	28 1/2 long
K Side Aprons (2)	3/4 x 4 - 10 1/2
L Frt./Bk. Aprons (2)	3/4 x 4 - 46
M Table Top (1)	3/4 x 16 - 54

Note: Tables use pre-made legs.



an oval table. So you can rout in the normal direction (left to right). The ends of the panels are still prone to some chipout at the corners, so rout across the ends first. Then rout the sides to clean up any ragged corners.

RECTANGULAR COFFEE TABLE

■ The base of the Rectangular Coffee Table has the same dimensions as the oval Coffee Table. So the end and front aprons are cut to the same lengths as those for the oval table (*Fig. 2*).

■ To make the rectangular table top,

glue up a blank and — after the glue has dried — trim it to 21" x 36".

■ Next, rout the edge profile on the top.

■ After applying finish to all pieces, center the top on the base and secure it with Z-shaped fasteners (*Fig. 5*).

END TABLE

■ The End Table uses legs that are slightly taller than those on the Coffee Table (*Fig. 3*). (Mine were 21 $\frac{1}{4}$ " long.)

■ The front aprons for the End Table are each cut to a length of 19". The end aprons are cut to a length of 13" (*Fig. 3*).

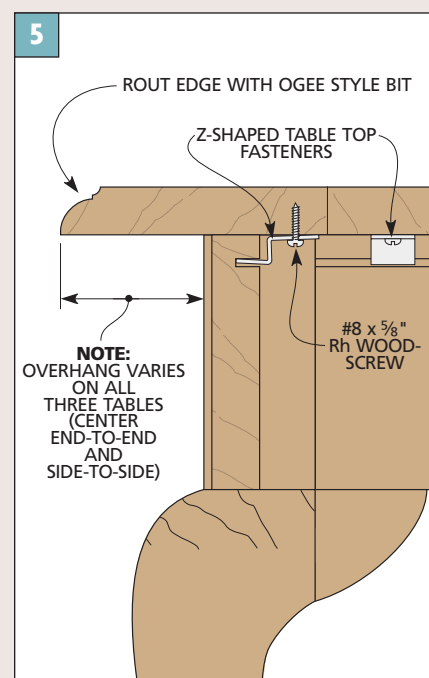
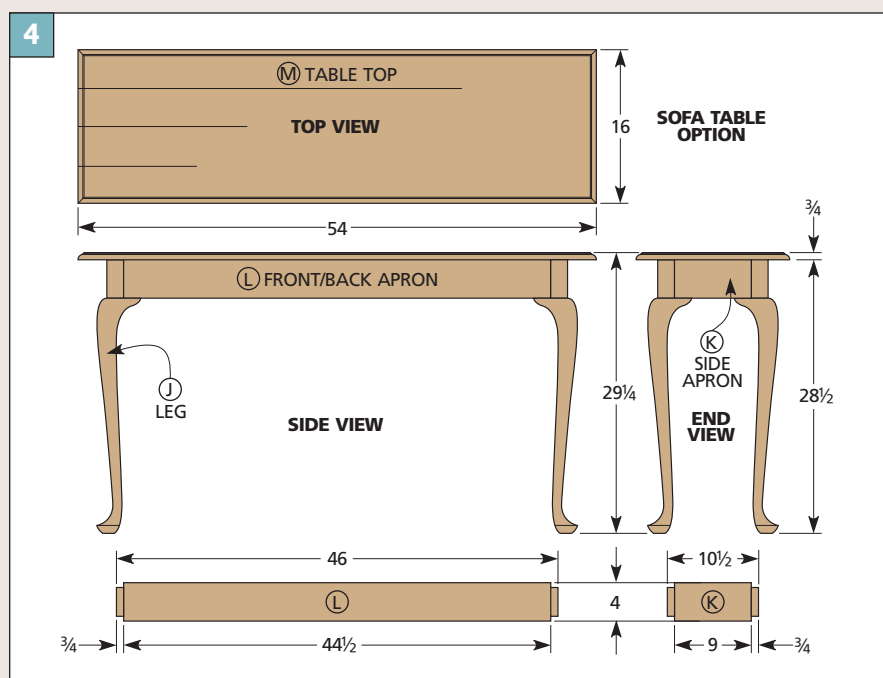
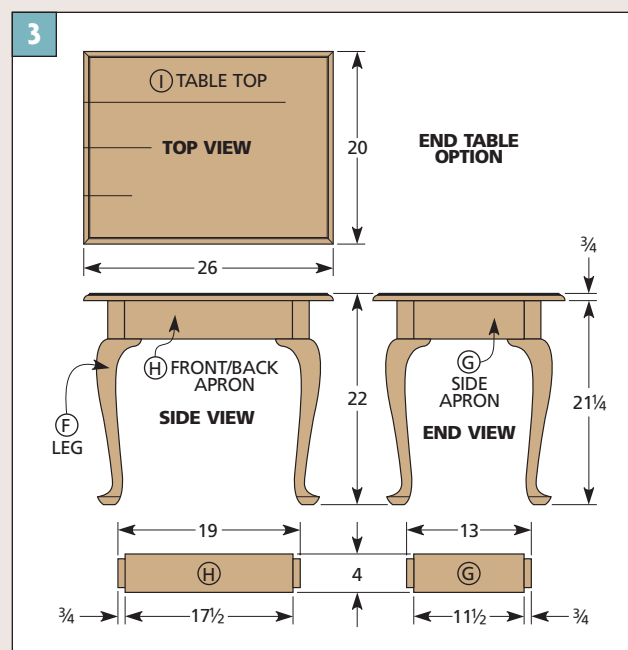
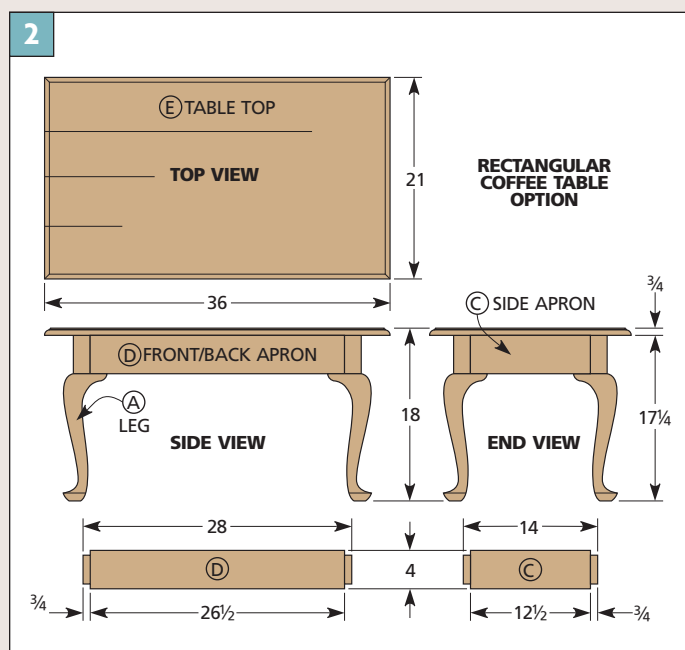
■ For this version, the table top measures 20" wide and 26" long.

SOFA TABLE

■ The Sofa Table is the tallest piece in the set. The legs I found for this table were 28 $\frac{1}{2}$ " long (*Fig. 4*).

■ On this version, the front aprons are 46" long. Cut the end aprons to a length of 10 $\frac{1}{2}$ " (*Fig. 4*).

■ The top panel for the Sofa Table is 16" wide and 54" long. After gluing up a panel this long, take extra care to make sure the surface is absolutely flat.



Bow-Front End Table

From the high-gloss, hand-polished finish to the bow-front drawers, the details in this piece are a reflection of your craftsmanship. The secret to the curved drawers is to build them square first.



Here's a little challenge. Set this end table in a room with a bunch of woodworkers and see what they look at first. I'll bet you nine times out of ten, the bow-front drawers will be opened first and given a close inspection. And frankly, I'd do the same thing.

The drawers are one of the most intriguing features of this project. So it's natural to be curious about how they're built. Are they bent to this shape or cut from a thick block? And how do you join the bowed front to the straight sides?

For these drawers, I used a procedure that was a little unusual, but it allowed me to build them without any

special jigs or materials. The secret is to start building an ordinary drawer with $\frac{1}{2}$ "-thick stock and machine-cut dovetails. But before assembling the drawer, I glued a thick block to the front piece and cut the curves. For a closer look at this process, there's a Technique article that starts on page 40.

FLUTED LEGS. There are a few other design details you'll want to look at a little closer. Take the legs, for instance. They look like square columns with flutes on the outside faces and chamfers on the corners. Here, consistency is everything. The three flutes on each face must be spaced evenly and stop the

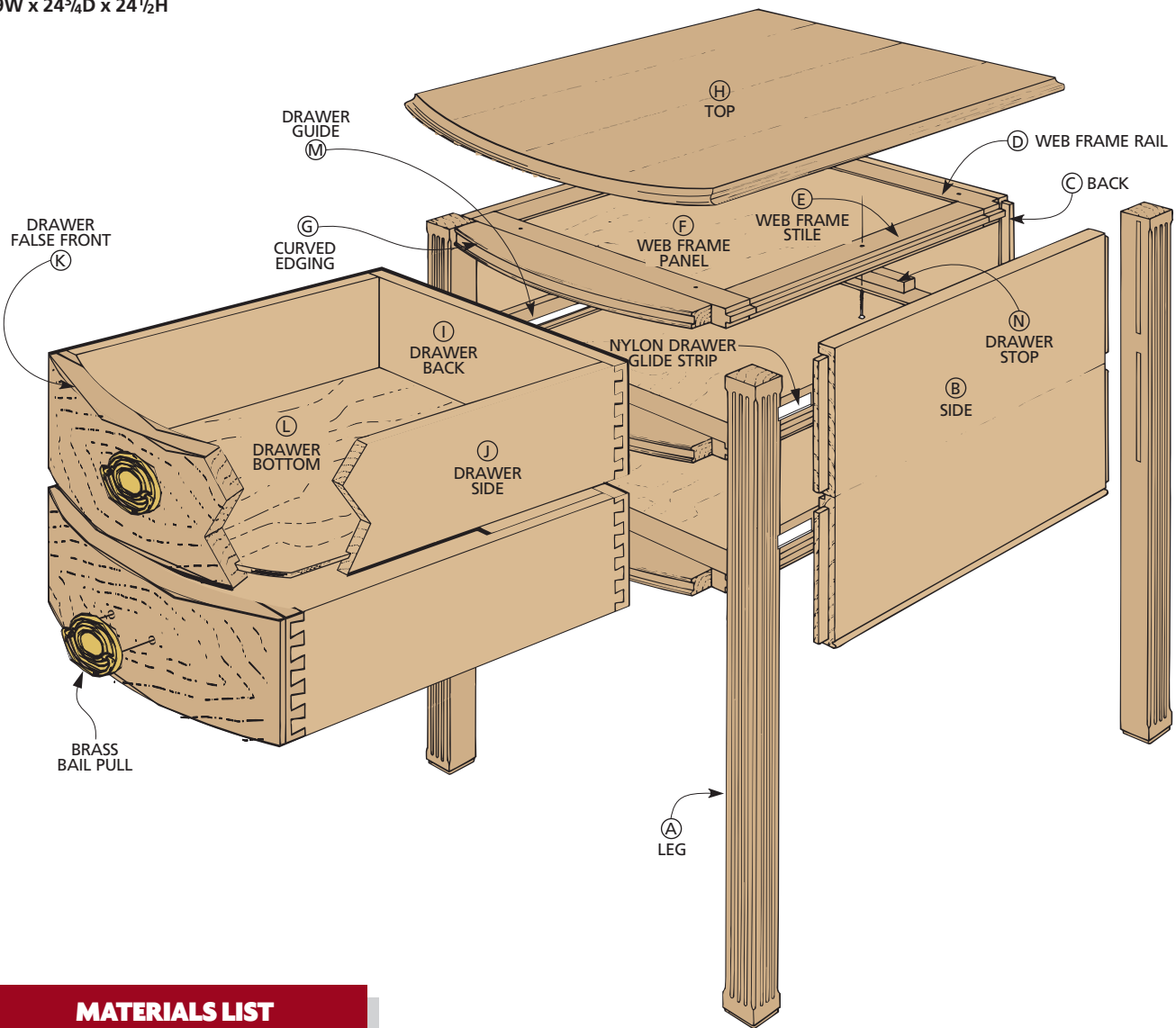
same distance from the top and bottom of every leg. But there's nothing complicated about the procedure. All you need is a careful setup on the router table with a common core box bit.

DETAILS AND FINISH. This end table has plenty of other details to attract your eye: the bead profiles on the sides, the curved edging, and the ogee profile around the top. But there's one detail you won't be able to resist *touching* — the finish. Making the top of this table glass-smooth requires a few extra coats of finish and a little elbow grease, but it's well worth it. The article on page 42 shows you how.

EXPLODED VIEW

OVERALL DIMENSIONS:

19W x 24³/₄D x 24¹/₂H



MATERIALS LIST

WOOD

A Legs (4)	1 ¹ / ₂ x 1 ¹ / ₂ - 23 ³ / ₄
B Sides (2)	³ / ₄ x 11 ¹ / ₄ - 19 ¹ / ₂
C Back (1)	³ / ₄ x 11 ¹ / ₄ - 15 ¹ / ₂
D Web Frame Rails (6)	³ / ₄ x 1 ¹ / ₂ - 16
E Web Frame Stiles (6)	³ / ₄ x 1 ³ / ₄ - 16 ¹ / ₂
F Web Frame Pnls. (3)	¹ / ₄ ply - 13 x 16 ¹ / ₂
G Curved Edging (3)	³ / ₄ x 2 ¹ / ₂ - 14 ¹ / ₂
H Top (1)	³ / ₄ x 19 - 25 ¹ / ₂ rgh.
I Drawer Fr./Back (4)	¹ / ₂ x 4 ³ / ₈ - 14 ³ / ₈
J Drawer Sides (4)	¹ / ₂ x 4 ³ / ₈ - 19
K Drawer False Fr. (2)	1 ³ / ₄ x 4 ³ / ₈ - 14 ³ / ₈
L Drawer Bottoms (2)	¹ / ₂ ply - 13 ⁷ / ₈ x 19 ⁷ / ₈
M Drawer Guides (4)	³ / ₄ x ⁹ / ₁₆ - 18 ¹ / ₂
N Drawer Stops (2)	³ / ₄ x ⁵ / ₈ - 4

HARDWARE SUPPLIES

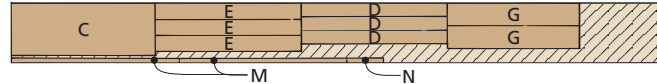
- (6) No. 8 x 1¹/₄" Fh woodscrews
- (4) Nylon glide strips
- (2) Bail pulls (2" bore)

CUTTING DIAGRAM

³/₄ x 6 - 96 WALNUT (Two Boards @ 4 Bd. Ft. Each)



³/₄ x 6¹/₂ - 72 WALNUT (Two Boards @ 3.25 Bd. Ft. Each)



NOTE: ALSO NEED A 48" x 48" PIECE OF ¹/₄"-THICK MAPLE PLYWOOD

1³/₄ x 5 - 96 WALNUT (6.6 Bd. Ft.)



¹/₂ x 5 - 60 MAPLE (Two Boards @ 2.1 Sq. Ft. Each)



¹/₂ x 5 - 30 WALNUT (1 Sq. Ft.)



LEGS

Though the bow-front drawers attract the most attention, construction of the table begins with the fluted legs.

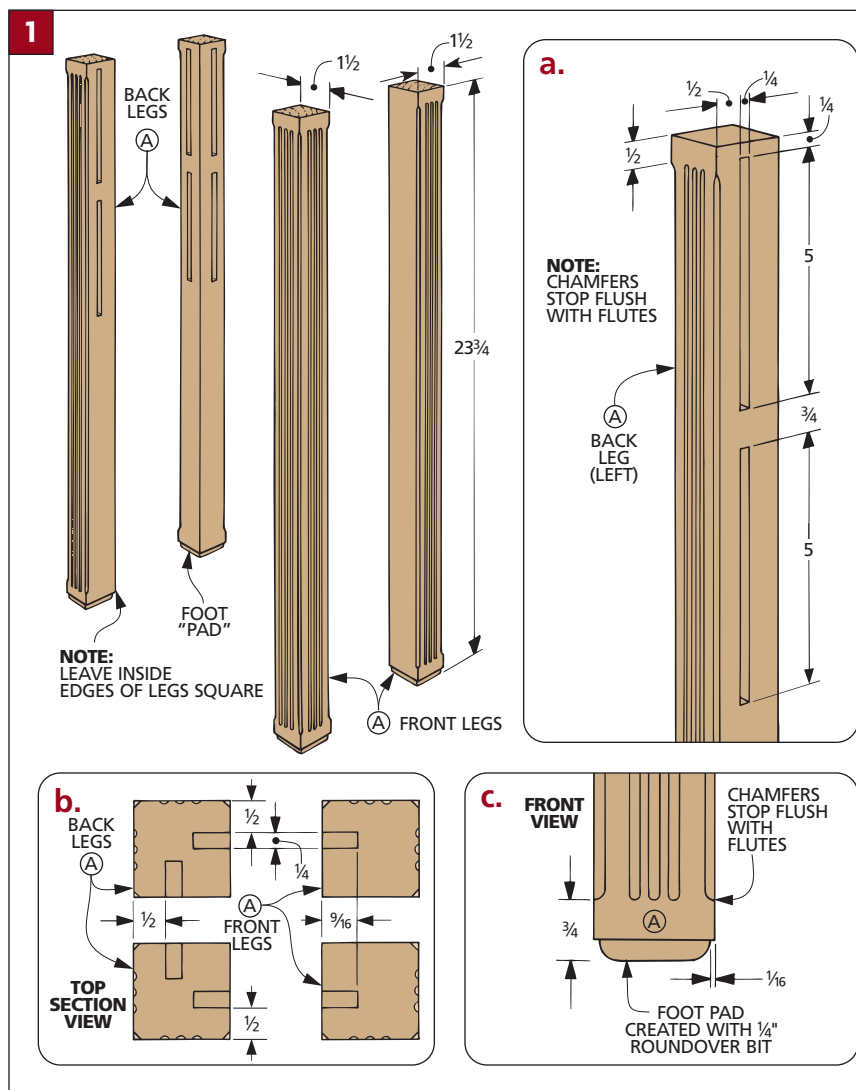
CUT TO SIZE. To make the legs (A), I started with 8/4 stock that's cut $1\frac{1}{2}$ " square (Fig. 1). Then the legs can be cut to final length. (I used walnut to build this table, but mahogany or cherry would also look nice for a formal project like this.)

CREATE MORTISES. The legs will be joined by a back and two side panels. This U-shaped case is held together with mortise and tenon joints. However, since the panels will be over 11" wide, I wanted to keep the leg mortises as strong as possible. So instead of a single mortise on each face, I cut two shorter ones $\frac{3}{4}$ " apart (Fig. 1a).

But before carrying the legs over to the drill press, I took the time to lay out the mortise locations carefully. There's nothing more frustrating than drilling a mortise in the wrong place. Plus, the legs on this table aren't identical (Fig. 1b). The back legs are mortised on two adjacent faces; the front legs on only one face each.

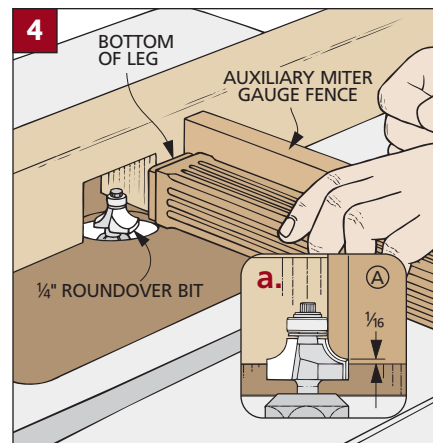
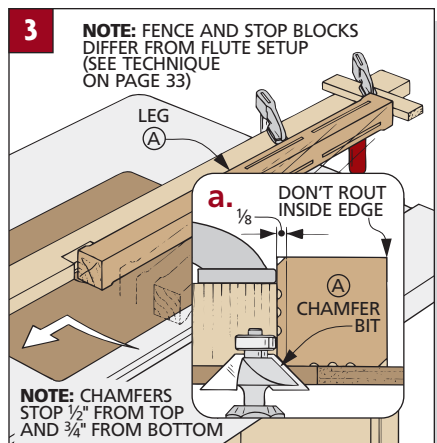
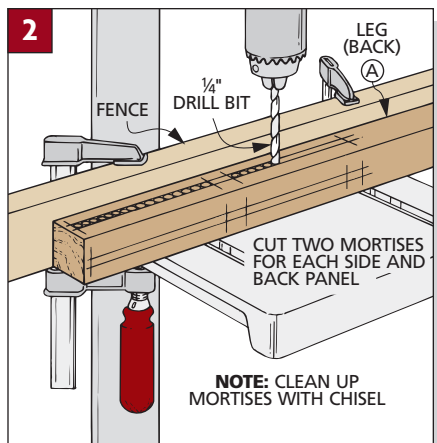
To create mortises, I like to drill overlapping holes and clean up each mortise with a chisel (Fig. 2). And I typically drill them $\frac{1}{16}$ " deeper than the length of the tenons. This way, there will be room for excess glue.

ROUT FLUTES. With the mortises cut, work can begin on the narrow flutes. The goal with the flutes is to get them spaced evenly and to get them to line up at the top and bottom. This is easy enough to do on the router table with a core box bit. All you need is a long fence and a couple of stop blocks. For more on this, see the opposite page.



CHAMFER EDGES. I also chamfered the outside edges of the legs. This is the same basic procedure used for the flutes. But you'll need to use a chamfer bit and readjust the fence and stop blocks so the chamfers end up even with the flutes (Fig. 3).

FOOT PADS. There's one last detail to add before the legs are complete. I cut a "foot pad" on the bottom of each leg (Fig. 1c). This pad is routed on the router table using a $\frac{1}{4}$ " roundover bit (Fig. 4). (To back up the cut, I used a miter gauge with an auxiliary fence.)



TECHNIQUE Routing Flutes

Many table legs are pretty basic and don't attract a lot of attention. But the legs on this table are "dressed up" with narrow, half-round flutes.

I routed the $\frac{1}{16}$ "-deep flutes on the router table, using a $\frac{1}{8}$ " core box bit. Since the flutes are stopped at each end, this is a plunge cut — at both ends. You have to set the leg onto the spinning bit at the beginning of the cut and lift it off at the end. This isn't difficult though. A stop block at each end makes the starting and stopping automatic.

SETTING FENCE. Normally, routing three flutes on a face would require three fence settings. But to keep the spacing even, I set the fence once and then used $\frac{1}{4}$ "-thick spacers to shift the piece (Steps 1-3 below).

Your normal router fence probably won't work though. In order to clamp a stop block at each end, you'll need a fence at least twice as long as the legs. I made mine out of $\frac{3}{4}$ " solid wood and clamped it to the table face down so it was only $\frac{3}{4}$ " tall (see drawing). This low profile allowed me to hold the legs and spacers together when routing.

There's one more thing to keep in mind when setting the fence. The spacers take care of the spacing, but the flutes should also be centered on the width of the legs. The easiest way to do this is to set the fence to cut the middle flute (routed with one spacer as shown in Step 1). If this flute is centered, then the others will be in the correct positions too.

SETTING STOP BLOCKS. With the fence set, the stop blocks can be added.

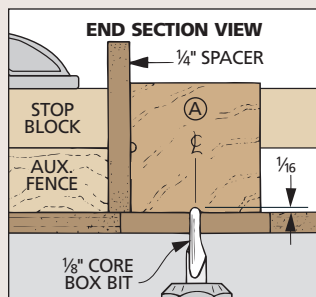
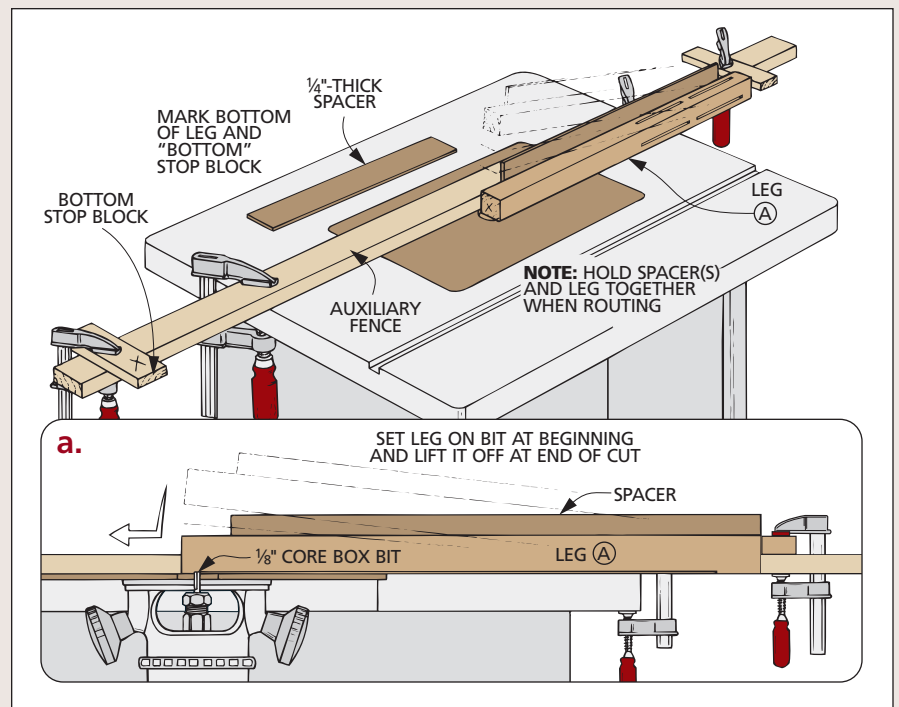
The trick is that the flutes are different distances from each end (there's an extra $\frac{1}{4}$ " on the bottom for a foot

pad). So when setting the blocks, make sure the grooves stop $\frac{3}{4}$ " from the bottom of the leg and $\frac{1}{2}$ " from the top (refer to Figs. 1a and 1c on page 32).

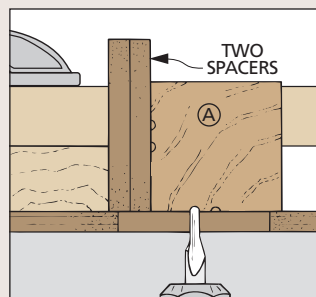
Note: To help me remember which end of the leg went against which stop block, I drew an "X" on the bottom of each leg and on the stop block that they butted against (see drawing).

Once the stop blocks are clamped in place, things go pretty quickly. When using the spacers, I simply held them to the legs as I ran them across the core box router bit (Steps 1 and 2).

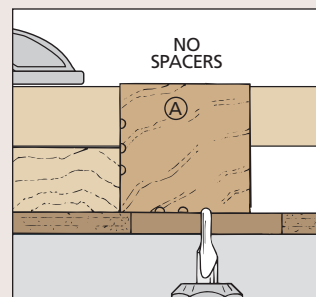
After all the flutes have been routed, you may see some burn marks at the ends. If so, a drill bit wrapped in sandpaper will help remove them (Step 4).



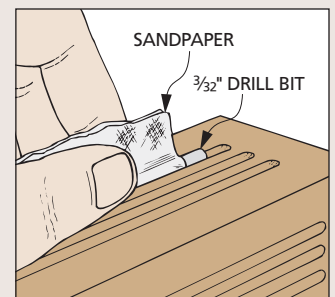
1 After the fence and stop blocks have been set, rout the middle flutes, using a single $\frac{1}{4}$ "-thick spacer.



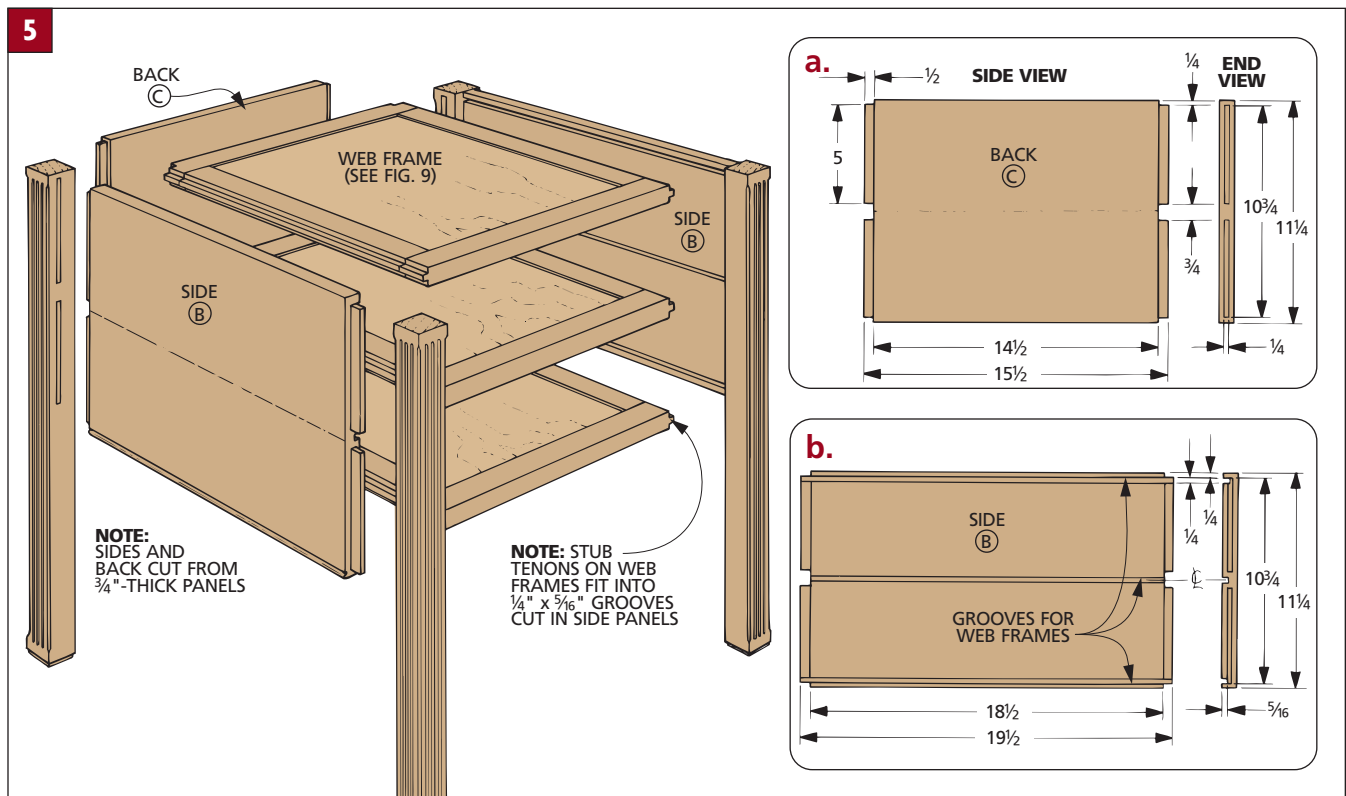
2 Next, place another $\frac{1}{4}$ "-thick spacer between the fence and leg and rout the second set of flutes.



3 Finally, remove both hard-board spacers and rout the last set of flutes on the two outside faces of the legs.



4 If there has been any burning, wrap sandpaper around a $\frac{3}{32}$ "-dia. drill bit and carefully sand the flutes.



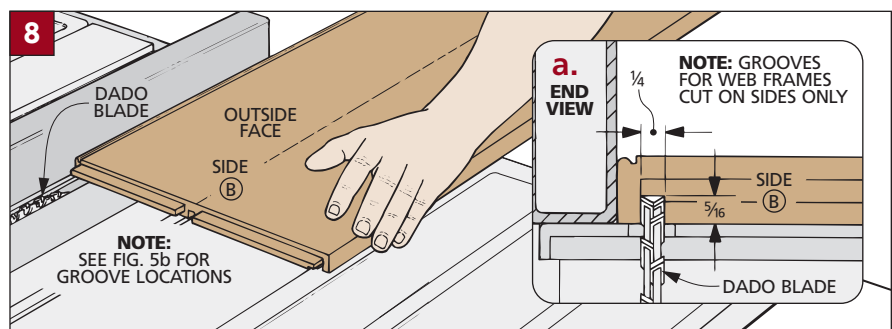
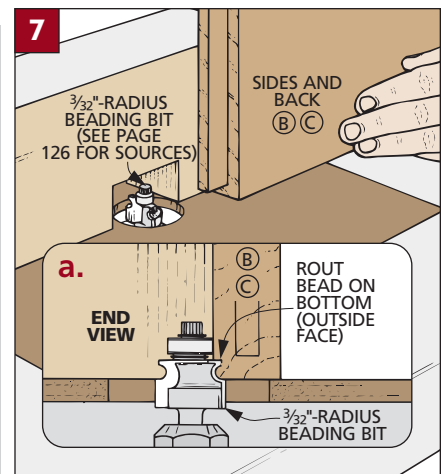
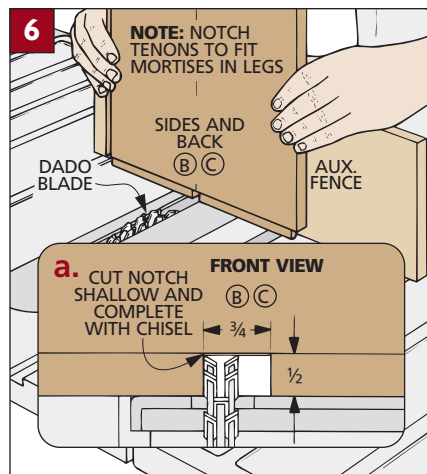
SIDE & BACK PANELS

Once the legs are complete, three wide panels can be made that will connect the legs into a U-shaped case (*Fig. 5*). After that, three horizontal web frames are added to form the drawer openings.

MAKE PANELS. The first thing to do is to glue up blanks for the side (B) and back panels (C) from $\frac{3}{4}$ "-thick pieces of stock (*Fig. 5*). Then the panels can be cut to size (*Figs. 5a and 5b*).

CUT TENONS. Next, two tenons can be cut on each end of the panels to fit into the mortises you cut in the legs. This is easier than it sounds. I simply cut one long tenon with $\frac{1}{4}$ " shoulders on the top and bottom. I did this just like I normally would, placing the pieces face down on the table saw and using a dado blade buried in an auxiliary fence.

To create two shorter tenons out of this one long tenon, I cut a $\frac{3}{4}$ "-wide notch in its center (*Figs. 6 and 6a*). Again, I used my dado blade to do this, standing the pieces on end and removing the waste in multiple passes. But I didn't raise the blade up all the way to the shoulder. That could cause score marks on the shoulders that would be visible later. Instead, I cut the notch a bit short and used a chisel to complete the notch.



ROUT BEADS. At this point, I added a small decorative bead on the bottom edge of each panel (B, C) (*Fig. 7*). (These beads will also be cut on the

curved edging pieces that divide the drawers later.) To do this, I used a $\frac{3}{32}$ "-radius beading bit. It's simply raised to cut a full bead with no shoulder (*Fig. 7a*).

CUT GROOVES. Once the bead is cut, the back panel (C) is complete. The sides (B), on the other hand, still need three $\frac{1}{4}$ "-wide grooves that will hold the web frames (Fig. 8). The grooves at the top and bottom are located $\frac{1}{4}$ " from the edges, and the groove in the middle is centered (Fig. 5b).

ASSEMBLE LEGS AND SIDES. After the grooves were cut, I glued the side panels between the front and back legs. (When doing this, just be sure the beads end up on the outside.) As for the back, it'll be glued between the side assemblies a little later.

WEB FRAMES

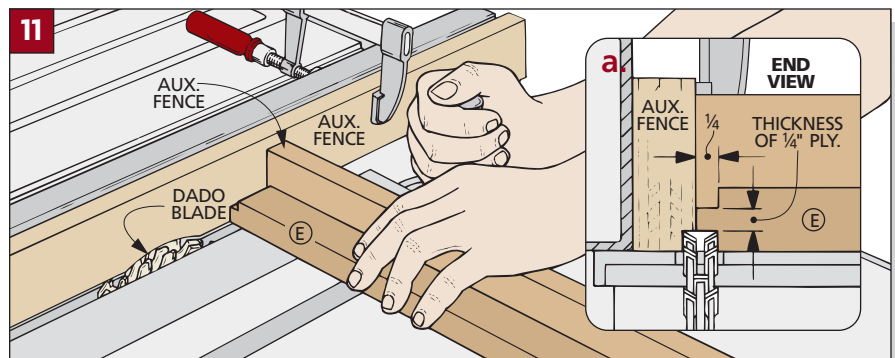
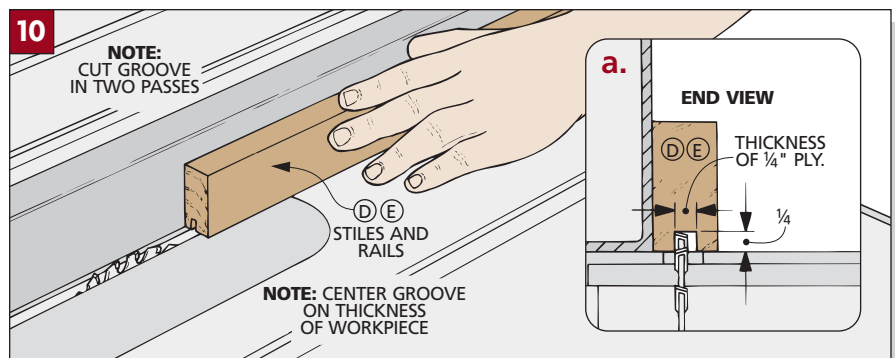
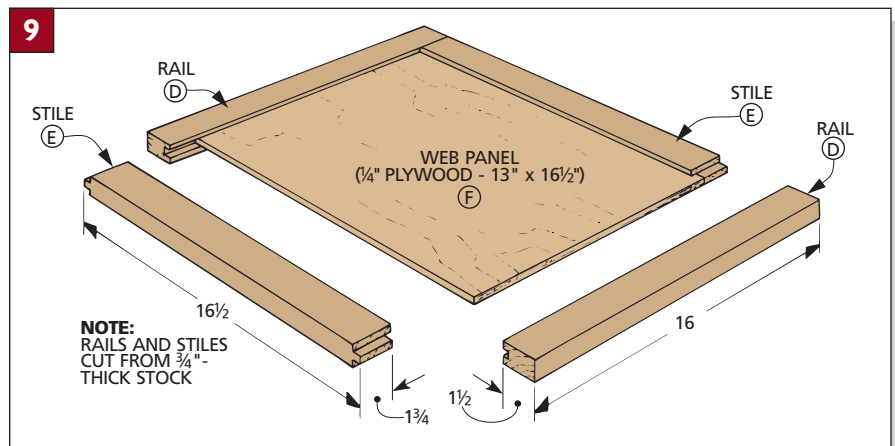
While the side assemblies were drying, I started on the web frames (Fig. 9). The frames strengthen the front of the case, create the drawer openings, and support the drawers.

RAILS AND STILES. To determine the final size of the frames accurately, I dry-assembled the side assemblies and back panel. Then I could begin cutting the rails and stiles to size (Fig. 9).

The rails (D) are cut to fit between the grooves in the sides, so add $\frac{1}{2}$ " to the interior side-to-side dimension of the case. And to find the length of the stiles (E), measure from the inside face of the front legs to the back panel (C). Then subtract the width of the two rails and add $\frac{1}{2}$ " for the stub tenons.

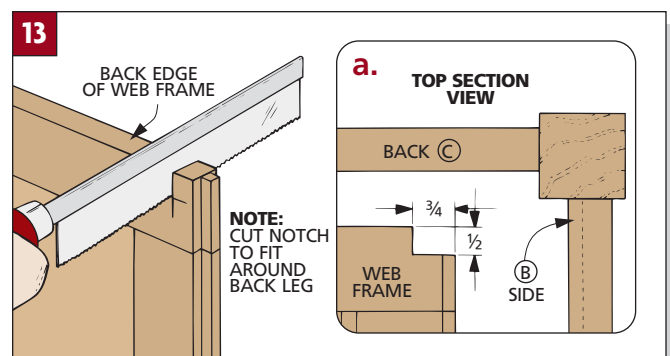
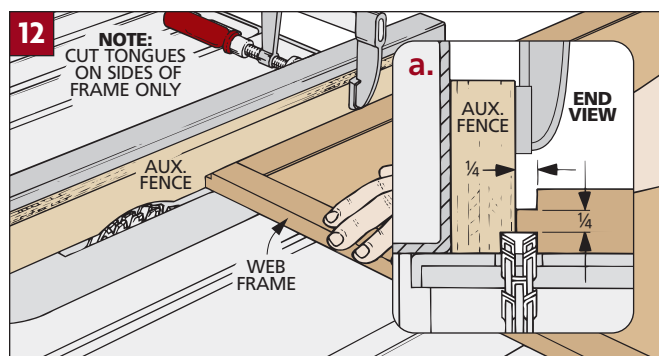
GROOVES AND STUB TENONS. To hold the $\frac{1}{4}$ " plywood panels, I cut a groove centered on the inside edge of each rail and stile (Fig. 10). Then cut mating stub tenons on the ends of the stiles to fit into the grooves that were just cut (Fig. 11).

PANELS. Now the $\frac{1}{4}$ "-thick plywood web panels (F) can be cut to fit into the grooves in the frame pieces. Then each of the frame and panel assemblies can be glued together.



TONGUES AND NOTCHES. There are still a couple of things to do to the frames. First, centered tongues need to be created on both sides of each frame (Fig. 12). These tongues are sized to fit the grooves in the side pieces.

And finally, I cut a notch in each back corner of each web frame (Fig. 13). These allow the frames to fit around the back legs inside the case. You don't need an air-tight fit. I simply laid out the notches, then cut them with a hand saw.



CURVED EDGING

The most distinctive feature of this table is obvious — the curves on the front.



But at first glance, you might miss the bead profile on the edging pieces above and below each drawer opening (*Fig. 14a* and photo at left). You can create this curved profile through an innovative process on the

router table before the edging pieces are fastened to the web frames.

CUT TO SIZE. The first thing to do is to dry-assemble the case — without the back (*Fig. 14*). (You'll need access to the back later.) Then with the case clamped together, you can cut three $\frac{3}{4}$ "-thick curved edging (G) pieces to fit between the front legs. But keep the edging wide at this point. It's easier to cut a smooth curve on an extra-wide blank. (I cut mine 3" wide.)

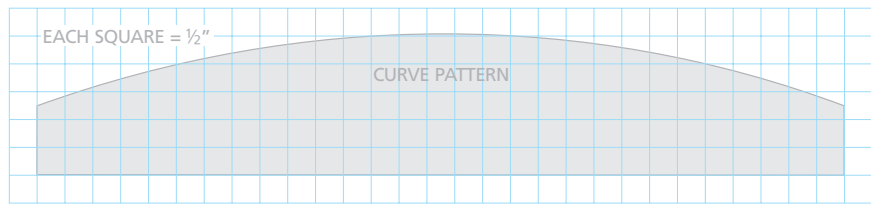
CUT CURVES. With the blanks roughed out, you can begin to lay out the curves. These are the same as the curves that will be cut on the drawers, so I took a little extra time to make a reusable $\frac{1}{4}$ " hardboard template (see the pattern above).

Now the template can be used to draw the curves on the three blanks. I roughed out the curves with a band saw, saving one of the "cutoff" pieces for later. Then I sanded to the lines with a drum sander on the drill press.

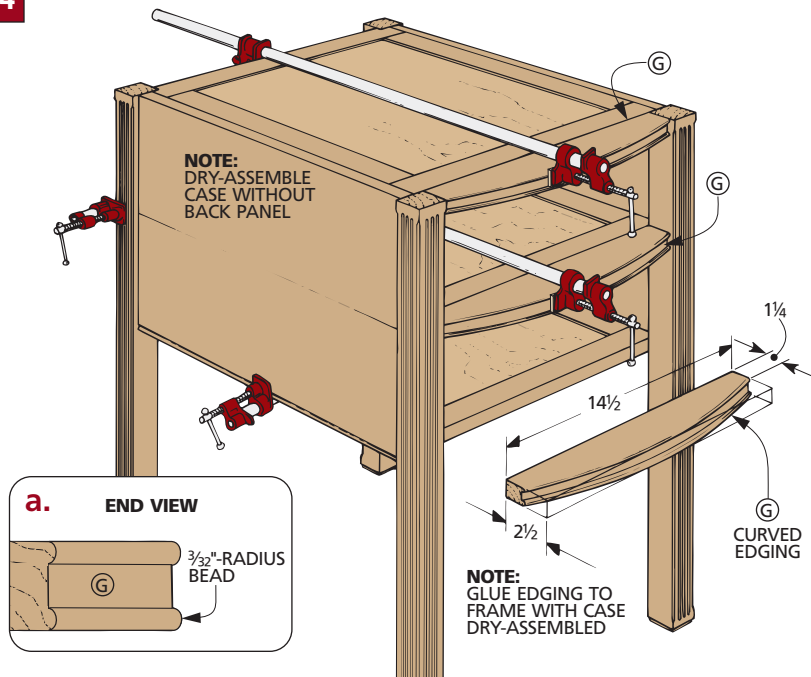
CREATE PROFILE. With the curves cut, I routed bead profiles on the top and bottom edges (*Fig. 14a*). This is done on the router table with the same bit used on the side panels earlier.

Routing the beads is just the first step. I also removed the material between the beads so they would stand out (*Fig. 14a*). To do this, I used a straight bit and a cradle made from one of the curved waste pieces (see the Technique on the opposite page).

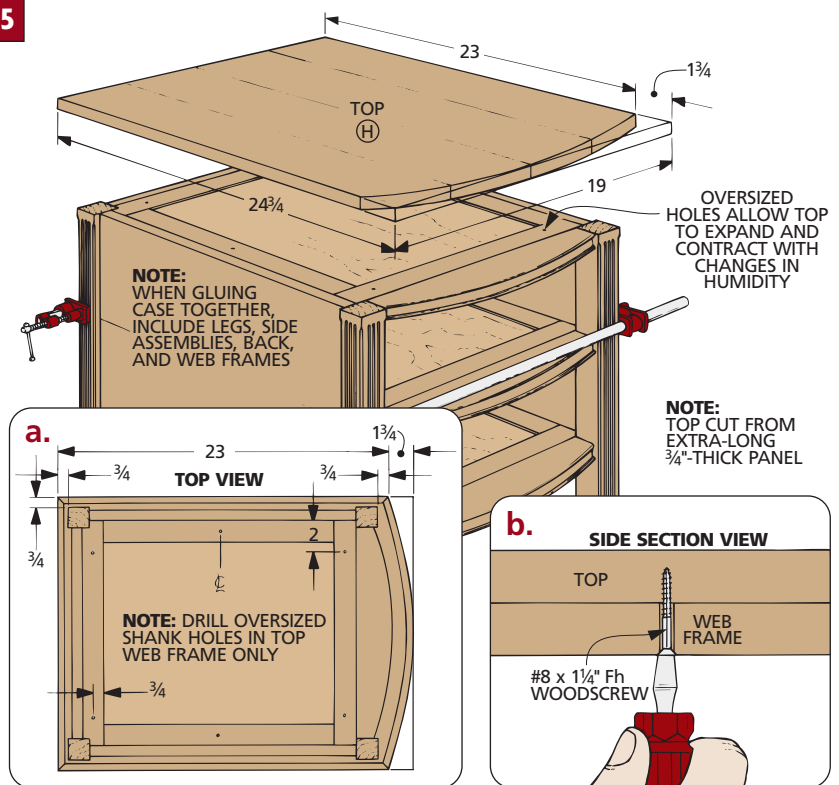
GLUE EDGING TO FRAMES. The curved trim pieces are now complete and can be glued to the front edges of the web frames. To do this, leave the case dry-assembled. This way, the legs



14



15



The Bow-Front End Table has curved edging pieces that dress up the drawer openings in the case. What's special about these pieces (besides the curves) are the bead profiles that are routed on both the top and bottom edges.

Creating the beads is no problem. I used a $\frac{3}{32}$ "-radius beading bit in the router table to cut the profile along the top and bottom edge of each edging piece (Fig. 1a). With a face flat on the table, the curve of the workpiece rides against the bearing of the bit (Fig. 1).

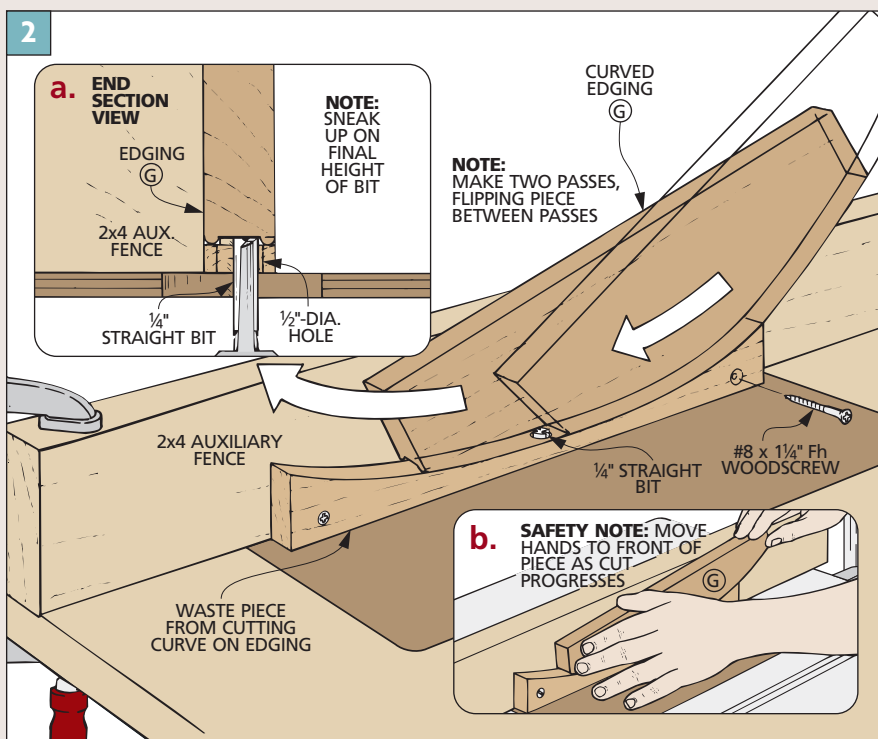
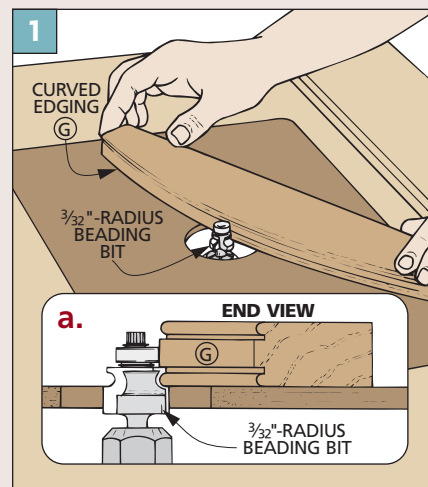
However, I wanted to make the two beads "stand proud," so I had to come up with some way to remove the material between the beads (see photo).

Had the pieces been straight, this wouldn't have been any trouble. But how do you guide a curved piece over a straight bit safely and consistently?

The solution was to use one of the waste pieces left from cutting the curves on the edging pieces. I sanded this waste piece and drilled a $\frac{1}{2}$ "-dia. clearance hole in the center. This hole fits over a $\frac{1}{4}$ "-dia. straight bit in the router table. And to provide support for the side of the edging piece, I screwed the waste piece to a scrap 2x4. Then I clamped the fence assembly to the router table (Fig. 2).

When routing, you'll want to sneak up on the height of the bit until it's flush with the bottom of the beads (Fig. 2a). And since the $\frac{1}{4}$ " bit is a hair narrower than the space between the beads, I made two passes at each height setting, flipping the edging piece end for end between passes.

Since the bit will exit the back end of the workpiece, move your hands to the front as the cut progresses (Fig. 2b).



on the sides will automatically position the edging (Fig. 14). (Just be careful that you don't glue the edging to the legs at this point.)

MOUNTING HOLES. With the curved edging glued to the frames, there's one last thing to do before the case can be glued together. The top web frame needs some countersunk shank holes drilled in it so you can mount the top panel later (Figs. 15a and 15b).

Note: Drill the holes slightly oversize so the panel can expand and contract freely with changes in humidity.

ASSEMBLY. Finally, the entire case is ready for final assembly. This means gluing the back panel and the three web frames between the two side assemblies (Fig. 15).

TABLE TOP

Like the legs and drawers, the top of this table should also have a few nice details. The front edge is curved to match the curved edging pieces, and I routed the edges with an ogee fillet bit to give it a classic profile.

GLUE UP PANEL. The first thing to do is glue up a panel from $\frac{3}{4}$ "-thick stock (Fig. 15). Since the top is the most visible surface on the table, I took extra care to choose and match some nice-looking walnut boards.

After the glue is dry, the top (H) can be cut to finished width (Fig. 15). I simply sized the panel to overhang the legs $\frac{3}{4}$ " on the sides (Fig. 15a). And though I cut the panel to its final width, I left it a little long. The panel is cut to its final length after the curve is formed on the front edge.

CREATE CURVE. The curve on the front edge of the top (H) is a couple of inches wider than the curved edging (G), so I couldn't use the same template. Instead I simply bent a flexible straightedge against a couple of blocks and drew the curve directly on the top (Fig. 16). Then it's cut out and sanded smooth with a disk or drum sander. Once the curve is formed on the front edge, cut the top to finished length (refer to Fig. 15a on page 36).

ROUT PROFILE. Next, to give the top a traditional profile, I routed around the edges with an ogee fillet bit (Fig. 17). This is a two-step process, but you can use the same bit in both steps.

The first pass is made with the router riding on the top face of the top panel (H) (Fig. 17a). (To avoid chipout, rout the ends first, moving the router left-to-right.) For the second pass, you'll need to flip the top over and adjust the depth of the bit so the bearing rides along the flat edge (Fig. 17b). This means there will be a little sanding left to do to round the edge completely.

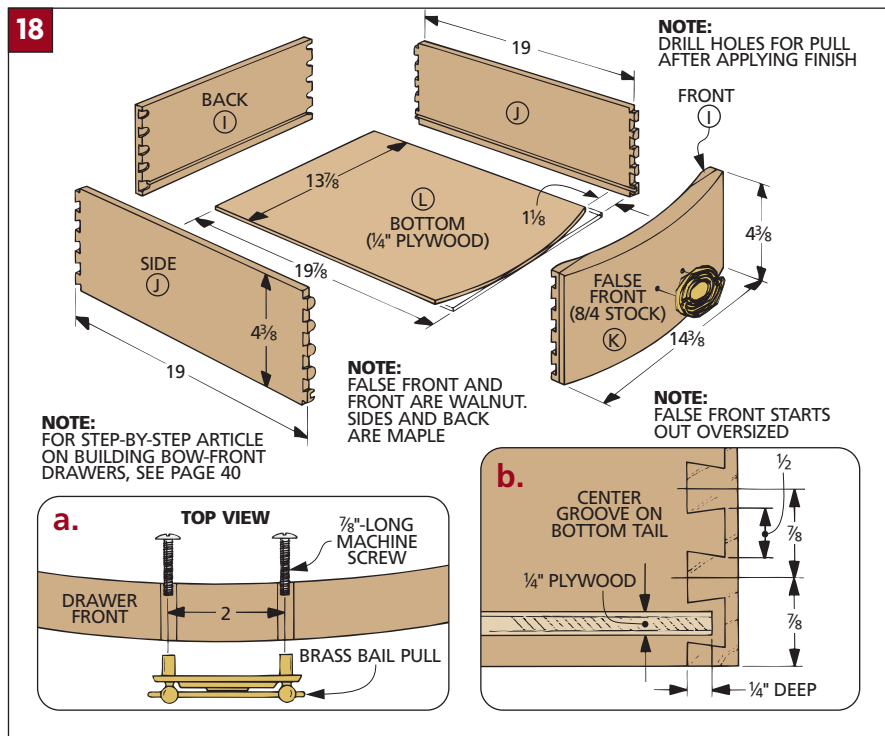
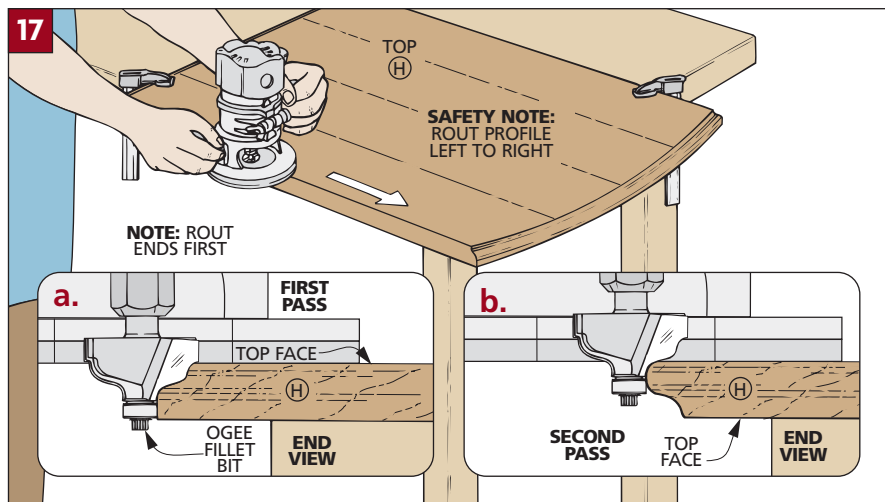
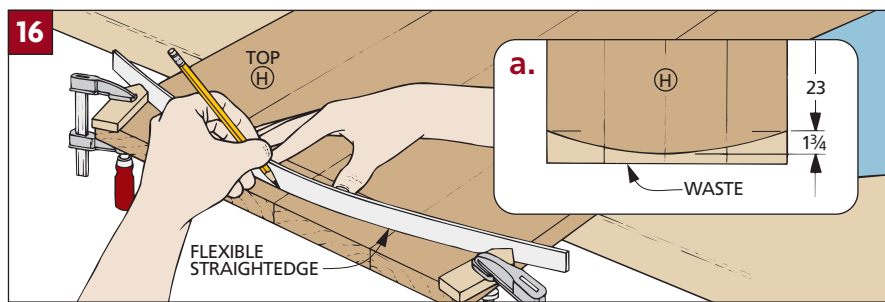
At this point, the top can be screwed to the case. But before doing this, I applied a coat of finish to the bottom face of the top so the panel would be less likely to cup.

BOW-FRONT DRAWERS

With this table, the best feature is saved for last — the bow-front drawers are both the main attraction and a great woodworking challenge.

BUILD DRAWERS. To build each drawer, you start by making a rectangular drawer with $\frac{1}{2}$ "-thick stock joined with machine-cut dovetails (Figs. 18 and 18b). (The Technique article on page 40 takes you through this step by step.) I sized the fronts (I) and backs (I) so the completed drawer would have $\frac{1}{16}$ " gaps at the top, bottom, and sides. And the sides (J) were cut 19" long. This allows for the false front (added next), plus a bit of "breathing room." (My drawer ended up $\frac{5}{8}$ " short of the back of the case.)

But before assembling the drawer, a thick false front (K) is glued to the front piece. Now the front can be cut to shape



and sanded smooth. Finally, a drawer bottom (L) can be added, and the drawers glued together.

GUIDES. There's still some work left to do before the drawers will slide smoothly in and out of the case.

The first thing I did was add pieces to guide the drawers and center them side-to-side. The $\frac{3}{4}$ "-thick guides (M) are cut to length to fit between the front and back legs, and they're ripped just wide enough to guide the drawer in and



out without binding (*Figs. 19 and 19a*). (Mine were $\frac{9}{16}$ " wide.)

GUIDE STRIPS. Though the guides direct the drawer, you don't want the drawer to rest directly on the web frame. Eventually the drawer sides would rub through the finish and wear a visible groove in the curved edging. So to avoid this, I placed nylon glide strips inside the cabinet for each drawer to ride on (*Fig. 19b*). These self-adhesive glide strips were roughly $\frac{1}{16}$ " thick, so they also established the proper gap at the bottom of the drawer. I cut the strips so they stopped at the joint line between the web frame and the edging strips (*Fig. 19b*). (See page 126 for sources of nylon glide strips.)

STOPS. The next task is to get each drawer to shut so that its front face is set just behind the bead on the curved edging (*Fig. 19c*). To do this, I added a

short block at the back of the case to act as a drawer stop (*Fig. 19*). Sneak up on the final width of this stop (N) until the drawer is properly positioned. (My block was $\frac{5}{8}$ " wide.) Then glue the block to the back of the case.

DRAWER PULLS. To complete the drawers, all that's left are the bail pulls.

Note: I waited to mount the pulls until after the finish had been applied and rubbed out (refer to page 42).

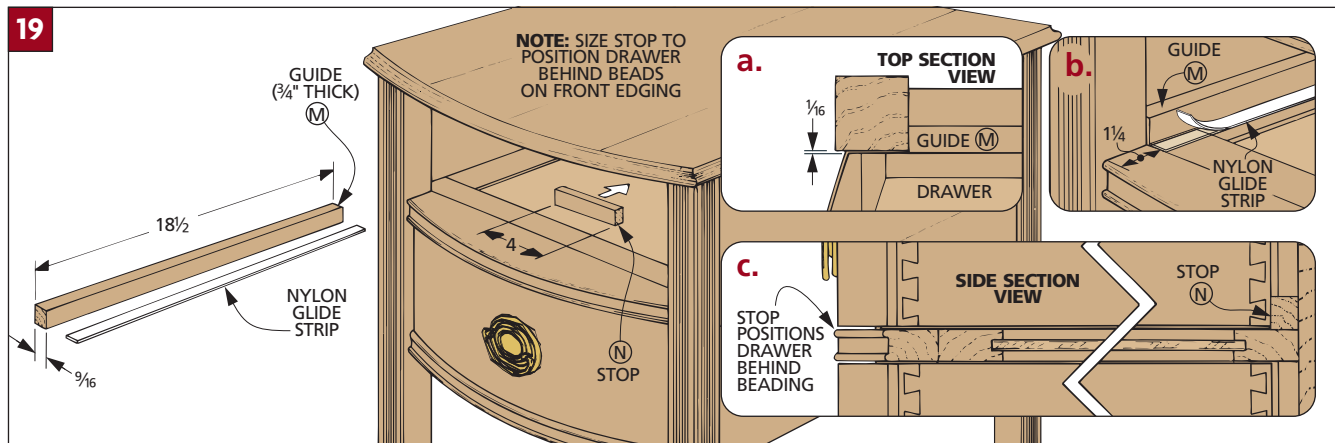
The Shop Tip at right shows how to lay out the locations of the mounting holes without marring the finish. Once the locations were marked, I drilled the holes for the machine screws that came with the pulls (*Fig. 18a*). I drilled these holes slightly oversize since the bail back plate will have to "bend" slightly around the drawer. Now all that's left is to remove the tape carefully and screw the pulls in place.

SHOP TIP

Pull Layout



Before laying out the locations of the pilot holes for the drawer pulls, I applied several strips of masking tape to the fronts of the drawers to protect the finish. This made it easier to see the lines and provided a no-slip surface for my awl.



SHOP JIG

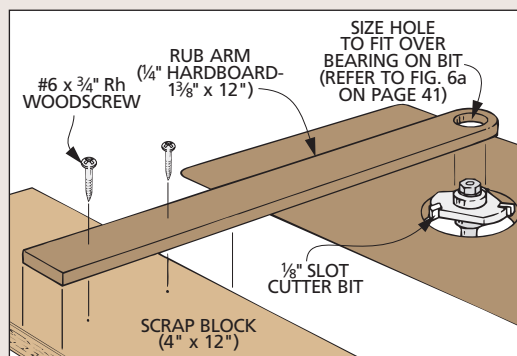
Rub Arm

For most drawers, I cut the grooves for the bottom panel on the table saw. But the curve on each drawer front on the end table makes that impossible. So I used a slot cutter bit in the router table (see photo).

However, my slot cutter routs a $\frac{1}{2}$ "-deep slot — too deep for the $\frac{1}{2}$ "-thick drawer pieces. And I didn't have a larger bearing that would reduce the depth of the slot. So I made a rub arm that fits over the bearing (see drawing).

My rub arm looks like a big tongue depressor cut from $\frac{1}{4}$ " hardboard. The round end has

a clearance hole sized to fit over the bearing on the bit. This hole should be drilled so that only $\frac{1}{4}$ " of the cutter is exposed (refer to *Fig. 6a* on page 41).



To position the arm at the right height above the cutter, I screwed it to a support block that can be clamped to the router table.



TECHNIQUE Bow-Front Drawers

Though it may sound difficult, there isn't any trick to "bowing" a drawer front. Simply start with a thick blank, cut the curves on a band saw, and sand them smooth. It's that simple.

However, the curved front has to be connected with two straight sides. And the traditional way to do this is with half-blind dovetails.

So how do you go about cutting dovetails on a curved piece? You don't. For the end table, I built "square" drawers with dovetails first and then "bowed" the front pieces later.

BUILD DRAWER. This drawer starts out like most — the $\frac{1}{2}$ "-thick pieces are cut to size (*Fig. 1*). To highlight the dovetails, I used maple for the drawer sides (see photo below).

Note: When cutting the sides to length, you want to make sure the drawer doesn't end up too deep. Take into account that a thick blank glued to

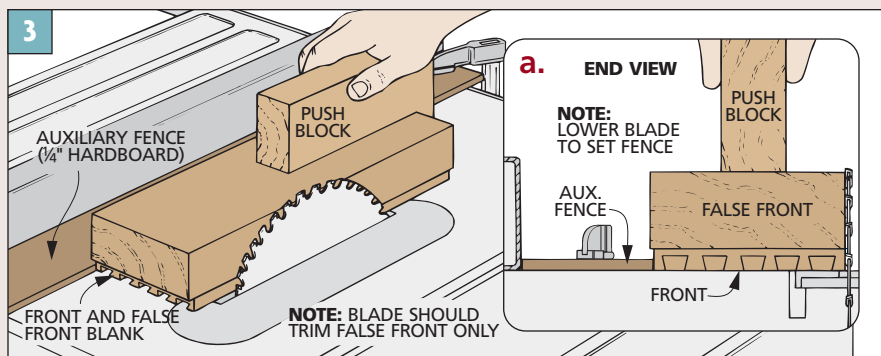
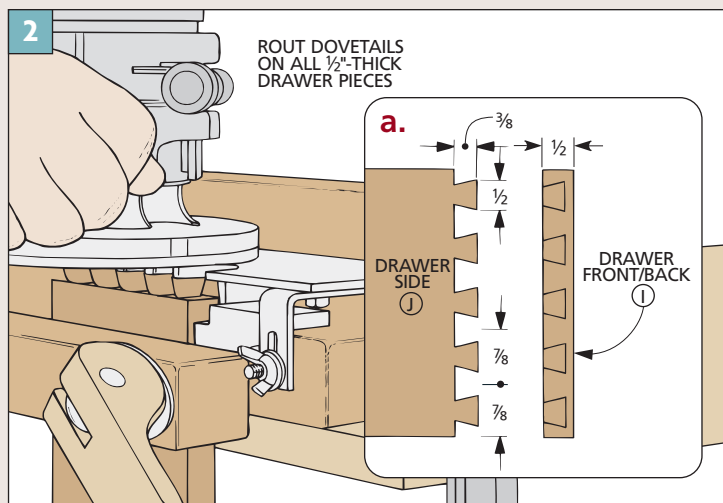
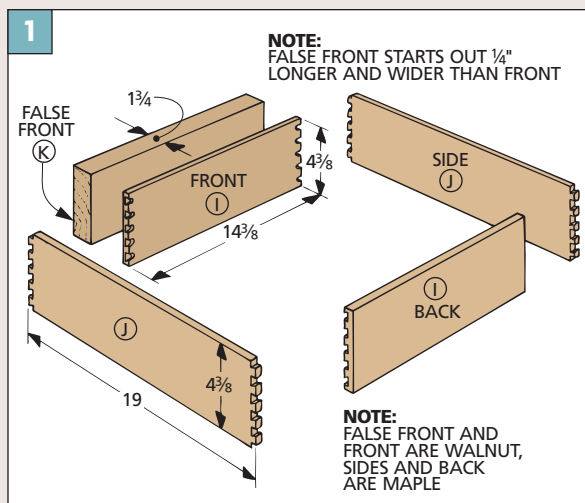
the front later will add $1\frac{1}{2}$ " to the depth of the drawer. (I cut my sides 19" long, which left about $\frac{5}{8}$ " between the back of the drawer and the case.)

To connect these pieces, I routed $\frac{1}{2}$ " dovetails with a hand-held router and a dovetail jig (*Figs. 2 and 2a*). Then I set the sides and back out of the way. It's time now to work on the drawer front.

OVERSIZED BLANK. To build up the thickness of the drawer front, I added a $1\frac{3}{4}$ "-thick false front made from $\frac{8}{4}$ walnut (see photos at right). And to accentuate the curves cut later, I chose a board with a grain pattern shaped like a "bulls-eye" (photo at left). I cut this blank slightly oversize and then glued it to the front of the front piece. (The false front will be trimmed flush later.)

At this point, the front looks massive. But don't worry. The curve gets cut on both the inside and outside faces, so the final thickness of the drawer front will only be about $\frac{7}{8}$ ".

TRIM OVERSIZED BLANK. After the glue is dry, the oversized blank can be trimmed to match the $\frac{1}{2}$ "-thick piece. I did this on the table saw, but the problem is that the oversized piece gets in the way. The solution is to use a thin auxiliary fence that the $\frac{1}{2}$ "-thick piece can ride against (*Fig. 3*).



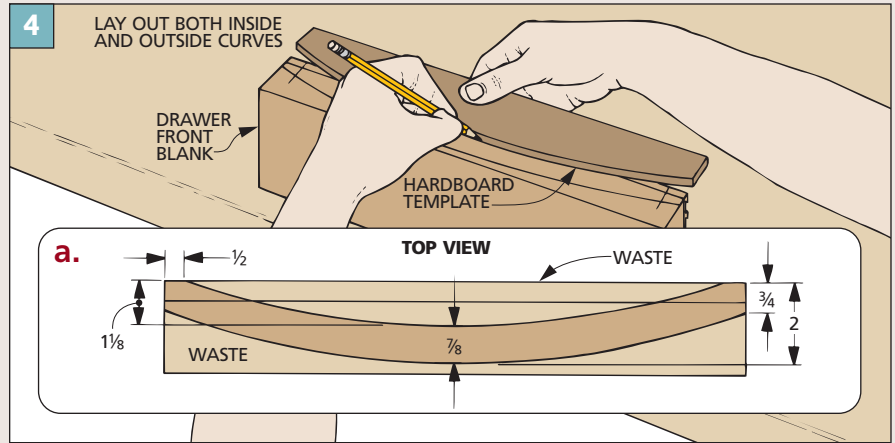


Built-up Drawer Front. The secret to cutting dovetails in the curved drawer front is to cut them in a $\frac{1}{2}$ "-thick blank first (top photo). Then glue a thick false front to the blank before cutting the curves (bottom photo).

To trim the oversized blank, lower the blade and position the rip fence and auxiliary fence so the edge of the $\frac{1}{2}$ "-thick piece is flush with the blade. Then clamp the auxiliary fence down, raise the blade, and trim the oversized blank (Figs. 3 and 3a).

With the long edges of the blank flush, you can trim the ends of the drawer front quickly using the miter gauge and an auxiliary fence.

CUT CURVES. Now that the front has been trimmed, it's time to create the curves on the inside and outside faces by cutting away most of the blank.



Laying out the curves was easy. I used the same template that I used to make the curved edging (Fig. 4). Lay out the starting points on the ends and inside face of the blank (Fig. 4a). Then simply line up the template with the marks and draw the curves.

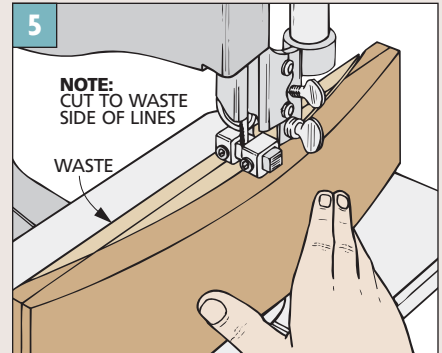
To cut the curves, I used the band saw, feeding the blank as smoothly as possible (Fig. 5). Just be sure to stay to the waste side of the lines because you'll need to do some sanding later.

SAND CURVES. To smooth the curves, I used a little elbow grease, sanding the pieces by hand. But I did find a simple way to make a curved sanding block that made the job easier (see the Shop Tip at right).

GROOVE FOR BOTTOM. With the drawer front smooth, grooves can be cut on all the pieces for the $\frac{1}{4}$ " plywood bottom. And to do this on the curved fronts, I used a slot cutter bit.

Note: I had to outfit my bit with a rub arm so it would cut a $\frac{1}{4}$ "-deep groove (Fig. 6). Refer to the Shop Jig on page 39 for details about this rub arm.

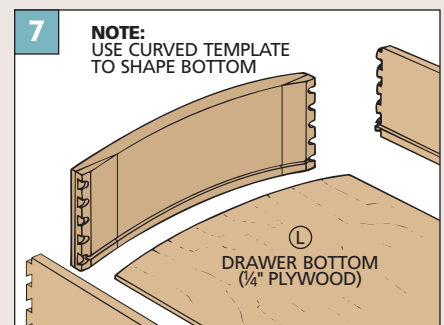
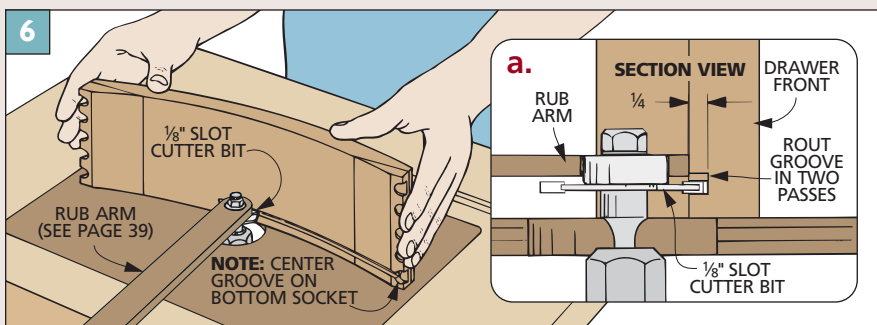
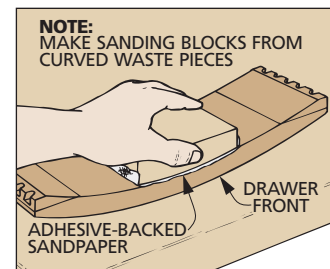
With the grooves routed, I cut out the drawer bottom (Fig. 7). Here again, I used the curved template to lay out the front edge before cutting it to shape. Then the pieces can be glued together just as you would with an ordinary square drawer.



SHOP TIP

Sanding Block

The waste piece from the drawer front makes a perfect sanding block. Just add adhesive-backed sandpaper.



FINISHING *Hand-Rubbed Finish*

Choosing a finish for the Bow-Front End Table was easy. I knew I wanted a finish that would attract as much attention as the table without hiding the beauty of the wood. Plus, it had to be durable. That's why I settled on varnish.

An oil-based varnish gives me the best results I can get without expensive spray equipment. By brushing on several coats and then rubbing out the top coat, you can achieve a smooth, glossy finish. It also adds a warm, reddish tint to the walnut without any special stain. And it provides a lot of protection too.

PREPARE SURFACE. I began by sanding the entire end table to 180-grit. (Refer to page 26 for tips about preparing the end grain on the front and back of the table top.)

CLEAN SHOP. Next, I take some time to clean my shop thoroughly with a vacuum cleaner. Because varnish takes a long time to dry, your worst enemy is dust. It settles on the wet finish and creates a rough surface. But be aware that cleaning can also kick dust into the air. So when I'm done, I wait until the next day to start varnishing. This allows the dust to settle.

APPLY VARNISH

With the shop clean, you can begin applying coats of varnish. For the first coat, you may want to thin down the varnish so it flows out a little better, but the technique is the same.

CROSS-GRAIN. I brushed the varnish across the grain first to get the finish on the wood. Then I smoothed out the coat using a light brush stroke with the grain. You'll want to apply thin coats, or the finish will run and sag. (If it does, wipe it off immediately with mineral spirits. Otherwise you'll have to sand or scrape it away after it dries.)

SANDING. After the first coat dries (overnight), you'll want to smooth out the surface and remove any dust nibs with 400-grit wet-dry sandpaper and a sanding block. Then you can add more coats, sanding between coats.

STEEL WOOL. For polishing moldings, curved surfaces, carvings, and all the nooks and crannies that are difficult to sand, steel wool is a good choice. However, steel wool shouldn't be used on flat surfaces since it forms around



the contours of the imperfections you're trying to remove. You'll get a much better (flatter and smoother) finish if you use sandpaper and a sanding block to sand between coats on flat surfaces.

RUBBING OUT THE TOP

After you've built up several coats of finish, you might want to consider "rubbing out" the top. This requires more time and elbow grease, but you'll end up with a glass-smooth surface.

Basically, "rubbing out" means using finer and finer abrasives to polish the surface. Depending on how fine an abrasive you use, you can have a satin finish or a high-gloss finish.

Before you can begin polishing, the finish needs to be "built up" so it's thicker. (I applied four additional coats to the top.) That way, you won't "cut" through the finish to bare wood.

SATIN FINISH

The difference between a satin finish and a glossy finish is simply in the amount of rubbing and the types of abrasives used.

BUFFING. For a satin finish, I'll buff the surface lightly with 0000 steel wool. But don't use it right out of the package. To create a consistent sheen without cutting through the finish, you need to use a lubricant.

One product made specifically for use with steel wool has a consistency

that's somewhere between axle grease and petroleum jelly. After saturating a steel wool pad with the lubricant and applying some more to the surface of the workpiece, you can quickly create a hand-rubbed satin finish.

PASTE WAX. Another very popular approach is to use paste wax to lubricate the steel wool. It cuts a bit slower than the steel wool lubricant, but leaves a glossier surface when it's buffed out.

HIGH GLOSS

With just a few more steps using finer abrasives, you can achieve a high-gloss finish. Pumice and rottenstone are commonly used in these steps.

POWDER. Pumice is a white-gray material that comes from volcanic ash. It's graded from FF (coarsest) to FFFF (finest). Rottenstone is an even finer, black-gray powder. It's made from ground-up limestone and gets its name from the odor that's released when the raw material is being processed. (Fortunately, the odor is gone by the time you open the bag.)

RUBBING FELT. Pumice and rottenstone can be worked with a clean, soft cloth. But I prefer a block of rubbing felt. It works just like a sanding block to provide a flat surface.

USING POWDERS. Pumice and rottenstone are used the same way. (Be prepared. It gets a bit messy.) First, a thin coat of rubbing oil is spread on the work surface. Then the powder is sprinkled around. Take long, even strokes with the rubbing felt, working with the grain.

Before long, the powder and oil will mix together into a creamy paste. If there's too much oil, you won't feel any cutting taking place. If there's too much powder, the felt will tend to catch rather than glide over the surface.

As you work, check the progress by wiping the paste from different sections of the surface. Try to rub all parts evenly. (One trick is to count off the same number of strokes over each area.) Once the finish is uniform, clean off the residue and move on to the next finer abrasive until you get the sheen you like.

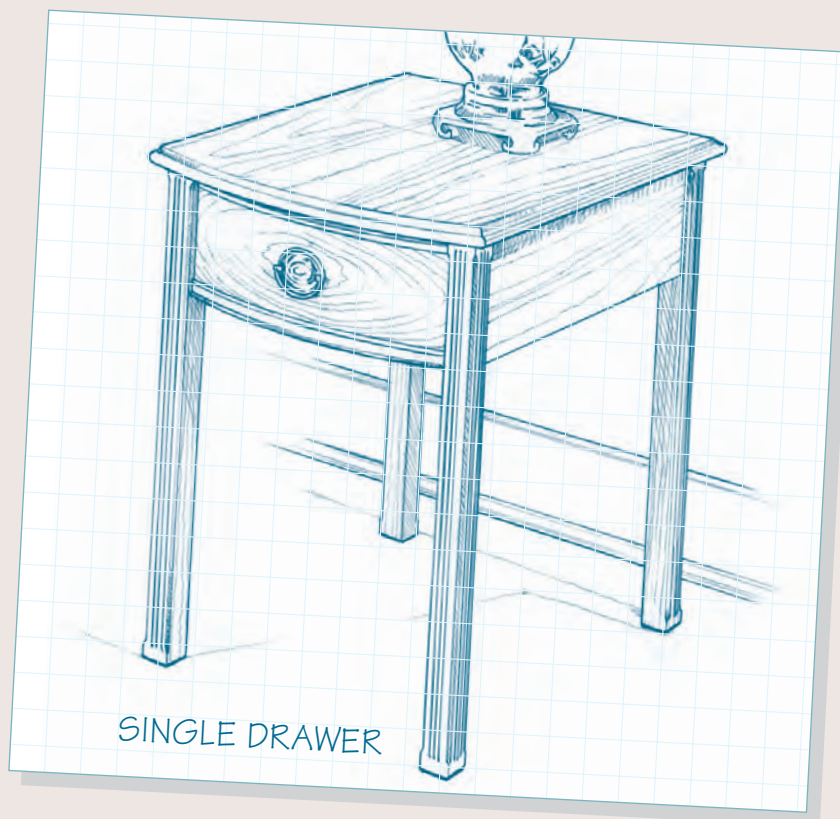
Once I had my table buffed the way I wanted it, I added a coat of wax to give the table a little more shine.

DESIGNER'S NOTEBOOK

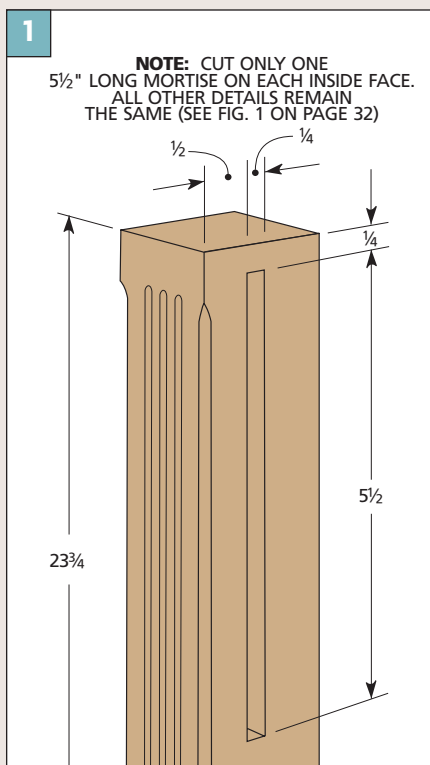
With just a single drawer, this version of the Bow-Front End Table has a lighter look. Since there are fewer pieces to make and fewer joints to cut, construction goes more quickly, too.

CONSTRUCTION NOTES:

- This Single Drawer Table is built with the same techniques used for the Bow-Front End Table.
- Start by cutting the legs to size. However, you only need to cut one $5\frac{1}{2}$ "-long mortise on each face where two are cut for the regular table (Fig. 1). (Refer to Fig. 1b on page 32 for locations of mortises on each leg.)
- All other leg details (flutes, chamfers, and foot pads) are the same as for the two-drawer Bow-Front End Table.
- The sides (B) and back (C) are cut to a width of 6" (Fig. 2).
- Next, tenons are cut on the ends of the sides (B) and back (C) to fit the mortises in the legs.
- After that, the grooves that accept the tongues on the web frames are cut on the inside faces of the sides (B) (Fig. 2).
- From here, construction is the same as for the two-drawer version of the table. The only differences are that you only need to make two web frames, two curved edging pieces, and one drawer.



SINGLE DRAWER



MATERIALS LIST

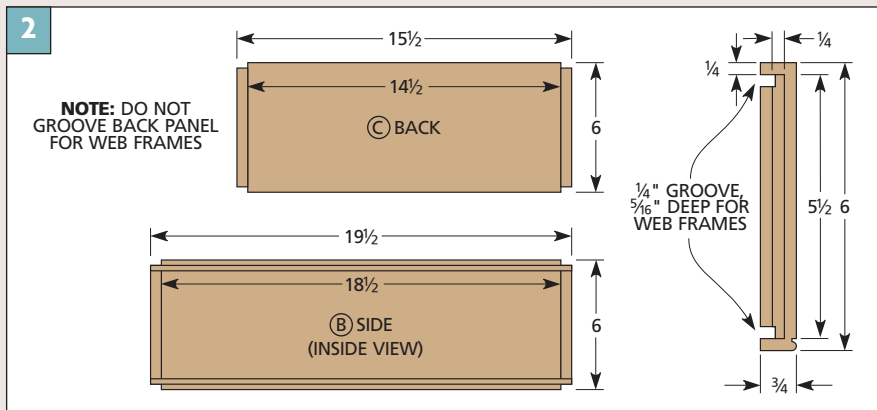
CHANGED PARTS

- B** Sides (2) $\frac{3}{4}$ x 6 - 19 $\frac{1}{2}$ "
C Back (1) $\frac{3}{4}$ x 6 - 15 $\frac{1}{2}$ "
D Web Frame Rails (4) $\frac{3}{4}$ x 1 $\frac{1}{2}$ " - 16"
E Web Frame Stiles (4) $\frac{3}{4}$ x 1 $\frac{3}{4}$ " - 16 $\frac{1}{2}$ "
F Web Frame Pnls. (2) $\frac{1}{4}$ ply - 13 x 16 $\frac{1}{2}$ "
G Curved Edging (2) $\frac{3}{4}$ x 2 $\frac{1}{2}$ " - 14 $\frac{1}{2}$ "
I Drawer Frt./Bk. (2) $\frac{1}{2}$ x 4 $\frac{3}{8}$ " - 14 $\frac{3}{8}$ "
J Drawer Sides (2) $\frac{1}{2}$ x 4 $\frac{3}{8}$ " - 19"

- K** Drawer False Frt. (1) 1 $\frac{3}{4}$ x 4 $\frac{3}{8}$ " - 14 $\frac{3}{8}$ "
L Drawer Bottom (1) $\frac{1}{2}$ ply - 13 $\frac{7}{8}$ x 19 $\frac{7}{8}$ "
M Drawer Guides (2) $\frac{3}{4}$ x $\frac{9}{16}$ " - 18 $\frac{1}{2}$ "
N Drawer Stop (1) $\frac{3}{4}$ x $\frac{5}{8}$ " - 4"

HARDWARE SUPPLIES

- (2) Nylon glide strips
 (1) Bail pull (2" bore)







ACCESSORIES

Chances are if you like the way a home is decorated, it has a lot to do with the accessories. The projects in this section add the warmth of wood to your home's decor. Plus, each one can be customized to suit your tastes. The molded edges of the oval mirror and the classic frames can be modified in numerous ways. The mantel clock is designed to work with either a traditional mechanical movement or a contemporary quartz movement. And the book stand is perfect for a library or den, or even a hallway.

Oval Mirror

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Oval Mirror

This mirror will be a pleasing addition to your foyer or front hallway. It's simple to make by cutting a number of short pieces, gluing them together to form an octagon, and then routing it into an oval.

The idea of building an Oval Mirror has always intrigued me. But without some kind of jig to cut the oval-shaped frame and rout the complex profiles, it's virtually impossible to make a consistent oval. So after a lot of thought (there's more to cutting an oval than a circle), I came up with a jig that made it possible. For more about how this works, see the Shop Jig on page 52.

PROFILE. The most interesting aspects of this project are how the profile is created and how the frame is cut to size.

To cut a profile like this normally requires a shaper and an expensive cutter. But I molded this profile and cut the oval to size with a router (mounted in the jig) and three router bits.

To rout the profile shown here and cut the frame, you'll need a $\frac{1}{4}$ " roundover bit (without the bearing), a $\frac{3}{4}$ " core box bit, and a $\frac{1}{4}$ " straight bit.

JOINERY. The frame is made from eight pieces joined together with splined miter joints. But don't worry, even with sixteen miters, I've come up with a simple way to make sure you end up with nice tight joints. Plus, I used $\frac{1}{8}$ "-thick hardboard for the splines because it's very stable and less likely to cause the joints to move during changes in humidity. This can be a real concern in a project like this.

WOOD AND FINISH. To allow enough thickness for the profile, you'll need $\frac{5}{4}$ stock ($1\frac{1}{16}$ " actual thickness). I used cherry for my mirror, but another good choice would be walnut.

For the finish I applied two coats of a satin polyurethane finish.

MIRROR. The mirror itself is a standard $\frac{1}{8}$ "-thick mirror. And unless you're good at cutting glass, you'll probably have to pay a little extra to have the oval shape cut.

HARDWARE. I used a heavy braided wire and hinged hangers to hang the mirror. See the Technique on page 51 for ideas on hanging heavy frames.



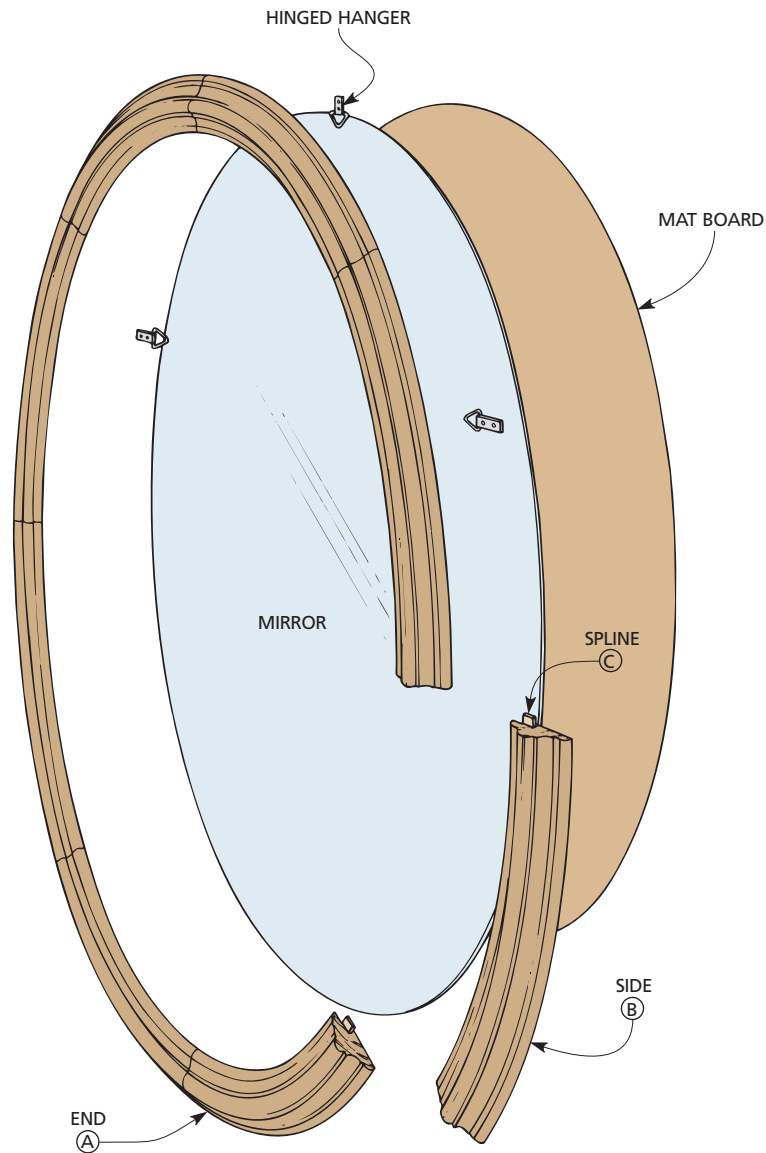
Finally, for more information on how to find the hardware needed to build (and then hang) the frame, see Sources

and project supplies on page 126. It also lists sources for the various router bits used in cutting the molding profiles.

EXPLODED VIEW

OVERALL DIMENSIONS:

25W x 1 $\frac{1}{16}$ D x 37H



MATERIALS LIST

WOOD

- A** Ends (4) 1 $\frac{1}{16}$ x 5 - 12 $\frac{1}{2}$
- B** Sides (4) 1 $\frac{1}{16}$ x 5 - 15
- C** Splines (8) $\frac{1}{8}$ hdbd. - $\frac{5}{8}$ x 2 $\frac{1}{2}$

HARDWARE SUPPLIES

- (1) Oval mirror (cut to shape)
- (1) $\frac{1}{16}$ " - 32" x 40" standard mat board
- (16) No. 7 glazing push points
- (4) 1 $\frac{7}{8}$ " hangers
- (8) No. 5 x $\frac{1}{2}$ " Fh woodscrews
- 10' (rough) 20# braided wire
- (4) $\frac{1}{2}$ " rubber bumpers

CUTTING DIAGRAM

1 $\frac{1}{16}$ x 5 - 60 (2.6 Bd. Ft.)



1 $\frac{1}{16}$ x 5 - 60 (2.6 Bd. Ft.)



NOTE: ALSO NEED
 $\frac{1}{8}$ " HARDBOARD FOR
SPLINES

BUILDING THE BLANK

The oval frame actually starts out as an octagonal blank (Fig. 1). Four of the pieces are identical ends (A), and the other four are identical sides (B). To cut all eight pieces, you'll need to set the saw for three different angles.

ENDS AND SIDES. To cut the ends (A) and sides (B), first rip all eight pieces from 5/4 stock (1 1/16" actual thickness) to a finished width of 5" (Fig. 1). Now miter one end of each piece at 22 1/2°.

Then cut each end (A) to final length with a 30° miter at the opposite end (Fig. 1). The sides (B) are cut to length by mitering the opposite end at 15°.

Once all the pieces are cut to size, the next step is to rout grooves for splines.

ORGANIZING PIECES. It's important with spline and groove joinery to make sure the grooves align. So before routing the workpieces, first organize them as they're going to appear in the blank (Fig. 1). Then draw an "X" on the top face of each piece so they'll be oriented the same way.

ROUTING GROOVES. Normally, a spline is centered on the thickness of a board. But for this project, a centered spline would be exposed once the profile is routed. So to avoid this, place the splines off-center (1/8" from the back) on the thickness of the frame pieces (Fig. 2).

The grooves also have to be stopped short so they won't be seen on the outside of the frame. So first rout one end of each workpiece in the normal, right to left manner stopping at a centerline drawn on both the router table and on one edge of the workpiece (Fig. 3).

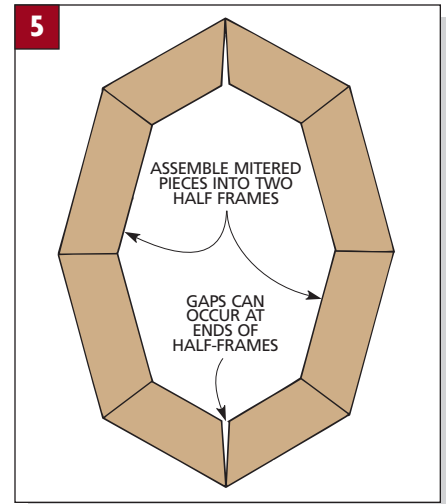
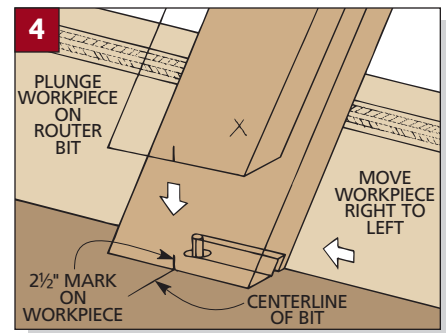
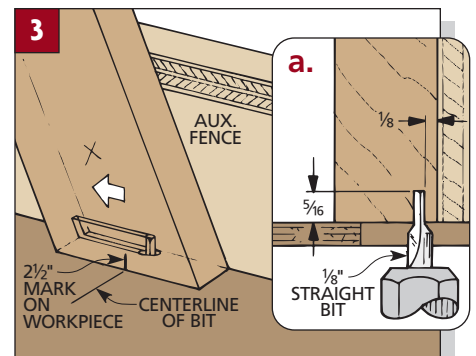
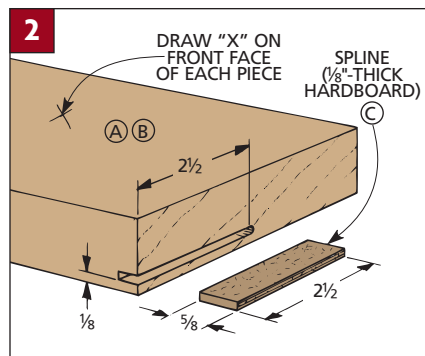
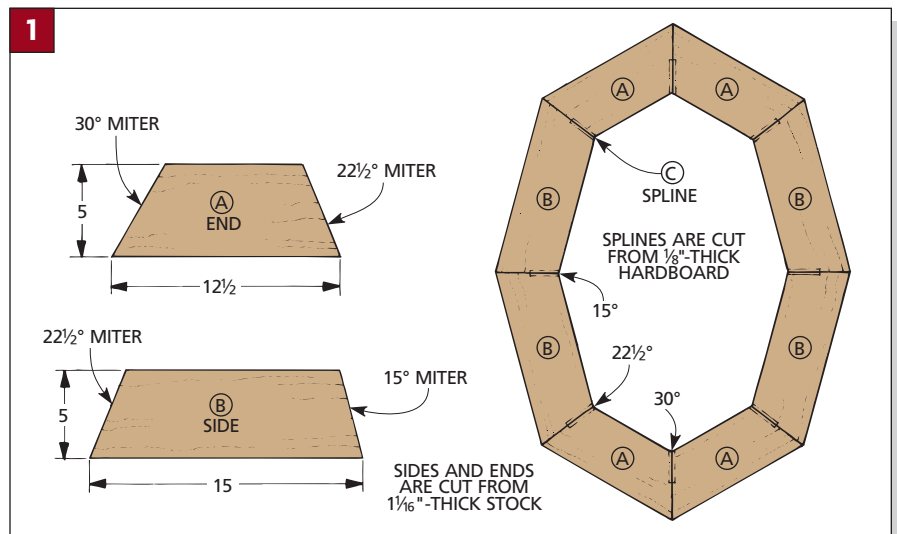
Note: Face the "X" away from the router table fence.

Then to rout the other end of each piece so the stopped grooves are on the same side, be sure to keep the "X" side of the workpiece facing out and plunge the workpiece onto the bit at the centerline and rout in the normal direction (Fig. 4).

GLUING AN OCTAGON. When cutting miters of an eight-sided frame, there's always a good chance for error.

Each of the pieces requires two miters (one for each end) for a total of sixteen cuts. If the miter gauge is off just 1/4°, the combined gap would be about 1/4" when the pieces are assembled (Fig. 5).

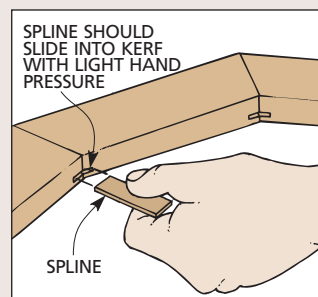
HALF FRAMES. The trick to creating tight joints at each miter involves assembling two "half frames," then cutting the ends of each to fit together tightly.



SHOP TIP

Sizing Splines

How tight should a spline be? When dry-assembling the joint, if you can't push the spline in easily with your finger, it will be too tight when there's glue in the joint. So the spline needs to be thinner. But, if the spline falls out when the workpiece is turned over, it's too loose to hold the joint together.



So first, cut the splines from hardboard and glue up four of the pieces (half the frame). See the Shop Tip on the opposite page for how to size the splines.

PLYWOOD CARRIER. After the pieces are dry, I use a piece of plywood as a cut-off table for the half frames (Fig. 6).

To cut the plywood, set up the fence on the saw a little wider than the glued-up half frame, ripping the plywood so the edges are parallel. Now fasten the half frame to the plywood with carpet tape.

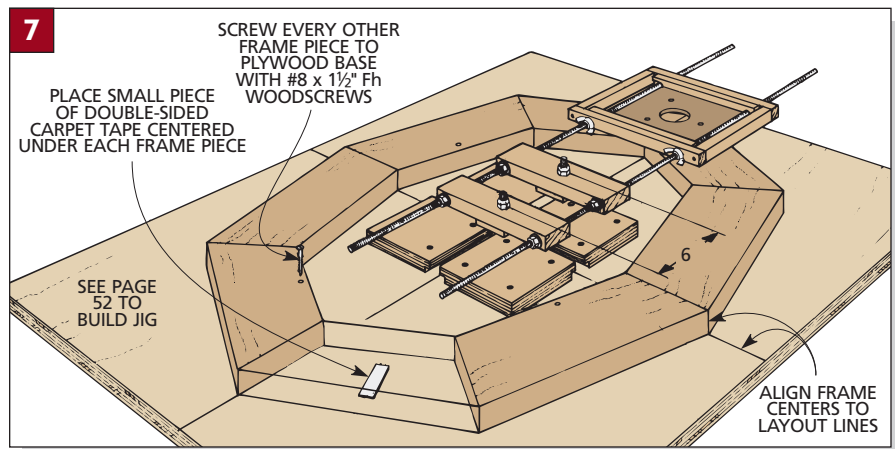
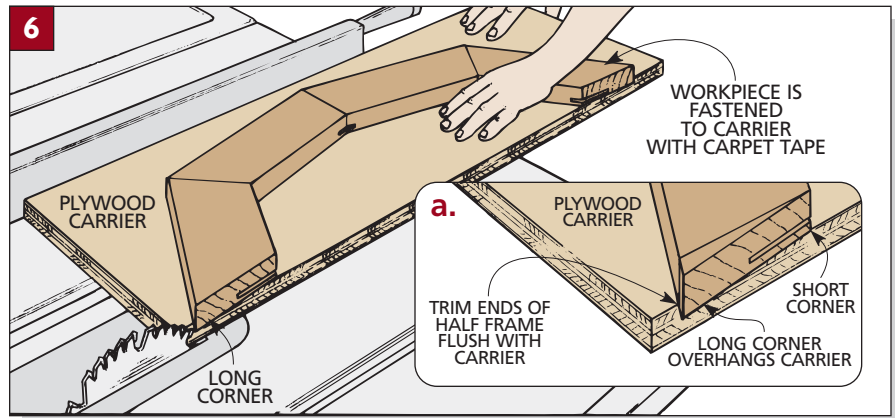
Then, if the miters are off, position the half frame so the two long corners extend beyond the edge of the plywood and the two short corners are flush to the edge (Fig. 6a).

MAKING THE CUTS. Next, run the plywood carrier through the table saw, trimming off the long corners of the half frame. Repeat the procedure on the other half frame. Now the two halves can be glued together without a gap.

MOUNTING BLANK TO JIG

Now that the frame blank is complete, you'll need an easy way to rout the profile. To do this, I designed an oval-cutting jig. (For more on the jig, see page 52.) To ensure the profile is routed in the center of the blank, the blank must be positioned correctly on the jig.

To do this, first drill pilot holes for woodscrews that hold the blank to the large plywood base (Fig. 7). I drilled the holes into every other frame piece.



Note: To ensure the router bits clear the screws, place the holes at the center of each piece within 1/4" of the inside edge.

Then center double-sided carpet tape on the bottom of each frame piece (Fig. 7). The tape holds the frame to the

plywood once it's cut from the blanks.

MOUNT BLANK. Now all that's left is to slip the frame blank onto the oval-cutting jig, aligning the center to the layout lines (Fig. 7). Then screw the blank to the plywood base.

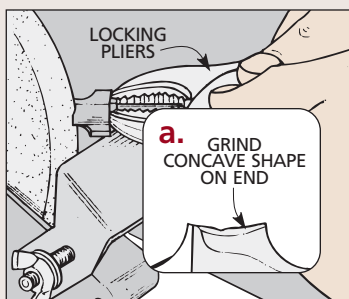
SHOP TIP

I needed a roundover bit without a pilot bearing to rout the bead in the center of the Oval Mirror.

To do this, I bought a high speed steel bit and arbor set. This bit has a

removable rub pilot, but there's a problem. Since the end of this bit isn't made to cut wood, I had to modify it to use it on this project.

To prevent burning, I ground a concave shape on the bit using a grinding wheel (see drawing). Hold the bit with locking pliers and use the corner of the wheel. Grind from the center outwards, being careful not to nick the cutting edge of the router bit.



Modifying a Bit



BEFORE: The bit with the flat end is difficult to push through the workpiece, and the friction it produces burns the wood.



AFTER: With the end of the bit hollowed out, the cut is much smoother, and the workpiece shows no signs of burning.

ROUTING THE PROFILE



With the blank mounted on the oval-cutting jig, you're ready to rout the frame's profile and the oval shape.

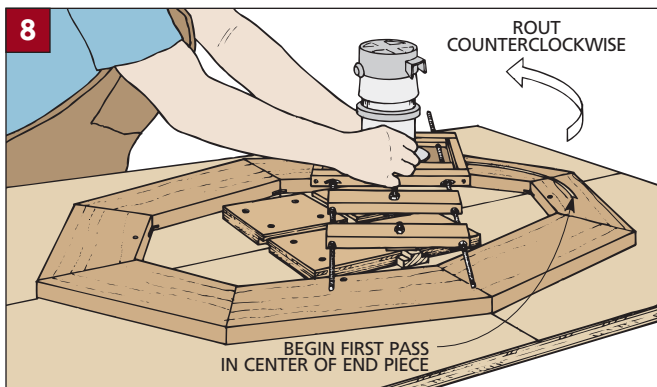
ROUTER BITS. A shaper cutter can mold the profile shown in the photo. But it also can be routed with three router bits: a $\frac{1}{4}$ " roundover bit without a bearing (see the Shop Tip on page 49), a $\frac{3}{4}$ " core box bit, and a $\frac{1}{4}$ " straight bit.

FIRST PASS. The profile is routed in nine separate steps. In each step the router bit is positioned at a different location on the blank. To determine where

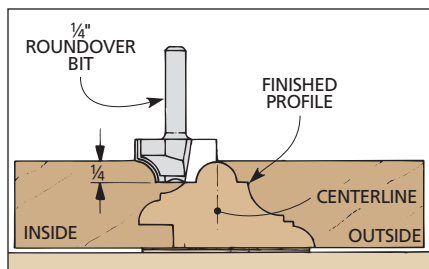
the first pass will begin, locate the center of one of the end pieces (A) and then draw a centerline (Fig. 8).

Next, mount the $\frac{1}{4}$ " roundover bit in the router. And then set the depth of the bit to rout $\frac{1}{4}$ " deep. Now adjust the router carriage so the outside edge of the bit is on the inside of the centerline (Step 1).

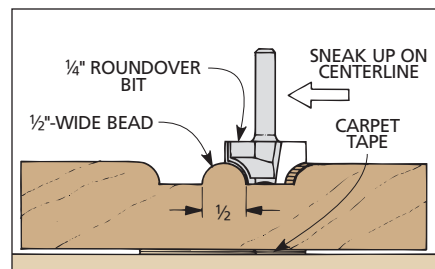
After the router carriage is adjusted, follow the steps below (changing the bits and adjusting the carriage as you go).



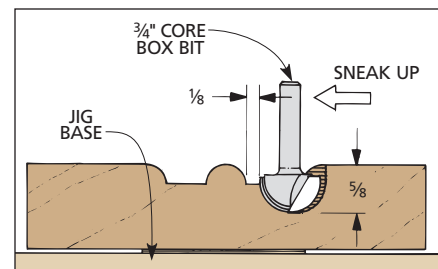
Note: When performing this step by step procedure, always remember to start a little wide from where you want to end up, then sneak up on the final measurement of the profile.



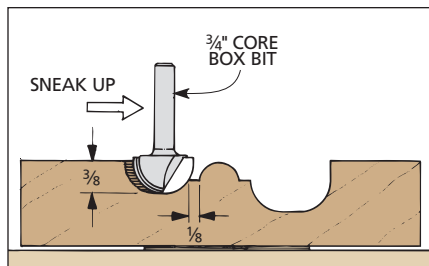
1 With a $\frac{1}{4}$ " roundover bit in the router, position the router carriage so the outside edge of the bit is on the centerline. Now rout inside half of $\frac{1}{2}$ "-wide bead.



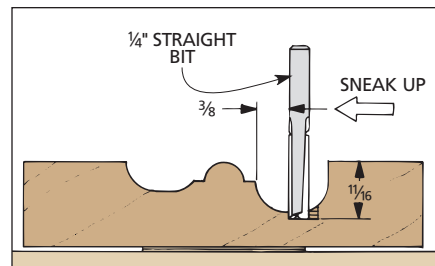
2 Next, readjust router carriage so the inside edge of bit is approximately $\frac{1}{8}$ " away from the centerline. Then sneak up on centerline to complete $\frac{1}{2}$ "-wide bead.



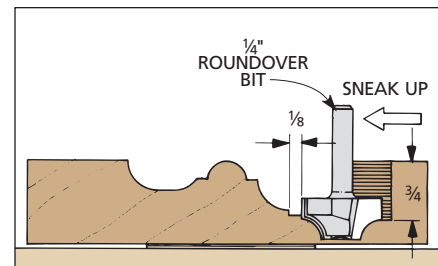
3 Switch to a $\frac{3}{4}$ " core box bit. Adjust carriage so inside edge of bit is $\frac{1}{4}$ " away from the outside edge of bead. Sneak up on the bead to create a $\frac{1}{8}$ "-wide shoulder.



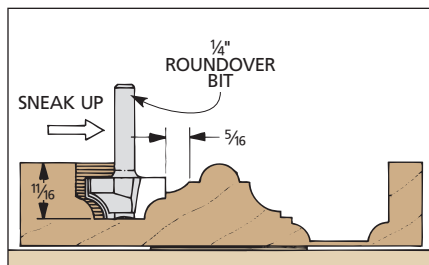
4 Next, reposition carriage so outside edge of bit is about $\frac{1}{4}$ " away from inside edge of the bead. Then, sneak up on the bead to create a $\frac{1}{8}$ "-wide shoulder.



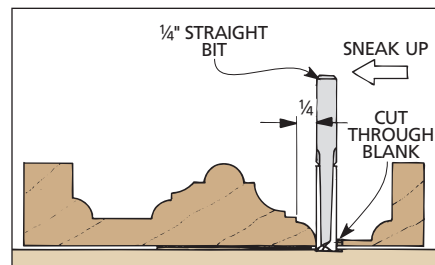
5 Switch to $\frac{1}{4}$ " straight bit. Then adjust carriage so the inside edge of the bit is about $\frac{1}{8}$ " away from the centerline. Next, sneak up to leave a $\frac{3}{8}$ "-wide cove.



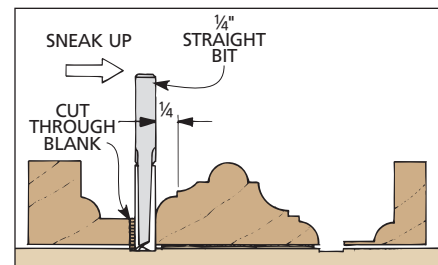
6 Reinstall roundover bit. Reposition carriage so inside edge of bit is about $\frac{1}{4}$ " away from outside edge of the cove. Sneak up to leave $\frac{1}{8}$ "-wide shoulder.



7 Reposition carriage so the outside edge of the roundover bit is approximately $\frac{9}{16}$ " away from inside edge of the bead. Sneak up to leave $\frac{5}{16}$ "-wide cove.



8 Reinstall the straight bit. Then adjust the carriage so the bit is $\frac{1}{16}$ " from the outside roundover. Sneak up on the roundover to cut the outside of the oval.



9 Now, readjust carriage so the straight bit is about $\frac{1}{16}$ " away from the inside roundover. Sneak up on the roundover and cut through the blank.

INSTALLING THE MIRROR

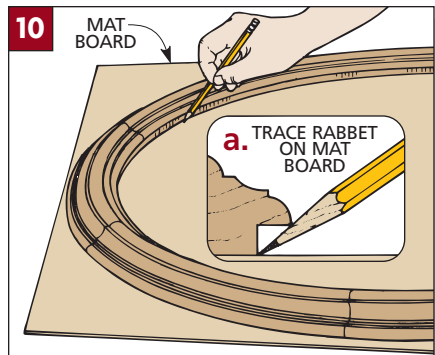
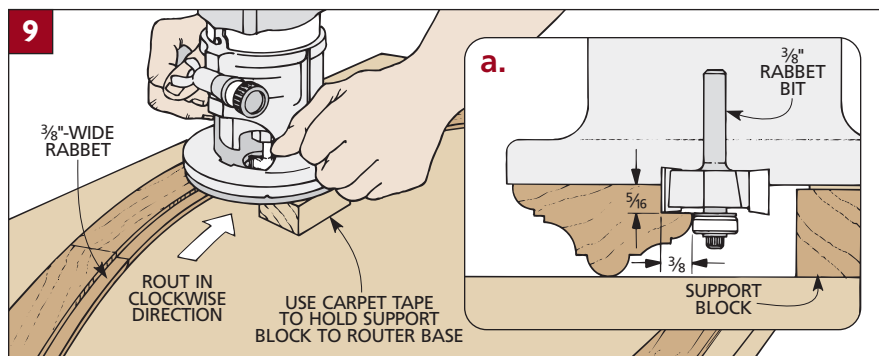
After the profile has been routed, gently remove the frame from the plywood base. If the double-sided carpet tape won't release the frame, a good way to dissolve the adhesive on the tape is by flowing a small amount of denatured alcohol under the frame.

ROUTING RABBET. The final step in making the frame is to rout a $\frac{3}{8}$ "-wide rabbet along the back inside edge for the mirror and mat board.

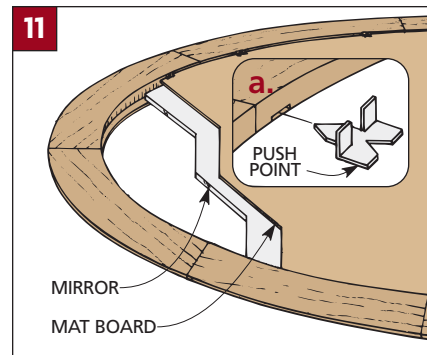
To do this, I used a hand-held router with a rabbet bit (*Fig. 9*). But, because the back of the frame isn't really very wide, I decided to use carpet tape to fasten a small block of wood to the base of the router for additional support. Then when you rout the rabbet, move the router in a clockwise direction.

FINISH. With the frame complete, the next step is to lightly sand the profile and then apply the finish.

BACKING BOARD AND MIRROR. To protect the silver coating on the back of the mirror from being damaged, I cut a standard mat board to use as a backing board (*Figs. 10 and 10a*).



Note: I also brought the mat board to the glass shop so they could use it as a template when cutting the mirror.



Then, install the mirror and mat board with push points spaced evenly around the frame's inside edge (*Fig. 11a*). ■

TECHNIQUE

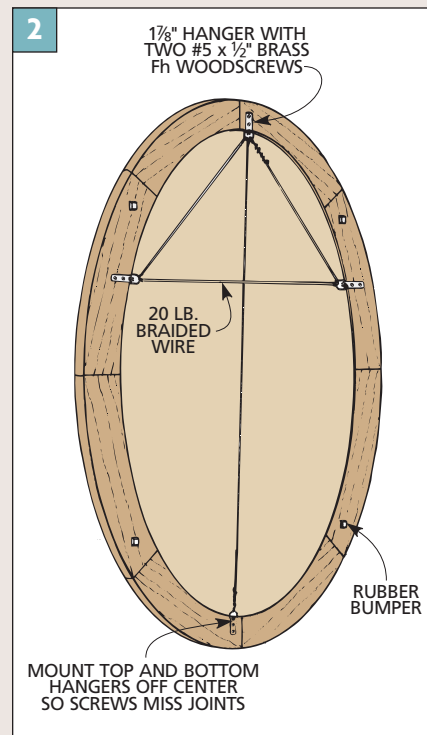
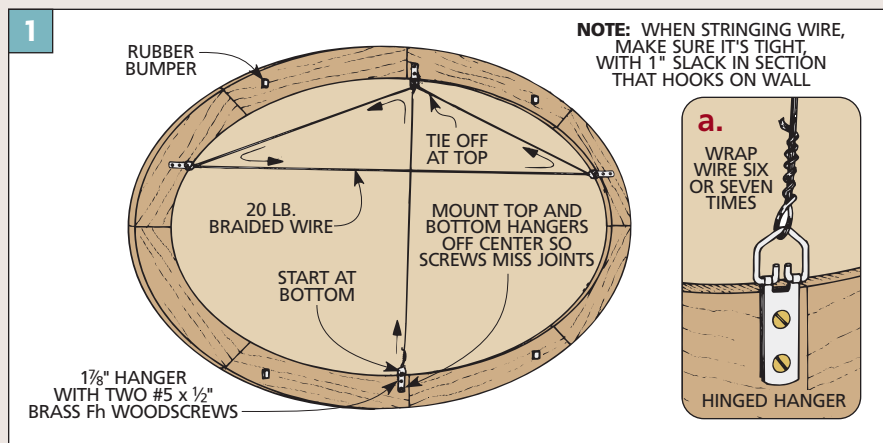
Hanging Heavy Frames

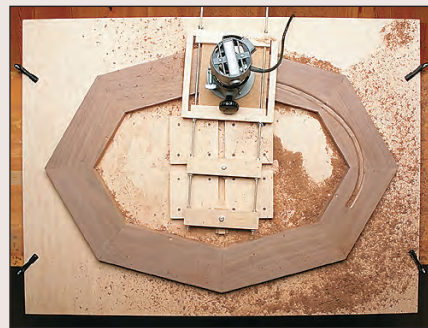
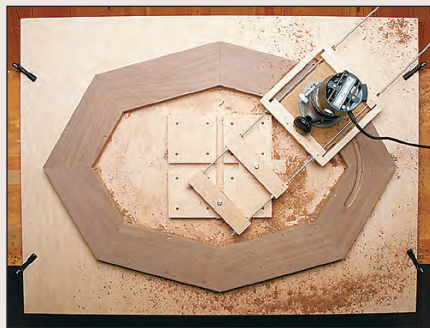
The braided wire used to hang this mirror is strung in such a way that it pulls the frame in towards the center of the mirror. This relieves some of the pressure from the weight of the mirror. And it works for both horizontal and vertical mountings (*Figs. 1 and 2*).

STRINGING WIRE. The first step to installing the hanging system is to screw

four hinged hangers to the back of the frame (*Figs. 1 and 2*). Then string braided wire through the hangers, starting with the bottom one (*Fig. 1a*).

Now thread the wire through the top, left, and right hangers. Then terminate the wire back through the top hanger, and tie it off just as you did at the bottom hanger (*Fig. 1a*).





Routing a glued-up blank into a perfect oval (ellipse) requires a trammel. But not the type you might expect. Most trammels swing on one anchor point, allowing you to rout a circle. But to rout an oval, you need a trammel that swings on two anchor points.

This oval-cutting jig does just that. It consists of a trammel platform that supports a large trammel arm. At the end of the arm is a frame that holds a router in place (*Fig. 1*).

As the arm rotates around the platform, the two anchor points are working together to control the orbit of the router. One anchor point controls the length of the oval (the longer distance across the oval), the other anchor point controls the width of the oval (the shorter distance).

HOW THE JIG WORKS. As the router orbits the platform, the two anchor points chase each other in a circular path. And while this is going on, they're also sliding back and forth in separate tracks that are perpendicular to each other (see photos above).

OVAL FRAMES. This jig allows you to do two things. You can rout the inside and outside edges of an oval frame with the width of the frame being equal all the way around. It's also good for routing a complex profile on the face of the frame (such as that shown on page 50).

JIG FEATURES. If you've ever routed a molding that has an ornate profile, you know that you have to change bits frequently. To make that easy with this jig, the router is mounted on a base plate

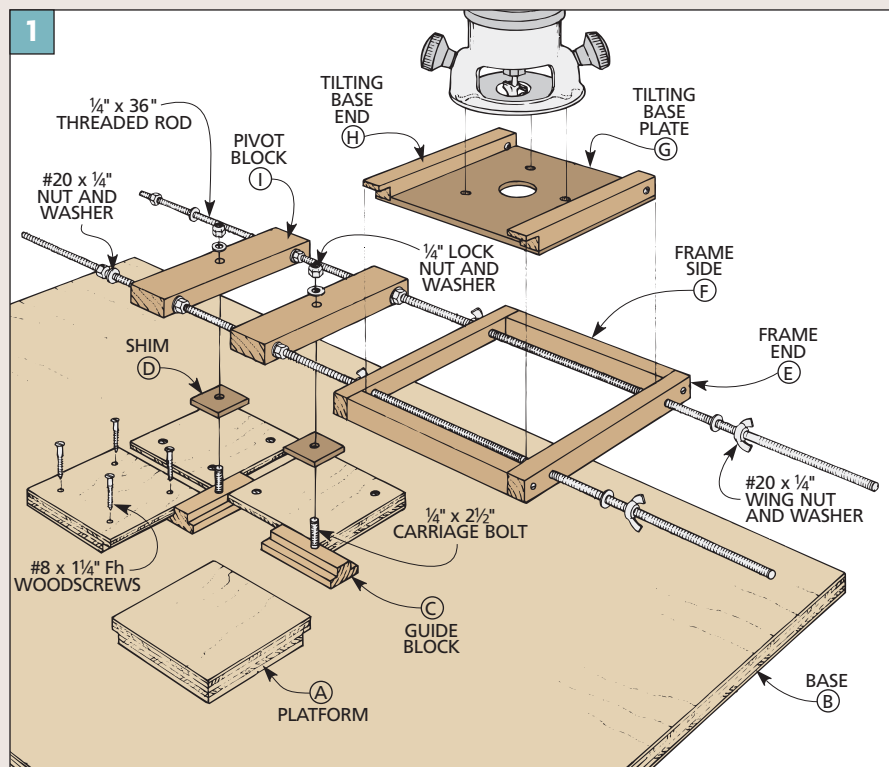
that swings up and down to allow easier access to the router's collet. It also lets you gradually lower the bit into the workpiece at the start of each pass.

MATERIALS. Because many of the pieces on the jig either rotate or slide, I used hard maple for most of the parts. The exceptions are the base and trammel platform ($\frac{3}{4}$ "-thick plywood) and some $\frac{1}{4}$ " hardboard for the tilting base plate and a pair of shims (for routing pieces of different thickness). The hardware should be available at most hardware stores or home centers.

TRAMMEL PLATFORM

When designing this jig, a major consideration was the size of the frame.

The trammel platform has to be small enough to fit inside a glued-up blank. But it also has to be large enough so there will be plenty of track for the guide blocks (C) to travel in (*Fig. 1*).



MATERIALS LIST

TRAMMEL

A Platform (1)	$\frac{3}{4}$ ply - 11 $\frac{3}{8}$ x 11 $\frac{3}{8}$
B Base (1)	$\frac{3}{4}$ ply - 36 x 48
C Guide Blocks (2)	$\frac{3}{4}$ ply - 1 $\frac{1}{2}$ x 4
D Shims (2)	$\frac{1}{4}$ x 2 - 2
TRAMMEL ARM	
E Frame Ends (2)	$\frac{3}{4}$ x $\frac{3}{4}$ - 10 $\frac{1}{2}$
F Frame Sides (2)	$\frac{3}{4}$ x $\frac{3}{4}$ - 8 $\frac{3}{4}$
G Tilting Base Plt. (1)	$\frac{1}{4}$ hdbd. - 8 $\frac{3}{4}$ x 8 $\frac{1}{2}$
H Tilting Base Ends (2)	$\frac{5}{8}$ x $\frac{3}{4}$ - 8 $\frac{1}{2}$
I Pivot Blocks (2)	$\frac{3}{4}$ x 2 - 8 $\frac{1}{2}$

HARDWARE SUPPLIES

- (20) No. 8 x $1\frac{1}{4}$ " Fh woodscrews
- (2) $\frac{1}{4}$ " x 36" threaded rods
- (4) No. 20 x $\frac{1}{4}$ " wing nuts
- (8) No. 20 x $\frac{1}{4}$ " nuts
- (14) $\frac{1}{4}$ " washers
- (2) $\frac{1}{4}$ " x 2 $\frac{1}{2}$ " carriage bolts
- (2) $\frac{1}{4}$ " lock nuts

Note: The following measurements work for the Oval Mirror beginning on page 46. But they will also work for similar-sized frames.

PLATFORM. The trammel platform (A) is cut from a piece of $\frac{3}{4}$ "-thick plywood (Fig. 2). After the blank is cut to size, the next step is to cut the track for the guide blocks.

Here, I took a slightly different approach. Instead of cutting the track in a large "X" across the blank, I first cut $\frac{3}{8}$ " rabbets on all four edges of the blank (Fig. 2a). Then I cut the blank into four equally sized squares (Fig. 3).

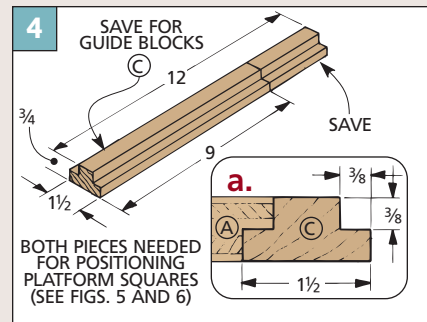
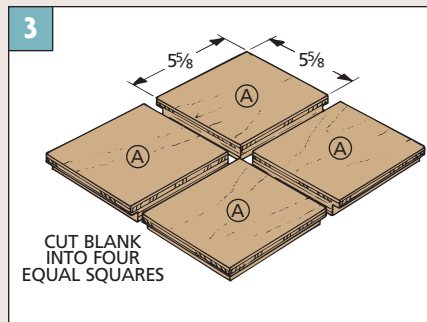
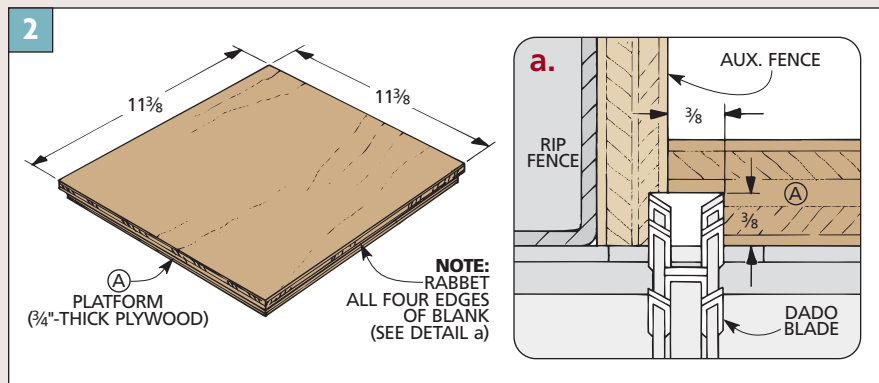
Now comes the different approach. I turned the four squares so the rabbets faced in. The rabbeted edges then create the tracks.

ALIGNMENT BLOCKS. To help align the squares on a base (B), first you cut a 12"-long rabbeted blank (Fig. 4). (Later, this blank becomes the guide blocks.) Then cut the blank into two separate alignment blocks (Fig. 4).

MOUNTING. To mount the platform, first cut a base (B) from $\frac{3}{4}$ "-thick plywood and draw alignment marks on the base (Fig. 5). Now position the first square on the alignment marks and screw it in place (Fig. 6).

Butt the shorter of the two alignment blocks up against the square and screw another square to the base with the block snug between the squares (Fig. 6).

To complete the platform, screw



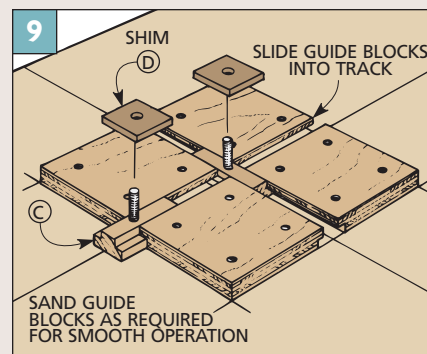
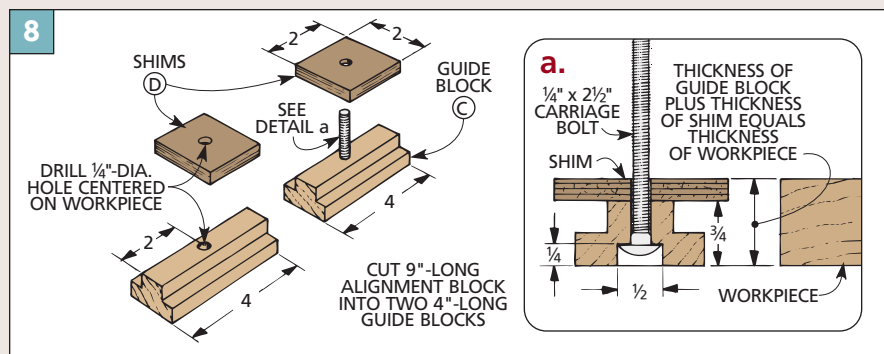
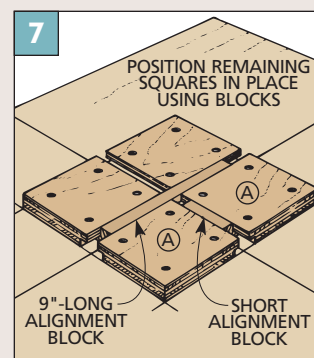
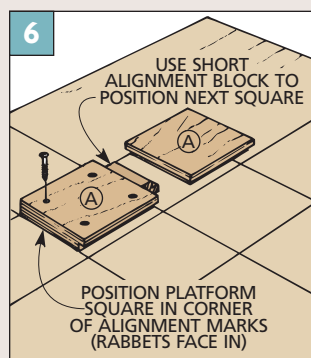
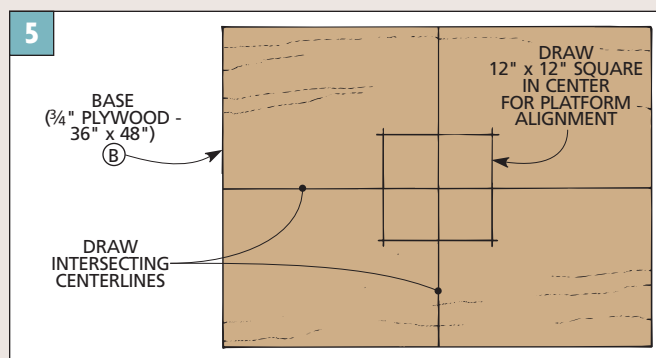
down each of the last squares in the same manner (Fig. 7).

GUIDE BLOCKS AND SHIMS. To make the guide blocks (C), cut the alignment block into two 4"-long pieces (Fig. 8).

Then drill a centered and counter-bored hole through each of these guide blocks for a carriage bolt (Fig. 8a). Now you can just slide the guide blocks into the track.

Note: If the guide blocks are too tight in the track, you can lightly sand them as needed for smooth operation.

When routing a frame that will be thicker than $\frac{3}{4}$ ", you'll need to shim up the trammel arm so that it rides flat on the surface of the workpiece being routed. For the Oval Mirror, I needed to place $\frac{1}{4}$ "-thick shims (D) on the guide blocks (Figs. 8 and 9).



TRAMMEL ARM

After the platform is complete, the next part to start working on is the trammel arm. This arm consists of a router carriage and two pivot blocks connected by threaded rods (refer to *Fig. 14*). The carriage supports the router and the pivot blocks determine the shape of the oval. I started on the carriage.

CARRIAGE. When routing an oval frame with a detailed profile, router bits need to be changed frequently. To make this a quick process, the carriage is designed so that it can be tilted up — making it a lot easier to get to the collet.

The carriage is actually a frame with a tilting base to hold the router. To build it, start by cutting two ends (E) and two sides (F) from $\frac{3}{4}$ "-thick stock (*Fig. 10*).

Next, to accept the threaded rods, drill $\frac{1}{4}$ " holes near the ends of each frame end (E). Also drill countersunk holes for the screws that hold the frame together.

TILTING BASE. After the frame is screwed together, a tilting base plate (G) can be cut to size from $\frac{1}{4}$ "-thick hardboard (*Fig. 11*).

To support the base plate within the frame, cut two tilting base ends (H) to size (*Fig. 11*). Drill a $\frac{1}{4}$ "-dia. hole for a threaded rod near one end of each piece.

Note: The hole is located $\frac{1}{8}$ " up from the bottom of the base end — it's not centered on the thickness.

Finally, the base ends can be glued to the plate. But first, to keep the bottom of the plate flush with the bottom of the carriage frame, rout rabbets along two edges of the plate (*Fig. 11*). Then glue the base ends to the plate.

BIT AND MOUNTING HOLES. Now remove the plastic base from your router, and use it as a template to locate the bit and screw holes for mounting your router to the jig (*Fig. 12*).

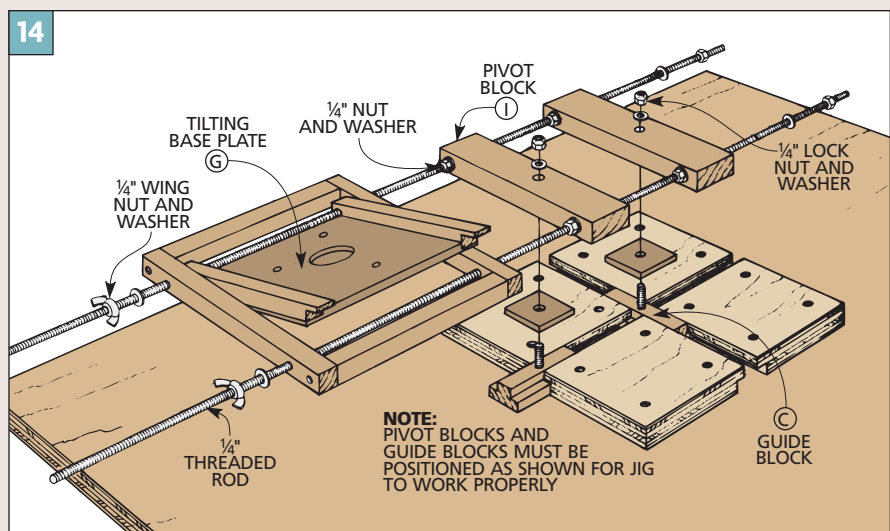
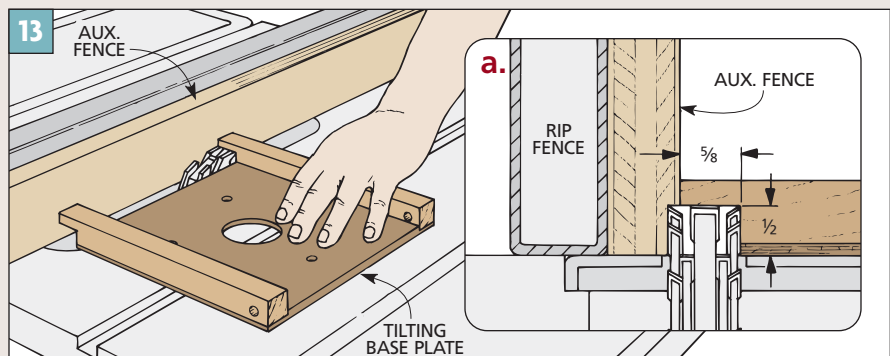
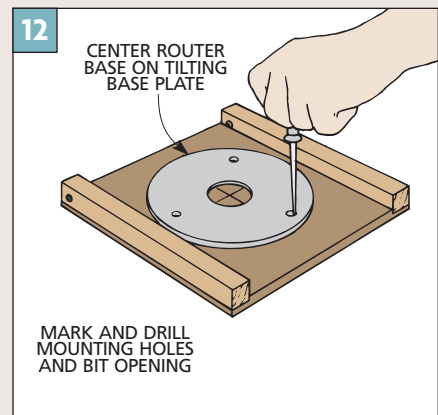
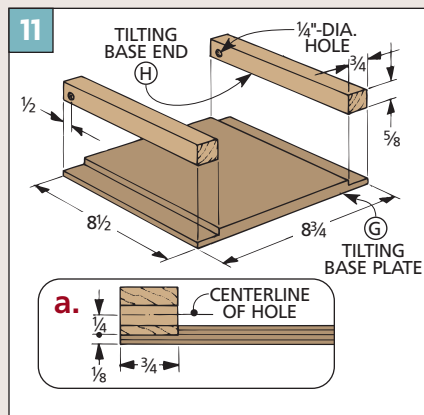
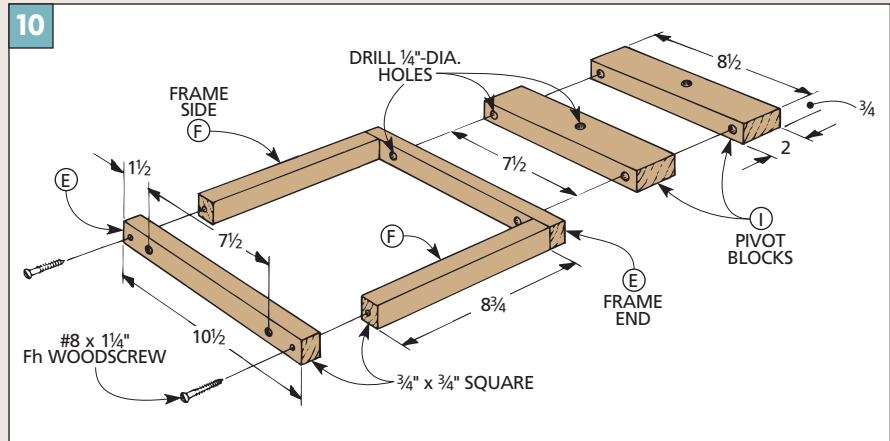
NOTCH THE BASE. After the holes are drilled in the base plate, there's one last step on the tilting base before it's complete. To allow it to sit down on the threaded rod (*Fig. 14*), a notch has to be cut at one end of each base end (H).

To do this, I cut a rabbet on the edge opposite the $\frac{1}{4}$ " hole (*Fig. 13*).

Note: You'll remove some of the hardboard base plate when doing this.

PIVOT BLOCKS. The last parts to make for the trammel arm are the pivot blocks (I) (*Figs. 10 and 14*).

After cutting the blocks to size, drill a hole in the center and two holes through the side of each block (*Fig. 10*).



Note: The holes in the sides must align with the holes in the frame ends (E).

ASSEMBLY. Finally, assemble all the wood parts, hardware, and threaded rods for the trammel arm (Fig. 14). Once the arm is completely assembled, attach the pivot blocks to the guide blocks with washers and lock nuts.

SETTING UP THE JIG

One thing I like about this oval-cutting jig is that it can be used to cut ovals of different shapes and sizes. The same jig can be used to cut several combinations of tall, short, wide, or narrow ovals. It all depends on how you set it up.

When setting up the jig for a particular shape, the distance between the front pivot block and the router bit

(shown as $12\frac{1}{2}$ " in Fig. 15) determines the *width* across the oval. And the distance between the back pivot block and the bit (shown as $18\frac{1}{2}$ " in Fig. 15) determines the *length* across the oval.

AN EXAMPLE. The key setup measurements for the jig are obtained from the dimensions of the oval frame you want to make. With the Oval Mirror, the overall dimensions of the frame are 25" wide and 37" long.

The first step is to calculate the *shape* of the oval. To do this, first divide both the width and length by two. This gives you the minor and major radii of the oval. (The minor radius is $12\frac{1}{2}$ " and the major radius is $18\frac{1}{2}$ " for the Mirror.) Then subtract the smaller number from the larger number to come up with the *radius differential*. (In this case, it's 6".)

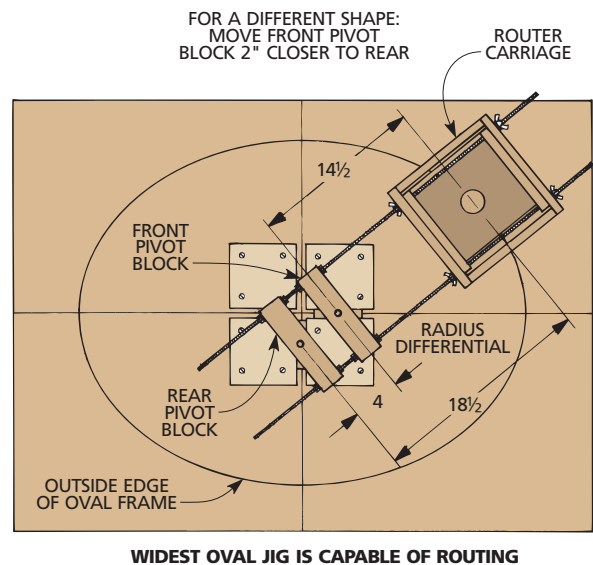
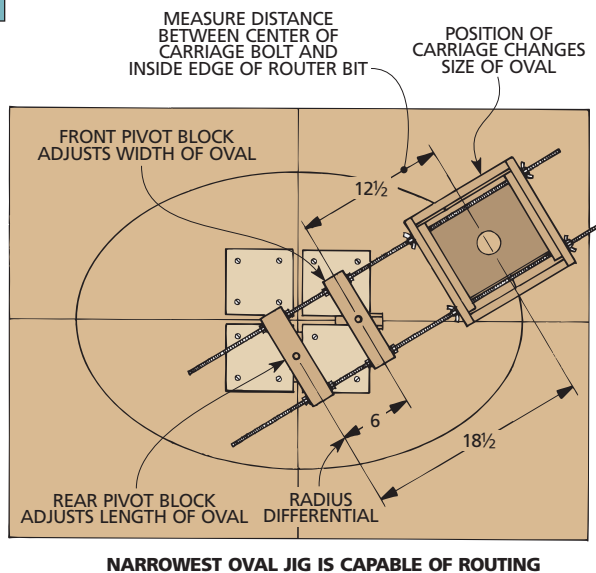
Now adjust the pivot blocks so they're the same distance apart as the radius differential (6") (see Fig. 15 and Adjusting The Trammel below).

The last step is to adjust the jig for the *size* of the oval. To do this, move the router carriage so the distance between the inside edge of the router bit and the center of the front pivot block equals the radius of the width ($12\frac{1}{2}$ "). (Measure from the center of the carriage bolt in the front pivot block.)

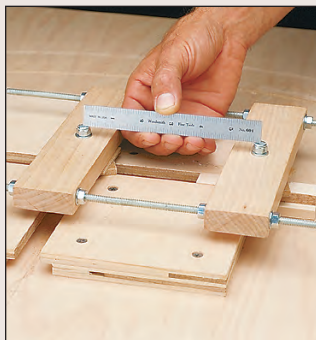
DIFFERENT FRAMES. If you're designing an oval frame that's significantly different from the Oval Mirror, keep in mind the limitations of a jig built with the dimensions shown here. It can only cut a certain shape and size frame.

The shape of the oval is limited to a radius differential of 4" to 6" (Fig. 15).

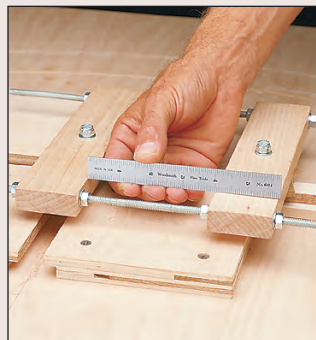
15



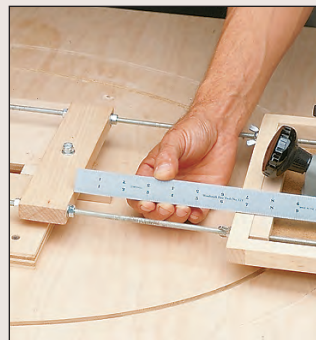
ADJUSTING THE TRAMMEL



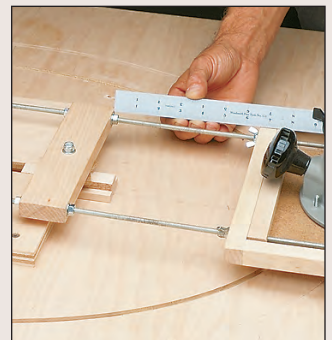
1 When setting the radius differential, make sure to use the distance between the centers of the carriage bolts.



2 Once the radius differential is set, measure distance between the pivot blocks to make sure they're parallel.



3 To rout frames with complex profiles, the carriage must be moved back and forth along the threaded rods.



4 So if the carriage and pivot block are not parallel to each other, you'll need to adjust the trammel again.

Mantel Clock

At first, your eye will be drawn to the handsome, molded top of this clock. But the sound of the chimes tells you there's much more. A look through the glass sides reveals an intricate brass clock movement.



Ever since I was a kid, clocks have always held a certain fascination for me. I think it has something to do with watching all those gears and levers move in harmony, ticking off the seconds and striking away the hours. The problem is that with most clocks, the mechanism is hidden inside a case. To me, that's like looking at an automobile without being able to open the hood.

That's why I like this clock. The sides are glass so you can see right in to the brass clock movement inside. And a glass door at the front of the clock protects the dial but still opens, allowing you to wind the clock and adjust the hands.

But there were other details about this clock that got me excited about building one. Take the top of the case, for example. It looks like a thick, solid piece of wood with complicated profiles molded on the edges. But in reality, it's made up of three pieces. And the profile is created with just a router table and some commonly available router bits.

TRADITIONAL STYLE. And since the top isn't one solid piece, it's easy to customize the Mantel Clock for a simpler, more traditional look. See the Designer's Notebook on page 65 for more on this.

QUARTZ MOVEMENT. Another option is to build the clock with a battery-pow-

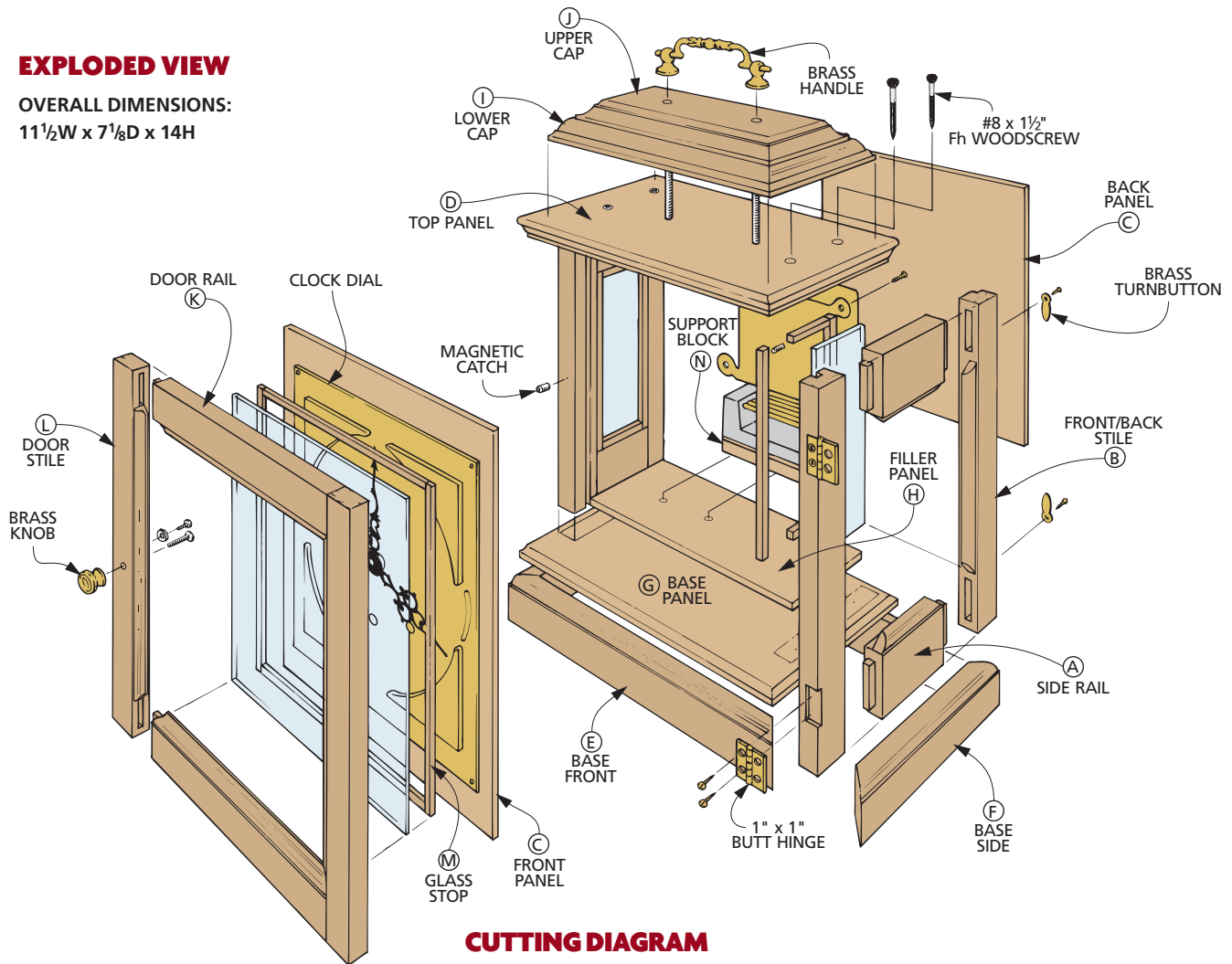
ered quartz movement. It's less expensive and you don't ever have to worry about winding it. And because there isn't much to look at, walnut plywood panels are substituted for the glass in the sides (see the Designer's Notebook on page 61).

HARDWARE. For sources of clock works and hardware, see page 126.

EXPLODED VIEW

OVERALL DIMENSIONS:

11½" W x 7⅞" D x 14" H

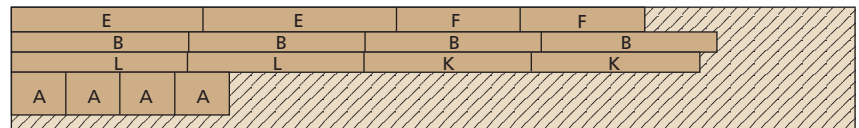


CUTTING DIAGRAM

¾ x 7 - 48 WALNUT (2.33 Bd. Ft.)



¾ x 7 - 48 WALNUT (2.33 Bd. Ft.)



NOTE: CUT PARTS M FROM WASTE. ALSO NEED ONE 2' x 2' SHEET OF ¼" WALNUT PLYWOOD FOR FRONT, AND FILLER PANELS.

MATERIALS LIST

WOOD

A Side Rails (4)	¾ x 2 - 3¼
B Front/Back Stiles (4)	¾ x 1¼ - 9⅞
C Front/Bk. Panels (2)	¼ ply - 8⅞ x 9⅞
D Top Panel (1)	¾ x 6⅞ - 11¼
E Base Front/Back (2)	¾ x 1½ - 11½
F Base Sides (2)	¾ x 1½ - 7⅞
G Base Panel (1)	¾ x 6⅞ - 10⅞
H Filler Panels (2)	¼ ply - cut to fit
I Lower Cap (1)	¾ x 5¾ - 10⅞
J Upper Cap (1)	¾ x 4 - 8⅞

K Door Rails (2)	¾ x 1¼ - 9
L Door Stiles (2)	¾ x 1¼ - 9⅞
M Glass Stop (1)	⅞ x 5⅞ - 56
N Support Block (1)	½ x 3 - 3

HARDWARE SUPPLIES

(4) No. 2 x ¼" Rh brass woodscrews
(4) No. 4 x ⅝" Rh brass woodscrews
(4) No. 8 x 1¼" Fh woodscrews
(8) No. 8 x 1½" Fh woodscrews
(32) No. 18 x ⅝" wire brads

(1) Triple-chime movement
(1) 7⅞"-dia. punched dial
(1 pr.) 3"-long serpentine hands
(1) 4½" ant. br. hdl. w/ thrd. studs & nuts
(1) ½"-dia. antique brass knob
(1) Mini brass knob
(1 pr.) 1" x 1" antique brass hinges
(1) ⅝"-dia. magnetic catch
(4) ⅝" brass turnbuttons
(2) ⅞" glass panels (sides) - 2⅞" x 6¼"
(1) ⅞" glass panel (front) - 7⅞" x 7⅞"

SIDES

I thought the beautiful brass movement of this Mantel Clock shouldn't be hidden. So to focus attention on the mechanical workings of the clock, I added glass panels to the sides of the case. This gives a clear view inside.

I built the clock from the center out. In other words, I started with the side assemblies, then added the front and back panels, and sandwiched all of this between the top and bottom panels.

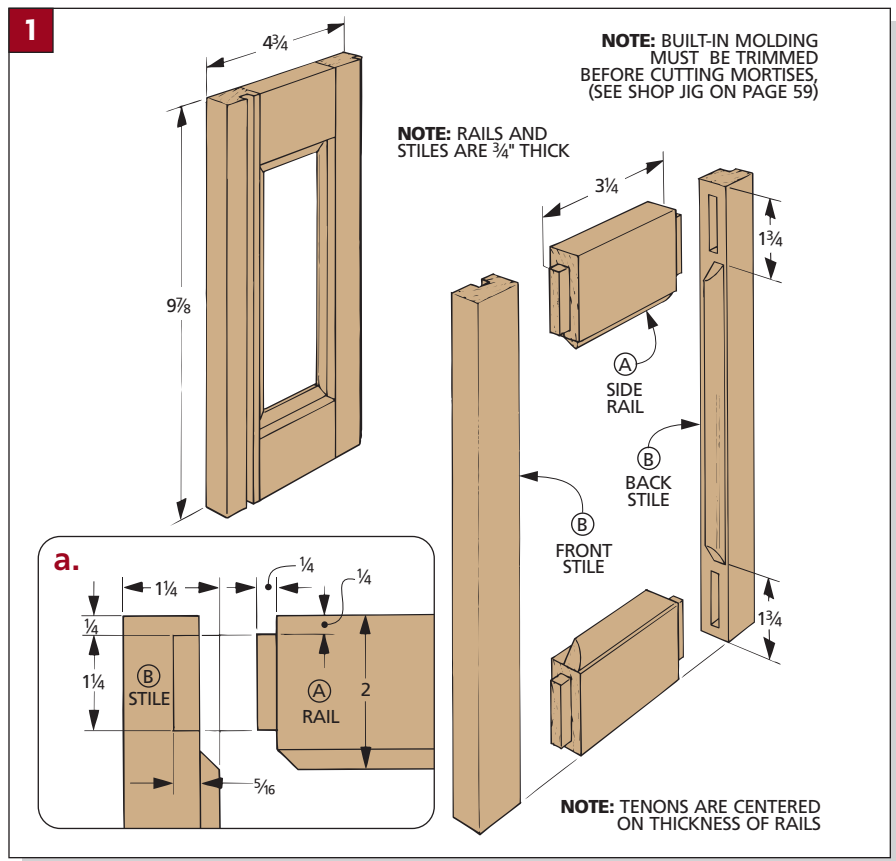
The sides of the clock are made up of rails and stiles joined by ordinary mortise and tenon joints. At first glance, it really doesn't look very fancy.

But, since each of the workpieces that make up the sides are small, I decided to add molded edges around the rails and stiles. This way, the inside edges of the rails and stiles create a "frame" around the glass.

Because of the way the molding is made, this also means that you'll have to do a little trimming and fitting to get the pieces to fit together. Plus you'll need to add stops on the inside to hold the glass. But all of that comes later.

RAILS AND STILES. To start, I cut the blanks for the rails (A) and the stiles (B) to width from $\frac{3}{4}$ "-thick stock (Figs. 1 and 1a). I left the blanks slightly longer than needed for the time being.

Then the molded edge is created on the router table (Figs. 2 and 2a). Set the fence so that it aligns with the outside edge of the pilot bearing of a $\frac{1}{4}$ " roundover bit, raising it enough to leave a $\frac{1}{16}$ " shoulder on the workpiece.

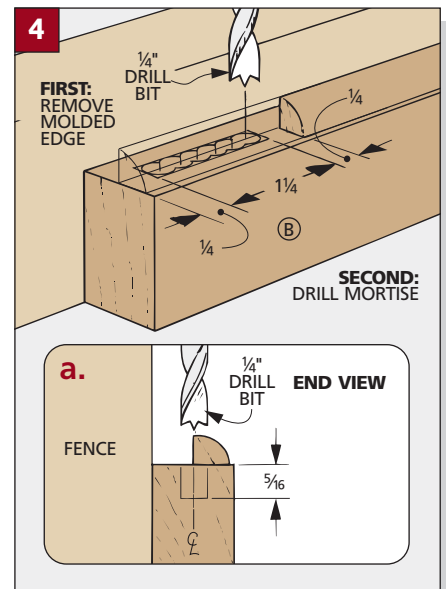
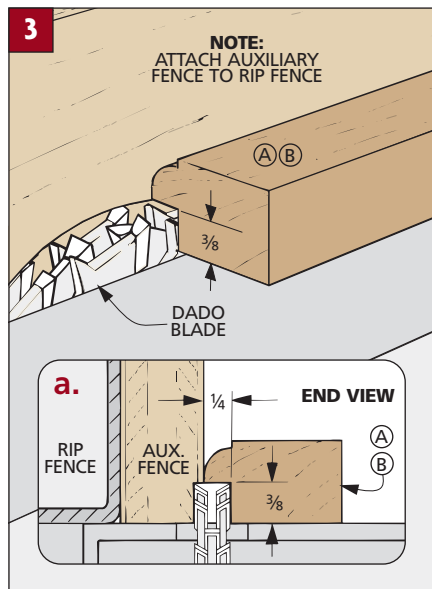
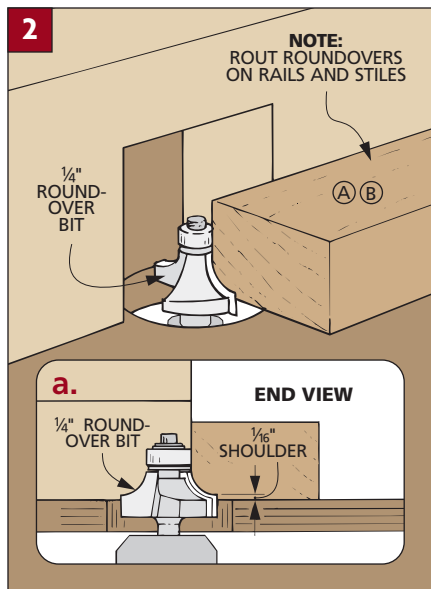


To make the rabbet that holds the glass, I switched to the table saw. Using a $\frac{3}{8}$ " dado blade buried slightly in an auxiliary fence, I was able to cut a nice, clean rabbet to the back edge of the molding (Figs. 3 and 3a).

TRIM MOLDING. Now that all the roundovers and rabbets have been completed, you can trim the rails and stiles to finished length (Figs. 1 and 1a).

Before you can start working on the mortise and tenon joints, however, there's another detail to tend to.

In order to allow the rails to fit tightly against the stiles, you'll have to trim off part of the molded edges at the ends of each stile. (Later on, some more trimming will be done to the molding edges, so I left just enough extra here to create a small miter.)

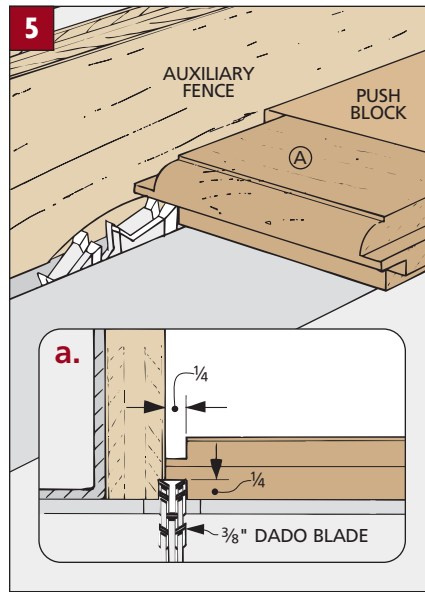


Trimming the built-in molding can be done with a table saw by making several passes over a dado blade. But I wanted a shoulder that wouldn't take a lot of time to clean up, so I used the table saw and a simple jig that holds the workpiece upright while making the cut. For more on how to do this, see the Shop Jig below.

MORTISES. After the molding on the stiles has been trimmed, I went to the drill press and removed the bulk of the waste for the mortises. Then I used a sharp chisel to square the ends and clean up the sides of each of the mortises (*Figs. 4 and 4a*).

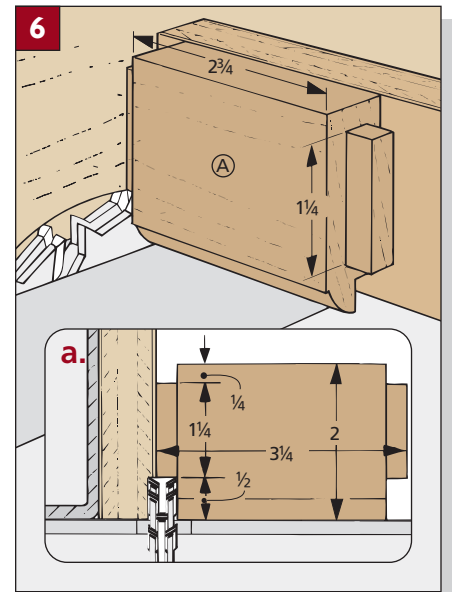
TENONS. With the mortises made, you can now cut the tenons on the rails to fit (*Figs. 5 and 5a*). Again, I used a dado blade — partially buried in an auxiliary fence on my table saw — to make these cuts.

Note: I used a scrap piece of plywood as a push block while cutting the tenons. The push block supports the small workpieces when cutting the tenons, and also helps prevent tearout on the back side of the cut.



One other thing — on these pieces you don't have to worry about trimming back the molded edges on the rails, since they will be removed when you cut the tenon shoulders (*Figs. 6 and 6a*).

Finally, there is some trimming to be done before the mortise and tenon



joints can actually be fitted together. As I mentioned earlier, the ends of the molded edges must be mitered at 45° to allow the rails and stiles to fit together. To miter these edges, I made a simple jig. (For more on this jig, see the Shop Jig on page 60).

SHOP JIG

Tenon Jig

Both the side and door frames on the Mantel Clock feature mortise and tenon construction with built-in moldings (see the photo on page 56). But before you can cut the mortises, part of the built-in molding has to be removed.

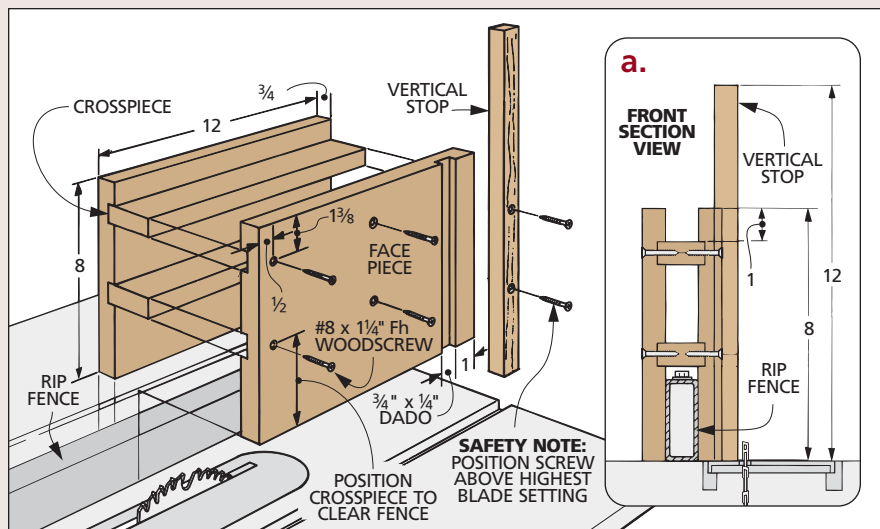
I could've done this by making multiple passes with a dado blade, but this

would've left score lines. So to get a clean shoulder, I used a tenon jig, standing the pieces on end (see photo below).

The tenon jig used here consists of two face pieces and two crosspieces. (I used medium-density fiberboard, also known as MDF.) The crosspieces are sized so the jig slides easily along the

fence without any slop (see drawing). (I cut dadoes in the face pieces to make it easy to assemble the jig.) Then I added a vertical stop along the back edge to support the workpiece and keep it square to the table.

Usually when cutting tenons, I place the face of the workpiece against the face of the jig. But to cut away the built-in molding, you'll need to set the outside edge of the piece against the face of the jig. It's also a good idea to sneak up on the cut so you don't leave any saw marks on the workpiece.



Even after you've cut the mortises and tenons for the Mantel Clock sides (and door), these pieces still won't fit together. That's because the built-in molding along the inside edge needs to be mitered (*Fig. 1*).

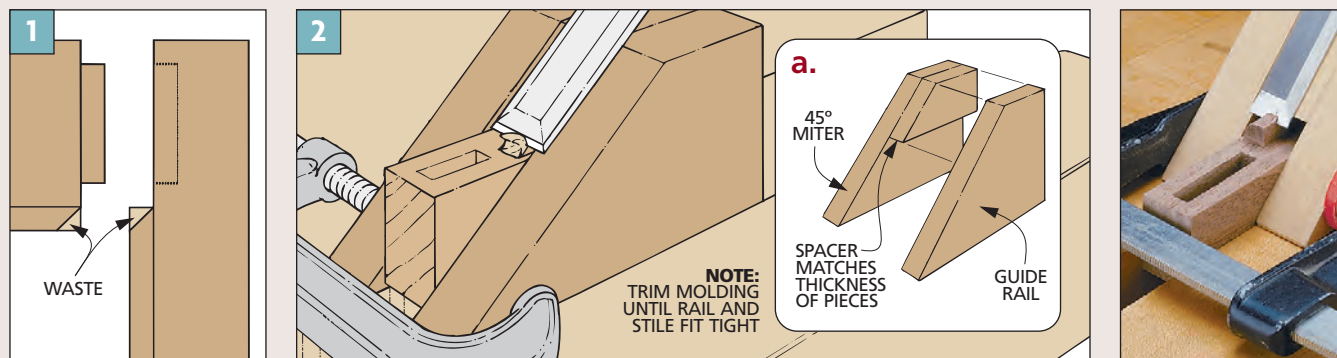
The secret to doing this without marring the workpiece is a simple, shop-made jig (*Fig. 2*). It fits over the pieces and guides your chisel as you miter the ends of the molding.

The jig is easy to make using $\frac{3}{4}$ " MDF — there are only three parts (*Fig. 2a*). First, a spacer is glued between two guide rails. This forms a pocket for your pieces to fit into. Then the jig is mitered on one end. About the only thing critical for the jig is that the spacer matches the thickness of the pieces you're trimming.

To use the jig to miter the molded edges, simply set it over a frame piece

and clamp it in place (*Fig. 2*). Then secure the workpiece into a bench vise.

Now you can carefully pare the molding with a sharp chisel. To do this, hold the chisel flat against the mitered center portion of the jig, then slice down until you have cut away a small piece of the molding. The goal is for the rails and stiles to fit together tight. So it's a good idea to sneak up on the cut so you don't end up with a gap.



GROOVES FOR PANELS. The time you spend fitting the mortise and tenon joints will pay off in the next step — gluing the side pieces up to create two “frames.” Once this is done, you can start making the grooves for the front and back panels that will connect the two sides.

Setup for these grooves is very simple. Start by mounting a $\frac{1}{4}$ " dado blade in the table saw and adding a groove near the front edge of each frame to hold the $\frac{1}{4}$ "-thick plywood front panel (*Fig. 7a*).

Then change to a $\frac{3}{8}$ " dado blade, and once again use an auxiliary fence to hide a portion of the blade. Now a

rabbet can be cut along the back edge of each frame to hold the $\frac{1}{4}$ "-thick plywood back (*Fig. 7*).

HINGE MORTISES. Once that is complete, the next step will be to cut the mortises for the hinges (*Fig. 8*). It's true that the door will be one of the last parts added to the clock, but it's a lot easier to cut the mortises for the door hinges at this stage, before the sides are sandwiched between the top and bottom assemblies.

To do this, I clamped one of the sides in a woodworking vise and used one of the hinges as a template for laying out the mortises. Then I carefully chiseled out each mortise.

FRONT & BACK PANELS

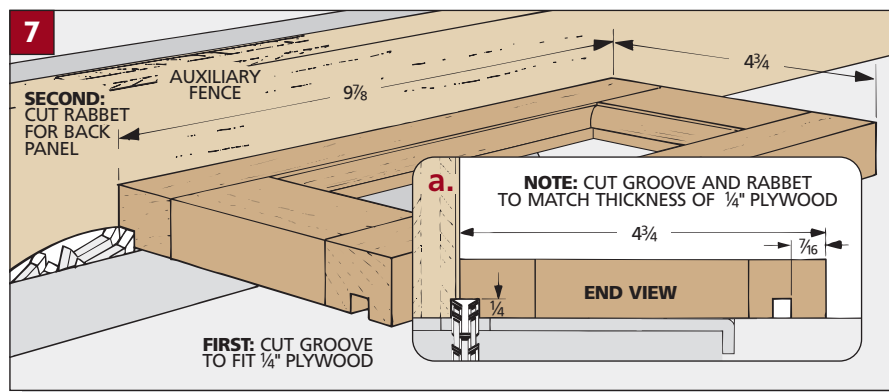
The two side frames are connected by two $\frac{1}{4}$ " plywood panels (C) (*Fig. 8*). Both panels are identical in size, but the front panel has several holes drilled in it to accommodate the hand shaft and winding arbor for the clock movement.

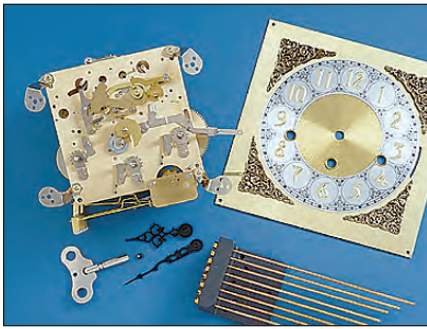
Note: My clock works had a stem for the hands, stems to adjust the time, and a key hole for winding the spring. There is also a slot for a lever used to select one of three different chimes.

I used a pre-punched dial face to lay out the holes in the front panel. (For sources of dials that are pre-punched, see page 126.) Laying out the holes in the front panel is just a matter of centering the clock dial on the plywood panel, screwing it in place, and then marking out the hole locations (*Fig. 8a*). Then with the dial removed, drill the holes slightly oversize. (This allows for some adjustment later on.)

To make the slot on the right side of the dial for the chime selector lever, I simply drilled a series of overlapping holes and then used a small file to clean up the edges (*Fig. 8*).

If you have difficulty locating a dial that is pre-punched, you'll need to use

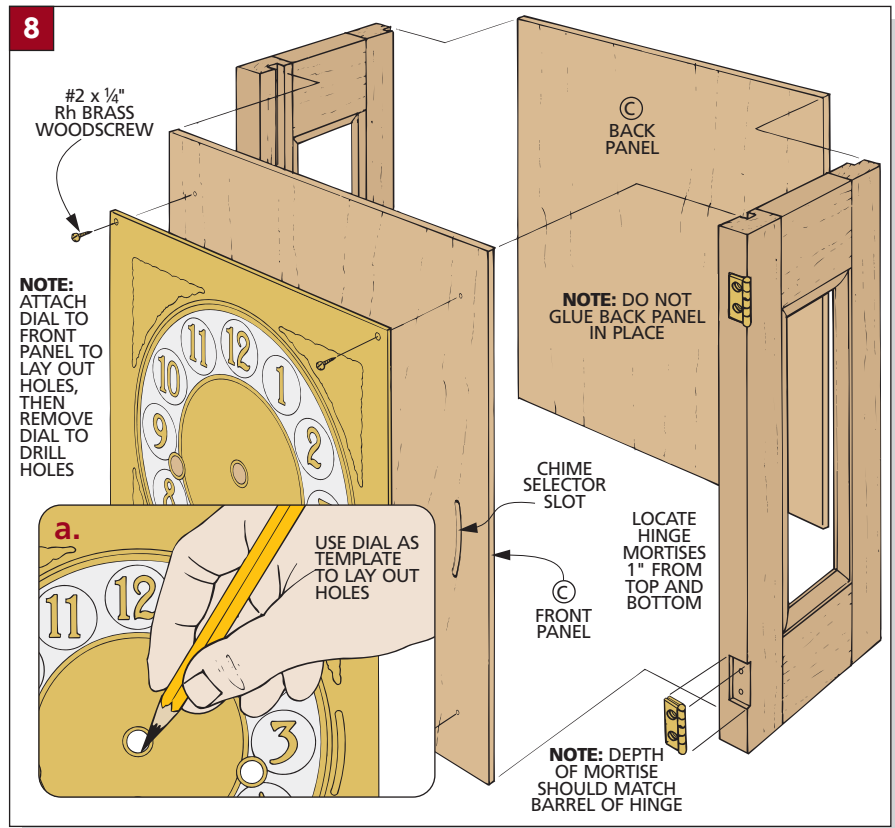




Using the mechanical movement with your clock, requires a key, pre-punched dial, and chime rods. Also needed are clock hands and hardware.

the actual clock works as a template to lay out the holes and slot on the back of the dial first. (Sources for clock works can be found on page 126.) Then carefully drill and file the holes in the dial.

ASSEMBLY. To assemble these pieces, glue the front panel into the grooves cut on the side frames. The back panel doesn't get glued to the sides, but I did set it in place just to keep everything square. A couple of band clamps will hold the pieces while the glue dries.



DESIGNER'S NOTEBOOK

A quartz movement and plywood panels make this version of the clock much more affordable.

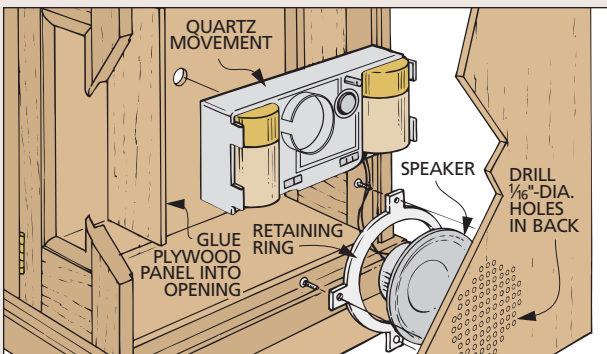


CONSTRUCTION NOTES:

- Should you plan on using a quartz movement in your clock, there are a couple of things you need to know before you start building.
- For one thing, since quartz movements don't need winding, you'll only need to make one hole in the front panel (for the hand shaft). It will also be much easier to find a clock face for this movement, since only one hole is necessary.
- Since there won't be very much to

look at inside the clock once the quartz movement is installed, the glass panels on the sides of the clock case can easily be replaced with plywood panels. These two 1/4"-thick panels are glued into the openings on either side, where the glass goes in the regular clock design.

- The quartz movement that I used has a separate electronic chip and speaker for the "chimes." In order to allow the sound from the speaker to "escape," I drilled a number of small (1/16"-dia.) holes in the back panel of the clock (see drawing). Then I mounted the speaker to the back panel using the screws and retaining ring supplied with the quartz clock movement.



Quartz Clock. The quartz movement shown has a speaker for authentic-sounding chimes. A dial face, clock hands, and mounting hardware are also needed to complete the project.

TOP & BASE

The sides, front, and back panels make up the “middle” of the clock. This assembly is then sandwiched between a base and a top.

TOP. The top of the clock looks like it might have been made on a shaper using a massive molding cutter. But it's actually built up out of three separate layers — a wide top panel and a two-piece cap. And the profile is made with a series of router bits (five in all). To start, I made the top panel and base assembly, since they're attached to the sides of the clock. Later, I added the cap.

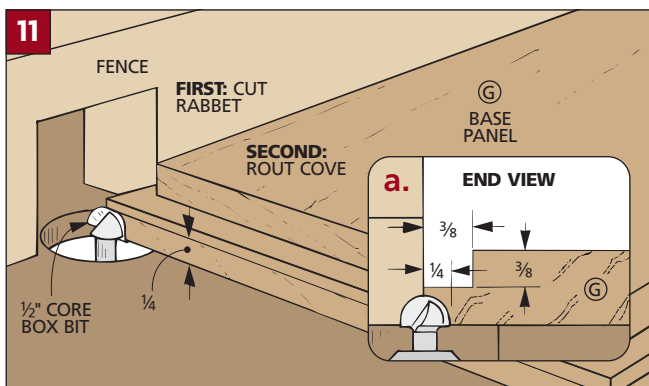
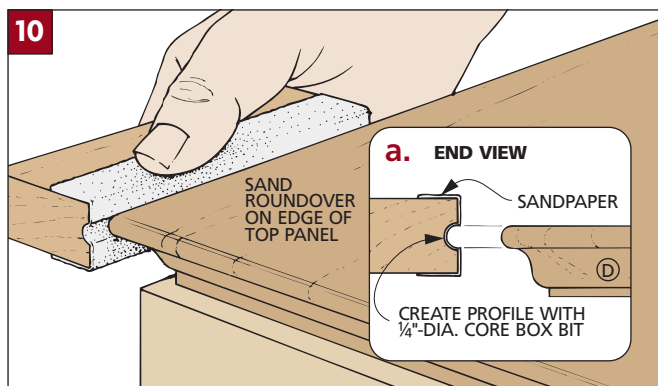
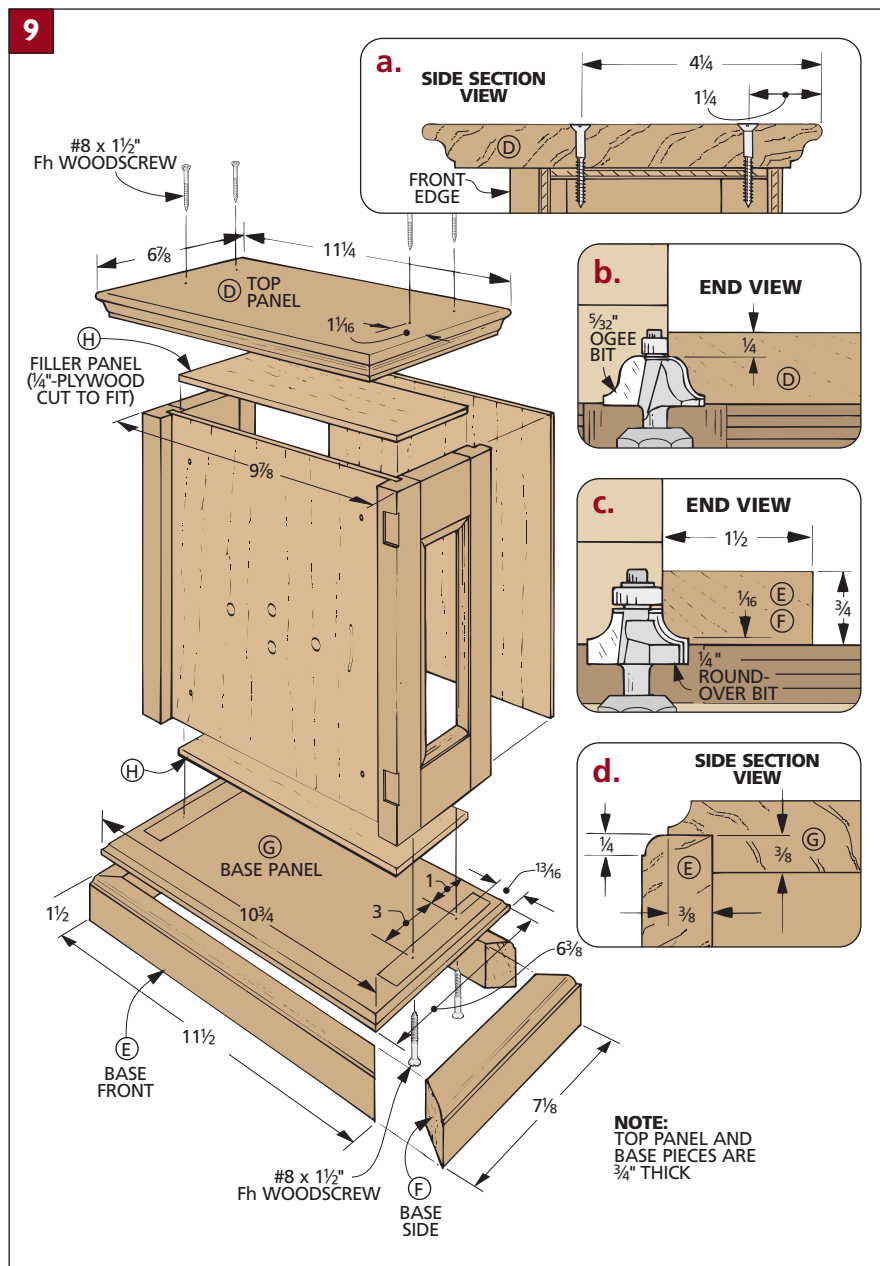
The top panel (D) is just a piece of $\frac{3}{4}$ "-thick stock with $\frac{5}{32}$ " ogees routed on all four edges (Figs. 9 and 9b). The challenge here is to rout the edges without any chipout. And to help with this, it's best to start by routing the ends of the panel first.

I also used a router to create the rounded lip above the ogee that was added to the top panel. But instead of routing the workpiece, I used a $\frac{1}{4}$ "-dia. core box bit to make a sanding block. Then I simply rounded over the lip with sandpaper (Figs. 10 and 10a). Once that was done, I screwed the top panel to the sides of the clock (Fig. 9a).

BASE. Like the top panel, the base panel is also a piece of $\frac{3}{4}$ "-thick stock. But this panel is supported by a frame made up of four pieces. Together, the frame and base panel create a raised “platform” for the clock.

I started by making the base frame. The base front/back (E) and base sides (F) are cut from a single long blank. The blank is ripped to width and then one edge is rounded over, leaving a small $\frac{1}{16}$ " shoulder (Fig. 9c).

Next, the individual base pieces are mitered to length and glued up to make a base frame (Fig. 9).



To lock the base panel (G) into the base frame, rabbets are cut on all four bottom edges (Fig. 9d). Then a $\frac{1}{4}$ " cove

is routed on the top edge (Figs. 11 and 11a). After the panel is glued to the frame, the base is screwed to the sides.

FILLER PANELS. Before moving on to making the top caps, I glued a couple of filler panels (H) to the inside of the clock at the top and bottom (*Fig. 9*). These panels are cut to fit the inside of the clock. They serve as stops for the back panel.

CAP. All that remains to complete the case of the clock is to add the cap to the top of the clock. The cap is made up of two $\frac{3}{4}$ "-thick pieces, each with a different profile routed on its edge. The profiles look a bit complex, but again, a couple of router bits will do the job.

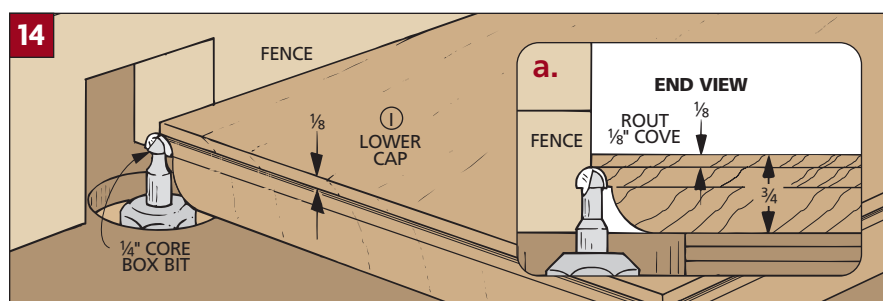
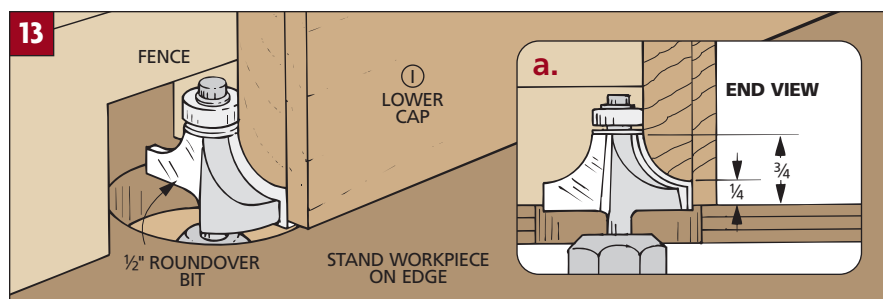
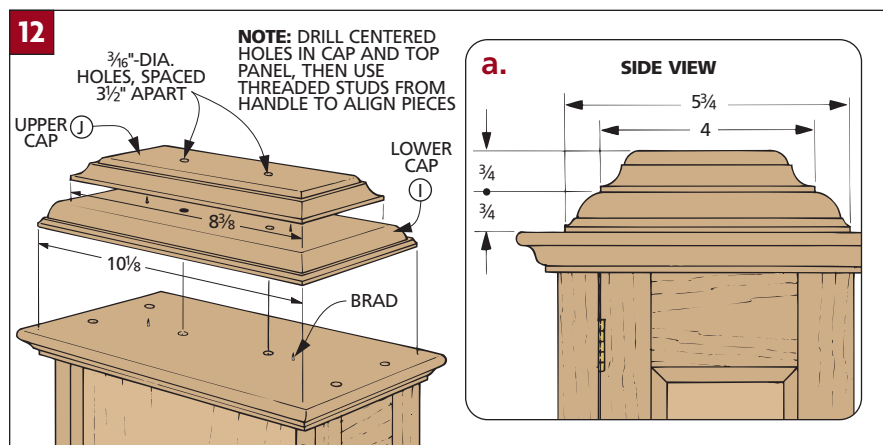
I made the lower cap (I) first (*Fig. 12*). The profile on this piece consists of a $\frac{1}{2}$ " roundover above a shallow cove. To make this profile, I cut the roundover first (*Figs. 13 and 13a*). In order to do this, you'll have to stand the workpiece on edge on the router table. To provide a little more support and to prevent the workpiece from tilting, I used the fence, even though the bit has a bearing.

After cutting the roundover, rout the cove using a $\frac{1}{4}$ " core box bit (*Figs. 14 and 14a*). This time you can place the workpiece down flat. But you'll still need to use the fence as a bearing surface.

UPPER CAP. The steps for routing the profile on the upper cap (J) are similar, but the bits are different sizes. A $\frac{3}{8}$ " cove is routed along each edge (*Figs. 15 and 15a*). Then a $\frac{1}{4}$ " roundover is routed on the top edge, again holding the workpiece on edge (*Figs. 16 and 16a*).

The overall thickness of the top of the clock is nearly $2\frac{1}{2}$ " (longer than most drill bits). Because of this, I decided to drill the holes for the handle of the clock before gluing the cap in place. I drilled a pair of holes in the upper cap, then transferred the hole locations to the lower cap and then to the top of the clock (*Fig. 12*).

ASSEMBLY. Assembling the caps is simply a matter of gluing them to the top of the clock, then centering them

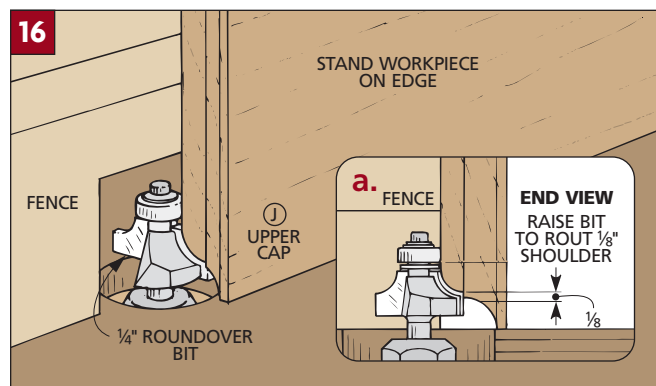
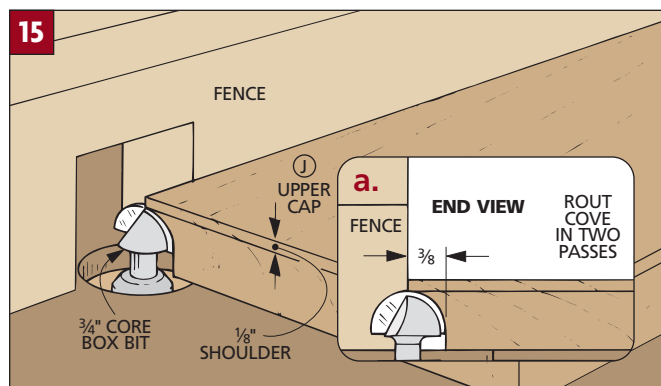


from side to side and front to back. But there's a couple of tricks to achieving a good result when doing this.

Before starting to glue the pieces together, stack them up and check the fit. If you can see gaps around the edges, the pieces aren't flat. To flatten them out, I placed a sheet of sandpaper on top of my table saw and lightly

sanded both sides of each cap (just like you would lap the sole of a hand plane).

When it was time to glue the pieces together, I used small brads to prevent the pieces from slipping under the pressure of the clamps. Just drive a few brads partially into the top of the top panel and the lower cap. Then snip off the heads, leaving about $\frac{1}{4}$ " of each brad (*Fig. 12*).



Now that the clock case is finished, all that's left is to build the door and add the glass, hardware, and clock movement.

The construction of the door is similar to the construction of the sides of the clock. The door rails (K) and stiles (L) each have a molded profile routed on the inside edge. And the rails are mortised into the stiles. But there are a couple of differences.

First, the molded profile is slightly different. Instead of a roundover, I routed an ogee on the edge of each door piece after cutting it to width (Fig. 17a).

Then after cutting the rabbets for the glass, the door pieces can be cut to finished length (Fig. 17).

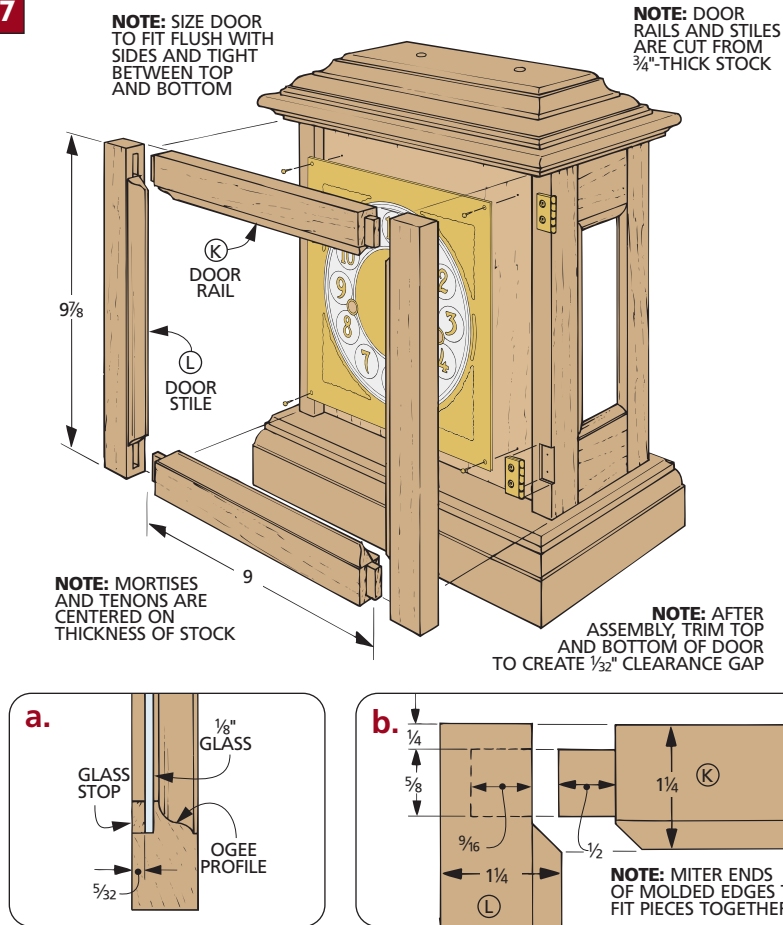
Note: I sized the door pieces to fit the clock opening exactly. Later, after the door is assembled, the top and bottom edges can be trimmed to create a gap.

The other difference is in the mortise and tenon joints. Because the door will be subjected to more twisting and racking than the sides of the clock, I made the tenons a bit longer (Fig. 17b). Otherwise, the mortise and tenon joints are made in the same manner. And like the rails and stiles on the sides, you'll have to miter the molded edges on the door pieces (Fig. 17b).

When the joinery is finished, the door can be glued up. (Make sure to check the door for square when clamping it together.)

GLASS STOPS. While the glue is drying, you can make the glass stops (M) for the glass panels in the door and

17

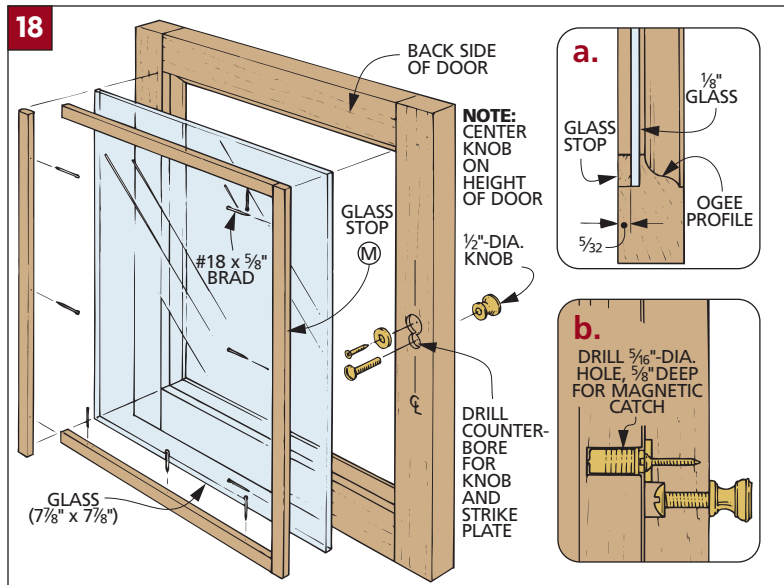


sides of the clock. These stops are $\frac{5}{32}$ " wide and $\frac{9}{32}$ " thick. After the pieces are cut to length, they are nailed in place behind the glass (Figs. 18 and 19). But since the pieces are so small and there isn't much room to work inside the

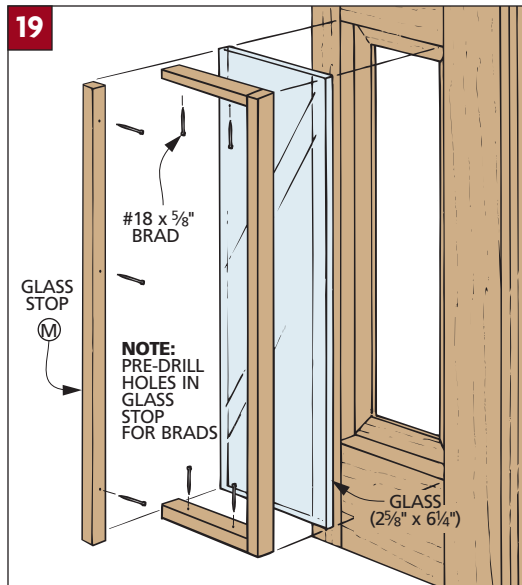
clock, I pre-drilled holes in the glass stops for the brads.

HANGING THE DOOR. With the glass in place, you're just about ready to hang the door. But there are a couple of things to take care of first.

18



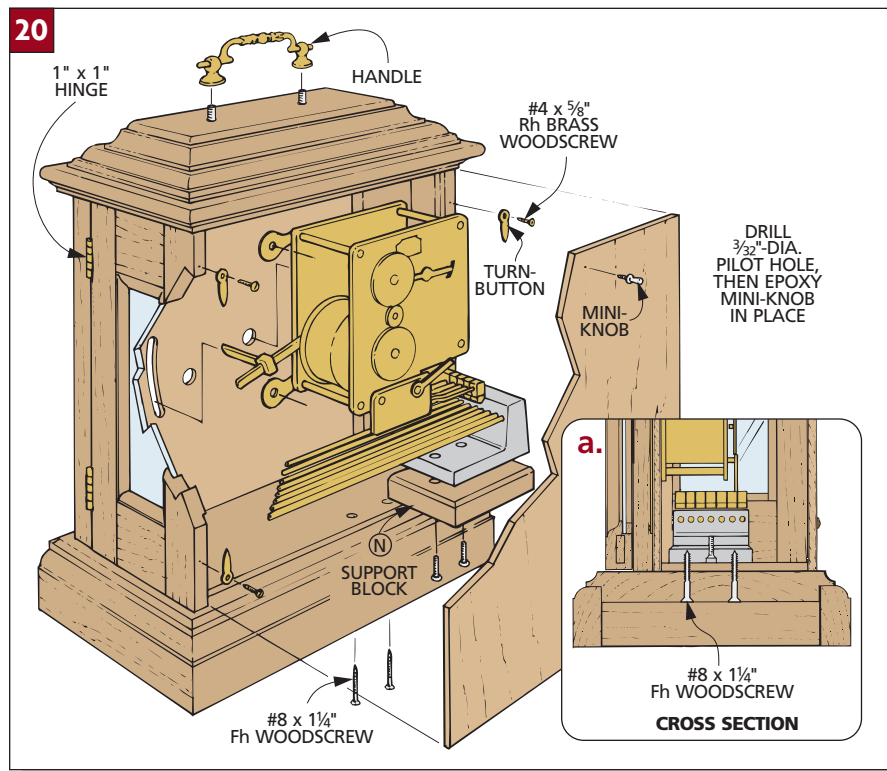
19



To start, you'll need to trim the top and bottom of the door to create a slight ($\frac{1}{32}$ ") gap between the door and the case of the clock. Second, you'll need to drill a couple of countersunk screw holes for the door knob and the strike plate of the catch (*Fig. 18b*). Once this is done, you can mount the hinges on the door and the side of the clock and then install the rest of the hardware — the door knob, magnetic catch, and handle.

INSTALLING THE MOVEMENT. Next, to install the clock movement, screw the dial to one side of the front panel and the movement to the other side (*Fig. 20*). When positioning the movement, check to see that the hand shaft and winding arbors are centered in the dial holes.

With the movement in place, set the chime rods inside the clock to determine their position. In order to raise the chime rods just below the level of the hammers, I had to make a chime rod support block (N). It's just a piece of stock cut to match the size of the chime rod base. I lightly chamfered the top edges of the block and then drilled a couple of countersunk screw holes on the underside of the block for the mounting screws. With the chime rods screwed to the block, I then screwed



the block to the bottom of the clock case from underneath the clock (*Fig. 20a*).

BACK. The back of the clock also gets some hardware. First, a mini-knob is

added to the back to make it easier to take on and off (*Fig. 20*). Then, four turnbuttons are added to the sides of the clock to hold the back panel in place. ■

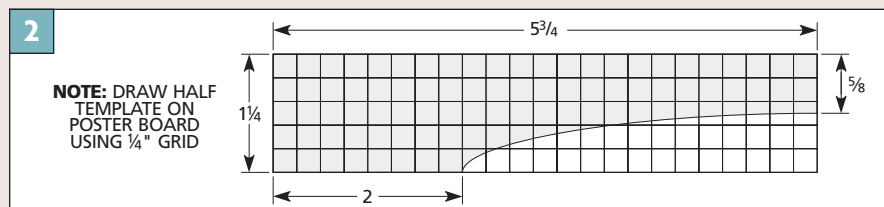
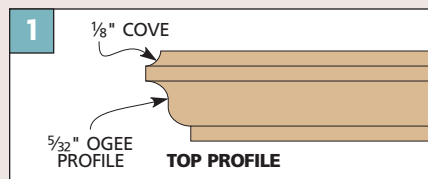
DESIGNER'S NOTEBOOK

Simplifying the top and curving the base of the clock gives it a cleaner, more traditional look.

CONSTRUCTION NOTES:

- Making this clean, traditional version of the clock is simple, but you could also change the movement or the type of glass in the sides to change the look.
- Build the side assemblies and front and back panels as before. Be sure to add the hinge mortises to the sides and drill holes for the clock works before adding the panels.
- The top panel (D) has the same ogee routed on the bottom edges, but now instead of adding the caps and handle, I routed a $\frac{1}{8}$ " cove in the top edge (*Fig. 1*).

- Lay out a curve on the base front molding using the template (*Fig. 2*). Then use a jig saw (or band saw) to cut the curve, and sand up to the line.
- Assemble the clock, counterboring and plugging the screws in the top panel.



MATERIALS LIST

NO NEW OR CHANGED PARTS

Note: Do not need parts I, J. Also do not need the $4\frac{1}{2}$ " antique brass handle with threaded studs and nuts.

Classic Frames

At first glance, it may be hard to believe that these frames were made in a home workshop. But all you need to make each of them is a table saw to cut coves and a router to shape the moldings.



Over the years, I've made a good number of frames. But none of them have been quite like the ones you see in the photograph above. Most of the frames I've made in the past were built up from small, narrow moldings of various routed profiles.

However, these frames all feature wide, sweeping coves that really set the frames off. But more interesting than how they look is how these coves are made. It may surprise you.

No, they're not made using a router. Instead I used my table saw to hollow out the coves. And it's really not too difficult. By pushing the workpiece over

the saw at an angle, you can create a wide variety of coves.

And if this technique sounds a bit odd or unfamiliar, don't worry. I've included a separate article on how to do it starting on page 74. (You'll want to take a look at that article before building your frames.)

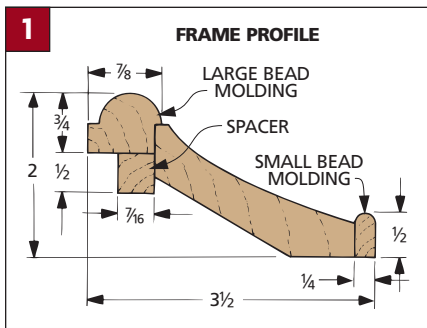
ELEGANT CHERRY FRAME. The first of the frames is made of cherry (the bottom frame in the photo above). The design for this frame makes the mirror look as if it's rising out from the wall.

CLASSIC WALNUT FRAME. Then you'll learn how to build the top frame in the photo above. It's made from walnut.

Here the use of two different coves offers some interesting challenges.

CRAFTSMAN-STYLE OAK FRAME. The third and last frame design is strongly influenced by the Arts and Crafts movement. The use of quarter-sawn white oak complements this timeless style, but just about any wood will do.

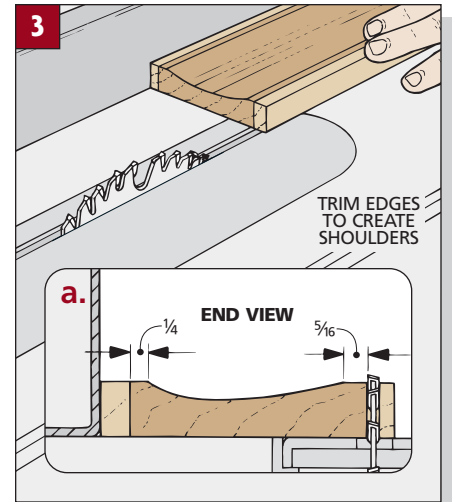
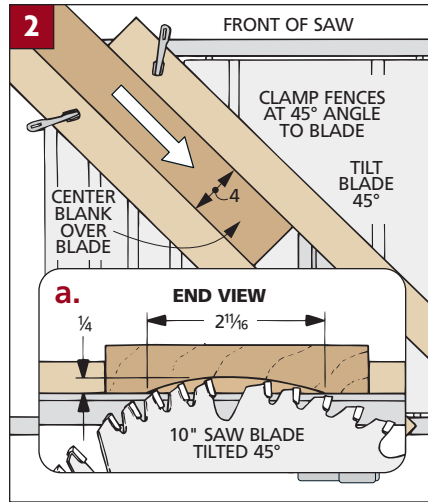
MOUNTING. One other thing. I'd strongly suggest that you have your print, artwork, or whatever else you're framing matted and ready to go before you build the frames. This way, you can make sure that your print and glass will fit the opening of your frame. For more on this, see the Technique on page 75.



ELEGANT CHERRY FRAME

This frame is designed so the outer edge rests flat against the wall, giving the center of the frame a raised-panel look.

My Cherry Frame is not used to frame a piece of art. Instead, I used it to frame a mirror. Construction is the same either way. But, it goes to show that you don't have to be framing artwork to try your hand at these frames.



MIRROR. I purchased the mirror for this frame at a local home improvement center and built the frame to fit around it.

The Cherry Frame is unique because it has two bead moldings. But before getting into how to do this, first take a look at the main section of the frame.

COVE. This frame has a wide, shallow cove which you'll see is slightly asymmetrical (*Fig. 1*). So to make this cove, you'll first have to tilt the blade as well as set up angled fences to guide the workpiece (*Fig. 2*). The fences are positioned at a 45° angle to the blade, and the blade is tilted 45°. For more on cutting asymmetrical coves using the table saw, see the Technique on page 74.

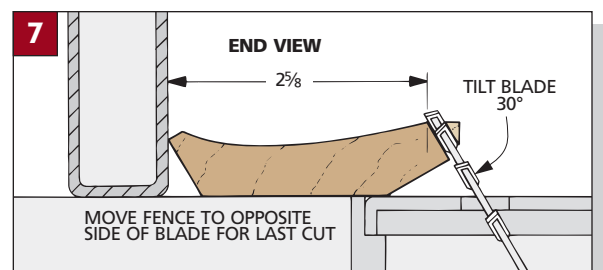
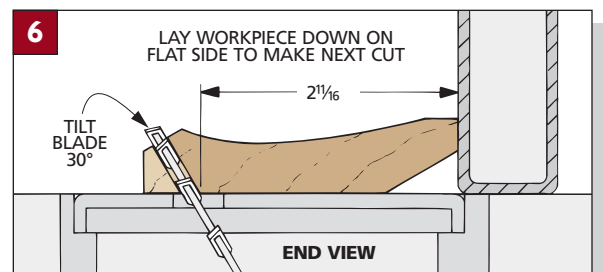
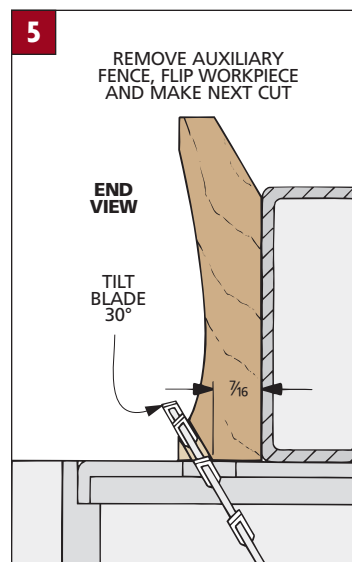
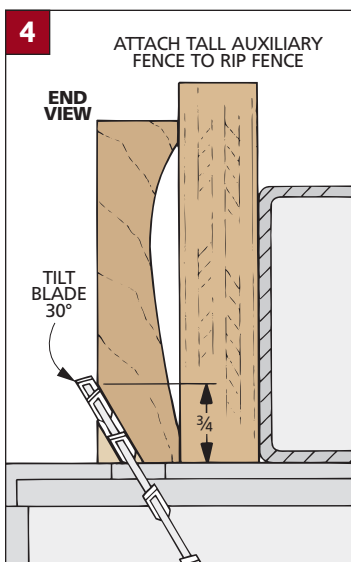
Next, trim the workpiece to its final width. But more important than the

overall width is the width of the shoulders on either side of the cove (*Fig. 3a*).

The last step to complete the cove molding is to rip bevels along all four edges. These bevels aren't difficult to make. I simply tilt the saw blade 30° and re-position the fence for each cut. But the important thing is to rip the bevels in a specific sequence. This way, the workpiece will have at least one flat surface to rest against the fence (or the table) during each cut (*Figs. 4 through 7*).

Note: To rip the last bevel you'll need to move your rip fence over to the opposite side of the saw blade (*Fig. 7*).

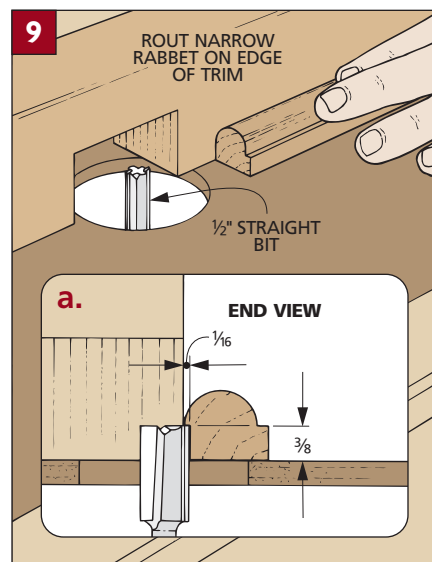
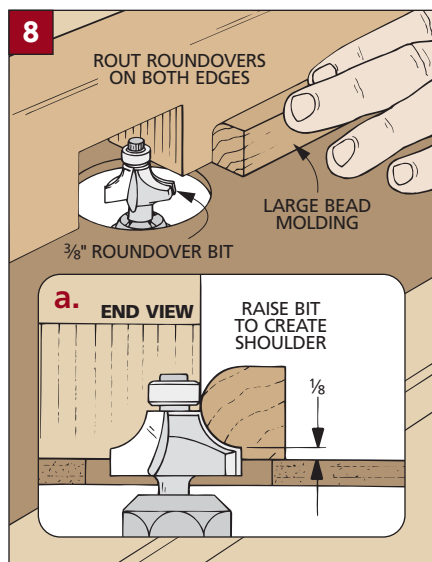
Once you've completed the coves, they need to be sanded smooth. (For a tip on how to sand coves easily, see the Shop Tip on page 73.)



LARGE BEAD MOLDING. With all the bevels ripped and the pieces sanded, the next step is to create the large bead molding that is attached to the inside edge of the frame. I used a roundover bit in the router table to make the bead on this piece, leaving a slight shoulder on one edge (*Fig. 8*). Then rout a rabbet along the opposite edge (*Fig. 9*). This allows the bead molding to “seat” against the inside edge of the frame.

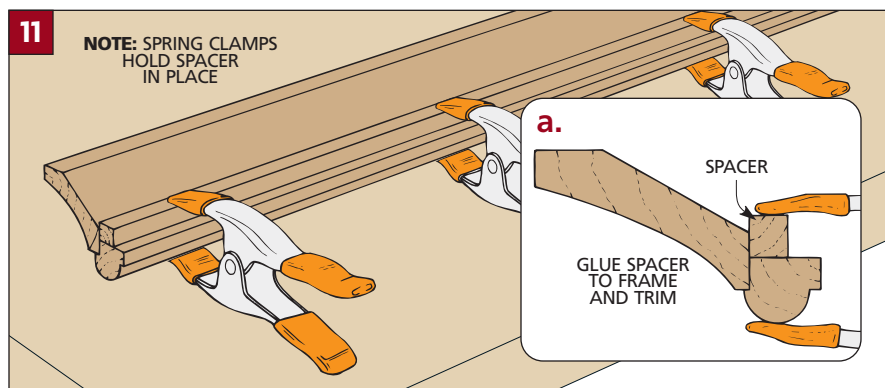
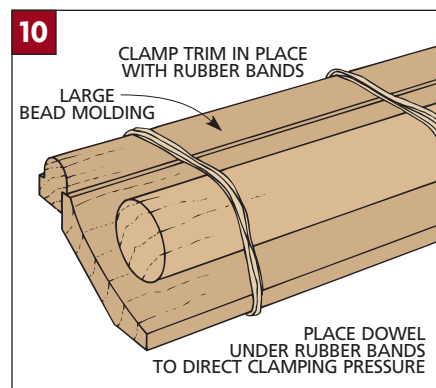
After the large bead molding is completed, it can be glued to the frame pieces. Because the rabbet in the bead molding helps to position it on the edge of the frame, all you have to do is find a way to hold it in place while the glue dries. I used rubber bands with a length of 1"-dia. dowel underneath them to concentrate the clamping pressure where I wanted it (*Fig. 10*).

Next you'll want to miter the frame pieces, but there's still one more step to



complete. To create a rabbet on the inside of the frame to hold the mirror, I added a spacer. This is just a small, rec-

tangular piece that is glued to the inside corner of the bead molding and edge of the frame (*Figs. 11 and 11a*).

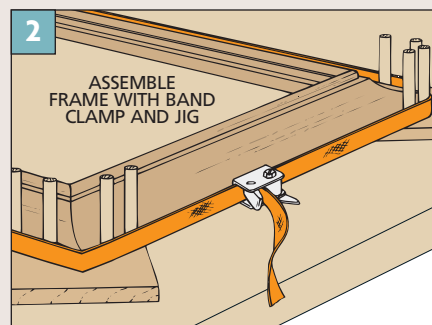
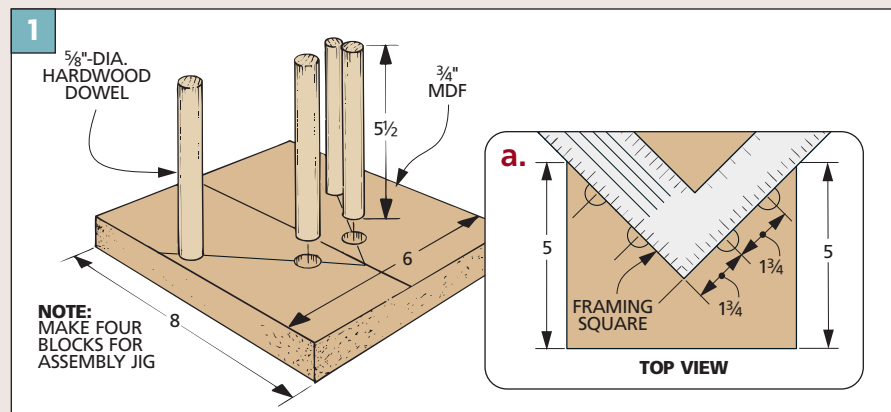


SHOP JIG Compound Miter Assembly Blocks

This assembly jig consists of four rectangular scraps, each with four dowels (*Fig. 1*). The key when assembling

each part of the jig is to use a framing square to make sure it will hold the frame pieces square (*Fig. 1a*).

When gluing and clamping the frames, the band clamp fits against the bottom of the dowels, and these dowels “capture” the top of the frame, keeping the pressure centered *and* keeping the frame from falling apart.



MITER FRAME. Once the glue is dry, you can miter the frame pieces to length. You'll need to construct a sled to hold the frame molding while cutting the compound miters. For more on how to do this, see the Shop Jig on page 71.

After you've carefully mitered the frame pieces, glue them together using a band clamp and a simple clamping jig. For more details on this, see the Shop Jig on the previous page.

Once the glue is dry, the corners should be reinforced with 4d finish nails. I drilled holes for the nails to prevent them from splitting the wood of the frame (refer to *Fig. 8* on page 73).

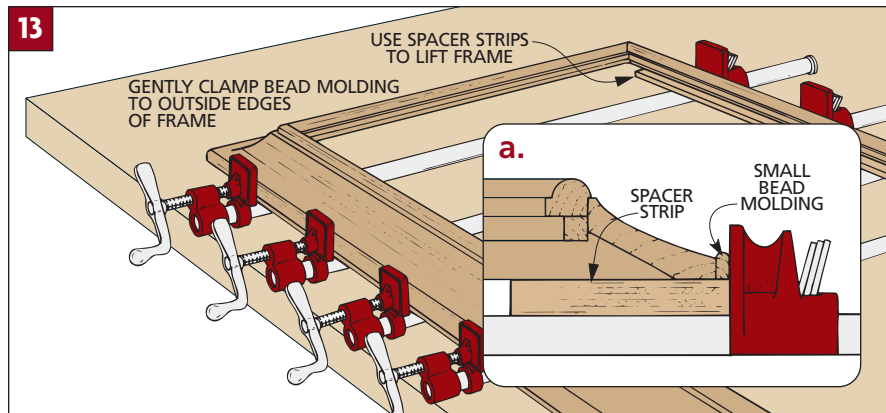
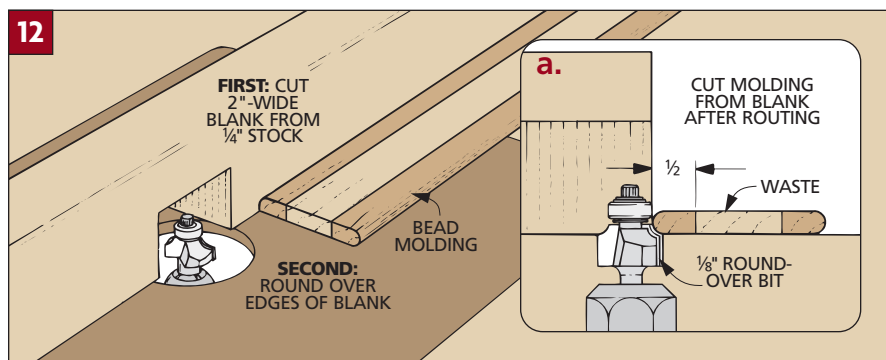
Note: I also staggered the nails to prevent them from hitting each other.

At this point, the frame is almost complete. The only thing left to add is a small bead molding all around the outside edge of the frame. Not only does this soften the edges of the frame, but it also covers up the finish nails that you used to reinforce the corners.

SMALL BEAD MOLDING. There's nothing out of the ordinary when it comes to making the small bead molding. As you can see, I started with an extra-wide, 1/4"-thick blank (*Fig. 12*). Using a 1/8"-radius roundover bit, I rounded over all four edges of the blank. Then I switched over to the table saw and ripped the moldings from the blank.

Note: Make sure you use a push block when cutting the moldings.

The bead molding is mitered to length to fit around the frame. In order to help fit the molding, I mitered the end of a scrap piece and clamped it to a corner of the frame. This gave me something to butt the molding up against as I fitted each piece (refer to *Fig. 11a* on page 73).



ASSEMBLY. After the bead moldings have been mitered to length, they can be glued to the outside edges of the frame. To hold them in place, I simply clamped across the frame with several bar clamps (*Fig. 13*). But in order to center the clamping pressure directly on the bead molding, I placed 3/4"-thick spacer strips underneath the frame to elevate it (*Fig. 13a*).

Once the glue was dry, I sprayed on a few coats of lacquer. But for an entirely different look, you might want to try an alternative finish like the ones discussed in the Finishing Tip below.



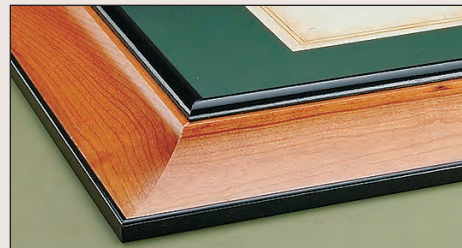
FINISHING TIP

By staining or painting the frame a different color, you can achieve a dramatic and interesting effect.

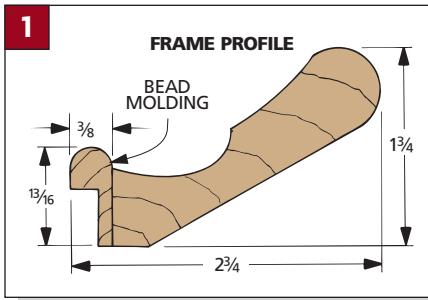
Just be sure to plan out the look you want. Then paint or stain the visible portions of the trim before applying them to the main portion of the frame.



Contrasting colors. This creates a subtle look. The moldings are finished natural while the main portion of the frame is stained.



Two-tone effect. Here the visible portions of the trim were painted black before they were applied to the cove molding.

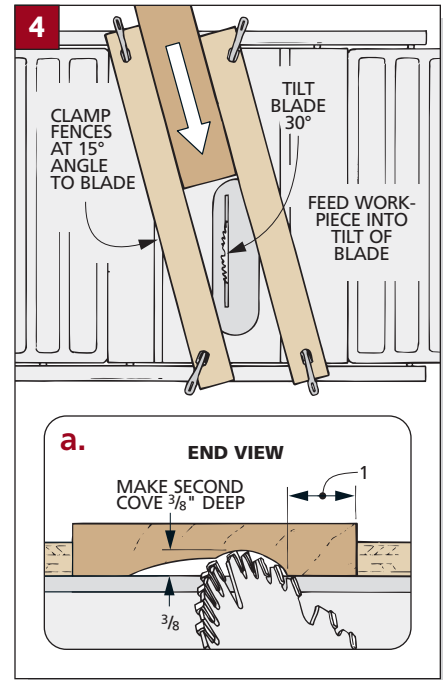
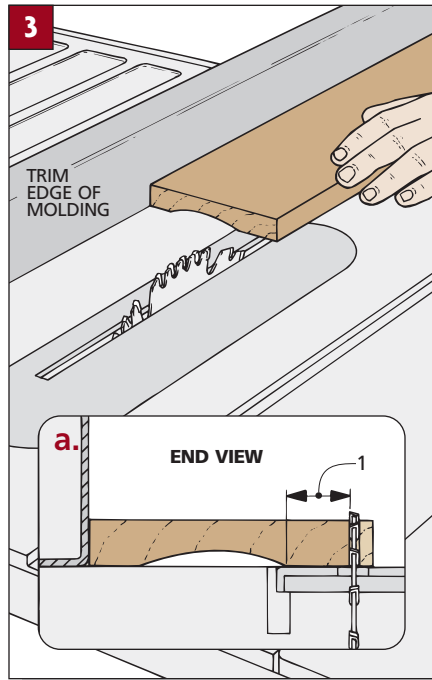
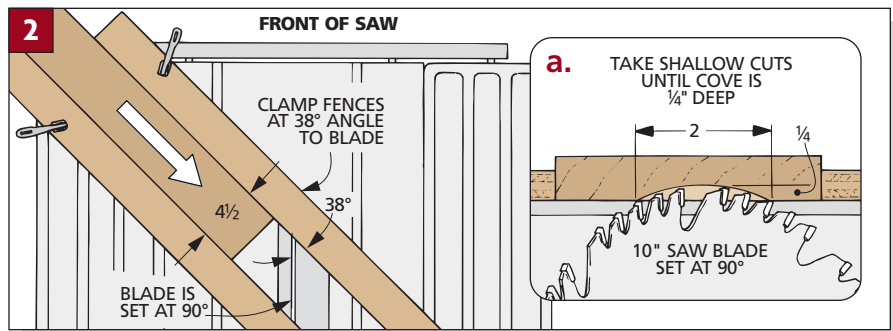


CLASSIC WALNUT FRAME

With the Classic Walnut Frame, I began experimenting a bit by combining a couple of different coves to create a more complex profile (*Fig. 1*).

COVES. First, I cut a shallow cove down the center (roughly) of the work-piece (*Figs. 2 and 2a*). Then to make it easier to position the second cove, trim one side of the blank, leaving a 1"-wide shoulder (*Fig. 3*).

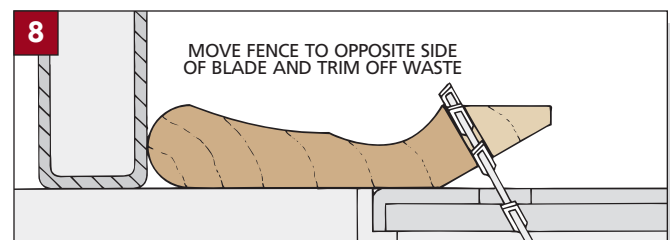
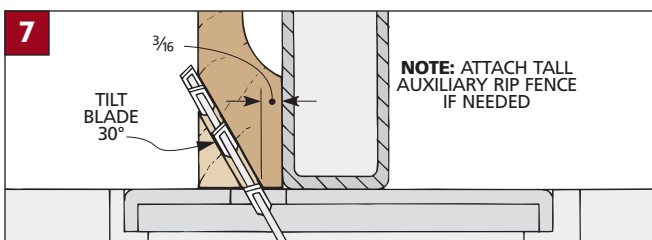
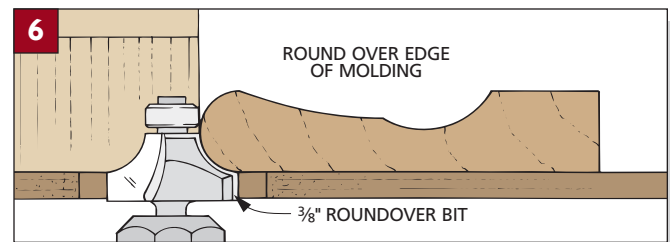
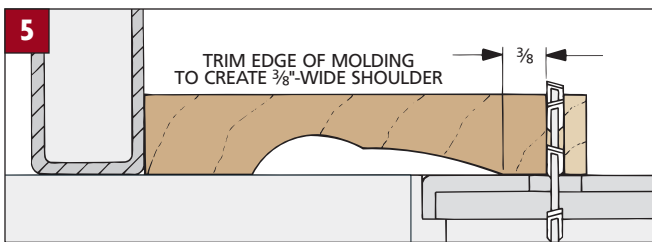
The second cove is cut by setting the fences at 15° and tilting the blade 30° (*Fig. 4*). But you'll have to pay more attention when positioning the fences for this cove. In order to get the second cove to line up with the first cove, you'll need to position the first fence 1" away from the leading edge of the blade (*Fig. 4a*).



After cutting the second cove, you can trim the other edge of the blank (*Fig. 5*).

To create the rounded edge of the molding, use a roundover bit on the router table (*Fig. 6*). Rout one side, then flip the blank over and rout along the other side to complete the full roundover.

In order to create a flat spot for the frame to rest against the wall, the next step is to rip a couple of bevels along the square edge of the molding. These bevels meet at a 90° angle (*Figs. 7 and 8*). Once these bevels are cut, the workpieces can be sanded smooth.

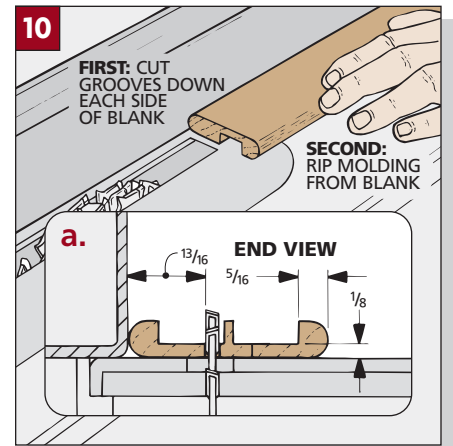
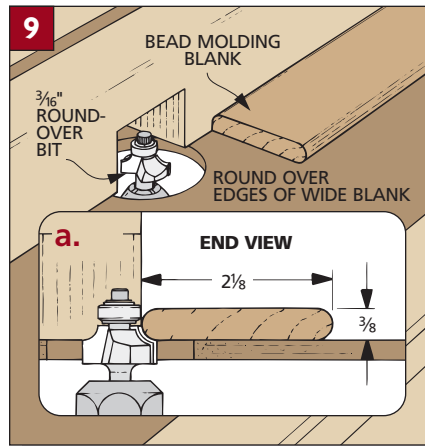


BEAD MOLDING. After sanding everything smooth, I added a rabbet on the edge of the molding to hold the picture.

Because it's difficult (and unsafe) to cut a rabbet on such a small piece of molding, I start with an extra-wide blank and rout roundovers on all four edges (*Fig. 9*). Next, use a dado blade to cut a couple of grooves at each edge of the blank (*Fig. 10*). Then, all you have to do is flip the blank over, switch to a regular saw blade, and rip the molding free (*Fig. 10a*).

Because of the profile of the frame molding, I made a special jig to hold the bead molding and frame pieces together while gluing and clamping (*Fig. 11*).

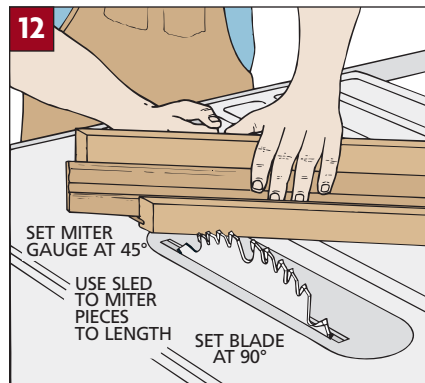
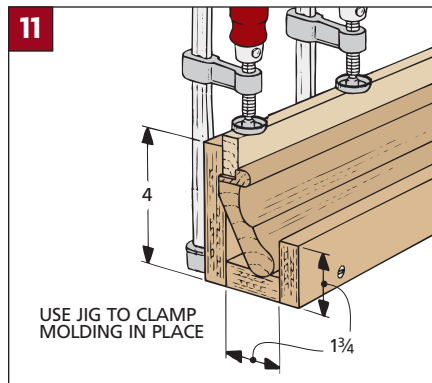
COMPOUND MITERS. After the bead is attached to the molding, you're ready to miter the frame pieces to length. But once again, since the molding for this frame doesn't sit flat, you'll have to use the sled described in the Shop Jig below to hold it in position while cutting the miters (*Fig. 12*).



ASSEMBLY. Because of the angles and the profile of this frame, clamping it up is difficult. A band clamp alone tends to pull the miter joints apart as it's tightened. So to support the corners and keep the joints tightly closed, I put the clamping jig used with the Cherry Frame to use again. See this jig and how to make it on page 68.

Once the glue has dried, you can drill some small pilot holes and reinforce each corner of the frame with a couple of 4d finish nails. Just be careful to position the nails so they don't "blow out" of the front or back face of the frame.

After applying a finish to the frame, just fill the nail holes in the corners of the frame with wood filler (or wood putty).



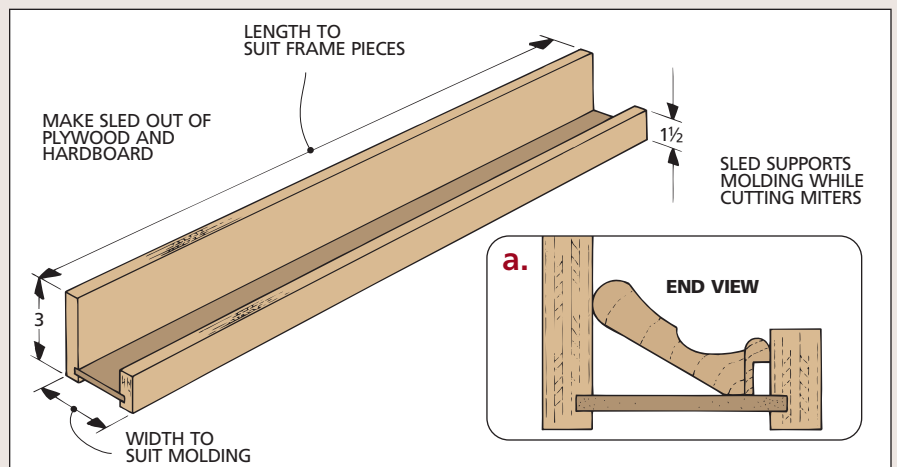
SHOP JIG

Compound Miter Sled

Since the picture frame moldings for the Cherry and Walnut Frames don't sit flat, fitting the pieces together means cutting a compound miter.

An easy way to cut a compound miter on a table saw is to leave the blade at 90° and tilt the workpiece. But, the trick to doing this is to hold the workpiece at the same angle that it will be when the frame is assembled.

To do this, I use a simple sled made out of plywood and hardboard (see drawing). The sled attaches to my miter gauge. A lip on the front of the sled helps hold the workpiece in the proper position while cutting the miters (detail 'a').





CRAFTSMAN-STYLE OAK FRAME

The Oak Frame is probably the simplest of the three frames, since it's flat and doesn't require any compound miters. I made my frame out of quarter-sawn white oak, but just about any nicely figured wood will do.

Start by cutting the $\frac{3}{4}$ "-thick blanks for the frame to rough size. I made my blanks 4" wide and about 9 to 10" longer than my matted print. This way, you can trim the frame pieces to exact width and miter them to length after you've created the profile.

CUT COVES. To cut the cove, set up a pair of fences on your table saw at a 30° angle to the blade (*Fig. 2*). Again, refer to the Technique on page 74 for details on how to do this. You want to position the fences so the cove will be roughly centered on the blank.

Note: Unlike the first two frames, the blade here should be square (90°) to the table to cut the cove for this particular frame piece. As before, cut the

cove in multiple passes, taking shallow ($\frac{1}{16}$ ") cuts, until the cove has reached the full cove width of $1\frac{7}{8}$ " (*Fig. 2a*).

When you've finished cutting the coves, trim the workpieces down to their final width. The thing to watch for here is that the shoulders on either side of the cove end up being the proper width (*Fig. 3*).

CHAMFER. Now take a look at the small profile drawing of the molding (refer to *Fig. 1*). You'll notice that the top inside edge of the workpiece (the shorter of the two flat edges) has a $\frac{1}{8}$ " chamfer. I made this chamfer on the router table (*Fig. 4*).

While you're at the router table, this is also a good time to cut a rabbet on the back side of the frame. The rabbet will hold the glass and picture. To do this, simply change over to a straight bit and flip the workpiece over (*Fig. 5*).

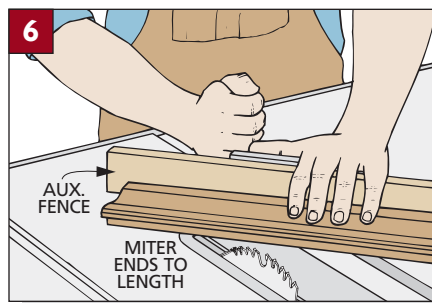
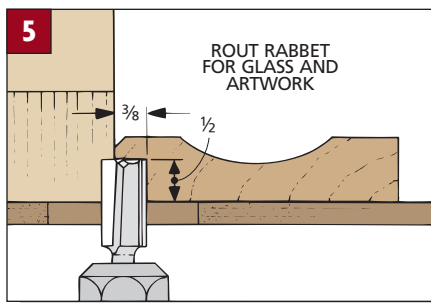
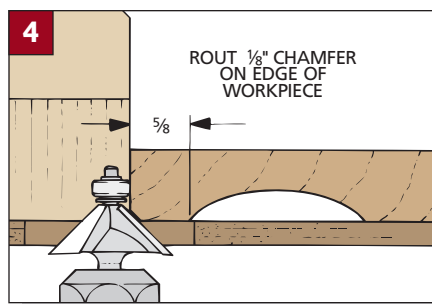
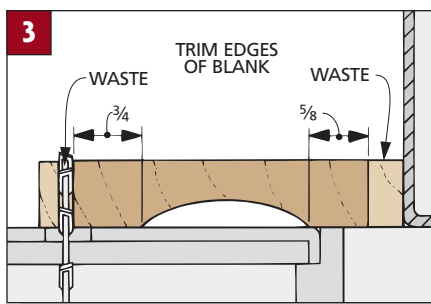
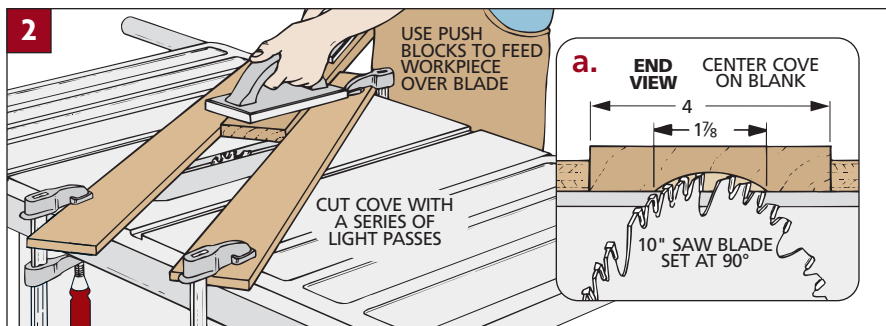
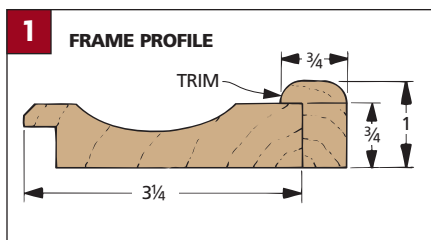
SAND COVES. Before going any further, you'll probably want to take some time to sand the coves smooth. This can be done many ways, but I decided to make my own "custom-made" foam sanding block. (For more information on how to make this sanding block, see the Shop Tip on the next page.) I started out with 80-grit sandpaper to remove the roughest marks and then worked my way up through 100, 120, and 150-grit papers.

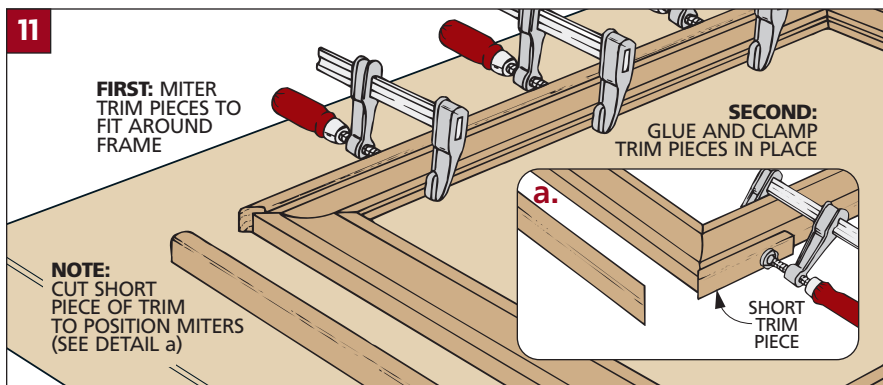
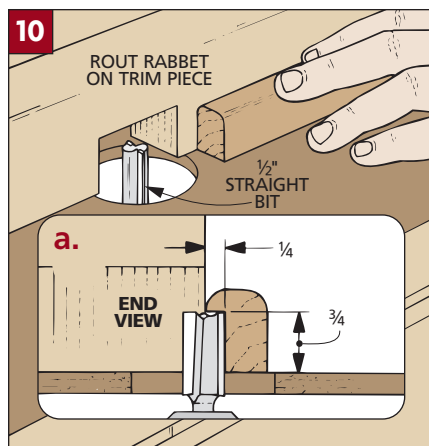
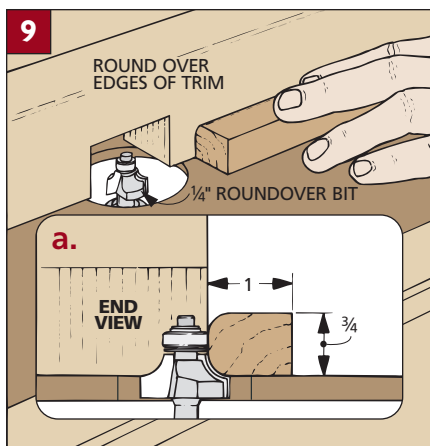
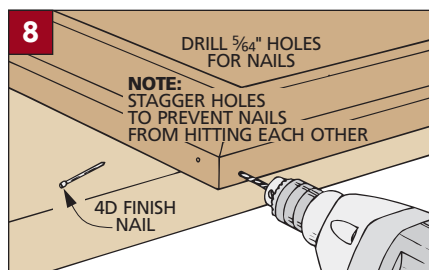
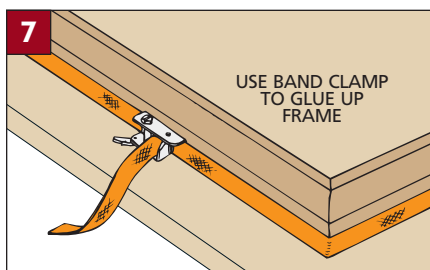
MITER PIECES. Once all the sanding is done, you can miter the pieces to length (*Fig. 6*). There are a couple of things to be aware of here. First, you obviously want the miters to fit together nicely. So spend some time setting up and checking your miter gauge.

Second, you want to make sure that you're cutting the pieces to the correct length so that when the frame is assembled, your glass and print will fit in the opening in the back. For some tips on doing this, turn to the Technique for mounting and hanging on page 75.

ASSEMBLY. Next you'll want to start gluing up the mitered frame pieces. The trick here is to keep all the miters tight. All it takes to do this is a common band clamp to hold the frame square while the glue sets up (*Fig. 7*).

Once the glue has dried completely, I like to reinforce each corner of the frame with a couple of 4d finish nails (*Fig. 8*). But to avoid breaking the glue joint when hammering in the nails, I drill a small pilot hole for each of the nails first.





TRIM. To complete the frame, I added trim pieces all around the outside of the frame. These are just strips of wood that have been rounded over on their two top edges (*Fig. 9*). Not only does the trim help to dress up the frame a bit, but it also covers the nail holes that you just made in the corners of the frame.

To make the trim, I start by ripping four pieces of $\frac{3}{4}$ "-thick stock 1" wide. Then, to complete the trim pieces, I simply round over the edges using a $\frac{1}{4}$ " roundover bit in the router table (*Fig. 9*).

To help position the trim, a shallow rabbet is routed on the inside edge of each piece (*Fig. 10*). Then the trim pieces are mitered to length and glued to the outside of the frame (*Fig. 11*). To help position the molding around the frame during glue-up, I mitered the end of a small piece of scrap molding to use as a guide (*Fig. 11a*). ■



SHOP TIP

Cove Sanding Block

The best sanding block is one that matches the shape to be sanded. So

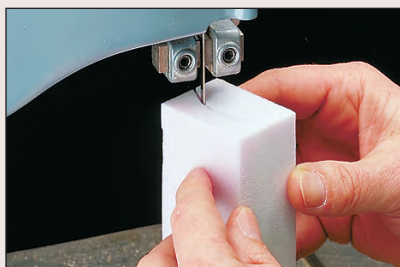
when it came time to smooth the large coves on the picture frames, I made

some custom sanding blocks from $1\frac{1}{2}$ "-thick foam insulation board.

The three steps below explain a handy way to make a cove sanding block.



1 First trace the outline of the cove onto a small block of $1\frac{1}{2}$ "-thick foam insulation board.



2 Next, use a band saw (or even a hand saw and file) to cut the profile to rough shape.



3 Smooth the profile by rubbing it across a piece of sandpaper stuck to the workpiece.

TECHNIQUE Table Saw Coves

The secret to creating a cove on the table saw is to “scoop” out the wood by running the workpiece over the blade at an angle. To do it safely, first clamp a couple of fences to your table saw to guide the workpiece along the way. And second, remove the material in very light passes.

ANGLE OF APPROACH. The size and shape of the cove you make is controlled by the approach angle (that is, the angle between the blade and the fences) (*Fig. 1*). A steep angle of approach results in a narrow, elliptical-looking cove. As the angle increases, the cove gets wider and rounder.

ASYMMETRICAL COVES. In addition to changing the approach angle, you can also affect the shape of a cove by tilting the blade. This creates an asymmetrical (skewed) cove (*Fig. 2*). The more the blade is tilted, the more the cove looks as if it’s “leaning” to one side.

Safety Note: When cutting asymmetrical coves, always feed the workpiece into the tilt of the blade.

SETUP. To set up the fences, I initially raise the blade to the desired height (depth) of the finished cove. This makes it easier to determine the angle to set your fences. (If you’re cutting an asymmetrical cove, you’ll need to tilt the blade first.)

FENCES. With the blade raised to the correct height, the next step is to clamp a pair of fences to the top of the saw. Make sure they have accurate, straight edges and that they’re thinner than the workpiece. This way your push blocks won’t hang up on the fences (see photo).

The first step in positioning the fences is to determine their angle. For the picture frames, use a protractor or your miter gauge to position the fences.



Note: If you’re experimenting with different cove profiles, you’ll need to determine the fence angle on your own. But it’s hard to “see” what the cove is going to look like. So a trick I like to use is to draw the profile of the cove on the end of my workpiece. Then I place the workpiece behind the blade and kneel down so I can sight down the blade (*Fig. 3*). Position the workpiece at different angles until the profile of the blade matches the profile drawn on the end of the workpiece (*Fig. 3a*). Once it does, you can position your fences to match this angle.

To clamp the fences in place, start by positioning a fence in front of the blade

and clamping it down. Then place your workpiece against this fence. Now just butt the second fence against the other edge of the workpiece and clamp it down as well. Lower the saw blade and check to see that the workpiece slides smoothly between the fences without binding, but also without any side to side play.

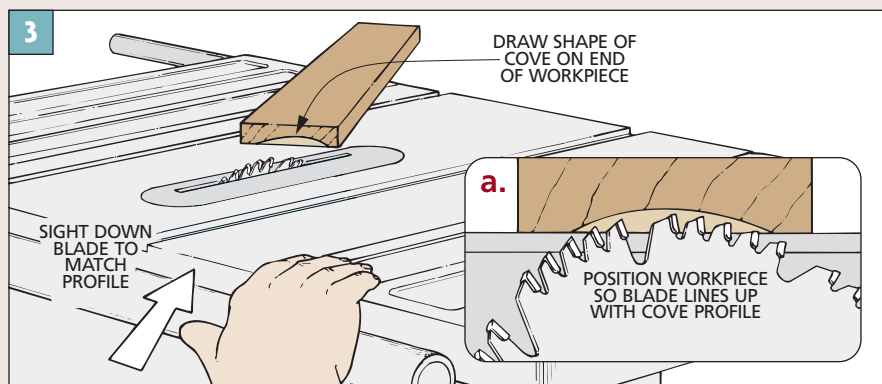
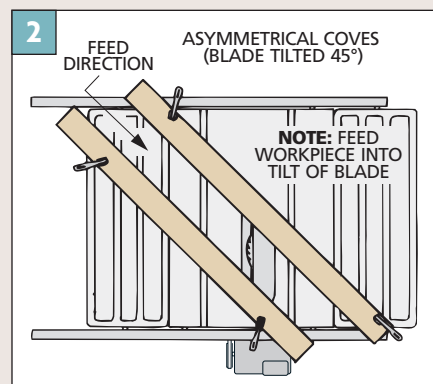
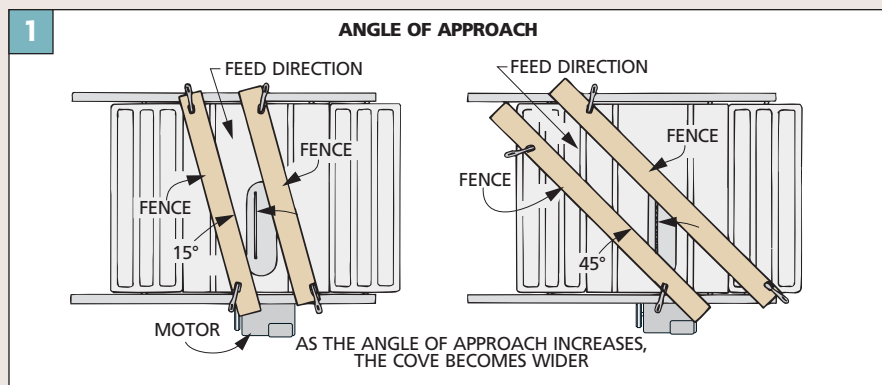
CUTTING THE COVE. Cutting the cove safely has to be done gradually, in a series of passes. Since you’re feeding the workpiece into the blade at an angle, the teeth are only cutting on one side.

I like to start with the blade raised only about $\frac{1}{8}$ " for the first pass. Then raise the blade no more than $\frac{1}{16}$ " at a time for each successive pass.

Maintain consistent downward pressure on the workpiece, using push blocks to keep it flat against the table.

And, you want to feed the workpiece at an even pace. A slower feed rate has the advantage of giving you a smoother cut, requiring less sanding later.

Finally, make sure that the blank is facing in the same direction for each pass. To keep things straight, I draw a directional arrow on the workpiece. All that’s left is to finish sand the cove using a sanding block, as shown on page 73.

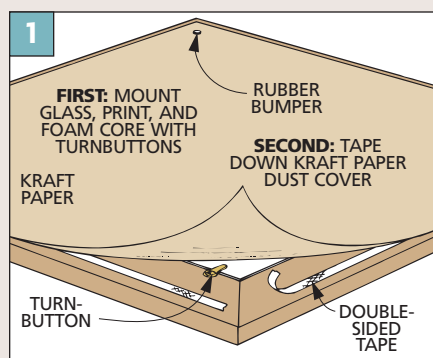


TECHNIQUE Mounting & Hanging

Before you build your frame, it's a good idea to get your print or artwork matted. This will make it easier when it comes to mitering the frame pieces to length (refer to *Fig. 5* below). For the prints in these frames, I sandwiched the print between a piece of mat board (with a "window" cut out of the center) and a piece of "foam core." Foam core is a polystyrene backing material that cushions the artwork and helps protect it from damage. I purchased both of these items from a frame shop.

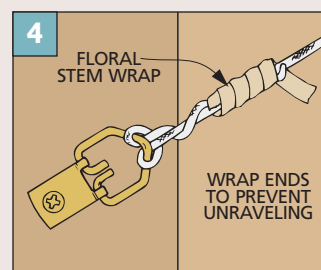
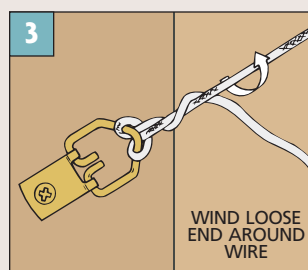
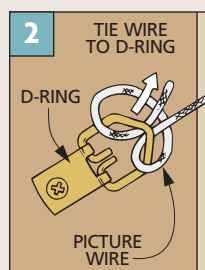
Note: If you're not comfortable cutting the mat yourself, order them cut to size — it's not worth risking the attempt to cut them on your own.

MOUNTING THE PRINT. After you've built your frame, you can take it to a frame shop and have your print professionally mounted. Or you can simply purchase the materials and do the mounting yourself. Although professional framers use special tools and fasteners to secure the glass and artwork into a frame, you can do the same thing with some simple turnbuttons, kraft paper, and double-sided tape (*Fig. 1*).



DUST COVER. To protect the print, it's a good idea to add a dust cover to the back of the frame. This is just a piece of brown kraft paper that is attached to the frame with double-sided tape. Once this is in place, I like to add rubber bumpers to prevent the frame from damaging the wall surface.

HANGING THE PICTURE. When it comes to hanging a picture (or any other item) it's important to make sure the hardware you're using is strong enough to support the weight of the object you're hanging. Since these frames are fairly heavy, I used heavy-duty picture wire and two 50 lb. picture hooks for each frame. (You can find these items at most hardware stores.)



Once the print has been mounted and the dust cover is in place, the picture wire can be secured to the frame with a couple of D-rings (*Fig. 2*). You can also see the special knot that is used to fasten the wire to the ring. After pulling the knot tight, wrap the end of the wire around itself to prevent it from unraveling (*Fig. 3*). Then, to prevent the wire from scratching or marking up the wall, I like to wrap the ends with floral stem wrap (available at craft stores) or masking tape (*Fig. 4*).

Note: For another idea for hanging heavy frames, see the Technique article on page 51.

TWO-POINT HANGING SYSTEM. To hang the picture, I prefer to use two picture hooks on the wall. This does a couple of things. First, it evenly distributes the load so all the weight of the frame and glass, as well as the artwork or a heavy mirror, doesn't depend on just a single hook.

And second, it makes it a lot easier to level the picture once it's on the wall. Just install the hooks about 6" apart on the wall. If you have plastered walls, it's best if one of the hooks is driven into a stud. But this isn't necessary if your walls are made of drywall.

CUTTING TO SIZE

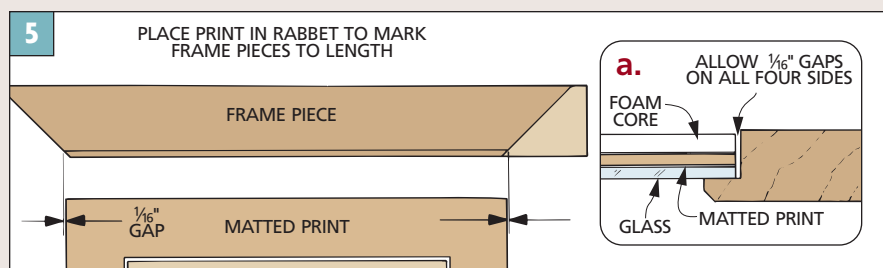
When framing your artwork, always have the item on hand before mitering your frame pieces. This way, you can use it as a gauge for marking your frame pieces to length (*Fig. 5*).

There are a couple of things to consider. First, I like to allow for at least $\frac{1}{16}$ " clearance between the edge of the artwork and the frame. Then, even if my glass or mat board is a little oversized it should still fit in the opening (*Fig. 5a*).

Then, I match the artwork with the size of the opening at the back of the

frame. When marking the frame pieces, before cutting them to length make sure to place layout marks on the inside edge

of the *rabbet*, not on the inside edge of the frame. Otherwise, you'll end up with a frame that is too large for your artwork.



Book Stand

The features that really stand out on this project are a clever shop-built ratchet that makes the top adjustable and legs that are built in short, easy sections. You can also build square legs to change the look.



Typically, legs like the ones on this Book Stand would be turned from single pieces of stock. But pieces this long (about 40" long, including waste at the ends) are too long to fit on a lathe found in the average woodworker's shop. Instead, I made each leg from four shorter pieces: two turned sections and two square sections (see Exploded View on opposite page).

To connect the parts of the legs, round tenons on the turned sections fit into round mortises drilled in the square sections. In addition to making the legs easier to turn, this method also makes assembly much simpler.

TOP. The top of the Book Stand is adjustable to several different positions. Thanks to a shop-built ratchet, it can be left flat or opened up to 45° with four positions in between.

That means you can display a large book (like a dictionary or an atlas) at whatever angle makes it easiest to see — depending on your height or the angle of the light in the room. Or if you prefer, you can just lay the top flat with the book rest against a wall to make an attractive side table.

SHELF. Another unique feature of the Book Stand is the shelf — it's made like a breadboard. This design lets the solid

wood shelf expand and contract with changes in humidity without damaging the rest of the stand.

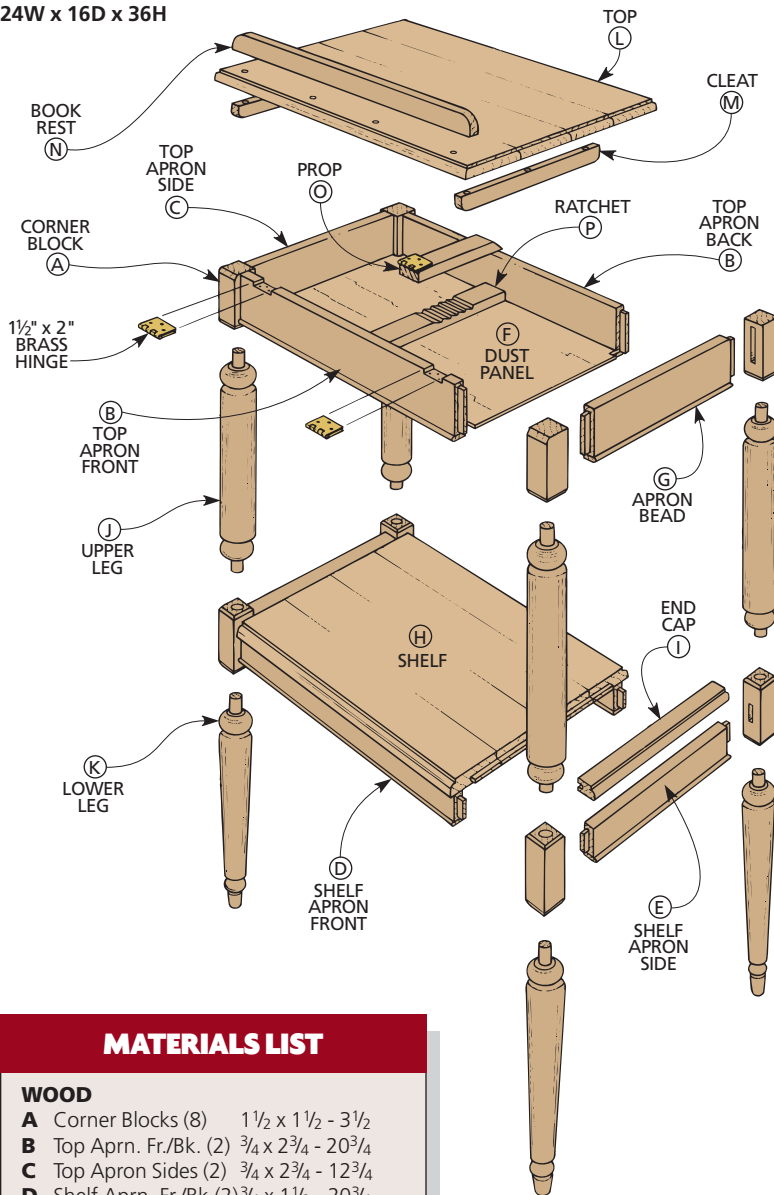
SQUARE LEGS. If you don't own or have access to a lathe, don't worry. A square leg design that doesn't require turning can be built from plans in the Designer's Notebook on page 83.

WOOD AND FINISH. I built the stand from solid plantation-grown Honduras mahogany. It looks almost like forest-grown mahogany but has a slightly pinker color. Rather than waiting a few years for it to darken naturally, I used a deep, dark cherry stain to "age" it and added a satin polyurethane top coat.

EXPLODED VIEW

OVERALL DIMENSIONS:

24W x 16D x 36H



MATERIALS LIST

WOOD

- A** Corner Blocks (8) $1\frac{1}{2} \times 1\frac{1}{2} \times 3\frac{1}{2}$
- B** Top Aprn. Fr./Bk. (2) $\frac{3}{4} \times 2\frac{3}{4} \times 20\frac{3}{4}$
- C** Top Apron Sides (2) $\frac{3}{4} \times 2\frac{3}{4} \times 12\frac{3}{4}$
- D** Shelf Aprn. Fr./Bk. (2) $\frac{3}{4} \times 1\frac{1}{2} \times 20\frac{3}{4}$
- E** Shelf Aprn. Sides (2) $\frac{3}{4} \times 1\frac{1}{2} \times 12\frac{3}{4}$
- F** Dust Panel (1) $\frac{1}{4}$ ply - $13\frac{1}{4} \times 21\frac{1}{4}$
- G** Apron Bead (1) $\frac{1}{4} \times \frac{7}{8}$ - 144 Rough
- H** Shelf (1) $\frac{3}{4} \times 14\frac{3}{4} \times 20\frac{3}{4}$
- I** End Caps (2) $\frac{3}{4} \times 1\frac{3}{8} \times 12$
- J** Upper Legs (4) $1\frac{1}{2} \times 1\frac{1}{2} \times 15\frac{1}{2}$
- K** Lower Legs (4) $1\frac{1}{2} \times 1\frac{1}{2} \times 14\frac{1}{2}$
- L** Top (1) $\frac{3}{4} \times 16 \times 24$
- M** Cleats (2) $\frac{3}{4} \times 1 \times 11\frac{1}{2}$
- N** Book Rest (1) $\frac{5}{8} \times 1\frac{1}{4} \times 23$
- O** Prop (1) $\frac{3}{4} \times 1\frac{1}{2} \times 7\frac{1}{2}$
- P** Ratchet (1) $\frac{3}{4} \times 1\frac{1}{2} \times 12\frac{3}{4}$

HARDWARE SUPPLIES

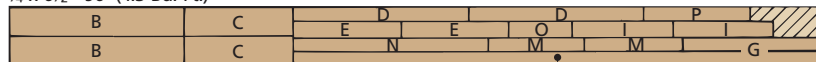
- (8) No. 8 x $\frac{3}{4}$ " Fh woodscrews
- (4) No. 8 x $1\frac{1}{4}$ " Fh woodscrews
- (6) No. 8 x $1\frac{1}{4}$ " Rh woodscrews
- (3) $1\frac{1}{2}$ " x 2" brass hinges w/ screws
- (4) Figure-8 fasteners

CUTTING DIAGRAM

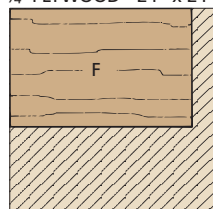
$\frac{3}{4} \times 9 - 96$ (6 Bd. Ft.)



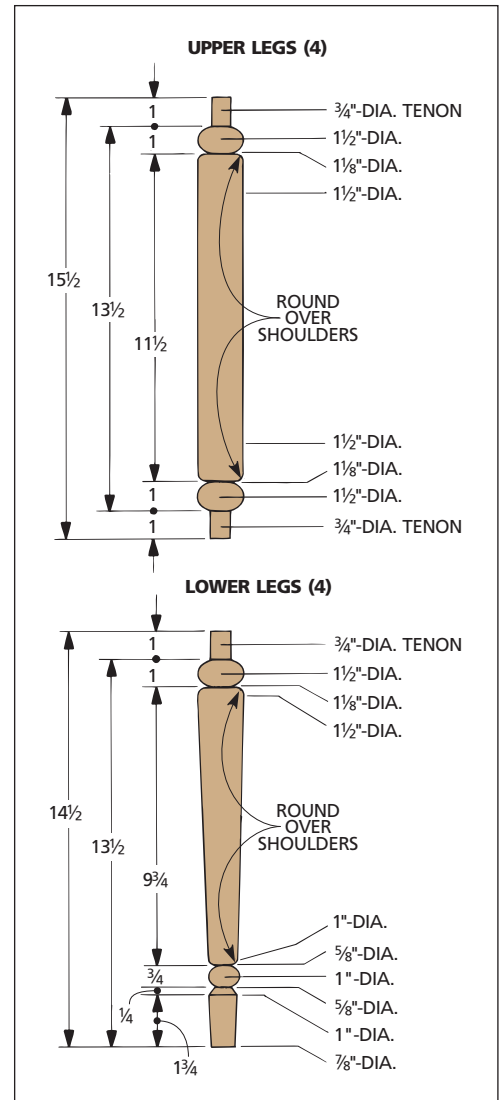
$\frac{3}{4} \times 6\frac{1}{2} - 96$ (4.3 Bd. Ft.)



$\frac{1}{4}$ " PLYWOOD - 24" x 24"



$1\frac{3}{4} \times 6 - 60$ (5 Bd. Ft.)



CORNER BLOCKS

I built the Book Stand in four main sections, beginning with the top frame and the shelf frame.

Each of these frames starts with four corner blocks (A). All eight blocks are the same size (Figs. 1 and 2). The main difference between them is the length of the mortises cut in them for the tenons on the aprons (Figs. 1a and 2a).

MORTISES. I used the drill press to cut out the mortises. And, to make cutting them easier, I made up four 7½"-long blanks, long enough for two corner blocks with waste in between (Fig. 3).

To cut out the mortises, first clamp a fence to your drill press table and adjust it so the width of the blank will be centered under the bit. (See the Shop Tip at right for help in centering the bit.) Then clamp two stop blocks to the fence (Fig. 3). The left stop block determines the right end of the mortise, while the right stop block is for the left end.

Once the stop blocks are in position, drill a hole at each end of the mortise. Then drill out the waste in between.

Now, rotate the blank 90° to cut a mortise on an adjacent face.

Next, turn the blank end for end, and without changing the setup, cut mortises at the other end of the blank to form the second corner block.

The shelf block mortises are shorter than those on the top blocks, so you'll have to change the positions of the stop blocks after cutting the mortises in two of the blanks. Then, cut the blocks to length.

HOLES FOR TENONS. Next, drill holes in the ends of the corner blocks to accept the round tenons on the legs (Fig. 4). The top corner blocks have holes in the bottom end *only*, while the shelf blocks have holes in both ends (Fig. 4a).

To drill the holes, I used a fence and three stop blocks. To do this, center a corner block directly under the drill bit, then clamp the fence and stop blocks around it (Fig. 4).

CHAMFERING. Finally, chamfer the ends of the corner blocks (Fig. 5). But there's a difference between the top blocks and the shelf blocks.

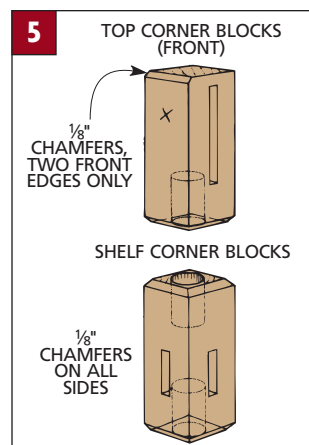
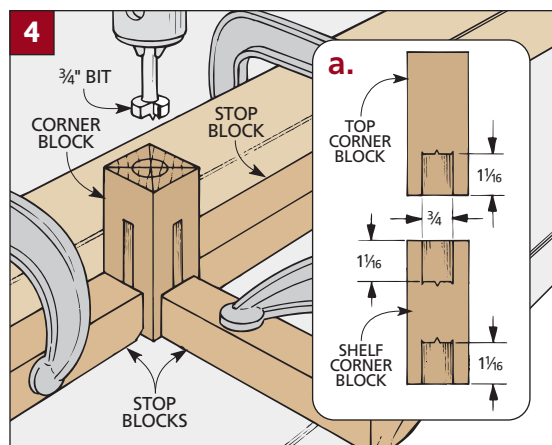
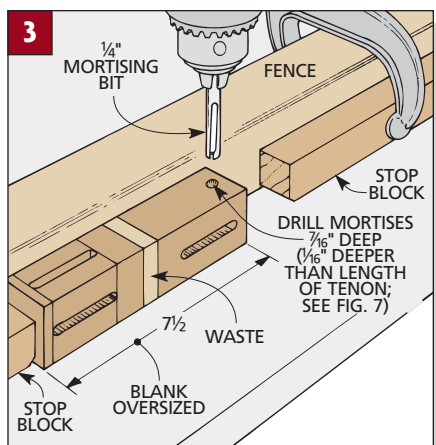
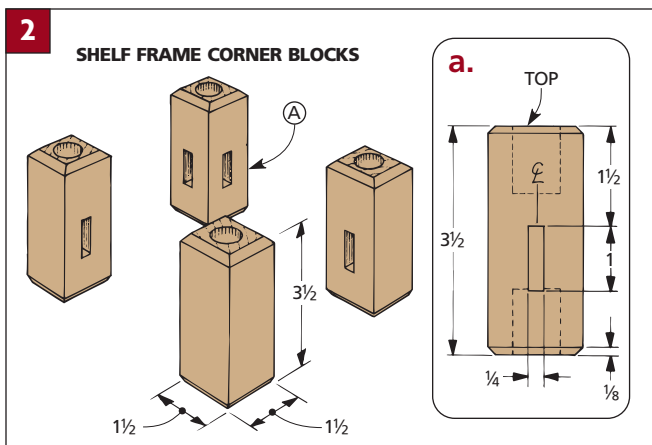
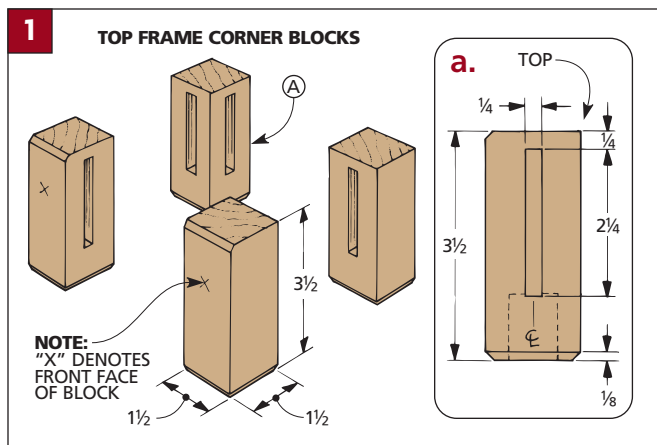
Chamfer all four edges at both ends of the shelf blocks and on one end of each

SHOP TIP

Centering a Mortise



To center a drill bit on thickness of stock, set the fence so a small bit touches the centerline. To re-check, flip stock end for end. Then switch to a ¼" mortising bit.



TOP FRAME & SHELF FRAME

Once the blocks are finished, the next step is to make the four top aprons (B, C) and the four shelf aprons (D, E).

All the aprons are the same thickness and length (including tenons) (Fig. 6). The only difference is their width — the top aprons are *wider* than the shelf aprons.

So begin by cutting the top and shelf aprons to finished size.

TENONS. Next, I used the table saw to cut the tenons on the ends of the aprons, sneaking up on the correct size. They need to fit the mortises on the corner blocks (Figs. 7, 8, and 9).

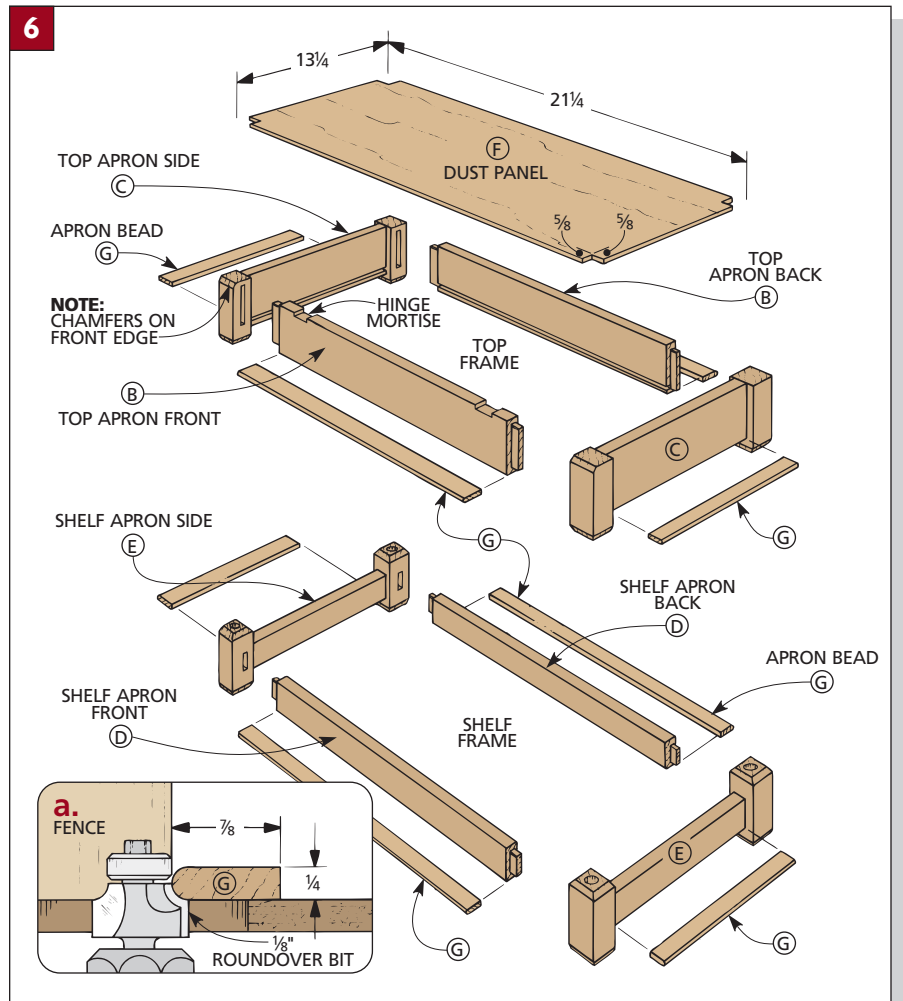
TOP FRAME. At this point, I set aside the parts for the shelf frame and focused on the top frame. Begin the top frame by cutting a groove on the inside face of each top apron for the dust panel (Fig. 7).

To be sure of a good fit for the dust panel, first dry-assemble the frame and measure the opening, including the depth of the grooves (Fig. 6).

Now cut the dust panel (F) to fit in the grooves. Then, notch out the corners of the panel to fit snugly around the corner blocks (Fig. 6).

HINGE MORTISES. There's one more step before gluing the top frame together — mortising the front apron for the hinges that hold the top of the Book Stand (Fig. 9). The mortises are “nibbled” out in a series of passes on the table saw.

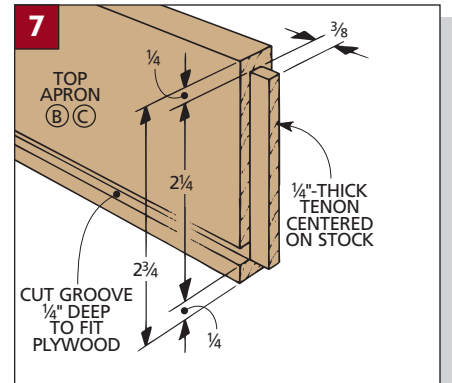
Now you can glue up the top frame. Start by gluing the side aprons and corner blocks together. After the glue is



dry, assemble the sides to the front and back aprons with the dust panel in place, and check the frame for square (see the Shop Tip below left).

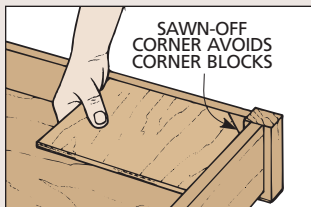
SHELF FRAME. The next step is to glue up the shelf frame. It's assembled in the same way as the top frame, except there isn't a dust panel (Fig. 6).

BEADING. Finally, add an apron bead (G) to the bottom edge of each apron (Figs. 6 and 6a). Cut it to fit between the corner blocks, gluing it to the bottom edge of the apron.

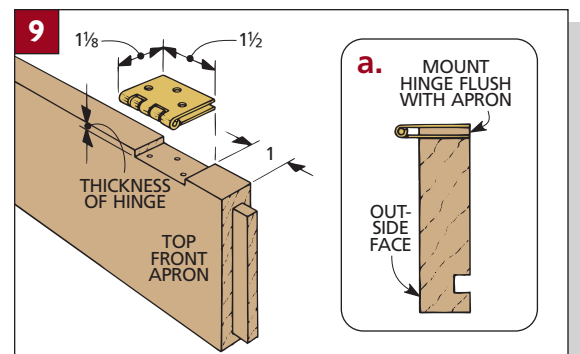
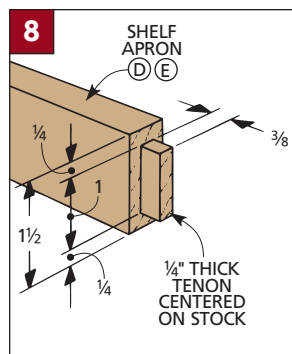


SHOP TIP

Checking for Square



A small piece of plywood acts as a substitute where a try square won't fit. Cut the plywood at exactly 90° and trim a corner for clearance.



SHELF

When the shelf frame is completed, you can start work on the shelf (H). I used breadboard ends, which allow the shelf to expand and contract with changes in humidity without damaging the stand.

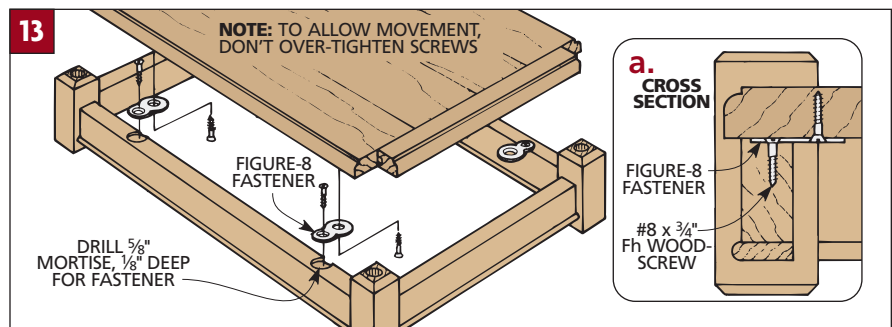
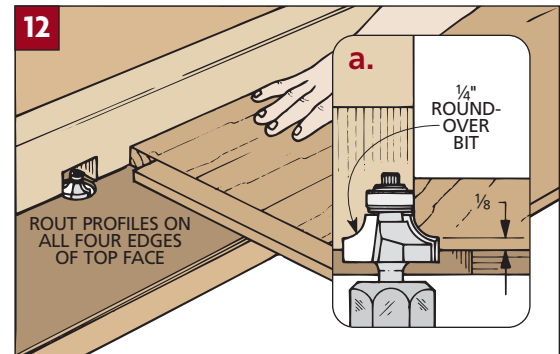
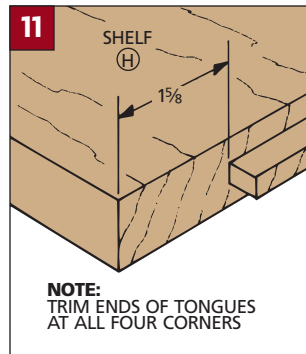
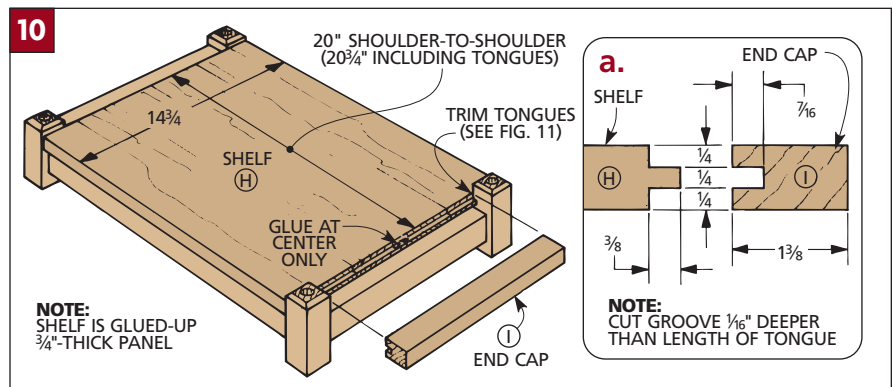
Most wood movement occurs *across* the grain, so the shelf panel can expand and contract — it's not limited by the corner blocks (Fig. 10). The end caps fill in the spaces between the corner blocks. And since wood expands very little *along* the grain, the end caps can safely abut the corner blocks.

SHELF BLANK. Start by cutting a shelf blank to finished width (measure from the outside edges of the aprons and add $\frac{1}{2}$ ") and length (from corner block to corner block, plus $\frac{3}{4}$ " for two tongues) (Fig. 10). Now, cut a tongue on each end of the shelf (Fig. 10a). Then, to allow the shelf to fit between the corner blocks, trim $1\frac{5}{8}$ " off each end of the tongue (Fig. 11).

END CAPS. The next step is to make the end caps (I) to fit between the corner blocks (Fig. 10). Each end cap has a groove centered on one edge to accept a tongue. Place a small dot of glue in the center of each tongue only.

EDGE PROFILE. Next, rout roundovers with shoulders on the edges of the shelf and end caps (Figs. 12 and 12a).

ATTACHING THE SHELF. The last step is to attach the shelf to the frame (Fig. 13). I used figure-8 table top fasteners screwed in shallow mortises drilled in the aprons (Fig. 13a).



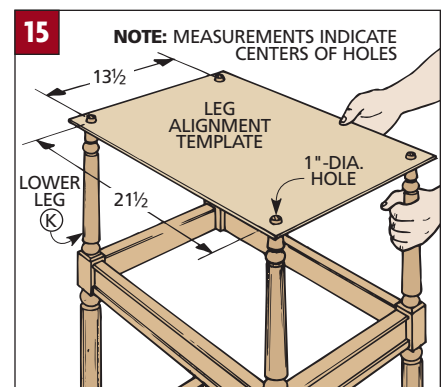
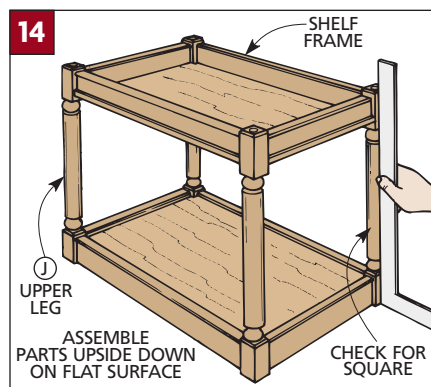
LEGS & ASSEMBLY

After completing the shelf and the top frame, the next step is to make the upper legs (J) and the lower legs (K). I turned the legs, tapering the lower legs (refer to the Exploded View drawing on page 77).

Note: For legs that don't require turning, see the Designer's Notebook on page 83.

The upper legs have tenons turned on each end. The lower legs have tenons turned on their top ends only. These tenons are sized to fit in the round holes in the corner blocks.

ASSEMBLY. After turning the legs, you can assemble the top frame, shelf, and legs (Fig. 14). I thought this was going to be tricky. But since the tenons fit snugly in the corner block holes, the parts were easy to glue up without clamps.



I found it easiest to assemble the pieces upside down on a flat surface. To begin, apply glue to the tenons on both ends of the upper legs, and insert them into the corner blocks in the top frame (Fig. 14). Then put the shelf on the legs. Now, use a framing square to check that everything is square.

Finally, glue the lower legs to the shelf frame. To help align the legs, I made a plywood template with holes drilled in it to accept the legs (Fig. 15). It holds the legs in the correct positions in relation to each other, and makes it easy to see and correct any racking or twist in the legs.

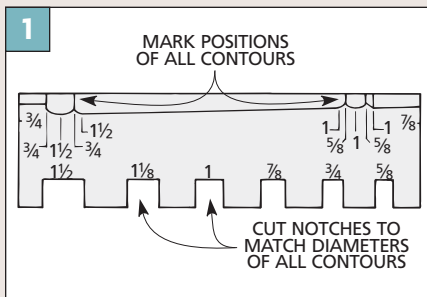
TECHNIQUE

..... Spindle Turning Template

When turning a spindle on the lathe to match a pre-determined pattern, all you really need is a ruler and caliper.

But, if you're making multiple spindles, like the four legs of the Book Stand, it's simpler and more accurate to transfer the pattern to a full-sized template first. Then turn each leg following the template, and they will all be identical.

TEMPLATE. The template I use is a piece of 4"-wide posterboard cut the same length as the finished leg (*Fig. 1*).



What makes this template different is that there are marks along both edges.

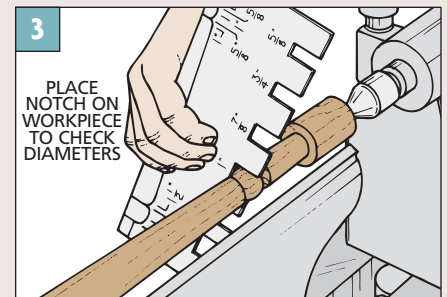
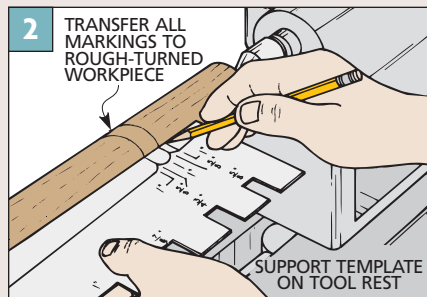
Along one edge of the template is a line of "tick" marks that serve as a ruler for laying out the pattern. The other edge of the guide has a series of cut-out notches used like a caliper.

PATTERN SIDE. The pattern side of the template shows where the different contours of the leg pattern are to be positioned along the length of the workpiece. By holding this side of the template against the spinning block, the

position of each contour can be marked with a pencil (*Fig. 2*).

CALIPER SIDE. As the spindle is being turned, the other edge of the template works as an indicator gauge. It shows when you've reached the correct outside diameters of beads, tenons, and tapers, and the correct inside diameters of coves, fillets, and V-grooves (*Fig. 3*).

A template like this helps ensure all spindles turned from the same pattern look identical (because they're all made using the same template).



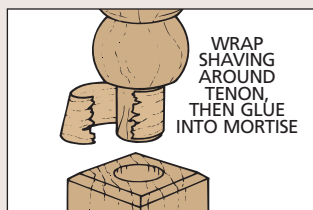
SHOP TIP

Enlarging a Round Tenon

When turning a round tenon on a lathe, it's easy to turn the tenon a little too small, meaning the tenon won't be a perfect fit in the mortise.

So how do you fix it? First plane a thin shaving. Then spread some glue on the tenon and wrap the curled shaving around it (see the drawing below).

When the tenon is glued into the mortise, the shaving becomes part of the joint.



TOP

The last part of the Book Stand to build is the top (L).

To start, glue up a panel and cut it to finished size (16" by 24") (*Fig. 16*).

EDGE PROFILE. Next, rout a profile along all four edges. I use the same setup on the router table as when routing the profile on the shelf (refer to *Fig. 12a*).

BOOK REST. With the profile complete, screw a 1 1/4" strip as a book rest (N) to the top near the front edge (*Fig. 16*).

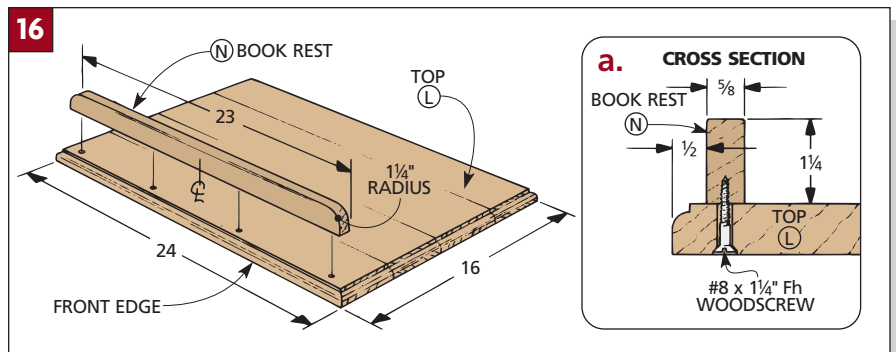
CLEATS. To keep the top flat, I screwed two cleats (M) to the underside of the top (refer to *Fig. 17* on page 82).

Screw (don't glue) the cleats to the top through counterbored oversized

shank holes. The oversized shank holes allow the top to expand and contract with changes in humidity. (If the cleats were glued on, the top might eventually split.)

RATCHET SYSTEM. The angle of the top is changed by adjusting a simple two-part ratchet system. The prop (O) is hinged to the underside of the top (refer to *Fig. 17* on page 82). The ratchet (P) is installed inside the top frame (*Fig. 18*).

To start, cut the prop to size and cut a 45° bevel at one end. Then screw one leaf of the hinge to the prop at the square end (refer to *Fig. 17* on page 82). The other leaf of the hinge is screwed to the bottom face of the top. Locate the barrel of the hinge 9 5/8" from the back edge, and center it on the length of the top.



To make the ratchet, cut the stock to length for a close fit between the front and back aprons (Fig. 18). To cut the teeth, I used a $\frac{3}{4}$ "-wide dado blade tipped at a 15° angle in the table saw (Fig. 18a).

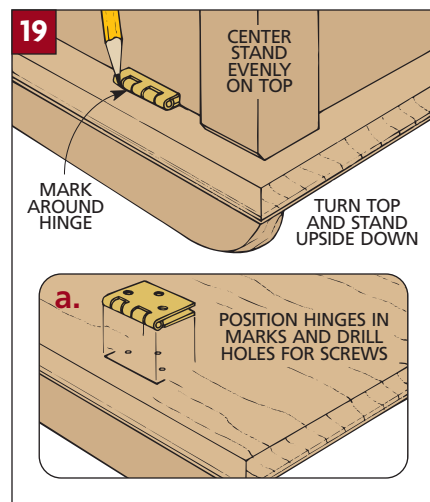
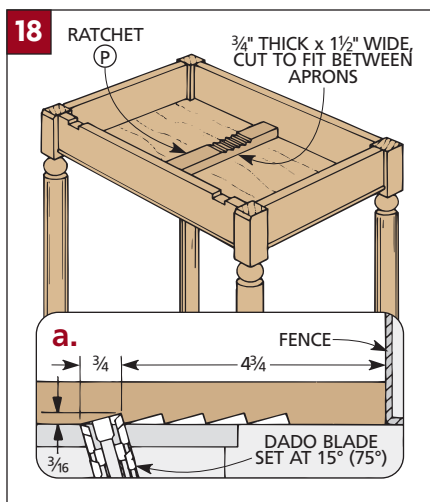
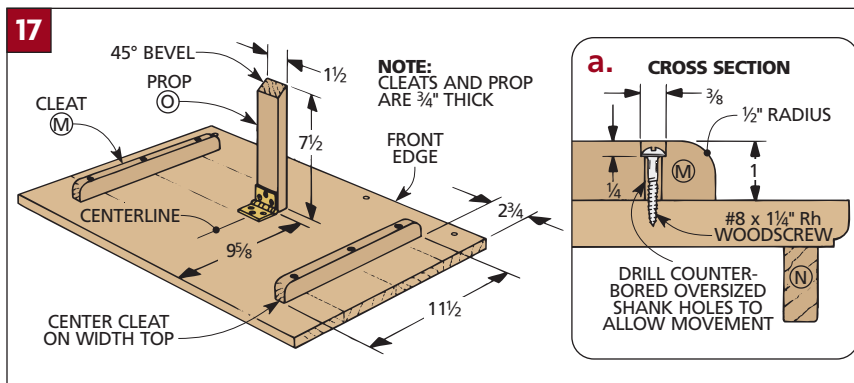
After cutting the teeth, glue the ratchet to the dust panel in the top frame, centered on the length of the top frame (Fig. 18).

ATTACHING THE TOP. The last step is to hinge the top to the front apron of the top frame (Fig. 19). To do this, first screw the hinges into the mortises in the apron. Then turn the top and the stand upside down, and position the stand on the top centered evenly between the front, back, and sides.

Now mark the positions of the hinges on the bottom face of the top. This is easier than you might expect, since the hinges stick out $\frac{3}{8}$ " in front of the apron (Fig. 19). Mark around the sides and barrel of the hinge.

Next, remove the stand and take the hinges off the apron. Now align the hinges with your marks on the top and drill the screw holes (Fig. 19a). Finally, screw the top to the stand.

Note: The stand also makes an attractive flat-top side table, perfect for a hallway or entryway.



SHOP JIG

Long Stock Drilling Jig

Drilling a straight hole into the end of a long workpiece can be difficult, so I used this jig for the drill press table to make the job easier.

HOLDING JIG. The jig consists of a block made from 2x6 stock attached to a fence and base (Fig. 1). The jig holds the leg off one side of the table so it's straight up and down under the drill bit (Fig. 3).

BUILD JIG. To make the jig, first I ripped the block and fence pieces to width. Then,

I glued and screwed the fence to the top of a square plywood base (Fig. 1).

Next, cut a brace block from the scrap and glue and screw it to one end of the fence and base, making sure it's square to the fence (Figs. 1 and 1a).

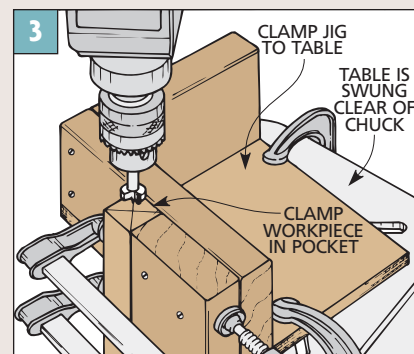
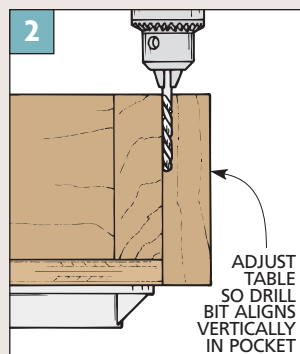
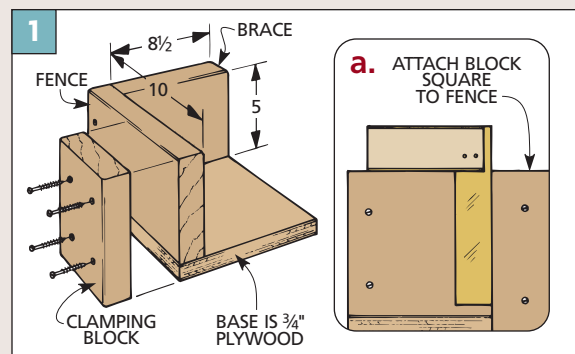
SETTING UP. Now, set the drill press table so it's perpendicular to the drill bit. First, place the jig on the table, take your longest drill bit and align it vertically with both the fence and the block (Fig. 2).

Then, install the bit you'll be using and clamp the piece in the pocket (Fig. 3).

Finally, position the jig on the table so the centerpoint on the bit aligns with the center of the workpiece.

DRILL HOLES. After you're sure that the bit is aligned, clamp the jig to the table and drill the hole.

Note: To drill holes the same depth, set the depth stop on the drill press and align each piece with the top of the jig.



DESIGNER'S NOTEBOOK

Building this stand with square legs may be your only option if you don't have access to a lathe. But you won't be sacrificing looks — it's a beautiful piece of furniture either way.

CONSTRUCTION NOTES:

■ I changed one feature — the legs — on this version of the Book Stand. This meant a redesign of the joinery for the pieces of the leg. Instead of turning tenons on the ends of the legs, I created round tenons by gluing dowels into holes drilled in the ends of the legs (refer to Fig. 5).

■ The first step is to cut eight blanks of square stock to finished length (Fig. 1).

■ After the blanks are cut to length, drill the holes in the ends of the legs to accept $\frac{3}{4}$ " dowels (Fig. 1). To do this on the drill press, see the Shop Jig on page 82.

Note: There's no hole in the bottom end of each lower leg.

You need a good fit between the dowel and the hole, so you may need to buy them a little oversized and sand them down to fit in the holes.

■ The next step is to chamfer both ends of the upper legs, but only the top end of the lower legs (Fig. 1).

■ To give the Book Stand a more delicate appearance, I decided to taper the lower legs, and create a decorative "foot" at the very bottom (Fig. 1).

■ First, cut the taper using a tapering jig on the table saw. Set the jig to begin the taper at the top end of the lower leg.

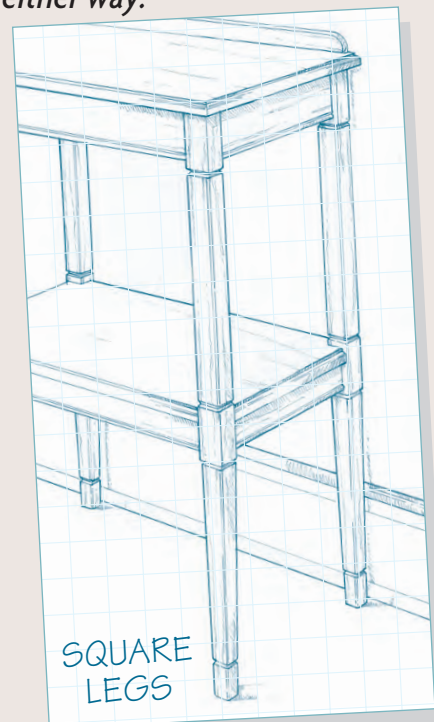
■ To make the foot on each leg, use the table saw to cut a V-groove 2" from the bottom end (Fig. 2). To set up this cut, tilt the blade to 45° and set it to cut $\frac{3}{32}$ " deep. Use the rip fence as a stop, setting it 2" from the blade (Fig. 2a).

■ You can't use the miter gauge set at 90° when cutting the grooves — the ends of the grooves on the adjoining faces won't align. Instead, tilt the miter gauge so the bottom of the leg is flat against the rip fence (Fig. 2). This is an angle of about 1½°. Now the V-grooves can be cut in the lower legs.

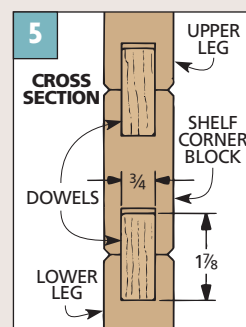
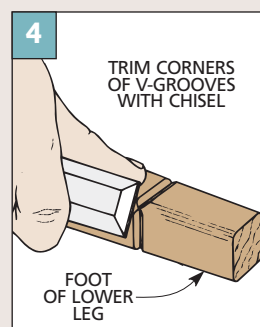
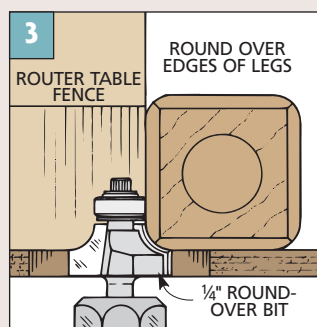
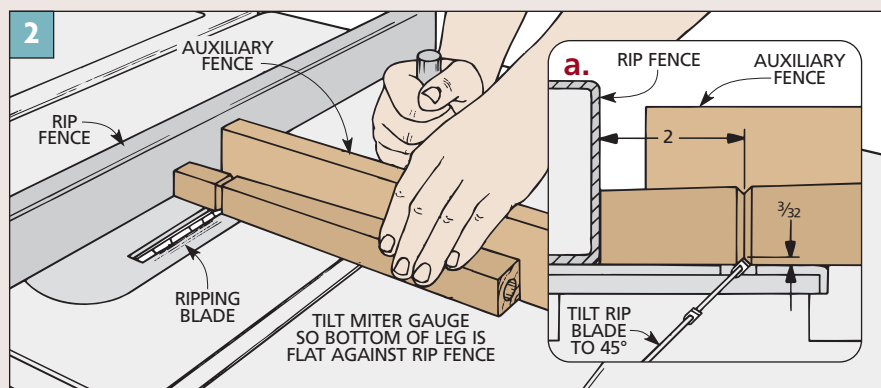
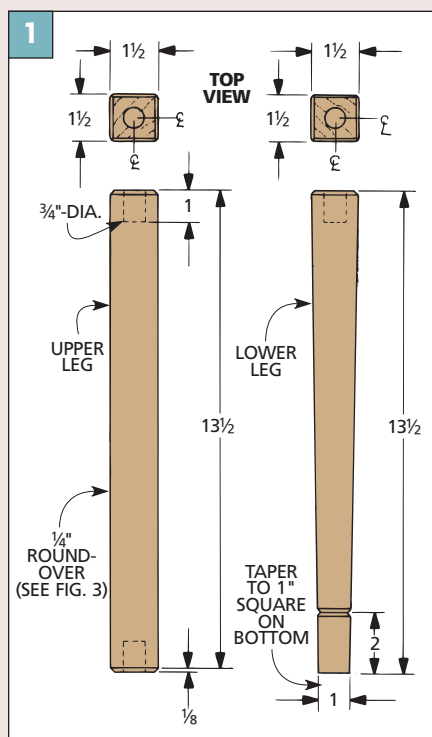
■ Now, the upper and lower legs can be softened by rounding over the edges using the router table (Fig. 3).

■ Once the legs are rounded, use a chisel to cut the chamfers evenly around the corners of the V-grooves (Fig. 4).

■ The last step is to cut the tenons from a $\frac{3}{4}$ "-dia. dowel (Fig. 5). (Cut them a bit short so they'll come together tight.)



■ Finally, the legs are ready to assemble to the other parts of the stand, just as was done on the Book Stand with turned legs (refer to Figs. 14 and 15 on page 80).







CABINETS

Inspired by traditional cabinets of the past, the pieces in this section offer a wide variety of woodworking challenges and provide an equally wide variety of functions.

Although the designs are inspired by traditional furniture, they have been simplified by the use of some non-traditional materials. Primarily, all three use plywood in some places instead of solid-wood panels. This resolves the issue of wood movement.

Each cabinet offers its own challenges to your skills. The jewelry cabinet's cabriole legs are simpler to make than you might imagine. The chairside chest and the buffet server both feature dovetailed drawers, and each also has a variation of a bead molding to provide visual interest.

Chairside Chest

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Chairside Chest

Handsome from any angle and featuring high-contrast dovetail drawers, this cabinet is a perfect chairside companion. An option for double-deep drawers gives you customized space without changing the look.



One of the most interesting features of this chest is the least obvious — the back of the cabinet is just as beautiful as the top and sides. It's designed to have a finished look wherever it's placed in a room.

The inspiration for this project was an antique spool cabinet. These cabinets displayed and stored thread, and they usually sat on a counter or in the middle of the store. Since they could be viewed from all sides, the back had to look as nice as the front.

DRAWERS. Though frame and panel construction is characteristic of spool cabinets, I've made a couple of changes

from the typical design. First, I increased the drawer height so I could store something larger than a spool of thread. (While I was at it, I came up with an additional design for double-deep drawers that doesn't change the appearance of the chest. Details about this are in the Designer's Notebook on page 95.) The drawers are held together with machine-cut dovetail joints — an attractive feature in these cabinets.

TOP. Another change is the top of this chest. It isn't solid stock, but a walnut frame around a walnut plywood panel. If the top were solid, you'd have to figure out how to anchor it to the case to allow

for expansion and contraction with seasonal changes in humidity. Since a frame and plywood panel won't expand or contract significantly, it can be glued down to the case.

WOOD. I used walnut and walnut plywood to build the chest. The drawer sides and backs are hard maple, as are the interior web frames.

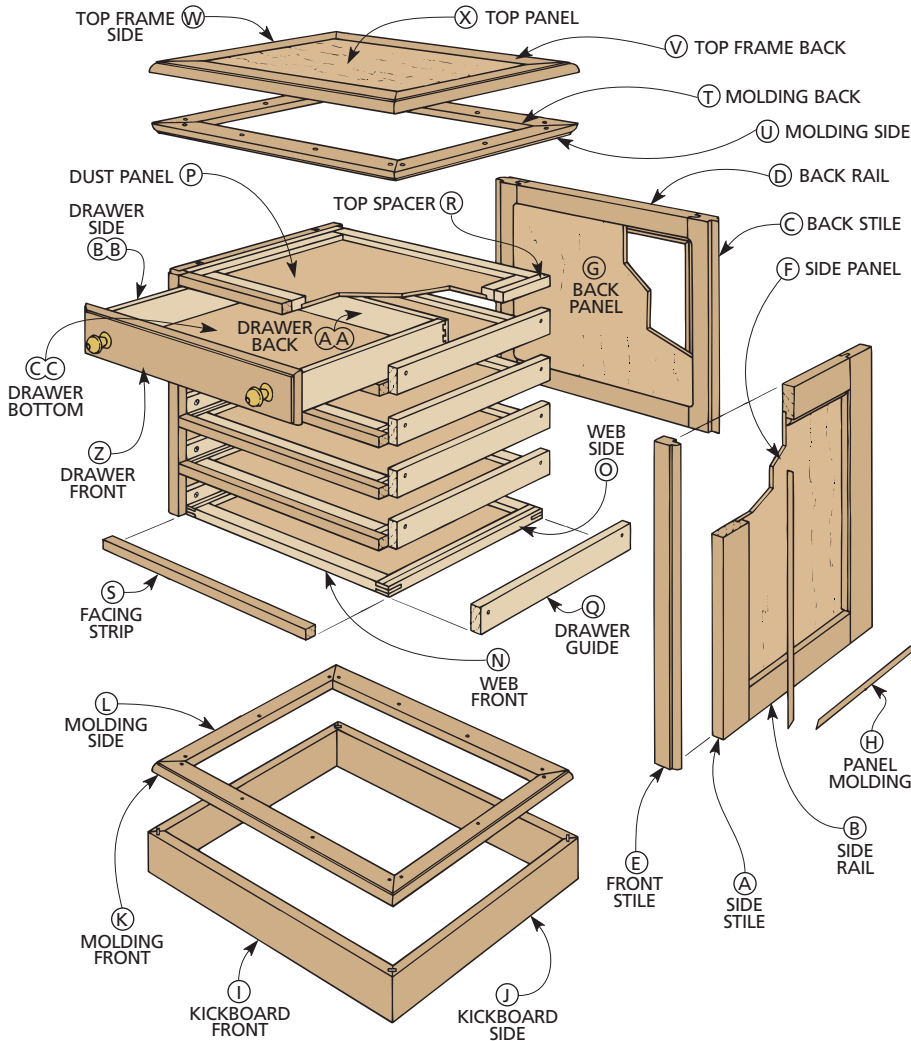
HARDWARE AND FINISH. The knobs on the drawers are classic fluted brass spool cabinet knobs. Many other styles are available (see Sources on page 126).

I finished the chest with two coats of satin polyurethane varnish, sanding lightly between coats.

EXPLODED VIEW

OVERALL DIMENSIONS:

27½" W x 17½" D x 23" H



MATERIALS LIST

CASE

A Side Stiles (4)	¾ x 2 - 18¼
B Side Rails (4)	¾ x 2 - 12
C Back Stiles (2)	¾ x 2⅜ - 18¼
D Back Rails (2)	¾ x 2 - 22
E Front Stiles (2)	¾ x 1⅜ - 18¼
F Side Panels (2)	¼ ply - 11¾ x 15
G Back Panel (1)	¼ ply - 21¾ x 15
H Panel Molding (2)	⅜ x ⅜ - 192 rough

BASE

I Kickboard Fr./Bk. (2)	¾ x 3 - 27½
J Kickboard Sides (2)	¾ x 3 - 17½
K Molding Fr./Bk. (2)	¾ x 1¾ - 27¼
L Molding Sides (2)	¾ x 1¾ - 17¼
M Splines (4)	⅛ hdbd. - ¾ x 12 rough

WEB FRAMES

N Fronts/Backs (12)	¾ x 1 - 23
O Sides (12)	¾ x 1 - 14½
P Dust Panels (6)	¼ ply - 13¼ x 21¾
Q Drawer Guides (10)	¾ x 1¾ - 14½
R Top Spacers (2)	¾ x ¾ - 14½
S Facing Strips (6)	¾ x ¾ - 23

TOP

T Molding Fr./Bk. (2)	½ x 2⅛ - 27¼
U Molding Sides (2)	½ x 2⅛ - 17¼
V Frame Fr./Bk. (2)	¾ x 2¼ - 27½
W Frame Sides (2)	¾ x 2¼ - 17½
X Panel (1)	¾ ply - 13 x 23
Y Splines (1)	¼ hdbd. - ⅞ x 72 rough

DRAWERS

Z Fronts (5)	¾ x 3⅜ - 25⅝
AA Backs (5)	½ x 2⅝ - 22⅝
BB Sides (10)	½ x 2⅝ - 14¾
CC Bottoms (5)	¼ ply - 14⅝ x 22⅝

HARDWARE SUPPLIES

- (14) No. 8 x 1" Fh woodscrews
- (18) No. 8 x 1¼" Fh woodscrews
- (10) Drawer knobs
- (14') Nylon glide tape

CUTTING DIAGRAM

¾ x 5 - 96 (Two Boards @ 3.3 Bd. Ft. Each)



¾ x 5 - 96 (3.3 Bd. Ft.)



¾ x 5 - 96 (3.3 Bd. Ft.)



¾ x 4 - 96 (Two Boards @ 2.7 Bd. Ft. Each)



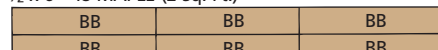
¾ x 6 - 96 MAPLE (Two Boards @ 4 Bd. Ft. Each)



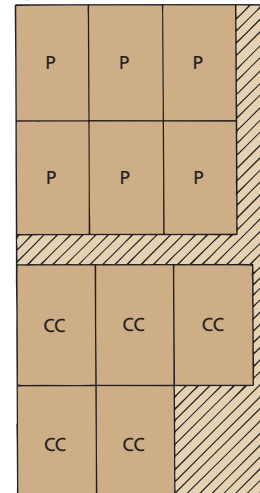
½ x 6 - 96 MAPLE (4 Sq. Ft.)



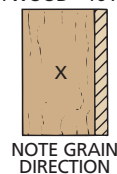
½ x 6 - 48 MAPLE (2 Sq. Ft.)



¼" MAPLE PLYWOOD - 48 x 96

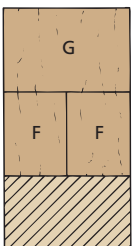


¾" WALNUT PLYWOOD - 16 x 24



NOTE GRAIN DIRECTION

¼" WALNUT PLYWOOD - 24 x 48



SIDE & BACK FRAMES

I began building the Chairside Chest by making the side and back frames of the case. The frames are $\frac{3}{4}$ " hardwood surrounding $\frac{1}{4}$ " plywood panels.

SIDE FRAMES. Start work on the two side frames by cutting the side stiles (A) and side rails (B) to size (Fig. 1).

BACK FRAME. Since the back frame and side frames have to be the same height, I cut the back stiles (C) and back rails (D) at this time (refer to Fig. 4).

All three frames are held together with open-ended mortise and tenon joints (Fig. 1a).

MORTISES. I cut the mortises in the stiles with a $\frac{1}{4}$ " straight bit on the router table (Fig. 2). Raise the bit $\frac{9}{16}$ " above the table, and position the fence so the bit is centered on the stile (Fig. 2a).

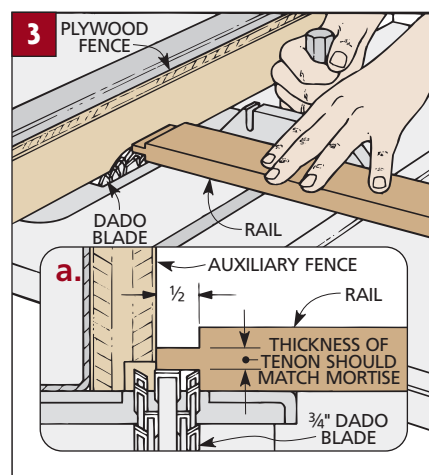
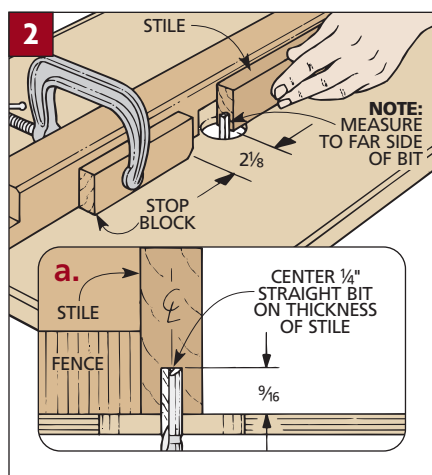
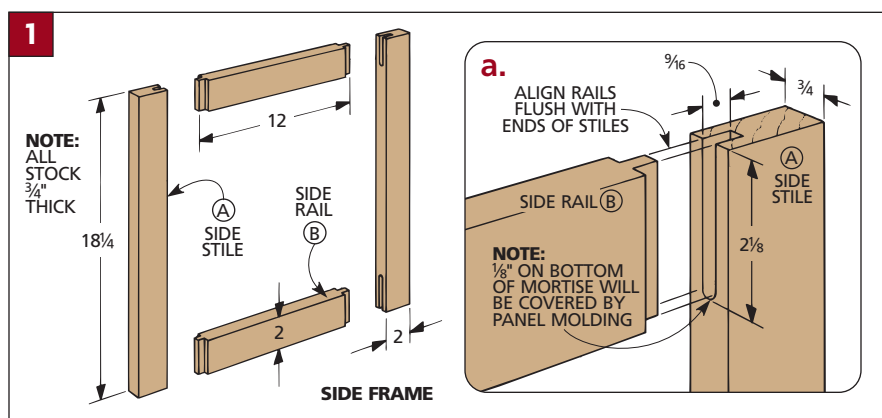
Next, I clamped a stop block to the fence to limit the length of the cut. Position the stop block $2\frac{1}{8}$ " from the opposite side of the bit (Fig. 2).

Note: The mortise only has to be 2" long to accept the tenon on the rail. But I cut it $\frac{1}{8}$ " longer, so I wouldn't have to square up the rounded end (Fig. 1a).

TENONS. The next step is to cut $\frac{1}{2}$ "-long tenons on the ends of the rails. To do this, I cut rabbets on both faces of the rails with a dado blade (Fig. 3).

Sneak up on the depth of cut until the tenon fits snugly into the mortise in the stile. Then cut tenons on all the rails.

FRONT STILES. With the joints completed, I cut two front stiles (E) (Fig. 4). When the case is assembled, these pieces will be glued to the side frames (refer to Fig. 10 on page 90). But I cut them now since they receive the same



edge profile as the back stiles (C).

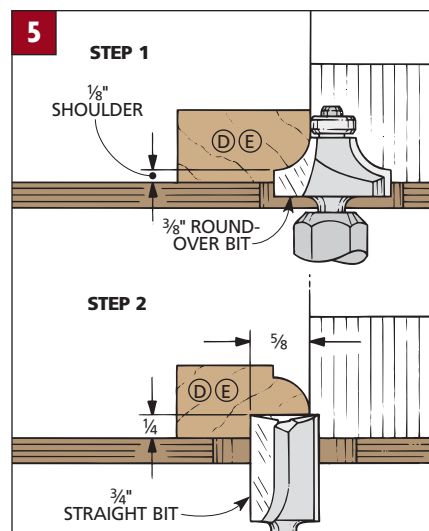
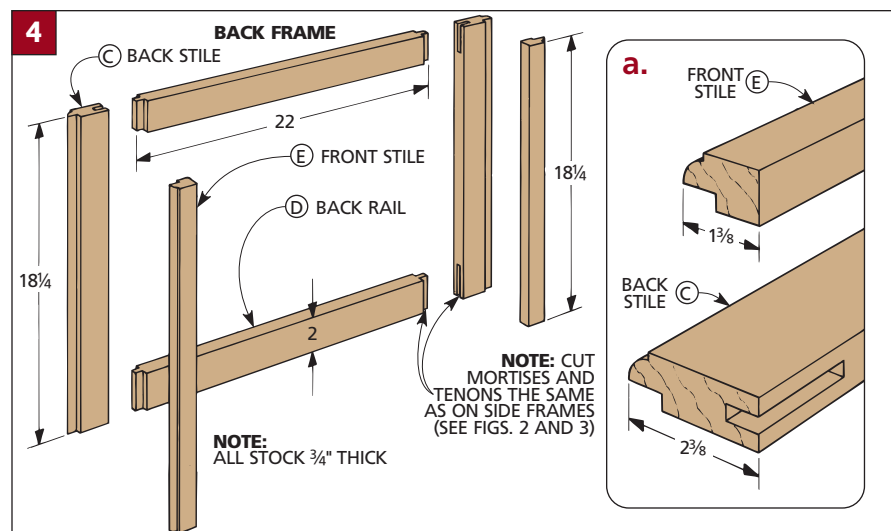
EDGE PROFILE. To dress up the edges, rout a roundover (with a shoulder) on the outside corner of each back stile (C) and front stile (E) (Step 1 in Fig. 5).

RABBET. Now, rout a $\frac{5}{8}$ "-wide rabbet on the inside corner (opposite the roundover) (Step 2 in Fig. 5). The side frames fit into these rabbets when the case is assembled.

ASSEMBLY. Finally, glue and clamp each of the three frames together, checking that they're square.

PANELS & MOLDING

After the three frames were dry, I routed rabbets around the inside face of each frame to accept a $\frac{1}{4}$ " plywood panel (refer to Fig. 7).



To do this, use a $\frac{3}{8}$ " rabbet bit in the router table and raise it to equal the thickness of the plywood (Fig. 6a).

PANELS. Next, cut the two side panels (F) and the back panel (G) to fit between the rabbets.

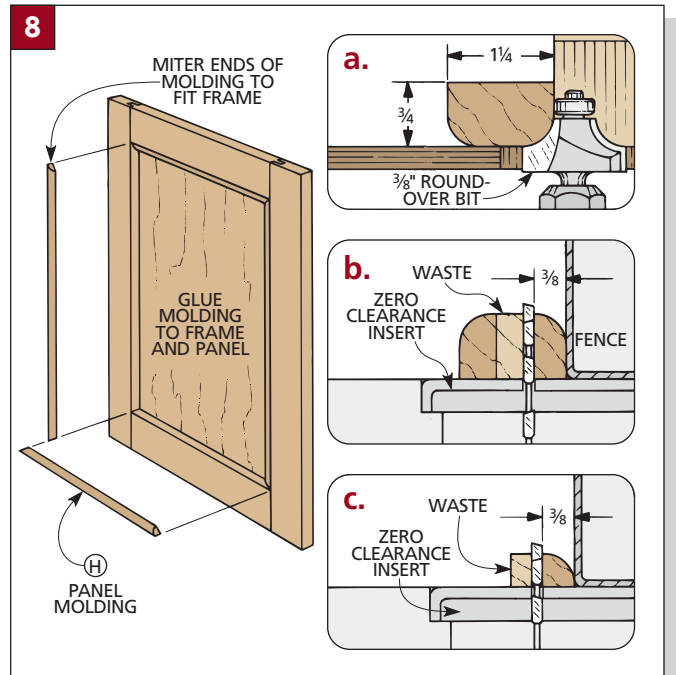
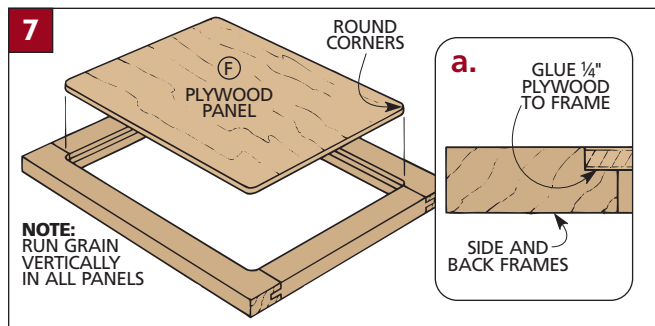
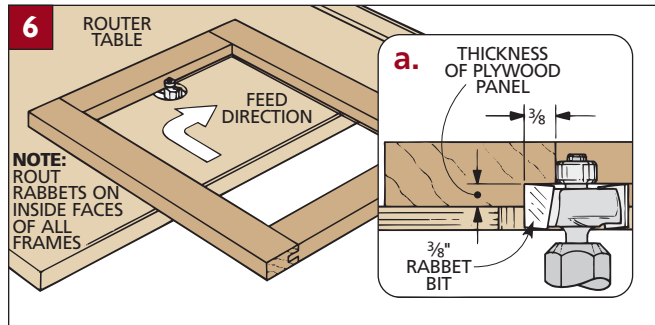
Note: The grain runs vertically on all three panels.

To make the panels fit, I rounded the corners to match the rabbets (Fig. 7).

MOLDINGS. Once the panels were in place, I glued decorative panel molding strips (H) on the front face of each frame (Fig. 8). To make the strips, cut $\frac{3}{4}$ "-thick stock $1\frac{1}{4}$ " wide. Then rout a $\frac{3}{8}$ " roundover on each edge (Fig. 8a).

With a zero-clearance insert around the table saw blade, trim a $\frac{3}{8}$ " strip off each side (Fig. 8b). And finally, cut each strip $\frac{3}{8}$ " wide (Fig. 8c).

Once the molding strips were cut to size, I mitered each end to fit inside the frame (see the Shop Jig below). Finally, glue the strips to the frame and panel.



SHOP JIG

Molding Miter Box

For this project, I built a special miter box for small pieces of molding.

BASE. Start by cutting a base out of $\frac{3}{4}$ " plywood (Fig. 1). Then, to hold the fence in place, cut a $\frac{1}{4}$ "-deep groove along the base $\frac{1}{4}$ " from the back edge.

FENCE. The fence starts out as a block of $1\frac{1}{2}$ "-thick hardwood (Fig. 1).

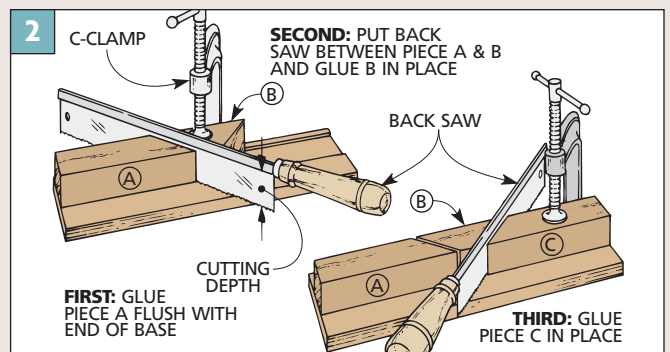
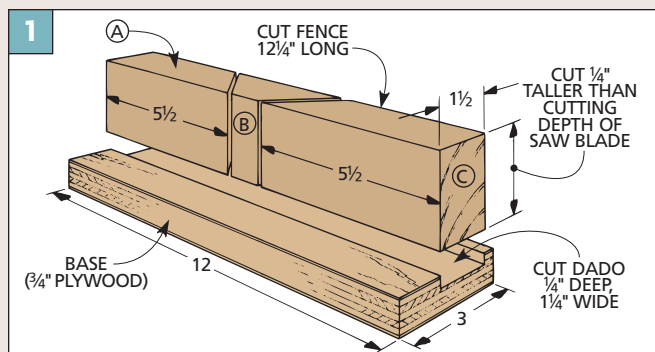
The width of the fence (its height when mounted on the base) should be

$\frac{1}{4}$ " taller than the cutting depth of the saw you'll use to cut the miters (Fig. 2).

Next, cut the fence block into three sections at 45° angles, so the left (A) and right (C) sections are both $5\frac{1}{2}$ " long. Save the middle section (B).

ASSEMBLY. To assemble the miter box, follow the sequence in Fig. 2.

When using the miter box, I clamp it to my bench to keep everything steady.



BASE

The base of the chest consists of a molding frame glued on top of a kick-board frame (*Fig. 9*).

KICKBOARD FRAME. To build the kickboard frame, start by ripping the kickboard front and back (I) and sides (J) to a uniform width (height) of 3". Then miter the front and back pieces so they measure 27½" (from long-point to long-point) and the side pieces measure 17½" (*Fig. 9*).

To help align the miters and strengthen the joint, I added a spline (M) in each corner (*Fig. 9a*). So before gluing up the frame, tilt your table saw blade to 45° and cut a kerf in each miter. Then cut splines to fit the kerfs.

Note: Splines can be resawn from solid stock or cut from hardboard. If they are cut from solid wood, make sure the grain direction runs *across* the assembled joint.

MOLDING FRAME. After the kick-board frame is glued together, work can begin on the pieces for the molding frame (*Fig. 9*). The first thing to do is to rip the front/back (K) and sides (L) to a uniform width of $1\frac{3}{4}$ ".

Before mitering the pieces to finished length, I routed a $\frac{3}{8}$ " roundover (with a shoulder) on the top outside edge of each piece (*Fig. 9b*). Also rout a $\frac{5}{8}$ "-wide rabbet to fit over the kickboard frame. These are the same procedures as on the front and back stiles (refer to *Fig. 5* on page 88).

Now you can mitre the pieces to finished length so the rabbets in the molding frame will sit on the kickboard once it's assembled.

The base is screwed to the bottom of the case later, but it's easiest to do this if the shank holes are drilled in the molding frame now (*Figs. 9 and 9b*).

After the holes are drilled, glue the molding frame on top of the kickboard frame. Keep the clamps centered over the edge of the kickboard frame so the top of the molding is square with the front of the kickboard.

ASSEMBLY

After the base is complete, the case sides and back can be assembled and then screwed to the base.

FRONT STILES TO FRAMES. Start assembling the case by gluing the front stiles (E) over the front edges of the

side frames (*Fig. 10a*). Check that the inside corners are square and that the ends of each stile are flush with the top and bottom of the frames.

SIDE TO BACK FRAMES. Once the stiles have dried, glue and clamp the side frames to the back frame to form a U-shaped assembly that's open in the front (*Fig. 10*). Again, check that the assembly is square.

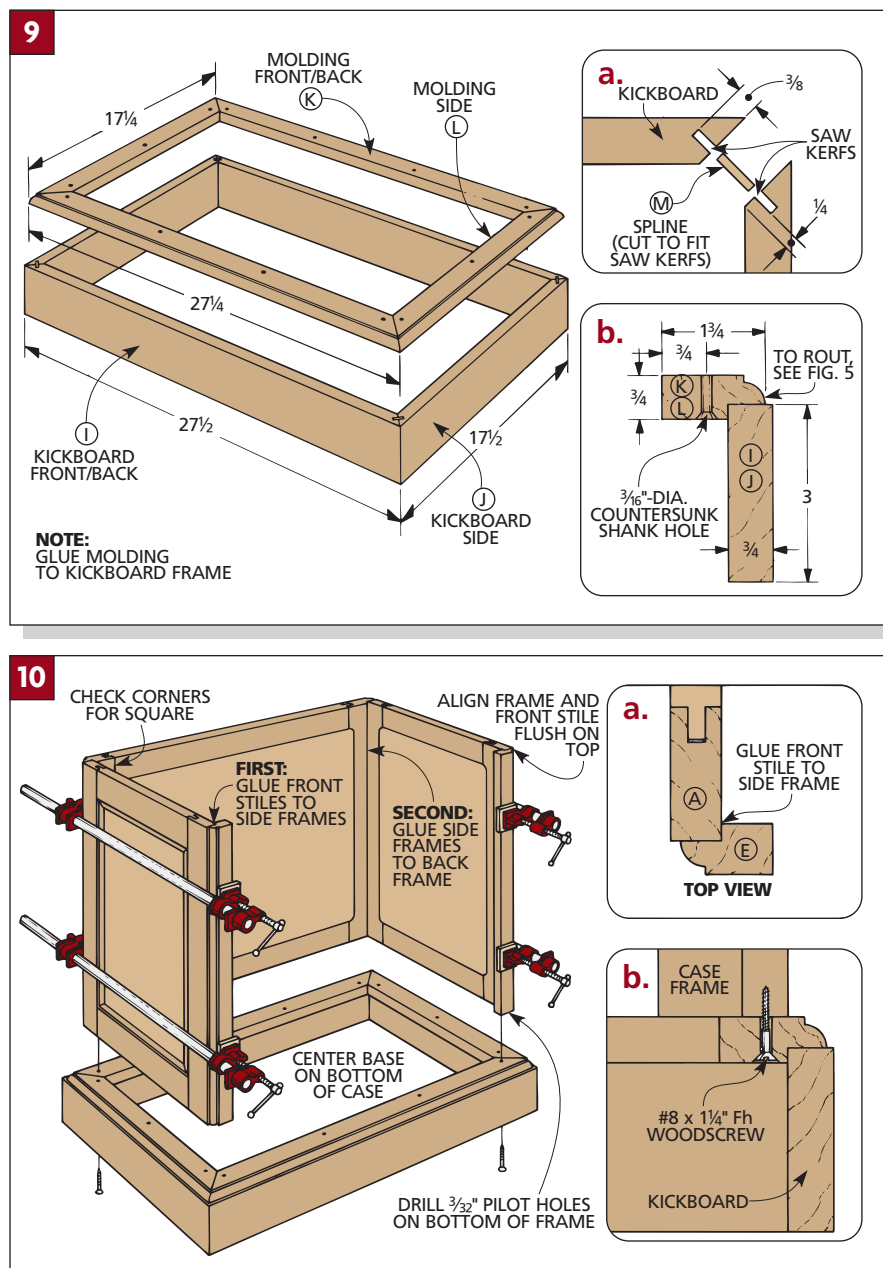
SCREW ON BASE. After the glue dries, turn the case assembly over and center the base on the bottom of the case. Then mark the locations of the screw holes on the bottom edges of the case by pushing an awl through the counter-sunk screw holes in the molding strips.

Finally, drill pilot holes at the marked locations and screw the base to the case with No. 8 x 1 $\frac{1}{4}$ " flathead woodscrews (*Fig. 10b*).

WEB FRAMES

With the case screwed to the base, the next step is to build six web frames. These frames connect the cabinet sides and support the drawers. The construction of these frames is similar to that of the case sides and back.

CUT TO SIZE. Begin by cutting all the $\frac{3}{4}$ "-thick frame pieces to a width of 1" (*Fig. 11*). To determine the length of the front/back(s) (N), measure the dis-



tance between the case sides ($24\frac{1}{2}$ " in my case). Then, since drawer guides will be glued to the sides of the frame (refer to *Fig. 14*), subtract the thickness of two drawer guides ($1\frac{1}{2}$ "). So I cut twelve web fronts/back (N) to a length of 23" (*Fig. 11*).

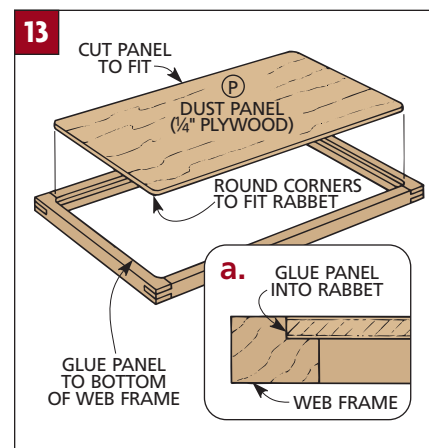
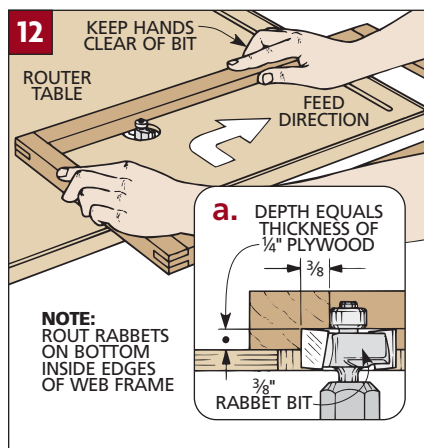
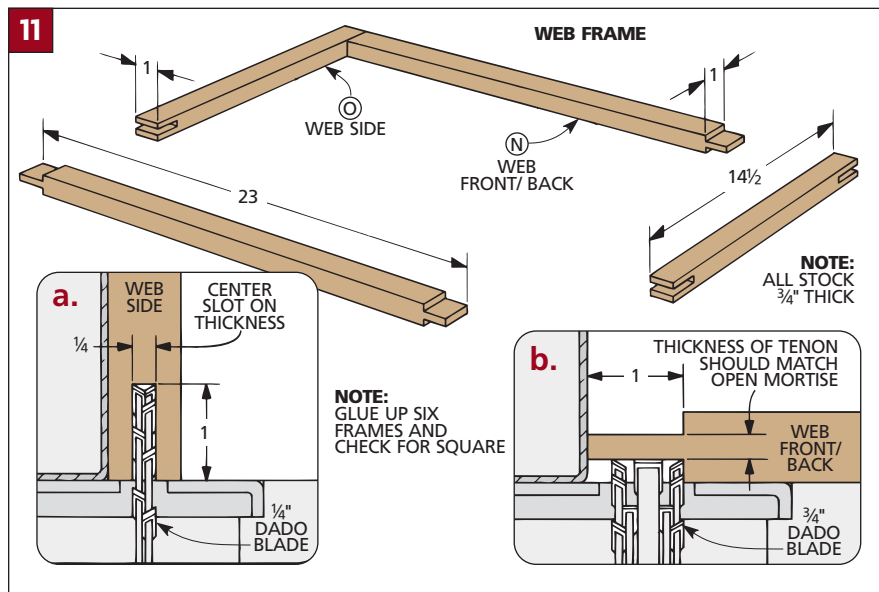
To determine the length of the web sides (O), measure the distance between the front and back stiles ($14\frac{1}{2}$ " in my case). Now cut twelve sides to this length (*Fig. 11*).

JOINERY. The web frame pieces are joined with open mortise and tenon joints. To make this joint, first cut an open mortise (slot) in each end of each of the web sides (O) (*Fig. 11a*). Center the mortise on the thickness of the piece, and cut it to depth to match the width of the front/back pieces (1").

Next, I cut a tenon on each end of the web front/back pieces (N) (*Fig. 11b*). Sneak up on the depth of the cuts until the tenons just fit the mortises.

Now glue and clamp all six web frames together, checking that each assembly is square and flat.

DUST PANELS. To keep a drawer from catching on any items in the drawer below, I glued a $\frac{1}{4}$ " plywood dust panel (P) to rabbets routed along the inside bottom edges of each frame (*Figs. 12 and 13*). Instead of squaring up the corners of the rabbets, I rounded off the corners of the plywood panels.



DRAWER GUIDES

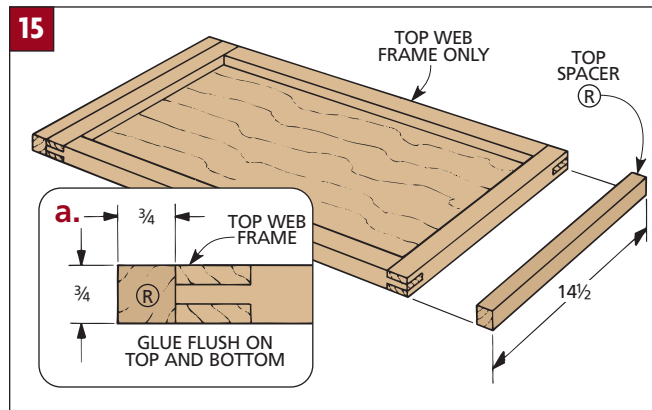
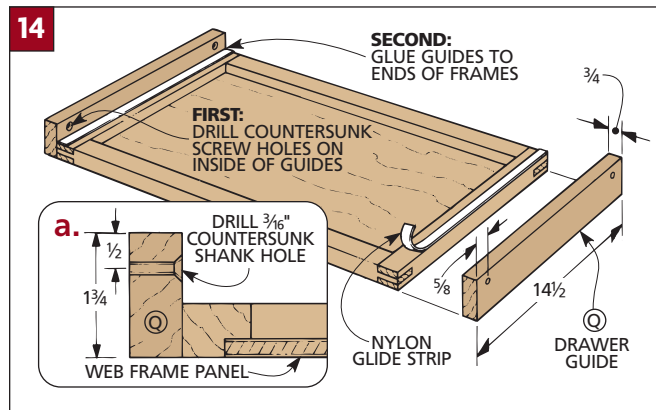
Before installing the web frames in the case, I added drawer guides to five of the frames for the drawers (*Fig. 14*). (The top frame doesn't need them.) The guides keep the drawer straight as it's moved in and out of the chest. They also provide a way to secure the web frames into the case.

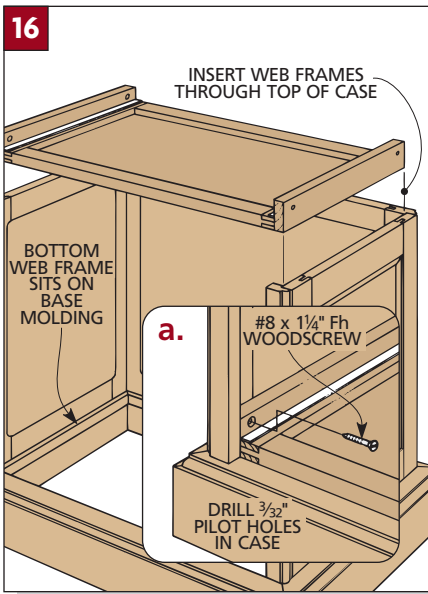
DRAWER GUIDES. The ten drawer guides (Q) are cut to a width of $1\frac{3}{4}$ " and to the same length as the web sides (O) (*Fig. 14*). Before gluing the drawer guides to the web frames, drill two countersunk mounting holes through each guide (*Fig. 14a*).

After the holes are drilled, glue the drawer guides to the sides of the web

frame so that they are flush with the ends and bottom edge of the frame. Then, to prevent wear on the frames, I added self-adhering nylon glide tape to the top of each frame (*Fig. 14*).

TOP SPACER. To keep the top frame the same width as the other frames, glue a $\frac{3}{4}$ " x $\frac{3}{4}$ " spacer (R) on each side of this frame (*Fig. 15*).





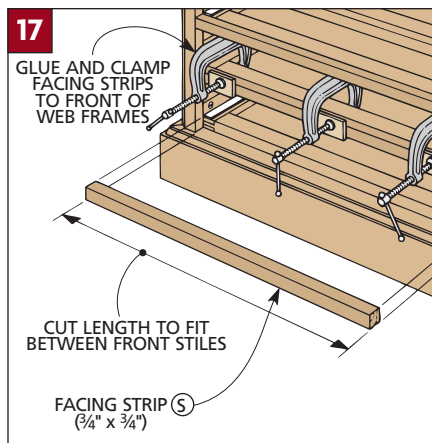
INSTALLING WEB FRAMES

The next step is to fasten the web frames in the case to form the drawer openings. I used a series of spacers to position the frames and to keep all five drawer openings identical.

BOTTOM FRAME. Start by inserting the bottom web frame through the top of the case until it sits on the base molding (Fig. 16). Now drill pilot holes through the mounting holes, and screw the frame to the case (Fig. 16a).

SPACERS. Next, measure the inside of the case to determine the width of the spacers. (See the Shop Tip above for details on how to do this.)

ASSEMBLY. Once the spacers are cut to the correct height, you can remove them and begin assembly. For each frame, insert two spacers and then a web frame. Then drill pilot holes and screw the frame to the case.



SHOP TIP Drawer Openings

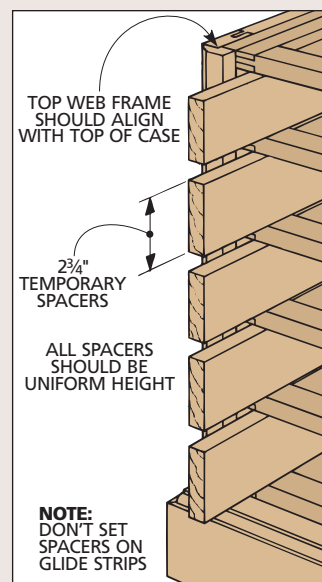
You can make several drawer openings all the same height by using a simple set of spacers to help position the web frames in the case.

To determine the size of the spacers, measure from the bottom web frame to the top of the case (17 1/2"). Then, subtract the combined thickness of the five remaining frames (3 3/4").

Now, take this measurement (13 3/4") and divide it by five (the number of openings). Then rip ten spacers (one for each side of the drawer opening) to this width (2 3/4") (see drawing).

Next, insert the web frames in the case and separate them with the spacers (see drawing). If the top frame isn't flush with the top of the case, adjust the height of all the spacers.

Note: Keep all the spacers identical.



FACING STRIPS. After all of the web frames are screwed in place, you can remove the spacers and glue a walnut facing strip (S) to the front of each frame (Fig. 18). Cut the strips to fit between the front stiles (E), and clamp them in place with C-clamps (Fig. 17).

TOP

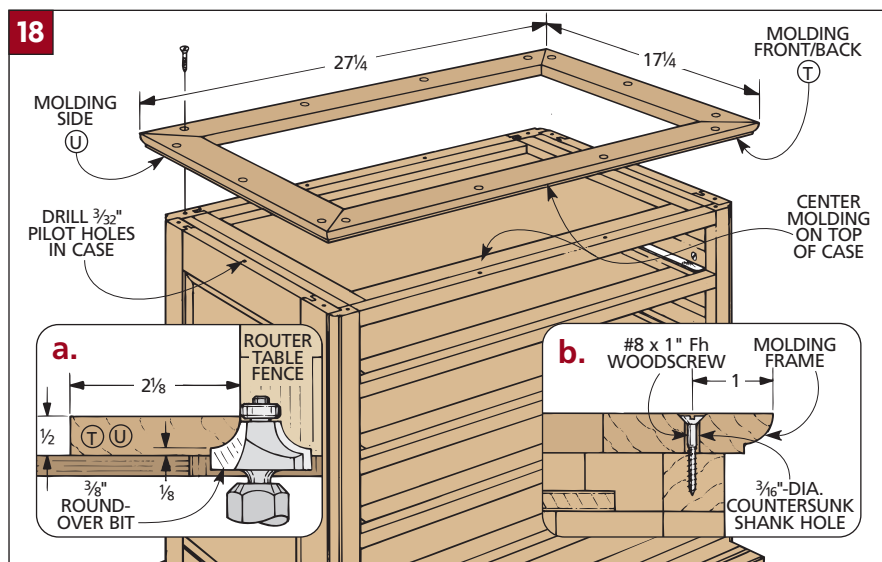
After the web frames and facing pieces are in place, work can begin on the top. This consists of two assemblies.

The top portion is a mitered hardwood frame that surrounds a 3/4" plywood panel (refer to Fig. 19).

Underneath this panel assembly is a molding frame. This allows you to add an interesting edge profile to the chest.

MOLDING FRAME. To make the molding frame, start by resawing enough 1/2"-thick stock for the front and back pieces (T) and two side pieces (U) (Fig. 18). Then rip the pieces to a uniform width of 2 1/8".

The next step is to rout a 3/8" roundover (with a 1/8" shoulder) on the bottom edge of each piece (Fig. 18a). Once that is done, you can miter the pieces to length so they're 1 1/4" longer (long-point to long-point) than the width and depth of the case (27 1/4" and 17 1/4").



After the frame pieces are cut, screw them down to the top of the case so there's a uniform overhang on all four sides. (In my case, the overhang measured $\frac{5}{8}$ " on all sides.)

TOP FRAME. Now work can begin on the frame and panel top. To make the frame, start by cutting enough $\frac{3}{4}$ "-thick stock for a front and back (V) and two side (W) pieces (Fig. 19). Then rip the pieces to a uniform width of $2\frac{1}{4}$ ".

Before cutting the pieces to length, there are a number of routing steps to go through (Fig. 20). First, rout a $\frac{1}{4}$ " roundover (with a shoulder) on the top edge of each piece (Step 1).

Next, to create a decorative shadow line between the frame and the plywood panel, I used a straight bit to rout a very small rabbet on the inside top corner of each frame piece (Step 2).

To keep the frame pieces and plywood panel aligned during glue-up, I used splines cut from $\frac{1}{4}$ " hardboard (Fig. 19). To accept the splines, I routed $\frac{1}{4}$ " slots on the inside edges of the frame pieces (Step 3 in Fig. 20). (Save this router setup for use on the top panel in a later step.)

After routing the slots, miter the frame pieces (V, W) to length so they're $\frac{1}{4}$ " longer (long-point to long-point) than the molding frame.

PANEL. Next, dry-assemble the frame and cut a $\frac{3}{4}$ " plywood top panel (X) to fit within the frame. Once the panel is cut to size, rout $\frac{1}{4}$ " slots on all four edges (Step 4 in Fig. 20).

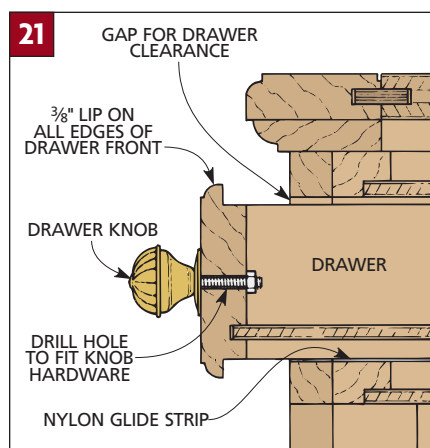
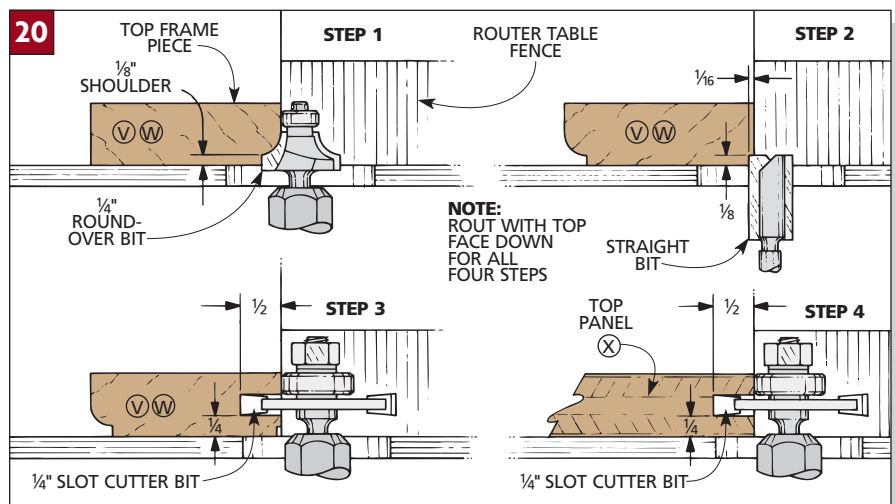
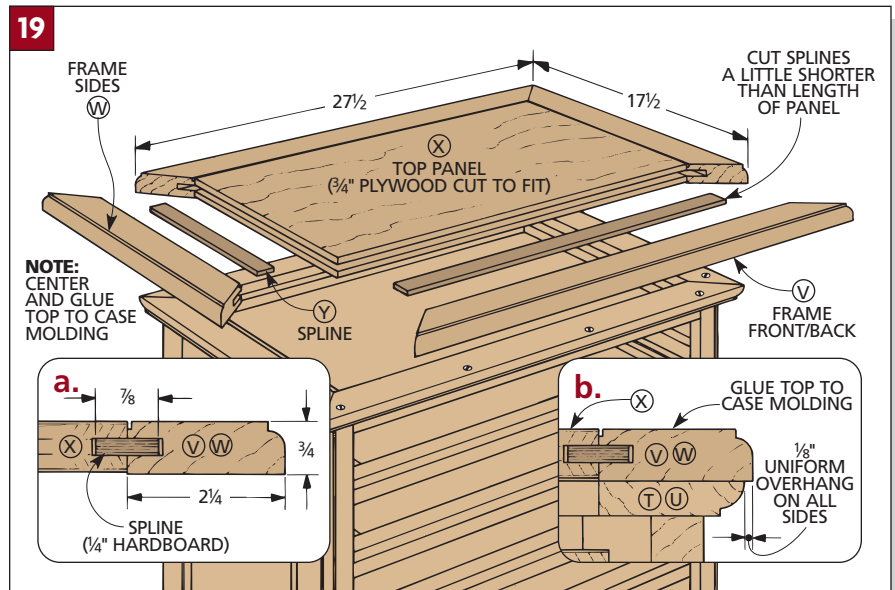
ASSEMBLY. Now cut the splines (Y) from $\frac{1}{4}$ " hardboard to a width of $\frac{7}{8}$ " (Fig. 19a). This allows room for excess glue. Then glue the frame around the panel with the splines in place.

After the glue dries, glue the frame and panel assembly down to the top of the case. Center it on the case so there's a uniform overhang ($\frac{1}{8}$ " on all four sides (Fig. 19b).

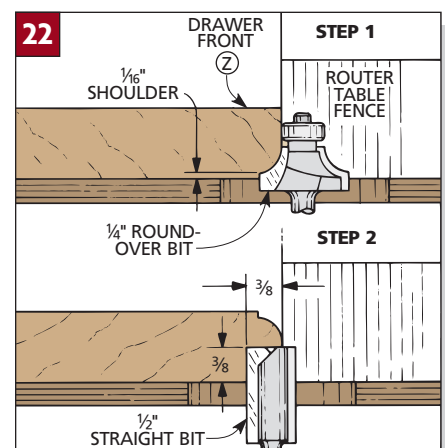
DRAWERS

The last step on the chest is to make the drawers. The fronts are walnut, and the sides and backs are maple. Dovetails are used at each corner. I started by making the lipped drawer fronts.

DRAWER FRONTS. The first thing to do is to determine the size of the drawer fronts (Z). To do this, measure a drawer opening (not including the glide strip) and add $\frac{5}{8}$ " to the height and width.



This allows for a $\frac{3}{8}$ " lip on each edge of the drawer, less $\frac{1}{8}$ " for drawer clearance (Fig. 21). In my case, the drawer fronts measured $3\frac{3}{8}$ " x $23\frac{5}{8}$ " (refer to Fig. 24 on page 94). Then cut five drawer fronts from $\frac{3}{4}$ "-thick stock.



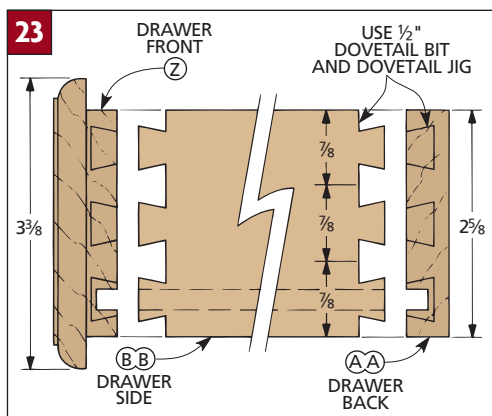
PROFILE EDGE. After the drawer fronts are cut to size, rout roundovers with shoulders on all four edges of each drawer front (Step 1 in Fig. 22). Then, to create a lip, rout a $\frac{3}{8}$ " rabbet on the back side (Step 2).



The contrast between the maple sides and the walnut fronts accentuates the dovetail joints at the front of each drawer.

BACKS AND SIDES. When the drawer fronts are complete, rip $\frac{1}{2}$ "-thick drawer backs (AA) and sides (BB) to match the shoulder-to-shoulder width of the drawer front (Fig. 23). (I used maple for these pieces.)

Then cut the five drawer backs (AA) to the same length as the shoulder-to-shoulder length of the drawer front



($22\frac{7}{8}$ ") (Fig. 24). Finally, cut the ten drawer sides (BB) $14\frac{3}{4}$ " long.

JOINERY. After all of the pieces were cut, I cut $\frac{1}{2}$ " half-blind dovetail joints on the corners. With dovetail joints at the front and back of each drawer, that would be a lot of sawing and chiseling by hand. So I sped up the process considerably by using a router and a dovetail jig to cut them (Fig. 23).

BOTTOM GROOVES. Next, cut grooves in all the drawer pieces to accept the $\frac{1}{4}$ " plywood bottoms (CC).

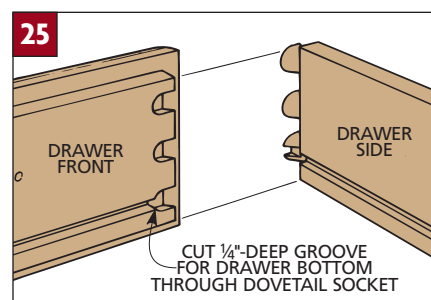
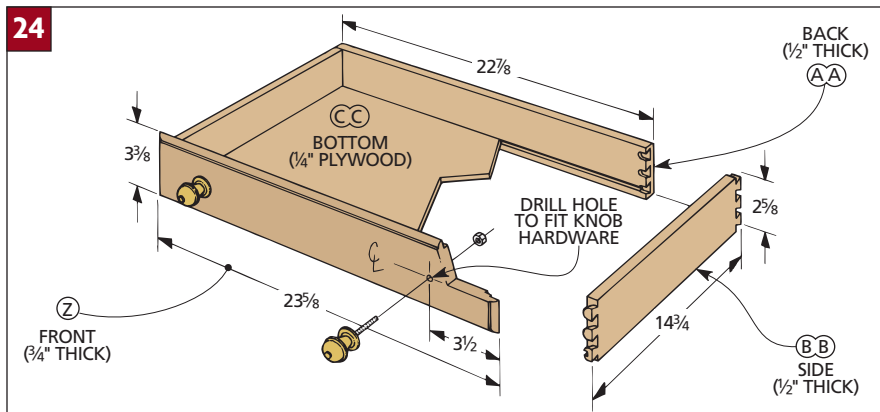
To prevent the grooves from showing on the sides of the drawers, I located it so it would cut through the dovetail sockets in the drawer front (Fig. 25).

This groove has to be in the same location on every drawer front, back, and side. But there's a problem — the drawer lip. It makes the drawer front wider than the other pieces. To work around this, I made an auxiliary fence that fits under the lip (refer to the Shop Tip below). The shoulder of the drawer front (not the lip) rides against the fence. If you use this same fence for all the pieces, the grooves will be cut the same distance from the shoulders on the drawer fronts as it is from the bottom edges of the drawer backs and sides.

Once the grooves are completed, dry-assemble the drawers so you can measure for the drawer bottoms (CC). Then cut the bottoms from $\frac{1}{4}$ " plywood to fit the drawers.

PULLS. Before assembling the drawers, I drilled shank holes in the drawer fronts to mount the knobs. Locate the holes $3\frac{1}{2}$ " from each end and centered on the height of the drawer (Fig. 24).

Finally, I assembled the drawers and finished the chest by applying a couple of coats of polyurethane.

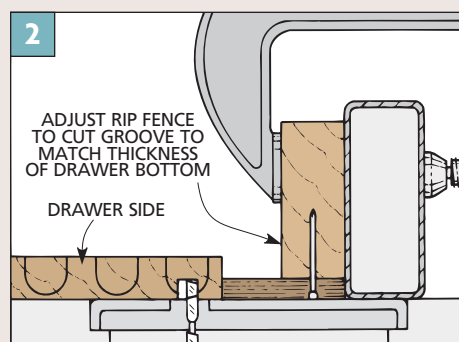
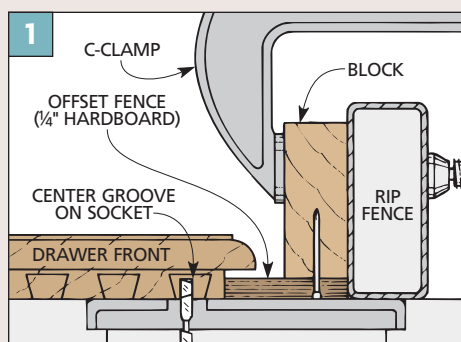


SHOP TIP

To align the grooves for the drawer bottom, I clamped an auxiliary fence to the rip fence.

This offset fence is just a piece of $\frac{1}{4}$ " hardboard nailed to a scrap block (Fig. 1). Cut a kerf in each drawer piece, then move the fence until the plywood fits the groove (Fig. 2).

Drawer Bottom Groove



DESIGNER'S NOTEBOOK

Although it looks identical, opening the drawers of this chest will reveal two that are double-deep. The construction is the same, but each large drawer front is made by gluing two shallow ones together.

CONSTRUCTION NOTES:

■ Since there are only three drawer openings, you will only need to make four web frames. The bottom frame is mounted as before.

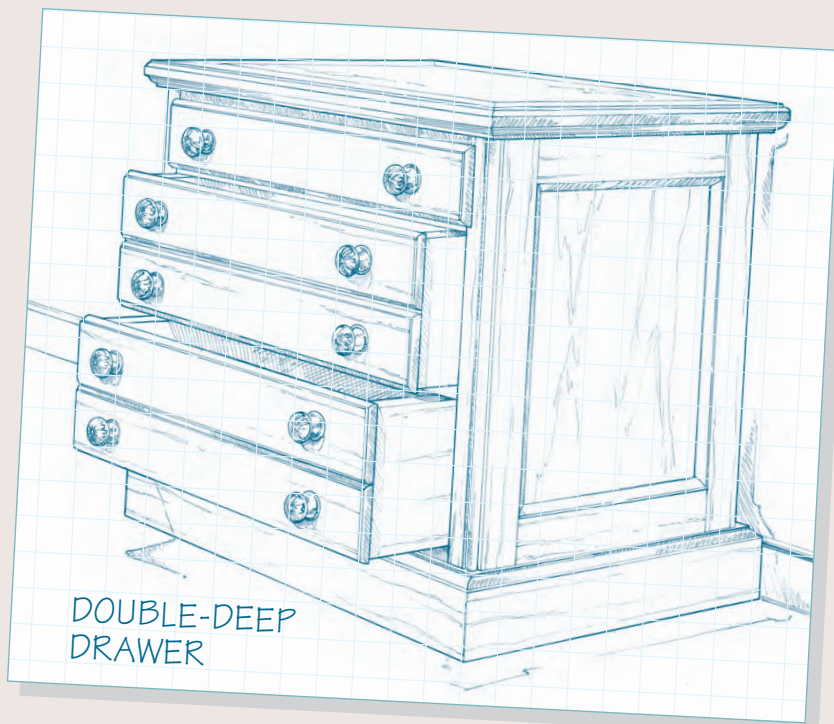
■ Now you'll have to do a little more math to space the web frames properly. Start again by measuring from the bottom web frame to the top of the case ($17\frac{1}{2}"$). Then subtract the combined thickness of the three remaining web frames ($2\frac{1}{4}"$). Now subtract the height of one regular drawer opening ($2\frac{3}{4}"$) and divide what's left ($12\frac{1}{2}"$) in half. This number ($6\frac{1}{4}"$) is the spacing between the web frames.

■ I ended up making two $6\frac{1}{4}"$ -high spacers for the double-deep drawers and one $2\frac{3}{4}"$ -high spacer for the regular drawer. Insert the spacers and web frames in the case (as in the Shop Tip on page 92), and adjust the heights of the spacers if necessary.

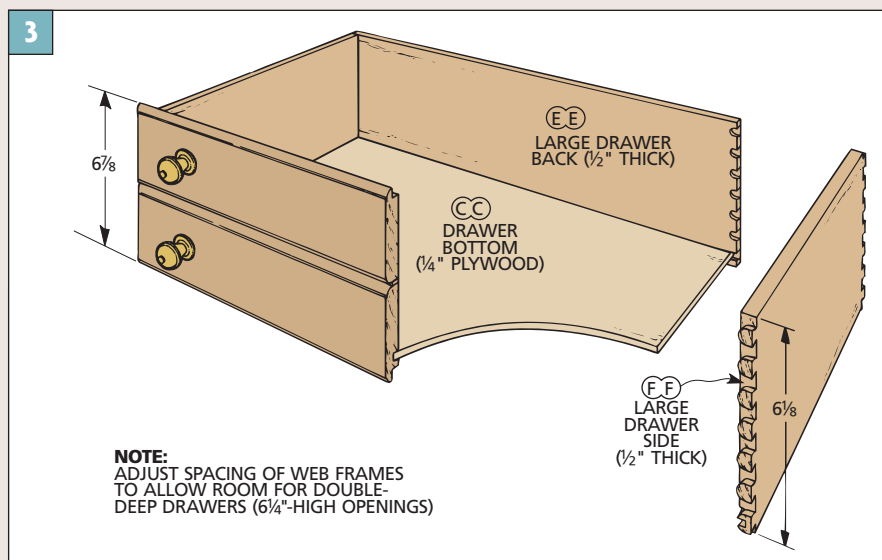
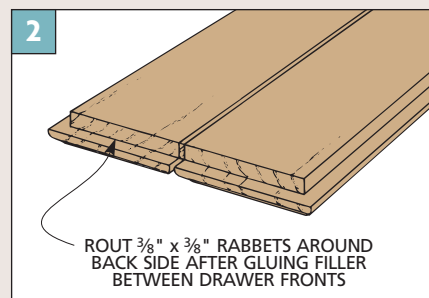
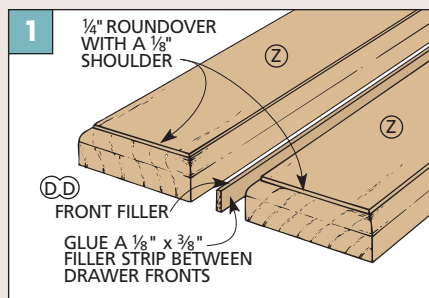
■ You'll still need five drawer fronts (Z). However, after routing the edge profile, the double-deep (tall) drawer fronts are created by gluing together two regular drawer fronts with a front filler (DD) between them (Fig. 1).

■ After the drawer front assemblies have dried, you can rout the lip around the edge (Fig. 2).

■ The large drawer backs (EE) and sides (FF) can be cut to size and dovetails routed on the drawer pieces (Fig. 3).



DOUBLE-DEEP DRAWER



NOTE:
ADJUST SPACING OF WEB FRAMES
TO ALLOW ROOM FOR DOUBLE-
DEEP DRAWERS ($6\frac{1}{4}"$ -HIGH OPENINGS)

MATERIALS LIST

CHANGED PARTS

N	Web Frts./Bks. (8)	$\frac{3}{4}$ x 1 - 23
O	Web Sides (8)	$\frac{3}{4}$ x 1 - $14\frac{1}{2}$
P	Dust Panels (4)	$\frac{1}{4}$ ply - $13\frac{1}{4}$ x $21\frac{3}{4}$
Q	Drawer Guides (6)	$\frac{3}{4}$ x $1\frac{3}{4}$ - $14\frac{1}{2}$
S	Facing Strips (4)	$\frac{3}{4}$ x $\frac{3}{4}$ - 23
AA	Drawer Back (1)	$\frac{1}{2}$ x $2\frac{5}{8}$ - $22\frac{7}{8}$
BB	Drawer Sides (2)	$\frac{1}{2}$ x $2\frac{5}{8}$ - $14\frac{3}{4}$
CC	Drawer Bottoms (3)	$\frac{1}{4}$ ply - $14\frac{5}{8}$ x $22\frac{3}{8}$

NEW PARTS

DD	Front Fillers (2)	$\frac{1}{8}$ x $\frac{3}{8}$ - $23\frac{5}{8}$
EE	Lg. Drwr. Backs (2)	$\frac{1}{2}$ x $6\frac{1}{8}$ - $22\frac{7}{8}$
FF	Lg. Drwr. Sides (4)	$\frac{1}{2}$ x $6\frac{1}{8}$ - $14\frac{3}{4}$

HARDWARE SUPPLIES

8' of nylon glide tape

Jewelry Cabinet

Plywood panels trimmed with solid wood make construction of this case simple. The elegant cabriole legs can be made by following simple step-by-step instructions — or can be purchased ready-made.



Years ago, jewelry was often one of the most valuable things a family owned. So these precious items were stored in a special case or box — something out of the ordinary. That's what I had in mind when I designed this Jewelry Cabinet.

The cabriole legs and curved aprons give the base an elegant look. The case includes built-up moldings at the top and bottom. But I think the most interesting feature is the doors.

DOORS. The doors are L-shaped, so they wrap around the front and sides of the case. Since they're attached at the back, you don't see any hinges. They fold out like wings on each side of the case, revealing a set of drawers and storage for necklaces. The photo shows flat paneled doors, but you may like the look of raised panels instead. The Designer's Notebook on page 105 shows how to build this option.

DRAWERS. The drawers also have some neat features. They can be removed from the case so you can find small items quickly. And the special padded inserts are shop-made.

You might think that all these details require special skills or equipment. But this entire project is built with ordinary woodworking tools and methods.

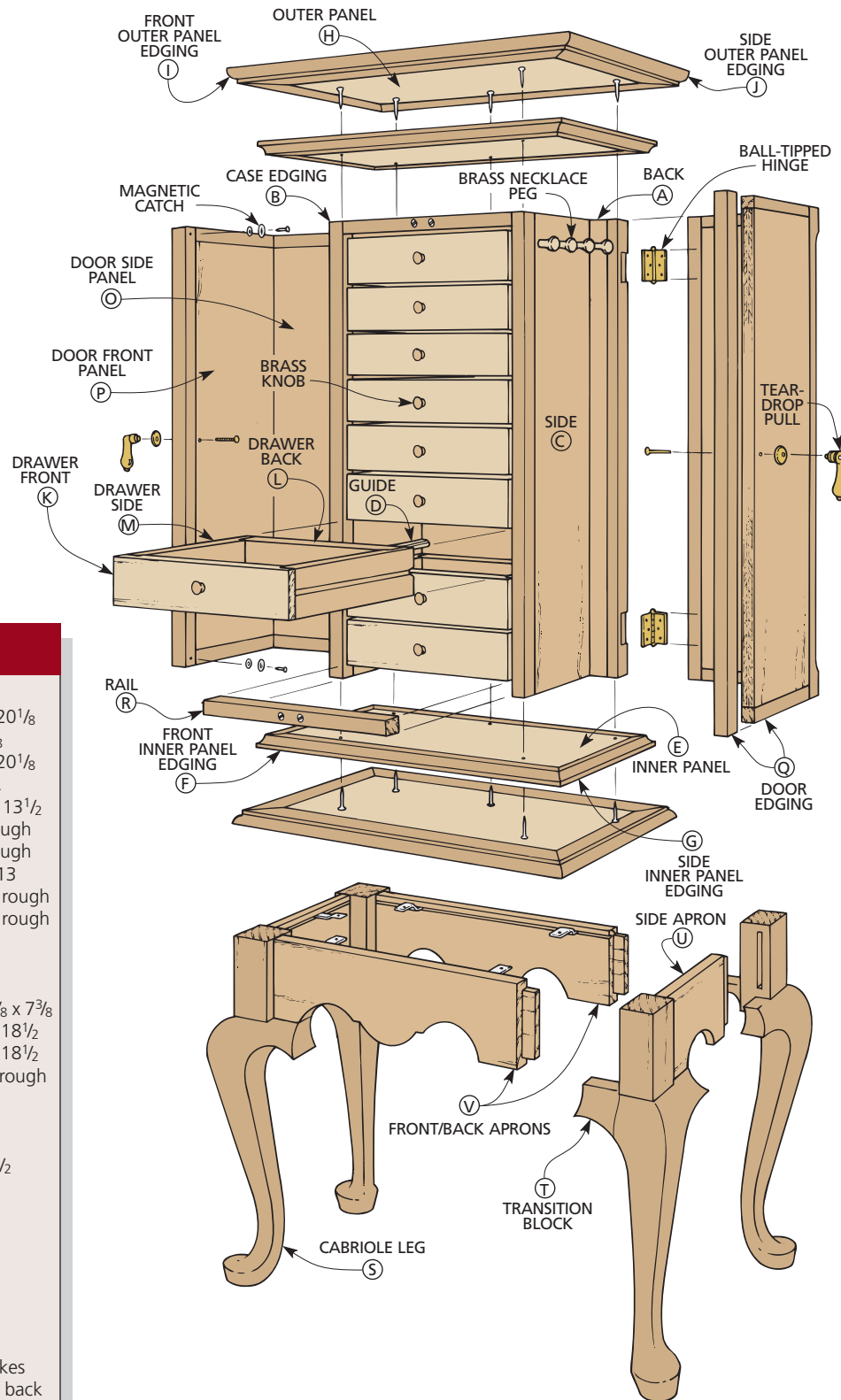
Even the fancy cabriole legs are straightforward to make. The step-by-step Technique article beginning on page 106 shows you how. Or if you prefer, you can purchase pre-made cabriole legs from one of several mail-order companies (see Sources on page 126 for further information).



EXPLODED VIEW

OVERALL DIMENSIONS:

18W x 12D x 40³/₈H



MATERIALS LIST

CASE

- A** Back Panel (1) $\frac{3}{4}$ ply - 11 x 20¹/₈
- B** Case Edging (4) $\frac{3}{4}$ x $\frac{3}{4}$ - 20¹/₈
- C** Side Panels (2) $\frac{3}{4}$ ply - 11 x 20¹/₈
- D** Guides (18) $\frac{1}{4}$ x $\frac{9}{16}$ - 5³/₄
- E** Inner Panels (2) $\frac{3}{4}$ ply - 7¹/₂ x 13¹/₂
- F** Fr. Inr. Pnl. Edging (4) $\frac{3}{4}$ x $\frac{3}{4}$ - 16 rough
- G** Sd. Inr. Pnl. Edging (4) $\frac{3}{4}$ x $\frac{3}{4}$ - 10 rough
- H** Outer Panels (2) $\frac{3}{4}$ ply - 17 x 13
- I** Fr. Out. Pnl. Edging (4) $\frac{3}{4}$ x 1³/₄ - 17 rough
- J** Sd. Out. Pnl. Edging (4) $\frac{3}{4}$ x 1³/₄ - 11 rough
- K** Drawer Fronts (9) $\frac{1}{2}$ x 2 - 7⁷/₈
- L** Drawer Backs (9) $\frac{1}{2}$ x 2 - 7³/₈
- M** Drawer Sides (18) $\frac{1}{2}$ x 2 - 5⁵/₈
- N** Drawer Bottoms (9) $\frac{1}{8}$ hdbd. - 5³/₈ x 7³/₈
- O** Door Side Panels (2) $\frac{3}{4}$ ply - 6¹/₂ x 18¹/₂
- P** Door Fr. Panels (2) $\frac{3}{4}$ ply - 5¹/₂ x 18¹/₂
- Q** Door Edging (1) $\frac{3}{4}$ x $\frac{3}{4}$ - 192 rough
- R** Catch Rails (2) $\frac{3}{4}$ x $\frac{3}{4}$ - 8

BASE

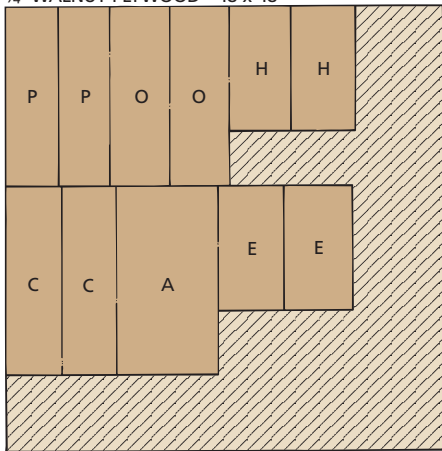
- S** Cabriole Legs (4) 3 x 3 - 17¹/₄
- T** Transition Blocks (8) 2¹/₈ x 2¹/₂ - 1¹/₂
- U** Side Aprons (2) $\frac{3}{4}$ x 4 - 8
- V** Fr./Bk. Aprons (2) $\frac{3}{4}$ x 4 - 14

HARDWARE SUPPLIES

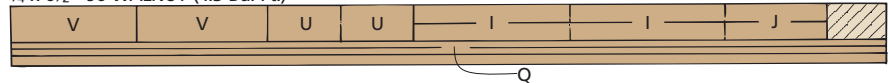
- (6) No. 8 x $\frac{5}{8}$ " Rh woodscrews
- (10) No. 8 x 1¹/₂" Fh woodscrews
- (2 pr.) 2" x 1³/₈" ball-tipped hinges
- (9) $\frac{1}{2}$ " x $\frac{1}{2}$ " brass knobs w/ studs
- (4) $\frac{5}{16}$ "-dia. magnetic catches w/ strikes
- (2) 1¹/₂"-tall teardrop pulls w/ 1"-dia. back plates
- (2) No. 8-32 x 1" brass Rh machine screws
- (6) Z-shaped table top fasteners
- (4) $\frac{3}{16}$ "-dia. rubber O-rings
- (8) 1¹/₈" brass necklace pegs

CUTTING DIAGRAM

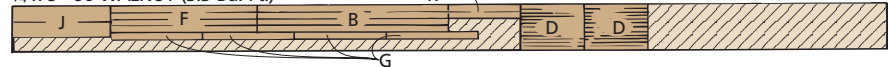
3/4" WALNUT PLYWOOD - 48 x 48



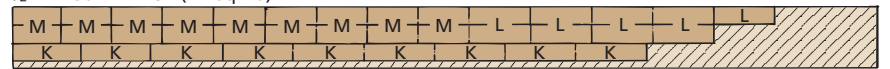
3/4 x 6 1/2 - 96 WALNUT (4.3 Bd. Ft.)



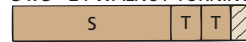
3/4 x 5 - 96 WALNUT (3.3 Bd. Ft.)



1/2 x 7 - 96 WALNUT (4.7 Sq. Ft.)



3 x 3 - 24 WALNUT TURNING BLANK (4 Needed)



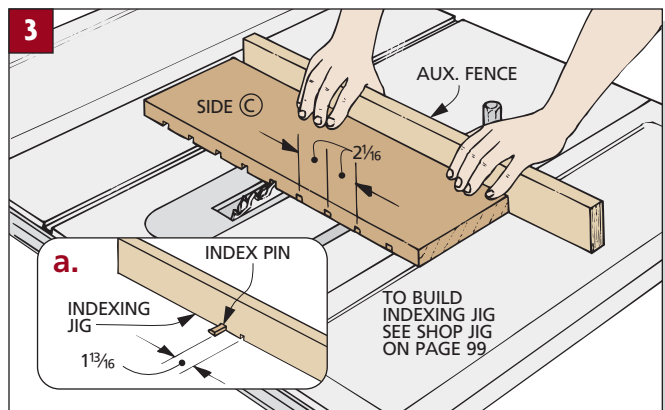
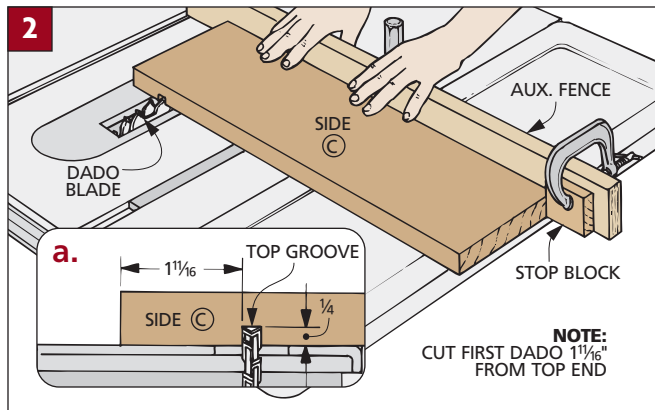
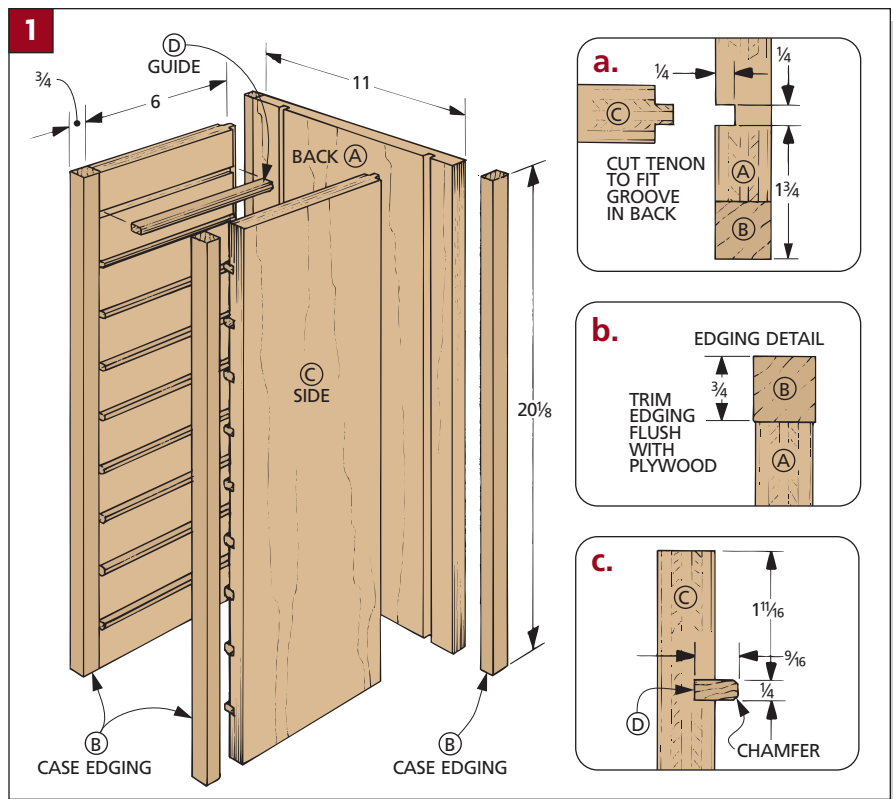
CASE

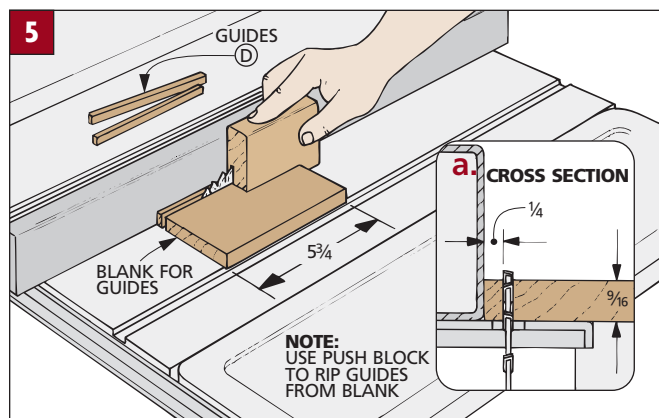
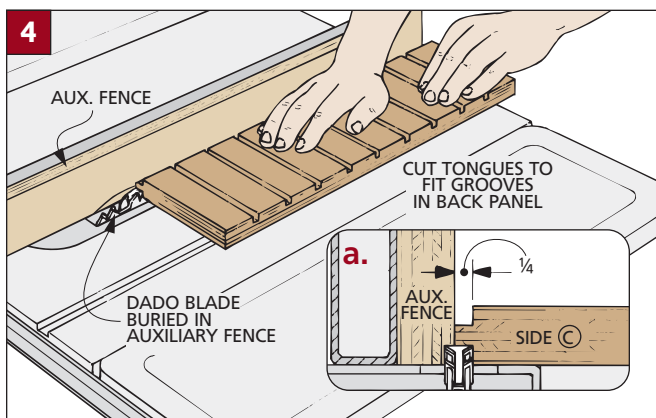
This Jewelry Cabinet is constructed in two parts. A storage case containing nine drawers is fastened to a base with cabriole legs. I built the case first, then sized the base to fit.

BACK PANEL. I started with the back (A) of the case (*Fig. 1*). This is a piece of 3/4"-thick plywood cut to size. The sides of this panel are edged with 3/4" solid wood case edging (B) to hide the plies. (The edging also provides a solid wood surface for the hinge screws when the doors are added later.) I cut the edging a little thicker than the panel is wide (*Fig. 1b*). That way, after the glue is dry, the edging can be cut perfectly flush with a flush trim bit in the router.

Next, I cut two 1/4"-wide grooves on the inside face of the panel to accept tongues that will be cut on the edges of the side panels (*Fig. 1a*).

SIDE PANELS. With the back panel complete, I cut two plywood sides (C). But before gluing edging to the sides, I cut a series of dados on the inside face





of each panel. These $\frac{1}{4}'' \times \frac{1}{4}''$ dados will hold the drawer guides. In order for the drawers to slide in and out without binding, each pair of guides must line up exactly when the case is assembled.

To accomplish this, I used an indexing jig. (See the Shop Jig box below for details about building this.) But before using the jig, you'll need to cut the top dado on each side (C). This dado is $1\frac{11}{16}''$ from the end (Fig. 2). To ensure that the dados would line up between the two sides, I fastened an auxiliary fence to my miter gauge and then clamped a stop block to the fence.

Once these cuts are made, you can use the jig to help you cut the remaining dados across the panels (Fig. 3).

After all the dados were completed, I cut rabbets on the back edge of each case side (C). This forms a tongue that fits snugly into the groove already cut in the back panel (Fig. 4).

Finally, I added case edging (B) to the front edges of the side panels to hide the plywood edges and the dados for the drawer guides (Fig. 1).

DRAWER GUIDES. Before assembling the sides and back, I added drawer guides (D) to the dados in the sides

(Fig. 1c). These guides are simply thin strips of solid wood that support and guide the drawers.

To make the guides, I planed down a blank to $\frac{9}{16}''$ thick, cut it to length, and then ripped $\frac{1}{4}''$ -wide strips from it (Fig. 5). Use a push block to keep the guides from getting pinched between the saw blade and the fence.

After they've been cut to size, the guides are glued into the dados, tight against the case edging. Then using a sanding block, I formed slight chamfers on the edges of the guides to help the drawers operate smoothly (Fig. 1c).

SHOP JIG

Indexing Jig

With just a piece of scrap and a couple of screws, you can make this simple jig for cutting the dados in the sides of the Jewelry Cabinet.

It's just a $\frac{3}{4}''$ -thick auxiliary fence that's attached to the miter gauge on the table saw. Then a small locating pin is mortised into the bottom edge. Once you've cut the first dado near the top edge of the side panel, the dado is placed over the pin, automatically positioning the workpiece for the next cut.

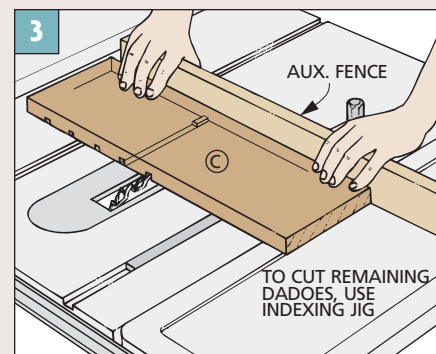
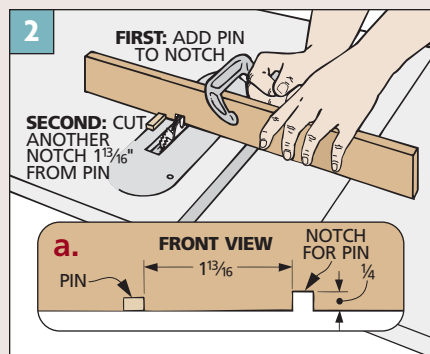
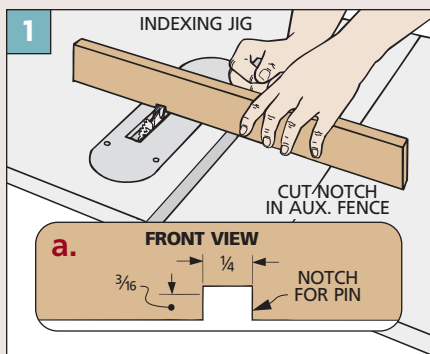
MAKING THE JIG. To make the jig, start by cutting a shallow notch in the fence that's the same width as the dados in the sides of the cabinet ($\frac{1}{4}''$) (Fig. 1). Cut the notch only $\frac{3}{16}''$ deep to allow clearance between the pin that will be added to the notch and the bottom of the dado in the side panel.

Next, make a pin so it fits snug in the notch and glue it in place (Fig. 2).

SET UP. To set up the jig, temporarily clamp it to your miter gauge (Fig. 2).

Adjust the fence so the indexing pin is $1\frac{13}{16}''$ from the blade (Fig. 2a). Then fasten the jig to the miter gauge with a couple of screws.

USING THE JIG. To cut the dados, place the side panel against the fence so that the first dado fits over the indexing pin. After running the panel over the blade, move the newly cut dado over the pin. Then just repeat this procedure until you have all the dados cut in each of the side panels (Fig. 3).



SIDE AND BACK ASSEMBLY. With the guides in place, the sides and back panel can be glued together (*Fig. 6*). To keep the top and bottom edges of the panels flush, I stood the assembly on end as I clamped it together.

Note: To keep the side panels square to the back when gluing them up, I cut a piece of plywood to use as a squaring block.

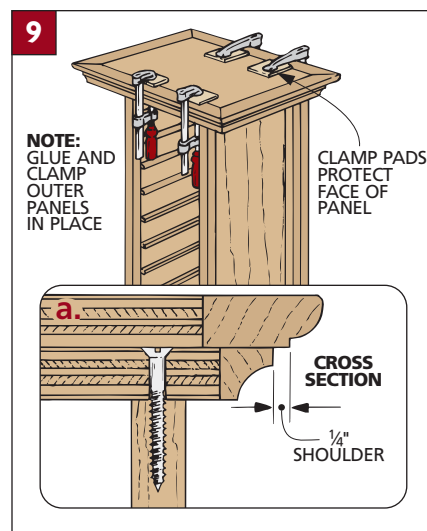
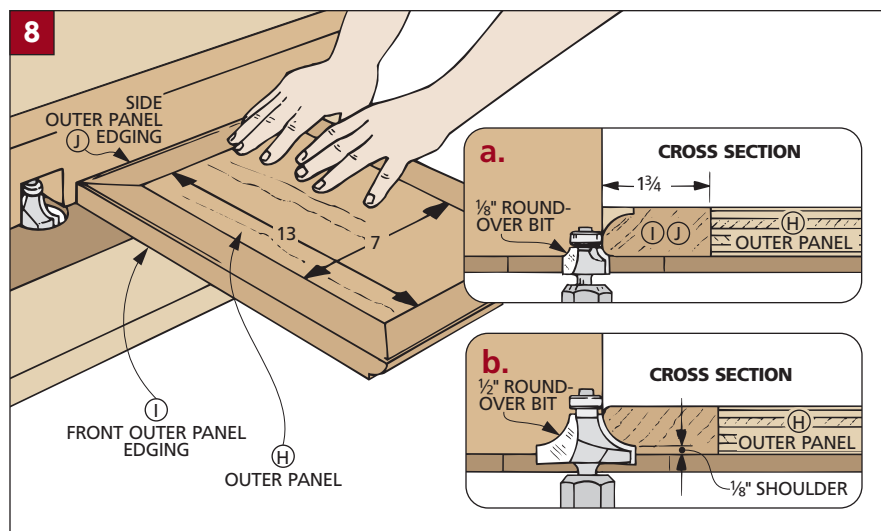
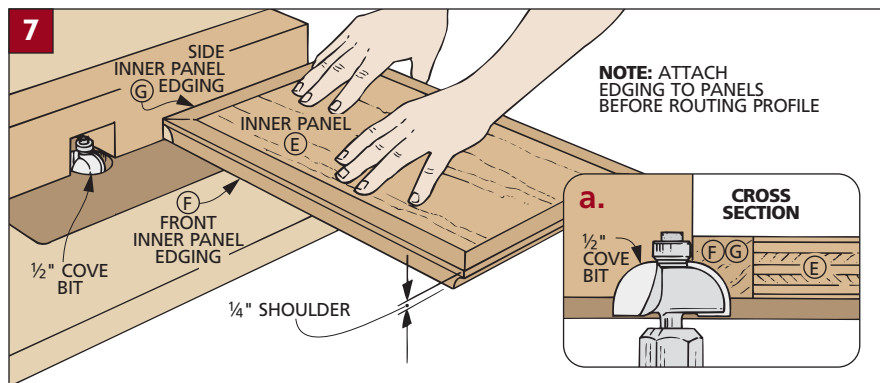
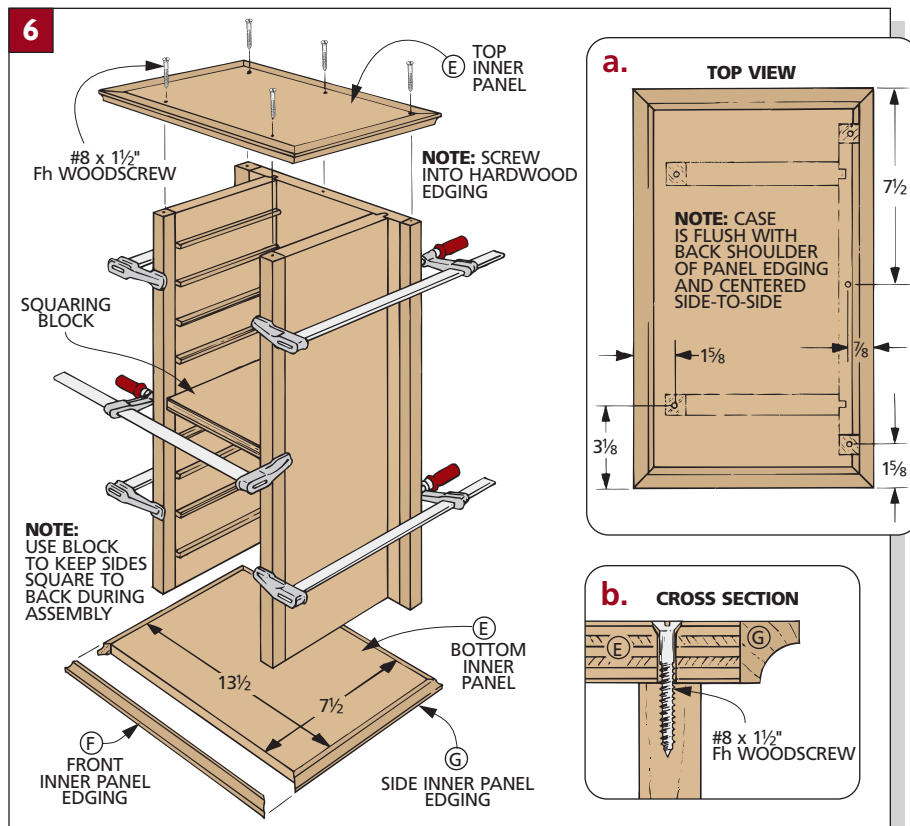
The top and bottom panels are both made up of an inner and outer layer of edged plywood.

INNER PANELS. The inner panels (E) are made of $\frac{3}{4}$ " plywood. These panels are wrapped on all four sides with $\frac{3}{4}$ "-wide inner panel edging (F, G) (*Fig. 6*). This edging is mitered at the corners and glued in place. Then a cove is routed around one face of the panel (*Fig. 7*).

Once the edge profiles are routed, attach the inner panels to the case with screws. Make sure to screw into the solid wood edging on the sides and back (*Figs. 6a and 6b*).

OUTER PANELS. The outer panels are built the same as the inner panels, with a few exceptions. First, the outer panel (H) is slightly smaller than the inner panel (*Fig. 8*). But once the $1\frac{3}{4}$ "-wide outer panel edging (I, J) is added, the panel ends up wider and longer than the inner panel (*Fig. 8a*). The wider edging not only looks better, but it will hold screws more securely when the case is attached to the base.

Another difference is the edge profile. I routed $\frac{1}{8}$ " roundovers on the outside edges and then $\frac{1}{2}$ " roundovers on the inside edges (*Figs. 8a and 8b*). Then the outer panels are simply glued in place (*Figs. 9 and 9a*).



DRAWERS

With the cabinet case completed, I began making the set of nine drawers that fit inside. Since all the drawers are the same size, you can quickly build them in an assembly line fashion.

To start, I cut all the drawer fronts (K), backs (L), and sides (M) to size from $\frac{1}{2}$ "-thick stock (Fig. 10).

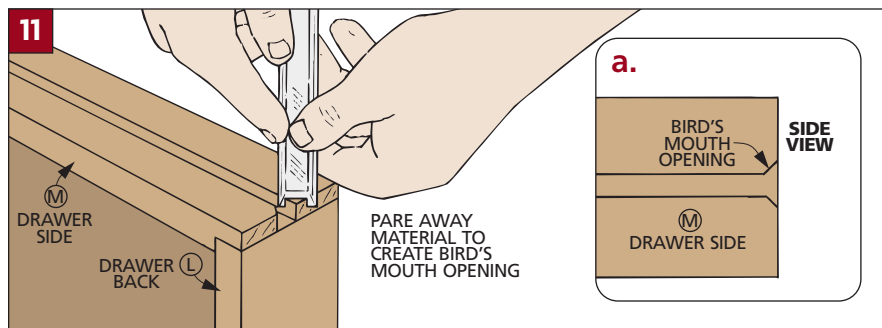
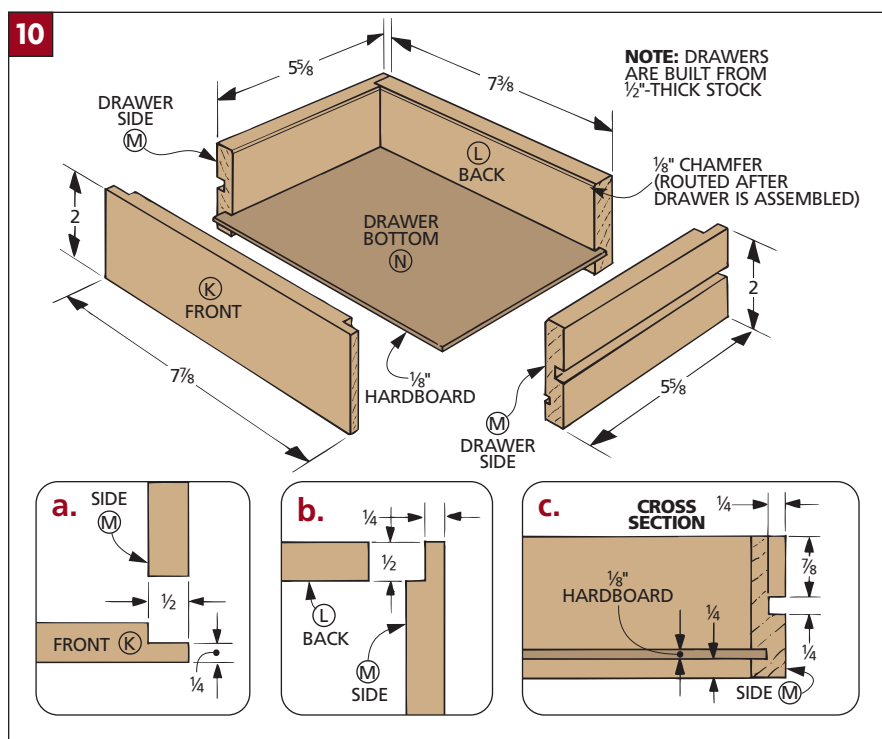
Note: The drawers are sized to allow for $\frac{1}{16}$ " clearance gaps around each drawer. This makes a $\frac{1}{8}$ " gap between drawers. (My drawers ended up 2" tall and $7\frac{7}{8}$ " wide.)

JOINERY. The drawers are held together with a series of rabbets. First, rabbets cut on each end of the front piece accept the sides (Fig. 10a). And by closing one end of the grooves that are cut in the drawer sides, the fronts also serve as drawer stops.

Next, each side piece receives a rabbet at one end to hold a back piece (Fig. 10b). Then, to allow the drawers to ride on the drawer guides, cut a centered groove along the length of each side piece (Fig. 10c).

After cutting the rabbets and side grooves, I added a $\frac{1}{8}$ "-wide groove to each piece for a drawer bottom (Fig. 10c). Now dry-assemble the drawers and cut the bottoms (N) to size from $\frac{1}{8}$ "-thick hardboard. Then glue and clamp the drawers (including the bottoms) together. Check each drawer for square as you assemble it.

FINAL TOUCHES. Once the glue had dried, I worked on a few more details on the drawers. First, I routed a $\frac{1}{8}$ " chamfer around the inside to soften the sharp edges (Fig. 10). Then using a



chisel, I created a "bird's mouth" opening at the end of each groove. This makes it easier to place the drawer onto the drawer guides after it has been

removed from the cabinet (Fig. 11). And finally, I added velvet-covered drawer liners and ring holders (as shown in the Technique box below).

TECHNIQUE

Lining Drawers



Liners. I lined some of the drawer bottoms with velvet-covered pieces of posterboard. Mount the fabric with tape and spray adhesive.



Custom Foam Inserts. For a couple of the other drawers, I made foam inserts for rings by cutting kerfs in blocks of rigid insulation (blueboard). Then I cov-



ered the blocks with fabric. Press the fabric into the kerfs with a straightedge and tape it in place. Then carefully slip the inserts into the drawers.

With the drawers completed, the case is ready for the doors (refer to *Fig. 15*). Each door is made up of two pieces of plywood joined together in an L-shape. This way, the doors swing open to allow access to necklaces and other jewelry hanging from the sides of the case.

I started on the doors by cutting side panels (O) and front panels (P) to finished size (*Fig. 12*). Then to hide the edges, I cut and glued door edging (Q) to the panels.

The front panels are edged on all four sides. But the side panels are only edged on three. Then the side panels are glued to the front panels. I used a square to help glue them together at a perfect right angle (*Fig. 12a*).

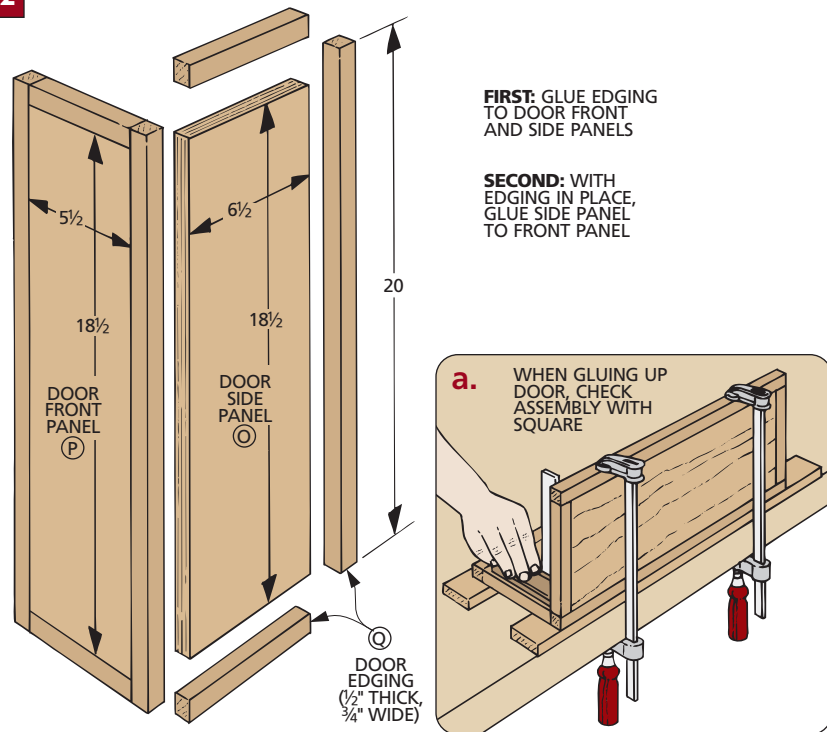
Then to complete the doors, I drew layout lines and used a hand-held router to rout $\frac{1}{8}$ " stopped chamfers on the outside corners (*Fig. 13*).

HANGING DOORS. Finally, I completed the case of the jewelry cabinet by hanging the doors with 2" butt hinges (*Fig. 14*). These are mortised into the inside faces of the doors.

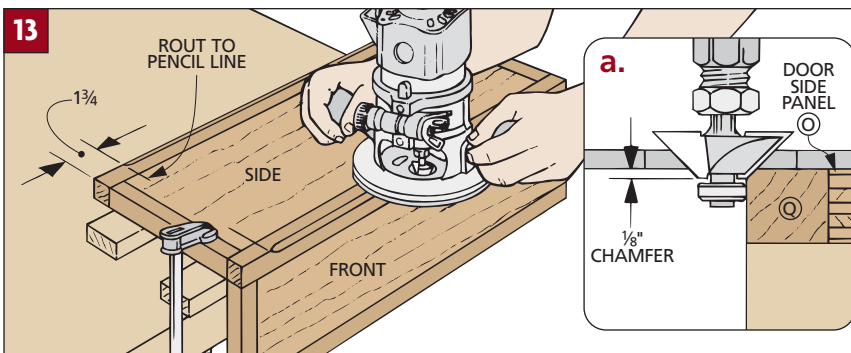
When hung correctly, the doors should be centered top-to-bottom, and the sides should end up flush with the molded edging on the top and bottom of the case.

MAGNETIC CATCH RAILS. To keep the doors closed, I used magnetic catches. These catches are installed in a pair of $\frac{3}{4}$ "-thick rails (R) (*Fig. 15*). The rails fit between the side panels of the case. I

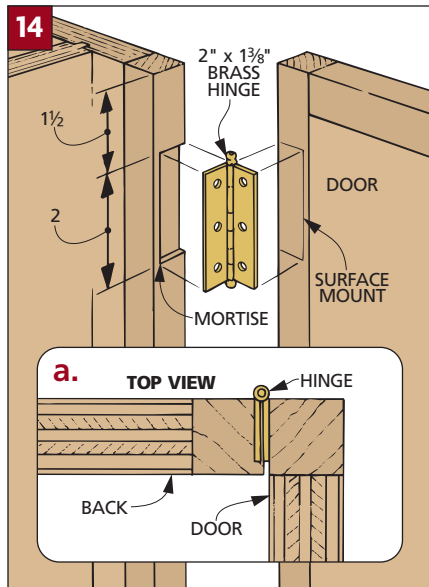
12



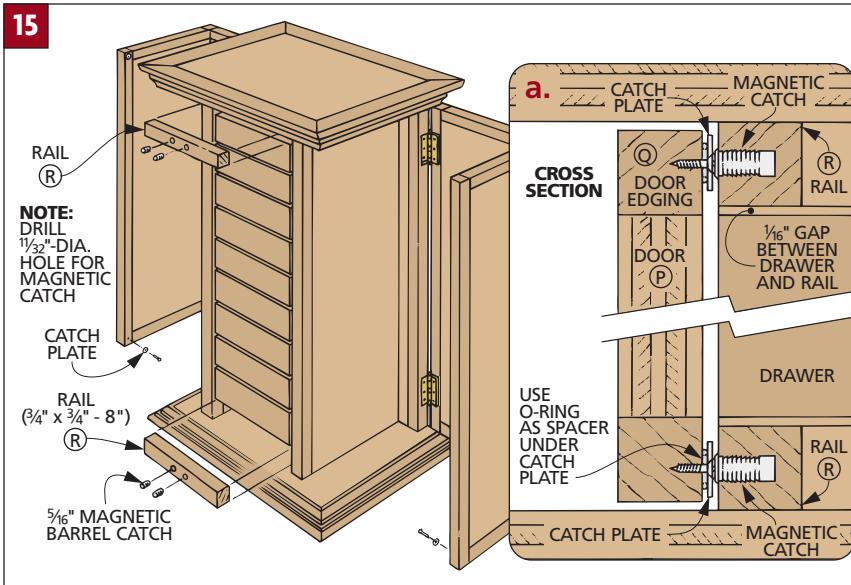
13



14



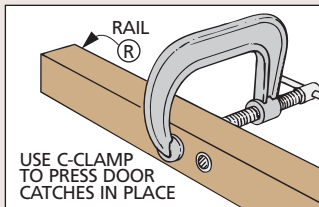
15



SHOP TIP

Catch Installation

To get magnetic catches flush with the surface of the rail, use a C-clamp to help press the catches in.



sized mine to create a $\frac{1}{16}$ " gap between the rails and the drawers ($\frac{3}{4}$ " wide in my case). Before gluing them in place, I drilled two holes for the catches.

I used C-clamps to help install the catches in the holes (see the Shop Tip above). Then I screwed the catch plates in place (Fig. 15a). To adjust the doors in or out, I used a rubber O-ring as a spacer under each catch plate.

BASE

With the case complete, I turned my attention to building the base. There's nothing too unusual about the construction of the base: just four cabriole legs joined by aprons.

LEGS. To make the base, I started with the cabriole legs (S) (Fig. 16). The interesting thing about cabriole legs is that they look a lot more complicated to build than they actually are.

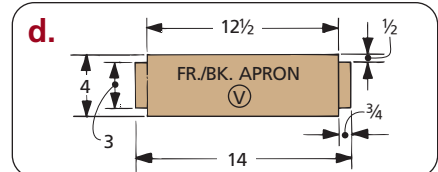
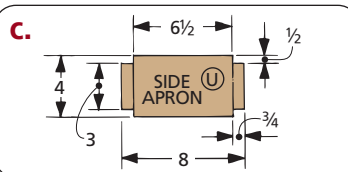
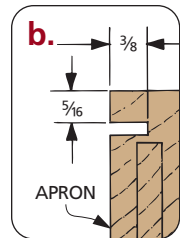
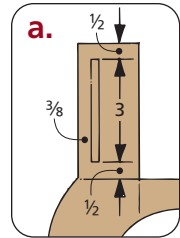
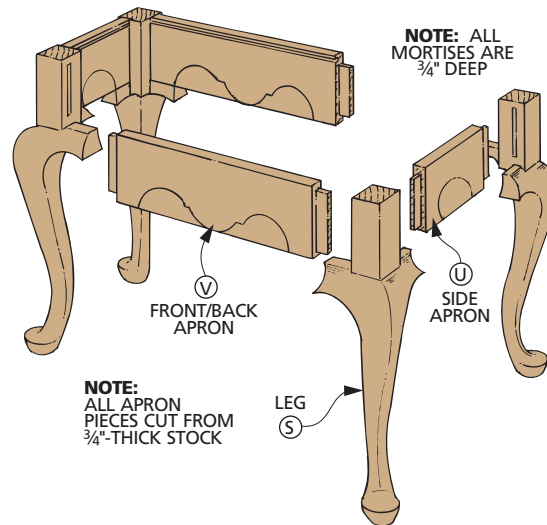
For this project, I kept the legs basic. All you need is a band saw, a drum sander, and some rasps or files — no carving and very little shaping are required. Refer to page 106 for step-by-step instructions.

Note: You can also buy completed legs with all the work done for you (see page 126 for sources).

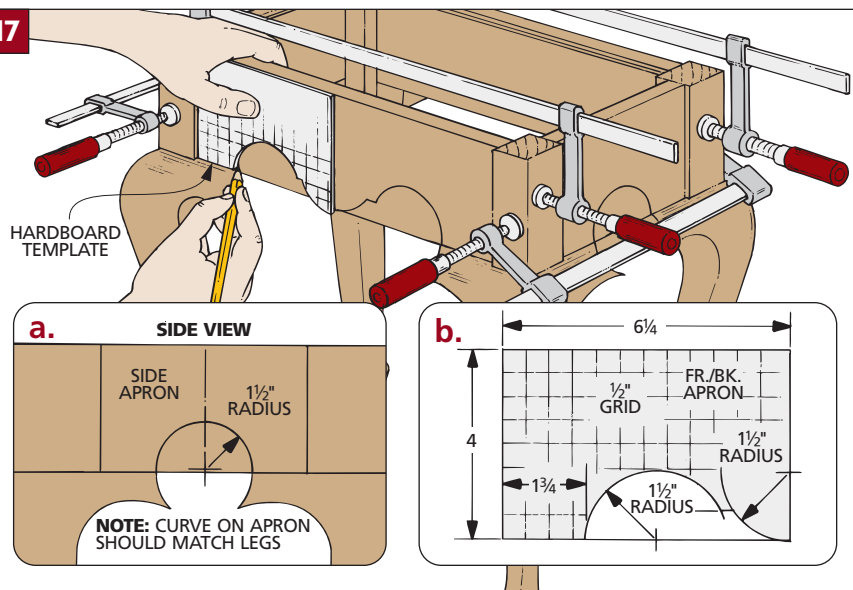
The legs are mortised to receive the $\frac{3}{4}$ "-long tenons that will be cut on the aprons (Fig. 16a).

APRONS. Once you have the legs ready, they can be connected with side aprons (U) and front/back aprons (V) (Figs. 16c and 16d). I started by cutting these pieces to finished size.

16



17



The case will be attached to the base later with metal table top fasteners. To accommodate these fasteners, I cut a $\frac{1}{8}$ "-wide groove $\frac{3}{8}$ " deep on the inside face of each piece (Fig. 16b).

After cutting the grooves, tenons are cut to fit the mortises in the legs. I cut them with a dado blade on the table saw.

PROFILE. After cutting the tenons, the next step is to dry-assemble the base and lay out the decorative profiles on the aprons (Fig. 17). The important thing to remember when laying out

these profiles is that they have to match up with the curves on the transition blocks of the legs (Fig. 17).

The side aprons have a simple centered radius (Fig. 17a). This can be drawn right on the aprons, cut out with a band saw, and sanded smooth.

For the front and back aprons, I made a hardboard template that's laid out using a grid pattern (Fig. 17b).

After tracing the pattern onto the front and back aprons, cut the profile with a band saw and sand it smooth.

ASSEMBLY

With the aprons complete, you can glue and clamp the base together. Just check to make sure the base remains square after tightening the clamps.

Once the glue dries, set the case on the base and center it front-to-back and side-to-side (*Fig. 18*).

Then install Z-shaped table top fasteners in the grooves and attach the other ends to the case bottom with screws (*Fig. 18a*).

FINISH AND HARDWARE. To complete the Jewelry Cabinet, I applied two coats of varnish that were then rubbed out to a high sheen (see the Finishing article on page 42 for details). Once that was completed, I installed the door and drawer hardware (*Fig. 19*).

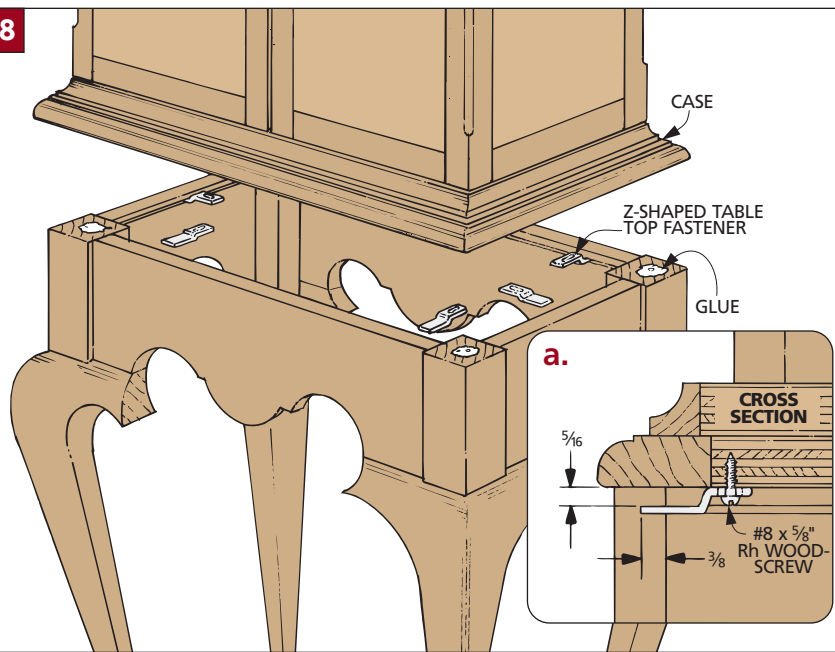
To finish off the cabinet and give it an extra touch of elegance, I used brass hardware. I mounted brass “teardrop” pulls on the cabinet doors (*Fig. 19a*). The drawers each received a simple brass knob centered on the drawer front (*Fig. 19b*).

Finally, I added specially designed brass pegs on the case sides to hang necklaces and bracelets (*Fig. 19c* and photo below). These are epoxied into shallow holes.

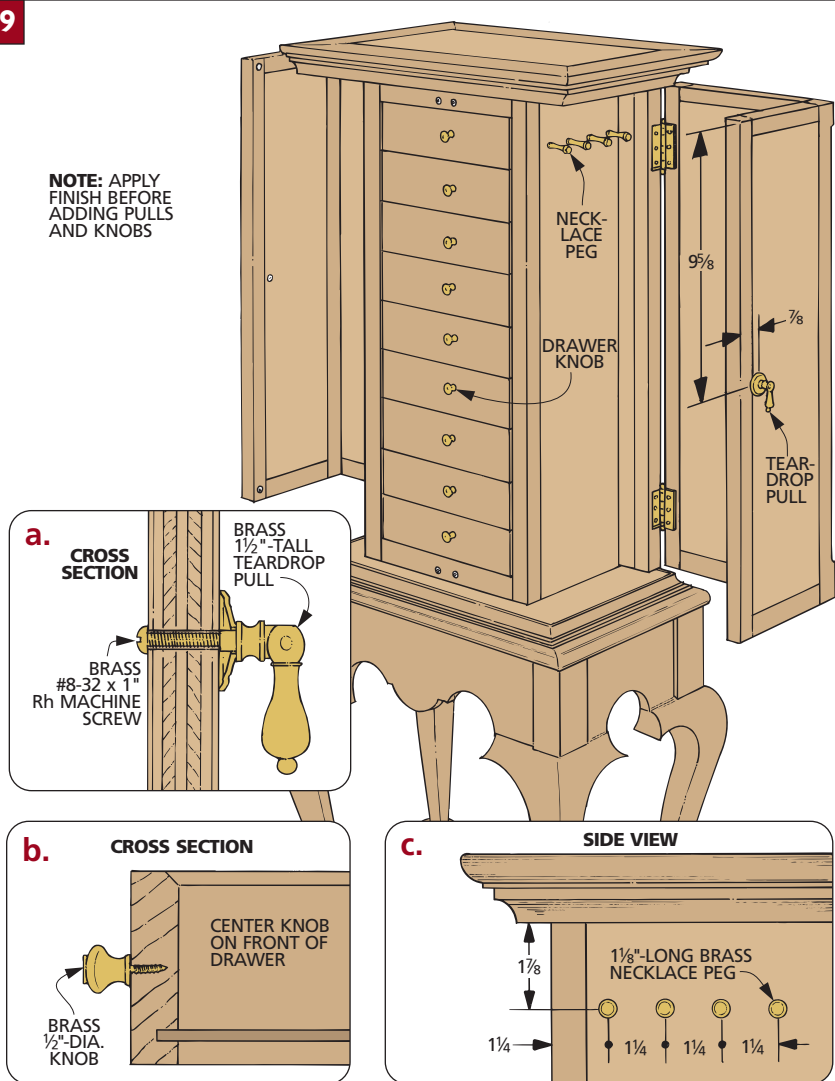
Note: See page 126 for mail-order sources of pulls and other hardware. ■



18



19



DESIGNER'S NOTEBOOK

Adding raised panels to the door fronts adds an extra touch of character to the Jewelry Cabinet. All you'll need is solid wood instead of plywood and a special bit for the raised panel profile.

CONSTRUCTION NOTES:

■ Adding a little extra character to the face of the Jewelry Cabinet is as easy as replacing the old doors with raised panel doors (see the drawing at right).

Note: This design option calls for solid walnut instead of walnut plywood for the front door panels. You'll need enough for two panels, four stiles, and four rails.

■ Start by making the door side panels (O) the same as before, with $\frac{3}{4}$ "-thick edging along the top, bottom, and back.

■ You don't need edging for the door front panels (P), because you'll be making a door frame to hold each one. Start by cutting the rails (X) and stiles (W) to length and width (Fig. 1).

■ Next, cut a groove on the inside edge of each rail and stile (Fig. 2). This $\frac{3}{8}$ "-deep groove is offset so it will hold the panel later.

■ Now you can also cut offset tenons on the ends of the rails. These tenons are $\frac{3}{8}$ " long to fit the grooves in the stiles (Fig. 2).

■ Now the door frames are complete. It's time to start work on the panels (P).

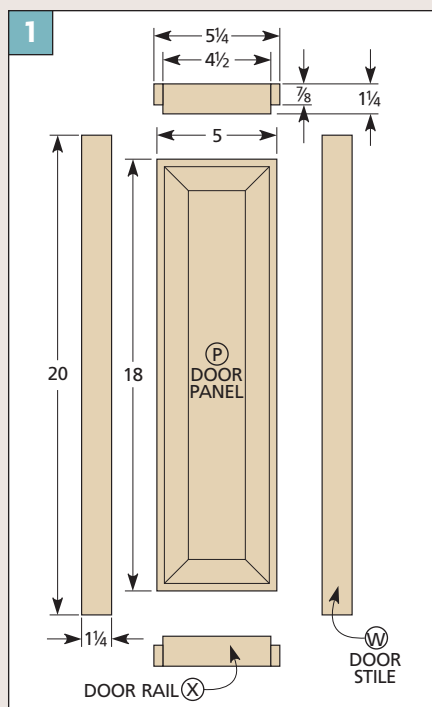
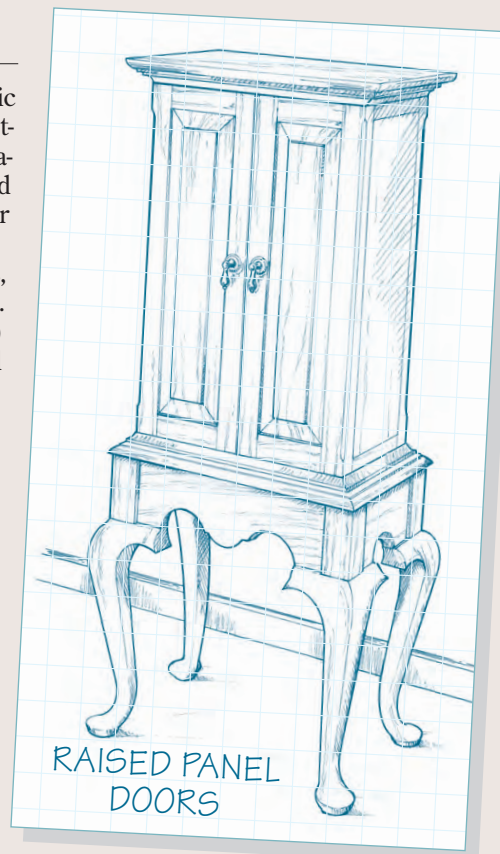
These raised panels have a specific profile (refer to Fig. 3). Start by cutting the panels to finished size (measure the opening in the frame and add $\frac{3}{4}$ " to the length and width for the grooves).

■ To rout bevels for the raised panels, use a router table and a $1\frac{7}{16}$ "-dia. raised panel bit (Sears bit No. 25465) (Steps 1 and 2 in Fig. 4). Each bevel is routed in a series of passes.

■ After making a final pass on the bevel, you can complete the profile by turning the panel over and routing a shallow rabbet along the back (Step 3 in Fig. 4).

Note: It's a good idea to finish the panels before assembling the doors. That way no bare wood will show if the panel contracts with changes in humidity.

■ Assemble the doors, but don't glue the panels in the frames (they should float so they can expand and contract). Then add them to the Jewelry Cabinet.



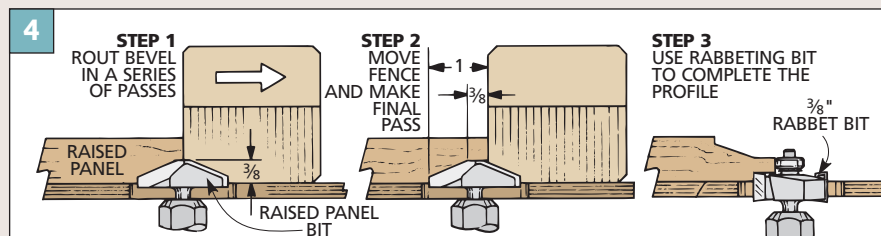
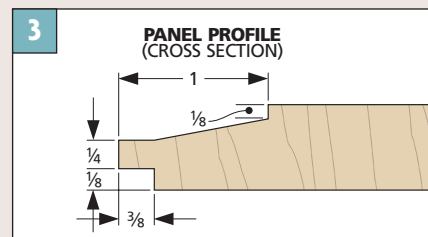
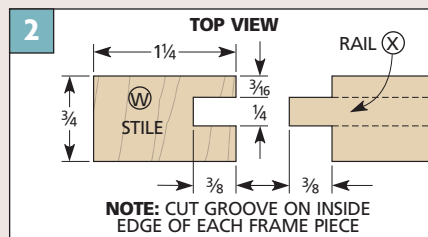
MATERIALS LIST

CHANGED PARTS

P Door Fr. Panels (2)	$\frac{3}{4}$ x 5 - 18
Q Door Edging	$\frac{3}{4}$ x $\frac{3}{4}$ - 7 ft. rgh.

NEW PARTS

W Door Stiles (4)	$\frac{3}{4}$ x $1\frac{1}{4}$ - 20
X Door Rails (4)	$\frac{3}{4}$ x $1\frac{1}{4}$ - $5\frac{1}{4}$



TECHNIQUE Cabriole Legs

Cabriole legs look more like sculpture than woodworking. And that may scare you away from trying your hand at them. But they really aren't that difficult to make. While some designs can get fancy, I kept these cabriole legs pretty basic. After a few cuts on the band saw, you'll be holding the rough shape of the leg in your hands. Then with some handwork, you can bring the legs to final shape. All you need to do is follow the steps below.

TURNING BLANKS. Cabriole legs start out as thick, square blanks. To avoid joint lines, I don't laminate thinner pieces of wood. I use solid stock to make the legs. The problem is finding pieces that are thick enough.

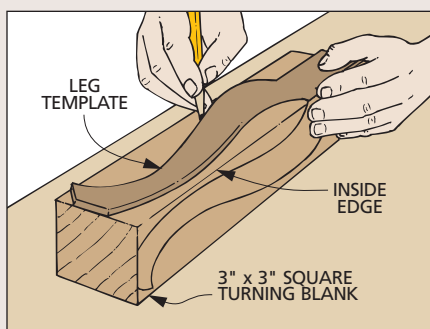
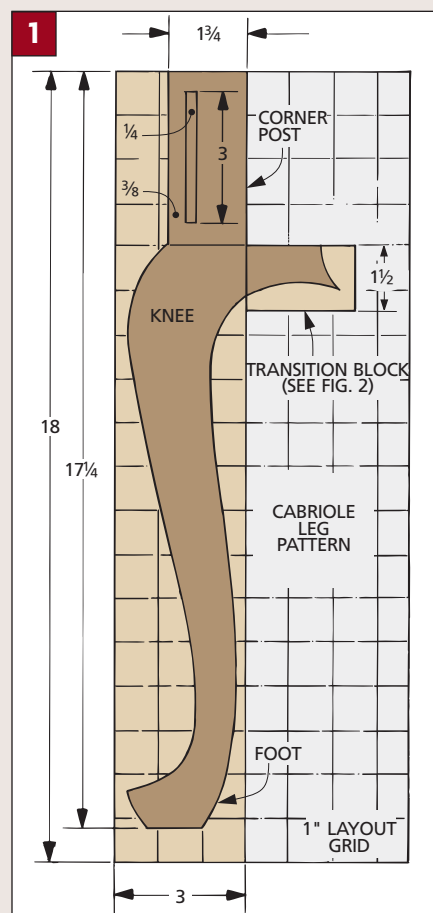
To get blanks this size, I use 3" x 3" turning squares. I buy them extra long, so I can also cut the transition blocks from the same blank. This makes a nice match in color and grain patterns. Turning squares often come rough cut, so you may need to square them up before you can begin on the legs.



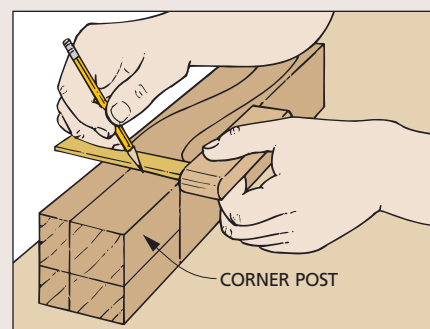
PATTERNS. Once you've squared up the turning blanks, the next step is to create patterns for the leg. (I made mine out of 1/8" hardboard.) There are two patterns: one for the leg (*Fig. 1*) and another that's used for the inside faces of the transition blocks (added later) (*Figs. 2a and 2b*).

Note: Though the same leg pattern works for the Jewelry Cabinet (pages 96-109) and Coffee Table (pages 20-29), the patterns for the transition blocks are slightly different (*Figs. 2a and 2b*).

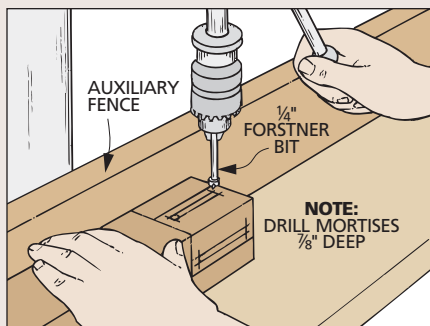
CORNER POST. After the shape of the leg is laid out (*Steps 1 and 2*), it's time to work on the blank. I start by drilling the



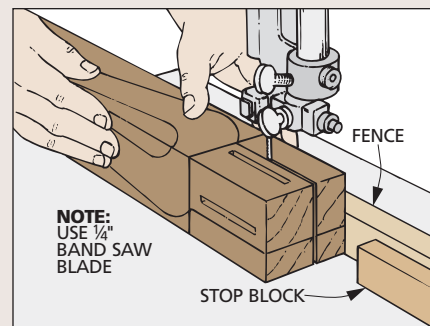
1 To draw the pattern, position template so the back edge of the corner post aligns with inside corner of blank. Flip template and repeat on adjacent side.



2 Next, use a square to draw reference lines around all four faces of the blank to indicate where the corner post meets the knee.



3 At this point, cut the mortises on the two faces with the patterns. Drill a series of overlapping holes. Then clean up the cheeks with a chisel.



4 Set up a band saw to make the face cuts on the corner post. Use a fence to guide the leg and clamp a stop block to the fence to set the depth of cut.

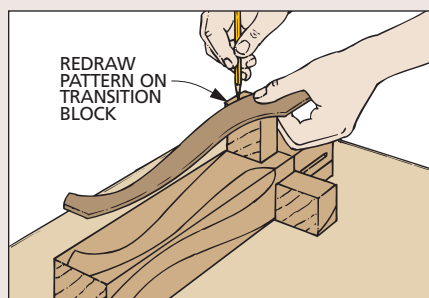
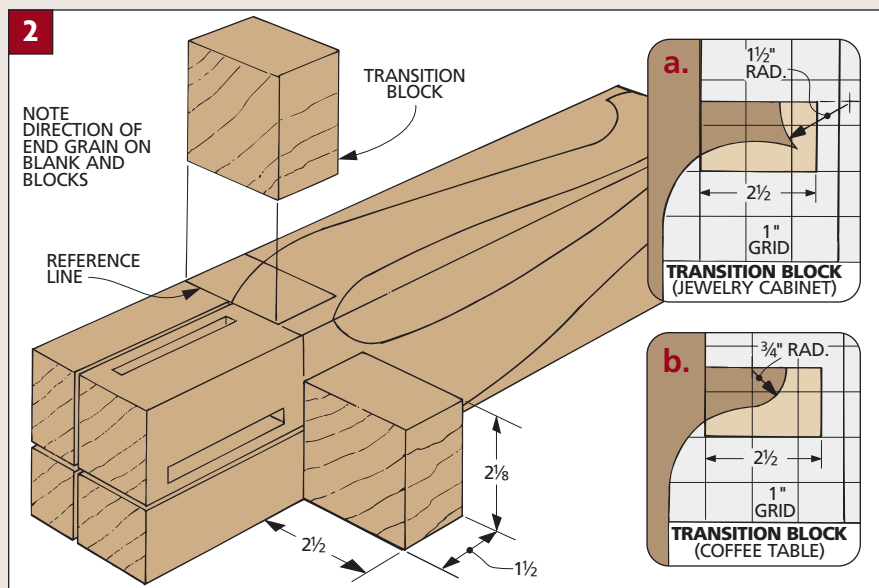
mortises (*Step 3*). Then two cuts are made on each corner post (*Step 4*). These cuts stop at the reference lines drawn in *Step 2*.

TRANSITION BLOCKS. Before making the cuts that shape the curves of the legs, you'll have to add two rectangular transition blocks (*Fig. 2*). These blocks are glued on over the knees of the legs. They should also line up with the reference lines between the corner post and the knee so they end up square.

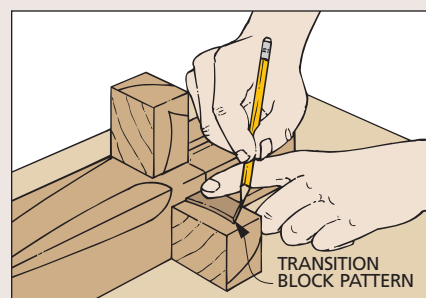
CUTTING THE LEGS. After the transition blocks are in place, redraw the leg pattern and transfer the transition block pattern to them (*Steps 5 and 6*). Then make the band saw cuts to complete the corner post (*Step 7*).

Now, it's time to cut out the leg. This is done in two steps. First, all the cuts are made along one face of the leg (*Steps 8 and 9*). Since these cuts remove part of the pattern on the adjacent face, you need to save the waste pieces. Then you simply tape them back onto the blank and cut the curves on the adjacent face (*Steps 10 and 11*).

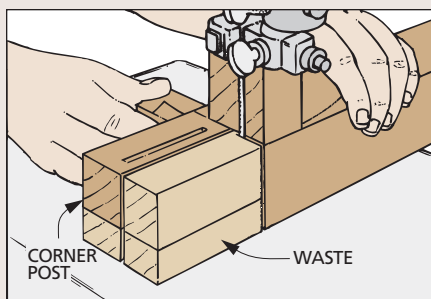
Now, while the leg is still relatively square, I sand the faces with a drum sander on the drill press (*Step 12*). (You'll need an auxiliary table to support the leg as you do this.) All you need to do here is sand until the saw marks have been removed.



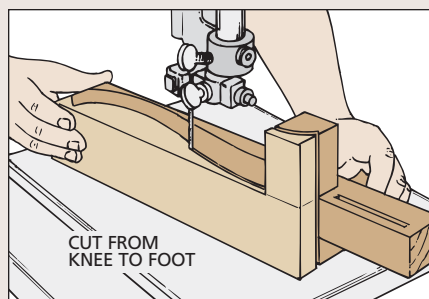
5 Glue on transition blocks, then redraw knee on blocks. Reference line on pattern should align with transition block.



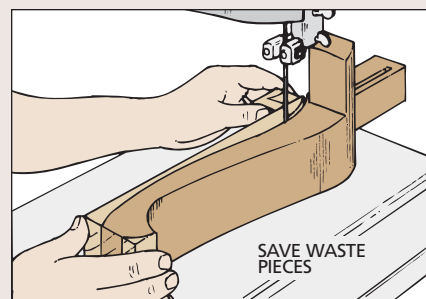
6 A second pattern is used to trace profiles on inner faces of transition blocks. Place pattern in corner and mark outline.



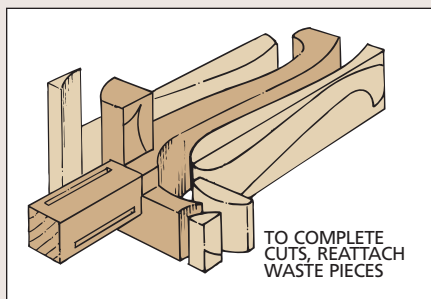
7 Start sawing at corner post by aligning blade with top of transition block. Saw to kerf. Repeat the cut on adjacent face.



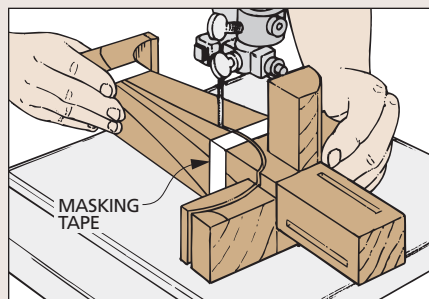
8 To cut front face of leg, start at knee and saw around to foot in one smooth pass. Be sure to save the waste piece.



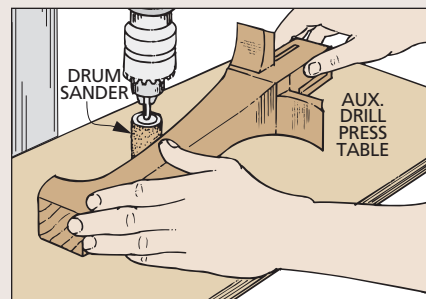
9 Cut back of leg just like the front. A second cut is needed to form the transition block. Again, save the waste pieces.



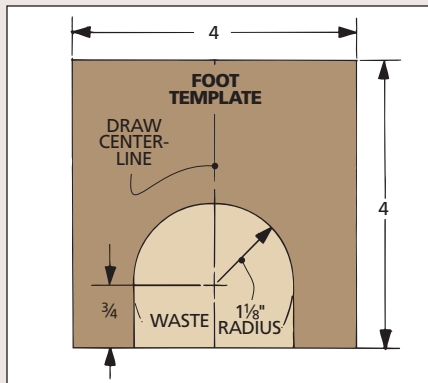
10 The waste pieces are needed when cutting remaining faces of leg blank. Tape the pieces to blank in original positions.



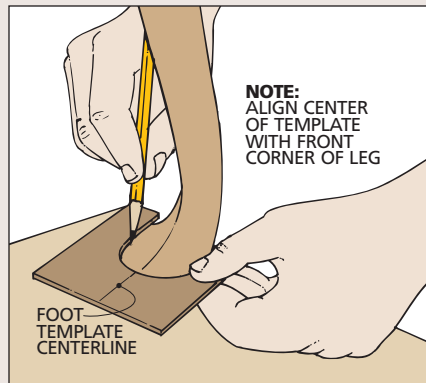
11 Now, finish roughing out leg by repeating cuts on front and back faces. Again, work from the knee down to the foot.



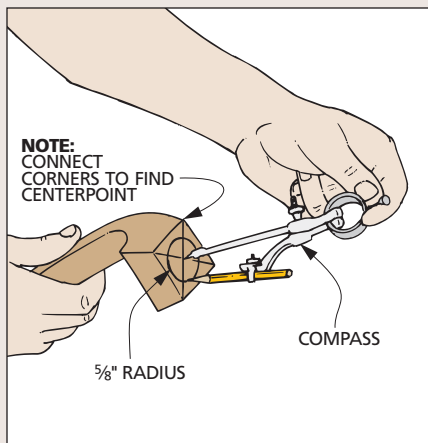
12 At this point, the "square" legs can be sanded with a drum sander to remove the saw marks.



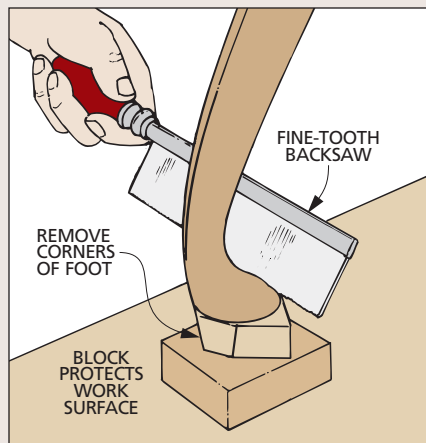
13 To begin shaping the legs, first make a template to help you draw the outline of the foot. This is a piece of $\frac{1}{8}$ " hardboard with a $1\frac{1}{8}$ "-radius cutout.



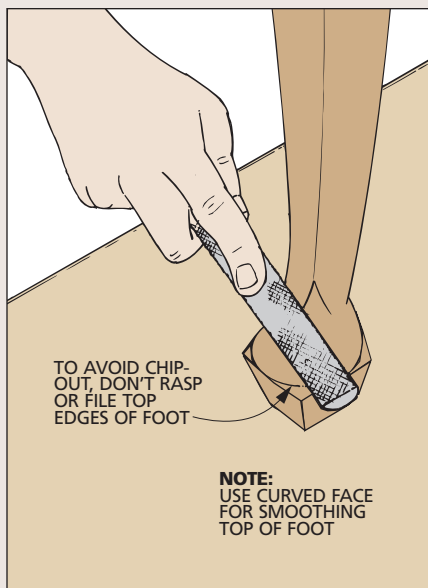
14 Now that the template has been made, the top of the foot can be laid out. Set the template on top of the foot and trace the outline.



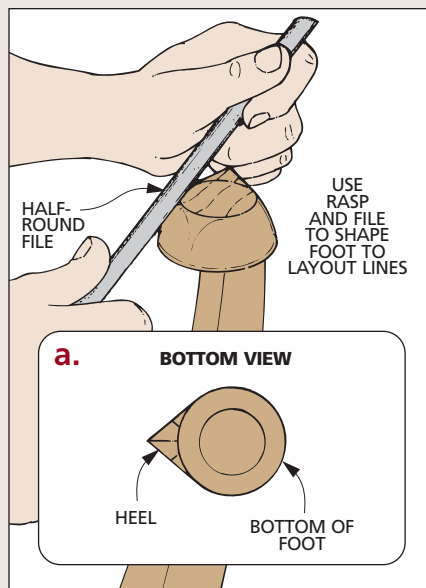
15 Turn the leg over and find the center-point on the bottom of the leg. Then use a compass to draw a $\frac{5}{8}$ "-radius circle on the bottom of the foot.



16 Next, hold the leg upright and cut away the front and side corners of the foot with a hand saw held at a slight angle. Cut on the waste side of the layout lines.



17 Still holding the leg upright, file the top face of the foot. Remove the sharp lines from the center and feather it out across the top of the leg.



18 Clamp the leg in a vise and finish rounding the front and sides of the foot, working from the top of the foot to the bottom to prevent chipout.

SHAPING THE LEG

At this point, the blanks are beginning to look like cabriole legs. Now it's time to do the final shaping that will soften the square edges.

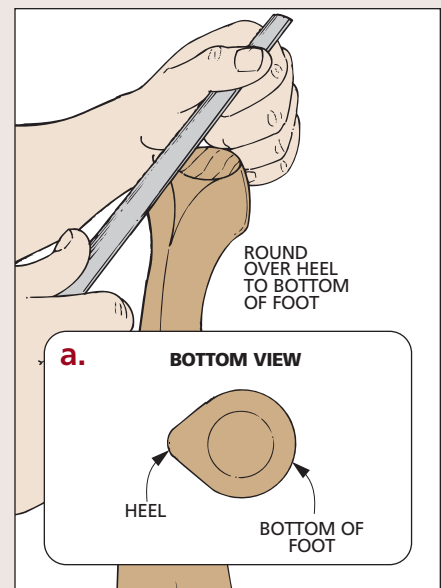
I work from the bottom up, starting with the foot and moving up to the transition blocks at the knee.

FEET. One of the tricks to making cabriole legs is to get four legs that look similar. And the feet are probably the most noticeable. So I shaped the feet on all four legs and then set them side by side to compare them. If one was noticeably smaller, I worked on getting the others to match it. But don't be too critical. After all, when the project's built, no one will be able to compare them as closely as you can now.

The first step for each foot is to lay out the final radius on the top. Then the corners can be sawed off (Steps 13-16).

To do the shaping, I used a rasp and a half-round file (Steps 17-19). The rasp allows you to remove the wood quickly. But the file gives you a cleaner cut. Both have a curved edge for cleaning up the top of the foot and a flat edge for shaping the sides of the foot.

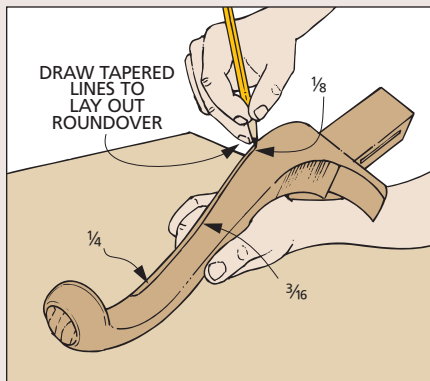
LEGS. Once the feet were done, I started on the legs. There's not much to these. The front and back corners of the legs get small, tapered roundovers with a file and some sandpaper. But these roundovers aren't the same for the front and back. The front gets rounded over a



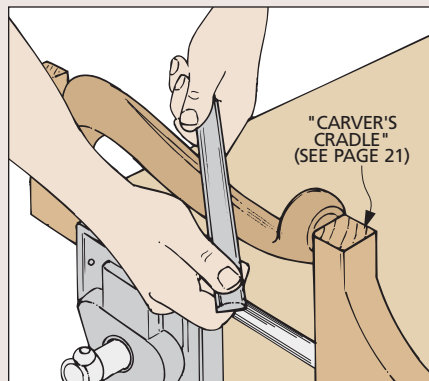
19 Once the sides and front are round, shape the taper on the back of the heel by blending the radius on the bottom of the foot into the back of the ankle.

little more (*Steps 20 and 22*). The side corners are softened with sandpaper.

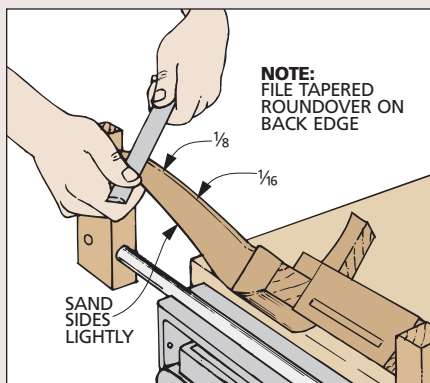
To hold the legs during this process, I came up with a shop-made carver's cradle by adding wooden extenders to the jaws of a common $\frac{3}{4}$ " pipe clamp (refer to the Shop Jig on page 21).



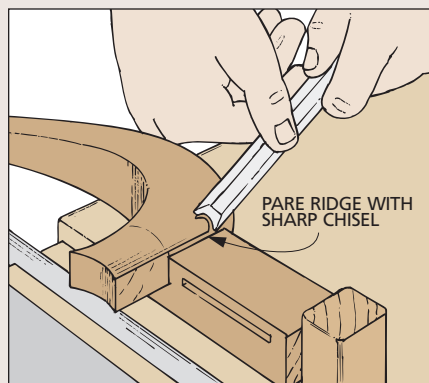
20 Next, lay out marks to show the tapered roundover on the front corner. Connect the marks by drawing lines up and down the leg.



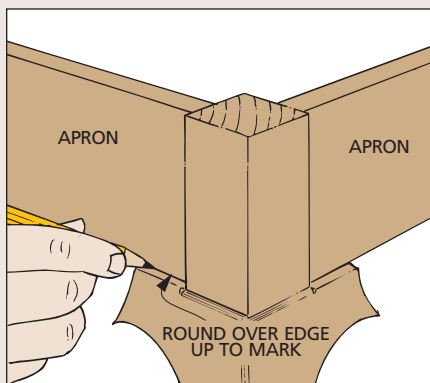
21 Now with a file and some sandpaper, carefully round over the front edge of the leg, until you reach the layout lines that were just drawn.



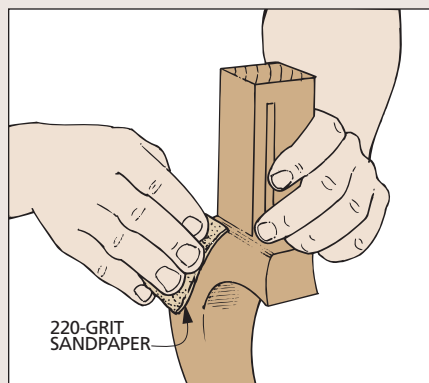
22 The back edge also gets a tapered roundover — though not as large as the front. Lay out guide lines similar to those used on the front edge of the leg.



23 Between the corner post and the beginning of the knee, there may be a small ridge. This can be pared away carefully with a sharp chisel.



24 Set the aprons in place and trace the front edges onto the leg. Remove the aprons and round over the hard edge to the line with a chisel and sandpaper.



25 Finally, sand the leg to 220-grit. If applying a liquid stain, you might want to use a wood conditioner before staining. See pages 26-27 for more about this.

fully — a scratch in the corner post from the chisel will be a chore to remove.

Next, I dry-assembled the aprons and marked the locations of their outside faces (*Step 24*). Then I rounded over the top of the transition block with sandpaper to blend the edges (*Step 25*).



Buffet Server

When it's open, the top provides extra room to set trays and dishes while serving guests. Closed, the cabinet top is smooth and uncluttered. The secret is a special set of hinges that hide out of sight.



It's easy to see how handy this Buffet Server can be. Fold out the top during those large family gatherings so you never have to worry about having enough room at the table. And with the wings folded in, the server doesn't take up much room and still provides plenty of storage.

FOLDING TOP. So how does the folding top work? It's pretty simple really. The top is divided into four parts. The two inside pieces pivot out on hinges and are supported by the two outside pieces (see photos).

But what I really like is that when the top is folded in, you can't see any hard-

ware. That's because I used a special type of "hidden" hinges — Soss hinges. (For step-by-step instructions on installing these, see the article on page 122.)

DOORS. I used another set of non-traditional hinges in this project. The inset doors are mounted on "no-mortise" hinges. Unlike regular butt hinges, these hinges are easy to install and allow for quite a bit of adjustment when it's time to hang the doors.

DRAWER. Although the top and doors use special hardware, I took a different approach with the drawer. I thought

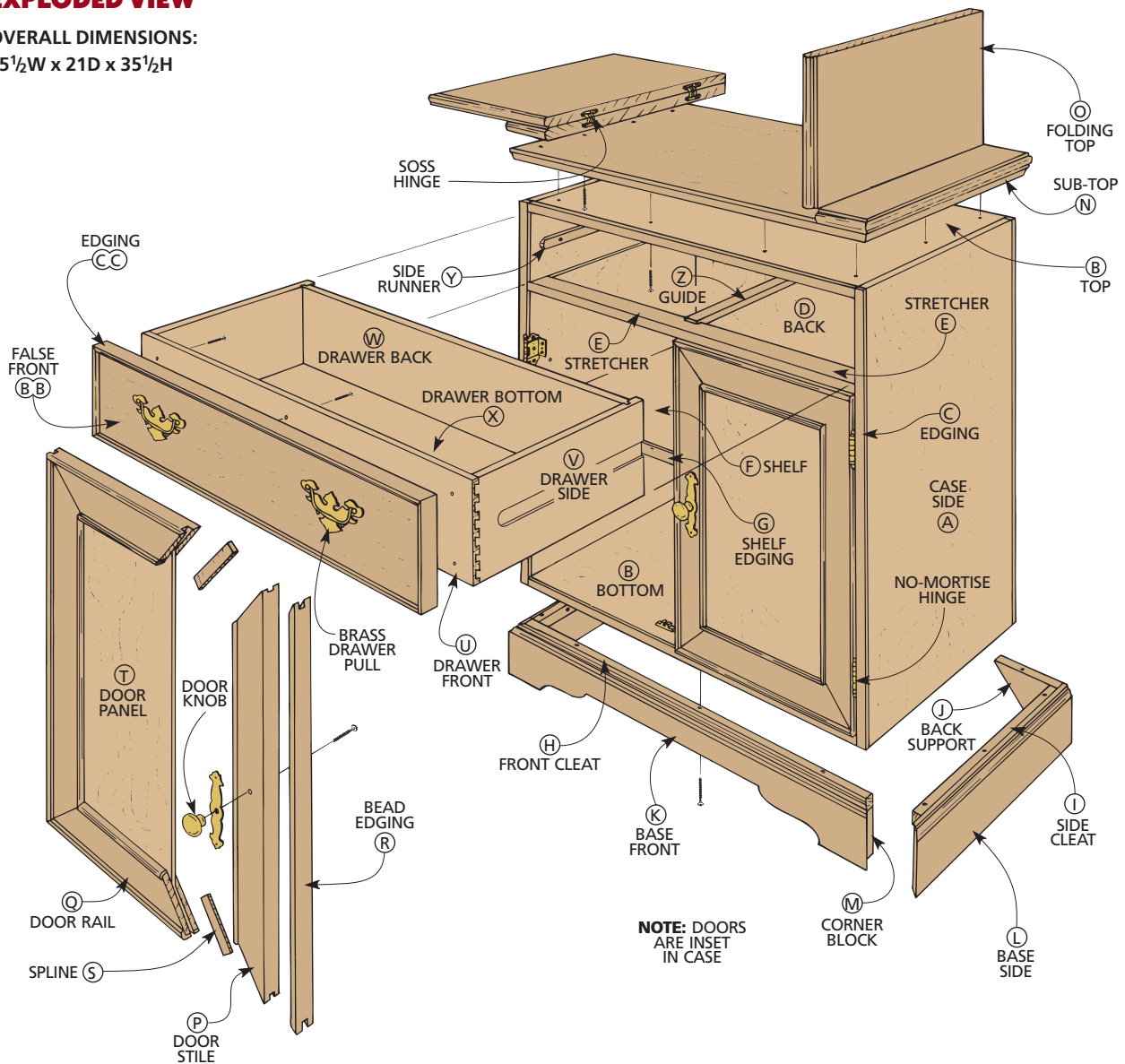
metal drawer guides would look out of place, so I used wooden guides. Traditional dovetail joints are used to fasten the drawer sides to the front.

One problem with wide drawers like this one is that they have a tendency to rack and bind as they're opened and closed. To avoid this, I used runners along both sides and simple guides underneath the drawer.

EXPLODED VIEW

OVERALL DIMENSIONS:

35½" W x 21" D x 35½" H



NOTE: DOORS ARE INSET IN CASE

MATERIALS LIST

CARCASE

A Case Sides (2)	¾ ply - 19½ x 30
B Top/Bottom (2)	¾ ply - 19½ x 32¾
C Edging (1)	¾ x ¼ - 260 rough
D Back (1)	¼ ply - 29¼ x 32¾
E Stretchers (2)	¾ x 2 - 32¾
F Shelf (1)	¾ ply - 17¾ x 31¾
G Shelf Edging (1)	¾ x ½ - 31⅞
BASE AND TOP	
H Front Cleat (1)	¾ x 1 - 33¼
I Side Cleats (2)	¾ x 1 - 18⅞
J Back Supports (2)	¾ x 4 - 6 rough
K Base Front (1)	¾ x 4 - 36 rough
L Base Sides (2)	¾ x 4 - 22 rough
M Corner Blocks (4)	¾ x ¾ - 3

N Sub-top (1)	¾ x 20⅝ - 34¾
O Folding Top (1)	¾ x 21 - 35⅞
DOOR AND DRAWER	
P Door Stiles (4)	¾ x 2¼ - 23 rough
Q Door Rails (4)	¾ x 2¼ - 17 rough
R Bead Edging (1)	¾ x ¼ - 320 rough
S Splines (8)	¼ x 3½ - ½
T Door Panels (2)	¼ ply - 11⅓ x 17⅝
U Drawer Front (1)	½ x 5¼ - 31⅞
V Drawer Sides (2)	½ x 5¼ - 18
W Drawer Back (1)	½ x 4¾ - 31⅞
X Drwr. Bottom (1)	¼ ply - 17¾ x 31⅞
Y Side Runners (2)	¼ x ¾ - 17
Z Guide (1)	¾ x 1 - 16¾
AA Center Runners (2)	¼ x ½ - 17½

BB False Front (1)	¼ ply - 5⅞ x 31⅞
CC Edging (1)	¾ x ¼ - 80 rough

HARDWARE SUPPLIES

(6) No. 8 x ¾" Fh woodscrews
(13) No. 8 x 1" Fh woodscrews
(22) No. 8 x 1¼" Fh woodscrews
(10) No. 8 x 1½" Fh woodscrews
(2) No. 8 x 2" Fh woodscrews
(2) Brass drawer pulls w/ machine screws
(2) Door knobs w/ back plates
(2 pr.) ⅓" partial-wrap no-mortise hinges
(2 pr.) ⅜" No. 101 Soss hinges
(4) Spoon-style shelf supports
(4) Ball catches

CUTTING DIAGRAM

$\frac{3}{4}$ x 5 - 96 CHERRY (3.3 Bd. Ft.)



$\frac{3}{4}$ x $4\frac{1}{2}$ - 96 CHERRY (3 Bd. Ft.)



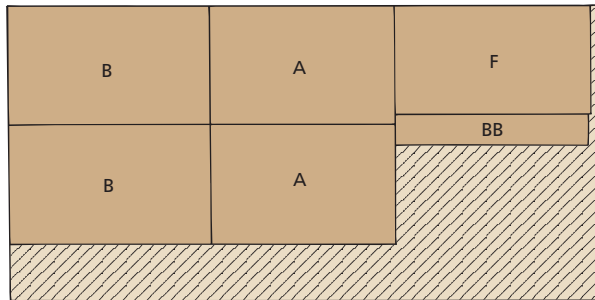
$\frac{3}{4}$ x $7\frac{1}{2}$ - 96 CHERRY (5 Bd. Ft.)



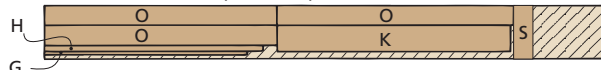
$\frac{3}{4}$ x $7\frac{1}{2}$ - 84 CHERRY (4.4 Bd. Ft.)



$\frac{3}{4}$ " CHERRY PLYWOOD - 48 x 96



$\frac{3}{4}$ x $7\frac{1}{2}$ - 84 CHERRY (4.4 Bd. Ft.)



$\frac{3}{4}$ x 5 - 84 CHERRY (2.9 Bd. Ft.)



$\frac{1}{2}$ x 6 - 72 SOFT MAPLE (3 Sq. Ft.)



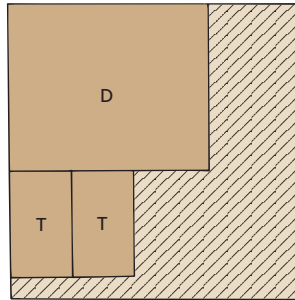
$\frac{1}{2}$ x $4\frac{1}{2}$ - 36 MAPLE (1.1 Sq. Ft.)



$\frac{1}{4}$ x 2 - 48 MAPLE (.7 Sq. Ft.)



$\frac{1}{4}$ " CHERRY PLYWOOD - 48 x 48



ALSO NEEDED:
ONE 18" x 32"
PIECE OF $\frac{1}{4}$ "-THICK
MAPLE PLYWOOD

CASE

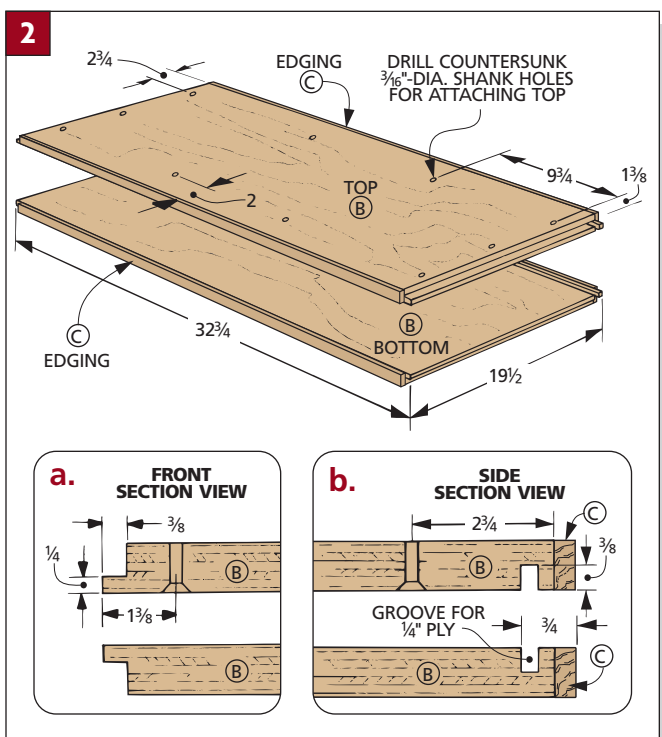
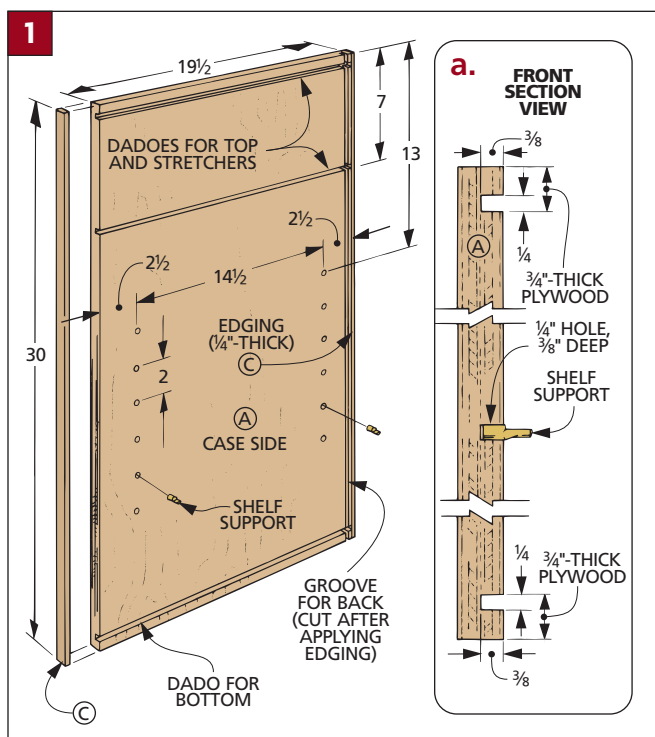
There are a lot of different parts to this Buffet Server, but the place to start is with the case. Most of the case is made with plywood that's edged front and back (Fig. 3). However, to create the opening for the drawer, there are two hardwood stretchers as well.

SIDES, TOP, AND BOTTOM. To begin construction on the case, I cut the sides (A), and top and bottom (B) to size from $\frac{3}{4}$ " plywood (Figs. 1 and 2).

Note: When sizing the panels, I allowed for $\frac{1}{4}$ "-thick hardwood edging strips that will be added to the front and back later to hide and protect the edges of the plywood.

But the edging isn't added just yet. A series of $\frac{1}{4}$ "-wide dados needs to be cut on the side panels first (Fig. 1). These dados will hold the top and bottom and the stretchers.

The next thing to do is to create $\frac{1}{4}$ "-thick tongues on the top and bottom panels that fit into the dados on the sides (Fig. 2a). These tongues are cre-



ated by cutting rabbets on the ends of the panels (*Fig. 2a*).

PLYWOOD EDGING. At this point, the plywood panels are ready for some $\frac{1}{4}$ "-thick edging (C) (*Fig. 3*). To do this, I glued extra-wide strips to the panels and trimmed them with a flush trim router bit. (See the Shop Tip on the next page for more about this).

Note: The edging doesn't run the entire length of the top and bottom panels. It stops flush with the rabbets on the ends (*Fig. 3a*).

CASE BACK. After the edging has been trimmed flush on the top and bottom panels, the next piece to make is a $\frac{1}{4}$ "-thick plywood back panel. This piece does more than just close off the back. It also strengthens the case and keeps it square.

To hold the back, first cut $\frac{3}{8}$ "-deep grooves along the back edges of the sides, top, and bottom panels (*Figs. 1, 2b, and 3b*). Make sure the width of these grooves matches the thickness of the plywood, which isn't exactly $\frac{1}{4}$ ".

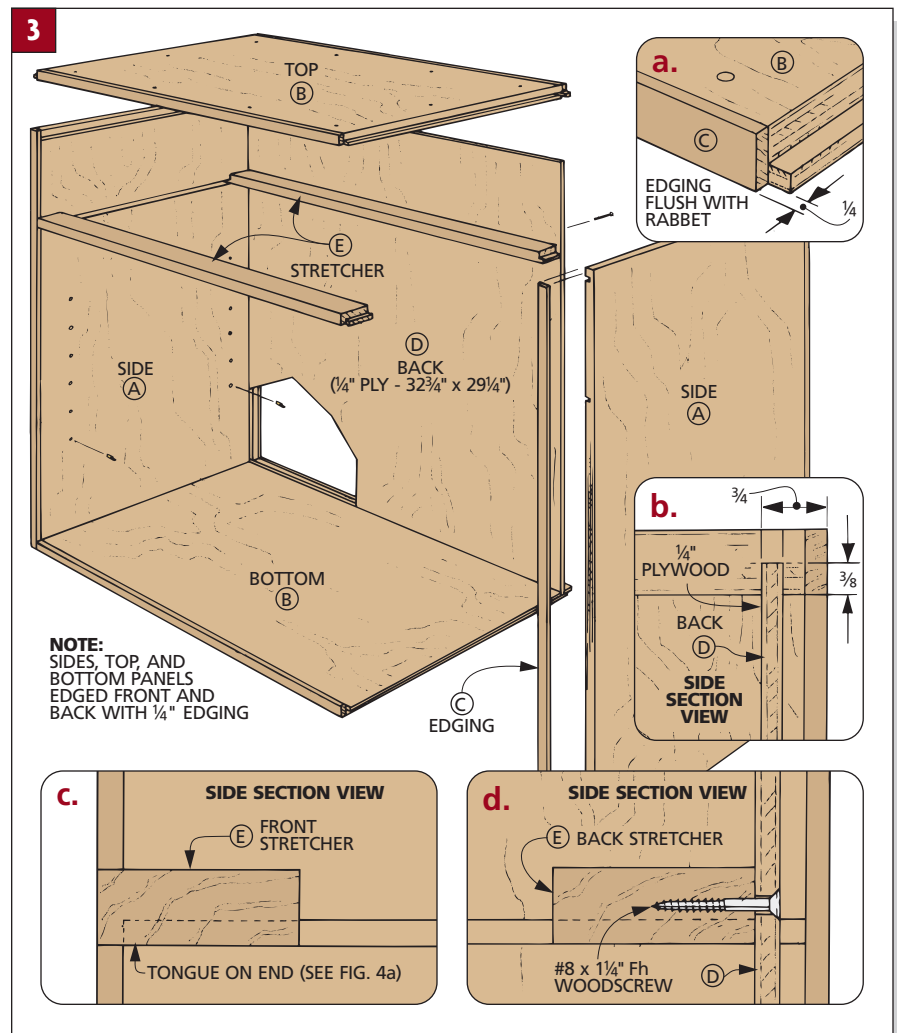
After the grooves for the back have been cut, the case back (D) can be cut to size (*Fig. 3*). To determine its size, I dry-assembled the case and measured the opening. (Just remember to allow for the depth of the grooves.)

STRETCHERS. The last two pieces of the case are the $\frac{3}{4}$ "-thick hardwood stretchers (E) (*Figs. 3 and 4*). These pieces are ripped 2" wide and are cut to the same length as the top and bottom panels ($32\frac{3}{4}$ ").

The stretchers fit in the grooves in the side panels just like the top panel — with tongues (*Figs. 3c and 3d*). Here again, all you have to do is cut rabbets on the ends to create $\frac{1}{4}$ "-thick tongues (*Figs. 4a and 4b*).

The only difference between the two stretchers is that the one in front also requires a notch in each tongue. This allows it to fit flush with the front of the edging on the sides of the case (*Figs. 3c and 4a*). This notch is easy to cut — you can use the same fence setting that you used to cut the rabbets. All you need to do is set the stretcher on its front edge and lower the blade so it cuts a notch the same thickness as the edging ($\frac{1}{4}$ ").

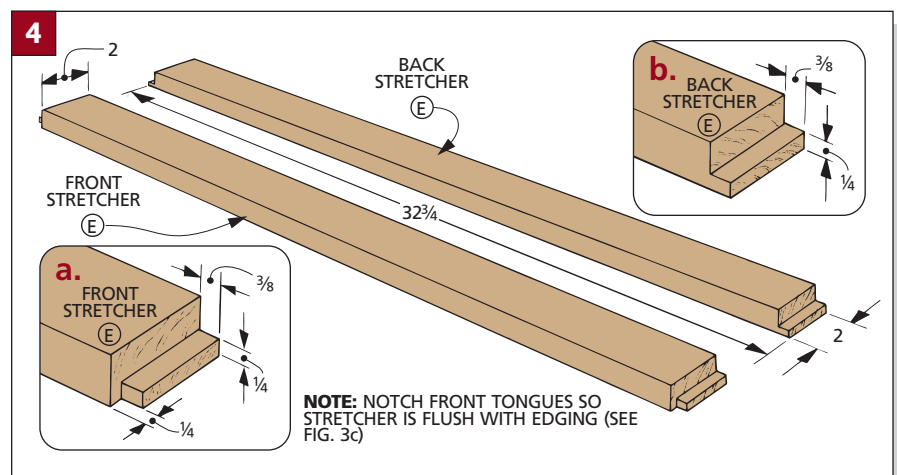
ASSEMBLY. At this point, the case could be assembled, but first I took the opportunity to drill some holes while it's easy to get at the inside faces of the pieces. On the case sides (A), I drilled holes for $\frac{1}{4}$ " shelf pins that will hold a



shelf that's added later (*Figs. 1 and 1a*). Then I drilled countersunk pilot holes in the top panel (B) (*Figs. 2 and 2a*). These holes will be used to secure the top later on.

Now the case can be assembled. To do this, I laid a side panel down on my shop floor and fit the panels and

stretchers into their grooves. Then I added the back and the other side panel on top, stood the case upright and clamped it together. This is not a quick assembly, so be sure to dry-assemble all the pieces first to make sure everything goes together well and use a slow-setting glue. (I used white glue.)



SHELF

With the case assembled, you can step back and take a deep breath. All that's left with the case now is to add a shelf inside (Fig. 5). I ripped the $\frac{3}{4}$ " plywood shelf (F) $17\frac{3}{4}$ " wide and cut it to length so there was a $\frac{1}{16}$ " gap at each side. (Mine was $31\frac{7}{8}$ " long.) To hide the

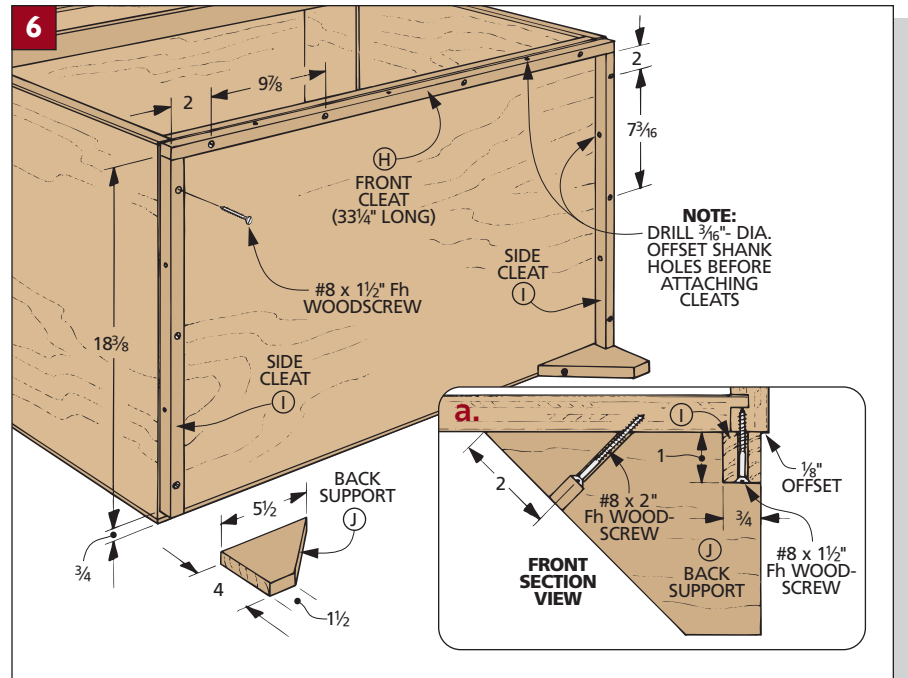
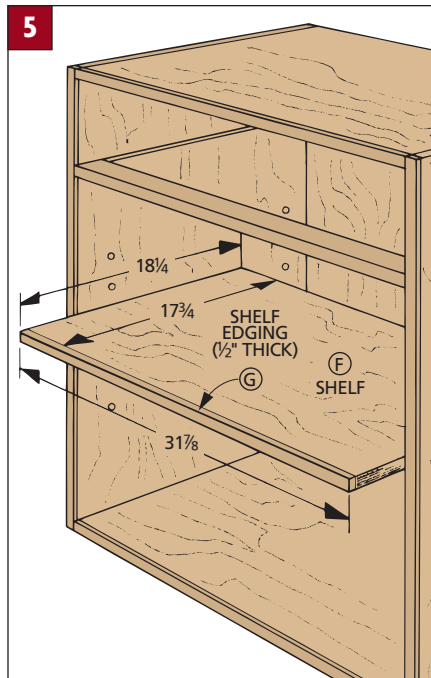
plies, the front of the shelf is edged like the case panels, except this time, I used $\frac{1}{2}$ "-thick edging (G).

BASE

With the case complete, I added the base next (see the photo on the opposite page). It's made up of three pieces

mitered to wrap around the front and sides of the case. These pieces have ogee profiles on their top edges, and the front piece has a curved profile cut along its bottom edge.

CLEATS. But you can't simply add the base pieces to the case — you need something to attach them to. So first, I added front and side cleats (H, I) to the



SHOP TIP

After the edging is glued to the side panels of the Buffet Server, it needs to be trimmed flush with the plywood. To do this, I used a router with a flush trim bit. But this presented a couple of problems.

First, it's difficult to balance the base of the router on the narrow edge of the workpiece. As a result, it's easy to gouge the edging.

Second, the bearing on the router bit will drop into the dadoes cut on the inside faces of the side panels — which can also gouge the edging.

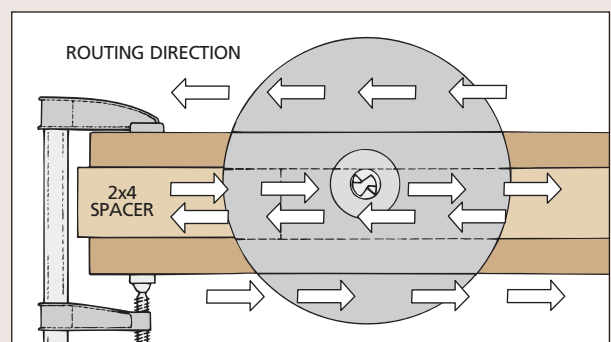
Fortunately, both problems are easy to solve. To



bridge the gap created by the dado, all that's needed is a filler strip (see photo). Cut the strip so it fits snug in the dado and is flush with the face of the plywood. (I sanded my filler strip to get it flush.)

To create a wider surface for the router to ride

Trimming Edging Flush



along, just clamp the sides together with a 2x4 spacer sandwiched in between (see photo). The spacer separates the sides so you can rout the edging on both faces of the panel at one time.

One thing to keep in mind is the routing direc-

tion (see drawing). The bit may grab the workpiece if you run the router in the wrong direction.

Finally, after the edging is trimmed flush with the faces, it can be trimmed to length. I use a chisel and carefully pare away the excess on the ends.



An ogee curve at each end of the base front echos the ogee profile routed on the top edge of the base. By cutting away the base between the ogees in a straight line, "toe room" is created. The Shop Tip at right shows how to do this.

bottom of the case (Fig. 6). The cleats are 1" tall and have two sets of countersunk pilot holes drilled in them. One set is for screwing the cleats to the case, and the other is for attaching the base pieces to the cleats.

Note: The holes for attaching the base pieces are countersunk from the back side of the cleat.

The cleats sit back $\frac{1}{8}$ " on the front and sides of the case (Fig. 6a). But they stop $\frac{3}{4}$ " short of the back edge. This creates room for two back supports (J) that can be added next. These are cut the same height as the base pieces (4").

BASE PIECES. After the back supports are glued and screwed to the case, the

SHOP TIP Straight Guide

The bottom edge of the base front has decorative curves at each end (see the photo at left). The portion of the base between these curves is straight. Forming this profile is done in several steps.

The curved portions are cut to rough shape on the band saw. Then use a drum sander to sand up to the lines.

To make the edge between the curves as

straight as possible, I used a flush trim bit in a router table. However, the bearing of the bit needs a surface to ride on.

So I fastened a straight piece of scrap to the base with double-sided carpet tape (see photo above).

You'll still have some touch-up to do since the bit won't reach



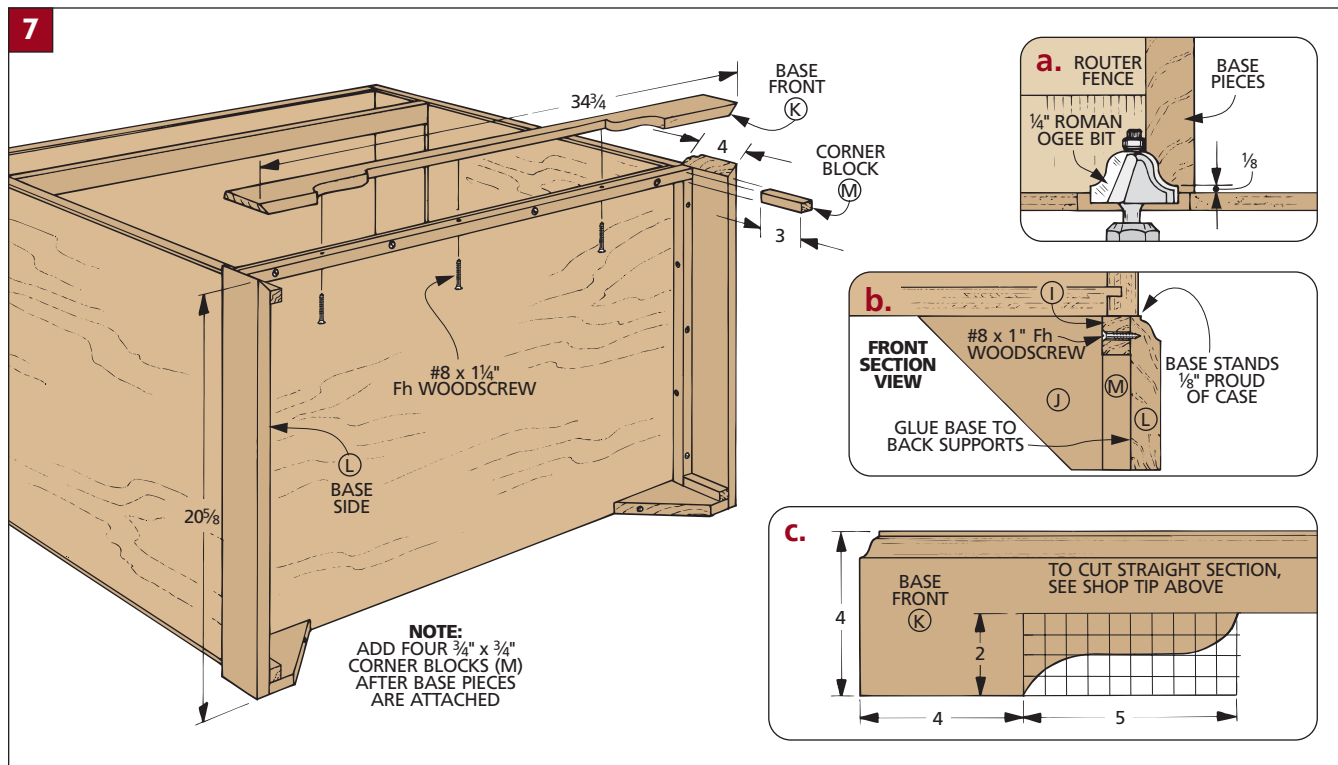
into the inside corner where the straight portion begins. So stop the cut just short of this point, then complete the profile by using a chisel to square up the corners.

base front (K) and sides (L) can be added (Fig. 7). These $\frac{3}{4}$ "-thick pieces are ripped 4" wide. But before mitering them to length, I routed the Roman ogee profile along the top outside edge of each piece (Fig. 7a.)

Now the three base pieces can be mitered so they wrap around the case with a $\frac{1}{8}$ " shoulder, starting with the base front (Fig. 7). And when the miters on the front corners are complete, the back ends of the sides can be cut flush with the back of the case.

Before attaching the base pieces, I laid out and cut the curved profile on the front (Fig. 7c). The straight section was shaped by roughing out the line with the band saw and then routing it straight with a flush trim bit and a straightedge (see Shop Tip above).

CORNER BLOCKS. When the base pieces have been glued and screwed to the supports, I glued short, $\frac{3}{4}$ "-square corner blocks (M) into the front and back corners of the base to strengthen this joint (Fig. 7).



Now the buffet can be set right side up so you can add the top. The top is made up of two hardwood panels: a sub-top and the folding top (Fig. 8).

SUB-TOP. The first thing to do is to glue up a $\frac{3}{4}$ "-thick panel for the sub-top (N) (Fig. 9). When cutting this panel to size, it should end up flush with the back edge of the case but overhang the front and each side $\frac{5}{8}$ " (Fig. 9). (My sub-top was $20\frac{5}{8}$ " x $34\frac{3}{4}$ ".)

With the panel cut to size, next I routed a $\frac{1}{2}$ " cove profile on the front and side edges (Figs. 9 and 9a). Then I drilled four countersunk pilot holes on each end. (Countersink the bottom face.) These are for securing the folding top to the sub-top later.

FOLDING TOP. Next, I started on the folding top (O). It starts out as another long, $\frac{3}{4}$ "-thick panel (Fig. 9). First I ripped the folding top 21" wide so it would overhang the front edge of the sub-top $\frac{3}{8}$ " (Fig. 8a).

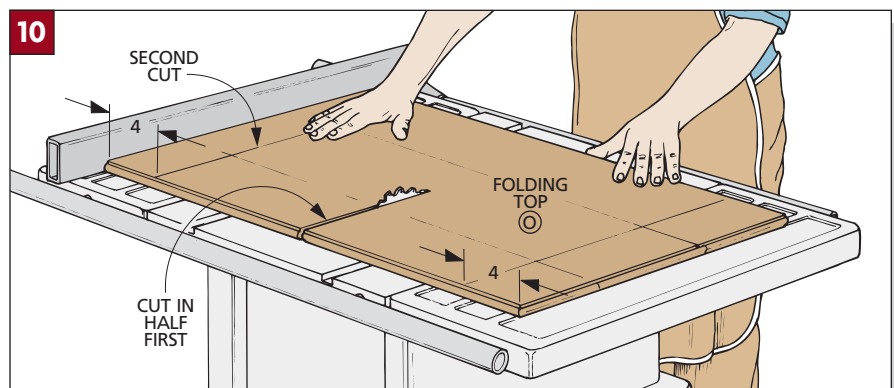
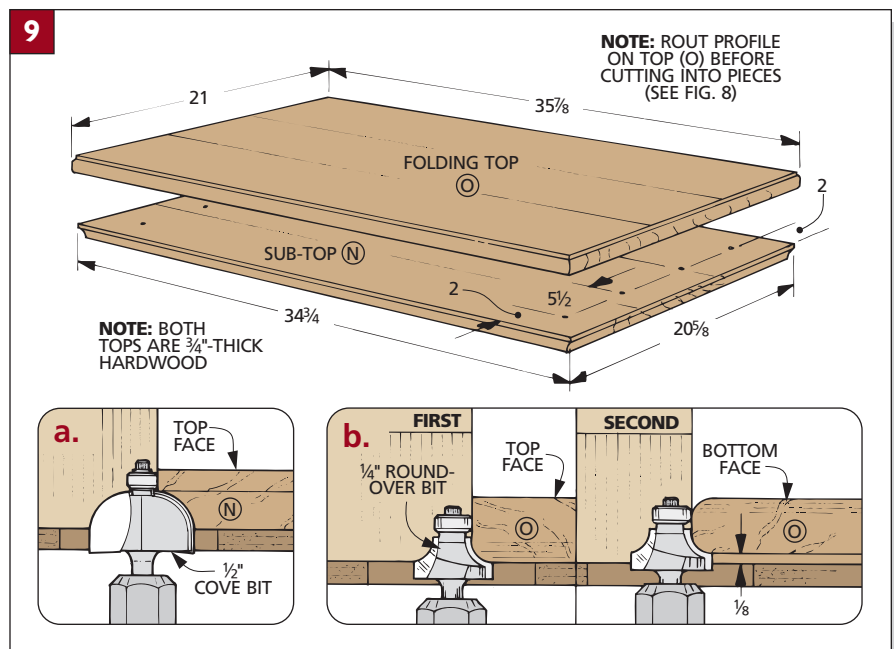
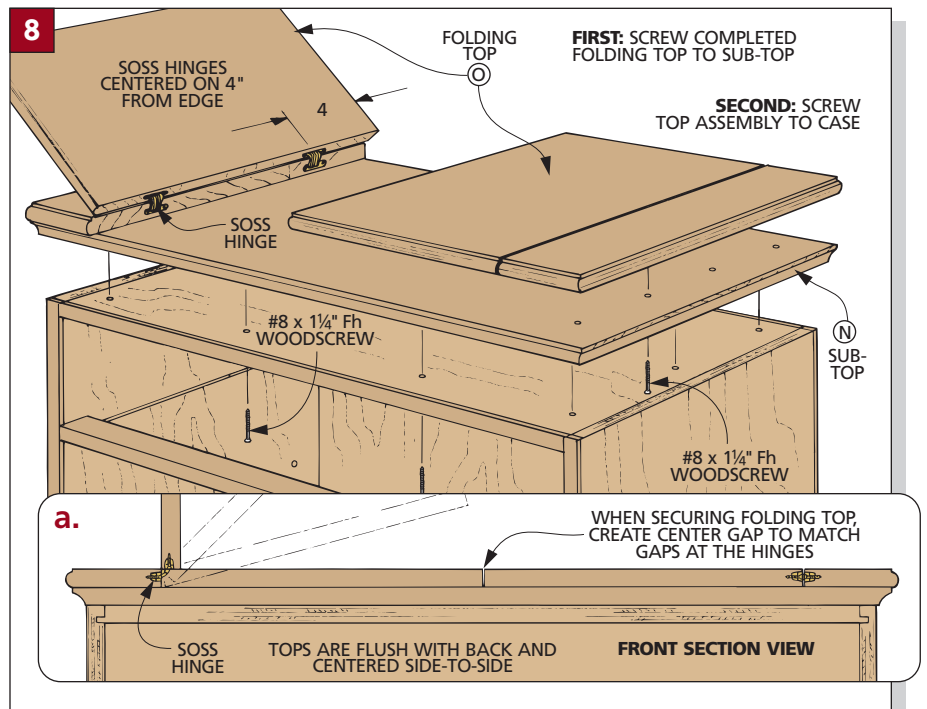
The folding top overhangs the sub-top $\frac{3}{8}$ " on the sides, too. But when initially cutting the panel to length, I added $\frac{3}{8}$ " to the final length to allow for the three saw kerfs that will be made when cutting the panel later. (My panel started off $35\frac{7}{8}$ " long.)

Before cutting the panel, I routed a profile along its front and side edges. Using a $\frac{1}{4}$ " roundover bit, the first thing to do is to round over the bottom edge (Step 1 in Fig. 9b). Then flip the panel over for a second pass. But this time, raise the bit to create a $\frac{1}{8}$ " shoulder along the top edge (Step 2 in Fig. 9b).

Now the folding top can be cut into four pieces (Fig. 10). To do this, I used my rip fence, cutting the long panel in half first and then cutting off the 4"-long pieces at each end.

TOP ASSEMBLY. Before the folding top can be attached to the sub-top, the two halves of each folding top must be joined with Soss hinges. (For more on installing these hinges, see page 122.)

With the hinges mortised into the folding top, the 4"-long end pieces can be glued and screwed to the ends of the sub-top (Fig. 8). The backs of these panels are flush and the folding top is centered side-to-side. But the important thing here is the gaps between the folding top halves should match the gaps where the halves are joined with the hinges (Fig. 8a).



With the folding top and sub-top screwed together, all that's left is to screw them to the case, making sure the tops overhang the case the same on each side (*Fig. 8a*).

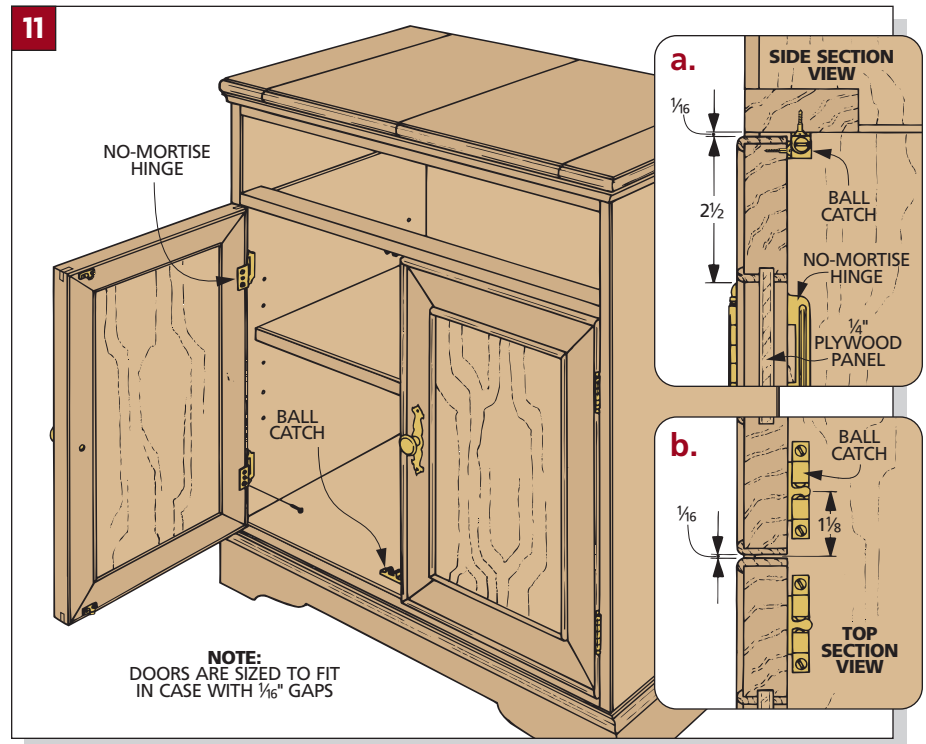
DOORS

Next I turned my attention to the two doors (*Fig. 11*). These doors are inset, and their frames are joined with reinforced miter joints. A bead edging wraps around the door frame.

FRAME PIECES. To build the doors, I started with the frames. The stiles (P) and rails (Q) are cut to width ($2\frac{1}{4}$ ") from $\frac{3}{4}$ "-thick stock (refer to *Fig. 12* on next page). But before these pieces can be cut to length, you need to make and add the bead edging (R) to both edges (see the Technique box below).

After the edging is on and has been trimmed, the stiles and rails can be mitered to size (*Fig. 12*). When doing this, I allowed $\frac{1}{16}$ " gaps around and between the doors (*Figs. 11a and 11b*).

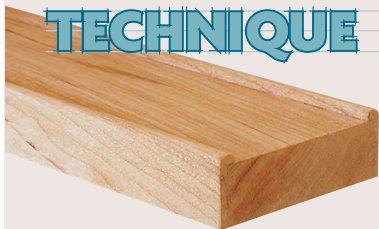
Usually I build an inset door to fit its opening exactly. This way, I can trim it slightly so the gaps around the doors are all the same. But this method won't work with these doors.



The reason these doors can't be trimmed much is because of the bead edging that's applied around the edges. It's too thin to allow you to trim much off without it being noticeable (or worse

yet, cutting right through the molding). So when mitering the rails and stiles to finished length, you need to be as accurate as possible so any trimming will be kept to a minimum.

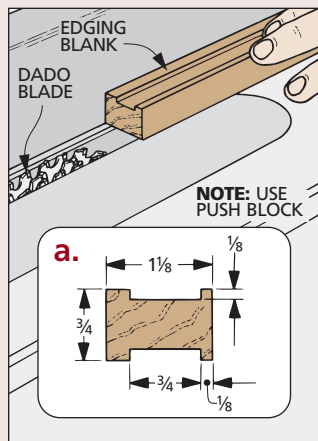
TECHNIQUE



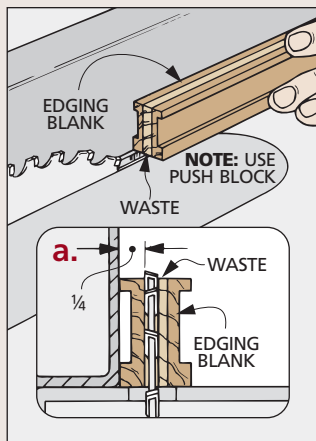
Bead Edging

The trick with the bead edging is attaching it to the frame pieces so it stands proud the same amount all around the door. But I came up with a

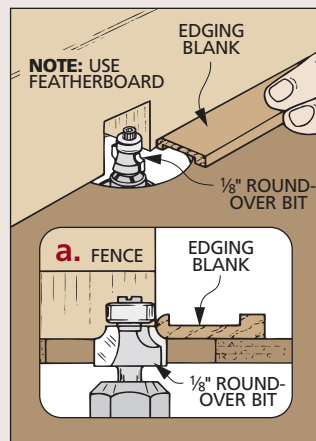
simple solution: I used a groove to "lock" the edging in position. Then after the edging is attached, the excess can be trimmed on the table saw.



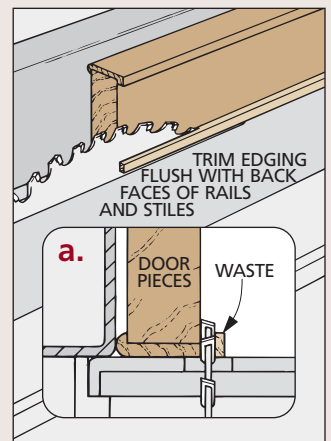
1 First, cut $\frac{1}{8}$ "-deep grooves on both faces of a $\frac{3}{4}$ "-thick blank. Size the grooves to hold the door pieces.



2 Next, rip two $\frac{1}{4}$ "-thick edging strips from each blank. Use a push block when making this cut.



3 Now, using a $\frac{1}{8}$ " roundover bit and the router table fence, rout both outside edges of each strip.



4 After the edging is glued to the rails and stiles, trim the back edge of the molding flush, using the table saw.

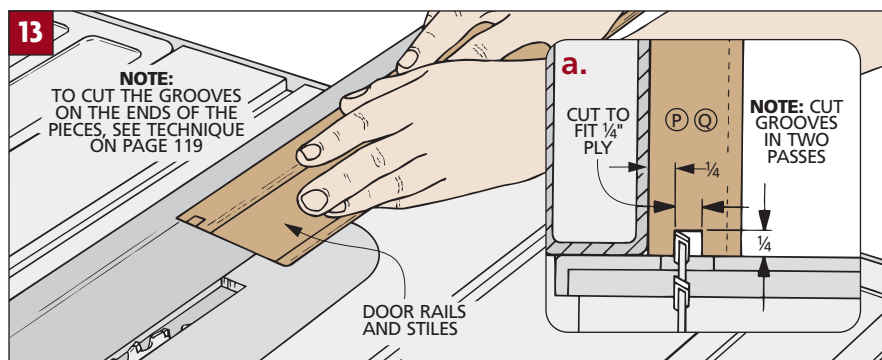
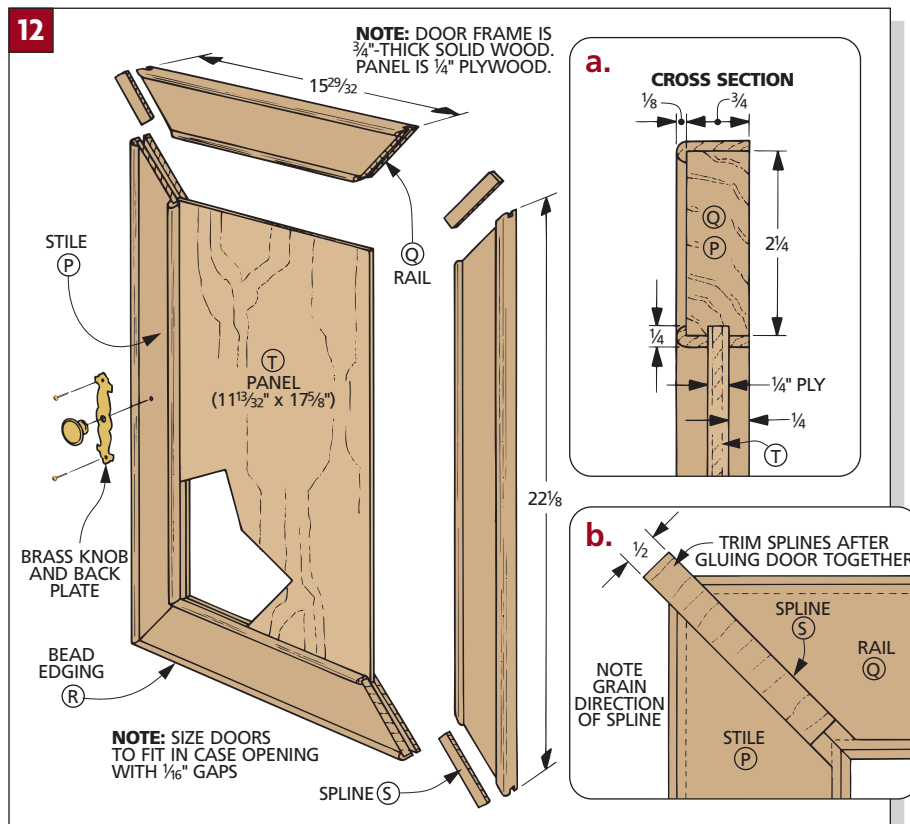
SPLINES AND DOOR PANELS. With the door pieces cut to size, the next thing I did was cut some $\frac{1}{4}$ "-deep grooves along the inside edges and along the ends of each piece (*Figs. 12 and 13*). The grooves on the edges will hold a $\frac{1}{4}$ " plywood panel. And the grooves on the ends will hold some splines, which will strengthen the miter joints.

Unfortunately, to cut these grooves, you can't use a dado blade because $\frac{1}{4}$ " plywood is just a little bit less than $\frac{1}{4}$ " thick. So for each groove, I made two passes with a regular blade (*Fig. 13*). And because of the bead molding on the edges, the inside face has to stay against the fence. So to sneak up on the final width of the grooves, you need to make a pass on the edge and end of each piece before nudging the rip fence over a bit for the second pass.

Note: As I cut the grooves in the door frame pieces, I also cut a groove in a piece of scrap. Then I used the scrap as a test piece to help position the fence properly for the second pass.

Cutting the grooves on the long edges of the frame stiles and rails is easy (*Fig. 13*). But when it's time to cut the grooves on the ends, the pieces are too narrow to pass over the blade safely. So I decided to add a little extra support. The Technique box on the opposite page shows how I did this.

Once the grooves are cut on the edge and ends of each piece, dry-assemble the door frames and measure for the plywood panels (T) (*Fig. 12*). Be sure to figure in the depth of the grooves in the rails and stiles. (My panels were $11\frac{13}{32}$ " x $17\frac{5}{8}$ ".)



HARDWARE

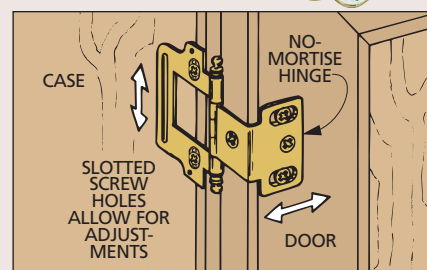
One problem with traditional butt hinges is that they require some precisely cut mortises. So with this project, I tried a type of hinge I hadn't used before: a no-mortise hinge. With these, the leaf attached to the case fits around the leaf attached to the door. So there are no mortises to cut.

But what I really like is that there's some built-in adjustment. The hinge has slotted shank holes in the leaves that allow you to move the door side to side and up and down. This is very useful when fitting inset doors.

INSTALLATION. To mount these hinges, I screwed them to the case first. Next, I set the door on a couple of $\frac{1}{16}$ "-thick shims inside the case opening. This sets the gap along the bottom of the door, so you can reach inside and mark the position of the slotted pilot holes on the back of the door.

Now, the pilot holes can be drilled, and the door can be mounted in the case. Next, you need to step back and check the gaps around the door. And if needed, you can even out the gaps by adjusting the hinge screws.

When the door fits, the last two screws "lock" the door in place.



No-Mortise Hinges

TECHNIQUE Grooves for Splined Miters

Cutting a groove in the end of a workpiece for a splined miter joint is usually pretty simple. All you have to do is make a couple passes over the table saw, flipping the piece between each pass to center the groove.

But cutting the grooves on the ends of the door frame pieces of the Buffet Server is a different story. For starters, I was concerned about keeping the long mitered pieces steady while at the same time keeping the end flat on the table as it passed over the blade.

Fortunately, the solution to this problem is simple. I just clamped a scrap to the workpiece to act as a runner along the top of the rip fence

(Fig. 1). I used a wood clamp pad to avoid damaging the bead molding.

And to prevent chipout as the blade exits the workpiece, I clamped a mitered scrap block to the runner, behind the workpiece.

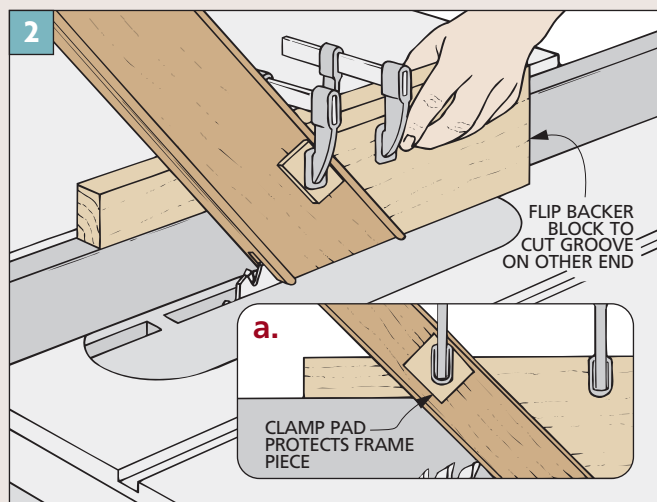
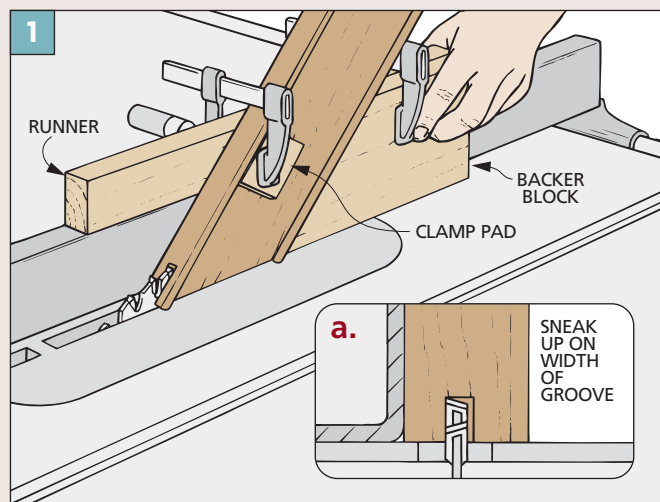
The bead molding on the edges of the mitered pieces raised another concern. Because this molding stands proud of the front face of the frame piece, only the back face can be placed against the rip fence of the table saw. This keeps the groove centered on the thickest portion of the workpiece.

Note: In order to cut a groove on the opposite end of each workpiece, you'll have to unclamp the backer block and

flip it around so the workpiece is angled in the opposite direction (Fig. 2).

I found it was easiest to cut the grooves in the ends while I was set up to cut the grooves in the edges. This way the grooves for the splines and the door panels will align. Start by making a single pass on each edge and end of the frame pieces. Then instead of flipping the workpiece to widen the grooves, you'll have to reposition the rip fence.

After making the initial pass on each of the ends, reposition the fence to sneak up on the final width of the groove (Fig. 1a). Once the fence is set and locked, finish cutting the rest of the grooves on the edges and ends.



ASSEMBLY. Before gluing the doors together, I made hardwood splines (S) to fit the grooves in the corners. These can be planed and cut from scrap, but to make them as strong as possible, make sure the length of the grain runs *across* the joint (Fig. 12b).

As you position each spline, be careful that it doesn't extend into the grooves on the inside corner of the workpieces. Otherwise, the plywood door panel won't fit in. The splines should stick out along the outside corners of the door frames (Fig. 12b). This allows you to trim them perfectly flush with a chisel and some sanding after the doors are assembled.

I glued and clamped the doors together on a flat surface so I could check for any twist in the frames.

MOUNTING THE DOORS. Now that the doors are completed, the next step is to mount them in the case. Since these are inset doors, it's important that they end up with even gaps all the way around. To make this part of the job easier, I used no-mortise hinges, which allowed me to adjust the position of the doors somewhat. (There's more about this in the Hardware box at left).

HARDWARE. With the doors mounted in the opening, I added the other pieces of hardware. First, I mounted brass knobs with back plates to the inside door stiles (Fig. 12). Then to hold the doors closed, I added double ball catches at the top and bottom of each door (refer to Figs. 11a and 11b on page 117). For sources of hardware, refer to page 126.



A hardwood spline at each corner of the door frame helps reinforce the miter joint, since this is an end grain to end grain joint. The splines are planed to thickness from scrap to fit the grooves cut in the ends of the frame pieces.



DRAWER

All that's left now is to add the drawer. The trick with adding a wide drawer is to get it to slide in and out smoothly. To make this work, the weight of the drawer is supported at the sides, but the drawer is guided in and out of the opening by a couple of runners on the bottom of the drawer that straddle a drawer guide fastened to the case.

FRONT AND SIDES. The first thing to do is to measure the opening in the buffet. (Mine was $5\frac{1}{2}$ " x 32".) The front (U) and sides (V) are ripped $\frac{1}{4}$ " shorter than the opening ($5\frac{1}{4}$ ") (Fig. 14). (A false front will be added later.) And the front (U) is cut $\frac{1}{8}$ " less than the width of the opening ($31\frac{7}{8}$ ").

To join the front and sides of the drawer, I routed $\frac{1}{2}$ " half-blind dovetails with a dovetail jig (Fig. 14b). Then to hold a $\frac{1}{4}$ " plywood drawer bottom, cut a $\frac{1}{4}$ "-deep groove along the bottom of each piece. Just as you did for the door frames, these grooves are cut by making two passes over the saw blade.

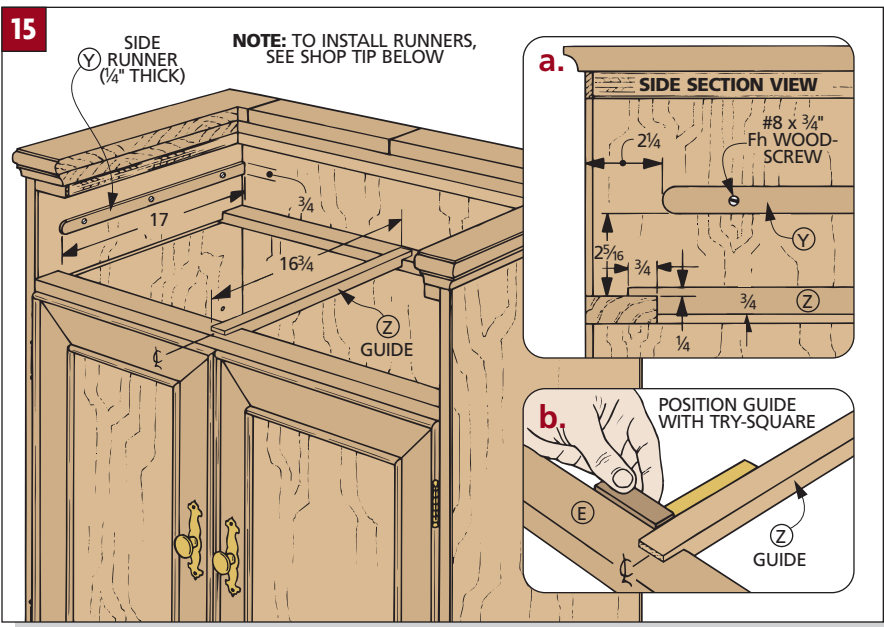
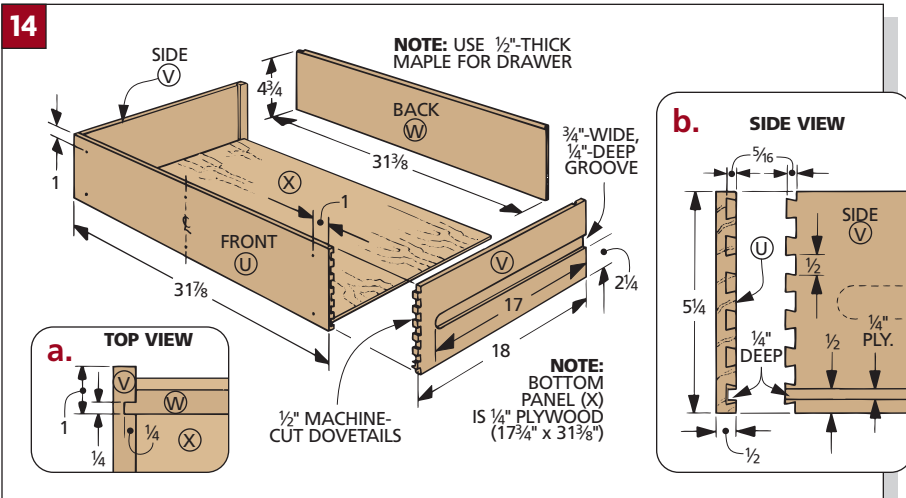
Then, to hold the back between the sides, cut a $\frac{1}{4}$ "-wide dado across each side toward one end (Fig. 14a).

BACK AND BOTTOM. Now the drawer back (W) can be cut to size from $\frac{1}{2}$ " stock. It doesn't match the height of the sides. The back is only $4\frac{3}{4}$ " high because it stops flush with the groove at the bottom. And it's cut to length to fit between the dados in the sides.

Note: When the drawer is assembled, the back sits on top of the drawer bottom. This makes a smooth surface the depth of the drawer for attaching the runners later (refer to Fig. 17).

To get the back to fit between the sides, cut a rabbet on each end of the back piece to create tongues that fit in the dados (Fig. 14a). Then I dry-assembled the drawer and cut a bottom (X) from $\frac{1}{4}$ " maple plywood.

Before gluing the drawer together, rout a stopped groove on the outside of



each side piece to accept some side runners (Fig. 14). Then the drawer can be glued together.

SIDE RUNNERS. To mount the drawer, the first thing I did was add the $\frac{1}{4}$ "-thick side runners (Y) to the case. These hardwood runners support the weight of the drawer (Fig. 15). Round the front ends of the runners to match the grooves in the drawer sides (Fig. 15a).

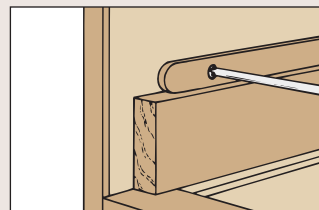
To allow the drawer to slide smoothly, the runners have to be positioned so the drawer will sit just above the stretchers. The easiest way to do this is to cut a spacer to set the runner on (see the Shop Tip at right). (The runners butt against the back of the case.)

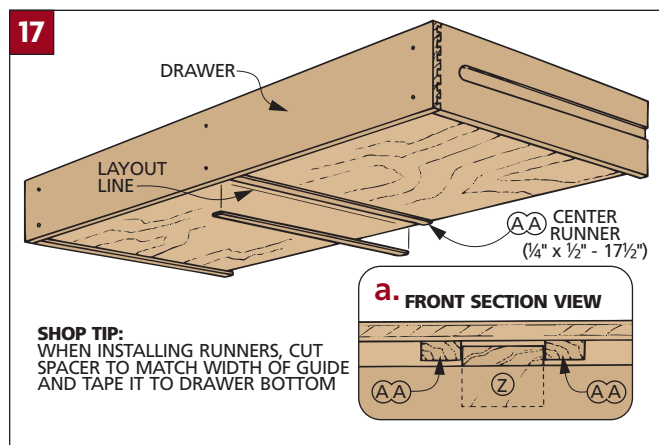
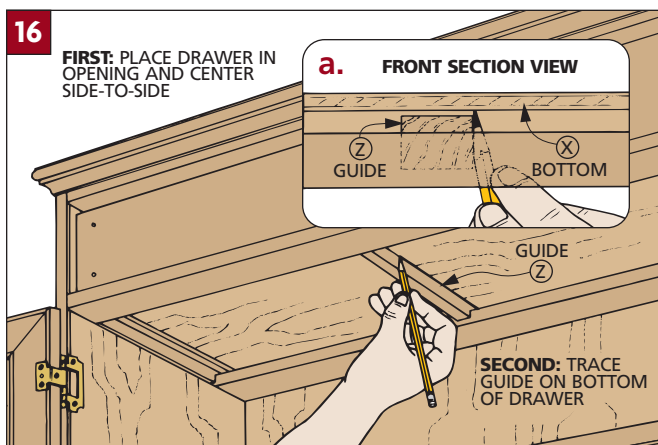
GUIDE. The next piece to add is the $\frac{3}{4}$ "-thick drawer guide (Z) inside the case (Fig. 15). It's cut $1\frac{1}{2}$ " longer than

SHOP TIP

Spacer

The combined width of the spacer and drawer runner should be $\frac{1}{16}$ " more than the distance from the top of the groove to the bottom of the drawer side.





the distance between the front and back stretchers (E). Then a $\frac{3}{4}$ " x $\frac{1}{2}$ " rabbet is cut on each end (Fig. 15a).

To add the guide, all you need to do is center it in the opening and glue it in place. The critical thing is that it's parallel to the sides and square to the stretchers (Fig. 15b).

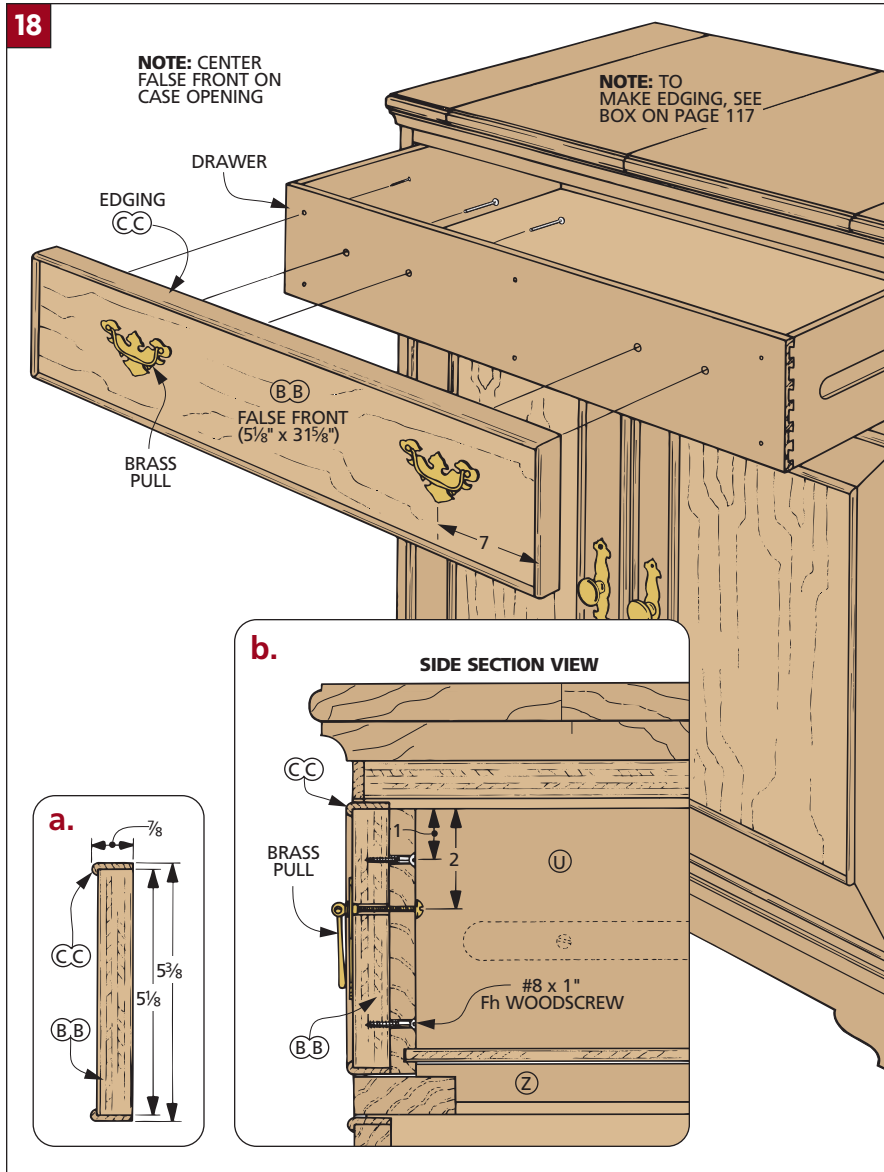
CENTER RUNNERS. The guide (by itself) doesn't keep the drawer aligned as the drawer moves in and out. To complete the guide system, you need to add two center runners (AA) to the bottom of the drawer. These $\frac{1}{4}$ " x $\frac{1}{2}$ " pieces are easy to make, but positioning them takes a bit more work.

To do this, I set the drawer in place and centered it side-to-side. Then I reached inside the case and traced the guide onto the drawer bottom (Fig. 16). After removing the drawer, I cut a spacer the same size as the guide and clamped it between the layout lines. Now it's a simple matter to glue the runners in place (Fig. 17).

FALSE FRONT. All that's left now is to add the false front (BB) to the drawer. The trick is cutting it to final size. That's because you have to account for the $\frac{1}{8}$ " edging just like on the doors.

To do this, I started with the drawer opening ($5\frac{1}{2}$ " x 32") and then subtracted from each edge $\frac{1}{16}$ " for the gap between the drawer and case and $\frac{1}{8}$ " for the edging.

With the false front cut to size, I added the edging (CC) around the outside (Fig. 18a and the Technique box on page 117). (This is similar to the edging on the doors, but this time, the strips have to be mitered to final size before they're glued in place.) Once the edging is applied, you can center the false front on the drawer front, screw it in place, and add the pulls (Fig. 18b).



Now all that's left is to add the finish. I removed the hardware and stained the buffet with a cherry stain. (This evens out any color differences between the

plywood and solid wood.) Then I applied a few coats of a wipe-on polyurethane finish. This provides a durable finish on the buffet top. ■

When it came to selecting hinges for the folding top of the Buffet Server, I was concerned with two things — strength and appearance. So I selected Soss hinges.

Soss hinges are a type of “invisible” hinge. Instead of a hinge pin, the two leaves of the hinge are connected by a “knuckle” made of interlocking fingers. When the hinge is closed, the knuckle joint folds into itself, within a pocket in the hinge (see photo). The result is a concealed hinge that provides strong mechanical support.

MORTISES. Like a butt hinge, a Soss hinge fits into a pair of mortises cut on each piece. But that’s where the similarity ends. Instead of a shallow, square



the top, the template should always be placed on the *outside* face of each workpiece.

Note: To position the template, I drew a line on my workpiece to align with the template’s centerline.

With the template in place, mark the four hole locations for each hinge with a sharp awl (*Step 1*).

TRANSFER LOCATIONS. After marking the center-points of the holes, use a square and a sharp pencil to draw guidelines through each centerpoint (*Detail ‘a’*

in *Step 1*). These lines are needed later for aligning a dowel jig.

Now the hole locations can be laid out on the other piece. But this calls for some creative thinking. In order for the two pieces to line up once the hinges are installed, both sets of hinge mortises must be laid out identically. But using a tape or ruler to lay out identical hole locations isn’t a reliable method, since it’s easy for errors to creep in.

Instead, I transferred the hole locations directly from the first piece to the second piece. To do this, hammer four small brads halfway into the hole locations on the first workpiece. Then snip off the heads of the brads, leaving about 1/4" exposed (*Step 2*).

Now to transfer the hole locations, simply place both workpieces on a flat surface against a straight edge. (I used the rip fence on my table saw.) The fence ensures the ends of the pieces are flush. A quick rap with a mallet trans-

mortise, a Soss hinge requires a rounded, deep mortise (see photo on opposite page).

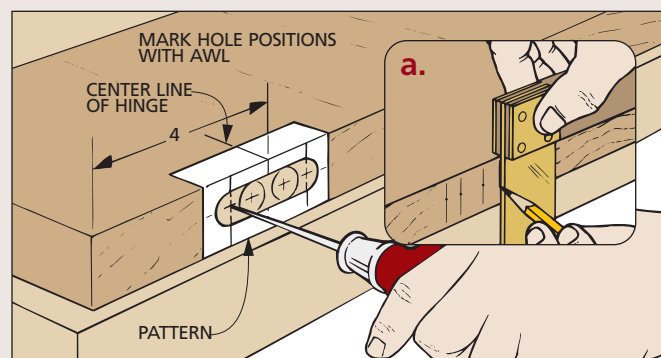
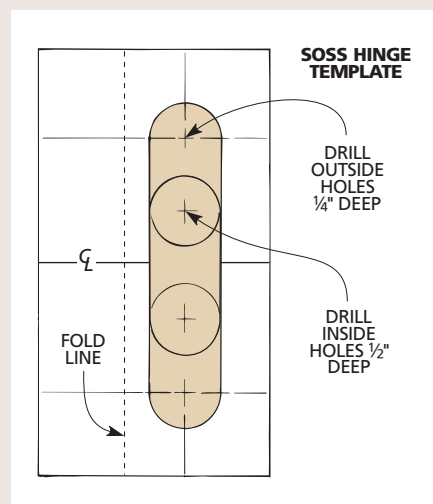
Normally, I would make each mortise by drilling a series of holes on a drill press and then cleaning up the mortises with a chisel. But because the folding top pieces of the buffet that receive the hinges are too tall to be supported on a drill press, I had to use a hand-held drill. This created some interesting challenges (more on that later).

LAYOUT

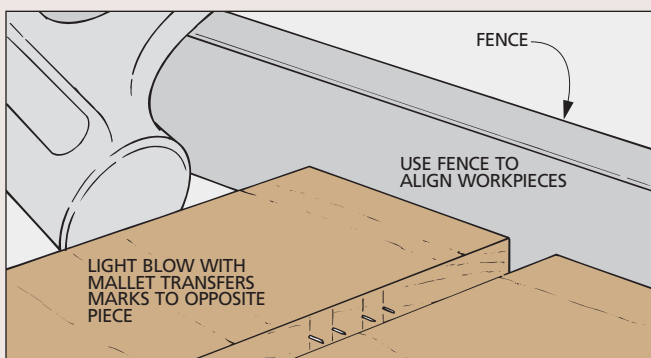
To help lay out the holes that create each hinge mortise, Soss provides a paper template (see drawing at left).

To use the template, simply fold it over on the line and place it on the edge of the workpiece where you wish to install the hinge (*Step 1*).

Just keep in mind that since the mortises aren’t centered on the thickness of



1 Place the template on the edge of the workpiece and use an awl to mark the four hole locations for each mortise. To aid in positioning a dowel jig later, draw layout lines on the edge of the board through each of the holes (*detail ‘a’*).



2 To transfer the hole locations, drive a small brad into each of the holes made by the awl. After snipping off the heads of the brads, butt the mating workpieces together and tap them with a mallet to mark the locations on the adjoining workpieces.

fers the locations from one to another (Step 2). Then remove the brads.

INSTALLATION

Now that the layout is complete, you can begin drilling the mortises.

DOWEL JIG. When it comes to drilling the holes for the mortises, there are three things to look out for. First, the holes have to be drilled to the right depth. Second, they have to be parallel with the face of the workpiece. And finally, they have to be drilled straight. Instead of trying to steady the workpieces on edge while drilling the mortises on the drill press, I used a hand-held drill and a dowel jig (Step 3). The dowel jig keeps the holes lined up and prevents the drill bit from wandering in the tough end grain of the workpiece.

Note: If you have a self-centering type of dowel jig, you'll need to place a spacer between the jig and your workpiece in order to drill off-center holes.

DRILLING THE HOLES. The waste is drilled out in two steps. Shallow holes are drilled at each end of the mortise

first (Detail 'a' in Step 3). Then a series of deeper holes are drilled in the center. (For the hinges used on the buffet, I used a $\frac{3}{8}$ "-dia. drill bit.)

The depth of the shallow end holes is important since they determine the position of the hinge once it's installed. (The hinge should sit just a hair below the surface.) Unfortunately, there isn't any way to test the fit until after the mortise is completed. But if you drill the end holes $\frac{1}{4}$ " deep, the hinge should sit at just the right height.

Note: I wrapped a piece of masking tape around my drill bit to serve as a depth guide (Detail 'a' in Step 3). And once I had the tape positioned correctly, I drilled the end holes for all the mortises at this time.

The center section of the mortise is deeper than the ends to provide room for the main body of the hinge (see photo at right). This pocket is created by drilling three $\frac{1}{2}$ "-deep holes to remove the waste (Step 4).

Note: The depth of these holes isn't as critical. Just make sure they are at least $\frac{1}{2}$ " deep.

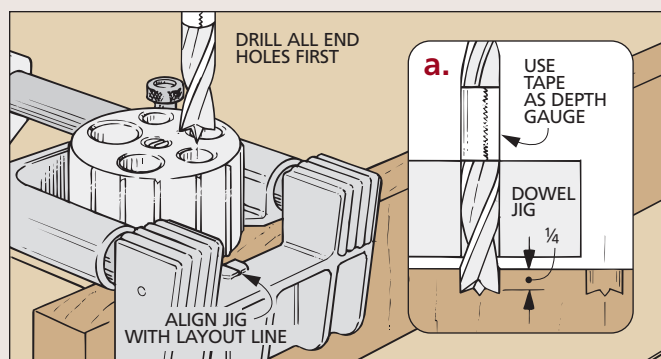


Stepped mortise. A Soss hinge is mortised into the edges of mating workpieces. Each mortise is "stepped." It's deeper in the middle to accommodate the body of the hinge.

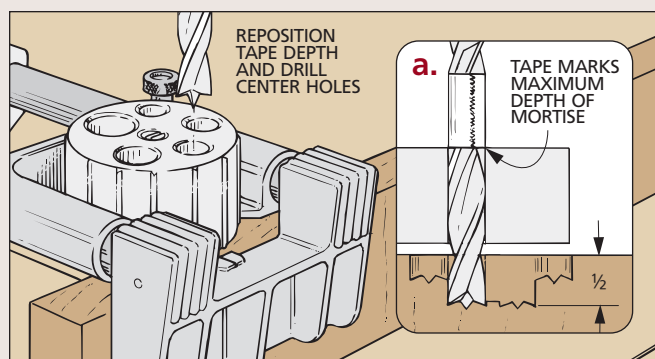
Once all the holes have been drilled, clean up the sides of the mortise carefully with a chisel (Step 5).

Note: To prevent splitting the thin wall of the mortise, I clamped the workpiece and a support board in a vise.

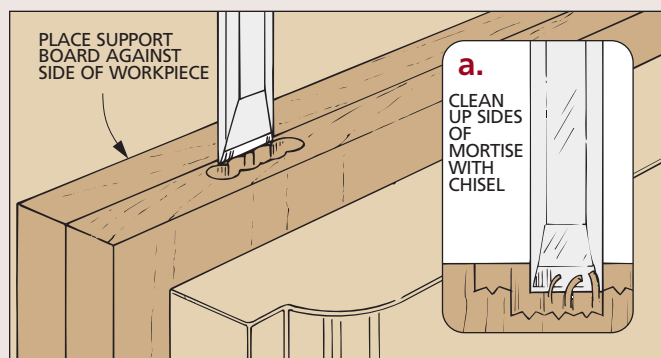
Installing the hinges is simple — it's just a matter of inserting each leaf into a mortise and using the screwholes as a guide for drilling pilot holes (Step 6). Then screw the hinges in place.



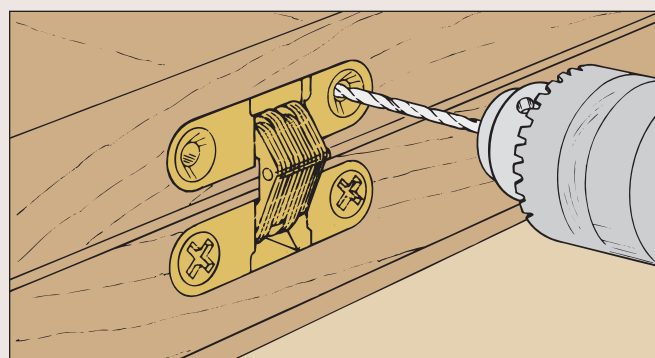
3 Align the dowel jig with the first layout line. Then using a $\frac{3}{8}$ "-dia. brad-point bit, drill a $\frac{1}{4}$ "-deep hole. Use a piece of masking tape on the bit as a depth gauge. Drill all the end holes for all hinges before readjusting the masking tape depth gauge.



4 After drilling the end holes in all the pieces, reposition the tape depth stop to drill a $\frac{1}{2}$ "-deep hole. Then drill out the waste in the center of the mortises, again using the layout lines to align the dowel jig.



5 After drilling all the holes, the mortise can be cleaned up with a chisel. To prevent splitting the thin sidewall of the offset mortise, clamp a scrap piece to the side of the workpiece for additional support.



6 To install the mounting screws (No. 5 x $\frac{3}{4}$ "), place the hinge in the mortise and drill pilot holes, using the hinge itself as a guide. Be careful not to overtighten the screws or the threads will strip out the end grain.

DESIGNER'S NOTEBOOK

Simple things change the look of the buffet server entirely, like adding muntins to the door panels and using stub tenons and grooves to connect the rails and stiles. New hardware completes the design.

CONSTRUCTION NOTES:

■ The base front (K) and sides (L) on this mission-style buffet server will stay the same as before, except that the base front (K) has a different profile (Fig. 1). Start by making this profile before cutting the miters on the ends (Fig. 1). Once that's complete, rout $\frac{1}{2}$ " chamfers along the top edge of the base front and sides, see chamfer detail below.

Note: See page 115 for a tip on using a straight guide to keep the newly cut edge of the base piece straight.

■ Next, make the sub-top (N) with the same $\frac{1}{2}$ " chamfers that were added to the front and side base pieces (Fig. 2).

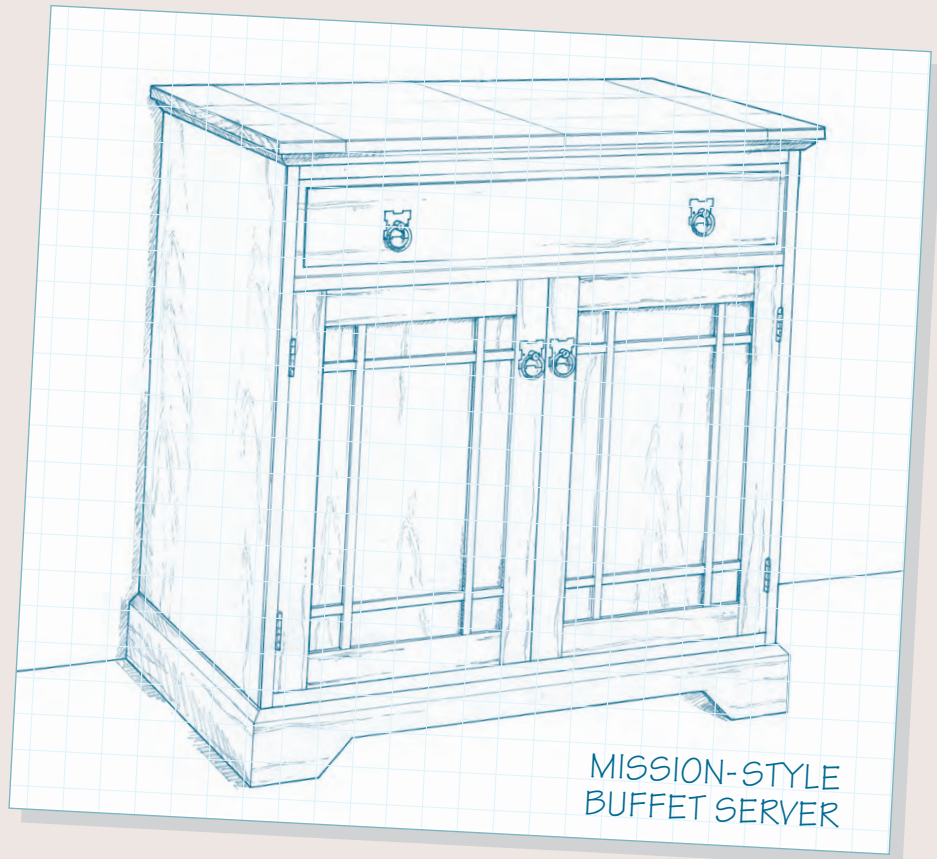
■ After the folding top (O) has been cut to size, use sandpaper to ease the sharp edges all the way around (Fig. 2). Then cut it into four pieces as before, and add the hinges.

■ The new drawer false front (BB) will have a routed raised panel. The edging (CC) is removed as well (Fig. 3).

■ First, make the drawer false front (BB) from solid wood, crosscutting and ripping it to size. To determine the size of this version, add $\frac{1}{8}$ " to the width and $\frac{1}{4}$ " to the length of the drawer front (U). (My false front is $5\frac{3}{8}$ " x $31\frac{7}{8}$ ".)

■ To cut the raised panel, I rabbeted the false front using a $\frac{3}{4}$ " straight bit in my router (mounted in a router table). Partially bury the bit in the router fence, leaving $\frac{1}{2}$ " exposed. Raise the bit to the desired height ($\frac{1}{8}$ " above the table and rout the rabbet (Fig. 3).

Note: Rout the end grain of the drawer first, using a piece of scrap to back it up to minimize chipout.



MISSION-STYLE
BUFFET SERVER

MATERIALS LIST

CHANGED PARTS

K Base Front (1)	$\frac{3}{4}$ x 4 - $34\frac{3}{4}$
L Base Sides (2)	$\frac{3}{4}$ x 2 - 22 rgh.
P Door Stiles (4)	$\frac{3}{4}$ x 2 - $22\frac{1}{8}$
Q Door Rails (4)	$\frac{3}{4}$ x 2 - $12\frac{3}{4}$
T Door Panels (2)	$\frac{1}{4}$ ply - $12\frac{3}{4}$ x $18\frac{7}{8}$
BB False Front (1)	$\frac{3}{4}$ x $5\frac{3}{8}$ - $31\frac{7}{8}$

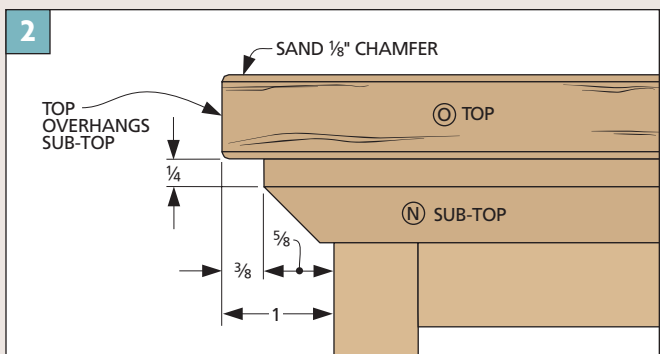
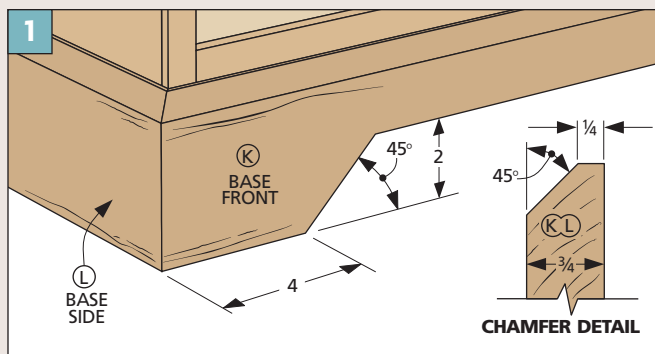
NEW PARTS

DD Vert. Muntins (4)	$\frac{1}{4}$ x $\frac{1}{2}$ - $18\frac{1}{8}$
EE Horz. Muntins (4)	$\frac{1}{4}$ x $\frac{1}{2}$ - 12

Note: Do not need parts R, S, or CC.

HARDWARE SUPPLIES

Need two pair of 2" butt hinges and four mission-style ring pulls w/ #8-32 x $1\frac{1}{2}$ " machine screws.



■ Now center and mount the drawer false front as before, making sure to leave $\frac{1}{8}$ " reveals at the top and sides.

■ Finally, lay out the location of the mission-style ring pulls and drill the holes for the mounting screws (*Fig. 3*). Add the pulls after the finish has been applied.

■ I also changed the look of the doors. Once again, I eliminated the bead edging (R). And instead of framing the door panels with mitered rails and stiles, I used stub tenons and grooves.

■ Start by ripping and crosscutting the stiles (D) to length (*Fig. 4*). They're sized to leave $\frac{1}{16}$ " gaps at the top and bottom, once the doors are installed.

■ To determine the length of the rails (Q), measure the width of the door opening and subtract the combined width of the four stiles. Divide this number by 2 and add $\frac{3}{4}$ " to their length to allow for the stub tenons (*Fig. 4*). (My rails were $12\frac{3}{4}$ ".)

■ Once the rails and stiles are cut to length, cut centered grooves on their inside edges. These grooves will accept the stub tenons and the door panel. I cut each groove in two passes using a regular saw blade in my table saw. It's sized to hold the $\frac{1}{4}$ " plywood panels.

■ Now cut the stub tenons on the rails, sizing them to fit the grooves (*Fig. 4a*).

■ Next, cut the door panels (T) to size and glue up the doors (*Fig. 4*).

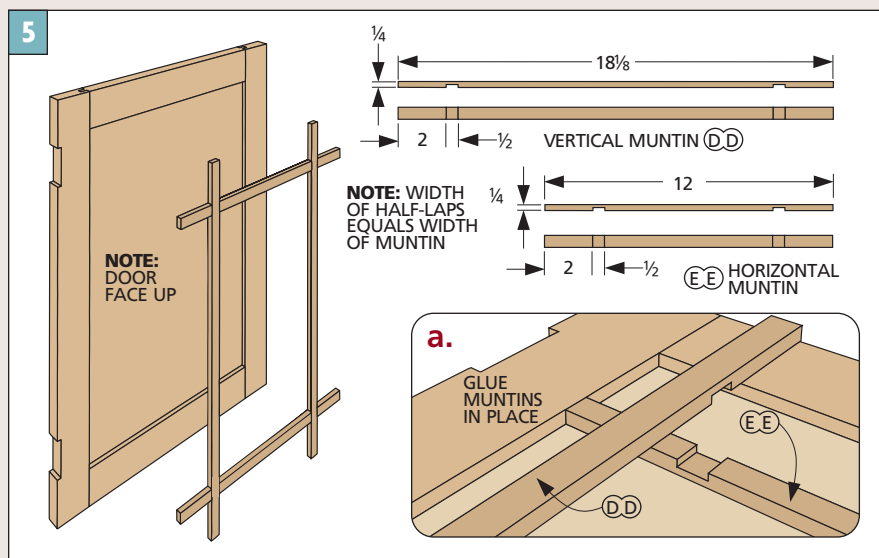
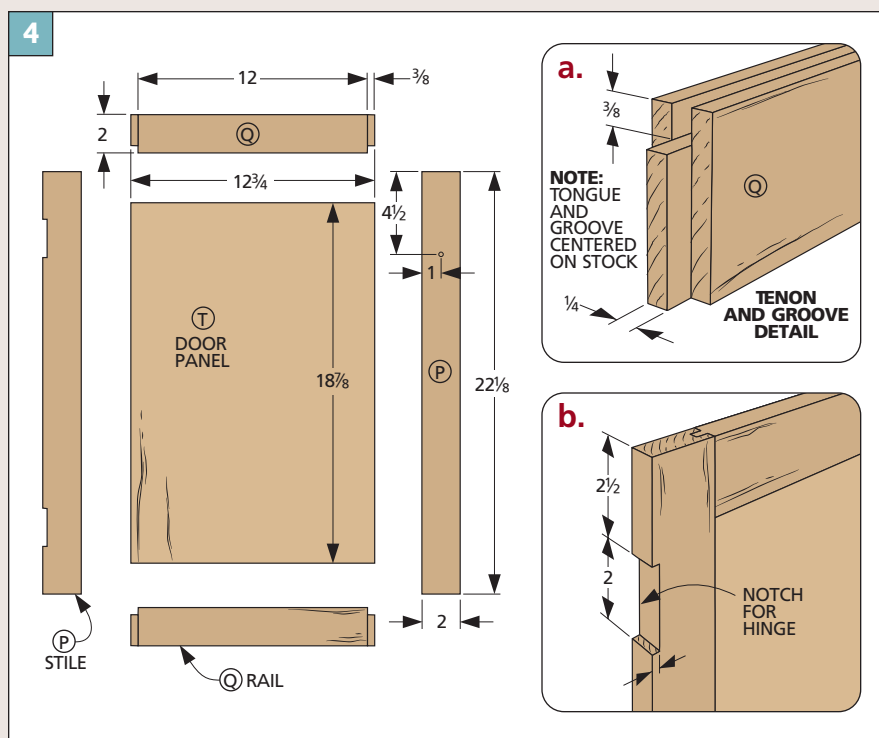
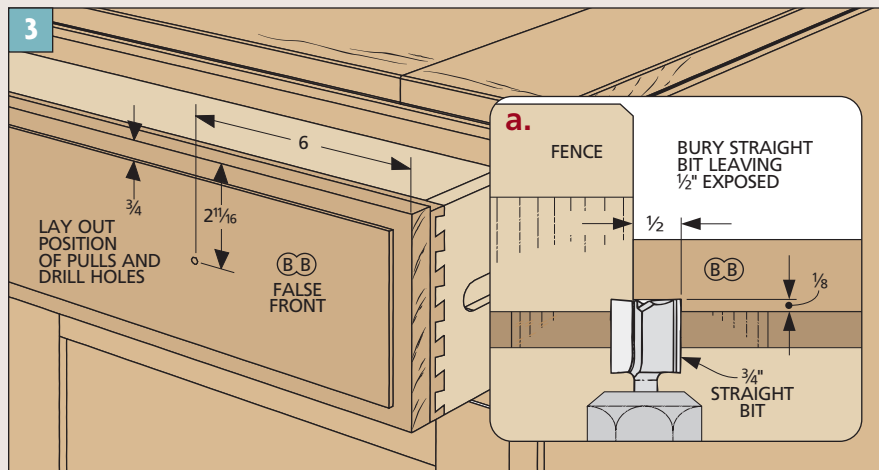
■ Before going on to the muntins, you'll have to mortise the doors to hold the door hinges (*Fig. 4*). The mortises are the full depth of the hinges. I laid them out (as shown in *Fig. 4b*), and cut them with a sharp chisel.

Note: You may have to trim $\frac{3}{64}$ " from the inside edges of the doors to fit the opening of the server. You want to end up with a $\frac{1}{16}$ " gap between the doors after mounting the hinges.

■ Next, I made the vertical (DD) and horizontal (EE) muntins. They're ripped from solid stock. An easy way to do this is to use an extra-wide blank for all of the muntins and then cut the half-laps across the blank before ripping them to size.

■ To locate the half-laps, set the table saw's rip fence to cut the first half-lap. After cutting a half-lap on one end of the muntins, flip the piece end-for-end to cut the half-lap on the other end. Finally, rip the muntins to width (*Fig. 5*).

■ Now all that's left is to glue the muntins to the door panels (*Fig. 5a*). Once the glue for the muntins has set up, you can add the door and drawer hardware and hang the doors.



SOURCES

One of the first things we take into consideration when designing projects at *Woodsmith* is whether the hardware is affordable and commonly available. Most of the hardware and supplies for the projects in this book can be found at local hardware stores or home centers. Sometimes, though, you may have to order hardware through the mail. If that's the case, we've tried to find reputable sources with toll-free phone numbers and web sites (see the box at right).

In addition, *Woodsmith Project Supplies* offers hardware for some of the projects in this book (see below).

Note: We strongly recommend that you have all of your hardware and supplies in hand before you begin building any project. There's nothing more discouraging than completing a project and then finding out that the hardware you ordered doesn't fit or is no longer available.

WOODSMITH PROJECT SUPPLIES

At the time this book was printed, the following project supply kits and hardware were available from *Woodsmith Project Supplies*. The kits include hardware, but you must supply any lumber, plywood, or finish. For current prices and availability, call toll free:

1-800-444-7527

Coffee Table (pages 20-29)

This kit contains full-size patterns for the apron and table top.

.....No. 8005224

Mantel Clock (pages 56-65)

This kit contains only the shop drawings. Clock works can be obtained from sources listed at right.No. 7119250

Chairside Chest (pages 86-95)

The nylon glide tape is available by the foot.No. 1006104

KEY: TL10

MAIL ORDER SOURCES

Some of the most important "tools" you can have in your shop are your mail order catalogs. The ones listed below are filled with special hardware, tools, finishes, lumber, and supplies that can't be found at many local hardware stores or home centers. You should be able to find many of the supplies for the projects in this book in

one or more of these catalogs. Many even offer on-line ordering.

Note: The information below was current when this book was printed. Time-Life Books and August Home Publishing do not guarantee these products will be available nor endorse any specific mail order company, catalog, or product.

THE WOODSMITH STORE

2625 Beaver Avenue
Des Moines, IA 50310
800-835-5084

Our own retail store with tools, jigs, hardware, books, and finishing supplies. We don't have a catalog, but we do send out items mail order.

CONSTANTINE'S

1040 E. Oakland Park Blvd.
Ft. Lauderdale, FL 33334
954-561-1716
www.constantines.com

One of the original woodworking mail order catalogs. Find hinges, pulls, and finishing supplies including gel stains and rubbing compounds.

ROCKLER WOODWORKING & HARDWARE

4365 Willow Drive
Medina, MN 55340
800-279-4441
www.rockler.com

A very good catalog of hardware and accessories, including dovetail jigs, pulls, hinges.

WOODCRAFT

560 Airport Industrial Park
P.O. Box 1686
Parkersburg, WV 26102-1686
800-225-1153
www.woodcraft.com

Almost everything you'd need, from layout to hardware to finishing supplies. A good selection of hinges and router bits, plus dovetail jigs.

LEE VALLEY TOOLS LTD.

P.O. Box 1780
Ogdensburg, NY 13669-6780
800-871-8158

www.leevalley.com

Several catalogs actually, with tools and hardware. In the hardware catalog you'll find pulls, hinges, magnetic catches, and necklace pegs.

WOODWORKER'S SUPPLY

1108 North Glenn Road
Casper, WY 82601
800-645-9292

www.woodworker.com

You'll find a good selection of pulls and hardware, router bits, and magnetic catches.

VAN DYKE'S RESTORERS

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ADAMS WOOD PRODUCTS

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