PROJECTS

Woodworking Shop Safety
10 Safety Tips to Post in Your Shop

1) **Think Before You Cut** – The most powerful tool in your shop is your brain, use it. Thinking your cuts and movements through before acting can help save both fingers and scrapwood.

2) **Keep a Clean Shop** – A cluttered shop is an accident waiting to happen. Keeping your shop clean will help protect you, and your tools, from tripping hazards.

3) **Avoid Distractions** – Pay attention to your actions. Looking up to watch the shop TV or visitor can result in your hand contacting the blade. Always wait until you have completed your cut before you take your eyes off the blade.

4) **Don't Rush** – Keep in mind that this is just a hobby and take a break when you feel rushed or frustrated with a project. Mistakes happen when we rush to complete a job.

5) **Don't Force It** – If your saw is resisting the cut, stop and see what's wrong. A misaligned rip fence or improperly seated throat plate can sometimes cause a board to get stuck in mid cut. Forcing the board in these situations may cause kickback or contact with the blade. Take a moment to evaluate the situation and determine the problem.

6) **Protect Yourself** – Wearing the proper shop protection is an important part of safe tool operation. Goggles, Ear Protection, and Lung Protection should be used when operating tools. Use push sticks when working close to the blade and make sure the tool's safety features are in place.

7) **Let the Tool Stop** – Giving the power tool time to wind down after a cut is an often-overlooked safety mistake. Even without power, the spinning blade can still do a lot of damage.

8) **Fumes and Dust** – Solvent fumes and airborne dust can present health and explosion hazards. Care should be taken to ensure a supply of fresh air and use only explosion proof vent fans.

9) **Wear Appropriate Clothing** – Loose clothing or hair can get caught in power tools and cause severe injury.

10) **No Alcohol** – Too many woodworkers have been injured because Alcohol clouded their judgment. Avoid their mistakes and wait until after you're done in the shop.

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1

CANDLEBOX

MAKING THE CANDLEBOX

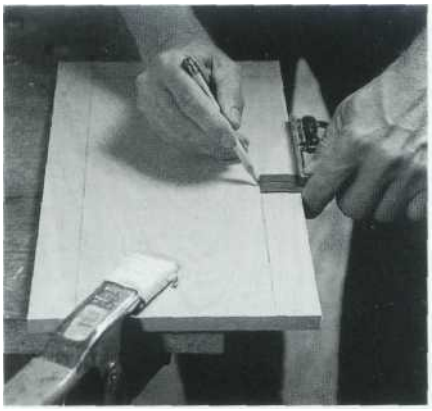
This simple but attractive candlebox is distinguished by its sliding top. The lid has beveled edges tapering so they can slide in grooves cut into the inside faces of the box's sides and one end. A carved, inset pull adds a decorative touch as well as providing a means for easy sliding of the lid.

After the lumber is milled to the required thicknesses, widths and lengths, cut grooves to receive the top and bottom panels. Next, cut the through dovetails at each corner (this procedure is discussed in chapter twenty-five). Bevel the top and bottom panels and assemble the case around the bottom panel, which is left unglued so that it can expand and contract across its width in response to seasonal changes in humidity. Complete construction by fitting plugs into the openings left at each corner at the ends of the grooves.

The open top of the candlebox lid reveals the grooves the lid rides in.

HAND-PLANING THE BEVELS FOR THE CANDLEBOX LID

1 First, make layout lines to mark the limits of the bevel. Make one line around the edges of the lid %" from the lid's bottom surface. Make a second line on the lid's top 1 *'A"* from the outside edges. The bevel will connect these two lines.



2

Plane the bevel across the end grain first so that any tearout occurring at the end of the plane's stroke will be removed when the adjacent bevel is formed. Although a jack plane can be used to make this bevel, it may be necessary to finish with a block plane which, with its lower cutting angle, produces a cleaner surface across end grain.

SHAPING THE PULL

1

With a marking gauge or a sharp knife, make a line parallel to and 1" from the unbeveled end of the lid. Position the stationary leg of a compass on that line halfway across the width of the lid. Draw an arc with the compass's pencil point.

2 Placing the tip of a flat chisel in the scored line, cut along that line, angling toward the arc. Using a wide-sweep gouge, make cuts from the arc back toward the scored line. Carefully lever up chips.

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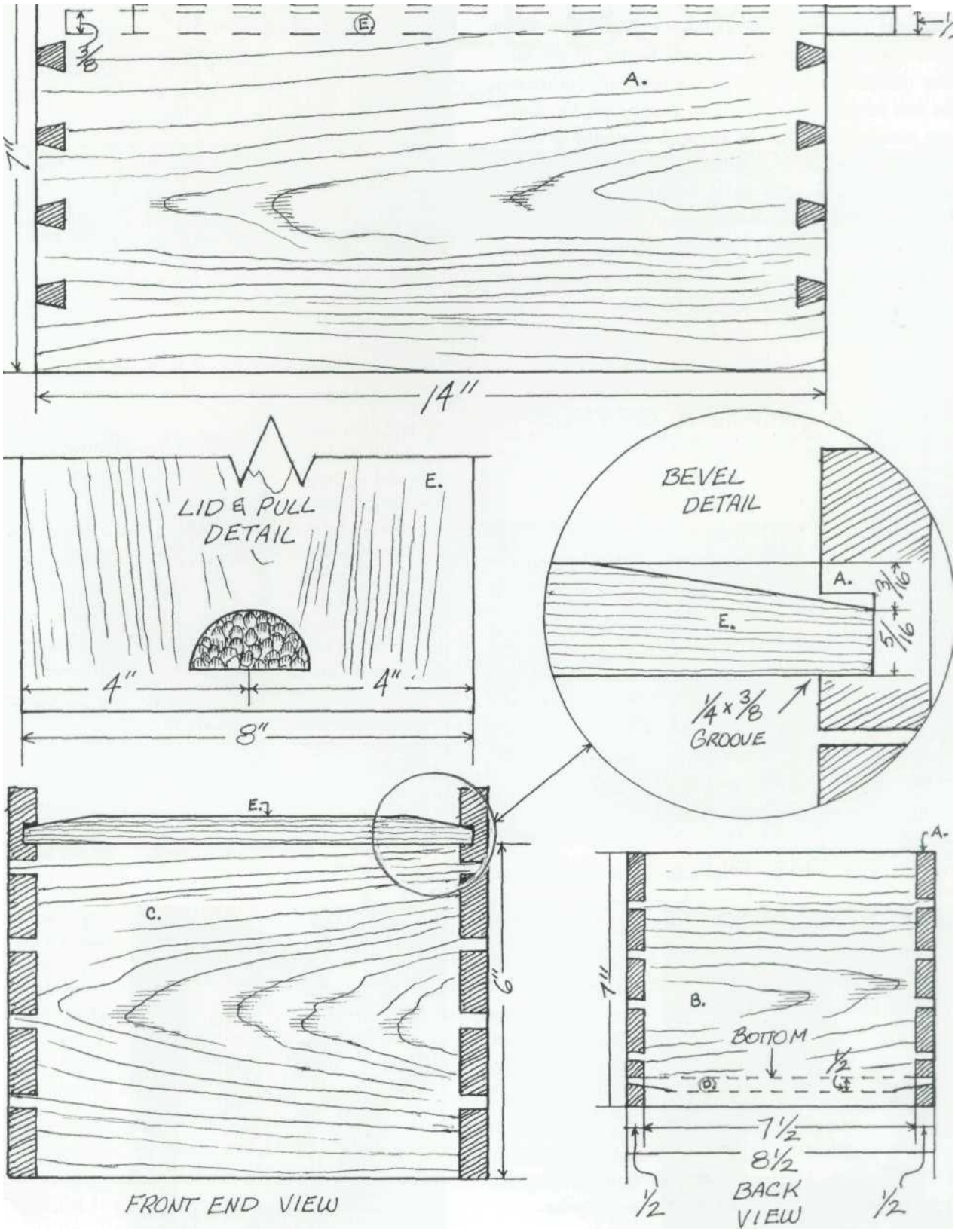
SIDE VIEW


E.
A.
14"
LID & PULL DETAIL
E.
4"
4"
8"
BEVEL DETAIL
A.
E.
3/16
5/16
1/4 x 3/8 GROOVE
E.
C.
9"
FRONT END VIEW
A.
7"
B.
BOTTOM
1/2
7 1/2
8 1/2
BACK VIEW
1/2
1/2

SHAPING THE PULL (CONTINUED)

3 Once the depression has been formed, you can give the pull a smooth surface, or, as I've done here, you can give it a bit of texture.

MATERIALS LIST			
A	Side	*2* pcs.	1/2X7X14
B	End	lpc.	*1/2X7X8 1/2*
C	End	lpc.	1/2X6X8 1/2
D	Bottom	lpc.	*1/2X*8X131/2
E	Top	lpc.	1/2X8X13 3/4
F	Plug	6 pcs.	1/4 X3/8 X1/4, shaved to fit

**These are net measurements, Surplus should be added to dove-tailed parts to allow them to be sanded flush.*

SAM MALOOF'S TWO-STAGE FINISH

Fifteen years ago, ***Fine*** *Woodworking* (issue no. 25) ran a profile of Sam Maloof, the California woodworker best known for his magnificent rocking chairs. Included in the article was a sidebar in which Maloof discussed several technical issues, closing with the recipe for his finishing mix.

My dad—who designed and built several of the pieces displayed in this book, including the crotch-grained chess table—began experimenting with MalooFs finish and found it wonderfully adapted to the small shop. After years of spraying lacquer, a toxic experience inevitably preceded by the emotionally toxic experience of attempting to vacuum every particle of dust from every shop surface, he found in Maloof's formula a finish that not only produced a very appealing surface but also, just as importantly, was impervious to dust contamination.

Preparation is no different for this finish than it would be for any other. Scrape the wood, then sand it with a variety of grits, finishing with a thorough sanding using paper no coarser than 220-grit. Then wipe the wood clean with a tack rag.

Maloof's recipe calls for equal parts mineral spirits, boiled linseed oil, and polyurethane varnish (an extra dollop of varnish seems to add body to the dried film).

Brush on this mixture liberally with only minimal concern for drips and runs—coverage is the focus at this stage. Allow the finish to set until it gets a bit tacky. Depending on temperature and relative humidity, this could be anywhere from ten to sixty minutes.

Wipe the surface with clean rags to remove any excess that has failed to penetrate into the wood.

As the finish dries, it lifts wood fibers and hardens them producing a rough texture. (This first coat acts as a sanding sealer.) Again, depending on temperature and relative humidity, this could take anywhere from one to three days. In humid Ohio, I've found it best to wait three days before sanding that first coat. Otherwise, areas of raised, roughened grain may not make their appearance until after the last coat has dried.

I use 320-grit wet/dry paper soaked in mineral spirits to cut away the raised grain. The thinner clots the removed material into a slurry which may help to smooth the surface; however, my reason for dunking the paper in mineral spirits is to unload the grit in order to get more mileage out of each piece of sandpaper.

Once you have sanded and thoroughly cleaned the surface with a tack rag, apply a second coat of the three-part mixture. It is particularly important that this coat (and any subsequent coats) be wiped clean. Any residue remaining on the surface will dry there and leave a roughened area.

Sam Maloof tops this finish with a layer or two of boiled linseed oil into which he's mixed enough shaved beeswax to achieve the consistency of cream. He applies the wax, allows it to dry, then buffs it out. You can achieve similar effects with a number of commercially prepared waxes.

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2

BENTWOOD BOXES WITH TURNED AND CARVED LIDS

Walnut, Curly Maple, Cherry

MAKING THE BENTWOOD BOXES

First, make a bending form for the main body of the box. This can be fabricated from any scrap that can be glued together to make up a sufficient thickness. This is then band sawn and sanded to the inside profile of the finished box. Undercut the face of the bending form at one point to allow for the thickness of the lapped material underneath the box's glue joint. Screw a thin strip of metal (I used a scrap of aluminum siding) to the form underneath which an end of the sidewall material should be inserted prior to being wrapped around the form.

At this time, saw a clamping caul (see photos, below) with a slightly greater radius than the bending form from scrap material. This caul will protect the sidewall material from the clamps.

The next consideration is the sidewall material itself. There are three possibilities. First, the stock can be resawn, planed and sanded to a thickness of 1/16". Second, Constant-e's Hardware sells 1/16" veneer in cherry, walnut and mahogany, even though those thicknesses aren't listed in their most recent catalogs. Third, the sidewall material can be glued-up from two thicknesses of 1/32" veneer, which is widely available in a variety of species. I would recommend using one of the new waterproof glues between the laminations, although I have built boxes using regular aliphatic resin glue to bond the thicknesses of veneer.

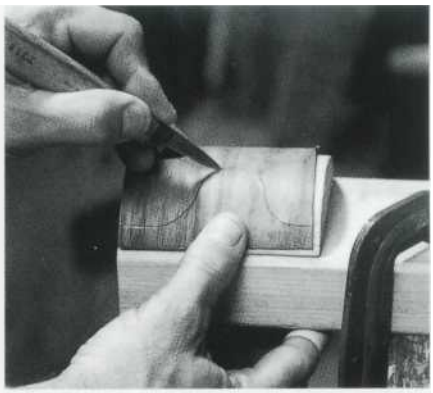
Then, soak the sidewall stock in a tub of cool water for twenty-four hours; dunk it briefly in warm water and take it directly to the bending form. Tuck one end of this softened, plasticized material under the metal strip on the bending form. Wrap the remaining length around the form and secure in place with clamps and the caul.

Four or five days later, remove the sidewall material from the form and cut the profile of the lap joint. A bench extension to which is nailed a piece of scrap sawn to the inside radius of the box simplifies the cutting of the joint.

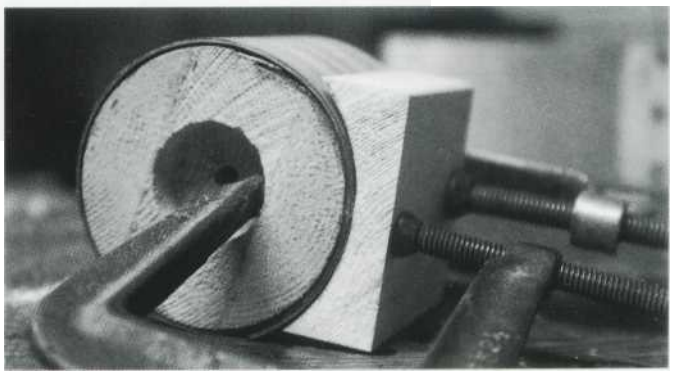
Then, glue the lap, wrap the sidewall material around the form once again and clamp with the aid of the caul. This time, however, do not insert the end of the sidewall material under the form's metal strip. After being turned, attached the box's bottom to the sidewalls with four 1/8″ wooden pegs driven into predrilled holes.

CUTTING THE LAP JOINTS

1 This is the bench extension used to maintain the curved form of the sidewall material during the cutting of the lap. The clamping caul is visible on the right.

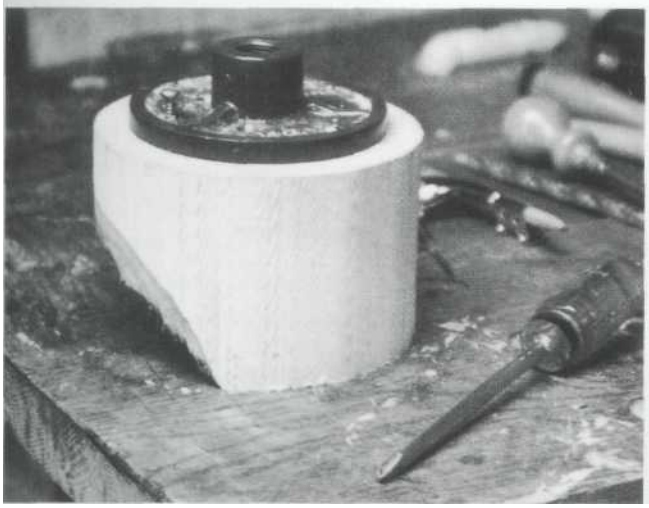


2 A lap joint is being cut on the bench extension.

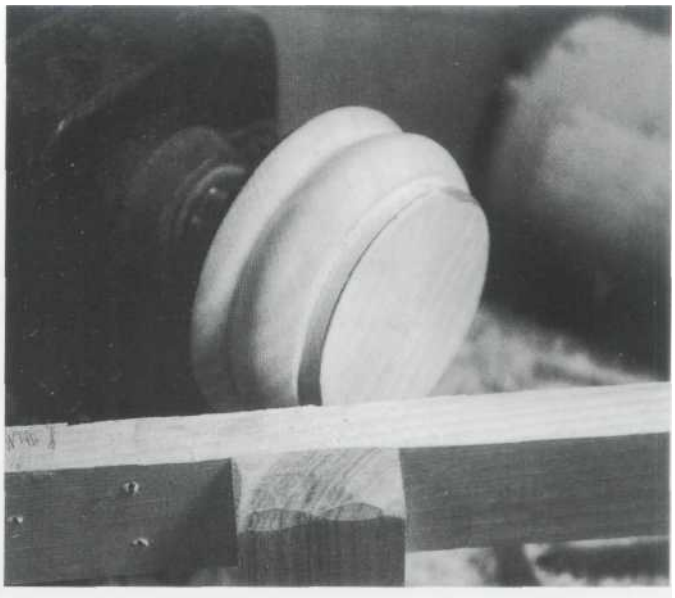


3 Here, the glued lap joint is being clamped with the aid of the caul. Notice that the end of the sidewall material is not positioned under the metal strip as it was during its initial clamping for shape.

TURNING THE LID AND THE BOTTOM

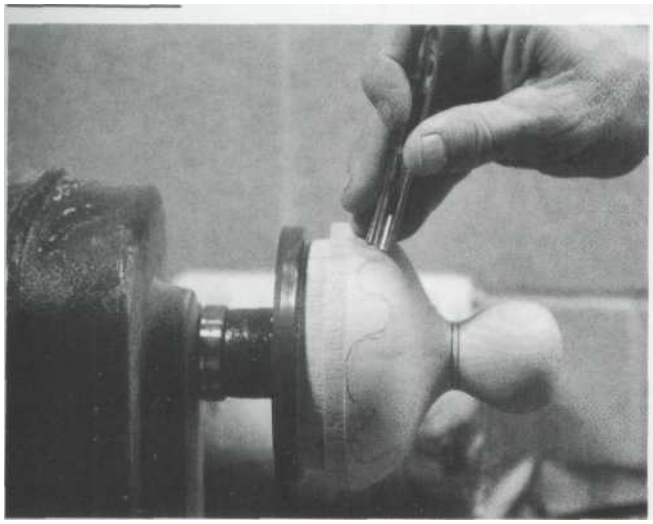


1 Screw a faceplate to a band-sawn turning blank with large sheet metal screws. Then, install it on the lathe.

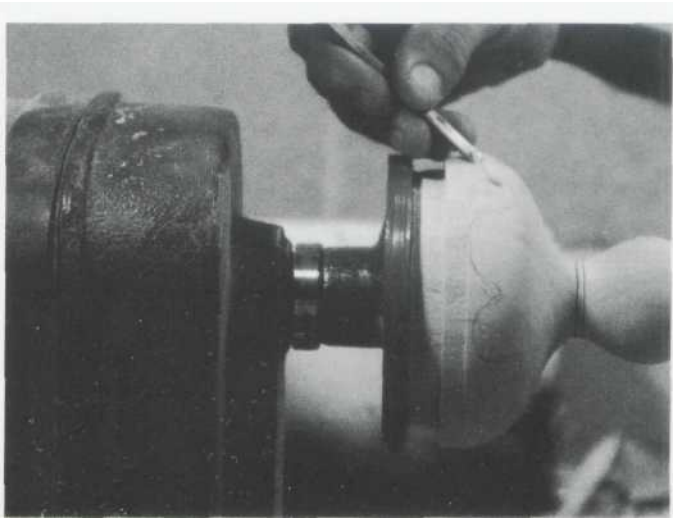


This is the same blank after being turned. Above the bead, notice the flange that will fit inside the box's sidewalls.

DECORATING THE SURFACES



1 Before removing the parts from the lathe, sketch pencil lines on the lid approximating the shapes to be created. Then with gouges of various sweeps, define those lines (shown above).



2 Remove material below the line (as shown above), and create the stippled texture by repeatedly tapping a nail set into the surface of the wood.

MATERIALS LIST		
A Form	1 pc.	3X3/2
B Caul	1 pc.	1/2X3 1/2X3 1/2
C Sidewall	1 pc.	1/16X 3 1/2X15
D Lid	1 pc.	variable
E Bottom	1 pc.	variable
F Pegs	4 pc.	1/8 X 1/8 X 1/2

3

CROTCH-GRAINED CHESS TABLE

Walnut, Poplar

MAKING THE CHESS TABLE

This piece is designed around a set of angles taken from the playing pieces, angles echoed in the fat dovetails holding the stretchers to the legs and to each other, in the big triangles cut from the apron parts, and in the compound angles used to bring the legs into the tabletop. The repetition of these angles—in addition to the consistent color of the walnut—unifies this piece.

Construction begins with the two sides (the faces of the table showing the wide sides of the legs). Fasten the apron parts to the legs with wide tenons glued only halfway across their widths in order to minimize the potential for cracking as these cross-grained constructions expand and contract in response to seasonal changes in humidity.

The creation of these joints is complicated by the compound angles at which the legs meet the tabletop. The tenon shoulders on the apron parts, for example, are cut at angles which are 83° from the top edges of these apron parts. The dovetailed ends of the stretcher are simpler to lay out, as these can be marked once the apron tenons have been dry-fit into their leg mortises.

Once dry-fit, glue and clamp these sub-assemblies—each of which consists of two legs, apron part, and stretcher.

On the table saw, give the center stretcher a dovetailed bottom that extends from end to end. Then fit this into dovetail mortises cut into the side stretchers. Surplus length is necessary on this stretcher so that the end grain can be pared back to the 83° angle at which the sides are canted. Then fasten the apron part opposite the drawer front to the legs on the back end of the table with a pair of 1/2"-long tenons. Again, in order to avoid cracking as a result of this cross-grained construction, glue the tenon only across half its width. Screw glue blocks into place behind this joint to reinforce these stubby tenons.

Resaw the drawer guide stock so that one face is canted at an 83° angle. Then, using a set of dado cutters on the table saw, plough a 1/2" X 5/8″ groove down the center of the uncanted face of this stock. Cut the two drawer-guide pieces to length and install them on the inside faces of the apron sides.

The top is the next concern.

If woodworkers stay in the discipline long enough, they inevitably become wood collectors. My dad is no exception. Over the years he's put together a hoard of native hardwoods with an emphasis on black walnut, his personal favorite among American species. At the time this table was built, he had in his collection a number of short lengths of crotch-grained walnut he'd harvested several years before, and he selected four of these for the top of this table because the swirling grain in the walnut echoed the swirling figure in the onyx frame of the chessboard.

Once you have chosen the stock for the chessboard frame, give it a shaped outside edge, and rabbet the bottom inside edge to receive the base on which the chessboard will set. Cut the slots for the splines. You can cut these by hand with a tenon saw, but I find it much easier to perform this operation on the table saw with a Universal Jig. (See

MATERIALS LIST

Table			
A	Leg	4 pcs.	1 × 2¼ × 15¾
B	Apron (sides)	2 pcs.	1 × 5⅜ × 14¼ (includes 1″ tenons on each end)
C	Apron (end)	1 pc.	1 × 5⅜ × 15⅞ (includes ½″ tenons on each end)
D	Stretcher (sides)	2 pcs.	1 × 1½ × 15 (includes dovetailed ends)
E	Stretcher (center)	1 pc.	1 × 2¼ × 18 (includes surplus to be sanded flush)
F	Glue block	2 pcs.	⅞ × ⅞ × 5¼
G	Drawer guide	2 pcs.	⅞ × 3¼ × 13⅞
H	Moulding (sides)	2 pcs.	1 1/16 × 1⅜ × 17¼
I	Moulding (end)	1 pc.	1 1/16 × 1⅜ × 18⅝
J	Chessboard base	1 pc.	¼ × 14⅜ × 14⅜
K	Chessboard frame	4 pcs.	⅞ × 3¾ × 21¼
L	Frame spline	4 pcs.	¼ × 1½ × 5⅜
M	Chessboard	1 pc.	½ × 13⅜ × 13⅜
N	Drawer stop strip	1 pc.	⅜ × 1 × 14⅜
O	Button	4 pcs.	¼ × ¾
P	Screws	various	
Drawer			
Q	Front (apron)	1 pc.	1 × 5⅜ × 14¾
R	Front spline	2 pcs.	¼ × ¾ × 5⅜
S	Moulding	1 pc.	1 1/16 × 1⅜ × 18⅝
T	Front shim	1 pc.	5/16 × 3⅛ × 12 7/16
U	Side	2 pcs.	⅜ × 3⅛ × 13¼
V	Back and front	2 pcs.	⅜ × 3⅛ × 11⅞
W	Bottom	1 pc.	¼ × 12¼ × 12¼
X	Runner	2 pcs.	7/16 × 9/16 × 13¼
Y	Screws	various	

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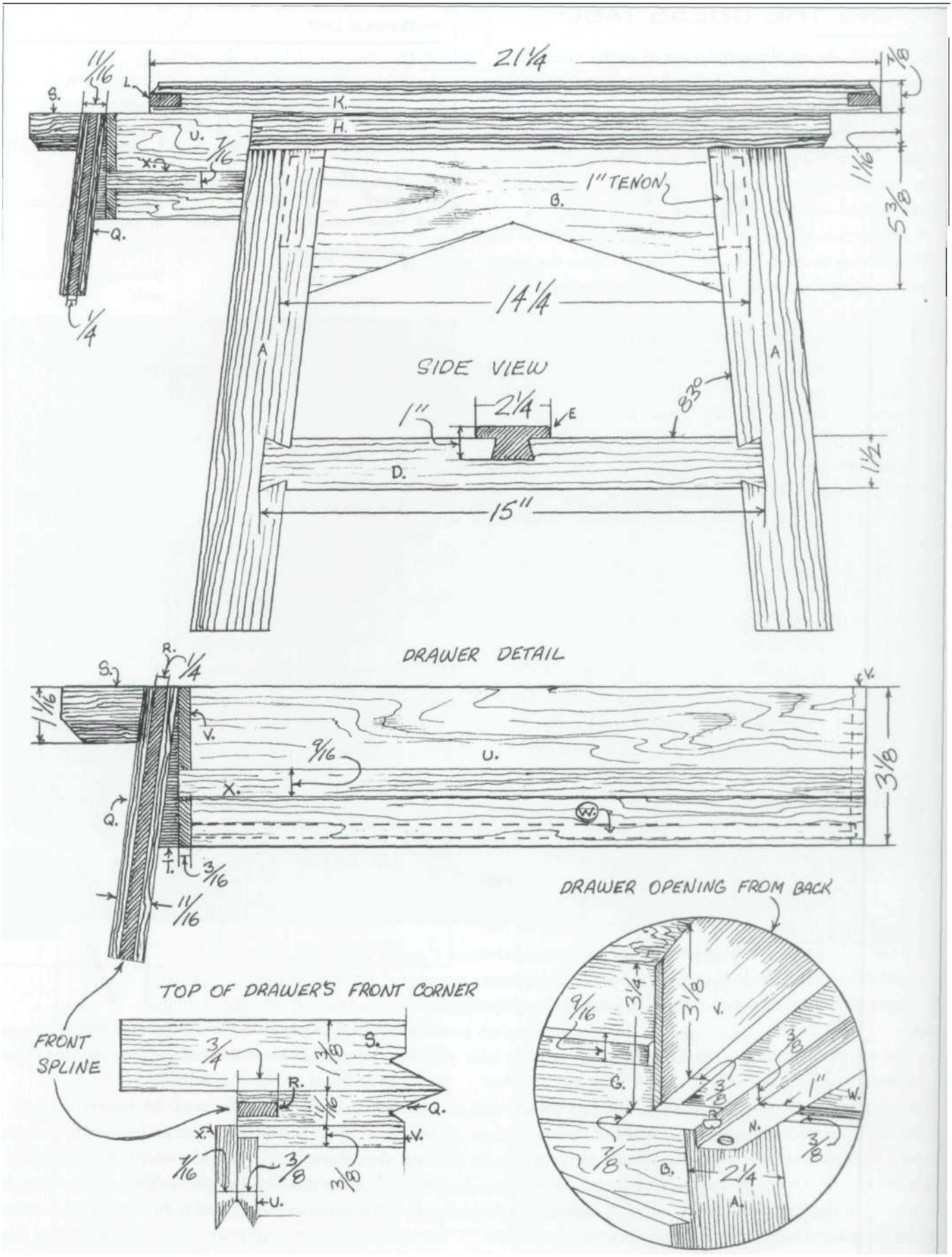
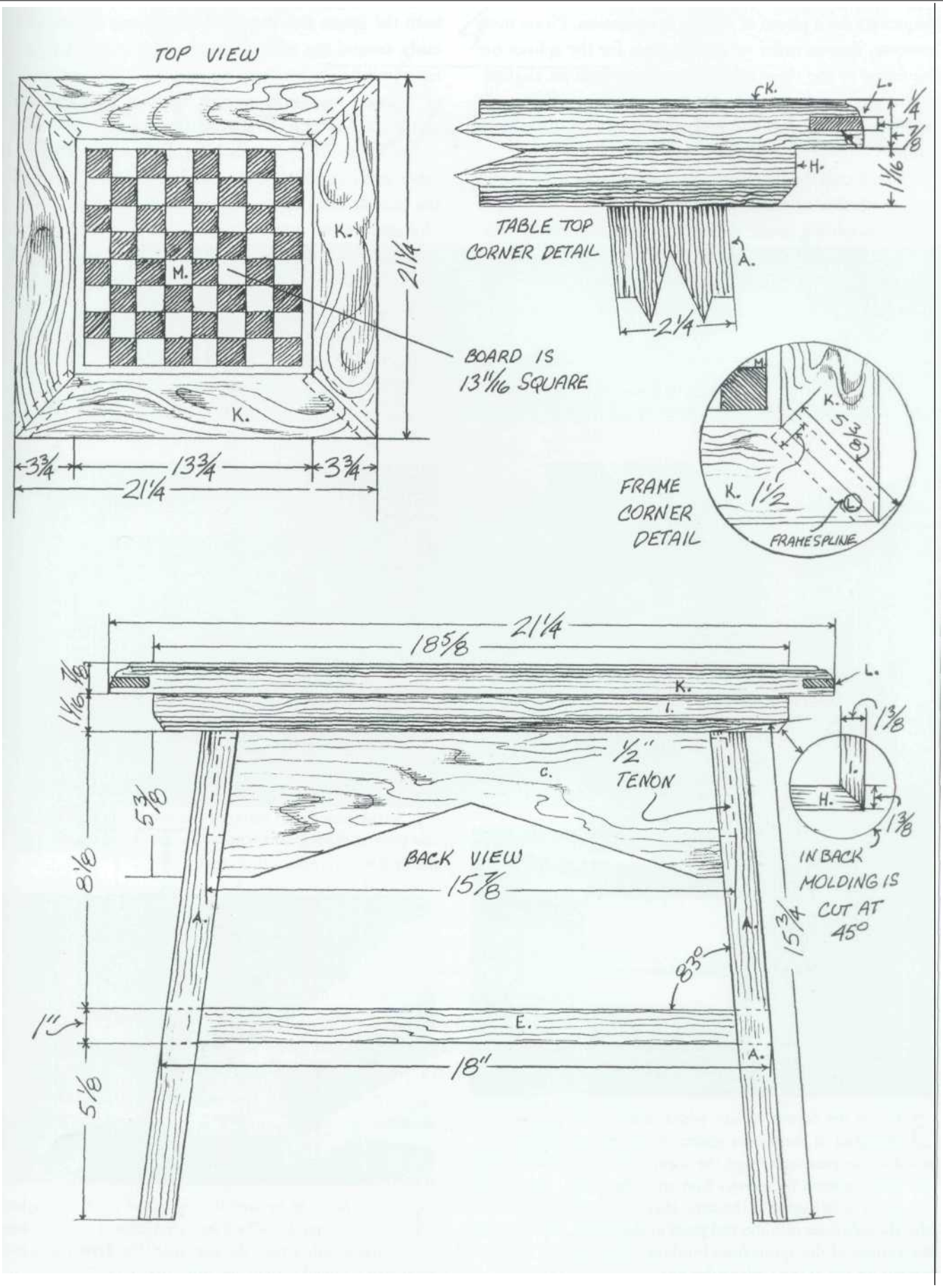

21¼
11/16
1/8
S.
L.
K.
H.
U.
1/16
X.
Q.
1" TENON
B.
1 1/16
5 3/8
14¼
1/4
A
A
SIDE VIEW
1"
2¼
E
83°
1½
D.
15"
DRAWER DETAIL
R.
1/4
S.
1 1/16
V.
9/16
U.
X.
Q.
T.
3/16
11/16
3 1/8
W.
DRAWER OPENING FROM BACK
TOP OF DRAWER'S FRONT CORNER
FRONT SPLINE
3/4
3/8
S.
R.
1 1/16
Q.
V.
1/16
3/8
U.
9/16
3¼
3 1/8
V.
G.
3/8
1"
W.
N.
1/8
B.
2¼
A.


TOP VIEW
K.
M.
K.
21¼
BOARD IS
13 11/16 SQUARE
3¾
13¾
3¾
21¼
TABLE TOP
CORNER DETAIL
K.
L.
¼
⅞
H.
1 1/16
A.
2¼
FRAME
CORNER
DETAIL
M.
K.
5 3/8
K. 1½
L.
FRAME SPLINE
21¼
18⅝
1 1/16
K.
L.
1⅜
½"
TENON
C.
5⅜
8⅛
BACK VIEW
15⅞
H.
1⅜
IN BACK
MOLDING IS
CUT AT
45°
15¾
83°
1"
E.
A.
18"
5⅛

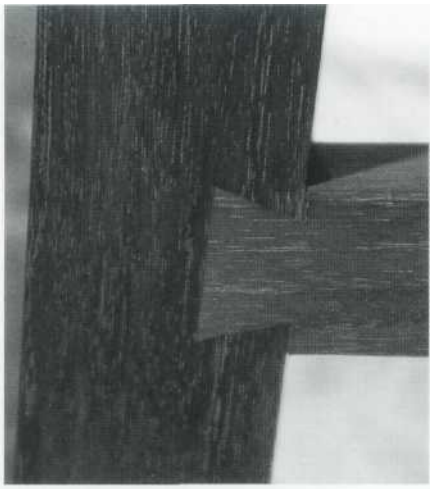
chapter six for a photo of this jig in operation. Please note, however, that in order to cut the slots for the splines on the frame of the chess table, the work would be aligned so that the mitered end of the frame stock sets flat on the saw table). Thickness and cut splines, and assemble the frame.

Next, install the 1/4" chessboard base in its 1/4" X 1/2" rabbet with a number of small wood screws.

The moulding under the tabletop is not merely decorative—it's also functional, serving to fasten the top to the base via a number of wood screws passing up through the moulding into the top and passing through the apron into the moulding.

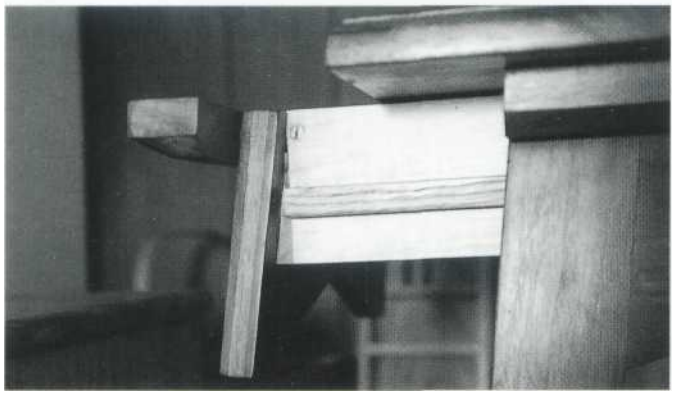
The drawer is a simple open-topped, butt-jointed box, to the front end of which a section of the apron and the moulding are affixed so that when the drawer is closed, both the apron and the moulding appear to run continuously around the table. Place a wedge of wood the full length of the drawer front, tapered from a bottom thickness of 5/16" to a top thickness of 0 between the drawer front and the apron that covers the drawer front. This shim causes the apron to be canted at the same 83° angle as the other sections of the apron. Slide the runners screwed to the outside faces of the drawer sides into the grooves ploughed in the drawer guides. Construct a drawer stop by screwing a strip of wood across the bottom of the drawer guides. When the drawer is opened to its greatest extension, a pair of screws turned slightly into the bottom edge of the drawer sides strike this strip, preventing the drawer from coming out too far and spilling its contents.

After finishing the table, set the chessboard into place on a felt pad.

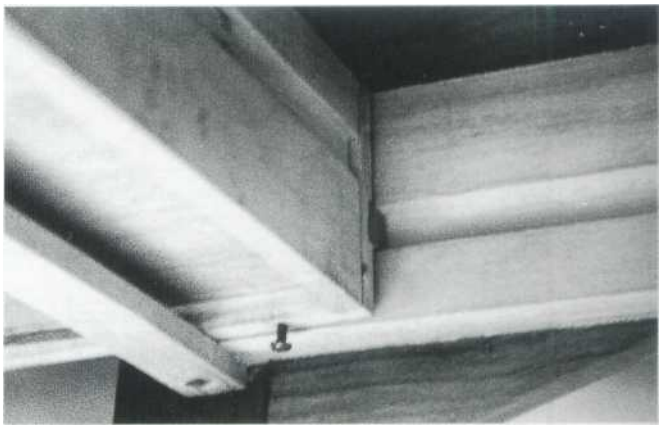


1 Fasten the stretcher to the leg with a hand-cut dovetail

2 Screws passing up through this moulding into the top and passing through the apron into the moulding hold the top to the base.



3 Fasten the drawer runner, which slides in the groove ploughed in the drawer guides, to the drawer via several wood screws passing through the drawer side into the slide. Note the shim between the drawer front and the apron. This causes the apron to be canted at the same angle as the table's legs. Note also the spline set into the end grain of the apron. This prevents the corners of the apron from breaking off because of the grain runout on the apron's triangular tips.

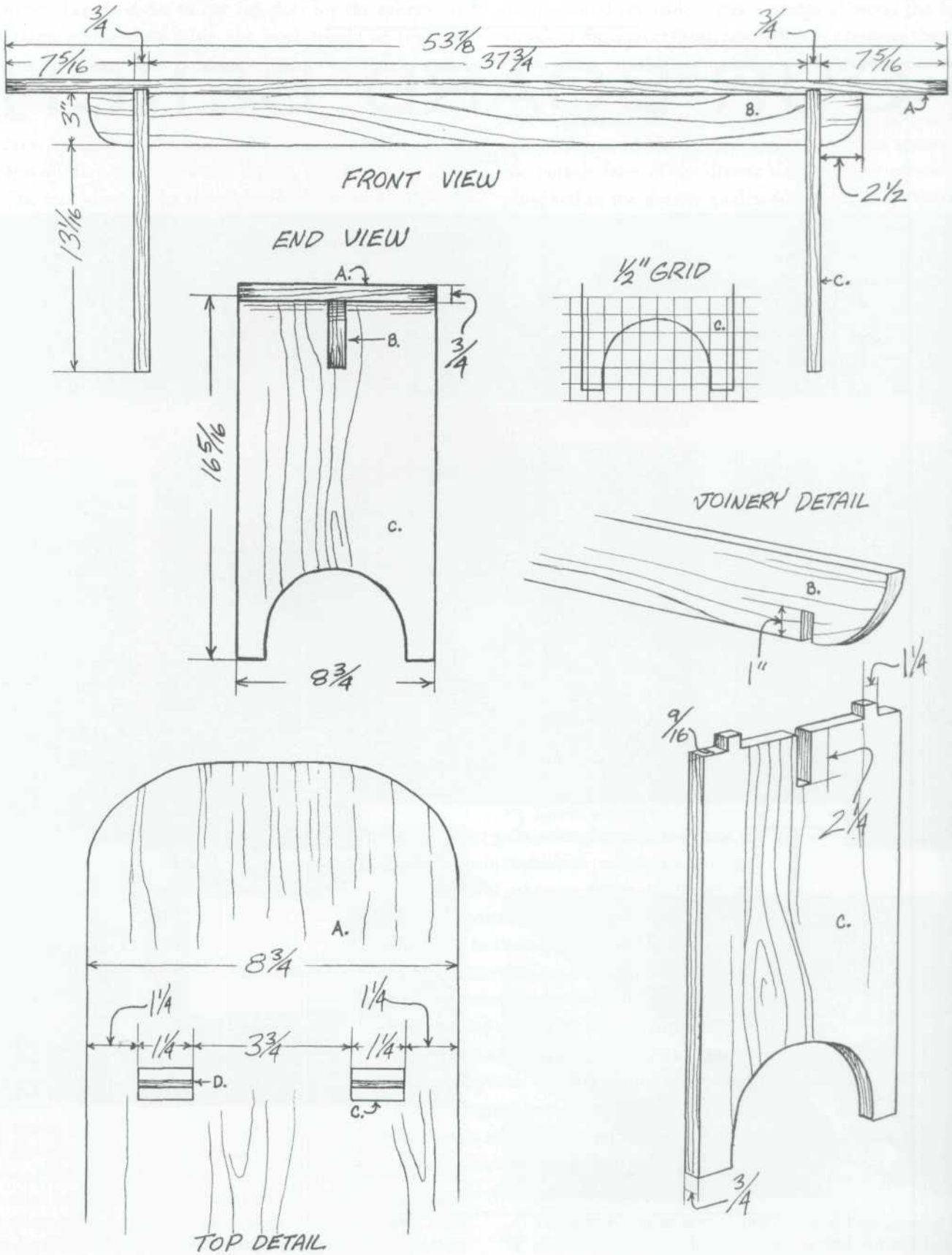


4 The drawer can be seen sliding in the groove ploughed in the drawer guide. When the screw turned into the bottom of the drawer side strikes the stop strip, the drawer is prevented from being pulled completely from the table.

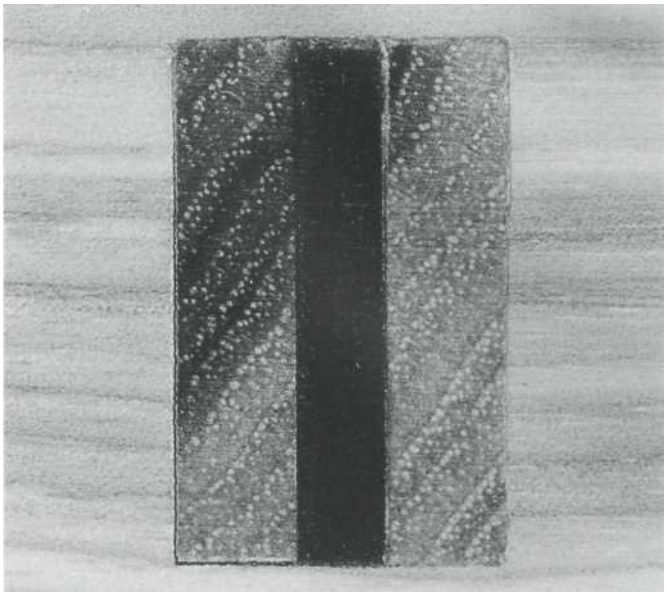
4

FOUR-BOARD BENCH

Hickory


3/4
53 7/8
37 3/4
7 5/16
3/4
7 5/16
3"
13 1/16
B.
A.
2 1/2
FRONT VIEW
END VIEW
A.
B.
3/4
16 5/16
C.
8 3/4
1/2" GRID
C.
C.
JOINERY DETAIL
B.
1"
1 1/4
9/16
2 1/4
C.
3/4
A.
8 3/4
1 1/4
1 1/4
1 1/4
3 3/4
1 1/4
D.
C.
TOP DETAIL

MAKING THE FOUR-BOARD BENCH



After the material has been dimensioned, profile the rounded ends of the top, the half round ends on the stretcher, and the circle cutouts on the legs. This can be done on the band saw, but because of the length of the top, it is probably easier to cut this, at least, with a handheld jigsaw.

Next, using a cutoff box on the table saw (or crowded against the fence of the radial arm saw), form the dadoes on the underside of the top. Cut the through mortises cut using the method described in chapter twelve.

Then, on the band saw, cut the through tenons at the tops of the legs. Because of the 1/4"-deep dado, these need only be 9/16" long (1/2" for the tenon and 1/16" to be sanded flush). Then, fit them into their mortises.

Next, cut the edge cross lap joints that will fasten the stretcher to the legs. Two notches are required at each leg. Cut one, 2 1/4" deep, in the leg panel midway between the through tenons. Cut the other, 1" deep, into the bottom edge of the stretcher. The extra 1/4″ in the total depth of the two notches is necessary because of the 1/4" dado on the underside of the bench top.

Then cut the notches in the ends of the through tenons using a fine-toothed backsaw. Drill a 1/8" hole from end to end at the base of each notch. This will prevent the tenon from splitting when the wedge is driven into the notch.

After the parts have been dry-fit, glue the joints and assemble the bench.

MATERIALS LIST

A	Top	1 pc.	¾ × 8¾ × 53⅞
B	Stretcher	1 pc.	¾ × 3 × 44¼
C	Leg	2 pcs.	¾ × 8¾ × 16⁵⁄₁₆
D	Wedge	4 pcs.	⅜₁₆ × 1⅛ × ¾

**These are net measurements. A surplus should be added to lengths of through tenons so that they can be sanded flush.*

5

TV RISER

Cherry

MAKING THE TV RISER

First, the material that will make up the riser is glued together.

Then, dress down the glued-up panel to a flat surface and a consistent thickness. In a shop with a big planer, this involves nothing more than feeding the stock into the machine; but in a small shop, like mine, this 15" panel must be flattened and smoothed with hand planes.

If the boards used to create the panel were all flat and all aligned correctly at glue-up, you may not need to do more than scrape away the glue squeeze-out and make a couple of token passes with a jack plane. However, boards are rarely flat, often undulating along their lengths like bacon. In such cases, more substantial plane work may be needed.

I begin by exchanging the regular iron in my jack plane for one that's been crowned across its width. This shape eliminates the sharp corners on either side of the iron's width, corners that can dig too deeply into the planed surface when the craftsman is attempting to remove material quickly. With this crowned iron, it's relatively easy to remove significant amounts of thickness. It does, however, leave a rippled, rather than smooth, surface, so it must be followed by a plane fit with a conventional iron.

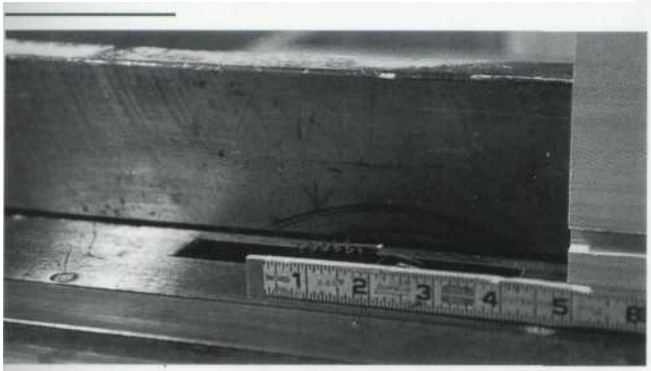
Next, cut the grooves into which the scrollwork will be inset. You can cut the groove across the bottom face of the top panel in one pass over a table saw fit with a 3/8" stack of dado cutters. But the grooves in the two end panels must be handled differently. Because the scrollwork is only two inches high, stopped grooves are necessary.

You can cut these freehand with a mallet and chisel or start them on the table saw and finish them by hand.

The scroll is then thicknessed, ripped to width, and profiled on the band saw.

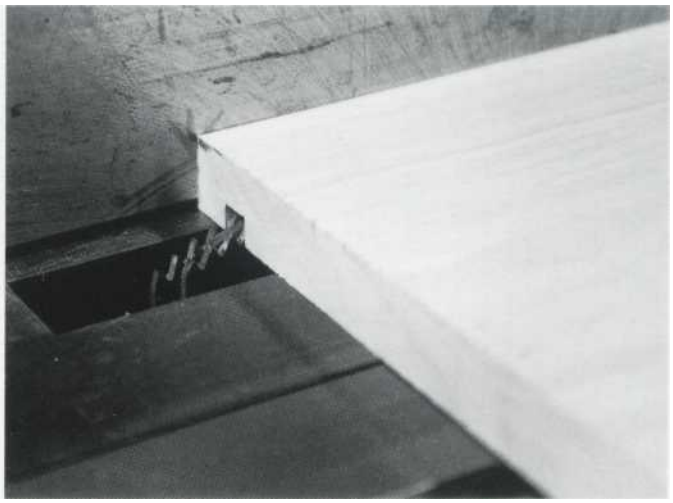
Following the procedure discussed in chapter twenty-five, cut the through dovetails joining the end and top panels. Then, glue-up the riser around the strip of scrollwork, and plug the holes in the ends of the grooves.

CUTTING A STOPPED GROOVE ON THE TABLE SAW

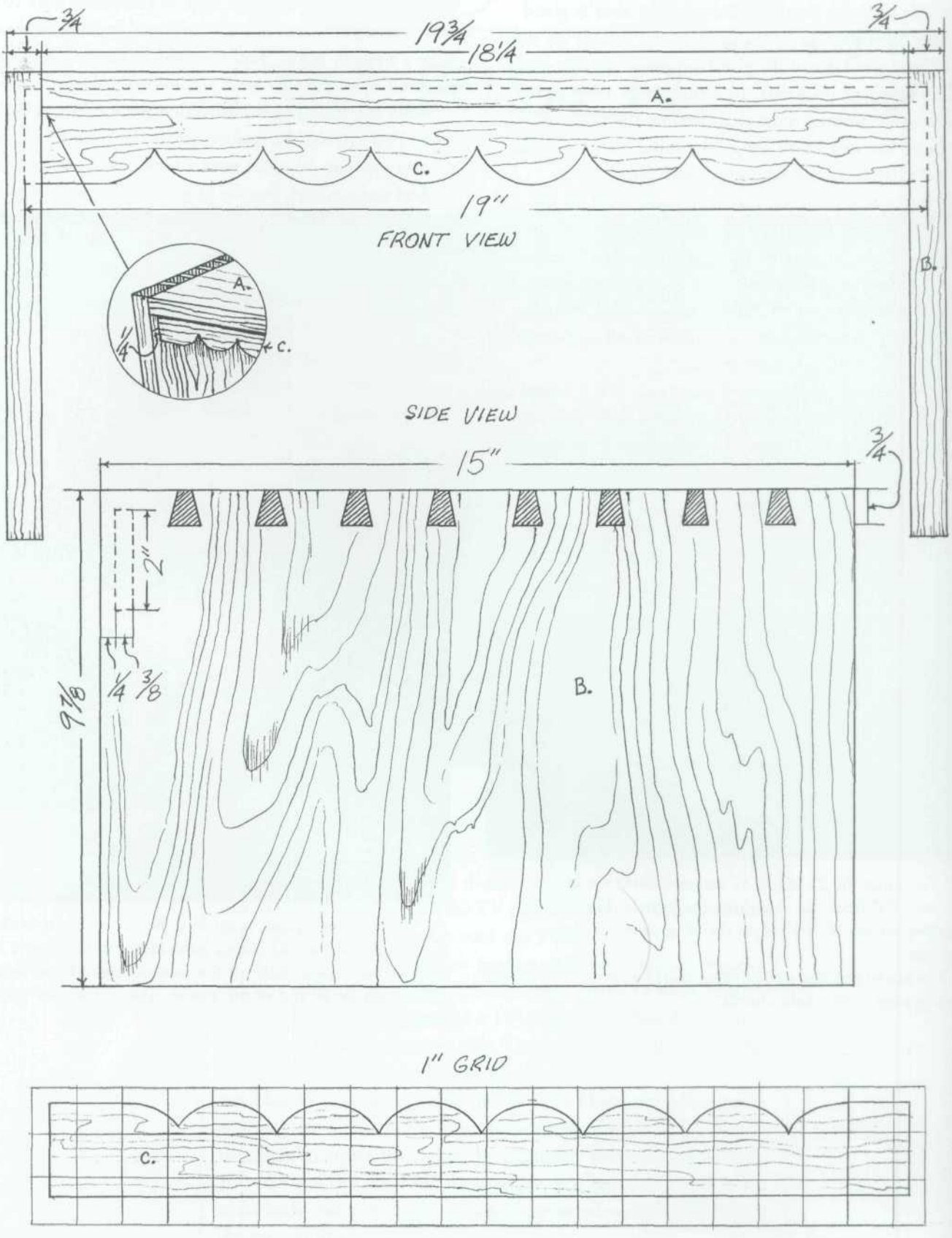


1 To match the 2" height of the scrollwork, the groove must stop 2 3/8" from the top of the end panels. The extra 3/8" provides for the *3/4"* top minus the 3/8" groove cut into that top.

The arrow penciled on the fence marks a point 2 3/8" past the leading edge of the dado cutters.



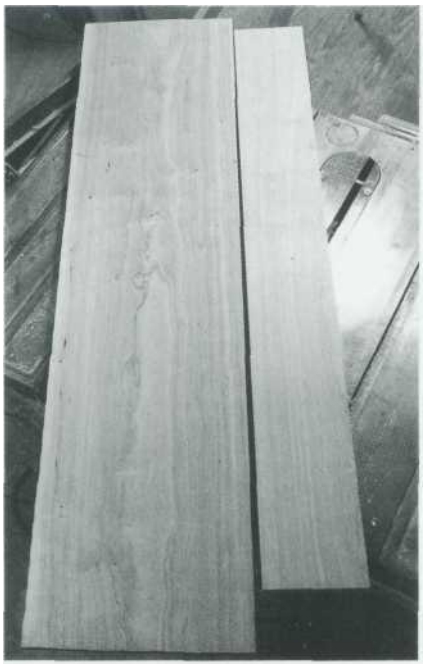
2 When the end panel is fed into the cutters as far as the penciled arrow, the cutters have advanced the groove *2 3/8"*. (Due to the circular shape of the dado cutters, a bit of material will remain in the end of the groove. This is removed with a chisel.)

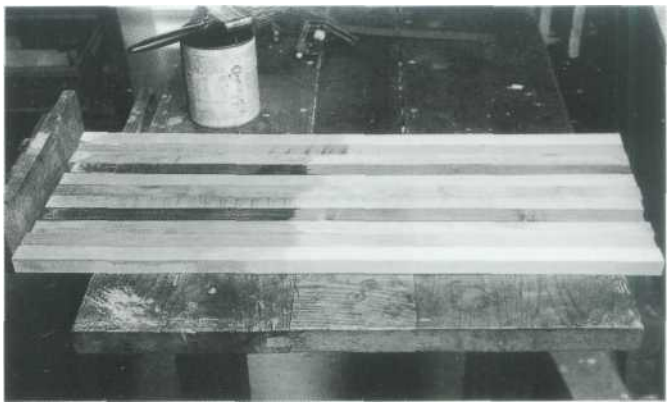

3/4
19 3/4
18 1/4
3/4
A.
C.
19"
FRONT VIEW
B.
A.
1/4
C.
SIDE VIEW
15"
3/4
2"
9 1/8
1/4
3/8
B.
1" GRID
C.

GLUING-UP PANELS

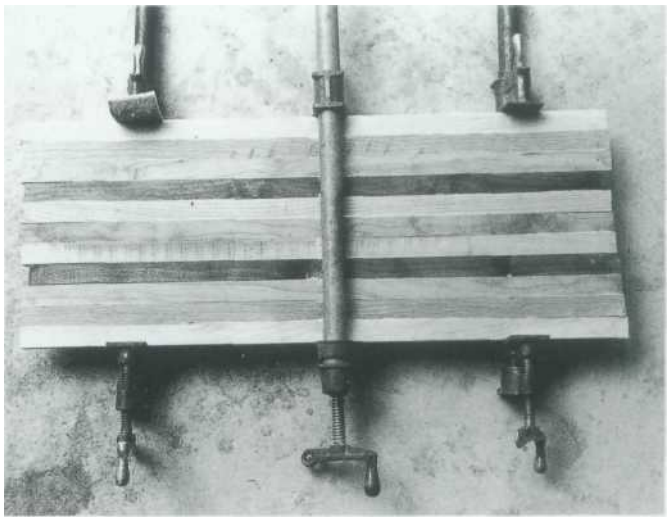
1 Matching figure and color is the first step. Here, two walnut boards with sapwood edges are being matched.

2 These two pieces of cherry were both cut from the same board, assuring a consistent color. Also, making the joint at the edges of the board where the lines of figure cluster close together helps to produce an invisible glue line.





3 A wash of mineral spirits reveals color, enabling you to achieve better matches.



4 Once you have matched (or, as in this case, contrasted) color and grain, form glue joints (the lowly butt joints) on the edges of each board. These joints consist of nothing more than flat, straight planes 90° from the board's adjacent surfaces.

You can create the joint by hand, using a jack or jointing plane. However, this is fussy work requiring experience and a steady hand. You can also create the joint on the jointer, a stationary power tool designed to perform this very task.

After cutting the joints, coat each edge with glue and align them in pipe or bar clamps. These are necessary in order to bring the joints tightly together.

Clamp arrangement should follow the pattern shown above. Position them no more than 12"-15" apart on alternate sides of the panel. After a couple of hours, you can remove them; within eight hours, you can work the panel.

MATERIALS LIST

A	Top	1 pc.	¾ × 15 × 19¾
B	End	2 pcs.	¾ × 15 × 9⅞
C	Scroll	1 pc.	⅜ × 2 × 19
D	Plug	2 pcs.	⅜ × ⅜ × ⅜, shaved to fit

**These are net measurements. Surplus length should be added to all dovetailed parts to allow them to be sanded flush.*

6

SHAKER-STYLE MIRROR

Walnut, Curly Maple

MAKING THE SHAKER-STYLE MIRROR

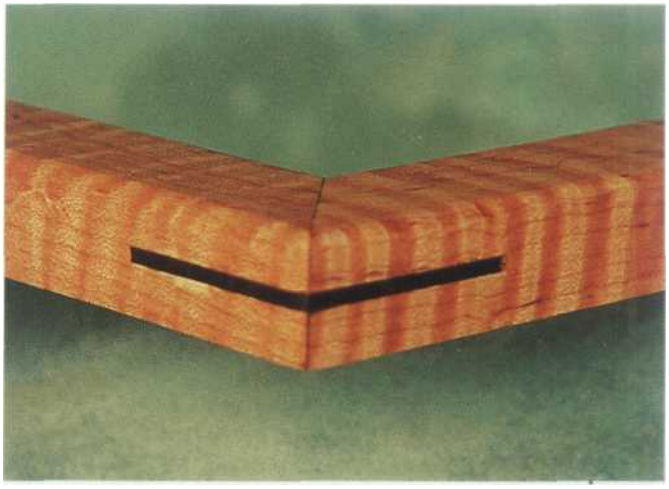
Begin construction with the mirror itself. After thicknessing the frame stock, cut the 1/2″ X 3/8" rabbet on what will become the back, inside edge of the frame. (This rabbet will ultimately receive the glass and the glass backing.) Form a radius on the two front edges of the frame stock.

Then miter the frame parts. You can do this on a miter box or a table saw or radial arm saw using a very fine-toothed blade. At this point, cut the slots for the feathers that will later join the frame parts. You can cut these by hand with a tenon saw or on a table saw fit with a hollow-ground planer blade, using a Universal Jig to control the stock as it is passed over the blade. Precision is important in the cutting of both the miters and the feather slots as these joints comprise the entire inventory of joinery in the mirror frame. Any error in these processes is very difficult to hide.

The feather stock is then thicknessed and slid into the slots, marked, and cut. The frame is assembled with glue.

The hanger consists of only three parts: the blade, the shelf and the shelf front.

Fashion the blade first. After cutting its shape on the band saw, facet the top edges. Do this by hand, guided by a marking system similar to that used in the hand manufacture of the raised panel in chapter one. First, draw a line down the center of each edge to be faceted. Then draw lines on the front and back faces of the blade adjacent to these edges. These lines should be placed about 3/16″ from the corners. Then, by using a wood file to create planes, join the lines down the center of the edges and the lines on the blade's faces. You could create these planes freehand, but the reference lines make it much easier to produce regular shapes.

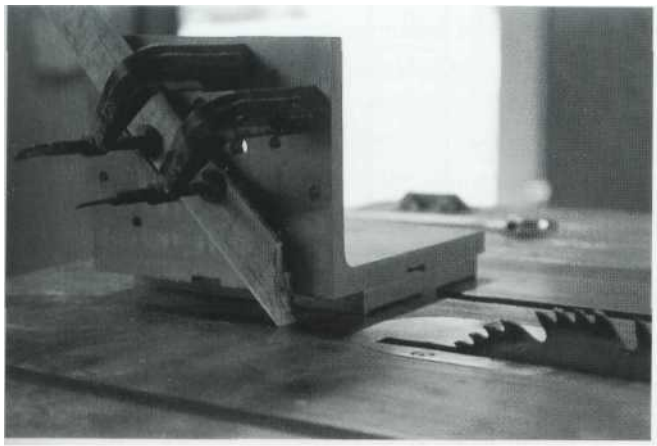


The walnut wedges in the mirror frame corners are not only beautiful, they also add structural support.

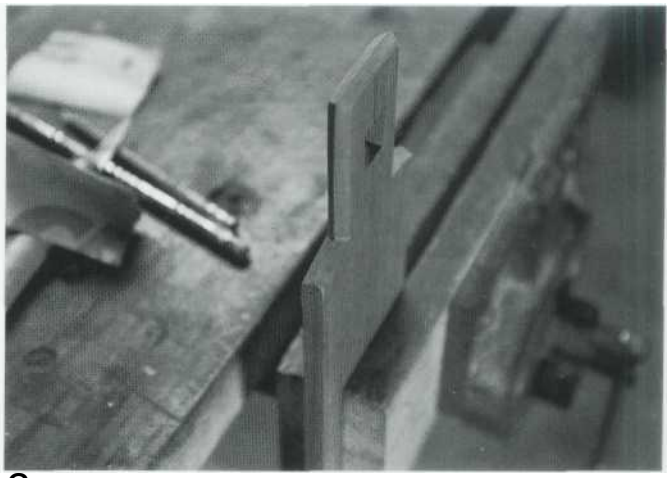
Cut a dado on the back edge of the shelf, and position the blade in that dado, holding it there with a bit of glue and two 1 1/2″ no. 12 wood screws.

Then profile the shelf front on the band saw and facet all except the top edges in the same manner as that used for the top edges of the blade. Glue this to the front edge of the shelf.

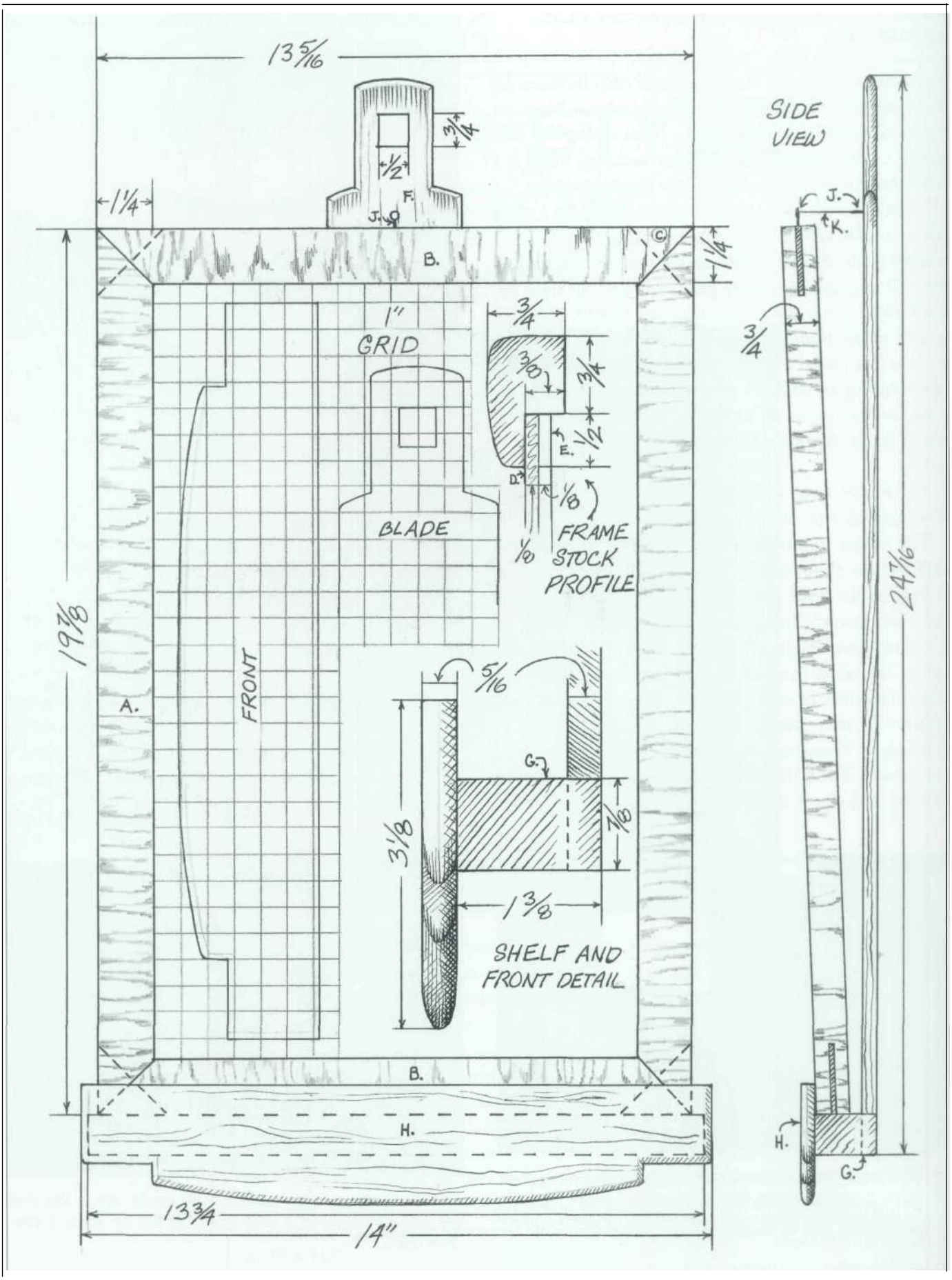
After sanding and finishing the wood parts, place the mirror glass and a matt board backing inside the rabbet cut in the back side of the mirror frame. Hold both in place with the protruding heads of a half-dozen wood screws turned into the sides of the frame rabbet.



1 Clamp a piece of mitered frame stock in the Universal Jig prior to passing it over the hollow-ground planer blade. Notice that the frame stock rests on its mitered tip and is clamped in the jig at a 45° angle.



2 The faceting at the top of the blade can be seen in this shot. The same faceting is used on all but the top edges of the shelf front.


13 5/16
3/4
1/2
F.
1 1/4
J.
B.
C.
1 1/4
1"
GRID
3/4
3/8
3/4
E.
1/2
D.
1/8
1/8
FRAME
STOCK
PROFILE
BLADE
19 7/8
A.
FRONT
5/16
G.
3 1/8
1/8
1 3/8
SHELF AND
FRONT DETAIL
B.
H.
13 3/4
14"
SIDE
VIEW
J.
K.
3/4
24 7/16
H.
G.

ADHESIVES

A recent *Woodworker's Supply* catalog lists eleven different types of adhesives. Several of those—for example, hot melt glues—are available in different formulas for different applications. These different formulas increase the actual number of choices to sixteen.

Sixteen kinds of glue?

Without devoting significant time to study and experimentation, no woodworker is likely to make the perfect adhesive choice for any particular application. And who wants to spend hours studying adhesives?

In my shop, except for specialized applications (for example bonding Formica-like products to wood), I've reduced the adhesive inventory to three choices: white glue (plain old Elmer's), yellow glue, and hide glue, all of which are more or less appropriate for any wood-to-wood joint.

Each of these three types forms a bond that is stronger than necessary for wood furniture. The primary differences are the amount of working time they allow, the ease with which joints they've bonded can be disassembled, and the convenience of their application.

Hide glue allows for relatively easy disassembly when making repairs and also offers the woodworker the longest working time. It's available in two forms, each of which, unfortunately, has its own set of drawbacks. Traditional hide glue, which comes in flakes or pearls, must be mixed with water and kept heated to a temperature of 140-150° F. Then, after a few days, it must be thrown out and a new batch mixed because, once mixed and heated, it quickly loses its strength. All of this is a significant inconvenience for the owner of a small shop.

The other form comes premixed in squeeze bottles just like white and yellow glues. Unfortunately, however, its shelf life is shorter than white or yellow glue and much shorter than the dry form of hide glue.

In terms of convenience, both white and yellow glue are clearly superior to hide glue. They come premixed in easy-to-use squeeze bottles. They have long shelf life if kept from freezing, and they form an all-but-unbreakable bond between two pieces of joined wood.

There are, however, drawbacks to their use. First, because the bond they form is all-but-unbreakable, a piece assembled with these glues is very difficult to repair. If a yellow- or white-glue-assembled chair comes into my shop needing a new rung, I have to explain to the customer that I can't predict the cost of the repair.

MATERIALS LIST

Mirror		
A Sides	2 pcs.	¾ × 1¼ × 19⅞
B Top and bottom	2 pcs.	¾ × 1¼ × 13⅝
C Feather	4 pcs.	3/32 × 1⅛ × 2⅛
D Mirror glass	1 pc.	⅛ × 11 11/16 × 18¼
E Mirror backing	1 pc.	⅛ × 11 11/16 × 18¼
Rack		
F Blade	1 pc.	5/16 × 3 × 24 7/16
G Shelf	1 pc.	⅞ × 1⅜ × 13¾
H Front	1 pc.	5/16 × 3⅛ × 14
Hardware		
I Brass eye hook	2 pcs.	⅞
J Brass chain		
K Screws	various	

Whereas a chair assembled with hide glue can be disassembled by applying warm water to a tight joint, thus allowing a fairly predictable repair time, the same chair assembled with white or yellow glue may resist my best efforts at disassembly. On more than one occasion, I've broken the slab seat on an old Windsor trying to break loose parts that have been joined with white or yellow glue.

The second problem associated with the use of white and yellow glues is short assembly time. When using these products, a woodworker may have only ten or fifteen minutes to get parts aligned and clamped before the glue grabs and adjustments become all but impossible to make. The time constraints applied to the assembly process by white and yellow glues add stress to an already stressful procedure.

In my shop, I follow these guidelines when choosing an adhesive:

1. For large, complex pieces with a high dollar value (pieces for which one could justify the cost of making repairs), I use hide glue.

2. For pieces requiring lengthy assembly time, I use hide glue.

3. For all other applications, I turn to the ease and convenience of white and yellow glues. For example, all the pieces in this book were assembled with one of those two varieties, the choice being determined by the prox imity of the glue bottle to my hand when it was time to glue something up.

7

SIDE TABLE WITH CURLY MAPLE DRAWER

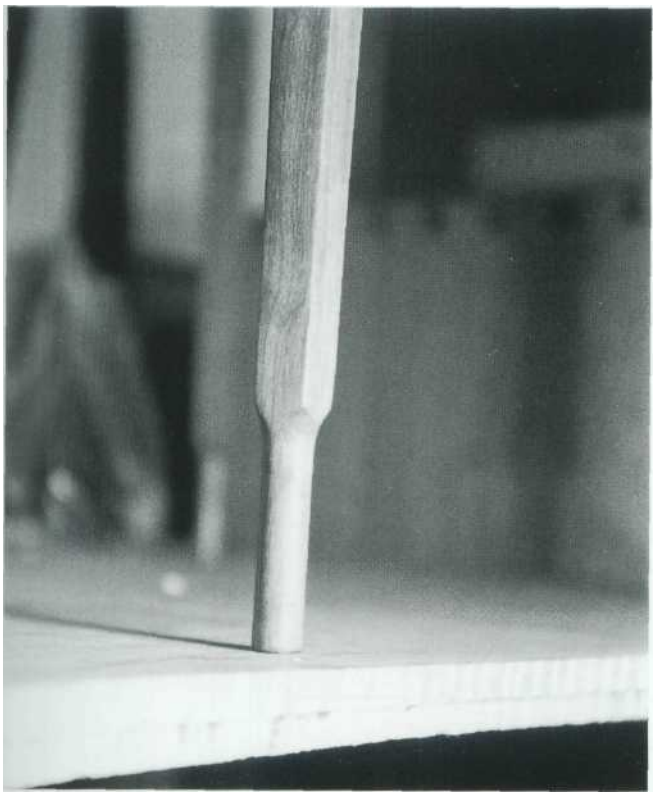
Cherry, Curly Maple

MAKING THE SIDE TABLE WITH CURLY MAPLE DRAWER

Joint, glue and clamp the boards selected for the top and set aside. Next, fashion the legs.

Rip and joint the leg stock to 1" X 1", and draw the tapers on the front and side of each leg. At the base of the apron, these two faces measure the full 1" X 1". At the floor, the legs measure $^{9}/16$"X $^{9}/16$". Then cut the tapers on the band saw, keeping the blade well to the waste sides of the taper lines. Finish the taper with a hand plane, while holding the stock in a vise.

Next, center the leg stock so that it can be loaded into the lathe prior to turning the feet. On the narrow end of each leg, this is simply a matter of drawing diagonals across the end grain. On the other end of the leg, however, finding the center is a bit more complicated because you don't want the actual center of the 1"X 1" end grain square. What you do want is the center of the 9/16" X 9/16" end grain square directly in line with the square on the opposite end of the leg. To find this, draw a square measuring 9/16" X 9/16" on the end grain with two sides of that square directly on top of what will become the outside edges of that leg. Draw diagonals on this square to find the center.



The table's dainty turned foot is blended into the flat, tapered sides.

The thin contrasting band inlay adds the perfect touch to this tabletop.

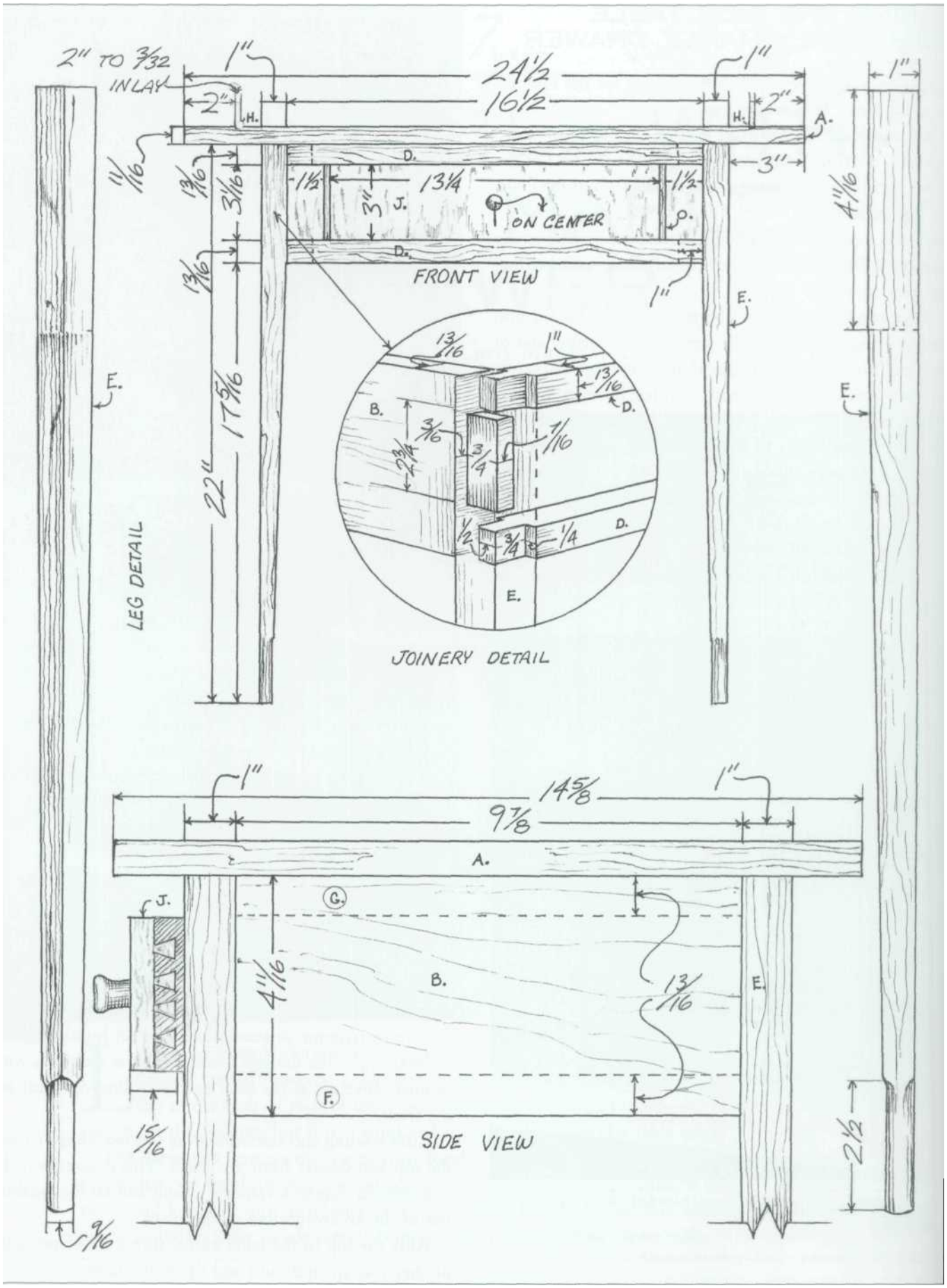
Then mount the leg in the lathe. In order to eliminate the fraying of corners that can occur when a round shape is turned immediately adjacent to a square shape along the length of a turned part, relieve the four corners of the leg with a knife just above the turned foot. Blend this cut into the round tip of the leg with a lathe tool. Finally, clean up with a chisel, knife and sandpaper.

Next, cut the mortises that will receive the tenons on the ends of the apron parts and drawer rails. Set these so that the outside faces of the apron parts are recessed 1/8″ from the outside faces of the legs. Set the drawer rails, however, so that their outside faces are flush with the outside faces of the legs. When the mortises are fit, assemble the table frame. Next, install drawer runners and kicker strips. Fit the kicker strips with oversized holes, through which screws will pass into the top. The oversized holes allow for expansion and contraction across the width of the top in response to seasonal changes in humidity.

Next, make the drawer. Construction is standard, with through dovetails at the back and half-blind dovetails at the front.

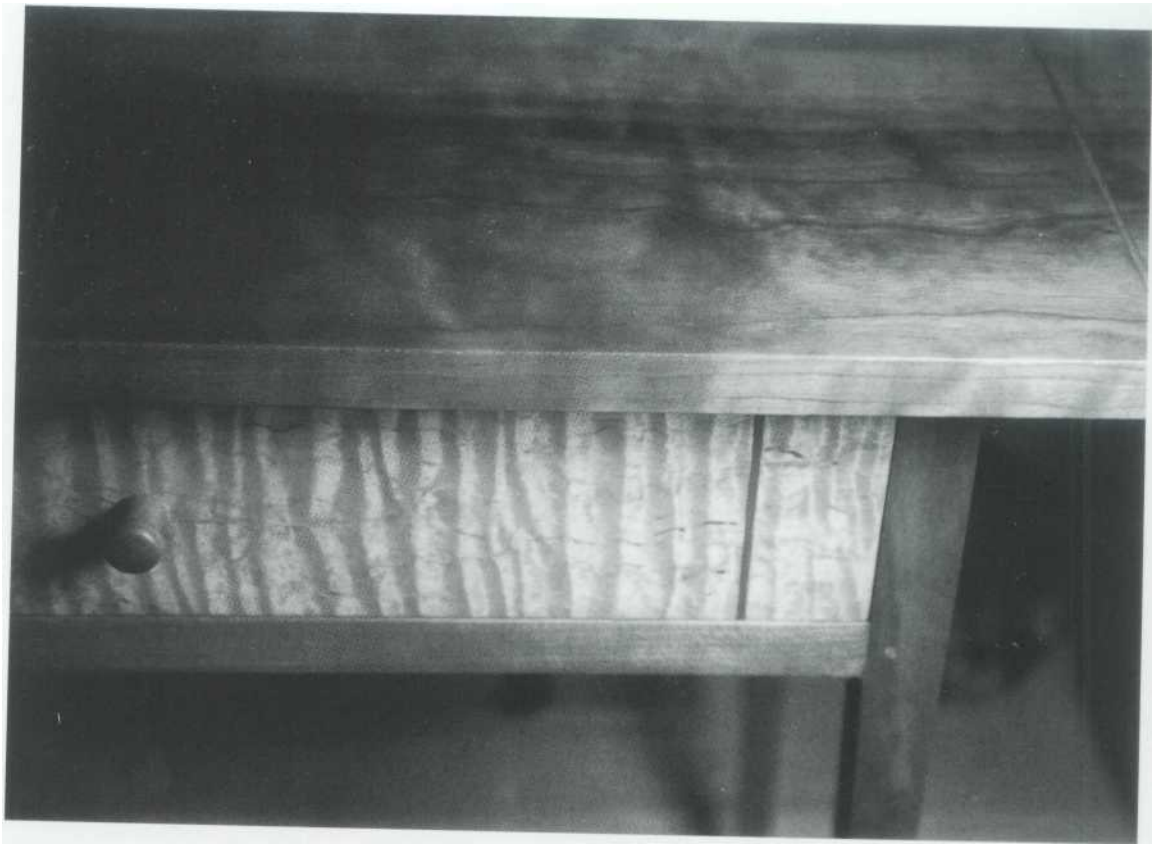
After leveling and smoothing the top (see chapter five), the top and drawer front are inlaid. This process, which is covered in chapter seventeen, is built around the capabilities of the hollow-ground planer blade.

Affix the top to the table frame, turn a pull from a bit of cherry scrap, and sand and finish the table.



www.TedsWoodworking.com

A strip of cherry is inlaid across the width of the drawer's curly maple front. Similarly, a strip of curly maple is inlaid across the width of the table's cherry top. Note the peg driven into the tenon of the drawer rail below the drawer front.



MATERIALS LIST

Table			
A	Top	1 pc.	1 1/16 × 14 5/8 × 24 1/2
B	Apron side	2 pcs.	13/16 × 4 11/16 × 11 3/8
C	Apron back	1 pc.	13/16 × 4 11/16 × 18
D	Drawer rail	2 pcs.	13/16 × 1 × 18*
E	Leg	4 pcs.	1 × 1 × 22
F	Drawer runner	2 pcs.	13/16 × 1 × 9 7/8
G	Kicker strip	2 pcs.	13/16 × 1 × 9 7/8
H	Inlay	2 pcs.	3/32 × 3/32 × 14 5/8
I	Screws	various	
Drawer			
J	Front	1 pc.	15/16 × 3 × 16 7/16
K	Side	2 pcs.	1/2 × 3 × 10
L	Back	1 pc.	1/2 × 2 1/2 × 16 7/16
M	Bottom	1 pc.	1/2 × 9 5/8 × 15 15/16
N	Pull	1 pc.	5/8 × 1 1/4
O	Inlay	2 pc.	3/32 × 3/32 × 3

**Includes ¾" tenons on either end.*
**These are net measurements. Surplus should be added to dovetailed parts to allow them to be sanded flush.*

8

FOOTSTOOL

Cherry, Walnut, Oak

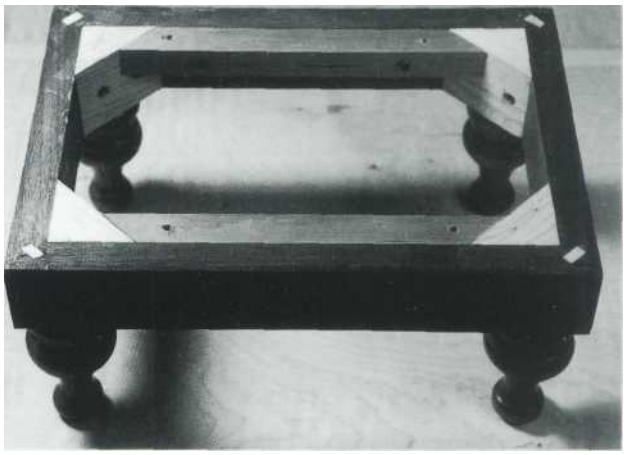
MAKING THE FOOTSTOOL

Construction begins with the legs since they are the most time-consuming components. Rip out 2X2 stock, cut to length, and center on the lathe. First, turn the 1/2 X 7/8" tenon on the top of the leg. Care must be taken in sizing the tenon so that a tight fit can be achieved. In my shop, 1 begin tenon sizing with a gouge, reducing the stock to 1/16″ over its finished diameter. Then, with a flat (paring) chisel laid bevel side down on the tool rest, I bring the tenon to its final size, checking frequently with calipers. (Charles Harvey, a chairmaker in Berea, Kentucky, uses an open-end wrench to check tenon diameter.)

After sizing the tenon, give the leg its rough shape. Then form the coves and beads.

The frame is next. After dimensioning the stock, cut miters on each end of the frame components. Then, on a table saw fit with stack of dado cutters tilted to a 45° angle, cut the dado for the spline on each end of every mitered piece.

Then rip out spline stock to a width of 2 1/16". Thickness to *1/4"*. When you have achieved a tight fit in the dadoes, crosscut the individual splines from the length of spline stock. Remember that the grain of the finished spline must run perpendicular to the mitered faces of the pieces being joined.



This photo shows the structural parts of the stool.

Assemble the splined and mitered frame. When the glue has dried, glue the triangular glue blocks in each corner and screw them into place. Take exact measurements for the screw strips and cut and install the strips.

The top of the footstool is a piece of 5/8″ wood stock on which a piece of 1/2" foam padding has been placed. This is held in place by upholstery cloth wrapped around the top and stapled underneath.

Turn four screws up through the screw strips into the bottom side of the top to hold it in place.

AIR-DRYING LUMBER

Lumber is expensive.

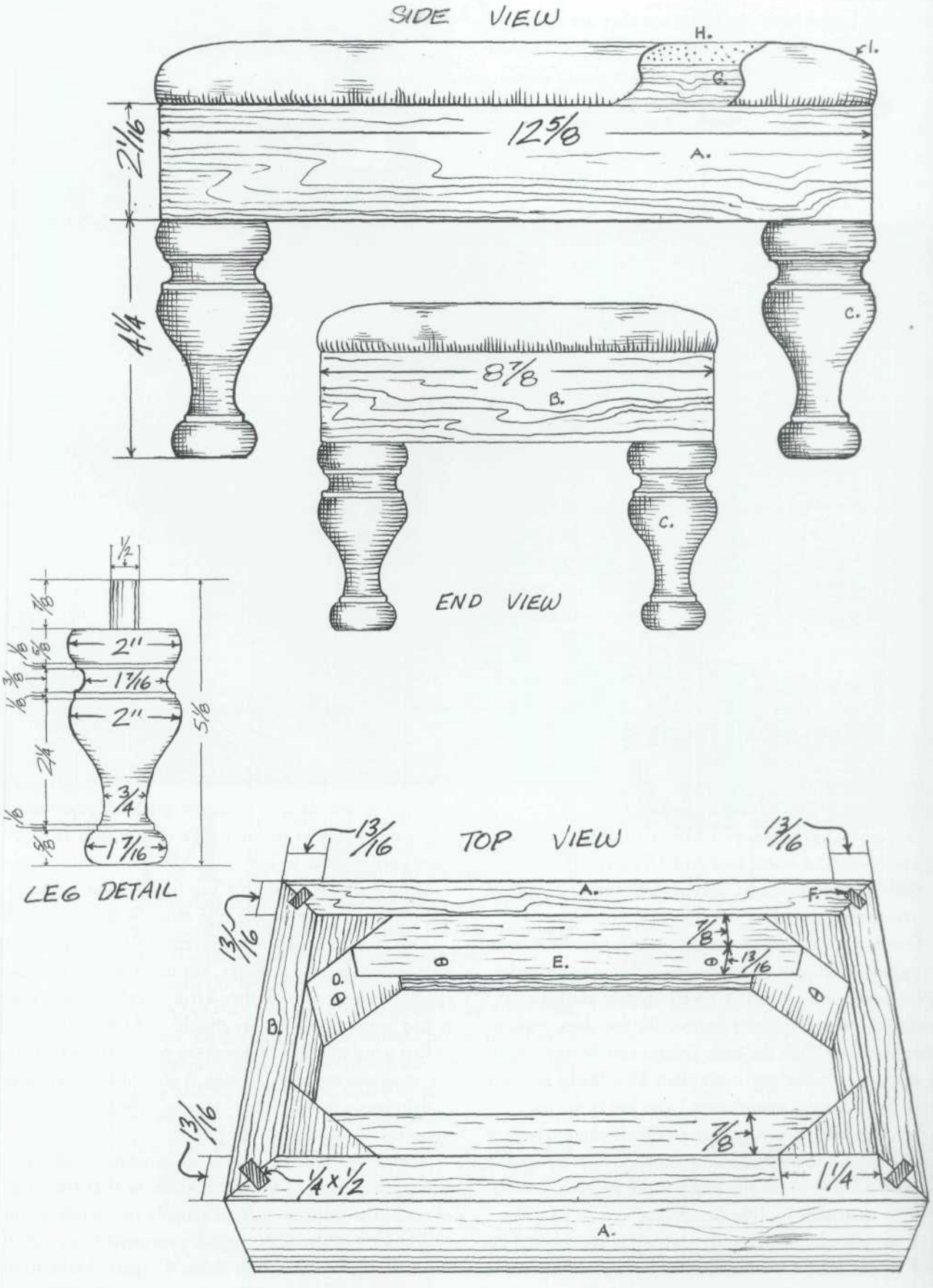
Beautiful lumber is very expensive.

One way to avoid these high prices is to switch from the expensive kiln-dried lumber available at retail outlets to the much less expensive green lumber available at sawmills. Preparing green lumber for use does require labor and time, but the cash savings can be enormous.

Before the green lumber can be air-dried, a solid foundation for the drying pile must be built.

First, you must choose an acceptable location. Drying piles are not beautiful things. For that reason a backyard might be a better choice than a front yard. Air movement is also important. The site should also be open enough so that wind can blow through the pile to aid in reducing the moisture content. Finally, it should be situated on a slight grade so that water can run off whatever roofing material is placed atop the pile.

Begin the foundation with six concrete blocks set in two parallel rows of three. Set these so that the length of each row (measured from outside to outside of the end blocks) is about 8'. Again, measured from outside to outside, place the rows about 4' apart. Make some


SIDE VIEW
H.
G.
F.
2 1/16
12 5/8
A.
4 1/4
C.
8 7/8
B.
C.
END VIEW
1/2
1/8
2"
1/8
1/8
3/8
1 7/16
2"
5/8
2 1/4
3/4
1/8
5/8
1 7/16
LEG DETAIL
13/16
TOP VIEW
13/16
A.
F.
13/16
7/8
E.
13/16
D.
B.
13/16
7/8
1/4 x 1/2
1 1/4
A.

effort to get the tops of these blocks into the same plane. Later, you can use shimming to correct minor inaccuracies.

Next, lay a row of railroad ties along each row of three blocks. Set these so that their top surfaces are in the same plane. You can check this by sighting across the ties from the side, shimming where necessary.

Then, set five 4' lengths of 4X4 across the ties at 20"-24" intervals. Again, these must be in the same plane because any twist in the foundation will be transferred to the drying lumber, in some cases making it unusable. Sight along the length of the pile from either end to reveal any twist in the alignment of the top surfaces of the 4 X 4s.

Air-drying lumber requires a large quantity of stickers, sometimes called sticks. These are nothing more than 1" X 1" X 48" dry hardwood rips which separate the layers of drying lumber so that air can pass freely through the pile.

Once you have ripped out the stickers, the actual lumber pile can be constructed. First, place a single 1" X 1" X 48" sticker along the center line of each 4x4 support. Then, place a layer of green lumber perpendicular to and atop that first layer of stickers. As you are laying out these boards, take care so that an air space (approximately 1") is left between the edges of the boards.

MATERIALS LIST

A Side	2 pcs.	13/16 × 2 1/16 × 12 5/8
B End	2 pcs.	13/16 × 2 1/16 × 8 7/8
C Leg	4 pcs.	2 × 2 × 5 1/8
D Glue block	4 pcs.	1 1/4 × 2 1/16 × 2 5/8
E Screw strip	2 pcs.	13/16 × 7/8 × 8 7/8, length to fit
F Spline	4 pcs.	1/4 × 2 1/16 × 1/2
G Top	1 pc.	5/8 × 8 7/8 × 12 5/8
H Foam	1 pc.	1/2 × 8 7/8 × 12 5/8
I Fabric	1 pc.	14 × 18
J Screws	various	

When that first layer of lumber has been positioned, place a second set of stickers across that layer directly above the first row of stickers. Then add a second layer of lumber, followed by another set of stickers and another layer of boards and so on until you have stickered all the green lumber.

Professional driers often build these piles to a height of 12'-14', but I find that if the top of the pile is more than five or six feet above the ground, it becomes too difficult to get the lumber up and down.

Complete the pile with a water-shedding top. It

doesn't need to be fancy. A couple of sheets of roofing metal will do, as will a tarp, or even a layer of knotted and checked lumber—anything that will keep water from percolating down through the pile.

Now, wait. The traditional rule-of-thumb states that material should air-dry outdoors one year for each inch of its thickness. I usually exceed that time allotment, although on a couple of occasions, in a pinch, I brought lumber inside after only six months. However, those six-months did include the prime drying seasons of summer and fall.

After air-drying outdoors, you can take the lumber to a commercial kiln for finish drying or bring it inside and sticker it again in a warm, dry room for a few additional months

It's then ready to use.

Much has been written about the importance of using kiln-dried material, and retail outlets often brag about the fact that the moisture content of their stock has been reduced to 7 percent.

I think this is misleading. Yes, the lumber might have had a moisture content of 7 percent on the day it was taken from the kiln. But wood is not an inert medium. After leaving the kiln, its moisture content immediately begins the process of moving toward a point of equilibrium with the relative humidity of the surrounding air.

That means that if a craftsman took that 7 percent board to his shop in Death Valley, California, that 7 percent would soon become 4 percent or 3 percent. And if I took that same 7 percent board to my shop in central Ohio during the steamy month of July, that 7 percent moisture content would quickly become 11 percent or 12 percent, which is the same as the moisture content of the material I've prepared for use by air-drying.

The 1" X 1" stickers are arranged perpendicular to the layers of drying boards. These stickers provide a space through which air can move to hasten the drying process.

9

TRESTLE TABLE

Walnut

MAKING THE TRESTLE TABLE

After the material has been dimensioned, lay out, joint and glue the stock for the top. Construct the leg assemblies next.

After laying out the feet but before profiling them on the band saw, cut the 2"-deep mortises that will receive the leg tenons. This can be done on the drill press, clamping the work to a tall fence custom-made for this operation. You can also cut the mortises by hand, securing the work in a vise, then removing the bulk of the waste with a drill bit, and cleaning up the mortise walls with a chisel. Similarly, cut the through mortises in the two cross braces. Profile the feet and cross braces on the band saw.

Then, fashion the leg tenons. You can do this on a table saw fit with a stack of dado cutters or by hand using a tenon saw. After fitting the tenons into their mortises, glue-up the two leg assemblies.

Shape the stretcher and fasten it to the top of the cross braces with half-notch joints. The top is held in place with wood screws passing through oversized holes in the braces. These oversized holes allow for expansion and contraction of the top in response to seasonal changes in humidity.

The original table was built of cherry with pine used for the drawer back, sides and bottom. The exception was the drawer front, which was made of maple. Because of this, Kassay suggests the possibility that the drawer might have been added at some time after the completion of the original table, a notion further supported by the drawer's extremely (and impractically) short front-to-back depth, a feature that suggests that the drawer wasn't fully integrated into the table's design.

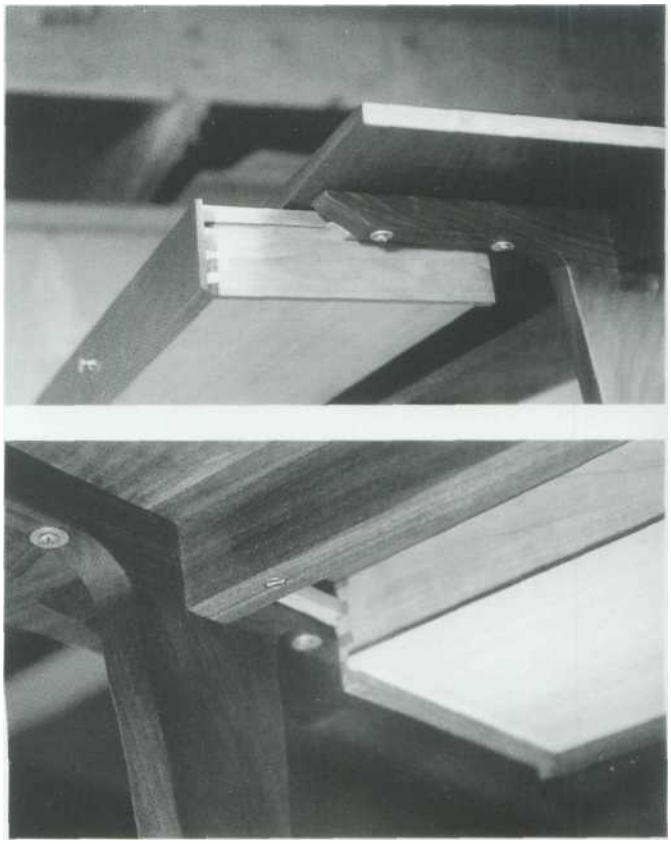
With the exception of the grooves that must be ploughed on the outside faces of the drawer sides, drawer construction is conventional, with through dovetails at the rear and half-blind dovetails at the front.

After fitting the drawer, sand and finish the table and drawer.

MATERIALS LIST

Table			
A	Top	1 pc.	½ × 17½ × 30⅝
B	Leg	2 pcs.	⅞ × 3⅝ × 20⅞
C	Foot	2 pcs.	⅞ × 7½ × 16⅛
D	Cross brace	2 pcs.	⅞ × 1⅝ × 16½
E	Stretcher	1 pc.	1 × 1⅝ × 28¾
F	Drawer runner	2 pcs.	¼ × ⅜ × 7
G	Screws	various	
Drawer			
H	Front	1 pc.	½ × 2⁵⁄₁₆ × 21¾
I	Side	2 pcs.	⅜ × 2⁵⁄₁₆ × 7⅛
J	Back	1 pc.	⅜ × 1¾ × 21⅜
K	Bottom	1 pc.	¼ × 7 × 21⅜
L	Pull	1 pc.	½ × ½

**These are net measurements. A surplus should be added to dovetailed parts to allow them to be sanded flush.*
**Pull was ordered from Constantine's Hardware*



1 These photos show the underside of the table. Note the washers under the heads of the screws holding on the top. These are necessary because of the oversized holes drilled through the cross braces. Note also the drawer runner affixed to the inside face of the cross brace.

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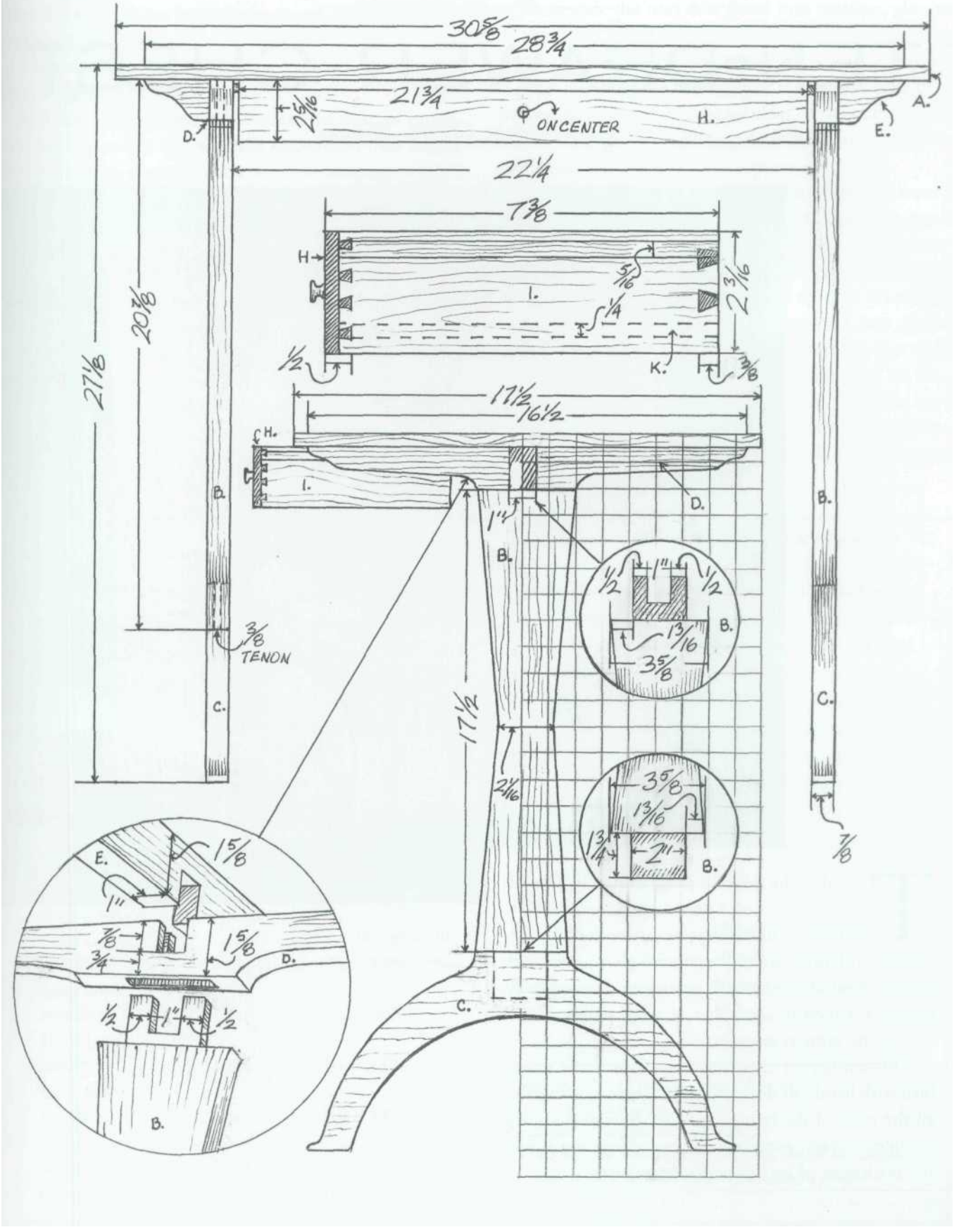
30 5/8
28 3/4
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2 5/16
ON CENTER
H.
A.
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TENON
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1 3/4
2"
7/8
E.
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15/8
7/8
3/4
D.
B.

10

TEN-DRAWER CHEST

Curly Maple, Cherry, Walnut

MAKING THE TEN-DRAWER CHEST

After the material has been dimensioned, glue-up the top panel and set it aside.

Then cut joints for the face frame. When these have been fit, glue the frame.

Build the end panels next. Because of the seasonal expansion and contraction that will take place across their width, they are built as framed panels with the tongues on the perimeter of the central panel floating in grooves cut into the inside edges of the frame components, which are held together with mortise-and-tenon joinery.

After the end panels have been glued-up, cut dadoes across their width for the tongues on the ends of the dust panels. Then, glue the front edges of the end panels to the back of the face frame.

Assemble the interior of the case in layers beginning at the bottom. First slide the tongues on the bottom dust panel into the dadoes cut on the inside faces of the end panels. Glue and clamp the front edge of the dust panel to the back side of the face frame. After removing the clamps, install the drawer guides and stops for the bottom tier of drawers.

Then, slide the next dust panel into position, glue and clamp it, and install its drawer guides and stops. Continue up the chest until each layer of interior work is completed.

After installing the filler strip at the bottom back of the cabinet, fasten the four mitered sides of the bottom frame in place with screws passing up into the bottom of the end panels and face frame.

Assemble the top frame, with kicker strips, as a separate unit. Before installing it in the cabinet, fasten the top to the frame with screws passing up through slotted screw holes. These holes allow the top to expand and contract across its width in response to seasonal changes in humidity.

Set the top frame, with the top attached, into place. Hold it there with screws passing through the top of the face frame and the tops of the end panels. Nail on the upper moulding, concealing these screws. Nail the lower moulding into place. Drawer construction is straightforward, with through dovetails at the back of the drawers and half-blind dovetails at the front.

MATERIALS LIST

Case			
A	Top	1 pc.	11/16 × 15 13/16 × 21 5/8
B	Short bottom frame	2 pcs.	11/16 × 1 11/16 × 15 13/16
C	Long bottom frame	2 pcs.	11/16 × 1 11/16 × 21 5/8
D	Central end panel	2 pcs.	5/8 × 10 1/8 × 14 7/8 [1]
E	Top of end panel frame	2 pcs.	7/8 × 3 5/8 × 10 5/8 [2]
F	Bottom of end panel frame	2 pcs.	7/8 × 5 3/16 × 10 5/8 [2]
G	Back of end panel frame	2 pcs.	7/8 × 2 15/16 × 22 11/16
H	Front of end panel frame	2 pcs.	7/8 × 2 1/8 × 22 11/16
I	Back planking	various	1/2 × various × 22 11/16
J	Short upper moulding	2 pcs.	5/16 × 1 3/16 × 15 7/16
K	Long upper moulding	1 pc.	5/16 × 1 3/16 × 20 3/4
L	Short lower moulding	2 pcs.	3/8 × 1 1/16 × 15 9/16
M	Long lower moulding	1 pc.	3/8 × 1 1/16 × 20 7/8
N	Outside vertical facing	2 pcs.	7/8 × 1 1/4 × 22 11/16
O	Central vertical facing	1 pc.	7/8 × 1 1/4 × 20
P	Top horizontal facing	1 pc.	7/8 × 1 3/4 × 18 7/8
Q	Bottom horizontal facing	1 pc.	7/8 × 2 3/16 × 18 7/8
R	Short facing	8 pcs.	7/8 × 15/16 × 9 3/16
S	Dust panel	5 pcs.	3/4 × 13 3/4 × 18 3/4 [3]
T	Drawer stop	10 pcs.	3/16 × 7/8 × 7
U	Central drawer guide	5 pcs.	3/4 × 1 7/16 × 13 3/4
V	Outside drawer guide	10 pcs.	7/16 × 7/8 × 13 3/4
W	Kicker strip	2 pcs.	13/16 × 1 5/8 × 12 7/8
X	Short top frame	3 pcs.	13/16 × 1 1/8 × 11 1/4
Y	Long top frame	2 pcs.	13/16 × 1 1/8 × 18 1/4
Z	Cleat	1 pc.	13/16 × 1 5/8 × 18 1/4
AA	Bottom filler strip	1 pc.	3/4 × 1 7/16 × 18 1/4
Drawers			
BB	Front	10 pcs.	1/4 × 2 15/16 × 8 1/16
CC	Sides	20 pcs.	3/8 × 2 15/16 × 14 1/8
DD	Back	10 pcs.	3/8 × 2 3/8 × 7 15/16
EE	Bottom	10 pcs.	5/16 × 7 9/16 × 14 1/8
FF	Pull	10 pcs.	1 × 1 1/2

[1] Includes 1/4" × 1/2" tongue on all four edges.
[2] Includes 3/4" tenon on each end.
[3] Includes 1/4" tongue on each end.
**These are net measurements. Surplus should be added to all dovetailed parts to allow them to be sanded flush.*

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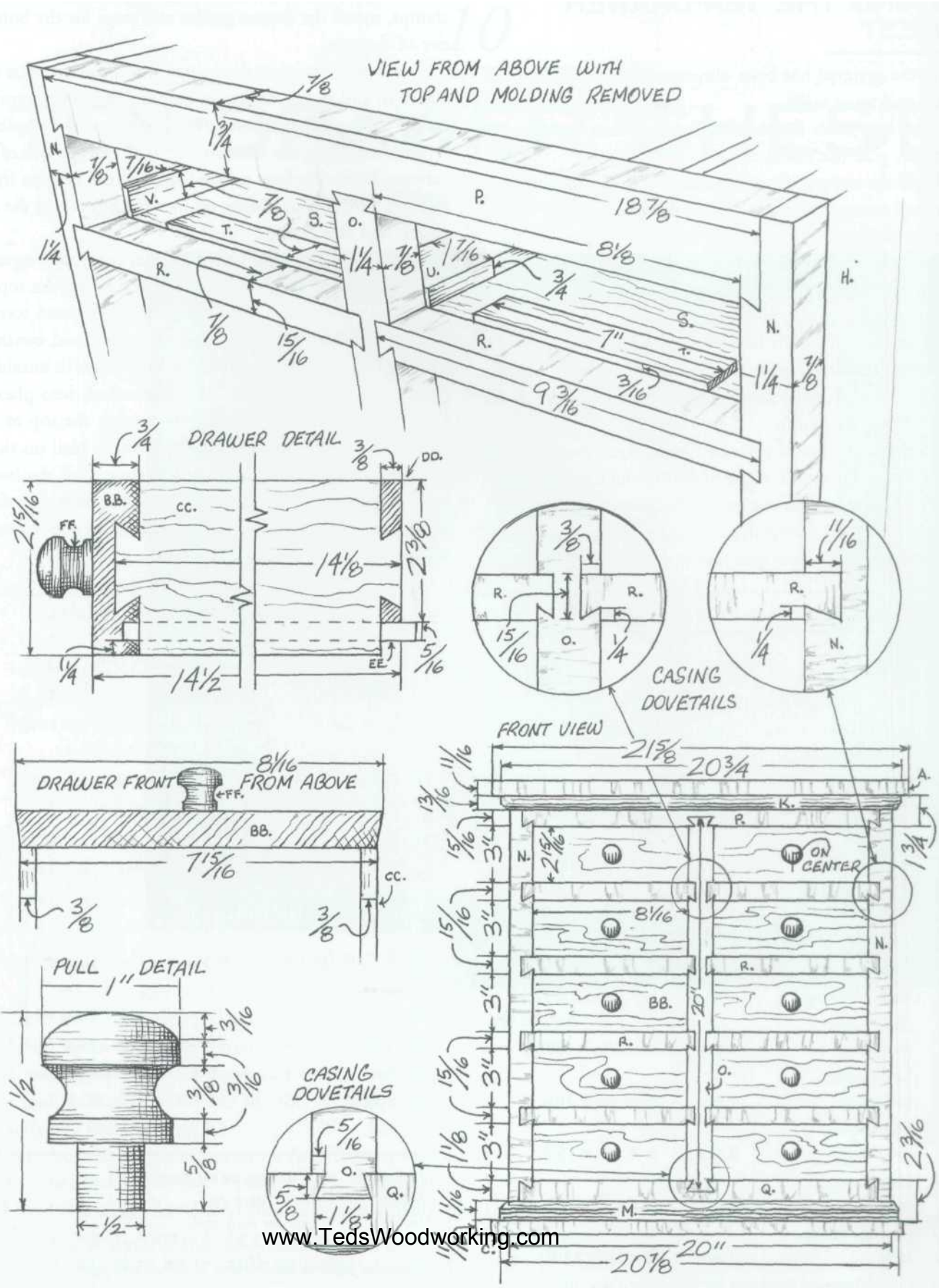
VIEW FROM ABOVE WITH TOP AND MOLDING REMOVED
DRAWER DETAIL
DRAWER FRONT FROM ABOVE
PULL 1" DETAIL
CASING DOVETAILS
FRONT VIEW
CASING DOVETAILS
ON CENTER
20"
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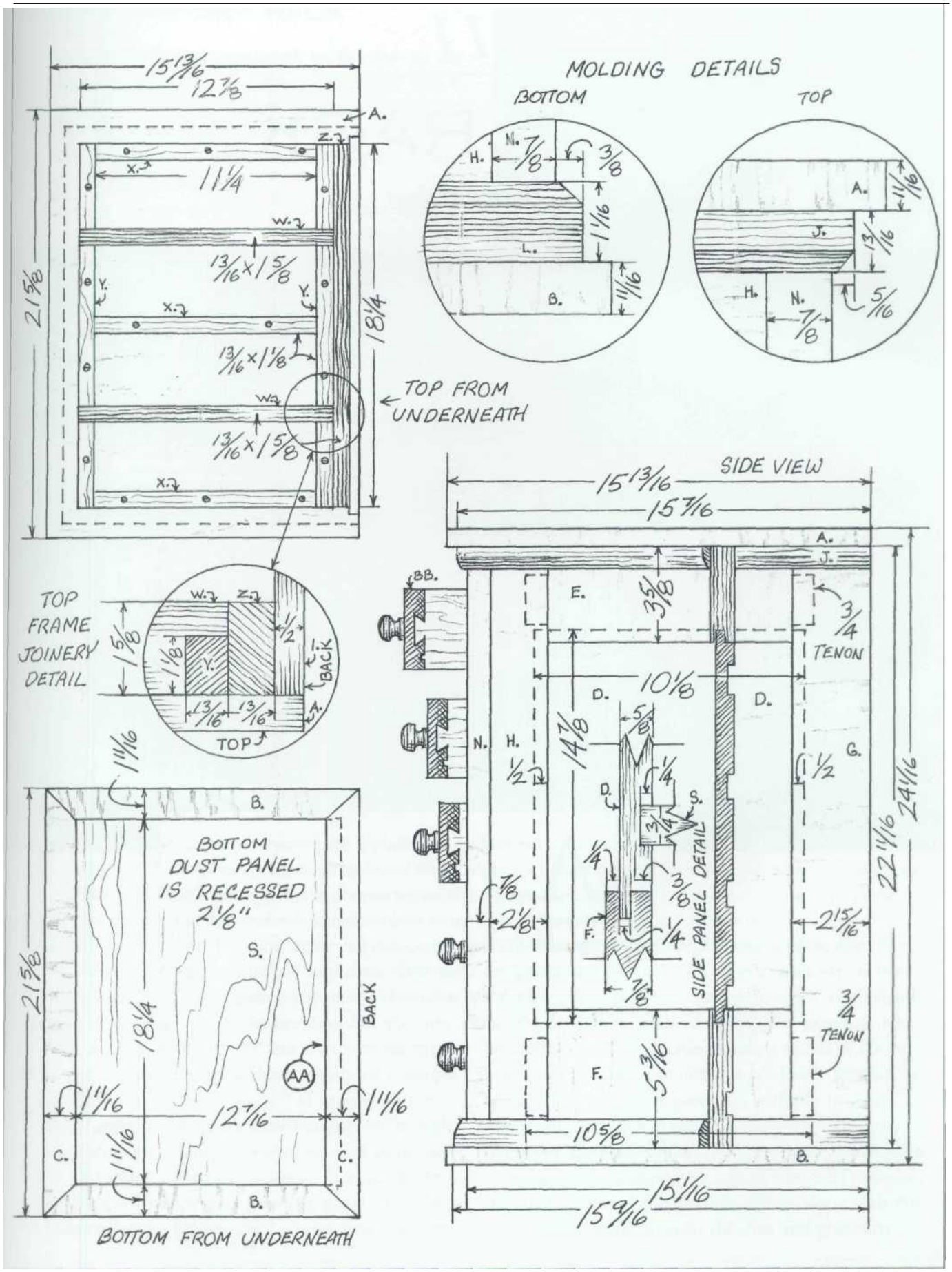

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11

KEY RACK

Cherry, Walnut

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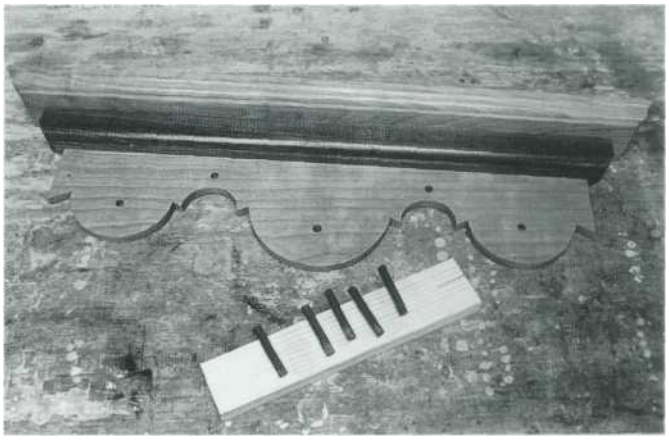
MAKING THE KEY RACK

After the stock has been dimensioned, lay out and cut the scrollwork with the band saw. Remove saw marks with a paring chisel, a wood file and some sandpaper. Care must be taken when cleaning up the scroll's sharp points since they can be easily broken off because of the grain runout on both sides of the points.

Next, form the moulded edges on the walnut mid-section with a shaper or a table-mounted router. Any of a number of different cutters would work nicely for this profile.

Cut a 7/16" X 5/16″ stopped rabbet along the bottom of the walnut mid-section to house the top of the scrollwork. You can do this by hand with a mallet and chisels or on the table saw using the method for cutting the stopped groove discussed in chapter five. You could use a similar method to cut the stopped rabbet with a table-mounted router, although it would take several passes.

Join the shelf and the mid-section with glue and a simple butt joint, as the width of the areas being joined provides ample glue surface. Fasten the scrollwork into its rabbet with glue and several 3/4" no. 6 wood screws.



Because it would have been difficult to wipe excess finish from the scrolled back while working around the five pegs, they were removed during finishing, then glued into place.

You can turn the pegs on a lathe or cut them from a length of 1/4″ walnut dowel available from Constantine's. Glue these into the 1/4″ mortises drilled in the scrollwork.

WOODWORKING MISTAKES

In the second issue of *Home Furniture* magazine, Alan Breed wrote an account of his experiences during the construction of a reproduction of one of the masterpieces of American cabinetmaking: a six-shell secretary built by John Goddard late in the eighteenth century. Before beginning any shop work, Breed took detailed measurements, rubbings and photos of the original, which awaited auction at Christie's in New York. (The original later sold for $12.1 million.) Although he found the level of craftsmanship to be superb, he also found mistakes "like planing a little too deeply on the upper door stiles and exposing the mortises for the rail tenons."

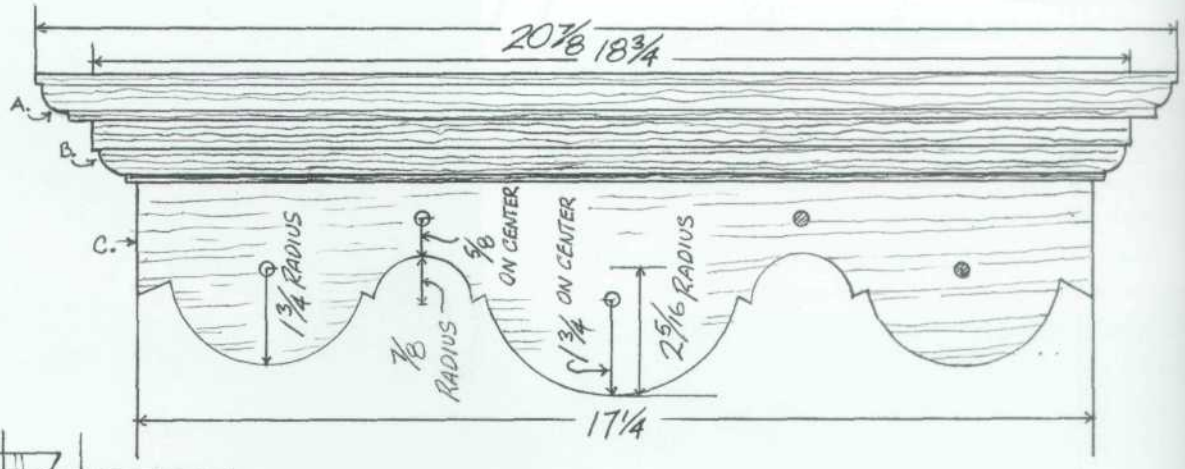
For those of us whose skills fall a good bit short of John Goddard's, this is reassuring. Just as we sometimes struggle in the shop, so did he.

With each piece I built for this book, for example, there is at least one nagging detail I wish I'd managed a little better. It might be an area of roughened finish. (I could have wiped the piece more thoroughly.) It might be a gap showing beside a through tenon. (I could have taken more time paring the mortise.) It might be an imperfect color match on a glued-up panel. (I could have dressed more lumber prior to choosing the pieces I would use.)

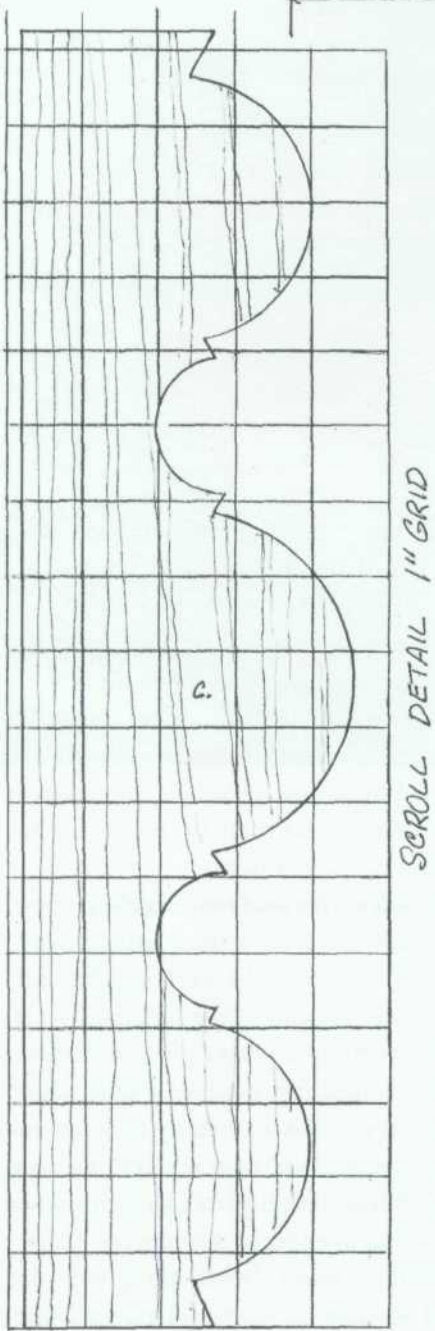
What follows are some of the more common fixes I use in my shop, each of which was employed at least once in the preparation of projects for this book:

1. ***Make a new part.*** Sometimes, after struggling for hours to make a piece come together, this most obvious solution can be emotionally difficult to face, but it is almost always the best solution. An hour spent cutting out a new end panel for a case on which the dovetails simply don't fit is better spent than an hour given to attempts at patching up such a joint.

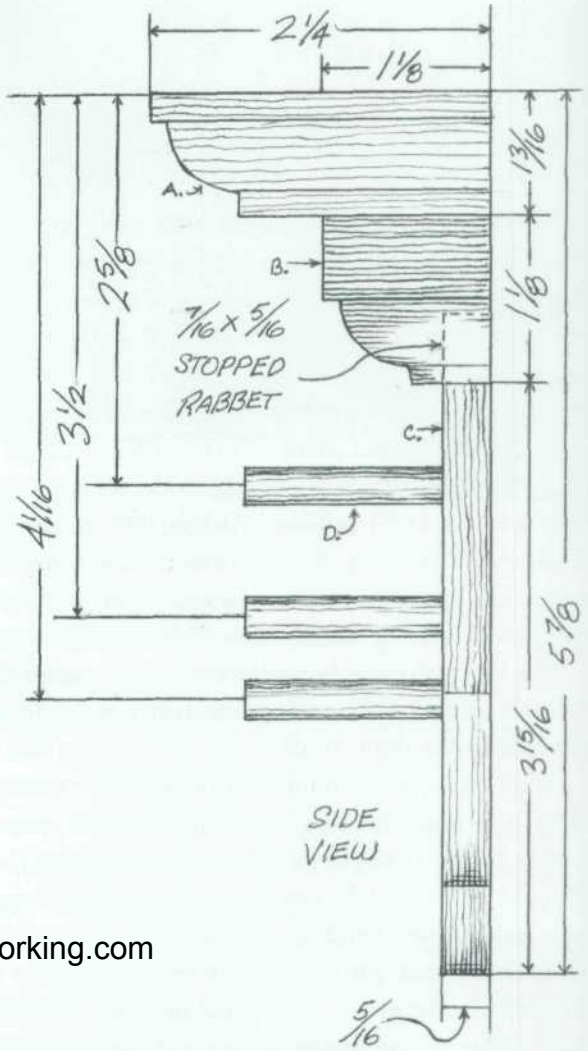
2. ***Mix up some yellow glue and sanding dust.*** Some times a set of dovetails will have a small gap or two beside a pin or tail. If the rest of the work is sufficiently well done, a filler made of yellow glue (aliphatic resin) and dust created by machine-sanding a piece of the same species as that being joined can produce a satisfactory appearance. It's not as good as a perfectly fit joint, but the results are much better than those achieved by using commercially made fillers. This is particularly true when working with photoreactive species like cherry. Com mercially prepared fillers won't darken along with the surrounding wood whereas the dust and glue mixture



FRONT VIEW



SCROLL DETAIL 1" GRID



SIDE
VIEW

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will, having been created from the same photoreactive material.

3. ***Trust the glue.*** Sometimes, no matter how carefully we work, a part will split during a test assembly, but this is rarely the disaster it may at first appear to be.

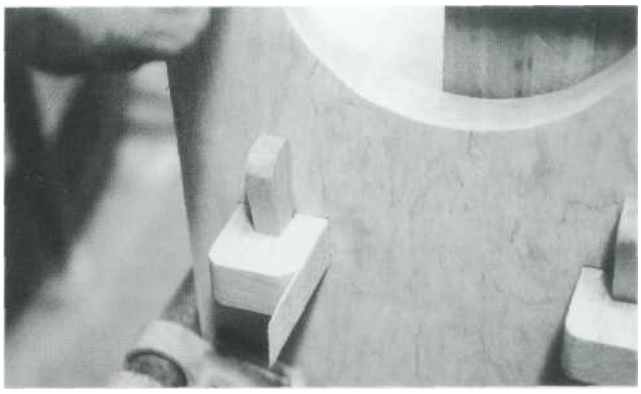
If the split runs the full length of the part and the two sides can be separated cleanly, a coat of glue on each fractured face and an hour in a set of clamps will restore the part to its original strength.

If the split only runs a couple of inches along the length of a longer piece, you can work glue into the split with a little patience. First, apply a generous layer of glue to the part, directly over the split. Then work the split open and closed a number of times, causing the glue to migrate down into the gap. When it appears that the glue has worked all the way through the split, wash the excess off of the surface, and clamp the part until the glue has cured.

4. ***Modify the piece.*** In places that can't be reached with shaving tools, I use a wood file to remove band saw marks from scrollwork. In cleaning up the scrollwork for the key rack at the beginning of this chapter, I got a little too aggressive with the file and flaked off some chips from one of the sharp points near the central arc. I worked that point down until I was beyond the torn-out grain, but when I stepped back from the part, I could see that that particular point was visibly different than the other three.

The solution? With a file, I carefully removed enough material from the other three points so that they matched the one on which I'd made my error.

5. ***Graft in new material.*** While building the figured oak magazine stand (chapter twelve), I got a poor fit on the mortise for one of the eight tusk tenons. The gap was fairly noticeable, and I would have liked to have made a new shelf, but I had no more oak with that particular wavy grain.



A gap was visible on one side of the tusk tenon so a sliver has been grafted onto the tenon to fill it.

To hide the Me" gap, I ripped a thin sliver from a piece of scrap having grain and color similar to the tusk tenon that fit through the bad mortise. Then, with a C-clamp and a couple of scrap pads, I glued the sliver to the side of the tusk tenon after sliding one end of the sliver into the 1/16" gap. When the glue had dried, I cut away the excess and blended the sliver into the curve at the end of the tusk tenon.

The gap hadn't made the joint structurally unsound, and the glued on sliver did conceal the gap, but this wasn't a perfect solution. When that particular tusk tenon is sighted from above, it's clear that there's a little more material on one side of the walnut wedge than there is on the other.

MATERIALS LIST

A	Shelf	1 pc.	13/16 × 2¼ × 20⅞
B	Mid-section	1 pc.	1⅛ × 1⅛ × 18¾
C	Scroll	1 pc.	5/16 × 4⅜ × 17¼
D	Peg	5 pcs.	¼ × 1⅝
E	Screws		¾" no. 6

12

FIGURED OAK MAGAZINE STAND

White Oak, Walnut

MAKING THE MAGAZINE STAND

Through tenons completely pierce and, in some cases, extend beyond the outside surface of the board through which they pass. One advantage of this joint over the shorter, more commonly used stopped tenon is increased glue surface.

The through tenon also offers some design opportunities not associated with the stopped tenon. A through tenon can be shaved flush and fit with wedges of contrasting wood, as was done with the through tenons on the ash drying rack pictured in this book (chapter nineteen). Or, as with this magazine stand, the tenons can extend well beyond the outside surface of the board through which they pass and can themselves be given through mortises into which wedges (keys) are driven. These wedges, characteristic of knockdown furniture, provide a mechanical lock for the sides of the case, in addition to adding an appealing visual detail.

After the stock has been thicknessed, ripped to width, and cut to length, lay out and saw the half-circle cutouts that separate the feet and those that form the handgrips with a handheld jigsaw.

Then, cut shelf dadoes. You can do this with a set of dado cutters on the radial arm saw or with a set of cutters on the table saw. At this time, cut the through mortises tor the tusk tenons.

Careful marking is essential. First, using a try square, extend the upper and lower limits of the shelf dadoes around the edges and onto the opposite faces of the end panels. These lines mark the upper and lower limits of the through mortises. Then, mark the widths of these mortises and score their perimeters with a knife held against a straightedge.

This wildly figured oak was perfect for this piece.

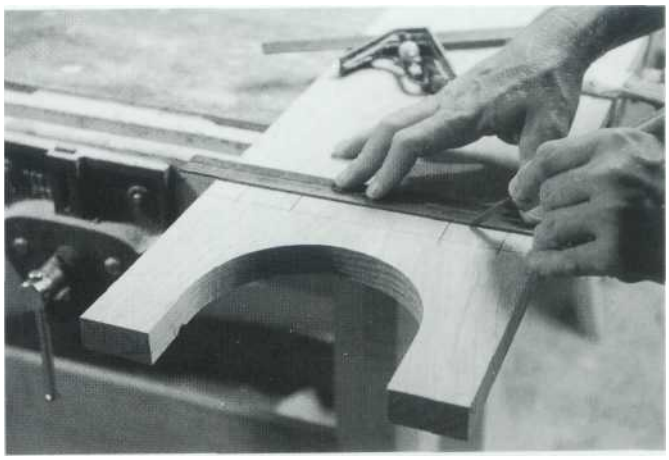
Remember: Aggressive drilling and chisel work can result in chips breaking out around the perimeter of the mortise on the back side of the board. For this reason, use a backup board during drilling, and lay out the mortise on both sides of the board so you can alternate chisel work from one side to the other, working toward the middle.

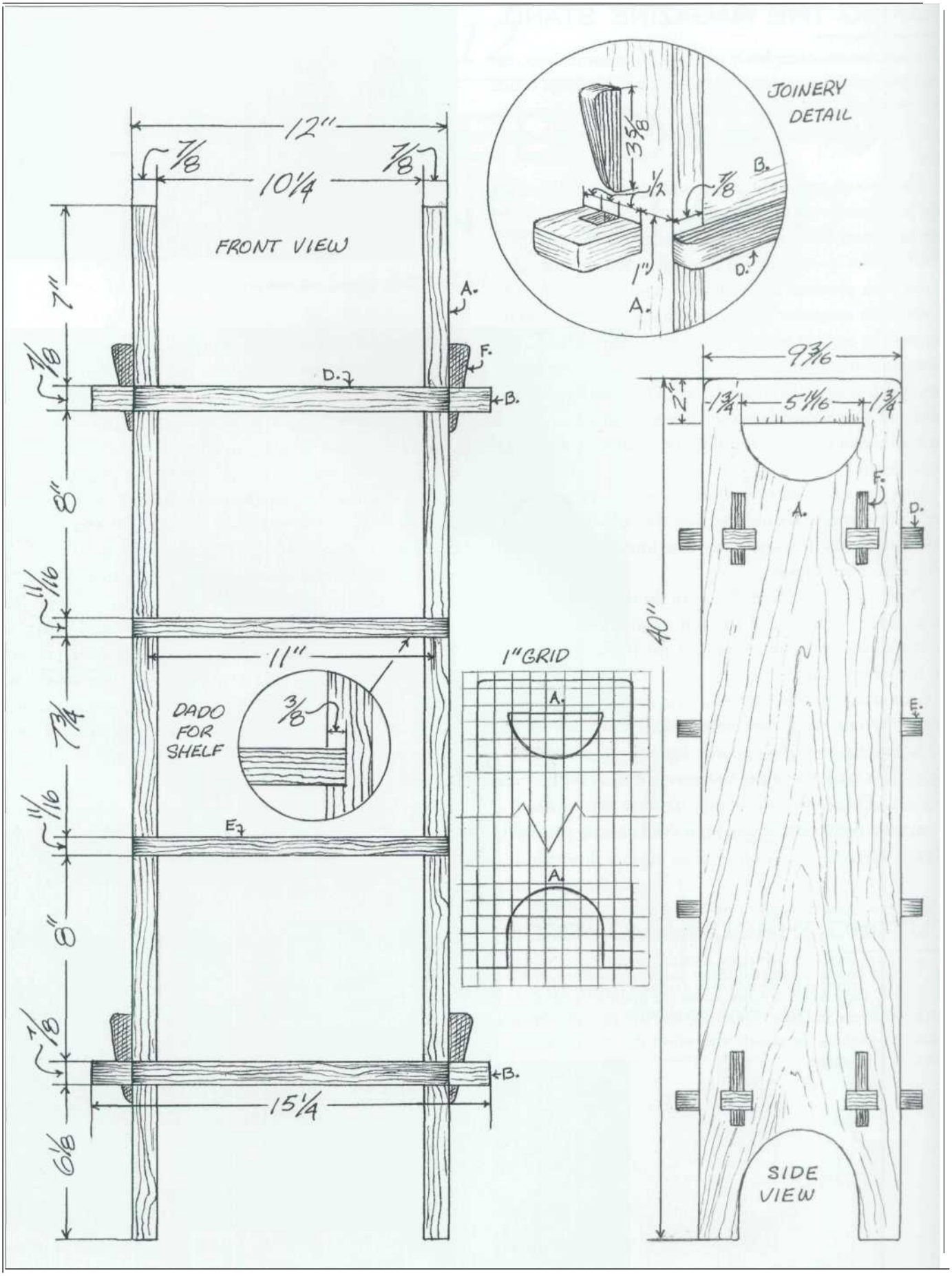
After cutting the mortises and fitting the tusk tenons through them, cut the mortises for the walnut wedges. It's important to dry-clamp the whole assembly tightly before marking these mortises so that they will be correctly located along the length of the tusk tenon. Their placement should cause the wedges to draw the case together as they are driven into their mortises. To achieve this, place the inside edge of the wedge mortise so that it will be approximately 1/8" inside the outside face of the end panel at assembly.

When the wedges have been fit, glue and assemble the case, clamping everything tightly together. After the glue has cured, remove the clamps and apply the walnut shelf-facings. Glue and nail these into place (my choice) or glue them and clamp until dry. The second method eliminates the need to fill nail holes, but it is a bit slower.

CUTTING THROUGH MORTISES

1 Careful layout is essential. After marking locations with a pencil, use a knife to score across the grain only on the perimeter of the mortises. This knife line will provide a reliable means for aligning the chisels with which the mortise will be given its final shape.



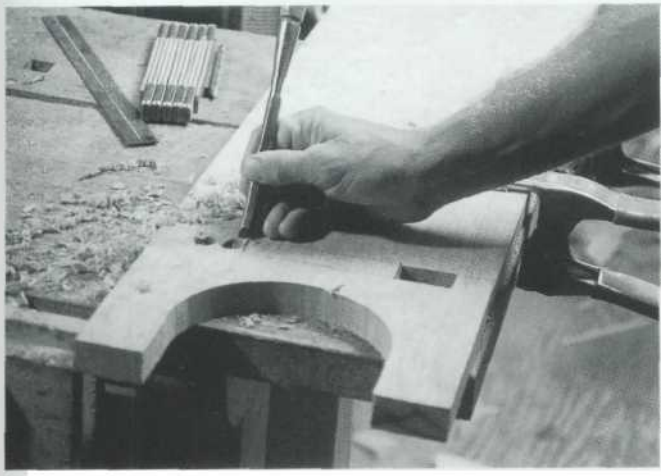

12"
7/8
10 1/4
7/8
FRONT VIEW
7"
A.
F.
D.
B.
7/8
8"
11/16
7"
11"
DADO FOR SHELF
3/8
E.
11/16
8"
7/8
B.
15 1/4
8 1/8
JOINERY DETAIL
3 5/8
1/2
7/8
B.
1"
A.
D.
1" GRID
A.
A.
9 3/16
2"
1 3/4
5 11/16
1 3/4
F.
A.
D.
40"
E.
SIDE VIEW

CUTTING THROUGH
MORTISES (CONTINUED)

2 Then, remove waste with a handheld drill and a Forstner bit.

MATERIALS LIST

A	End	2 pcs.	7/8 × 9 3/16 × 40
B	Top and bottom shelf	2 pcs.	7/8 × 9 3/16 × 15 1/4
C	Middle shelf	2 pcs.	11/16 × 9 3/16 × 11
D	Top and bottom shelf facing	4 pcs.	7/8 × 1 × 12
E	Middle shelf facing	4 pcs.	11/16 × 1 × 12
F	Wedge	8 pcs.	1/2 × 13/16 × 3 3/8

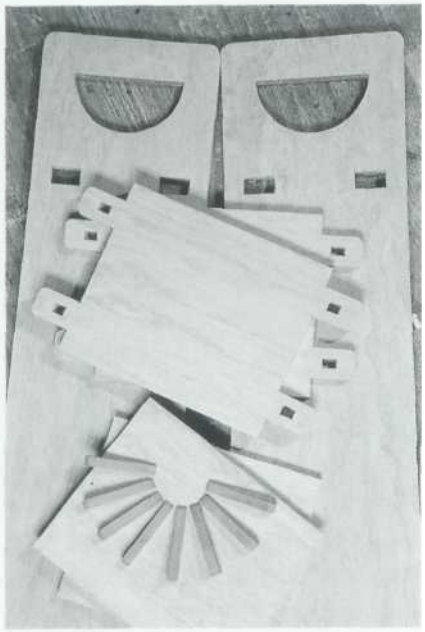


3 With a paring chisel and a wooden mallet, define the walls of the mortise.

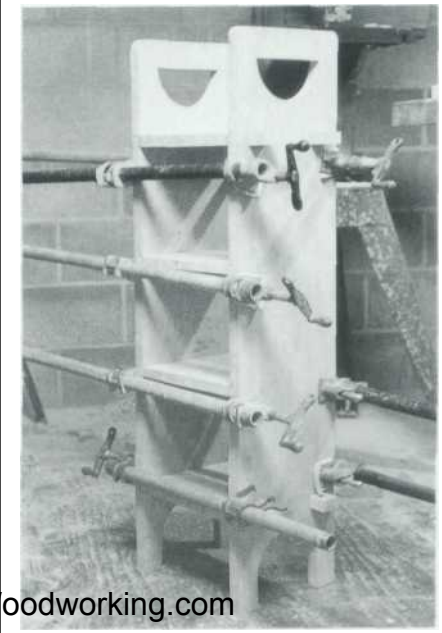
4 Mark the tusk tenons on the upper and lower shelves using the mortises as guides. Then, cut tenons on the band saw.

GLUE-UP

1 Sand parts before assembly, even though additional sanding will be necessary later



2 A large number of clamps are required to bring the case together before you can drive the wedges into place through the tusk tenons.



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13

BOX WITH RAISED PANELS

MAKING THE BOX WITH RAISED PANELS

After the material has been selected and dimensioned, plough grooves on the inside faces of the box's sides and ends to receive the tongues on the edges of the box's top and bottom. Cut dovetails at each of the box's four vertical comers,

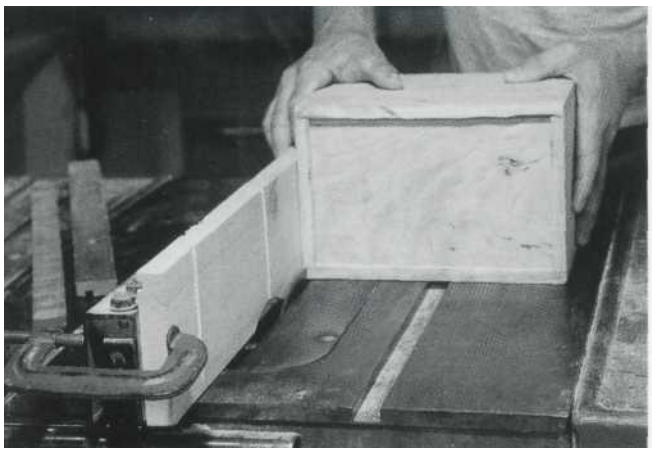
Glue the dovetails and assemble the four walls of the box around the top and bottom. At first, this may seem strange because this makes the box a completely sealed enclosure, allowing no access to the space inside. This problem, however, will be solved very quickly.

Because of the placement of the groove near the top of the inside faces of the front, back and ends, the top panel is already raised 1/8". After the pins and tails at each of the box's vertical corners have been sanded flush, the four vertical panels are raised by cutting a 7/16" X 1/8" pass around all four sides.

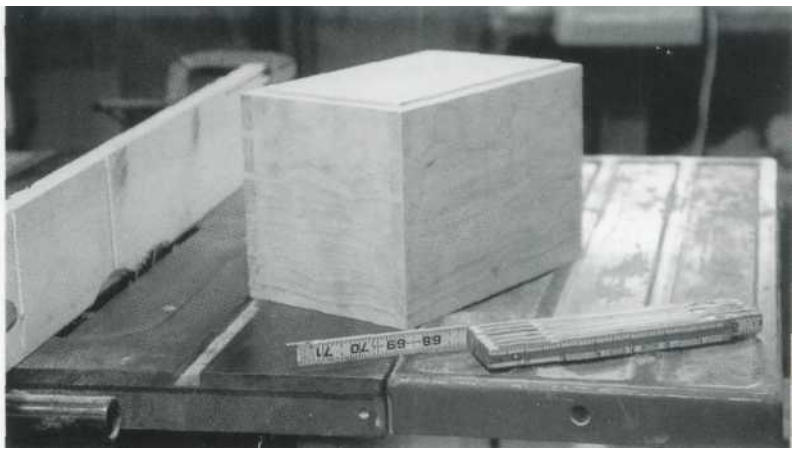
You can do this on either the table saw or on a table-mounted router by removing enough material to give the effect of raising the central portion of each of the vertical panels.

Create a lid by cutting a saw kerf through the four walls of the box $1^{7}/8$" from the top.

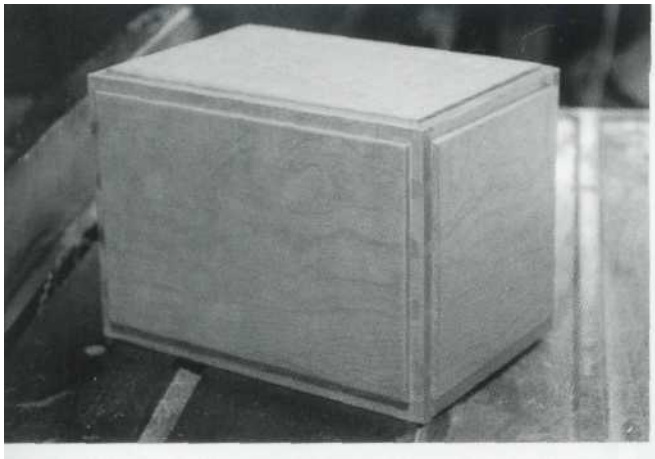
After installing the hardware (see chapter twenty-seven), cut a shallow mortise around the strike plate, and fasten the *1/8"* thick pull into place with glue and a few brads. The box is then ready for sanding and finishing.



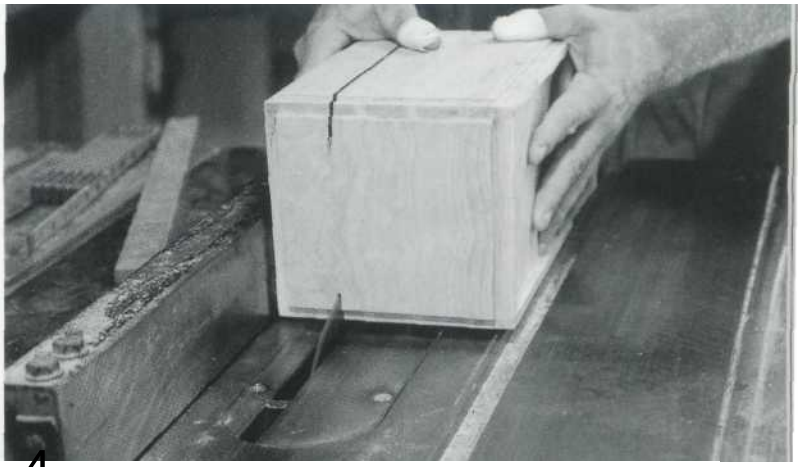
1 Clamp a strip of wood to the saw fence. This wood will protect the blade when the fence is crowded against it. Then, set the blade at a height of 7/16" above the saw table, and bring the fence up to it.



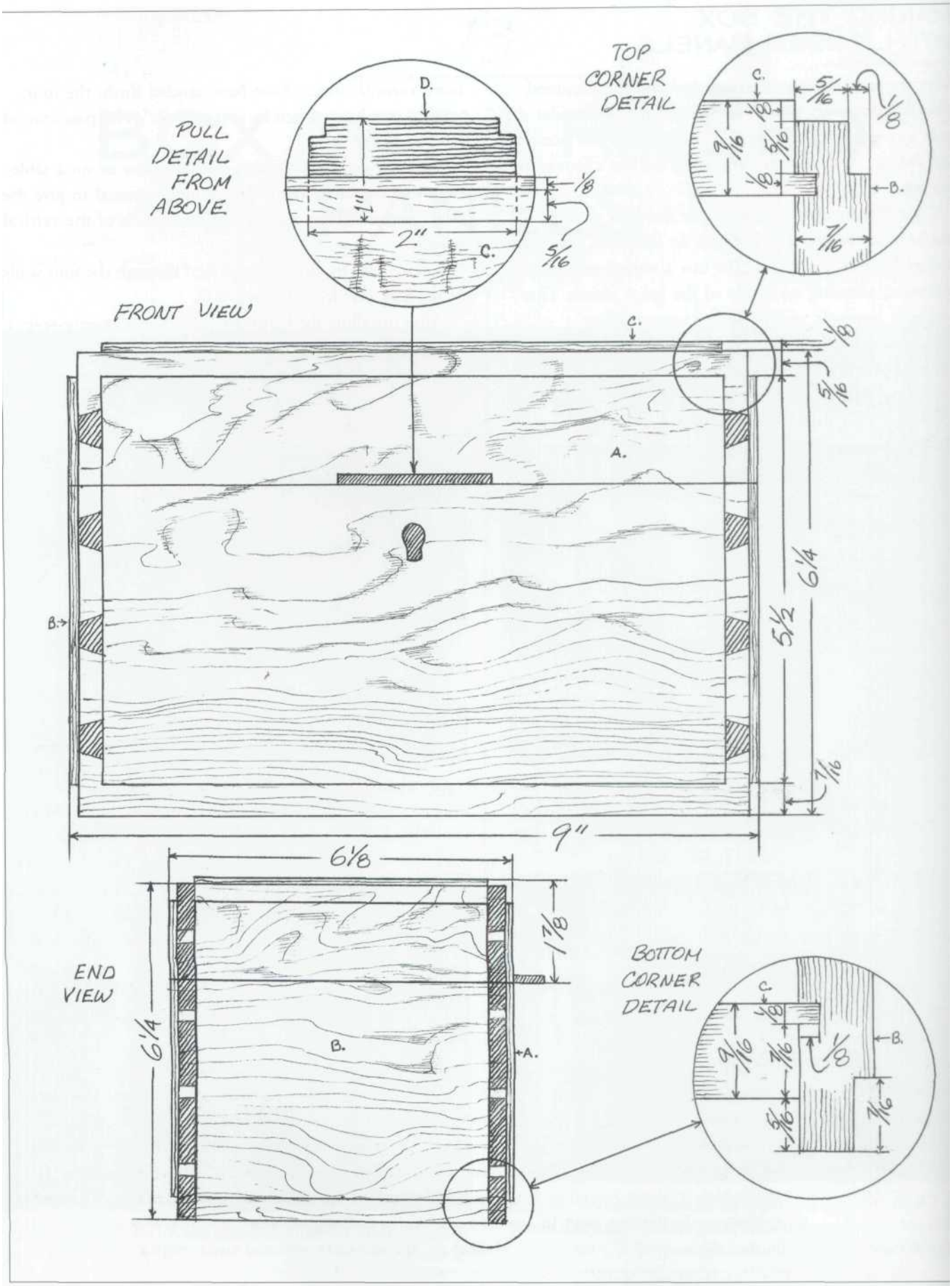
2 The box's four vertical faces are framed by the 7/16" X 3/32" saw kerf created when the perimeter of those faces is passed over the blade.



3 Chisels, files and sandpaper are necessary to remove the grain tear-out and burn marks left along the saw kerfs. (This should bring the saw kerf to its finished thickness of 1/8".)



4 Set the fence 1 7/8" from the blade, cut off the top, creating the lid.



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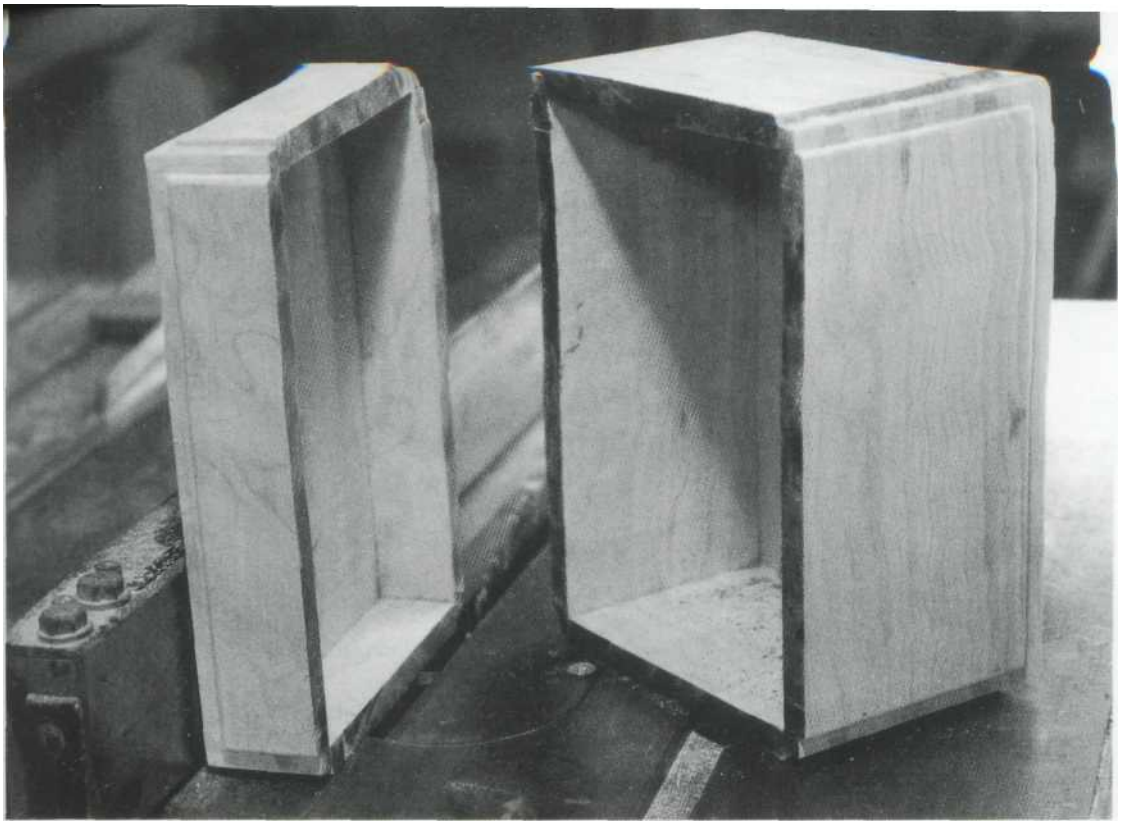

5 Notice the burn marks left by the saw blade. A blade on which the teeth have set won't burn; however, the hollow-ground planer blade is made without set in order to produce a smoother cut and, as a result, often leaves a burned surface.

BURN REMOVAL

I have read that a hollow-ground planer blade can be persuaded to cut without leaving behind the unsightly, blackened surfaces visible in the above photo. I have read that if the blade is razor sharp, free of pitch, and set perfectly parallel to the rip fence, it is possible to cut without burning.

But I haven't been able to manage it.

I clean the blade frequently, and it is kept sharp, and of course I make an effort to properly set the rip fence, but 1 always end up with burned surfaces on one or both sides of the cut.

This could be a result of the fact that machine tool maintenance is not a priority in my shop. Although I have the standard array of power tools, I use them no more than necessary and never take pleasure in their operation. They produce too much noise and too much dirt, making the shop a thoroughly unpleasant place to be.

I have, instead, focused on methods for removing these bum makes from cut surfaces.

Those in the above photo are relatively easy to eliminate. Placing the tip of an extremely sharp 1" butt chisel across the thickness of the blackened wood, I drag the chisel backward (in the direction opposite the bevel) in a scraping motion. Two or three passes removes most of the scorching, in addition to leveling any irregularities left behind by the sawing process. A little work with sandpaper wrapped around a bit of flat scrap then completes the clean-up process.

The scorched areas resulting from the formation of the raised panels on the four sides of this box are a little more difficult. Because the raised panel is immediately adjacent to these flats, they can't be straddled with a chisel. Making the process even more difficult is the fact that the vertical flats on each end of the raised panels run across the grain.

The solution? The only one I know requires patience and a lot of work with a fine-toothed wood file and sandpaper.

I suspect that it would take less time to tune my table saw so that a hollow-ground planer blade wouldn't burn cut surfaces than it does to remove the burn marks afterwards. I suspect that I'm not using my shop time as wisely as I might. But there is a trade-off here. To achieve the overall time savings, I would have resigned myself to several hours of frustrating, knuckle-busting power-tool maintenance, and the truth is that I would rather spend my time scraping and sanding.

MATERIALS LIST

A	Front and back	2 pcs.	7/16 × 6¼ × 9
B	End	2 pcs.	7/16 × 6¼ × 6⅛
C	Bottom and top	2 pcs.	9/16 × 5½ × 8⅜
D	Pull	1 pc.	⅛ × 2 × 1
E	Hinges	2 pcs.	1½ × ⅞
F	Box lock	1 pc.	1½ × 1

*These are net measurements. A surplus should be added to dovetailed parts to allow joints to be sanded flush.
*Hinges and lock were ordered from Constantine's Hardware.

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16

CHIPPENDALE MIRROR

Cherry, Walnut

MAKING THE CHIPPENDALE MIRROR

Although not a reproduction of any specific eighteenth-century original, this mirror does evoke a number of Chippendale designs.

Begin construction with the scrollwork background. After the pieces have been band sawn and sanded, assemble them with butt joints and hold in place with a pair of cleats which are glued and screwed across the back of the scrollwork. At that time, take measurements for the large moulding which lifts and presents the glass.

This close-up shows how the scrollwork, tack strip and cleat are assembled.

Working with these measurements and the available shaper cutters and router bits, you can determine the moulding's profile. After the stock has been run, miter the four pieces of the moulded frame to length and screw into place. Complete finishing before installing the mirror to avoid sullying its surface. Tack four wood strips to the back, inside face of the moulding, to hold it in place.

MATERIALS LIST

A	Vertical scrollwork	2 pcs.	½ × 2¼ × 24¼
B	Top scrollwork	1 pc.	½ × 6⅞ × 14⅛
C	Bottom scrollwork	1 pc.	½ × 4¾ × 14⅛
D	Horizontal moulding	2 pcs.	1¼ × 1¼ × 14⅞
E	Vertical moulding	2 pcs.	1¼ × 1¼ × 19½
F	Cleat	2 pcs.	5/16 × 1½ × 16⅛
G	Vertical tack strip	2 pcs.	¼ × ½ × 17 9/16
H	Horizontal tack strip	2 pcs.	¼ × ½ × 12⅞
I	Mirror back	1 pc.	⅛ × 12⅞ × 17 9/16
J	Mirror	1 pc.	Exact measurements should be taken after the frame has been constructed.

CHIPPENDALE

What are the characteristics of Chippendale furniture?

In the strictest sense, the only furniture that can be identified as Chippendale is that to which Thomas Chippendale, the English carver and designer actually applied his tools. But there are few such pieces and many that are commonly (and usefully) referred to as Chippendale.

Another approach reserves the Chippendale name for those pieces that are exact representations of his published drawings. But this, too, is very limiting, particularly when discussing furniture made in North America. While there are a handful of American-made pieces which accurately represent specific Chippendale designs, the overwhelming majority of American-made Chippendale furniture does not—for some very good reasons.

Thomas Chippendale, George Hepplewhite and Thomas Sheraton—the English designers whose seminal books inspired much American period furniture—all designed for a different market than that served by most American craftsmen of the day. Many of the English designs were intended for placement in grand English homes and included, therefore, elaborate ornamentation that was inappropriate for less palatial American settings (and perhaps for less effete American sensibilities).

This doesn't mean that discriminating American buyers weren't concerned about the appearance of their furniture. Clearly they were, but what those buyers wanted was furniture that not only looked good but was also, and most importantly, useful. They wanted storage, serving surfaces, beds. In short, they wanted furniture in which function and form were more fully integrated.

To address this desire on the part of their customers, American designers/craftsmen reinterpreted the forms presented in the books of the English designers, restraining the decorative excesses of the originals, focusing on the usefulness of their furniture in the homes of their customers.

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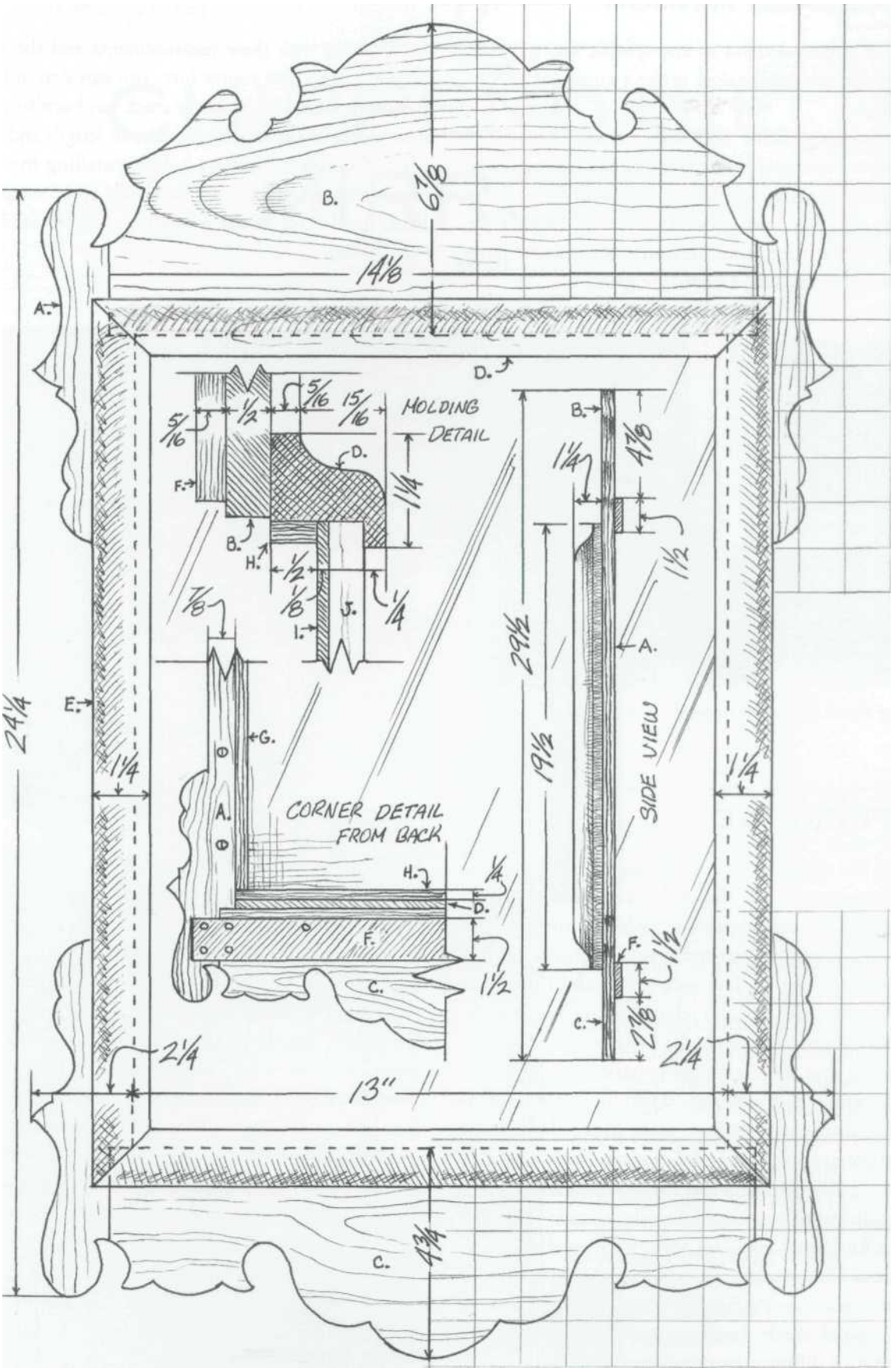

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This makes stylistic attribution a slippery business. Even though almost all high-style American furniture of the late eighteenth and early nineteenth centuries exhibits characteristics of Chippendale, Hepplewhite and Sheraton designs, very little actually represents any specific published drawings. Further complicating the business of stylistic attribution is the fact that many pieces exhibit characteristics of more than one style. A sideboard might have a spade foot (a Hepplewhite signature) and a gallery of turned spindles (associated with Sheraton's designs). A chair might have a balloon back and solid splat (Queen Anne) and ball-and-claw feet (Chippendale).

In the hands of a skilled craftsman, such blending is unimportant. A well-designed chair is a well-designed chair whatever the origins of its iconography.

But for the student of furniture, it can be useful to look at this matter of stylistic attribution—not to fasten a particular label on a particular piece but in order to reflect on the American designer/craftsman's handling of the forms and motifs with which he worked.

With that in mind, I put together the following chart:

STYLE CHARACTERISTICS

This chart is not intended to list all the elements of any of these styles. It is meant only to illustrate ways in which one style might be differentiated from another.

	CHIPPENDALE	HEPPLEWHITE	SHERATON	EMPIRE
form	syma curve	geometrical curvilinear	geometrical rectilinear delicate	massive
ornament	carving scrollwork	stringing veneering inlay	turning bandings carving reeding	carving veneering ormolu
motif	cabriole leg ball-and-claw foot	spade foot tapered legs	turned and tapered legs	animal feet animal heads

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14

SHAKER-STYLE PEDESTAL STAND

Cherry, Walnut, White Pine

MAKING THE SHAKER STYLE TWO DRAWER PEDESTAL STAND

After the stock has been dimensioned, glue-up the top panel and set aside to cure. The pedestal is turned next.

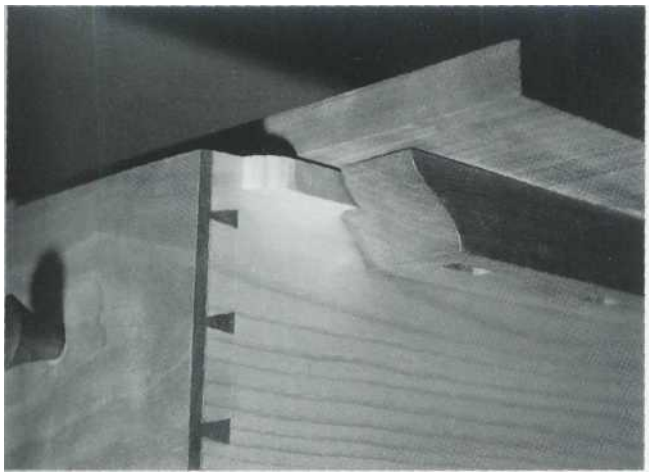
Although the arrangement of coves, beads and vases will be determined by the craftsman's individual tastes, there are two areas along the length of the pedestal that must be shaped to meet the requirements of joinery.

The first of these is the very top section, the one that will eventually become the tenon fitting into a mortise cut into the center cleat. In order to create at this location a joint that would lock more positively than would a round tenon in a round mortise, I decided to cut that tenon into a l"X 1" square. This meant that the diameter of that top section could be turned to no less than 1 7/16″.

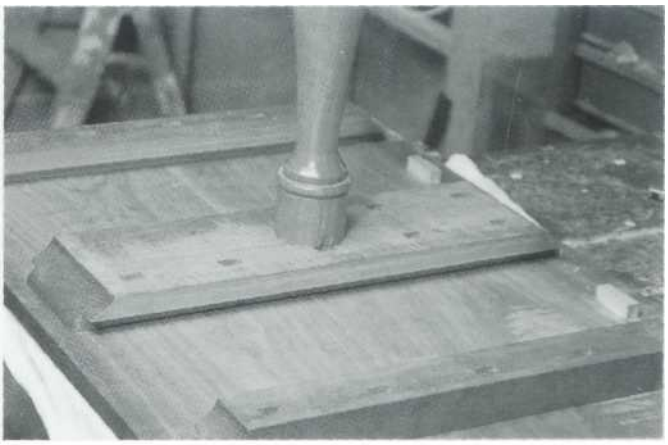
The second area requiring special attention is the base into which the tenons (or sliding dovetails) are fit. The exact diameter of this section is, of course, up to the discretion of the individual craftsman, but it is very important that a consistent diameter be maintained along the full 5 1/4"

The walnut drawer pulls contrast nicely with the cherry drawer fronts.

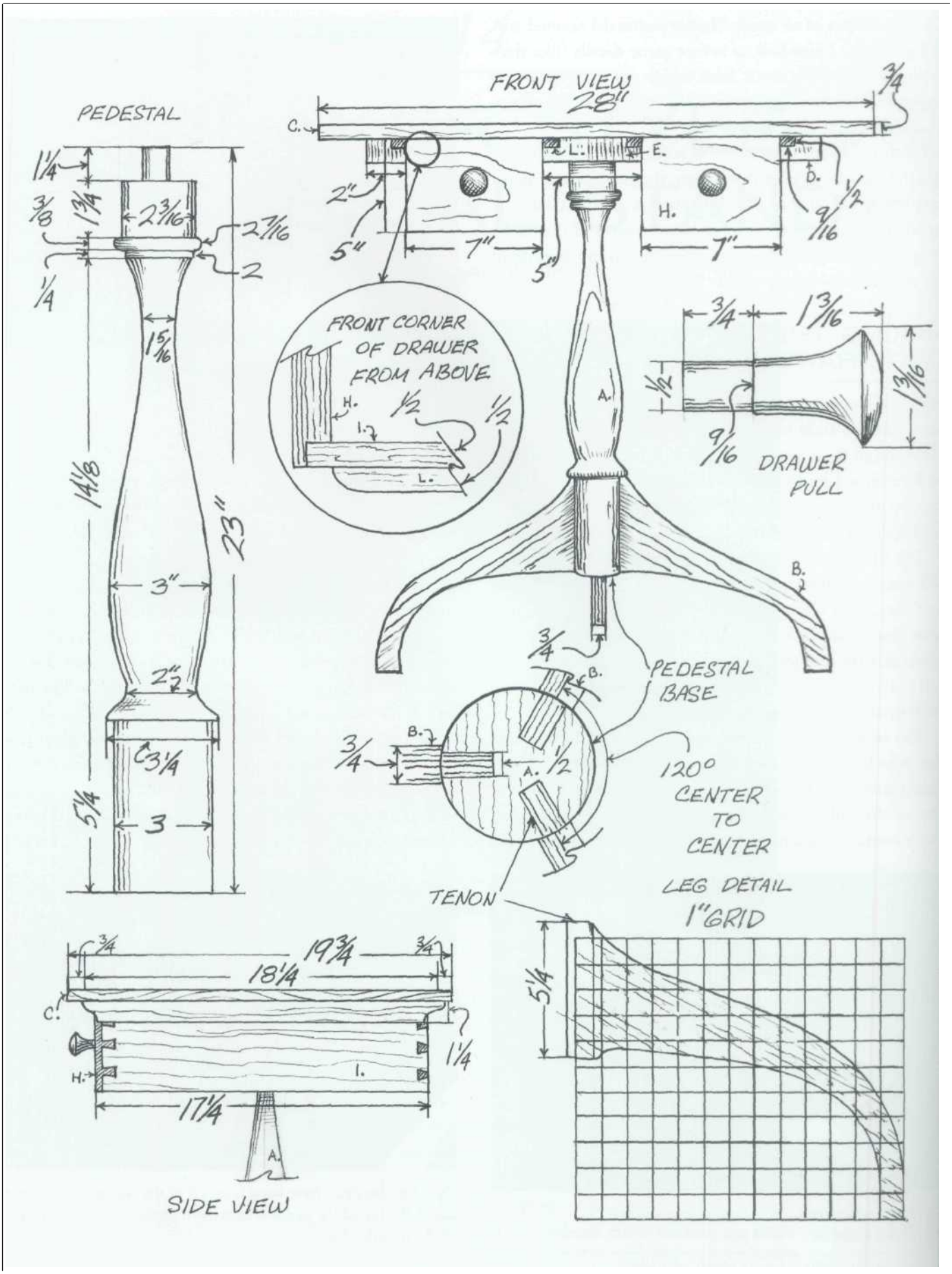
length of this section because the shoulders of the three legs will be fit tightly against this turned face, and any variation in diameter will result in gaps at those shoulders. The next step, which is taken before the work is removed from the lathe, is marking leg locations on the base of the pedestal. This can be done by using the lathe's indexing head. Briefly, an indexing head is a disk centered on the lathe's axis that is divided into thirty-six sections, each representing 10° of the disk's circumference. On my lathe, there is a spring-loaded peg that can be set into any of thirty-six holes marking these divisions. To locate the centerline of the first leg, I release the peg into any of the holes, locking the work into that position. Then, with the tool rest snugged against the base of the pedestal, I draw a line along the 5 1/4" base. This line marks the centerline of the first leg. To find the second line, I remove the peg, rotate the work, allowing the peg to slide into the next



1 Here, a drawer runner can be seen sliding into its rabbet.



2 After the cleats have been fastened to the top, glue the tenon at the top of the pedestal into the mortise cut into the center of the middle cleat.


PEDESTAL
FRONT VIEW
28"
3/4
C.
L.
E.
D.
H.
2"
5"
7"
5"
7"
1/2
9/16
1 1/4
3/8
1 3/4
2 3/16
2 7/16
2
1/4
1 5/16
14 1/8
23"
3"
2"
3 1/4
5 1/4
3
FRONT CORNER OF DRAWER FROM ABOVE
H.
1/2
1/2
I.
L.
A.
3/4
1 3/16
1/2
1 3/16
9/16
DRAWER PULL
B.
3/4
B.
PEDESTAL BASE
3/4
B.
A.
1/2
120°
CENTER
TO
CENTER
TENON
LEG DETAIL
1" GRID
5 1/4
3/4
19 3/4
3/4
18 1/4
C.
1 1/4
H.
I.
17 1/4
A.
SIDE VIEW

hole. This process is repeated until I have worked my way to the twelfth hole. Here, I draw another line along the tool rest, marking the centerline of the second leg. Then, counting out twelve more stops on the indexing head, I arrive a: the centerline for the third leg.

Although the indexing head simplifies the process of dividing the circumference of the pedestal base into three equal sections, there is an alternative requiring only a compass, a pair of calipers and a rule. First, with the calipers and a rule, determine the diameter of the base. Then, multiply half of that diameter by 1.732. Separate the points of the compass by this distance, and position the stationary leg of the compass at any point on the cylinder's circumference. Make a line along the tool rest at that point. Then, make a second line at the point at which the opposite leg of the compass is farthest from the first line. Then advance the compass so that its stationary leg rests on this second line. Finally, draw a third line along the tool rest where the opposite leg of the compass is farthest from the second line, completing the process of dividing the circumference of this cylinder into three equal sections.

Fit the three legs of this stand into $5^{1/4}$" long sliding dovetails cut into the base of this pedestal. To this point, I've cut the joints on every pedestal table I've made by hand, and it is inevitably a laborious process. To cut the dovetail mortise, I place the pedestal between 1 "-thick blocks of Styrofoam held in place by a towel wrapped in tape, securing the entire, awkward assembly in my vise. This method works but it is slow and a bit clumsy.

The dovetail tenons are even more difficult to cut. I begin these by scoring lines which mark the shoulders on the faces of the 3/4"-thick legs. Then, crowding the teeth of a fine-toothed backsaw against the waste side of this line, I cut the shoulders. Complicating this process even further is the fact that the shoulders have to be undercut so that they form a sharp knife-like edge. This is necessary so the shoulders make tight contact with the round base. Maintaining an accurate alignment along the full 5 1/4" length of these shoulders is very tricky, but not as tricky as cutting the face of the dovetail. This cut begins on the end grain of the leg and, like the shoulder, was a full 5 1/4" long. The saw delights in wandering to one side.

After having made several of these stands with hand-cut sliding dovetails, I'm ready to suggest some alternatives. First, if I were to make another with the dovetail joints, I would take the time to build a fixture that would allow the dovetail mortises to be cut with a router while the pedestal is still mounted on the lathe. A reeding or fluting fixture would work nicely for this purpose. The tenons, of course, could be readily cut on a table-mounted router.

But I really believe that, if I were to make another of these stands, I would drop the dovetail joints and switch to mortise-and-tenon construction. Not only would this be much easier to cut, it would, I think, result in no loss of strength since it would provide an equal amount of glue surface and, at least in this particular application, there is little mechanical advantage to the dovetail joint

MATERIALS LIST

Table			
A	Pedestal	1 pc.	3¼×23
B	Leg	4 pcs.	¾×5¼×18
C	Top	1 pc.	¾×19¾×28
D	Outside cleat	2 pcs.	1¼×2×18¼
E	Middle cleat	1 pc.	1¼×5×18¼
F	Drawer stop	2 pcs.	½×½×¾
G	Screws	various	
Drawers			
H	Front	2 pcs.	¾×5×7
I	Side	4 pcs.	½×5×17¼
J	Back	2 pcs.	½×5×7
K	Bottom	2 pcs.	½×4½×17
L	Runner	4 pcs.	½×½×15¾
M	Pull	2 pcs.	1 3/16×1 5/16
N	Screws	various	

**These are net measurements. A surplus should be added to dovetailed parts to allow them to be sanded flush.*

After profiling the legs on the band saw and fitting their tenons into the mortises cut into the pedestal, flatten and smooth the tabletop (see chapter five) and cut to its final length and width. Then, profile the ends of the cleats on the band saw, and cut rabbets for the drawer runners.

Using a backsaw, cut the tenon at the top of the pedestal to its 1"X 1" final size. Cut a matching mortise into the center of the middle cleat. Dry-fit this to the tenon.

At this point, fasten cleats to the bottom of the tabletop using no. 12 wood screws passing through oversized holes (holes that will allow the top to expand and contract in response to seasonal changes in humidity) in the cleats.

Build the drawers with through dovetails at the back and half-blind dovetails at the front. Screw drawer runners to the tops of the drawer sides and fit them to the rabbets in which they will slide. Turn and install pulls. Fasten drawer stops (two blocks of wood screwed to the underside of the top) into place. The piece is ready to finish.

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15

WALL BOX

Hard Maple

MAKING THE WALL BOX

After the material has been dimensioned, lay out the scroll-work on the back. Once the location of the top circle is established but before the scrollwork is cut out on the band saw, cut a dado across the grain on the back side of this circle. This dado should extend well below the narrow throat on which the top circle is resting. Fit a strip of vertically grained wood into that dado and fasten with 3/8″ no. 4 wood screws. Then, cut out the scrollwork.

After establishing the angle for the two sides, cut the top edge of the front to match. You can do this on the table saw by ripping the piece to width on a blade canted at the proper angle, but I find it quicker to create that angle with a few strokes of a hand plane. Use a bevel gauge to check progress during this operation.

Remember that the angle on the box's front piece is not cut to match the height of the sides at their front most point because the highest point of the angle on the front piece will join the sides 7/16" back from the frontmost point. The 7/16" measurement allows 3/8″ for the thickness of the dovetail joint, plus a 1/16" surplus which will be sanded away to make the joint flush.

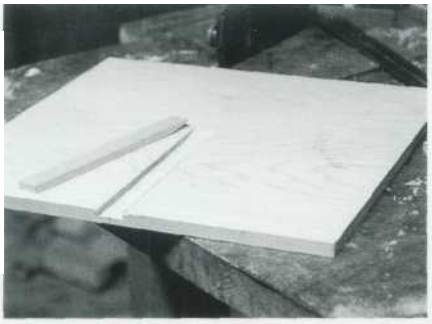
Cut the dovetails at each of the box's corners. After sanding these flush, give the bottom of the box and the lid shaped edges on a shaper or a table-mounted router. Install the bottom with wood screws passing through over-sized holes in the bottom. These holes are oversized to allow the part to expand and contract in response to seasonal changes in humidity.

The narrow top, to which the lid will be hinged, is the next consideration. Form the angled front edge, which will abut the angled back edge of the lid, with a hand plane. Then fasten it to the case with several screws passing through the back of the box. Although 1 felt it unnecessary because of the top's narrow width, this part might be more securely fastened by installing some short glue blocks underneath the joint between the top and the sides of the case.

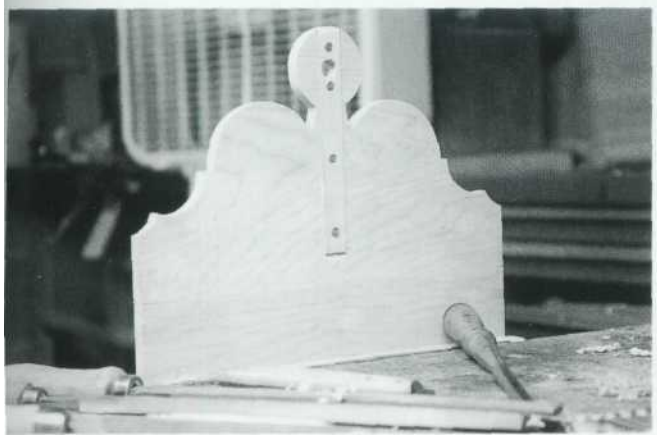
Using a hand plane, fit the back edge of the lid to the angle already established on the front edge of the box's top. Do this gradually so that it can be fit against the front edge of the top without gapping at the ends.

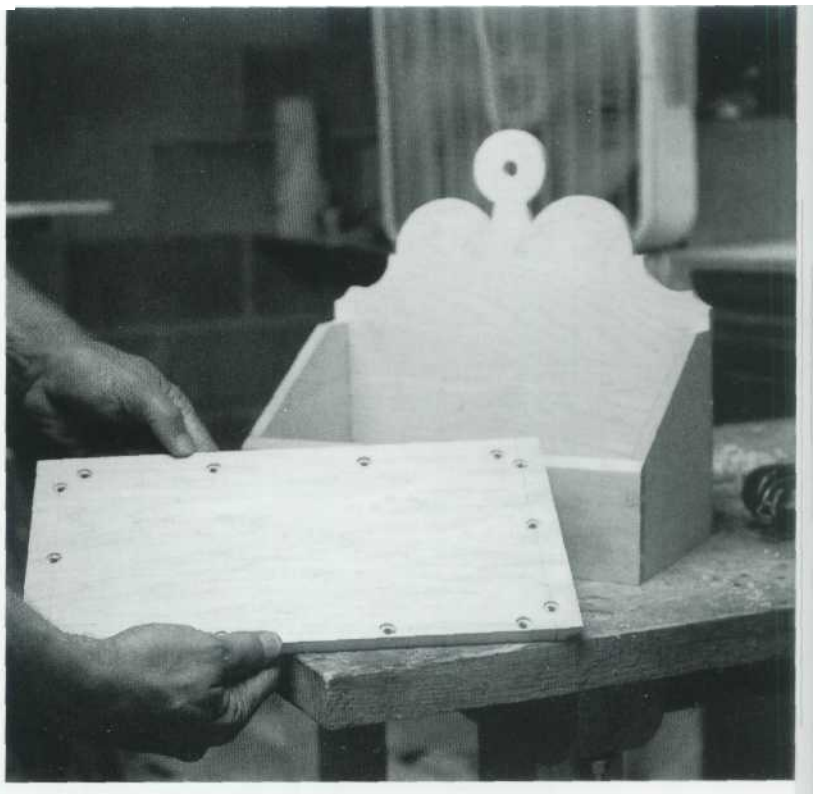
Next, install the hinges. The pair shown in the photo are Brainerd antique brass hinges from which the tails on the upper leaves have been cut to allow those upper leaves to fit on the narrow width of the top of the box.

Remove the hinges and give the box a final sanding and several coats of finish.



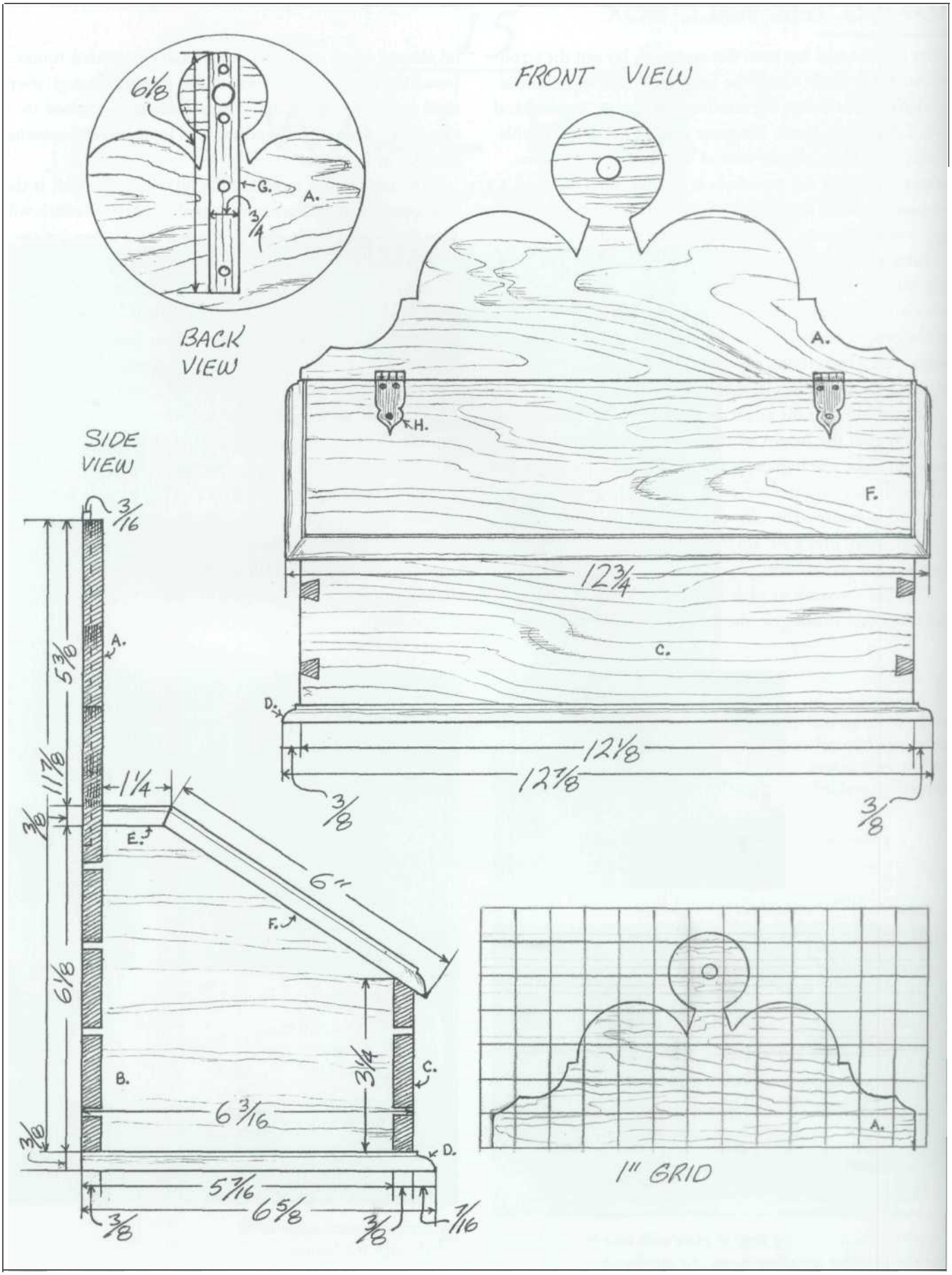
1 Butt this wide, straight edge up to the fence on the radial arm saw and | cut the dado before the back is profiled.

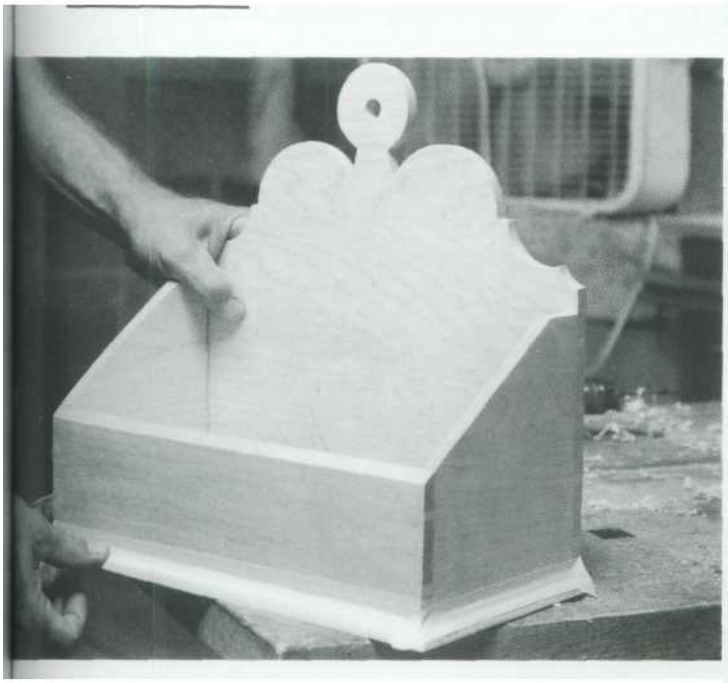




2 Hold the reinforcing strip in place with four 3/8" no. 4 wood screws. After installing it, cut the scrollwork.

3 Drill oversized screw holes through the bottom.


FRONT VIEW
6 1/8
G.
A.
3/4
BACK VIEW
A.
H.
F.
12 3/4
C.
D.
12 1/8
12 7/8
3/8
3/8
SIDE VIEW
3/16
5 3/8
A.
1 7/8
3/8
1 1/4
E.
6"
F.
6 1/8
3 1/4
C.
B.
6 3/16
3/8
D.
5 7/16
6 5/8
3/8
3/8
7/16
A.
1" GRID



4 Hold the bottom in place with masking tape while driving the screws up into the box's frame.

5 With the box held upside down in a vise, fasten the bottom.

6 Check frequently to ensure that the top and the lid will come together without gaps.

MATERIALS LIST

A	Back	1 pc.	⅜ × 11⅞ × 12⅛
B	Side	2 pcs.	⅜ × 6⅛ × 6³⁄₁₆
C	Front	1 pc.	⅜ × 3¼ × 12⅛
D	Bottom	1 pc.	⅜ × 6⅝ × 12⅞
E	Top	1 pc.	⅜ × 1¼ × 12¾
F	Lid	1 pc.	⅜ × 6 × 12¾
G	Reinforcing strip	1 pc.	³⁄₁₆ × ¾ × 6⅛
H	Hinge	2 pc.	3¼ × ½
I	Screws	14 pcs.	¾″ no. 6

**These are net measurements. A surplus should be added to dovetailed parts to allow them to be sanded flush.*

17

HEPPLEWHITE-STYLE END TABLE

Cherry, Birch, White Pine

MAKING THE HEPPLEWHITE" STYLE END TABLE

Select plane, joint and edge-glue material for the top.

Set aside the top panel, and prepare the legs. First, dimension the leg stock to 15/16″ *X 15/16".* Then mark and cut the mortises for the apron parts and the drawer rails, and draw the taper on the leg stock with a pencil.

On the face of the leg that will be seen from the side of the table, the legs taper from ^{15}/i6" at the lower limit of the apron to 1/2″ at the floor. On the face of the legs that will be seen from the ends of the table, the legs taper from *5/16" to 3/8"*

Cut the tapers on the band saw; clamp the leg in a vise so that saw marks can be removed with a hand plane.

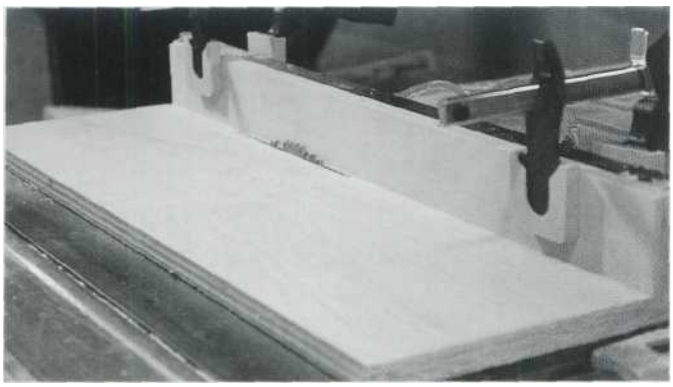
Cut out and tenon apron parts and drawer rails. Fit these tenons into the leg mortises which are placed so that the outside faces of the apron parts are recessed 1/8″ from the outside faces of the legs. Set the drawer rails, on the other hand, so that their outside faces are flush with the outside faces of the legs. Then, glue-up the frame—consisting of the apron parts, the drawer rails and the legs.

Remove the tabletop from the clamps, and surface' it with hand planes and sandpaper, a process discussed in chapter five.

Next, cut the grooves for the inlay. You could make these with a router, but I cut the grooves on this top on a table saw fit with a hollow-ground planer blade. This blade is made without set and with a thin-ground rim. As a result, it leaves a 3/32" saw kerf with sharp, clean edges.

Rip out the birch inlay itself using the same planer blade passing through a combination wood fence and throat that is clamped to the saw's steel fence. Glue the inlay into its grooves; plane and sand flat.

Because the top will expand and contract across its width in response to seasonal changes in humidity, fasten it to the table frame with wood screws passing through oversized holes in the kicker strips. (The kicker strips are the two cleats above the drawer sides that keep the front of the drawer from dropping as the drawer is opened.) The over-sized holes in the kicker strips will allow wood movement without splitting the top.



Shown here is the combination fence and throat I use for ripping inlay and cock bead.

This close-up of the drawer side shows the cock bead inlay around the drawer.

Drawer construction is standard. Use through dovetails at the back of the drawer and half-blind dovetails at the front. (Both joints are discussed in chapter twenty-five.)

Rip strips for the ^{3}/32" cock bead (thin, mitered strips framing the drawer front) from $^{7/8}$" birch stock. Next, plane them. To round the front edge of the cock bead, clamp the strips of *3/32"* planed stock in a vise between thicker, wider boards so that approximately 1/4" sits above the clamping boards along the full length of the strips. Then with a block plane, remove enough material to round the front edges of the strips.

Next cut rabbets for the cock bead. This operation is done on the table saw, again using a hollow-ground planer blade. The blade is set to a height 1/8″ less than the width of the cock bead (5/8")• Then, with the blade crowded against a wood fence, take a single pass from the top, bottom and both ends of the drawer which stands on its front end.

This cuts a rabbet 3/32" wide which is equal to the thickness of the cock bead. With brads and glue, fasten the mitered cock bead to the drawer front so that its rounded edge stands 1/8" proud of the face of the drawer front.

After installing the drawer runners and stops, the table is ready for finishing and hardware.

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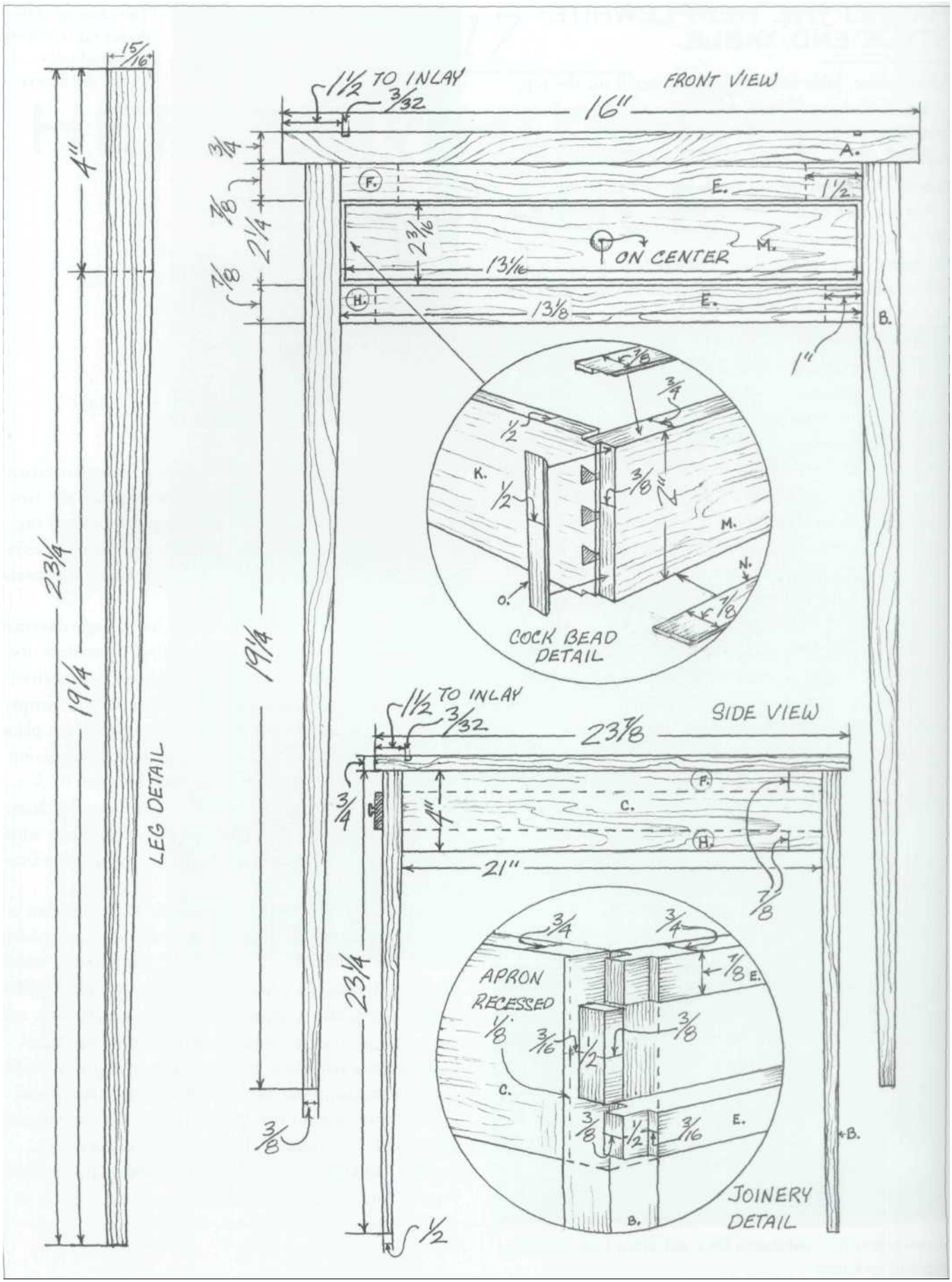


www.TedsWoodworking.com

Almost 150 pages of Thomas Sheraton's *The Cabinet-Maker and Upholsterer's Drawing Book*, a collection of some of the most influential furniture designs ever published, is focused on geometry, including almost thirty pages on the five classical orders of proportion taken from the five types of Roman columns: Tuscan, Doric, Ionic, Composite and Corinthian.

This lengthy exposition on the subjects of geometry and proportion highlights the importance of formal design education to the makers of period originals. This is an education that many modern designers/craftsmen lack. Some contemporary woodworkers, guided by enormous natural talent, seem unhindered by this absence. Others, however, lacking both the talent and the education, are creating furniture which, while well-crafted, is often clumsy in appearance.

Although not guided by either an enormous natural talent or by a classical design education, I've found that, in order to do business, it has been necessary for me to design work to suit my customer's needs. What follows is a list of commonsense principles I've found useful:

1. *Steal from the past.* Wood furniture has a history that stretches back at least five thousand years, and throughout that span designers and craftsmen have struggled with the same question confronting wood workers today: How can chairs, beds, tables and chests be designed so that they are both beautiful and useful?

Clearly, no single answer to this question is perfect. If it were, we would have only one style of bed, chair or table. But many of the hard-won solutions created by our predecessors are worthy of study and emulation.

2. ***Take chances.*** Particularly at the pencil and paper stage, the most bizarre ideas deserve consideration be cause, although they may never be translated whole into actual pieces of furniture, a careful examination may reveal things that can be incorporated into more tradi tional forms.

3. ***Consider aesthetics and joinery simultaneously.*** Often, designs that look spectacular on paper simply can't be created from wood, a natural material with a whole range of characteristics that must be considered each time one wood part is joined to another.

4. ***Develop graceful lines.*** When I designed the two-drawer sewing stand (after several Shaker originals), I worked to create a curve in the legs that would move smoothly into the curves of the pedestal. I hoped this would lift the eye to the tabletop and drawers, as well as produce a line that was inherently satisfying to contemplate.

5. ***Repeat motifs.*** Repetition of a shape, pattern or color can give a piece both rhythm and unity. On the six-drawer chest, for example, the cone shape of the pulls is repeated six times across the front of the drawers, adding visual rhythm in much the same way that a repeated drumbeat can add auditory rhythm to a piece of music. Also, that tapered cone shape is repeated in the four legs that support the chest, assuring the viewer that all these parts belong to the same piece.

6. *Incorporate exposed joinery.* *A* set of dovetails marching across the corner of a piece not only adds rhythm (see photo on page 26), it also adds an appealing

MATERIALS LIST

Table		
A Top	1 pc.	¾ × 16 × 23⅞
B Leg	4 pcs.	1⅝ × 1⅝ × 23¼
C Apron side	2 pcs.	¾ × 4 × 22[1]
D Apron end	1 pc.	¾ × 4 × 14⅛[1]
E Drawer rail	2 pcs.	⅞ × ¾ × 14⅛[1]
F Kicker strip	2 pcs.	⅞ × 1½ × 21
G Cleat	1 pc.	⅞ × 1½ × 10
H Drawer runner	2 pcs.	⅞ × 1 × 21
I Inlay		3/32 × 3/32 × 7 linear feet
Drawer		
J Bottom	1 pc.	½ × 12⅝ × 15¾
K Side	2 pcs.	½ × 2 3/16 × 16⅛
L End	1 pc.	½ × 1⅝ × 13 1/16
M Front	1 pc.	¾ × 2 3/16 × 13 1/16
N Horizontal cock bead	2 pcs.	3/32 × ⅞ × 13 1/16
O Vertical cock bead	2 pcs.	3/32 × ½ × 2 3/16
P Pull	1 pc.	½ × ½

[1] *Includes ½" tenon on each end.*

**Net measurements are given. A surplus should be added to the lengths of dovetailed parts to allow them to be sanded flush.*

**Drawer height and width are 1/16" less than the height and width of drawer opening. This allows 1/32" of clearance on all four sides.*

**The pull was ordered from Constantine's Hardware.*

visual detail, which arrests the eye, satisfying its hunger for interesting shapes and patterns.

7. *Adapt stock thickness to the scale of the piece.* Smaller, more delicate pieces require stock dimensioned to a greater thinness. A plate rack that is elegant when built from 3/8″ material is brutish and clumsy when built from $^{7}/8$" stock.

8. ***Use beautiful materials.*** Yes, hardwood—particu larly figured hardwood—is expensive, but the simplest pieces (the Shaker document chest, for example) are enormously appealing when built with beautiful material.

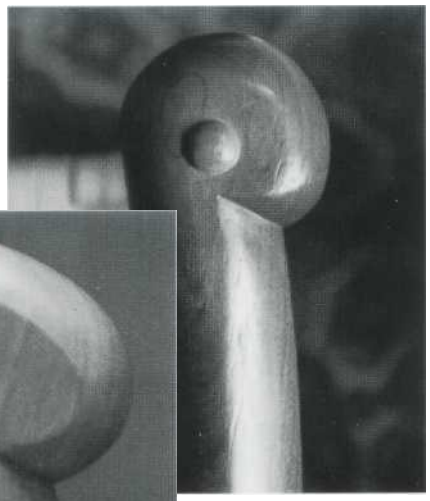
9. ***Use contrasting materials.*** A desk made entirely of walnut heartwood can be very attractive. But imagine that same desk with curly maple drawer fronts or with streaks of walnut sapwood showing like jagged lightning across the top.

10. *Recognize that design is as much an evolution ary process as a revolutionary process.* Rather than focusing on sweeping changes that might be made to the form of a chair, bed or chest, a designer might be better served by focusing on small, incremental changes which, over time, might add up to something significant.

DESIGN EVOLUTION

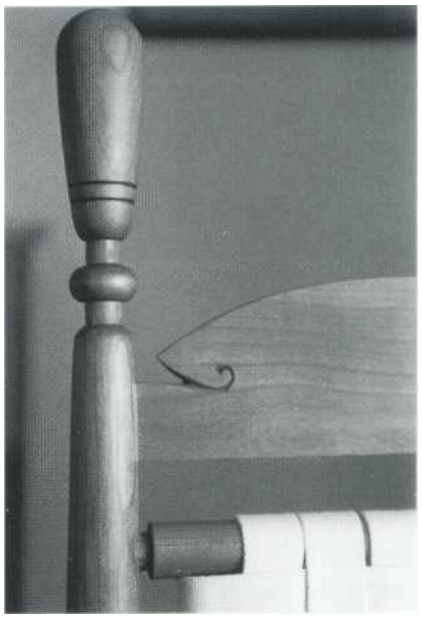
These photos illustrate the evolutionary development of an arm shape I've used on many Shaker-style chairs.

1 The first photo shows one of my earliest attempts to elaborate on the cookie-cutter shapes of the Shaker original.



3 The last two photos show details of a more recent chair.

2 The second shows an arm that's been widened and given a more distinct form.



4 The incised curve on the top of the arm now reaches to the wedged through tenon at the top of the chair's front post, a shape that recurs on the chair's slat.

18

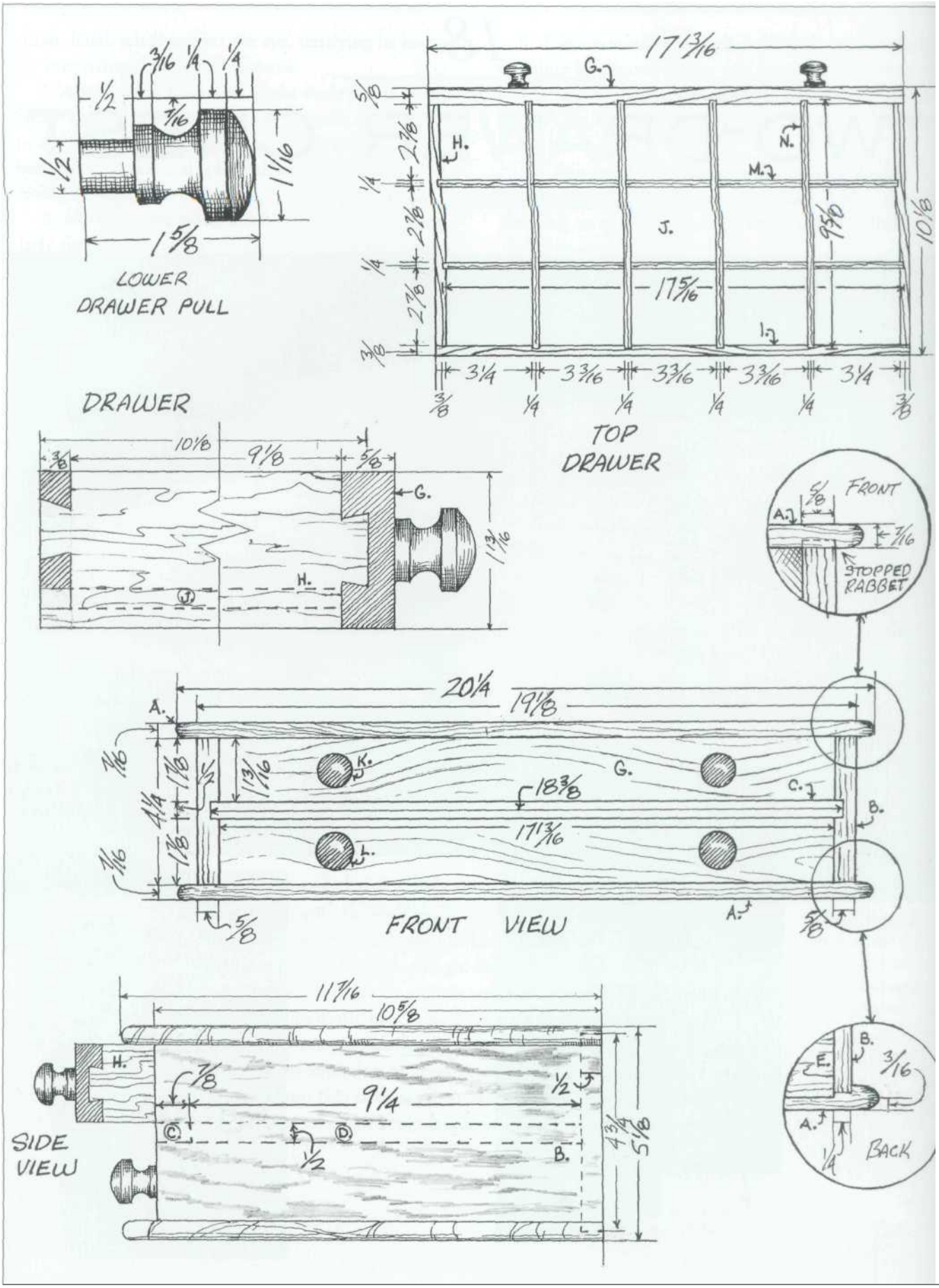
TWO-DRAWER CHEST

Curly Maple, Cherry, Beech, Poplar

18

TWO-DRAWER CHEST

Curly Maple, Cherry, Beech, Poplar


LOWER
DRAWER PULL
DRAWER
TOP
DRAWER
FRONT
STOPPED
RABBET
FRONT VIEW
SIDE
VIEW
BACK

MAKING THE TWO-DRAWER CHEST

After the material has been dimensioned, cut the joints for the case. First, cut the 1/8" X 5/8" stopped dadoes on the top and bottom that will receive the case sides. (See chapter five for information about cutting a stopped joint on the table saw.) Then cut the 5/16" X 1/2" rabbet along the back inside edges of the case sides and a 1/4" X 1/2" rabbet along the back inside edges of the top and bottom. Although the side rabbets run the length of the stock, the rabbets on the top and bottom are stopped on both ends. (Chapter five discusses a method for making stopped grooves and rabbets on the table saw.) Finally, cut the dadoes that will receive the dust panel and the drawer rail. Assemble the case with glue and screws. Fit plugs into the countersunk screw holes in the case's top.

Build the drawers next. The bottom drawer is a simple box, the parts of which are joined together with a single fat dovetail at each corner, through at the back, half-blind at the front (see chapter twenty-five). The upper drawer, compartmentalized by egg crating, is a little more complex.

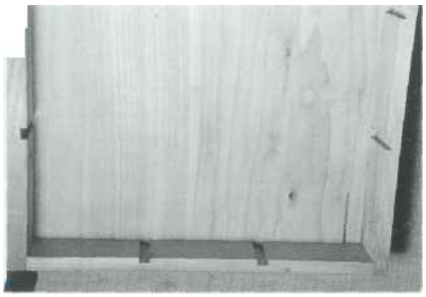
After the egg crate stock has been dimensioned, dado the interior faces of the drawer sides, front and back to receive the ends of the crating material. Lay out and cut the half-slots that will join the pieces of the crating material. For this particular drawer, the slots were cut on the bottom half of the short lengths and the top half of the long lengths.

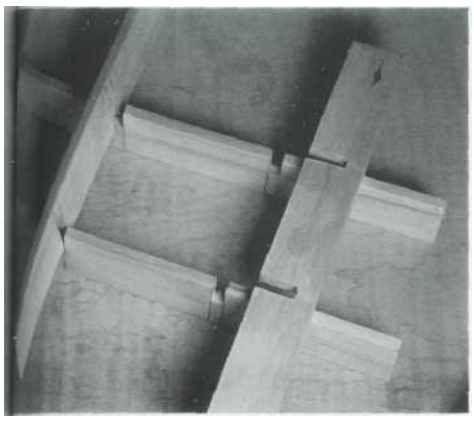
MATERIALS LIST

Case			
A	Top and bottom	1 pc.	7/16 × 11 7/16 × 20 1/4
B	Side	2 pcs.	5/8 × 4 1/2 × 10 5/8
C	Drawer rail	1 pc.	1/2 × 7/8 × 18 3/8
D	Dust panel	1 pc.	1/2 × 9 1/4 × 18 3/8
E	Back	1 pc.	1/2 × 5 × 18 3/8
F	Plug	8 pcs.	3/8 × 1/4
Drawers			
G	Front	2 pcs.	5/8 × 1 13/16 × 17 13/16
H	Side	4 pcs.	3/8 × 1 13/16 × 10 1/8
I	Back	2 pcs.	3/8 × 1 7/16 × 17 3/4
J	Bottom	2 pcs.	1/4 × 9 3/4 × 17 1/4
K	Upper pull	2 pcs.	1 × 1 1/2
L	Lower pull	2 pcs.	1 1/16 × 1 3/8
Egg crating			
M	Long	2 pcs.	1/4 × 1 3/16 × 17 5/16
N	Short	4 pcs.	1/4 × 1 13/16 × 9 5/8
Hardware			
O	Screws	various	

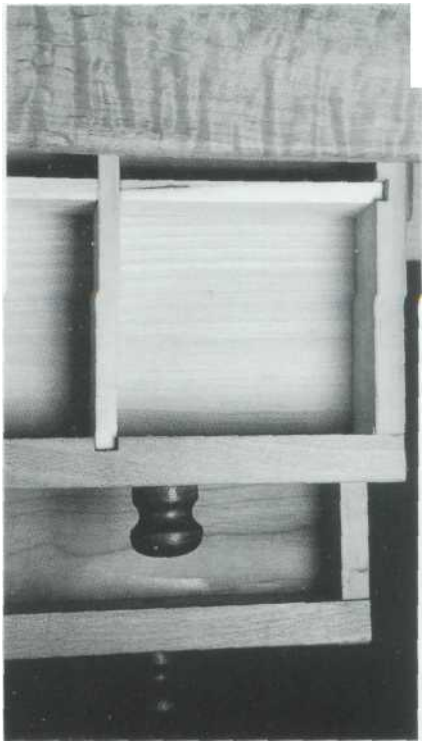
**These are net measurements. A surplus should be added to dovetailed parts to allow them to be sanded flush.*

1 Prior to the drawer's assembly, cut dadoes on the inside faces of the drawer front, back and sides.





2 The egg crate components are held together with half-slots.



3 The chest's partially open drawers are shown here from above. Note the shape of the drawer pull.

19

DRYING RACK

White Ash, Walnut

MAKING THE DRYING RACK

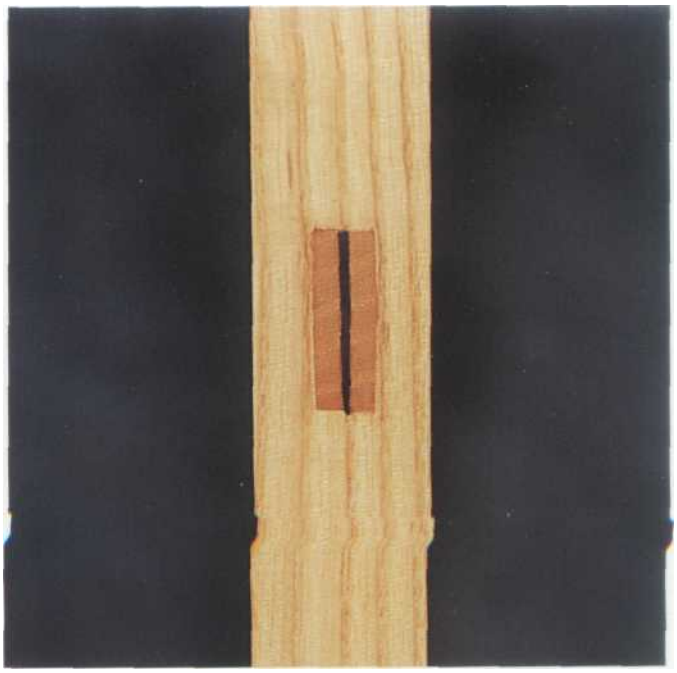
After milling the stock to the required thicknesses, widths and lengths, cut the feet with a band saw.

Form tenons on both ends of the posts and crossbars. This can be done by hand, using a tenon saw, or on a table saw fit with a stack of dado cutters.

Lay out and cut the twelve through mortises. Precision is essential with these tiny joints as the slightest error will multiply over the lengths of the posts, arms and crossbars. When test-fitting these tenons into their mortises, it's important to use a framing square (or other long-armed square) to make frequent checks of all right angles.

Notches for the walnut wedges should be no wider than *the kerf of a fine-toothed hacksaw. After cutting these* notches, dry-assemble the rack. Check angles and joints. Then, knock apart the rack, glue the joints, and drive the tiny walnut wedges into their notches.

After the glue has cured, saw off protruding wedges, pare tenons, and give the piece a final sanding.



Walnut wedges contrast with the ash through tenon and end grain.

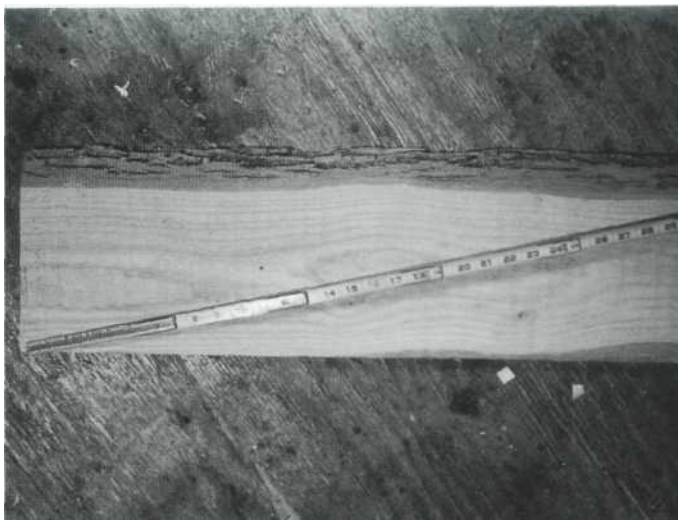
FITTING MATERIAL TO TASK

All woods are not created equal. Among our American hardwoods, some—like cherry and walnut—display striking color. Others—such as oaks, ashes and hickories—have enormous resistance to breaking. Still others—like hard maple—can be turned or carved very finely without detail crumbling away as it might with a coarser wood.

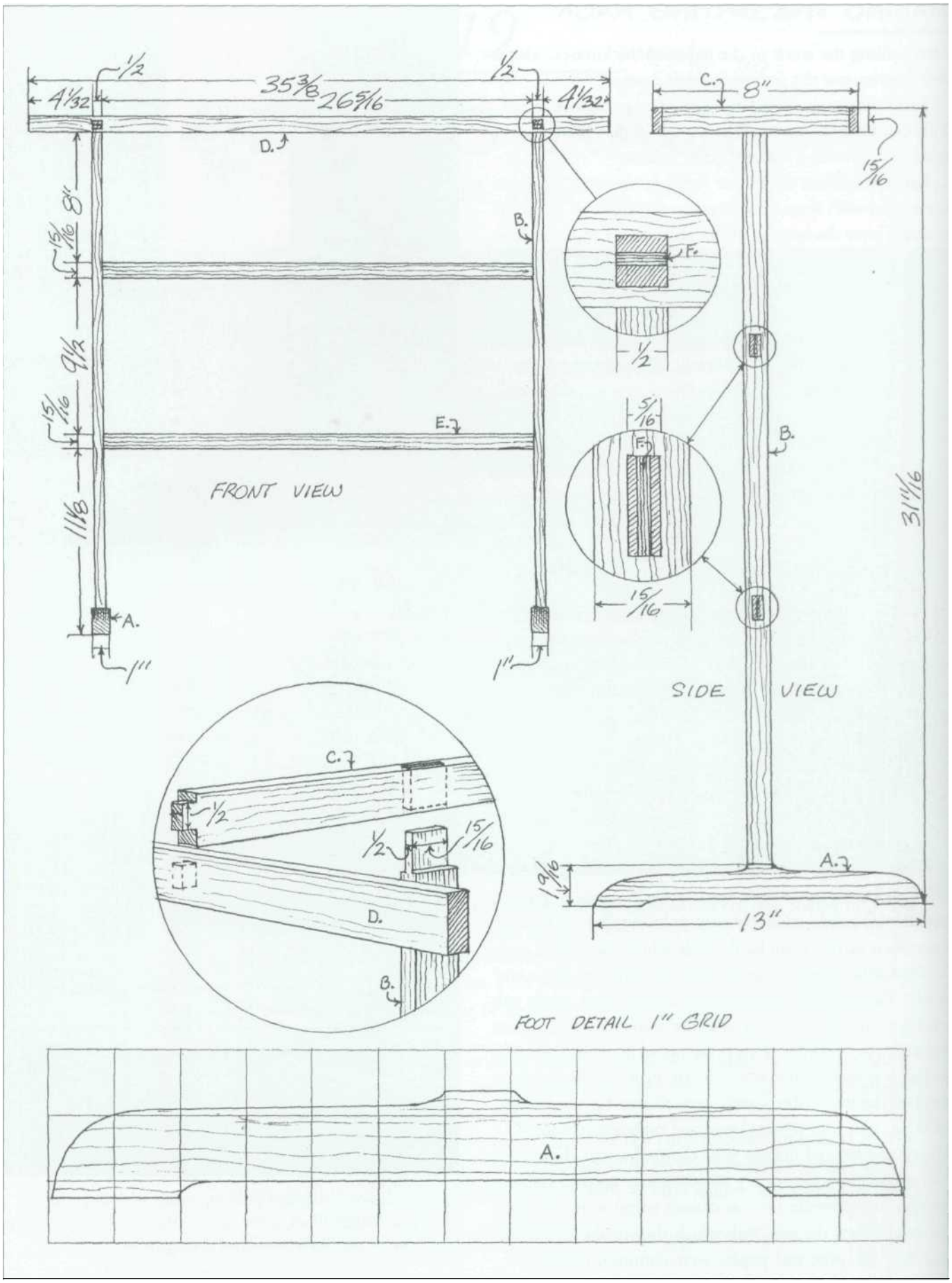
Traditionally, furniture was designed to take advantage of the different characteristics of the different species. The selection of species for the various parts of the Windsor chair illustrates this point. Windsor seats, which must be shaped to conform to the human bottom with hand tools—adzes, inshaves, travishers—were typically made of pine or poplar: softwoods relatively easy to manipulate. The legs were often turned from hard maple which, despite its non-descript color, possesses enormous strength and turns very nicely. Back spindles were usually shaved from white oak which, even when reduced to a tiny diameter, retains great resistance to breaking. This principle of matching material to task was also applied to casework. Primary woods (those used to fashion visible parts) were chosen for the beauty of their color and figure. Imported mahogany, walnut, cherry and figured maples were the traditional choices for this application. Secondary woods (those used to fashion interior components such as drawer parts) were selected for availability, the ease with which they could be worked. For this use, pine and poplar were common choices.

In general, eighteenth- and nineteenth-century woodwork reflected an intimate knowledge of the different qualities of different species of wood.

In an attempt to fit my material to my task, I chose ash for this drying rack because, of all the woods available in my shop, it offered the greatest strength when *planed so* thinly. This said, I should also point out that the original on which this rack is based was, inexplicably, built of pine.



1 The Shakers delighted in doing much with little. In this single length of ash, there is more than enough material to build two of the Shaker-designed drying racks.



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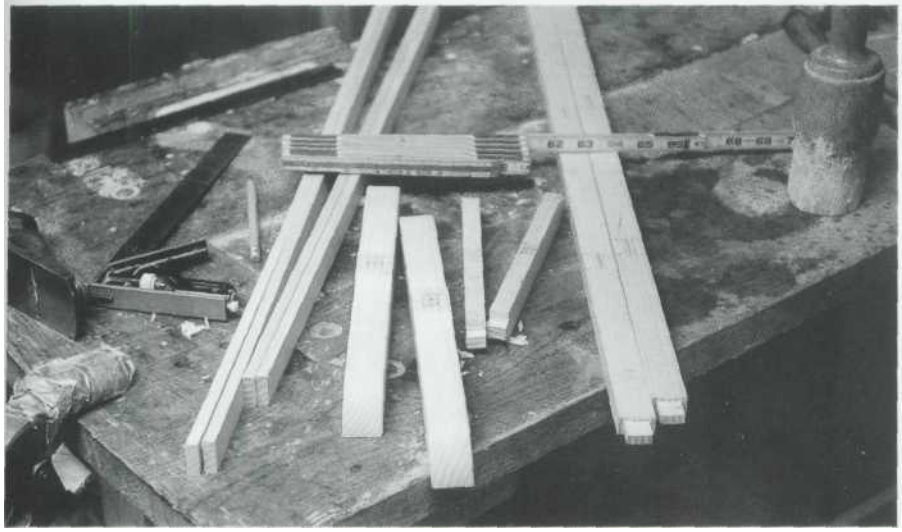
2 Tenons can be cut on the table saw with a stack of dado cutters.



3 After the parts have been dimensioned, shaped and tenoned, lay out and cut mortises.

MATERIALS LIST

A	Feet	2 pcs.	1 × 1 9/16 × 13
B	Post	2 pcs.	1/2 × 1 5/16 × 31 7/16
C	Crossbar	2 pcs.	1/2 × 1 5/16 × 8
D	Arm	2 pcs.	5/16 × 1 5/16 × 35 3/8
E	Post brace	2 pcs.	5/16 × 1 5/16 × 27 5/16
F	Wedges	8 pcs.	1/8 × various widths

**These are net measurements. Surplus should be added to the lengths to allow through tenons to be sanded flush.*

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SIX-DRAWER CHEST

Curly Maple, Walnut

MAKING THE SIX-DRAWER CHEST

After the stock for the top, bottom and ends of the case has been thicknessed, ripped to width, and cut to length, each must be given a 1/4″ X 5/16" rabbet that will later receive the back panel. At this time, cut the through dovetails at each corner. *The rabbet complicates this process, but there* are a couple of easy choices you can make here: (1) miter the materiaJ that will house the rabbet, or (2) use a Jap joint in which the rabbets on the case's top and bottom simply lap the rabbets on the ends.

After fitting the dovetails, lay out and cut the dadoes for the partitions between drawers. Then glue-up the case.

After the glue on the dovetails has cured, slide the partitions into place with a bit of glue spread in the dadoes. Drive brads through the top, sides and bottom of the case to help hold these partitions.

Fit the tenons at the top of each leg into mortises drilled into the bottom of the case, and affix the back panel in its rabbet using 1/2″ no. 6 wood screws passing through oversized holes (to allow for wood movement as the panel expands and contracts in response to seasonal changes in humidity) in the panel.

Except for the big, fat dovetail at each corner, drawer construction is conventional. Plough a 1/4" X 1/4" groove on each drawer side and on the back of the front. These will receive the 1/4"-thick drawer bottom. The back of the drawer is not as high as the sides; it extends down only as far as

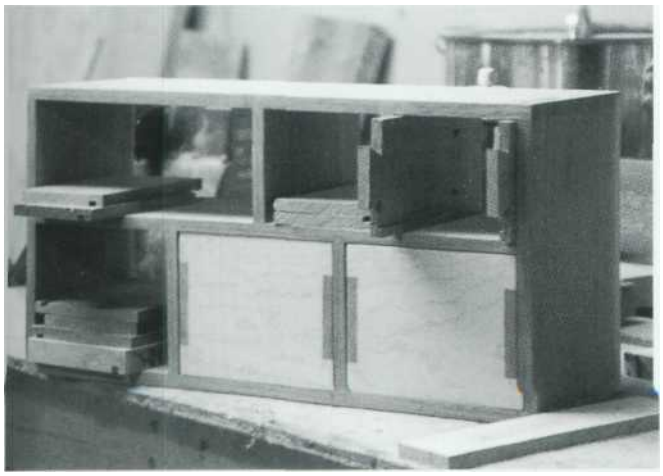
Partially open drawers reveal the fat dovetails.

the top of the drawer bottom. Nail through the drawer bottom, up into this drawer back.

For a larger, weight-carrying drawer, the single dovetail at each corner would be a poor choice, but for such a tiny drawer, one that will never carry more than a few ounces of load, the single dovetail provides a joint offering a fair amount of mechanical resistance to forward pull and a fair amount of glue surface.

Turn the drawer pulls from walnut and fasten them in place with a thin tenon fit into a mortise drilled into the drawer front.

BUILDING THE DRAWERS



Each drawer is custom-fit into its opening. First, plane the sides to the right height—one that permits them to slide into their openings with the least amount of clearance.

2 Cut dovetails using a backsaw and a coping saw. Use a parting chisel to achieve final fit.

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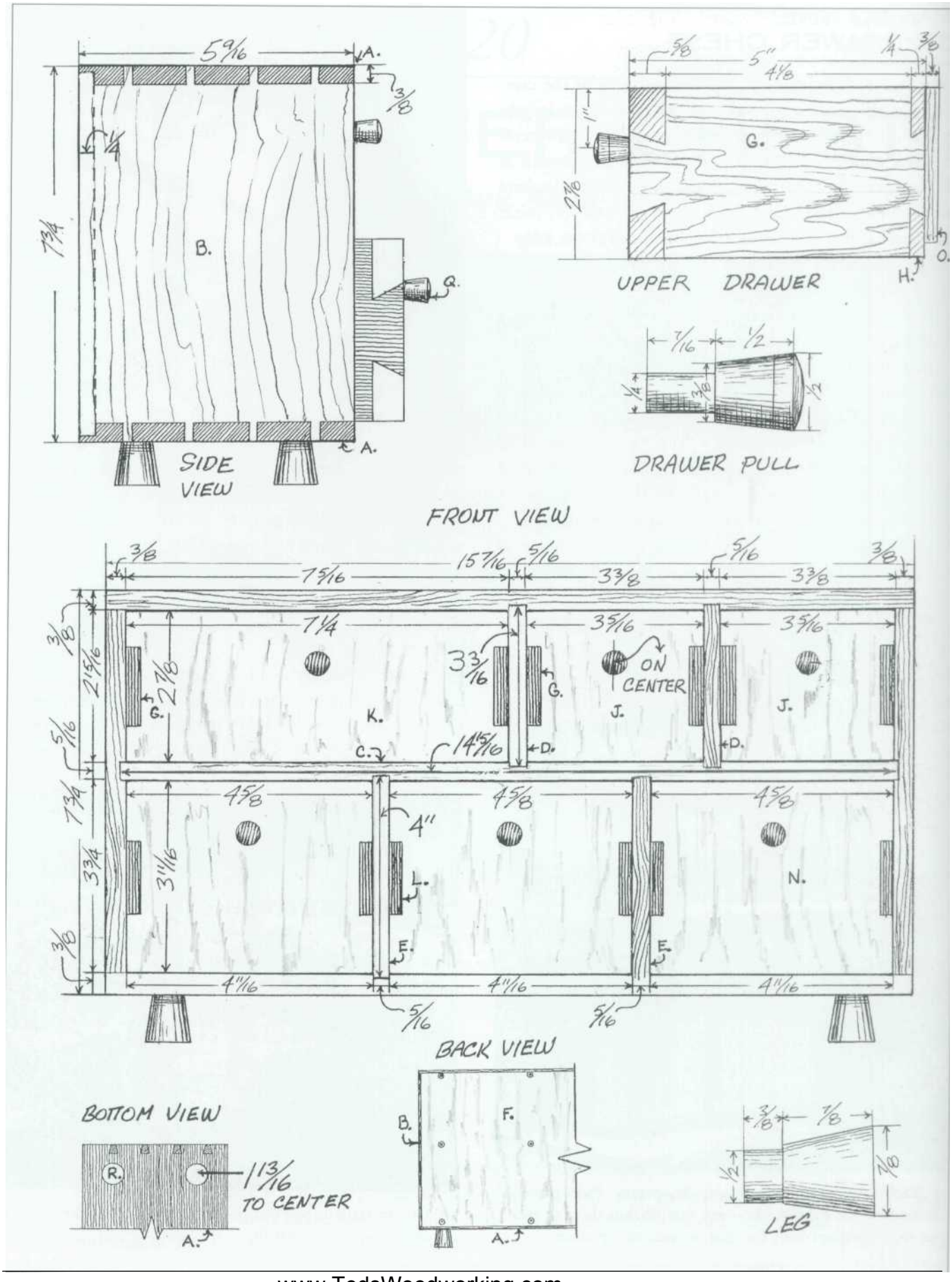
5 9/16
A.
3/8
1/4
7 3/4
B.
Q.
A.
SIDE VIEW
5/8
5"
4 1/8
1/4
3/8
1"
G.
2 1/8
H.
O.
UPPER DRAWER
7/16
1/2
1/4
3/8
1/2
DRAWER PULL
FRONT VIEW
3/8
7 5/16
15 7/16
5/16
3 3/8
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3 3/8
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7 1/4
3 5/16
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BACK VIEW
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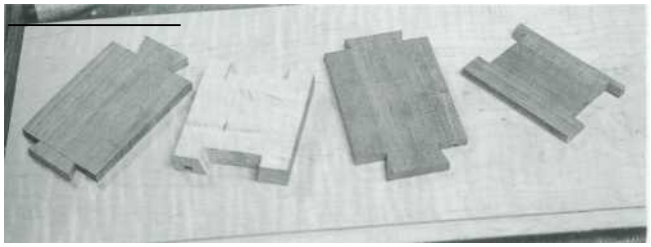
LEG

BUILDING THE DRAWERS
<CONTINUED>



3 After its parts have been cut and fit, the drawer is ready to assemble. Brads help the glue hold the drawer sides in place.

4 Note the surplus length at each corner. This is ground off with a belt sander

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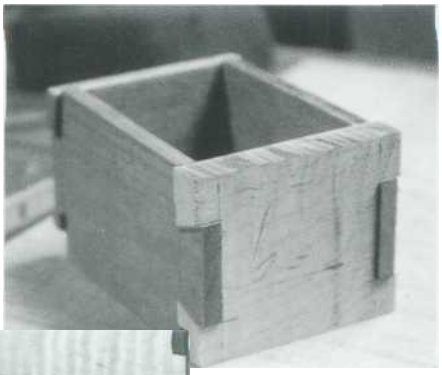
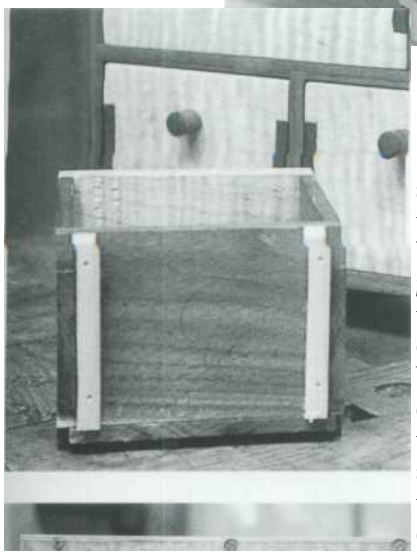




5 After sanding the sides and the front of the drawer, slide the bottom into *place and fasten with* brads. Plug the holes at the ends of the grooves on both sides of the drawer front. Plane thickness from the two strips of softwood tacked to the back of each drawer to achieve final fit.

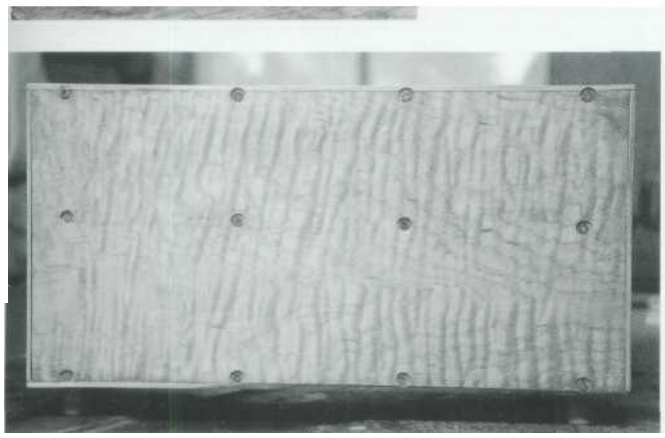
MATERIALS LIST

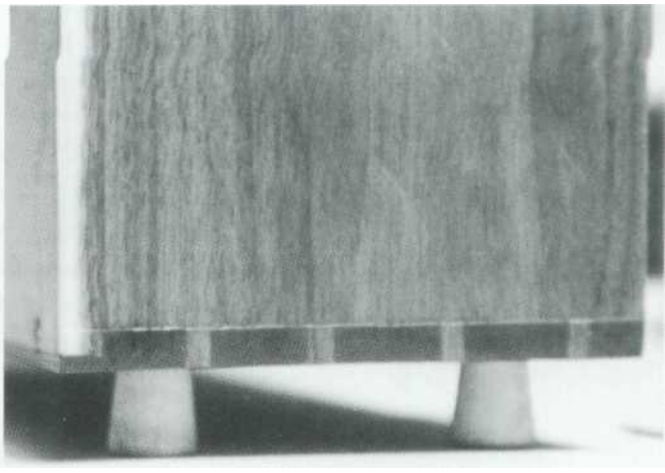
Case			
A	Top and bottom	2 pcs.	⅜ × 5 9/16 × 15 7/16
B	End	2 pcs.	⅜ × 5 9/16 × 7¾
C	Central partition	1 pc.	5/16 × 5¼ × 14 15/16
D	Upper partition	2 pcs.	5/16 × 5¼ × 3 3/16
E	Lower partition	2 pcs.	5/16 × 5¼ × 4
F	Back panel	1 pc.	¼ × 7½ × 15 3/16
Upper Drawers			
G	Side	6 pcs.	¼ × 2⅞ × 5
H	Short back	2 pcs.	¼ × 2⅜ × 3 5/16
I	Long back	1 pc.	¼ × 2⅜ × 7¼
J	Short front	2 pcs.	⅝ × 2⅞ × 3 5/16
K	Long front	1 pc.	⅝ × 2⅞ × 7¼
Lower Drawers			
L	Side	6 pcs.	¼ × 3 1/16 × 5
M	Back	3 pcs.	¼ × 3 3/16 × 4⅝
N	Front	3 pcs.	⅝ × 3 1/16 × 4⅝
Miscellaneous			
Softwood fitting strip			
O	Upper drawer	6 pcs.	¼ × ⅜ × 2⅜
P	Lower drawer	6 pcs.	¼ × ⅜ × 3 3/16
Q	Pull	6 pcs.	½ × 1 (this includes tenon length)
R	Leg	4 pcs.	⅞ × 1¼ (this includes tenon length)

**These are net measurements. A surplus should be added to dovetailed parts to allow them to be sanded flush.*
**Opening measurements are given for drawer width and height. I subtract 1/16 from both dimensions. This gives me 1/32 clearance on all four sides of drawers.*

CHEST BACK The back is unglued, fastened with screws to the case's top, bottom and central partitions.

BACK RABBET This photo shows the lapped rabbet corner at the back of the case





21

CHIP BOX

Walnut, White Oak

MAKING THE CHIP BOX

Walnut was used in the construction *of this box with care* taken to select pieces exhibiting contrasting streaks of white sapwood. The bail was shaped from white oak. While any of a number of woods would do nicely for the box, make the bail from a wood that is not only strong but also pliable enough to assume the U shape without breaking. Suitable woods include oaks, ashes and hickories.

Construction is very simple. After milling the stock to a thickness of 1/2″, rip the sides, ends and bottom to width and cut to length. Then plough a 1/4″ X 1/4" groove in the *sides and ends to* receive the bottom. Then cut and pare dovetails to fit (see chapter twenty-five). With hand planes, bevel the edges of the bottom to allow them to slide in their grooves (see chapter one).

Then assemble the box and fit plugs into the ends of the grooves ploughed into the sides.

After removing the bail from its bending form, give its two paws their final shape using a paring chisel and a shop knife. Then fasten the bail to the box with four 1/8″ X 1 1/4″ brass machine screws and nuts.

SHAPING THE BAIL

The bail requires a 3/8"-thick length of continuous-grain bending stock. This means that, when viewed from the quarter-sawn side (the side with the narrow, parallel lines), the grain should run from end to end. Traditionally, this is achieved by splitting out the stock with the use of a froe and beetle. However, few contemporary woodworkers have these tools. You may, therefore, choose to use a length of sawn stock selected for straight grain.

Before bending, work the band-sawn strip with a drawknife and spokeshave to rough-in the desired shape. At this point, it isn't necessary to be fussy. The goal is simply to round the edges on the top side of the bail since this procedure can be carried out more comfortably now, when the stock is unbent, than later, when the bail has taken on its *U* shape.

STEAM BENDING

My steamer is a deep fat fryer. I've cut an opening in the lid the same size as the outside diameter of a length of PVC which I use as a steam chamber. Three sheet metal screws turned into the PVC just above its base are allowed to protrude. These rest on the fryer's lid holding the steam chamber above the water's surface. A square of hardware cloth that laps the bottom of the steam chamber and is screwed to the PVC supports the material being steamed. To hold the entire apparatus upright, a strip of wood lath is screwed to the PVC and spring-clamped to a stepladder.

Similarly, functional steamers can be made in a number of different ways. Many woodworkers use a hot plate and a tea kettle with a spout fitted with a length of plastic hose which conducts steam to a chamber of some sort—a wooden box, a length *of* downspout, or a section of PVC.

Steam the bending stock long enough to become plastic. In my steamer, with material of this thickness, that means about forty-five minutes.

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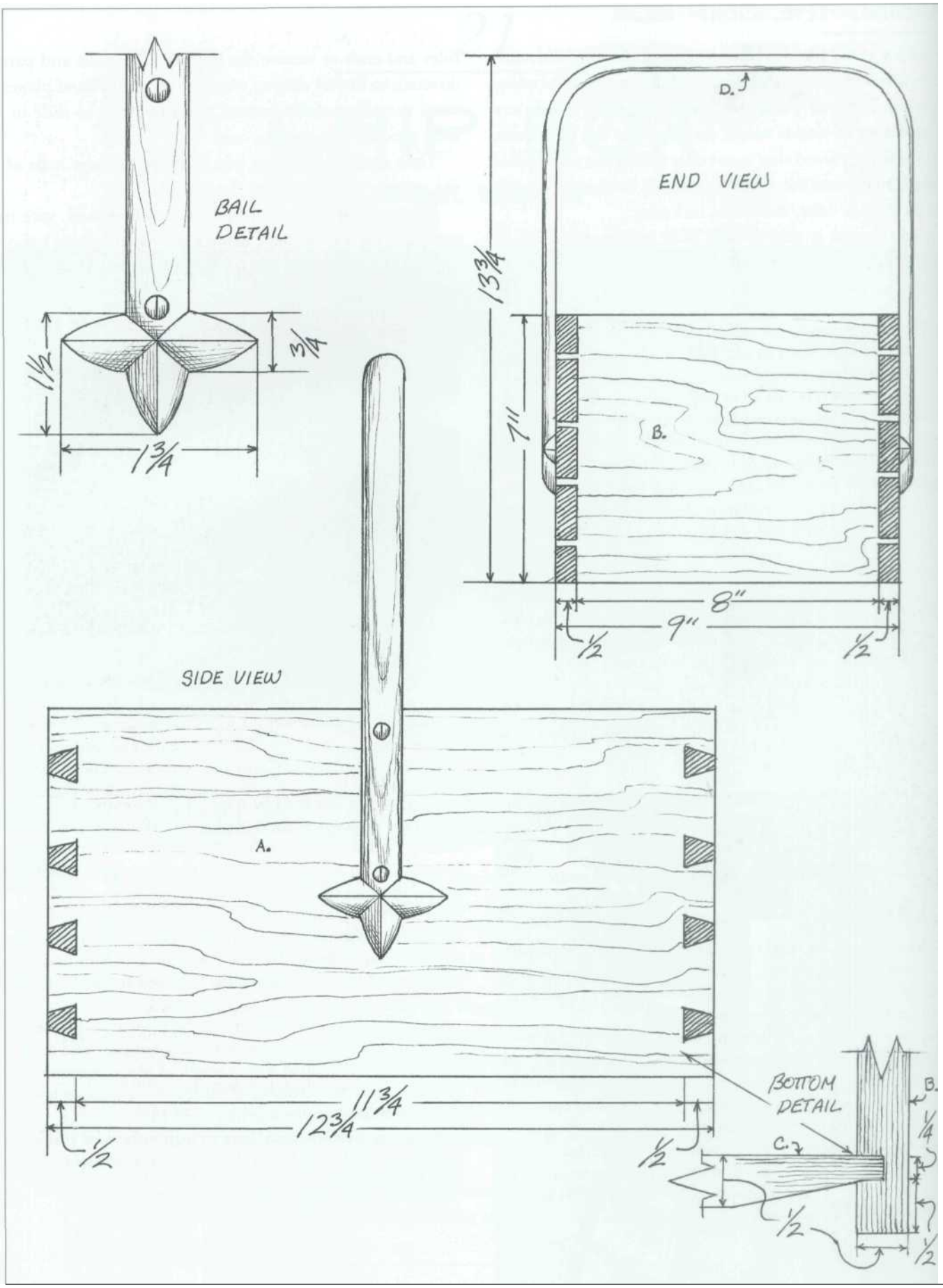

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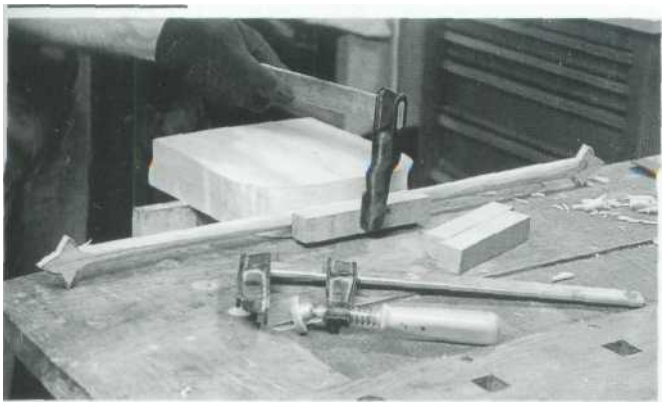
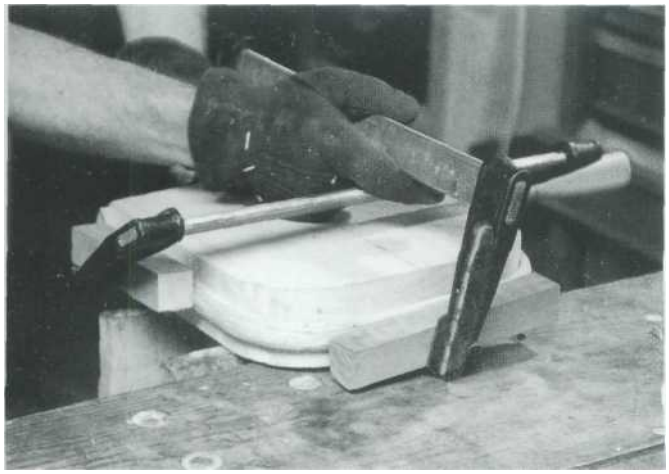
STEAM BENDING (CONTINUED)



2 Prepare bending forms beforehand. This particular form, a 2"-thick block of poplar cut to the inside profile of the bail, is nailed to a block of wood held in a vise. Necessary clamps and clamping blocks are placed nearby. Gloves are needed because the steamed oak will be very hot when removed from the steam chamber.

Although you shouldn't rush, proceed quickly because the steamed wood will cool rapidly, becoming less pliable.

Place the midway point along the length of the oak strip at the halfway point across the width of the poplar form. Then clamp it, using a block of wood to protect the oak from clamp marks.

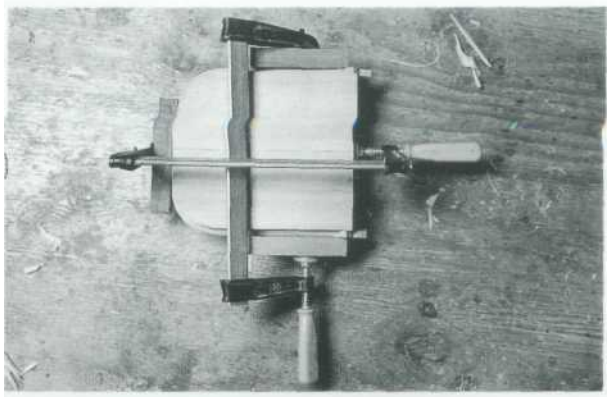


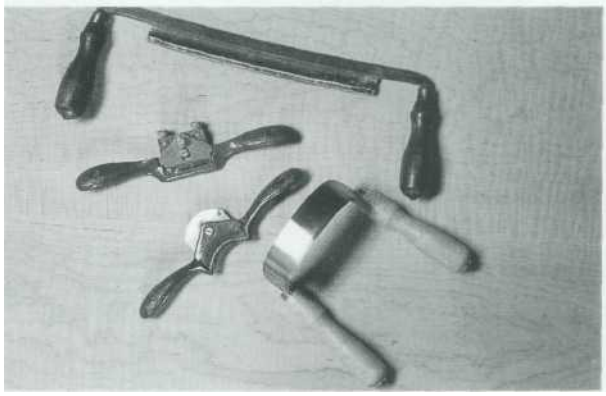
3 Bend the oak strip into its U shape, holding it in place with a second clamp set perpendicular to the first. Again, use blocks of scrap to protect the oak. From above, the strip can be seen to have assumed the shape of the bail.

Green wood is best for bending, but dry material can be coaxed into the required shapes with enough steam and enough patience.

Wood bending, particularly bending involving the sharp curves shown here, is a process rich with opportunities for failure. Sometimes, even after selecting continuous-grained material, even after steaming that material thoroughly, fracture can occur along the bends. When that happens, the only solution is to start the process all over again.

SHAVING TOOLS





Shown are the shaving tools I use in my shop. The two with turned wooden handles are drawknives. The knife at the top is a general-purpose tool, while the one at the bottom is a variety known as the "inshave" used by makers of Windsor chairs to hollow-out seats. The two middle tools are metal-bodied spokeshaves. The shave with the straight iron is used for general-purpose work, while the other, a hollow shave, can only be used for rounding spindles.

MATERIALS LIST

A	Side	2 pcs.	½×7×12¾
B	End	2 pcs.	½×7×9
C	Bottom	1 pc.	½×8½×12¼
D	Bail	1 pc.	⅜×2⅛×29
E	Plug	4 pcs.	¼×¼×¼, shaved to fit
F	Machine screws & nuts	4 pcs.	⅛×1¼

**These are net measurements. Surplus should be added to lengths of dovetailed sides and ends to allow joints to be sanded flush.*

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PEGGED DISPLAY SHELF

Curly Maple, Walnut

MAKING THE PEGGED DISPLAY SHELF

After the material has been dimensioned, profile the end panels, the back panels, and the lower shelf on the band saw. Form the moulded edge on the top on a shaper or table-mounted router fit with appropriate cutters.

Next, cut joinery. You can cut the stopped rabbet that will house the ends of the back panel on the table saw (see chapter five), with a table-mounted router, or by hand, using chisels.

Cut the through mortises in the end panels (see chapter twelve). Then, with a backsaw or a stack of dado cutters on the table saw, cut the tenons on the ends of the lower shelf and pare to fit these mortises.

On the lathe, turn the two Shaker-style pegs. Then, fit their tenons into mortises drilled into the shelf's back panel.

When all the parts have been dry-assembled and checked for fit, glue the frame and screw it together. Install the top, using four 1" no. 6 wood screws passing through the top into the end grain of the side panels. Glue four maple plugs and tap them into the countersunk screw holes.

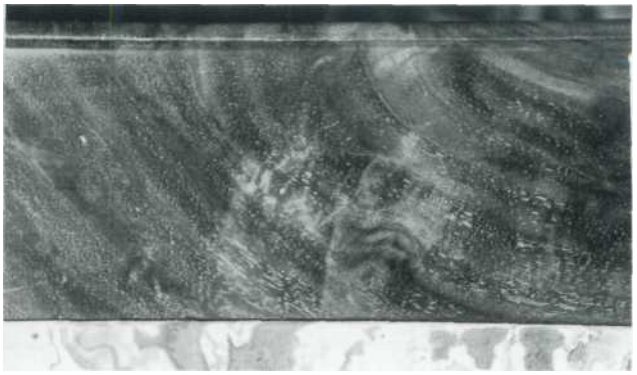
FIGURED LANGUAGE

In *The Woodworker's Dictionary* by Englishman Vic Taylor, the word *curlis* defined this way: "Highly figured grain obtained by cutting through the junction of a tree or large limb. Used only in veneer form. Also known as crotch or feather."

If you ordered curly material from an American supplier of figured wood, you would not get the material described by Vic Taylor. You would, instead, get lumber marked by rippling bars of grain marching across the widths of the boards perpendicular to the grain direction. This inconsistency of language occurs not only among dealers working in different countries but also among dealers in the U.S.

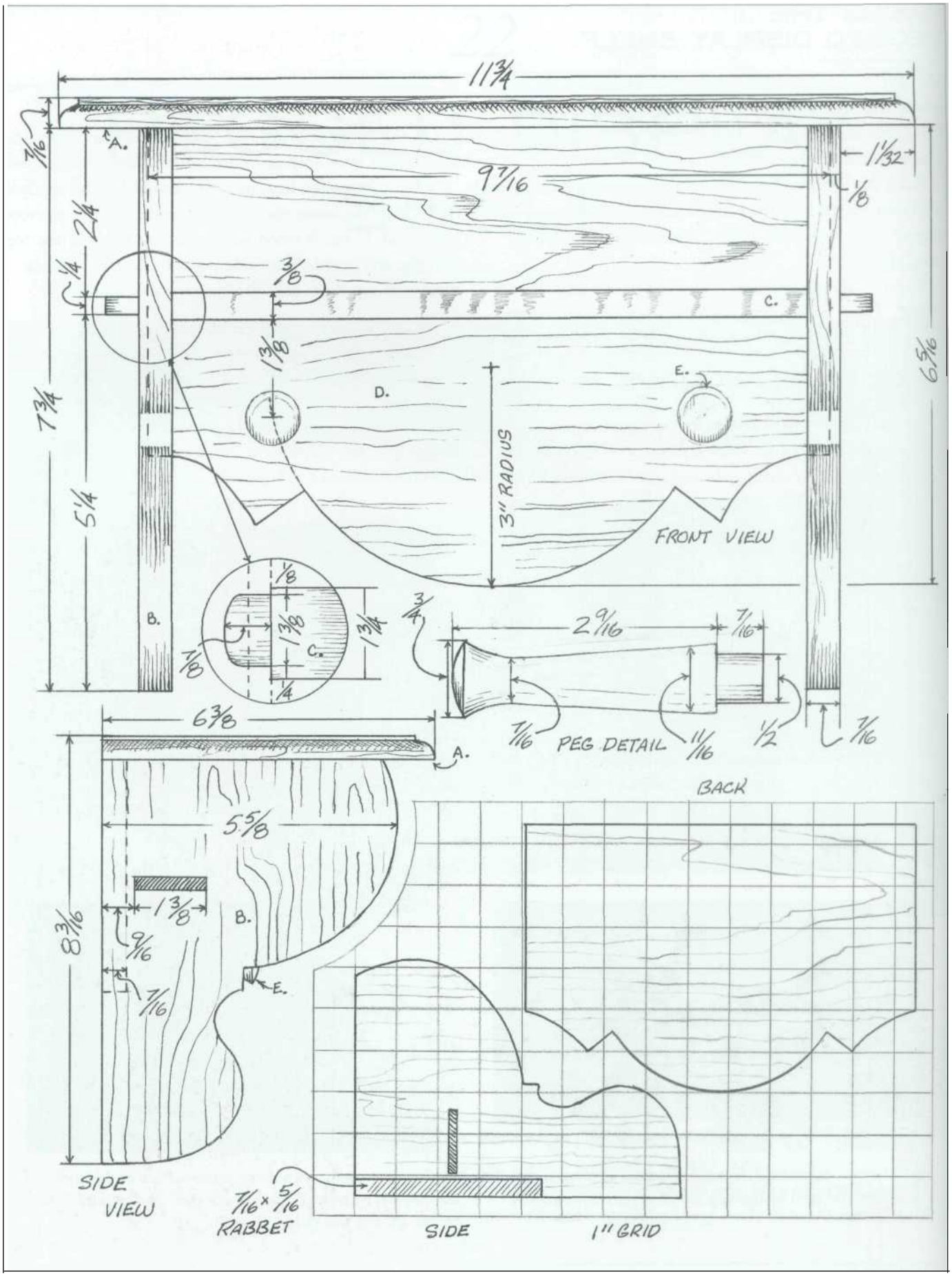
One of the sawmill operators from whom I buy has his own system of figured wood classification: If it tears out in the planer, it's curly. Period. And he sells it that way. Because I've bought from him in the past and am aware of his system of classification, I carefully inspect every curly board I buy from him, but a customer unfamiliar with his system might assume that whatever he purchased from this sawmill operator as curly would exhibit a figure that was consistent from board to board and consistent with the buyer's expectation of curly lumber.

In general I've found that owner/operators of small sawmills aren't good sources of figured lumber. In part, this may be because they are sawyers, not woodworkers, and therefore look at lumber from a different perspective. But I also think that owner/operators of small sawmills don't have the experience with figured lumber to make considered judgments about its quality.



1 The border of the chess table (featured in chapter three) shows the kind of figuring common in crotch-grained lumber.

2 Tiny dots are scattered across the surface of this piece of bird's eye maple. (This grain is used on the top of the display shelf in this chapter.)



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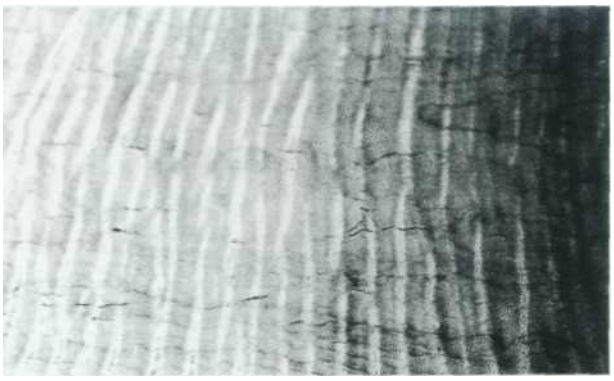
Tiger maple. Often referred to by the generic "curly," the wood identified by this term includes the soft (red and silver) curly maples.
Fiddleback maple. This material, characterized by a tighter, more compact curl than is evident in tiger maple, comes from hard maple and is widely used by violin makers for the backs of their instruments.
Blistered maple. This figure, which is also present in hard maple, has a surface on which there is the appearance of raised blisters or boils.

Quilted maple. A product of the western big-leaf maple, this material is marked by a regular pattern of what appear to be raised areas of varying shapes.
Bird's eye maple. This variety of hard maple exhibits swirling grain scattered with dots resembling bird's eyes.
Crotch-grained. For American woodworkers, this is the material about which Vic Taylor wrote in his definition of "curly." Sometimes known as "feathered," this is taken from the junction of a tree and a large limb.
Burl. Taken from growths that appear on the trunks of certain trees, this material is highly prized by makers of veneer and by turners for its wildly convoluted grain.

3 This panel of glued-up cherry exhibits a wavy figure not uncommon in cherry (see the side table in chapter seven for an excellent example).



4 This photo shows a length of heavily figured curly (tiger) maple (featured in the document chest in chapter twenty five).

SUSTAINABLE FORESTS

At some point, everyone who applies tools to wood considers the issue of forest maintenance. Although many experts believe that reserves of the commonly used American species are adequate to meet projected needs, there is an irrefutable difference in the quality of available material. Although cherry, maple and oak are always on hand in any well-stocked lumberyard, the boards are not as wide and not as clear as they were even a single generation in the past. And the situation is even more critical for walnut, the king of American hardwoods. Walnut saw logs are increasingly rare, and when they can be found of any quality, they are inevitably snatched up by veneer mills.

MATERIALS LIST

A	Top	1 pc.	7/16 × 6⅜ × 11¾
B	End	2 pcs.	7/16 × 5⅝ × 7¾
C	Shelf	1 pc.	⅜ × 1¾ × 10½
D	Back	1 pc.	7/16 × 6 5/16 × 9 7/16
E	Peg	2 pcs.	¾ × 3
F	Plug	4 pcs.	⅜ × ¼
G	Screws	various	

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TABLETOP DESK

Cherry, Poplar

MAKING THE TABLETOP DESK

After the material has been dimensioned, edge-joint and glue the boards that will make up the desk top.

Plough a 1/8" X 1/4" groove on the inside faces of the desk sides, front, and back. This groove will later receive the bottom of the materials compartment. Then, cut openings in the sides for the inkwell and stationery drawers.

Next, cut the angles on the desk sides on the band saw, after which the four sides of the case are dovetailed. The case is dry-assembled, and the bevels on the top edge of the front and back are marked from the angles on the sides. Form these bevels with a hand plane, and glue-up the four walls of the case around the bottom of the materials compartment.

Before installing the bottom, glue and brad into place the cock bead that frames the stationery drawer. Also at this time, glue the two fill strips that will guide the stationery drawer in position. Then, tack the bottom into place using small finishing nails. Nails are perhaps better than screws for this particular application because they are flexible enough to allow for seasonal expansion and contraction of the bottom across its width. Screws—unless they pass through oversized holes which would be very difficult to achieve in such thin stock—could lock the material so that cracking would occur in connection with this expansion and contraction.

The inkwell drawer is next. The unusually shaped long drawer side does two things. First, it is a drawer guide, and second, it prevents the drawer (with its bottle of ink) from being completely withdrawn from the case, a circumstance that could easily have had messy results.

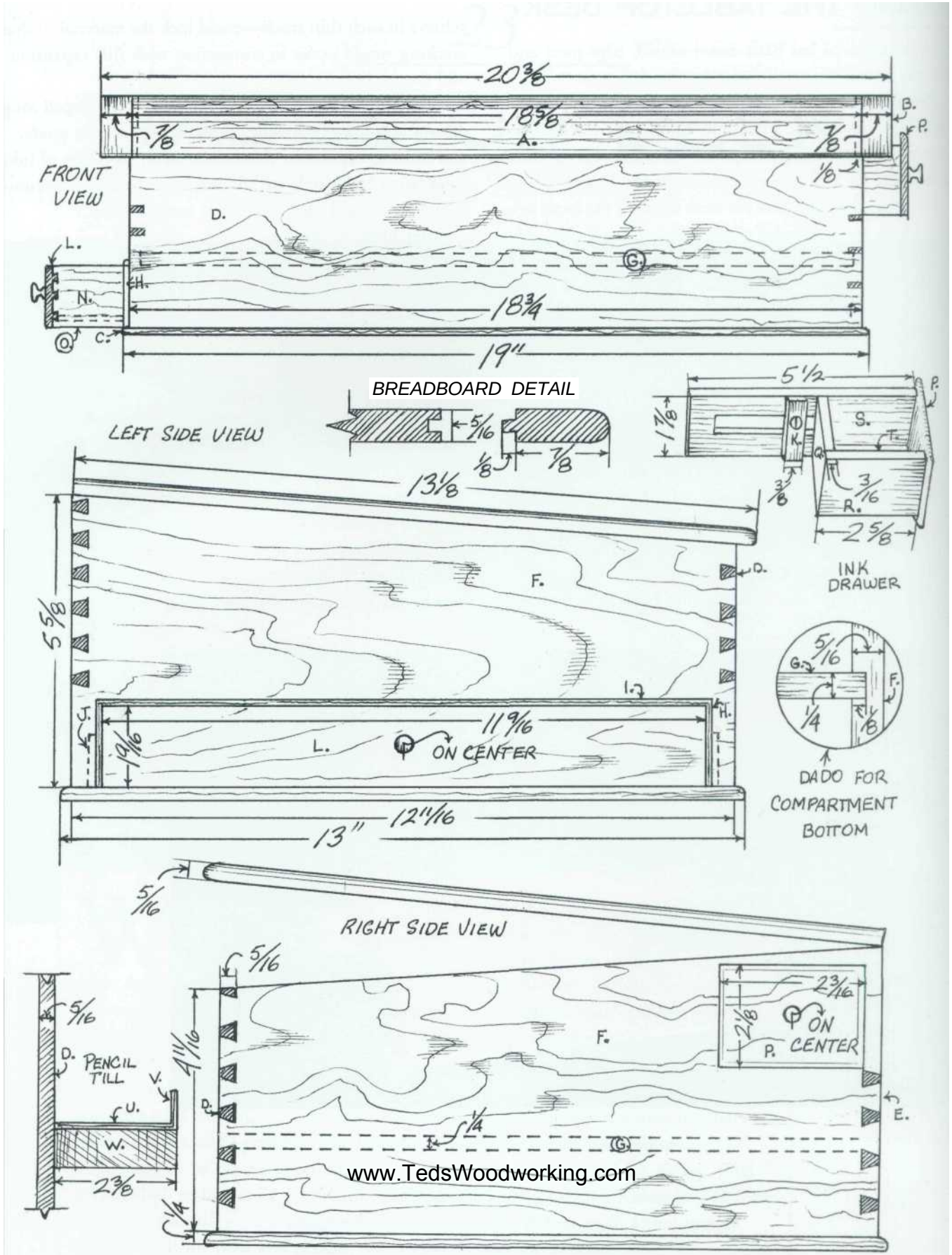
After forming the drawer parts, glue and tack them together. Then, fit the drawer to its opening and screw the wooden bracket that acts as its guide and keeper to the inside face of the desk back.

Assemble the stationery drawer with through dovetails at the front and half-blind dovetails at the back.

The till rests on a pair of 1/8"-thick supports which are glued to the inside faces of the desk front and back. After installing these supports, glue the till—with its side already glued to the bottom—into place atop the supports. Fasten it also to the desk side with a thin line of glue.

The top panel is removed from the clamps and planed to a thickness of 5/16". Then, cut 1/8"X 1/8" grooves in both ends of the top panel to receive the tongues on the breadboard ends. Form and fit the tongues to the grooves. Hold

The opened tabletop desk reveals the ink well drawer and the paper drawer in the bottom.



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each breadboard end in place with a dab of glue on the tongue at the middle of the tongue's length. The remainder of the tongue floats on the groove, allowing for seasonal expansion and contraction of the top.

Hinges are problems because of the top's extreme thinness. My dad, who built this particular piece, struggled to find screws that could get a good enough bite in the top to hold it in place. After trying and discarding several brass screws, he settled on deep-threaded 3/8″ no. 6 steel screws from which he'd ground away the tips so that they wouldn't penetrate the upper surface of the top.

After fitting the hinges, remove the hardware, and give the desk a final sanding.

KILN-DRIED OR AIR-DRIED

Reference books inevitably cite the necessity of using kiln-dried material for funiture construction. I think that's misleading.

Of the thousands of board feet of lumber I've turned into chairs and into casework, less than a quarter was kiln-dried. The remainder was air-dired outdoors and finish-dried in my shop. Nevertheless, I can remember only two occasions when pieces I built experienced wood failure.

Once, I built a Hepplewhite huntboard from air-dried cherry. The top (which didn't fail) was fastened to cleats fixed with slotted screw holes. But one of the end panels, which I had triple-tenoned into the posts, split after sitting in our living room through a couple of cold, dry Ohio winters. In looking back on the construction of the huntboard, I remember hurrying to finish it before Christmas since it was a present for my wife.

When I glued up the end panels, I remember noticing, as I slathered glue on the middle tenon, that I hadn't cut the top and bottom tenons back to allow the end panel to shrink. Each tenon completely filled its mortise. But the glue was already on the middle tenon and in its mortise. To cut the other tenons back, I would have to wash away the glue, find my paring chisel, pare the tenons, and reglue. Or risk having the aliphatic resin glue set before the joint was assembled. I remember thinking it wasn't worth the effort. I remember thinking I could get away with it. The end panel failed because I built it to fail. I think that if allowances are made during design for the inevitable movement of wood, carefully air-dried material is every bit as good as kiln-dried. In fact, I think that careful air-drying is preferable to the kind of rushed kiln-drying practiced by some commercial driers. At least in humid Ohio, air-drying is a gradual process during which wood surrenders its mosture so slowly that surface checking is almost unheard of. And it's worth mentioning that, just like air-dried stock, kiln-dried stock, when exposed to humid, July conditions, quickly takes on enough moisture to reach 11, 12 or even 13 percent.

The answer to the problem of wood movement isn't laboring to make wood inert; it is, I think, to accept movement as an inevitable component of solid-wood construction and to design to accommodate that inevitability.

MATERIALS LIST

Desk			
A	Top	1 pc.	5/16 × 13⅛ × 18⅝
B	Breadboard end	2 pcs.	5/16 × 1 × 13⅛
C	Bottom	1 pc.	¼ × 13 × 1
D	Front	1 pc.	5/16 × 4 11/16 × 18¾
E	Back	1 pc.	5/16 × 5⅝ × 18¾
F	Side	2 pcs.	5/16 × 5⅝ × 12 11/16
G	Compartment bottom	1 pc.	¼ × 12 5/16 × 18⅜
H	Short cock bead	2 pcs.	⅛ × ½ × 1⅞
I	Long cock bead	1 pc.	⅛ × ½ × 11⅞
J	Drawer fill strip	2 pcs.	⅛ × 1 × 16¼
K	Ink-drawer stop	1 pc.	⅜ × ⅜ × 1⅞
Stationery drawer			
L	Front	1 pc.	5/16 × 1 9/16 × 11 9/16
M	Back	1 pc.	¼ × 1 9/16 × 11 9/16
N	Side	2 pcs.	¼ × 1 9/16 × 18
O	Bottom	1 pc.	¼ × 11 5/16 × 18¼
Ink drawer			
P	Front	1 pc.	5/16 × 2⅛ × 2 13/16
Q	Back	1 pc.	3/16 × 1⅞ × 2 3/32
R	Short side	1 pc.	3/16 × 1⅞ × 2⅝
S	Long side	1 pc.	3/16 × 1⅞ × 5½
T	Bottom	1 pc.	3/16 × 2 11/32 × 2½
Pencil till			
U	Bottom	1 pc.	⅛ × 2¼ × 12 1/16
V	Side	1 pc.	⅛ × ¾ × 12 1/16
W	Support	2 pcs.	⅛ × ¾ × 2⅜
Hardware			
X	Hinge	2 pcs.	1½ × ⅞
Y	Pull	2 pcs.	½ × ½
Z	Screws and nails	various	

**These are net measurements. A surplus should be added to dovetailed parts to allow them to be sanded flush.*

**Pulls were ordered from Constantine's Hardware.*

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SHERATON-STYLE TABLE

Walnut, White Pine

MAKING THE SHERATON-STYLE TABLE

Begin construction with the legs. The exact shapes of their various *sections can* be determined by the individual woodworker; however, the section that will be joined to the apron, that section above the upper bead, must be carefully formed so that it maintains a consistent diameter from top to bottom as any variation in diameter will show itself here as a gap.

Once a leg has been formed but before it's taken from the lathe, mark the centerlines for the mortises that will receive the apron tenons. Do this using the lathe's indexing head.

The indexing head is a disk centered on the lathe's axis with holes drilled near its perimeter. Each of these holes marks 10° of the disk's 360° circumference and, by extension, 10° of the 360° circumference of any work centered on the lathe's axis. After selecting the faces of the leg that will be visible from the table's side and end, the tool rest is brought into contact with that section of the leg that will be joined to the apron. The indexing head is then locked at this position (on my lathe that's simply a matter of releasing a spring-loaded peg into one of the holes drilled near the head's circumference) and a line is drawn along the tool rest on the leg. Then, using the spring-loaded peg to count holes, the work is turned nine stops on the indexing head which is then locked at this point and a second line drawn. These lines are 90° apart and mark the centerlines of the mortises that will house the apron tenons.

After the apron parts and drawer rails have been dimensioned, cut their tenons. You can start this on the table saw, but it must be completed by hand or on the band saw as the shoulders of the apron parts must be undercut so that the shoulders come to a sharp point. This is necessary if the shoulders are to make tight contact with the round surface of the leg.

The table frame—consisting of the four legs, the three sections of the apron, and the two drawer rails—is then glued-up.

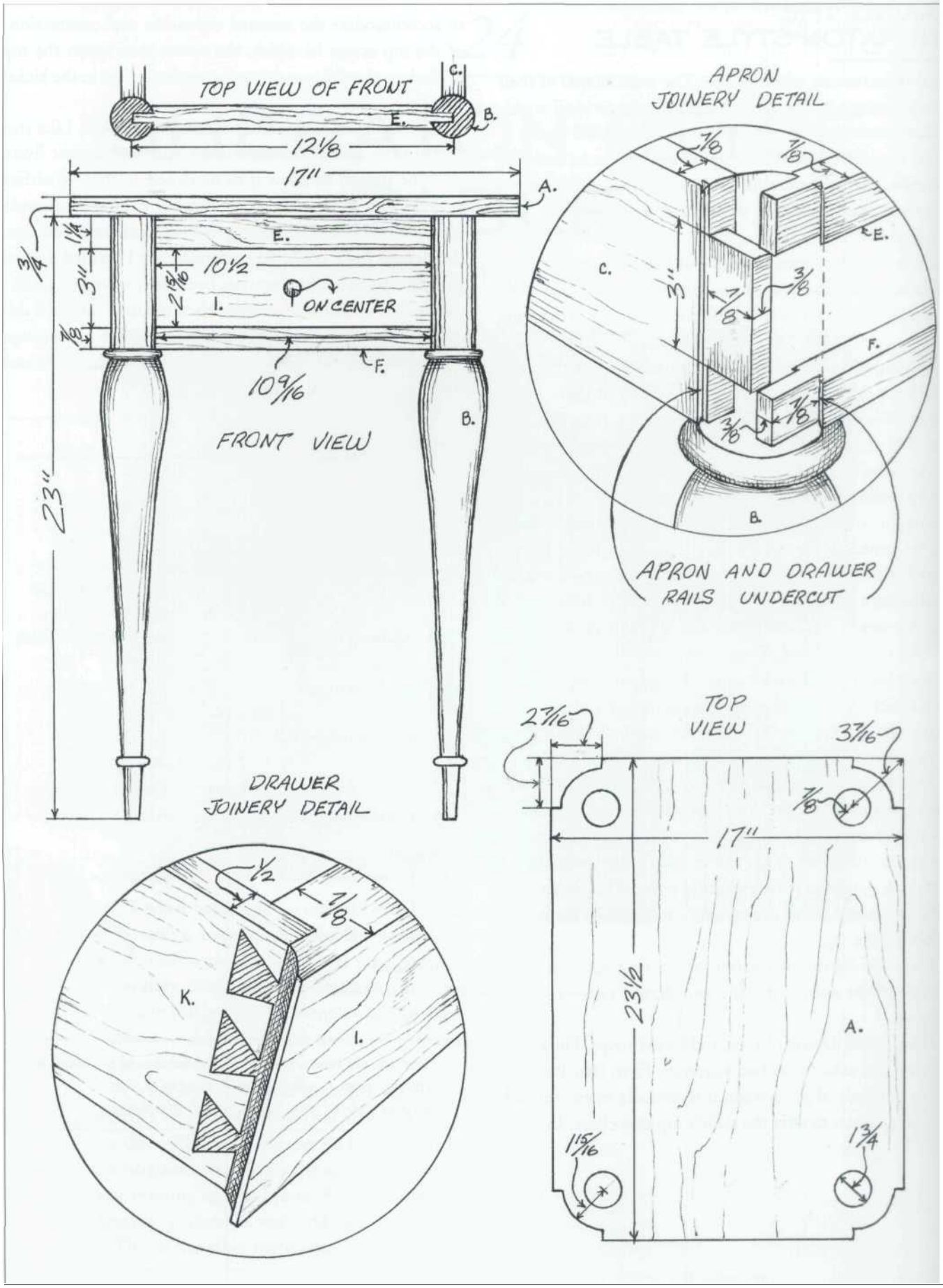
Next, install drawer runners and kicker strips. The kicker strips on this table serve two purposes. First, they keep the drawer properly aligned when it is partially open. Second, they act as cleats to affix the table's top to its base. In order to accommodate the seasonal expansion and contraction of the top across its width, the screws that fasten the top to the base should pass through oversized holes in the kicker strips.

Drawer construction *is tricky* in one respect. *Like the* parts of the apron and the drawer rails, the drawer front must be shaped to allow it to be closed so that its surface is flush with the surface of the drawer rails without wide gaps at either side. Like the apron and drawer rail shoulders, the drawer front could be undercut, but I wanted a more graceful shape in this location because it is visible when the drawer is opened. I decided then to curve the back side of the drawer front, matching it to the curve on the legs. After fitting the drawer, sand and finish the table and drawer.

MATERIALS LIST

Table			
A	Top	1 pc.	¾ × 17 × 23½
B	Leg	4 pcs.	2 7/16 × 2 7/16 × 23
C	Apron side	2 pcs.	⅞ × 5⅛ × 18¾ (includes ⅞ tenon on each end)
D	Apron end	1 pc.	⅞ × 5 ⅛ × 12¼ (with tenons)
E	Top drawer rail	1 pc.	⅞ × 1¼ × 12¼ (with tenons)
F	Bottom drawer rail	1 pc.	⅞ × ⅞ × 12¼ (with tenons)
G	Kicker strip	2 pcs.	1¼ × 1½ × 17⅞
H	Drawer runner	2 pcs.	⅞ × ⅞ × 17⅞
Drawer			
I	Drawer front	1 pc.	⅞ × 2 15/16 × 10½
J	Drawer back	1 pc.	½ × 2 15/16 × 10
K	Drawer side	2 pcs.	½ × 2 15/16 × 17
Hardware			
L	*Brass knob*	*1 pc.*	*½ × ½*
M	Screws	various	

**These are net measurements. A surplus should be added to dovetailed parts to allow them to be sanded flush.*
**Pull was ordered from Constantine's Hardware.*



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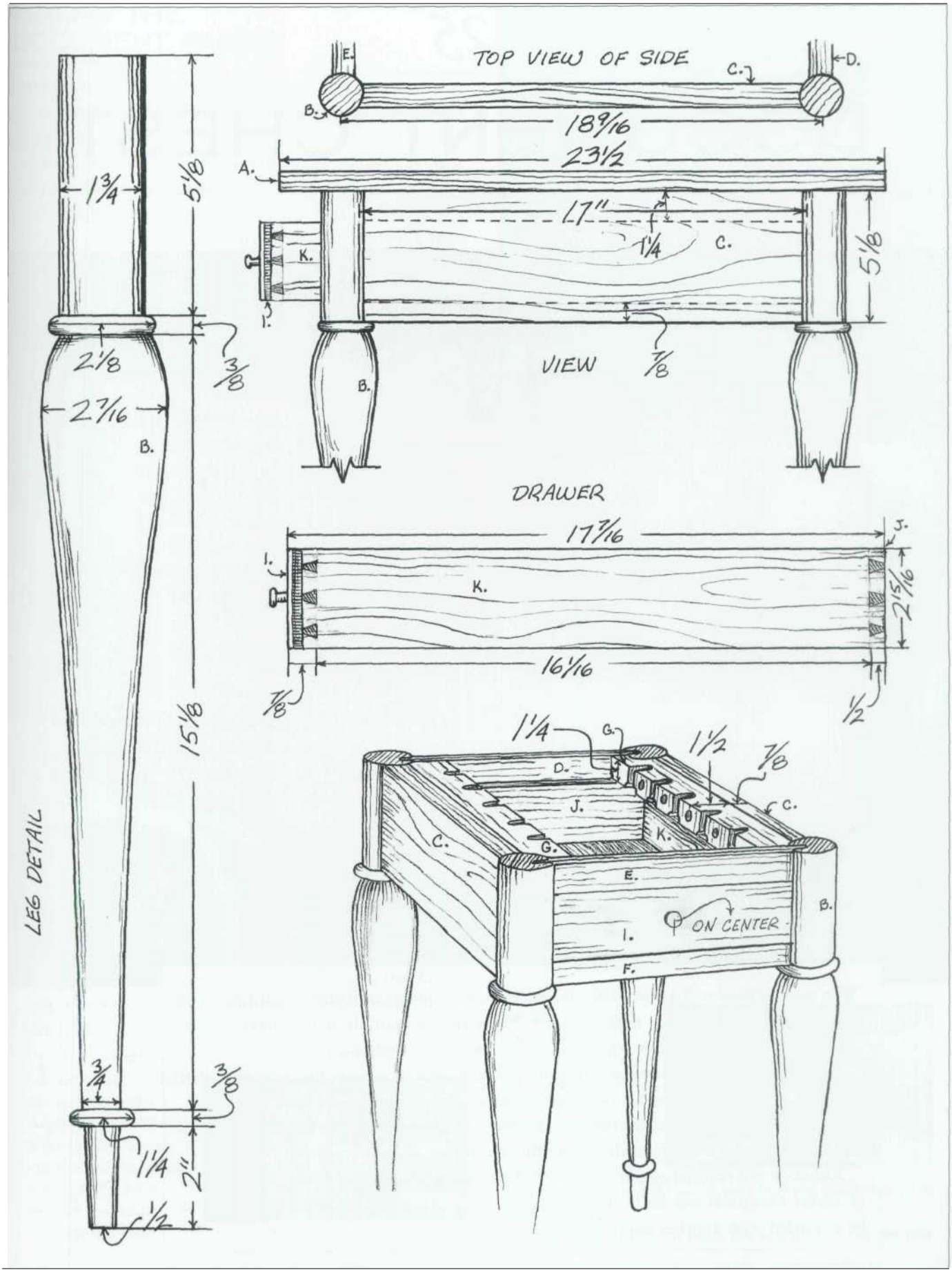

LEG DETAIL
1¾
5⅛
2⅛
3/8
2 7/16
B.
15⅛
¾
3/8
1¼
2"
½
TOP VIEW OF SIDE
E.
D.
C.
B.
18 9/16
23½
A.
17"
1¼
C.
K.
5⅛
VIEW
⅞
B.
DRAWER
17 7/16
J.
I.
K.
2 15/16
16 1/16
⅞
½
1¼
G.
1½
⅞
D.
J.
C.
K.
G.
E.
B.
ON CENTER
I.
F.

25

DOCUMENT CHEST

Curly Maple, White Pine

MAKING THE DOCUMENT CHEST

After the stock has been thicknessed, ripped to width, and cut to length, plough a 1/4" X 3/8" groove on the inside faces of the front, back and two ends. This groove will receive the raised panel that will separate the upper storage chamber from the drawer compartment.

Then cut through dovetails for the four corners of the case (this process is detailed in the sidebar below). Glue the joints and assemble the case around the raised panel that separates its two sections.

Shape the moulded edge on the top and bottom of the lid and on the top side of the chest's bottom. Fasten the bottom to the case with ten 1 1/2" no. 10 wood screws. These pass through oversized holes drilled in the bottom to allow tor seasonal expansion and contraction across its width.

Although the Shaker original didn't have them, I installed a pair of sturdy ash cleats on the underside of the lid to prevent it from cupping—a problem I encountered the first time I built one of these chests.

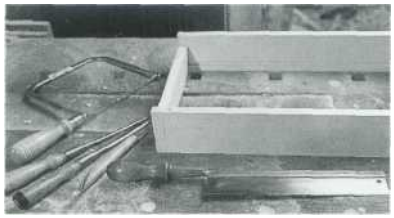
Build the drawer next (see the sidebar below) with through dovetails at the rear and half-blind dovetails at the front. Slide the drawer bottom into its groove and tack it up into the drawer back. Then fit the length of the completed drawer by planing thickness from a pair of softwood strips tacked to the back side of the drawer.

Complete the chest by finishing the wood and installing the hardware.

CUTTING DOVETAILS BY HAND

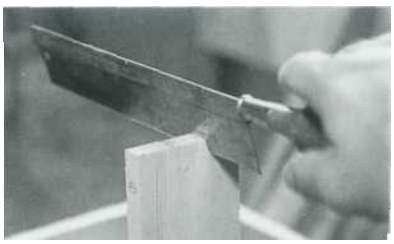
There's something soothing about the process of cutting dovetails by hand. The shop is quiet. The air is clean, carrying no load of machine-generated dust. There is the sense that this is what woodworking is supposed to be: calm, unhurried, not driven by the frantic scream and whine of power tools. This is woodworking stripped of the efficient unpleasantness of technology, reduced to the application of sharp tools to beautiful material. Even though the case must be made first, the following discussion of hand-cut dovetails will begin with drawer construction because, unlike the case, the drawer requires the creation of both through and half-blind dovetails.

1 The process begins with careful stock preparation. After the parts have been dimensioned, cut the grooves into which the drawer bottom will slide. Establish base-



lines for every pin and tail (the pins are those parts of the dovetail joint that fit between the tails). Score these lines across the grain with either a marking gauge or a sharp knife. In the case of the through dovetails (those on the back of the drawer), lines should be placed a distance from the end that is 1/16" more than the thickness of the stock to which the piece is being joined. Since, in this case, the drawer sides and back are 1/2" thick, the baselines will be set 9/16" from the ends of the drawer sides and back. Placement of the baselines on the front end of the drawer sides is handled a little differently because these joints will be half-blind dovetails. Because the drawer front is 11/16" thick, set the baselines on the front ends of the drawer sides 1/2" from the end. This leaves 3/16" of drawer-front material covering the ends of the dovetails on the front ends of the drawer sides.

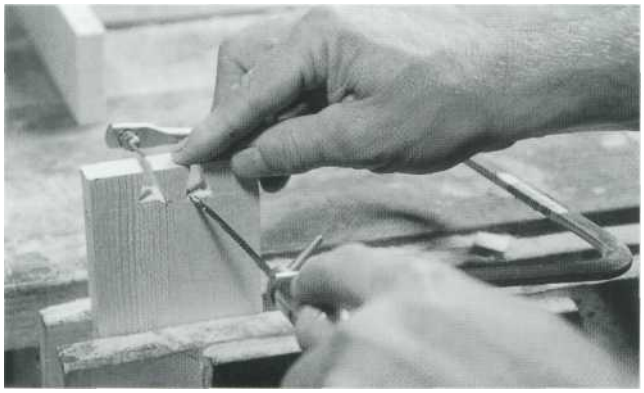
2 Cut the tails first. After deciding on their widths, use pencil lines (drawn with the aid of a try square) to mark the end grain of the drawer side. These lines indicate the widths of the gaps between the widest parts of the tails.



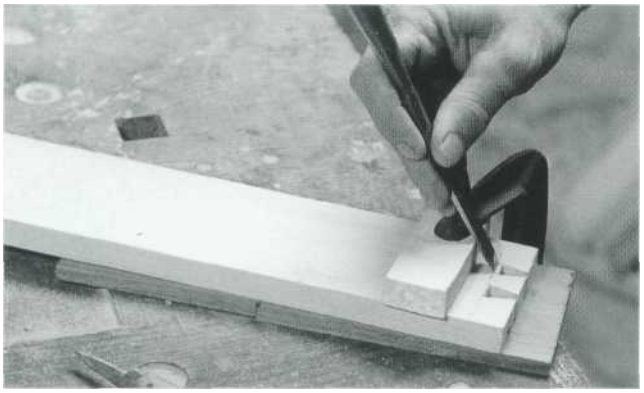
At this point, you can mark the actual angles of the tails

with the aid of a dovetail gauge. I chose to cut these freehand because the slight variances of angles and tail-widths provide incontrovertible proof of the piece's handmade origin.

With a fine-toothed backsaw, make cuts from the lines squared across the end grain down to the baseline established for the tails.

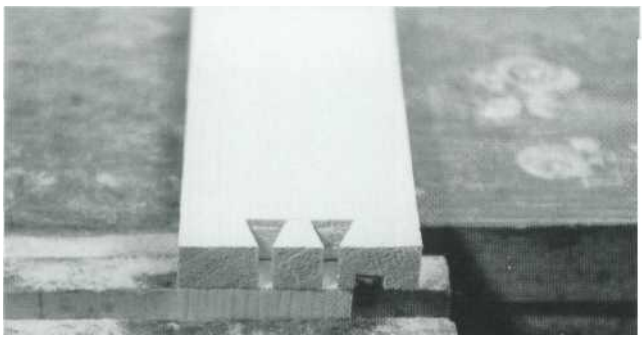


3 With a coping saw, remove the bulk of the waste. Don't approach the scored baseline too closely.



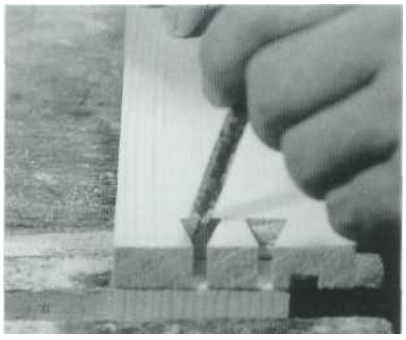
4 Then, use a paring chisel driven by a wooden mallet to cut away the remaining waste. The scored baseline serves to position the tip of the chisel.

In order to avoid breaking out chips on the back side of the piece, flip over the drawer side from time to time, working toward the middle from one side, then the other.



5 When the gaps between the tails have been cut and pared down to the baseline, mark the pins. Position the pin stock (in this case the back of the drawer) in a vise so that its end is just above the level of the bench top. Position the tails that were just cut above the end grain on the drawer back. Take care to align the baseline between the tails directly above the inside face of the drawer back.

(Because the drawer bottom must slide underneath the back of the drawer, the width of the back extends only from the top of the drawer side to the top of the groove.)



6 With a sharp pencil (you may need to whittle the tip of the pencil to a smaller diameter so that it can work its way into the gaps between tails), mark the limits of the pins on the end grain of the drawer back.

MATERIALS LIST

Chest		
A Side	2 pcs.	1 1/16 × 10 1/4 × 18 3/8
B Full End	1 pc.	1 1/16 × 10 1/4 × 10 7/8
C Partial End	1 pc.	1 1/16 × 7 1/8 × 10 7/8
D Lid and bottom	2 pcs.	1 1/16 × 11 3/8 × 18 7/8
E Bottom of storage chamber	1 pc.	5/8 × 9 7/8 × 17 3/8
F Cleats	2 pcs.	1 1/8 × 1 7/8 × 8
G Plug	4 pcs.	1/4 × 3/8 × 1/2
Drawer		
H Front	1 pc.	1 1/16 × 3 1/16 × 9 3/8
I Side	2 pcs.	1/2 × 3 1/16 × 17
J Back	1 pc.	1/2 × 2 1/8 × 9 7/16
K Bottom	1 pc.	5/8 × 8 1/2 × 16 3/4
L Fitting strip	2 pcs.	3/8 × 3/8 × 2 1/8
Hardware		
M Hinges	2 pcs.	1 1/4 × 2
N Pull (brass)	1 pc.	1/2 × 1/2
O Closer	1 pc.	
P Screws	10 pcs.	1 1/2" no. 10

**These are net measurements. Surplus should be added to the length of dovetailed sides and ends to allow joints to be sanded flush.*

**Drawer height and width are 1/16" less than the opening size. This allows 1/32" clearance on all four sides.*

**Hardware was ordered from Constantine's Hardware.*

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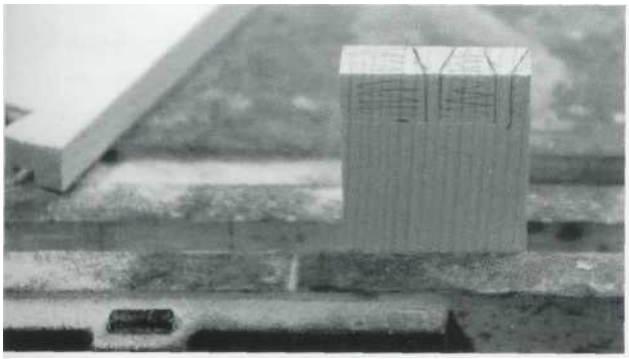
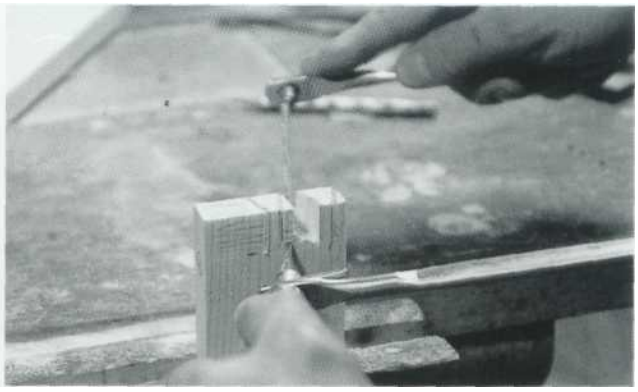
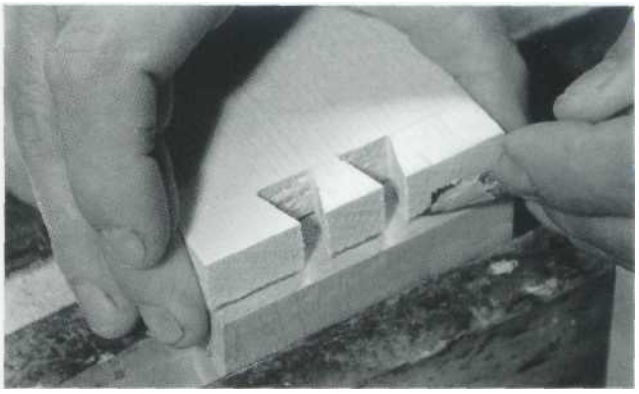




7 Using a try square, extend those lines from the end of the drawer back to the scored baseline for the pins. These lines identify the waste that is to be removed.

With a fine-toothed backsaw set just to the waste side of each line, cut the pin walls down as far as the baseline.

8 With a coping saw, remove the bulk of the waste between the pins. As with the gaps between the tails, cut away the remaining waste between the pins with a sharp chisel. Again, use the scored baseline to position the tip of the chisel.

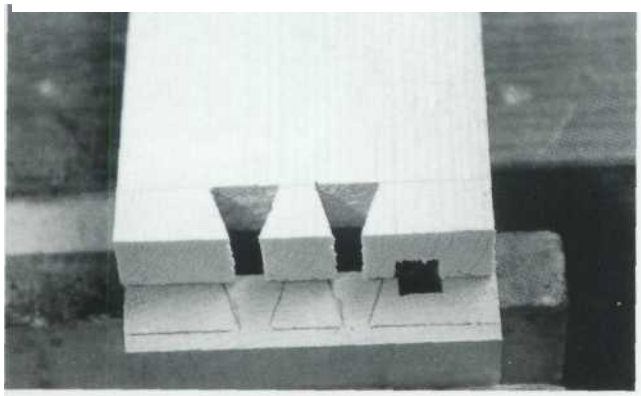


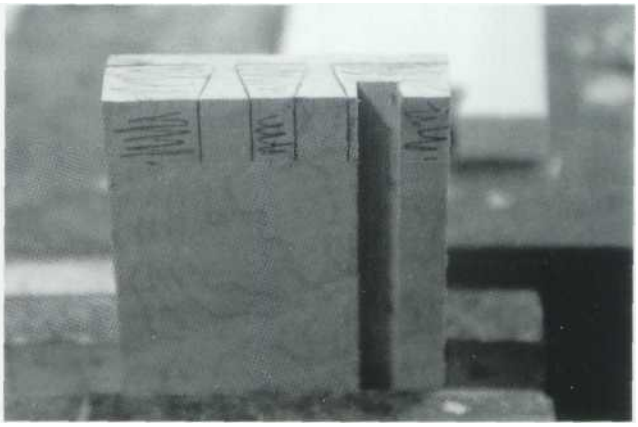
9 Shaving some of the pin walls may be necessary, but once fitting is accomplished, the joint can be dry-assembled (without glue).

White pine is a very soft wood, so a joint that might not fit perfectly can still be brought together. Hardwood, however, requires more fine-tuning of the pins with a paring chisel. Too much force applied to the fitting of a dovetailed joint can result in a split drawer side.

10 The half-blind dovetails (so named because the joint doesn't show from the front) used at the front of the drawer are a bit more complicated to cut.

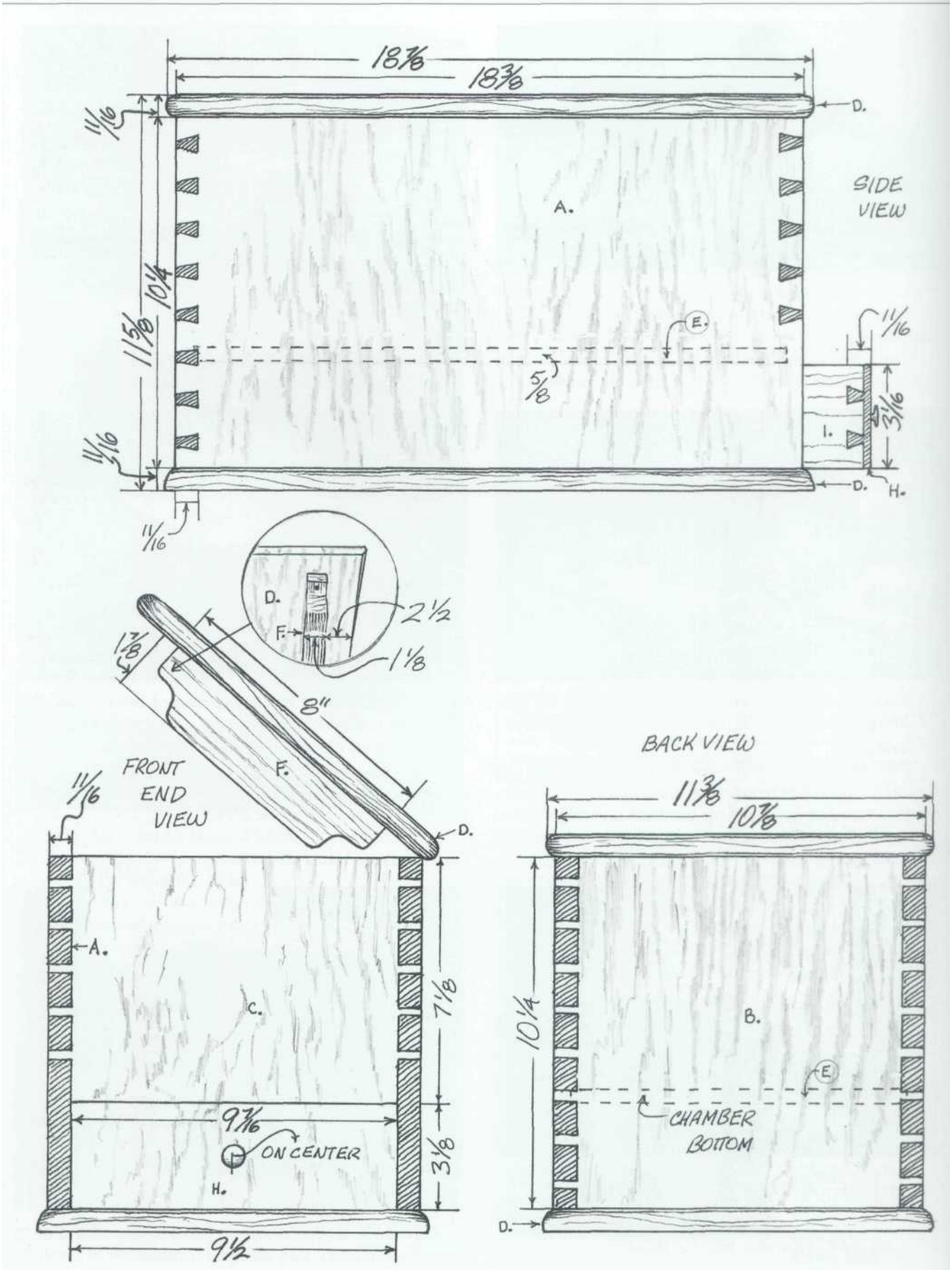
Again, the process begins by cutting the tails. Then lay these across the end grain of the drawer front, and mark the perimeter of each tail on the drawer front.



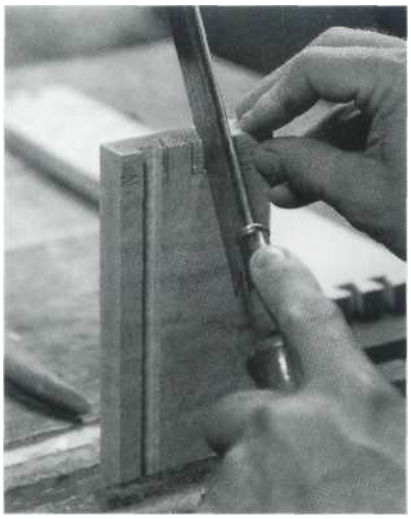


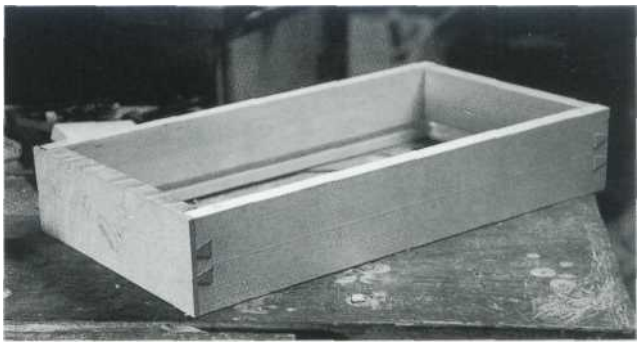
11 The marking can be seen more clearly here.

12 With a try square, extend the lines from the end of the drawer front to the scored baseline. Scribbling indicates waste.


18 3/8
18 3/8
11/16
D.
A.
SIDE VIEW
10 1/4
11 5/8
E.
5/8
11/16
3 1/16
I.
11/16
D.
H.
11/16
D.
2 1/2
F.
1 1/8
1 7/8
8"
F.
FRONT END VIEW
11/16
D.
A.
C.
7 1/8
9 7/16
ON CENTER
H.
3/8
9 1/2
BACK VIEW
11 3/8
10 7/8
10 1/4
B.
E.
CHAMBER BOTTOM
D.

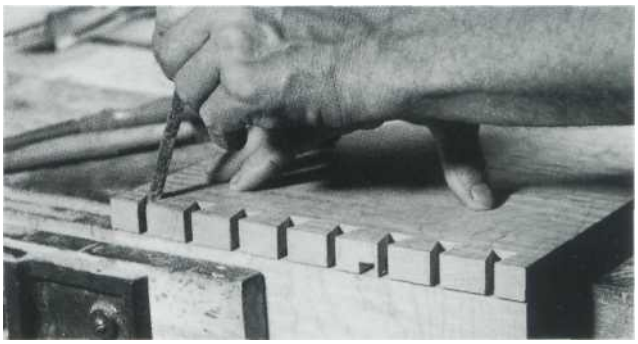
13 With a backsaw positioned just to the waste side of each line and held at about a 45° angle, define the sides of each pin by a saw kerf that connects the baseline on the back of the drawer front with the line drawn on the end grain indicating the forward limit of the tails.



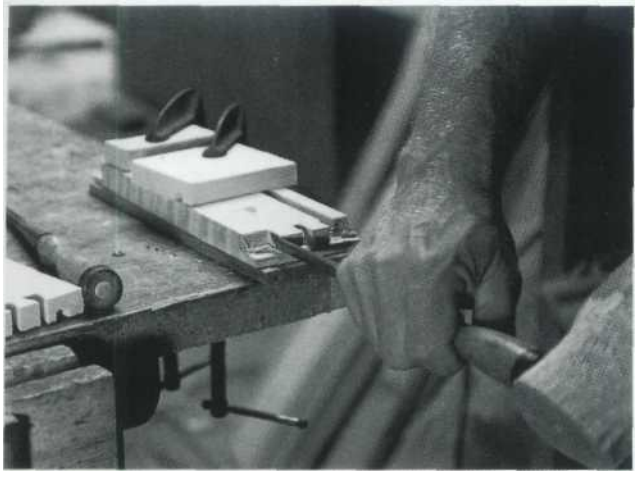


16 The dry-assembled drawer shows through dovetails at the back and half-blind dovetails at the front.

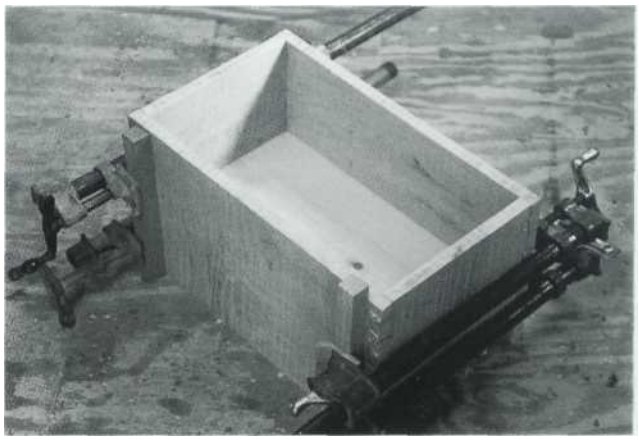
14 Then clamp the drawer front to the bench with its inside face up. Cut away the waste with a mallet and chisel.



17 The procedure for dovetailing the sides of the case is the same as that used for the back of the drawer with two important differences: First, because of the board widths, there will be many more pins and tails, making joint fitting more time-consuming. Second, because the joint components are hardwood, they must be fit more carefully. Forcing a hardwood joint nearly always results in split stock.



15 Carefully (to avoid splitting the drawer front), shape the sides of the pins with the chisel.



18 Assemble the case around the bottom of the storage chamber. The edges of this bottom are housed in the groove on the inside faces of the four sides of the chest.

Clamping blocks permit the pressure to be exerted behind the pins. This allows the pins to protrude 1/16". After the glue has cured and the clamps have been removed, sand this excess away, making the ends of the pins flush with the sides of the case.

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26

SHADOW BOX

White
Oak

MAKING THE SHADOW BOX

First, cut a 1/2" X 3/8" rabbet on the back inside edges of the two sides, into which the piece's back will later be fit. Cut through dovetails at each corner (see chapter twenty-five). After dry-fitting but before gluing the dovetails, cut the dadoes that will house the ends of the shelves on the inside faces of the two sides. When the shelves have been fit into the dadoes, glue and assemble the four sides of the case.

While the glue in the dovetail joints is curing, cut the dadoes in the two upper partitions and fit the partitions into them. Then glue and slide the partitions into place.

Below the half-circle at the top of the back, relieve the sides of the back so that they will fit into the rabbet cut into the back inside edges of the sides. Fasten the back in place with 3/4" no. 6 wood screws passing through the back, into the rabbet and into the back edges of the box's top and bottom. Then, sand and finish the shadow box.

MATERIALS LIST

A	Back	1 pc.	½×6 5/16×20 5/16
B	Side	2 pcs.	½×2×17⅜
C	Top and bottom	2 pcs.	½×1½×6 5/16
D	Shelf	3 pcs.	⅜×1½×5 5/16
E	Partition	2 pcs.	¼×1½×2⅛
F	Screws	10 pcs.	¾" no. 6

**These are net measurements. Surplus should be added to dovetailed parts to allow them to be sanded flush.*

INTERPRETING HARDWOOD GRADES

The grading system used to indicate the quality of individual hardwood boards can be a little intimidating. In an effort to clarify that system, I spoke with the National Hardwood Lumber Association.

First, the system *is* complicated. The training course offered by the National Hardwood Lumber Association for people interested in a career in lumber grading consists of fourteen weeks of "intensive" training.

Second, although there are only nine commonly used grades, there are any number of specialized or combination grades used in the woodworking industry. However, the good news is that there are only four grades with which the average cabinetmaker need to be concerned. These are FAS, Selects, #1 Common, and #2A common.

Third, the grades are distinguished by the precentage of clear wood that could be taken from a board in cuttings not smaller than those specified on the chart below. For example, to be graded FAS, a board must be able to yield 83 1/3 percent of its surface as clear wood when taken in cuttings not smaller than 4"X 5' or 3" X 7'. (The odd percentages reflect the convention of measuring lumber in board feet, a unit consisting of the amount of material contained in a cutting 12"X 12"X 1'.)

Fourth, all grades, with the exception of Selects, are determined from the poor face of the board. This means that if a woodworker buys a board graded FAS, its good face is likely to offer a higher percentage of clear surface than is indicated on the chart.

	FAS	SELECT	#1 COM	#2A COM
Minimum Size Board	6″×8′	4″×6′	3″×4′	3″×4′
Minimum Size Cuttings	4″×5′ 3″×7′	4″×5′ 3″×7′	4″×2′ 3″×3″	3″×2′
Minimum Clear Yield	83⅓%	83⅓%	66⅔%	50%

**Please note that this chart is not intended to be a complete representation of any of the grades shown. It's intended only to offer some general guidelines.*

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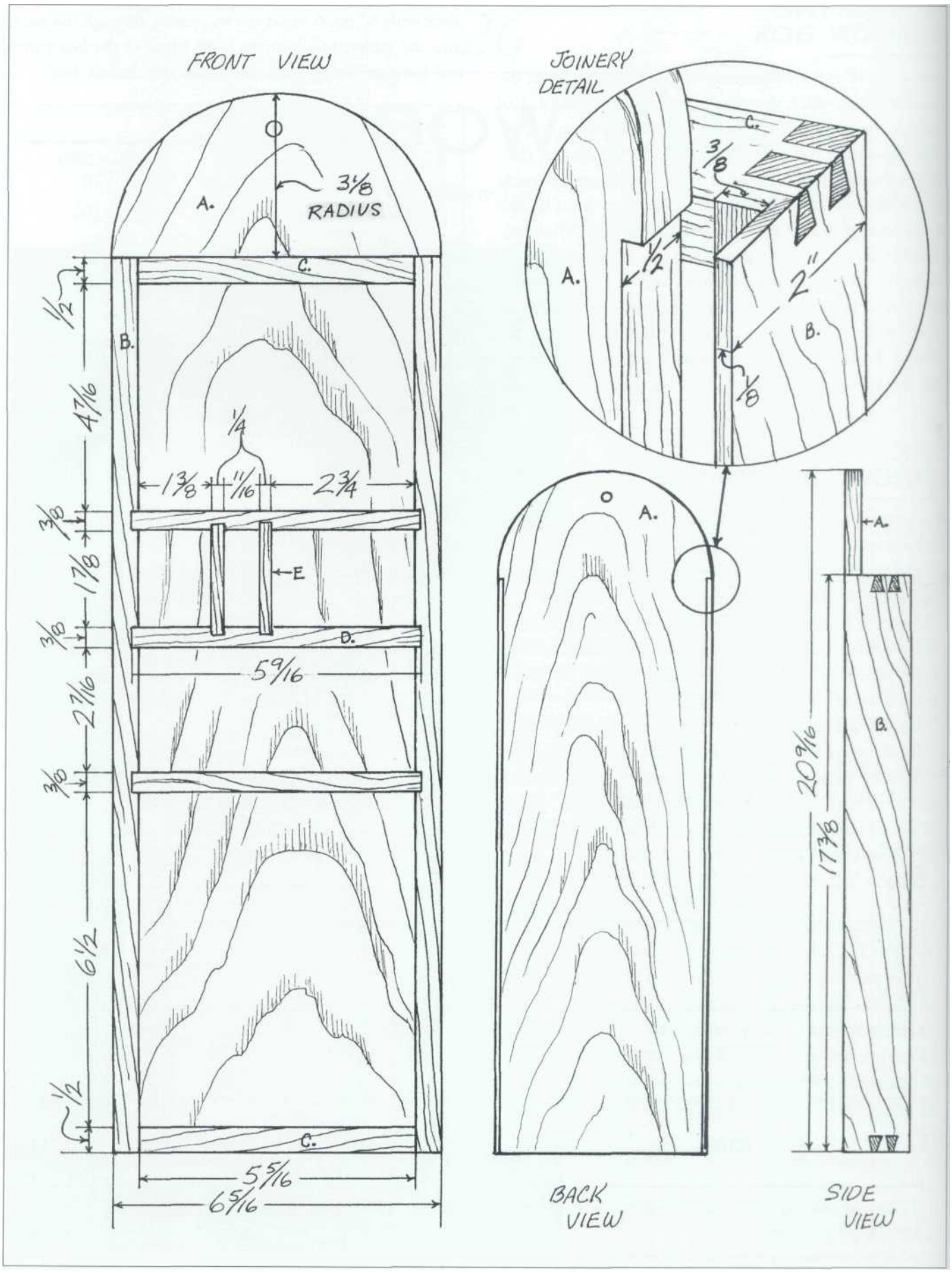

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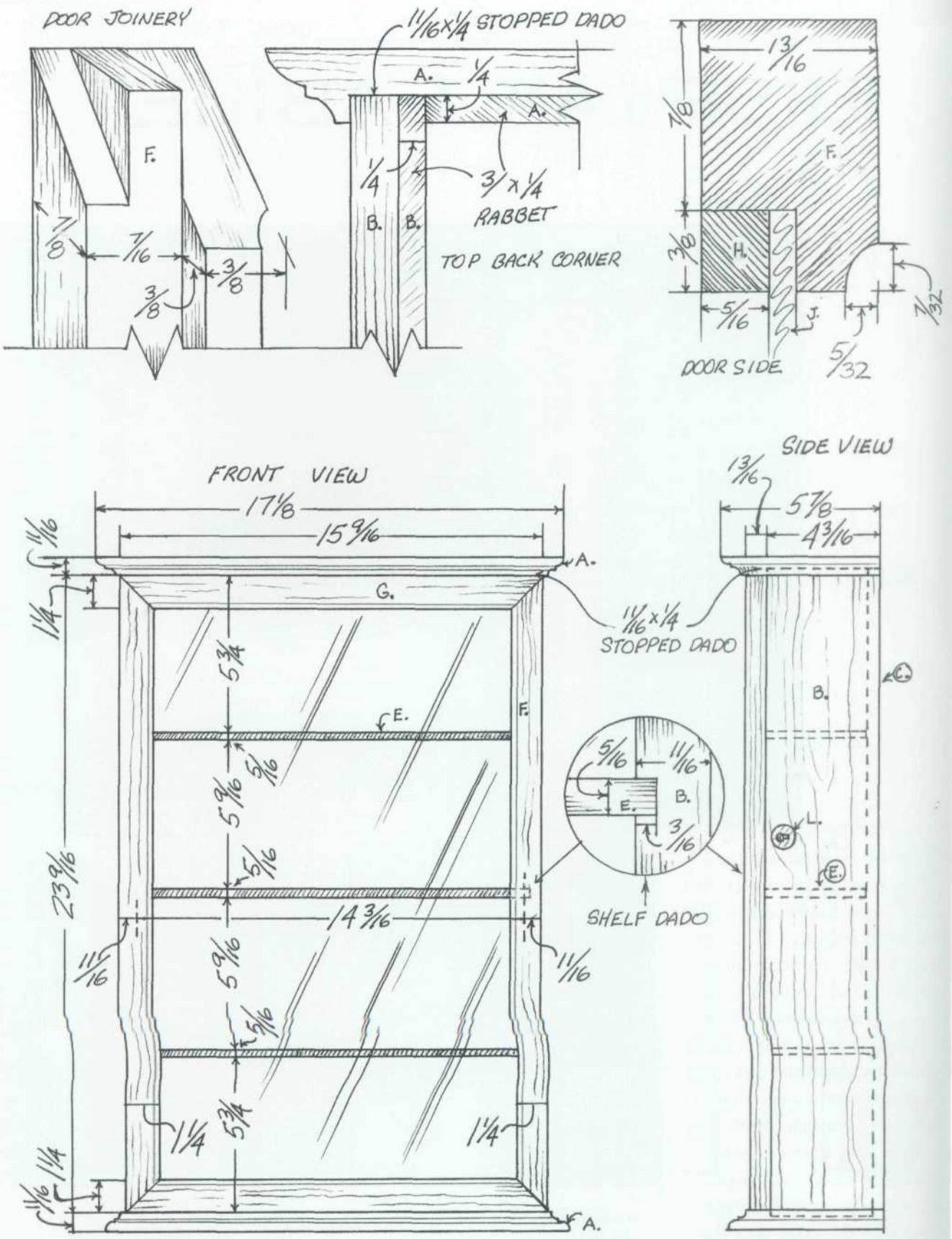
27

DISPLAY CABINET

Cherry


DOOR JOINERY
F.
1/8
7/16
3/8
3/8
11/16 x 1/4 STOPPED DADO
A.
1/4
A.
1/4
3/8 x 1/4
RABBET
B.
B.
TOP BACK CORNER
13/16
7/8
F.
3/8
H.
5/16
J.
7/32
DOOR SIDE
5/32
FRONT VIEW
17 1/8
15 9/16
11/16
1/4
A.
G.
5 3/4
E.
F.
5 9/16
5/16
5/16
23 9/16
14 3/16
5 9/16
11/16
11/16
5/16
5 3/4
1/4
1/4
1/4
11/16
A.
SIDE VIEW
13/16
5 7/8
4 3/16
11/16 x 1/4
STOPPED DADO
B.
C.
5/16
11/16
B.
E.
3/16
L.
E.
SHELF DADO

miter. This spline not only increases the glue surface; it also allows face grain to be glued to face grain. The feathered miter, used in the construction of the Shaker-style mirror, is another variation of the basic miter joint, one offering the same advantages as the splined miter. The mitered bridle joint used in the construction of the door on this cherry display cabinet is still another variation, one including tenons on the door's sides which fit into mortises cut into the miters on the door's top and bottom. This joint offers the strength of tenons which are an actual part of the door's sides. It does, however, provide less glue surface than either the splined or feathered miter joints.

MAKING THE DISPLAY CABINET

After milling the stock to the required thicknesses, lengths, and widths, form the moulded edge on the front and ends of the cabinet top and bottom. Then, cut 11/16" X 1/4" stopped dadoes on the top surface of the bottom and the bottom surface of the top (see chapter five). These dadoes will house the ends of the cabinet sides. Cut a 3/8" X 1/4″ rabbet across the back of the cabinet top and bottom connecting the dadoes. Cut the same rabbet on the back, inside edges of the cabinet sides. These four rabbets will house the perimeter of the cabinet back. Finally, cut three 3/16″ X 5/16" dadoes across the inside surface of the cabinet sides to house the ends of the shelves.

Then assemble the case with glue and screws passing down through the top into the sides, and up through the bottom into the sides. Screw the back to the cabinet sides, top, bottom and the backs of the shelves. These screws pass through oversized holes to allow the back to expand and contract in response to seasonal changes in humidity.

Begin door construction by running the moulded edge on the front inside corner of the frame stock. Cut a 3/8" X 7/16″ rabbet on the back inside edge. Then cut the mitered bridle joint. You can do this with a backsaw and a chisel or with a stack of dado cutters on the table saw, holding the work in a Universal Jig.

The glass is held in its rabbet with the four tack strips.

MATERIALS LIST

A	Top and bottom	2 pcs.	11/16 × 5 7/8 × 17 1/8
B	Side	2 pcs.	11/16 × 4 3/16 × 24 1/16
C	Back	1 pc.	3/8 × 14 13/16 × 24 1/16
D	Cleat	1 pc.	13/16 × 1 1/4 × 14 3/16
E	Shelf	3 pcs.	5/16 × 3 3/16 × 14 9/16
Door			
F	Door side	2 pcs.	13/16 × 1 1/4 × 23 9/16
G	Door top and bottom	2 pcs.	13/16 × 1 1/4 × 15 9/16
H	Vertical tack strip	2 pcs.	1/4 × 3/8 × 21 3/4
I	Horizontal tack strip	2 pcs.	1/4 × 3/8 × 12 15/16
J	Glass	1 pc.	1/8 × 13 3/4 × 21 3/4
Hardware			
K	Hinge	2 pcs.	1 × 1 3/4
L	Lock	1 pc.	1 5/8 × 1 7/8
M	Screws	various	

**These are net measurements. Surplus should be added to door sides to permit joints to be sanded flush.*

28

SIX-WOOD BOX

Mixed Woods

INSTALLING HARDWARE

Many years ago, I made a drop-leaf walnut wall desk with a number of variously sized pigeonholes. I remember the satisfaction I felt fitting each of the little dividers into its dadoes. I remember the pains I took to smooth the wood with a variety of sandpaper grits. I also remember visiting the hardware store in search of a lid support that would hold the drop leaf at the proper angle so that it could be used as a writing surface.

I found the brass support that I had envisioned for my desk and I took it home and tried to install it. I tried it one way and then another and another, each time making screw holes in my carefully sanded walnut, until I realized, with a growing sense of panic, that it simply wasn't going to work, that the arrangement of pigeonholes I'd designed left no room for the operation of this lid support.

I searched the mail order catalogs next (at that time, there weren't nearly as many to choose from). But nothing I found there looked any more likely to work in the tight confines of my desk than what I'd already tried.

Rule number one for makers of furniture and woodenware: *Buy the hardware first.* Buy it before construction starts, before a single stick of wood is cut, before even the finishing touches are put on the design. Buy the hardware first because what the project requires may not be available or, if available, may not work as envisioned.

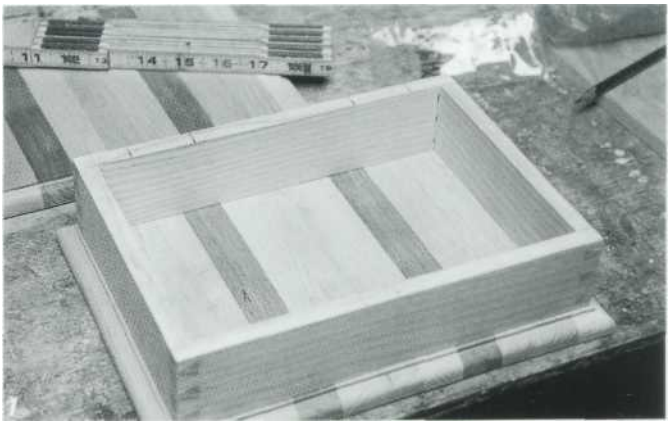
What happened to the wall desk? I did finish it, and we did use it in our home for several years. We, then, later gave it to a friend. Although I haven't seen it for ten or eleven years and have attempted to blot its memory from my mind, I believe that my solution to the problem of the drop leaf support involved a length of noisy and inelegant brass chain.

The opened six-wood box shows the lock installed in the front.

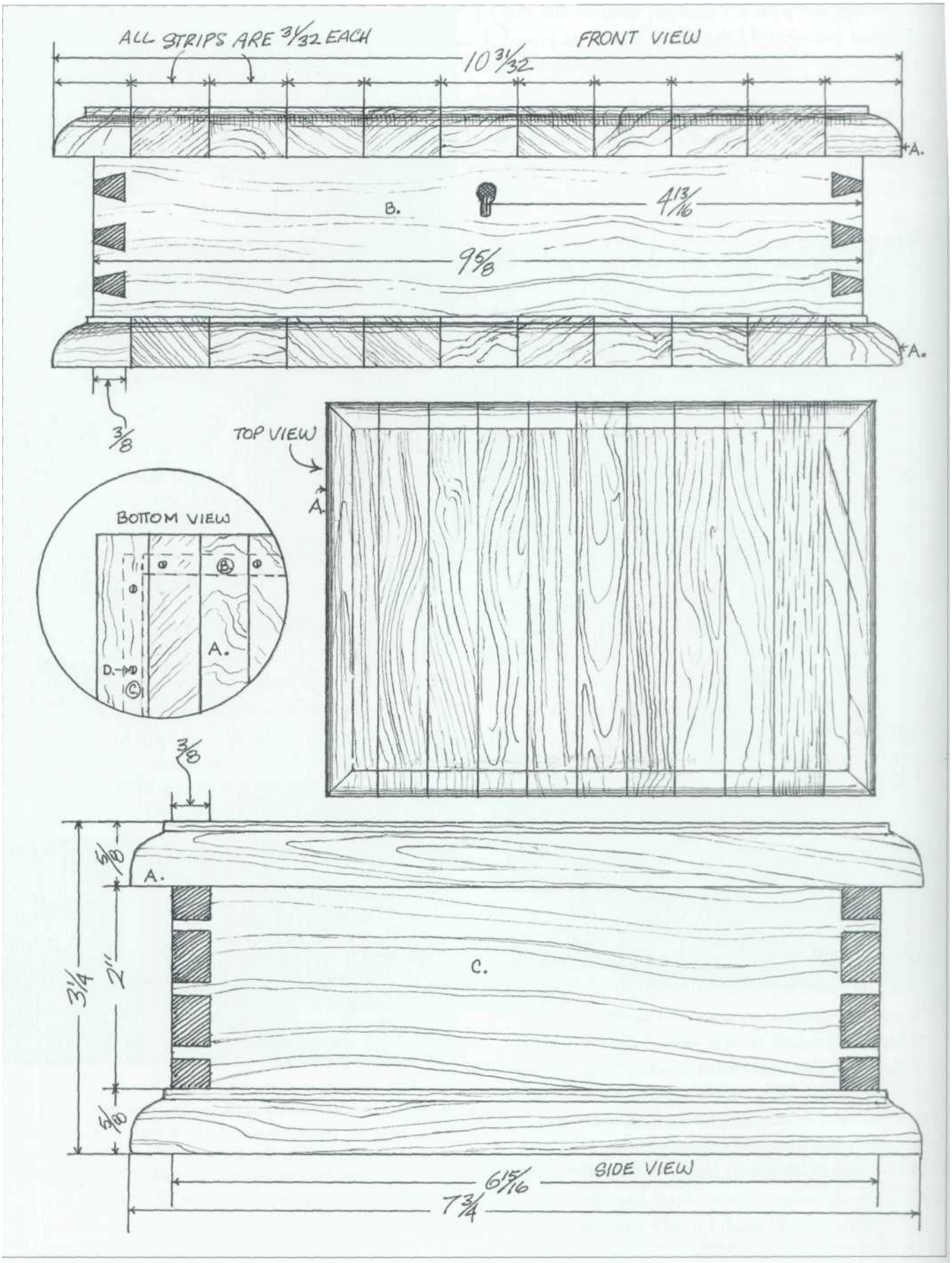
Before beginning work on this small box, I waited for my hardware to arrive.

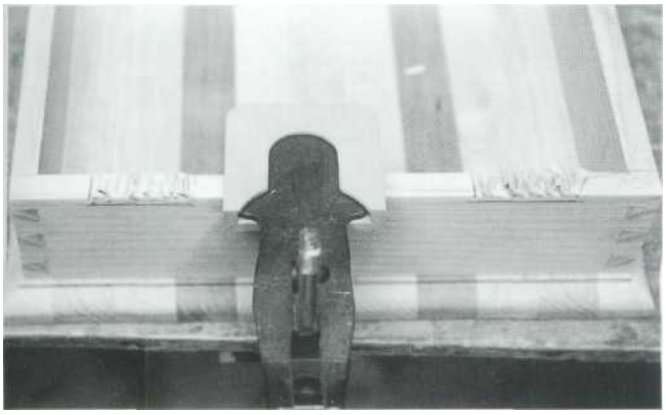
Begin construction with the glued-up panel from which the top and bottom are cut. Shuffle around a number of rips approximately 1" wide until a pleasing arrangement is found. Then glue-up and clamp these rips. After the glue is cured, you can plane the panel (see chapter five) cut out the box's top and bottom, and mould them on a shaper or a table-mounted router.

Dimension and dovetail sidewall material together (see chapter twenty-five). Fasten the bottom in place with a number of screws passing through oversized holes that allow expansion and contraction of the bottom in response to seasonal changes in humidity.

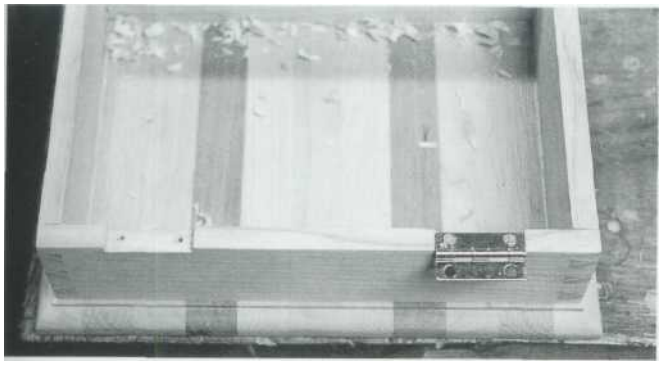


1 Install the hinges on the back wall of the box. This process begins with careful layout. Lines marking the ends of the hinge leaves are squared across the back wall of the box. Then, additional lines marking the depth of the hinge mortises are drawn. Set these lines so that the top surfaces of the top leaves are flush with the top edge of the box's back wall.

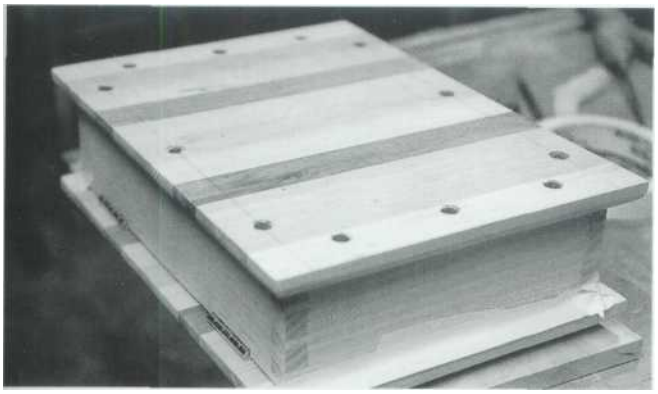

ALL STRIPS ARE 3/32 EACH
FRONT VIEW
10 31/32
A.
B.
4 13/16
9 5/8
A.
3/8
TOP VIEW
A.
BOTTOM VIEW
B.
A.
D.
C.
3/8
5/8
A.
3 1/4
2"
C.
5/8
SIDE VIEW
6 15/16
7 3/4



2 *A series of **shallow** chisel cuts lifts wood from the mortises. this will be removed by working the chisel back, from the* opposite direction.



3 After cutting the mortises, install the hinges. Take care to accurately align the hinges so that both hinge pins open on the same axis.

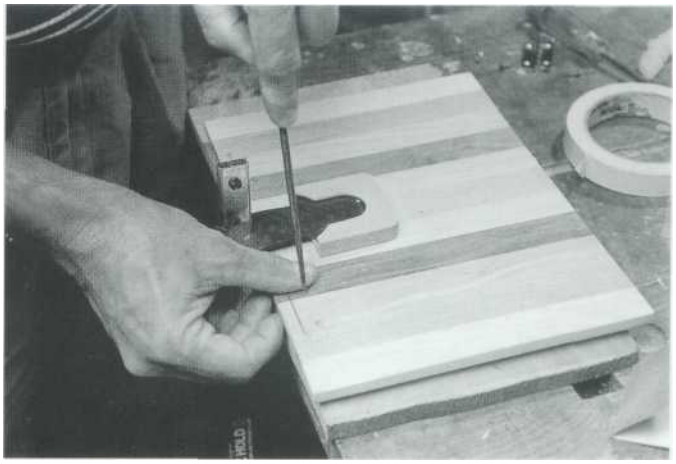


4 When the hinges have been fastened to the box's back wall, invert the box over the lid and tape in place. Then mark hinge locations very carefully.

MATERIALS LIST

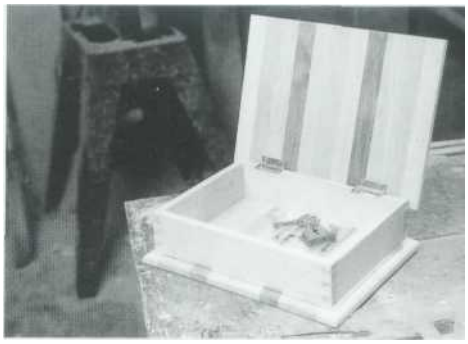
A	Top and bottom	2 pcs.	$\frac{5}{8} \times 7\frac{3}{4} \times 10\frac{31}{32}$
B	Front and back	2 pcs.	$\frac{3}{8} \times 2 \times 9\frac{5}{8}$
C	Side	2 pcs.	$\frac{3}{8} \times 2 \times 6\frac{15}{16}$
D	Screws	12 pcs.	1¼ no. 8
E	Hinge	2 pcs.	$1\frac{1}{2} \times \frac{7}{8}$
F	Box lock	1 pc.	$1\frac{1}{2} \times 1$

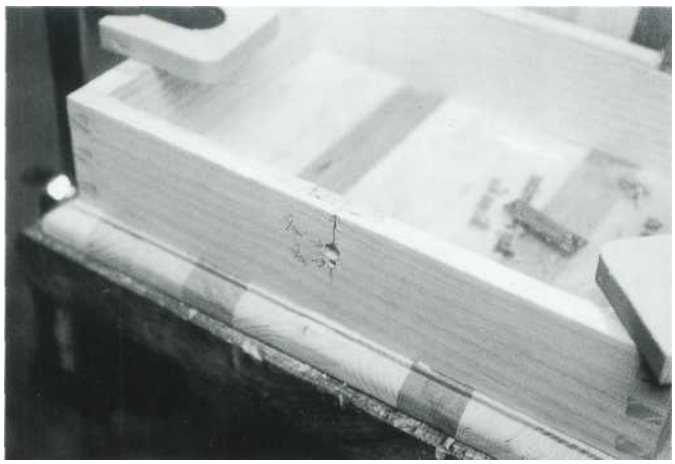
**Front, back and side length measurements are net. Surplus should be added so that dovetail can be sanded flush.*
**Hinges and lock were ordered from Constantine's Hardware.*
**Reading from left to right, the woods in the top are as follows: hard maple, white oak, cherry, walnut, sassafras, cherry, sassafras, walnut, cherry, white oak, hard maple. The box's walls are made of ash.*



5 Remove hinges from the back wall so they can be installed on the lid. Here, a scratch awl is being used to punch **a** starting hole for the drill bit in the center of the circle marking the screw holes in the hinges.

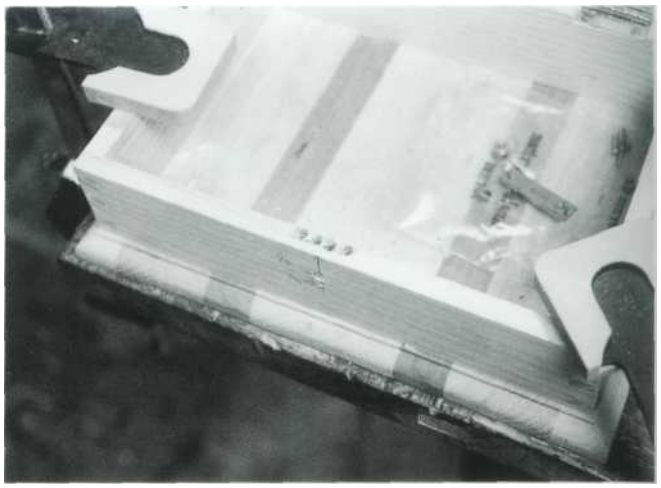
6 After installing the hinges on the lid, fasten the hinges' other leaves into the mortises previously cut into the box's back wall.





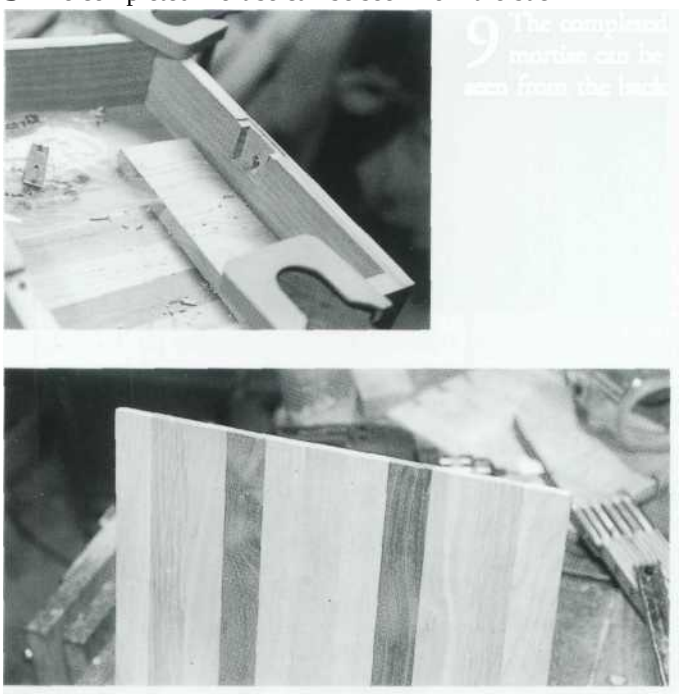
7 Next, install the brass box lock. Again, careful layout is essential. Square a centerline across the top edge of the box's front wall and draw the mortise for the lock on the top edge and inside face.

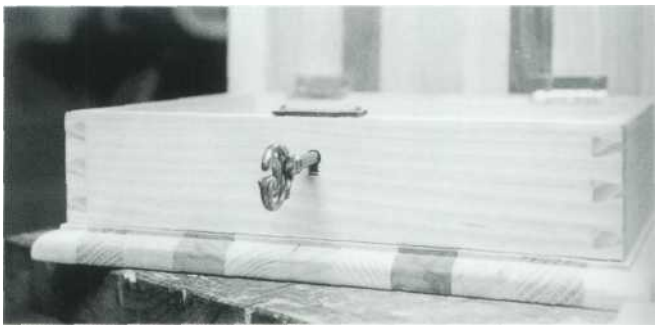
Then extend the centerline down the front face of the box's front wall, and lay out the keyhole along this line. Drill a 1/4″ hole above a 1/8" hole to remove most of the waste necessary for the creation of the keyhole.



8 Four 3/16" holes remove much of the waste for the mortise that will house the main body of the lock.

9 The completed mortise can be seen from the back

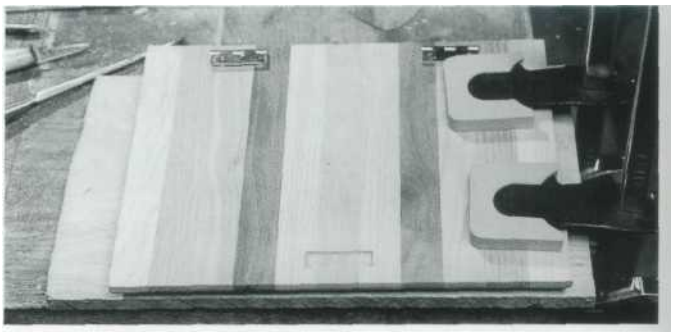




10 After installing the lock in the box's front wall, locate the strike plate on the bottom side of the lid. The fist step in that process is locking that strike plate in place with the key.

Here, the strike plate can be seen locked facedown. Notice the two bumps on the back side of the strike plate. When the lid is closed and tapped firmly, these two bumps leave depressions on the lid's bottom surface, locating the strike plate on the lid.

12 Cut the mortise in which the strike plate will sit. The lock is now fully functional.



11 In this photo, the two depressions can be seen near the upper edge of the lid. After the lid has been clamped face-down on the benchtop, position the strike plate so that the two bumps on its upper side are located in these depressions. Then draw a line around the strike plate and the mortise cut.

29

BENTWOOD BOX WITH SNAP-FIT LID

Walnut, Hard Maple

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MAKING THE BENTWOOD BOX

Work begins with the construction of a bending form for the main body of the box. Mine consists of a stack of spruce 2 X 4's laminated together and band-sawn and sanded to the box's inside profile. On the side of the form that will shape the front of the box, the face of the form is undercut for the lap of material beneath the box's glue joint. A thin strip of metal (in my case, aluminum siding) is screwed to the form creating an opening into which the end of the sidewall material can be slipped as that material is wrapped around the form.

The next step is acquiring material for the sidewalls of the box (see chapter two for a detailed discussion).

After the sidewall material has been soaked (for twenty-four hours in cool water, followed by ten minutes in warm water), wrapped around the form, and clamped in place, it should dry for four or five days. At that time, remove it from the form and cut the lap joint. For this particular example, I drilled three holes in the joint, sandwiching in three bits of peacock feather between the lapping laminations so that the feather was visible through the holes. The joint is then glued and clamped using the bending form and the caul both to protect the material from the clamps and to preserve the box's oval shape while the glue cures. (this process is described in some detail in chapter two).

Cut out the clasps and the handle next. Thicknesses can vary, but the thickness of the clasps must be accurately transferred to the stock that will later become the lid so that the walls of the notches fit snugly against the clasps.

When you have selected the lid material, place the box's bentwood sidewalls on that material and draw a line around its circumference. Next, establish a centerline running from one end of the box to the other. This centerline is necessary in order to lay out the notches that will house the clasps.

Next, sketch the outside profile of the lid. There is considerable freedom in establishing this profile since the notch placements are the only critical locations on the lid. Then cut the lid's outside profile on the band saw.

Once the lid has been shaped, the handle is affixed. I taped the handle in place, turned the lid over, and drove a couple of wood screws up through the lid and into the handle.

Make the bottom next. After thicknessing the stock to *7/16"*, place the box's bentwood sidewalls on the bottom

MATERIALS LIST

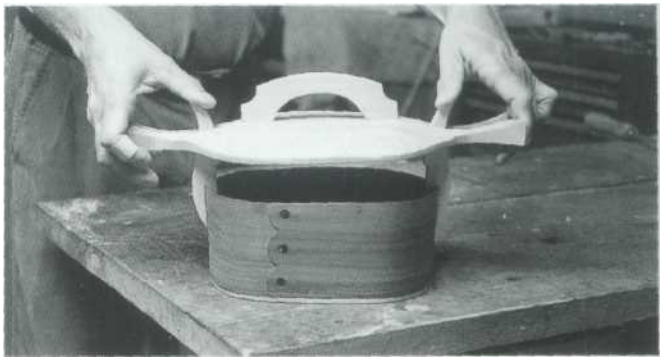
A	Top	1 pc.	1 × 7¼ × 15½
B	Sidewall	1 pc.	1/16 × 3½ × 30
C	Bottom	1 pc.	7/16 × 6¼ × 8½
D	Clasps	2 pcs.	½ × 1⅛ × 7¼
E	Handle	1 pc.	9/16 × 1¾ × 6⅛

**Measurements for lid, bottom and clasps must be taken from the dimensions of the sidewall, which are, in turn, determined by the size of the bending form.*

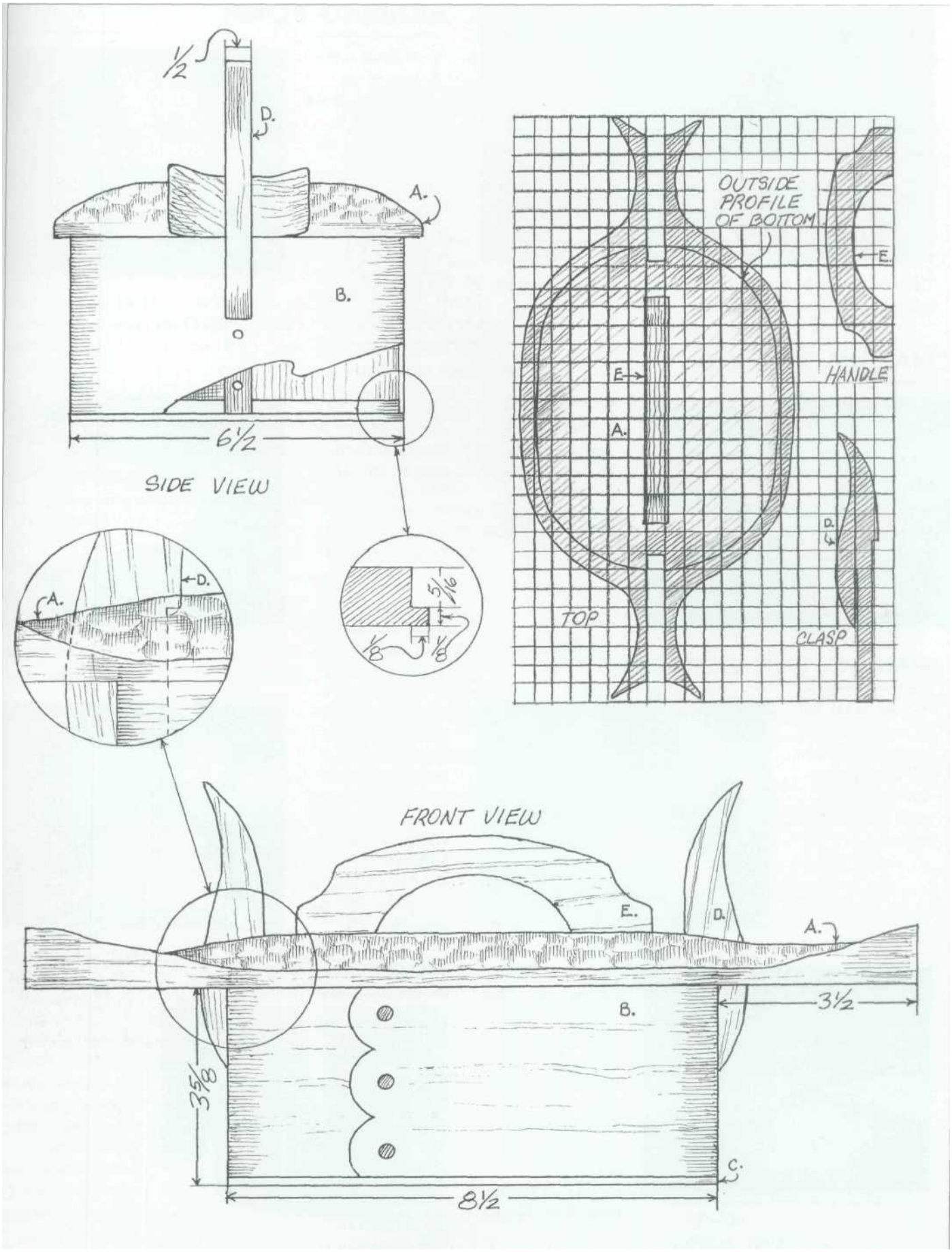
material. Profile the inside and outside of the sidewalls. On the band saw, cut the bottom profile, keeping the saw kerf approximately 1/16" outside the pencil line that marked the outside circumference of the sidewalls. Then, clamping the bottom in a vise, cut away the extra 1/16" of material with a block plane, to remove the saw marks.

Mark the rabbet around the bottom circumference with a line 5/16" from the top surface of the bottom. Next, with a dovetail saw, make a shallow cut along that line. This saw kerf represents the bottom of the rabbet. With a chisel, cut the rabbet to the depth marked by the line traced around the inside face of the sidewalls. Once the bottom has been fit, sand the parts and assemble the box using 1/8" wooden pegs to both fasten the walls to the bottom and the clasps to the walls.

OPENING THE BOX



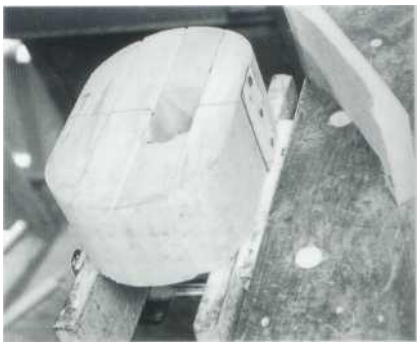
1 Place your thumbs on the tops of the box's clasps while your fingers grasp the fishtail ends of the lid. Spread open the clasps and lift the lid. To close, press the lid down against the clasps until it snaps into place.


1/2
D.
A.
B.
6 1/2
SIDE VIEW
OUTSIDE PROFILE OF BOTTOM
E.
HANDLE
A.
D.
TOP
CLASP
5/16
1/8
1/8
FRONT VIEW
E.
D.
A.
3 1/2
B.
3 5/8
C.
8 1/2

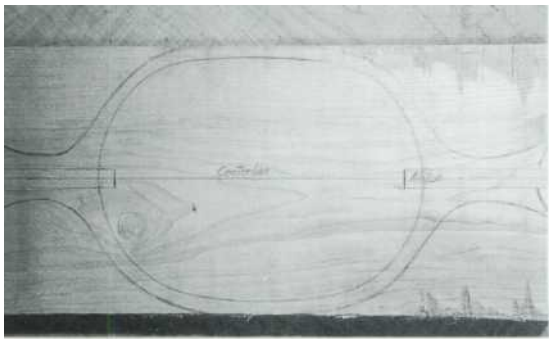
This close up of the box side reveals peacock feather inlay in the holes, a very unique design element.

BENDING FORM

1 A block at the base of the bending form allows a vise to hold it. After wrapping the soaked, resawn stock around the form, clamp the caul to the form to hold it in place. Cut an opening in the top of the form for the clamp head.

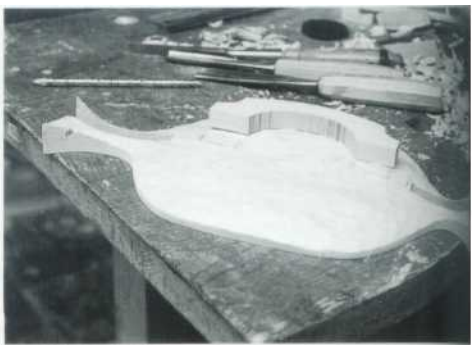


MAKING THE LID



1 The layout of the lid is shown. Careful planning at this stage will ensure a lid that snaps cleanly into place.

2 If the surface of the lid is to be shaped, flat surfaces must be left for the base of the handle.



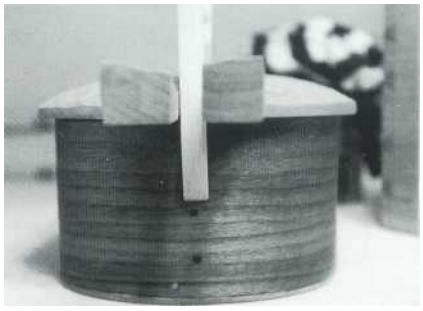
MAKING THE BOTTOM

1 Define the bottom of the rabbet that will receive the sidewalls by a shallow saw cut made all around the bottom.

2 Cut the rabbet with a chisel. Here, the chisel is cutting across end grain. After cutting another 3/4" of the rabbet, reverse the bottom in the vise in order to cut back to that point from the other side.

3 The various parts have been cut and fit and are ready for assembly. Notice the widened section of the rabbet which will receive the lapped section of the sidewalls. Notice, too, the notches for the bottoms of the clasps.

PEGS



1 This shows the ends of two pegs driven through the sidewall into the clasp. Below, to the left, is one of the pegs holding the bottom and sidewall together. Drill a hole before inserting these pegs.

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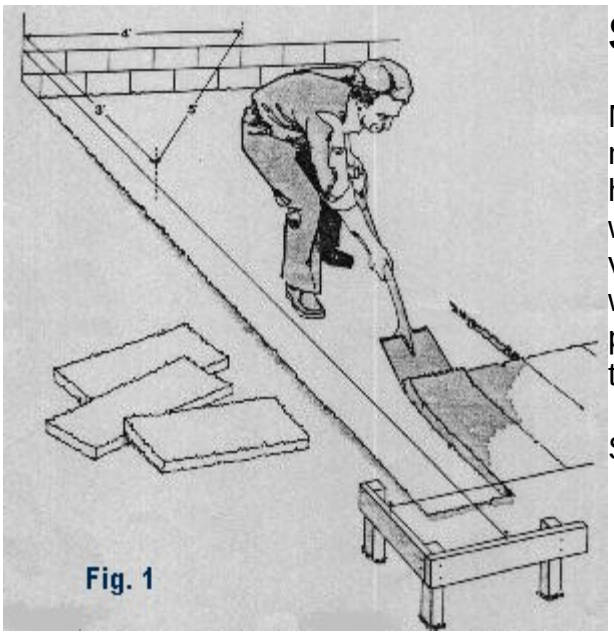
30
DECK

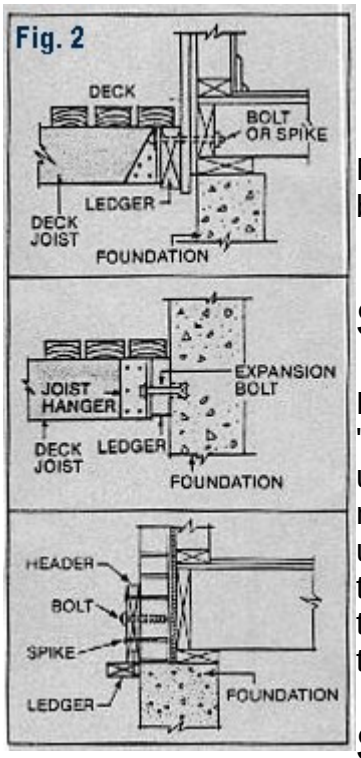


Step 1

Mark off the deck area using string and "batterboards" making sure that it is square. Batterboards are boards hammered in to the ground just outside the corners of where the deck will be. See Fig 1. The string will help you visualize the size and appearance of the finished deck and will also serve as a guide for excavation and post placement. But trust me, it will always look smaller this way than when it is done.

SQUARING WITH STRING

1. Attach string to house and/or batterboards to make sure its level.
2. Use a felt tip marker to mark the string 3' from the corner in one direction and 4' from the corner in other direction.
3. When the diagonal connecting these 2 points is 5', you have a right triangle and the angle at the corner will be 90°.



Note: To obtain the 5' measurement, move the string attached to batter board to the left or right until correct.

Step 2

Prepare the site. With a spade or sod cutter, remove sod to a depth of 2 or 3 ". Uncover an area approximately 2 ft. larger than the planned deck. It's unlikely that grass would be able to grow in the shadow of your deck, so you might as well transfer the sod to a bare spot in your yard where it would be useful. To prevent weeds and unwanted vegetation from growing up through the deck, spread a sheet of polyethylene film over the area. You'll have to slit this to embed posts in the ground. After the posts have been installed, cover the sheet with gravel, pebbles or wood chips.

Step 3

A ledger/header board is the next step if you are attaching your deck to an existing structure.

The placement of the ledger/header determines the level of the deck floor, so be sure it is positioned at the correct height and is horizontal.

When fastening ledger/header boards to wood, the ledger should be held securely with bolts through the wall or lag screws. Use aluminum flashing to keep water from getting behind your ledger board.

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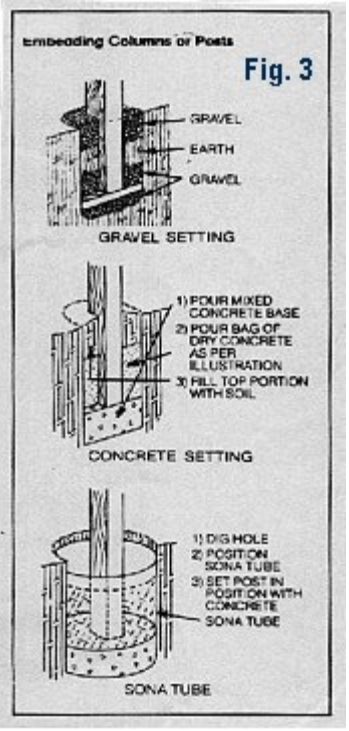


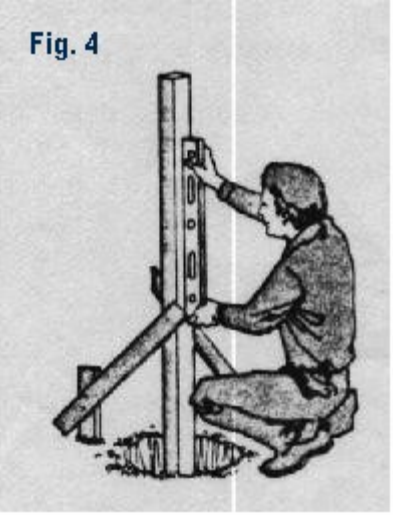
This should tuck up under your siding and bend down over the ledger, then down the face of the ledger board. Where aluminum or vinyl siding is in place, carefully cut siding away from house so that ledger/header board can be secured directly to the house. You may be able to use the bottom edge pieces of the siding above the deck to refinsh the lower edge, so save these if possible. See figure 2. I will assume the joists are hung from the ledger and not resting on it, but be sure you account for the height of your deck boards when figuring the placement of the ledger. (Typically just 1 ½ inches down from the final height of the deck.)

Step 4

Locate and dig holes for footings. In normal soil the holes should be a minimum of 24 to 36 inches deep, although the actual depth will depend on the height of the column and the depth of the frost line. Posts should go deeper than the frost line to avoid heaving during freeze and thaw cycles. Again, this is usually specified by code when the deck is attached to the house.

If you have many holes to dig and/or have difficult soil to dig in, you should rent a power posthole digger. These can be operated by one person, and certainly make the digging go MUCH faster.

You can use pressure treated wood in the ground for your footings as follows. Fill the bottom of the hole with 6 inches of gravel and place a wood footer plate (2" x 6", or 2" x 8" cut off) on top of the gravel. Upright posts can then be positioned on this base (Fig. 3). Fill the posthole with alternating layers of 4 to 5 inched of gravel and earth. Tamp each layer until the hole is filled and post is plumb and solid. If concrete collars are used, taper the tops downward and away from the post for drainage. Posts can also be set in concrete. Or my preferred method, uses a cement footing to just above the ground level. Fill the post hole completely with cement and use a section of "sono tube" (a heavy cardboard tube, 8 inches in diameter) to finish off the hole at ground level. Make sure you have already purchased the hardware to attach the posts to the cement so you can set the bolts in the cement while it is wet.



When setting the posts directly in the holes, make sure they are plumb and in alignment with one another. Use a carpenter's level to check for vertical alignment (Fig. 4).

One advantage of using the cement footings and the wood attached to them above ground, is the leveling and exact location can be set later, when the beams are positioned. It allows for some adjusting later (a little, but that is all you are usually looking for.)

Step 5

Secure beams to posts. Using a string and level, find the desired deck floor height on the posts. Or extend a long straight 2 by 4 from the ledger board to the posts and placing a level on the board, determine the post height. By subtracting the thickness of the joist (use the actual dimension not the nominal one), you will have determined the correct height for securing the top of the beam to the post. Carefully mark all 4 sides of the posts. Beams can rest on top of the post, or be fastened to the side. You may cut all posts except those serving as railing supports at this time. Fasten the beam to the post, keeping post and beam flush. Or set the beam atop the post nailing it down to the post.

Step 6

Attach joists. Joists are attached to the house with joist hangers and/or supported by a ledger board. Joists are placed on 16" or 24" centers, and attached to the beams and ribbon joist. Joists can be attached to the beams using joist hangers, or rest on the beam. If the joists are to extend over a beam, do not extend them more than 1/3 of their length.

Step 7

Install deck boards using hot-dipped zinc-coated 16-penny nails.

Seperate boards using a small finishing nail as a spacer or set boards right up against each other. If pressure treated wood came dry, a space would be necessary for some expansion may take place when it gets wet. However, it typically is quite wet and will always shrink. I have found that when placed tight against each other they will shrink leaving an adequate gap. If you leave to large a gap while they are still wet, the gap may get quite large .

Your deck surface is an important part of your project, and the most visible. Make it simple with the boards set to end on the joists. If you could not get decking long enough to span your deck, stagger the butt end joints so they do not all end along the same joist.

You can trim your deck after nailing to assure a straight line (see Fig. 5). Do not allow an overhang exceeding 1 ½". For a more finished appearance, cut boards flush to the joist and add a fascia board.

If a board is slightly humped, install it with the bark side up when possible to minimize cupping. The weight of people and objects on the deck, and of the board itself, will tend to flatten it. A curved board can also be used; use a board to pry it to the desired position and nail securely.

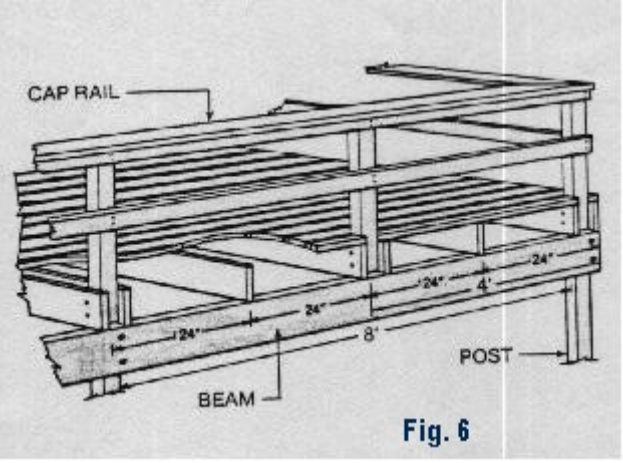


Fig. 6

Step 8

Install posts for railing. These can be a continuation of the posts which support the deck, or railing posts may be bolted to the outside joist or joist extensions.

Notice in Fig. 6 how the main posts continue up from the actual deck floor level and by doing so provide a good sturdy post. Intermittent posts or spacer posts can by used between the main support posts. The top railing member can be easily nailed to the side of the main posts at desired height. Posts can then be cut off. Spacer post height can be determined and added for additional support and appearance. Railing cap of suitable size can now be added as well as additional rails. More railing ideas are illustrated below.

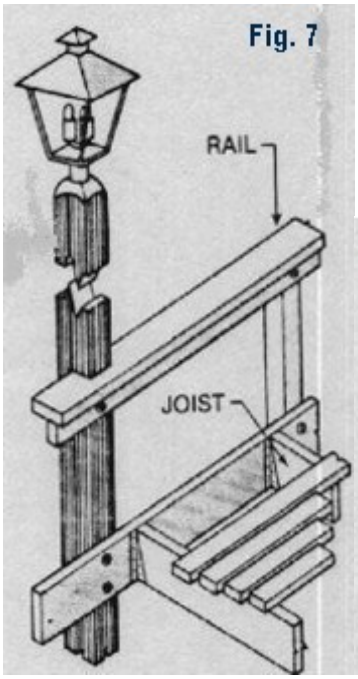


Fig. 7

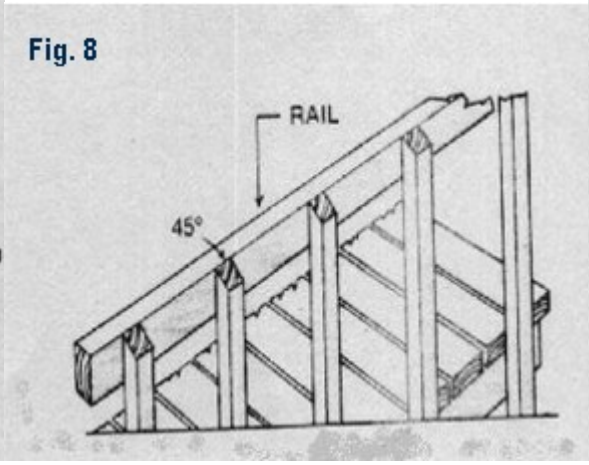


Fig. 8

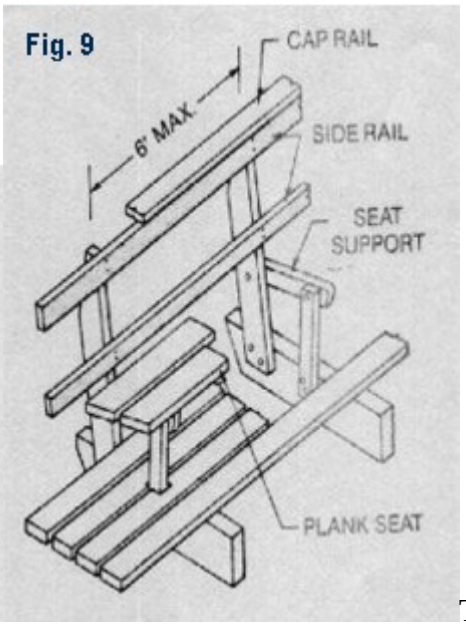
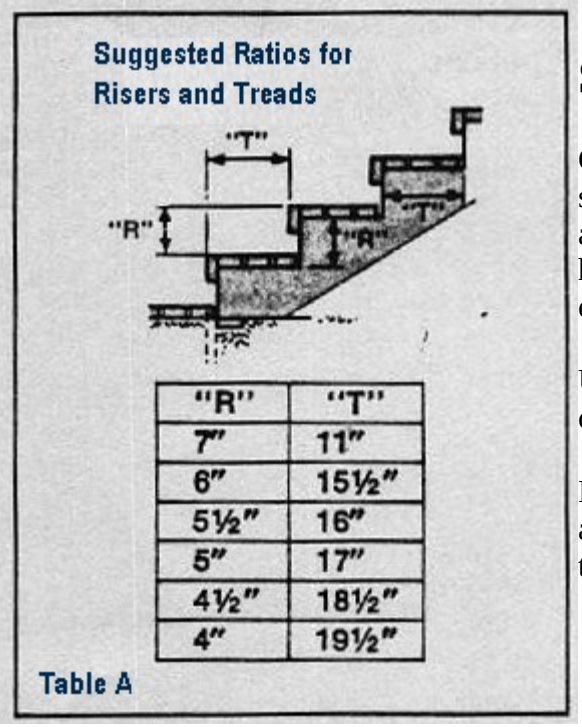


Fig. 9

The safety and beauty of your deck are enhanced by its railings. They can be plain or very elaborate, offering as much opportunity for individual preference as a fence.

Benches can be integrated into the railing on one or all sides. Bench seats should be at least 15" wide and 15" to 18" above the deck floor.

Privacy screens can enhance the beauty of your deck, as well as offering you privacy. They can also be used effectively under an elevated deck to create a storage facility or hide an unsightly hillside.



"R"	"T"
7"	11"
6"	15½"
5½"	16"
5"	17"
4½"	18½"
4"	19½"

Table A

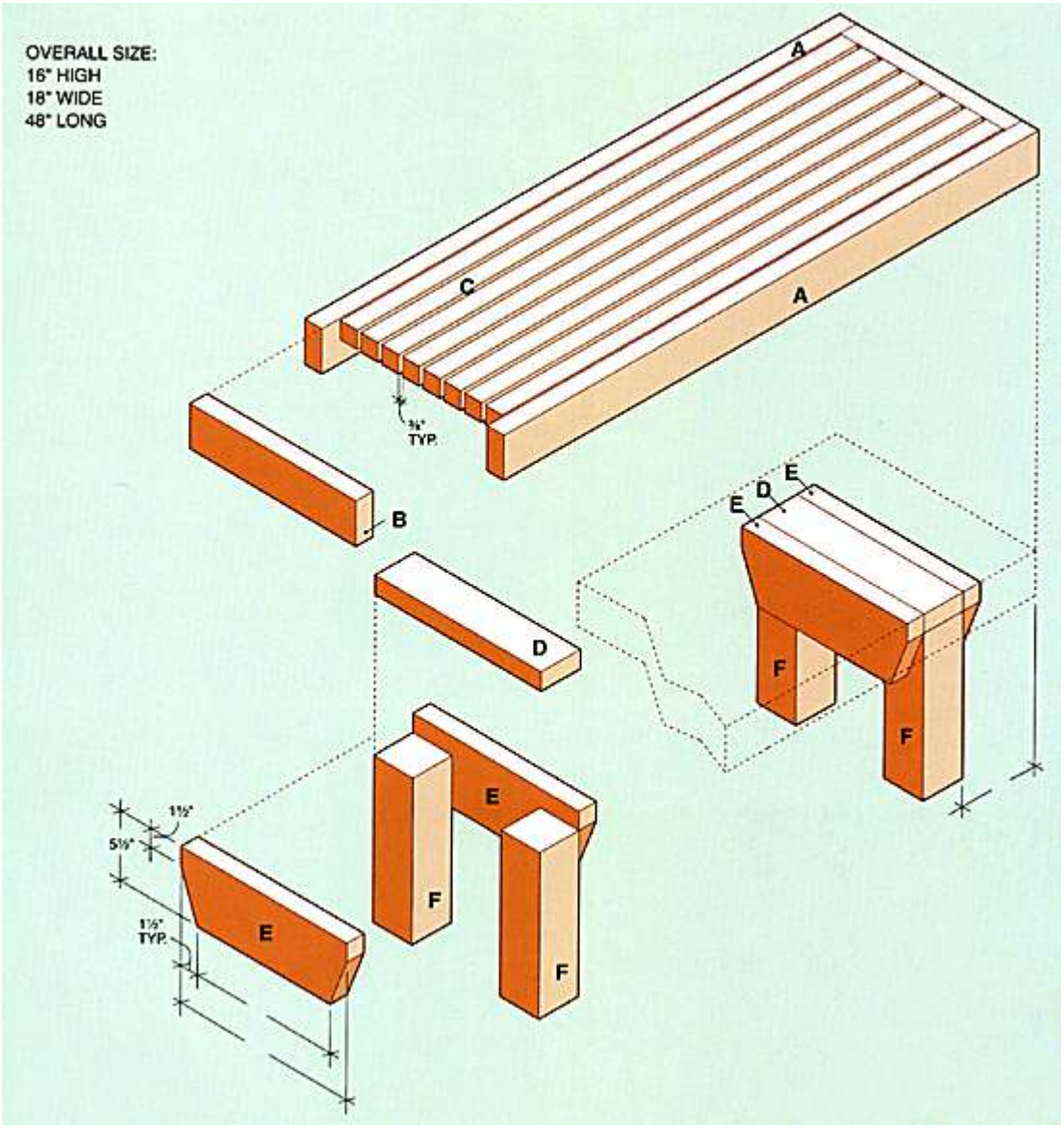
Step 9

Construct steps. Measure the vertical rise and decide upon the best riser size for each step. This will determine the number of steps needed. The adjecent table shows some recommended ratios of tread length and riser height. Multiply the number of steps by the tread length to find the overall run of the stairs.

Using 2 x 4 or 2 x 6 boards for treads will reduce cupping problems common with wider boards.

It is also possible to purchase precut steps at certain lumberyards. A call ahead might eliminate some of the more difficult angle cutting you need to do.

31
DECK BENCH



Due to its modular design, this bench can be mixed or matched with planters or other benches. Cedar wood enables this bench to withstand sun, rain, and even snow. This bench will enhance your enjoyment of your deck and its beauty.

Everything You Need:
Materials: 3" gold-colored deck screws (60) 2 1/2" gold-colored deck screws (16)

Directions: Deck Bench

CONSTRUCTION MATERIALS	
Quantity	**Lumber**
1	2 × 4" × 8' cedar
1	2 × 4" × 6' cedar
4	2 × 2" × 8' cedar
1	2 × 6" × 6' cedar
1	4 × 4" × 6' cedar

Cutting List				
Key	**Part**	**Dimensions**	**Pcs.**	**Material**
A	Sides	1 1/2 × 3 1/2 × 48"	2	Cedar
B	Ends	1 1/2 × 3 1/2 × 15"	2	Cedar
C	Slats	1 1/2 × 1 1/2 × 45"	8	Cedar
D	Stretchers	1 1/2 × 3 1/2 × 15"	2	Cedar
E	Braces	1 1/2 × 5 1/2 × 15"	4	Cedar
F	Legs	3 1/2 × 3 1/2 × 13"	4	Cedar

Note: Measurements reflect the actual thickness of dimensional lumber.

MAKE THE FRAME.

The butt joints make this bench sturdy and easy to construct. For strength and good looks, we used gold-colored deck screws.

1. Measure, mark and cut the sides (A) and ends (B) to length, using a circular saw.

2. Position the ends between the sides so the edges are flush. Measure from corner to corner. When the diagonals are equal the frame is square.

3. Drill 1/8" pilot holes through the sides and into the ends. Fasten the sides to the ends by driving 3" gold-colored screws through the pilot holes.

BUILD THE SEAT.

The slats that make up the seat are spaced 3/8" apart to allow rain water to run off.

1. Cut the slats (C) to length using a circular saw.

2. Set the frame on a flat surface and place 3/8" spacers against one side. Place the first slat in the frame against the spacers. Drill 1/8" pilot holes through both ends into the slat. Secure the slat to the ends with 3" deck screws. Repeat this process of positioning and attaching slats until all the slats are in place **(photo A).**

3. Measure, mark and cut the stretchers (D) to length.

4. To mark the stretcher outlines, measure in 5" and 3 1/2" from the inside of each end piece on the back of the slats and make a mark.

5. Position the stretchers between the marks. Drill 1/8" pilot holes through the stretchers into the slats. Attach the stretchers with 2 1/2" screws **(photo B).**

ASSEMBLE THE BENCH.

The braces hold the legs in place against the stretchers.

1. Measure, mark and cut the braces (E) to length.

2. To shape the ends of each brace, mark the angle by measuring down 1 1/2 " from the top edge and 1 1/2" along the bottom edge. Draw a line between the two end points and cut along that line **(photo C).** Repeat this step at the other end of the brace.

3. On each brace, measure down 3/4" from the top edge and draw a reference line across the stretcher for the screw positions. Drill 1/8" pilot holes along the reference line. Position a brace on each side of the stretchers and fasten it with 3" screws driven through the braces and into the stretchers.

4. Measure, mark and cut the legs (F) to length, using a circular saw. If needed, finish any cuts with a handsaw.

5. Position each leg between the braces and against the sides of the bench frame. Drill pilot holes through each brace and attach the leg to the braces by driving 3" screws through the braces and into the leg. Repeat the process for each leg until all legs are installed **(photo D).**

APPLY THE FINISHING TOUCHES.

1. Sand all surfaces with 150-grit sandpaper. Be sure to sand edges thoroughly so bare legs will not be scratched.

2. Because cedar is naturally resistant to decay, it will age to a natural gray. To preserve its reddish color, you can apply a clear sealer as we did. Cedar is also suitable for painting.

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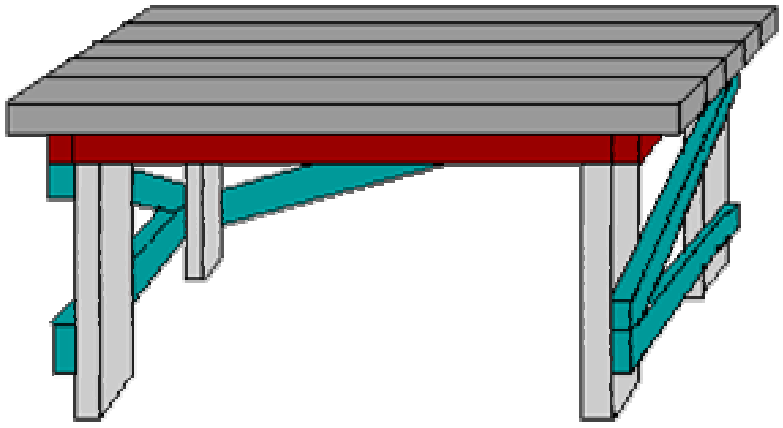
WORK BENCH

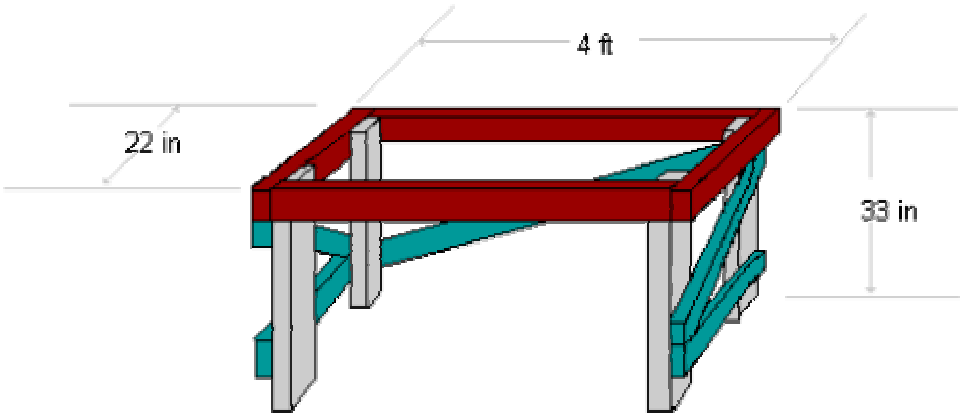


These plans are for a simple workbench you would build for your garage or along the wall in your shop. It is a sturdy bench, built simply, but to last as long as the structure you put it in.

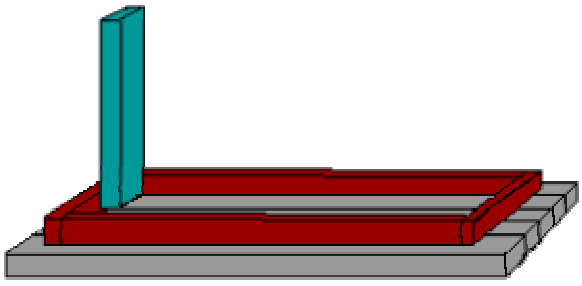
I used 2x6 boards for the top and the legs. The braces and frame can be 2x4's. You can also use 2x4's for the top.

The length should be dictated by your location. If the bench will be longer than 8 feet, you should build another set of legs under the center. The height should be about 34 inches high. But depending on your height you may want that higher or lower. A good rule of thumb is to stand with your arm straight down and your palm parallel to the floor. Measure the distance from the floor to your palm and build it that high. The width should be about 27-28 inches, which equates to 5 2/6's or 8 2x4's.

I have listed the dimensions and bill of materials for a bench 5 feet long, 27 ½ wide and 34 ½ high.



Start by nailing the bench's top boards to the two boards that run perpendicular underneath using 16d nails. The boards for our example size are five 2x6's 5 ft. long. Squeeze the top boards together as tight as you can, since little items will be finding their way through any cracks for years afterwards. The boards that will run underneath are 2x4's 22 in. long and should be set in from the edge 6". Flip the top over and nail the front and back frame boards to the end boards. These are 2x4's, 3' 9" long and go between the two nailed to the top.



Next nail the legs into the 4 corners of the frame under the bench. The legs are 2x6's cut 33 in. long. Nail the long 2x4 diagonal board that runs along the back of the bench to the two back legs. Turn the bench back right side up and nail in the stretchers that join the legs on both sides and the two diagonal boards on either side. These four boards are 2x4's.

You can make a shelf underneath by running boards from one side to the other supported by the stretchers between the legs. You may also wish to add a backsplash board to keep things from falls behind the bench. Nail a 2x4 to the top of the bench along the length of the back.

Bill of Materials:

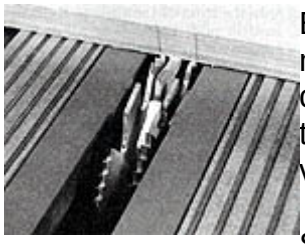
3 (three) 10 foot 2x6 (cut two of them in half for the top and one in 3 pieces for 3 of the legs)
1 (one) 8 foot 2x6 (cut the remaining leg and remaining top board from this one)
3 (three) 8 foot 2x4

33
BOOKCASE

1. **Cut the plywood to size.** Begin by ripping the plywood lengthwise into strips 15 3/4" wide. The extension table on the Mark V helps support the heavy plywood for these long cuts, yet even with this support, you should enlist the assistance of a helper or use a roller stand and rear support table.

   After ripping the plywood, crosscut it to length. Follow the cutting instructions in the list of materials.

2. **Cut the dados.** Mark the position of your dados on the sides (A, O). All of your dados will be 3/4" wide and one-half the thickness of the plywood, or 3/8" deep, with some exceptions on the top (B) and shelf divider (J).

   Be sure the machine is unplugged for your set-up. Carefully line up the marks you made on the edge of the plywood with the Dado Blade. Then crosscut your dados with one edge flat against your miter gauge. This is a tricky procedure because furniture-grade oak plywood has a very thin veneer on the outside that is susceptible to splitting if it is not cut properly.

   Set your speed dial to "R". Make a cut that is only as deep as the veneer thickness on the plywood. Then lower the table to final depth and make a second cut at the same place. The Stop Collars (from the lathe Tailstock) mounted on the table posts will set the final Dado depth of cut.

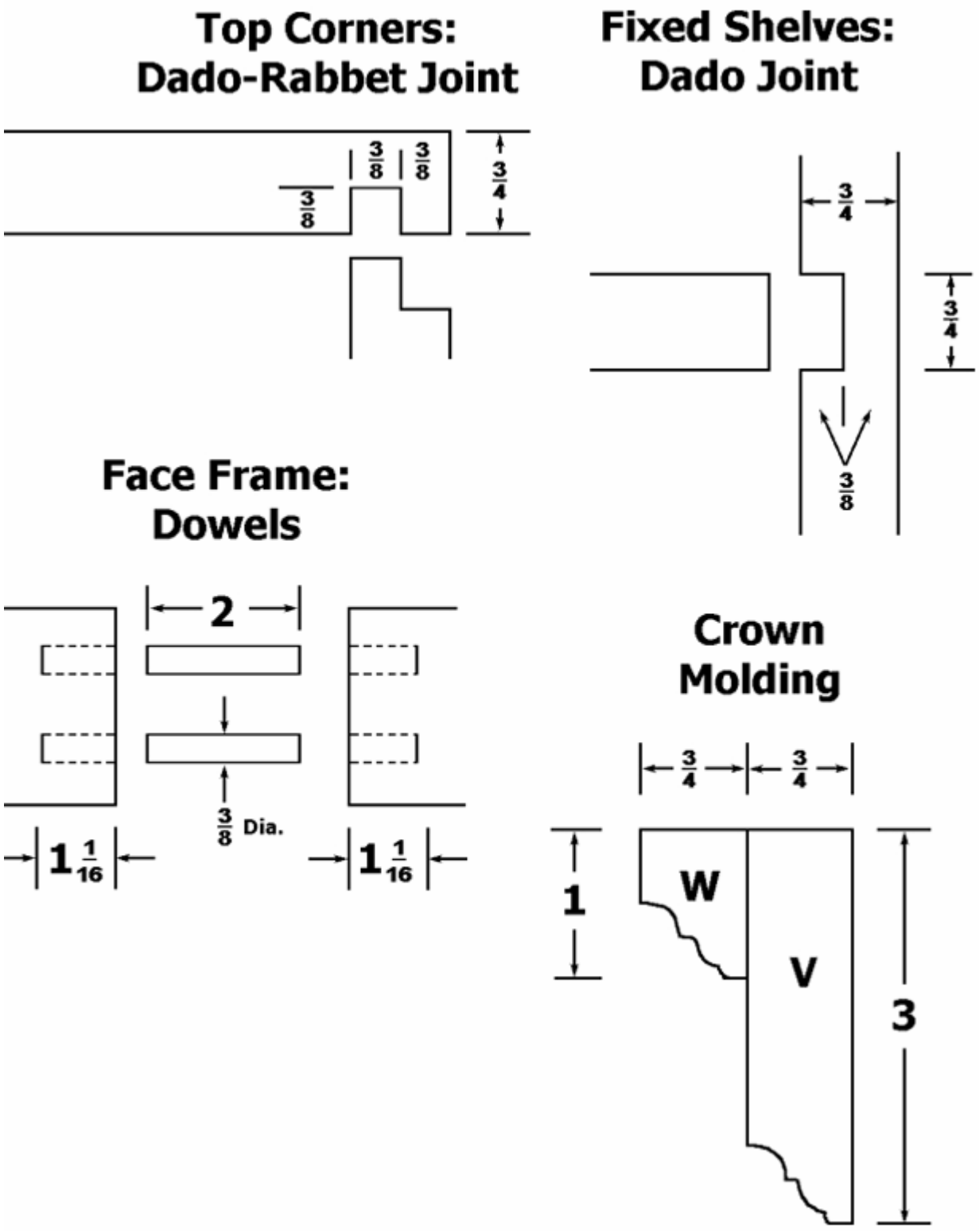
   The large table system on the Mark V 510 allows you to crosscut or Dado wide pieces with ease. If you are working with the Mark V Model 500, use the Front Table Extension to help support wide pieces as you crosscut and Dado. The Rear Support Table, Roller Stands, a Miter Gauge Extension or a Cross-Cut Sliding table will also help provide additional stability.

   Now mark and cut the other dados on shelf divider (K), and fixed shelves (G, N).

   Mark the dados on shelf divider (J). The dados on the button will be on both sides of the piece, so mark them just 1/4" deep.

   Mark the Dado in the center of the top (B), but not the ones on the ends. Cut these dados.

3. **Other dados and rabbets.** Now that you have completed all the 3/4" dados, change the width of your blade to 3/8". As you can see from the illustration of this Dado-Rabbet joint, the dados on the ends of the top (B) are 3/8" wide, 3/8" deep, and 3/8" from the end of the board. Mark and cut these dados.



The L-shaped cuts on the top of sides (A, O) are rabbets. Use the same 3/8" adjustment on your Dado blade to cut them 3/8" deep right on the ends of the boards. Notice that these cuts are on the opposite side of the previously cut dados (A, O).

4. **Drillholes for brackets.** Brown plastic shelf brackets are used here for the adjustable shelves. They are available in hardware stores and fit in 1/4" holes. Mark and drill you holes in the right side (O), and shelf dividers (J, K). These holes are set in two inches from the front and back, at 2" intervals up and down.

5. **Finishing.** At this stage, the finish is applied to the plywood. The reason for finishing the unassembled boards is so you can work on them while they lie flat and so the finish will not run.

   Put masking tape on the ends of the boards that will be housed inside dados. The joints will glue together better on bare wood.

6. **Glue up the carcass.** For this, you will definitely require the help of an assistant to provide extra hands while you assemble the awkward pieces. Yellow wood glue is used.

   Assemble the bookcase dry first to be sure all the pieces fit. Set your clamps and check for square. Then re-assemble it with glue.

   Leave out your adjustable shelves (F, H, M) and TV shelf (P) during the glue up.

7. **Begin the face frame.** Cut the left side (Q); right side (R), top (S), and bottom (T). Do not cut the narrower, 3/4" molding strips at this time. As you rip the long 96" pieces, use a helper or roller stand to hold them level during the cuts.
8. **Joint the edges.** Run the edges of your face frame pieces over the Jointer to square them up and smooth them out. This will you give a much smoother edge than you get from the table saw.
9. **Drill dowel holes.** Set up your Mark V for the horizontal-boring mode. Drill 3/8" holes in the top and bottom edges of the long, 96" side pieces (Q, R). Each joint will have two dowels. Measure the spacing on them so they will fit into the ends of the 3" bottom piece (T) and the 4" top piece (S). Drill the holes as shown in illustration.

10. **Match the dowel positions.** Place 2 3/8" dowel centers into the holes at the bottom edge of side piece (Q). With a try square or a combination square, line up the bottom piece (T). Push it against the dowel centers and tap it with a mallet to mark the exact centers of your dowel holes. Then cut corresponding dowel holes in the end of your bottom piece. Repeat this process for each end of your top (S) & bottom piece (T).

    NOTE: If you prefer, biscuit joints the Biscuit Joiner Attachment could be substituted for the dowel joints suggested here.

11. **Glue up the outer frame.** Glue the 3/8" dowels and edges of the outer frame pieces where they will join. Clamp them together and allow the glue to dry.
12. **Finish the frame.** Follow the same procedures you followed earlier. Finish all additional pieces similarly just prior to assembling them.
13. **Attach the face frame.** Use glue and small finishing nails (2" long) and attach the outer face frame to the carcass. Drill pilot holes into the frame so that the solid oak will not split.
14. **Shape the molding.** Use the Shopsmith Shaper Package your Mark V with a 1/2" Bead & Quarter Round Cutter. Round the edge of a long piece of oak with the Quarter Round side of the cutter. Then turn the piece over and round the other corner of the same edge.

After you have completed shaping the edge, rip it on the table saw so that it is 3/4" wide. You now have half-round molding. Shape and cut enough molding strips to face all of your shelves and shelf dividers, and both the front and sides of the TV shelf (P).

The secret to shaping is to take shallow cuts, follow all the safety guidelines, and experiment with some scrap wood to test the results. Shaping is also mch easier with the DC3300 Dust Collection System, which disposes of the chips just as they are being made.

15. **Size the molding.** Measure the shelf lengths after the outer frame is attached and cut your 3/4" molding strips to length.

    Chamfer the ends of the molding. Set up your disc sander and tilt the table to 45°. Lay a molding strip upside down against your miter gauge and chamfer the end to add a little accent if you wish.

    Since the TV shelf (P) will have molding on the sides as well as the front, the ends of the molding will have to be beveled at 45° to "frame" the shelf on the front corners. Do not chamfer the ends of the TV shelf molding.

16. **Attach the molding.** After applying the finish to the molding, nail the molding onto the front of the shelves. Remember to drill pilot holes. Inset all of your finishing nails with a punch. Then cover the holes with wood patch that is mixed with stain.
17. **TV shelf hardware.** A combination shelf slide and lazy-susan called a "TV Extension Slide" will hold your TV shelf (P), and eventually your TV set. Attach the slide to the TV shelf (P) and fixed shelf (N) with #8 3/4" screws.
18. **Crown Molding**

    With your shaper, you can create a crown molding effect. This effect is achieved by shaping the edge of a wide piece of oak with the Cove & Bead Cutter.

    Then flip the piece over and shape a corner on the opposite edge. After the piece is shaped, rip one side on your table saw 3" wide and the other side 1" wide.
    (The ripping is done after the shaping because shaping is safer with wide pieces.)

    Repeat this process so that you will have two 3" wide and two 1" wide molding strips, each 48" long.

    All of the molding pieces must be measured precisely and cut with 45° bevels on the front corners. To avoid mistakes, we suggest clamping each piece in place at the top of the bookcase and checking precisely where the bevel cuts should go. Glue up each 3" and 1" molding combination together. Line up the beveled edges, and then clamp them while the glue dries.

    Clamp each 1" and 3" molding combination to the top of the bookcase. Line up the corners carefully. Then drill pilot holes from the inside of the bookcase and screw in #8 1 1/4" screws to secure the crown molding.

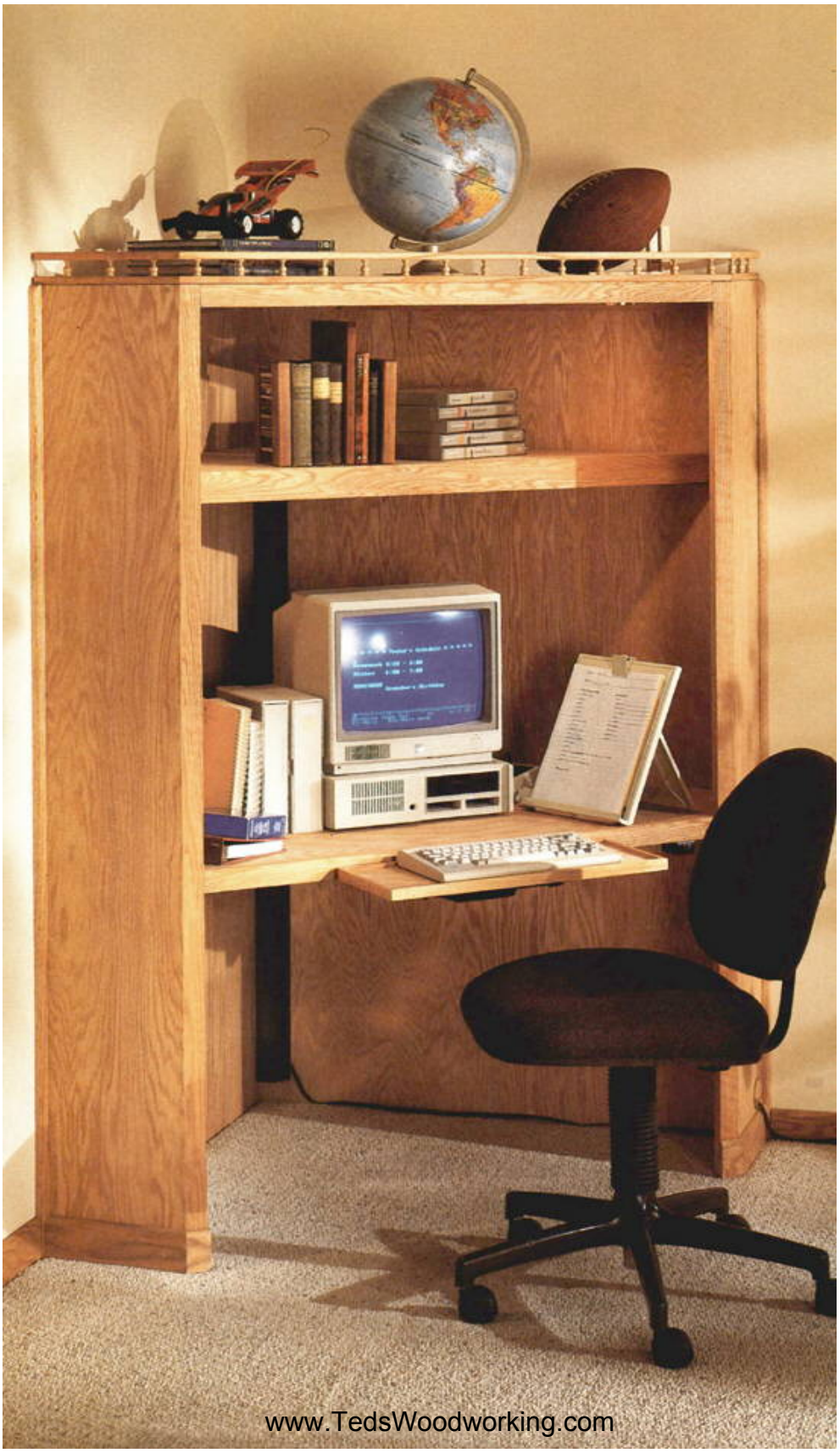
19. **Make the door.** This door is optional and hides the "record" shelves. The vertical stiles and horizontal rails are made on the shaper with the Complete Cabinet Set. The cutter is used in different combinations and positions on the insides of the rails and stiles, and on the ends of the rails. The Bead and Quarter Round Cutter is used on the outsides of the pieces to round the outer edges on the front only.

This cutter kit takes some practice to perfect, so plan to spend time experimenting on scrap wood before making the door. It is a challenge to work out, but the appearance of a nice looking, door makes it worth while.

Slide a 1/4" oak plywood panel into the frame pieces. Glue and clamp the pieces together - no dowels are necessary because of the way the rails and stiles fit together.

Apply your finish, add hinges, and attach the door to the bookcase.

34
CORNER CABINET



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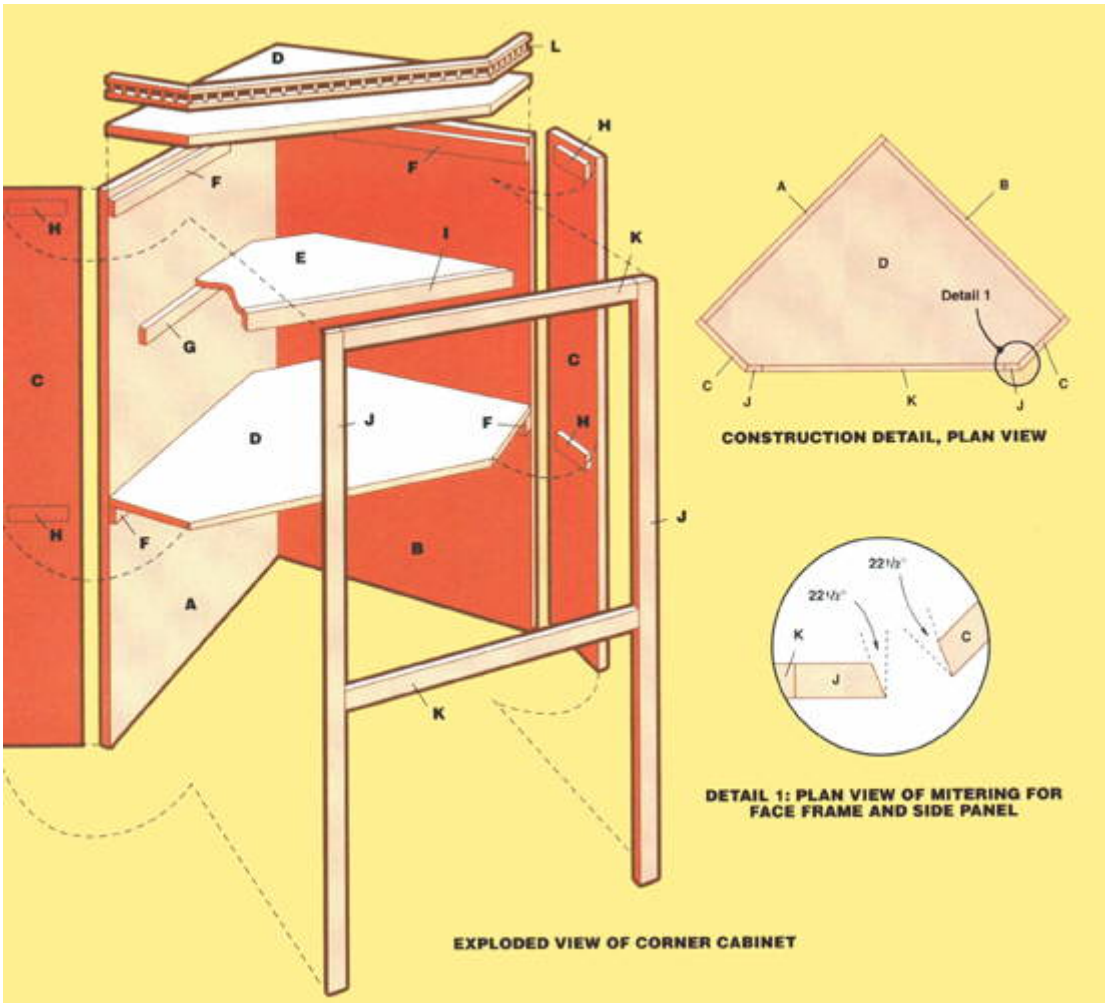
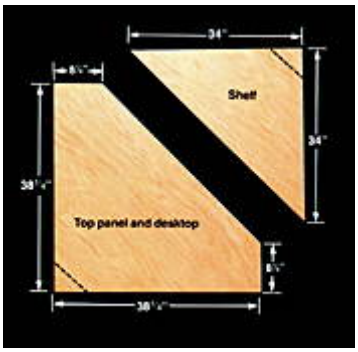
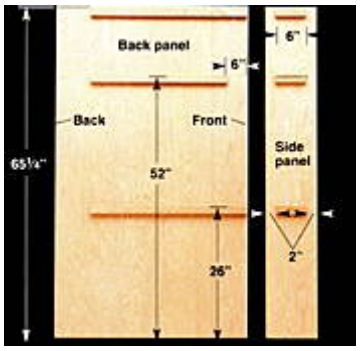


Key	Part	Material	Pieces	Size
A	Left back panel	3/4" oak plywood	1	39" Ã?? 66"
B	Right back panel	3/4" oak plywood	1	38 1/4" Ã?? 66"
C	Side panels	3/4" oak plywood	2	10" Ã?? 66"
D	Desktop and top panel	3/4" oak plywood	2	38 1/4" Ã?? 38 1/4"
E	Shelf	3/4" oak plywood	1	34" Ã?? 34"
F	Cleats for desktop, top panel	1 Ã?? 2	4	31"
G	Cleats for shelf	1 Ã?? 2	2	27"
H	Cleats on side panels	1 Ã?? 2	4	6"
I	Shelf edging	1 Ã?? 2	1	51 1/2"
J	Face frame stiles	1 Ã?? 2	2	66"
K	Face frame rails	1 Ã?? 2	2	37 1/2"
L	Decorative top trim	spindle rail		5 linear ft.



Desktop, top panel, and shelf are made from 3/4" finish-grade plywood. Use a circular saw and a straightedge guide to cut the pieces to the dimensions shown. If you plan to use the cabinet as a computer work center or an entertainment center, cut off the back corners of the desktop and shelf (but not the top panel) to provide ventilation and space for routing electrical cords.



Back panel and side panels have 1 × 2 hardwood cleats to hold the desktop, shelf, and top panel. Attach them to the panels with glue and 1 1/2" screws driven into counterbored pilot holes. Position cleats according to dimensions shown. **NOTE:** If you wish to make the shelf the same size as the desktop, add shelf cleats to the side panels (dotted line).

1. Measure and cut back panels (left panel overlaps right panel, so it is 3/4" wider than right panel). Cut and attach 1 × 2 cleats. Drill counterbored pilot holes in cleats, then attach cleats with glue and 1 1/4" screws.

2. Clamp right back panel (38 1/4" wide) to your workbench, then apply glue to back edge. Butt left panel (39") against glued edge, and hold in place with clamps. Join back panels by drilling pilot holes and driving 2" screws through butt joint.

3. Attach a plastic wire organizer to one back panel edge, next to the corner joint, using 1" wire nails. Skip

4. Measure and cut the desktop, then apply glue to the tops of the desktop cleats mounted on the back panels. Set the desktop on the cleats, then attach by

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this step if you do not plan to store electronic equipment in the corner cabinet.)

5. Measure and cut shelf, then install on shelf cleats with glue and 1 1/4" finish nails. Measure and cut a 1 × 2 hardwood shelf edge with 45º mitered corners to fit flush with top of shelf. Attach with 2" finish nails driven through pilot holes.

7. Attach 6" cleats to side panels using glue and 1 1/4" finish nails, then attach side panels to back panels with glue and 1 1/2" screws driven into counterbored pilot holes. Cut top panel and attach to cleats with 1 1/4" finish nails.

drilling pilot holes and driving 1 1/4" finish nails every 8".

6. Set a table saw blade to 22 1/2º blade angle, then cut 10"-wide, 66"-long side panels, beveling the front edge of each panel.

8. With table saw blade set to 22 1/2º, cut 1 × 2 face frame stiles (as in step 6). Apply glue to the outside edge of each side panel, then attach stiles to side panels using 2" finish nails driven through pilot holes at 8" intervals.

9. Measure and cut 1 × 2 face frame rails. Attach them to edges of desktop and top panel, so upper edges of rails are flush with the surfaces of the shelf and top, using glue and 2" finish nails driven through pilot holes.

10. Measure and cut decorative trim to match the angle of the face frame stiles and side panels, then attach the trim to the outside edges at the top of the cabinet, using finish nails.

11. With a helper, move cabinet into corner, flush against the walls.

12. Shim below the side panels, if necessary, to bring the cabinet to level.

13. Drill pilot holes, then toenail the cabinet to the floor at shim locations, using 2" finish nails. Score the shims with a utility knife, then break off the excess shim.

14. Attach the cabinet to the wall with 3" screws driven through the back panels and into wall studs. Drive screws just behind or below shelf cleats to keep them out of sight.

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material.

15. Measure and cut base shoe molding to cover the gap between the cabinet and the walls and floor, using 1 1/2" finish nails. **TIP:** To protect wall from oil or paint, insert plastic between molding and wall as you attach the molding.

16. Sand and finish cabinet then remove plastic. If cabinet will contain electronic equipment, use a hole saw or forstner bit to cut a hole for an outlet strip cord in side panel, then feed cord through hole and install a grommet.

17. Install any other hardware and computer desk accessories, like a retractable keyboard slide, that you need to complete your project.

35
PLAY HOUSE

Materials List

Quantity	Item
11	2" x 6" x 8' lumber rated for outdoor use
1	10' x 10' sheet of 1 mil. plastic film
2	4' x 8' sheets of 3/4" CDX plywood
18	2" x 4" x 12' spruce
14	2" x 4" x 8' spruce
3	4" x 4" x 8' lumber rated for outdoor use
7	4' x 8' sheets of 5/8" T-111 sheathing
3	5/4" x 6" x 12' lumber rated for outdoor use
4	4' x 8' sheets of 1/2" sheathing
1	36"-long roll of 15-lb. roofing felt
3	bundles of roofing shingles
	small quantity of roofing cement
3	windows
3	tubes of caulking compound
5	1" x 4" x 8' Ponderosa Pine
1	1" x 4" x 6' Ponderosa Pine
2	1" x 3" x 12' Ponderosa Pine
1	1" x 6" x 8' Ponderosa Pine
3	1" x 2" x 12' Ponderosa Pine
2	gallons latex primer
1	gallon latex top coat paint
2	quarts of accent colors, depending on color scheme
2	8' pieces of drip edge
4	decorative fan brackets (optional)

Step 1: Site Preparation
Select a site that is fairly level and has good drainage. Using a tape measure and a framing square, measure an 8' x 8' square. Check that your site is perfectly square by measuring the diagonals. If they each measure 11' 6", your site is a perfect 8' square.

Step 2: Outer Frame
Use two 8' lengths of 2" x 6" lumber rated for outdoor use for the front and rear rim joists. From two more 8' lengths of 2" x 6"lumber rated for outdoor use, cut two pieces of 2" x 6" x 7' 6" for the side rim joists. Assemble the outer frame by nailing through the front and rear rim joists into the side rim joists, using two 12d 3 1/4" common nails for each corner. See Figure 1.

Step 3: Leveling the Site
Level the ground under your floor frame using a shovel and a rake. Check your level by placing a 4'-long carpenter's level on top of the rim joists (you may have to prop up a corner of the floor with a brick or a patio block). After the site is level, move the frame away and spread a sheet of polyethylene film over the site to prevent vegetation from growing. Move the frame back into place.

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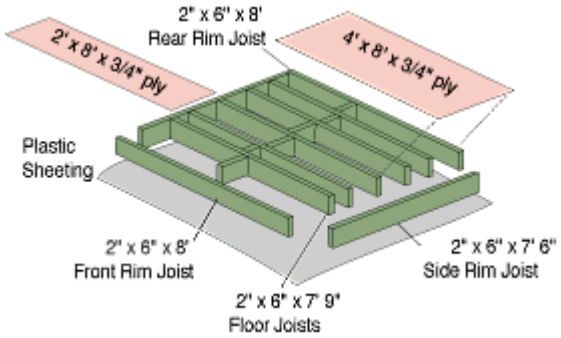
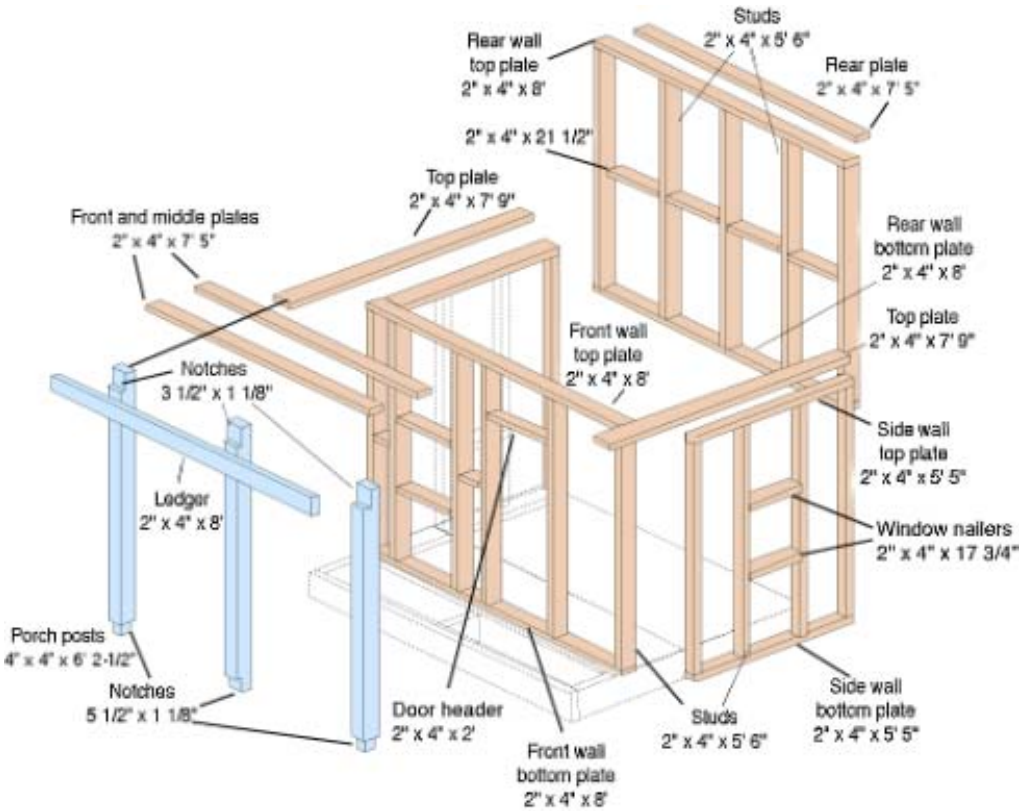
Step 4: Inner Frame Joists

From 8' lengths, cut five pieces of 2" x 6" x 7' 9" lumber rated for outdoor use for the floor joists. Measure from the outer rear corners of the frame, and locate the centers of the inner floor joists at 16", 32", 48", 64" and 72". Use two 12d 3 1/4" galvanized common nails to secure each end of the inner floor joists to the side rim joists. Measure the gaps between the inner floor joists and cut lengths of 2" x 6" lumber rated for outdoor use to fit between each pair of joists. Nail the blocks into place near the middle of the floor joists. Every second block should be offset slightly to facilitate nailing.



Step 5: Plywood Floor

Set one 4' x 8' sheet of 3/4" CDX plywood on the frame, with one edge of the sheet flush with the rear rim joist. Use the plywood as a guide to square up your frame. The front edge of the plywood sheet should fall exactly at the center of the floor joist that was secured at 48" on center. Fasten the plywood to the joists with 1 5/8" #6 coated deck screws at 8" intervals around the perimeter and at 12" intervals in the center of the plywood. Mark and cut the second sheet of 3/4" CDX plywood in half lengthwise. Put one half aside for later use as the door. Set the other half on the floor joists next to the full plywood sheet, leaving a 1/16" gap between the two sheets. Secure the half-sheet to the floor joists with 1 5/8" #6 coated deck screws.



Framing

Build the walls on the ground, stand them up and then nail them into place.

Step 1: Wall Studs
Cut nineteen 5' 6" lengths of 2" x 4" from 12' lengths for the wall studs.

Step 2: Rear Wall
Use two 8' lengths of 2" x 4" for the top and bottom plates. Space the studs 2' on center between the top and bottom plates and secure the studs by nailing through the plates with 8d 2 1/2" galvanized common nails. Cut four 2" x 4" x 21 1/2" pieces and nail them, horizontally, between the studs about halfway up the wall.

Set the rear wall in place directly over the rear rim joist and floor. Nail the rear wall into place with 16d 3 1/2" galvanized common nails, driven through the wall's bottom plate and the floor and into the rim joist. Temporarily prop up the rear wall with an 8'-long 2" x 4". Rest one end on the ground and nail the other at an angle into the right-side stud of the back wall, at a height of about 4'.

Step 3: Side Walls
The two side walls are identical. Our windows required a 17 3/4"-wide x 15 1/4"-high opening. If you use different windows, adjust the distance between the two center studs. In doing so, make sure you have a stud centered at 4' from the back of the playhouse to use as a nailer for the edges of the sheathing boards. Since the side walls will be mounted 3 1/2" from the back of the playhouse, the middle nailers should be centered at 44 1/2" from the back of the side walls.

Cut four 2" x 4" x 65" pieces from 12' lengths for the top and bottom plates. Nail the plates to the end studs with two 8d 2 1/2" common nails at each joint. Nail one stud on center at 44 1/2" from the back of each side wall. Nail another stud at the appropriate distance for the window framing.

Set one side wall in place, butted up against the end of the rear wall and flush with the edge of the side rim joist. Nail the wall into place with 16d 3 1/2" nails. Use a level to make sure that the wall is plumb and then secure it to the end of the back wall with 8d 2 1/2" common nails. Repeat for the other side wall.

Step 4: Front Wall
Use two 2" x 4" x 8' pieces for the top and bottom plates. Fasten a stud to each end of the top plate by nailing through the plate into the stud, using two 8d 2 1/2" common nails at each joint. Fasten the bottom plate to the two end studs with 8d 2 1/2" common nails. Fasten another stud 22" from the right end of the front wall for the edge of the doorway. Fasten a fourth stud so that it is centered 48" from each side of the wall. This will serve as the second stud for the doorway and as a nailer for the left front sheathing. The other two studs serve as framing for the front window. We spaced them 17 3/4" apart so that their centers were 61" and 79 1/4" from the right side of the wall (adjust for different window sizes).

Set the front wall in place, butted up against the side walls and flush with the edge of the plywood floor. Nail the front wall to the floor with 16d 3 1/2" common nails. Make sure the front and side walls are plumb and nail their end studs together with 8d 2 1/2" common nails.

Step 5: Porch Posts
Cut three 4" x 4" x 6' 2-1/2" pieces of lumber rated for outdoor use for porch posts. Cut a 3 1/2"-long by 1 1/8"-deep notch at the top of the front face of each post. The easiest way to do this is to make a series of 1 1/8"-deep cuts in the face about 1/2" apart, break out the cuts and clean out the excess wood with a 2"-wide, sharp chisel.

Cut 5 1/2"-long, 1 1/8"-deep notches on the bottom front faces of the posts, at the bottom left side of one post and at the bottom right side of another post.
Stand the left post inside the rim joists at the front left of the playhouse. The notches will allow the base of the post to be flush with the left and front rim joists. Have a helper hold the post plumb. Secure the post to the floor frame by nailing through the rim joists with four 12d 3 1/4" common nails. Repeat for right post.

Stand the center post inside the front rim joist with its center at 50" from the right side of the frame. The notch allows the base of the post to be flush with the front of the rim joist. Secure it to the rim joist with two 12d 3 1/4" common nails.

Step 6: Top Plates
Insert one 2" x 4" x 8' into the top notches of the front posts as a ledger board. Check that the posts are plumb and secure the ledger to each post with two 2 1/2" #7 deck screws.

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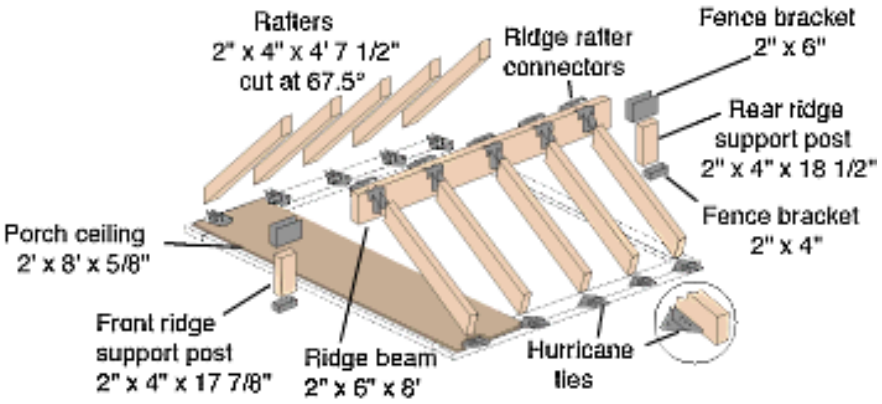
Cut two 2" x 4" x 7' 9" pieces from 8' lengths for the lateral top plates. Set one on top of each side wall, overlapping the splice between the back and side walls and stretching to the front edge of the post. Using ten 12d 3 1/4" common nails, secure each side plate by nailing into the post, the back wall splice and the top of the side wall.

Cut three 2" x 4" x 7' 5" pieces from 8' lengths for the front, middle and rear plates. Set them in place between the side plates and over the front wall, the rear wall and the ledger. Using ten 12d 3 1/4" common nails, secure the plates.

Step 7: Window and Door Framing
Cut six lengths of 2" x 4" to serve as window nailers. Our nailers are 17 3/4" wide, to bridge the distance between the two studs that serve as side framing for the windows. Using two 8d 2 1/2" galvanized common nails at each joint, fasten the lower nailer between the two studs, 24" from the floor. Check that the nailer is level before securing it.
Fit a window into the opening, resting on the lower nailer. Set the top nailer in place over the window. Remove the window and fasten the top nailer with 8d 2 1/2" galvanized common nails, driven through the studs into the nailer. Repeat for the other two windows.
Cut one 2" x 4" x 2' for the header above the front door. Insert the header between the two front door studs at a height of 5' from the floor. Make sure that it is level and then fasten the header in place, with two 8d 2 1/2"galvanized common nails, driven through the studs into each end of the header.



Roof Framing

Step 1: The Ridge Beam
Use one 2" x 6" x 8' board for the roof ridge beam. Use 1 1/2" galvanized joist hanger nails to secure five ridge rafter connectors to each side of the ridge beam. Starting from the front end of the beam, locate the centers of the connectors at 2", 24", 48", 72" and 93".

Step 2: Hurricane Ties
To ensure that the rafters are secured to the proper locations on top of the two side walls, set the ridge beam on top of each side wall in succession, allowing the beam to overhang 1 1/2" in the front and 1 1/2" in the back. Mark the top of each side wall at the center of each ridge rafter connector. Secure hurricane ties to the top of each side wall at the ridge rafter marks, using 1 1/2" galvanized joist hanger nails. Make sure the prongs of the ties are facing outward and protrude over the edges of the plates.

Step 3: Porch Ceiling
Cut one 4' x 8' sheet of 5/8" T-111 tongue and groove sheathing in half, lengthwise, for the porch ceiling. Set half the sheet, groove-side down, over the front wall and flush with the front edge of the posts. Mark the location of the front hurricane ties on the sheathing and cut 1 3/4"-wide, 1 3/4"-deep notches in the sheathing at each hurricane tie location. Set the sheathing back in place and secure it to the wall plates with 1 5/8" #6 coated deck screws every 6" around the perimeter.

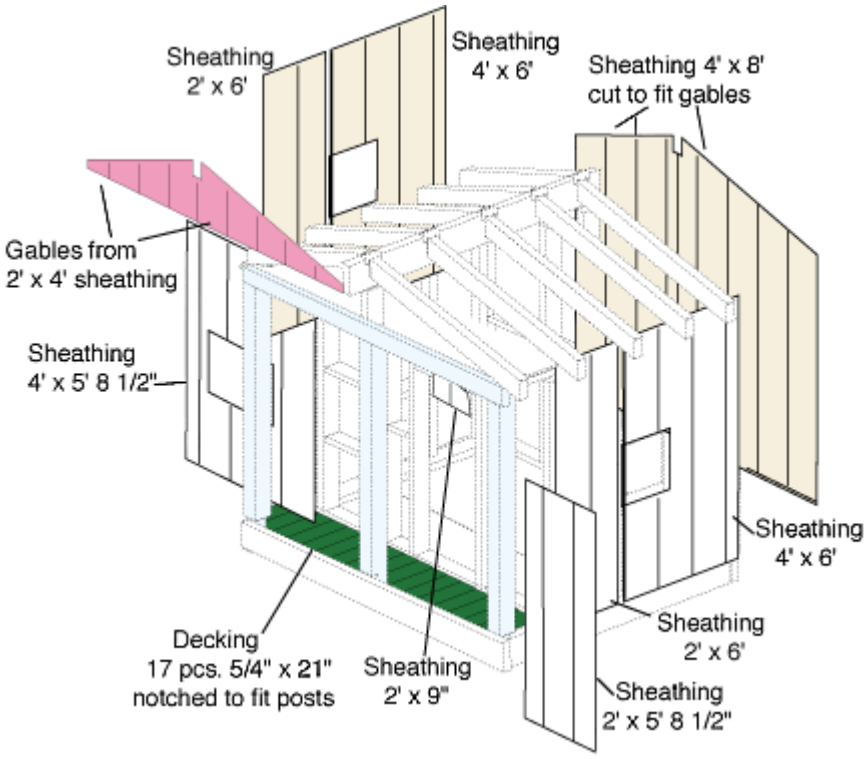
Step 4: Front Ridge Support Post
Cut one 2" x 4" x 17 7/8" piece for the front ridge support post. Using 1 1/2" joist hanger nails, secure one 2" x 6" fence bracket to the top edge of the ridge beam support post, flush with the front of the post, as shown in Figure 3. Secure the support post to the center of the porch ceiling, flush with the front edge, using a 2" x 4" fence bracket and 1 1/2" joist hanger nails.

Step 5: Rear Ridge Beam Support Post
Cut one 2" x 4" x 18 1/2" piece for the rear ridge beam support post. Prepare the top of the post as outlined in Step 4. Center a 2" x 4" fence bracket over the rear wall plate, flush with the rear edge of the plate. Secure the bracket and post as outlined in Step 4.

Step 6: Fastening the Ridge Beam
Set the ridge beam, rafter connector-side up, into the 2" x 6" fence brackets. The beam should overhang the posts by 2" in the front and 1" in the back. Using 1 1/4" #6 deck screws, secure the beam to the brackets.

Step 7: The End Rafters
A miter saw is particularly useful for cutting the rafters. They are 55 1/2"-long parallelograms, cut from 2" x 4" lumber. Cut ten rafters at 67 1/2° angles, as shown in Figure 3. Using one 1 1/4" #6 deck screw, secure one rafter to each of the front ridge rafter connectors and set the other end of each rafter into the appropriate hurricane tie. Use a torpedo level to bring the front ridge beam support post to a plumb position. Secure each front rafter to its hurricane tie with one 1 1/4" #6 deck screw. Repeat for rear rafters.

Step 8: Securing the Rafters
Insert the remaining rafters into the ridge rafter connectors and hurricane ties. Using 1 1/2" galvanized joist hanger nails, fasten all rafters to the hurricane ties and rafter connectors. It is vital to use all of the fastening holes in the connectors, as this will increase the strength and snow-bearing capacity of the roof.



Decking & Sheathing

Step 1: Decking
Cut 17 pieces of 5/4" x 6" x 21" for the front deck boards. Notch one deck board to fit around the left post and secure it to the front and left rim joists and the floor joist with 2" #7 deck screws. Use two 16d 3 1/2" common nails as spacers between deck boards and secure all deck boards in place. You will need to notch two boards to fit around the center and right posts. You will also have to trim the right decking board to make it flush with the right rim joist.

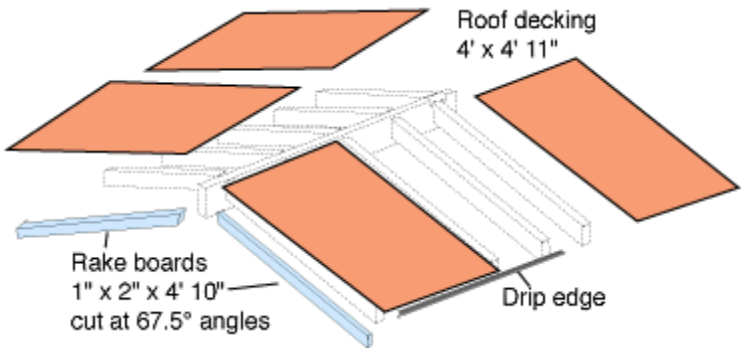
Step 2: Rear Wall Sheathing
Position two 4' x 8' sheets of T-111 tongue-and-groove sheathing vertically, so that they fit together at the center stud of the rear wall and reach the top of the ridge. Using two 6d 2" finishing nails, hammered through the sheathing and about 1" into two studs, tack each rear sheathing board into position. The boards will be bent slightly at the top because the ridge beam hangs over the rafters. Mark each sheet of sheathing for the ridge beam notch. Remove the sheathing and cut the notches. Tack the sheathing back into place and mark the sheets for the gable cuts.

Cut the sheathing for the rear gable and use the two sheets as templates for marking the front gable angles on two other sheets of sheathing, making sure that the front gable sheathing boards meet with a tongue on one side and a groove on the other. Mark the sheathing for the location of wall studs and then secure the sheathing to the rear wall with 1 3/4" galvanized ring shank nails, spaced 6" apart around the perimeter and 12" apart on the rest of the board.

Step 3: Side Wall Sheathing
Cut two 2' x 6' pieces of T-111 sheathing from one 4' x 8' sheet. Butt the straight edge of one board against the front edge of the playhouse and push the sheathing up until it is 1/16" from the bottom of the rafters. Fasten it to the front wall stud and the top and bottom wall plates with 13/4" galvanized ring shank nails at 6" intervals. Do not secure the sheathing to the stud that is 48" from the rear wall at this point.

Cut the front gables from the tops of the two previously marked sheets of sheathing. You will have two 4' x 6' sheets left that should be used as the side wall sheathing. Attach, using 1 3/4" ring shank nails.

Step 4: Front Wall Sheathing
Fasten the two gable sheathing pieces to the front gables, using 1 3/4" ring shank nails. Cut one sheet of T-111 sheathing to a height of 68 1/2" and secure it to the left side of the front wall, using 1 3/4" ring shank nails. Cut a 68 1/2"-high piece of sheathing from the 2' x 8' piece that was left from the front shelf cut. Nail it to the left front side of the playhouse with 1 3/4" ring shank nails. Cut a 2' x 9" piece of sheathing and nail it to the door header, top plate and door studs with 1 3/4" ring shank nails.



Roof Deck

Step 1: Laying Out the Deck
Cut four 4' x 4' 11" pieces of 1/2" plywood sheathing from the four 4' x 8' sheets. Snap chalk lines down the centers of the middle rafters on each side of the roof. Those lines should be exactly 4' from each end of the ridge beam. Stand on the front shelf and carefully position the left front piece of sheathing so that one side meets the center of the left middle rafter. The top end of the sheet should be positioned directly over the center of the ridge board. Tack the sheet in place, using two 6d 2" finishing nails, driven to a depth of about 1" through the deck board and into the rafters.

Step 2: Fitting the Deck Sheets
Set the second deck sheet in place next to the first sheet, leaving a 1/16" gap between the two sheets. Tack the sheet in place with two 6d 2" finishing nails. Set the right rear roof deck sheet in place and make sure that the sheets meet at the ridge. If they do not, adjust the sheets until they do. Do not tack the right rear deck sheet at this time.

Step 3: Nailing the Roof Deck
Remove the right rear roof deck sheet. This will allow you to stand on a ladder inside the playhouse to secure the left deck boards. Snap chalk lines on the two left roof deck boards to mark the positions of the rafters. Using 6d 1 7/8" coated cooler nails, fasten the roof deck boards to the rafters. The nails should be positioned at 6" intervals around the perimeter and at 12" intervals in the centers of the sheets.

Secure the right roof decking boards in the same way. To secure the front right board, you will need to sit on the peak of the roof.

Step 4: Drip Edge
Cut two 8' 2" pieces of drip edge. Secure them to the left and right edges of the roof deck with 7/8" roofing nails.

Step 5: Rake Boards
Cut two pieces of 1" x 2" x 4' 10" boards at 67 1/2° angles from a 12' length for the rake boards. They are parallelograms that match the angles of the rafters. Using five 1 5/8" #6 deck screws, driven through the roofing deck, fasten the rake boards flush with the front edges of the roofing deck.

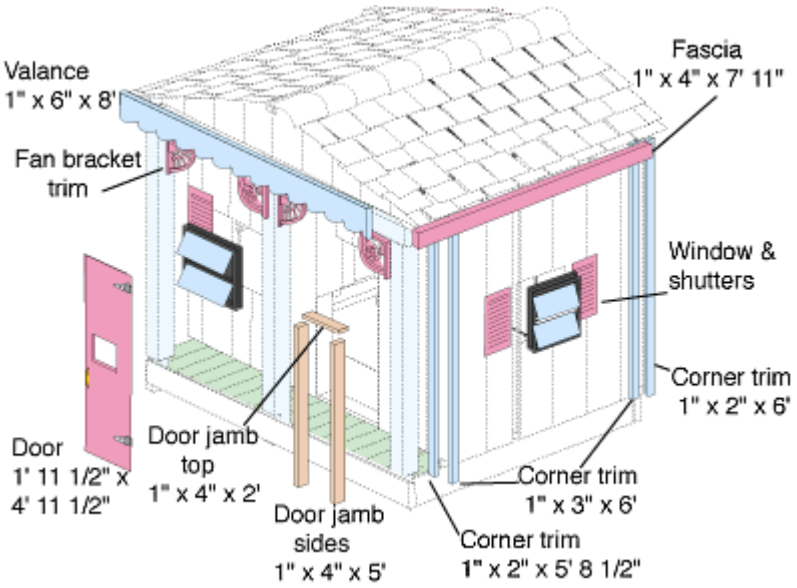
Roofing

Wear sneakers when roofing on a warm day. Since the materials are designed to bond together by melting slightly in warm weather, heavy, hard shoes can mar the shingles. Do as much work as you can from a ladder and then sit on the roof for the remainder of the work.

Step 1: Roofing Felt
Snap chalk lines across each side of the roof deck, 34" and 50" up from the drip edges. Place a 36'-long roll of roofing felt at one corner of the deck. Roll it out along the first chalk line, extending over the front and rear of the deck by 2". Cut the felt with a sharp utility knife. Staple the roofing felt down with 9/16" staples, spaced about 18" apart. Roll out and staple down the next course of felt, along the second chalk line, overlapping the first courses by about 8". Repeat for the other side of the roof. Roll out and staple down the ridge course, overlapping the second courses on both sides by about 10".

Step 2: Shingles
Since asphalt roof shingles vary from manufacturer to manufacturer, carefully read the instructions provided with your shingles. In general, three bundles of asphalt shingles is enough material to cover a 100-square-foot area, or slightly more than is needed to cover this playhouse roof.

To ensure that nails do not protrude into the playhouse, secure the shingles with 7/8"-long roofing nails. Cut shingles on the smooth side, using a sharp utility knife. If you follow the manufacturer's instructions carefully, you should have only two exposed roofing nails on the ridge. They must be covered with roofing cement.



Windows, Doors & Trim

Step 1: Window Openings
From inside the playhouse, drill 1/2" holes through the sheathing in the four corners of the rectangular window frames. Use a framing

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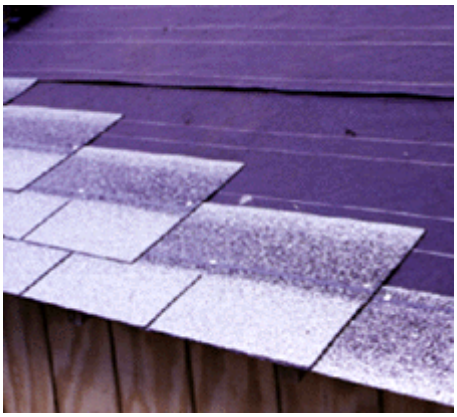
square to draw lines for each window on the outer sheathing, linking the four holes for each window. Cut out the window rectangles. We used a DeWalt cordless circular saw to make the cut. It can also be done with a saber saw.

Step 2: Inserting Windows
Caulk liberally along the inside flange of each window and then secure it in place according to the manufacturer's instructions.

Step 3: Door Opening
Using a handsaw, cut away the bottom plate of the doorway framing in the front wall. Cut one 2' piece and two 5' pieces of 1" x 4" Ponderosa Pine from a 12' length for the top and sides of the door jamb. Using 6d 2" finishing nails, join the top piece to each of the 5' jamb sides. Set the jamb in the door opening and nail it in place with 6d 2" finishing nails. Although it is preferable to make the door jamb level and plumb for the sake of appearance, it is not really necessary because the door will mount over the jamb, rather than inside it.



Step 4: Door
Cut a 1' 11 1/2" x 4' 11 1/2" door from the remaining half-sheet of 3/4" CDX plywood. Secure the door with 4" galvanized tee-hinges, mounted on the right side of the jamb on the outside of the playhouse. The hinges should be positioned 10" from the top and bottom of the door. When mounting the door, set it on a piece of scrap shingle to create a 1/8" clearance from the deck boards. If your playhouse is square, your door should fit inside the right and left pieces of T-111 sheathing.

Step 5: Fascia
Cut two 7' 11" pieces of 1" x 4" Ponderosa Pine for the fascia boards to cover the exposed edges of the rafters. Secure them to the rafters with 6d 2" finishing nails.

Step 6: Exterior Corner Trim
Cut four 6' pieces of 1" x 3" Ponderosa Pine and two 6' pieces of 1" x 2" Ponderosa Pine from 12' lengths. Caulk the back of a 1" x 2" piece and secure it lengthwise to the rear corner of the side wall, flush with the edge of the back wall and the bottom of the sheathing, using 6d 2" finishing nails. Caulk the back of a 1" x 3" and secure it to the corner of the back wall, flush with the outer edge of the 1" x 2" trim. Repeat for the other rear corner.

Cut two 5' 8 1/2" pieces of 1" x 2" Ponderosa Pine for the front wall corner trim. Caulk the back of a 1" x 2" and secure it lengthwise to the right corner of the front wall, flush with the edge of the side wall, using 6d 2" finishing nails. Caulk the back of a 1" x 3" and secure it to the corner of the front wall, flush with the outer edge of the 1" x 2" and the base of the sheathing. Repeat for the remaining corner.

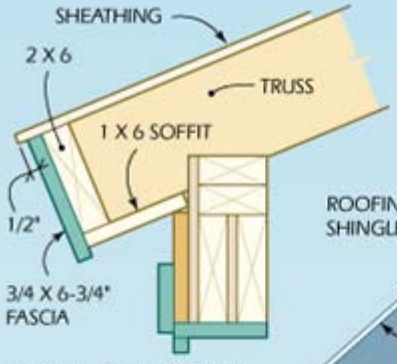
Step 7: Paint the Playhouse
Use a top-quality outdoor latex primer and top coat. We chose Enterprise® Severe Weather because it has a warrantee of 15 years. For a playhouse that blends with the exterior of your house, choose colors that are compatible with your home's color scheme. Or have fun and let your children select a color palette.

Step 8: Finishing Touches
Since 18"-long shutters are difficult to find, we used shutters from two interior-wood shutter kits and secured them to the sheathing at the sides of the windows, with 11/4" #6 deck screws. We fastened decorative fan brackets at the front corners of the playhouse, using 6d 2" finishing nails. Using a saber saw, we made the scalloped valance from an 8' piece of 1" x 6" Ponderosa Pine, finished it off with a router and then nailed it in place with 6d 2" finishing nails. We also cut a hole in the door for a Plexiglas window and trimmed the rough opening with corner molding.

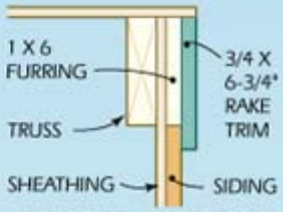
36
SHED

GARDEN SHED

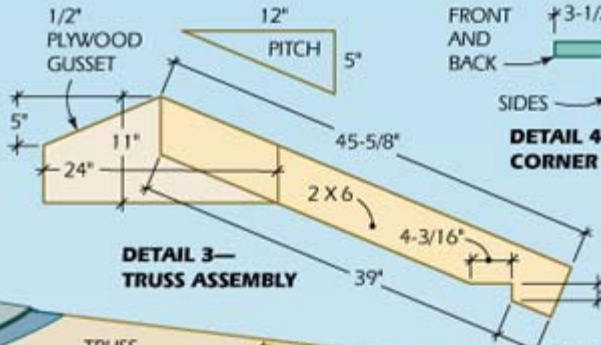
7'5" DEEP X 8'3" WIDE X 9'4" HIGH



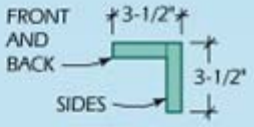
DETAIL 1—EAVE TRIM



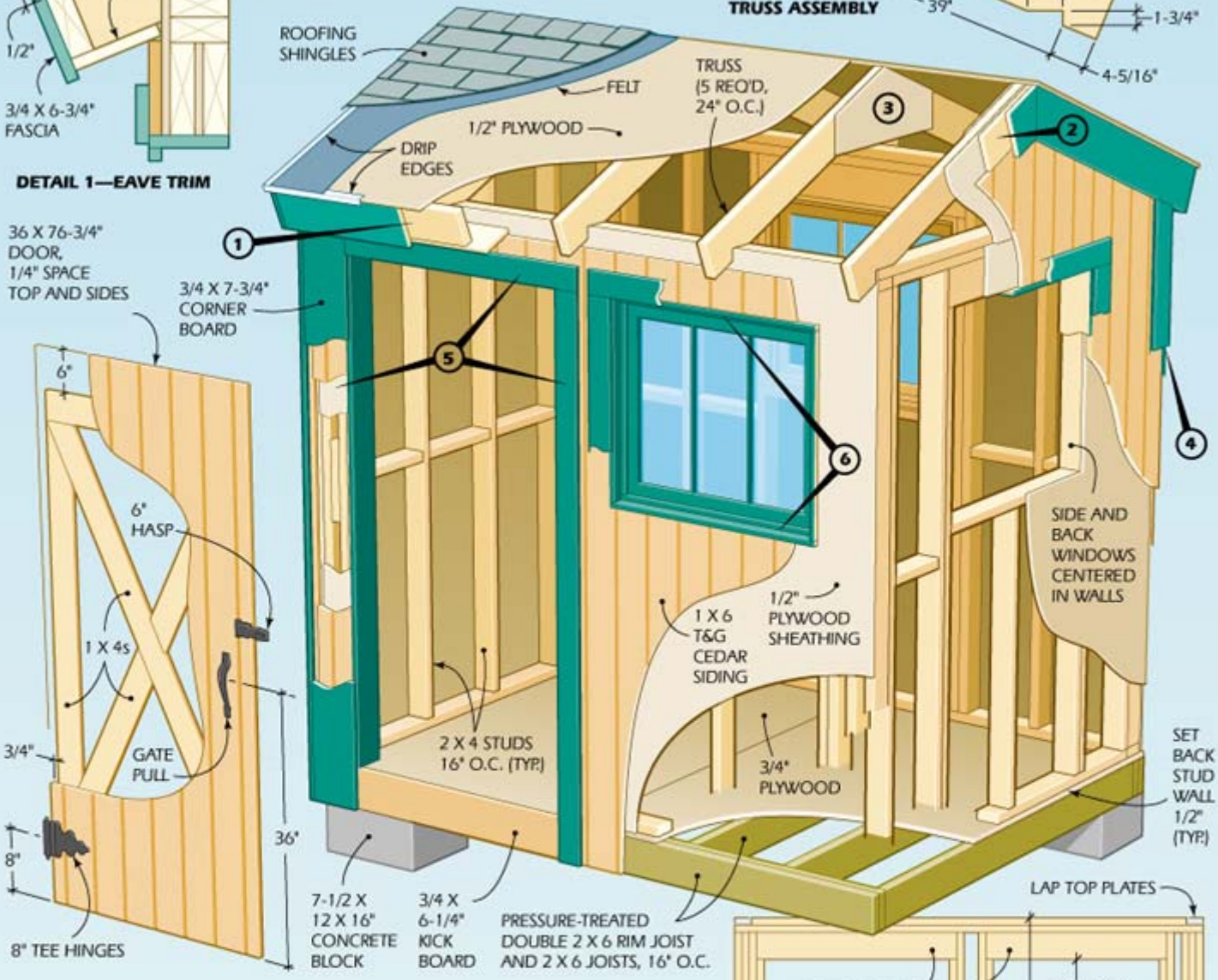
DETAIL 2— RAKE TRIM

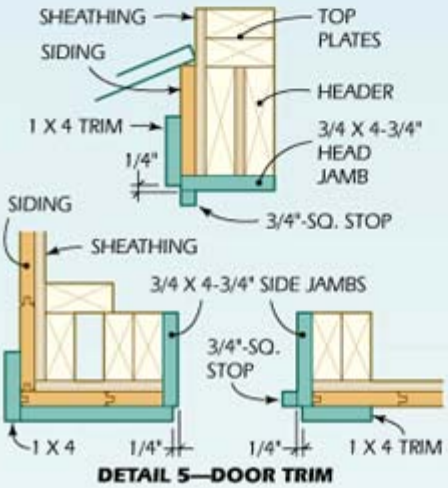


DETAIL 3— TRUSS ASSEMBLY

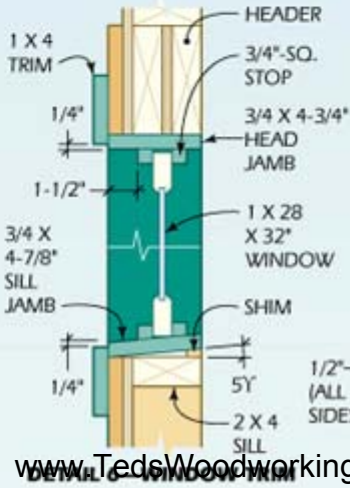


DETAIL 4— CORNER BOARDS

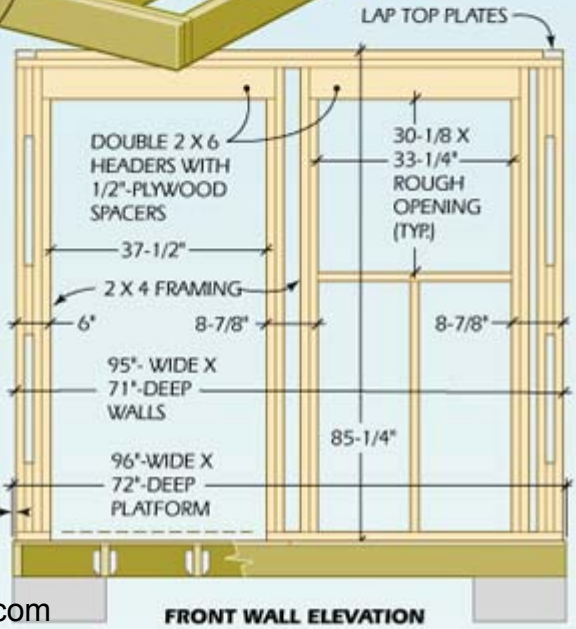




DETAIL 5—DOOR TRIM



DETAIL 6—WINDOW TRIM



FRONT WALL ELEVATION

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Site Work
Begin by marking out the building's location in your yard. For a structure of this size, it's simplest to build a lightweight frame that's the exact size of the shed, then use the frame to mark the site.

Use 3/4-in.-thick pine to build your frame. Cut the sides to the exact dimensions of the floor, and use one screw in each corner to fasten the sides into a rectangle. Screw a diagonal brace between two sides of the frame to hold it square.

Clear the building site and level any obvious high spots. Place the frame in the site and adjust its position until you're happy with the location of the shed. Drive stakes into the ground to mark each corner, stretch string between them (Photo 1) and then remove the frame.

Find the highest corner of the site and excavate for the first foundation corner block. Plan on having 3 to 4 in. of block exposed above grade. Dig out an area several inches wider than the block. Spread 2 or 3 in. of crushed stone in the hole to form a stable base for the block.

Now you're ready to position the first block, aligning its edges with the layout string. Check that the block is level across its length and width (Photo 2), and adjust the crushed stone as required.

Use a long, straight 2 x 4 and level to check the relative height of the second corner, then excavate the site for the block. Check that the second block is level with the first (Photo 3), and add the remaining corner blocks in the same way.

Use a wooden frame to find the best spot for your shed. Drive a stake at each corner and use string to delineate the site.

Dig a hole for the first block at the highest point in the grade. Add gravel, install the block, align it with the string, and level it

.

Use a straight 2 x 4 and a 4-ft. level to check that the corner blocks are installed at the same height.

After marking joist locations on long front and rear rim joists, install metal hangers with 1-1/2-in. joist hanger nails.

Lay the front and rear joists on the corner blocks. Then, cut the joists, position them in the joist hangers and secure with nails.

After doubling the front and rear joists, add the 3/4-in. plywood floor. Nail it in place with 8d nails spaced about 6 in. apart.

Building The Floor

It's a good idea to use pressure-treated lumber for the floor joists. Cut 2 x 6 stock to length for the front and back rim joists, and then lay out the locations of the floor joists on 16-in. centers. Nail joist hangers to the inside surface of each inner joist using 1-1/2-in. joist hanger nails (Photo 4). Next, place the inner front and back joists between the corner blocks, and then cut and position the floor joists (Photo 5). Nail the floor joists in place, then attach the outer rim joists to the front and back of the floor frame.

Compare opposite diagonal measurements of the floor assembly to check that it's square. Nail 3/4-in.-thick plywood to the joists for the shed floor (Photo 6).

Wall Construction

Cut 2 x 6 stock to size for the door and window headers. Use pieces of 1/2-in. plywood as spacers between the 2 x 6s to bring the header assemblies to 3-1/2 in. thick. Nail together the header pieces with 16d common nails.

Cut 2 x 4 stock to length for the wall studs and window and door jack studs. Nail each jack stud to a wall stud with 8d common nails. Build the four corner posts by nailing three 2 x 4 spacers between two studs as Show on the diagram

Begin framing the back wall by laying out the stud locations on the top and bottom plates. Then, lay out the framing members on the deck (Photo 7). Nail through the top plate and into the wall members, then secure the bottom plate. Frame the window opening, and nail the second top plate to the wall, keeping its ends back 3-1/2 in. from each end of the wall.

Now compare the opposite diagonal measurements of the wall and adjust the assembly until it's square. Then, apply 1/2-in. plywood sheathing, using 6d common nails spaced about 6 in. apart.

Stand the rear wall, bracing it with 2 x 4s nailed between the wall and the outside floor joists (Photo 8). Nail the bottom plate to the deck so the plywood sheathing is flush with the edge of the deck.

Frame the front wall, but don't apply the sheathing yet. Instead, stand the framed wall and brace it. Position the wall 1/2 in. from the deck edges to allow for the thickness of the sheathing. Then frame the side walls, one at a time, and stand them. Leave the second top plate off the side walls until they are raised. Nail the walls together at the corners, and then cut and install the side wall top

With the back wall framing members cut to length and headers assembled, lay out the pieces on the shed floor and join with nails.

Install 1/2-in. plywood wall sheathing on the framed back wall. Then, raise the assembly and secure it with diagonal braces.

Frame and raise the remaining walls without sheathing. After nailing together the corner studs, add the top plates.

plates (Photo 9). Use a level to check that the corners of the building are plumb, and nail temporary diagonal braces to the inside surface of each wall.

Apply the remaining plywood sheathing (Photo 10). At the side walls, keep the plywood 1-1/2 in. down from the top to provide room to nail the gable-end sheathing.

When the framing is in place and the assembly is square and plumb, add the remaining plywood sheathing.

To find the rafter cutting angle, align the 5- and 12-in. marks on the framing square's legs with the edge of the rafter stock.

Set up a worktable with the outline of the rafter assembly marked. Then, join each pair of rafters with a plywood gusset.

Framing The Roof

Use a framing square to lay out the 5-in. pitch on the first roof rafter (Photo 11). Cut out the rafter and use it as a pattern to make the second rafter. Test the first two for proper fit, then trace and cut the remaining rafters.

Cut a gusset for each truss from 1/2-in.-thick plywood as shown in the plans. Use a sheet of 3/4-in. plywood as an assembly table, and draw the outline of the roof truss directly on the plywood surface. Align two rafters over the pattern and nail the gusset to the rafters with 1-1/2-in. roofing nails (Photo 12).

Toenail the trusses to the front and rear walls with 8d common nails (Photo 13). At the gable ends keep the gussets on the inside faces of the trusses.

Cut 2 x 6 stock to length for the subfascia, and nail the boards to the rafter ends with 16d common nails. Cut and install the gable-end sheathing, and then nail 1 x 6 pine furring over the gable rafters.

Rip cedar stock to width for the front and back soffits and cut it to length. Use 6d galvanized finishing nails to fasten the soffit boards to the rafters and subfascia. Then, install the cedar fascia and rake trim.

Install the plywood roof deck, allowing it to overhang the fascia by 1/2 in. along the eaves. Nail aluminum drip edge to the eaves, and apply

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With all the rafters assembled in pairs, position each pair on the wall top plates and secure by toenailing.

roofing felt. Then, install the drip edge along the ragke edes.

Roofing And Siding

Follow the manufacturer's directions for installing the roof shingles (Photo 14).

Since the tongue-and-groove siding is installed vertically, add 2 x 4 nailing blocks between the studs, about halfway up the wall. Cut and install these nailers by toenailing them between adjacent studs.

If you plan to stain or paint the trim a different color than the shed siding, it's a good idea to finish the roof trim before applying the siding. Cut siding boards to length and begin installing them at a corner of the building. Use galvanized finishing nails to fasten the boards—8d nails for fastening to the 2 x 4 framing and 6d nails for the plywood sheathing (Photo 15). Face nail the first board, but fasten succeeding boards with nails driven diagonally through the tongue so the heads will be hidden. Set the nailheads slightly below the wood surface.

Use 1/2-in. plywood for the roof deck and cover it with roofing felt. Install shingles following the manufacturer's instructions.

Nail 1 x 6 tongue-and-groove cedar siding in place. Use 8d nails over wall framing and 6d nails when nailing into plywood alone.

Cut stock for doorjambs and nail in place. At a window, install the angled sill piece first, then the top jamb, then side jambs.

Position the door in its opening with a 1/4-in. space at the top and sides. Bore pilot holes for the hinge screws and secure the hinges.

Windows And Doors

After staining or painting the siding, install the door and window jambs (Photo 16). Nail the jambs directly to the framing, with the outside edge of each jamb flush to the face of the siding. At the windows, slope the sill pieces about 5° toward the outside of the building, add the top jambs, and then cut the side jambs to fit.

Cut stops for the windows from 1 x cedar stock, and install the outer stops with 6d galvanized finishing nails. Then, place a window in each opening and add the inner stops.

Rip door and window trim and shed corner boards from rough-sawn cedar. Cut each piece to length and nail in place.

Cut siding boards to length for the shed door. Use clamps to pull the boards together, but don’t use glue on the joints. Cut the battens for the door, and screw them to the inside surface of the boards.

Hold the door hinges in place and mark the mounting-hole locations. Bore pilot holes and fasten the hinges to the shed. Position the door with a 1/4-in. space on the sides and top, and mark the hinge holes. Bore pilot holes and mount the hinges (Photo 17). Install the door pull and hasp. Cut the doorstops and nail them in place on the top and open-side jamb. Then, stain or paint the windows, door and remaining trim.

We built a ramp from pressure-treated stock to make it easier to wheel a mower or snowthrower into the shed. To build a ramp, use 2 x 6 material spaced about 1/2 in. apart for the ramp deck, and 2 x 4 stock for battens underneath.

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CORNER CABINET

Skills needed include using a circular saw. Definitely not one for beginners! Remember to allow for the room's skirting board – the top section of the cabinet will be set further into the corner than the bottom. Our cutting diagram (Figure I) allows for this

THE BOTTOM CABINET
1. Mark out the plan or template as shown in Figure I (diagram 1). It's essential to be accurate with the complex angles that occur. As you proceed, check all the components against this plan. Glue and screw all the joints.

2. Screw the two backs together at the rear corner. Position the cabinet floor in place, 90mm up from the bottom, using its 90-degrees corner to set the backs at the same angle relative to one another.

3. The top rail is made of three pieces screwed together to negotiate the front corners (see Figure I, diagram 1). Making this is the most complex section of the project. Notches are cut out of the front corners to accommodate the vertical hinging rails. The top rail is screwed into place, checking that the structure remains square. The second purpose of the top rail is to make the cabinet structurally sound, without its two side panels. This makes the installation procedure simpler and allows you to shape the side panels into the wall, allowing the cupboard to be a perfect fit regardless of irregularities in the wall surface.

4. Cut out the hinging rails, noting that they stop at the cupboard bottom. Use 42mm x 19mm radiata pine with a 67-degree chamfer, where they abut the sides. Check the top and bottom hinges; screw them in place. Add a 67-degree chamfer to the corner edge of the sides before screwing them in place temporarily.

5. Screw down through the floor into the bottom rail which is a single timber component mitred to the sidewall angle at each end.

6. Position the top using angle brackets, screwed in place from the inside and hinge the doors in place.

THE TOP SHELVES
7. Screw the two backs together and brace them against one another, using one of the triangular shelves as the top.

8. Include another fixed shelf halfway down the backs. These two will be sufficient bracing and all other shelves will be adjustable.

9. Screw the side fascias in place.

Materials for bottom cabinet:

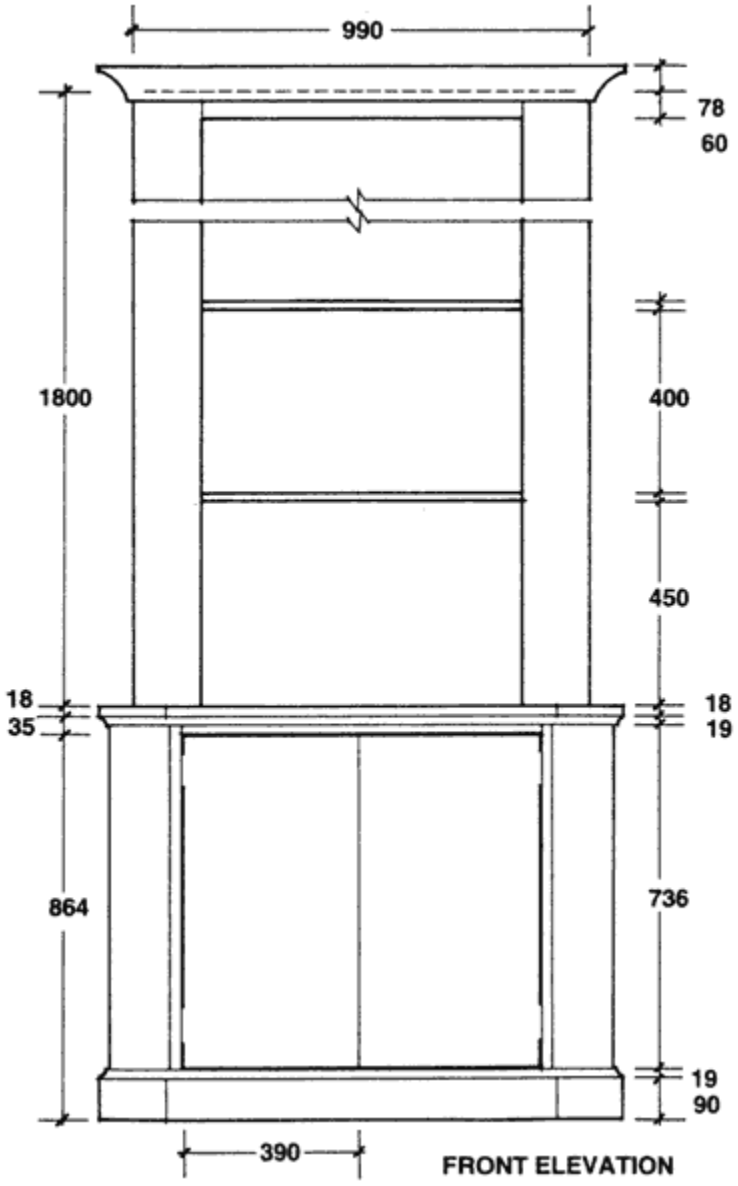
Component	Material	Length/size
Back (1 of each size)	18mm thick MDF	882mm x 800mm 882mm x 782mm
Bottom: shelf (2) sides (2)	18mm thick MDF	960mm right-angle triangle 882mm x 200mm
Rails: top/bottom (2) side (2)	45 x 35mm pine	850mm 250mm

Hinging cleats (2)	42 x 19mm pine	754mm
Skirting: sides (2) front (1)	90 x 19mm pine	225mm 850mm
Top (1)	18mm thick MDF	1060mm right-angle triangle
Doors (2)	9mm thick MDF 13mm thick lining boards	755mm x 390mm

Materials for top shelving

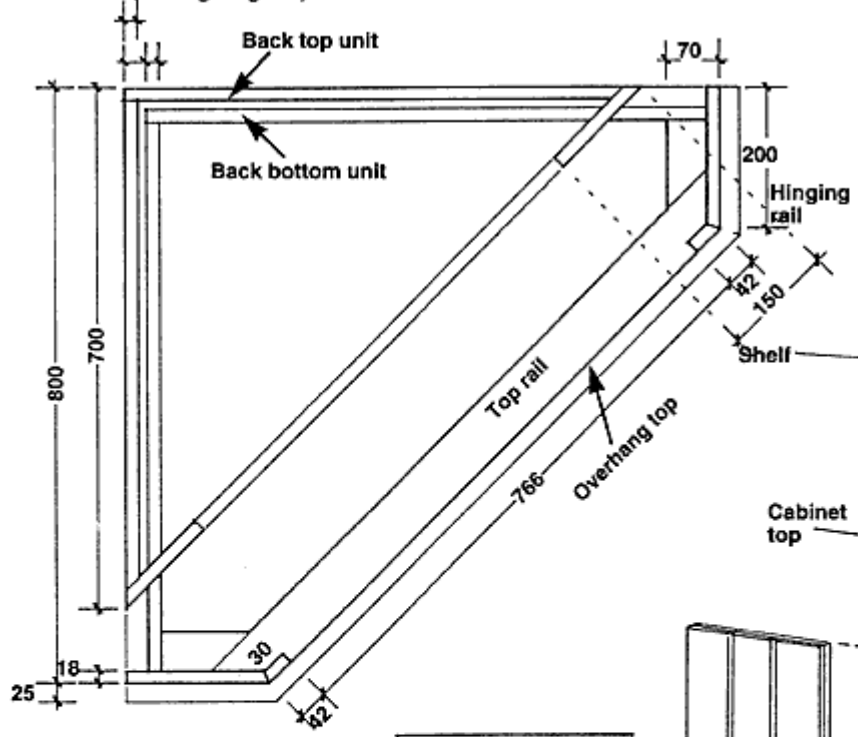
Component	Material	Length/size
Backs (1 of each size)	16mm thick MDF	1740mm x 665mm 1740mm x 649mm
Shelves/top (3)	18mm thick MDF	645mm right-angle triangle
Fascia (2)	18mm thick MDF	1740mm x 150mm
Cornice (1)	78mm pine cornice moulding	1100mm

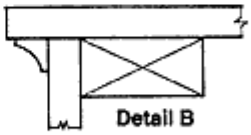
Other materials: 50mm particle-board screws; wood glue; 35mm brass butt hinges (4); magnetic door catches (2); 19mm scotia for trimming.

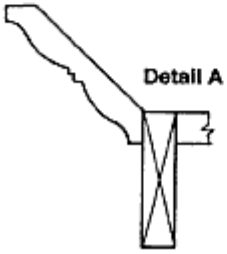


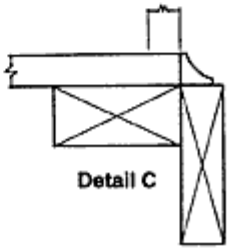
FRONT ELEVATION

DIAGRAM 1 (cutting diagram)









All measurements in mm

DIAGRAM 2

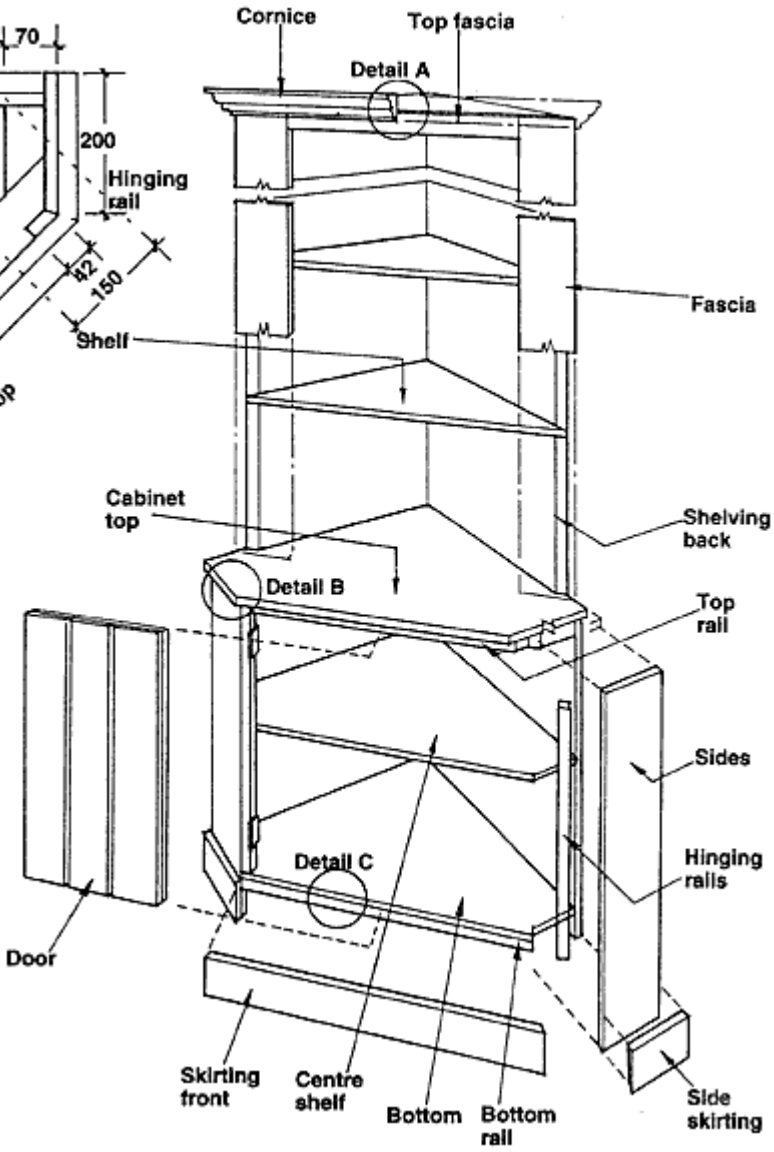


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TABLE AND BENCH SET

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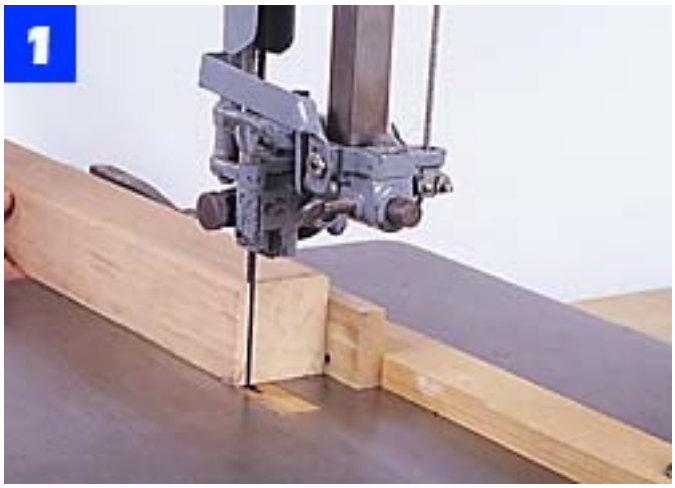
We chose red cedar for this project. This wood resists rot and insect infestation and it's readily available at lumberyards and home centers. If you can't purchase kiln-dried cedar for your project, you should buy the material several weeks before starting and stack it someplace where it will have a chance to air dry. Place evenly spaced strips of wood between each layer of boards to allow air to flow through the stack of lumber. Other suitable wood species for this project are redwood, teak and cypress. These woods are more expensive than cedar, however, and you may have a hard time finding them at lumberyards and home centers.

We should mention that we used Titebond II wood glue to assemble the furniture joints. This single-part glue is waterproof for all but the most extreme situations, such as when joints are subject to continuous submersion in water. Unlike epoxy or resorcinol adhesives that are truly waterproof, this glue is easy to use and readily available.

Making The Parts

The table legs are cut from 4 x 4 stock (or they can be glued up from thinner material). When using 4 x 4 stock, cut each leg to rough length. Next, clamp a fence to the band saw table, and rip the blanks to a 2 3/4 x 2 3/4-in. square **(Photo 1).** Then clamp the leg to a workbench, and use a razor-sharp plane to remove the saw marks **(Photo 2).** Unless you are very experienced with a hand plane, check the workpiece frequently as you go. The edges of the leg must remain square to one another. Remember that you are only smoothing the surface, so do not remove too much material.



Rip the table leg stock out of a cedar 4 x 4. Clamp a temporary rip fence to the band saw table to do this.

Clamp a table leg to a benchtop and remove saw marks with a hand plane. To make a smooth cut, push the plane at an angle.

Use a miter gauge on the band saw to crosscut the leg blanks to finished dimension **(Photo 3).**

Since the bench legs are smaller than the table legs, it is a better use of materials to glue them up from three pieces of 3/4-in.-thick stock. You can simplify the job if you plan to make the blanks large enough to cut four legs from each glued-up stack.

Crosscut the legs on the band saw. Here, a shopmade crosscutting table and a miter gauge are used to make the cut.

Rip and crosscut material for the leg blanks slightly oversize, then use a foam roller to spread glue on the mating surfaces of each piece. Assemble the pieces into a stack, and clamp the pieces together **(Photo 4).** After about 20 minutes, scrape off the glue that has squeezed from the joints, then allow the glue to fully set.

For the bench legs, spread glue on 3/4-in.-thick stock. Lay disposable material under the pieces and clamp them together.

Now use the table saw to rip the blanks to 21/4 in. wide, and crosscut the bench legs to finished length.

Lay out the mortise locations in all the legs for the apron joints. You can speed the process by clamping four legs together with their ends perfectly aligned. Then, mark across the stack using a square **(Photo 5).** Next, use the router and edge guide to cut the leg mortises **(Photo 6).** It's best to use a spiral up-cutting bit in the router because that type of bit pulls the dust and chips out of the cut, and reduces the strain on the motor. This also keeps the bit's cutting edge cooler.

Rip and crosscut the individual bench legs to size, and then clamp them together. Mark out mortise locations the legs.

Rip and crosscut 1-in.-thick stock for the table and bench aprons as well as for the top frames and slats. Install dado blades in the table saw, and then use the miter gauge to guide the workpiece over the saw blades when cutting tenons **(Photo 7).** Note that you can use the rip fence as a stop to gauge the tenon length. Since the tenons are 1 in. long, you need to make two passes to complete each cheek.

Using a spiral up-cutting bit in a plunge router, cut the table leg mortises. Two legs clamped together provide a stable base.

Use a dado blade setup in the table saw to cut the tenons on the apron pieces. Butt each apron to the fence, and make the cut.

Cut the tenons across the width of each workpiece, then adjust the blade height and move each workpiece over the blade on edge to cut the shoulder **(Photo 8).** Clamp each workpiece upright in a vise and gently round over the tenon's edges using a wood rasp **(Photo 9).**

To cut the shoulders on a tenon, stand the apron up, and hold it firmly to the miter gauge. Butt it to the fence and make the cut.

Round off a tenon with a rasp. The tenon's radius matches the radius left by the spiral up-cutting bit used to cut the mortise.

Lay out the mortise locations for the tabletop and benchtop joints. Use a router with an edge guide and a spiral up-cutting bit to cut the mortises **(Photo 10).** It is best to clamp three workpieces of the same width together when routing to form a wide and stable base for the plunge router.

Mark the location of the umbrella posthole in the center rail of the tabletop, and then use a Forstner bit in the drill press to bore the hole.

After laying out the locations of the holes in the aprons for mounting the top, use a Forstner bit in the drill press to counterbore a recess for each screwhead. Next, use a 3/16-in.-dia. bit to drill the pilot holes for the screw shanks. Each of these holes is centered in a recess.

To cut the long row of mortises in each stile and rail, clamp three of the work-pieces together to support the router.

To complete the part-making process, install a chamfer bit in the router table, then use it to cut the 3/16-in.-deep chamfer on the table and bench legs, aprons and top parts as shown in the plans **(Photo 11).** Note that not all edges are chamfered.

Use a chamfer bit in the router table to cut the chamfer on all four edges of the legs for the benches and table.

Assembly

Begin assembly with the benches, since they are smaller and are much easier to work with. After you refine your technique on them, you can assemble the table.

It's worth noting that all the parts for the table and benches should be dry assembled before glue is applied. With the assemblies joined in this manner, make reference marks and numbers on the backs of the parts or in some other discreet location. Before proceeding to gluing and clamping, gather the parts together in batches so they are not confused during the assembly process. In some cases, you'll want to make a second dry fit midway through the assembly process, such as when gluing and clamping a stile or rail to multiple slats that have been glued to a stile or rail on the opposite side. This is a necessary evil to ensure that the parts go together smoothly--the parts may have fit the first time you tried them but shifted slightly when they were glued up as a subassembly.

Apply glue to the mortises of two bench legs and on the tenons of one short apron. Use a small wood shim to spread glue on the mortise walls, and use a small brush to coat the tenons. Press together the apron and legs, and then clamp the subassembly to pull the joints tight **(Photo 12).**

Glue and clamp together a pair of bench legs and one short apron. Make two of these subassemblies.

When the glue is dry on these parts, glue and clamp the long bench aprons to the end subassemblies **(Photo 13).** It's best to do this on a flat work surface to ensure that the base assembly is not twisted.

Assemble the table base in the same manner as the bench bases. Make two subassemblies consisting of a pair of legs and one apron. When the glue has set on these, join the subassemblies spanned by a pair of aprons.

Join two leg-apron subassemblies spanned by a long pair of aprons. Glue and clamp this to complete a bench base.

The first stage in assembling a benchtop is to glue and clamp slats to one stile. Use one clamp in the center of each slat.

Now move on to assembling the benchtops. Since there are several slats in each top, assemble each top in stages. First, glue and clamp the slats to one long rail **(Photo 14).** After the glue sets on those joints, apply the opposite rail.

Multiple subassemblies are made in assembling the tabletop. First, slats are joined to the center rail.

Approach the tabletop assembly in the same manner. Begin by gluing and clamping a slat at each end of the center rail. Fill in between these two slats with more slats **(Photo 15).** When the glue is dry on this subassembly, glue and clamp slats to the opposite side **(Photo 16).** Next, glue and clamp the side rails to this subassembly **(Photo 17).** When the glue is set on that subassembly, position clamps across it and then glue and clamp one stile to it **(Photo 18).** Complete the top by gluing and clamping the second stile.

A second set of slats is glued and clamped to the cen
rail. Again, use one clamp in the center of each slat.

Using this technique, you will not have to worry about getting all the parts together before the glue begins to set. Your results will be better, and the stress of a frantic assembly is eliminated.

Glue and clamp a side rail to the center rail. One clamp, carefully centered, should provide enough force.

Mark the benchtops and tabletop for the 45 degree corner cuts, and make these cuts with a sabre saw. Sand the cut corners smooth, then use the chamfer bit in the router to shape the table edges and benchtops. Use the router and chamfer bit to shape the top edge of the umbrella hole as well.

Clamp one stile at each end of the top subassembly. Space clamps evenly and at the center of a tenon.

Rip, crosscut and miter the 1-in.-thick stock to make corner blocks. Bore and countersink pilot holes in each block, and then attach them with screws to the aprons for the table and benches **(Photo 19).**

A corner block is installed at each leg on the table and the benches. A pair of screws holds each block to the aprons.

Invert the tabletop on a padded surface, then place the base over it. Adjust the base so there is an even reveal on all sides of the top, and then attach the base to the top with screws **(Photo 20).** Assemble the benches in the same manner.

Attach the tabletop to the base with several screws. Drive each screw into its matching counterbored hole the apron.

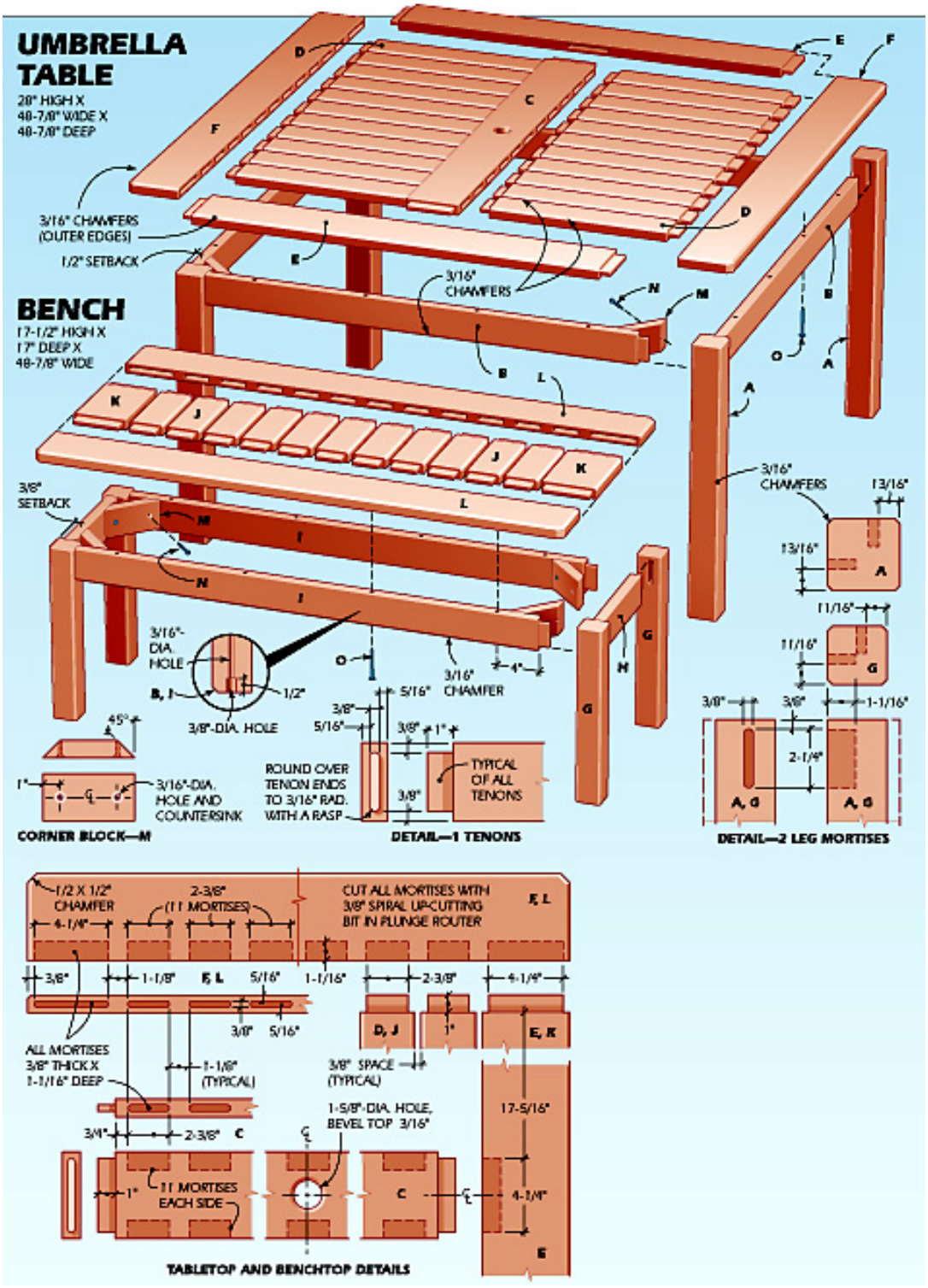
Sand all surfaces with 120-grit and 140-grit sandpaper, and remove all dust with a tack cloth. While cedar is resistant to rot and insect infestation, it will weather if left untreated. To preserve its natural color and protect it from the elements, apply a penetrating finish with a high-quality brush. We used clear (unpigmented) Cabot Decking Stain No. 1400.

A pigmented stain could easily be used on this project. In fact, pigmented finishes provide greater protection against weather damage--even if they do obscure the wood's grain. Although most people prefer white, green or redwood-colored finishes for outdoor wood furniture, there's nothing to prevent you from being a bit more creative. The finish could be color matched to other outdoor furnishings, or to the house itself.

For maximum protection against the elements, use a paintable water-repellent preservative, followed by a compatible primer and topcoat. Visit your paint store to buy these three products and check that they are fully compatible.

MATERIALS LIST--UMBRELLA TABLE AND BENCH		
Key	No.	Size & Description (use)
A	4	2 3/4 x 2 3/4 x 27" cedar (leg)
B	4	1 x 3 x 43 7/8" cedar (apron)
C	1	1 x 5 x 40 7/8" cedar (rail)
D	22	1 x 3 1/8 x 18 15/16" cedar (slats)
E	2	1 x 5 x 40 7/8" cedar (rail)
F	2	1 x 5 x 48 7/8" cedar (stile)
G	16	2 1/4 x 2 1/4 x 16 1/2" cedar (leg)
H	8	1 x 3 x 12" cedar (apron)
I	8	1 x 3 x 44 7/8" cedar (apron)

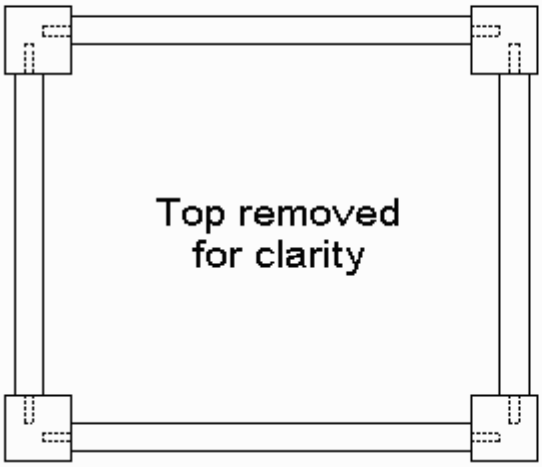
J	44	1 x 3 1/8 x 9" cedar (slats)
K	8	1 x 5 x 9" cedar (rail)
L	8	1 x 5 x 48 7/8" cedar (stile)
M	20	1 x 2 3/4 x 5 1/4" cedar (block)
N	40	2" No. 8 fh galvanized screw
O	48	3" No. 8 fh galvanized screw


UMBRELLA TABLE
28" HIGH X
48-7/8" WIDE X
48-7/8" DEEP
3/16" CHAMFERS (OUTER EDGES)
1/2" SETBACK
BENCH
17-1/2" HIGH X
17" DEEP X
48-7/8" WIDE
3/16" CHAMFERS
3/8" SETBACK
3/16"-DIA. HOLE
1/2"
3/8"-DIA. HOLE
45°
1"
3/16"-DIA. HOLE AND COUNTERSINK
CORNER BLOCK—M
3/16" CHAMFER
5/16"
3/8"
1"
ROUND OVER TENON ENDS TO 3/16" RAD. WITH A RASP
TYPICAL OF ALL TENONS
DETAIL—1 TENONS
13/16"
11/16"
1-1/16"
2-1/4"
A, G
DETAIL—2 LEG MORTISES
1/2 X 1/2" CHAMFER
4-1/4"
2-3/8" (11 MORTISES)
CUT ALL MORTISES WITH 3/8" SPIRAL UP-CUTTING BIT IN PLUNGE ROUTER
F, L
3/8"
1-1/8"
5/16"
1-1/16"
2-3/8"
D, J
E, K
ALL MORTISES 3/8" THICK X 1-1/16" DEEP
1-1/8" (TYPICAL)
3/8" SPACE (TYPICAL)
1-5/8"-DIA. HOLE, BEVEL TOP 3/16"
17-5/16"
3/4"
C
11 MORTISES EACH SIDE
TABLETOP AND BENCHTOP DETAILS

39
BASIC TABLE

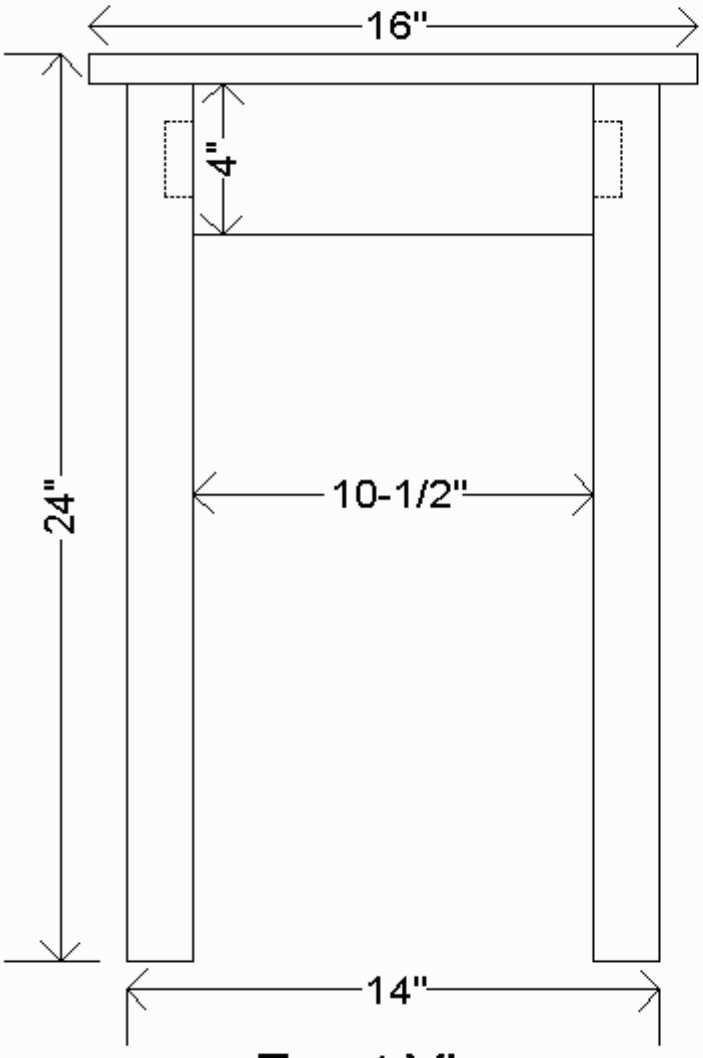
Basic Table

Top View

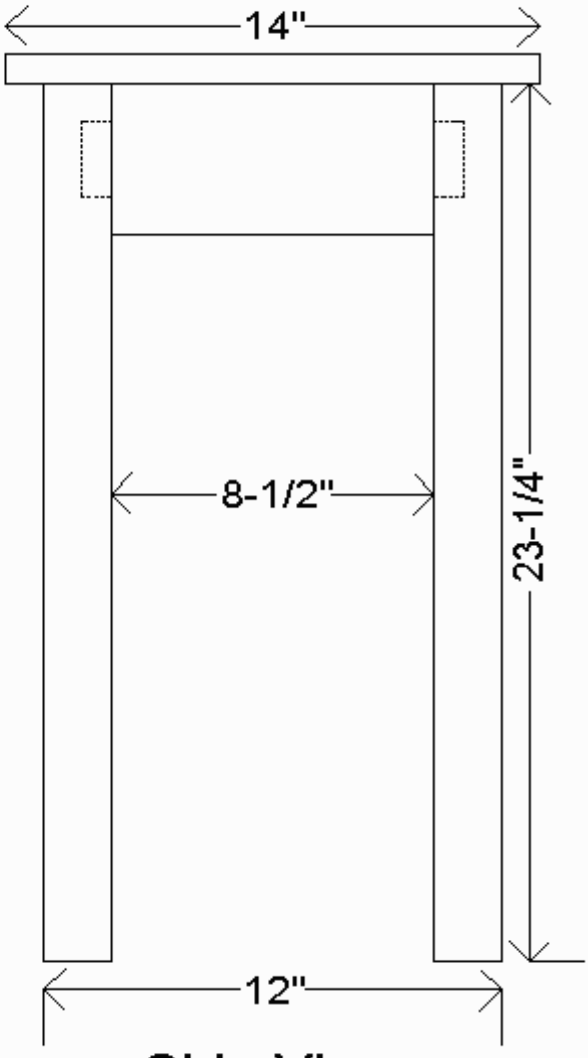


Top and apron are 4/4 stock
(3/4" nominal thickness)

Legs are 8/4 stock (1-3/4"
nominal thickness)



Front View



Side View

www.TedsWoodworking.com

Stock Selection:

Try to get some North American Eastern White pine, probably available up there in Canada. In the states, Idaho pine is a good substitute, because of it's easier tooling and fewer and smaller knots. Home center Ponderosa pine from the North West has much large knots and doesn't hand tool as well.

Because the nominal thickness is standardized, your planing will be limited to mostly jointing & smoothing. Unless you add a drawer, (more good experience) then you'll want to thickness the stock down.

Tool Required:

The basic list of tools needed for this project is small. Some of the variants will require some other tools (see below).

- **Layout Tools**
  A good ruler (tape measure will do) and a very important tool called a square. Get a marking gauge as well.
- **Saws**
  26" Crosscut saw and a 10-14" backsaw.
- **Planes**
  Eventually you'll need a scrub, jointer, and smooth plane too, but you can start by getting a common Stanley #5 jack plane and a fully-adjustable (mouth and blade) block like the Stanley #65 or #18.
- **Chisel**
  Since we will be doing mortises in this project, a 1/4" mortise chisel will be needed. Alternately, a brace with a 1/4" bit and a paring chisel could be used.
- **Stones**
  I won't start an argument over which are better, and yes you can use Silicon Carbide sandpaper to sharpen too. But I will say that without a doubt, Sharpening is the most important skill you must learn. Otherwise most of the above tools are useless, resulting in frustration.
- **Bench**
  Hey, perhaps this should be your 1st project… Make sure you get a good quality and large faced woodworking style vise.

Optional Tools:

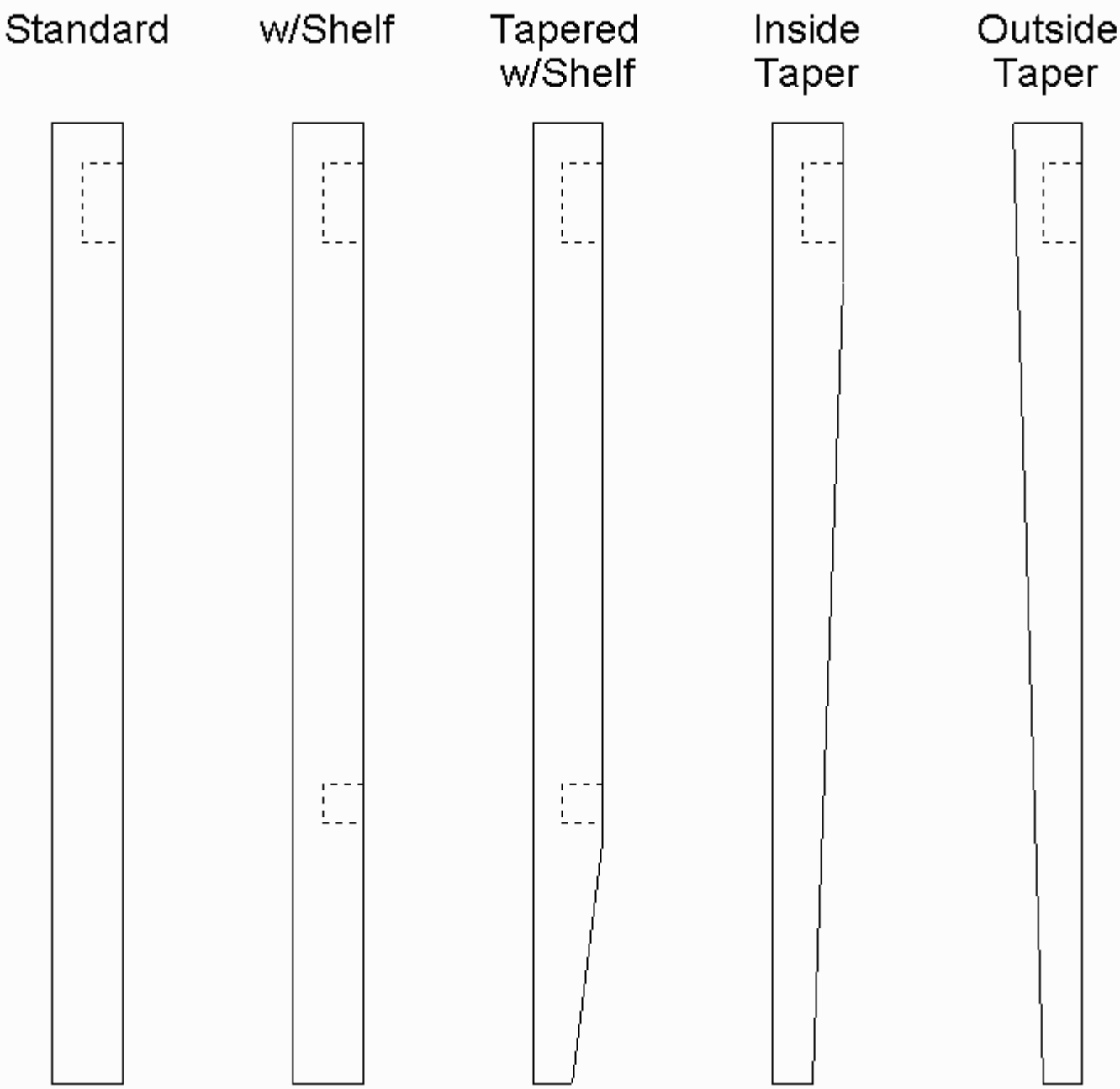
These are tools that either make the job easier, or are needed for some of the variants on the original design.

- **Smooth Plane**
  A #3 or #4 is a very handy tool for final smoothing of the parts.
- **Mortise Gage**
  Not strictly necessary, but makes laying out mortise and tenon joints much easier.

- **Rip Saw**
  If you would like to use tapered legs, a 26" rip saw will make the job easier.
- **Drawknife**
  Another good way to taper the legs is with a drawknife.
- **Spokeshave**
  If you will be using curved aprons, a round-soled spokeshave will be needed to smooth the curves. Either metal or wooden will do.
- **Coping Saw or Turning Saw**
  If you will be using curved aprons, you will need a saw capable of cutting the curves.

Making the Legs

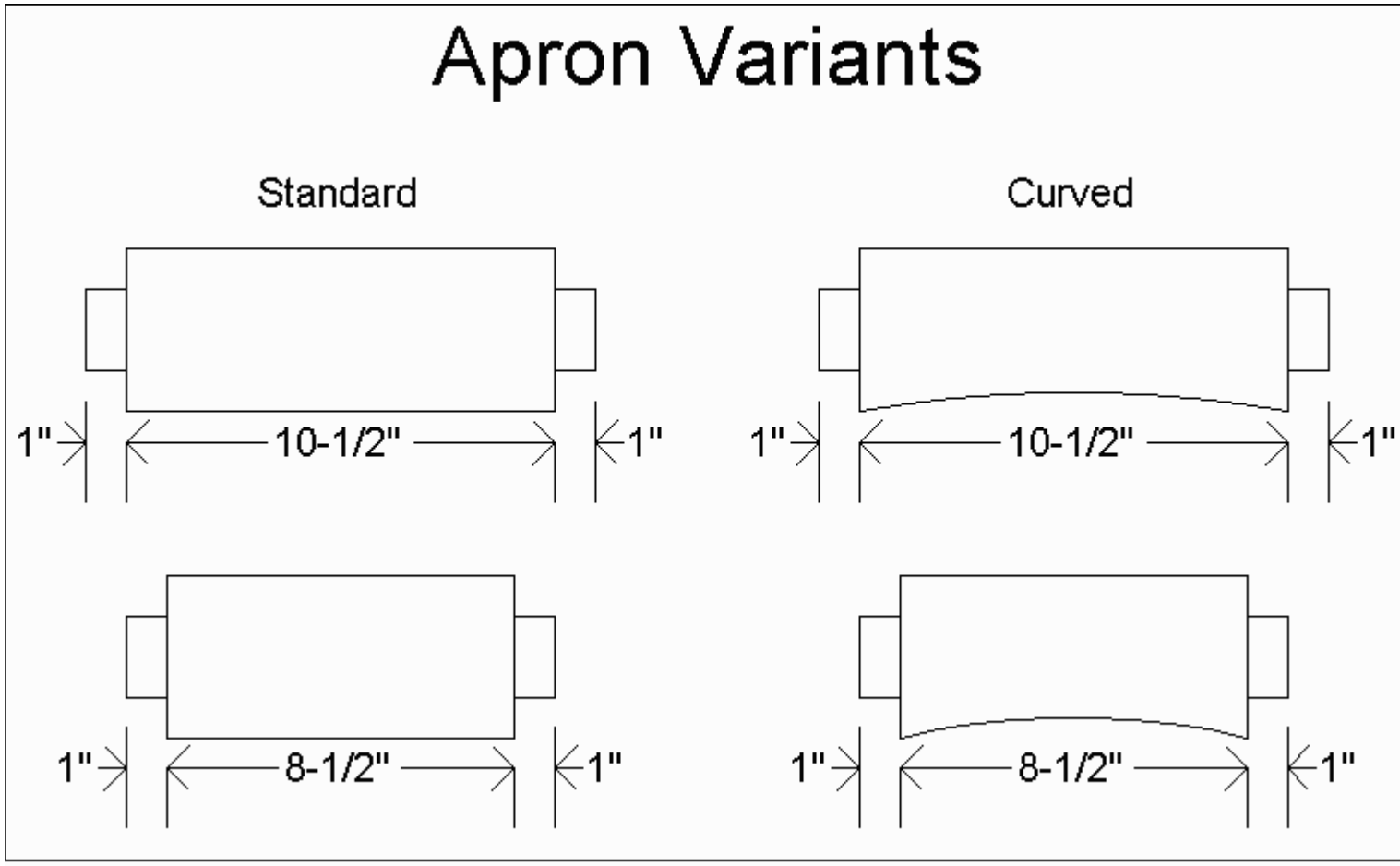
Leg Variants



Start with the legs. Either get 8/4 (actual size 1-3/4") square stock, or joint and glue some up into four usable squares of the desired length. The jack plane should be fully capable of jointing a 24"-30" length. Glue & clamp overnight. Then remove & smooth all four sides.

Now cut the mortises for the rails to join into. Lay them out on those same two "inside" sides of each leg. Mortises should be 1/4" wide and 1" deep, set 1/2" back from the front face. Mortises can be either chopped with a mortise chisel, or bored with a brace and bit and cleaned up with a paring chisel. Either way is pretty simple.

Making the Aprons



Cut your 4/4 (actual size 3/4") stock to *FULL* length and lay out the tenons. Score the tenon shoulders first with a knife or chisel edge. Use your backsaw to remove the cheeks & cleanup with a chisel. If you will be using the curved aprons, lay out and cut the 1/2" deep curve last, and clean up with a spokeshave.

Glue the tenons into their appropriate mortises & clamp the entire assembly together. Check the diagonals and ensure that the entire assembly is square and level (or even on the top).

Making the Top

Normally, the top is probably already glued up & ready to be mounted at this time. But assuming that you didn't multi-task, let's cover making one now.

Saw the boards to length, watching for stock that might twist or cup after glueup. Lay them out and mark the face around each joint for ensure the proper order for assembly. Since this is a basically small project the jack plane can be used as a jointer.

As a newbie, joint the edges two at a time, back to back. This way if you can't plane nice & square, the bevel on Each will offset the other, and your panel will be flat.

Learn during planing to press on the toe upon entry and the heel during exit. This helps avoid rounding down the ends of the board being planed. When you are getting complete shavings for the entire length of the stroke, and the boards join together without any light appearing through anywhere, move on to do the other side of board #2 with board #3.

Glue, clamp, set overnight. Remove, cut to size, clean up. Smooth the top with your jack plane very sharp & set very fine (if you have a smoother, use it instead). Plane the top as smooth as possible, and finish by knocking off the corners with your block plane.

Attaching the Top

When attaching the top, be sure to allow for seasonal movement of the wood!

The easiest method is to put corner blocks in the rails, and attach the top with a couple of small screws in from the bottom. Alternatively, you could use any of the commercial "button" attachments, or use L-shaped cleats which engage a groove in the apron. Any good woodworking book should show several options for this.

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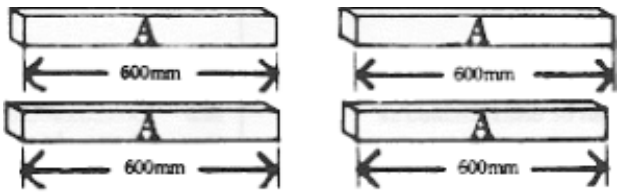
WINE RACK

Here is a rack for one dozen average size wine bottles. Longer or higher racks can be designed using spacing shown but some variation in timber thickness, width, etc., may be necessary.

TOOLS YOU WILL NEED	MATERIALS YOU WILL NEED	
• Hand saw • Hammer • Nail punch • Carpenter's square and pencil • Measuring tape or rule • Drill and bits	**TIMBER** Timber: Seasoned softwood DAR for decorative rack, otherwise sawn hardwood or softwood 1550x25mm, 1piece 75x25mm, 1 piece 2.7m	**HARDWARE** • Hardware • 50x2.9mm bullet head nails • Sandpaper or electric sander.

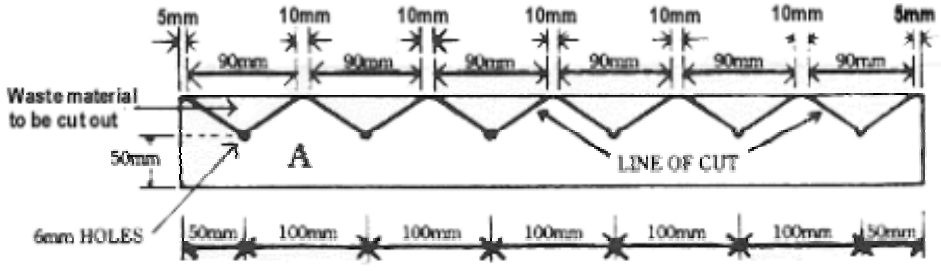
Cut these four rails

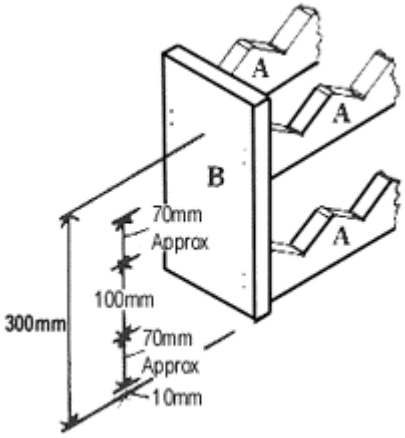
from the pieces 75x25mmx2.7m. Each rail to be exactly 600mm long



Mark out

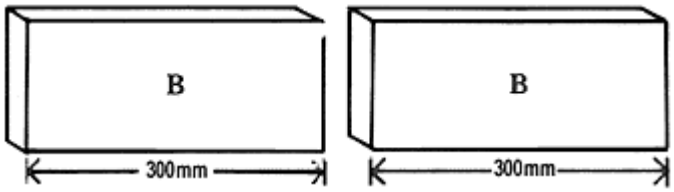
each of the four pieces **'A'** as below. Drill **six** 6mm holes as shown in Step 2, then cut each triangular piece out using hand-saw or jig saw, cutting into the prepared 6mm holes. Smooth off each rail each of the four pieces **'A'** with sand paper or sander.





Cut two end pieces

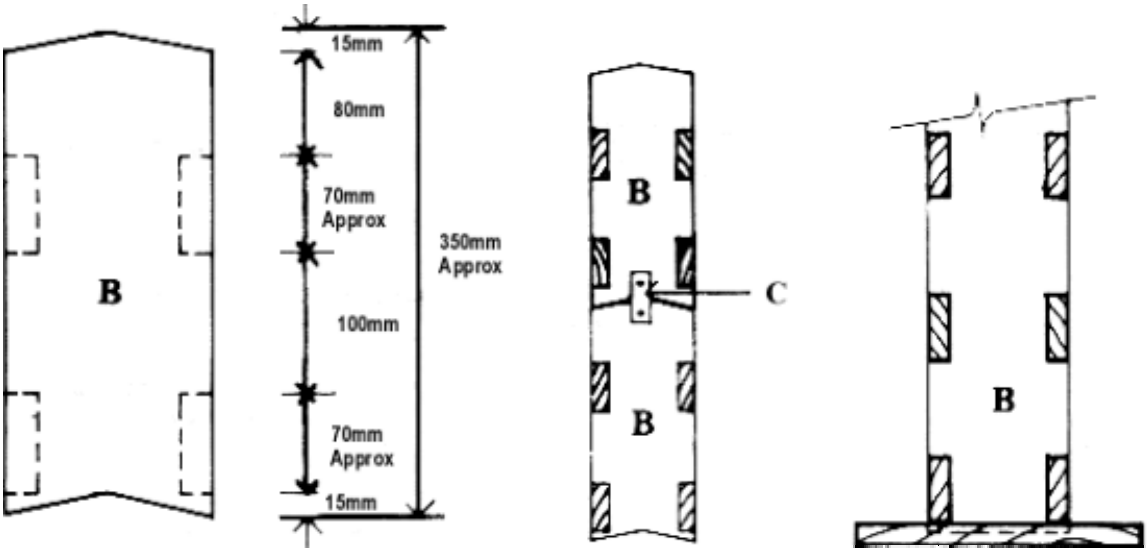
'B' from the piece 150x25x600mm. Each piece should be exactly 300mm long.



Attach rails

'A' to ends **'B'** at spacing shown using two 50x2.8mm nails at each end. Punch nail heads. Not: Pre-drill nail holes but locate to avoid timber splitting and penetration into bottle retaining space. Smooth down, fill nail holes, etc., stian, clear finish, paint etc, as desired.

Design Variations



DEMOUNTABLE RACK

Use screw fastening instead of nailing so that rack can be diassembled as required.

STACKING RACKS

Cut two sides 'B' from a timber piece 150x25x900mm DAR and to shapes shown. Assemble as indicated using location clamp or clip.

TALL RACKS

Very tall racks could be unstable because of height. Use standards or racking design but add a 'foot' to each side of the rack depending on space available. Use an added 'foot' to each side of the rack depending on space available. Use an added 'foot' equal to about normal bottle length. Use, for example, one 'foot' each end, cut to 75x50x300mm DAR.

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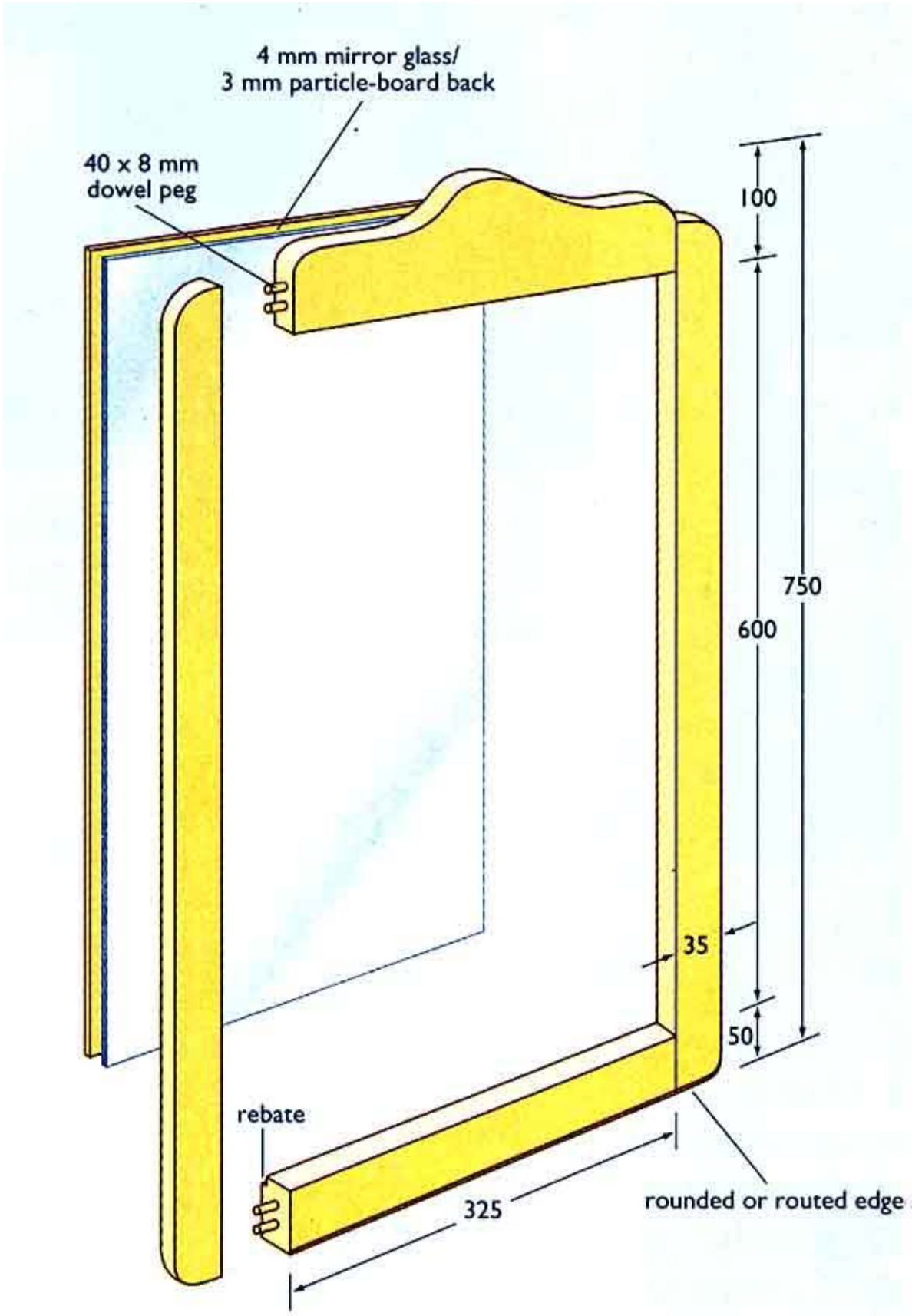
BATHROOM MIRROR


4 mm mirror glass/
3 mm particle-board back
40 x 8 mm
dowel peg
100
750
600
35
50
rebate
325
rounded or routed edge

You'll need:

Item	Material
mirror frame sides (2)	40 x 19mm timber, cut and planed to 700 x 35mm
mirror frame top (1)	115 x 19mm timber, cut and planed to 325 x 100mm
mirror frame bottom (1)	65 x 19mm timber, cut and planed to 325 x 50mm

You'll also need: 8mm dowel cut into 8 x 40mm lengths; waterproof epoxy resin (if using in bathroom) or PVA glue; mirror glass measuring 342mm x 616mm; 3mm-thick plywood or MDF measuring 345mm x 620mm; 120 grit sandpaper; polyurethane gloss varnish; panel pins.

Here's how:
1. Cut and plane the timber to the correct measurements. Click on the illustration at the top of this story for a full-sized diagram.

2. With a jigsaw, shape the top piece, making it 50mm high at the ends and the full 100mm height at the centre. Similarly, round off all the corners.

3. Using a router with a straight bit, cut a 10mm square rebate into the rear inside edges of each of the four frame components to take the mirror glass and back. Make the corner joints by drilling holes for two dowel pegs into each one. A dowelling jig will ensure accuracy. Now glue and assemble the frame.

4. You can simply round the front edges of the frame with an electric sander, but for a better trim, rout the edges with a 12mm round-over bit. Sand and triple-varnish frame.

5. Have mirror glass cut to size and fit 3mm-thick plywood or MDF inside the back rebate. Use panel pins tapped into the inside edge of the frame to hold the back in place.

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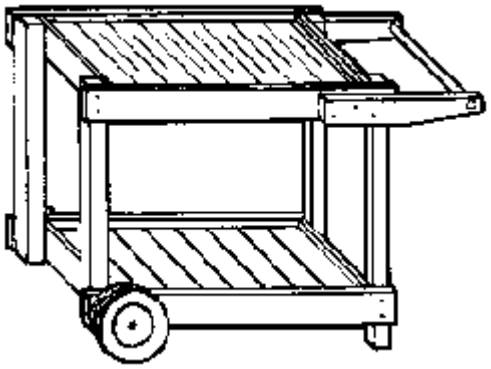
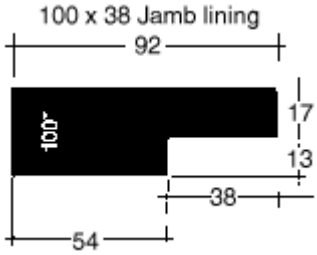
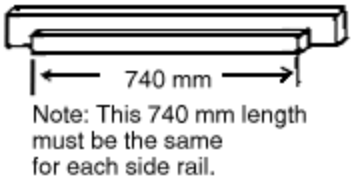
BARBECUE TROLLEY

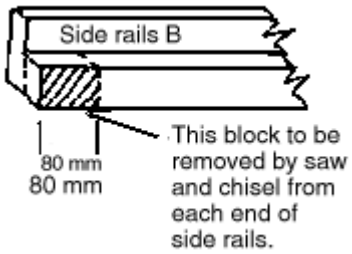


Many of those odd bits and pieces required at the outdoor barbecue can be delivered conveniently on this barbecue (or indoor tea) trolley. Basic design consists of two equal sized flat trays supported on corner posts. However we strongly advise that you decide first on the sort of wheel/axle system since width of trays should be made to fit closely between the wheels. With some changes in details the width of this barbecue trolley can be adjusted to suit your purchased wheel, axle, bracket units. As an alternative you could use a system of bolts and lock nuts, etc to fasten wheels to base tray or corner post as shown later.

TOOLS YOU WILL NEED	MATERIALS YOU WILL NEED	
• Saws • Drill and bit, countersunk bit • Measuring tape/rule • Carpenter's square and pencil • Adjustable spanner • Wood chisel • Hammer • Screwdriver • Chisel	**Timber** Note that this trolley is designed on the assumption that it will be generally protected from exposure to rain and dew. If this limit on exposure is accepted then standard door jamb lining can be used (e.g. from Pacific Maple, meranti, oregon, radiata pine, Tasmanian oak, etc.) and standard or interior quality particle board or plywood would be acceptable for bottom of trays. Corner of posts could be timber selected for appearance rather than for performance under weather exposed conditions.  • 50 mm x 50 mm DAR 4 pieces 750 mm * (4 posts) • 100 x 38 mm door jamb lining (see diagram) 4 pieces 900 mm * (side rails) 4 pieces 600 mm * (end rails) • 100 x 25 mm DAR softwood 16 pieces as bottom planks or use 19 mm particleboard or 12 mm plywood cut to fit frames. • 75 x 25 mm DAR softwood 1 piece 900 mm * (rail bracket) • 19 mm or 25 mm diameter dowel or 1 piece 700 mm for handle/rail * Discuss these length requirements with your supplier, who will supply standard lengths of timber from which these pieces can be cut.	**Hardware** • 8/50 x 6 mm diameter round head wood screws (end rail to post). • 40 mm x 6 mm diameter round head wood screws (side rail to post, handle) • 100/50 x 2.8 mm bullet head nails. (bottom planks) • PVA wood adhesive • 2/150 mm diameter wheeels/axles bracket units as available.

Step by Step





Cut corner posts

From the pieces of 50 x 50 mm DAR timber cut four posts (P) each 750 mm long.

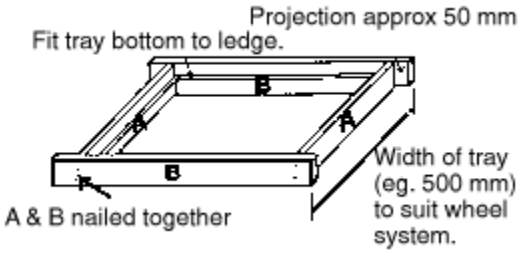
Cut end rails

From the pieces of door jamb cut four end rails (A) each of an exact length to suit the axle/wheel system.

Example: For an overall width of tray of 500 mm cut four end rails each 465 mm long

Mark out side rails

At each end of the four side rail pieces mark out as shown 80 mm from each end. Mark edges as guide for removal of excess material.



Saw and chisel out rail section

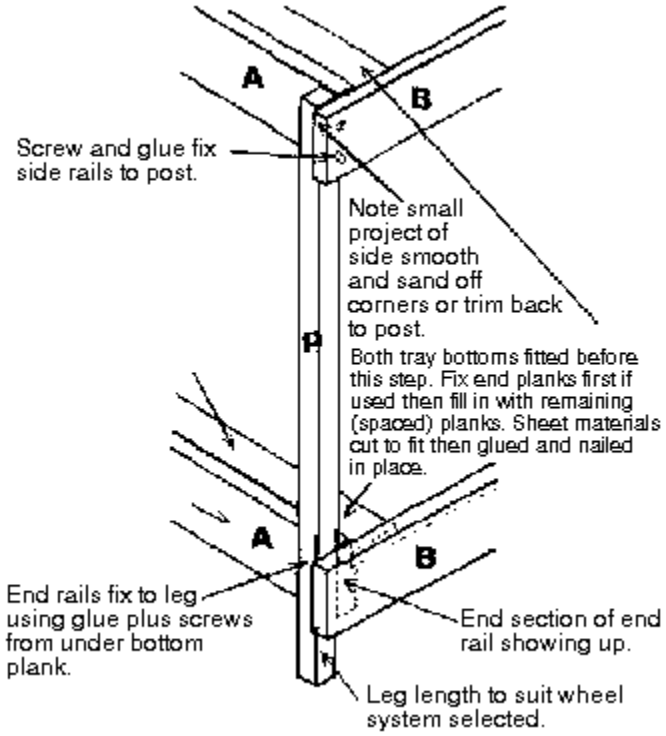
Saw and cut on marked line 80 mm from each end and chisel out excess materials to give four rails as indicated in diagram. Check the dimension shown as 740 mm in diagram. This measurement should be the same for each cut and trimmed rail.

Assemble tray frame

Fit tray rails together and fix in position using nails. Check squareness of trays and confirm that the two trays are the same size. Trim rails and adjust where necessary.

Cut bottom planks

Measure internal width of tray as shown in previous diagram. Cut 16 bottom planks to this length or cut particleboard or plywood to fit in as tray bottom.

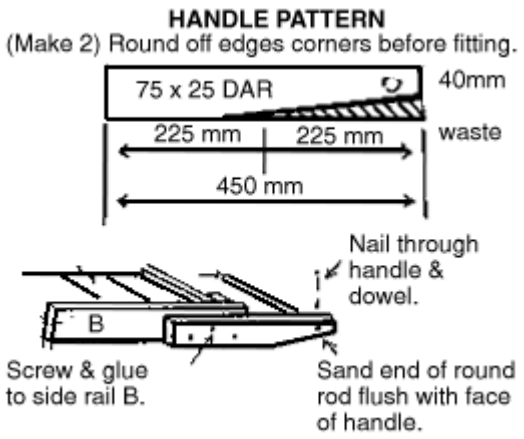


Square up trays

Fit a bottom into each tray and fix in place using glue and nails. Before final fixing square up tray and check that the two trays are of the same size.

Attach legs

Fix trays to the four legs as shown in diagram below using glue and screws. Note that the final length of each pair of legs will depend on wheel/axle bracket system used. However, in this initial assembly, the four posts are of equal length such that the overall height remains at 750 mm. The distance between trays maybe varied depending on the wheel and axle system chosen.



Fix wheel system

Note: The assembly could stand on four legs until the wheels are attached to the front of the units, or the front 'legs' are removed first as appropriate for selected wheel assembly. Fit selected wheel/axle system. Cut off excess front legs as required.

Provide drainage holes

If sheet products (particleboard or plywood) are used in trays, provide drainage holes (9mm 3/8" diameter in each corner. Loose fitted plank bottom if used should give adequate drainage.

Smooth and rounding off

Using sanding disc, sander or hand sanding or planing, smooth and round off all accessible sharp corners and edges of the trays and posts. Punch all nails if desired and fill nail holes with putty/filler the same colour as timber.

Note: The trays could have side rails projecting 5-10 mm beyond posts. These projections should be rounded off thoroughtly, or trimmed off.

Cut, trim and fix handle

< From the piece of 75 x 25 mm DAR x 900 mm cut two handles each 450 mm long. Trim or shape as in diagram, smooth all corners and edges, then screw - and glue-fix to rear end of upper tray as in diagram.

Note: To make sure that handle fits flat to the rail you may need to chisel out small pieces of the handle where it comes into contact with the heads of screws into posts or use countersunk screws.

Cut to length and insert broom handle/dowel. Use glue in hole and drive in one 30 mm long nail through top edge of shaped timber piece into handle/dowel.

Apply finishes

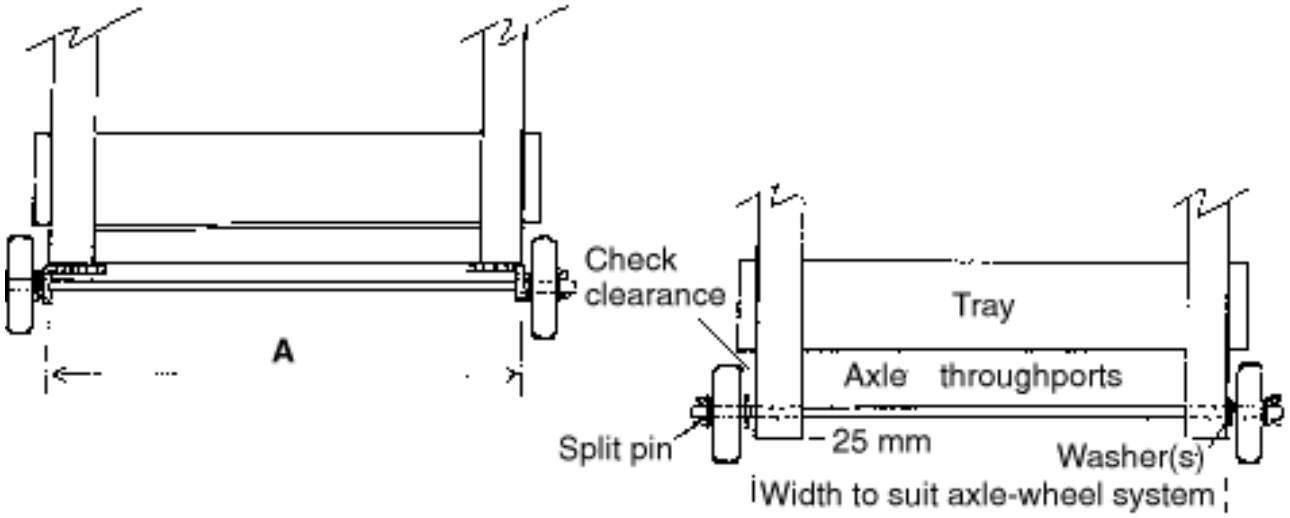
Clear finish with three coats of satin clear polyurethane finish, or selected stains, or garden furniture finish or conventional paint finish. It is strongly recommended that the trolley receive a thorough coating of one of these finishes and that this coating be maintained adequately.

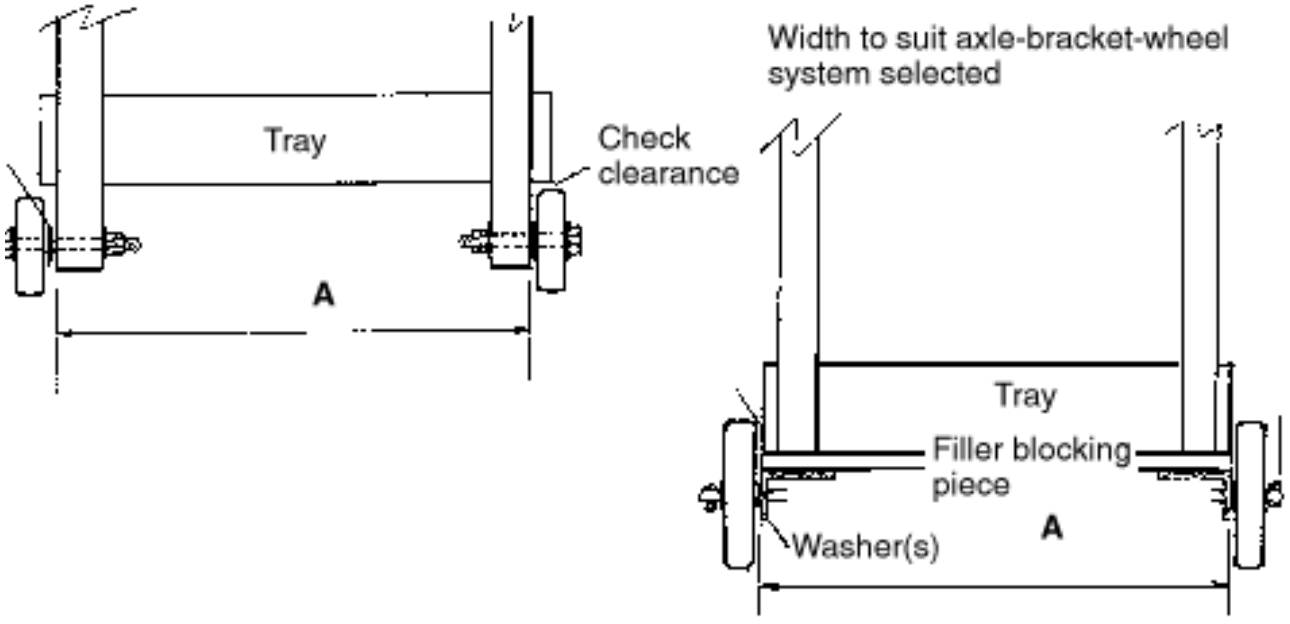
For weather exposed trolleys

If the trolley is to be exposed to weather for long periods, then be selective about materials. For timber components for example select 'durable' or moderately durable timbers such as western red cedar, jarrah, black butt etc. or preservative treated timber, OR pay particular attention to applying exterior finishes (and then maintenance) to low durability timbers. Fastenings (nails, bolts, etc.) should be non-corroding such as hot dipped or electroplated galvanised coatings.

Alternative wheel/axle systems

Dimension 'A' adjusted to suit your system
Check wheel clearance from tray side





43
CABINET BATHROOM

Start At the Top

The first thing I needed was a moulded sink top. It measured 19" x 31" and was the starting point for the project.

My design includes what I call extended cabriole legs on the front, creating an elegant, old-fashioned look. I used sugar pine for these legs. It's a little harder than eastern white pine, but it's still easy to work with. The outline of the 1/4"-thick hardboard template I made for the leg profile is on this illustration.

Creating cabriole legs is within the reach of most woodworkers. The plans include step-by-step directions. The technique is quite straightforward but you'll need access to a bandsaw and the patience to sand the inside and outside curves that form each leg. This is where pine makes life easier than hardwood.

Once you've got two front legs and the straight back legs done, it's time to tackle the side panels. Although most bathroom cabinets are 32" tall, I went with 36". This is reflected in the materials list. To shorten this cabinet to a standard height, reduce the side stiles, door stiles and upper portion of the legs by 4".

The plans show the stiles and rails joined into a frame with #20 biscuits. The panels fit into the inside face of this frame, within 1/4"-wide x 3/8"-deep table-routed rabbets you make after the frames are dry and sanded flat.

The next step is to install the side panels, but two things must happen first. The edge of the panels needs to be routed to fit the 3/8" rabbet you routed in the frame. The four rounded corners of the frame rabbet must be squared with a sharp chisel. Secure the panel with 1/2" finishing nails or wood trim on the inside face of the side frame. This is the same design and construction process I used to build the face frame, door and drawer frames. Build these parts now. Sand them flat, then rout a round-over profile on the outer edges of the drawer face and doors.

Bring the Cabinet Together

Creative cabriole legs cut from a template refine the vanity's stance and give it a furniture-like appeal

Sillaot's trademark drawer slides function beautifully but require an eye for precise tolerances

With the side and face frames done, it's time to join them to the legs. I used screws driven into angled pocket holes. This is fast, easy and allows me to assemble the whole cabinet without waiting for glue to dry.

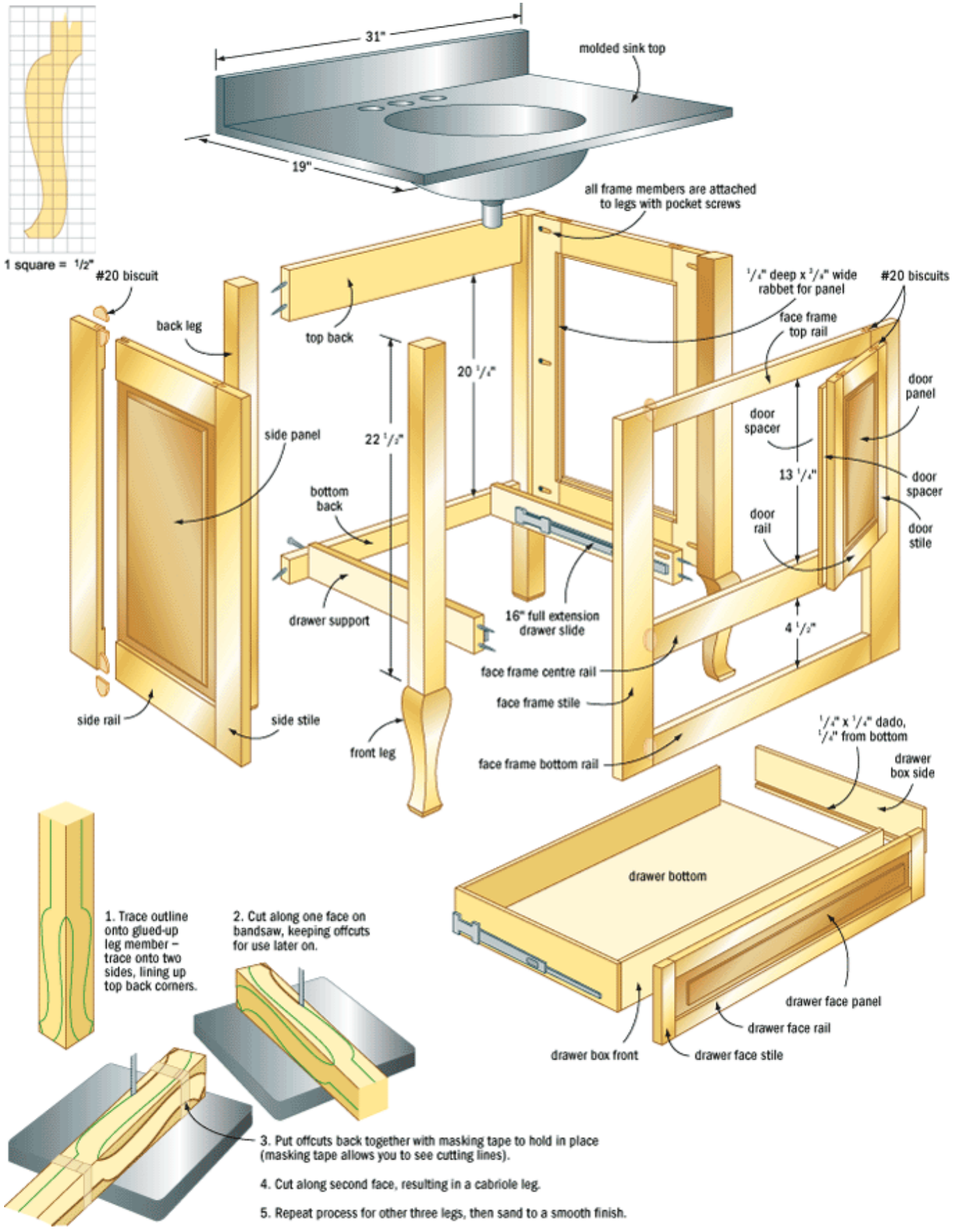
When the cabinet is assembled, including the two back support members, you can measure the opening for your drawer box. Mechanical slides like the kind I used require a specific drawer-to-cabinet clearance—usually 1/2" on each side. That's why you should measure your drawer opening and make changes to the drawer specs if needed. Construction variations can easily throw dimensions off 1/8"—more than enough to make mechanical drawer slides perform poorly. The plans show how the drawer support rails provide a surface for the mechanical slides to fasten to.

I kept things simple with butt joints at all four drawer box corners. The drawer bottom fits into 1/4" x 1/4" dados in the sides, front and back. Install the drawer in its opening on the slides, then temporarily fasten the frame and panel drawer face to the drawer box with four screws driven from inside the box. Take the drawer face off for finishing.

Final Steps

Minwax pre-stain wood conditioner was used to even out the absorption of the Ipswich Pine stain. The stain was sealed under three coats of oil-based urethane. Once the finish is complete, seat the sink top on a bead of silicone applied along the top edges of the cabinet. Screws driven through the top and bottom back members and into wall studs will secure it to the wall. Hook up the plumbing and you're ready to go.

For the Cabinet	Material	Size	Qty.
Front legs	sugar pine	4" x 4" x 36"	2
Back legs	sugar pine	2" x 2" x 36"	2
Side rails	pine	3/4" x 2 1/4" x 9 3/4"	4
Side stiles	pine	3/4" x 2 1/4" x 22 1/2"	4
Side panels	pine	3/4" x 10 7/8" x 18 3/4"	2
Face frame stiles	pine	3/4" x 2 1/4" x 22 1/2"	2
Face frame top rail	pine	3/4" x 1 1/4" x 20 5/8"	1
Face frame centre rail	pine	3/4" x 2" x 20 5/8"	1
Face frame bottom rail	pine	3/4" x 1 1/2" x 20 5/8"	1
Drawer supports	pine	3/4" x 2 3/4" x 16 1/8"	2
Top back cross member	pine	3/4" x 4 1/2" x 25 1/4"	
Bottom back cross member	pine	3/4" x 2" x 25 1/4"	1
Sink top	molded acrylic	19" x 31"	1
For the Doors			
Door rails	pine	3/4" x 1 3/4" x 7"	4
Door stiles	pine	3/4" x 1 3/4" x 14 1/2"	4
Door panels	redwood	3/4" x 7 5/8" x 11 5/8"	2
Door spacer	pine	1/4" x 2" x 13 3/8"	1
For the Drawers			
Drawer box fronts	birch-veneer ply	1/2" x 4" x 18 5/8"	2
Drawer box sides	birch-veneer ply	1/2" x 4" x 16"	2
Drawer bottoms	birch-veneer ply	1/4" x 15 1/2" x 19 1/4"	1
Drawer face rails	pine	3/4" x 1 3/4" x 18 1/4"	2
Drawer face stiles	pine	3/4" x 1 3/4" x 5 1/2"	1
Drawer face panel	redwood	3/4" x 2 5/8" x 19"	1
Drawer slides	full-extension	16"-long	2
Drawer/door knobs	white porcelain	1 1/8" dia.	4



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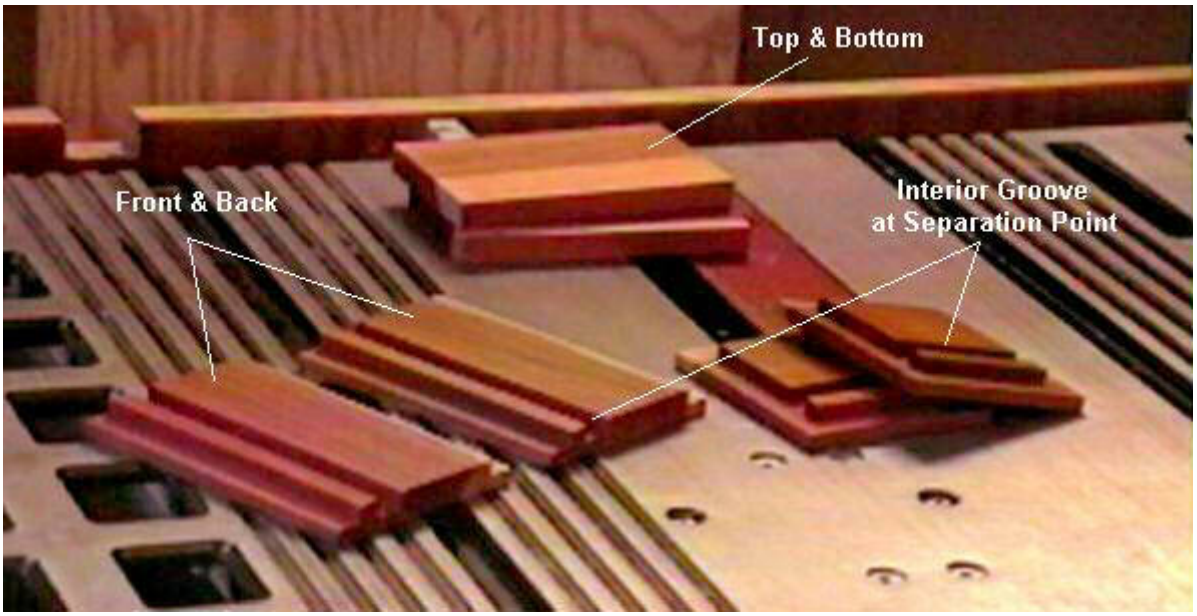
SMALL BOXES

The box can be made from any 3/8" wood.

Some exotic wood seems usually to come in 3" x 24" pieces so that kind of dictates the size of your small box. So I cut 4 pieces 4 1/8" long for the front, back, top & bottom, and 2 - 2 7/8' for the ends. I was left with a piece no more than 5/8" as scrap because of wastage due to the thickness of the saw cuts. Set the pieces which will be your top and bottom aside till later.



ROUTING THE RABBETTS & GROOVE

On the front, back, and end pieces, cut 3/8" rabbetts, about half the thickness of the stock deep, (with a 3/8" straight bit) lengthwise ONLY along the inside of the TOP AND BOTTOM EDGES ONLY. On your end pieces ONLY, cut 3/8" rabbetts across the inside of the other two edges.

Move your router's fence away from the bit about 1/4" and leaving your router's 3/8" straight bit at the same depth, rout a groove length wise on these 4 pieces. This groove will become a necessary element of the way the top fits on the finished box.

For more details, see drawing below.

IMPORTANT With a soft lead pencil, mark a line end to end, on the outside of these 4 pieces indicating where the bottom edge of your interior groove is - once your box is glued together you need to know where that bottom edge is.

Mark it end to end because you may be rounding over ALL edges and small markings may be cut off

Dry assemble your box and holding it together with some light clamp pressure, measure carefully for the width you need to cut your top and bottom. Oversize your top and bottom if you're unsure of

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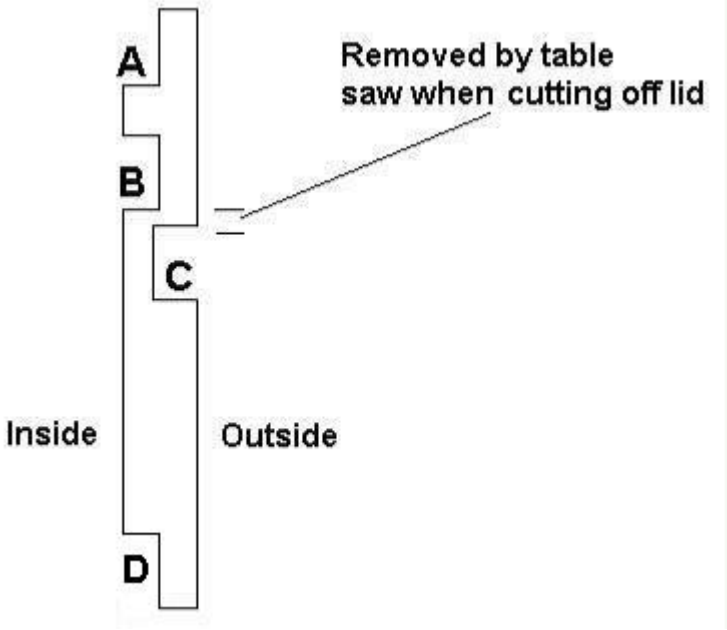
an exact fit. You can always take a tad more off but you can't put it back.

BE CAREFULL! THIS PIECE WILL BE CUT TO ONLY APPROXIMATELY 2 1/2" WIDE. KEEP YOUR FINGERS AWAY FROM THE BLADE AND USE A GOOD PUSH STICK AND FEATHERBOARD TO PROTECT YOUR HANDS! IF YOU DON'T FEEL COMFORTABLE MAKING THIS CUT, GET SOME HELP FROM SOMEONE WHO IS!



Use LOTS of clamps and glue your box together. When dry, you will make another cut with your router but this time on the outside of the box and just a bit deeper than you previously were using. Position your box against the fence and line up your 3/8" straight bit so that it will make a cut just below the line which you marked on the outside of the box. Leave a small space between the line and the edge of your bit. This is all that will be holding your box together and you must be sure of the placement of this groove for safety reasons, so be sure to measure correctly!

PROFILING THE EDGES

Now we can do the profiles on the edges you choose using a 1/2" round over bit. I decided to do just the top front and top back, but different "looks" of baxes can be attained by selective choices of edges to be routed with the 1/2" roundover bit, for instance another attractive box has all edges rounded over. Another has just all four top edges rounded over.

LOCATION OF GROOVES

This profile shows the location of the grooves & rabbetts. When you are sure you've got your bit positioned properly for this cut (C), extend your bit just a bit and make your exterior groove. If you wish, you may want to make a couple of shallower passes to insure a clean cut.

For a nice fit of the lid to the bottom, just be sure you extend the bit just a very small amount, like 1/32". Extending it too much will make for a sloppy fit. Not enough may be too snug.

CROSS SECTION DRAWING EXPLANATION

- "A" is the top rabbett on the inside which accepts the top
- "B" is the interior groove which along with the exterior groove "C", forms the mating edges for the 2 sections (top & bottom) of this box

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- **Note the location of the saw kerf. When cutting off the top, most of the wood which was left between the inner and outer grooves, will be cut away as the lid is cut off. This edge will probably need a bit of cleaning up though for a proper fit before finishing.**
- **"D" is the bottom rabbett on the inside which accepts the bottom**

CUTTING THE TOP OFF

Now it's time to cut off the top of your box. You could do this with a Japanese draw saw, on your table saw ar with an Exatco blade. I think this task is best accomplished using your table saw,,, I find less clean up needs to be done afterward that way. No matter how you do this, you will have to clean up this area later with a sander or by hand sanding and/or an Exacto knife.

Here's how I do that job on a table saw. Start with the cuts to the ends of the box first. Turn your box on it's end and position your saw's fence so that the blade will make it's cut adjacent to the line you marked on the outside of the box. Set your blade height to just higher than the thickness of the wood and so that it *just takes off the line,* and make your cut on each end.

***BE CAREFUL!!! THIS STEP MUST BE DONE PROPERLY TO AVOID INJURY BY KICKBACK AND/OR RUINING YOUR PROJECT!* Insert a small piece (1" x 1") of 1/8" thick wood into each kerf or cut, and using masking tape, tape these pieces securely to the top and bottom to keep the kerfs open thereby avoiding any problems. You must be sure this arrangement is secure for safety's sake. It's worthwhile noting that your taping must be done so that when you make this next cut, you won't be cutting through your tape job.**

Without changing the blade setup in any way, turn the box on it's side and make the length wise cut to the front and then to the back. When all cuts are completed, remove the tape and those small 1/8" thick spacers.

FINAL CLEANUP AND FINISHING

Using sand paper, carving knife, chisel or any other tool you prefer, clean up your project and fit the top to the bottom of the box. It should go on and off easily, but not sloppily! Sand the project with 80 - 120 grit sand paper and then 220 grit, and finish with a top coat of your choice. I used a clear satin finish spray lacquer.

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BASIC BOARD FENCE

Instructions

Fig. 1

1) Prepare and Set the Posts
Coat the ends of each post with a waterproof deck sealer (Fig. 1).

Dig holes for and install the corner posts first, setting them below the frost line and on a 6-inch tamped bed of crushed rock or gravel so their end grain does not sit in water.

Next, stretch a taut mason's line between the corner posts to help locate the intermediate holes and posts; try to space them evenly about 6 feet apart.

Gradually backfill each hole with soil and tamp every four inches. Then fill the area around the posts with a well-tamped mix of earth and gravel or with concrete for extra strength at corners and gate openings. Check for plumb.

Fig. 2

2) Mark the Lower Fence Rail Position on the Posts
Establish a level for the lower rail at least a few inches above the ground and, on each post, mark placement for the top and bottom edges of the lower rail. (Fig. 2)

Fig. 3

3) Cut the Posts to Accept the Lower Rail
Between the marks, make several kerf cuts 1-1/2 inches deep with a circular saw. Chisel out each post to accept the rail. (Fig. 3)

Fig. 4

4) Join the Lower Rails at Corners
At the corners, inset intersecting rails and screw them in place (after predrilling to avoid splits) with galvanized deck screws. (Fig. 4)

Fig. 5

5) Affix an End Post to the House, If Necessary
If your fence will meet the house, fasten an end post to your home's siding. Make sure the post is plumb; you may need to insert spacers or shims if the siding is irregular or slanted. (Fig. 5)

Fig. 6

6) Adjoin the Upper Rails
Center the joint between upper rails in the post notches, then predrill the rails before screwing them to the posts. (Fig. 6)

Fig. 7

7) Install the Pickets
Cut a 1/2-inch spacer to simplify installation of the pickets. Periodically check for plumb as you work along the rails. (Fig. 7)

Fig. 8

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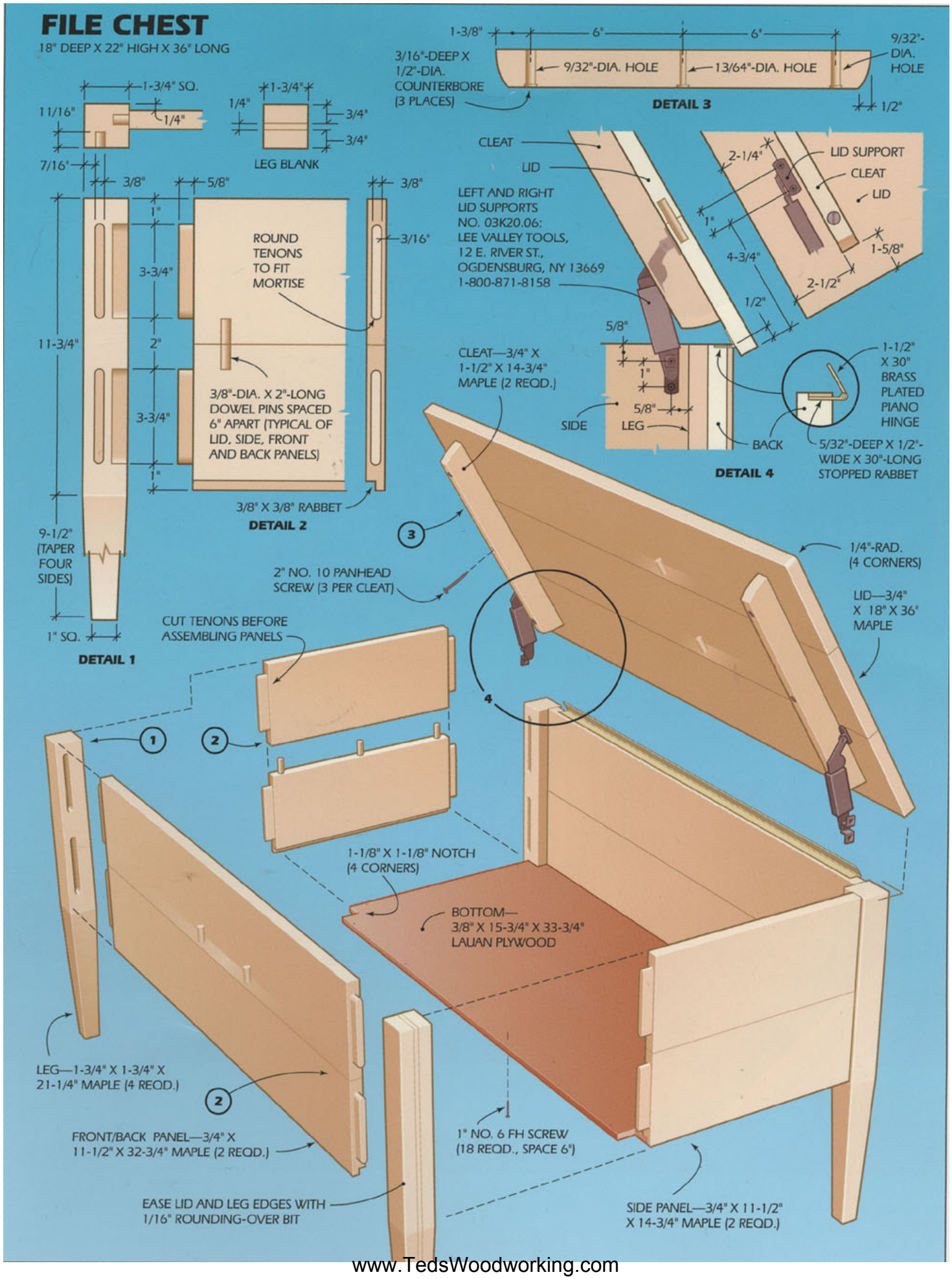
FILE CHEST

FILE CHEST

18" DEEP X 22" HIGH X 36" LONG



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Making Panels

To get started, rip and crosscut the stock for the front, back and side panels to the sizes indicated in the accompanying drawing. For the top, cut all three boards about 1 in. oversize in length. The two outside boards are cut about 1/2 in. oversize in width while the center board is cut to the 6-in. finished width. This allows for trimming the top to size.

Arrange the boards back to back in a vise and, using a square, mark the dowel centerlines across both edges. Then, always working the same side of a doweling jig to the face of the workpieces, bore the dowel holes.

The end tenons on the side panels must be cut before the paired boards are edge glued. For best results, add an auxiliary fence to the saw's miter gauge, and clamp a stop block to the fence to ensure that the rabbet cuts are of uniform size. Using a dado blade, make a cut on the face of the workpieces. Then raise the blade to project 1 in., and pass each board over the blade on edge to form the tenon.

Prepare for edge gluing by readying three bar or pipe clamps, four small clamps and four cauls. Apply paste wax to the cauls so they don't get glued to the panel. Tap the dowel pins into their holes and then apply glue to the panel edges (Photo 3).

Join the pieces. Then alternately apply pressure to the bar clamps and to the caul clamps to close the joint and to keep the panel from buckling.

Use a belt and finish sander to dress the panel faces. Then use a 4-in. hand file or a chisel to round the tenons.

To complete the panels, cut the rabbets for the bottom Next, use a router with a straight bit to cut the hinge rabbet. Then switch to a 1/16-in. rounding-over bit to ease the panels' exposed edges.

Making The Legs

Make the legs from two 45-in.-long blanks, which you'll later cut into four finished

Mark each leg mortise with centerlines 3/8 in. apart, and then bore the mortise holes. Trim the mortise to finished dimension.

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lengths. The legs require that three pieces of wood be glued together. The center piece is sawed from a thicker piece. Be sure to use a smooth cutting blade, the saw's antikickback splitter, a feather board and a pushstick for this operation.

Glue and clamp the leg pieces (Photo 8). To keep the pieces from sliding out of alignment during clamping, bore two 3/32-in. holes in the ends of the blanks, and use 2-in.-long finishing nails as alignment pins. The pins are inserted in an area to be cut off.

Mark the mortise locations on each leg, and be sure to arrange the legs so that the surfaces showing the glue joint face the chest's ends.

Use a jig to cut the leg tapers. Place the leg between the rear stop and the front notched block, and make two cuts. The notched block is tack nailed so it projects 1 in. from the guide board. Make a taper cut on two adjacent faces, and then reposition the block so the notch projects 1-3/8 in. Cut the remaining tapers.

Then use a router to ease their corners

Assembly

Before gluing the parts together, make a dry assembly to prepare the necessary cauls. Check the clamp adjustments and the fit of parts.

Do the gluing in two stages. Apply glue only on the short end panels and legs. Then make a temporary complete assembly. When the glue has dried, remove the clamps. Then glue and clamp the long side panels to the preglued end subassemblies.

Cut the bottom panel to size and attach it with screws.

Trim the top to size. Rip and crosscut its cleats, and bore the holes in them. The two outside holes are oversize to permit the lid to move with changing humidity.

Bore the pilot holes for the hinge, lid supports and cleats. First, install the hinge at the back, then lay the table on its back to join the second leaf of the hinge to the lid. Attach the lid support in the same manner (Photo 14). Attach the cleat with screws only, not glue.

After finish sanding, we applied three coats of clear satin polyurethane. The first coat was tinted with yellow ochre universal color, available at art supply stores.

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FIRE PLACE MANTLE

1. Cut a 1x8 for the front plate to the length of the hearth opening. Cut a 1x6 piece one inch longer than the length of the 1x8. Use a router table and a chamfer bit to bevel a 1/4-inch detail along the edge and sides of each piece. Connect the two pieces at a ninety-degree angle with wood glue and finishing nails.

2. Cut and attach small triangle supports where the pieces meet, which add extra strength to the top and provide a place for a piece of crown molding to rest (**figure A**). Make the angled trim molding using the router table and chamfer bit by running each long edge over it. The trim will later be centered between decorative end brackets (**figure B**).
3. To make the decorative brackets for each end, first sketch the desired design on a piece of paper to use as a template. Put double-sided tape between the two pieces of lumber so they can be cut at the same time so they're identical. Trace the design onto the lumber and cut it out using a jigsaw with a scroll blade attached (cut as close as possible to the line). Sand the pieces smooth using the pencil lines as a guide and separate the boards.
4. To build up the top shelf, cut a 1x8 with a 1-1/2-inch reveal and make the same routed bevel on the edges. For more interest, add square drawer pulls along the front plate. Place the entire assembly against the wall; secure it using wall anchors and hide the screws with button caps.
5. Caulk around the edges; prime and paint the piece as desired.

Figure A

Figure B

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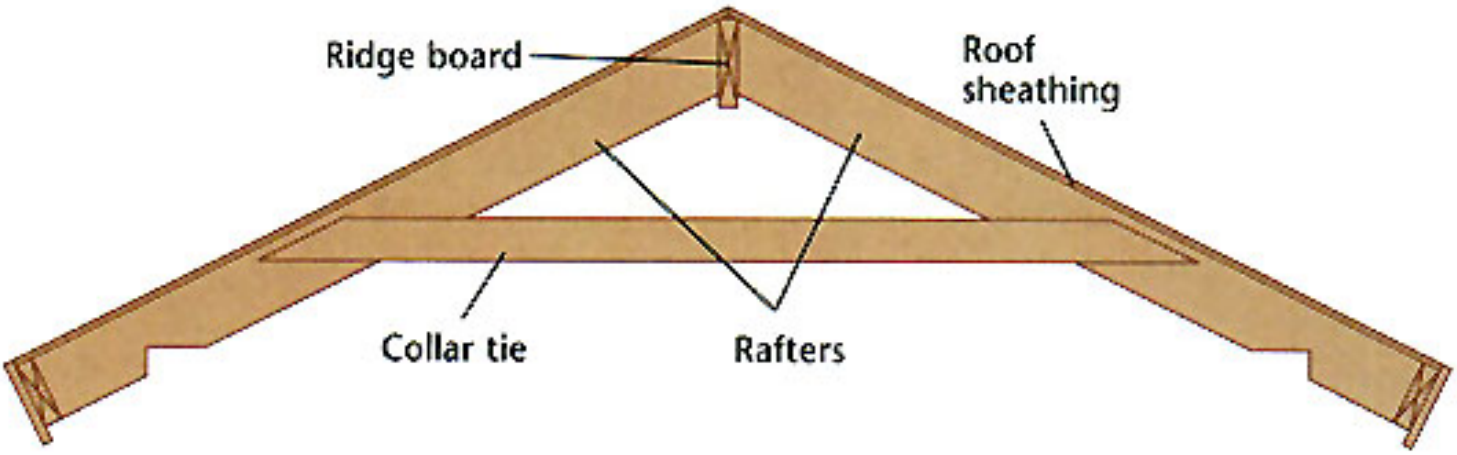
ROOF FRAMING



A roof frame is an important structure not only because it supports the roofing and helps keep the building dry, but because its style and shape have a great impact on the character of the building, the feel of the interior space, and the amount of storage space available.

There are four common roof types shown in this book. A *gable* roof is the classic, triangular design, with two sloped sides meeting at the peak, and flat ends (called *gable ends*). *Gambrel* roofs are like gable roofs with an extra joint on each side, resulting in two different slopes. A *hip* roof is structurally similar to a gable, but has no gable ends. *Shed* roofs are the simplest style, with only one sloped plane. They can be built with frames or, for small structures, a sheet of plywood.

All of these roof styles have a designated slope, which is the degree of angle of each side. The slope is expressed in a ratio that states the number of inches of vertical rise per 12" of horizontal run. For example, a roof that rises 6" for every 12" of run is said to have a slope of 6-in-12. Roof slope is indicated in plan drawings by a triangular symbol known as the *roof-slope indicator*. You'll use the roof slope to lay out rafters and fascia.

In standard roof framing, rafters are the principal structural members, rising from the walls to theridge board (or *hub*, in gazebos) at the peak of the roof. Rafters in outbuildings typically are made from 2 × 4s or 2 × 6s, are spaced 16" or 24" on center, and are installed perpendicular to the length of the building. To keep the roof planes from spreading apart, *rafter ties*, or *collar ties*, are nailed between opposing rafters to form a structural triangle. With shed-style roofs, the rafters span from wall-to-wall and no ridge board or ties are needed.

The key to successful roof sheathing framing is making accurate cuts on the rafters. Take your time to cut the first two rafters, making any necessary adjustments, then use one as a pattern for marking the rest. The following project shows you how to cut and install rafters in a gable roof frame, but the basic procedures are the same for gambrel and hip roofs.

As an alternative to rafter framing, you can take your plans to a truss manufacturer and have custom trusses built for your project. However, this will cost you more and probably will limit your storage space: the internal supports in truss frames leave little room for storage.

TOOLS & MATERIALS	
Circular saw	2 × lumber
framing square	8d, 10d, and 16d common nails
4-ft. level	

A speed square is a handy tool for marking angled cuts—using the degree of the cut or the roof slope. Set the square flange against the board edge and align the PIVOT point with the top of the cut. Pivot the square until the board edge is aligned with the desired DEGREE marking or the rise of the roof slope, indicated in the row of COMMON numbers. Mark along the right-angle edge of the square.

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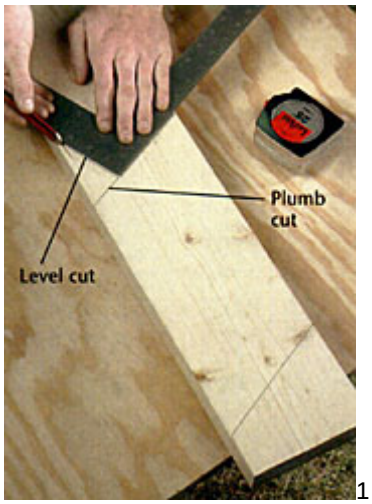
HOW TO BUILD A ROOF FRAME

Note: The following instructions are based on the sample rafter template shown here, which is designed for a 6-in-12 roof slope.

Step A: Mark the Plumb Cuts



1. Select a straight board to use for the pattern rafter. Mark the top plumb cut near one end of the board: Position a framing square with the 6" mark of the tongue (short part) and the 12" mark of the blade (wide part) on the top edge of the board. Draw a pencil line along the outside edge of the tongue.

2. Starting from the top of the plumb-cut mark, measure along the top edge of the board and mark the overall length of the rafter, then use the square to transfer this mark to the bottom edge of the board. Position the square so the tongue points down, and align the 6" mark of the tongue and the 12" mark of the blade with the bottom board edge, while aligning the tongue with the overall length mark. Draw a line along the tongue. If the bottom end cut of the rafter is square (perpendicular to the edges) rather than parallel to the top end, mark a square cut at the overall length mark.

Step B: Mark the Bird's Mouth Cuts

1. Measure from the bottom of the lower plumb cut and mark the plumb cut of the bird's mouth. Position the square as you did for the lower plumb cut and draw a line across the board face at the new mark.

2. Measure along the bird's mouth plumb cut and mark the bird's mouth level cut. Use the square to draw the level cut—it must be perpendicular to the bird's mouth plumb cut.

Step C: Make the Cuts

1. Cut the rafter ends at the plumb-cut lines, using a circular saw or power miter saw.

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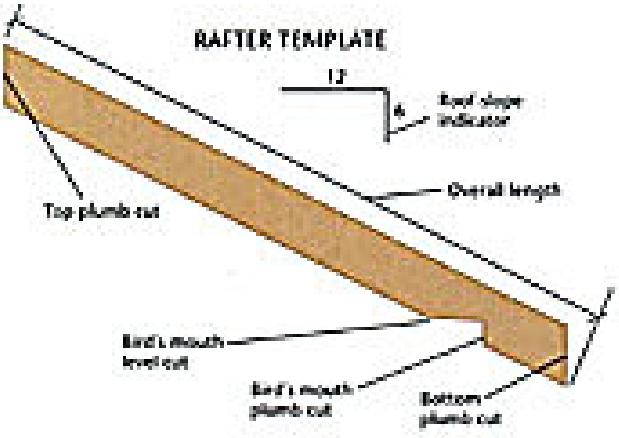

Step E: Lay Out the Wall Plates & Ridge Board

Note: Start the rafter layouts from the ends of the walls where you started the wall stud layouts. This ensures the rafters will fall above the studs. Install rafters aligned with the end studs but not the extra corner studs.

1. Make a mark on the top wall plate 1 1/2" in from the end. Then, mark at 15 1/4" (for 16" on-center spacing) or 23 1/4" (for 24" on-center spacing)—measuring from this mark, make a mark every 16" (or 24") to the end of the wall. Make a mark 1 1/2" in from the remaining end. Following your plan, draw an

2. Set the base of a circular saw to cut at the maximum depth. Make the bird's mouth cuts, overcutting slightly to complete the cut through the thickness of the board. As an alternative to overcutting (for aesthetic reasons), you can stop the circular saw at the line intersections, then finish the cuts with a handsaw.

3. Select another straight board to use as a second pattern rafter. Use the original pattern rafter to trace the cutting lines onto the duplicate, then make the cuts.

Step D: Test-fit the Rafters

1. Cut a 12"-long spacer block from 2 × 6 or 2 × 8 material.

2. With a helper or two, set the two rafters in place on top of the walls, holding the spacer block between the top rafter ends. Make sure the rafters are in line with each other (perpendicular to the walls) and are plumb.

3. Check the cuts for fit: the top-end plumb cuts should meet flush with the spacer block, and the bird's mouths should sit flush against the wall plates. Make sure the top ends are at the same elevation. Recut any angles that don't fit and test-fit the rafters again.

4. Write "PAT" on the pattern rafter, then use it to trace the cutting lines onto the remaining rafters. Before marking, check each rafter for crowning and mark the crowned edge; always install the crowned edge up. If your building has overhangs at the gable ends, mark the end cuts for the overhang rafters but not the bird's mouth cuts-overhang rafters don't have them. Also, if you have the fascia material on-hand, use the pattern rafter to mark the angle for the top ends of the fascia boards.

5. Cut the remaining rafters.

Step F: Install the Rafters

1. You'll need a couple of helpers and a long, straight 2 × 4 to get the rafters started. Lay the first two rafters on top of the wall, then nail the 2 × 4 to the far end of the ridge board to serve as a temporary support. Set up the rafters at the end of the walls and hold the free end of the ridge board in place between them. Have a helper tack the rafters to the wall plates. Hold a level on the ridge board and make sure it's level, then have a helper tack the support to the far wall to keep the ridge level.

2. Slide one rafter a few inches to the side and endnail the other rafter through the ridge board with three 16d common nails (use two nails for 2 × 4 rafters). Slide the other rafter

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× next to each mark, designating to which side of the line the rafter goes.

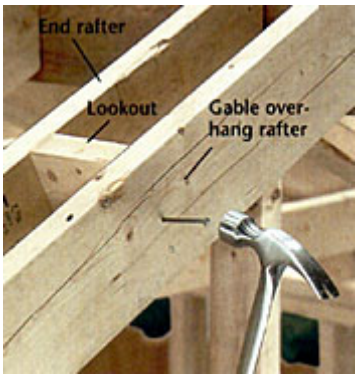
2. Mark the wall on the other side of the building, starting from the same end.

3. Cut the ridge board to length, using the plan dimensions. Check the board for crowning, then lay it on top of the walls next to one of the marked plates, making sure it overhangs the end walls equally at both ends. Use a square to transfer the rafter layout onto both faces of the ridge board.

Step G: Install the Collar Ties

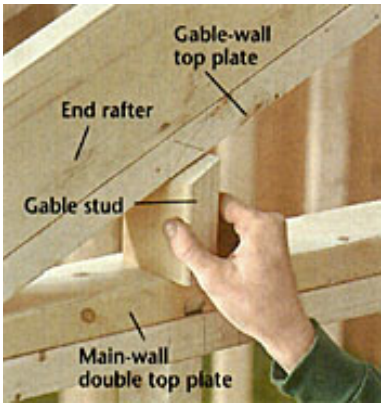
1. Cut the collar ties (or rafter ties) to span between opposing rafters at the prescribed elevation, angle-cutting the ends to match the roof slope.

2. Position the collar tie ends against the rafter faces so the ends are about 1/2" from the rafters edges. Make sure the ties are level, then facenail them to the rafters with three 10d common nails at each end.



onto its layout mark and toenail it to the ridge with four 16d nails (three for 2 × 4s). Toenail the lower end of each rafter to the wall plate with two 16d nails, then reinforce the joint with a metal anchor, using the nails specified by the manufacturer.

3. Make sure the rafters are plumb and the ridge is level. Install the remaining rafters, checking for plumb and level periodically as you work.



Step H: Frame the Gable Wall

Note: Gable walls consist of top plates that attach to the undersides of the end rafters, and short studs set on top of the wall plates. They appear only on gable and gambrel roofs.

1. Cut the top plates to extend from the side of the ridge board to the wall plates. Angle-cut the ends so they meet flush with the ridge and wall plate. The top-end angle matches the rafter plumb cut; the bottom angle matches the level cut of the bird's mouth.

2. Fasten the plates to the rafters so the front plate edges are flush with the outside faces of the rafters; use 16d nails.

3. Mark the gable stud layout onto the wall plate, then use a level to transfer the layout to the gable plates. Cut the gable studs to fit, angle-cutting the ends to match the roof slope. Install the gable studs with 8d toenails. Also install a square-cut stud directly under the ridge board.

Step I: Build the Gable Overhang (Gable Gambrel Roofs)

Note: Gable overhangs are built with additional rafters installed at the gable ends. They are supported by the ridge board and blocks called *lookouts*—attached to the end rafters.

1. Mark the layouts for the lookouts onto the end rafters, following the project plan. Cut the lookouts and toenail them to the rafters with 8d nails (or endnail them with 16d nails) so that the top edges of the blocks are flush with, and parallel to, the tops of the rafters.

2. Install the overhang rafters over the ends of the lookouts with 16d endnails.

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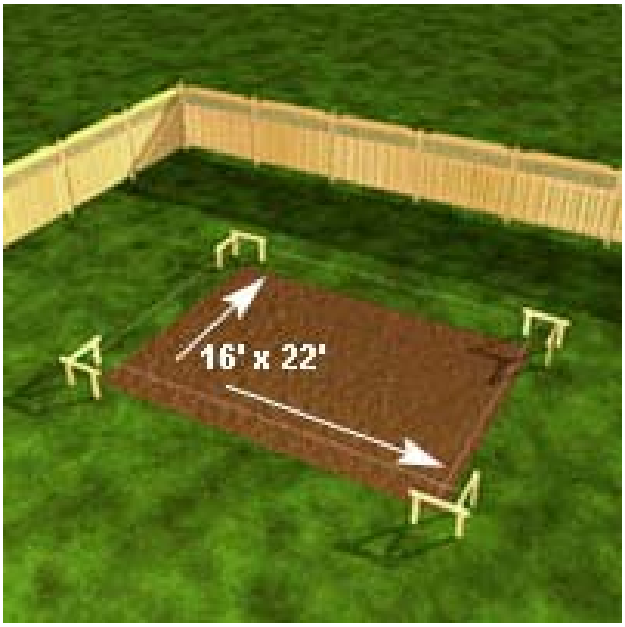
GARAGE

1. Build the foundation and floor

1.1 Carefully mark the location of the garage on your lot. Hire a surveyor to precisely locate the site for the garage and define the excavation area.



1.2 Have a contractor excavate the designated site to the required depth. He will properly dispose of the dirt excavated.

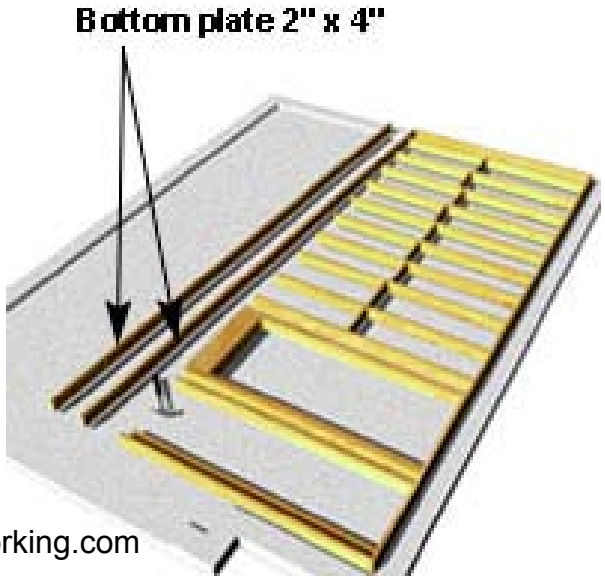
1.3 In order to build the foundation, we recommend you contract out this job. The foundation specialist will start with the footing, the concrete walls and backfilling before making the foundation slab. Make sure that anchor bolts are encased, centered every 4 feet (1.2 m).

2. Build the walls

2.1 Outside walls

Start the outside walls building them flat on the ground, using lumber with less than 19% moisture content. Wall studs should be centered every 16 in. (406 mm) and made of 2 x 4 in. (50 x 100 mm) timber. Strengthen the base of the walls with a 4 in. (100 mm) bottom plate in which you will drill holes every 4 ft. (1.2 m) for the anchor bolts.

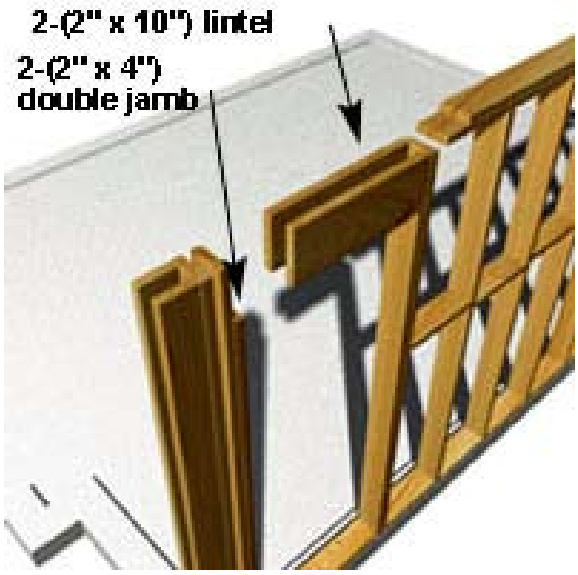
2.1.1



Separate the top and bottom plate slightly more than a stud's length apart with the bottom plate positioned nearest the wall's final location. Center the studs every 16 in. (406 mm). Attach pre-nailed double 2 x 4 in. (50 x 100 mm) top plates above the studs.

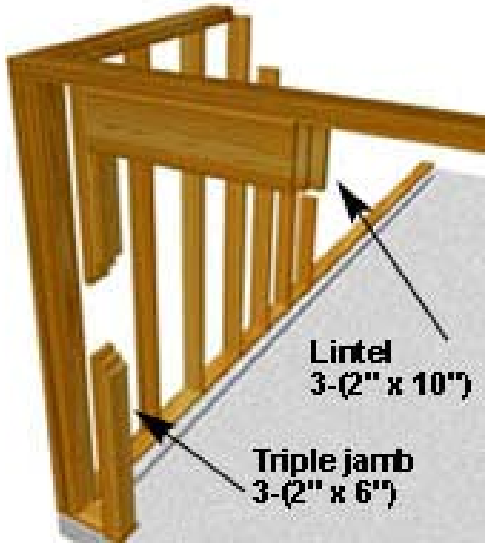
2.1.2 A secondary stud made of two planks solidly nailed together will delineate the sides of the door or window opening and support the coping.

2.1.3 The lintel (window contour) load will be transmitted to the twin studs on each side of the opening. To install a lintel, nail a 2 x 10 in. (50 x 254 mm) each wall face. Fill the empty space between them with insulation material.



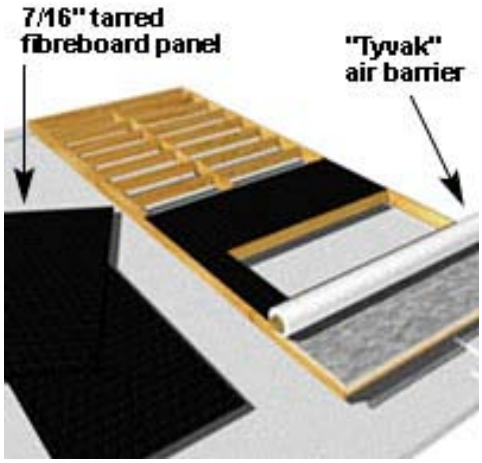
2.2 The garage door framing

Build the two short sections on either side of the large opening using three 2 x 6 in. (50 x 152 mm) studs nailed together. The top part of the frame (called lintel or header), is made up of three 2 x 10 in. (50 x 254 mm) nailed together then nailed to the trimmer studs of the two side sections.



2.3 Sheathing and air barrier

2.3.1 The suggested sheathing material is 4 x 8 ft (1.2 x 2.4 m) tarred fiberboard panels. Use a thin plastic air barrier.



2.3.2 First, apply the sheathing, positioning the panels on the wall (that is still flat on the ground) and nail to frame with dog nails. Apply the air barrier and nail or staple into place. Lastly, install fillers every 16 in. (406 mm).

2.4 Before lifting the wall into place, make sure the bottom plate is well positioned. At this stage, make sure you have enough people to lift and hold the wall in position while bracing. Nail braces from the top of the wall into stakes driven into the ground outside the wall and nail the wall upright to hold it temporarily.

3. Build the roof

3.1 With the walls up, you should close the roof as soon as possible to avoid rain or wind damage to the inside of your garage. Roof trusses are a pre-built series of structural members designed to carry the load of the roof to the outside walls. Trusses are built in special factories to the individual specifications for your garage plans.

3.2 Trusses are designed to resist loads only when they are in a vertical position. That is why they should not be lifted flat or laid over the top of the outside walls. Gently lift the trusses mechanically or with a rope and pulley.

3.3 Beginning at one end, measure and mark every 24 in. (610 mm) the location of the roof trusses on the top plate. Nail the trusses in place.

3.4 With the trusses installed, nail a temporary brace to each one. You can now start putting up the edge boards. Apply roof sheathing. Plywood or particleboard roof sheathing is most commonly used, being rigid, durable, non-slip and easy to apply.

3.5 Align panels perpendicular to the rafters and stagger the joints of each course. Panels should meet in the center of a truss or rafter. Leave a small gap between the panels for contraction of the material. According to the truss spacing, the horizontal edges of the panels should be attached every 24 in. (610 mm). To prevent sagging, use sheathing clips to attach the panels between the trusses.

4. Install doors and windows

Doors usually come with comprehensive installations, a pre-mung door is expensive and if not properly installed, will loose it,s energy efficiency and will not operate properly in the long run. It is recoomended to have your door indtalled by a professionnal. However, if you decide to do itself follow these instructions and get some help as they tend to be heavy.

5. Install the asphalt shingles

The next step is to install the asphalt shingles.

6. Install the outside siding

It is now the very last step, the one that has to do with the outside siding.

The construction of a garage is a huge project. Once it is completed you'll be proud of it. You will find it very useful and not only to put your car away in Winter.

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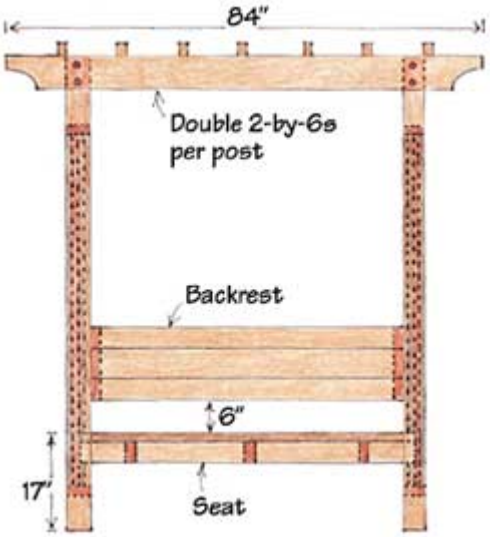
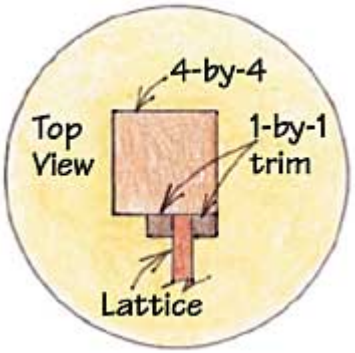
ARBOR BENCH

Materials



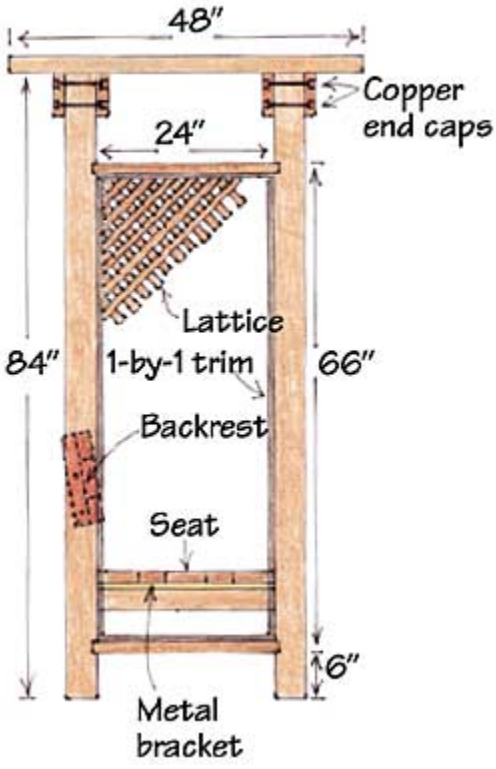
- Lumber
- 4-by-4s: four 8-foot lengths
- 2-by-4s: one 8-foot length, four 10-foot lengths
- 1-by-1s: eight 8-foot lengths (or rip down from two 8-foot lengths of 1-by-6)
- 2-by-6s: eight 8-foot lengths, two 10-foot lengths
- Two 2- by 8-foot redwood lattice panels
- 3 1/2-inch deck screws
- 2-inch galvanized finishing nails
- Six 2-by-4 joist hangers (with nails)
- 6 feet of undermount deck fastening brackets
- 30 1 1/4-inch deck screws (for seat)
- A dozen 2 1/2-inch screws
- Eight 5 1/2- by 3/8-inch carriage bolts
- Eight 3/8-inch washers
- 16 3/8-inch nuts
- Sandpaper
- Clear wood sealer
- Cotton rags
- 16 1-inch copper-pipe end caps

Tools



Most of the project requires basic woodworking tools--a circular saw, a saber saw, an electric drill, a hammer, and a nail set. You'll need to rip a few boards into smaller sizes; you can use a table saw or ask the lumberyard to do it. You'll also need:

- Tape measure
- Pencil
- Combination square
- Compass
- C-clamps or adjustable clamps
- Framing square
- 15/16-inch paddle bit
- Extra-long 1/2-inch drill bit
- Socket wrench set
- Ladder
- A small pump sprayer (about $10) to apply wood sealer (optional)
- Pipe clamps



Directions

The arbor bench has four main sections: the two sides, the bench seat, and the backrest. Build it in the sequence that follows, allowing for the inevitable variation in the thickness of the lumber and lattice, which will affect widths and lengths. The trellis top, which consists of two pairs of horizontal 2-by-6s and seven 2-by-3 crosspieces, is added piece by piece. Before starting construction, rip four of the 8-foot 2-by-6s in half (to create 2-by-3s).

Assembling the side sections

1. Cut the 4-by-4s 84 inches long. To avoid splintering, bevel the bottom edges of each post.

2. Divide the posts into pairs and mark them (A and B, C and D). Lay each pair side by side on a flat work surface. Measuring from the bottom end, mark points at 6, 7 1/2, 70 1/2, and 72 inches. Using a pencil and combination square, draw lines at these points across the width of the posts. Set blade of circular saw to extend 1/4 inch and make multiple passes to remove the wood between the pairs of lines, creating grooves.

3. Measure actual width of lattice panels, add 1/2 inch to that dimension, then cut four 2-by-4 crosspieces to that size.

4. Turn pairs of posts so grooves face each other, place crosspieces in grooves, check squareness, and secure with two angled 3 1/2-inch deck screws.

5. Cut both lattice panels to fit between crosspieces, approximately 63 inches long.

6. Each lattice panel will be sandwiched between 1-by-1s mounted to the posts and crosspieces. Create the outer layer by cutting 1-by-1s to fit between posts and nail them to crosspieces flush to their *outside* edges. Cut and nail 1-by-1s to fit vertically between crosspieces. Place outer side face down on work surface. Insert lattice panel, then hold in place with 1-by-1s at top and bottom.

7. To complete sandwich, mark a point 17 inches from the bottom of each post. Measure, cut, and nail lengths of 1-by-1 that extend from the top crosspiece down to this point on either side of the lattice. (After seat is in place, cut and nail 1-by-1 to fit between seat and bottom crosspiece.)

The bench seat

The seat pieces are attached to a sturdy frame, which is held in place by deck screws that run through the frame and into the four posts. To

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make a snug fit, measure the distance between the posts and build the bench frame to that depth.

1. Equally space three 2-by-4 crosspieces between two 5-foot-long 2-by-4s and secure with joist hangers and nails.

2. Add undermount deck fastening brackets to top of each crosspiece.

3. Cut one 10-foot-long 2-by-4 and two 10-foot 2-by-6s into 5-foot lengths. Place on a work surface, alternating three 2-by-6s (save the fourth 2-by-6 for the back) with the two 2-by-4s. Position frame on top so the outer 2-by-6s are flush with the edge of the frame, equally space middle boards, and attach with 1 1/4-inch deck screws.

4. Stand the side panels on their back edges and slip in the bench so its top butts against the 1-by-1s on the inside faces of the posts. Check for squareness and drive two 3 1/2-inch deck screws through bench frame into each post.

The back

Slightly shorter than the bench, the back fits snugly between the two back posts. The actual size is determined after the bench seat is in place. The back is held together by screws running through a 12-inch 2-by-2 (ripped from a scrap of 2-by-4) at each end of its three boards.

1. After checking for squareness of the assembled sides and bench sections, measure the distance between the two rear posts. Cut two 2-by-4s and one 2-by-6 to this size.

2. Space the boards 1/8 inch apart, with ends flush. Overlay and attach the 2-by-2s, flush to the ends, with 2 1/2-inch screws. (Predrilling holes will avoid splitting the wood.) Round outside corners.

3. Stand the bench upright and recheck for squareness. Slip the back in place so the bottom board is 6 inches above the seat and the 2-by-2 backer boards are centered on the posts. Tack loosely in place with one screw through each 2-by-2 backer. Angle the back so it feels comfortable to lean against, then add another screw through each side. Set the screws firmly.

Adding the trellis

The top of the bench has two pairs of 2-by-6 beams connecting the posts and attached with countersunk carriage bolts. Seven 2-by-3s are spaced across the top.

1. Cut four 7-foot-long 2-by-6s. Using the compass, draw identical curving cutouts at the ends of each beam. Make cutouts with saber saw.

2. Lay the arbor bench on its back. Clamp a pair of the beams to the front and back of the front posts so they're flush with the tops and extend equally on each side. Find center line of posts, transfer to top 2-by-6, and mark points 1 inch from top and bottom edges.

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3. Drilling the holes through the beams and posts is the trickiest part of the whole project. When doing this step, it's important to keep the drill perpendicular to the work surface. Use a square as a guide. Start drilling with the 15/16-inch paddle bit and make a 3/4-inch-deep hole at each of the four marked points. Switch to the long 1/2-inch bit and continue drilling through the top 2-by-6, the post, and almost through the bottom 2-by-6. Stop when bit begins to break through. Remove clamps and bottom 2-by-6. Switch back to a 15/16-inch bit and drill back into board (using break-through hole as a guide), making a 3/4-inch-deep hole.

4. Reposition and clamp boards, aligning them over the holes. Slip the carriage bolts through all the boards, add washers and double nuts, then tighten firmly with socket wrench.

5. Flip arbor bench on front face; repeat steps 2 through 4 for rear set of posts.

6. Cut seven 48-inch-long 2-by-3s.

7. While bench is still on its front, find center of beams and mark points, evenly spaced (approximately 9 inches apart), for the 2-by-3s.

8. Stand arbor upright. Place 2-by-3s at points marked so they extend equally to front and back. Secure with 3 1/2-inch deck screws.

Finishing touches

Sand all the wood surfaces except lattice. Transport structure to outside location (two strong people can do this, but three are better). Using a small pump sprayer--a life-saver with all that lattice--apply clear sealer to all surfaces. Wipe off excess sealer with cotton rags. When dry, apply second coat, following directions. The last step is to insert the copper-pipe end caps in the holes for the countersunk bolts. Depending on the fit, you may have to hammer or glue them in position.

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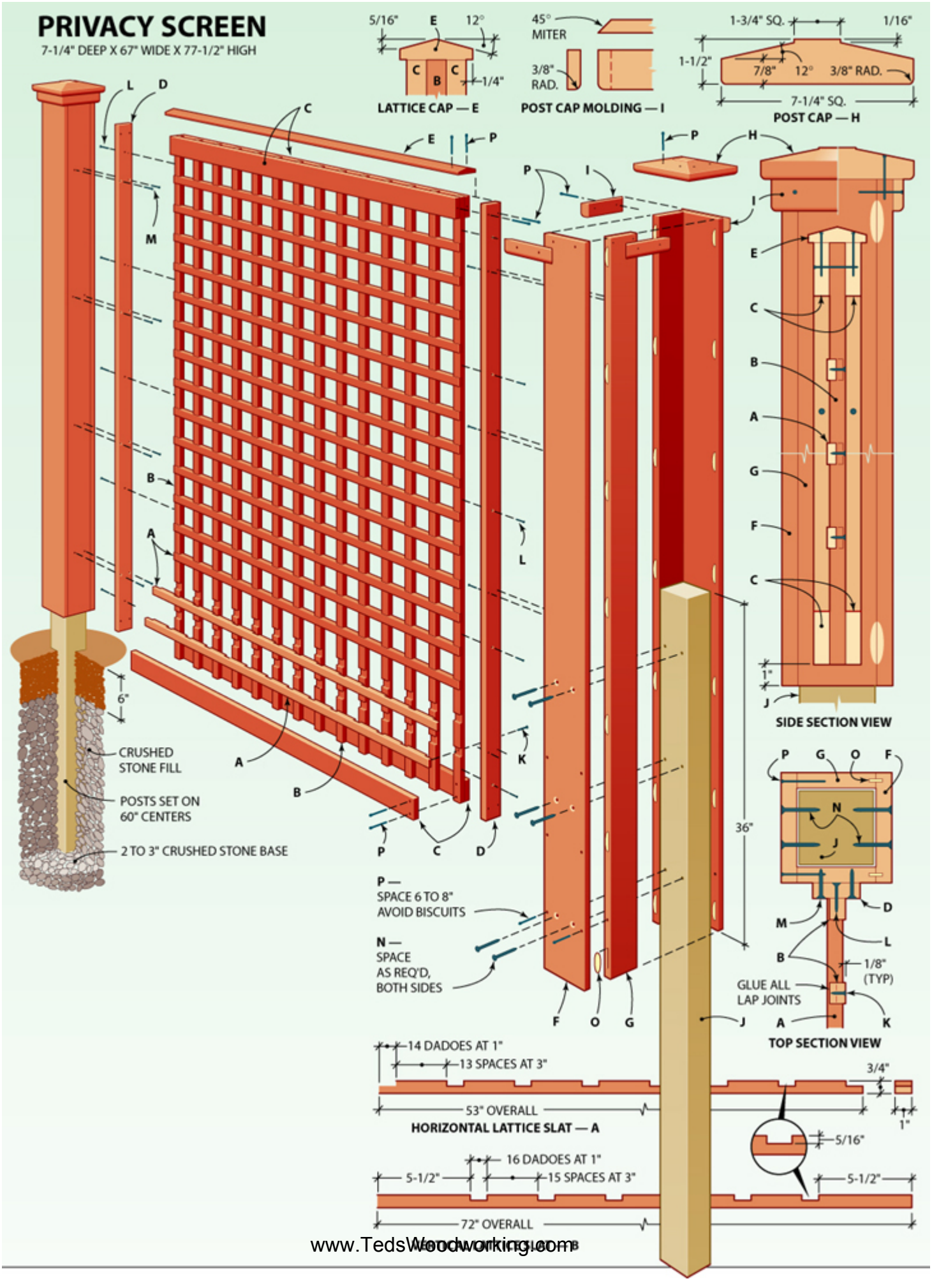
GARDEN SCREEN FENCE

PRIVACY SCREEN

7-1/4" DEEP X 67" WIDE X 77-1/2" HIGH



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Materials List--Privacy Screen		
Key	**No.**	**Size and description (use)**
A	16	3/4 x 1 x 53" cedar (horizontal slat)
B	14	3/4 x 1 x 72" cedar (vertical slat)
C	4	3/4 x 2-1/2 x 53" cedar (rail)
D	2	3/4 x 2-1/4 x 72" cedar (lattice end)
E	1	3/4 x 2-3/4 x 54-1/2" cedar (top cap)
F	4	3/4 x 5-1/4 x 76" cedar (post face)
G	4	3/4 x 3-3/4 x 76" cedar (post side)
H	2	1-1/2 x 7-1/4 x 7-1/4" cedar (post cap)
I	8	1/2 x 1-1/2 x 6-1/4" cedar (molding)
J	2	6'-long 4 x 4 pressure-treated post
K	224	3/4" No. 4 fh brass woodscrew
L	10	1-1/2" No. 8 fh brass woodscrew
M	16	1-1/2" No. 10 fh brass woodscrew
N	24	2" No. 10 fh brass woodscrew
O	56	No. 0 plate
P	as reqd.	6d galvanized finishing nail
Note: Quantities based on one lattice and two posts.		
Misc.: 120-grit sandpaper; Benjamin Moore Moorwhite Penetrating Alkyd Primer 100 and MoorGlo 100% Acrylic House & Trim Paint 096,		

Making The Lattice
First, crosscut 1 x 8 stock to length for the vertical and horizontal lattice members. Clamp each set of blanks in a stack with the ends flush, and mark the locations of the half-lap joints on the stock edges.

Use a dado blade to cut 5/16-in.-deep notches at the half-lap joint marks (Photo 1). Make two passes to complete each notch. Then, rip the lattice slats from the wide stock (Photo 2).

To assemble a lattice panel, first lay out the horizontal slats with a 3-in. space between each. Spread glue in the notches of a vertical slat and in the mating notches on the horizontal slats. Firmly seat the joints, and drive a 3/4-in. No. 4 brass screw at each intersection (Photo 3). Install the remaining vertical slats in the same way.

Rip and crosscut the top and bottom rails to size, and fasten them to each side of the lattice with 6d galvanized finishing nails (Photo 4). Cut the vertical end strips to size, and nail them to the ends of the top and bottom rails. Attach the end strips to the end vertical lattice slats with screws placed in between the horizontal slats (Photo 5).

Rip and crosscut blanks for the lattice panel cap. Then, tilt your table saw blade to 12° and cut the top bevels. Smooth the cut surfaces with 120-grit sandpaper and use galvanized finishing nails to fasten the cap to the top rails and end strips (Photo 6).

After cutting the 1 x 8 lattice stock to length, lay out the half-lap joint notches and cut them with a dado blade.

When the notches are cut, rip the 1-in.-wide horizontal and vertical lattice strips from the 1 x 8 blanks.

Apply glue to the half-lap joints and press the lattice strips together. Reinforce each joint with a single screw.

Position the top and bottom rails along each side of the lattice panel, and secure them with galvanized finishing nails.

Nail the vertical end strips to the top and bottom rails, and add screws between the horizontal lattice members.

After ripping the angles on the top of the lattice cap, fasten the cap to the rails and end strips with finishing nails.

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The Posts
Rip and crosscut the post faces and sides to finished size. While it's not necessary to use fasteners other than nails, post assembly is easier if you use joining plates to help position the parts.

Clamp a fence to the worktable and cut plate-joint slots in the post faces (Photo 7). Then, cut the corresponding slots in the edges of the post sides. Install the joining plates in the faces. Since the plates are only positioning aids, it's not necessary to use glue. Position the side pieces over one face, add the opposite face and secure with 6d galvanized finishing nails. Take care not to nail through the joining plates (Photo 8).

Cut 2 x 8 stock into 7-1/4-in. squares for the post caps, and set up the table saw to make the angled cuts on the caps. Begin by clamping a tall guide to the table saw fence. Tilt the saw blade to 12° and raise it so the top of the blade is 2-3/4 in. above the table. Adjust the fence so it's 7/8 in. from the blade at the table. Clamp one edge of a cap block to a 2 x 6 x 12-in. backer board. Turn on the saw and cut one of the angled faces (Photo 9). When the blade enters the backer board, shut off the saw, wait till the blade stops and remove the assembly. Then make the remaining cuts in the same way. If using the raised fence, backer board and clamps seems too complicated, simply shape the cap bevels with a hand plane. This may take longer, but it's a more relaxed procedure.

Mount a 3/8-in.-radius, quarter-round bit in your router table and shape the bottom edges of the post caps. Sand the caps and nail them to the post tops (Photo 10). Then, use the same bit to round one edge of 1/2 x 1-1/2-in. stock for the cap molding. Cut the molding pieces to length with a miter saw, and nail the mitered pieces under the post caps (Photo 11).

Lay out plate joints in the post parts and cut the slots. The plates keep the pieces aligned during assembly.

Assemble the box posts with plates but no glue. Then, use galvanized finishing nails to fasten the pieces together.

Use a tall auxiliary fence when cutting the post cap angles. Clamp stock to a backer board to support the cut.

Position the cap so it overhangs the post uniformly. Then, fasten it to the top of the post with galvanized finish nails.

Miter the ends of the cap molding pieces. Fit each piece under a cap and secure with galvanized finishing nails.

Assembly And Finishing

Bore screwholes in the lattice panel side strips, position a panel on one of the posts and secure with screws (Photo 12). Repeat the procedure for each lattice/post joint. If you're constructing more than one screen section, disassemble the parts into separate lattice/post subassemblies so they're easier to carry.

Cut pressure-treated 4 x 4s to 6-ft. lengths. Slide one of these pieces into the bottom end of each post so that 30 to 36 in. protrudes. Notice that the post cavity is 1/4 in. wider than the 4 x 4 to make installation easier. Drive two screws through the post into the 4 x 4 to temporarily hold it in place. After you install the screen you can remove the screws to adjust the relative heights of the posts.

Set all nail holes, then prime the screen with a quality exterior-grade primer. We used Benjamin Moore Moorwhite Penetrating Alkyd Primer 100. Fill all nail holes with glazing compound or painter's putty, then apply a coat of a 100 percent acrylic topcoat, such as Benjamin Moore MoorGlo

Bore screwholes in the lattice side strips and position the lattice on a post. Attach with screws.

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100% Acrylic House & Trim Paint 096.

To install the screen, mark the post centers on the ground, and use a posthole digger or shovel to dig holes at least 30 in. deep. Place a few inches of crushed stone in the bottom of each hole.

Bring the screen to the site and reassemble it. Tip the 4 x 4 post ends into the holes, and brace the screen so that the posts are plumb. Fill the holes with more crushed stone to within 6 in. of the surface, tamping it down to provide a solid base. Then top off the holes with topsoil. Check that the bottom rail of the screen is level. If necessary, remove the screws that hold the posts to the 4 x 4s and adjust the height of the screen as required. Install more screws to hold the posts to the 4 x 4s, then fill the holes over the screwheads and touch up the paint. This system will work for locations where the ground slopes no more than 2 in. from one end of the screen to the other. For dramatically sloped yards, you'll need to construct posts that accommodate the difference in grade.

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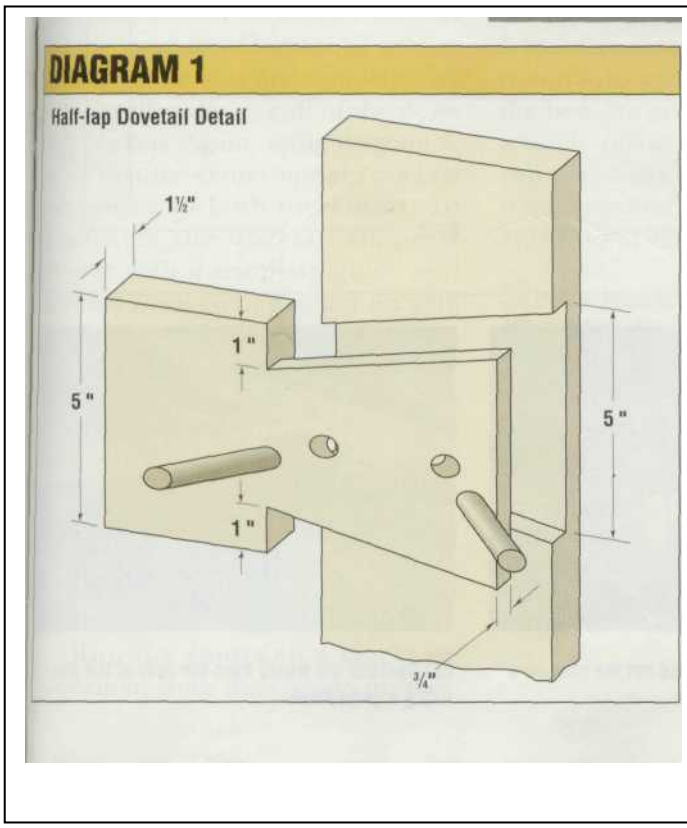
CHILDREN'S BUNKHOUSE LOFT

Children's bedrooms are frequently the smallest rooms in the house. And, as the youngsters grow, their space seems to become smaller. One way to lessen this problem is to go vertical, as in building a loft**.**

The loft we've constructed was made from 12 simple 2x6s in 8' lengths. We used standard yellow pine, but did spend a few minutes at the lumberyard trying to pick out the best looking wood without large knots, twists or terribly mangled edges.

Even having been picky with our lumber, we still felt more comfortable ripping and planing the boards to 1 ½" x 5" to remove the factory edges and to make sure the material was uniform.

Once your boards are ready, pick the straightest ones and cut the five long rails to length. Work through the cutting list from longest to shortest, getting your shortest lengths from the worst lumber.



Loft Frame Cutting list

	No.	Size
Posts	5	1½" x 5" x 60"
Face frame rails	4	1½" x 5" x 82¼"
Face frame rail	1	1½" x 5" x 61½"
End rails	4	1½" x 5" x 41"
Step rails	4	1½" x 5" x 26"
Mattress support	1	¾" x 40¾" x 75¾"

Bookcase Cutting list

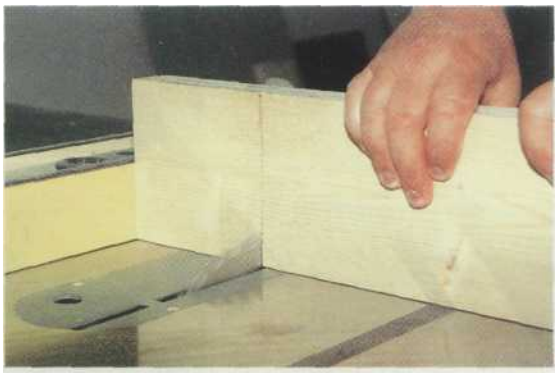
	No.	Size
Shelves	6	¾" x 8" x 39½"
Ends	4	¾" x 8" x 30"
Backs	4	¾" x 6" x 39½"
Shelf supports	12	¾" x 1½" x 39½"
Cleats	12	¾" x 1½" x 4½"

You're now ready to cut the half-lap dovetails which will provide aesthetics, as well as stability and strength, to the loft (diagram 1). Start by separating the lumber into vertical (posts) and horizontal (rails) piles. All of the horizontal pieces (the five longer rails and the steps) will receive the pins for the dovetails.

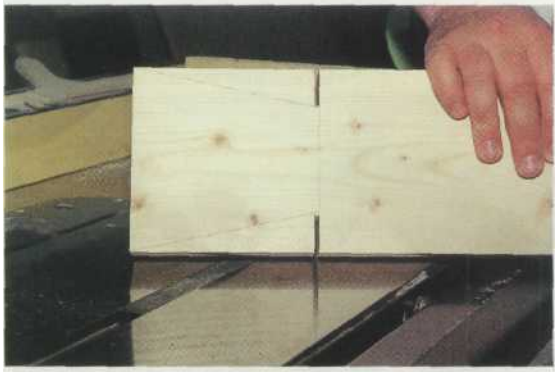
The first cut, to form the shoulder of the pin, was accomplished on the table saw using the rip fence as a guide set at 4 7/8" (5" with the kerf) (photo 1). We chose to work with a 12° angle for the dovetails, and marked the board to use the entire width. Photo 2 shows the defined shoulder and the pin as marked.

Without changing the rip fence setting, lower the blade height to 3/4", Then run the back side of each pin to form the cheek of the joint (photo 3). Take note, we had all the dovetails' joints visible to the front of the bed, including those on the rear frame.

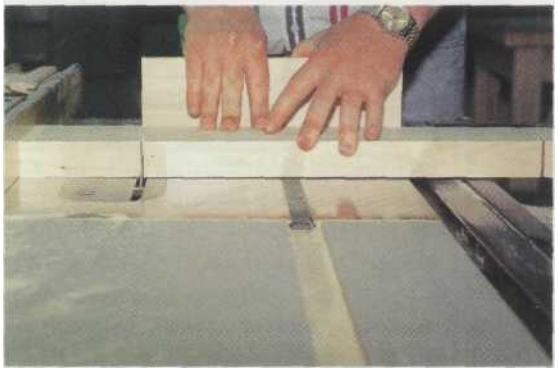
To form the pin itself, move to the



1 The shoulder of the pin is cut on the table saw, 5" in and 1"



2 Flip the board and make the same cut on the opposite side. Note the angle for the dovetail.



3 Lower the blade to 3/4″ and run the backside of the pins to form the joint's cheek.

band saw and follow your 12° marks, cutting from the front side (photo 4). We freehanded the cuts since the overall finish of the piece is intended to be rustic. If you choose, a sled jig can be made to cut the tails in a more exact manner.

The final step in forming the pin is to remove the waste from the rear to form the half-lap. After considering a number of methods of performing this step (hand sawn, resawn on the band saw, using a router), we opted to use a dado stack on the table saw **(photo** 5). This method removed the waste quickly, and in a safe and uniform manner. If the dado stack isn't an option for you, the router may be your next best choice.

To form the dovetail pockets, we marked the location of all the pock-

DIAGRAMS 2 & 3

Diagram 2 Front Frame Layout

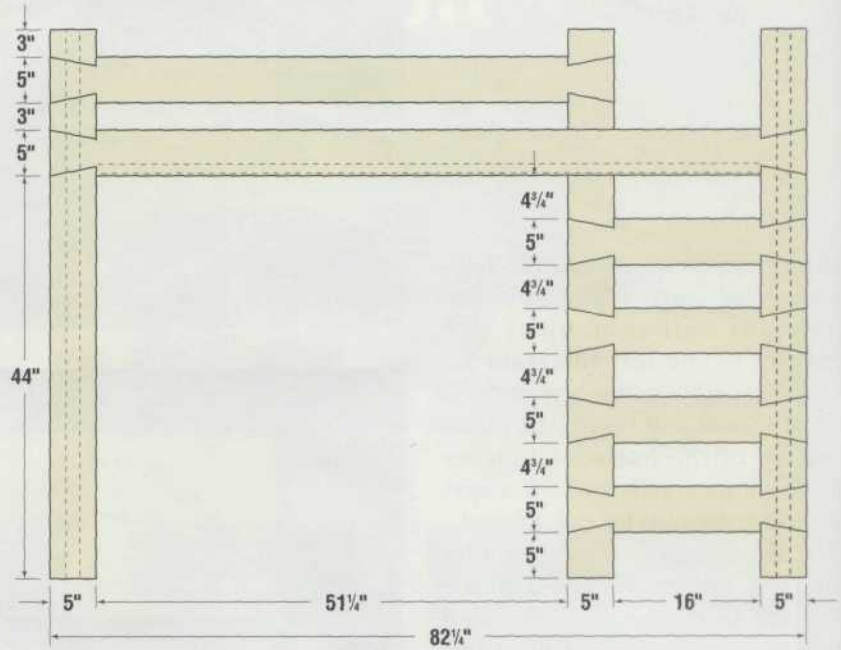
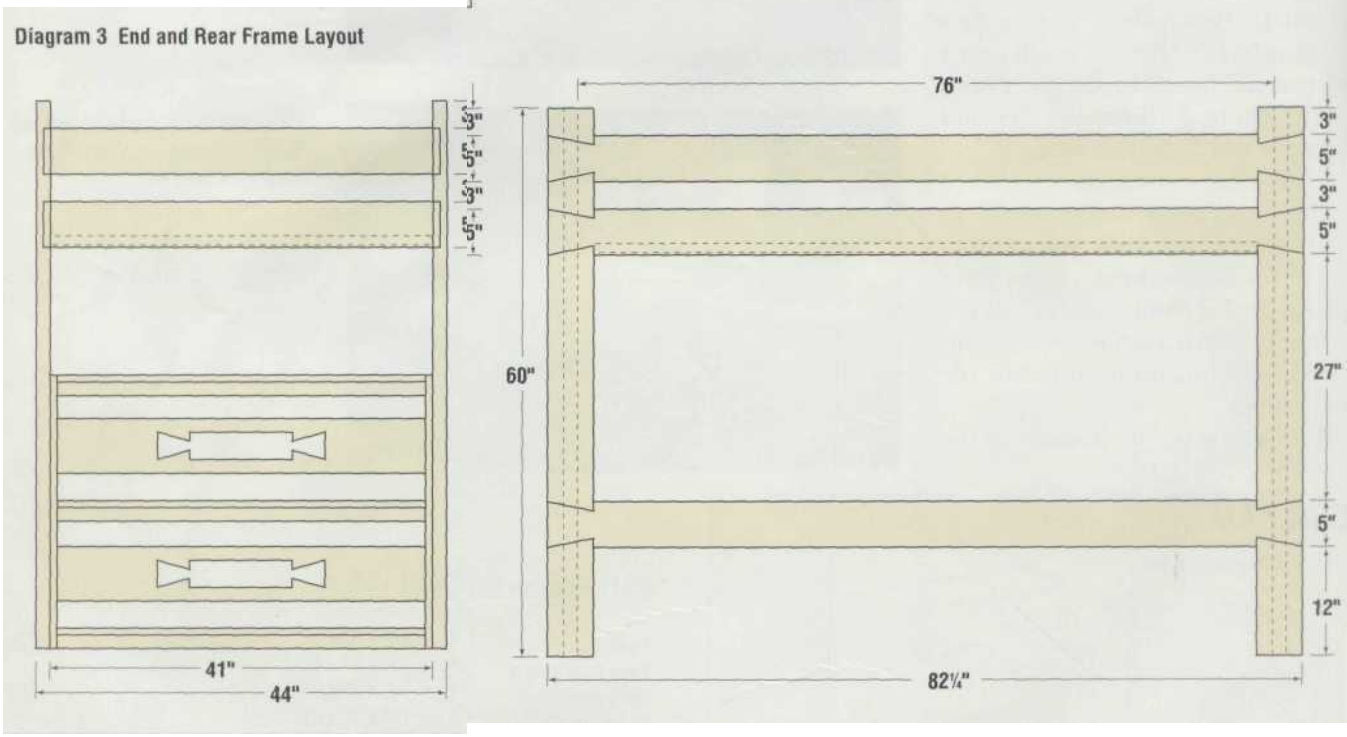
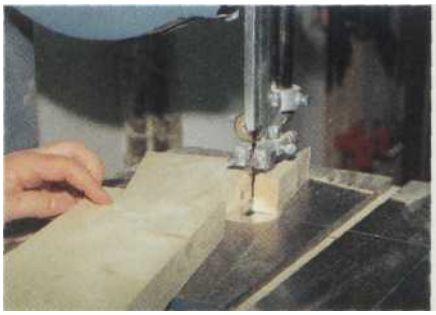


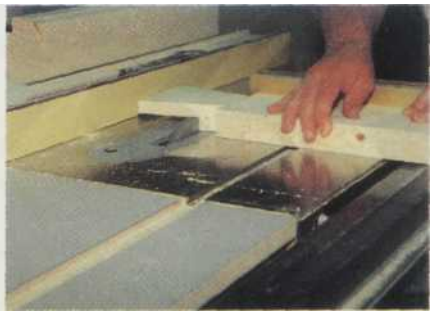
Diagram 3 End and Rear Frame Layout



4 Follow the 12° marks and cut the pins on a band saw.



5 Remove the waste from the rear of the pin using a dado stack.



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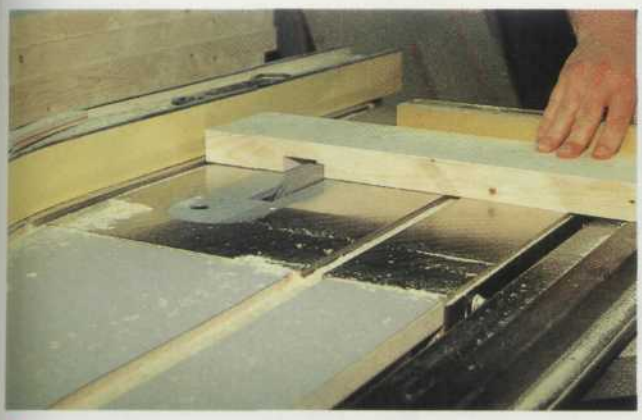
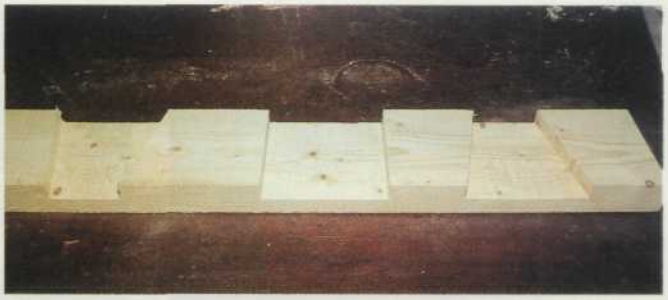
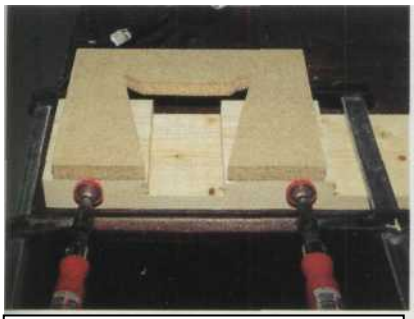


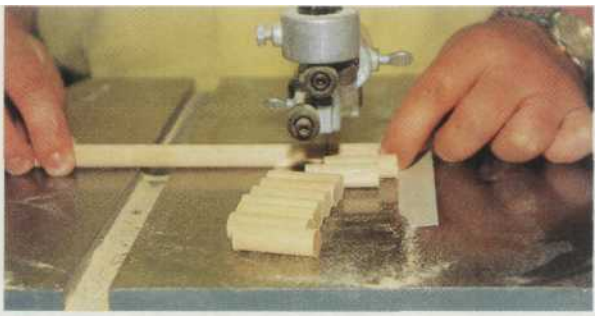
6 Remove the waste from the dovetail pockets using the dado set-up.



7 Detail showing dovetail pockets and the full 5" half-lap.



8 A template guide makes quick work of finishing the dovetail shape



9 1½" dowels, cut on the band saw, help make the joint stronger.

ets **(diagrams** 2 & 3), left the dado stack in the saw and removed most of the material from the posts (photo 6).

As you're cutting the dadoes, note that the center post requires a full 5" half-lap joint **(photo 7).** The mate to this joint should be located and cut on the lower front horizontal rail.

After these cuts are complete, lay out the direction for all of the dovetail pockets. Again, using **diagram** 2, note that the center upright pockets are going in both directions. To complete the dovetail shape, a router with a template guide and upward spiral cutting router bit were used. The template can be made out of most any common scraps in your shop **(photo 8)**.

Clamp the template firmly in place. If you're using a 1/2″ shank bit, the router depth can be set to match the full dado depth and cut in one pass. If you're using a 1/4" shank, you'll want to use two depth passes to remove the waste material.

Run the router in a clockwise direction, from the outside in, starting at the bottom left. Be careful not to run the router in the opposite direction, as it may cause kickback.

Once all the pockets are cut, check the fit at each joint. Chances are good some minor adjustments with a chisel will be required.

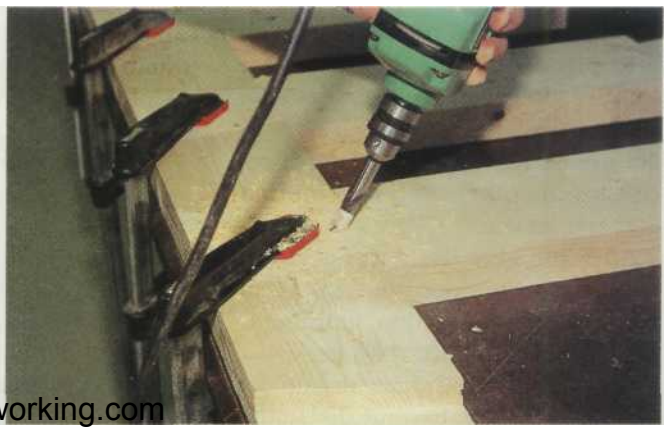
In gluing-up the front and back frames you may want to consider how transportable you want to make the bed. We glued each frame up as a single piece, but for convenience you may want to screw parts of the frame together to make it more of a knock-down design.

To make the joint even stronger (and the whole piece more aesthetic), we used 1/2″ dowels to pin the dovetail joints. Cut the dowels to uniform length *(1 1/2")* using the band saw. To make the cut safely we used a piece of tape to mark the length **(photo 9).** Don't work too fast and keep your fingers clear.

Start your glue-up with either the right or left end of the back frame. Use a flat work surface which you can clamp the glued components to. Cover all touching surfaces of the joint with glue and clamp the two pieces together.

Next mark a 1/2″ drill bit at 1 1/4" with a piece of tape. Then, with the drill held at an approximate 45° angle, drill two holes through the dovetail joint, stopping at the tape **(photo 10).** The two holes should be drilled at opposing angles. The

10 Drill ½" holes at a 45°, 1¼" deep, to accept the dowels.



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dowels

11 The dowels in place and the joint clamped.

12 After the glue has dried, cut the dowels with a hand saw.

13 The knock-down hardware installed.

14 The aluminum "L" track is mounted 1" up from the bottom edge of the rail.

15 Veneer tape is simply ironed on to the visible edges of the MDF board.

should be glued and hammered into place **(photo 11).** We used a smaller dowel to spread the glue around the interior of each hole to get even coverage. Repeat this process for the other two joints on that end and let dry.

After the glue has set, repeat the process on the opposite end. Then move to the stair section, and finally the left end of the front frame.

After both frames have dried, any dowels extending beyond the frame can be cut flush with a hand saw **(photo 12).**

Unless you've been extraordinarily precise or lucky, your joints will more than likely not fit flush in all places. If you try to sand or plane these joints flush, you'll end up doing more harm to the appearance than good. So, in keeping with the overall rustic look, we opted to leave any rough joints as they were.

To make the loft more "child friendly," we used a 1/4" roundover bit in a router on all the edges of both frames and the long edges of the four end rails.

The next step is to install the knock-down hardware to assemble the bed. Many types of knock-down hardware are on the market, so the type you choose may be quite different from ours. With our hardware it was necessary to rout pockets in both the face of the frames and ends of the cross pieces that mount the KD plates flush to the surface **(photo 13).**

Assemble the bed to check the fit of all pieces. This also is a good opportunity to measure and attach support rails for the 3/4″ plywood which will, in turn, support the mattress. For our loft we chose a 1/8″ gauge aluminum "L" track drilled, countersunk and mounted 1" up from the bottom edge of the lower rail **(photo 14).**

This is not, however, the least expensive method to support the plywood and mattress. Other fine alternatives include 1" x 1 " wood strips attached in the same location, or "L" brackets rather than "L" strips. Regardless of your choice of material, make sure it will support plenty of weight without allowing the plywood to slip out of place.

At this point the loft is essentially complete; but to provide toy and book storage and to strengthen the overall piece, we added a couple of simple bookcases **(diagram 4).**

The cases were made from 3/4" MDF (medium density fiberboard) material with a factory Birch veneer on both sides. To finish the look of the pieces we used Birch veneer tape on the visible MDF edges. The veneer tape is simply ironed on **(photo 15),**

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16 Once the veneer has been attached, it can be trimmed using a block plane.

then trimmed to fit using a block plane **(photo 16)** and sanded flush.

Part of the Southwestern detail is achieved by using a jigsaw to cut out part of the backs **(diagram 4** & **photo 17).**

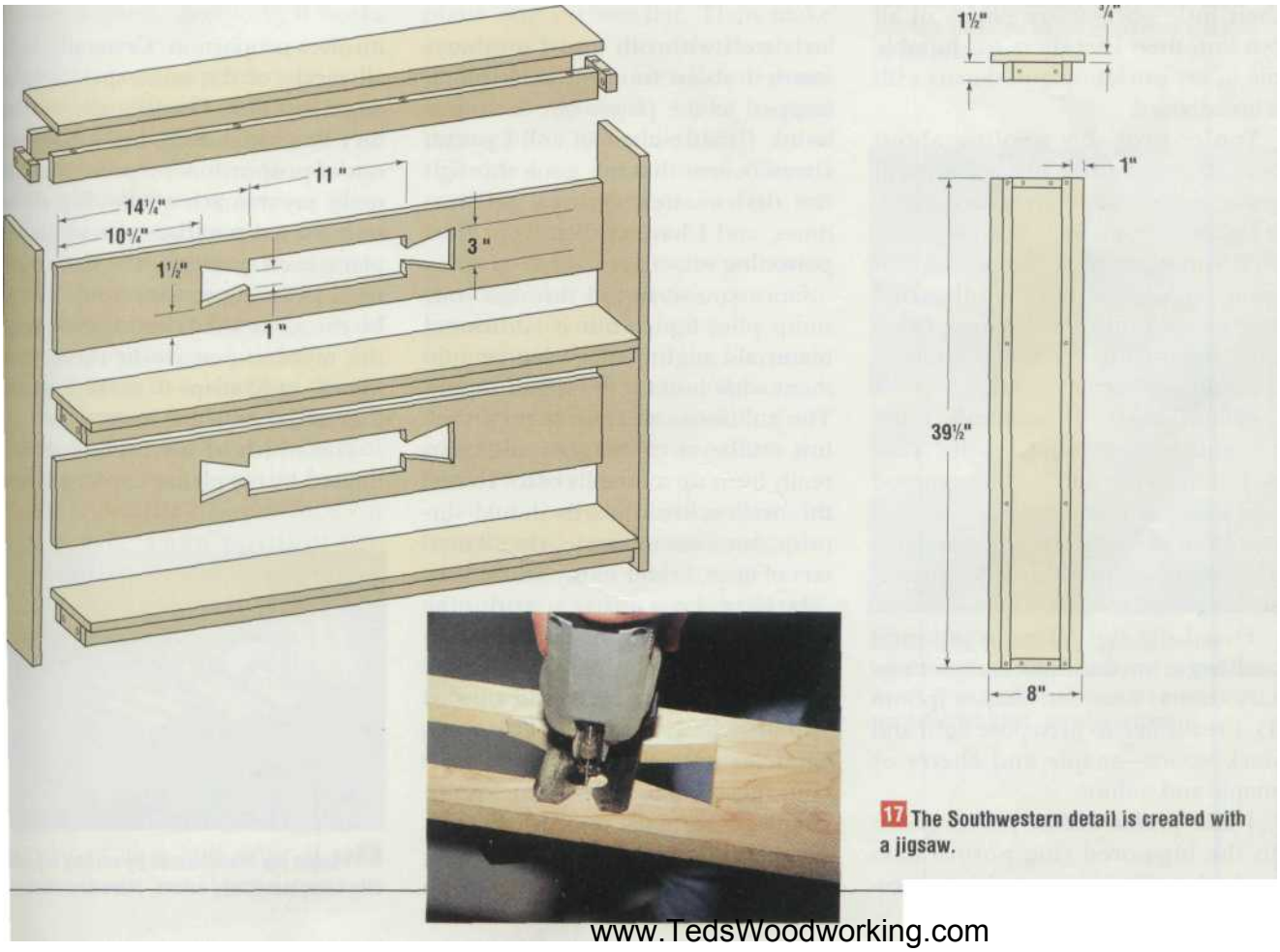
The next step is to attach the pre-drilled shelf supports and cleats to each shelf s underside **(diagram 5).**

After that, it's a simple process of screwing the cases together. The backs were pilot drilled and screwed into place through the case ends. When in place between the posts of the bed, these screws won't be visible. The cases themselves are then screwed between the posts from the inside.

As shown in the opening photograph, we used an oil-based grey wash stain which was a simple wipe-on, wipe-off process. This brought out more of the wood's character and gave the piece a more antiqued "barn board" look. We used multiple coats of lacquer with a dull finish to seal and protect.

You've no doubt by this time realized that these same plans can be rearranged to fit your particular space needs. In fact, you can even duplicate the frame's upper structure and make a traditional bunk bed. However you design it, we hope your special youngsters enjoy their time "aloft."

DIAGRAMS 4 & 5



17 The Southwestern detail is created with a jigsaw.

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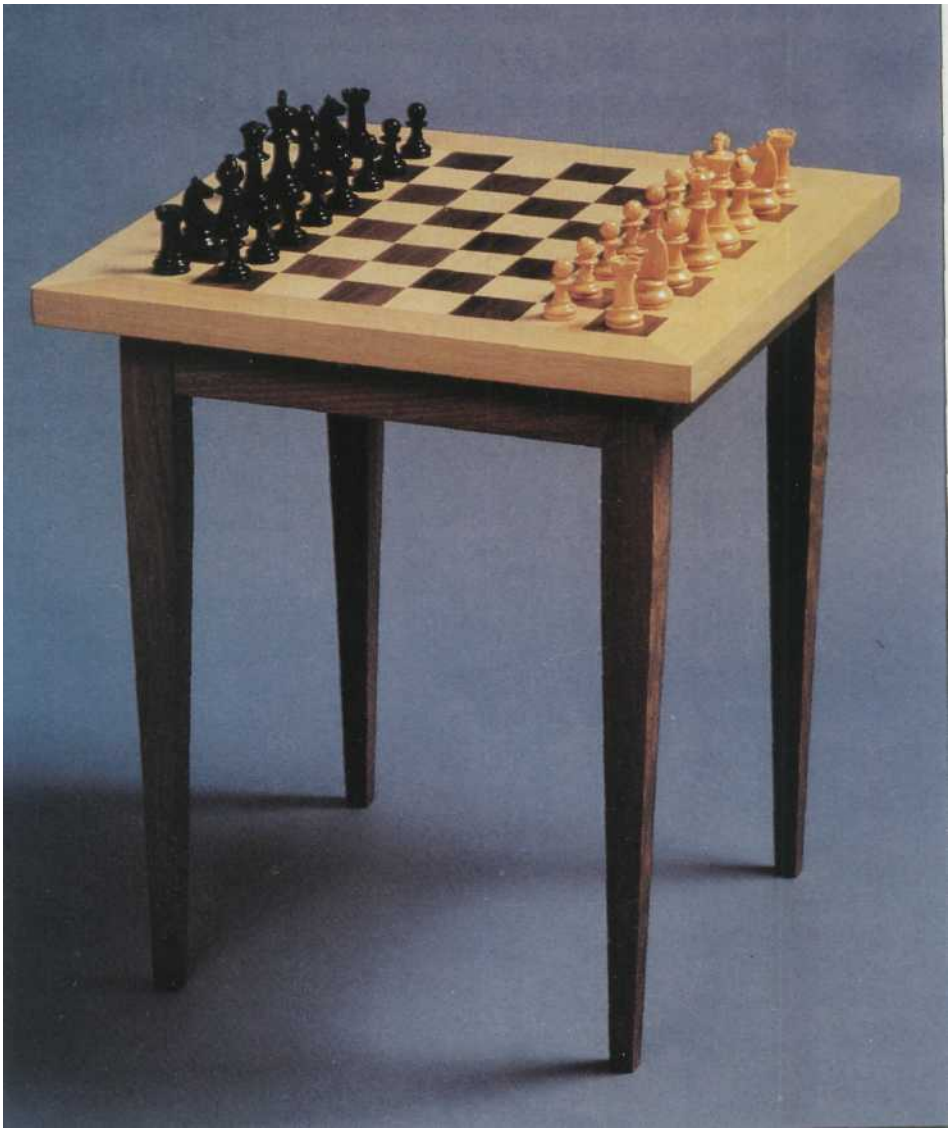
TRI-COLOR CHESS TABLE



Have you ever played a serious game of chess while crouching on the floor? You're likely to be racked by lower-back pain. And unless you're a chess fanatic, storing the board out on a surface can take up room needed for other purposes.

This chess table evolved to cure these problems and put the enjoyment back in the game. But even if you don't play, you'll have to admit the top's checked pattern and full four-quarter thickness is an eye-catcher.

This tri-color chess table gets its name from the black walnut, white oak, and blond, fine-textured hardwood, known as *ramin*, it's constructed from. But it doesn't really matter what you make it out of as long as one species color-contrasts from the other (for obvious reasons). Even using just one variety of a light colored, tight-grained softwood and staining the alternate strips of the board could save you the trouble of searching for a darker species. The legs and frame can be matched with the border.

There's no trick to setting up the board other than keeping your cuts square, your blade sharp, and your work on a flat surface. Alternate strips of dark and light wood are glued together, face side down directly on the pipe clamps. It's best to apply the glue sparingly and carefully, so no excess runs from the joints to spoil the final finish. You also should be aware that rust or oil on the clamps can put an indelible stain on the wood, so cover the pipes with kraft paper to prevent disappointment.

Once the parallel strips are cross-cut, they're shifted alter-

Dimensions

Materials List

1	1×6×5′	ramin
2	1×2×3′	walnut
1	1×3×4′	white oak
1	2×3×40″	white oak

(All measurements are in actual dimension)

Cut List

5	1×1¾×18	ramin strips
4	1×1¾×18	walnut strips
4	1×1¾×17½	ramin border
4	1×2×11½	white oak skirts
4	1½×1½×19	white oak legs
4	1×1¾×2½	ramin corner braces

Hardware and Materials

4 #6×1¾″ cabinet screws
Yellow carpenter's glue (aliphatic resin)

Cutting Assignments

1×6×5′	ramin strips border corner braces
1×2×3′	walnut strips
1×3×4′	skirts
2×3×40″	legs

Tools

Table saw	#6 screw bit
Radial arm saw (optional)	#2 Phillips bit
Taper jig	4 pipe clamps
Combination square	Bar clamp
Framing square	Band clamp
Measuring tape	Palm sander
VSR drill (variable speed reversible)	Belt sander (optional)

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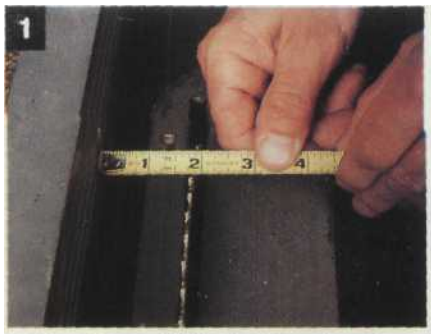
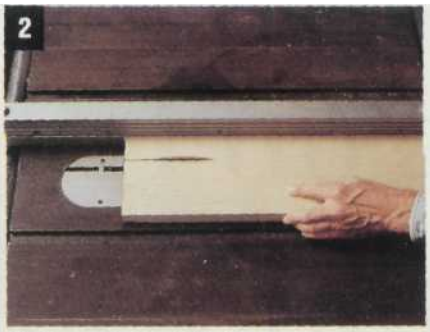
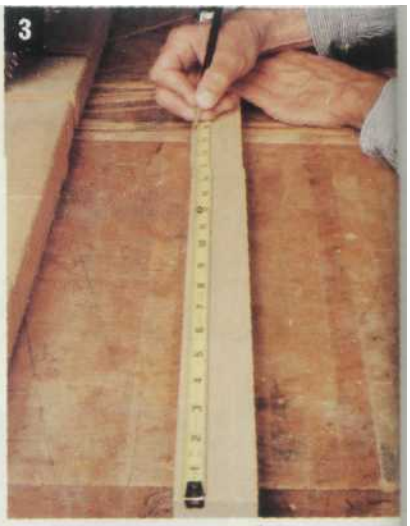


Set the table saw blade at a 90° angle and measure exactly 1¾" from the fence.



Rip the ramin into 1¾" strips.



Cut nine 18" lengths from the 1¾" ramin strips and select five.

Glue the strips together with an even bead, alternating the four dark and five light species to make a 15¾" width. Place the best face down toward the clamps.

Use the edge of a framing square to check the plane of this initial glue-up. Any inconsistencies should show on the exposed side, which will be the underside of the table surface. Square one edge as well before tightening the clamps.

After 24 hours, once the glue is dry, square up the board against the miter gauge and carefully trim the squared edge.

Mark the miter lines on one end of each of the four remaining 1" × 1¾" × 18" border strips.

Establish the exact length of the first piece against one edge of the board and mark the opposite miter. Set the miter gauge to a 45° angle, and cut the first border piece. Cut the marked ends of the other three pieces.

Determine the exact length of each remaining border by measuring against its respective side before you mark it. The finished lengths should be very close to 17½".

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Rip the walnut into 1¾" strips and cut them into four 18" lengths.

nately and reglued with the same care to create the checked pattern (**step 9**). Then the border pieces can be trimmed and fastened. Though you may prefer to rip down the 1¾" border to a less imposing 1" width, I left it full to provide for a place to line up chess pieces taken in play.

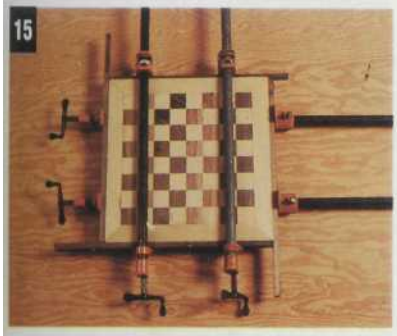
This project does not use metal fasteners, except for four screws that hold the corner braces to the legs. All the joints rely on an even application of glue and solid clamping. However, don't make the mistake of overtightening the pipe clamps, which would force the glue out of the joints and weaken them.

You can finish the table with a brushed-on semi-gloss polyurethane for good abrasion and stain resistance. If durability isn't a major concern, try a wipe-on technique using water-based polyurethane for a thinner coat. Simply slosh the liquid over the surface and remove it immediately with a lint-free rag. It will get into the wood and still leave a somewhat protective film that looks surprisingly like a Danish oil finish.

Reset the fence for a 1¾" cut and pass the board through the blade until you've got eight dark-and-light strips. Arrange them in the same order they've been cut.

Using the same procedure as before, glue the eight strips together, in order, best face down, but shift every other strip by one block width to create the checkered pattern. Line up the cured joints carefully, because you won't get a second chance!

Clamp the board and allow the glue joints to cure for another 24 hours. Note the protective stickers at the clamps' heads and tails.



Glue and clamp the finished border pieces to the board. The border and board should be on an even plane against the pipe clamps.

Use the saw's miter gauge to carefully trim the board to a 14" square.

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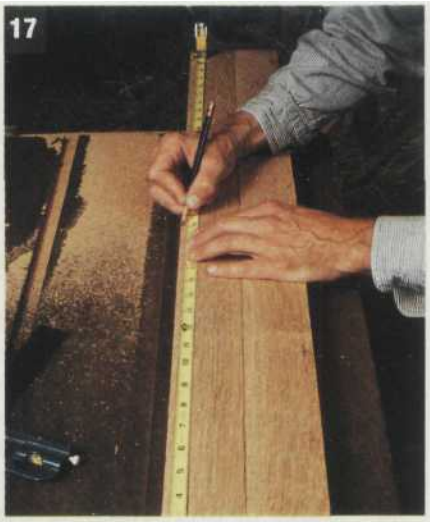
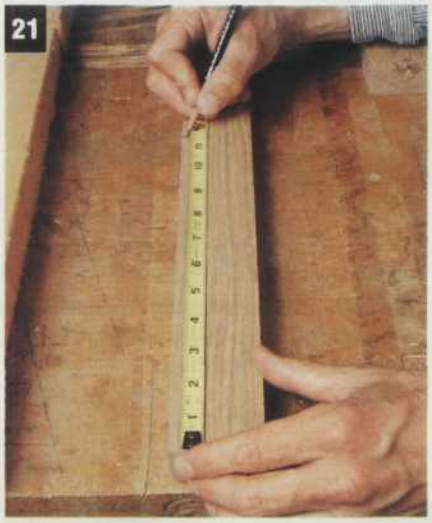
Rip the 2″ × 3″ × 40″ leg billet in half to make two 1½″ × 2″ × 40″ pieces.

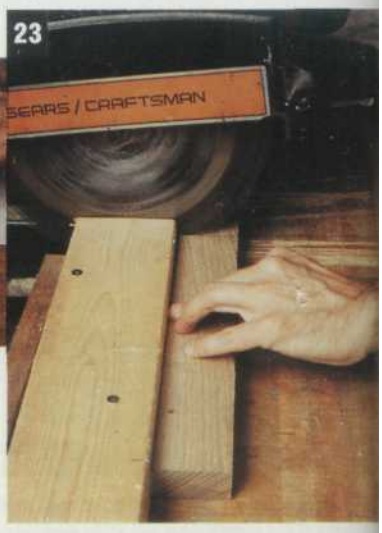


Lay the pieces side by side, align the ends flush, and mark at 19″.

Use a square to carry the mark to the adjacen piece, then cut both. Repeat the procedure on remaining pieces to make four 19″ leg blanks.



Measure an 11½″ length on the 1″ × 2″ × 48″ skirt piece. Square the mark and cut. Repeat for the remaining three skirt pieces. Now's the time to check the skirts and legs for blade burn, and sand the faces if needed.



Tilt the table saw blade to a 45° angle and cut the four 1″ × 1¾″ × 2½″ corner braces. Because the work is so close to the blade, clamp each brace to a scrap of 1 × 2 and make the cuts that way. Be sure the clamp clears the blade before starting the saw.

Set up the table frame on a flat work surface with a band clamp placed snugly around the frame's circumference. Use a #6 screw bit with the stop collar set at 1¾″ to pre-drill a hole through each brace and then into the leg behind it. Center the hole ¾″ from the exposed edge, and set the braces flush against the work table.

Glue the skirts to the legs, and the braces to skirts. If the corner braces don't set squarely against the skirts, place and draw up the cab screws lightly to hold the braces in place. Tigh the band clamp.

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SERVING TRAY

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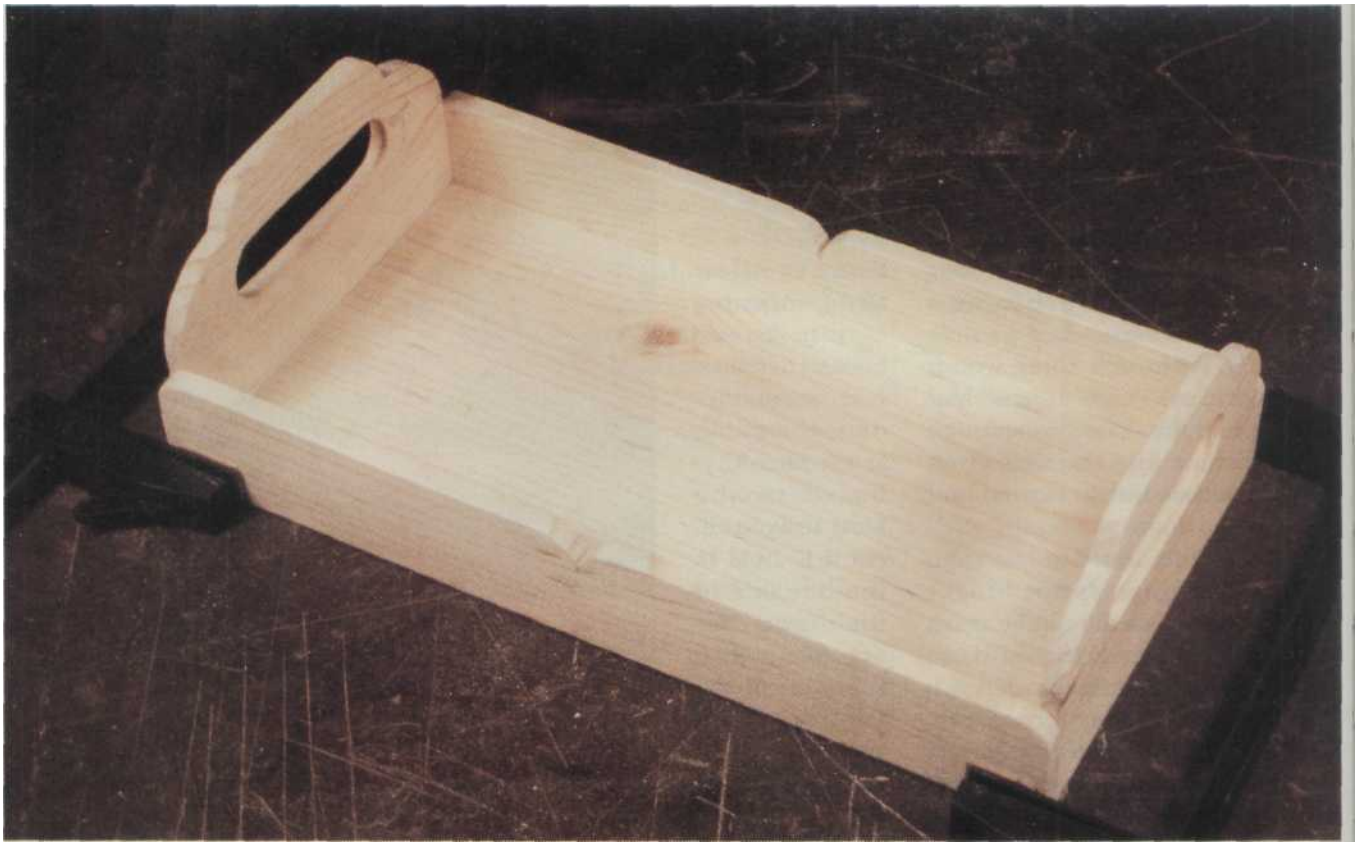


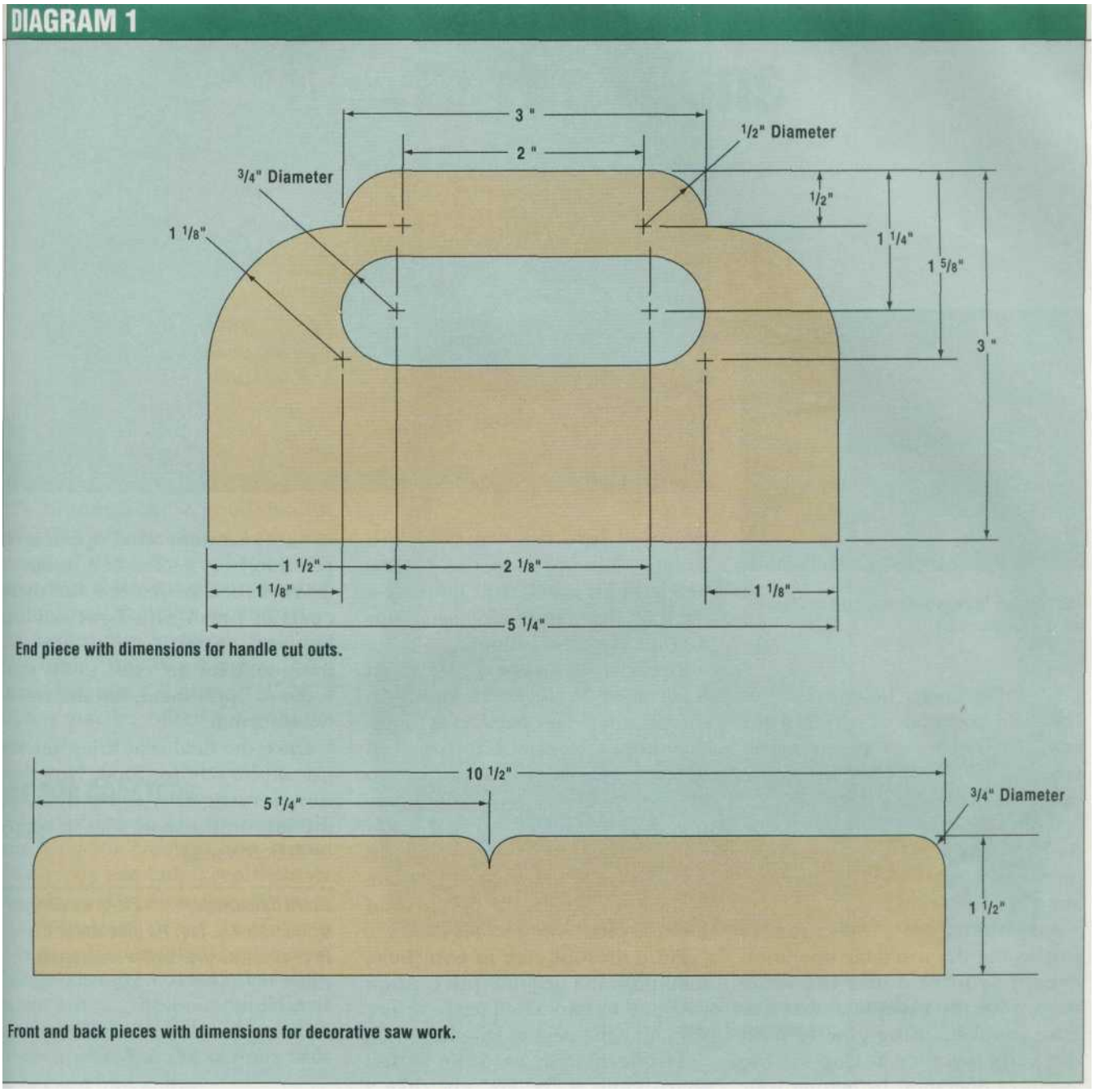
This is a great project for using up some of that leftover, common pine you've got lying around the shop. It won't take much material or time to build this tray once you get the stock to its proper thickness.

You also should enjoy both the easy construction methods and the results. Another interesting feature is the use of round pegs that give the piece an antique look. Once you see how it's done, you'll want to use this method on other projects to add both strength and beauty.

Start with 3/4"-thick common pine stock and resaw it so it can be finished to a 1/4″ thickness. Resawing the lumber is easily done on a band saw, but this material is so easy to work that you can probably hand plane it to thickness without too much trouble.

In either case, you should make sure all the cutting tools you're using are at their sharpest state because the fibers of softwoods, like pine, tend to compress rather than cut when worked with dull tools. This compression leads to crushed **edges** instead of the sharp edges that are formed when sharp tools , are used.

If you elected to resaw the **boards,** you'll have to either finish plane or power sand the boards to



their final thickness. I used a belt sander for this operation. The job went so quickly that the boards were down to their finished size almost before I realized it.

Cut the base to its finished length of 10", then set the rip fence on your table saw for the *5 1/4"* width. Without changing the saw setting, rip another piece at least 7" long to the same 5 1/4" dimension. Cut this board into two pieces, each measuring 3 1/2" long x 5 1/4" wide. These two pieces will be used as the tray's ends.

Rip a pair of boards measuring at least 11" long into 1/4" widths to become the sides of the tray. Don't cut these sides to length at this time.

Before you go any further, you need to lightly touch up all the cut edges of the parts with some fine sandpaper. Be careful not to round any edges, just take off the fuzzies that formed when the cuts took place. Once this is done, your parts will be as clean as possible and ready for dry assembly.

Dry assembly is the act of putting the pieces together without any glue or fasteners to ensure everything is of the proper size. If you've never done this operation before, you should find this project to be a good opportunity to test your

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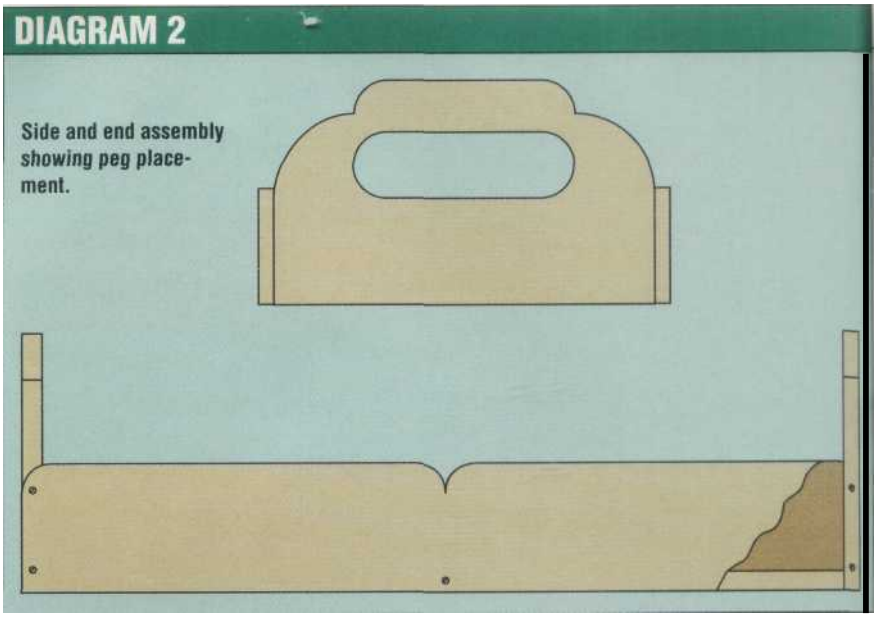
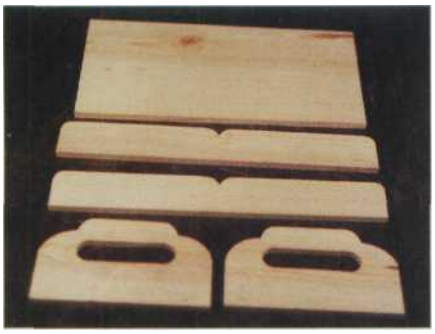
Dry assemble the tray by butting one end panel against each end of the base board. Make sure the end panels are square to the base, and set a single side panel in position. Mark that panel for length, and cut both of the 1 1/2"-*wide* side panels to the same length. Touch up the cut edges with fine sandpaper, being careful not to round the edges.

Referring to the sketches, lay out the curved areas on the two end panels and two side panels. Instead of using a compass for the layout work, I found a drafting circle template works well and doesn't leave any holes from the compass pin. Cut the curves to shape, then drill a





The parts for the tray are completed and laid out prior to assembly.

pair of 3/4"-diameter holes in each of the end panels for the finger cutouts. Use a coping saw, scroll saw, or jigsaw to cut out the finger openings in these two panels.

Lightly sand all pieces in preparation for final assembly, then dress up the cuts just made. Don't round any edges at this time.

Assembling the parts is just as easy as the dry assembly operation because you're doing the same steps, with the exception that this time you'll be using glue to hold the parts together. Set up for the assembly operation by getting your clamps set to the approximate openings and preparing your clamp blocks for use. Clear your work area, and have a container of water and a rag available for wiping up any excess glue.

Now you're ready to start. Apply some yellow woodworker's glue to the edges to be joined and butt all the parts together. A few light-duty clamps are all that are needed to hold the details in place.

Once the glue has completely dried, it's time to install the round pegs that help make this project unique. The pegs are nothing more than round wooden toothpicks that have had the tapered ends cut off, then cut into two equal length pieces. The toothpicks I used needed only a #40 drill hole for a good fit, but you should check your toothpicks before drilling.

The holes should be drilled about 5/8″ deep at the locations shown in the drawing. The pegs' exact locations aren't important. You also can create any pattern you choose to get the effect you want. I used only five pegs per side because the tray will be subjected to very light duty, but you could easily adjust the number to suit your own opinion on how the piece should look.

Put a drop of glue in each hole, then push the peg into place. Allow the glue to cure completely before trimming the pegs to length.

Trimming can be done with a sharp knife, a "setless" saw (like a backsaw), a chisel, or a belt sander. I chose a sharp chisel to get the pegs to the proper length, then touched up their ends with fine sandpaper.

At this time, you should dress up all the exposed edges on the assembly with sandpaper to remove the sharp areas. Pay particular attention to the end panels that will receive the most handling. It won't take too much effort to complete this step. Before you know it, you'll be ready to apply the finish.

I used a clear, water-soluble finish that's environmentally safe. Regardless of what you select for this job, follow the manufacturer's recommended application procedures to get the best results.

My directions called for three coats of finish with light sanding between coats. It definitely took more time for the coats to dry than it did to apply them, but the results were worth it.

Once the final coat dries, the finish will be safe for food. Now your new serving tray is ready to sit proudly on the table with its supply of delicacies.

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CRAFTY COMPUTER DESK

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For most computer owners, finding a desk with enough space for all the computer's components plus enough room to work is a challenge. While many models are on the market, most are made of pressed wood products lacking any redeeming aesthetic qualities.

This computer desk was carefully designed to satisfy the need for a functional work space and the desire for quality furniture.

A typical computer system has four basic pieces: a hard drive unit, monitor, keyboard and printer. These pieces must be hooked together with an array of plugs and cables. Through the pictures, drawings and text, you'll see how this center has been designed to accom-modate these parts and hide unsightly cables.

The computer center consists of a desk and a hutch. Each is built as a separate unit, then assembled to complete the design. For both units, you will use 3/4″ solid oak lumber, 3/4″ MDF oak and 1/44" oak ply-wood. The solid oak is available in any length; the MDF and oak ply-wood come in 4' x 8' sheets.

A rule every experienced wood-worker lives by is "measure twice, cut once." Even though you're get-ting the most exact measurements possible, you should double check before cutting.

To begin, build the desk face frame from oak stiles and rails **(parts A-F),** using **diagram 1** and the **Materials List** as a guide. Special consideration should be given to the location of the shelf rails to accommodate your computer's

DIAGRAM 1

Materials List

Desk

Desk Face Frames (¾" solid oak)

A	2 ends	1⅝" x 29¼"
B	1 middle	1⅝" x 27⅝"
C	1 top	1⅝" x 53¾"
D	1 divider	1" x 20"
E	2 dividers	¾" x 20"
F	1 base	2¾" x 20"

Desk Bulkheads (¾" MDF oak)

G	2 outer	23¾" x 29¼"
H	1 inner	23¾" x 29¼"
I	1 back rail	2⅛" x 33"

Desk Shelves (¾" MDF oak)

J	3	22½" x 23⅜"

Drawers - (Overall 19" x 22", allowing ½" each side for the drawer slides.)

Top Drawer (¾" MDF oak)

K	2 sides	2⅜" x 22"
L	2 ends	2⅜" x 17½"
M	1 bottom	¼" oak 18⅛" x 21⅛"

Printer Drawer (¾" MDF oak)

N	1 side	2" x 22"
O	1 side	11" x 22"
P	2 ends	11" x 17½"
Q	1 bottom	¼" oak 18⅛" x 22¾"

Drawer Fronts

R	1	1¾" solid oak 3¼" x 20½"
S	1	1¾" solid oak 12¼" x 20½"

Pull Out (¾" MDF oak)

T	1	19⁵⁄₁₆" x 20"
U	1	¾" x ¾" x 20½" solid oak

Guides (glue 2-¾" pieces together)

V	2	1½" x 2" x 17" (⅝"x⅝" rabbet)

Stop Piece

W	1	¾" x ¾" x 17"

Desk Top (¾" solid oak)

X	1	25½" x 59"

Hutch

Face Frame (¾" solid oak)

AA	2 ends	1⅝" x 37¼"
BB	1 middle	1⅝" x 22¾"
CC	1 top	2½" x 53¾"
DD	1 left bott.	1⅝" x 24⅜"
EE	1 right bott.	1⅝" x 27¾"

Bulkheads (¾" MDF oak)

FF	2 outer	12¾" x 37¼"
GG	1 inner	12¾" x 25¼"

Fixed Shelves (¾" MDF oak)

HH	1 shelf	12⅜" x 26"
II	1 shelf	12⅜" x 30¼"

Adjustable Shelves

JJ	1	12¼" x 25"
KK	2	12¼" x 29¼"

Inner Rails (¾" solid oak)

LL	1	2⅛" x 29½"
MM	1	2⅛" x 25¼"

Base Molding (¾" solid oak)

NN	1	2" x 60"
OO	1	2" x 30"

Hutch Crown Molding (¾" solid oak)

	1	⅞" x 62"
	2	⅞" x 16"

Top (¾" solid oak)

PP	1	14¾" x 59"

Doors (¾" solid oak)

Panels

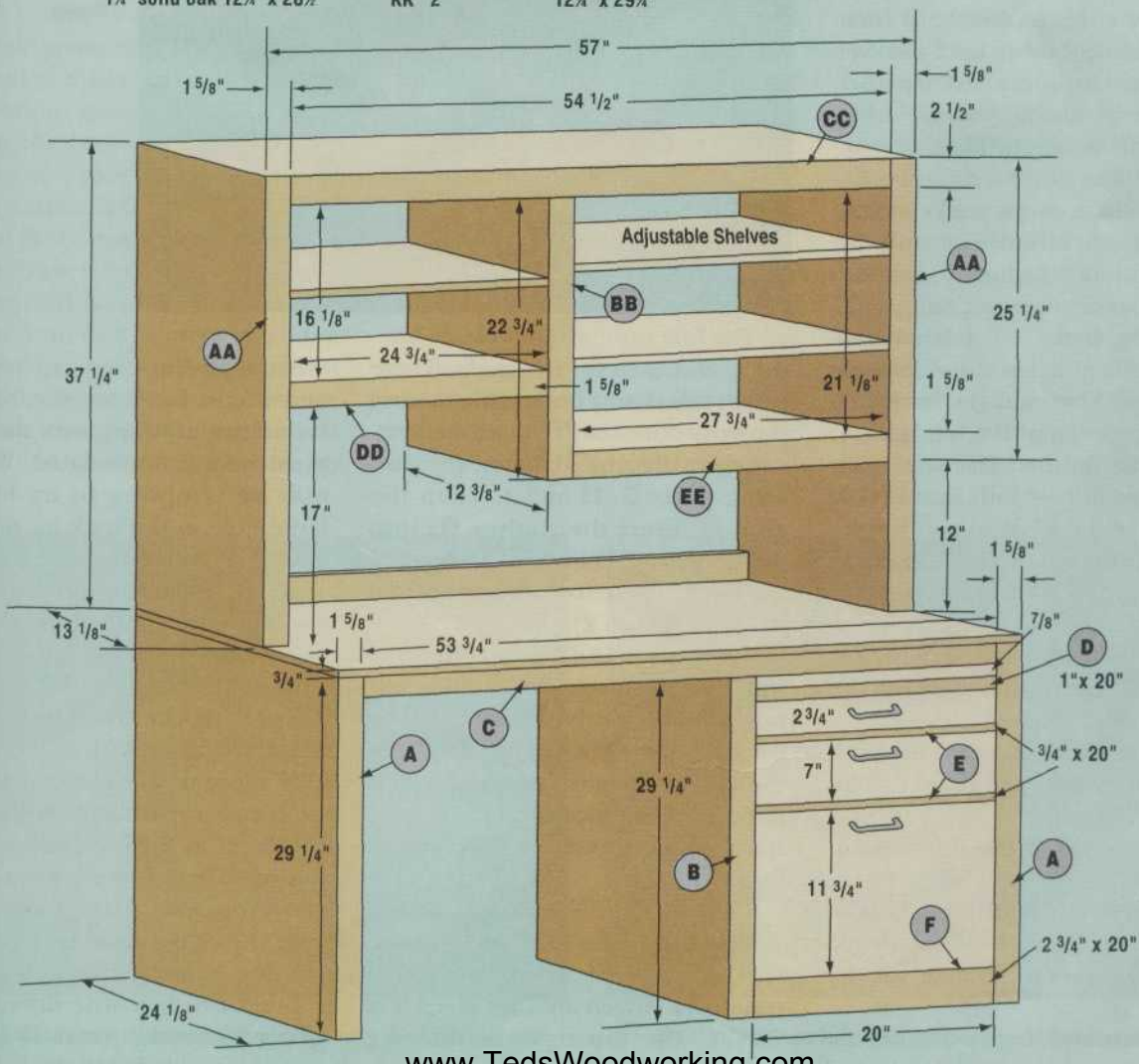
2	8¾" x 12⁹⁄₁₆"
2	10⅜" x 17¾"

Frames

4 Rails	2⅛" x 8¹⁄₁₆"
4 Rails	2⅛" x 10⅛"
4 Stiles	2⅛" x 21⅝"
4 Stiles	2⅛" x 16⅝"

Drawer Hardware

1 Set	22" full extension
1 Set	22" heavy duty full extension



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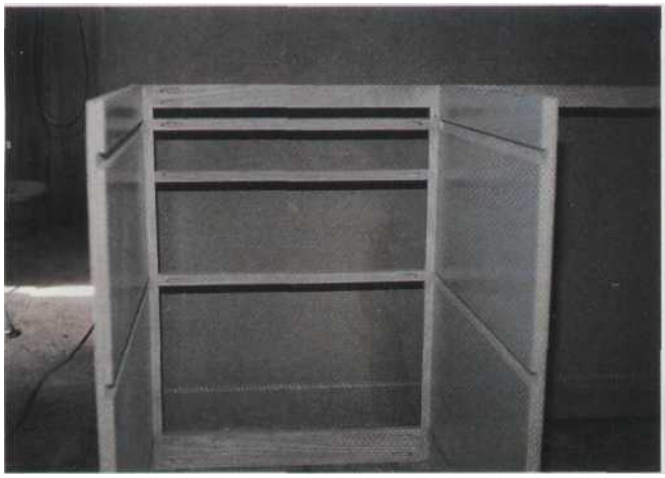

1 Mirrored dadoes in the drawer bulkheads are ready to receive the drawer shelves.

2 The assembled drawer section with shelves in place. The face frame has already been glued on.

hard drive unit and printer. If you find the spaces inappropriate for your system, adjust the spacing accordingly.

There are a number of ways to attach the stiles and rails to form the face frame, but we used a doweling jig as the simplest option. Remember to lay out your doweling lines exactly before drilling.

If you'd like to try a different fastening method, screw pockets using a Kreg jig works well not only for the face frame attachment, but also for the carcase construction.

Once the frame has been assembled and the glue has dried, remove the clamps. Flat sand the back side joints to get a flat gluing surface.

Using the finished face frame, lay out the two drawer bulkheads (G & H) to make the *3/8"* dado cuts for the shelves **(photo 1).** The top dado holds the shelf to support the pull out board. The second dado is for the hard drive unit's shelf. The bottom dado houses the shelf for the bottom printer drawer.

Spacers will be needed on both bulkheads to allow the drawer slides to clear the face frame. You may need to custom fit the thickness of these pieces.

On the outside bulkheads (G), cut a 3/8″ x 3/8″ rabbet on the inside rear edge to accommodate for the 1/4″ back.

Before assembling, pre-sand the visible sides of the bulkheads and the 1/4" oak used for the backs. These pieces are almost impossible to sand properly once they're put together.

3 The three backs in the desk unit shown in place. Notice the wire chase hole for the printer drawer.

Assemble the drawer section using parts G, H and I. Then use glue to insert the shelves (J) into the dadoes in G and H. Clamp the assembly, check for squareness and let it dry **(photo 2).**

Next, glue and clamp the face frame to the assembled drawer section and the left bulkhead (G). Finish nail the back rail (I) between the two bulkheads. The back rail is important for supporting the knee space section and the 1/4" plywood back.

Using 1 1/4" finish nails, attach a 1/4" x 33 3/4" x 29 1/4" piece of oak plywood to the back of the knee space **(photo** 3). Attach another piece 5" x 22 1/2" to the top right behind the pull out shelf and the top drawer.

Since all the computer's components must hook together with the hard drive unit, space for the cables must be accommodated. While it may be tempting to try to cut a large hole in the back for this area, it's actually easier to leave the entire space between the top drawer and the second shelf open to allow access for hooking up the hard drive unit.

Enclose the area behind the printer drawer with a 1/4″ x 15 1/4" x 22 1/2" piece of oak plywood. Cut a 3" hole in this piece to match the hole you'll cut in the back of the printer drawer. These holes are essential to allow for cable passage and to prevent the cables from tangling when the drawer is opened or closed.

Build two box style drawers **(diagram 2)** using parts K-Q. The upper drawer is standard, but the

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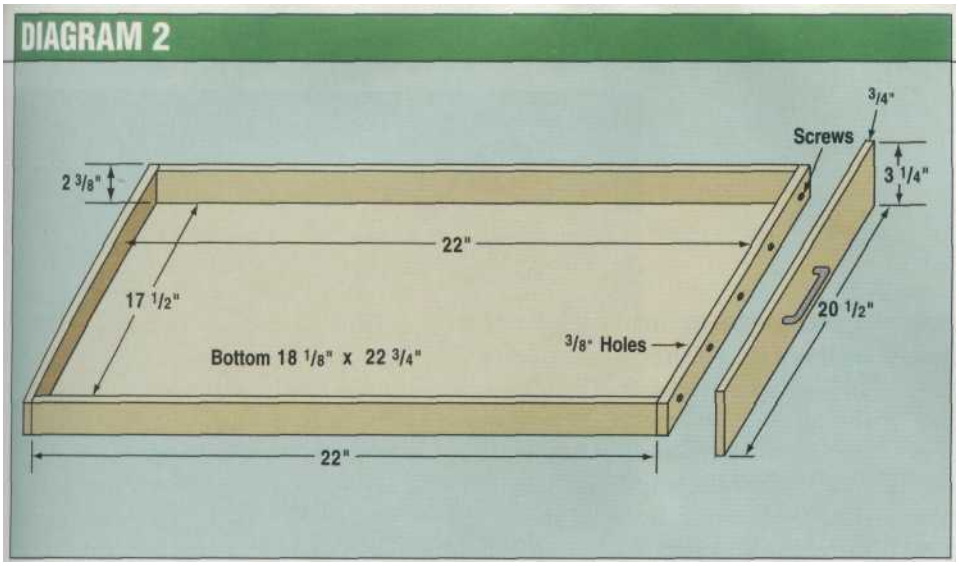

printer drawer has been designed to allow easier access to the printer and paper. Three sides of the drawer are 11" high, but the left-hand side is only 2".

When making the drawers, dado 1/4" x 3/8 deep, 1/4″ up from the bottom of the sides and ends to allow for the 1/4″ bottom. Use glue and nails or an air powered stapler to attach one end and two sides. Then slide the bottom into the groove and attach the last end. Square the drawer and turn the box upside down, running a heavy bead of glue around the bottom's inside.

The drawer fronts (R & S) are constructed from solid oak. The smaller front can be created from a single piece, but the bottom front will probably need to be glued-up. Alternate the growth ring pattern on the end grain of the boards to prevent bowing. Pay attention to the grain pattern while you're arranging the drawer fronts.

Glue-up the pull out board made of MDF oak (T) with a 3/4″ oak piece (U) glued on the front edge. Before you start gluing, cut a finger pull on the underside of **part T,** using either the table saw or a cove bit in a router.

Next, cut the rabbets in the pull out guide pieces (V). When in place, these will act as the top guide for the pull out. The top shelf will be the bottom guide and support, thereby creating a slot for the pull out to ride in **(photo 4).**Corner braces in three of the four corners add stability to the unit and will fasten the top.

Screw the stop piece (W) to the top of the pull out board at the desired length. The pull out board and the desk top will be easier to finish unassembled, so don't glue the stop strip to the pull out.

The top of the desk (X) is fashioned from multiple oak boards. The lumber you have available will determine how many pieces will be necessary for its construction.

Joint the edges to be glued, then glue and clamp, making sure the top will dry on a flat. Again, pay attention to the growth rings while gluing.

Unless you're fortunate enough to have a multitude of double clamps, it's important that you alternate them about 8" apart (one on top, the next on the bottom, etc.) to keep the top flat **(photo 5).** When dry, the top is sanded with a random orbital sander and smoothed with a palm sander.

Next, attach the top. (Even if you finish the top unattached, you should attach it now to make final assembly easier.) To attach the top's back right-hand side, use a hole saw or expansion bit to create a 3" hole in the top shelf, then drill a 3/16" pilot hole in the right back corner brace. This gives you accessibility in fastening the desk top through the shelf to the corner brace.

On the right front side, drill a 1/2″ hole about halfway through the top front rail. This pocket will give you

4 The pull out board is shown in place with a top guide (V) being held in place with squeeze clamps.

5 Alternating clamps help keep the glued-up top level while drying.

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room to maneuver your screwdriver or drill. Make a 3/16″ pilot hole the remainder of the way for the screw. Attaching the left side is easier. Simply screw through the corner braces into the desk top.

An effort was made to maintain as much desk top working space as possible, so the keyboard was placed underneath it on a slide-out unit. There are a variety of options for the keyboard's hardware. The type shown **(photo 6)** is mounted on a board measuring 1 1/2" (or thicker) x 6" x 17", which in turn is mounted to the top's underside in the center.

The hutch's design gives special consideration to space utilization. Computer monitors, like hard drive units, are being made bigger than in the past, so they require at least 17" in height. On this hutch, only the left side was made this height to provide maximum storage for office and computer supplies. You may prefer to make both of the shelf units equal in height.

The hutch's construction is similar to the desk's, with rails and stiles **(parts AA-EE)** fashioning the face frame. Using your face frame, mark the position for the 3/8″ shelf dadoes on the bulkheads (FF & GG). Again cut a 3/8″ x 3/8″ rabbet on the rear inside edge of the outside bulkheads (FF) to accommodate the *1/4"* back. The two back pieces (30 1/4" x 37 1/4", 26" x 37 1/4") will meet and overlap the inner bulkhead edge.

The hutch's bottom stationary shelves (HH & II) are flush with the top of the bottom face frame rails. Do not cut dadoes for the adjustable center shelves (JJ & KK).

Glue in the top rails (LL & MM) and the hutch base moldings (NN) to the inside of the back. Make sure the piece is flush with the inside of the back rabbets.

Next, cut out and glue-up the hutch top (OO). Again, remember to pay attention to the growth rings.

If you prefer not to use solid oak, make sure your crown molding covers the unfinished edges.

Next, glue the crown molding to the front and both sides. You can make your own crown molding if you have access to the proper equipment. If not, you can purchase preshaped crown molding from a local lumberyard.

Make sure your corner miters are tight before you start gluing. Attach the hutch top by gluing and clamp ing, or you can use some strategically placed screws through the front and back rails.

The doors depicted on this hutch are fashioned in the popular raised panel mode. In case of expansion, it may be beneficial for you to stain the interior of the panel prior to assembling rather than after, since the stain may not cover the unexposed areas.

6 The keyboard retracts under the top to allow for a cleaner desk top. Notice the cable running into the side of the drawer section.

7 The edge view of the door shows the through tenon and groove used to assemble the stiles and rails.

8 The back of the door shows the dadoes cut to receive the hinges.

9 This detailed photo shows the hole cut in the drawer section's left bulkhead for the keyboard wire.

The stiles and rails for the door are made on the shaper using a standard 1/4" tongue and groove **(photo** 7). Although some woodworkers find a 3/8″ or 1/2″ tongue and groove make the door stronger, the 1/4″ is sufficient. Use the sizes given in the **Materials List** to cut out and assemble the doors.

To fasten the doors to the cabinet, a knife hinge (pivot hinge) gives a more finished look. To make the hinge grooves, use a 1/4" dado blade in your table saw raised 9/16". The groove is 1 3/4" long for the type of hinge shown **(photo 8).** Always check the manufacturer's instructions for specifications.

A 1/2″ round over bit in a router was used to shape both the ends and fronts of the hutch and desk top. Shape all the edges of the doors and drawer fronts to your own style. Run a profile on the rest of the base material, then glue to the desk and hutch.

Attaching the hutch to the desk base is one of the easiest tasks. Simply drill pocket holes angled through the outside of the hutch back and screw in with face frame screws.

Now you're almost finished, with the exception of a couple modifications to allow the computer system to be hooked together.

To accommodate the cable from the keyboard to the hard drive unit, cut a 1" hole in the left side of the drawer section **(photo 9)** at the level of the hard drive unit shelf.

Next, cut a 2" hole in the back of the hutch to access the cable from the monitor to the system. The monitor will cover the hole nicely and isn't readily visible.

If you opt to cut the hole in the top of the desk, you will need to make the 1" hole in the drawer section larger (at least 2" to allow for the cable attachments).

Complete the entire piece using your favorite stain and preferred finish.

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CAPPUCINO BAR

Materials:

white pine 2" x 6", 8 feet long
3/4" and 1/2" dowels, 3 feet each
circular saw
drill
3/4" and 1/2" drill bits
2 or 3 large C-clamps
hammer
2-1/2" drywall screws
heavy-duty picture frame hangers
paint
polyurethane stain
measuring tape
black paint
coarse, medium and fine sandpaper
small scrap block of wood
wood glue

Note: Before tackling this project, practice drilling on some scrap 2" x 6" wood pieces to see how straight you can make a hole. Always wear safety goggles when using the drill or saw.

Steps:

1. Place the pine on the work table and measure 21 inches from the end that has the flattest cut. Put the straightedge on the board, diagonal from one corner to the other, and draw a cut line. Use the clamps to hold the wood down while cutting, and manipulate the wood in order to make a clean cut with the circular saw.
2. Put the cut piece on top of the other like a sandwich, so the widest end is now the top of the base for the shelf.
3. Make a pencil line along the sandwich edge to match the other.
4. Un-sandwich, re-clamp and cut along the line.
5. Cut the top, measure 29 inches from the edge and draw a cut line. Cut with circular saw.
6. Pick the side that will look the best for the front, and measure 2" from each end, measuring in towards the center. Mark. Draw a line from both of these to the back corners. Clamp and cut these two lines.
7. At the widest end (the top), find the center along the side where you are to insert the 3/4-inch dowel and mark. From this marked point, measure down the side 2-1/2 inches twice, then one inch back toward the uncut end, which is the back. These are the other two dowel marks. Clamp both pieces together like a sandwich.
8. Fit the drill with the 3/4-inch bit and with a steady hand, drill through both pieces as straight as possible.
9. Repeat for 1/2-inch dowels using the 1/2-inch drill bit.
10. Cut the 3/4-inch dowel to 20 inches and the two 1/2-inch dowels to 12 inches.
11. Sand all pieces with coarse, medium and fine sandpaper.
12. At the bottom of the base, if the edges are too sharp, wrap sandpaper around a block of wood and sand it flat.
13. Assemble the two sides of the base, with the top down, and set on the table. Feed the dowels through the holes and center each one. Use the scrap pine for the spacer in between the two sides. Mark each dowel and slide out to glue, then slide back to the marks and twist, spreading the glue. Allow to glue to dry for at least an hour.
14. Lay the newly glued base flat on its back with the spacer underneath, center the top next to the top base, and mark two pilot holes for each side, two inches apart. Mark and drill the four pilot holes, all the way through to the base.
15. Spread some glue on the tops of each base, reposition and screw together.

16. Turn over and find the center, mount the hangers 16 inches on center from the center mark on the back.
17. Finish by masking out the dowels on the base and painting the them with black paint. Apply a polyurethane stain and let dry overnight.

CHINA HUTCH

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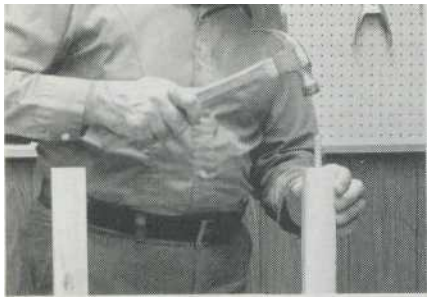


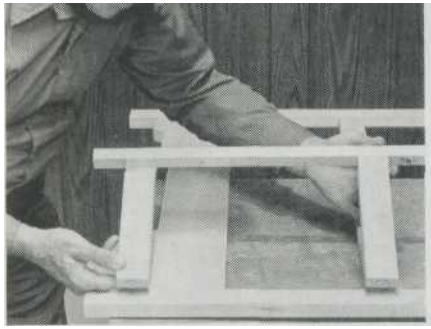
The frame sections of the china hutch are assembled with the aid of glue and spiral dowels. Dowel centers are recommended to ease matching of dowel holes.

lectibles? Here's the perfect cabinet for you, with lots of transparent glass to show off your treasures. It even has an elegantly wallpapered hacking that can be changed at will. Select the decorative hardware to match the decor of your room—bright, brassy and modern or dark and intricate Mediterranean, or even sleek Oriental. You'll find a wide variety of handles and drawer pulls in all styles at any good hardware shop.

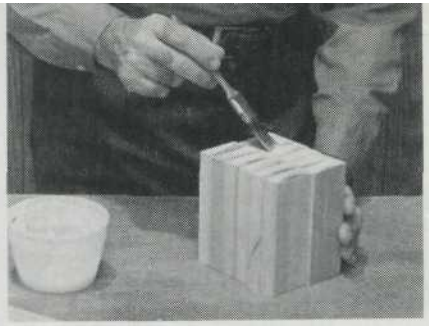
Choose flat defect-free boards in the wood of your choice tor the frame. Rip them on the table saw into strips 13/4" wide. Remove all saw marks with a plane or jointer. Do not

you will need three strips cut to 28 1/2". These are tor the crosspieces. You will also need one piece 5 3/4" x 28 1/2" to be used for the lower section.

Drill dowel holes as indicated; the use of a doweling jig and dowel centers is recommended. Mark of! the hole locations and drill into the ends of the crosspieces. Make the holes 3/8" in diameter and 1 1/16" deep. Because of the narrow width (1 3/4") use only one dowel per joint. The jig will automatically center the hole. After drilling the crosspieces, use dowel centers to transfer the hole locations to the uprights. Use two dowels for



This photo more clearly shows how locating pins are used to transfer the dowel holes from the edge to front of frame. Use bar clamps till glue dries.



Shown here is how the end grain of the crosspieces are given a sizing coat of glue. Sized glue is made by mixing equal measurements of glue and water.

The upper, center, and lower panels are assembled with glue and nails. Pilot holes are drilled before nailing to prevent the thin wood from splitting.

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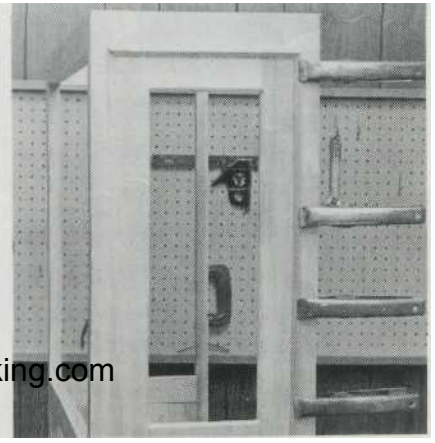
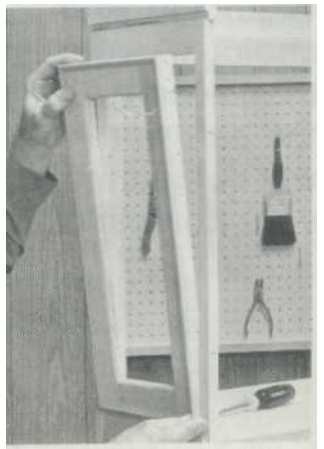
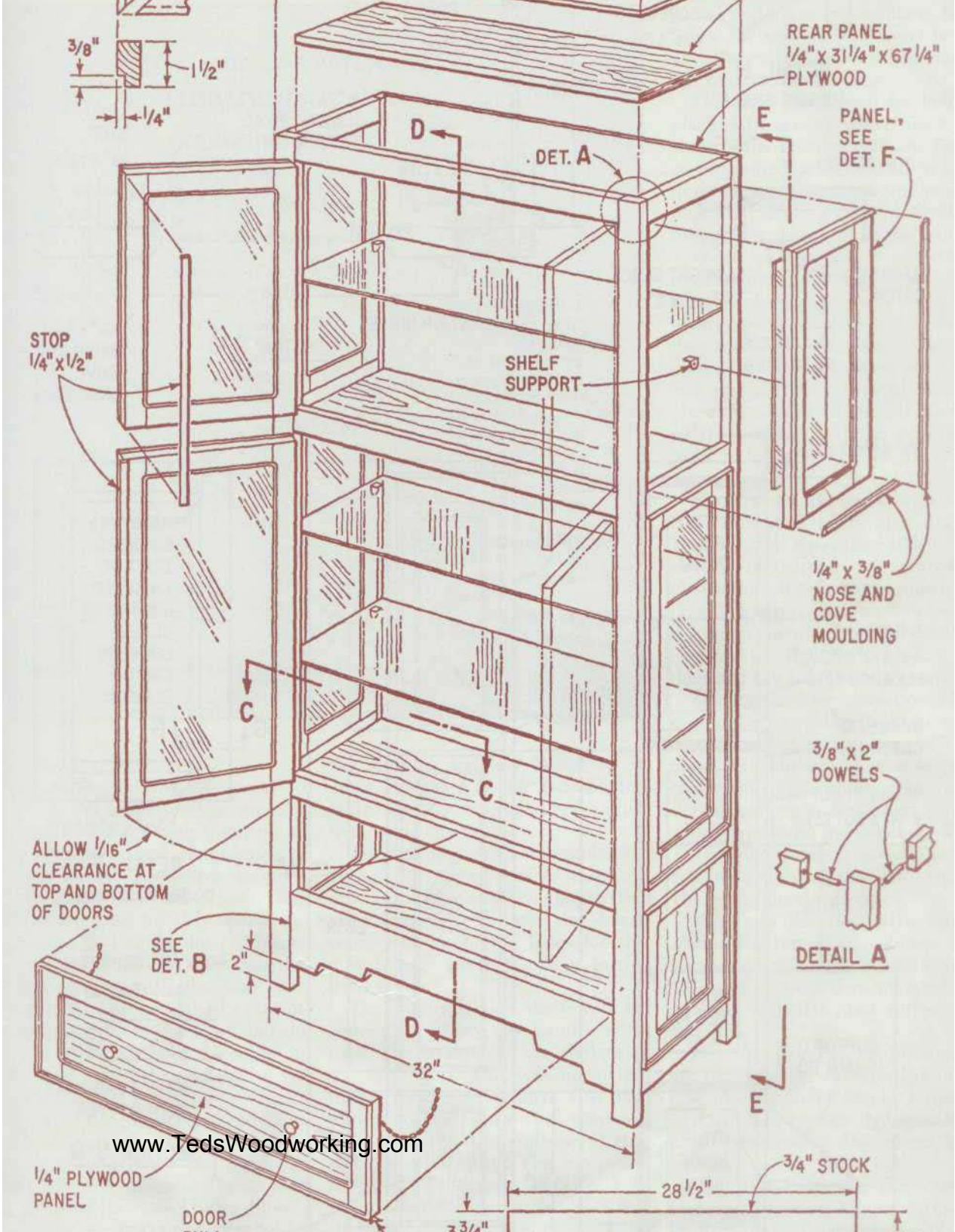
The edges of the panels are dressed up





The inside edges of the panels must be



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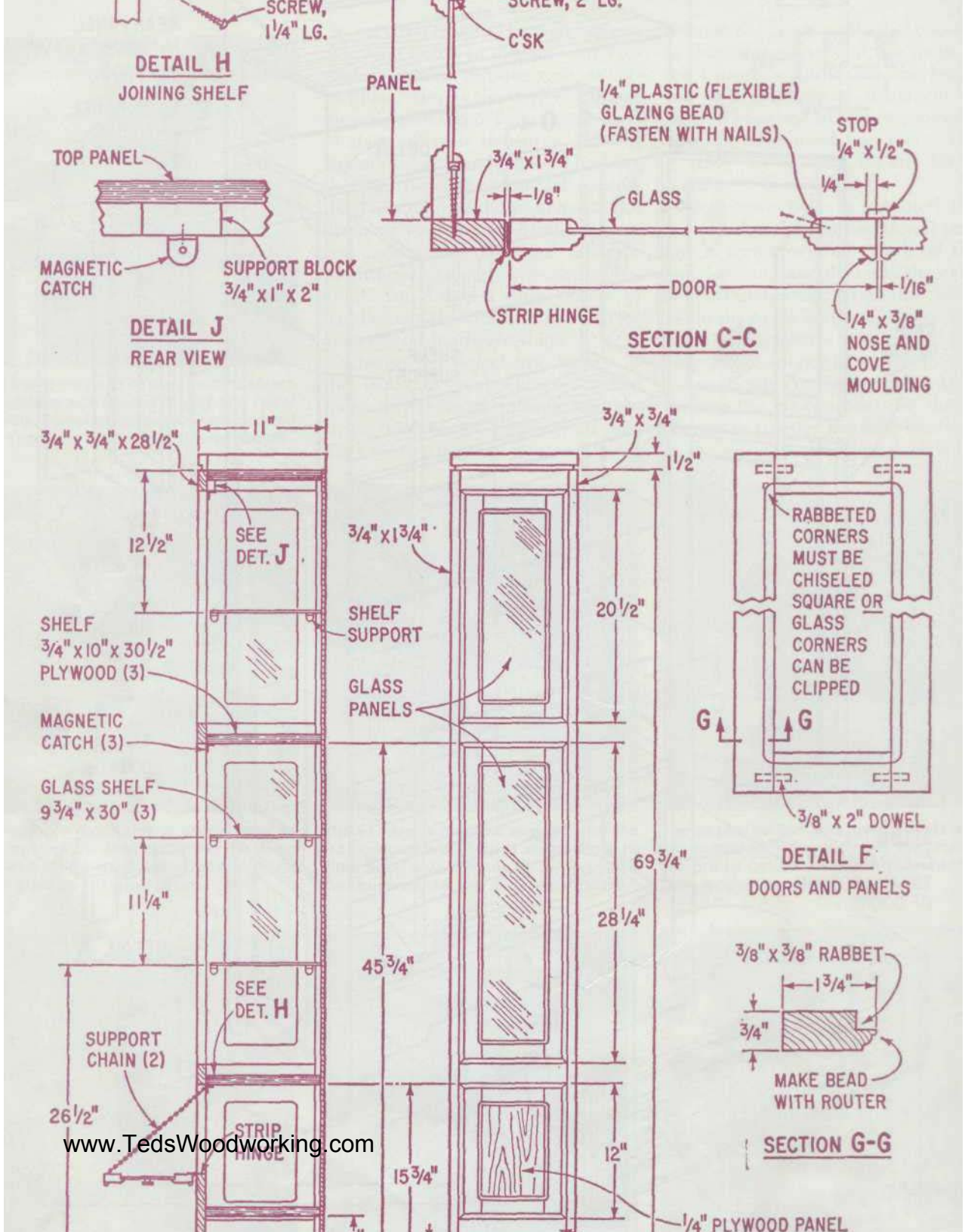

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BILL OF MATERIALS

QUANTITY	SIZE AND DESCRIPTION	PURPOSE
2	3/4" × 1 3/4" × 69 3/4"	Front stile
2	3/4" × 3/4" × 69 3/4"	Side stile
3	3/4" × 1 3/4 × 28 1/2"	Front rail
1	3/4" × 5 3/4" × 28 1/2"	Apron
8	3/4" × 1 3/4" × 9 1/2"	Side rail
2	3/4" × 1 1/2" × 11"	Side cap
1	3/4" × 1 1/2" × 32"	Front cap
1	1/4" plywood, 31 1/4" × 62 3/4"	Rear panel
4	3/4" × 10" × 30 1/2"	Shelves
4	3/4" × 2" × 20 1/4"	Upper side panel
4	3/4" × 2" × 28 3/8"	Center side panel
4	3/4" × 2" × 12 1/8"	Lower side panel
12	3/4" × 2" × 9 1/2"	Side crosspieces
4	3/4" × 2" × 20 1/8"	Upper door stiles
4	3/4" × 2" × 28 1/4"	Center door stiles
8	3/4" × 2" × 14 3/32"	Door rails
2	3/4" × 2" × 28 3/8"	Lower door stiles
2	3/4" × 2" × 7 7/8"	Lower door rails
1	1/4" × 4 3/4" × 24 1/4"	Lower door panel
2	1/4" × 3/8" × 60 ft.	Nose & cove molding
2	1/4" × 6 1/4" × 8 7/8"	Lower side panels
1	1/4" × 1/2" × 48"	Door stops
	8 ft.	Strip hinges
6		Pulls
3		Magnetic catches
	3/8" × 2"	Dowels
	40 ft.	Glazing bead, plastic
12		Shelf pegs

Also: have glass pieces cut to fit frames.

the wide bottom piece.

Before assembling the parts to make up the frame section, prepare the clamps by opening them up to size; also have some scrap strips of wood at hand for protecting the work surface from the clamp jaws. Bar clamps are ideal for this operation. Dab some glue on the dowels, insert into the drilled holes, then coat the mating surfaces with glue and join. Use adequate pressure on the clamps to force glue from the joint, but do not overtighten. Check the frame to be certain that it is square, then set aside while the glue dries.

Prepare the side crosspieces and the rear uprights. These are drilled and assembled much like the front frame, the only difference being that the depth of the dowel holes differs. The holes are drilled 1 1/2" deep into the 9 1/4" crosspieces and 1/2" deep into the uprights.

After drilling the necessary holes the uprights are only 3/4" X 3/4" in cross section, a double pass on the table saw **is** recommended rather than using the router.

The side frames are assembled by gluing the crosspieces to the rear uprights. These are then glued to the front frame. Again, use the dowel centers to locate the holes for the dowels from the crosspieces to the front frame.

The frame at this stage will be somewhat flimsy, so handle with care. The addition of the shelves is the next step. This will make the frame rigid and strong. Cut the frames to size, then drill diagonal holes through the bottom of the three lower shelves. The top piece is drilled from the top side. Use 1 1/2" round head (RH) screws to attach the shelves.

The frames for the doors and side panels are made next. Cut the necessary pieces and assemble them

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with the router later on when making the rabbets for the glass.

The side panels will be held in place with screws which must not show in the finished cabinet. This is accomplished by drilling screw holes in the rabbeted area where the glass molding will conceal them. Drill the holes before assembling the panels.

When all the panels are assembled, rabbet them lor the glass and cut the decorative bead using the router. Sand all edges and surfaces, then install into the frame. The nose and cove molding is added using glue and spring clamps to hold them in place. Miter all corners and use care not to mar the molding surface. A piece of felt glued under the clamp jaws is recommended.

Door panels are made with sufficient allowance for the strip hinges. The left-hand doors have a door stop added. The right-hand doors are beveled at the left edge to clear the other door. When installing the strip hinges, use only the end holes until you have cheeked fit. If fit is okay, you can then add the balance of the screws.

The bottom door which opens horizontally is treated in the same manner. Instead of glass, it has a 1/4" back panel. In addition, it has an insert to improve its appearance. This insert is simply a piece of 3/8" solid lumber which drops into the panel opening.

Add the plywood inserts to the bottom panels of the side pieces. These are glued into place.

Next add the decorative strips around the top of the cabinet. This is made by rabbeting a long strip of 1 1/4" stock which is then cut apart and mitered. Hold it in place with **screws** and glue.

The rear panel of 1/4" plywood is *not* nailed to the cabinet. Instead it is screwed so that it can be removed as desired to change the decorative paper background. Use round head serews.

Drill the holes for the various pieces of hardware. Mount and check fit. Remove hardware when applying finish, then replace.

Finish the cabinet as desired. You can stain the wood and top with sev

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CORNER DISPLAY CABINET

ALTHOUGH it looks complicated, there are short-cuts that take much of the hard work out of the project. First is use of readily available decorative molding strips; second is use of flexible wood tape to cover exposed plywood edges. The fancy scalloped curves on side pieces, fringe, and skirt can be cut with a power jig saw or saber saw, and if you clamp the two side pieces together you can use a wood rasp and sandpaper to get exactly-matching curves.

The entire cabinet is made of 1-inch thick veneered plywood, except for the door facings. These are 1/2-inch plywood. Use the veneer surface of your choice (birch, ash, mahogany, walnut, etc.) and buy wood tape to match.

Cut out the two back pieces. Note that one panel is 21 inches wide, the other is 20 3/4 inches. Rabbet the front and back edges of the narrower panel as shown in Detail A. Now cut out the bottom, top, intermediate top, and the shelves. Make up full-size patternsfor the side piece scallops (or use those available as noted at the end of this article), trace them on the rectangular side pieces, and cut the wood to shape. Clamp the side pieces together as noted above, and trim to smooth, fair curves.

Make up the spine from 3/4-inch plywood (or hardwood), and bevel each side to a 45° angle. This gives added strength to the back joint.

Use glue on mating surfaces, and fasten the two back panels together with 1/4-inch #8 flat head wood screws. Be sure to drill pilot holes for all screws, and countersink for the heads. Next install the spine and the top panel with 1 1/4-inch #8 flat head wood screws, after coating the mating surfaces with glue.

Rabbet the rear edges of the two side pieces, and install them as shown in Detail A. Now you can install the bottom panel, the intermediate top, and the upper shelves. Cover the exposed edges of the shelves with wood tape before installation, and be sure that all these panels are square with the back

and side pieces. Again, use glue on mating surfaces, and fasten with l 1/4-inch flat head wood screws.

Make up a cleat of 3/4 X 3/4-inch pine stock, as shown in the exploded perspective drawing. Install it underneath the intermediate top, and fasten the apron to it. The face of the apron should be flush with the edge of the intermediate top.

Cut out the two spacers from *7/8" X* 7/8-inch pine or other hardwood stock, and bevel one side of each to a 45° angle as shown in Detail A. These spacers are installed along the front edge of each side piece, bottom and intermediate top panels.

Use full size patterns for the skirt and fringe pieces, cut the pieces out, sand the curves smooth, and install them. The fringe goes under the front edge of the top panel, and the skirt goes under the front edge of the bottom panel. Make cleats of 3/4 *X 3/4-inch* stock as shown in the exploded perspective view, and install them behind the fringe and skirt pieces. Cover the scalloped edges with flexible wood tape.

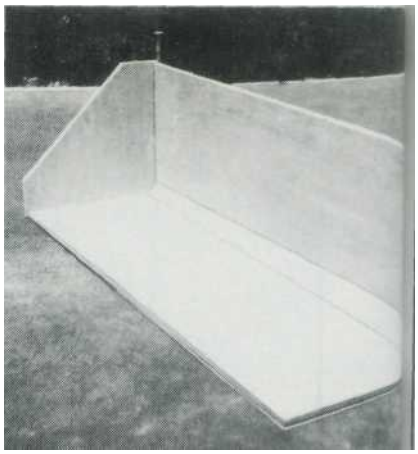
Now install the decorative molding at the top and intermediate top. Bevel the corners and use the same trim along the sides. Use glue and small brads to fasten the molding in place. Set the brad heads below the surface of the wood, and cover with matching wood filler. Cut out and install the cabinet shelf in the lower compartment after covering the front edge with wood tape.

Make up the two doors from 3/4-inch plywood, with /2-inch plywood facings and decorative molding around the edges as shown on the plans. Note that corners of facings and moldings must be mortised carefully for a snug fit. Round the edge of each door on the side opposite the hinges, and cover the exposed top and inner edges with wood tape

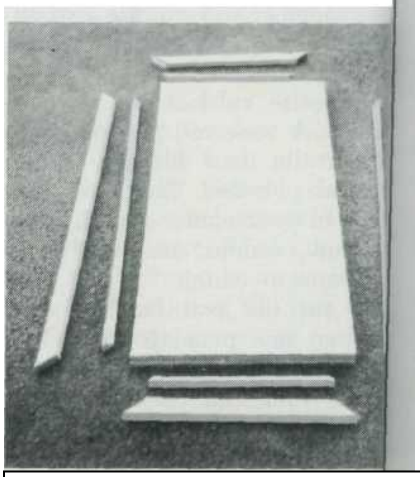
. For hinges, use the new knife type used by radio cabinet manufacturers. These come in left hand and right hand models, and they feature stops that prevent the doors from swinging all the way back. See Detail B for hinge and door relationship.

Finally, sand the cabinet lightly, and finish with two coats of varnish or other clear coating to bring out the natural beauty of the wood. Sand lightly between coats, and if additional coats are needed, sand before application. When the final coat is dry, install the doorknobs of your choice, and the project is done.

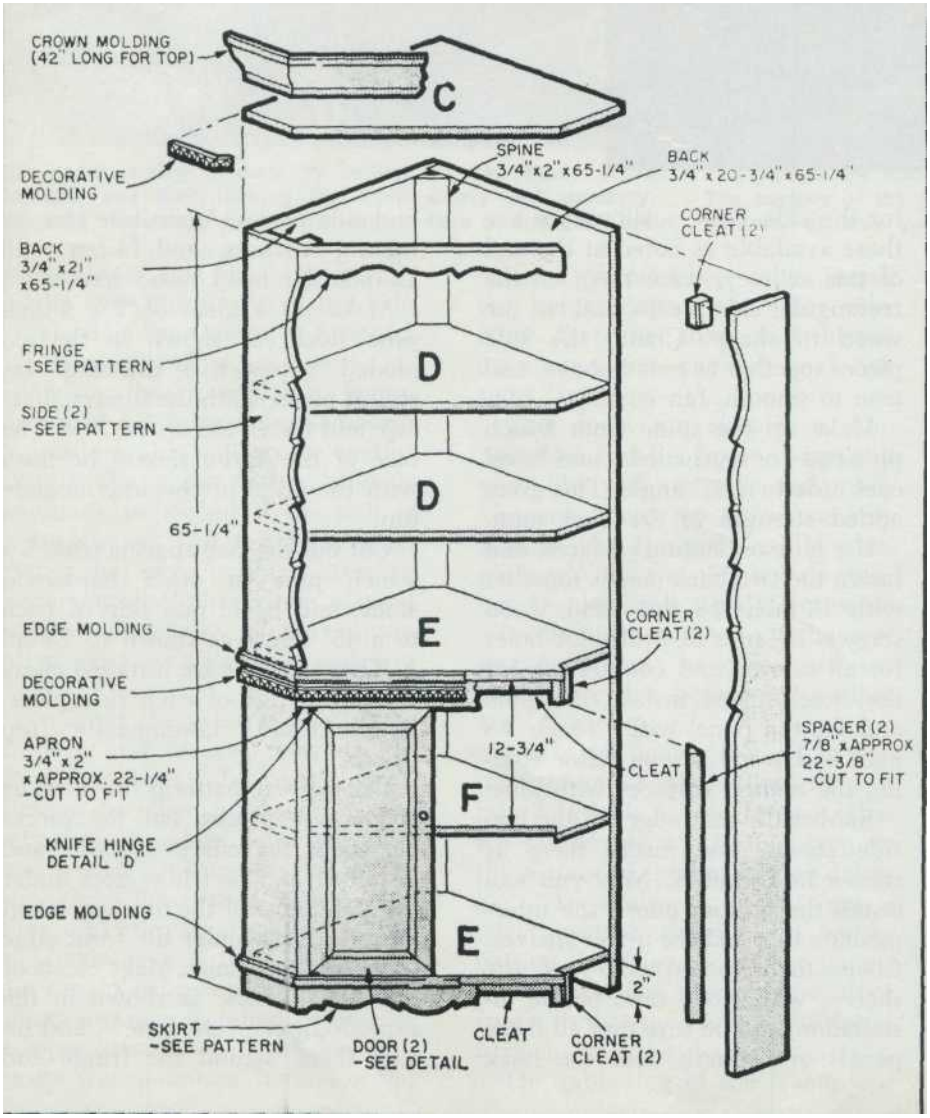
Shown here are the assembled back top and spine. The spine is beveled each side to a 45 degree angle, and gives strength to the back join



Put in the intermediate top, apron and shelves, covering shelf edges tape. Next is fringe and skirt, plus molding on top and intermediate top



Attach door facings with glue, and wood screws. Work from backside door. The corners and facings must be mortised carefully for a snug fit


CROWN MOLDING (42" LONG FOR TOP)
C
DECORATIVE MOLDING
SPINE 3/4"x2"x65-1/4"
BACK 3/4"x20-3/4"x65-1/4"
CORNER CLEAT (2)
BACK 3/4"x2" x65-1/4"
FRINGE -SEE PATTERN
D
SIDE (2) -SEE PATTERN
D
65-1/4"
E
EDGE MOLDING
CORNER CLEAT (2)
DECORATIVE MOLDING
APRON 3/4"x2" x APPROX. 22-1/4" -CUT TO FIT
12-3/4"
CLEAT
SPACER (2) 7/8" x APPROX 22-3/8" -CUT TO FIT
F
KNIFE HINGE DETAIL "D"
EDGE MOLDING
E
2"
SKIRT -SEE PATTERN
DOOR (2) -SEE DETAIL
CLEAT
CORNER CLEAT (2)

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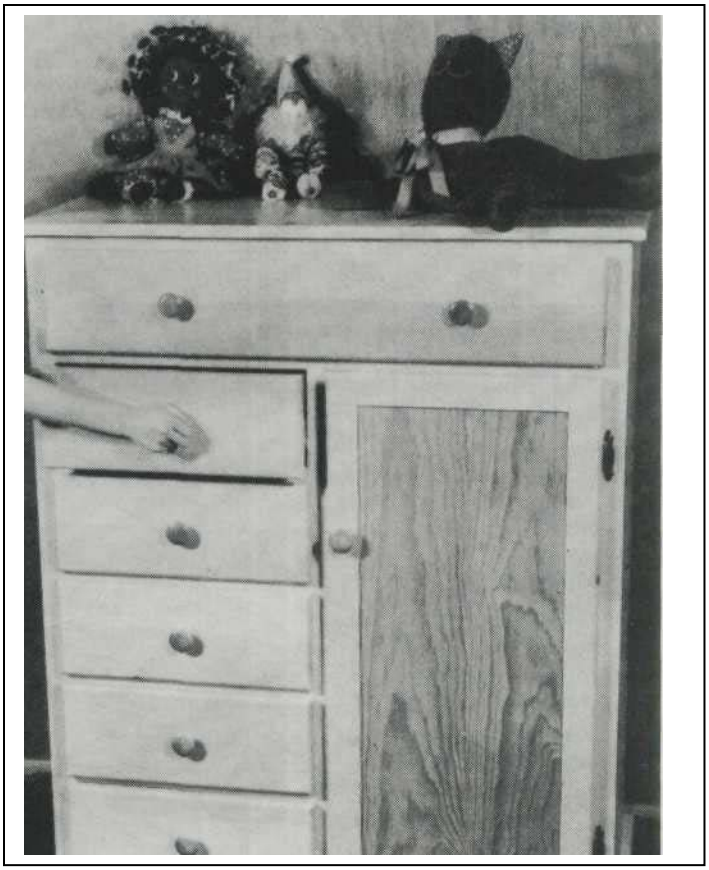
CHILD'S ARMOIRE

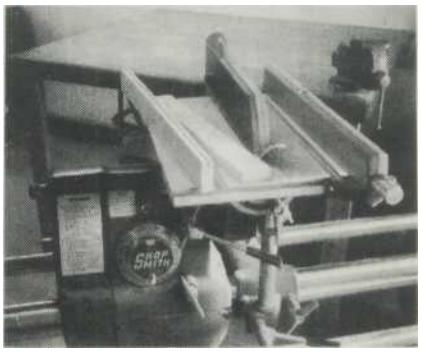


THIS CHILD'S ARMOIRE will make it easy for kids to keep their rooms neat and orderly. Its six drawers and two shelves provide enough storage space to house a substantial wardrobe. By following a simple modification to be described below, the shelf compartment can even be replaced with a small closet complete with clothes pole for hanging dresses, suits, or coats. Best of all, the ar-moire is designed especially with the pint-sized set in mind. No more standing on tippy toes just to reach a clean pair of socks!

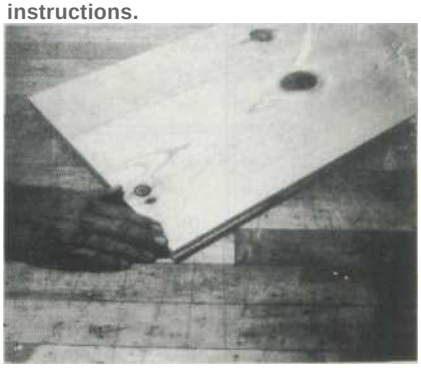
Before starting on the project, carefully study all photos, diagrams, lists, and building instructions. One attractive feature worth noting at the outset is that no fancy joinery is required. With the exception of a few simple rabbets, nothing more complicated than butt joints is called for. On all of these joints, use 1 1/4" finish nails and glue unless otherwise specified. Another plus is that only the most basic of shop tools are needed, although a router is essential, and you 11 probably also find a table saw to be helpful.

Because of the variety of dimensions encountered in the plan, we've simply indicated the total amount of 3/4" pine required, which is 47 board feet. This figure allows approximately 15% for scrap. When shopping at the lumberyard, bear in mind that the largest single width of pine called for in the plan is 6 3/8" (parts V and W).

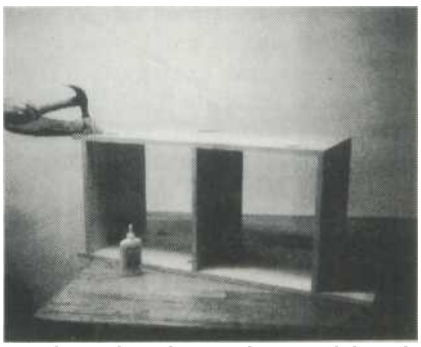
Procuring the hardware should not be much of a problem. If you do have difficulty, though, a complete



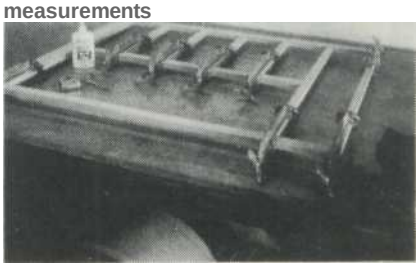
The first step is to cut all wood to proper size. Refer to the cutting schedule and Details 1 and 2 for further instructions.



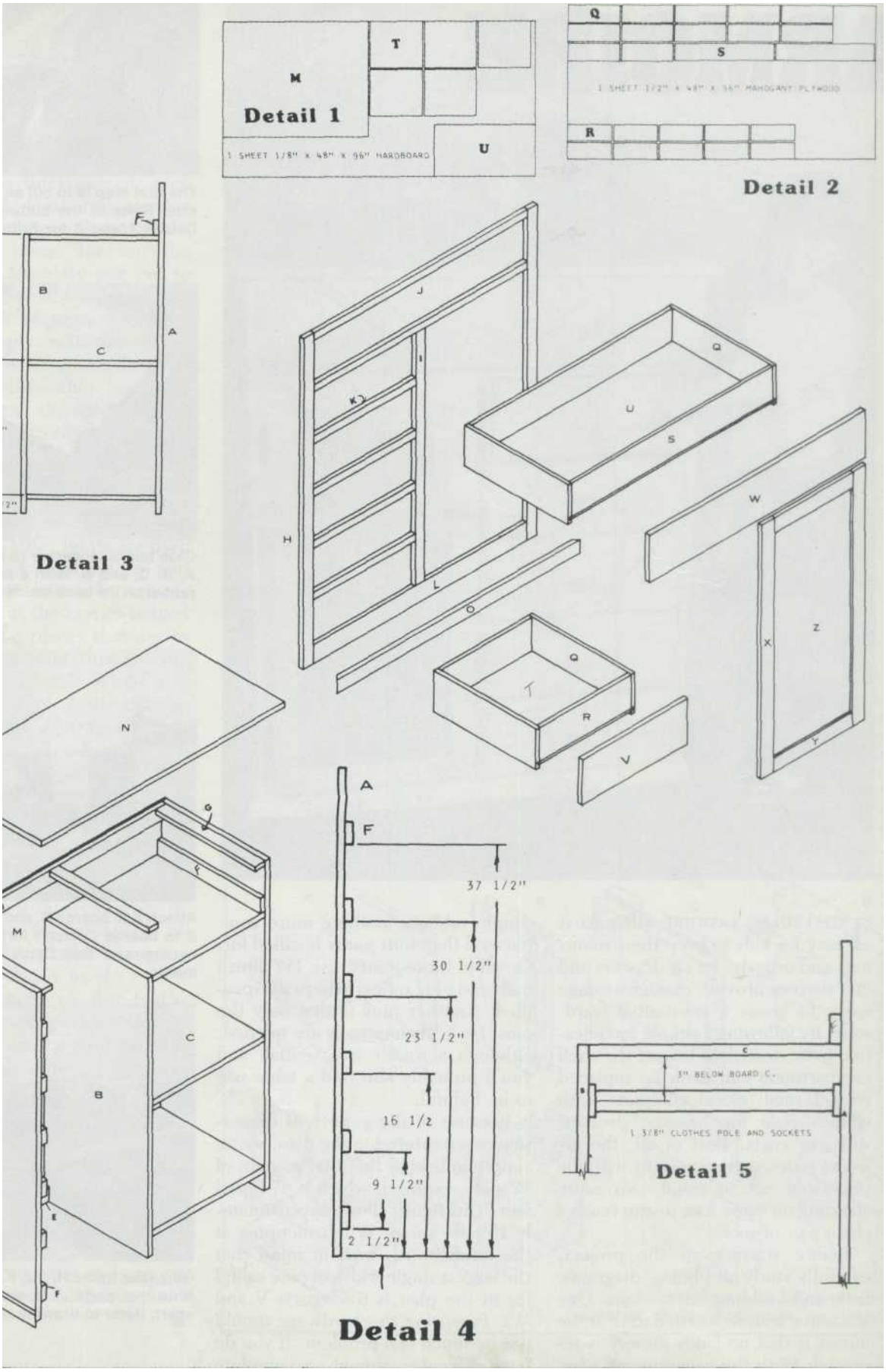
Glue boards together to make up boards A, B, C, and N. With a router, cut a thin rabbet on the back inside edge of board A.



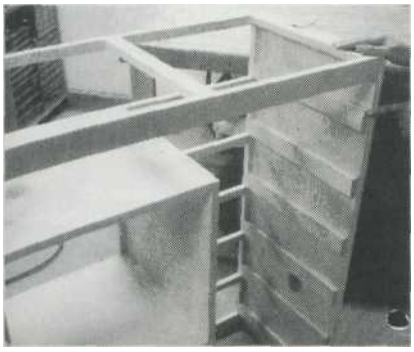
Attach A to boards B, and C. Attach board B to boards C. Don't forget to check for squareness. See Detail 3 for measurements



Glue face frame H, I, J, K, and L together. Note that parts J, K, and L are each 6" apart. Refer to drawing on the next page.

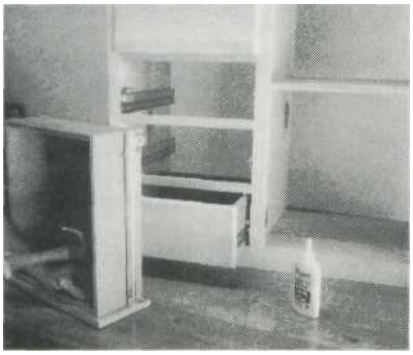

M
T
U
1 SHEET 1/8" x 48" x 96" HARDBOARD
Detail 1
Q
S
R
1 SHEET 1/2" x 48" x 96" MAHOGANY PLYWOOD
Detail 2
F
B
C
A
Detail 3
J
I
K
H
L
O
Q
U
S
W
X
Z
Y
T
R
V
N
G
M
C
B
E
F
A
F
37 1/2"
30 1/2"
23 1/2"
16 1/2
9 1/2"
2 1/2"
Detail 4
C
3" BELOW BOARD C.
1 3/8" CLOTHES POLE AND SOCKETS
Detail 5

Attach face frame to A, B.and C. Attach upper back crosspiece D to boards A. Attach lower crosspiece E to A and B.



Attach two boards G to A, D, and J. Attach one board G to the center of D and J. Then attach drawer supports F to both boards A.

Nail Q to R using 1" brads. Slide hard-board T into groove in Q and nail. Follow the same procedure for the large drawer.



Attach drawer guides to boards Q and F. Nail the drawer fronts R and S to the drawer face panels using brads and glue.

set of hardware, replete with mounting instructions and all necessary screws, can he ordered through the mail. Write to the address found at the end of this article for more information.

Cutting the Parts. Begin by cutting all parts down to their proper sizes as indicated on the cutting schedule. Consult the panel layouts in Details 1 and 2 before cutting out parts M, Q, R, S, T, and U. Farts A, B, C, and N are formed by gluing smaller hoards together. This not only saves you the trouble of hunting down unusually large widths of lumber, but is also an excellent strategy for avoiding possible warpage. Of course, whenever you build up large boards from smaller ones in this way, it's a good idea to use dowels for extra strength. When cutting out the parts, note that only two shelves (C) are needed if you intend to make the cabinet space into a closet.

With a router, cut a rabbet into the back inside edge of each part A side piece; this is to allow for the eventual placement of the rear hard-board panel (M). Similarly, cut grooves into the lower inside edge of each of the drawer sides (Q) to provide access for the hardboard drawer bottoms (T and U). In the interests of safety, you'll also want to round off all of the exposed edges of the piece with a router. The upper edges of the top piece (N), for example, should be rounded off to a 1/4" radius, as should the outside edges of the drawers (parts V and W) and cabinet door (parts X and Y).

Construction. Start by building the cabinet compartment with parts B, C, and one part A. Refer to the accompanying photos and to Detail 3 for the proper placement of parts. If you intend to make a closet out of the shelf space, ignore the middle shelf board (C) shown in Detail 3. Check for squareness and accurate alignment of all parts. Next, assemble the face frame from parts II, I, J, *K,* glue here, and drive the nails through part II (on the drawer side of the face frame) into the front edge of the side panel. To secure the construction, attach the upper back crosspiece (D) between the two parts A, following the placement indicated on the schematic. This crosspiece must be aligned with the rabbets on the two parts A in order to accommodate the rear hardboard panel (M). The lower back crosspiece (E), spanning from part B to the drawer-side part A, is similarly aligned with the rabbet on A.

On each side of the unit now, attach a top support (G) between the face frame and the upper rear cross-piece (D), as shown in the schematic and Detail 3. Then take the remaining part G top support and fasten it to parts D and J in the center of the unit. The drawer supports (F) are added next. Detail 3 shows how one part F is to be situated on the cabinet-side part A. The remaining six drawer supports are arranged on the drawer-side part A according to the measurements given on Detail 4. Once all the drawer supports are in place, carefully center the armoire top (N) and fasten it to parts D, G, and J. Set the unit aside now, and allow all glue to dry.

Drawers. Each of the five small drawers consists of two sides (Q), a front and back (both parts R), a hard-board bottom (T), and a face panel (V). Start by attaching the front and back to the sides with 1" brads and glue. As seen in the schematic, the tops of the two parts R are flush with the tops of the drawer sides. Next, slide the hardboard bottom (T) into the grooves of parts Q, and secure it with a nail or two. Repeat this procedure in assembling the large drawer from parts S, U, and the remaining parts Q.

Following the manufacturer's instructions, attach the 16" drawer guides now to the drawer supports (F) within the armoire unit and to the sides (Q) of each drawer. Assembly of the drawers is completed then with the addition of the face panels (parts V for the- small drawers; W for the large drawer). Use glue here, and drive 1" brads through the drawer fronts (R or S) into the face panels. Again using 1" brads, fasten the hardboard rear panel (M) to the back of the armoire, driving the brads through M into parts A,

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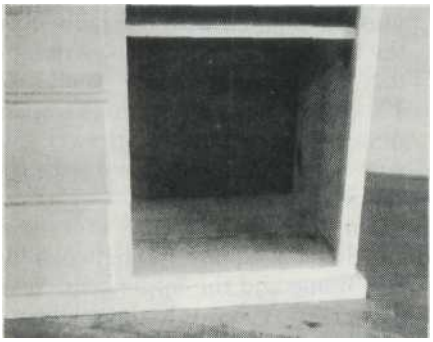

Use 1" brads to attach M to A, D, and E. Miter front ends of boards P and attach to A. Miter both ends of O and attach to L.

attached next. First, miter both ends of the front base piece (O) at a 45° angle, and miter the matching end of each of the two side base pieces (P). Parts P are then glued and nailed to parts A, while O is fastened to the face frame bottom (L).

Cabinet. The cabinet door comprises parts X, Y, and Z. Start by routing out a 1/8"'-wide x 3/8"-deep channel centered along the inside edges of parts X and Y. The cabinet door panel (Z) is nestled within these channels and secured in place with glue. The excess channel space on both ends of each part X may be concealed with a wood filler. Otherwise, **cut** four 1/8″ x 3/8" x 1 1/2" splines from scrap and glue into place. Hang the door with hinges mounted 4" in from each end. Attach wooden knobs to the drawers and cabinet door, sand the entire unit and finish as desired.

Assuming you've left out the middle shelf (C), it's an easy matter **to** make the cabinet compartment into a closet for hanging clothes. All that's needed is a pair of 1 3/8" diameter clothes pole sockets and a 17" length of l 3/8" dowel. Just locate the sockets 3" below the cabinet ceiling (C), and centered on parts A and B. Detail 5 shows the arrangement found in the closet option.

and L, as shown in the schematic. The horizontal parts J, K, and L are spaced 6" apart in the frame to make room for the drawers. Clamp the completed face frame securely, and allow all glue to dry before continuing.

The face frame assembly is then carefully positioned on the cabinet compartment and fastened into place. Now attach the remaining side panel (A) to the construction. Use

B, D, and E. The front and side base pieces are

MATERIALS LIST

Qty.	Size	Material	Items
1	⅛" × 48" × 96"	Hardboard	M,T,U
1	½" × 48" × 96"	Mahogany plywood	Q,R,S
1	⅛" × 13" × 31"	Pine or birch plywood	Z
47	Board feet, ¾"	Pine	A,B,C,D,E,F,G, H,I,J,K,L, ,N,O,P,V,W,X,Y

CUTTING SCHEDULE

All measurements are in inches. All material is pine unless otherwise indicated.

Item	Qty.	Size	Description
A	2	¾ × 16¼ × 44½	Sides
B	1	¾ × 16⅛ × 37½	Vertical divider
C	3	¾ × 16⅛ × 17¼	Shelves
D	1	¾ × 2 × 34½	Upper back crosspiece
E	1	¾ × 2 × 16½	Lower back crosspiece
F	7	¾ × 2 × 16⅛	Drawer supports
G	3	¾ × 1½ × 15⅜	Top supports
H	2	¾ × 1½ × 44½	Face frame sides
I	1	¾ × 1½ × 34	Face frame vertical divider
J	2	¾ × 1 × 33	Face frame top drawer guides
K	4	¾ × 1 × 15¾	Face frame drawer guides
L	1	¾ × 2½ × 33	Face frame bottom
M	1	⅛ × 35¼ × 44½ (hardboard)	Rear panel
N	1	¾ × 17¾ × 37½	Armoire top
O	1	¾ × 1⅝ × 37½	Front base piece
P	2	¾ × 1⅝ × 17¾	Side base pieces
Q	12	½ × 5⅝ × 16 (mahogany ply.)	Drawer sides
R	10	½ × 5¼ × 13¾ (mahogany ply.)	Small drawer fronts and backs
S	2	½ × 5¼ × 31 (mahogany ply.)	Top drawer front and back
T	5	⅛ × 14¼ × 16 (hardboard)	Small drawer bottoms
U	1	⅛ × 16 × 31½ (hardboard)	Top drawer bottom
V	5	¾ × 16⅜ × 16¼	Small drawer face panels
W	1	¾ × 6⅜ × 33½	Top drawer face panel
X	2	¾ × 2 × 34⅜	Cabinet door frame verticals
Y	2	¾ × 2 × 12¼	Cabinet door frame horizontal
Z	1	⅛ × 12¾ × 30⅞ (ply.)	Cabinet door panel

Hardware:
6 pair 16" drawer guides
8 1½" diameter wooden knobs
1 pair door hinges
1 small box 1" brads
1 small box 1¼" finish nails
1 bottle yellow carpenter's glue
1 quart finish

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CHINA HUNT

ARE YOU LOOKING for a showpiece china hutch to display your elegant chinaware, antique vase, or collectibles? Here's the perfect cabinet for you, with lots of transparent glass to show off your treasures. It even has an elegantly wallpapered hacking that can be changed at will. Select the decorative hardware to match the decor of your room—bright, brassy and modern or dark and intricate Mediterranean, or even sleek Oriental. You'll find a wide variety of handles and drawer pulls in all styles at any good hardware shop.

Choose flat defect-free boards in the wood of your choice tor the frame. Rip them on the table saw into strips 13/4" wide. Remove all saw marks with a plane or jointer. Do notremove too much stock, just enough to clean the edges, Cut the strips to the various lengths. For the front, you will need three strips cut to 28 1/2". These are tor the crosspieces. You will also need one piece 5 3/4" x 28 1/2" to be used for the lower section.

Drill dowel holes as indicated; the use of a doweling jig and dowel centers is recommended. Mark of! the hole locations and drill into the ends of the crosspieces. Make the holes 3/8" in diameter and 1 1/16" deep. Because of the narrow width (1 3/4") use only one dowel per joint. The jig will automatically center the hole. After drilling the crosspieces, use dowel centers to transfer the hole locations to the uprights. Use two dowels for the wide bottom piece.

Before assembling the parts to make up the frame section, prepare the clamps by opening them up to size; also have some scrap strips of wood at hand for protecting the work surface from the clamp jaws. Bar clamps are ideal for this operation. Dab some glue on the dowels, insert into the drilled holes, then coat the mating surfaces with glue and join. Use adequate pressure on the clamps to force glue from the joint, but do not overtighten. Check the frame to be certain that it is square, then set aside while the glue dries.

Prepare the side crosspieces and the rear uprights. These are drilled and assembled much like the front frame, the only difference being that the depth of the dowel holes differs. The holes are drilled 1 1/2″ deep into the 9 1/4" crosspieces and 1/2″ deep into the uprights.

After drilling the necessary holes into the rear uprights, rabbet the edge to take the rear panel. Because the uprights are only 3/4" X 3/4" in cross section, a double pass on the table saw **is** recommended rather than using the router.

The side frames are assembled by gluing the crosspieces to the rear uprights. These are then glued to the front frame. Again, use the dowel centers to locate the holes for the dowels from the crosspieces to the front frame.

The frame at this stage will be somewhat flimsy, so handle with care. The addition of the shelves is the next step. This will make the frame rigid and strong. Cut the frames to size, then drill diagonal holes through the bottom of the three lower shelves. The top piece is drilled from the top side. Use 1 1/2" round head (RH) screws to attach the shelves.

The frames for the doors and side panels are made next. Cut the necessary pieces and assemble them with 3" finishing nails. Pilot holes for the nails must be drilled to simplify nailing and to prevent splitting. Note: Space the nails so they won't be cut with the router later on when making the rabbets for the glass.

The side panels will be held in place with screws which must not show in the finished cabinet. This is accomplished by drilling screw holes in the rabbeted area where the glass molding will conceal them. Drill the holes before assembling the panels.

When all the panels are assembled, rabbet them lor the glass and cut the decorative bead using the router. Sand all edges and surfaces, then install into the frame. The nose and cove molding is added using glue and spring clamps to hold them in place. Miter all corners and use care not to mar the molding surface. A piece of felt glued under the clamp jaws is recommended.

Door panels are made with sufficient allowance for the strip hinges. The left-hand doors have a door stop added. The right-hand doors are beveled at the left edge to clear the other door. When installing the strip hinges, use only the end holes until you have cheeked fit. If fit is okay, you can then add the balance of the screws.

The bottom door which opens horizontally is treated in the same manner. Instead of glass, it has a 1/4″ back panel. In addition, it has an insert to improve its appearance. This insert is simply a piece of 3/8" solid lumber which drops into the panel opening.

Add the plywood inserts to the bottom panels of the side pieces. These are glued into place.

Next add the decorative strips around the top of the cabinet. This is made by rabbeting a long strip of 1 1/4" stock which is then cut apart and mitered. Hold it in place with **screws** and glue.

The rear panel of 1/4″ plywood is *not* nailed to the cabinet. Instead it is screwed so that it can be removed as desired to change the decorative paper background. Use round head serews.

Drill the holes for the various pieces of hardware. Mount and check fit. Remove hardware when applying finish, then replace.

Finish the cabinet as desired. You can stain the wood and top with several coats of varnish for an antique look.

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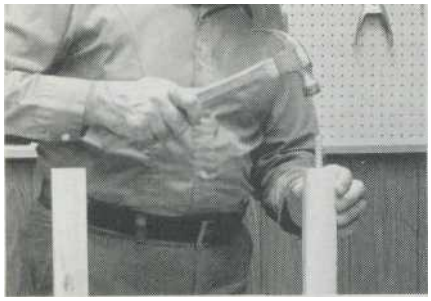
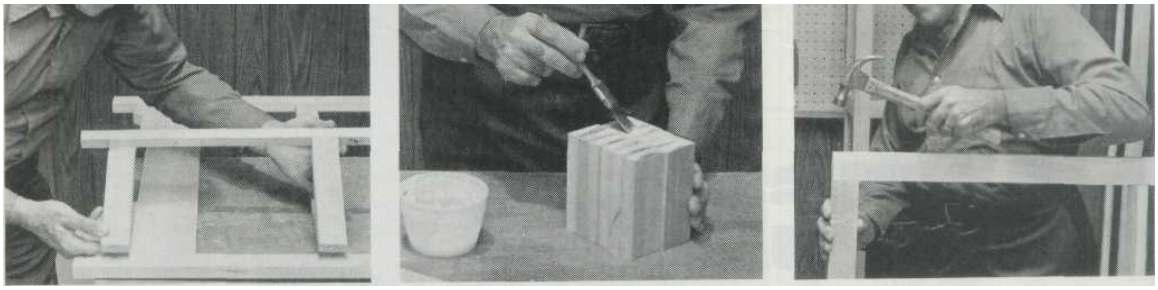


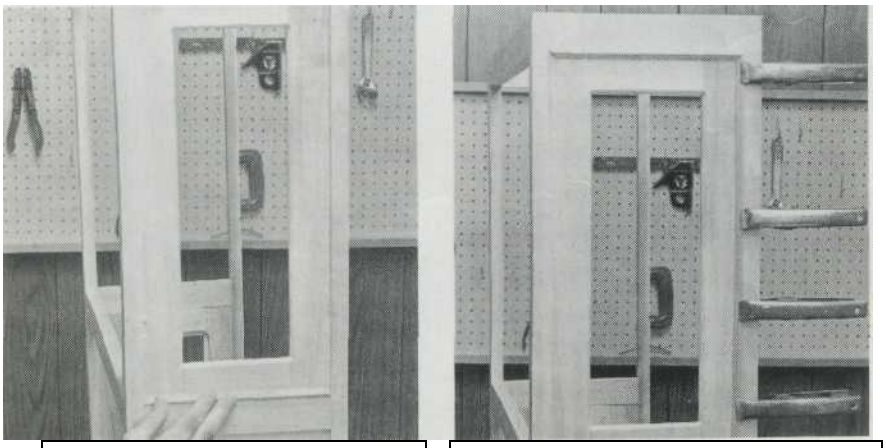
The frame sections of the china hutch are assembled with the aid of glue and spiral dowels. Dowel centers are recommended to



This photo more clearly shows how locating pins are used to transfer the dowel holes from the edge to front of frame. Use bar clamps till glue dries

Shown here is how the end grain of the crosspieces are given a sizing coat of glue. Sized glue is made by mixing equal measurements of

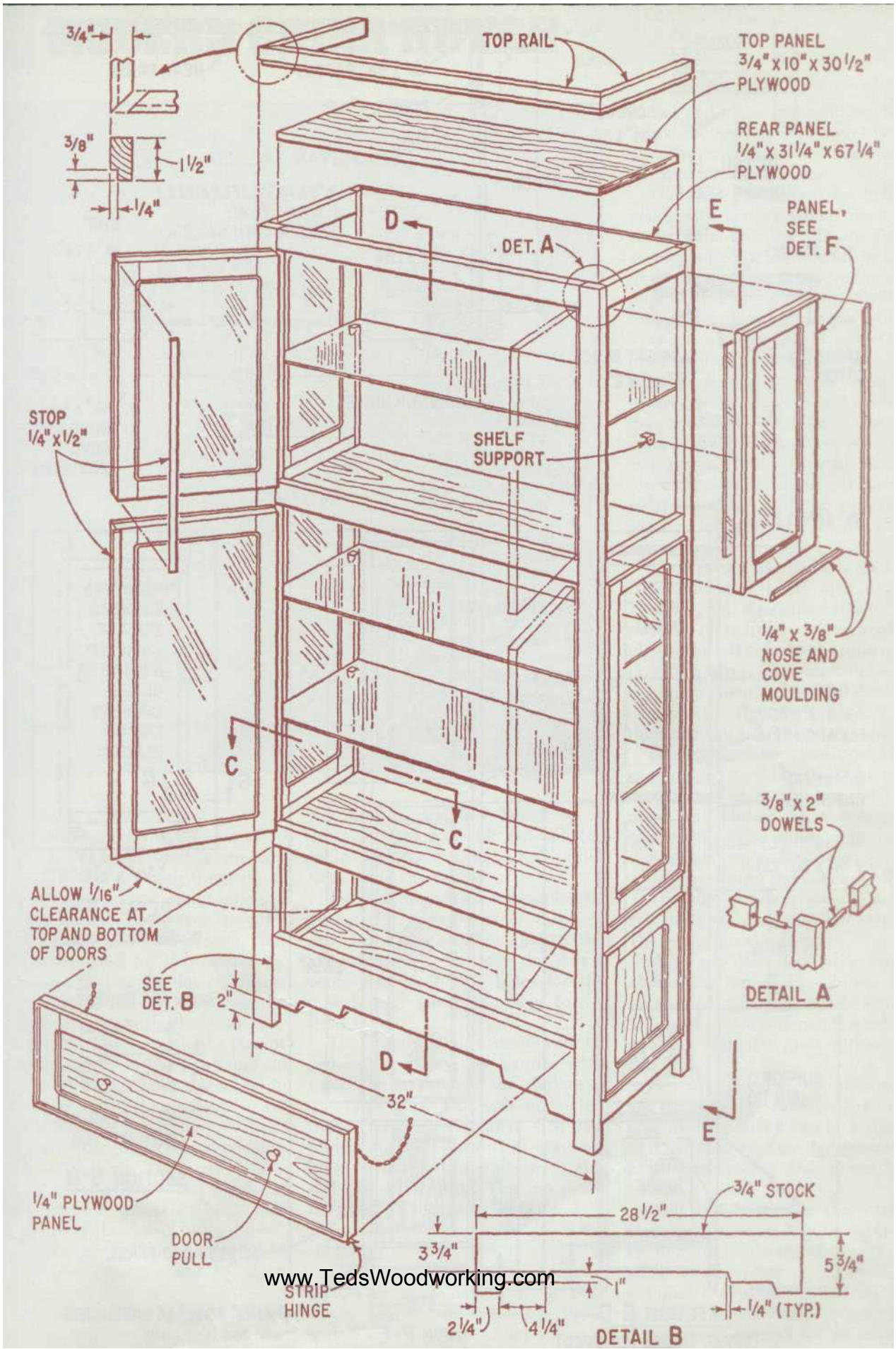
The upper, center, and lower panels are assembled with glue and nails. Pilot holes are drilled before nailing to prevent the thin wood from



The edges of the panels are dressed up with the application of nose and cove molding. This molding can be bought at lumber yards, home decorating centers.

You won't need to use nails to apply the molding if you follow the technique shown here. The molding is simply glued into place, held by clamps until dry

The inside edges of the panels must be rabbeted to accept the glass; they are re-moveable so that glass can easily be replaced in the event they are broken.



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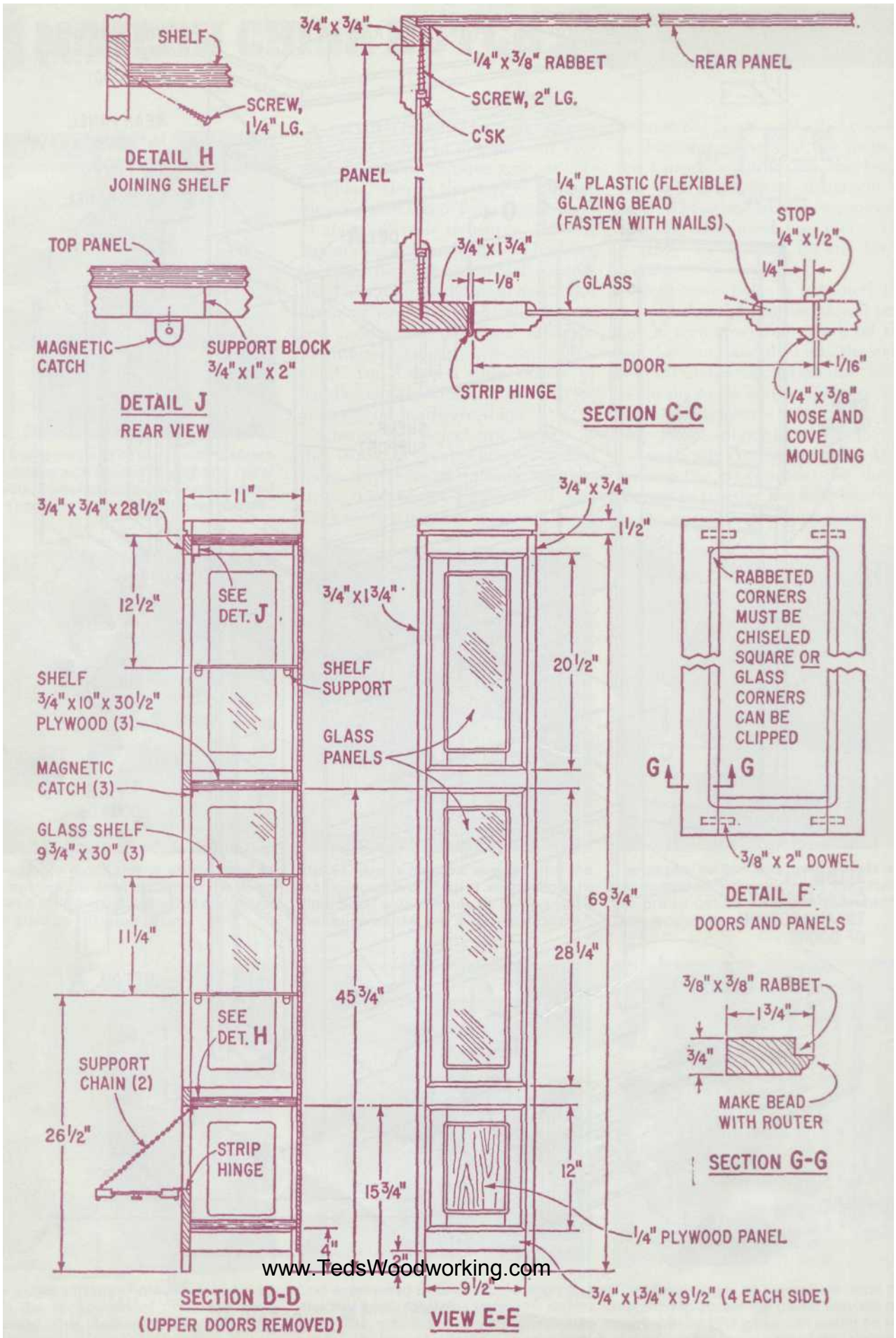

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Shaker-Style Woodbox

Given the resurgence of fireplaces and wood-burning stoves over the last couple of decades, needs for in-home firewood storage also have redeveloped. Unlike earlier times, when many households depended upon wood-fueled fires for all of their cooking and heating, storage requirements today are somewhat reduced. This became readily apparent as I looked through my library for design ideas to construct a woodbox. place. While the room's overall ambiance is southwestern, it also contains a few other early-American antique pieces. A durable, functional woodbox was needed that, rather than providing a focal point for the room's decor, would serve its purpose without detracting from the ambiance.

Because the box was to be painted, I built it of clear white pine. Also, since the box was to be simple but functional, the joinery was selected on the basis of durabil-ity and efficiency. This box is easy to make, but it is still high quality To ensure that the box would hang together as chunks of firewood are thrown in, and as the wood shrinks and swells with the changing sea-sons, the joinery, the grain orienta-tions and the seasonal movements of its components all had to be carefully considered.

As indicated in the drawings, dadoes and rabbets were used to join this box, securing the joints with cut nails. Cut nails are my choice over wire nails because they have more holding power and are historically correct for this style of joinery. I oriented the grain so the ends and bottom expand and contract in unison; that is, the cross-grain dimension extends front to back in these components. Thus, the front and back panels are carried along as the end and bottom shrink and swell.

The cross-grain orientation in the front, back and partition is vertical so these three components move as a unit as well. However, the partition is not carried with the bottom; therefore, the partition is housed in dadoes at each end and its length is adjusted so the bottom (along with the front and back pan- els) will move independently throughout the year.

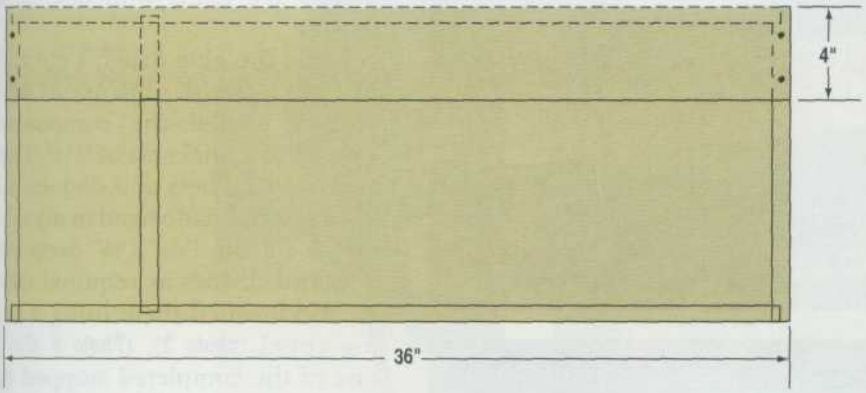
Finally, the rabbets in the end panels are stopped at the bottoms of the front and back panels. With the bottom housed in dadoes in the ends and in rabbets in the front and back, the bottoms of the front and back should be fixed, forcing expansion and contraction of these components to operate along their tops.

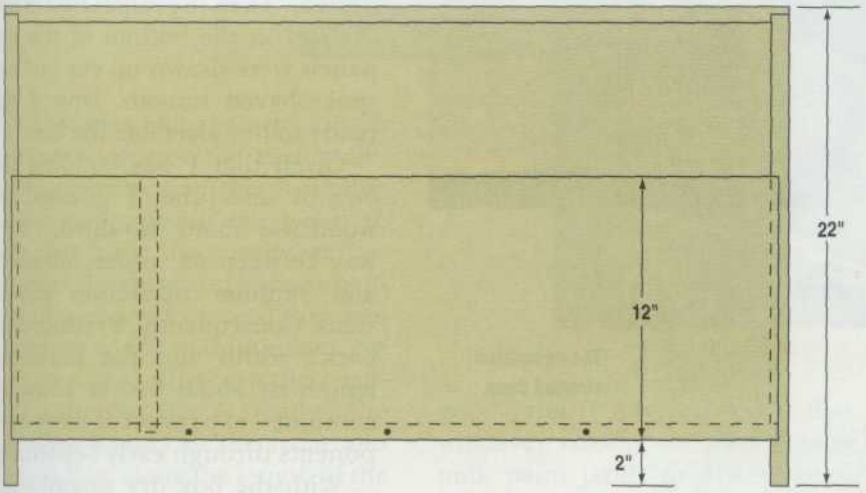
Since the back is housed in the top of the rabbet, the gap between the back and top from late-winter to mid-summer will be visible only from the back. However, the front will shrink to expose an 1/8″ or so of the rabbets in each end, while in late summer the front's top edge will extend above the relief in the ends

If this is objectionable, one could use a housed rabbet and dado joint, stopping the dado below the relief. This is a more complicated joint, however, requiring a bit more time which translates, in the commercial world, to additional cost.

With these design and construction details thought through, I proceeded to select and square-up stock for this box, not overly concerning myself with grain and color matching since the box was going to be painted. I also did not discard stock because of blue stain as I glued-up stock to the panel dimensions given in the cutting list. To make the wider panels, I simply edge-joined the stock, liberally spreading yellow glue on the edges, and clamped the stock together. Since one of my most important goals is to build furniture that does not self-destruct a decade

Dimensions



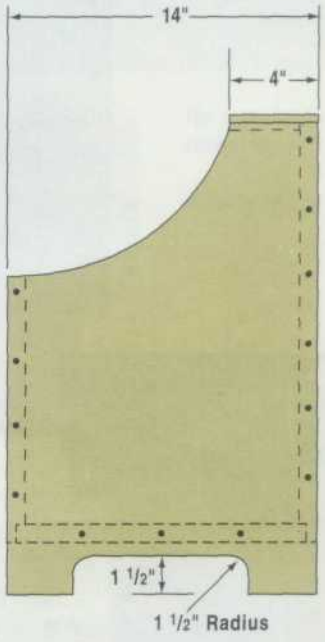


Materials List

White Pine:

2 ends	13/16" × 14" × 21 9/16"
1 front	13/16" × 12" × 35 1/8"
1 back	13/16" × 19 9/16" × 35 1/8"
1 top	13/16" × 4" × 36"
1 partition	3/4" × 11 9/16" × 13 1/8"
1 bottom	13/16" × 13 1/8" × 35 1/8"

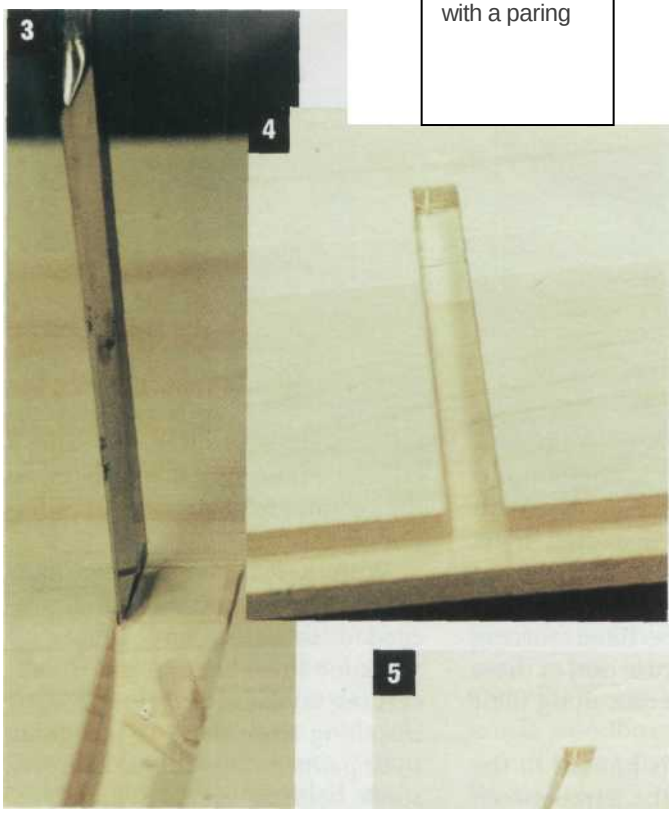
2d cut finish nails
1 pint milk paint



Cutting glued-up ends to finish dimensions

Cutting the rabbet in the bottom edge of the back panel

Completing a stopped dado with a paring



The completed stopped dado.

or two hence, I did not "reinforce" these edge joints with biscuits or dowels.

Once the glue dried, I cut each piece to its finish dimensions (photo 1) and planed the components smooth to a thickness of 13/16″. Then I laid out rabbets and dadoes. Using a stacked dado head in my table saw, I cut the 13/16"X3/8" deep rabbets and dadoes as required (photo 2), and finished them using a paring chisel **(photo 3). (Photo 4** shows one of the completed stopped dadoes.) I also cleaned up the rabbets with a shoulder plane so the assembled joints would be tight and crisp **(photo 5).** Then the reliefs that create the feet in the bottom of the end panels were drawn in, cut out and spokeshaved smooth. Now I was ready to dry assemble the box.

Given that I was building this box in mid-June, I guessed my wood was about two-thirds of the way between its winter minimum and summer maximum dimensions. Consequently, I reduced the back's width and the partition's length by about 3/32" to allow for continued expansion of these components through early September

With the box dry assembled, I laid out the curved relief in the top front of the end panels. By drawing the curves full-size on the ends, I could play with the shape until I found one that was pleasing to the eye. Disassembling the box, I cut the reliefs in each end, spokeshaved them smooth, and sanded the inside surfaces to 180 grit. The box was now ready for final assembly.

As before, I assembled the box dry and clamped it together securely. No glue was used in the box's assembly to ensure that slight differences in expansion would not cause the components to pull themselves apart. Using a 1/16" drill bit, I provided pilot holes for the nails and proceeded to nail through the ends into the front, back and bottom panels. In using cut nails, which have a

Cleaning up a rabbet joint with a shoulder plane

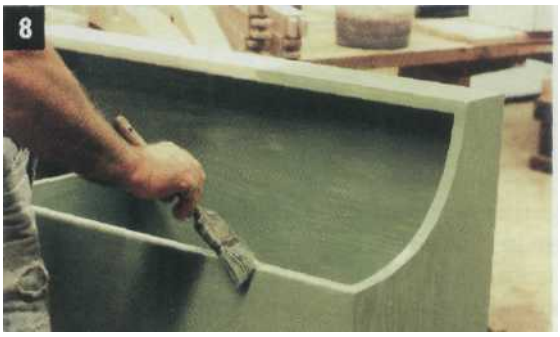
rectangular cross-section shape, the wide dimension must be oriented along the grain **(photo 6);** thus the wedge effect of the wider than thick nails is exerted against the end grain, thereby eliminating the possibility of the nail causing the wood to split. Similarly, the bottom was secured to the front and back by nailing through the front and back into the edges of the bottom panel. No nails are used to secure the partition, since the idea is to allow the partition dadoes in the front and back to float along the length of the partition as the bottom/ends unit expands and contracts. Finally, I nailed the top to the ends, then countersunk all nail heads 1/16" to 1/8" below the surface. The cavities were filled, and after the filler cured, all exterior surfaces were sanded to 180 grit. **(Photo 7** shows the assembled box.) While 180 grit abrasives leave far too coarse a surface for my taste, this box was to be painted with tavern green milk paint. Since milk paint provides a textured mat surface, sanding beyond 180 grit would have been a wasted effort.

Driving a cut nail, showing the wide dimension of the nail, is oriented along the grain of the wood you're nailing through

The assembled and sanded woodbox.

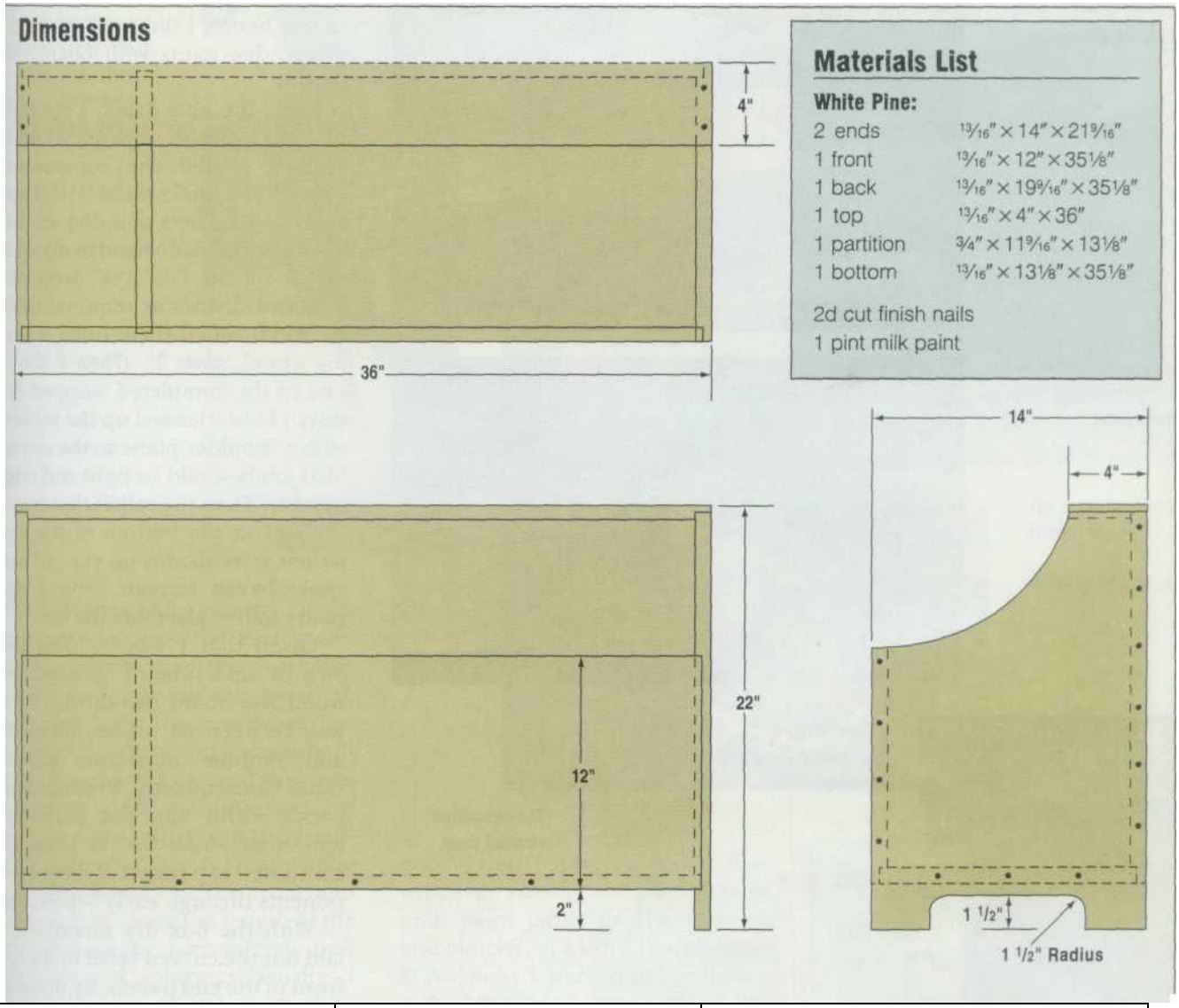
Following the manufacturer's directions, I mixed a pint of tavern green milk paint and coated the box inside and out. Now I have painted a fair number of Windsor chairs with milk paint since I began building chairs in 1984, but despite this decade of experience, my reaction as the first coat of milk paint dries is almost always the same — good grief, I have ruined it! For whatever reason, the first coat of milk paint tends to dry off-color and blotchy, in a word, awful! **(photo 8)** Anyhow, I persevered and burnished the dry painted surface with #2 steel wool. Then I applied the second coat and, voila, things were looking up. Once the paint was dry, I again burnished the surface, this time with #0000 steel wool. Now the box looked like something I could sign.

While the milk paint provides a



Appling milk pain

very durable and quite refractory finish, it does water spot badly. To minimize this, I always seal milk painted surfaces with an oil finish of some sort —tung oil, Watco Danish oil or, for this piece, a mix of equal parts of boiled linseed oil, turpentine and satin polyurethane varnish. I coated the box with this mix, let it stand for 10 or 15 minutes, then wiped off the excess with paper towels, taking great care to collect all the oily paper afterward and destroy them in my wood-burning stove to avoid having them



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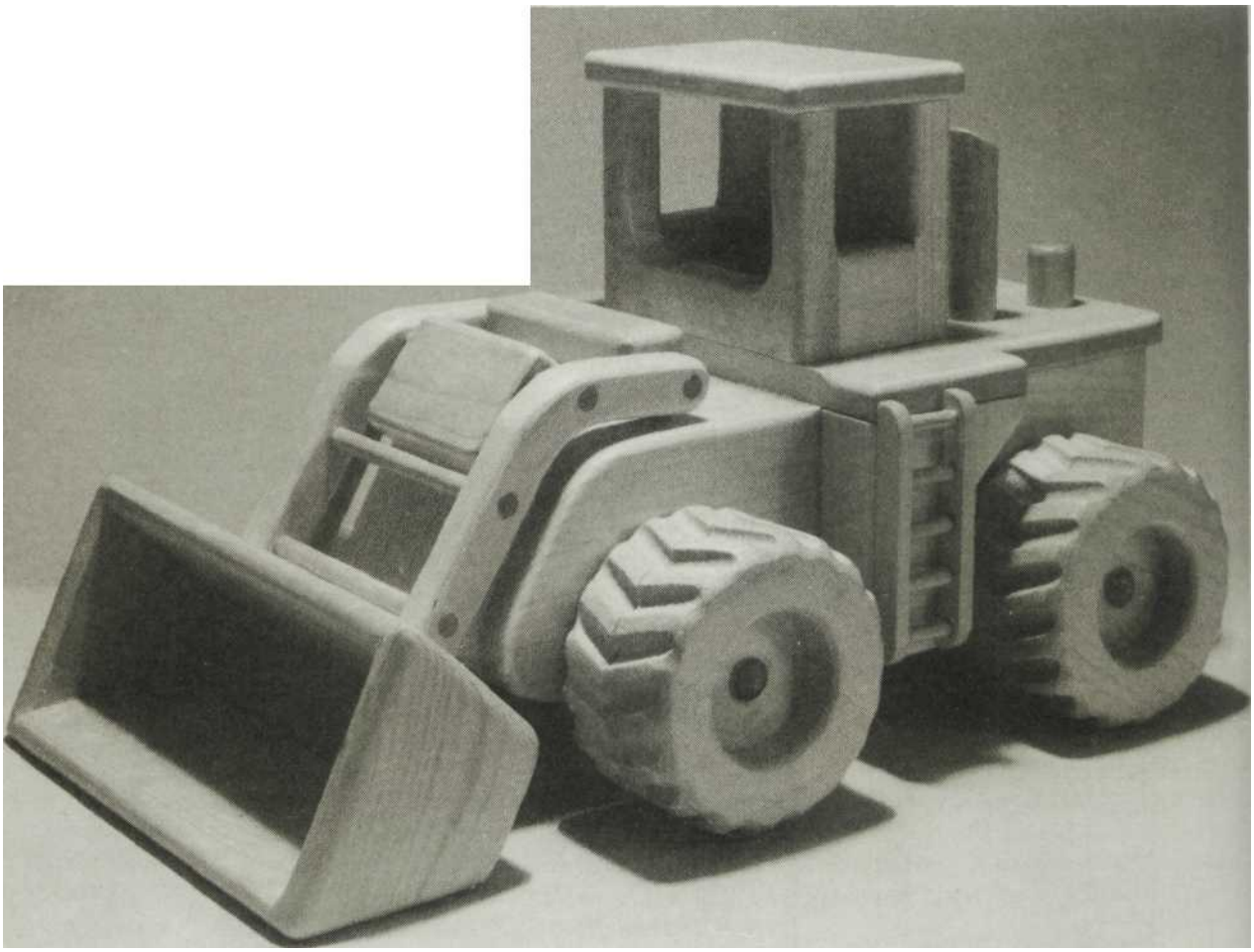
EARTH MOVER



This earth mover features a moveable shovel that stops in different positions. This project should successfully accommodate most of your child's heavy earth moving needs for quite sometime. It is pictured here built in clear pine but it can built in a wide variety of woods. Soft maple would be an excellent alternate choice.

Begin construction with the body. Rip an 18" length of 3/4" stock 4-1/2" wide then set the saw for a 30 degree bevel. Make a crosscut to produce the mitered ends . Cut from the remainder then make a series of 1/8" deep kerf cuts spaced 1/8" apart to detail the radiator grille.

Cut the side pieces to size then bore the axle holes before assembly. Use a belt sander or hand plane (or both to form the front end curves.

Cut the cab and remaining body parts to size then use the router with a 5/32" corner rounding bit to ease all sharp corners before completing the body assembly.

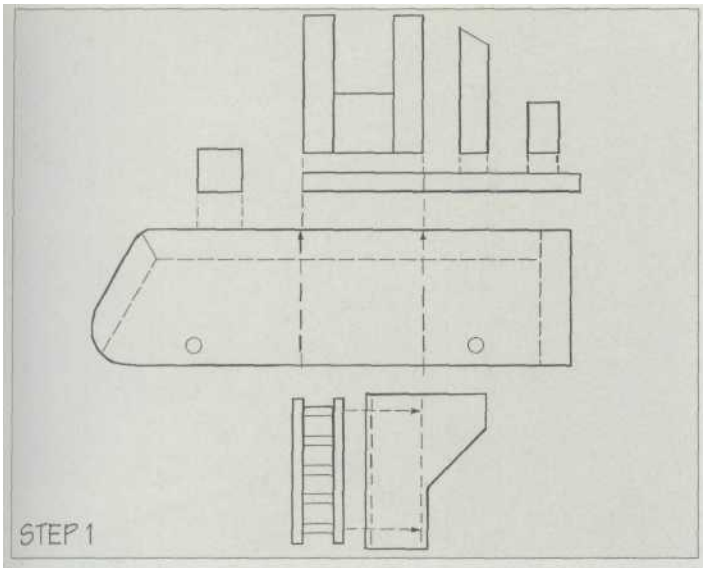
Construct the bucket and bucket arm assembly. Mark the location of the arm ends and use a chisel to cut the 1/4" deep mortises to receive them. If you have a brad point or Forstner bit that bores a flat bottomed hole, use it first then square the corners with the chisel. The bucket pivot is nailed and glued to the body after the entire bucket assembly has been completed.

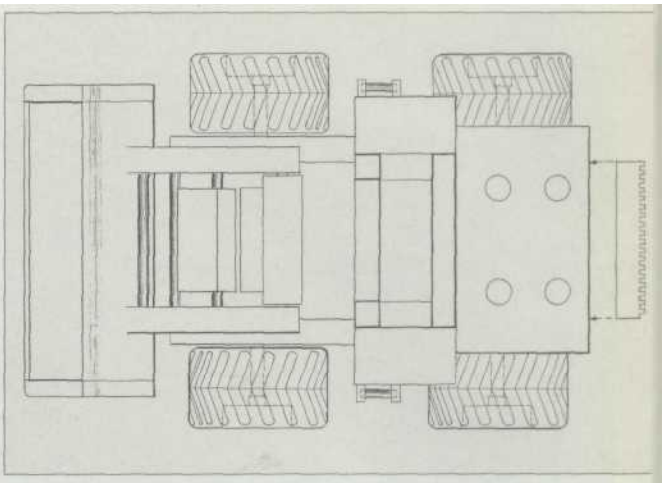
The fat wheels are made up by joining two discs of 1-1/8" stock after angled holes are bored to form the knobby treads. The simple jig used to bore the holes features a hardwood guide block which has two holes drilled at 20 degrees angles in **opposite** directions. Note that these holes must align with the pivot hole so they are bored from the bottom of the block before the jig is assembled.

The jig may be used with a portable drill or on a drill press. If using a drill press tilt the table or prop the jig so the bit enters the angled guide holes squarely. Bore the holes in discs #1 & #2 as indicated. To save layout time make photocopies of the wheel diagram and attach to each disc with rubber cement.

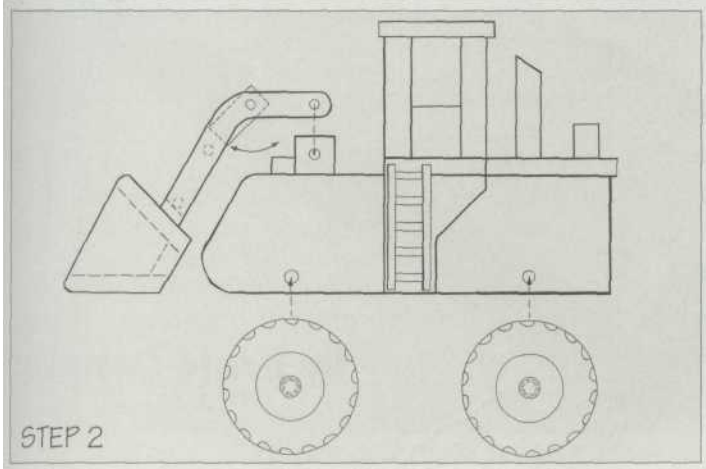
Use a 2" dia. Forstner bit to bore the recess in the outer disc, Part 1, then Counterbore for the plug and axle. Saw the discs to final size after the angled holes are bored to reveal the treads. Use the router to round over the corners. Sand then glue the wheels to the axles in place on the body.

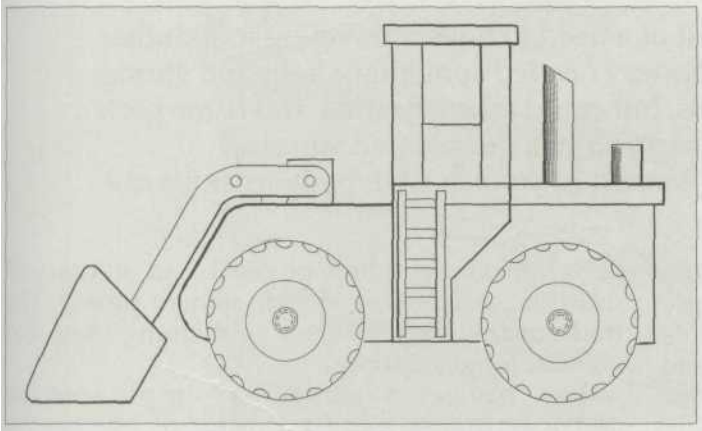
Finish with several thin coats of shellac or two coats of polyurethane finish.



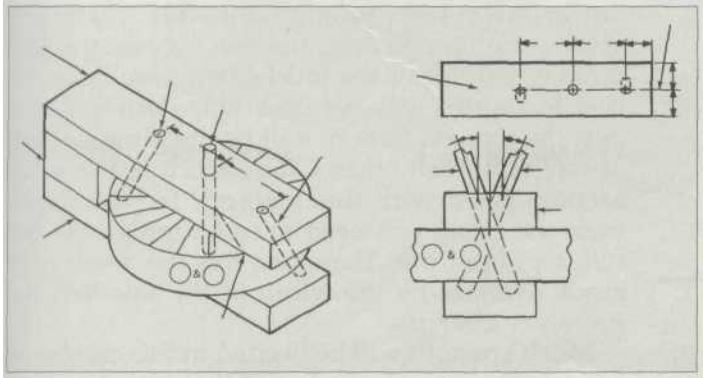


PLAN VIEW OF COMPLETED PIECE





STEP 3 COMPLETED PIECE



JIG FOR CREATING TIRE TREAD

BRUT EARTH MOVER MATERIAL LIST

QTY.	DESCRIPTION	
4	1-1/8″ x 5″ dia.	(outer wheel)
4	1-1/8″ x 5″ dia.	(inner wheel)
2	3/8″ dia. x 8-1/2″ dowel	(axle)
4	5/8″ dia. wood buttons	(hub cap)
1	3/4″ x 3-5/16″ x 4-1/2″	(body front)
1	3/4″ x 4-1/2″ x 1O″	(body top)
1	3/4″ x 3-1/2″ x 4-1/2″	(radiator)
2	3/4″ x 3-1/2″ x 12″	(body side)
2	1-1/8″ x 3″ x 3-1/2″	(body)
1	1/2″ x 3″ x 3-1/2″	(cab deck)
1	1/2″ x 3-7/8″ x 6-1/2″	(engine hood)
1	3/4″ x 3-1/2″ x 5″	(cab front)
1	3/4″ x 3-1/2″ x 5″	(cab rear)
2	3/4″ x 1-1/2″ x 1-1/2″	(cab side)
1	1/2″ x 3-3/8″ x 5-1/4″	(cab roof)
2	3/4″ dia. x 3-1/2″ dowel	(exhaust)
2	3/4″ dia. x 1-1/2″ dowel	(exhaust)
2	1/2″ x 2-3/4″ x 4″	(bucket end)
1	1/2″ x 3″ x 8″	(bucket rear)
1	1/2″ x 1-1/4″ x 8″	(bucket bottom)
1	1/2″ x 3-1/2″ x 8	(bucket front)
2	3/4″ x 2-1/4″ x 6-1/4″	(bucket arm)
1	3/4″ x 1-3/4″ x 3″	(bucket lift)
1	1/2″ x 5/8″ x 3″	(bucket stop)
1	1-1/8″ x 1-1/8″ x 3-3/4″	(bucket pivot)
4	5/16″ dia. x 5-3/8″ dowel	(arm support)
4	1/4″ x 1/2″ x 3-3/4″	(ladder rail)
10	1/4″ dia. x 1″ dowel	(ladder rung)
4	7/16″ I.D. x 1″ O.D.	(flat washer)

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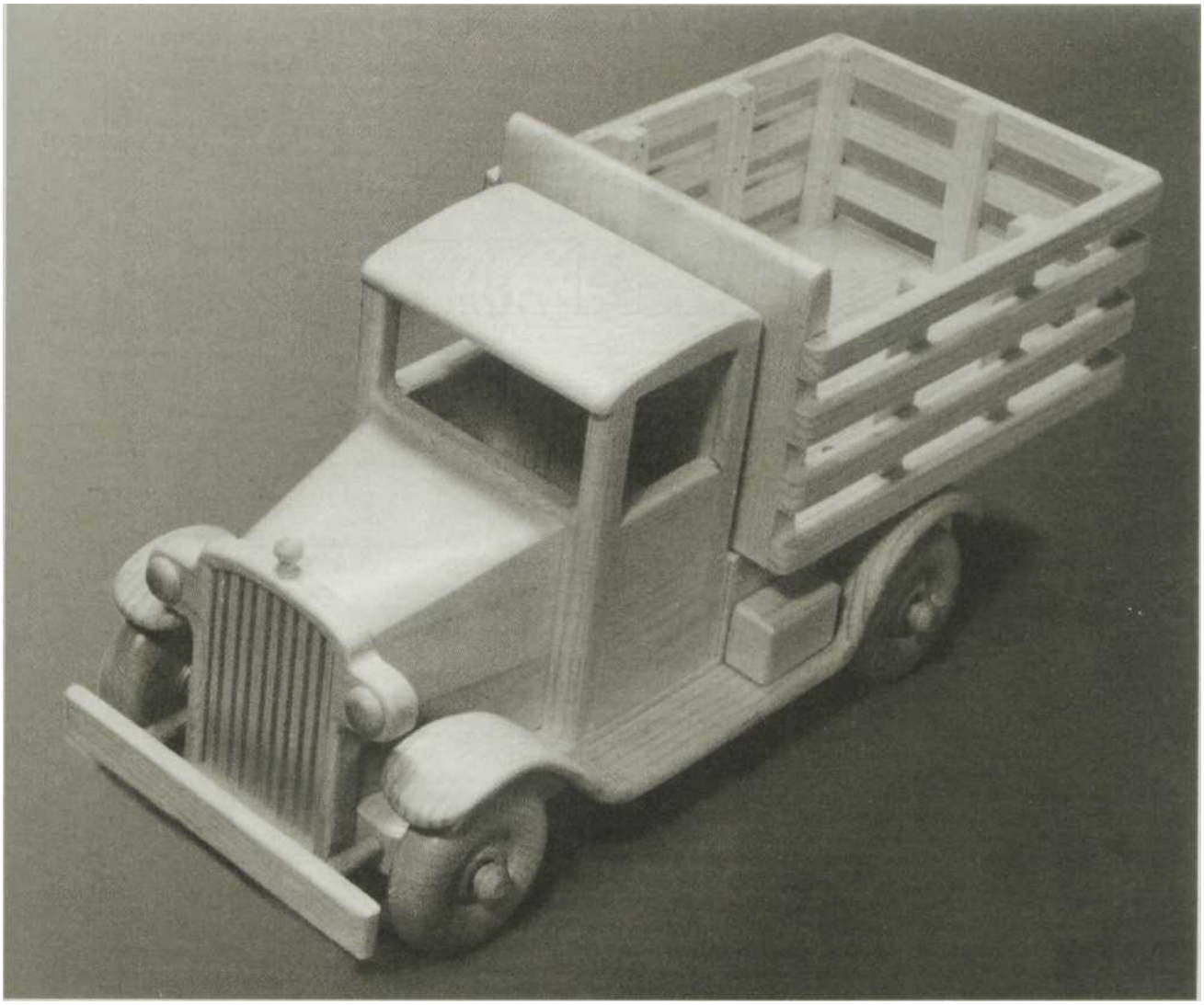
STAKE TRUCK



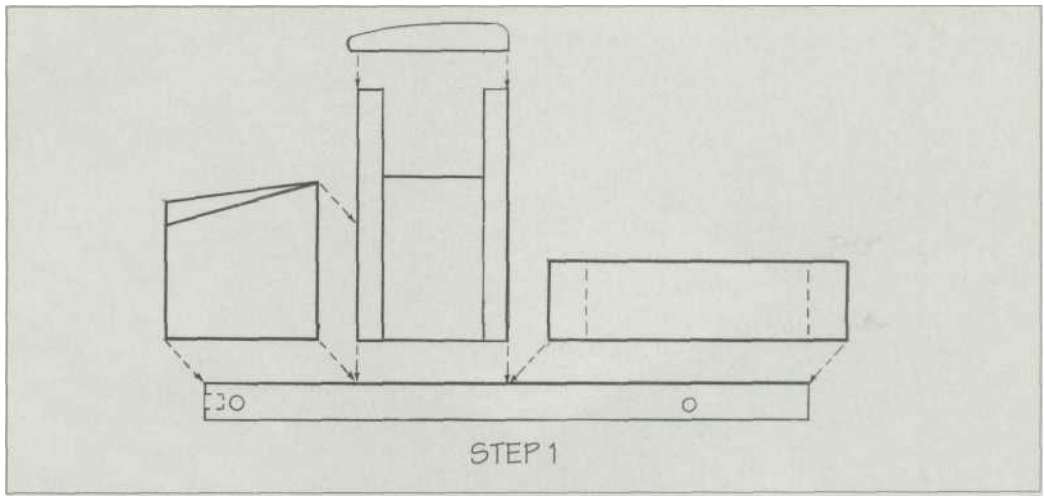
Here is a neat easy to build toy truck that your child will treasure. This truck is made of clear pine but you may opt for a different stock.

Begin gluing several pieces of stock together to make the thick block for the engine section. Cut this piece to size then saw the slants on the sides and use a plane and sander to form the top countour.

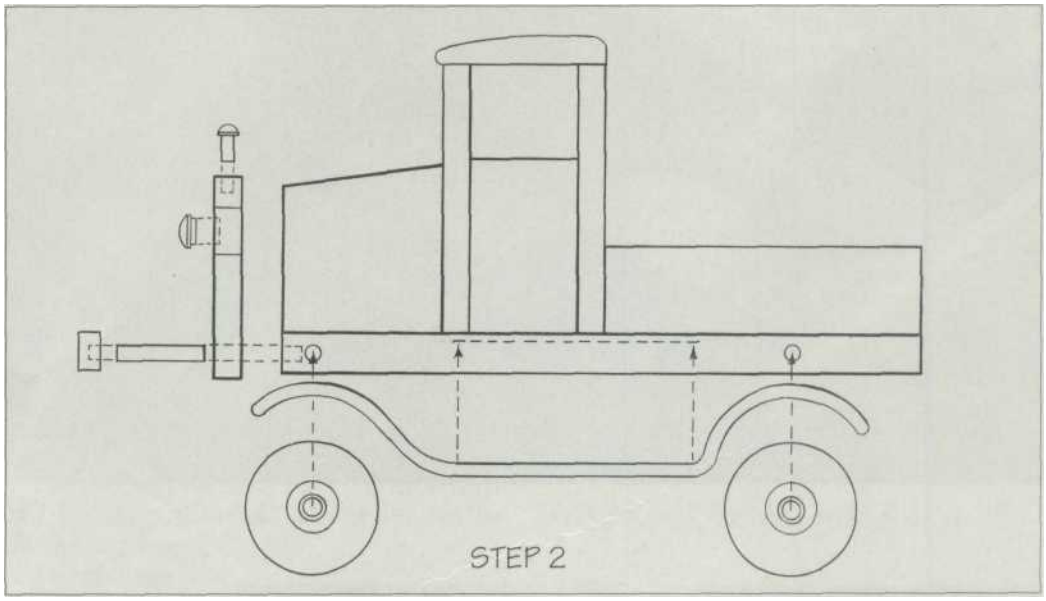
Next, finish sand all the pieces then join the cab front and back members to the cab sides and add the cab roof. Bore the blind axle and bumper holes in the base piece then attach the engine block, cab and back members to it.

Use the scroll saw to cut the radiator frame then cut a series of evenly spaced saw cut grooves in a piece of 3/8" stock to make the radiator frame. Be sure to bore the headlamp and radiator cap holes in the radiator frame before attaching it to the chassis.

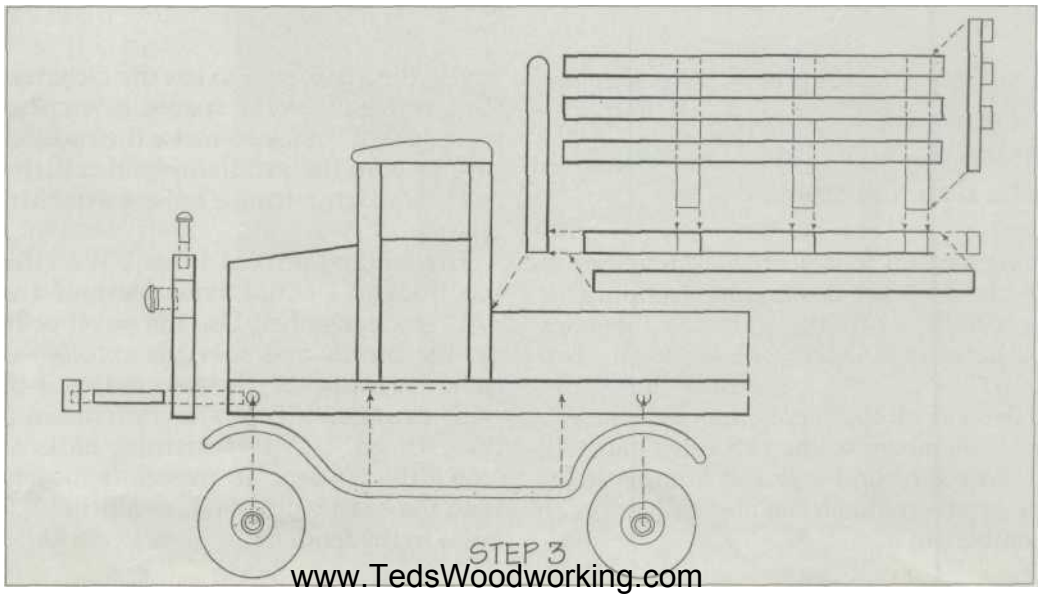
The fenders are cut from 1 1/2" thick stock. If this thickness is not available glue two pieces of 3/4" stock together. Use the scroll or hand saw to cut the profile and save the cutoffs—use them as back-up supports during sanding which is done with drum sandling attachments in a drill. Use thin, 19 ga. 1-1/4" finishing nails and glue to attach the fenders. To prevent splitting use a nail, with the head clipped off, as a drill bit to bore pilot holes in the fenders.



STEP 1



STEP 2



STEP 3

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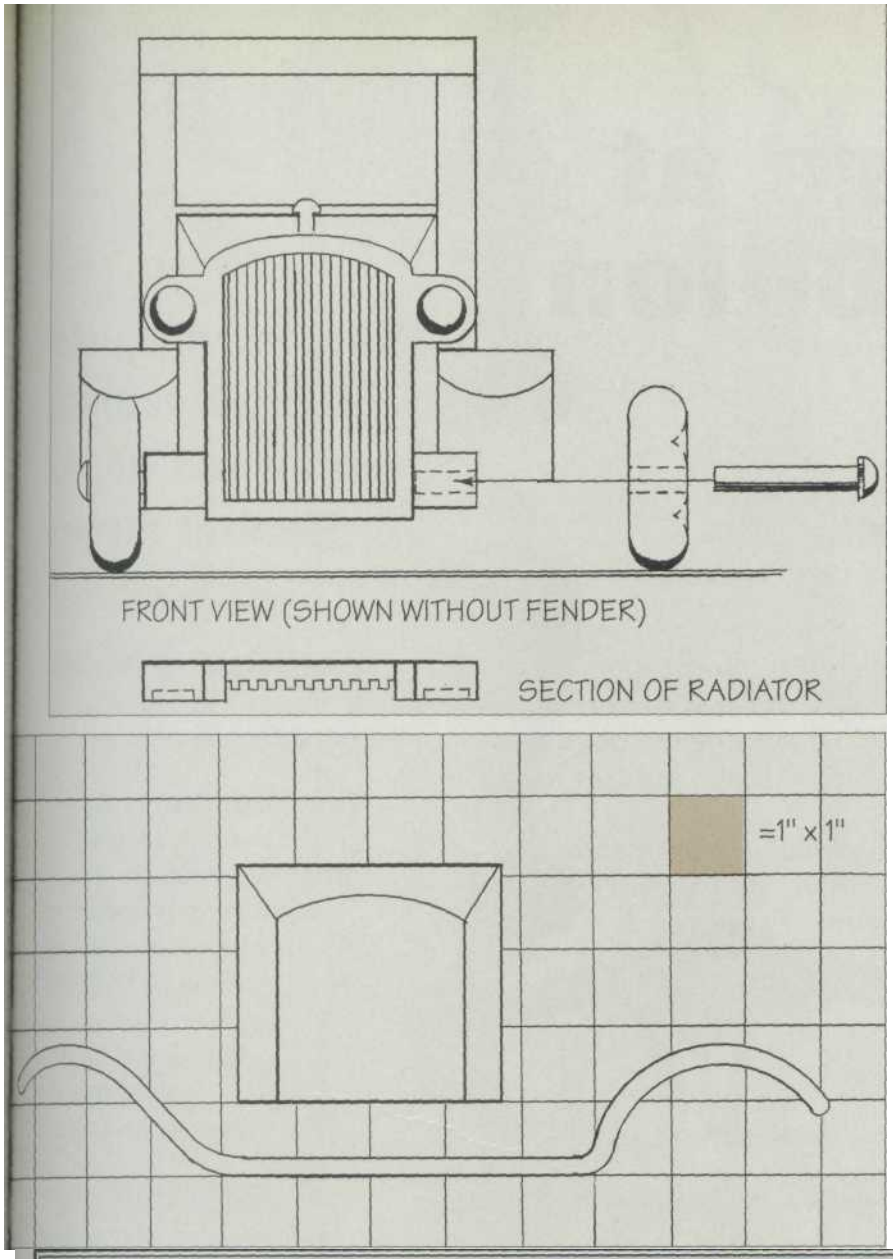

The dump truck cargo container has two pivoting parts; the bin which tils back on a pair of hinges, and the tailgate door which swings open when the bin is tilted up. Attach the hinges to the bin first then hold the bin in a fully raised vertical position so it butts against the rear of the body while marking the hinge screw holes.

To assemple the rails on the stake truck nail and glue the stakes into place in the bed notches then alternately lay the assembly on its sides and attach the rails in place with a dab of glue at each intersection.

The special parts including axle pegs, wood buttons and wheels are available from hobby and craft shops or through mail order woodworker's supply outlets.

The trucks may be clear finished with shellac or varnish or they may be painted with brightly colored non-toxic paints.

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TOY STAKE TRUCK MATERIAL LIST

All dimensions are in inches.

Truck body quantity is listed for one truck

QTY.	DESCRIPTION	
1	3/4 x 4-1/2 x 12	(truck base)
1	3 x 3-1/8 x 3-1/2	(engine)
1	1/2 x 4-1/2 x 5	(cab front)
1	1/2 x 4-1/2 x 5	(cab rear)
2	1/2 x 2 x 3-1/4	(cab side)
1	1/2 x 3-5/16 x 4-1/2	(cab roof)
1	3/4 x 1-5/8 x 3	(truck front)
2	3/4 x 1-5/8 x 6	(truck side)
1	3/4 x 1-5/8 x 3	(truckrear)
1	1-1/2 x 1-3/4 x 11-5/8	(left fender)
1	1-1/2 x 1-3/4 x 11-5/8	(right fender)
4	2-1/2 dia. x 3/4	(wheel)
4	5/16 dia. x 1-7/8	(axle peg)
2	3/4 x I x 1-5/8	(gas tank/tool box)
1	1/2 x 3-3/4 x 4-1/2	(radiator)
1	300/8 x 2-1/4 x 3-1/4	(radiator grille)

QTY.	DESCRIPTION	
2	5/8 dia. wood button	(headlight)
2	5/16 dia. x 1-5/8 dowel	(bumper supports)
1	3/8 x 3/4 x 5-3/4	(bumper)
1	7/32 dia. x 9/16	(radiator cap)
	Additional parts for stake truck:	
1	1/2 x 5-1/2 x 8	(bed)
1	1/2 x 4-1/2 x 5-1/2	(front)
7	5/16 x 1/2 x 3-1/2	(stake)
8	5/16 x 1/2 x 8*-13/16	(side rail)
4	5/16 x 1/2 x*-5-1/2	(rear rail)

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TOY BOX

This little chest, which can hold a bunch of easily accessible toys, turns into a convenient bench when the top is closed. And the lid is controlled by a spring-tensioned support that prevents accidental slamming on little fingers.

1--Tack nail a strip to the back of each panel. The strip should ride in the miter gauge groove as the panel is being cut.

Next, rip and crosscut maple edge banding and glue it to the panels (Photo 2). We used 3-way clamps, but you can try bar clamps or even masking tape. Note that the top edge bands of the end panels are slightly long, so they'll be sawn at an angle when the ends are cut to shape. Also, use three 19-gauge brads partially driven into each edge band to keep it from sliding. Band all the panels in this fashion -- except the lid, which gets its edge bands after the chest is assembled.

2--Glue and clamp each of the edge bands to the panels. Note that the top edge band of the end panel is just slightly long.

After the glue dries, scrape off glue beads and plane edge bands flush to the panel surfaces.

Next, set the table saw miter gauge to 35 degrees and make the angled cuts on the end panels (Photo 3). Glue and clamp the edge bands onto the sawn surface. We cut the panel dadoes and grooves with a router and a 1/2-in.-dia. straight bit. A rectangular frame is used to guide the router to make these cuts (Photo 4). Be sure that the side rails are parallel and are spaced to fit the diameter of your router base, plus the difference between the diameter of the router bit and the width of the required dado or groove. You must precisely measure the thickness of the plywood before setting the distance between the rails. (Hardwood plywood is always slightly thinner than its stated dimension.) Tack nail a movable stop across the rails to control the length of the cut, and cut each groove or dado in two passes. Then, using a chisel, cut the ends of the grooves square.

Making The Splat Rail And Assembly

Cut the splats to shape, then smooth their edges. The pieces will be too small to clamp to a bench. Instead, use a 1/16-in.-radius corner-rounding bit in the router table for the job (Photo 5).

4--Cut grooves and dadoes in the end panels with a router. Then tack nail a block across the rails to stop the cut.

With the dado head in the table saw, cut the groove in the top rail and the edge band on the back panel. Then cut the filler blocks to length, leaving the four end blocks 1/2 in. longer than the others. Remember to round off the rail edges before assembling the workpieces.

When the back assembly is dry, complete the project in the following sequence: Insert the back panel into the groove (Photo 7). Join the bottom and front to this subassembly, then add the second end and lay the chest on its back. Next, glue and clamp the entire assembly together (Photo 8) and check it for square
Cut the lid panel to size, glue and clamp the side bands to it and then add the front and back bands. Install the hinge and lid support, attach the standoffs and relieve any sharp corners with fine sandpaper. Finally, apply several coats of polyurethane to finish off the project.

5--Since the splats are so small, it's best to round over their edges on a router table. A ball-bearing bit usually works best.

6--Insert the splats and spacer blocks in the top rail. After the glue has dried, repeat the procedure on the back panel.

7--Begin the assembly by inserting the back into an end panel. Next, add the bottom and front, then the other end.

8--Clamp the chest using five bar or pipe clamps. Be sure to check the assembly for square before allowing the glue to set.

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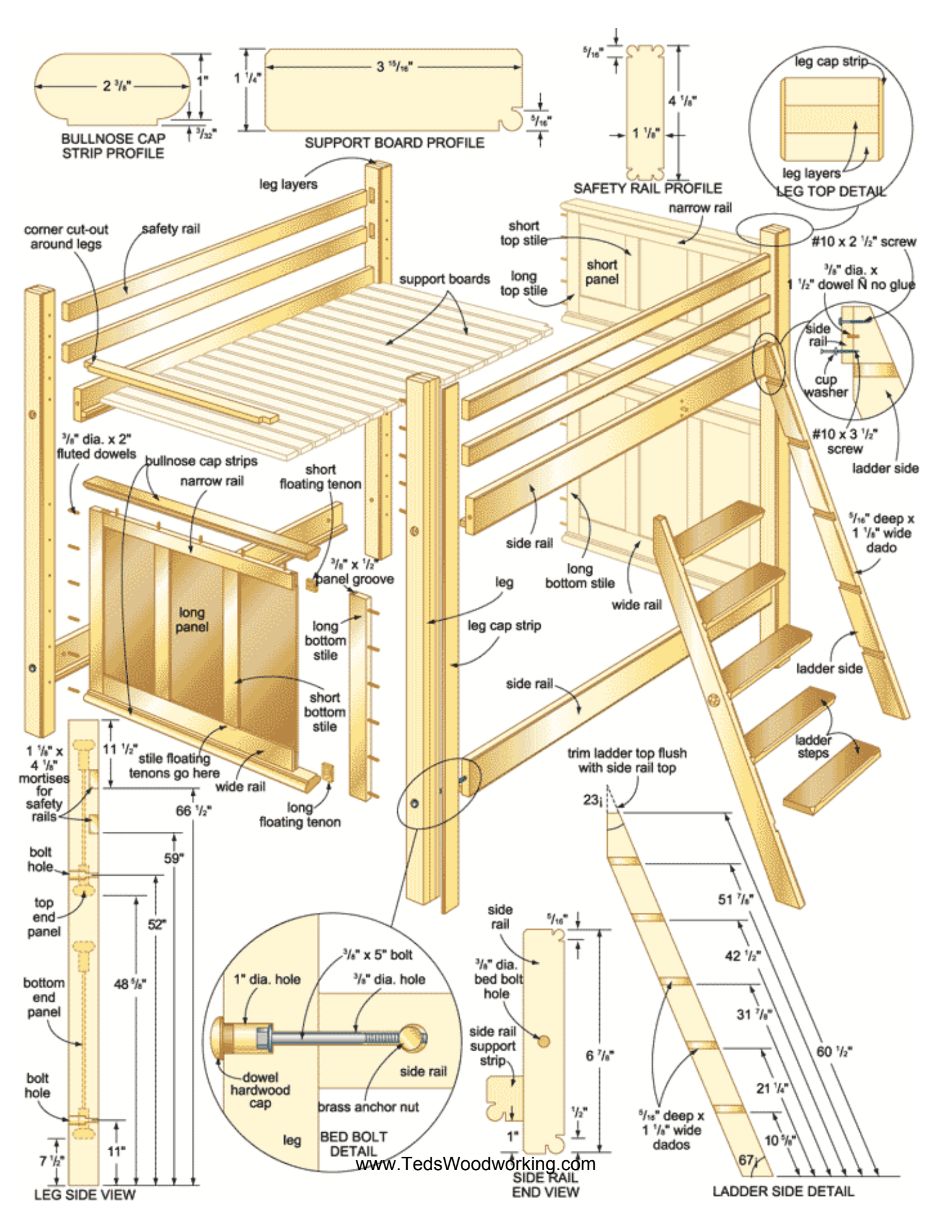
BUNK BEDS


2 3/8"
1"
3/32"
BULLNOSE CAP STRIP PROFILE
1 1/4"
3 15/16"
5/16"
SUPPORT BOARD PROFILE
5/16"
4 1/8"
1 1/8"
SAFETY RAIL PROFILE
leg cap strip
leg layers
LEG TOP DETAIL
leg layers
corner cut-out around legs
safety rail
support boards
narrow rail
short top stile
long top stile
short panel
#10 x 2 1/2" screw
3/8" dia. x 1 1/2" dowel N no glue
side rail
cup washer
#10 x 3 1/2" screw
ladder side
3/8" dia. x 2" fluted dowels
bullnose cap strips
narrow rail
short floating tenon
3/8" x 1/2" panel groove
long panel
long bottom stile
short bottom stile
leg
leg cap strip
side rail
long bottom stile
wide rail
5/16" deep x 1 1/8" wide dado
ladder side
ladder steps
side rail
trim ladder top flush with side rail top
1 1/8" x 4 1/8" mortises for safety rails
11 1/2"
stile floating tenons go here
wide rail
66 1/2"
long floating tenon
bolt hole
59"
top end panel
52"
48 5/8"
bottom end panel
bolt hole
7 1/2"
11"
LEG SIDE VIEW
1" dia. hole
3/8" x 5" bolt
3/8" dia. hole
side rail
dowel hardwood cap
brass anchor nut
leg
BED BOLT DETAIL
side rail
5/16"
3/8" dia. bed bolt hole
side rail support strip
6 7/8"
1/2"
1"
SIDE RAIL END VIEW
23"
51 7/8"
42 1/2"
31 7/8"
60 1/2"
21 1/4"
10 5/8"
67"
5/16" deep x 1 1/8" wide dados
LADDER SIDE DETAIL
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For the head and foot boards	*Size*	*Qty.*
Legs	3 1/4" x 3 5/8" x 78"	1
Leg cap strips	3/16" x 3 1/4" x 78"	8
Long panels	3/8" x 9 7/8" x 24 1/2"	6
Short panels	3/8" x 9 7/8" x 17 5/8"	6
Long top stiles	1 1/8" x 2 3/4" x 24"	4
Long bottom stiles	1 1/8" x 2 3/4" x 30 3/4"	4
Short top stiles	1 1/8" x 2 3/4" x 17"	4
Short bottom stiles	1 1/8" x 2 3/4" x 23 3/4"	4
Narrow rails	1 1/8" x 2 3/4" x 33"	4
Wide rails	1 1/8" x 4 1/4" x 33"	4
Short floating tenons—*hardwood*	3/8" x 1" x 2 1/4"	16
Stile floating tenons—*hardwood*	3/8" x 1" x 1 3/4"	16
Long floating tenons—*hardwood*	3/8" x 1" x 3 3/4"	16
Bullnose cap strips	1 1/8" x 2 3/8" x 38 3/8"	8
Dowels	3/8" dia. x 1 1/2" fluted	40
For the mattress support assembly		
Side rails	1 5/16" x 6 7/8" x 76 3/4"	4
Side rail support strips	1 1/8" x 1 3/4" x 76 3/4"	4
Support rail screws	#14 x 2" round head, brass	24
Support boards	1 1/8" x 3 15/16" x 40 7/8"	40
Bed bolts	3/8" dia. x 5"*	8
Bed bolt caps	hardwood, 1" dia. domed caps	8
For the ladder and safety rails		
Ladder sides	1 1/4" x 4 3/8" x 61 1/2"	2
Main ladder steps	1 1/8" x 5 1/8" x 16 1/2"	5
Safety rails	1 1/8" x 4 1/8" x 78 3/4"	4
Long ladder screws and cup washers	#10 x 3 1/2"	2
Short ladder screws and cup washers	#10 x 2 1/4"	2
Dowels	3/8" dia. x 1 1/2" fluted	2

Start With The Panels

Variations of the tudor rose are all over my house. Although the spruce is strong, it proved difficult to slice cleanly. Consider white pine or basswood for carving

Since construction-grade wood needs time to dry while you're building, I'll lead you through the preparation of parts in stages. Moving from one group of parts to another as you work allows wood to cup and twist (as it inevitably will) while you still have the opportunity to do something about it.

The panels are a prominent part of the bed, so choose and combine grain patterns with care. This is where artistry comes in. Since the finished panels are about 3/8" thick, you can easily get two panel parts by splitting 1 1/2" lumber down the middle, on edge. This leaves lots of extra wood for jointing and planing operations. If you don't have a bandsaw, rip the panel parts no wider than 4", then slice them in half, on edge, in two passes across your tablesaw. Splitting thick stock like this naturally reveals striking book-matched grain patterns on matching parts. This is good stuff, so make the most of it.

Next, spend time at the workbench arranging panel parts so they look their best. Mark the location of neighbouring pieces, then set them aside to dry for at least three or four days before jointing and edge gluing. Thin, newly split pieces like these tend to cup as they dry, so you'll want to let that happen before jointing. I designed the completed panels to be less than 12" wide so they could be milled in any benchtop thickness planer after lamination. Set the panel parts aside for now.

Bags And Bags Of Shavings

Most of the bunk bed parts are 1 1/8" thick, meaning you'll have to spend hours working with your planer to mill the 1 1/2"-thick boards down to size. You'll save time if you rough-cut all stiles, rails, bullnose cap strips, side rail support strips, support boards, safety rails and ladder parts to width first, instead of running uncut lumber through your planer, and then cutting these parts. Joint and plane components to 1/8" thicker than final size, then let them sit for a week with a fan blowing on the stickered pile before milling to final thickness. Keep the parts in separate groups so you can work on each kind in turn.

Laminate The Legs

The bunk bed legs are thick and long, making them the most troublesome part of the project. The plans show how each leg has five parts: three hefty internal layers, capped by two face strips that hide the lamination lines.

Divide the 12 leg layers you cut earlier into four groups: three pieces for each leg. The idea is to arrange the layers so the outer face of each leg looks best. Mark relative layer locations, then joint and plane leg layers to 1 1/4"-thick and glue them together. A few wooden hand screws tightened across the edges of the layers will do wonders to align the parts as the main clamps draw them together. This saves lots of jointing later.

While the leg layers are drying, cut the leg cap strips slightly wider than listed and plane to final 3/16" thickness. When the legs are ready to come out of the clamps, joint and plane them to final size. Glue the cap strips over the sides showing the lamination lines, using as many clamps as needed for gap-free joints. Plane the excess edging flush with the legs, sand and rout a chamfer along all edges. The plans show how the joint line between leg and leg cap disappears if you cut so its edge lands on the joint line.

Head and footboard panels are made of planks sawn in half on edge, so there's lots of bookmatched grain pattern. Use wood with growth rings perpendicular to the panel face

Back To The Panels

Joint one face of each panel member, then joint an edge, before ripping each piece to wider-than-final width and jointing this sawn edge. Keep all panel parts grouped, as you arranged them earlier for best appearance, while dry-fitting the panel parts. When everything looks good, edge-glue the panels, scraping off excess glue after a few hours when it's half-hard.

As the panels are drying, joint and plane the rails and stiles to final size, then trim to length. The plans show how the edges of these parts require grooves to house the panel edges. These grooves also admit floating hardwood tenons that join the panel frames. This is why the panel grooves extend around the ends of the rails. A wing-cutter router bit in a table-mounted router is the best tool for cutting these grooves. Take one pass from each side of the rail and stile parts so the grooves are centred. Aim for a 3/8"- to 7/16"-wide groove, then plane and trim your floating tenons for a snug fit.

The corner of the underside of the top bunk, showing mattress support boards, mattress support strip and the bottom of the headboard where it joins the leg

Dry-fit all stiles, rails and floating tenons under clamp pressure to check for tight joints, then measure the inside dimensions of the frame (to the bottom of the grooves) to determine the ideal panel size. Make the panels 1/16" smaller than these measurements and plane the panels to fit nicely within the grooves. Dry-fit the stiles, rails and panels, then assemble the frame permanently with glue. Give everything a day or two to dry, then joint the outside edges of the frame parts to level and square them.

Mill the bullnose cap strips on a table-mounted router, then fasten them to the top and bottom edges of the assembled panel frames using 3/8" fluted dowels. With all the parts of this project that needed dowelling, I invested in a self-centering drilling jig to help me bore accurate dowel holes in the panel edges and the ends of the side rails—all parts too large to be bored on my drill press. It worked wonderfully. When the cap strips are glued to the panel frames, run the edge of the assembly over the jointer again, taking a light cut to level the sides for a tight fit with the legs. Install 3/8"-fluted dowels across the leg-to-panel joints, dry-fit under clamping pressure, then join the legs and panel frames permanently. Cleaning glue squeeze-out from the corner where the legs meet the panel frames would be difficult without help. I used Waxilit, a glue resist that looks like skin cream. Smear some across the dry-fitted joints—when the joint is reassembled with glue the product prevents the squeeze-out from bonding to the surface wood. The hardened glue pops off with a chisel.

Refine The Legs And Safety Rails

The plans show how each leg needs counterbored holes for the bed bolts, and two mortises to house the safety rails for the top bunk. Drilling the holes is easy (just don't do it before you've read further), though the mortises demand explanation. I made mine using a router and flush-trimming bit, guided by the shop-made plywood jig. This creates four identical round-cornered mortises in the legs that need to be squared by hand with a chisel. Use these mortises as a guide to plane, rip and joint the safety rails you rough-cut earlier, so they fit into the mortises sweetly. Complete the rails by sanding, trimming to final length and routing quirk beads

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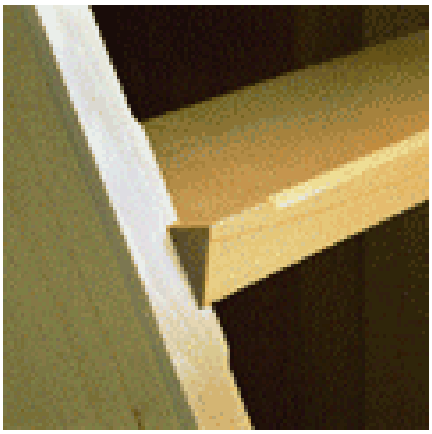
on all four edges. These extend to within 1 1/4" of the end of each safety rail.

Side Rails, Support Strips And Support Boards

These parts connect the head and foot boards, and support the two twin-size mattresses that the bed is made for. Mill and trim these parts to final size, then rout quirk beads on all four edges of the side rails, on one edge of the support strips, and along one edge of the support boards. The plans show the details, though you're free to use whatever profile you like.

Before you go further, think about mattress size. Although there are supposed to be standard sizes out there, the variation from brand to brand can be considerable. It's safest to have your mattresses on hand, then measure them and adjust side rail hole locations in the legs, and the side rail lengths, to suit. The dimensions and locations I used are for mattresses that are slightly larger than printed mattress specs.

Drill holes in the legs and side rails for the bed bolts now, then glue and screw the mattress support strips to the inside edge of the side rails. If I had to build my beds over, I'd raise the support strips 1" higher than where I put them. That's what's shown in the plans. Without an exceptionally thick mattress, the side rails press into your legs as you roll out of bed. Raising the mattresses with the higher support strip location solves the problem .



Chamfer the top front edge of the ladder steps for better resistance to wear. A sharp chisel makes quick work of angling the outer corners of each step

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CHILD'S BED

Making the Headboard

The legs are first cut to length and then the mortises are cut into the four leg posts using a router fitted with a 16mm straight cutter, remembering to make handed pairs. It is important to ensure that each corresponding pair of mortises are cut at the same distance from the bottom of each leg so the rails, when fitted to the legs, will be square. The mortises can then be squared with a chisel or alternatively the tenons can be rounded to fit the holes. Rather than cut tenons individually on the end of each rail, cut a length of oak 950mm in length from each of the 200mm wide boards and clamp a straight edge guide in place. Use the router free hand against the guide to cut the rebates to form the tenons. Obviously care must be taken when setting the depth of cut as well as making sure that the straight edges are true on each side of the board. The boards can then be cut lengthways to form the rails and the ends notched by hand to fit the mortises.

A profile/scribe cutter set (Titman RPSS1) is used in the router table to form the profiles on the rail sides and the headboard, temporarily clamped together ensuring all is square. The length of the stiles can now be accurately measured and the appropriate length cut from the oak board. The ends of the boards can now be scribed on the router table without worrying about any breakout as the boards are a little overwidth anyway. After cutting the timber to width, the cutter can be reversed and the stiles profiled to match the rails. It will be noticed that one of the stiles is, in fact, a half width and this is to fit into a rebate cut into the leg to visually balance the panelled effect. Another dry assembly takes place spacing the stiles equally in place and the space for the panels accurately measured. All three panels should measure the same size. Each panel should be cut and planed so that it can fit neatly on top of the profiling with the headboard laid flat. I aim to cut the panel a whisper undersize to allow for any slight expansion in the timber as well as to ensure the assembly is straightforward without putting undue stress on the joints.

A bearing guided panel cutter (Titman RPCB7) is

used to shape the edges of the panels. The depth of cut is set so the panel is a tight fit into the profiled stile with its edge just off the bottom of the groove. With this set up the bearing runs along the sides of the panels so it is important that the edges are straight as any defect here will show up on the finished panel as a kink in the fielding. The footboard is made in exactly the same way.

The Bed Rails

The long side rails are cut to length allowing an extra 60mm in the total length for the mortises and the tenons are formed using the router and a straight edge clamped in place as a guide. Care is taken to prevent the router rocking over the ends and thus removing too much timber. The ends are trimmed so the tenons are a tight fit into the mortises. All four edges are rounded over with a rounding over bit to remove sharp edges and as a decorative feature the top outside edge is moulded with a sunken bead cutter (Titman SBBC4) At this stage some 38 x 19mm softwood can be firmly screwed in place on the inside of each rail near the bottom edge. When the slats are screwed in place on this battening the mattress will sit between the rails rather than level with the top edge. This not only looks neater but it prevents the mattress from sliding around.

Finishing and Final Assembly

All the joints are held together with threaded rods and barrel nuts. This entails boring a hole about 20mm deep on the opposite side of each mortise in the middle of the leg. This should be wide enough to take the steel washer as well as the socket used to tighten the nut. A hole the diameter of the threaded rod is drilled through the leg and into the ends of the tenons to a depth of about 100mm into each rail. A further hole is drilled either in the back of the headboard or footboard or on the inside of the side rails into which is inserted the barrel nut. Great care should be taken to ensure that this hole does not break through the other side of the rails where it would be seen and ruin the effect of the bed.

A small rail with a decorative moulding on each

side can be made to fit on top of the headboard and the footboard. This can have a shallow 20mm wide groove underneath so it fits neatly on top of the rails and can be held in place with a few spots of glue. Lengths of softwood, 75 x 25mm, are screwed in place with a 25mm gap between each to support the mattress.

Four acorns are turned on the lathe using the offcuts of timber from when the legs are cut to length. A spigot is left under the acorn and glued into a hole drilled on top of the legs.

The finish is a matter of personal preference but I covered all surfaces with a 50/50 mix of raw linseed oil and turpentine to bring out the grain and left this to dry thoroughly for a couple of days. Three coats of button polish are brushed on and allowed to dry. This is gently cut back with 0000 grade wire wool and wax and then buffed to a soft shine. As a finishing touch antique brass bed post covers were screwed in place to cover the nuts.

Cutting List

Item	Quantity	Dimensions (mm)
Legs	4	75 x 75 x 1200
Headboard Panels	1	280 x 20 x 2500
Headboard / Footboard Stiles and Rails	2	200 x 20 x 1500
Bed Side Rails	2	75 x 35 x 2000

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BOOKCASE

Cutting the Parts

For precise crosscuts, first make a simple, self-aligning T-guide for your circular saw. Cut a piece of 1/2-in. plywood to 2 1/2 x 24 in. and glue and screw it to a roughly 12-in.-long piece of 1 x 4 pine that will serve as the crossbar of the T. Center the plywood strip along the 1 x 4 and make sure the pieces are perfectly square to each other.

Butt the crossbar of the T-guide against the edge of a piece of scrap lumber, tack the guide in place and make a cut through the 1 x 4 with your saw base guided by the plywood strip. Then, trim the 1 x 4 on the opposite side in the same way. Now, the ends of the 1 x 4 can be aligned with layout lines on the stock for precise cut positioning.

Begin construction by using a tape measure to mark the length of a side panel on 1 x 10 stock, and lay out the cut line with a square **(Fig. 1)**. The side panels on our bookcase are 48 in. long.

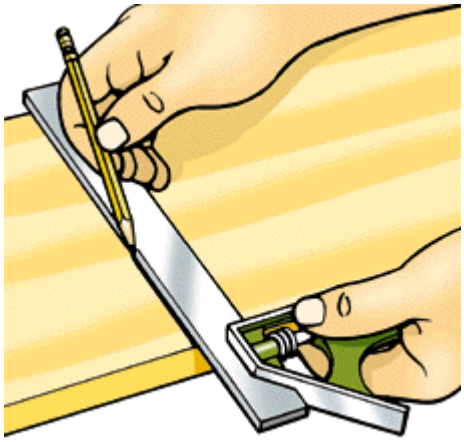

Fig. 1 Mark the lengths of the bookcase side panels on 1 x 10 lumber and use a square to lay out the crosscut lines.

Place the T-guide against the edge of the stock and align its trimmed end with the cut line. Tack the guide in place and use your circular saw to make the cut **(Fig. 2)**.

To support your work during the cuts, use 2 x 4s spanning two saw-horses for a temporary bench and clamp your work in place. Set your circular saw cutting depth so the blade cuts about 1/8 in. into the 2 x 4s.

After both sides are cut to length, lay out and cut the five shelves to length to suit the width of your bookcase. Our shelf length is 31 in.

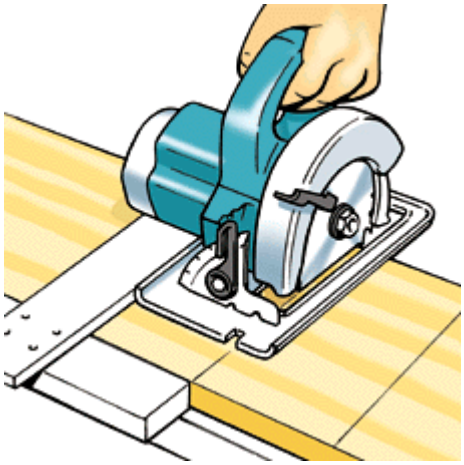

Fig. 2 With a T-guide cut to match your saw, align the end of guide with crosscut line. Tack guide to the work and then make the cut.

Rip the four lower shelves to 8 7/8 in. wide to allow for the thickness of the case back. Clamp each shelf to the sawhorses and tack a straight strip to the work to guide your circular saw (**Fig. 3**).

Next, cut the 10 shelf-support cleats from lengths of 1/2 x 3/4-in. parting strip. Use a handsaw to cut the pieces slightly oversize, then gang the pieces together with masking tape. Mark the cut lines and use your circular saw and T-guide to cut the cleats to 8 7/8 in. long (**Fig. 4**).

Because we varied the spaces between the shelves, the vertical back cleat lengths vary. Rough cut and mark the back cleats in pairs. From the top down, the lengths are 8, 9, 9 1/2 and 11 1/4 in. When cutting the back cleats with the T-guide, first gang them together so all the marks on one side align. After the cut, untape the cleats and reposition them so the marks on the opposite side are aligned for the next cut.

Fig. 3 Use a straight strip as a guide when ripping stock for the four lower shelves to 8 7/8 in. The top shelf remains a full 1 x 10.

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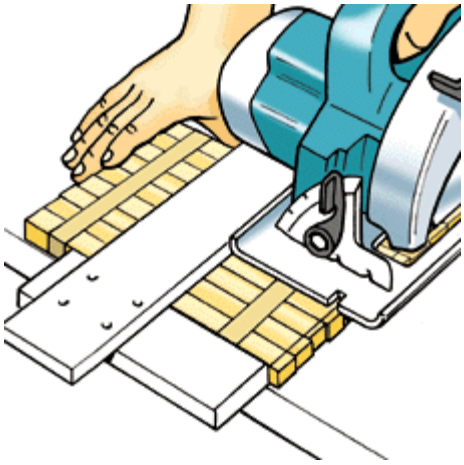

Fig. 4 After cutting shelf cleats oversize, gang them together with tape, mark the cut lines and trim with a T-guide and circular saw.

Assembly

First mark the shelf cleat locations. Hook your tape measure to the top edge of a side panel, extend the tape and place marks at the following dimensions: 3/4, 10 1/4, 20 3/4, 31 3/4 and 44 1/2 in. These marks indicate the top edges of the shelf cleats. Transfer the marks to the other panel. Lay both side pieces edge to edge with the marks on the outer edges and use a rule or straightedge to extend the shelf locations across both panels at once (**Fig. 5**).

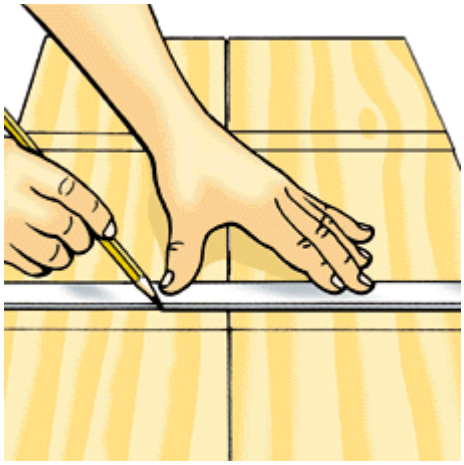

Fig. 5 Butt sides together with shelf-location marks on outer edges. Use a straightedge to extend the shelf marks across work.

Use 2d nails and glue to attach the shelf cleats to the sides. Position the cleats so they're flush with the front edges of the sides. Then, attach the vertical back cleats, leaving a 3/4-in. gap at the bottom of each back cleat for a shelf (**Fig. 6**). The gaps will help to keep the shelves aligned during assembly. Align the back cleats with the back ends of the shelf cleats to provide the 3/8-in. recess for the back panel.

Fig. 6 Nail and glue shelf cleats and back cleats to the side panels. Note that cleats are recessed 3/8 in. from back edge of sides.

To join the sides and shelves, first lay a side panel on a few 2 x 4s placed on the floor. With a helper assisting, stand the shelves in position and lay the opposite side on the shelf ends. Start a pair of 6d finishing nails at each shelf location so the points just penetrate the shelves. Lift the side off and apply glue to the endgrain of the shelves. Let the glue soak in for a few minutes, then apply a second coat. Follow with a coat of glue on the sides and cleats. Replace the panel using the nail points to align the shelves. Then drive the nails (**Fig. 7**) and set them below the surface.

After the first side is attached, grasp the sides at one end while your helper grasps the opposite end and flip the assembly over. Secure the remaining side and check that the case is square. If necessary, tack a diagonal brace across the back to hold it while the glue sets. When the glue is dry cut a piece of parting strip to fit between the two top cleats and under the top shelf. This piece will be set 3/8 in. in front of the top shelf rear edge to provide room for the back panel. Glue and nail this long cleat to the shelf.

Fig. 7 Secure one side to the shelves with glue and 6d finishing nails. Then flip the assembly over and attach the other side. Set all nails.

Adding the Fascia

To fit the 1 x 2 fascia over the case front edges, first mark the stock for crosscutting. Make the vertical pieces 48 in. long to match the sides and mark the horizontal members at 29 1/2 in. Rough cut the pieces to length and use the T-guide and circular saw to trim them squarely to exact size.

Apply glue to one of the vertical members and nail it to the case so its edge is flush with the side. Then, add each horizontal member with glue and nails, keeping the top edges flush with the shelf tops (**Fig. 8**). Finally, add the remaining vertical member with nails and glue.

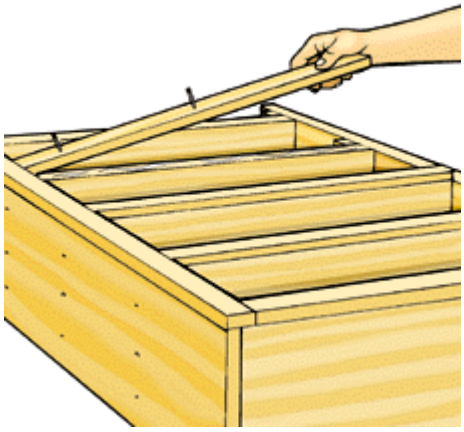

Fig. 8 Attach the 1 x 2 strips to the case starting with a vertical member. Then, add the horizontal pieces and the other vertical.

Use 1 x 4 stock for the front and two side baseboard pieces. Cut the length of each side piece to 10 in. long and glue and nail the parts in place. Then, cut the front baseboard piece to 34 in. long and secure it so its ends are flush with the side pieces.

After the glue has dried, use a block plane to trim a chamfer around the top edge of the baseboard. Plane the side pieces first, working from front to back to avoid splitting the corners of the front piece. Then, plane the front piece to match. It helps to lean the plane against the case to maintain a uniform angle (**Fig. 9**).

The final component is the case back. Lay out the cut lines on 1/4-in.-thick lauan plywood. Tack a straight strip to the panel to serve as a guide for your circular saw and cut the stock to size (**Fig. 10**). Attach the back panels to the case with glue and 1-in. finishing nails.

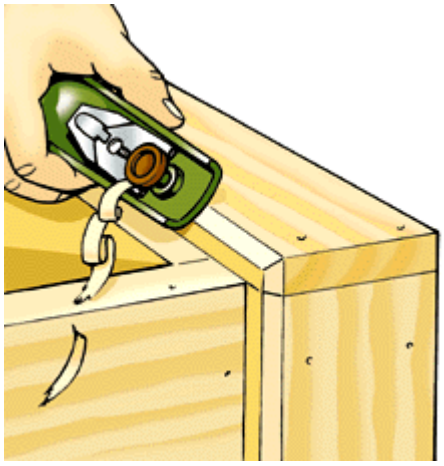

Fig. 9 Use a block plane to shape the chamfers on the baseboard. Rest the plane against the case to maintain a uniform angle.

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Fig. 10 Cut the 1/4-in.-thick back panel to size with a circular saw. Use a straight strip as a guide when making the cuts.

Finishing

First make sure all the nails are set below the surface. Use a putty knife to fill the nail holes with wood filler and let the compound dry (**Fig. 11**).

Sand the entire bookcase with 120- followed by 220-grit sandpaper. Then, use a sanding block and 220-grit paper to slightly ease all corners. Thoroughly dust off the case with a tack rag.

If you plan to paint your bookcase, first apply two coats of shellac over each knot to prevent the knots from bleeding through the final paint job (**Fig. 12**).

Then, prime and paint the bookcase according to the manufacturer's instructions.

Fig. 11 Use a nail set to drive all nails below the surface. Then apply wood filler over the nailheads with a putty knife.

Fig. 12 Apply shellac to any knots before painting. This will seal the knots and prevent sap from bleeding through.

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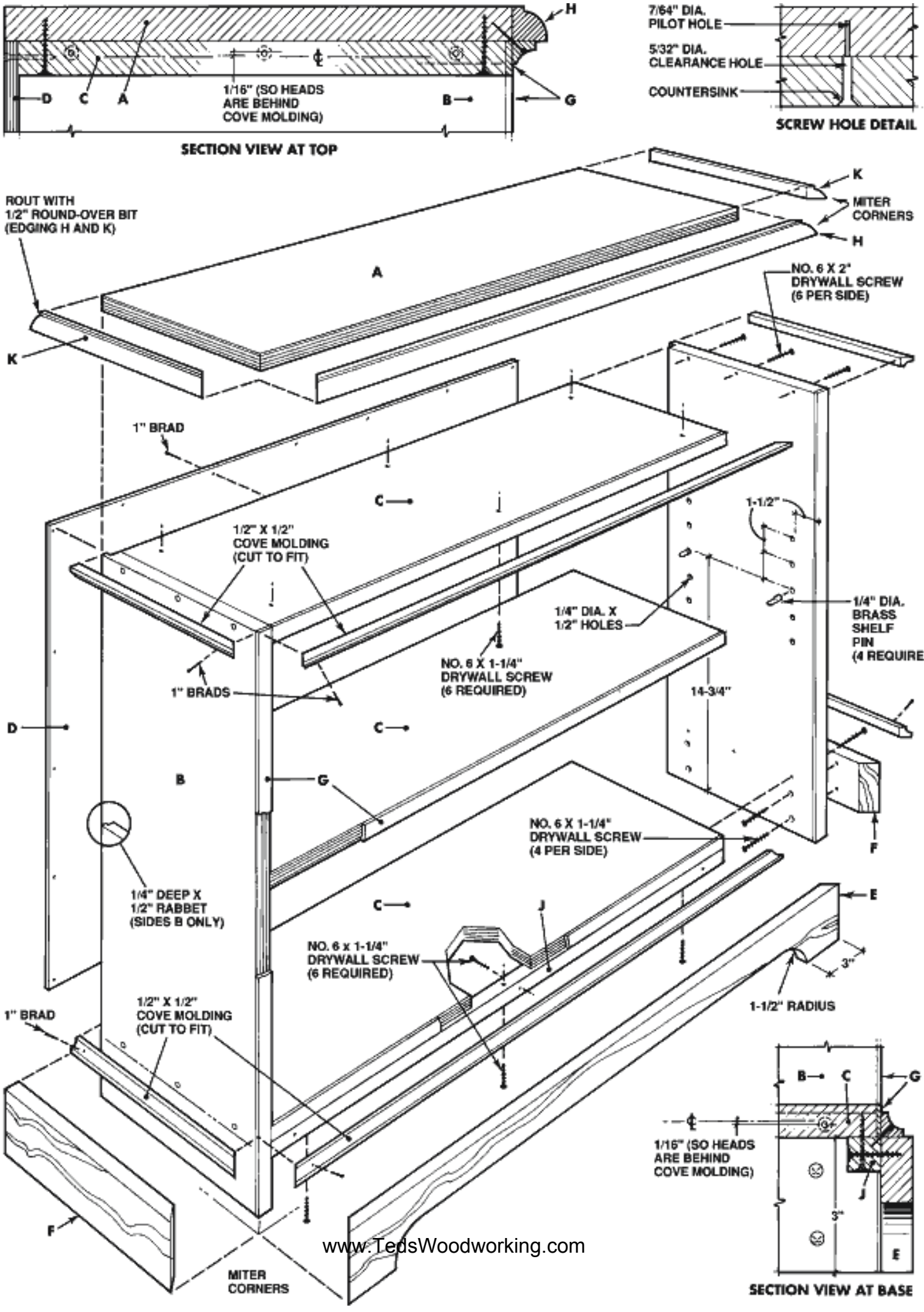
TRADITIONAL BOOKCASE



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CUTTING AND ASSEMBLY PROCEDURE
Refer to the Assembly Diagram.

1. Cut the 3/4" plywood pieces (A, B and C) to the sizes given in the Cutting List.

Woodworker's Tips: Many people have trouble cutting hardwood plywood cleanly, especially across the grain. For this bookcase, you'll have to master this skill, because some of the cuts will show on the finished piece. Here are a few tricks:

- Be aware of which side of your plywood is the good side, and keep it facing up while cutting on the table saw.
- Adjust your saw so the fence is exactly parallel to the blade, and the miter gauge slots are exactly perpendicular to it. If not, the blade will tear up fibers where it touches the wood behind the cut.
- For the smoothest cuts, use a 10" carbide-tipped saw blade with 60 to 100 teeth.
- If you're still not getting clean cuts, score the cutting line deeply with a sharp utility knife before you saw.

2. Cut the solid wood pieces (E, F, G, H, and K) a couple of inches longer than the dimensions given, so they can be trimmed to exact size later. Part J can be cut to the specified size now.
3. Rip part G into 1/8" strips for gluing to the front edge of pieces B and C. Your saw blade will be close to the fence, so use a push stick to guide the wood.
4. Glue the strips (G) to the front edges of pieces B and C using yellow carpenter's glue. After the glue is dry, cut or sand the strips so they're flush with the plywood. You can do this with a block plane or belt sander. If you use a sander, be careful not to cut or sand through the thin veneer of the plywood. If you've never tried this operation before, you may want to experiment on some scrap plywood first. When the strips are flush with the veneer, trim the ends with a small handsaw.

Woodworker's Tip: Use strips of masking tape as clamps for the edge strips. Tape is strong enough for this job and less cumbersome than bar clamps. Apply a tape strip about every 3-4".

5. Cut mitered ends on the 3/4" edging (H, K) that is used for the top (A). Cut the front piece (H) first, so that the miters are exactly flush with the corners of the plywood, then cut the side pieces (K). Clamp them to be sure they fit, then glue. The sides can be long in back and trimmed after the glue is dry. When the glue has dried, sand the edging flush with the plywood.
6. Cut the profile on the edge of the top with a router, using a 1/2" round-over bit with a pilot bearing.
7. Mark where the screws will go into the sides of the case, the top and the cleats. Drill the countersinks, then the clearance holes for the screws. Note that these holes are slightly off-center (about 1/16"), so the cove molding you add later will completely cover them.

Woodworker's Tip: Drilling first and countersinking second can result in a rough, chatter-marked hole, especially on oak plywood, which tears easily. Drill the countersink first, or use a combination drill/countersink bit.

8. Carefully lay out and then drill the shelf pin holes into the inside face of the sides (B).

Woodworker's Tip: A common mistake is to drill the shelf-pin holes inaccurately, resulting in a shelf that wobbles because it's not sitting on all four corners. To avoid this, mark out the holes very carefully; use an awl to prick the surface where you want the drill bit to start; and use a brad-point drill bit, which won't easily wander off the mark.

9. Cut the rabbets on the back edges of the sides (B). The easiest way to do this is with your table or radial arm saw, making two cuts and adjusting the fence after the first cut. Or, install a dado blade and set up the saw to make the rabbets in one pass.
10. Finish-sand all the pieces you've made so far. Start with 120-grit paper and finish with 220-grit.

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Woodworker's Tip: It's a good idea to do as much of your sanding as you can before any pieces are assembled. That way, you eliminate having to sand inside corners. The same goes for finishing: If you can finish parts separately and then assemble them, do it. Remember, however, that glue won't stick to a finished surface, so don't put finish on the surfaces of glue joints.

11. Dry-clamp the pieces to be joined with screws and drill the pilot holes, using the countersunk clearance holes as your guide.
12. Screw the bookcase together. Start by screwing the top and bottom shelves (C) to the sides (B). Then screw the base cleat (J) to the bottom shelf (C). Next, screw the top (A) to the case.
13. Hold the base front piece (E) to the front of the bookcase and mark on its inside surface where the miters should be cut. Cut these miters, then cut the miters on the base sides (F).

Woodworker's Tip: Test your miter cuts on a couple of pieces of scrap (plywood works fine) before making the final cuts.

14. When the three base pieces (E and F) fit well, cut the curved opening at the bottom of the base front (E). Give all the base pieces a final sanding, then screw them onto the case. Use yellow carpenter's glue on the miter joints and other surfaces that meet. Trim the ends of the side pieces (F).
15. Mark the cove moldings for cutting the miter joints, and fit them on as you did with the edging and base piecesthe front first and then the sides. Drill pilot holes for the brads, not just into the cove molding, but into the bookcase as well. Nail on the molding, sink the nailheads slightly with a nail set, push putty into the nail holes. When the glue is dry, trim the ends of the molding and sand them smooth.
16. Cut the back (D) to size and sand it, but don't nail it on until you've completed the finishing.

To prepare for finishing, slightly break all sharp edges on the bookcase with sandpaper.

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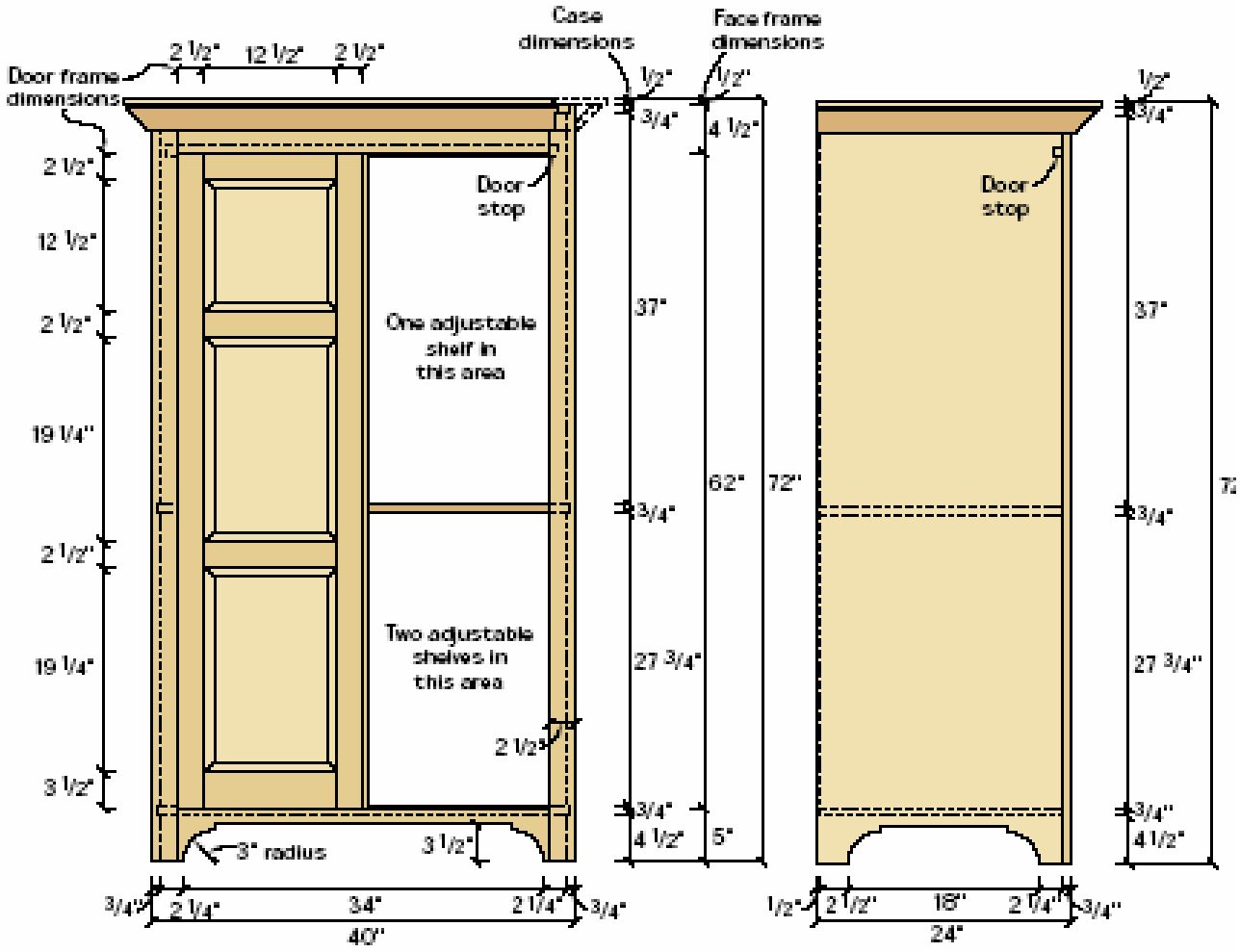
TRADITIONAL ENTERTAINMENT CENTER



Shaker Entertainment Center

No.	Item	Dimensions T W L	Material
2	Face frame stiles	3/4" x 2 9/16" x 71 1/2"	Maple
1	Face frame top rail*	3/4" x 4 1/2" x 37"	Maple
1	Face frame bottom rail*	3/4" x 5" x 37"	Maple
3	Door stiles	3/4" x 2 1/2" x 62"	Maple
1	Door stile	3/4" x 3" x 62"	Maple
6	Door rails*	3/4" x 3 1/2" x 14 1/2"	Maple
2	Door bottom rails	3/4" x 3 1/2" x 14 1/2"	Maple
2	Door panels	5/8" x 13" x 13"	Maple
4	Door panels	5/8" x 13" x 19 3/4"	Maple
2	Cabinet sides	3/4" x 23 1/4" x 71 1/2"	Maple
3	Fixed shelves	3/4" x 22 3/4" x 39"	Maple
3	Adjustable shelves	3/4" x 22 1/4" x 38 1/4"	Maple
1	Back	1/2" x 39 1/2" x 71 1/2"	Maple
1	Door stop	3/4" x 7/8" x 37"	Maple
1	Crown moulding	3/4" x 3 3/4" x 96"	Maple
1	Crown cap	1/2" x 3 1/8" x 96"	Maple
6	Hinges, Lee Valley #00H52.03, $2.30 each, 800-871-8158 or www.leevalley.com		

*Measurement includes 1"-long tenon on both ends

As cabinet construction goes, this is about as basic as it gets, and it still offers old-world joinery, styling and strength. The entire piece is solid lumber, using a face-frame front and a shiplapped back. The raised-panel

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doors are held together with mortise-and-tenon joinery, and the crown moulding is all simple cuts on the table saw and jointer.

I start construction on face-frame cabinets by making the face frame first. All the other pieces will be sized to fit the frame, so it just makes sense to begin there. Also, the width of the face frame's stiles are 1/16" wider than shown in the drawing. This will allow you to trim them flush to the case after assembly.

There are a number of ways to fasten a face frame together, but when I'm making a piece of furniture that has the potential to be moved every so often I prefer the strongest joint I can think of — mortise and tenon. That's because if it's moving it's racking. While a strong back will help keep the cabinet from racking, the face frame does most of the work. In addition, if the piece is a reproduction, like the one here, it's appropriate to use a mortise-and-tenon frame.

I prefer to cut the tenons on the ends of the rails first, then use the tenons to lay out the mortises on the stiles. Set up your table saw to cut the 3/8" x 1"-long tenons, centered on both ends of the top and bottom rails. Then set up your mortiser to cut the mating mortises, setting your depth to 11/16" to avoid having the tenon bottom out in the mortise.

Once the mortises and tenons are cut, assemble the frame by putting glue in the mortises. Don't overdo it; glue can keep the tenon from seating properly in the mortise. After the glue is dry, I pin the joints using 3/8"-square stock.

Three-Panel Doors

Since I'm already set up for making mortise-and-tenon joints, I go ahead and make the doors next. The doors are basic frame-and-panel construction using raised panels with an 8° bevel on the front face. Determine the size of the doors by making them exactly the size of the opening in the face frame. We'll trim them to fit later.

Before cutting the joints for the doors I make the groove in the rails and stiles for the raised panels. These grooves are 3/8" x 3/8" and are centered on the inside edge of each piece, with both edges of the center rails receiving a groove. After the grooves are run, start making the tenons on each end of the rails. Make the tenons and mortises the same size as you used for the face frame. Because the panel groove was run through the ends of each stile, the tenons on the top and bottom rails need to be haunched (the tenon shoulder is left wider to fill the notch left by the groove).

Next mark the locations for the mortises at the locations shown in the diagrams, and cut the mortises in the stiles.

The panels themselves are cut to size allowing ½" extra in both height and width to fit into the grooves in the door frame. With the panels sized, set your table saw blade to an 8° angle. Then set the rip fence to bevel the faces of the panels. The distance between the fence and blade should be set so that the bevel is about 3/8" thick, ¼" in from each edge.

When the door pieces are ready, assemble the doors, again being careful not to use too much glue on the joints. Clamp up the doors and determine if the doors are square by measuring corner to corner. The distance should be the same in both directions. If not, adjust the door by tightening a clamp diagonally across the longer length. When everything is square, tighten the clamps and set the doors aside for the glue to cure.

When the doors are ready, take them to your saw and cut a 3/8" x ½" rabbet on the two interior edges to form a shiplap joint to keep the dust out. Then head to the jointer and trim them to size, allowing a 1/16" gap all the way around the doors. When fitting the doors, run the top and bottom of the doors over the jointer first, as the end grain on the ends of the stiles may tear out. By running the long grain edges last, you should be able to clean up any tear-out on the stiles.

With the doors fit, go ahead and mount the doors in the face frame. I used 2½" non-mortise butt hinges (see schedule). They look good, are easy to attach and are adjustable. When the doors are attached, take them off again to make it easier to glue up the cabinet.

Cabinet: Dadoes and Nails

You're now ready to make the cabinet itself. All the cabinet pieces are made of solid lumber on this piece to keep it reproduction quality. The center shelf, top and bottom are fit into ¼"-deep by ¾"-wide dadoes in the sides. Use the diagrams to locate the dadoes. The sides of the cabinet have 3/8" x 1/2" rabbets run on the inside edges for the back. Cut the dadoes, then glue and nail the top, bottom and center shelf between the sides.

After assembling the case, lay it on its back and glue and clamp the face frame to the cabinet. Check for square, and make sure the overhang on the sides is even. When the glue is dry, I simply remove the clamps and use a flush-cutting router bit to trim the face frame flush to the sides. I used a ½" hardwood beaded shiplap back for this piece. The number of back slats is up to you. They can be random widths, or they can all be the same. I cut a ¼" x ½" rabbet on the slat sides, then add a ¼" bead on one edge using a beading bit in my router table. Don't attach the back yet, as it'll only make finishing more difficult. Set the pieces aside for now.

Shaker furniture is known for its lack of ornamentation, but the Shakers still had a sense of style. Style for this cabinet requires a crown moulding. Cut the moulding pieces to the sizes given in the materials list. Set your table saw blade to a 45° angle and bevel one long edge of the moulding piece. Then move to your jointer, adjust the fence to 45° and run the sharp bevel edge of the moulding over the jointer to leave ¼" flat on the moulding's edge. Repeat the entire process on the opposite edge.

Fit and cut the crown pieces to length, then glue and nail them to the case. On the side pieces I only glue the first 8" of the moulding and attach the back end with a screw through a slotted hole in the case. This allows the sides of the case to move during humidity changes without tearing the crown moulding off. I use small triangular glue blocks behind the crown moulding to support the crown. Next cut the ½" cap pieces to length, mitering them to overhang the crown by ¼", then attach them to the case as well.

A Simple Base

You're almost done. To give the case a base (and to make it sit on an uneven floor without rocking) I used a jigsaw to cut out a pattern on the bottom of the face frame and the sides of the piece, essentially leaving legs. Drill the holes for the shelf pins. Then cut slots for ventilation in the back pieces, and holes through the shelves to pass wires.

The next to last step was finishing. I used a coat of dark oak stain over the entire piece and then applied three coats of semi-gloss spray lacquer.

All that's left is the hardware. You can use whatever you find attractive. I used a couple of turned pulls and added a stop rail behind the doors (at the top of the cabinet). A couple of bullet catches and I was ready to deliver it to the customer. Of course it'll take them another two days to get all the equipment hooked up and arranged the way they want it

When you trim the doors to size, make sure you support the door adequately and start with the top and bottom edges. That way any tear-out on the end grain will be removed when you run the long-grain edges over the jointer.

After the face frame is glued to the cabinet, it's a simple step to walk around the case with a flush-cutting bit in your router to trim the frame flush to the cabinet. A little sanding and you're ready to move on.

To bevel the crown pieces, first bevel cut one edge (shown) with the table saw blade set at 45°. Then move to your joiner (also set at 45°) and put a ¼" flat at a right angle to your first bevel.

Head back to the saw to cut the second bevel. As you'll see in the photo, by cutting the return bevel on the first edge you've provided a bearing surface for the rip fence, rather than let the bevel slip under the fence, messing up the cut.

With one last pass on the joiner you're ready to start hanging the crown.

To make sure the crown moulding is flush to the top of the cabinet, I temporarily screw two scrap strips to the top of the cabinet while I align the front piece. When the front piece is attached, it's fairly easy to carry the height orientation around to the sides. Then simply remove the strips.

The last step on the crown is to attach the cap to the crown and cabinet. Notice the glue blocks behind the crown moulding to support the crown and add stability.

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PICTURE FRAMES

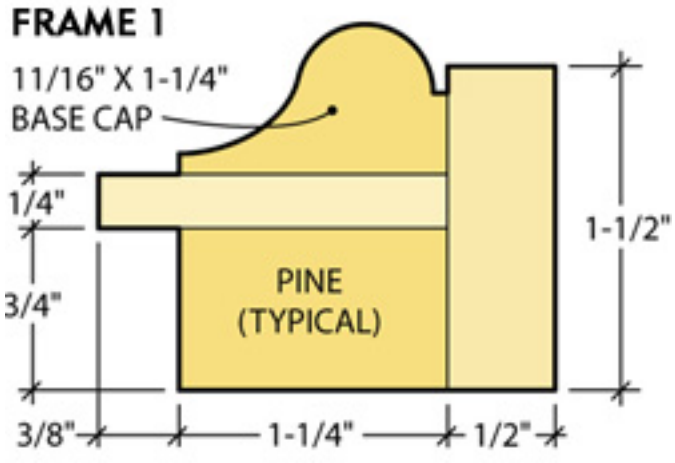
Painted Pine Frames

Our first two frames are made from pine and are great candidates for a paint finish. They feature standard moldings available at well-stocked home centers (below we give the molding's reference number in addition to its common name). For all the frames, it's best to cut the rough materials about 2 or 3 in. longer than necessary before ripping to width or machining.

Frame 1 uses base cap molding (No. WM 166) and flat pine stock. Rip four 3/4 x 1-1/4-in. pine pieces and glue lengths of 1/4 x 1-5/8-in. lath to each. Place them face to face with the edge of one piece flush with the adjoining piece. Use spring clamps to hold the assembly while the glue sets. Then, spread glue on the back of the molding and clamp it to the top of the lath (Photo 1). Make sure that the outer edge of the molding aligns with the flush edge of the flat-stock assembly.

Next, cut the four laminated frame members to size with a miter saw (Photo 2). Use a small brush to spread glue on the mitered ends and assemble the frame in a miter clamp (Photo 3). Check that all corner joints remain tight as you tighten the clamp. After the glue has cured, remove the frame from the clamp and drive small brads into the corners to reinforce the joints.

Next, rip pieces of 1 x 2 to 1/2 in. thick and miter them to fit around the perimeter of the frame. Apply glue and clamp them to the frame with spring clamps (Photo 4).



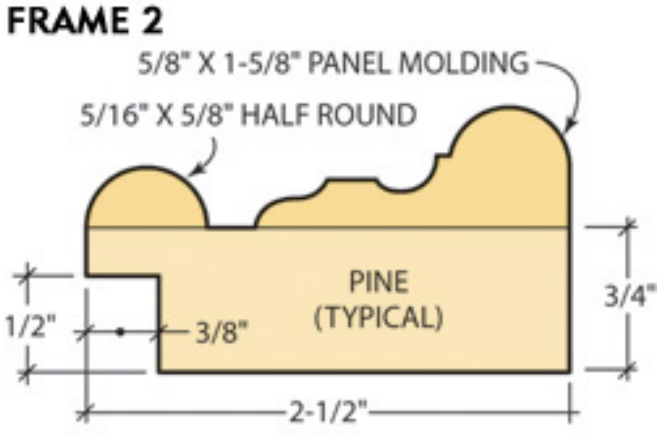
After gluing a 1/4-in.-thick lath to a 3/4-in. backer, add the molding to the lath. Use spring clamps to apply pressure.

Use a miter saw to make the 45° cuts at both ends of each piece. Make sure opposite pieces are the same length.

Spread glue on the mating surfaces and assemble the sides in a frame clamp. Use brads to strengthen joints.

Cut banding strips of 1/2 x 1-1/2-in. pine to length with mitered ends. Glue these to the outside of the frame.

Frame 2 features a panel molding (No. WM 8174) and a 5/8-in. half round (No. WM 123), glued to 1 x 3 pine. After cutting the stock to rough length, spread glue on the back of the molding and use spring clamps to hold it to the 1 x 3 until the glue sets. Keep the panel molding flush to one edge and the half round flush to the opposite edge. When the glue is dry, use a dado blade in your table saw to cut the rabbet along the inner edge of the 1 x 3 (Photo 5). Then, miter the frame stock to exact length.



Since this frame is wider than the first, you can use No. 0 joining plates to reinforce the corners and eliminate the need for brads. Mark centerlines for the plate slots in the mitered ends of the frame stock and cut the

slots (Photo 6). Spread glue on the mitered faces, in the plate slots and on the plates, and assemble the pieces in the frame clamp to pull the corners tight. After about 20 minutes, use a small chisel or putty knife to remove any glue that has squeezed from the joints.

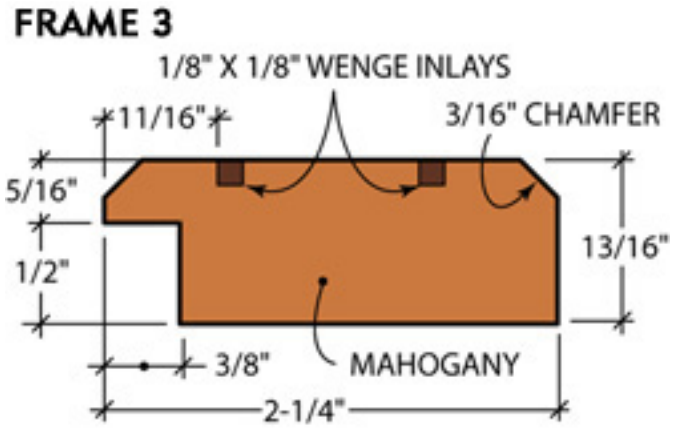
To finish these painted frames, first lightly sand with 150- and 220-grit sandpaper. Then apply an aerosol spray finish, following the manufacturer's instructions. We used Rust-Oleum Hammered Gold (No. 7210) and Hammered Silver (No. 7213) for our frames.

Frame 2 uses two moldings glued to 1 x 3 stock. Cut the frame rabbet with a dado blade and table saw.

Reinforce the corners of wider frames with plate joints. Mark the centerlines and cut slots for No. 0 plates.

Hardwood Frames

Another approach to building frames is to use hardwood with either a clear or stained finish. In each of the following designs, we've combined different woods to create patterns of contrasting colors and textures. After building four oversize pieces of frame stock for each design, use a dado blade or router table to cut the 3/8-in.-wide frame rabbet on the inner edge of each piece. Then, use a miter saw to cut the pieces to precise length and join the corners with plate joints.



Frame 3 is constructed of mahogany with wenge inlay. Begin by ripping 13/16-in. mahogany to 2-1/4 in. wide. Crosscut the stock to rough length, then readjust the saw blade and cut two 1/8-in.-deep kerfs in the face of each piece. Use a band saw to rip 1/8 x 1/4-in. inlay strips of wenge. Run a bead of glue into each saw kerf and press the inlay

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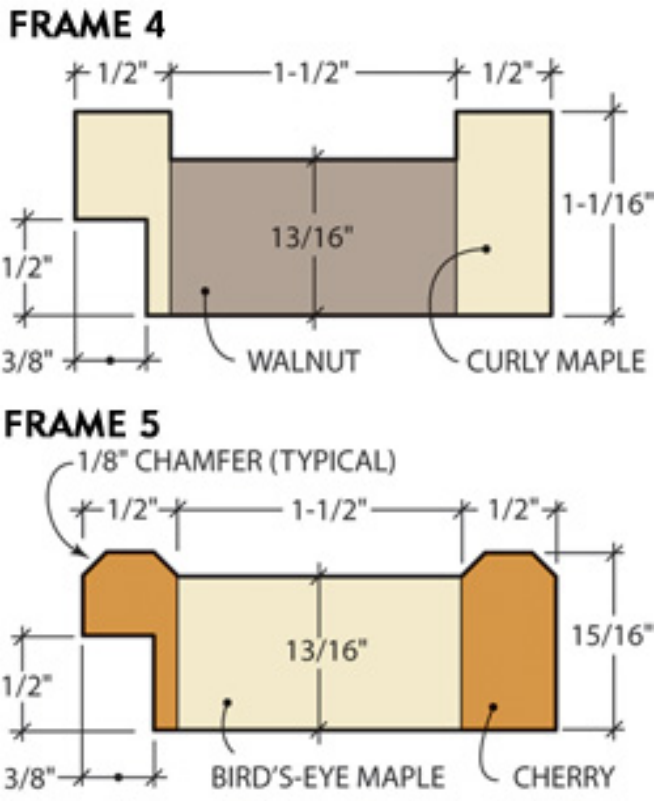
strips into place. Use spring clamps to hold them while the glue cures (Photo 7). When the glue is dry, use a plane or sharp cabinet scraper to trim the wenge flush to the mahogany surface. Then, install a chamfer bit in your router table and bevel the two top edges of the frame stock.

Frame 3 has two inlaid strips. Cut the slots on a table saw. Glue the strips in place and rout a chamfer on the edges.

Frames 4 and 5 are variations on the same theme. For the first design, rip curly maple strips to 1/2 x 1-1/16 in. and glue them to the edges of a 13/16 x 1-1/2-in. walnut field (Photo 8). Keep all pieces flush on the back side of the frame.

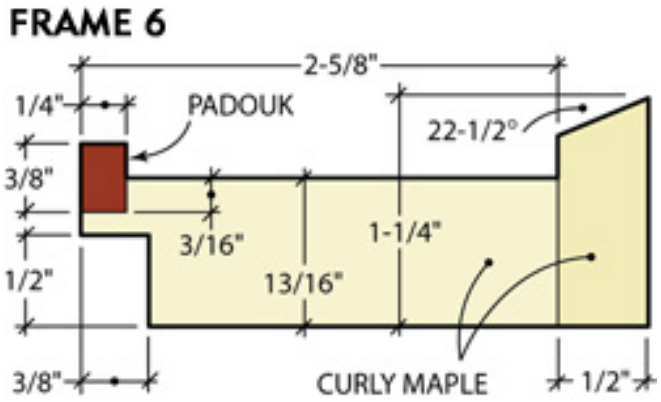
For the second variation, rip 1/2-in.-thick cherry stock to 2-1/2 in. wide. Use a router table with a chamfer bit to shape all four edges of the cherry, then rip the molded stock into 15/16-in. strips (Photo 9). Glue these strips to both edges of a bird's-eye maple field.



Clamp maple strips to both edges of a walnut field to form Frame 4. Make sure the pieces are flush on the back.

After routing chamfered edges on cherry stock, rip two strips. Glue them to the edges of a maple field for Frame 5.

For Frame 6, we've chosen curly maple for the field and raised outer band, with a padauk inlay that accents the inner edge. After ripping the maple stock to width, use a dado blade or router table to cut a 3/16-in.-deep x 1/4-in.-wide rabbet along one edge of each of the four frame pieces. Then, cut pieces of padauk to fit the rabbet in each piece. Glue the inlays in place, securing them with strips of masking tape until the glue sets (Photo 10).



To make the outer band, rip a 22-1/2° angle on the edge of a 1/2-in.-thick piece of maple. Re-adjust your saw to 90° and rip this beveled strip from the board. With four band strips made, glue each to the outer edge of the maple field pieces (Photo 11).

After sanding to 220 grit, we finished our

hardwood frames with clear shellac. This finish is easy to apply, it dries quickly, and it won't react with delicate artwork and mounting materials. Brush on a light coat with a good-quality bristle brush and let dry for at least 2 hours. Lightly sand with 320-grit paper to remove any roughness, and dust off. Apply one or two additional coats as needed. When the last coat is dry, rub it with 4/0 steel wool for a warm, satin gloss.

For Frame 6, glue padauk strips in a rabbet on the edge of a maple field. Use masking tape instead of clamps.

Glue the angled band strips to the outside of the maple frame pieces. Be sure that the strips are flush on the back.

Mounting Equipment

Now that you have your wooden frames ready, it's time to gather the materials for mounting. You can buy what you need at any well-stocked art supply store.

Photos and prints are typically mounted within a broad mat-board window that highlights the artwork. Mat board is available in a variety of colors and a few textures as well. Make sure to get acidfree, or archival, mat board to protect the artwork from deterioration. This same material can be used as the mounting board behind the artwork. You'll also need archival mounting tape. This tape is made of linen cloth and is activated by wetting its glued surface. Backing board, installed behind the mounting board to keep it flat, can be either stiff corrugated cardboard or foam core stock. After the backing board, you'll need kraft paper to act as a dust cover over the back of the frame--a glue stick is a convenient way to attach the paper to the frame.

Most artwork requires a pane of glass to protect it from dirt and changes in humidity. In most cases, normal window glass will work, although a special ultraviolet-protective glass is available to help prevent fading. Nonglare glass is also used for framing. However, this type has a slightly dull appearance. Acrylic sheet can be a practical alternative to glass--especially if weight is an issue. But acrylic scratches easily, attracts dust and doesn't have the same degree of transparency as glass.

As for special tools, you'll need a straightedge and a mat cutter. Mat cutters come in a variety of configurations, ranging from basic $15 models to professional versions costing a few hundred dollars. We achieved good results with a medium-priced Logan Model 3000 Pro-Am mat cutter and Adapt-A-Rule straightedge and ruler.

Mounting The Artwork

Measure and mark the size of your mat and mounting boards. It's best to work from the back of the boards to prevent soiling the face. Place the boards on a piece of scrap cardboard and use a utility knife and straightedge to cut both pieces to size.

Position the artwork on the mounting board and mark the corners with light pencil marks. Rip two 1-1/2-in.-long pieces of linen mounting tape and moisten about 1/2-in. of each piece. Adhere the tape to the back side of the artwork, along the top edge so that about 1 in. extends beyond the top. When the glue dries, turn the piece face side up and position it on the mounting board. Rip two more strips of tape, each about 3 in. long, and moisten them. Apply them across the extending tape strips so the artwork is hinged to the mounting board (Photo 12). This system allows the print to expand and contract with changes in humidity, without wrinkling.

Use linen tape to attach photos and prints to the mounting board. Hinge the artwork at the top edge.

Mark the cutlines for the opening, or window, on the back side of the mat board. Typically, a mat extends over the image by no more than 1/4 in. on each edge. Use the straightedge and mat cutter to make the cuts (Photo 13). It's a good idea to practice on scrap board to learn how to start and stop the cuts exactly at the corners.

To cut the mat opening, mark cutlines on the back side of the mat board and use a mat cutter to make the cuts.

Place the cut mat over the mounted print (Photo 14). It's not necessary to attach the mat since the whole assembly will be sandwiched in the frame.

Place the mat over the print and mounting board. It's not necessary to fasten the two boards together.

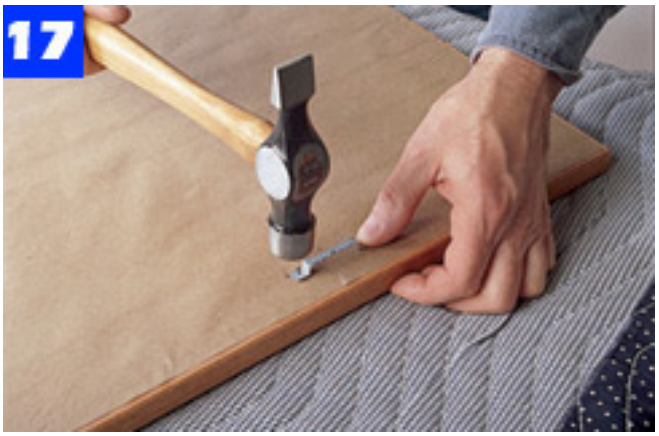
Turn the frame upside down and install the glass. Then place the matted print into the frame (Photo 15). Cut the backing board to size and place it over the mounting board. Use framer's points to hold the back in place (Photo 16). You can use a special driving tool or a flat-blade screwdriver to install the points. On hardwood frames, the driving tool is worthwhile since the points are a bit harder to install.

Cut a piece of kraft paper slightly larger than the overall frame size. Rub a glue stick on the back side of the frame and apply the paper, letting it overhang on all edges. Press the paper to the frame to get a good bond and use a straightedge and utility knife to trim it 1/8 in. in from each edge. The simplest method of hanging a frame is to use a sawtooth-type hanger. Center the hanger on the back of the top rail of the frame and drive brads to hold it in place (Photo 17). On a hardwood frame, use an awl or bore small pilot holes for the brads.

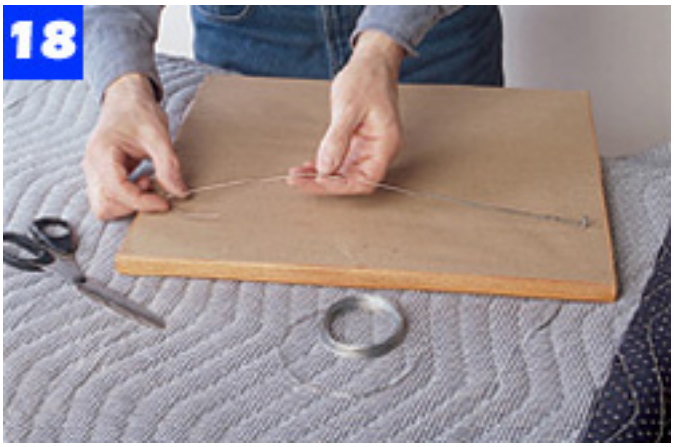
Large or heavy frames are best hung with picture wire. Bore pilot holes, and install screweyes or D-ring hangers in the side frame rails about 3 or 4 in. from the top edge of the frame. String a length of picture wire between the hangers, leaving about 1-1/2 in. of slack. Twist the wire together to lock it to the hangers (Photo 18).

With the frame lying face side down, install the glass panel. Then, place the mounted artwork in the frame.

Place a corrugated or rigid foam backing board over the mounting board and hold it in place with framer's points.



A sawtooth hanger is fine for supporting light frames. Use brads to secure it to the center of the frame.



Hang heavy frames with picture wire. Install screweyes or D-ring hangers and string picture wire between them.

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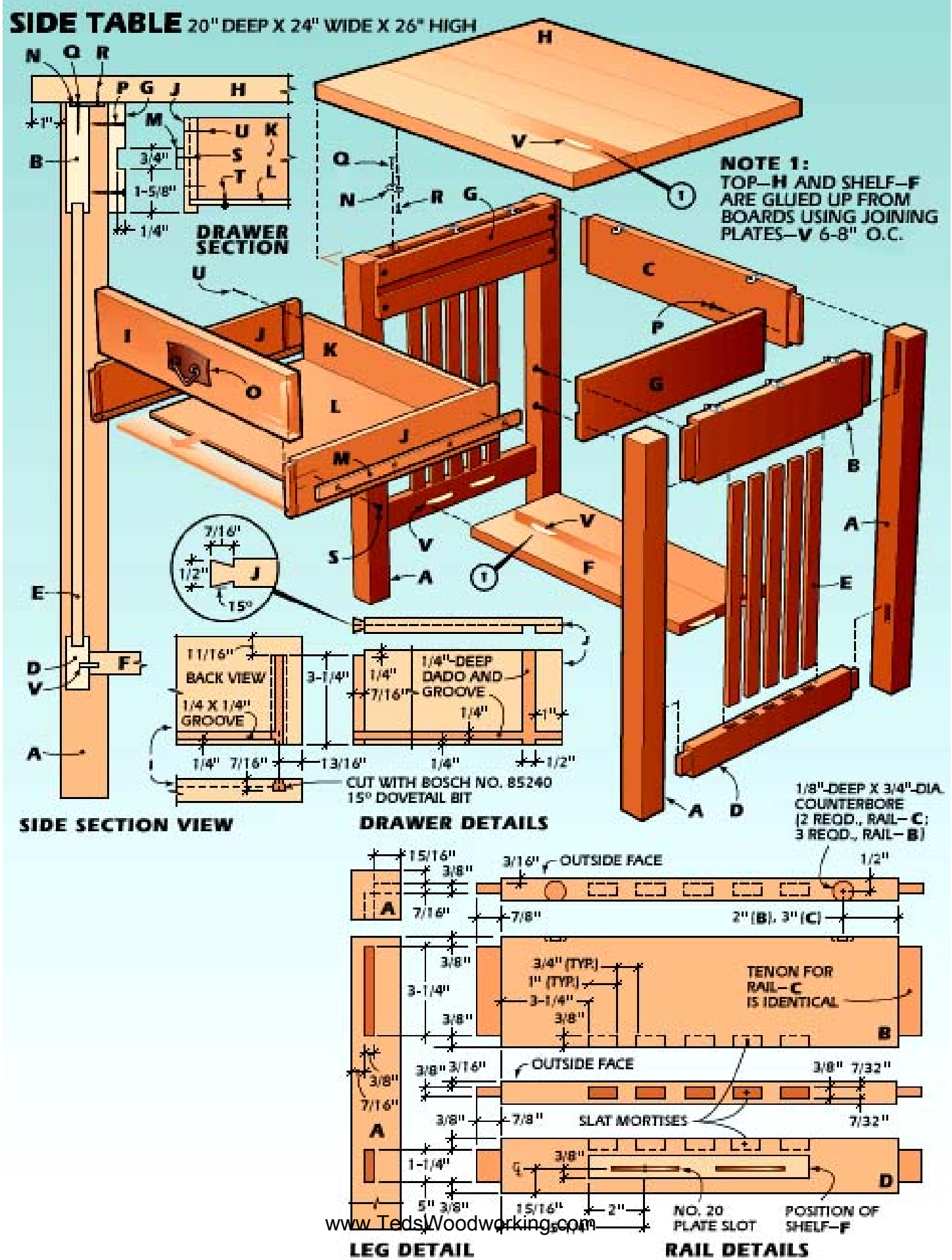
SIDE TABLE

SIDE TABLE 20" DEEP X 24" WIDE X 26" HIGH



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MATERIALS LIST–SIDE TABLE		
Key	**No.**	**Size and description (use)**
A	**4**	**1 3/4 x 1 3/4 x 25" oak (leg)**
B	**2**	**13/16 x 4 x16 1/4" oak (rail)**
C	**1**	**13/16 x 4 x 20 1/4" oak (rail)**
D	**2**	**13/16 x 2 x 16 1/4" oak (rail)**
E	**10**	**3/8 x 1 x 15 1/8" oak (slat)**
F	**1**	**13/16 x 8 x 19 7/8" oak (shelf)**
G	**2**	**5/8 x 4 x 15 7/8" oak (drawer guide)**
H	**1**	**1 x 20 x 24" oak (top)**
I	**1**	**13/16 x 3 15/16 x 18 3/8" oak (drawer face)**
J	**2**	**1/2 x 3 1/2 x 16 1/4" oak (drawer side)**
K	**1**	**1/2 x 3 x 16 3/4" oak (drawer back)**
L	**1**	**1/4 x 15 1/16 x 16 3/4" oak plywood (drawer bottom)**
M	**2**	**1/4 x 3/4 x 15 13/16" oak (drawer guide strip)**
N	**8**	**Knape & Vogt No. 1547STL tabletop fastener**
O	**1**	**Whitechapel No. 106STH2 drawer pull**
P	**8**	**1 1/4" No. 8 fh screws**
Q	**8**	**1" No. 8 fh screws**
R	**8**	**5/8" No. 8 fh screws**
S	**8**	**1/2" No. 6 fh screws**
T	**3**	**5/8" No. 6 rh screws**
U	**8**	**3/4" x 16-ga. brads**
V	**16**	**No. 20 joining plates**
Misc: Yellow glue, 120- and 220-grit sandpaper, 0000 steel wool, aniline stain, tung oil varnish, paste wax.		

Stock preparation

Like the rocker and bookcase, the material used in this table is quarter- sawn white oak. The legs are cut from 8/4 solid stock, the top from 5/4 material and the rest from 4/4 lumber. For the drawer sides, you will have to either plane 4/4 stock to 1/2-in. thickness or have your lumber dealer plane the lumber to the finished size. The same holds true for the drawer guides, which are 5/8 in. thick.

The panels for the bottom shelf and tabletop are glued up from narrow boards. Cut stock slightly longer and a bit wider than required to yield the finished panel. Edge-joint each piece, then lay out the locations of the No. 20 joining plate slots every 6 to 8 in. along the mating edges. Keep the end slots about 3 in. from the finished ends of the panels.

Use the plate joiner to cut the slots, registering the cuts against a flat work surface. Then apply glue to the slots, plates and edges and assemble the panels. Use clamps to pull the joints tight, then let the glue set for about 20 minutes. After the glue fully cures, rip and crosscut the panels to finished dimension.

Joinery

Rip and crosscut the remaining parts for the table base to finished dimension. Then, lay out the mortise in the table legs. Use a router with an edge guide and 1/2-in.-dia. up-cut spiral bit to make these cuts (Photo 1). Use a sharp chisel to square the ends of each mortise (Photo 2).

Use a dado blade in your table saw to cut the tenons on the side and back rails. Since the tenons are 7/8 in. long, you will have to make two passes for each tenon cheek. Readjust the blade height to cut the shoulders at the top and bottom edges of the tenons (Photo 3). Check the fit of each tenon in its matching mortise.

Mark the locations of the slat mortises in the side rails. Clamp a tall fence to the drill-press table to help locate the rails, then bore overlapping 3/8-in.-dia. holes to remove most of the waste (Photo 4). Complete the mortises by smoothing the walls and squaring the ends with a sharp chisel.

1--Use a router with an up-cut spiral bit and an edge guide to cut the rail mortises in the table legs. Make several passes.

2--When the routing is done, carefully square the ends and flatten the sides of each mortise with a sharp chisel.

3--Use a dado blade in a table saw to cut the rail tenons. First cut the cheeks, then readjust the saw to cut the shoulders.

4--Cut the slat mortises in the rails using a drill press to remove most of the waste and a sharp chisel to finish the cuts.

Lay out the joining plate slots on the bottom shelf and side rails. Use the plate joiner to cut the slots in the shelf ends, registering the cut on a flat workbench or on the top of your table saw (Photo 5). To cut the slots in the side rails, you must use a spacer block under the plate joiner to yield the proper slot position (Photo 6).

Before beginning to assemble the base, sand all the parts with 120- and 220-grit sandpaper, then dust off the pieces thoroughly. It is much easier to do a good job of sanding at this stage than it is once the base is together.

Base assembly

Position the side slats in their mortises in one bottom side rail (Photo 7). If the parts fit properly, you need not apply glue to these joints, since the slats will be held captive between the rails. Place the top side rail over the slat ends, then clamp the assembly temporarily to be sure that the slats

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are completely seated in the mortises.

Apply glue to the rail tenons and leg mortises, then assemble the table side. Clamp the joints tight, then compare opposite diagonal measurements to be sure that the assembly is square (Photo 8). Follow the same procedure for the other side. Apply glue to the joining plate slots, mortises, tenons and plates for assembling the shelf and back rail to the sides. Join the rail and shelf to one side (Photo 9), then place the opposite side over the shelf and rail ends. Stand the base on a flat work surface and clamp the joints tight (Photo 10). Check for square.

Use a router with an edge guide to cut a 1/4-in.-deep x 3/4-in.-wide dado in each drawer guide (Photo 11). Bore and countersink pilot holes for mounting screws in the guides, then sand the guides with 220-grit sandpaper before fastening them to the table legs (Photo 12).

5--Clamp the bottom shelf securely to a workbench. Then use a plate joiner to cut joining slots in both ends of the shelf.

6--Clamp the bottom rails to your table saw fence. Then use a plate joiner to cut joining slots in one side of both rails.

7--Test fit the side slats in the rail mortises. Sand or trim the joints, if necessary, to achieve a tight fit for each slat.

8--Apply glue to the mortises and tenons, then clamp the parts. Check for square by comparing diagonal measurements.

9--To join the sides to the back rail and bottom shelf, apply glue to the slots and plates, and to the mortises and tenons.

10--Clamp the side assemblies to the back rail and shelf and check the parts for square. Readjust the clamps if necessary.

Mark the locations of the tabletop fasteners on the top edge of the side and back rails. Use a 3/4-in. Forstner or multispur bit to bore the 1/8-in.-deep recess for the fasteners. Bore a pilot hole for each, then attach the fasteners with 1-in.-long No. 8 fh screws.

Drawers

Cut stock to finished size for the drawer sides and back, and rip stock for the drawer face, but don't cut it to length yet. Instead, leave the drawer face blank about 12 in. long. The drawer sides are joined to the face with sliding dovetails. These joints are not difficult to cut, and they provide a nice compromise when you do not want to invest the time required for traditional dovetail corner joints. In order to cut these stopped dovetail slots, construct a U-shaped jig to guide the router. You can build this jig by screwing together three strips of scrap lumber or plywood. The dimensions of these pieces are not critical. But it is important that the three pieces are assembled square to each other.

Set the dovetail bit–we used a Bosch No. 85240–to cut 7/16 in. deep, then make an indexing cut into the fence of your jig to make locating your cut easy. Mark the position of the two slots–along with an end mark for each slot–on the inside surface of the drawer face, centered on the length of the face blank. Clamp the face to the routing jig with the indexing cut centered on one mark. Slide the router bit into the slot, turn on the motor and guide the tool along the jig to the end mark of the slot (Photo 13). Turn off the router and slide the bit back to the indexing cut to remove it. Repeat for the other slot. Cut the face to finished length.

13--Rout slots in the drawer face for the drawer sides with a dovetail bit. Use a square U-shaped jig to guide the router.

Use the same dovetail bit in the router table to cut the dovetail shape on the ends of the drawer sides (Photo 14). For the joint with the drawer back, use a dado blade in the table saw to cut a simple dado. Then use a 1/4-in.-dia. straight bit in the router, and an edge guide, to cut the grooves for the drawer bottom in the face and drawer sides (Photo 15). Note that the groove in the face runs only between the dovetail slots.

14--Use the same dovetail bit in a router table to cut both sides of the dovetails on the ends of each drawer side.

Use a small backsaw to cut the shoulder at the top of the dovetail on each drawer side. Then dry assemble the drawer box to be sure that all joints fit properly. If all the joints are correct, sand all drawer parts, then apply glue and reassemble the drawer (Photo 16). Use brads to reinforce the glue joints between the back and drawer sides. Then clamp the drawer parts together. Check that the assembly is square.

Cut the drawer bottom from 1/4-in.-thick plywood, then slide it into place, and fasten it to the bottom edge of the drawer back with screws. You can remove the bottom later to make finishing the drawer easier.

Cut the drawer hanger strips to size, then bore and countersink pilot holes for attaching them to the drawer sides. Clamp the strips to the drawer sides, then fasten them with screws (Photo 17). Finish the drawer assembly by marking the locations of mounting screws for the drawer pull. Bore pilot holes and attach the pull.

15--Cut a dado between the dovetail slots on the drawer face for the bottom panel. Cut matching dadoes in the drawer sides.

16--Apply glue to all the drawer joints, then clamp the box together. Reinforce the side-to-back joints with brads.

17--Slide the drawer bottom in place and attach it to the back with screws. Also, screw the guide strips to the sides.

18--Center the base over the top and mark the fastener holes. Then bore pilot holes in the top and attach the base.

Assembly

Sand the tabletop smooth with 220-grit sandpaper, then place it upside down on a padded surface. Invert the base on the top and adjust it for an even reveal on all sides. Next, mark the locations of the screwholes for the tabletop fasteners (Photo 18). Use a clamp to maintain the proper spacing between the front table legs.

Remove the base from the top and bore pilot holes for the tabletop fastener screws. Then, replace the base and install the screws. You'll need a screwdriver with a magnetic tip to start the screws between the drawer guides and side rails. Apply the same stain and finish that's described in "Rocking Chair."

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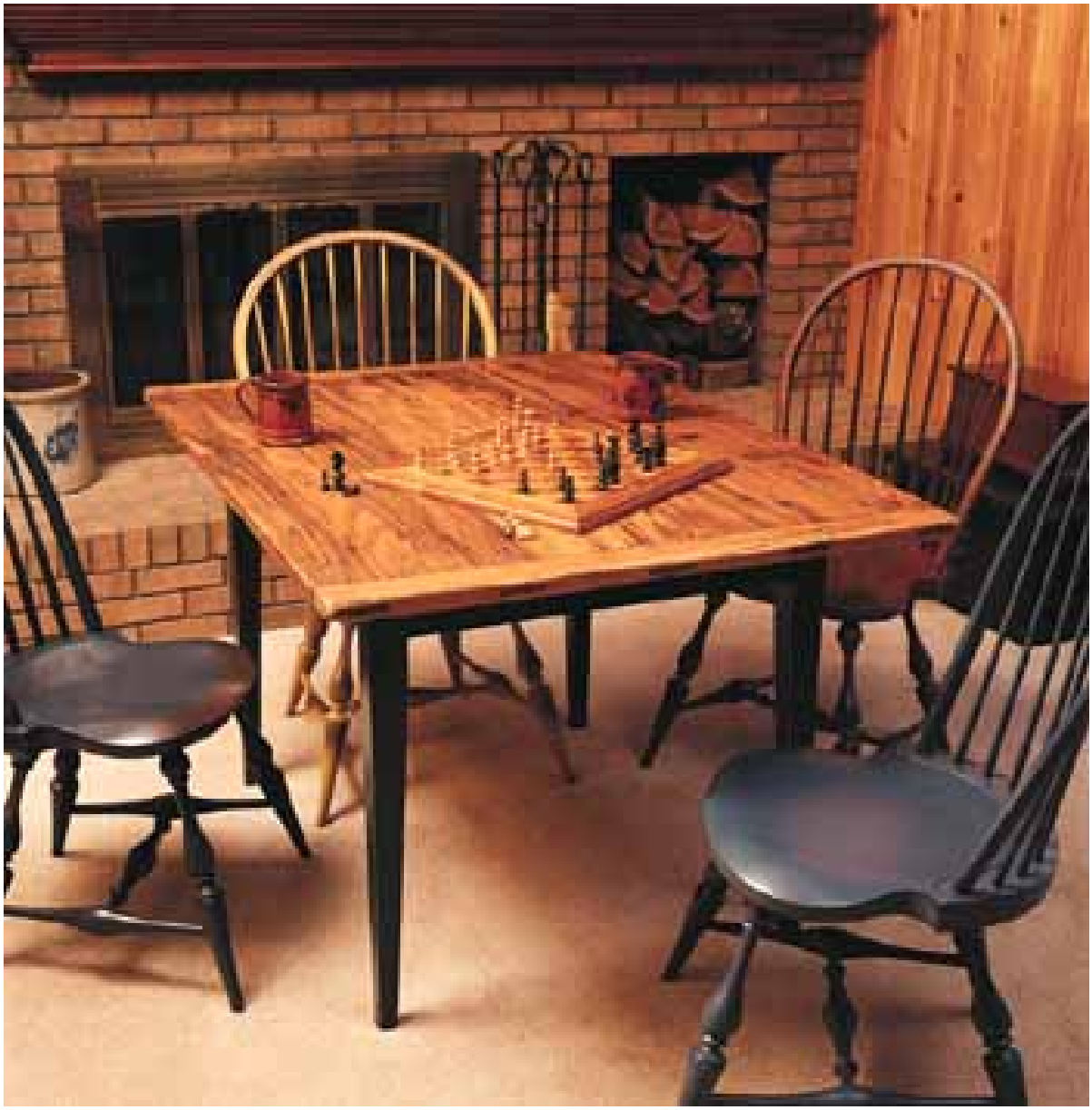
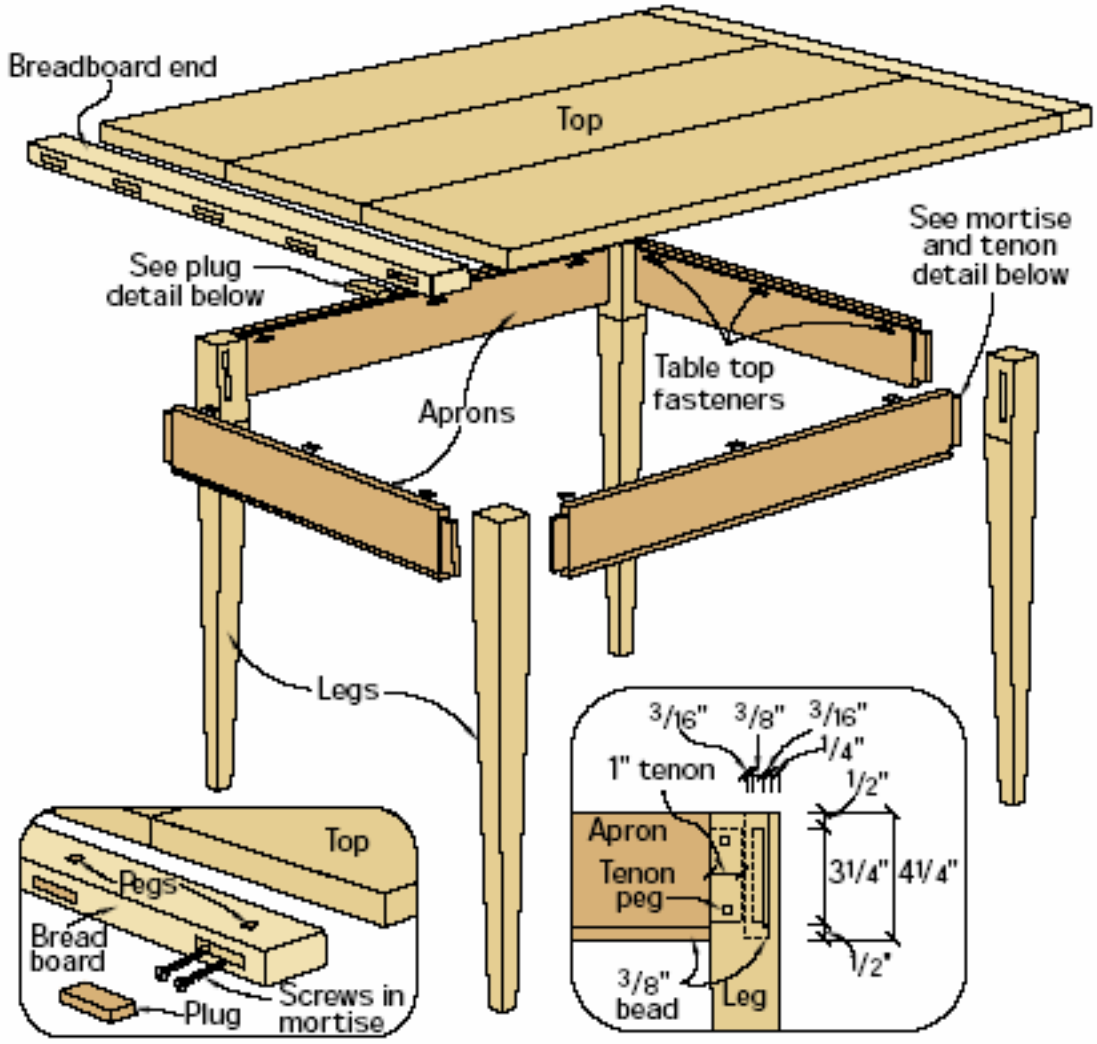
TAVERN TABLE





Detail of breadboard ends

Detail of mortise and tenon

Schedule of Materials: Tavern Table

No.	Item	Dimensions T W L	Material
4	Legs	2 1/8" x 2 1/8" x 28 1/4"	S
2	Aprons*	3/4" x 4 1/4" x 31 3/4"	S
2	Aprons*	3/4" x 4 1/4" x 25 3/4"	S
1	Top	1 1/8" x 36" x 43"	P
2	Breadboards	1 1/8" x 2 1/2" x 36"	P

P – chestnut; S–poplar • * Including 1" tenon

Begin the project by milling the legs and cutting the taper. You can use a tapering jig for your table saw, but I don't recommend it. A few years ago I came up with a quick way to use a jointer to cut tapers faster and safer..

There are a lot of ways you can join the aprons to the legs, from totally traditional to quick-and-dirty. I prefer using a straight mortise-and-tenon joint, though if I were building a little side table or something else that wouldn't see daily abuse, the two less traditional methods I'm going to cover would work just fine. But before we talk about the bases, build the top.

Making the Top

After I pulled the right boards from my woodpile, I got them ready for glue-up. I wanted this top to look rustic, so I didn't plane the lumber. Instead, I jointed the edges of the planks and glued up the top. Then I rough sanded it with a belt sander to get it reasonably flat and to remove some of the milling marks. Then I cut the top to size and worked on the breadboard ends.

For a long time I used traditional through-mortises to attach breadboards to cover the end grain of my tabletops. Other people showed my how to do it with slotted screw holes. I was always against using that method until I actually tried it. Now it's the only way I'll attach breadboards. You actually get less up-and-down movement using screws, and the top stays flatter-looking for a longer time. Here's how I make my breadboard ends.

After cutting the breadboards to size, cut 3/8"-wide by 2-1/2"-long by 1-1/2"-deep mortises in the breadboards. I cut five of these for my 36"-wide top. How ever many you use, it's always good practice to use an odd number of mortises so it's easier to lay them out. I put the two outside mortises 1/2" in from the end of the breadboard.

Now cut two slots for two screws in each mortise. I make the slots about 3/8" long to give the top some real room to move if it has to. You can make a router jig to cut the slots, or you can use your drill press and work the bit back and forth. Clamp the breadboard to the table top and put two screws in each mortise. I put the screws at the sides of the mortise, not at the center. I do this because I peg the fake plug later in the process, and this keeps me from boring a hole into one of my screws accidentally. Don't drive the screws in too tightly because you want the table top to be able to move.

Now plug the mortises. I cut plugs to fit the opening and taper them a bit so they fit snugly when tapped in place. Glue the plugs in place, then peg the plugs through the top with 1/4" x 1/4" square pegs.

Now age the top. I strike the top with a key ring full of keys; I even write people's names in the top with a knife. It's pretty amusing to watch people as they see me do this. They freak out.

Stain the top with a golden oak color and then add a natural oil finish, such as Watco, which is an oil/varnish blend. You don't want the top to look too shiny.

Now plug the mortises. I cut plugs to fit the opening and taper them a bit so they fit snugly when tapped in place. Glue the plugs in place, then peg the plugs through the top with 1/4" x 1/4" square pegs.

Now turn your attention to the base.

Mortise and Tenon

Cut your aprons to size. Cut 1"-long tenons that are 3/8" thick. The apron lengths in the Schedule of Materials include the tenons. I cut my tenons first and use them to lay out my mortises, which results in less layout, in my opinion. These aprons are set back 1/4" from the front of the legs, this is called a "set back."

Now cut a bead on the bottom edge of the aprons using a beading bit in your router. Finally, cut a slot on the inside of the aprons for fastening the base to the top. I use metal

The plugs for the breadboard ends are made from the same material as the table top. Sand the plug to fit, put some glue on the sides and tap it in place.

I usually build my tables using straight mortise-and-tenon joinery. However, there are special cases when other methods are just as good or even better.

These table top fasteners are cheap ($1.99 for a pack of eight) and sturdy. Simply place the clip end into the kerf in your apron and screw the other end to your table top.

tabletop fasteners from Rockler (see the supplies list at the end of the article). Rockler sells very sturdy ones, and I recommend them.

For these fasteners, the slot needs to be the width of your table saw's blade (between 1/8" or 1/16" wide) and 7/16" down from the top of the apron and 3/8" deep.

Glue up your base, peg the mortises through the legs and finish the base. I use square pegs in my legs. Drill a round hole through the leg and into the mortise. Then take a piece of square stock, whittle one end of it roundish, then pound it into the hole. It should convert your round hole into a square.

Mitered Mortise and Tenon

This method is similar to the straight mortise and tenon above, but you must miter the ends of the tenons because your mortises meet in the middle of the leg. Why would they meet? Well you might have a thinner leg, or your mortises might be back farther if you chose to use a larger set back.

When this is the case, I make a standard tenon and chop the end off at a 45-degree angle on my miter saw. You're not trying to match the two miters exactly (it will never show) so leave a little gap between the two tenons. If it's too tight, it could get you in trouble because the ends of the tenons will touch before the shoulders seat into the legs.

Pocket Screws

I wouldn't recommend this for a large table. If you're going to spend the money on the wood, you might as well do it right. But if you want to build a quick-and-dirty side table, this will work fine. Be sure to glue and screw this joint for added strength. It's important to keep the pieces tightly together as you screw the apron to the leg.

Corner Brackets

Corner brackets are a faster alternative to traditional joinery, but they aren't as sturdy. However, you can't beat them when you want to make a table that can be knocked down and stored away.

These measurements apply to the brackets from Rockler (see the supplies box at the end of the article). The first step to installing these brackets is to cut a bevel on the inside corner of the legs. This is where you'll later install the hanger bolts. The best way to cut the bevel is on your jointer. Set the machine's fence to a 45-degree angle and the depth of cut to 1/4". Cut 3-1/2" in on the top corner as shown in the photo.

Now install the hanger bolts, which are odd-looking fasteners that have wood screw threads on one end and machine screw threads on the other. The wood screw end goes into the leg, and the machine screw end is bolted to the corner bracket. To install the hanger bolts, first lay out and drill pilot holes on the leg. Then install the bolts using the method shown in the photo.

Now you need to cut a kerf in each apron for the bracket to grab. The kerf should be 1-3/4" in from the end and 3/8" deep for these brackets. Different brands can use different measurements.

Attaching the Top and Finishing

I attach the top with tabletop fasteners that I screw in place about every foot. On the long aprons, don't push the fasteners all the way into the kerf when screwing them down. This will give your top some room to move.

I finished the base with a couple coats of latex paint followed by a glazing stain. Finally, I added a couple coats of lacquer for protection.

When you have to use mitered mortise-and-tenon joinery, don't get too worked up about the fit of the miter. You don't want the miter too tight.

Mitered mortise-and-tenon joinery is common on tables with thin legs or when your set back is deeper than normal.

Be sure to glue the joint and hold the leg and apron together tightly while screwing it together.

Pocket screws aren't my first choice for building dining tables, but for a small occasional table, it'll work.

Use the bracket as a template for locating the holes for the corner bracket. Then use a drill press to make your pilot holes.

To install the hanger bolts, thread two machine nuts onto the end of the hanger bolt and tighten them against one another. Then grip the two nuts with a wrench and screw the hanger bolts into the leg.

Corner brackets are great for building furniture that needs to be knocked down or moved frequently.

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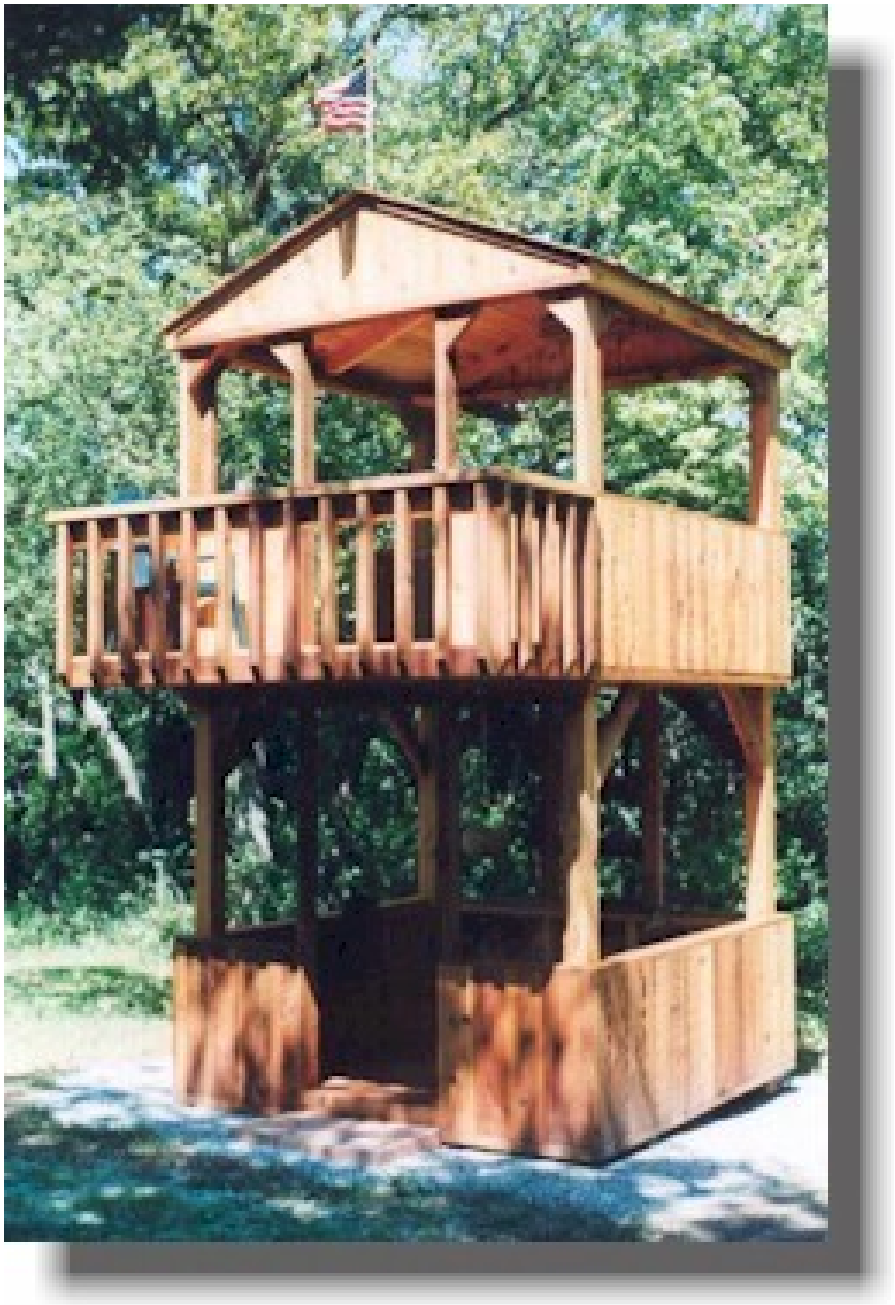
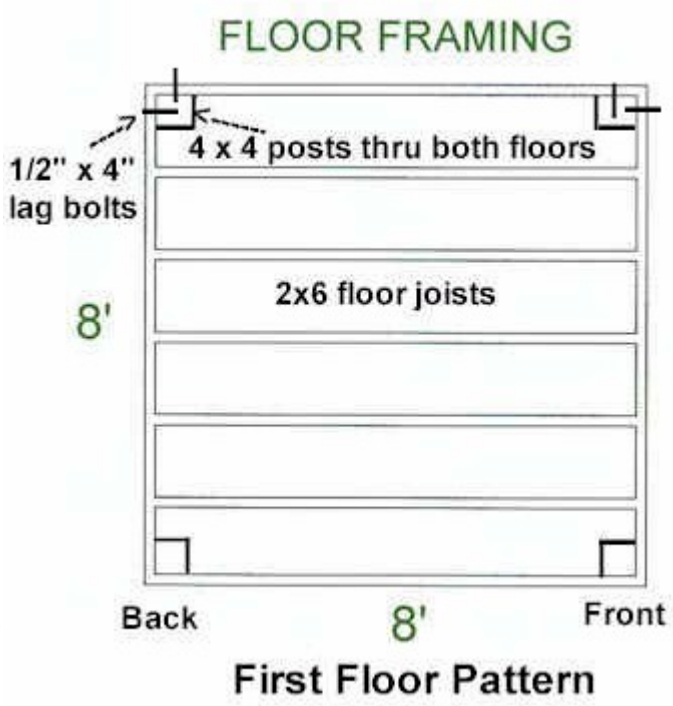
FORT PLAYHOUSE



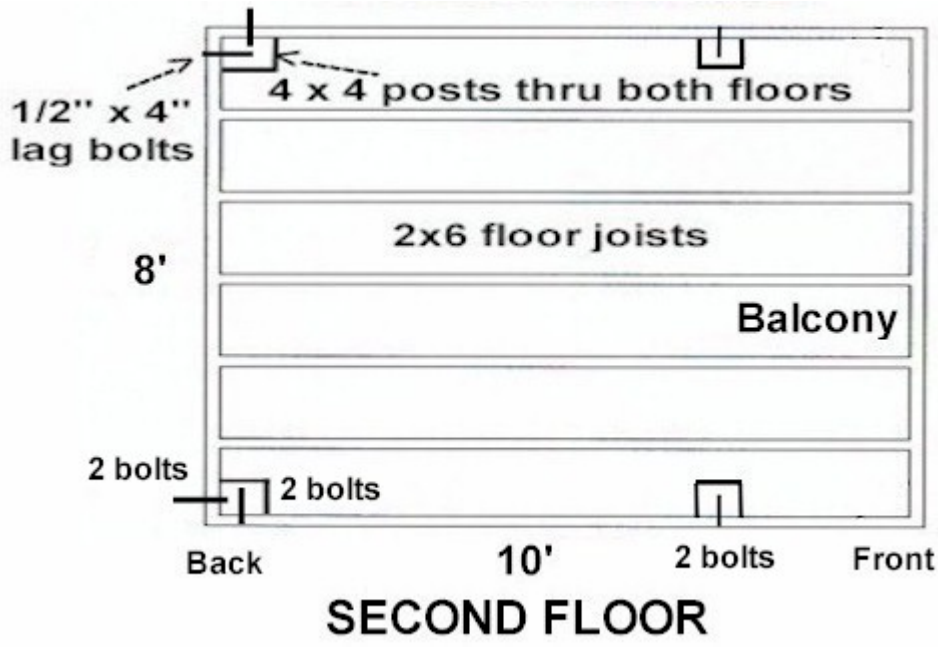
Step1: Frame 1st and 2nd floor system following diagrams shown. Use 2x6x8' pressure treated lumber and measure to have outside to outside dimensions exactly 8' x 8' on first floor, and 8' x 10' for the 2nd floor.

Step 2: The lumber and measurements on the next step will be determined by what you are going to do with this structure. If you will be making the bottom a storage shed, the height you will need will be taller than if it is a playhouse. For a children's playhouse use 4x4x10' PT lumber uprights. Measure 60" from one end (make that the bottom) and mark a line. This is the mark for the **bottom** of the second floor joists.

Step 3: Install 4 - 4x4x10' uprights to first and second floor framed sections following measurements given in step 2. Bolt these uprights in place with 2 - 1/2"x4" Galv. lag bolts at each attachment point. On corners place 2 on each side of the corner.



First Floor Pattern



SECOND FLOOR

Note: The easiest way to accomplish step 3 is to assemble the unit on it's side. Use a helper when lifting the structure to the upright position.

Step 4: With the unit in the upright position we are ready to level and brace it. Level the first floor on the ground. Using a level, temporarily plumb and brace the vertical uprights, while 45 degree braces are installed on the first floor that are shown in the picture. Cut these 24"

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long with a 45 degree angle in each end. Bolt these to the bottom of the second floor joists and the 4x4 upright as shown.

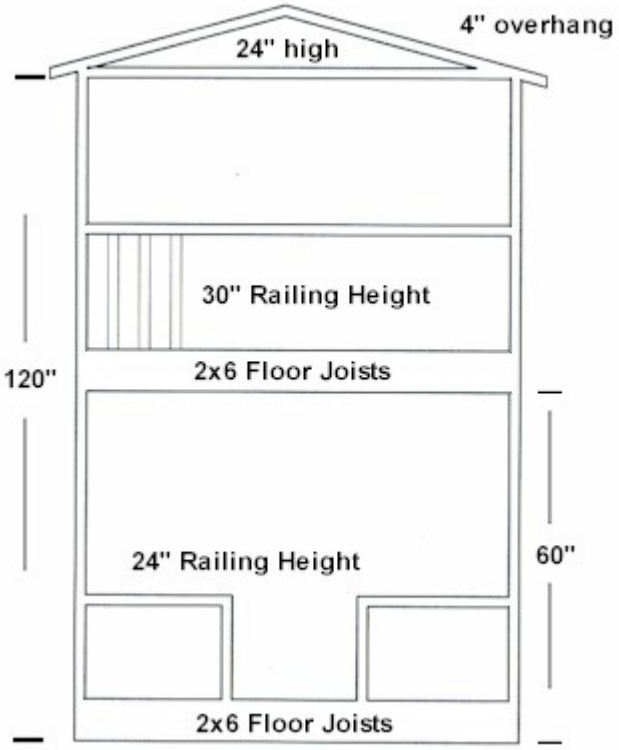
Step 5: Now it's time to install the plywood floor. Add 3 1/2" long nailers to the sides of the 4x4 uprights at the spot where the plywood floor meets the upright. (the cut out is necessary to allow the upright post to pass through the plywood floor). If you do not add these nailers the floor will be springy. Measure, cut and install the plywood floor on both floors. Use pressure treated 5/8" plywood if possible. (1/2" will work if 5/8" cannot be located)

Note: The extra 4x4's in the photo at the front entrance are optional (location A) . They are in place to hold the railing on both floors.

Another Note: This design uses a simple 2x4 ladder (location C) that is mounted in the back of the first floor. The ladder is vertical with a 16"x24" hole cut in the second floor plywood for the visitors to climb through. If you are building a shed in the bottom, you could place the ladder up the outside in the back and cut a section of railing out. Another choice is to have the entrance on the side of the front balcony.

Step 6: Install siding as shown, covering the floor joists as well as the railing area. The siding (location B) can be T-111 plywood siding (or individual fence boards). Siding on the gable ends (location E) use the same materials and instructions.

Note: The 45 degree braces on the second floor are 14" long.

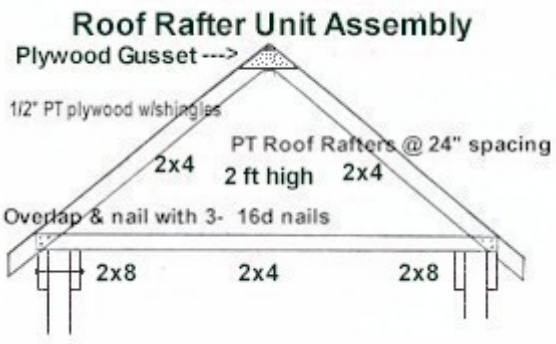


Step 7: Install railing on front balcony. This railing can be any style you desire. The picket style railing shown fits the rustic western theme of the entire structure.

The railing shown is simple to install. It uses the pickets as the supports...there are no corner supports holding the railing. Note in the photograph how the pickets are bevel cut at the bottom. They are securely fastened to the floor joists on 3 1/2" spacing. The top rail is two 2x6 boards nailed together in an "L" shape. The pickets are nailed in the crook of the "L" as shown. Miter cut the left and right corners of the railing.

Step 8: Measure, cut and install the roof. Start by installing the double 2x8 header on each side of the 4x4 uprights. Install header flush with the top of the 4x4's, and bolt assembly together with 1/2" x 8" galv. carriage bolt. Roof system uses 2x4 rafter assemblies on 24" centers with 1/2" plywood sheathing. Make 7 roof rafter assemblies following the measurements in the drawing below. Make these assemblies on a flat surface, and install them 1 at a time with 24" spacing from front to back of the playhouse. After all 7 assemblies are in place and temporarily braced, install the roof sheathing. Overhang the plywood roof sheathing 2 inches all around as shown in the pictures.

Install shingle molding on the outside of the gable ends, on top of the siding at the underside of the roof sheathing. (location F) Install roof shingles of your choice.



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PICNIC TABLE

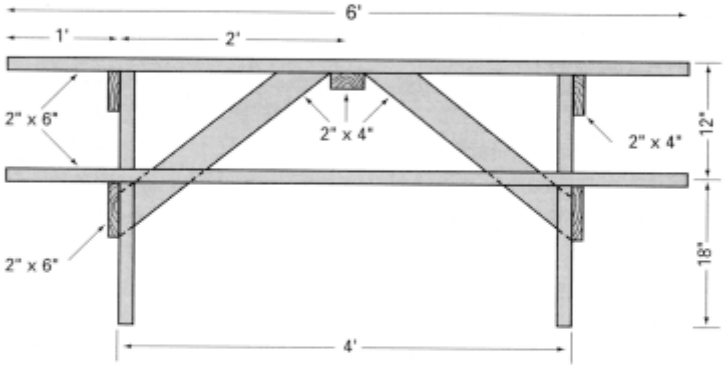
Picnic Table

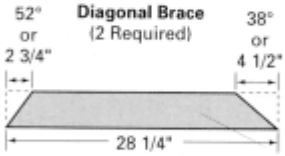
Lumber

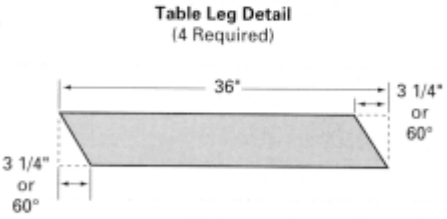
- Seat, Top, Legs: (6) 2"x 6" - 12'
- Seat Supports: (1) 2"x 6" - 10'
- Table Supports, Braces: (2) 2"x 4" - 10'

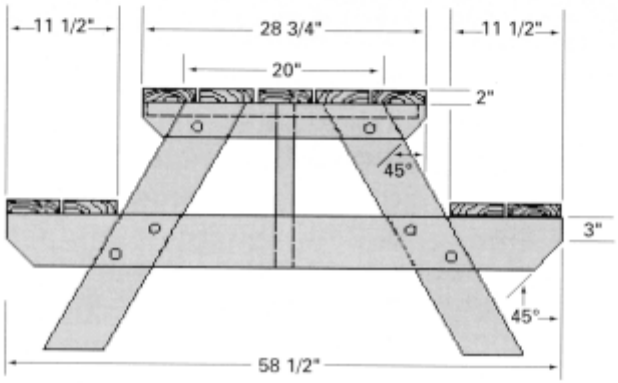
Hardware

- (12) Galvanized Carriage Bolts: 3/8"x 3 1/2"
- (12) 3/8" Flat Washers
- 2 1/2" Galvanized Nails as required









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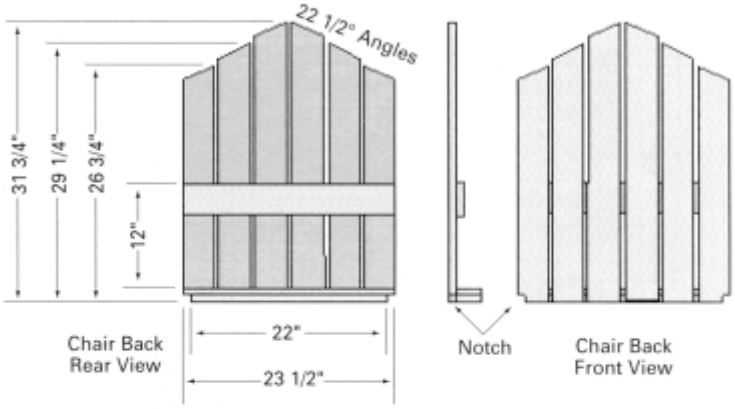
CHATTAHOOCHEE CHAIR

Chattahoochee Chair

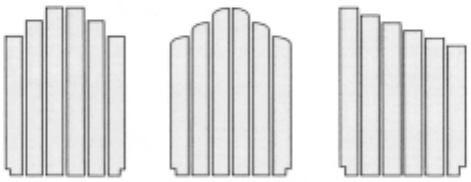
Lumber

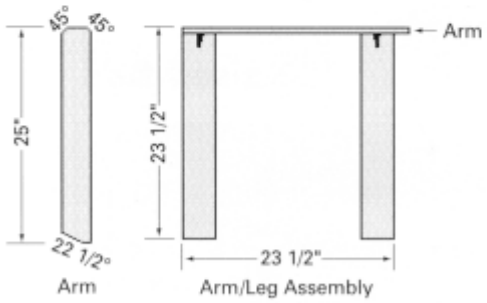
- ▲ (7) 1"x 4" - 8' [4' waste]
  or
- ▲ (5) 1"x 4" - 8' and
- ▲ (1) 1"x 4" - 12' [4' waste]

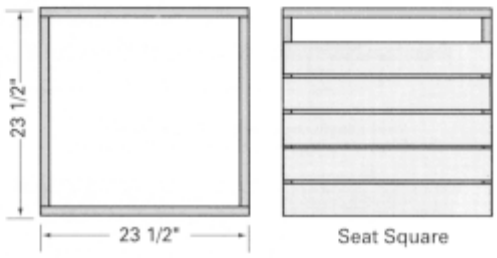
Hardware as required



Chair Back Variations







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PLANTER BENCH

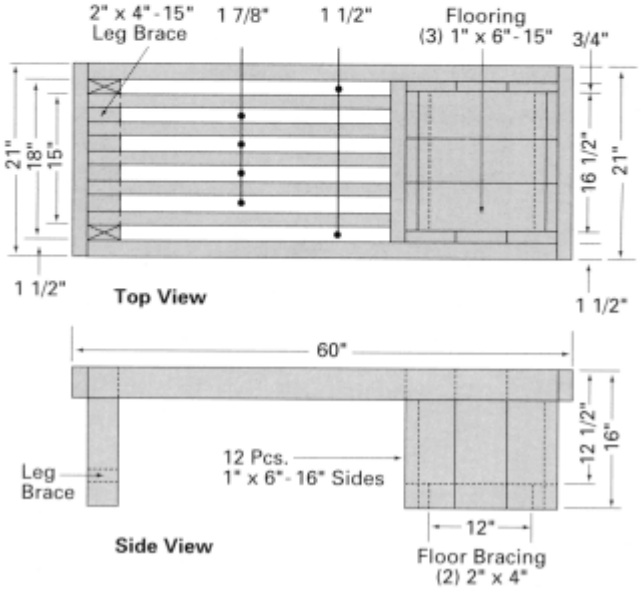
Planter Bench

Lumber

- (6) 2" x 4" - 8'
- (3) 1" x 6" - 8'

Hardware

- 6d Galvanized Nails as required
- 16d Galvanized Nails as required



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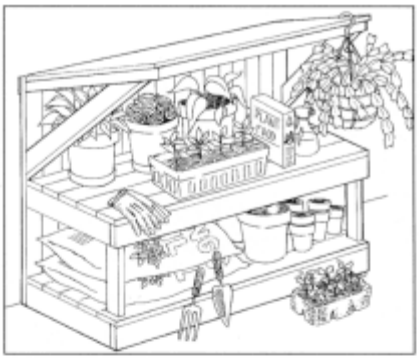
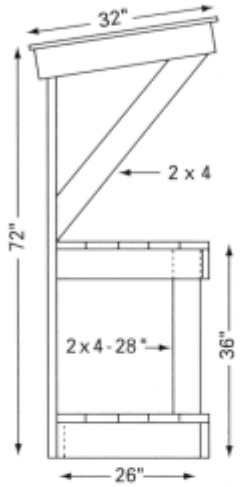
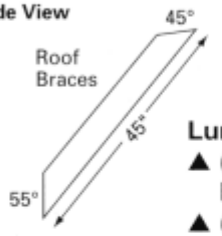
GARDEN WORK BENCH



Garden Work Bench



Side View

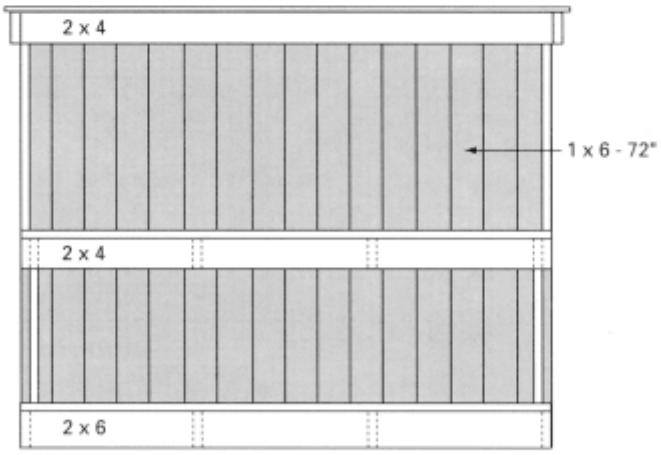


Lumber

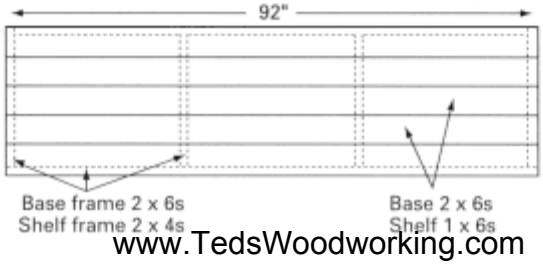
- (1) 4'x 8'- 1/2" Plywood
- (3) 2"x 4"- 8'
- (3) 2"x 4"- 12'
- (5) 2"x 6"- 8'
- (2) 2"x 6"- 12'
- (5) 1"x 6"- 8'
- (8) 1"x 6"- 12'

Choice of Roof Covering
Hardware as required

Front View



Top View (shelf and base)



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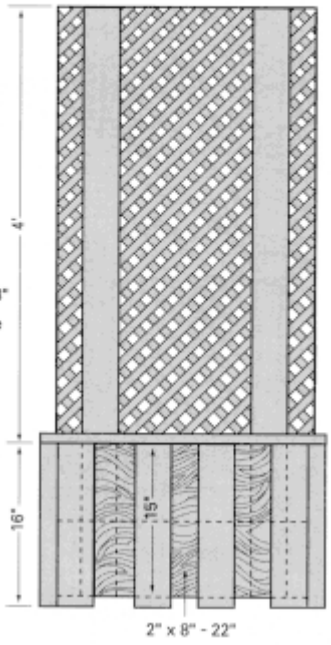
PLANTER BOX

Planter Box



(2) 2" x 4" - 63"
2' x 4' Lattice

Box Front View

Lumber

- Base, Top Trim, Sides: (3) 2"x 4" - 12'
- Sides: (2) 2"x 4" - 8'
- Sides: (2) 2"x 8" - 8'

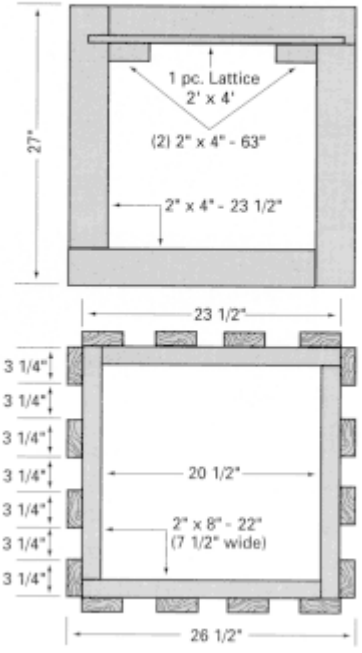
Hardware / Nails

- Base to Floor: 3" galvanized as required
- Sides 2"x 4" to 2"x 8": 2 1/2" galvanized as required
- Sides 2"x 8" to 2"x 8": 3" galvanized as required

Optional Lattice Work

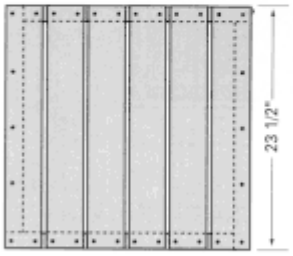
- (1) 2'x 4' Lattice
- (2) 2"x 4" - 63" [(1) 2"x 4" - 12']

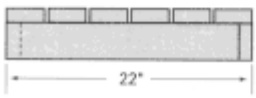
Top Trim



Box Top View

Base Top View





Base End View

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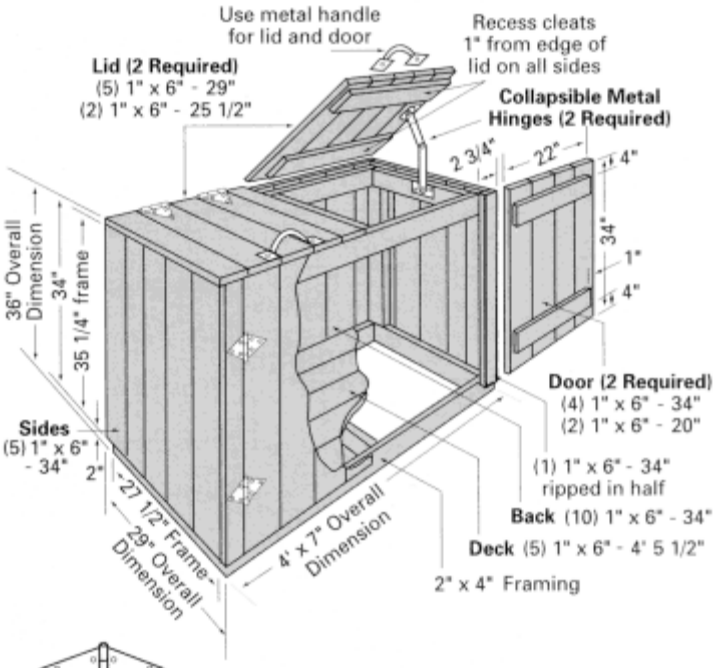
STORAGE AND TRASH CAN BIN

Storage and Trash Can Bin

Lumber

- ▲ Frame: (2) 2"x 4" - 14'
- ▲ Front, Back, Sides, Deck, Lids and Doors:
  (20) 1"x 6" - 6'
  (2) 1"x 6" - 8'
  (3) 1"x 6" - 10'



Attach lids and doors with strap hinges mounted on exterior

Hardware

- ▲ Frame to Frame:
  2" Nails as required
- ▲ All other 1"material:
  1 1/2" Nails as required
- ▲ Lids: 2 pr. 5" Strap Hinges
  (2) 5" Handles
- ▲ Doors: 2 pr. 2" Strap Hinges
  (2) 5" Handles
  (1) Small Gate Latch

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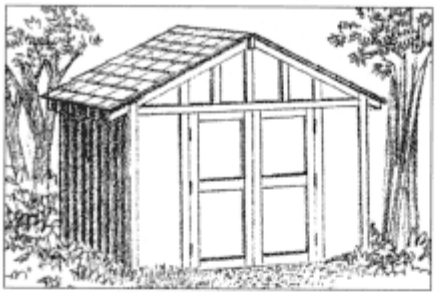
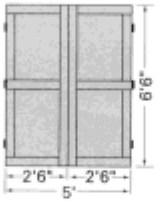
STORAGE SHED



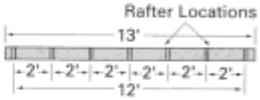
Storage Shed

Doors
Cut Double Doors from 2 sheets of 1/2" *Wolmanized* plywood and attach 1" x 4" *Wolmanized* trim as shown



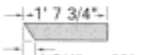
Rafters
Cut 14 rafters 6' 6 9/16" long from 2" x 4"s and nail to ridge beam blocks and ceiling joists

Ridge Beam Detail

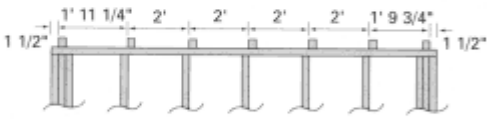


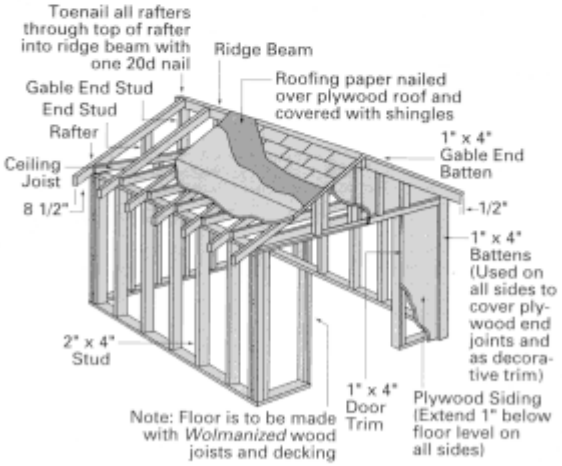
Gable End Stud Detail
(2 Required)

End Stud Detail
(4 Required)



Ceiling Joists
Toenail seven 2" x 4" x 10' joists along side wall top plates with 10d nails





SHED

Lumber

Framing:
- ▲ (44) 2" x 4" - 8'
- ▲ (11) 2" x 4" - 10'
- ▲ (5) 2" x 4" - 12'

Ridge Beam:
- ▲ (1) 2" x 6" - 14'

Door Trim:
- ▲ (1) 1" x 4" - 8'
- ▲ (4) 1" x 4" - 10'

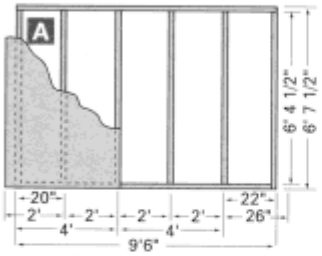
Doorway and Gable End Batten:
- ▲ (8) 1" x 4" - 8'
- ▲ (2) 1" x 4" - 6'

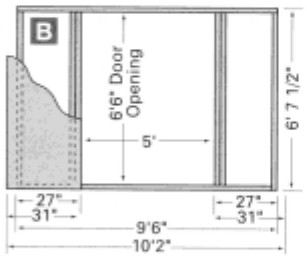
Batten Trim:
- ▲ (2) 1" x 4" - 10'
- ▲ (2) 1" x 4" - 12'
- ▲ (36) 1" x 4" - 8'

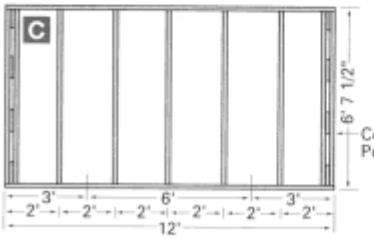
Wall, Roof, Door and Gable End Covering:
20 sheets 4' x 8' x 1/2" Exterior Plywood

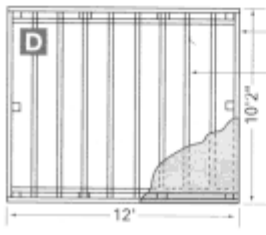
Hardware and Other Materials

- ▲ 3d, 6d, 10d and 20d Nails as required
- ▲ Steel 'T' Door Hinges: 3 pr.
- ▲ Safety Hasp: 1 pc.
- ▲ Shingles: Sufficient amount for 170 sq. ft. Roof Area plus 13 ft. of Ridge and 26 ft. of Eaves
- ▲ Asphalt Roofing Paper: 2 rolls
- ▲ 7/16" Roofing Nails as required







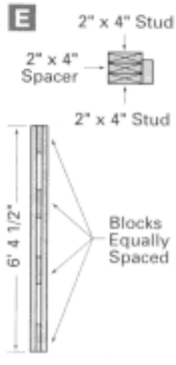


FLOOR

Lumber

- ▲ (12) 4" x 4" - 4' Main Support Posts (length may vary according to terrain)
- ▲ (4) 2" x 8" - 12' Header Boards
- ▲ (2) 2" x 8" - 12' Fascia Ribbon Boards
- ▲ (2) 2" x 8" - 10' Fascia Ribbon Boards
- ▲ (8) 2" x 8" - 10' Joists
- ▲ (22) 5/4" x 6" - 12' Floor Decking

A. Rear Wall Framing
B. Front Wall Framing
C. Side Wall Framing
D. Floor Decking
E. Corner Post Assembly and Top View



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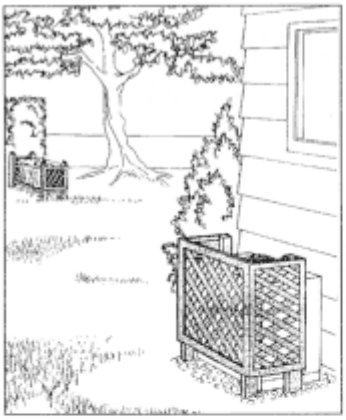
UTILITY SCREEN

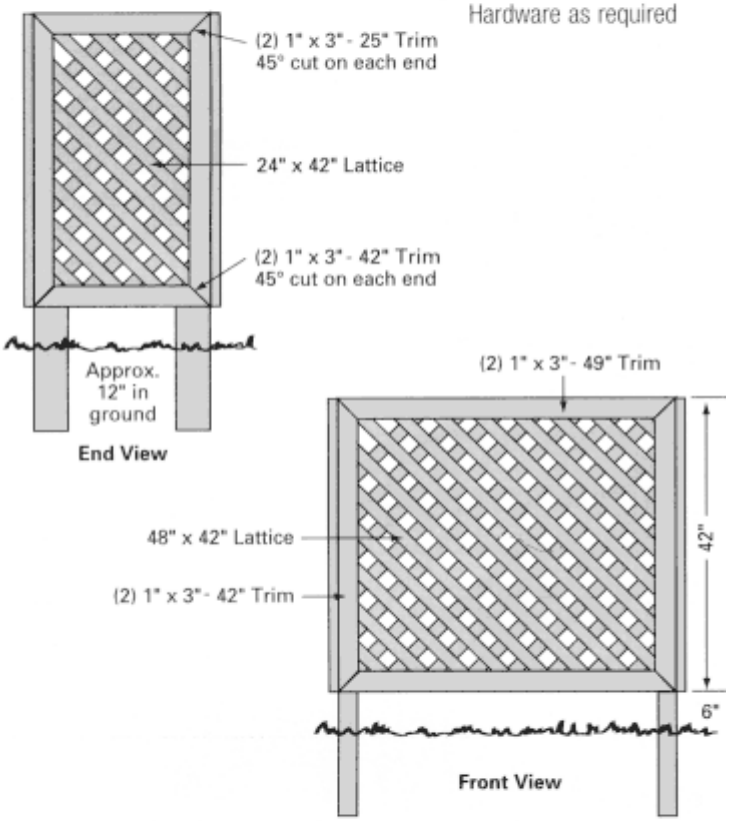


Utility Screen

Lumber

- ▲ (4) 2" x 4" - 5' Posts
  [2 pcs. 2" x 4" - 10']
- ▲ (1) 4' x 4' Lattice*
- ▲ (2) 2' x 4' Lattice*
- ▲ (1) 1" x 3" - 49" **
- ▲ (6) 1" x 3" - 42" **
- ▲ (4) 1" x 3" - 25" **

[* 1 pc. 4' x 8' Lattice]
[** 3 pcs. 1" x 6" - 8']
Hardware as required



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BATHROOM TOWEL RACK

Wood Selection

The two basic categories of wood used most often in wood working projects are hardwood and softwood. Hardwood is more durable and less prone to dents and scratches. It is also more expensive but will finish to a better advantage. Soft woods, like pine, are more prone to dents and scratches and do not have the durability of hardwood. Softwoods are much less expensive and easier to find.

Ask your lumber supplier to show you "Class 1 " or "Select Grade" lumber. Make sure it is properly dried, straight, and free of knots and defects. (It may be impossible to be completely free of defects but be sure you understand how to cut around these.)

Ask your Lumber supplier for assistance when purchasing your wood. Similar to laying a pattern out on a piece of cloth, often you can cut several different pieces of the same thickness of wood out of a single piece. It is a good idea to add up the total number of board feet, being careful to make sure you group short pieces in a board with long pieces to minimize waste.

This project could be built out of scrap wood already in your workshop. If you choose to use new stock from the lumber yard, both hardwoods and softwood are good choices.

Note: Developing a good relationship with Your lumber suppliers is important. They can help guide you in making material selections as well as making special orders for a type of wood you may desire for a project.

Now that you have reviewed safety hints, learned the mistakes to avoid, reviewed the basic components and gathered your tools and materials for your projects - you are ready to BEGIN!

Steps to follow:

1. Cut the wood to size
2. Cut the dadoes for the shelves
3. Band saw the design
4. Drill holes for the rack or racks. (Depending on the size of your sides you can have one or two towel bars)
5. Assemble the bathroom rack

Cut the Wood to Size

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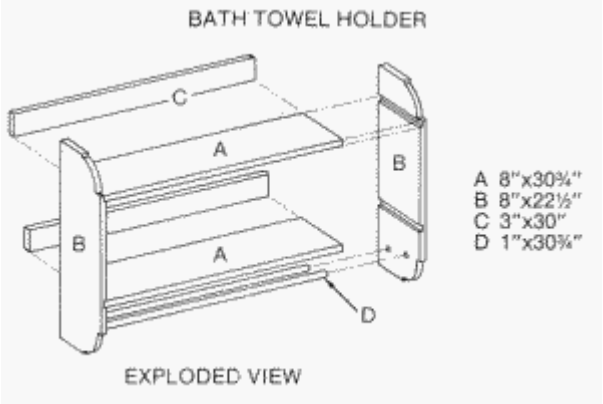
For this project there are two sides, two shelves, and the backs for the shelves. Wood from a lumber yard may not be square so square the ends before cutting the stock.

1. Crosscut the stock to length using a table saw with a stop block. Guide the wood through with the miter gauge. Note: Do not use a miter gauge with the rip fence as it may cause the wood to bind.

2. Rip the stock. Measure from the rip fence to the inside of the blade so that the cut is made on the scrap side of the wood and is the proper dimension.



Cut the Dadoes for the Shelves

Check your plans for the exact location of the dado cuts.

1. Use a table saw with a dado set to make the cuts. A miter gauge with an extension fence and stop block will assure an accurate cut. A router with a guide board clamped at the correct distance can also be used to make the dado cuts. Note: Always start the router away from the wood and ease it up after the bit is on speed to make a clean cut.

Cutting the Curve

1. Measure and mark the wood for the design that you wish to make. The one shown is two straight lines using a coffee can top to join the ends of the marks.

2. Using a band saw or a jig saw, cut the two straight marks first, then on the waste side of the curve, cut in and make short curved cut first, then going slowly cut the long side of the curve.

3. Repeat this process on the other ends.

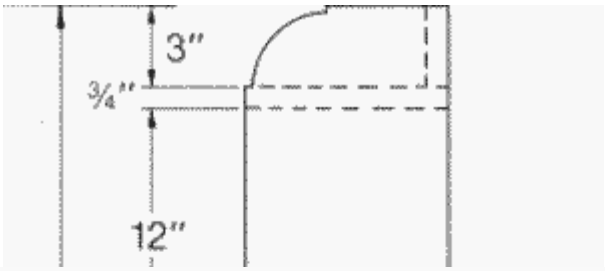
Drill the Holes for the Towel Rods

Use a drill or a drill press to make the holes.

1. Measure according to the plans for the hole locations and mark them.

2. Set the depth for the hole to be drilled. A depth gauge can be made with a piece of tape wrapped around the bit if you are not using a stationary tool.

3. Drill the holes for the towel bar.



Assemble the Bathroom Rack

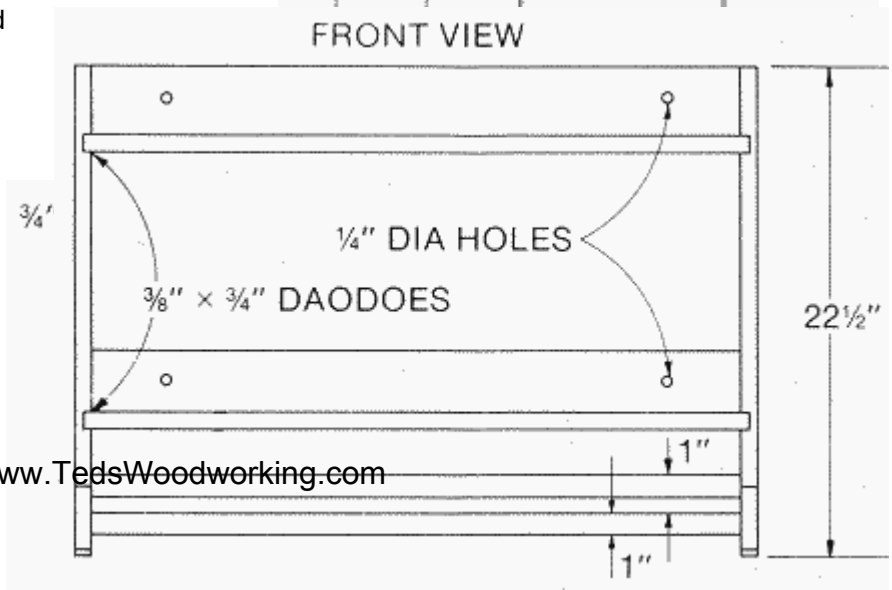
1. Sand the pieces before assembling.

2. Assemble the unit dry to check for proper fit.

3. Apply wood glue to all edges and rod ends. Then use clamps to hold tight while drying.

4. Apply finishing nails while drying for additional strength.

5. Sand the rack and apply the finish you have selected according to the manufacturers instruction. There are helpful hints on finishing at the end of this pamphlet.



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BANDSAW BOX

Materials

Wood Selection

The two basic categories of wood used most often in wood working projects are hardwood and softwood. Hardwood is more durable and less prone to dents and scratches. It is also more expensive but will finish to a better advantage. Soft woods, like pine, are more prone to dents and scratches and do not have the durability of hardwood. Softwoods are much less expensive and easier to find.

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Ask your Lumber supplier for assistance when purchasing your wood. Similar to laying a pattern out on a piece of cloth, often you can cut several different pieces of the same thickness of wood out of a single piece. It is a good idea to add up the total number of board feet, being careful to make sure you group short pieces in a board with long pieces to minimize waste.

This project could be built out of scrap wood already in your workshop. If you choose to use new stock from the lumber yard, both hardwoods and softwood are good choices.

Note: Developing a good relationship with Your lumber suppliers is important. They can help guide you in making material selections as well as making special orders for a type of wood you may desire for a project.

Now that you have reviewed safety hints, learned the mistakes to avoid, reviewed the basic components and gathered your tools and materials for your projects - you are ready to BEGIN!

Steps to Follow:

For this project you can use scrap pieces of wood from other projects or a solid block of wood to create a beautiful box. The steps to follow for this project are:

1. Laminate the pieces of wood (if not using a solid block).
2. Cut the block to size.
3. Make the drawers.
4. Finish sand the drawers and carcass.

Laminate the Scrap Pieces of Wood

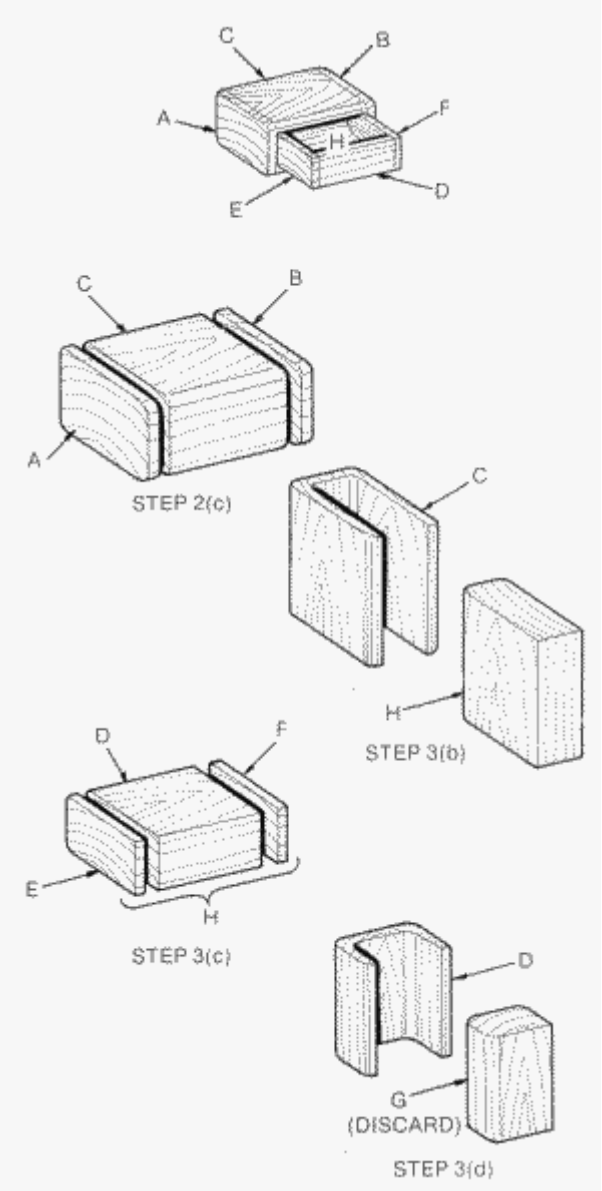
1. Stack scrap wood of approximate width and length together for a stack that can be cut by your band saw blade.
2. Use wood glue on the inside pieces of the stack and clamp together and set over night to dry. Alternating the grains is a nice touch depending on the wood scraps that you are using.

Cutting the Sides (A & B)

1. Using a ¼" width band saw blade cut the block to size. A ¼" blade will be used for all the following cuts because it will provide a tighter fit for the drawers and a neater cut.
2. Mark the sides of the box, a "V" will do so that later when you glue the box you know which side belongs where.
3. Using the band saw cut the sides off being careful to make the cuts straight and accurate for later assembling of the box. The tape makes this cut at ½" into the solid wood.

Making the Drawers

1. On the center block (C) mark the interior of the box for your drawer. Make the corners rounded so that the band saw will not bind when making the cut.
2. Cut out the drawer (H) making sure to go slowly and stay on the scrap side of the mark.
3. Cut off the sides of the drawers (E&F) being careful to mark their proper location for gluing later.
4. Cut the interior of the drawer out, again being careful to round the turns so that the band saw does not bind.
5. Sand lightly all the pieces before gluing on the sides.



6. F. Glue the sides on the carcass and the drawers. Use clamps to hold tight till the glue dries, over night is suggested.

Finish Sanding the Drawers and Carcass

1. Using a belt sander finish sand the carcass. This can be used to round the edges as well as smooth the glue joints on the carcass.
2. The belt sander and fine sand paper can finish the drawer. Make sure that as you sand, check the drawer often for smooth opening and closing.

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CUTTING BOARD

Materials

Wood Selection

The two basic categories of wood used most often in wood working projects are hardwood and softwood. Hardwood is more durable and less prone to dents and scratches. It is also more expensive but will finish to a better advantage. Soft woods, like pine, are more prone to dents and scratches and do not have the durability of hardwood. Softwoods are much less expensive and easier to find.

Ask your lumber supplier to show you "Class 1 " or "Select Grade" lumber. Make sure it is properly dried, straight, and free of knots and defects. (It may be impossible to be completely free of defects but be sure you understand how to cut around these.)

Ask your Lumber supplier for assistance when purchasing your wood. Similar to laying a pattern out on a piece of cloth, often you can cut several different pieces of the same thickness of wood out of a single piece. It is a good idea to add up the total number of board feet, being careful to make sure you group short pieces in a board with long pieces to minimize waste.

This project could be built out of scrap wood already in your workshop. If you choose to use new stock from the lumber yard, both hardwoods and softwood are good choices.

Note: Developing a good relationship with Your lumber suppliers is important. They can help guide you in making material selections as well as making special orders for a type of wood you may desire for a project.

Now that you have reviewed safety hints, learned the mistakes to avoid, reviewed the basic components and gathered your tools and materials for your projects - you are ready to BEGIN!

These are the steps to follow for the cutting board:

1. Cut the stock
2. Laminate the boards
3. Finish the board

Cut the Stock

1. The block thickness is determined by the width you cut the individual pieces. Example: For a block to be 111 thick you will cut the stock 1" wide because of the lamination process which will group the boards together.

2. Cut the stock a little longer than you wish the length of the cutting board to be. You will cut the board to the finished side after it has been laminated and sanded.

Laminating the Stock

1. Use resorcinol glue on both sides of the stock to glue them together. Resorcinol glue is water proof and will provide stability if the board is soaked in water.

2. After gluing, clamp the boards together and let dry overnight.

3. Scrub off extra glue before it dries to prevent chipping the cuffing blades when finishing and shaping.

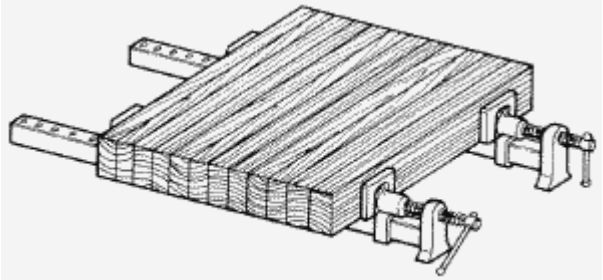
Finishing the Cutting Board

1. • After the board dries, take out of the clamps and use a belt sander to smooth the top and bottom surfaces.

2. Using a table saw or circular saw, cut the board to length. If using a table saw be sure that the cutting blade does not exceed 1/4" above the cutting board to prevent drag.

3. Using a shaper or router put around over edge on the top surface of the cutting board. Be careful to follow the guidelines reviewed in the tape.

4. Use a non-toxic finish such as mineral oil or a salad bowl finish for this project.



CUTTING BLOCK

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CASSETTE HOLDER

Materials

Wood Selection

The two basic categories of wood used most often in wood working projects are hardwood and softwood. Hardwood is more durable and less prone to dents and scratches. It is also more expensive but will finish to a better advantage. Soft woods, like pine, are more prone to dents and scratches and do not have the durability of hardwood. Softwoods are much less expensive and easier to find.

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Ask your Lumber supplier for assistance when purchasing your wood. Similar to laying a pattern out on a piece of cloth, often you can cut several different pieces of the same thickness of wood out of a single piece. It is a good idea to add up the total number of board feet, being careful to make sure you group short pieces in a board with long pieces to minimize waste.

This project could be built out of scrap wood already in your workshop. If you choose to use new stock from the lumber yard, both hardwoods and softwood are good choices.

Note: Developing a good relationship with Your lumber suppliers is important. They can help guide you in making material selections as well as making special orders for a type of wood you may desire for a project.

Now that you have reviewed safety hints, learned the mistakes to avoid, reviewed the basic components and gathered your tools and materials for your projects - you are ready to BEGIN!

Steps to follow:

1. Cut the wood to size.
2. Cut the dadoes for the shelves.
3. Bevel the shelves.
4. Drill holes for the rods. (Depending on the size of your sides you can have one or two sets of rods.)
5. Assemble the cassette holder.

Cut the Wood to Size

For this project there are two sides, two shelves, and rods. Wood from a lumber yard may not be square so square the ends before cutting the stock.

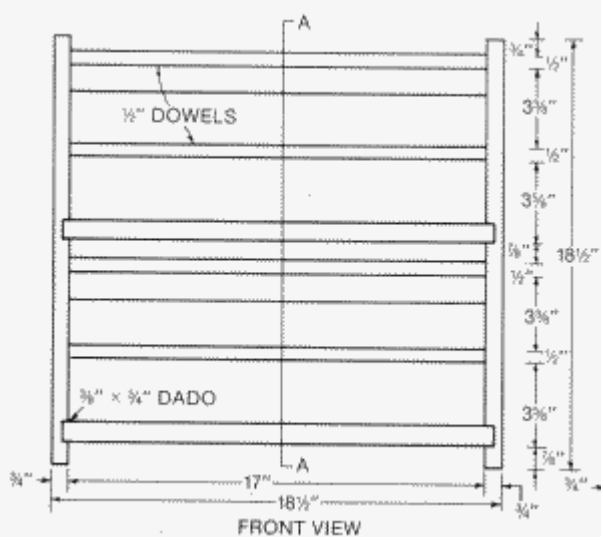
1. Crosscut the stock using a table saw with a stop block. Note: do not cut the shelves at this time because of the bevel cuts to be made later. Guide the wood through with the miter gauge. Note: Do not use a miter gauge with the rip fence as it may cause the wood to bind.

2. Rip the stock. Measure from the rip fence to the inside of the blade so that the cut is made on the scrap side of the wood and is the proper dimension.

Cut the Dadoes for the Shelves

Check your plans for the exact location of the dado cuts.

1. The dadoes on this project are cut at a 45 degree angle. Use a table saw with a dado set to make the cuts. A miter gauge with an extension fence and stop block will assure an accurate cut. A router with a guide board clamped at the correct angle can also be used to make the dado cuts. Note: Always start the router away from the wood and ease it up after the bit is up to speed, to make a clean cut.



Bevel the Shelves

Tilt the table or the table saw blade at a 45 degree angle. A circular saw can be used for this step by tilting the guide and blade at a 45 degree angle.

1. If you are using a circular saw, clamp on a guide to assure accuracy.

2. Check to make sure the angle is correct, and cut the shelves.

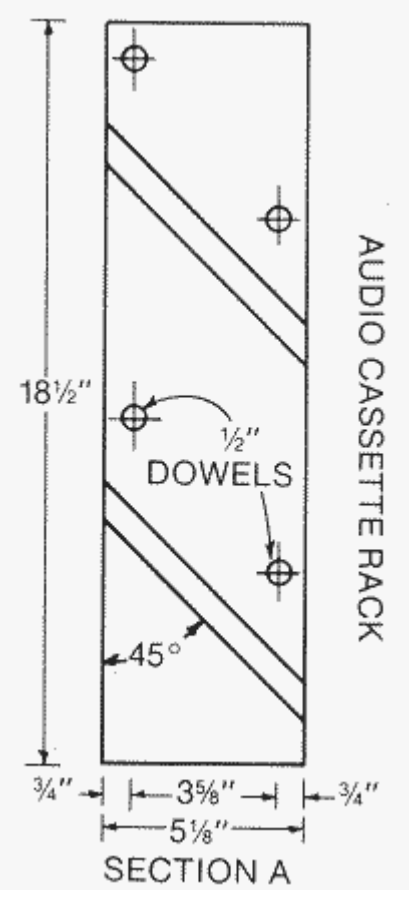
Drill the Holes for the Rods

Use a drill or a drill press to make the holes.

1. Measure according to the plans for the hole locations and mark them.

2. Set the depth for the hole to be drilled. A depth gauge can be made with a piece of tape wrapped around the bit if you are not using a stationary tool.

3. Drill the holes for the bars.



Assemble the Cassette Holder

1. Sand the pieces before assembling.

2. Assemble the unit dry to check for proper fit.

3. Apply wood glue to all edges and rod ends. Then use clamps to hold tight while drying.

4. Apply finishing nails while drying for additional strength.

5. Sand the rack and apply the finish you have selected according to the manufacturer's instructions. There are helpful hints on finishing at the end of this pamphlet.

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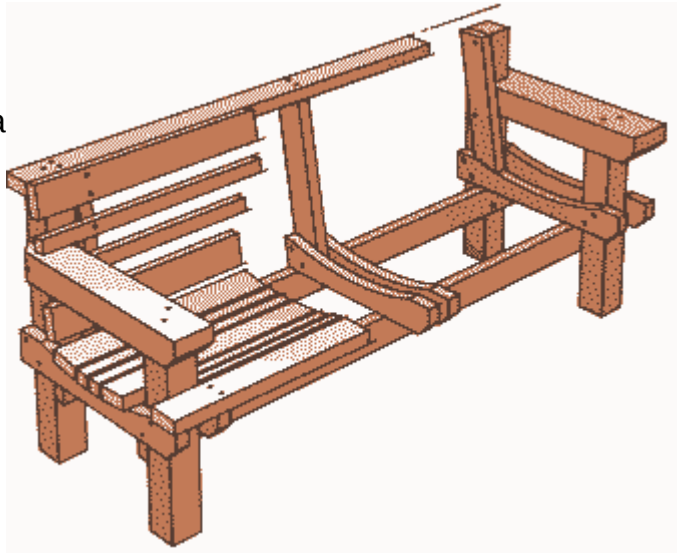
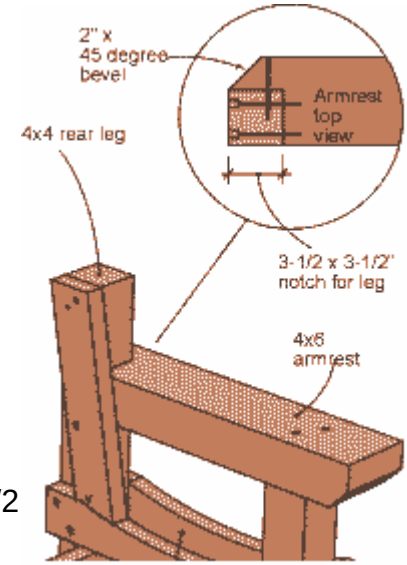
BENCH SEAT

The clean, horizontal lines and rich redwood tones of this bench design reflect the simple beauty of Northern California. Comfortable and elegant with a gracefully curved seat and angled backrest, it offers a standing invitation to sit, relax and enjoy. This freestanding bench uses Construction Common or Deck Common redwood grades that have a pleasing mix of heartwood and sapwood. Where increased decay resistance is needed, use all-heartwood grades: Construction Heart or Deck Heart. Use only corrosion-resistant deck screws to prevent staining. Counter-sink and plug screw attachments.



Materials for Benches

	Quantity	Size	Length
Top, Seat and Backrest Rails	6	2x4	6 feet
Seat and Backrest Rails	6	2x2	6 feet
Main Braces	2	2x4	5 foot 9 inches
Seat and Backrest Supports	9	2x4	26 inches
Front Legs	2	4x4	20-1/2 inches
Back Legs	2	4x4	30-1/2 inches
Armrests	2	4x6	26 inches
Deck Screws	1-1/2 pounds	3 and 4 inches	

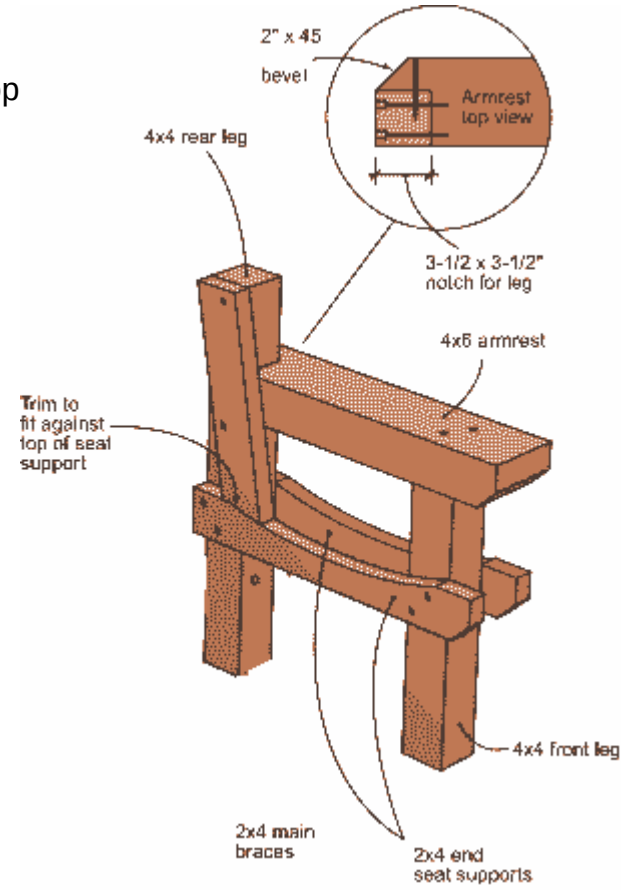


Trim and Notch the Armrests

Start building the bench by trimming and notching the armrests. Trim the front end of each 4x6 armrest at a 45 degree angle, beginning 1-1/2 inches down from top. Notch the inside back of each armrest where it will wrap the rear leg. Finish with a 45 degree bevel cut. See armrest detail.

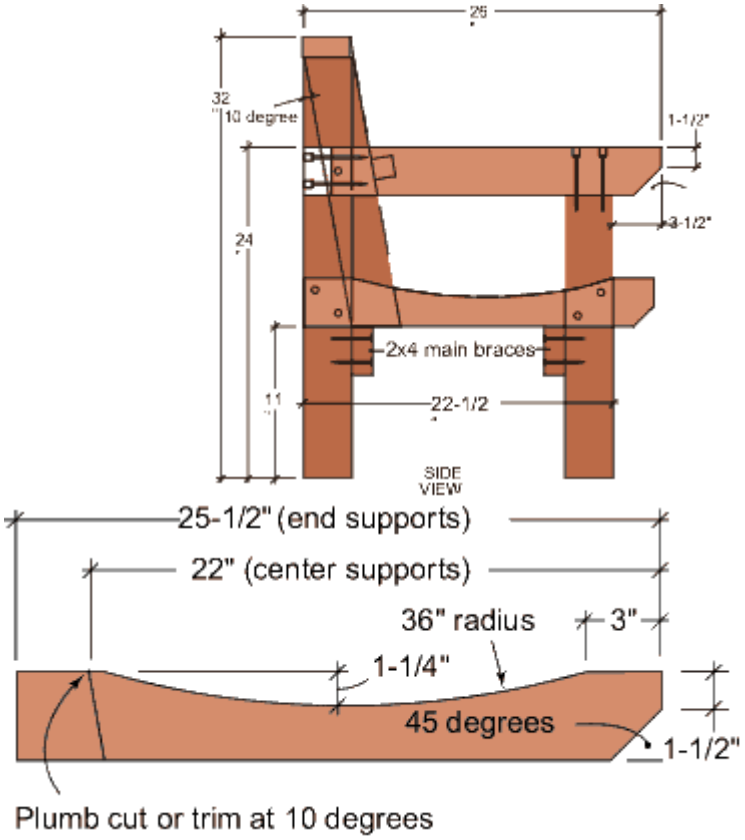
Prepare the Legs

Using 4-inch screws, attach armrests to 4x4 rear legs 24 inches up from the bottom. Attach armrests to front legs by driving two screws through the armrest and into the top of the leg.



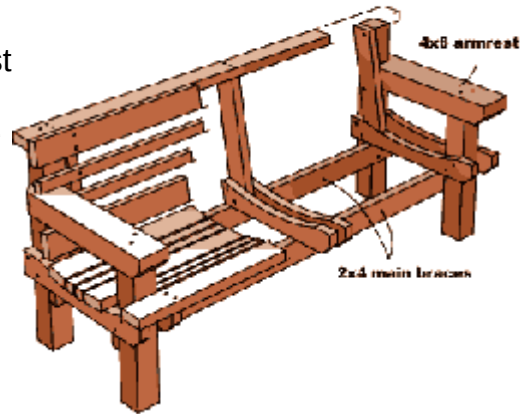
Main Braces

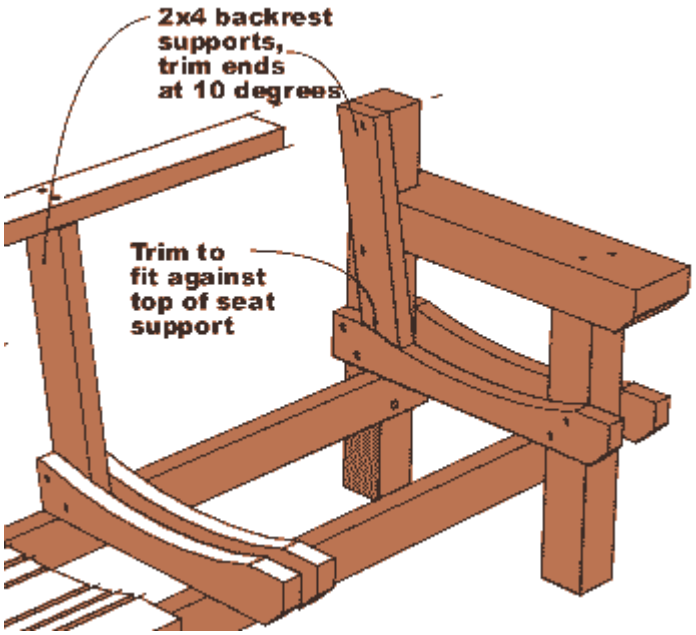
Trim 2x4s for the main braces and attach to inside front and rear legs 11 inches from bottom.



Seat Supports

The curved seat supports are made up of 2x4 lumber sandwiching either the 4x4 rear legs or the single 2x4 backrest support. To shape the curve, make a template for a 36-inch radius cut. Mark the cut to start 3 inches in from the front. Use a bandsaw to cut the radius to a depth of no more than 1-1/4 inches.

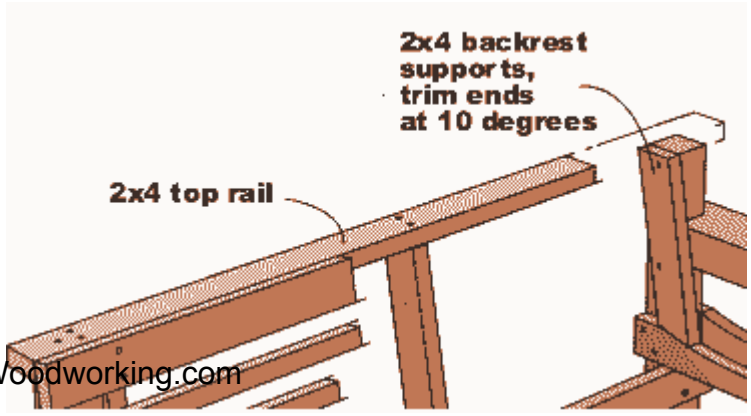




Finish the seat supports with a 45 degree bevel cut to match the armrests. Note that the end and center seat supports differ slightly in length and attachments. End seat supports Trim four 2x4s to 25-1/2 inches. Attach the inside seat supports to the rear and front legs so they rest on the top edge of the 2x4 main braces. Attach the outside seat supports level with the inside ones.

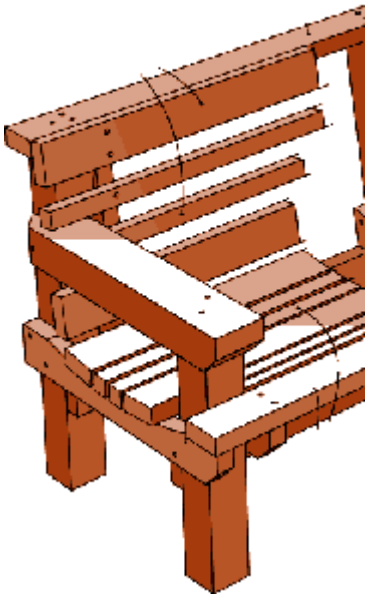
Center Seat Supports

Trim the two center seat supports to 22 inches. Using a scrap piece of 2x4 as a temporary spacer for the backrest, attach these seat supports across the main braces flush with the back edge of the rear brace. Use two 3-inch screws for each joint, angled from below and inside. Remove the spacer.

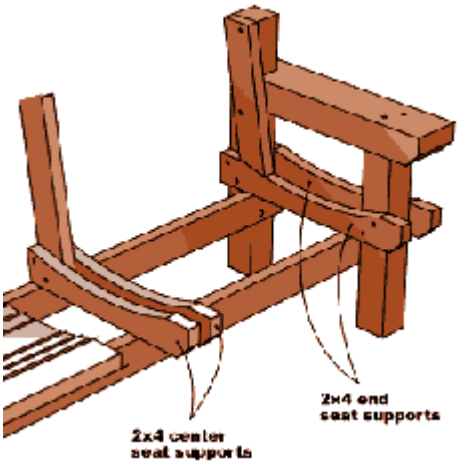


Backrest Supports

Trim the 2x4 backrest supports to a 10 degree angle at the top edge. The two end backrest supports start at the top of the 4x4 rear leg and trim to rest on top of the seat supports.



The center backrest trims flush to the bottom edges of the two center seat supports. Attach the end backrest supports to the inside of the 4x4 rear leg with two screws. The bottoms should fit snugly to the top of the seat supports and can be secured with screws driven at an angle from below. You should install the top rail before trimming and attaching the center backrest.

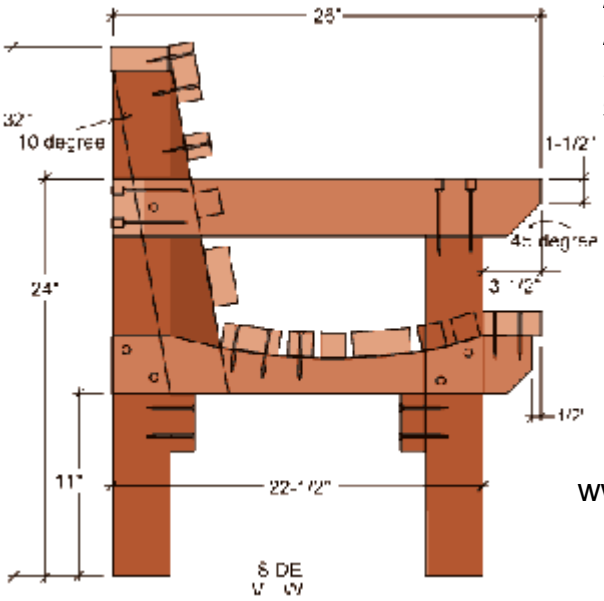


Top Rail

Attach the 2x4 top rail to the rear legs with three deck screws at each end. Measure and trim the center backrest. Install between the seat supports and flush to the underside of the top rail. Secure with screws.

Seat and Backrest Rails

Trim one 2x2 backrest rail to fit between the armrests. Trim the other 2x2 and 2x4 seat and backrest rails to six feet. Install the front seat rail so that it overlaps the seat support by 1/2 inch, and attach with two deck screws at each joint.



Attach the rear seat rail to each support with two deck screws. Adjust the spacing of the remaining seat rails before attaching. Space the backrest rails equally, and attach to supports with a single screw at each 2x2 and two screws at each 2x4.

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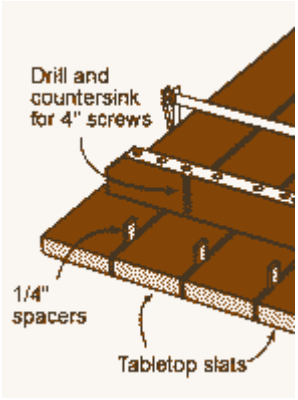
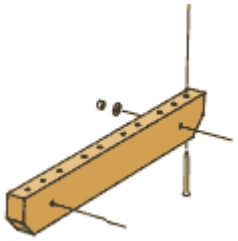
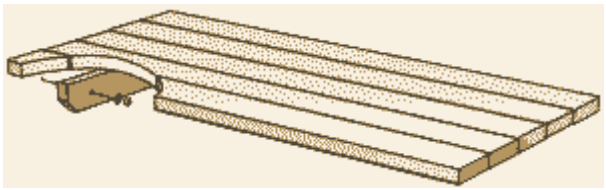
PICNIC TABLE



An excellent weekend project, this easy-to-build picnic table will soon become the focal point of your backyard. Redwood's beauty and durability will ensure countless summers filled with barbecues, picnics and outdoor parties.



The economical, knotty redwood garden grades, such as Construction Common or Deck Common, are great choices for building your table. For maximum durability, choose Construction Heart or Deck Heart.

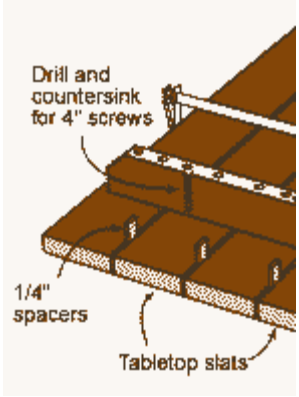


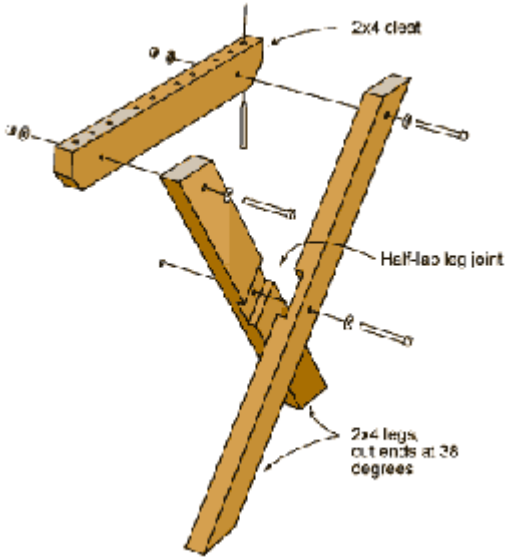
Materials for Table

	Quantity	Size	Length
Top Slats	5	2x6	60 inches
Cleats	2	2x4	27 inches
Legs	4	2x4	40 inches
Braces	2	2x4	30 inches
Machine Bolts, Washers and Nuts	6 sets	3-1/2 inches x 1/4 inch	
Deck Screws	1 pound	4 inches	

Build the Table Top

Measure and cut the 2x6 slats. Lay the slats on a clean and stable work surface with their most attractive sides down. Separate the slats with 1¼4-inch spacers and square. Clamp the slats together with a bar clamp.





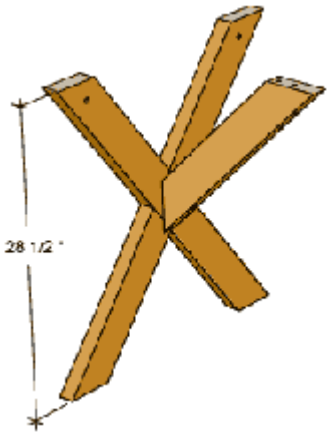
Fasten the Cleats

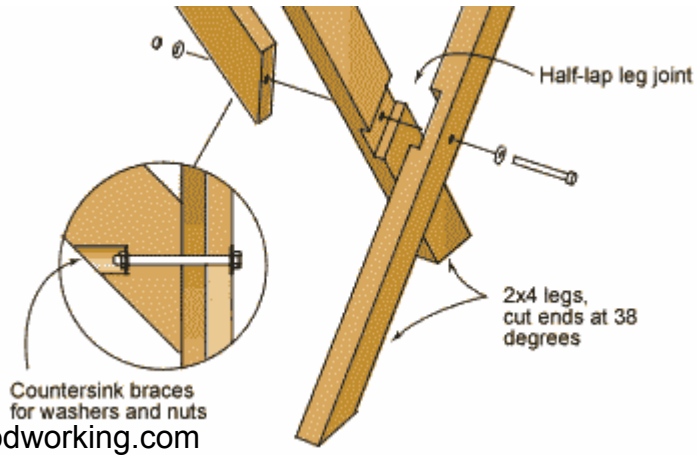
Cut the 2x4 cleats to 27 inches and trim the ends at 45 degree angles starting 2 inches down from top edge. Place a cleat on edge 7 inches from each end of the table top. Allow a 3/4-inch margin from the table's edges. With the combination countersink bit, drill two screw holes into the cleat above each slat, deep enough to set the screw heads below the surface. Fasten to slats with 4-inch screws.

Assemeble the Legs

Cut the legs to 39 inches with 38 degree parallel angles top and bottom. Loosely clamp legs together at their centers with C clamps. Adjust the tension in the clamp until you can open the legs to make a cross with a 28-1/2-inch span at each side, with tops and bottoms aligned. Mark along the sides of each leg where they cross. Remove the clamp and cut the half laps from each 2x4 leg. Reclamp the legs in position. Attach leg assemblies to table top cleat with two 3-1/2-inch x 1/4-inch machine bolts at each connection.

Attach the Braces and Legs





Mark and cut table braces to fit between the table leg assembly and the table top with 45degree angles at both ends. Attach braces to table top with 4-inch screws from below. Drill bolt holes through the “X” of the legs and completely through the angled ends of each 2x4 brace. Countersink the

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Teddy Bear Bank

MAKING THE TEDDY BEAR BANK

Having studied the working drawings for making the box and carefully selected your wood, set out the various dimensions and cut out the ten component parts—the four sides, the base, the top and the four inside-corner fillets. Cut the rabbets at the corners and glue up. Round over the edges of the base and lid with a quarter-curve profile and fit with countersunk screws.

Trace the side-view profile of the bear through to your chosen wood—best if it's a soft easy-to-carve timber like lime, jelutong or basswood—and cut it out on the scroll saw. Rerun this procedure for the front views. You should finish up with six parts—the head, the body, two arms and two legs. Drill 1/2"-diameter holes down through the body, up into the head, through the shoulder and into the arm, and fit stubs of 1/2"-dowel for the neck and for the jointed arm.

When you have made the basic parts for the bear, use a knife to swiftly whittle the cutouts to shape. Don't try for anything fancy, just go for uncomplicated and stylized chunky forms.

Finally, having first used a scalpel and sandpaper to tidy up and create a good finish, use a dash of black acrylic paint to detail the nose, eyes and mouth.

PUTTING IT TOGETHER

Once you have made the box and all the parts that go to make the bear, then comes the difficult task of putting the whole thing together. It's not so much that any single tage is difficult, but that everything has got to be just right. If one of the control strings is too slack, or the shaft is too tight, or whatever, then the movement won't work.

Start by running 1/16"-diameter holes through the neck and arm stubs. The neck needs a side-to-side hole for the pivot and a front-to-back hole for the control cords, while the arm needs a single front-to-back through-hole for both the control cords and the pivot strings. In essence, the controls are beautifully simple. There are four cords— one to pull the head down, one to pull the head up, one to pull the arm down and one to pull the arm up. And of course, depending upon how you want the action to go, fix either the "up" or the "down" cords to a lightweight tension "pulling" spring so the lever action becomes the positive movement.

Finally, when you are happy with the movement, cut two slots in the box (one for the lever and one for the coins), fit the shaft with its dowels and end plates, glue-fix the bear to the top of the box, run the control cords down into the box and then variously tie the cords to the spring or shaft.

MATERIALS LIST—

TEDDY BEAR

A Head (1)	2″×2″×2″
B Body (1)	2″×2″×3″
C Arms (2)	1″×¾″×3″
D Legs (2)	¾″×2″×3″

Note that all the above pieces are oversize and allow for cutting waste.

BOX

E Front (2)	3″×4¼″×6½″
F Shaft plates (2)	¼″×2″×2″
G Top (1)	½″×5½″×7½″
H Bottom (1)	½″×5¾″×7¾″
I End (2)	⅜″×5″×4¼″
J Corner fillets (4)	⅝″ triangular section at 4½″ long

HARDWARE AND EXTRAS

K Drive shaft (1) broomstick dowel—cut to fit
L Slot and lever bars (2) ¼″ dowel—cut to fit
M Strong cord—to fit
N Brass screws—various
O Small quantity of black acrylic paint

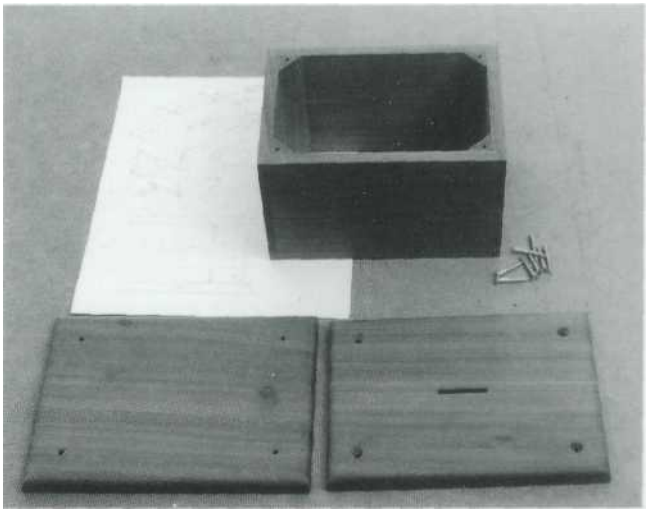
Note that all box measurements are to size.

www.TedsWoodworking.com

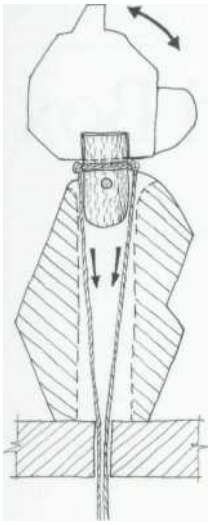
SPECIAL TIP: GLUING

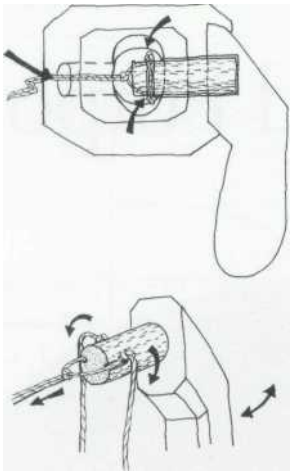
For swiftly fitting and fixing all the control cords, you can't do better than a cyanoacrylate. It's good for holding the knots tight, for little trial-and-error holds, for fixing the bear to the top of the box. In fact, it's just about perfect for everything.

STEP-BY-STEP STAGES



The finished box, with the bottom and top slabs ready to fit. Note how the fixing screws are placed so they run into the corner fillets.





2. Next we string the bear. This cross section shows how the control cords operate the up-and-down movement of the head on the pivot. Be sure to use strong twine and nonslip knots. Notice the plan view at top right, show ing how the arm is both pivoted and controlled by the cords. A detail of the cord is shown at bottom right. See how one cord pulls and pivots the arm, while the other two cords operate the up-and-down movement.

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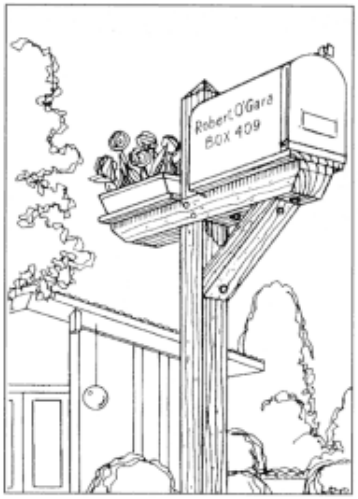
MAIL BOX STAND



Mailbox Stand and Planter

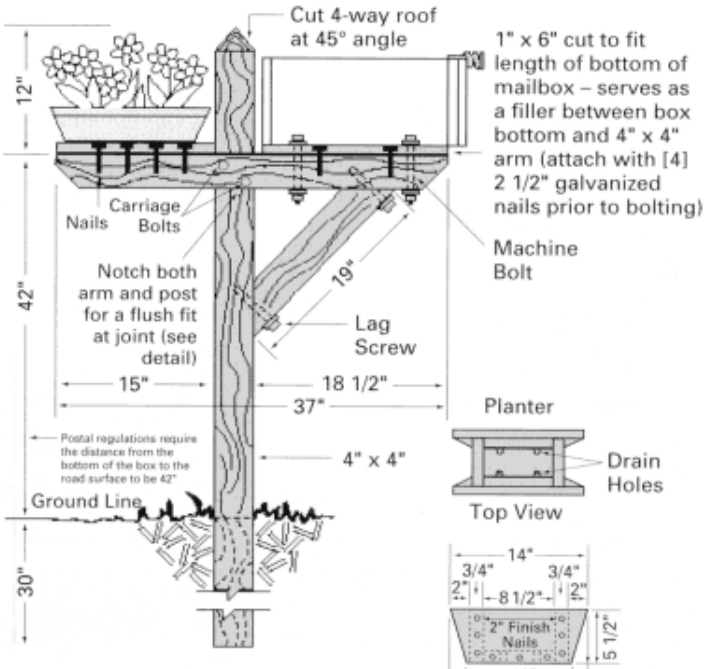
Lumber

Stand

- ▲ Post, Arm and Brace: (1) 4"x 4"- 12'
- ▲ Box and Planter Base: (1) 1"x 6"- 3'

Planter

- ▲ Sides, Ends and Bottom: (1) 1"x 6"- 4'



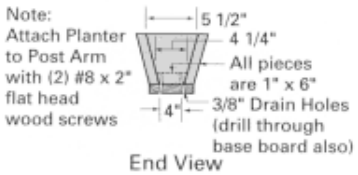
Hardware

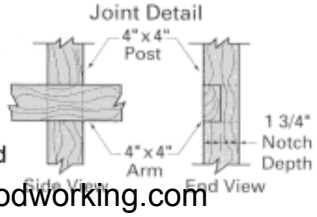
Stand

- ▲ Carriage Bolts with Nuts: (2) 5/16" x 4"
- ▲ Lag Screws: (2) 5/16" x 4"
- ▲ Machine Bolts with Nuts: (2) 5/16" x 5"
- ▲ Flat Washers (std.): (10) 5/16" I.D.

Planter

- ▲ 6d Galvanized Nails as Required





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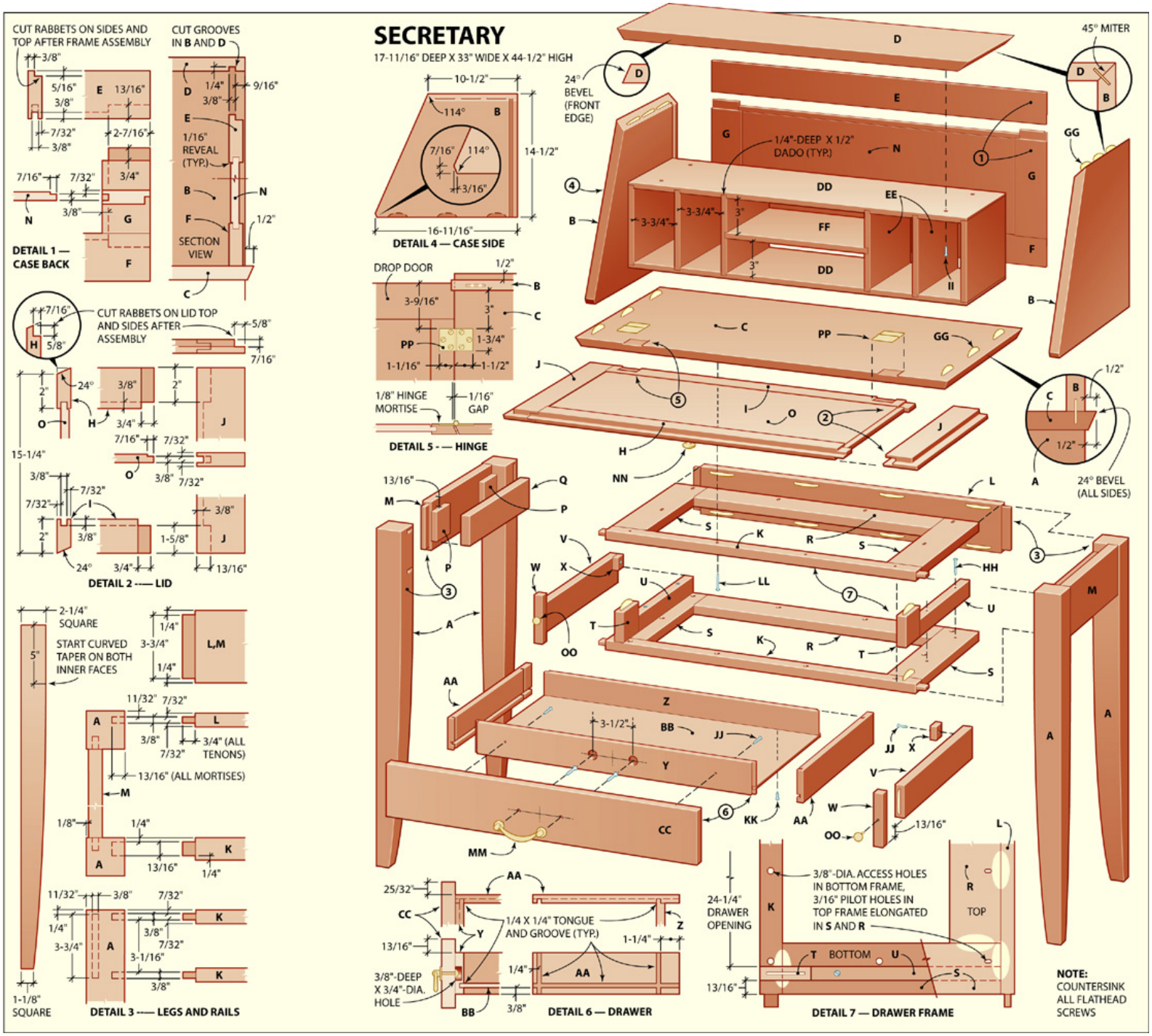
SHAKER STYLE TABLE



MATERIALS LIST--SECRETARY		
Key	**No.**	**Size and description (use)**
A	4	2-1/4 x 2-1/4 x 29-3/16" mahogany (leg)
B	2	13/16 x 14-1/2 x 16-11/16" mahogany (side)
C	1	13/16 x 17 x 33" mahogany (bottom)
D	1	13/16 x 10-7/8 x 32" mahogany (top)
E	1	13/16 x 2-13/16 x 30-7/8" mahogany (back rail)
F	1	13/16 x 2-1/2 x 30-7/8" mahogany (back rail)
G	2	13/16 x 2-13/16 x 10-1/8" mahogany
		(back stile)
H	1	13/16 x 2-3/8 x 27-3/8" mahogany (lid rail)

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I	1	13/16 x 2 x 27-3/8" mahogany (lid rail)
J	2	13/16 x 2-13/16 x 15-5/8" mahogany (lid stile)
K	2	13/16 x 1-5/16 x 29" mahogany (base rail)
L	1	13/16 x 4-1/4 x 29" mahogany (base rail)
M	2	13/16 x 4-1/4 x 13" mahogany (base rail)
N*	1	1/2 x 9-3/8 x 26" flakeboard (back panel)
O*	1	1/2 x 12 x 26-5/8" flakeboard (lid panel)
P	4	1/2 x 2-1/2 x 2-5/8" mahogany (spacer)
Q	2	13/16 x 2-5/8 x 11-1/2" mahogany (guide)
R	2	13/16 x 3 x 21-1/2" mahogany (frame rail)
S	4	13/16 x 3 x 12-13/16" mahogany
		(frame side)
T	2	13/16 x 2-5/8 x 3" mahogany (frame divider)
U	2	13/16 x 1-7/16 x 11-1/8" mahogany (blocking)
V	2	3/4 x 2-9/16 x 14-1/8" mahogany
		(lid support)
W	2	3/4 x 13/16 x 4-3/16" mahogany (facing)
X	2	1/2 x 1-1/8 x 1-1/8" mahogany (stop)
Y	1	1/2 x 2-9/16 x 23-11/16" mahogany (front)
Z	1	1/2 x 1-15/16 x 23-11/16" mahogany (back)
AA	2	1/2 x 2-9/16 x 14-1/8" mahogany (side)
BB	1	1/4 x 12-7/8 x 23-11/16" plywood (bottom)
CC	1	13/16 x 4-3/16 x 25-3/4" mahogany (drawer face)
DD	2	1/2 x 9 x 30-3/8" mahogany (insert top/bottom)
EE	6	1/2 x 7 x 9" mahogany (insert partition)
FF	1	1/2 x 9 x 12-7/8" mahogany (insert shelf)
GG	as reqd.	No. 20 plate
HH	4	2" No. 8 fh woodscrew
II	4	1" No. 6 fh brass woodscrew
JJ	4	1" No. 8 rh woodscrew
KK	3	3/4" No. 6 fh woodscrew
LL	10	11/4" No. 8 fh woodscrew
MM**	1	Drawer pull, Whitechapel No. 13PWLID
NN**	1	Lid pull, Whitechapel No. 76KSB2P
OO**	2	Support pull, Whitechapel No. 76KSP
PP**	2	Hinge, Whitechapel No. 166HISP

Making The Legs
We ripped the four legs from one board. First, crosscut the board a few inches longer than required and plane one edge straight and square. Use a circular saw and ripping guide to cut blanks slightly wider than specified so you can plane the edges smooth and to exact size. Rip each piece by cutting half the depth from opposite faces to reduce the strain on your saw (Photo 1).

Mark the mortise locations and use a router and edge guide to cut the side- and back-rail mortises (Photo 2). Use a block clamped across each front leg to guide the horizontal front-rail cuts. Square all the mortises with a sharp chisel.

Make a full-size template to transfer the tapering leg shape onto two sides of each leg blank. Then, use a sharp plane to trim the faces to the line. When all legs have been shaped, crosscut them to finished length.

Case Panels
The wide panels are made by gluing together narrower stock. We used a router table and a straight bit to true the edges for good joints. To joint stock in a router table, set up the fence to take a fine surfacing cut on the board edge. Then offset, through shims or adjustment, the outfeed side of the fence so it's aligned with the bit and will support the wood after the cut. Some commercial router tables have this feature built in. After adjusting the table for jointing, pass the mating edges of the stock past the cutter to trim them straight (Photo 3).

Use joining plates spaced 6 to 8 in. apart when gluing the panel pieces. After about 30 minutes, scrape excess glue from the surfaces and let the glue dry. Then, saw the panels to size with the appropriate beveled cuts (Photo 4). Keep the blade on the waste side of the layout line and plane the cut edges smooth.

Use a circular saw to create the leg blanks. Cut halfway through the stock, then flip it over to complete the cut.

Lay out the mortise locations and use a router and edge guide to cut the mortises. Square the ends with a chisel.

Shim the outfeed fence of a router table so it's aligned with the bit, and use your table to joint the stock edges.

After gluing up the panels, use a circular saw to cut the panels to size with the appropriate angled ends and edges.

Lay out and cut the joining plate slots at the miter joints between the top and sides, and the joints between the bottom and sides. Then, rout the grooves in the side and top panels that house the case back. Rip and crosscut frame parts for the case back and drop-front lid to specified dimensions. At the same time, cut the rail stock for the desk base to finished size.

Rout the tenon cheeks on the back-frame stiles, lid rails and base rails with a 3/4-in. straight bit and router table (Photo 5). A scrap board behind the workpiece prevents tearout at the end of the cuts. With the cheeks shaped, use a backsaw to cut the shoulders at the top and bottom edges of the base rails.

Install a 3/8-in.-dia. bit in the router table and cut the grooves along the inside edges of the door and back-panel parts. Re-adjust the height of the bit to cut the mortises in the ends of

Cut all of the tenons with a router table and miter gauge. Use scrap stock behind

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the back rails and lid stiles, and square the mortise ends with a sharp chisel. Rout the rabbets around the back and lid panels, and test the fit of the panel edges in the frame grooves.

Apply glue to the back mortise-and-tenon joints and assemble the stiles to the bottom rail. Slide the panel into position (Photo 6) and then add the top rail. Check for square, and assemble the lid in a similar manner.

Saw the beveled edges at the top and bottom of the door. Then, rout the rabbets around three sides of the back panel and along the top and ends of the door.

Case Assembly

Apply glue to the case miter joints, slots and plates, and join the sides to the top. Clamp the parts in both directions to pull the joints tight (Photo 7), and check that the assembly is square.

Slide the back panel into the grooves (Photo 8), and join the sides to the case bottom panel.

the work to prevent splintering.

Assemble the back-panel rail and stiles, then slide the panel in its groove and add the remaining rail.

Apply glue and clamp the sides to the top. Clamp in both directions and check that the assembly is square.

Slide the back panel into the grooves in the case sides. After the glue dries, join the bottom to the sides with plate joints.

Building The Base

Spread glue on the side-rail/leg joints and clamp each side subassembly. Cut the spacer blocks and guide strips to size, and glue them to the side rails as shown in the drawing on the first page.

Cut the parts for the drawer frames to size, and add the joining plate slots. Spread glue on the frame joints and assemble the top and bottom frames. Then, use plate joints to attach the frame divider. Bore and countersink pilot holes in the drawer guide strips, and secure them to the bottom frame with screws (Photo 9).

Lay out and cut the plate slots for joining the back rail to the drawer frames. Also, bore and countersink holes in the top frame for mounting the case. Note that some of the holes in the top frame are elongated to allow the case bottom to expand and contract. Then, bore access holes in the bottom frame.

Join the top frame to the bottom frame assembly, and then join the back rail to both drawer frames. When the glue has set, join the drawer-frame/rail assembly to the two leg subassemblies (Photo 10).

Cut the lid supports and facing strips to size and join the parts with plates and glue. Cut the stopblocks from 1/2-in.-thick stock and bore the pilot holes for securing them to the supports. Slide each support into its slot and fasten the stopblock. You'll remove the stop when it comes time to apply the finish. Place the case on top of the desk base, and fasten the parts temporarily.

Lay out the hinge locations on the case bottom and door. Use a sharp chisel to cut the mortises (Photo 11). Mount the hinges and test the operation of the door. If it binds against the case side, simply sand or trim the side or door rabbet until it works smoothly.

Drawer And Storage Insert

Cut the drawer parts to size and use a router table to make the joints. Apply glue to the sides, front and back, and then assemble the box and check for square. Slide the bottom panel into place and screw it to the drawer back.

Mount the drawer pull to the drawer face, and screw the face to the drawer box. Test the fit of the drawer in its opening and trim where necessary. Then, temporarily mount the lid pulls and the support pulls.

Cut the parts for the storage insert and rout the dadoes in the top, bottom and center partitions. Apply glue and assemble the parts (Photo 12). Bore and countersink screwholes in the top of the insert, slide it into position and screw it to the case top.

Finishing

Disassemble the secretary and sand all parts with 120-, 150-, 180- and 220-grit sandpaper. To achieve a smooth finished surface, we applied Behlen Pore-O-Pac filler before staining. First, thin the filler with filler solvent until it has the consistency of thick cream. Working on only a small area at a time, brush the filler into the woodgrain and let it set until it appears dull. Rub the filler off the surface and into the grain with burlap cloths and remove all excess. Allow the filler to dry overnight and sand lightly to remove any residue.

To achieve a deep reddish brown, we applied Behlen Solar Lux Medium Brown Mahogany stain. This is a solvent-based dye that dries quickly, so it's best to add Solar Lux retarder to slow the drying time and prevent lap marks. Let the stain dry overnight before applying the first coat of finish.

For our surface finish, we applied three coats of Waterlox Original Sealer/Finish. Liberally soak the wood surface with finish and wait about 20 minutes before wiping off the excess. After overnight drying, lightly sand the surface with 320-grit sandpaper and dust it off thoroughly before applying a second coat. Apply the final coat using the same technique. When the last coat is dry, rub the surface with 4/0 steel wool to remove any dust nibs and give the piece a warm glow. Polish with a soft cloth. Reassemble the desk and install the hardware. To ease drawer and door-support operation, apply a light coat of paste wax to the parts and then polish.

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ADIRONDACK CHAIR

Overview: Adirondack chairs can be made from a variety of woods. The most common wood used in their construction is 5/4 pine. My recommendation is to use southern yellow pine (SYP) because it's high resin content makes it naturally resistant to decay. If you have

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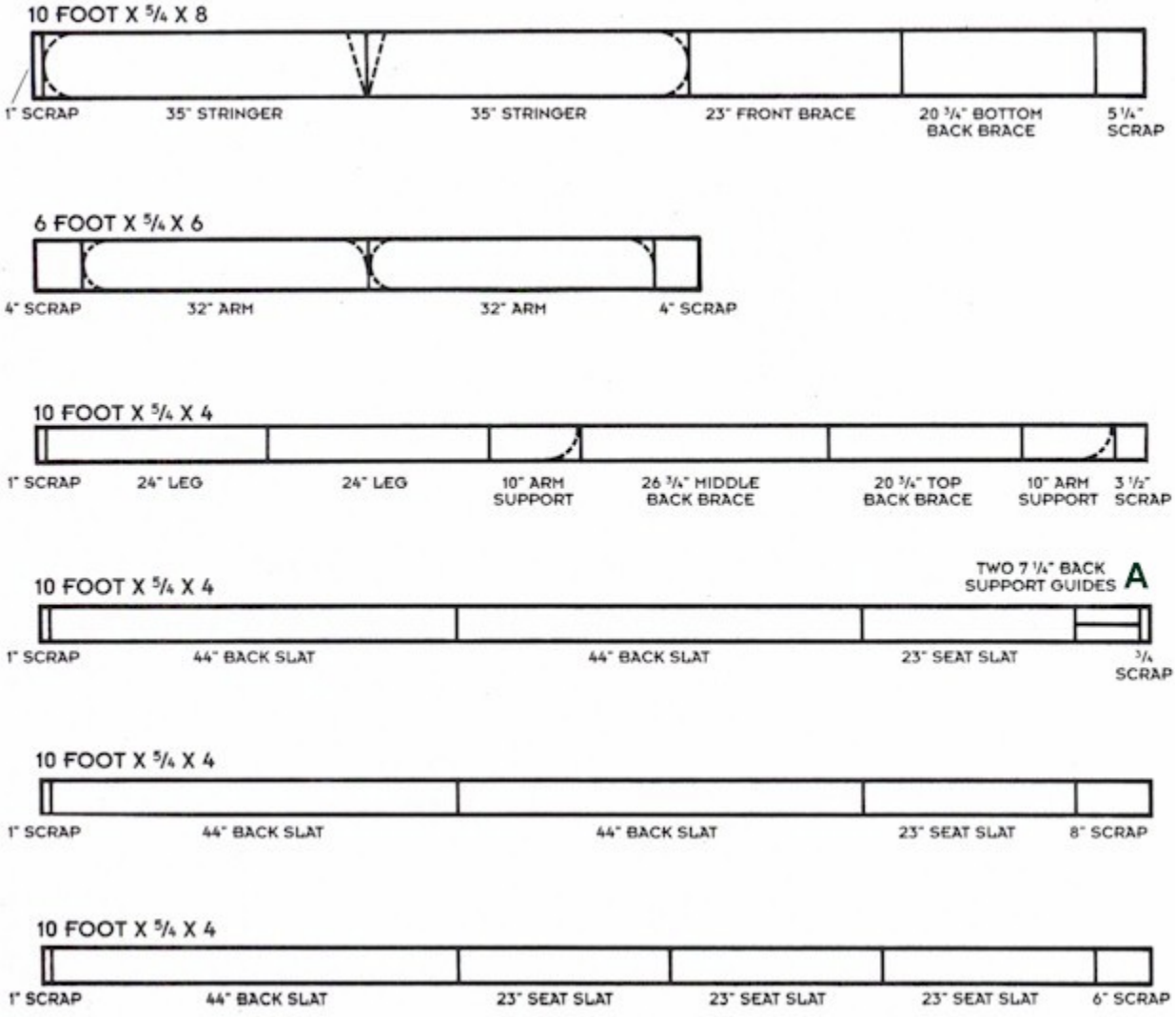
trouble locating 5/4 SYP look for pine stair tread material. Stair tread material comes almost free of knots because it comes from the center of the tree. Let's get started...

Step 1: Mark and cut your materials per the cutting diagram on the next page. Sand and smooth each piece in preparation for assembly.

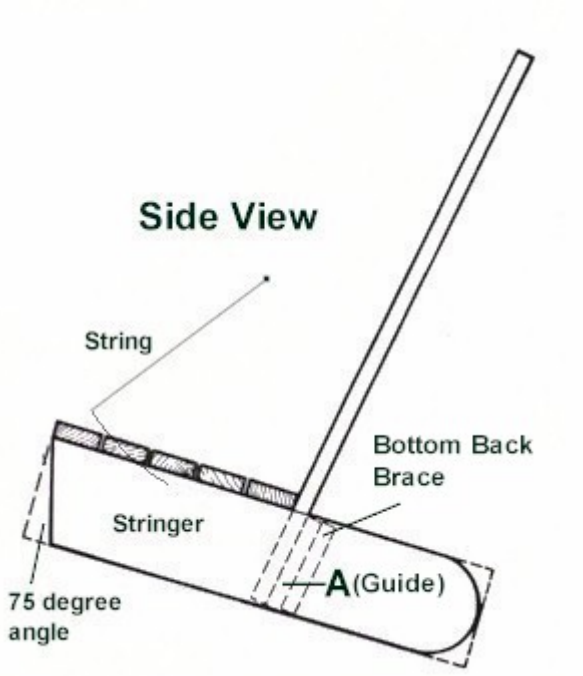
Wood Cutting Diagram



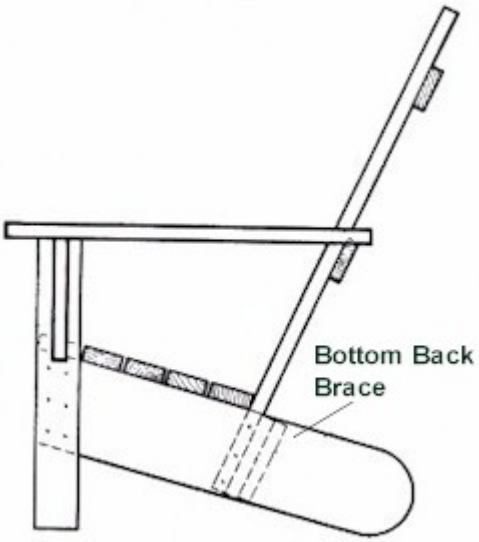
Step 2: After the wood is cut and sanded it's time to start assembly. We start with the two back legs (which we are calling stringers) The 2 stringers are the heart of the chair as they hold everything else together.

Use wood screws that are 1 5/8" to 1 3/4" long for all assembly, except where noted. Always pre-drill the holes to prevent splitting.

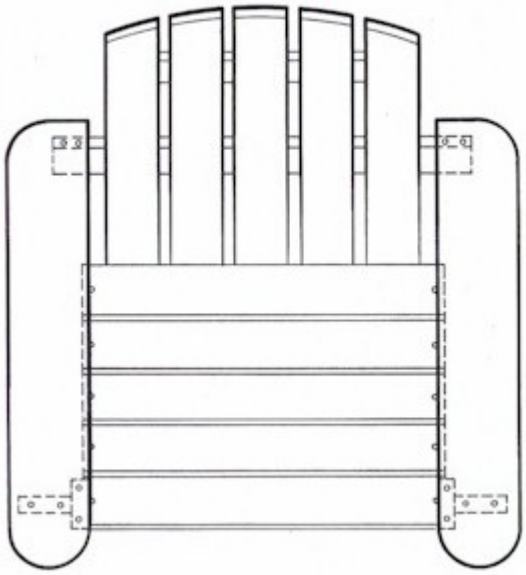
Note: Most assembly will be simply fitting the appropriate pieces together. The guides at location "A" (drawing on right) are noted on wood cutout diagram above.

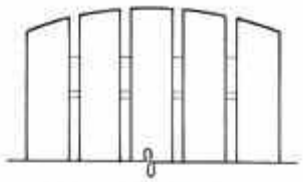


The string shown in the drawing above indicates how to cut curves for the seat or the back (if desired).

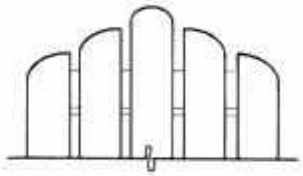


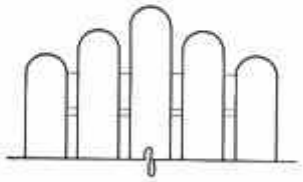
Top View

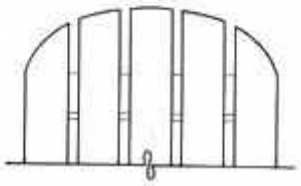




Back Styles







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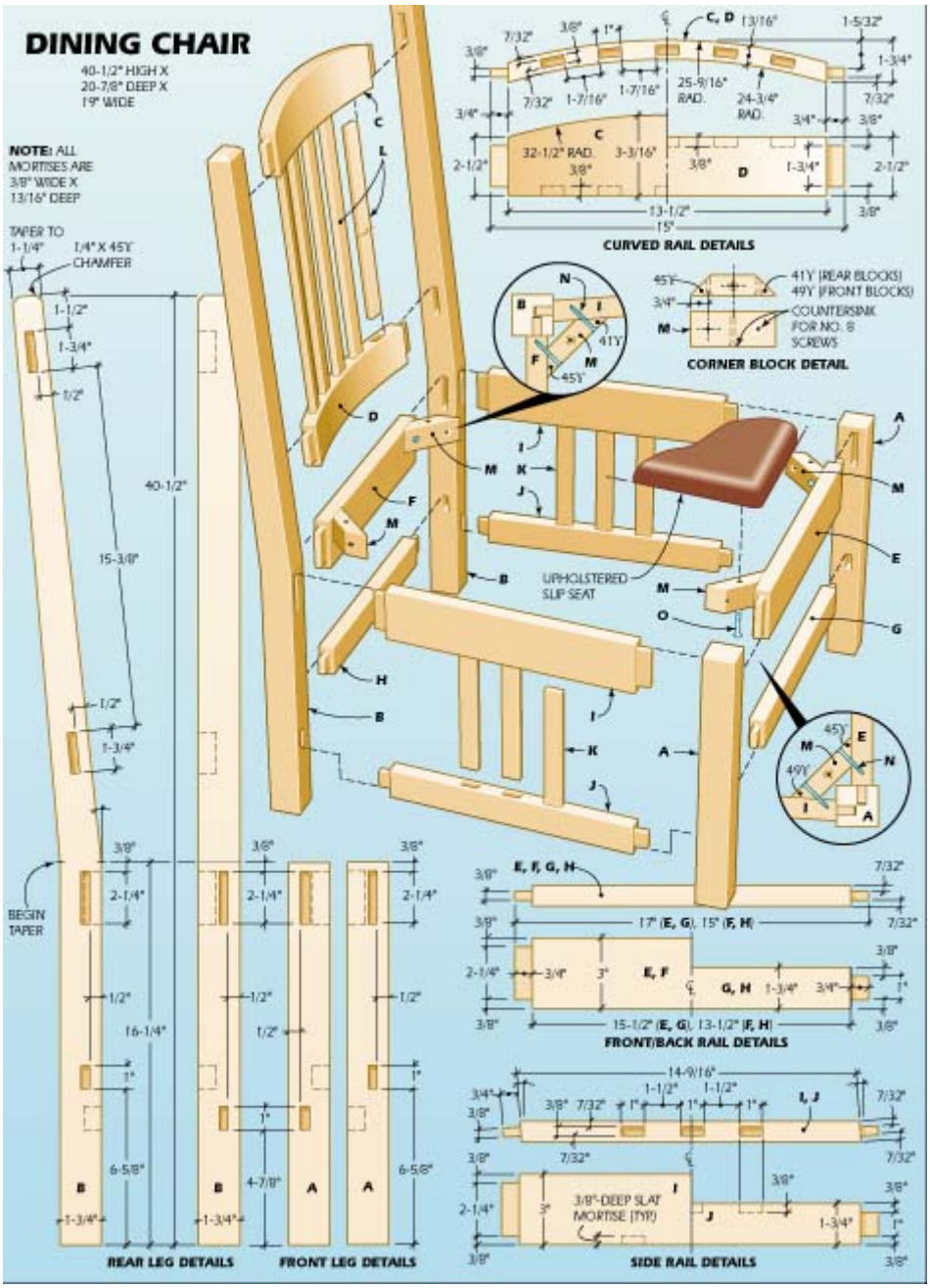
ARTS AND CRAFTS CHAIR



MATERIALS LIST--DINING CHAIR		
Key	**No.**	**Size and description (use)**
A	2	1-3/4 x 1-3/4 x 16-1/4" oak (front leg)
B	2	1-3/4 x 3-3/4 x 40-1/2" oak (rear leg)
C	1	1-3/4 x 3-3/16 x 15" oak (top rail)
D	1	1-3/4 x 2-1/2 x 15" oak (bottom rail)
E	1	13/16 x 3 x 17" oak (top front rail)
F	1	13/16 x 3 x 15" oak (top back

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		rail)
G	1	13/16 x 1-3/4 x 17" (lower front rail)
H	1	13/16 x 1-3/4 x 15" oak (lower back rail)
I	2	13/16 x 3 x 16-1/4" oak (top side rail)
J	2	13/16 x 1-3/4 x 16-1/4" (lower side rail)
K	6	3/8 x 1 x 7-3/4" oak (side slat)
L	5	3/8 x 1 x 15-3/8" oak (back slat)
M	4	13/16 x 1-1/2 x 3-5/8" (corner block)
N	8	1-1/2" No. 8 fh woodscrew
O	4	2-1/4" No. 8 fh woodscrew
Misc.: Medium Fumed Oak aniline dye (No. W1190)		

Making The Parts

Begin construction by ripping and crosscutting stock to size for the front legs. Then, cut two 4 x 42-in. blanks for the rear legs. Make a cardboard template for the rear legs and trace around it to transfer the shape to each blank. Saw to the waste side of the line with a band saw or sabre saw, and use a sharp plane to trim each leg square and to finished dimension (Photo 1).

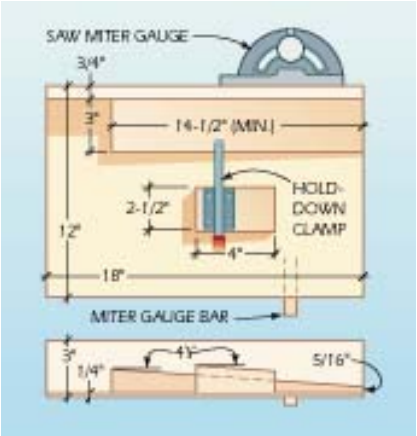
Mark the mortise locations on all legs. To make this job easier, clamp several legs together with the ends held even and mark across them using a straightedge or square as a guide. Install a 3/8-in.-dia. spiral up-cutting bit in your router, and use an edge guide to rout the mortises in the legs (Photo 2). Square the rounded mortise ends with a sharp chisel.

Cut blanks of 1-3/4-in.-thick stock for the curved back rails. Before cutting their curved profiles, use a table saw and dado blade to cut the tenons at the ends of the pieces (Photo 3). Note that the tenons are not centered across the thickness of the blanks. Cut one side of all the tenons first, then readjust the blade height to cut the other side. It's best to cut the tenons about 1/32 in. thicker than indicated, and then use a sharp chisel to pare the surfaces smooth and bring the tenons to finished dimension.

Make a cardboard template for the back-rail shape and use it to transfer the shape to each blank. Use a band saw to cut the inside curve of each rail (Photo 4). Then, remove the saw marks and smooth the curved shape with a spokeshave (Photo 5). Go back to the band saw to cut the outside curve and smooth that surface with either a block plane or spokeshave. Don't cut the arched profile of the top rails at this time.

Cut stock for the lower front and back rails to finished dimension and use a dado blade in the table saw to cut the tenons. Readjust the blade height and hold the rails on edge to cut the top and bottom shoulders at each rail end.

Next, cut stock to size for the side rails. Study the drawing to be sure you understand the angled tenons on these pieces. Label each rail with its



ANGLED-TENON JIG

After sawing the rear leg shape, use a sharp plane to remove saw marks and trim the leg to exact size.

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location in the chair to avoid confusion when it comes time to cut the joints.

We built a jig to cut the angled tenons. To make the jig, first attach a hardwood fence to a plywood base, and then screw the assembly to your table saw miter gauge. Glue up four pieces of 3/4-in.-thick stock and band saw the stack into a ramp with an angle of 4°. Screw the ramp to the plywood base. To use the jig, hold a rail on the ramp and push the jig past the dado blade. We used a holddown clamp mounted on a tapered hardwood block to hold the workpiece.

Mark the mortise locations in the chair legs, and use a plunge router with an edge guide to cut the mortises.

Use a table saw and dado blade to cut the tenons in the blanks for the curved back rails. These tenons are not centered.

Lay out the back-rail curve onto the edge of each rail blank. Then, cut the inside curve on the band saw.

Use a spokeshave to smooth the inside curve of the back rail, and then cut and smooth the outer curve.

Cut one surface of each tenon with the ramp angled down toward the dado blade (Photo 6). Then, secure the ramp in the opposite direction and readjust the blade height for the opposite side of each tenon (Photo 7). If you're using the holddown clamp, you'll need to remount it. Then, use the miter gauge without the jig to make the angled cuts for the top and bottom shoulders of the side rails (Photo 8). Cut strips for the side and back slats. Crosscut the slats to finished length, and set them aside.

Lay out the slat mortises in the side rails and in the curved back rails. Mark the side-rail mortises by clamping several rails together and marking across the stack with a square. Mark the curved rails individually.

Install a 5/16-in.-dia. bit in the drill press and bore slightly overlapping holes to remove most of the waste from the mortises in both the curved and straight rails (Photo 9). Then, use a sharp chisel to pare the walls and square the ends of the mortises (Photo 10). Test a slat in each mortise--the fit should be snug. Make another template for the arched shape of the top back rail and use the template to trace the shape onto the workpiece. Use a sabre saw to cut the profile (Photo 11).

To cut the angled tenons on the side rails, support the stock in a table saw jig that holds the work at a 4° angle.

When cutting the opposite tenon faces on the rails, reverse the ramp on the jig and readjust the dado blade height.

Finish the rail tenons by cutting the top and bottom shoulders with the miter gauge and dado blade.

Use a 5/16-in.-dia. bit to bore slightly overlapping holes to remove most of the waste from each slat mortise.

Trim and square the slat-mortise walls with a sharp chisel. Then, test fit the slats--they should be quite snug.

Use a template to lay out the arched profile of the upper back rail. Then, cut to the line with a sabre saw and smooth.

Mark the shoulders on the top and bottom edges of the curved back rails and use a small backsaw to make the cuts (Photo 12). First, make the cuts into the endgrain of the tenon. Then finish the shoulder by cutting across the grain.

Place guide marks for the 1/4-in. chamfer at the top end of each rear leg. Clamp a leg in the bench vise and use a sharp block plane to cut the chamfers.

Assembly
First, sand all parts with 120-, 150-, 180- and 220-grit paper, dusting off thoroughly between grits.

Spread glue on the mating surfaces for the front-leg/front-rail joints. Use a small shim to spread glue in the leg mortises and a small brush for the tenons. Spread the glue sparingly on the tenons to avoid excessive squeeze-out at the joints.

Join the rails to the front legs, then clamp the joints and compare opposite diagonal measurements to be sure the assembly is square (Photo 13). Let the glue set for about 20 minutes and use an old chisel to pare off any excess glue.

Next, insert the side slats in the mortises of the bottom side rails and position the top side rail over the slat ends. While you don't need glue in the slat joints, a drop of glue in a loose joint will keep the slat from rattling. Temporarily clamp the rails and slats (Photo 14).

Spread glue in the open mortises of the front-leg assembly and on the front tenons of the side rails, and join the side rails to the legs (Photo 15).

Join the back slats to the curved rails (Photo 16) and temporarily clamp the assembly. Again, it's not necessary to glue these joints unless a slat is loose in its mortise.

Spread glue on the tenons of the back rails and in the matching mortises in the back legs. Join the rails to the legs, clamp and compare opposite diagonal measurements (Photo 17).

Cut the shoulders of the curved back rail tenons with a small backsaw. First cut in from the end, then across the grain.

Join the front rails to the legs, and clamp. Compare opposite diagonal measurements to check for square.

Join the side slats to the rails. It's not necessary to use glue since the slats are held captive between the rails.

Spread glue on the rail and leg mating surfaces. Join the side rails to the front leg assembly and clamp.

Join the back slats to the curved rails. If a slat is too loose in its mortise, add a drop of glue to keep it from rattling.

Join the back rail and slats to the legs. Apply the glue sparingly, clamp, and check that the diagonals are equal.

Once the glue has set on the subassemblies, complete the chair frame by joining the side rails to the back-leg assembly. Spread glue on the mating surfaces and position the joints. Apply clamps to pull the joints tight. Set the chair upright on a flat worktable to be sure that all four legs sit evenly (Photo 18). Adjust the clamps and joints, if necessary, until any rocking is eliminated.

Cut corner blocks to reinforce the joints and provide a means for attaching the seat. Note that the angles for the blocks at the front of the chair are different than those for the rear blocks. Use a miterbox to cut the blocks. If your miterbox won't handle the 41° angle for the rear blocks, make the cuts on a band saw.

Bore and countersink pilot holes through the width of the blocks for attaching the seats. Use a clamp to hold each block in place while you bore and countersink pilot holes for attaching it to the rails (Photo 19). A combination bit and countersink is the most efficient tool for the job. Fasten the blocks to the rails with 1-1/2-in. No. 8 screws.

Join the back subassembly to the front-leg/side-rail assembly. Work on a flat surface so the legs remain even.

Finishing

First inspect each chair for scratches, and sand if necessary. We used a water-soluble aniline dye for a beautiful, clear and lightfast color. To eliminate raised grain problems, wipe the chairs with a sponge dampened with clean water. Let the wood dry completely and lightly sand the surface with 220-grit paper.

Follow the manufacturer's directions for mixing and applying the dye, and be sure to allow sufficient drying time before applying a finish.

For our finish, we used Waterlox Original Sealer/Finish. Brush or wipe on the first coat, which will soak into the wood readily. Allow the finish to dry overnight. Lightly sand with 320-grit paper and remove all dust. For the next and subsequent coats, apply the finish and let it sit for about 30 minutes before wiping off any excess. Then, let the finish dry overnight. At this point, you will sand between coats only if the finish is rough. After three or four coats, burnish the surface with 4/0 steel wool to remove any rough spots, and polish with a soft cloth.

Finally, attach the finished slip seats to the frames with screws installed through the corner blocks into the underside of each seat.

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KENTUKY CHAIR

You start with three six foot 2x4s (I used pressure treated pine), ripped into nine equal 1 1/2 x 1 1/8 pieces. By judicious measuring, this should yield the following:

Seat: (A) 6 pieces 15" long) each piece has two 1/4" holes
(B) 2 pieces 35" long) drilled in the center of the wider side.Measure from the same end:
1st hole 1 1/2";
2nd hole 12".
(C) 9 pieces 9 5/8" long: Two holes, 1 1/2" from each end.

Back: (D) 4 pieces 31 1/2" long) Each piece has two holes, at
(E) 2 pieces 29" long) 1 1/2" and 25" measured
(F) 2 pieces 42" long) from the same end.

All held together with 9 gauge galvanized wire..

Align seat pieces as : A-A-B-A-A-B-A-A and hold together loosely at top with a length of wire through the upper (1 1/2" holes); At the lower (12")holes, intersperse each piece with a length of C. That is:

C-A-C-A-C-B-C-A-C-A-C-B-C-A-C-A-C. Wire and set aside.

Align back pieces in the order F-D-E-D-D-E-D-F, and again hold together loosely with a wire through the holes which are 1 1/2 from the end.

Now marry the two parts by threading wire through the remaining holes, with the C pieces acting as the connectors. The new joint should have the configuration: C-F-C-D-C-E-C-D-C-D-C-E-C-D-C-F-C.

Draw all wires tight, cut off and secure ends somehow (I threaded them and used cap nuts).

Now take it all apart, sand as appropriate, finish as desired and reassemble.

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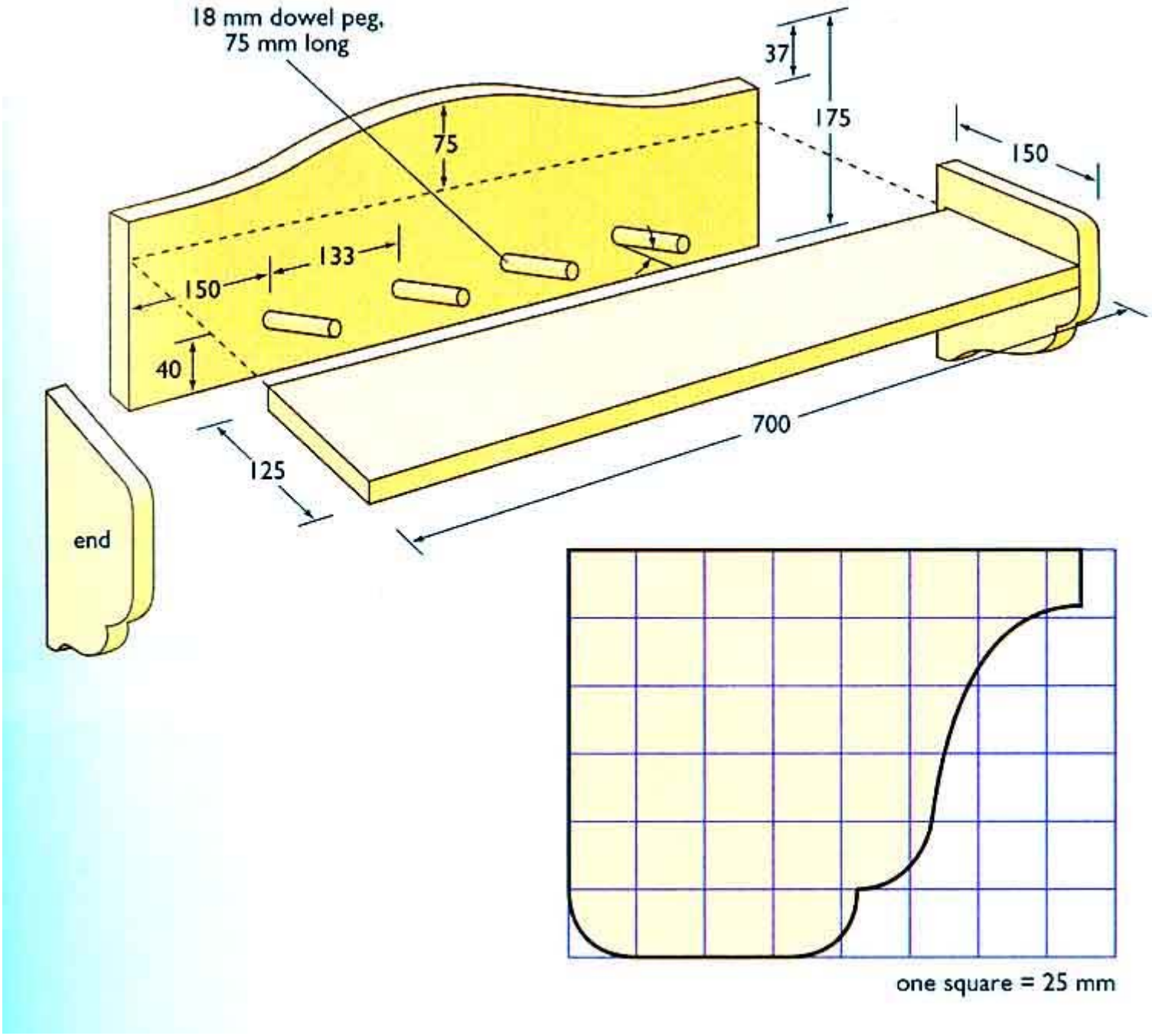
BATHROOM SHELF



Item	Material
shelf (1)	140 x 19mm timber, cut and planed to measure 700 x 125mm
shelf back (1)	190 x 19mm timber, cut and planed to measure 700 x 175mm
shelf ends (2)	165 x 19mm timber (or 2 offcuts measuring 200 x 150mm)

You'll also need: 5 x 30mm countersunk screws; 4 x pieces 18mm dowel, each 75mm long; waterproof epoxy resin (if using in bathroom) or PVA glue; 120 grit sandpaper; polyurethane gloss varnish; fasteners to fit shelf to wall.

Here's how:
1. Click on the illustration at the top of this story to get a larger diagram. Transfer pattern for shelf end to graph paper. Cut out all the components as shown in the diagram. Plane to correct width. Use a jigsaw to cut the two shaped ends. Give the edges a rustic irregularity with a spoke shave or plane.

2. Drill and insert 30mm-long countersunk screws in three places through the back into the rear edge of the shelf and twice through each of the sides into the shelf ends.

3. Drill four 18mm peg holes 40mm up from the bottom (see diagram for spacing). Allow the drill to rest against the bottom of the shelf as you proceed. This will give your pegs an even upwards tilt. Glue and insert pegs.

4. Sand and triple-varnish the shelf before fixing it to the wall through the upper back using appropriate fasteners for the wall type.

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SMALL BOX SHELF

You'll need

Part	Material	Length
End (2)	150 x 25mm timber, DAR	148mm
Top/bottom (2)	150 x 25mm timber, DAR	240mm
Rail (1)	50 x 25mm timber, DAR	240mm

You'll also need: 40mm nails (12); PVA adhesive; wood putty; 50mm x 8 gauge countersunk screws (2) or hollow wall anchors.

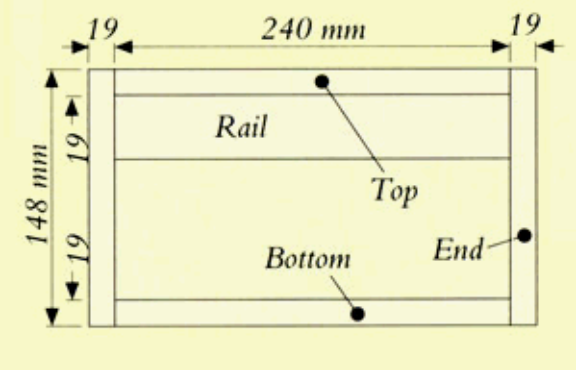
Here's how

Cutting out

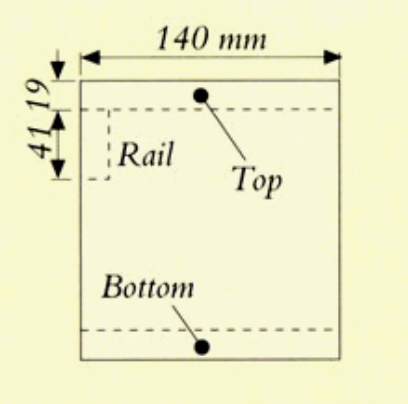
1. Mark out the required lengths on the timber (see diagrams below), leaving 5mm between each part for the saw cut and for cleaning back. Use the square to square the lines across the face and around all sides of the timber. Check that the lines are square and, when you're satisfied, retrace the lines using a utility knife to cut the top fibres. This reduces the breaking out of fibres on the underside of the cut and reduces the need for putty at a later stage.

2. Cut the components to length. If you are using a circular saw, use a straight timber batten to run your saw against to ensure a square cut.

3. Take the timber parts of the same size and hold them together in the vice. Ensure the marking knife lines are aligned. With a fine set on the plane, plane the ends down to the correct length. Plane towards the centre from each side of the parts so as to prevent the timber chipping. Check that you have planed each part to a peak in the centre and that you are planing square to the face of the material. Then work from the centre towards the outside edges to plane the peak down flat. Regularly check your parts for square. Repeat this step for each part of the job, including the fixing rail.



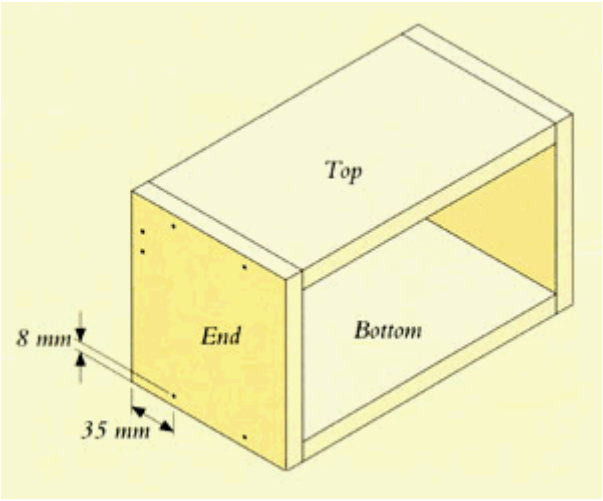
Front elevation.



End elevation

Assembly

4. Take the top and place it in the vice, end up. Take one end and determine the outside and front and top edges. On the outside, about 8mm down from the top edge and 35mm in from the front and back edges, start a 40mm nail off (see diagram below). Spread adhesive on the edge to be joined, use your finger to spread the adhesive and rub it in well. Apply a second thin coat of adhesive to the joint and bring the two parts together. Nail the joint together. Try to keep the face and edges flush.



Position for the nails

5. Following the same method, join the bottom to the end. Turn the box over and nail on the other end.

6. Insert the fixing rail and nail it home. Punch and putty nail heads.

Finishing and installation

7. Finish the shelf as desired. If painting your shelf, use two coats of paint, sanding between each with 180 grit sandpaper. Use a primer first to choke the timber grain and make it easier to sand. If you intend to use stain or clear lacquer, remove all excess adhesive first or the stain will not penetrate through into the timber and there will be white blotches.

8. Decide where the shelf should be fixed. If you're fixing the shelf to a masonry wall, drill two 6.5mm holes in the fixing rail about 180mm apart and 30mm down from the top edge. Position the unit on the wall, using a spirit level to make sure it is horizontal, and mark the position for drilling on the wall. Use a 6.5mm masonry bit to drill the holes in the walls, place plastic star plugs in the holes and screw the unit into position. If your

walls are not solid masonry, use hollow wall anchors to fix the shelf in position, following the manufacturer's instructions and using a spirit level to be sure it is positioned horizontally.

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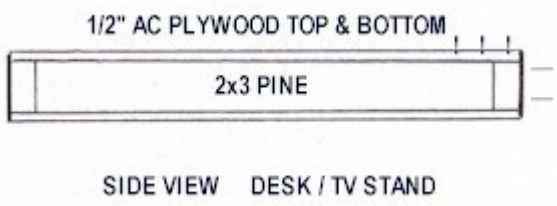
WALL DESK AND TV SHELF

Step 1 - Prepare..... Hand select 2x3 or 2x4 construction grade lumber, looking for a few clean, straight and blemish free studs. If you use 2x4 studs...rip them down to 2x3 size (2 1/2"). The top is made from 1/2" A/C plywood. Determine width and length of your project to fit your needs.



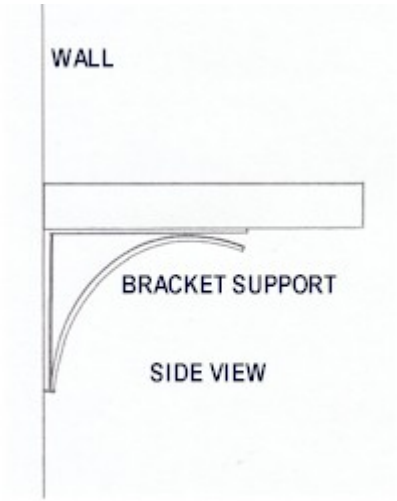
Step 2 - Cut 2 - 2x3 to length and 3 - 2x3 to the width needed to make the desk the size you desire. Nail or screw front 2x3 to side 2x3 as shown in above drawing. Nail or screw the 3rd 2x3 in the middle of this frame as a center support for the plywood top. Countersink the nails or screws and fill with wood dough.

Step 3 - Measure the outside dimensions of your frame and cut the plywood top and bottom to fit. Nail the top and bottom in place as shown. Countersink the nail heads and fill with wood dough.

Step 4 - The finishing of this project will take a good deal of sanding. Use a belt sander and smooth the sides of the desk until the plywood and 2x3 panels are flush and smooth. Smooth the top and bottom edge of the plywood being careful to not sand through the top veneer of the plywood sheet. Fill all voids in the plywood with a hardening wood putty (Plastic Wood type) Sand and finish with stain or paint.

Project mounted from below with brackets.

Step 5 - Mount project on wall at desired location using support from above or below as shown in our two examples. Make sure your supports from above or below are at a measurement that hits the framing studs in the wall.



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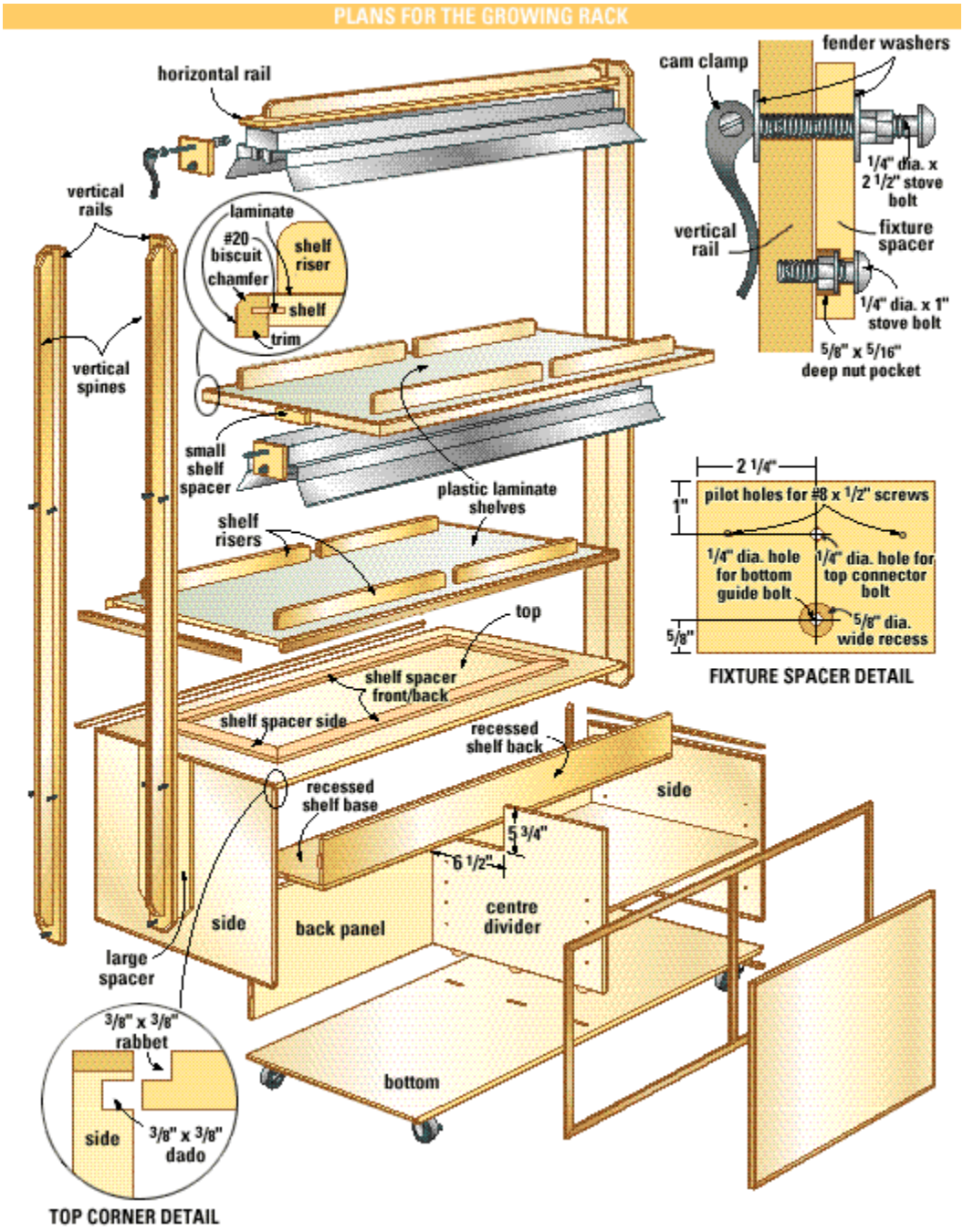
GROWING RACK



Make the Base Case

Begin by cutting panels for the sides, top and bottom. I used birch ply for these parts, but any 3/4"-thick sheet material will do. Next, cap the top and bottom edges of the side panels with 1/4"-thick strips of solid hardwood. The rest of the exposed plywood edges are capped later. Make the strips slightly wider than the thickness of your sheet material so the edges overhang the plywood, allowing it to be sanded flush later.

I used rabbet and dado grooves for the interlocking joinery that connect the corners of the box. First, cut the 3/8" x 3/8" rabbets on the ends of the top and bottom pieces, then cut the matching dado grooves in the side members.

Now is also the time to prepare plywood panels for the cabinet back, recessed shelf base, shelf back, and the centre divider. Although you're almost ready to assemble the box, first drill 5/16" dia. x 3/8"-deep holes on the inside faces of the

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side panels and on both sides of the centre divider, to receive the adjustable-shelf-pin sleeves. Assemble the recessed shelf, then attach the shelf, back panel, and centre divider to the box using #20 biscuits. The plans show how it all fits together and where to plunge slots for the biscuit.

Dry-fit the base unit, then reassemble it with glue and clamps. Measure and equalize the diagonals to square the unit before you set it aside to dry.

Next, use a tablesaw to prepare plywood panels for the doors and adjustable shelves, then cover all exposed plywood edges on the base unit and the doors and shelves using the solid birch strips. The base unit rolls on lockable casters. Install these now.

I borrowed a couple of tricks from the kitchen-counter trade to make the two plant shelves for this project. Begin by preparing two 3/4" -thick plywood shelf panels and enough 3/4" x 1"-solid birch trim to wrap around the edges. Mark and cut the edging to fit with mitred corners, then fasten it to the ply using glue and #20 biscuits.

The high-pressure plastic laminate comes next. I used my tablesaw spinning a standard 80-tooth carbide-tipped combination blade to cut the laminate panels to size for the top and edges. To minimize chipping, make your cuts with the good side facing up and use a feather board or pushstick to keep the material pressed flat against the saw table. Cut all the laminate pieces you'll need for the shelf sides and tops, allowing about 1" of excess all around.

An electric timer saves effort and makes lighting more consistent, which is essential for optimum plant growth.

I prefer LePage's Pres-Tite Green Professional Quality contact cement for securing laminate. It cleans up with soap and water, and doesn't emit toxic fumes. Spread some on the back of the laminate and corresponding shelf faces before setting the parts aside to dry.

When the adhesive is no longer tacky, roll the laminate on to the substrate, keeping the edges aligned as you work. When you're done, apply pressure to the entire surface with a roller or the palm of your hand, working from the centre outwards, to consolidate the bond.

I used a hand-held router spinning a flush-trimming bit to remove the excess laminate from the top of the shelves. Next, I installed laminate on the shelf edges before using a 45* chamfering bit to reveal an angled face of solid wood around the perimeter.

The water-tight plastic plant trays are suspended from 13/4"-high risers attached to the top of the shelves. Make the risers from 3/4"-thick solid birch, then use the bandsaw to cut a decorative 5/8" -radius curve on the top corners. Sand, then install the risers using #8 x 2" screws, driven up through the underside of the shelves.

Light intensity is controlled by varying the lamp height. A well-adjusted cam clamp makes locking quick and simple.

I also added a spacer under the lower shelf to raise it up slightly from the top of the base unit. Cut the four sides of the spacer frame from 3/4" solid birch, then assemble the parts using #20 biscuits and glue to strengthen the mitred corners. When dry, centre the frame on the bottom of the shelf and secure it with #10 x 11/4" screws. Countersink the heads so they don't interfere with the shelf when installed.

Fasten the shelf to the top of the base unit with #8 x 13/4" screws driven up through the underside of the cabinet top. Don't use glue. The shelf needs to come off later for finishing.

Cut the rail and spine stock you'll need from 3/4"-thick hardwood. To make these parts more pleasing to the eye, trim the outside corners to a 45o angle and chamfer the edges to match the profile routed on the shelves. Just leave the guide slots square.

With this done, attached the spines to the corresponding rails using glue and #8 x 11/4" screws. Pre-drill for the screws and counterbore their heads so they can be covered with tapered plugs. Mitre the corners of the large spacers to a 45° angle to match the profile on the ends of the rails. The corners of the small spacers are rounded over with sandpaper.

Next, attach the large spacers to the ends of the base unit with glue and #8 x 1" screws. But before you install the rails, take time to cut temporary spacers to maintain a consistent slot gap while you work. The spacers should be a hair wider than 1/4", to allow the bolts that guide the fluorescent fixtures to travel freely in the slots as they slide up and down for adjustment.

Attach the upright assemblies using glue and #8 x 13/4" screws, with nickel-plated cup washers under the heads. As you install the upper shelf, it's a good idea to clamp a couple of temporary braces to the vertical rails. These will support the shelf while you work. With the shelf and small spacers in position between the rails, drill pilot holes for #8 x 2" screws. Next, remove the shelf and widen the pilot holes in the rails and spacers with a 3/16"-dia. bit. This prevents the narrow spacers from splitting as the screws are driven home. With the shelf back in position, install screws (with cup washers under the heads).

Let There Be Light

Home centres carry all sorts of 48" fluorescent light fixtures, but for this project the best choice is the type that comes prewired with a grounded electrical cord.

Before you begin, notice how a system of spacer blocks and bolts are added to the ends of the fixtures to make a connection with the vertical rails. Cut the spacer blocks from 1/2"-thick hardwood, then pair up each spacer with one of the fixture end plates. Take the time to mark the spacers and end plates to keep track of the pairings. The holes you will drill may not align if the pieces aren't returned to their original homes.

Use a drill press to bore a 1/4"-dia. hole through the centre of each end plate and corresponding spacer to receive the bolt that connects the fixtures to the rail assemblies. While you're at it, switch to a smaller bit and drill pilot holes for the screws that secure the spacers to the end plates.

With holes drilled and bolts installed, secure the spacer blocks to the corresponding end plates with #8 x 1/2" pan-head screws, inserted through the pilot holds you drilled earlier. Reinstall the end plates on the fixtures.

At first it may appear that the 1/4" dia. x 21/2" bolts used to connect the fixtures to the rail assemblies are too long. Don't be fooled. Tighten a pair of 1/4"-dia. nuts together on the bolt, close to the head, to serve as adjustable spacers. The spacers are used to alter the thread length that protrudes through the rail slots for the cam clamps. These clamps won't work properly unless the bolts they thread onto are just the right length. Spin the nuts onto the bolts, then add a fender washer to each before inserting the bolts through the fixture ends.

Locate the wooden risers to match your plastic seedling trays. The risers make it easier to pick up the trays when necessary.

Tilt the light assemblies into place between the rails and engage the bolts in the rail slots. Add a fender washer and cam clamp to the end of each bolt protruding through the rails. Check to make sure the lights slide up and down without binding, then lock them in place by engaging the cam clamps.

Finishing Up

Remove the light assemblies and plant shelves before sanding the entire project up to the 220-grit level. I like the look of natural birch, so I brushed on three coats of semi-gloss polyurethane, sanding with 600-grit paper between coats. Don't forget about the chamfered edges on the plant shelves while you're finishing.

When everything's dry, reinstall the shelves and light assemblies with fluorescent tubes. Finish up by attaching the doors with piano hinge, then add the shelf pin sleeves, magnetic door catches, and door pulls.

Any basic electrical timer works fine for controlling the lights. For safety, use only a GFI-protected (ground fault interrupter) circuit to power this unit. Load up the base with supplies and tools and you're ready to get growing.

You will need:			
For the Base Unit	**Material**	**Size**	**Quantity**
Top and bottom	birch ply	3/4" x 20 3/4" x 47 1/4"	2
Sides	birch ply	3/4" x 19 1/2" x 20 3/4"	2
Centre divider	birch ply	3/4" x 18 1/2" x 20"	1
Recessed shelf base	birch ply	3/4" x 6 1/2" x 46 1/2"	1
Recessed shelf back	birch ply	3/4" x 5" x 46 1/2"	1
Back panel	birch ply	3/4" x 12 3/4" x 46 1/2"	1
Doors	birch ply	3/4" x 19 1/2" x 23 1/2"	2
Adjustable shelves	birch ply	3/4" x 19 3/4" x 22 1/4"	2
Edging	hardwood	1/4" x 3/4" x 70' *	1
For the Supports and Braces			
Vertical rails	hardwood	3/4" x 2 1/2" x 66"	4
Vertical spines	hardwood	3/4" x 1" x 63"	4
Horizontal rail	hardwood	3/4" x 3" x 49"	1
Horizontal spine	hardwood	3/4" x 1" x 47"	1
Large spacers	hardwood	1/2" x 4 1/2" x 15"	2
Small spacers	hardwood	1/2" x 3/4" x 4 1/2"	2
Fixture spacers	hardwood	1/2" x 3 1/4" x 4 1/2"	4
For the Fixed Shelves			
Shelf panels	birch ply	3/4" x 20 1/2" x 46 1/2"	2
Edging	hardwood	3/4" x 1" x 25'*	1
Shelf surface	plastic laminate	24" x 48"	3
Shelf risers	hardwood	3/4" x 1 3/4" x 22"	8
Shelf spacer sides	hardwood	3/4" x 3" x 19"	2
Shelf spacer front and back	hardwood	3/4" x 3" x 45"	2
Accessories and Hardware			
Fluorescent fixtures		48"-long	2
Timer			1
Power Bar			1
Plant trays		LV#PK404	4
Door pull	trowel	LV#01W94.08	1
Door Pull	fork	LV#01W94.07	1
Magnetic catches			2
Casters		3" dia.	4
Bolts		1/4" dia. x 1"	4
Bolts		1/4" dia. x 2 1/2"	4
Nuts		1/4" dia.	12
Fender washers		1/4" dia.	8
Cam clamps		LV#05J51.01	4

Shelf pin sleeves			24
Shelf pins			8
Cup washers	nickel plated	for #8 screws	24
Piano hinges		3/4"-wide x 20"	2
Piano hinge screws		#5 x 1/2"-long	approx. 100
Flathead screws		#8 x 2"	36
		#8 x 1"	18
		#8 x 1 3/4"	22
		#8 x 1 1/4"	40
Pan head screws		#8 x 1/2"	8
		#8 x 3/4"	16
*total length required			

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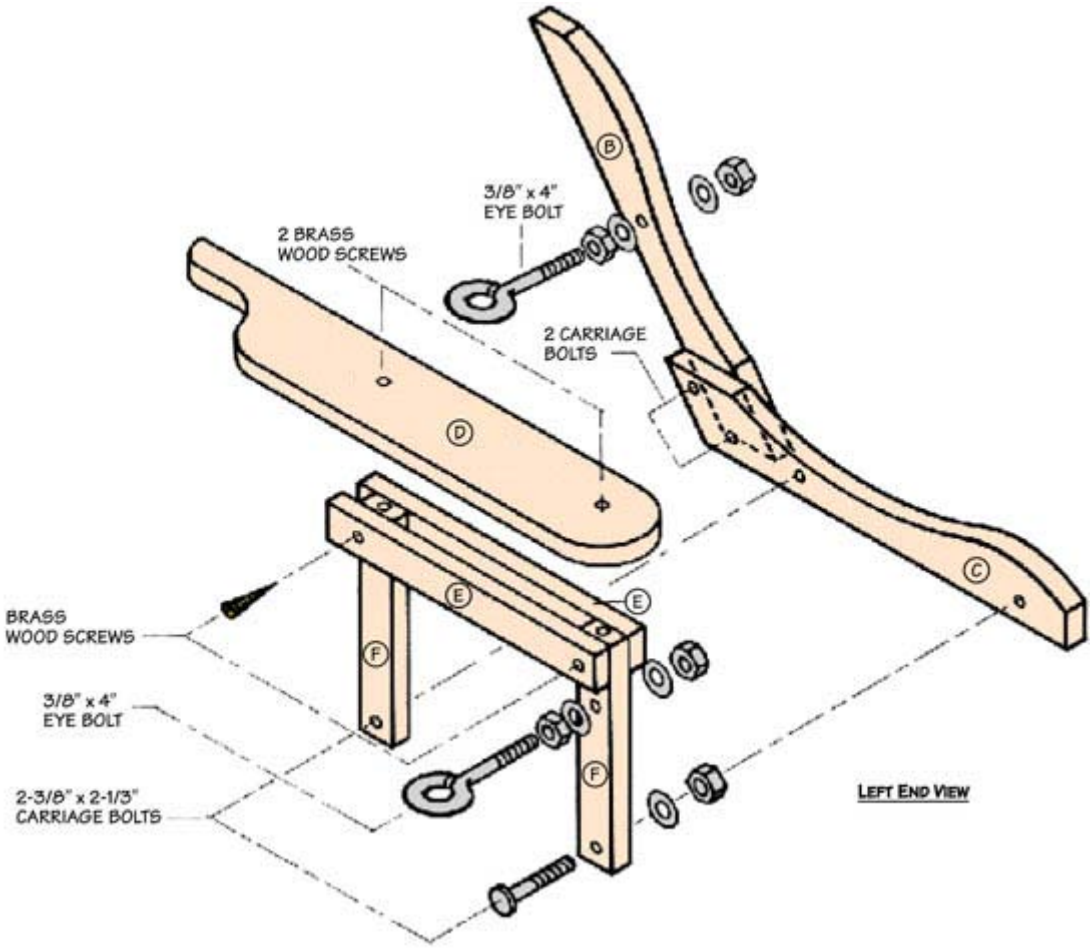
PORCH SWING



List of Materials

(finished dimensions in inches)

A	Slats (21)	3/8 x 1-1/2 x 52
B	Back Supports (3)	7/8 x 2-1/2 x 19-1/4
C	Bottom Supports (3)	7/8 x 2-1/2 x 19-1/4
D	Arm Rests (2)	3/4 x 4 x 23-1/2
E	Arm Braces (4)	3/4 x 1-1/2 x 13
F	Arm Posts (4)	7/8 x 1-1/2 x 9-1/2

Hardware

(all dimensions in inches)

Eye Bolts (2) – Heavy Gauge	3/8 x 4
Carriage Bolts (10)	3/8 x 2-1/2
Washers (14) – To fit Carriage Bolts	3/8
Nuts (14) – To fit Carriage Bolts	3/8
Brass Wood Screws (68)	#8 x 1-1/4
Brass Wood Screws (6)	#8 x 1
Heavy-Gauge Chain	25 feet

STEP 1:

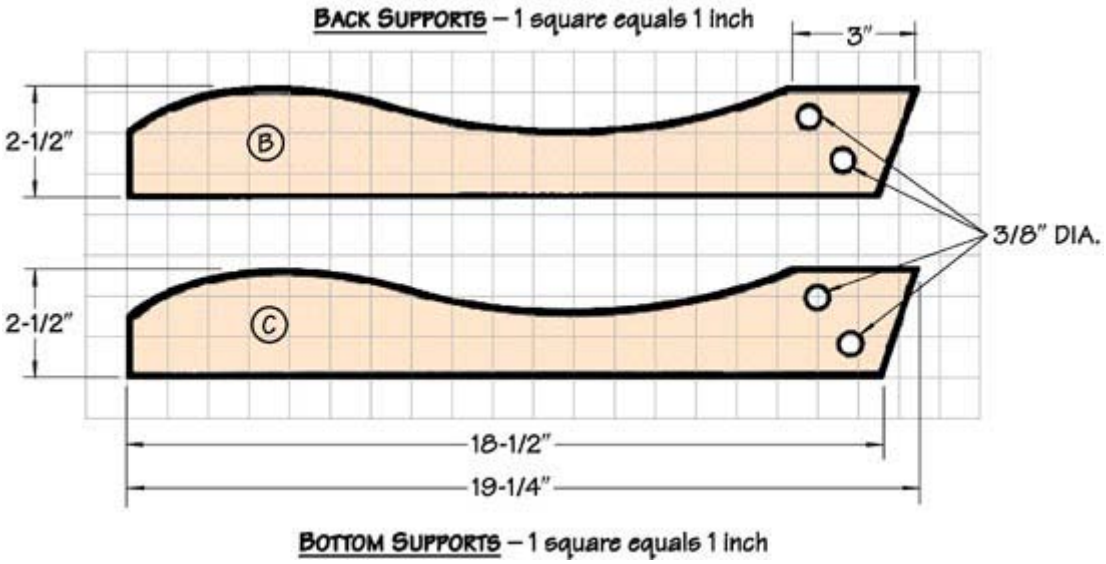
Plane your stock for the three back supports (B), three bottom supports (C) and 21 slats (A) to the desired thickness. Our guidelines call for 7/8-inch, 7/8-inch and 5/8-inch, respectively. Remember, you may choose to make these parts thicker if you are lengthening the swing or using lumber that may not be as strong as oak.

STEP 2:

Cut the back supports (B), bottom supports (C) and slats (A) to size/length, according to the List of Materials.

STEP 3:

Using your bandsaw or scroll saw, cut out the contours for the back and bottom supports (B & C). For best results, use the pad sawing technique with double-faced tape to cut multiples of the same profile at the same time.



STEP 4:

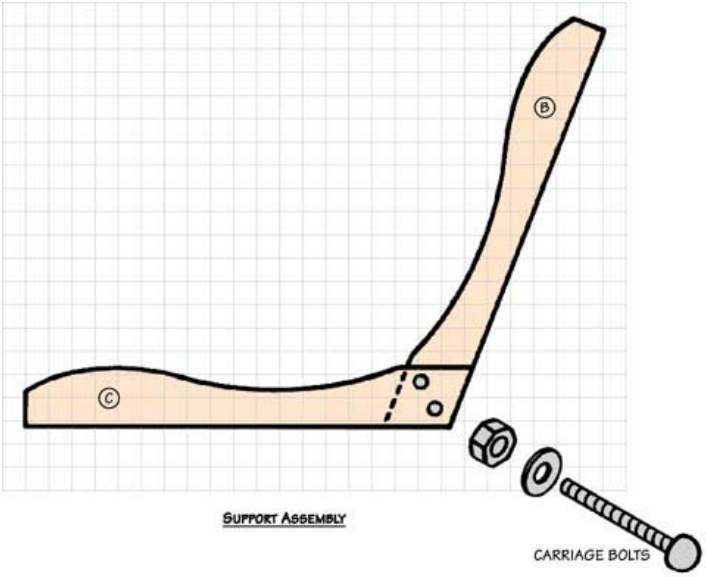
Using your drum sander, sand all the support profiles (B & C) while they're still taped together.

STEP 5:

Again . . . while they're still taped together . . . drill 3/8-inch diameter holes at the locations indicated in the support pattern.

STEP 6:

Untape the back and bottom supports (B & C) and assemble them with carriage bolts, washers and nuts. Tighten securely (see Support Assembly).



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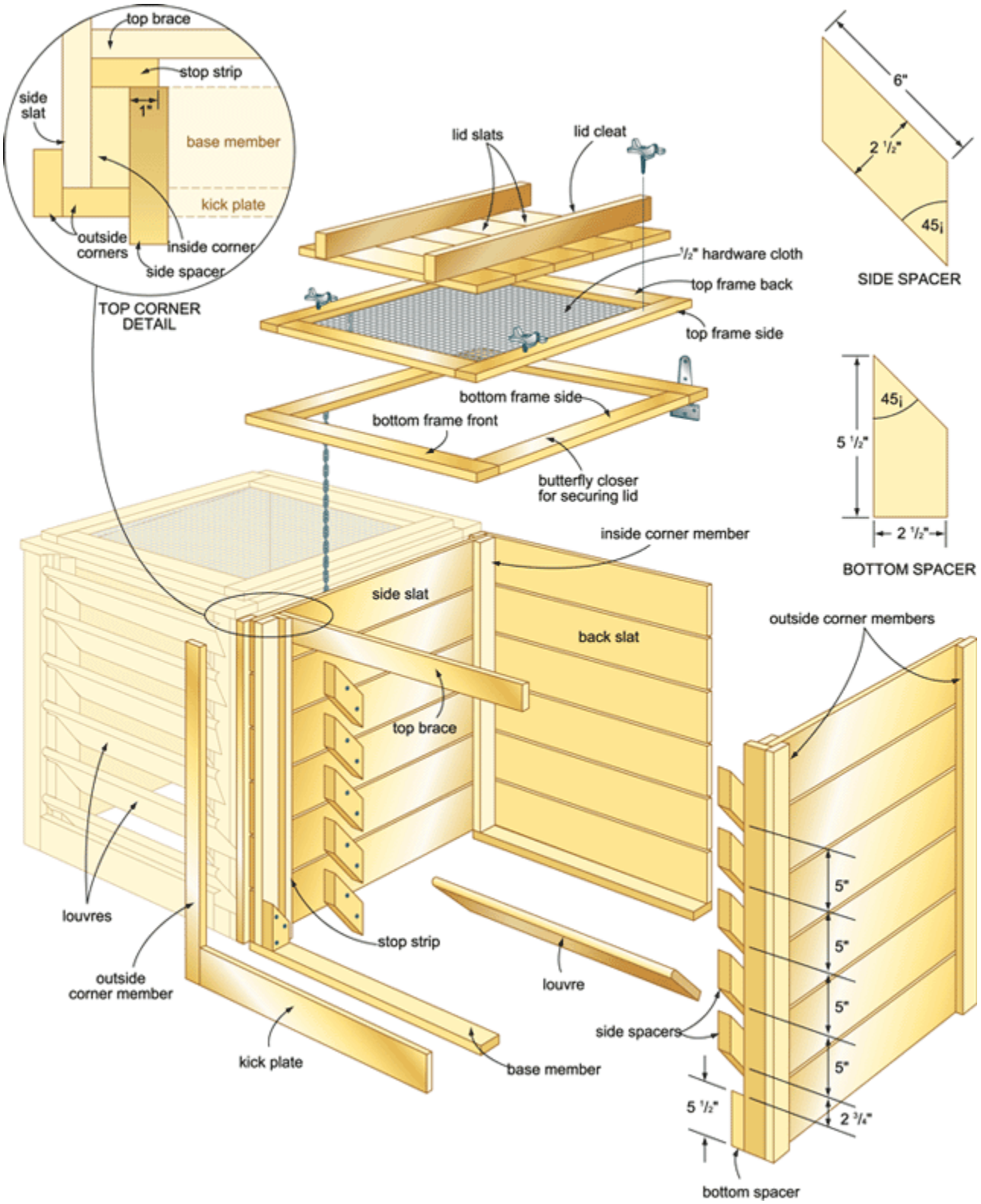
GARDEN COMPOST BIN



Start building the box by cutting 18 side and back slats, and four spruce inside corner members. Next, place two corners on your workbench, 34" apart, with their 2 1/2" faces down. Now attach six side slats to these parts, ends flush with the outer edges of the corner members and a 1/2" space between each slat. Fasten the slats and corners with one screw per joint initially, then square the frame by equalizing diagonal measurements taken corner to corner before adding two more screws per joint to lock the assembly firm. Build the opposite side frame exactly the same, then stand both upright, 34" apart, and join them with the remaining six slats to produce a three-sided, free-standing box.

Next, prepare the six outside corner members and add one to each back corner of the box, flush with the back face as shown on the plans. Attach two more outside corners to the front face of sides, and the final two on the outside faces of the sides. As

you'll discover, the outside corner members add considerable strength to the unit, and cover the exposed ends of the slats, for a neater, trimmed look.

Cut the two stop strips to size and attach them to the backside of the front inside corners. The plans show how these strips overlap the inside corners by 1" along their length and prevent the removable louvres from dropping into the composter.

Louvres help aerate your compost pile, and because they're removable, you can take a few out to reach finished compost at the bottom, or take them all out and turn the whole pile over.

At this point, you have the basics of a three-sided box. Now it's time for some detailing. From your supply of 2 x 3s, cut the ten side spacers and two bottom spacers to shape, with 45° cuts, as shown in the plans. These are screwed to the inside surface of the front inside corners, to hold the removable louvres.

Begin spacer installation by screwing the bottom pair flush with the bottom ends of the front inside corners. Then, working your way upward, apply five spacers per side as shown. This leaves about 1 1/16" between each spacer for the louvres to slide 45° down to the vertical stop strip you added earlier.

The kickplate and top brace bind the three sides of the compost box together to hold the load it will contain during use. Cut these parts now and screw them in place as shown on the plans. Cut and install the base members while you're at it. These are designed to snuggle into the ground, boosting stability. Cut the removable baffles next, slide them home, and the body of your composter is done.

You Will Need

For the Body	Material	Size	Qty.
Side and back slats	cedar	1" x 5 1/2" x 34"	18
Inside corner members	spruce	1 1/2" x 2 1/2" x 35 1/2"	4
Outside corner members	cedar	1" x 2 1/2" x 35 1/2"	6
Stop strips	cedar	1" x 2 1/2" x 35 1/2"	2
Bottom spacers	spruce	1 1/2" x 2 1/2" x 5 1/2"	2
Side spacers	spruce	1 1/2" x 2 1/2" x 8 1/2"	10
Kickplate	cedar	1" x 5" x 29"	1
Top brace	cedar	1" x 4" x 32"	1
Base members	spruce	1" x 2 1/2" x 34"	2
Baffles	cedar	1" x 5 1/2" x 28 7/8"	6
For the Lid			
Bottom frame front & back	cedar	1" x 5" x 38"	2
Bottom frame sides	cedar	1" x 5" x 26 1/2"	2
Top frame sides	cedar	1" x 4" x 35 1/2"	2
Top frame front & back	cedar	1" x 4" x 29"	2
Lid slats	cedar	1" x 5 1/4" x 28 7/8"	5
Lid cleats	cedar	1" x 1 3/4" x 29 1/2"	2

Hardware

approx. 250 #8 x 2 1/2" deck screws; approx. 40 #7 x 2" deck screws; one 32" x 32" hardware cloth; a 3ft. chain and two eye-bolts; a pair of 5" strap hinges; onehandle and 4 butterfly closers

The composter lid has two parts: an outer, screened double frame and an inner lid that sits within it. Start by joining the top and bottom members together into two frames using weatherproof glue and biscuits or dowels. Next, stretch and staple the hardware cloth to the top surface of bottom frame. Place the smaller frame on top, then clamp the assembly together before joining the two frames with 2" screws driven from underneath.

The removable portion of the lid is simply five pieces of wood laid edge to edge and joined into one unit with two top cleats screwed 2" from the lid slat ends. Attach four butterfly closers to the top of the frame to hold the lid in place, a chain to stop the lid from flopping back too far when open, and hinges.

Occasionally you'll want to remove the lid to screen finished compost into a wheelbarrow or a bucket. Remove the hinge pin by grinding off one end and replace it with a large spring pin—a kind of removable cotter pin you can get at hardware stores. Now when you want to move the screen, just pull the pins out.

Once you've screened out any pieces that haven't composted completely, you'll have struck gold—pure, black, garden gold.

Strong corner construction is essential for durability. Your composter has to withstand the forces of weather from the outside and the strain of a heavy pile of hot, rotting compost on the inside.

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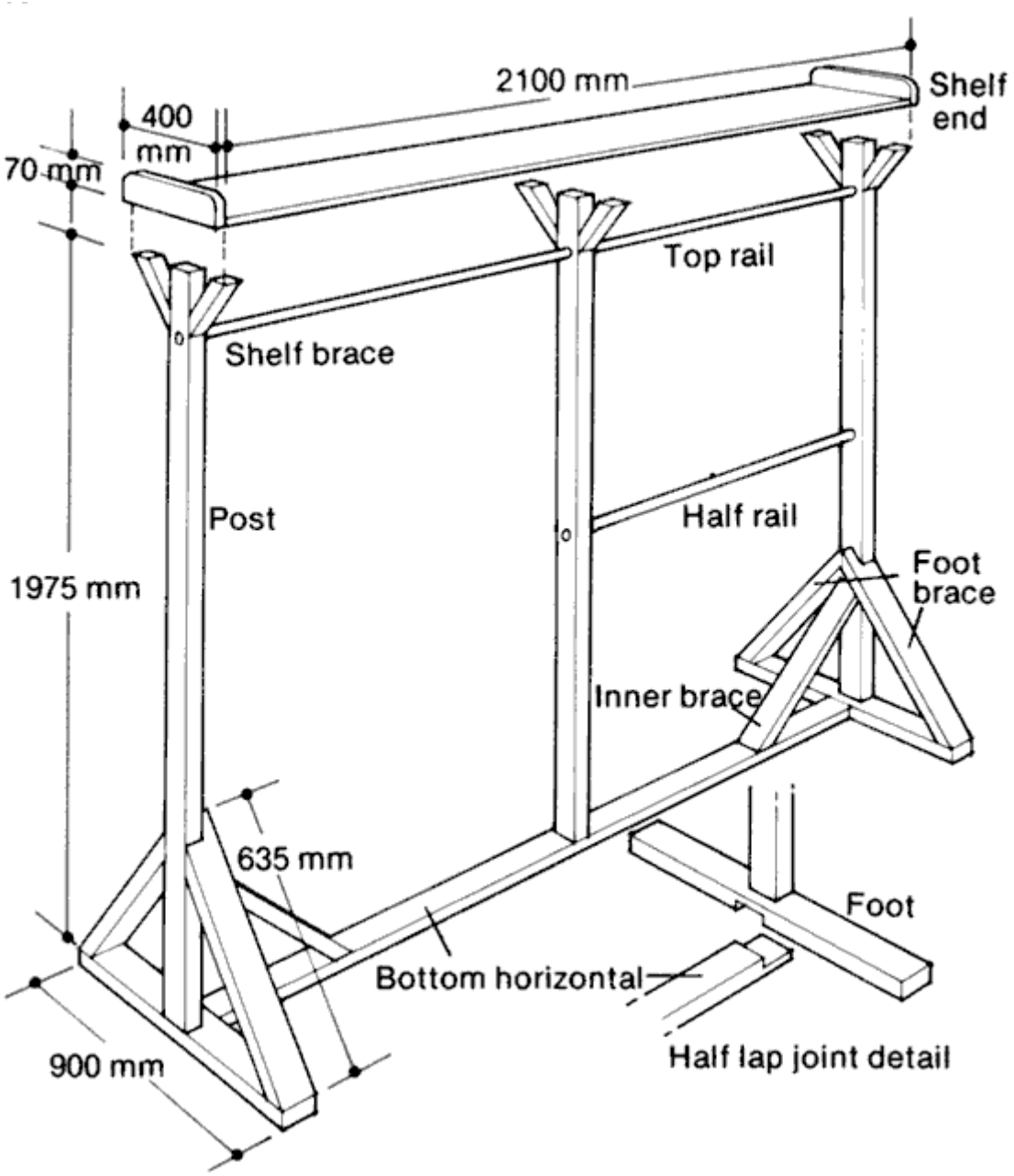
CLOTHES RACK



Part	Material	Length in mm
post (3)	70 x 37mm pine	1975
bottom horizontal (1)	70 x 37mm pine	2100
feet (2)	70 x 37mm pine	900
feet braces (4)	70 x 37mm pine	635
inner braces (2)	70 x 37mm pine	625
shelf (1)	19mm edged particleboard	2100 x 400
shelf ends (2)	70 x 19mm pine	400
top rail (1)	25mm dowel	2063
half rail	25mm dowel	1031

You'll also need: 40mm and 60mm countersunk screws; wood filler.

Tools
Basic carpentry kit including a drill and mitre box.

Here's how:
1 Start by joining the feet to the bottom horizontal using half-lap joints. Drill and screw through the joints and into the bottom of the posts, using two screws for each joint.

2 To fit the leg braces, cut 45 degree angles at either end and saw out a 37mm x 35mm section at the top end to enable them to fit around the post and the foot. Mitre the ends of the inner braces and screw in place. Screw the central post in place through the bottom of the horizontal.

Right foot and brace, see diagram above.

3 Glue and screw shelf ends in to the shelf. Screw through the shelf into the top of the end posts, remembering to face the finished timber edge of the shelf to the front.

4 Drill holes in the posts to take dowel rails. Position the top dowel 150mm below the shelf and half rail 900mm up from the floor. Drill holes slightly larger than the dowels, noting that you should drill only halfway in tot he outer posts to accommodate the ends of the dowels. Drill and screw into the dowel ends through the posts.

5 Fit and screw the shelf braces in place and fill and sand all screw holes. Paint if required.

Right upper shelf and brace, see diagram above.

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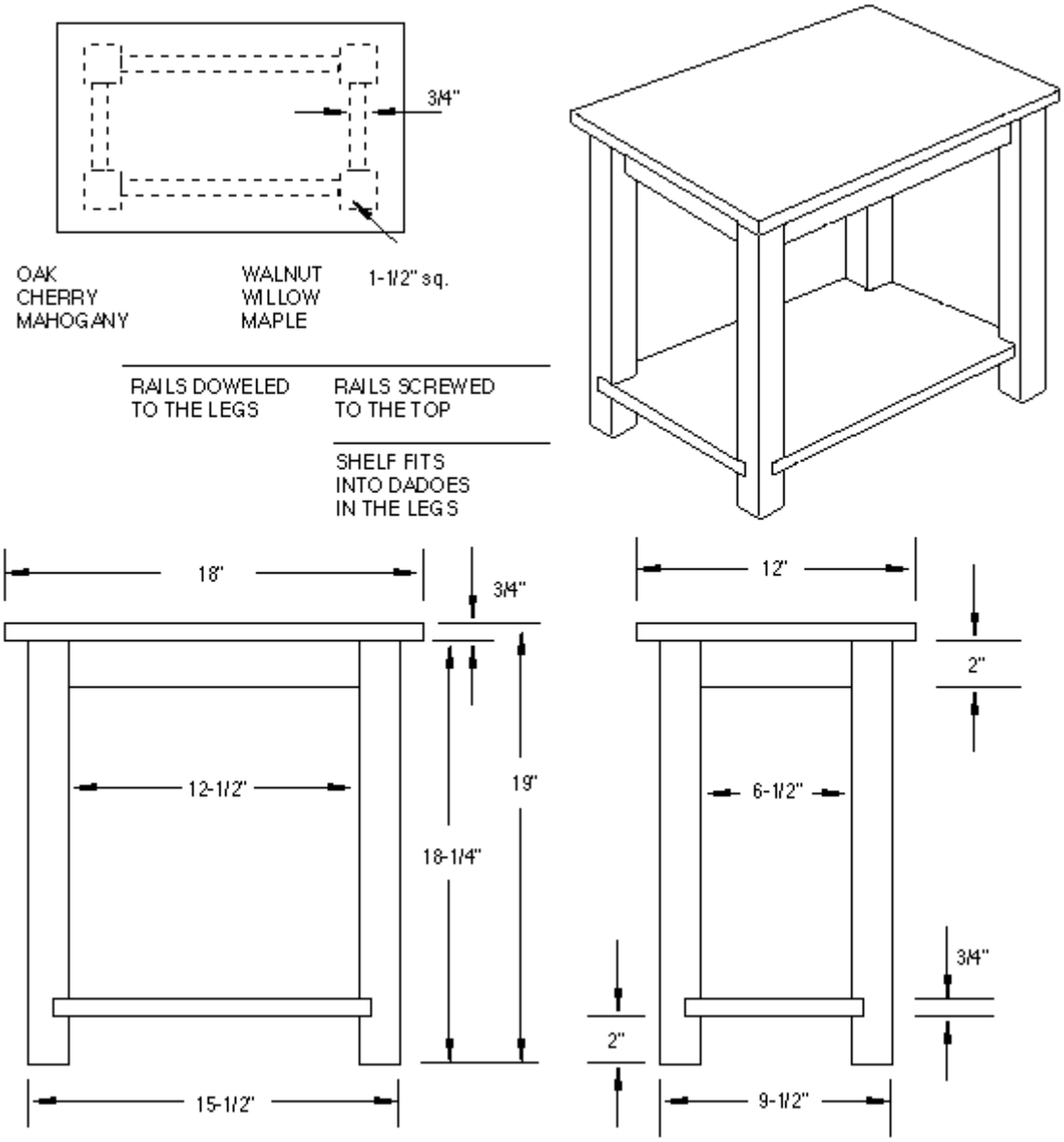
BEDSIDE TABLE



Procedure

I. Top and Shelf

1. Lay out rough dimensions of all parts on wood.
2. Cut pieces to rough dimension lengths.
3. Joint one edge of each piece.
4. Cut and glue pieces edge to edge to make the top. (Glue oversize.)
5. Cut and glue pieces edge to edge to make the shelf. (Glue oversize.)
6. Let glue cure overnight.
7. Plane to 3/4" thick. * If you started with 3/4" stock, keep it as thick as possible.
8. Cut to finished size on the table saw.
9. Sand smooth.

10. Rout the top edge of the top with whatever edge-forming bit you like. * DO NOT ROUT THE SHELF!

11. On the shelf only, cut a 3/4" X 3/4" square off each corner to fit into the legs.

II. Legs

1. Face-glue two 3/4" thick by 1 1/2" wide leg pieces to make four leg blanks 1-1/2" X 1-1/2" X 20". Use straight finished wood.

2. Using the router table, rout a 3/8" roundover on each edge.

3. Square cut one end of each leg on the miter box.

4. Measuring from the squared end, mark and cut the other end of each leg to 18-3/4".

5. Sand smooth.

III. Rails

1. Cut rails to 2" wide.* You may wish to cut slightly oversized and joint to 2". Machine the two short rails together as one piece and cut into two short lengths after all machining is done. * Make sure to use proper push blocks and safety procedure for the jointer.

2. Cut one end of each rail square on the miter box or table saw.

3. Measuring from the squared end, mark and cut two long rails at 12-1/2" and one extra long rail into two short rails at 6-1/2".

4. Drill a 3/8" hole 1" into the edge of each rail. Then drill a 9/64" pilot hole the rest of the way through. (The holes will be used to attach the top to the table.) * The hole should be approximately centered on each piece.

5. Elongate the hole on the upper side by coming in from the top with a drill and carefully wiggling the drill around to end up with a tapered hole. This will allow for a little movement in the table. Wood shrinks and expands with changes in temperature and humidity, and without an allowance for movement, the table could crack at some point in time.

IV. Assembly

1. Take the four legs and cut a 3/4" dado 3/4" deep in two adjacent edges approximately 2" in from one end. * These dadoes support the shelf.

2. Finish sand all pieces.

3. Use either dowels or biscuits to attach the rails to the legs.* You must insert the shelf before you glue the rails to the legs.

4. Attach the top using four #6 X 1-5/8" drywall screws. * The screws slide through the holes that you drilled in your rails.

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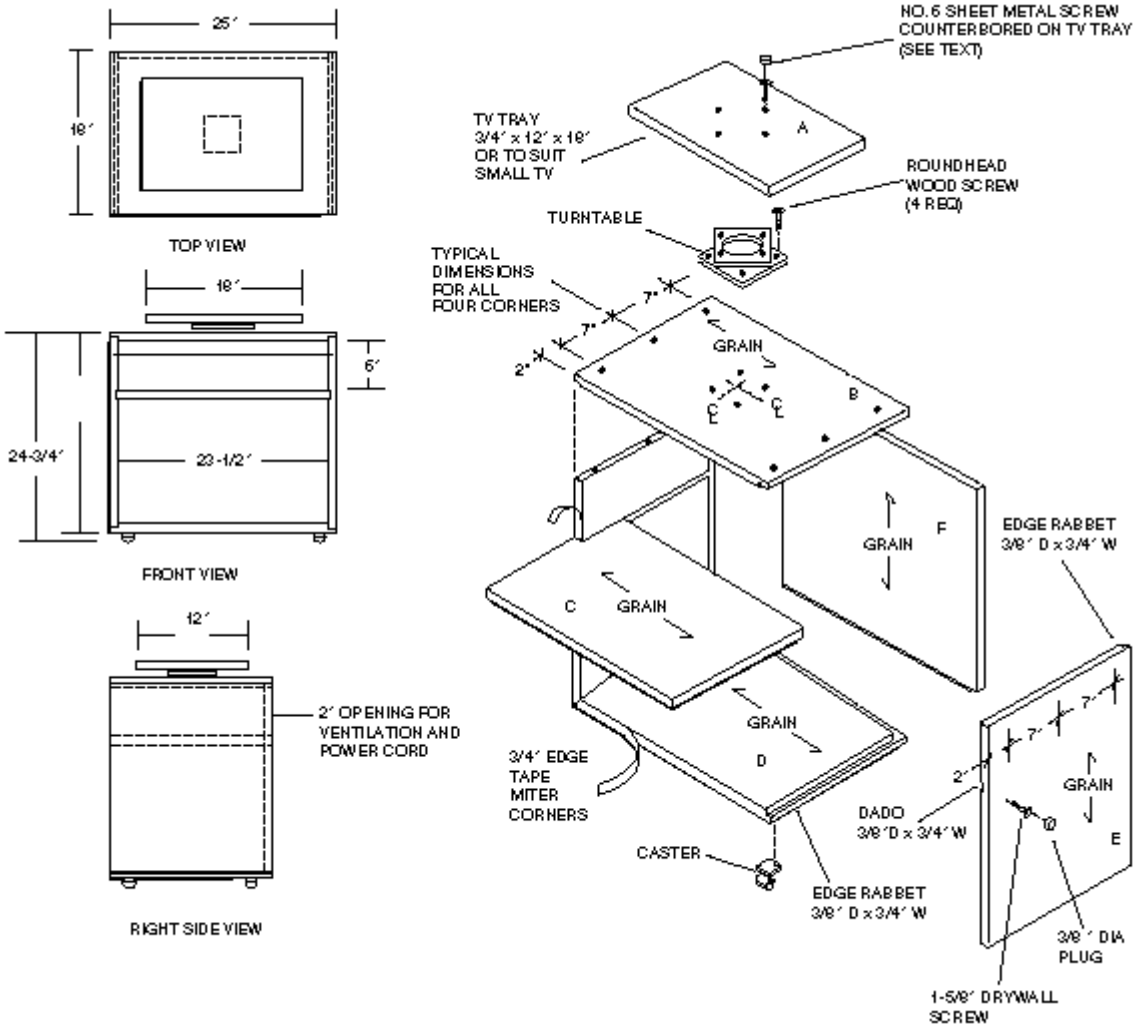
TV/DVD CABINET



Builder's Tip: When building quality furniture, remember all wood grains should "run" in a certain direction. For this project: sides and back - vertical; top and bottom - left to right.

1. After checking direction of wood grain, rough cut all members (slightly oversized). Note: The easiest way to work a large sheet of plywood initially is by placing it on top of three lengths of 2x3s laid across a pair of sawhorses. This improvised "table" puts the material at a convenient height.

2. Using a securely-clamped 4-ft. T-square as the straightedge, carefully trim the top, shelf, bottom and side pieces to size. Note: Back and tray piece will be trimmed later.

   Builder's Tip: Whether you use a table, radial arm, or portable circular saw, a fine tooth, plywood veneer blade should be installed to ensure perfectly clean cuts. Always cut wood with the veneer side down when using a portable circular saw, and with the veneer side up when cutting with table and radial arm saws.

3. Mark locations for ploughing all dadoes and rabbets on sides, top and bottom pieces.

   Builder's Tip: No edge rabbet is required at back edge of the top piece to accommodate the back piece because the back is installed with a 2" space between its top edge and the cabinet top. This space ensures ventilation for the VCR, plus easy ingress/egress for the cords.

4. Plough grooves and rabbets using a 3/4" straight bit in the router guided by a securely-clamped straightedge. If necessary, set up dado heads in the table saw to make these cuts.

   Builder's Tip: Cut edge rabbets for bottom piece in veneer side of plywood, so "good" side will face up into the cabinet. All other rabbets should be cut into the non-veneer or "lesser" side of the plywood panels.

II. Cabinet Assembly

1. Temporarily assemble cabinet by tack-nailing parts together with partially driven 1-1/4" finishing nails; if necessary, use several bar clamps as well. Note: Try to position nails where 1-5/8" drywall screws will eventually be driven, so nail holes will not be visible in veneer.

2. With piece assembled, bore screw holes using a counterbore bit, which makes the pilot, shank, countersink and counterbore holes in one step. Note: Drive home several strategically-placed screws to secure the piece until all the holes are bored.

3. With piece assembled, measure and trim back piece to size; temporarily install with veneer side out.

4. Lightly sand cabinet using 150-grit paper in the pad sander; always use with-the-grain strokes. Thoroughly dust all surfaces and disassemble.

5. Reassemble cabinet using carpenter's glue and 1-5/8" drywall screws. Immediately install back piece to ensure that cabinet remains square during glue drying period. Note: Since you may want access to cabinet from the back in the future, install back using screws only - no glue.

6. Use flexible veneer tape to cover exposed plywood edges:

    a. Cut tape slightly overlength for each edge.

    b. Work one edge at a time; apply contact cement to back of tape and mating surface, allowing adhesive to dry until it can be touched with a piece of clean brown paper without sticking.

    c. Carefully position first end of tape and guide along edge. Trim off any overlap.

    d. Allow entire assembly to rest for at least four hours.

III. TV Tray

1. Trim TV tray to size.

2. Install turntable (swivel) hardware. Note: Select and install turntable hardware that will accommodate the size and weight of the television it will support.

    a. Center "blind" side of turntable on tray's underside and mark screw holes.

    b. Remove turntable and bore holes for four No. 6 (1" long) self-tapping screws. On top side of tray, bore countersink holes (about 1/4" deep) using drill and countersink bit, so screw heads will be slightly below the wood surface when turned home.

    c. To make certain that self-tapping screws are correct length and won't interfere with turntable operation, temporarily attach the tray to the turntable by driving at least two of the screws into the turntable's small holes.

    d. Remove turntable from tray.

    e. Center turntable on top of cabinet; "blind" side up, mark and bore pilot screw holes for bottom plate.

    f. Lubricate turntable's ball bearings with a light to heavy oil, depending on the degree of rotating action wanted.

    g. Mount turntable on cabinet using four 1" No. 8 roundhead wood screws.

    h. Place the tray on the turntable using 6d finishing nails as guide pins to position the pre-drilled holes over the small turntable holes. Remove nails one at a time and drive home four self-tapping screws.

3. Cut the required number of 1/4" long dowel plugs from a length of 3/8" dowel to conceal screws holding cabinet together. To keep sanding on veneer surface to a minimum, do not cut plugs too long. Squirt glue into each hole and press plugs into place. Immediately remove excess glue from surface with clean, damp rag. Allow glue to dry overnight if possible.

4. Position plate casters on underside of bottom piece; mark for screws and bore pilot holes.

5. Fasten casters to cabinet bottom using screws that come with the hardware.

6. Inspect cabinet inside and out for smoothness. Sand lightly where necessary and wipe clean.

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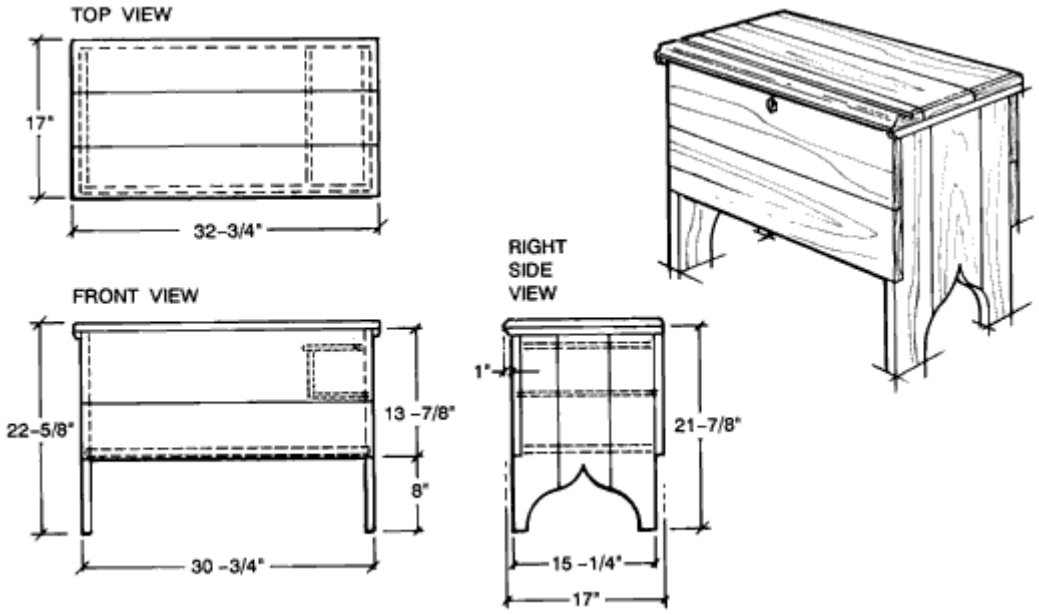
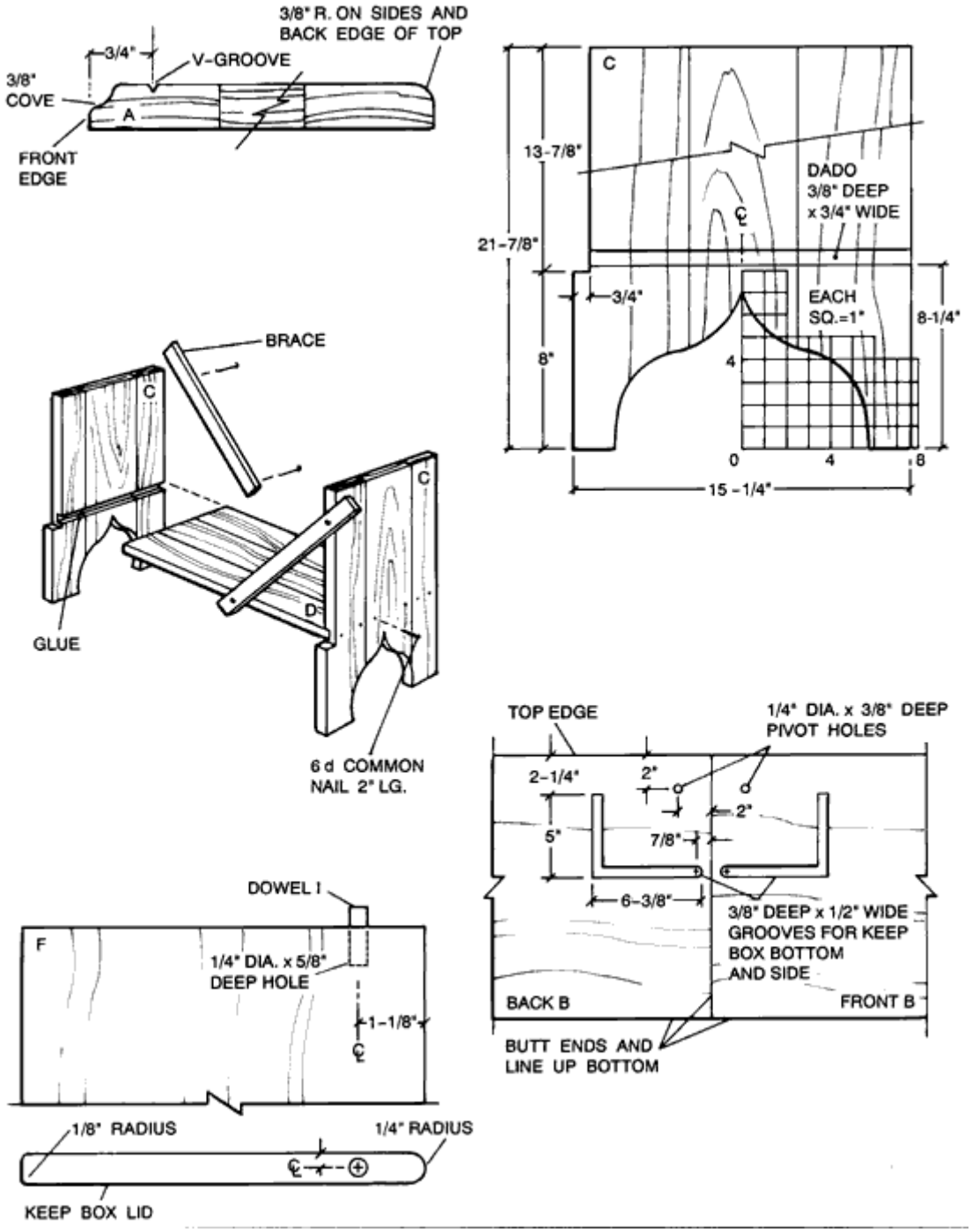
PINE BLANKET CHEST



Steps for building the Pine Blanket Chest:

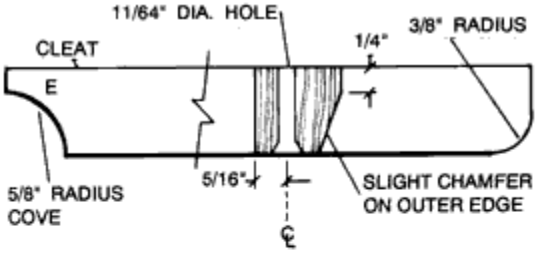
1. Cut all parts to size (see the cutting list); note that Parts A, B, C and D are initially cut slightly over-length to make edge-joining easier. Using glue and no. 20 biscuits, join the boards to make up six members (front, back, ends, bottom and top): use bar clamps to keep all sections tightly joined while the glue dries. The next day, these parts can be cut to their actual sizes, as shown in the drawing.
2. Shape the front edge of top A with a cove cutter chucked in the router. Then, replace the cove cutter with a V-groove cutter to rout the shallow V-cut along the front edge as shown. Finally, switch to a 3/8-in. rounding-over bit to shape the ends and back edges of top, A.
3. Lay out the leg shape on 1/4-in. plywood or hardboard and cut it out. Sand the cut edges smooth to remove any irregularities left by the saw blade. Set the pattern aside for use in Step 5.
4. Position the end panels back-edge to back-edge with inside surfaces up. With a framing square, check across leg bottoms to make certain they are perfectly aligned. When they are, apply light pressure with a bar clamp to hold them in place. Then, lay out the location of the dado, which will receive the bottom member, on the interior surfaces. After determining the router shoe offset (i.e.; the distance from cutter edge to shoe edge) with the 3/4-in. straight cutter in its chuck, clamp or tack a straightedge to serve as a guide for ploughing the dado across both boards at one time.
5. Next, tack the two end pieces together, with inside surfaces (the planes with dadoes) abutting. Trace the leg pattern onto the top member. Cut out the notch at front using a band saw or handsaws (rip and crosscut). Then, cut out the leg shape using either a saber or scroll saw.
6. After all chest parts have been cut to shape and size, plane the surfaces to remove any squeezeout where boards are joined. Smooth all boards beginning with 100-grit sandpaper and finish with 120-grit.
7. Cut the parts for the Keep Box to size.
8. Then, position the chest front and back members edge-to-edge (i.e.; the front's right edge should abut the back member's left edge, with their top edges aligned) so the grooves to receive the Keep Box front and bottom panels can be laid out. Rout grooves 3/8-in. deep using a 1/2-in. straight cutter; make certain you also use tacked-on guides to prevent the router from "walking off" the cutting line when you rout. At this time, also lay out and bore the blind holes, which will receive the lid's dowel hinges.
9. Round over the front edge of the Keep Box lid and bore the dowel holes. Glue-in the dowel "hinges."
10. Final pre-assembly step; shape the cleats as shown, bore the screw pilot and countersink holes and attach cleats to the underside of the top using glue and wood screws, as shown.

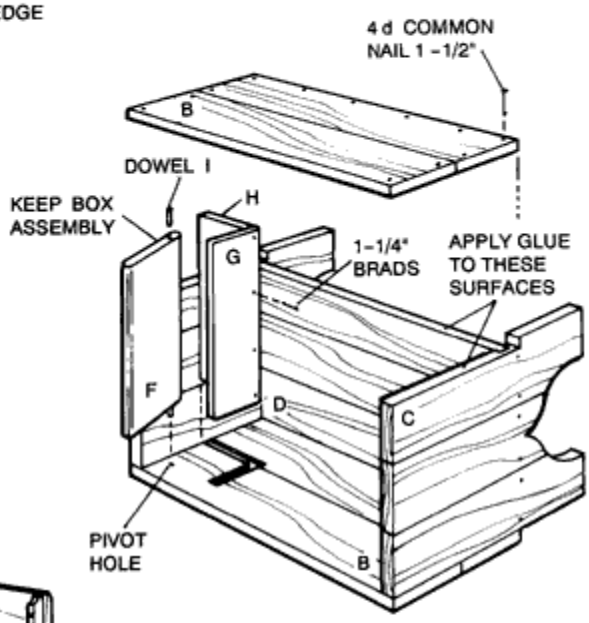
Cabinetmaker's Tip: Notice the shape (cross-section view) of these cleats. You will find it easier to obtain this shape if you chamfer cleats before installing them on the top.

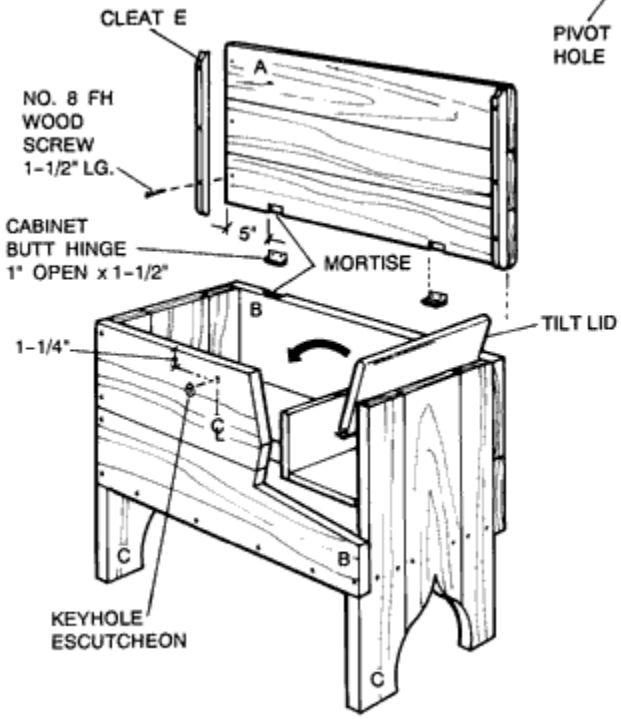


Assembling the Pine Chest

11. Fasten the back to the chest bottom and legs using glue and 1-1/2 in. common nails. (Nail heads should be set slightly below the surface after the cabinet is fully assembled.)
12. Lay the carcass on its back and install the Keep Box bottom and front into the slots in the carcass back, without glue. If necessary, apply clamp pressure to ensure that these parts are fully seated in their slots. Nail Keep Box front to bottom front using 1-1/4 in. brads.
13. Apply glue to front edges of chest legs and bottom and install front with Keep Box parts positioned in the slots in front member and the lid dowel hinge placed in its respective hole. When all is in place, fasten front to carcass with glue and nails.
14. Stand the chest upright and put the top in place. Then, mark and cut the hinge mortises in both top and back members.
15. Locate the position for the false keyhole at front; bore a small hole, about 1/4-in. deep. Paint the hole interior black or, use a permanent black ink marker.
16. Install hinges and the keyhole escutcheon plate so you can make certain that carcass and top align. Make any necessary adjustments if they do not. When satisfied with the fit, remove the hardware so you can move on to the next step--finishing.


11/64" DIA. HOLE
3/8" RADIUS
CLEAT
1/4"
E
5/8" RADIUS
COVE
5/16"
SLIGHT CHAMFER
ON OUTER EDGE


4 d COMMON
NAIL 1 - 1/2"
B
DOWEL I
H
KEEP BOX
ASSEMBLY
G
1-1/4"
BRADS
APPLY GLUE
TO THESE
SURFACES
F
D
C
PIVOT
HOLE
B


CLEAT E
A
NO. 8 FH
WOOD
SCREW
1-1/2" LG.
5"
CABINET
BUTT HINGE
1" OPEN x 1-1/2"
MORTISE
TILT LID
B
1-1/4"
C
B
C
KEYHOLE
ESCUTCHEON
C

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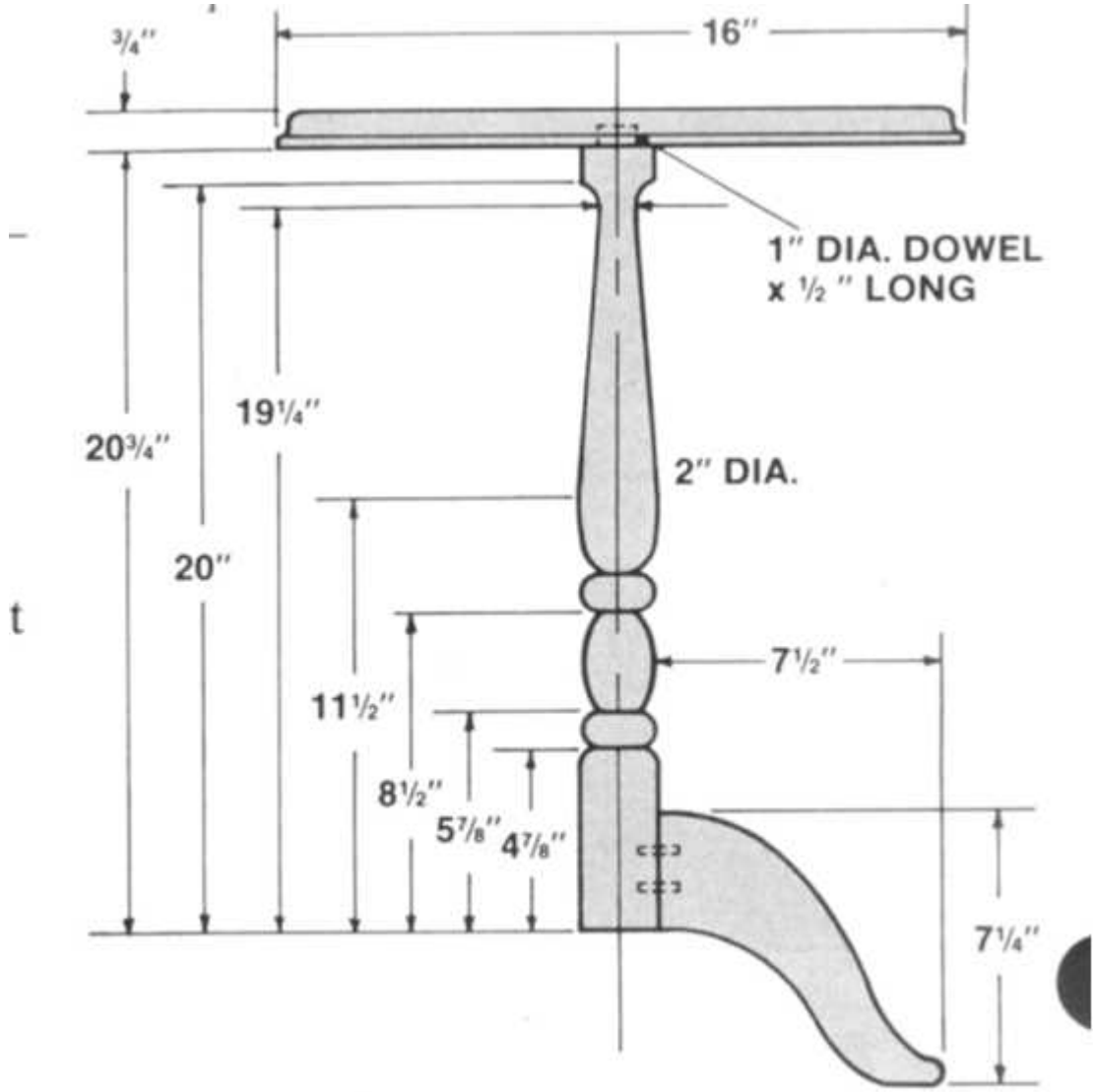
CONCORD TABLE



LIST OF MATERIALS

Finished dimensions in inches

A. Spindle 2 dia. x 21 1/4 stock

B. Top 3/4 x 16 dia. Stock

C. Leg (3) 3/4 x 7 1/4 x 7 1/2

D. Dowels (10) 3/8 dia. X 1 1/2 (hardwood)

E. Top Brace 3/4 x 3 x 12

1. Cut stock to size according to List of Materials. Layout the spindle pattern (A) on a piece of 1/4" thick stock.
2. Use a scroll saw, Bandsaw or jigsaw to cut out the pattern and sand all sawn edges smooth. You now have the template for the lathe duplicator.
3. Mount the template on the lathe duplicator per your Owner's Manual.
4. Turn part A from a piece of 2" diameter x 21 1/4" stock.

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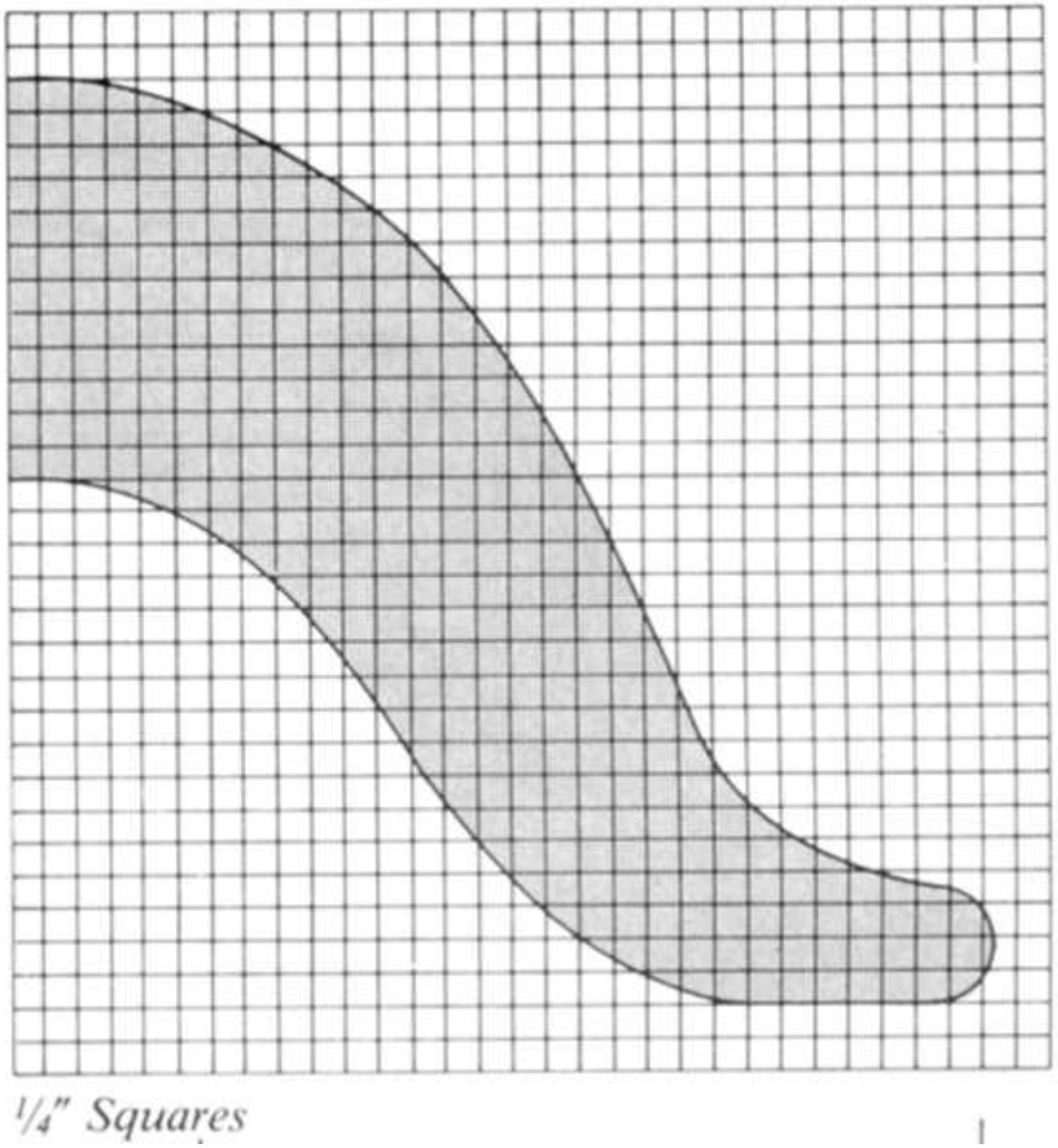
5. Sand the spindle.
6. With the Mark V in the horizontal boring mode, drill the 3/8" diameter holes for the dowels "D" in the legs "C."
7. Use the grid pattern to layout the pattern for the legs "C."
8. Transfer the pattern to three pieces of stock 3/4" x 7 1/4" x 7 1/2".
9. Use a scroll saw, Bandsaw or jigsaw to cut out the legs. Save one piece of scrap from the outside curve for future use.
10. Use a drum sander to and the curves of the legs.
11. Use a router with a piloted 1/4" rounding over bit to shape the curved edges of the legs. Do not shape the straight section.
12. Use a drum sander to sand a concave curve in the straight portion of the leg. This makes for a better fit when attaching the legs to the spindle.
13. Sand the legs and set aside.
14. Divide the base diameter of the spindle into three equal parts 120 degrees apart. Draw vertical lines on the base of the spindle to form the centerlines for the leg dowel holes.
15. Use dowel centers to mark the holes to be drilled in the spindle. In the vertical drill press mode, drill the 3/8" diameter holes in the spindle. Set up the table and rip fence to form a V-block to cradle the turning.
16. Glue and clamp the legs to the spindle, one at a time, to allow each leg time to set up. The scrap cutting from Step 9 will aid in clamping. With a square, check the bottom of the leg to assure it's square to the outside of the spindle.
17. Glue and clamp the stock to form the 16" x 16" piece for the top (B). Let glue dry for at least 24 hours.



1. Layout the 16" diameter circle for the top. Belt and surface of top blank smooth.
   NOTE: Mark the center for future use.

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2. With a scroll saw, Bandsaw or jigsaw cut out the top (B).
3. Disc sand the edges of the top.
4. Use a router with a 1/4" Roman ogee bit to shape the top edge of B. **NOTE:** The surface with the marked center should be on the bottom.
5. On the bottom of the table top, use a 1" Forstner or Brad-point bit to drill a 1" diameter hold through to brace (E).
6. Sand the table top.
7. Cut angled ends on brace with Bandsaw. Sand with disc sander or belt sander. Drill for screw holes.
8. Screw the top brace to the spindle.
9. Screw the brace to top.
10. Apply the finish of your choice.

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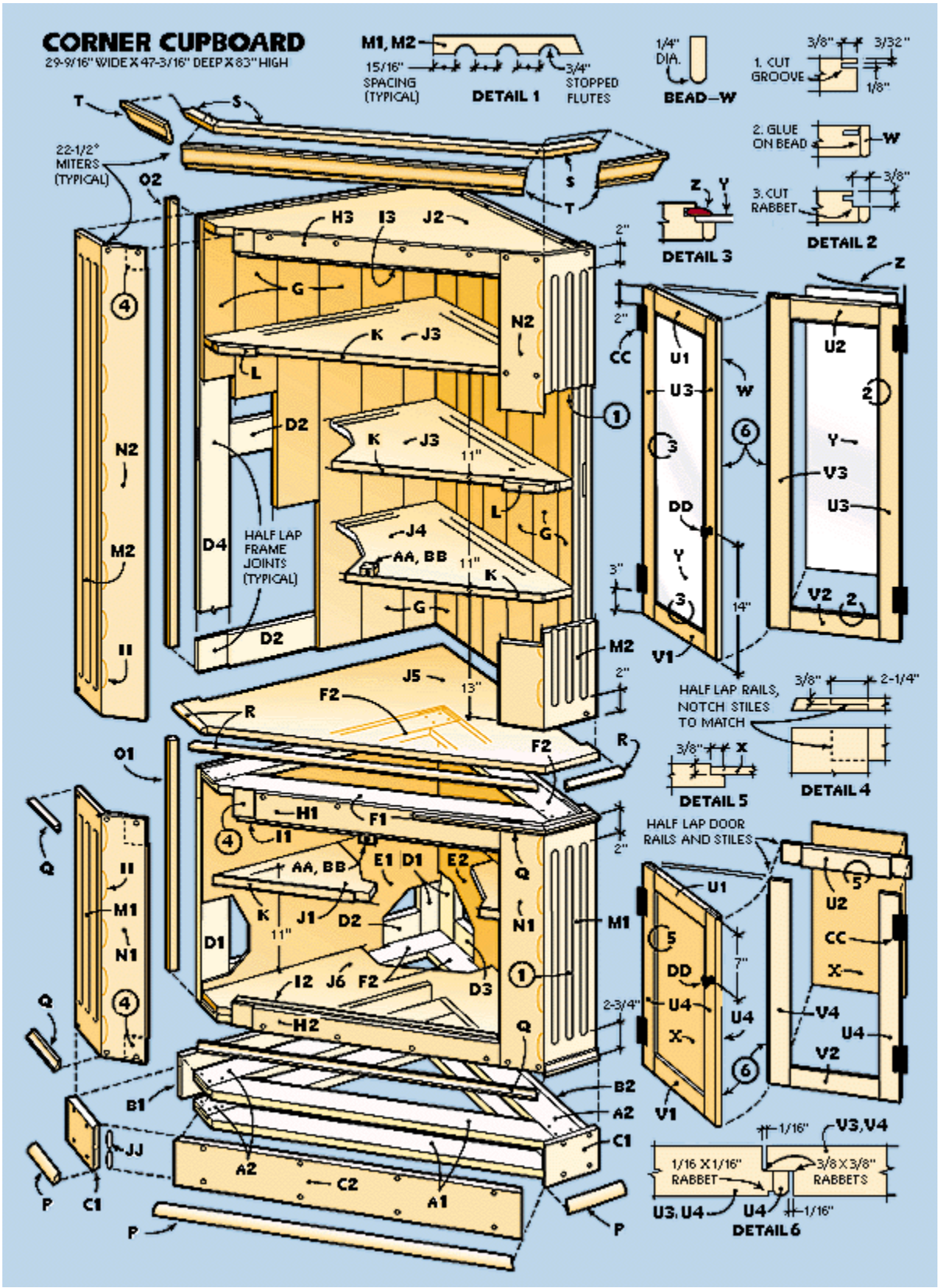
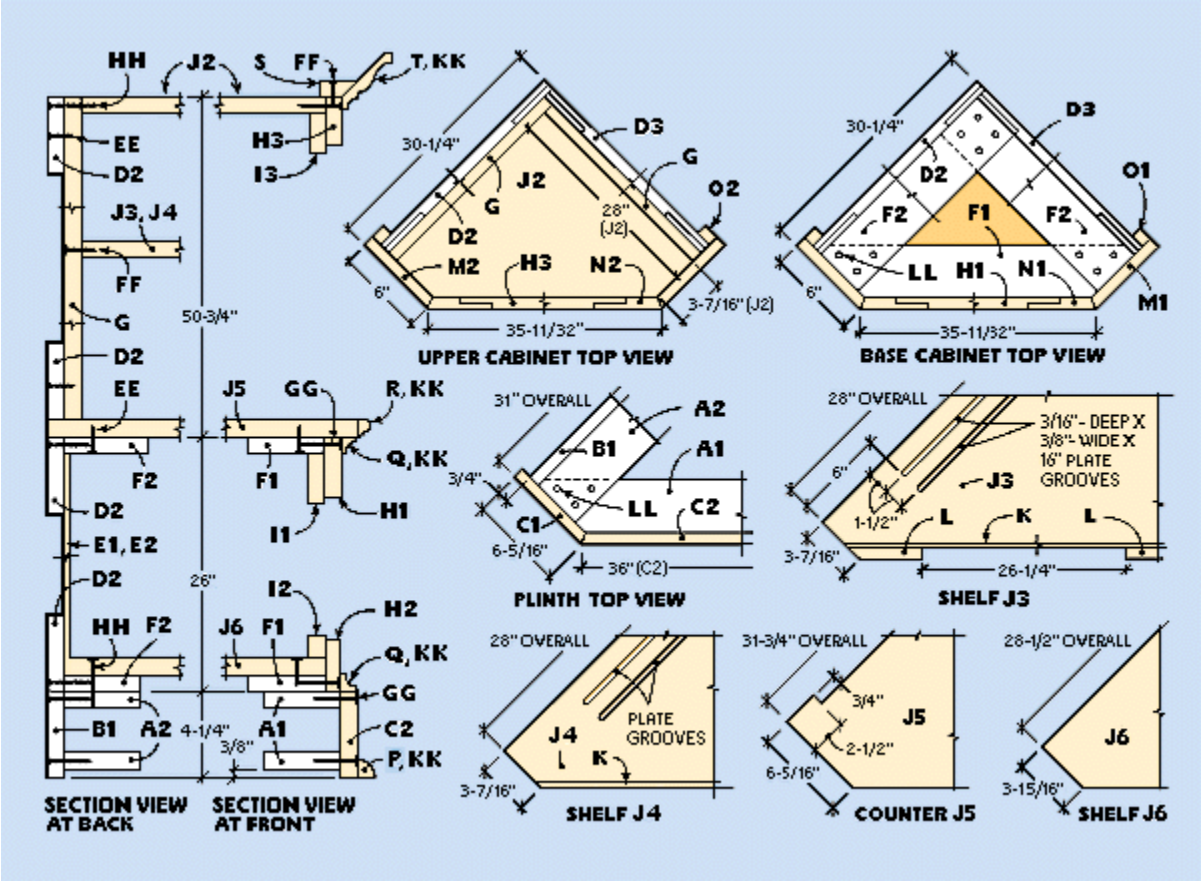
CORNER CUPBOARD


CORNER CUPBOARD
29-9/16" WIDE X 47-3/16" DEEP X 83" HIGH
M1, M2
15/16" SPACING (TYPICAL)
DETAIL 1
3/4" STOPPED FLUTES
1/4" DIA.
BEAD–W
1. CUT GROOVE
3/8"
3/32"
1/8"
2. GLUE ON BEAD
W
3. CUT RABBET
3/8"
DETAIL 2
Z
Y
DETAIL 3
22-1/2° MITERS (TYPICAL)
O2
O1
T
S
H3
I3
J2
G
K
J3
L
N2
D2
D4
HALF LAP FRAME JOINTS (TYPICAL)
M2
I1
J4
AA, BB
11"
J5
13"
F2
R
H1
F1
E1
D1
E2
Q
N1
M1
J1
I2
J6
D3
H2
B1
B2
A2
C1
JJ
C2
A1
P
2"
3"
14"
CC
U1
U3
U2
V3
Y
DD
V2
V1
HALF LAP RAILS, NOTCH STILES TO MATCH
2-1/4"
X
DETAIL 5
DETAIL 4
HALF LAP DOOR RAILS AND STILES
7"
2-3/4"
U4
V4
1/16
V3, V4
1/16 X 1/16" RABBET
3/8 X 3/8" RABBETS
DETAIL 6



Materials List

Key	No.	Size and description (use)
A1	2	3/4 x 3 1/2 x 41 3/4" pine (plinth frame)
A2	4	3/4 X 3 1/2 X 29 1/2" pine (plinth frame)
B1	1	3/4 X 4 1/4 X 30 1/4" pine (plinth back)
B2	1	3/4 X 4 1/4 X 29 1/2" pine (plinth back)
C1	2	3/4 X 4 1/4 X 6 5/16" pine (plinth front)
C2	1	3/4 X 4 1/4 X 36" pine (plinth front)
D1	4	3/4 X 3 1/2 X 26" pine (back frame)
D2	5	3/4 X 3 1/2 X 29 1/2" pine (back frame)
D3	5	3/4 X 3 1/2 X 28 3/4" pine (back frame)
D4	4	3/4 X 3 1/2 X 50" pine (back frame)
E1	1	1/4 X 24 1/2 X 28 3/4" plywood (back panel)
E2	1	1/4 X 24 1/2 X 28 1/2" plywood (back panel)
F1	2	3/4 X 3 1/2 X 40 5/8" pine (frame)
F2	4	3/4 X 3 1/2 X 28 3/4" pine (frame)
G	12	3/4 X 5 1/2 X 50" pine (back panel)*
H1	1	3/4 X 2 3/4 X 30 9/16" pine (rail)

H2	1	3/4 X 2 3/8 X 30 9/16" pine (rail)
H3	1	3/4 X 2 1/4 X 30 9/16" pine (rail)
I1	1	3/4 X 2 1/4 X 30" pine (doorstop)
I2	1	3/4 X 1 X 30" pine (doorstop)
I3	1	3/4 X 13/4 X 30" pine (doorstop)
J1	1	3/4 X 26 5/8 X 26 5/8" plywood (shelf)
J2	1	3/4 X 28 X 28" plywood (top)
J3	1	3/4 X 28 X 28" plywood (shelf)
J4	1	3/4 X 28 X 28" plywood (shelf)
J5	1	3/4 X 313/4 X 313/4" plywood (counter)
J6	1	3/4 X 28 1/2 X 28 1/2" plywood (bottom)
K	1	1/4 X 3/4" X 12' pine (edge band)**
L	4	3/4 X 3/4 X 5" pine (spacer)***
M1	2	3/4 X 6 X 26" pine (side)
M2	2	3/4 X 6 X 50" pine (side)
N1	2	3/4 X 4 5/8 X 26" pine (stile)
N2	2	3/4 X 4 5/8 X 50" pine (stile)
O1	2	3/4 X 1 X 26" pine (cleat)
O2	2	3/4 X 1 X 50" pine (cleat)
P	1	3/4" X 5' pine quarter round (trim)**
Q	1	5/8 X 3/4" X 10' pine cove (trim)**
R	1	5/8 X 3/4" X 5' pine cove & nose(trim)**
S	1	3/4 X 1 3/4" X 5' pine (cleat)**
T	1	31/2" X 5' pine crown (trim)
U1	2	3/4 X 1 7/8 X 12 7/8" pine (top door rail)
U2	2	3/4 X 1 7/8 X 13 1/8" pine (top door rail)
U3	3	3/4 X 1 7/8 X 35" pine (top door stile)
U4	3	3/4 X 1 7/8 X 20 3/4" pine (lower door stile)
V1	2	3/4 X 2 1/4 X 12 7/8" pine (lower door rail)
V2	2	3/4 X 2 1/4 X 13 1/8" pine (lower door rail)
V3	1	3/4 X 2 1/8 X 35" pine (top door stile)
V4	1	3/4 X 2 1/8 X 20 3/4" pine (lower door stile)
W	1	1/4 X 3/4" X 22' pine lattice (beading)**
X	2	1/4 X 9 1/4 X 17" plywood (door panel)
Y	2	1/10 X 9 5/8 X 31 3/4" glass (door glass)
Z	1	15' glass retainer, No. 27078**†
AA	2	3/4 X 1 X 1 3/8" pine (latch block)
BB	2	magnetic latch
CC	2	pair H hinges, No. 76067

DD	4	knob, No. 76117
EE	As reqd.	1 1/4" drywall screw
FF	As reqd.	1 1/2" drywall screw
GG	As reqd.	2" drywall screw
HH	As reqd.	2 1/2" drywall screw
II	As reqd.	No. 20 joining plate
JJ	As reqd.	No. 0 joining plate
KK	As reqd.	1 1/4" finishing nail
LL	As reqd.	3/4" finishing nail
Misc: Glue, paint, and 1/8"-radius half-round router bit (part #TF82102) available at *Trendlines*, 135 American Legion Highway, Revere, MA 02151; call 800/767-9999 to order).		
* 1x6" beaded tongue-and-groove ** Overall quantity indicated, cut to length as required. *** Cut to fit †(available at *The Woodworkers' Store*, 4365 Willow Drive, Medina MN 55340; call 800/610-0883 to order)		

Case Construction

Begin by cutting 1 x 4 stock to length for all of the 31/2-in. frame members. Rip 1 x 6 stock to 41/4 in. for the wider plinth frame pieces. Mark all of the square half lap joints for the vertical and horizontal frames, and code the pieces with letters so you won't get them mixed up.

Build a router lapping jig by securing two 16-in.-long 1 x 6 boards to a worksurface so they're 31/2 in. apart. At one end of the space between the 1 x 6s, secure a 6-in.-long 1 x 4 stopblock between the boards. Then place the first workpiece between the 1 x 6s and against the stopblock. Measure the distance from the edge of your router's baseplate to the cutting edge of a 3/4-in. straight bit, and use this dimension to locate the four guide strips that will limit the router's path to the size of the half lap joint.

With the bit set for a 3/8-in.-deep cut and the workpiece butted against the stopblock, shape the half lap while moving the router within the four guide strips **(Photo 1)**. To cut the angled half lap joints in the horizontal frames, first lay the parts together and mark the 45 degree joints. Then, build similar jigs for these pieces and rout the half lap joints.

1 --Rout the half lap joints with a straight bit. Hold workpiece in a jig that has guide strips to confine the cut to the lap area.

Apply glue to the mating surfaces of all the joints, assemble and then drive four 3/4-in. nails from each side of each joint. Double-check that the frames are square and set them aside until the glue dries.

Crosscut boards for the upper and lower case sides and stiles to finished length. Then, plane one edge of each board straight and smooth. Adjust your circular saw for a 22 1/2 degree bevel and tack a straight-edge guide strip to each piece to cut the beveled edges **(Photo 2)** and plane smooth. Mark the joining plate locations and cut the slots with a plate joiner. If your plate joiner fence can't be set for the angled edge of the work, construct a 22 1/2 degree platform jig to hold the joiner square to the edge **(Photo 3)**.

2 --After planing one edge of the case sides and stiles, use a circular saw to cut 221/2 degree bevel. Use a straight strip to guide saw.

Before joining the case sides to the stiles, install a 3/4-in. corebox bit in your router and cut the stopped flutes in the sides. Use a router fence to make the cuts, as shown. If you don't have a router fence, mount your router to a shop-built sliding carriage **(Photo 4)**. Set the fence to make the two outer flutes first, then reset it for the middle flute. Rout the blind half laps at the top of the upper case stiles and at the top and bottom of the lower case stiles.

3 --Cut the plate joint slots in the beveled edges of the case sides and stiles. Build a jig to hold the joiner at 221/2 degrees if required.

To join the sides to the stiles, first make a set of L-shaped clamping brackets **(Photo 5)**. Cut the upper edge of the short leg of each bracket at 45 degree. Apply glue to the plate joints and along the beveled edges. Clamp the brackets to the case sides, and draw the sides to the stiles with bar or pipe clamps.

Next, glue and screw together the two rear

frame subassemblies to create the back corner frame for the upper and lower cases. Cut to length 12 50-in. pieces of 1 x 6 beaded tongue-and-groove pine. Then, starting at the corner of the upper case frame, attach the boards with glue and screws driven from the back of the frame **(Photo 6)**. Rip the last board on each side to exact width before installing. Follow this step by adding the 3/4 x 1-in. cleats, as shown. Cut to size the plywood shelves, the upper case top, lower case bottom and counter with a circular saw and plywood blade. Use a sabre saw to finish the long notch on each back edge of the counter. Use a 3/8-in.-dia. corebox bit to rout the 3/16-in.-deep plate grooves in the three upper shelves.

Temporarily clamp the top and the three shelves to the upper case back assembly. Tack triangular blocks to the panels to provide clamping surfaces **(Photo 7)**. Then, bore screw pilot holes for attaching the panels to the back assembly. Remove the shelves, add the edge banding and attach the spacer blocks, as shown. Reassemble the shelves and back with screws and glue. Mark the exact position of the upper face rail and install. Finally, bore countersunk pilot holes for installing the side/stile subassemblies and install with glue and screws **(Photo 8)**. Join the triangular lower case frames to the rear frames with screws and glue **(Photo 9)**.

4 --Use a corebox bit and router to make the stopped flutes. A shopmade carriage supports router in correct position.

5 --Attach L-shaped pieces to side to facilitate clamping side to stile. When the glue has cured, scrape away excess.

6 --After back frames have been assembled, secure the beaded paneling

with glue and screws driven from the back of frame.

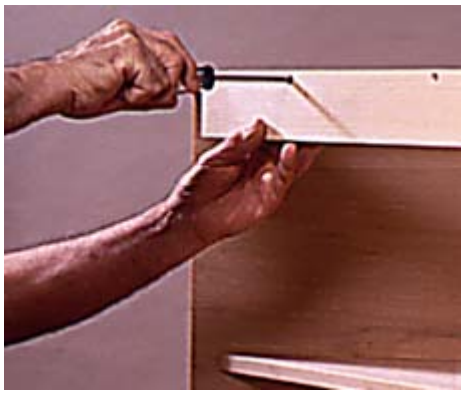
7 --After cutting shelf panels, tack triangular blocks to corners and clamp panels to back assembly. Bore screw pilot holes.

8 --Join shelves to back with screws and glue. Then, apply glue and install side and stile assemblies with countersunk screws.

Attach the 1/4-in. plywood panels with glue and nails. Screw and glue the case bottom and shelf to the assembly, and add the face rails **(Photo 10)**. Finally, secure the side/stile subassemblies.

9 --Use screws and glue to join the triangular lower frames to the back frames. Bore pilot holes to avoid splitting the wood.

Miter the ends of the plinth face pieces and slot for plate joints. Then, screw and glue the plinth backs to the triangular frames. Add the long front face piece, and finish the assembly by attaching the ends **(Photo 11)**.



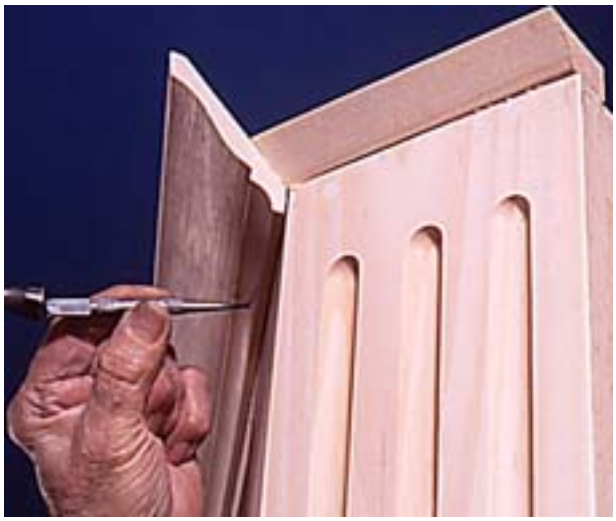
10 --After the lower case frame and back panels have been assembled, add the rails that go across the top and bottom.

Doors And Trim

Rip the beveled cornice support cleat to size with a 45 degree bevel on one edge. Then, use a simple wood miterbox to cut the 22 1/2 degree miters at the exact length. Next, glue and nail the cleats to the case top.

To cut the compound cornice miters, place the stock in the miterbox and tilt it at a 45 degree angle so its top edge is on the base of the miterbox and the back edge rests against the back of the miterbox. Cut the long section first. Then, cut the miters for the case sides to exact length. Attach the crown molding with glue and finishing nails **(Photo 12)**. Miter the remaining trimpieces to exact length, and install with glue and finishing nails **(Photo 13)**. Set all nails below the surface, fill and sand smooth.

11 --Use plates to join the plinth face pieces. Join the long piece to the plinth frame first, then add the short endpieces.



12 --Attach the long crown section first. Miter the endpieces to exact length, and then glue and nail to cleat. Set nails and fill.

13 --Miter remaining molding to length, and install each profile, long piece first. Use glue and finishing nails.

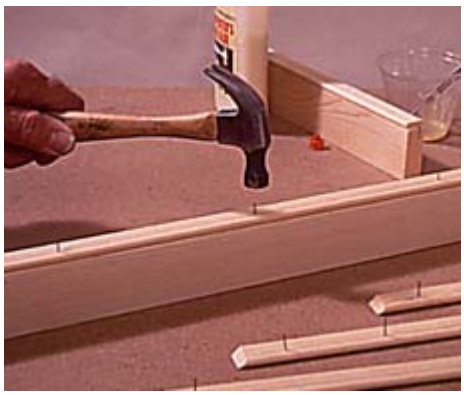
After the molding has been installed, secure the plinth to the lower cabinet section with 2 1/2-in. screws. Use 2-in. screws to attach the counter to the upper case, and then attach the upper case to the lower case with 1 1/2-in. screws driven up into the bottom of the counter. Cut the door rails and stiles from 1 x 3 stock. Use a router to shape the half lap joints. Then, use a 1/8-in. slotting cutter to rout the stopped grooves in the upper doors for the glass-retaining strips **(Photo 14)**. Set up your router table with a 1/8-in.-rad. half-round bit, and round one edge of the 1/4-in.-thick pine lattice for the door beading **(Photo 15)**. Use the miterbox to cut the lattice to length. Then, attach the beading to the inside perimeter of the upper door frames -- and along the opening edge of the upper and lower left doors-with glue and 3/4-in. brads placed near the outer face of the door **(Photo 16)**. Rout the rabbet for the glass, and square the corners with a sharp chisel. Then, rout the overlapping rabbets along the door-opening edges, as shown.

Install the glass, cutting the plastic retaining strips to exact length with a knife, and glue the 1/4-in. plywood panels in the lower doors. Finally, shim the doors, mark the hinge and knob screwhole locations and install the hardware **(Photo 17)**.

To finish the cabinet, remove the glass and disassemble the sections. Apply one coat of latex primer, tinted to the final color, followed by one finish coat of paint. We used Sherwin-Williams Birdseye Maple Latex Satin House and Trim Paint. After it's dry, reassemble the cabinet.

14 --Use a router with a piloted slotting bit to cut the slots in the upper door frames for the plastic glass-retaining strips.

15 --Make the beading from 1/4-in. lattice. Cut the round edge with a 1/8-in.-rad. half-round bit mounted in a router table.



16 --Nail and glue the beading to the door-frame pieces. Then, cut glass and door overlap rabbets with a router and straight bit.

17 --Clamp upper doors in place and shim to achieve equal clearance all around the frame. Then, install the H hinges.

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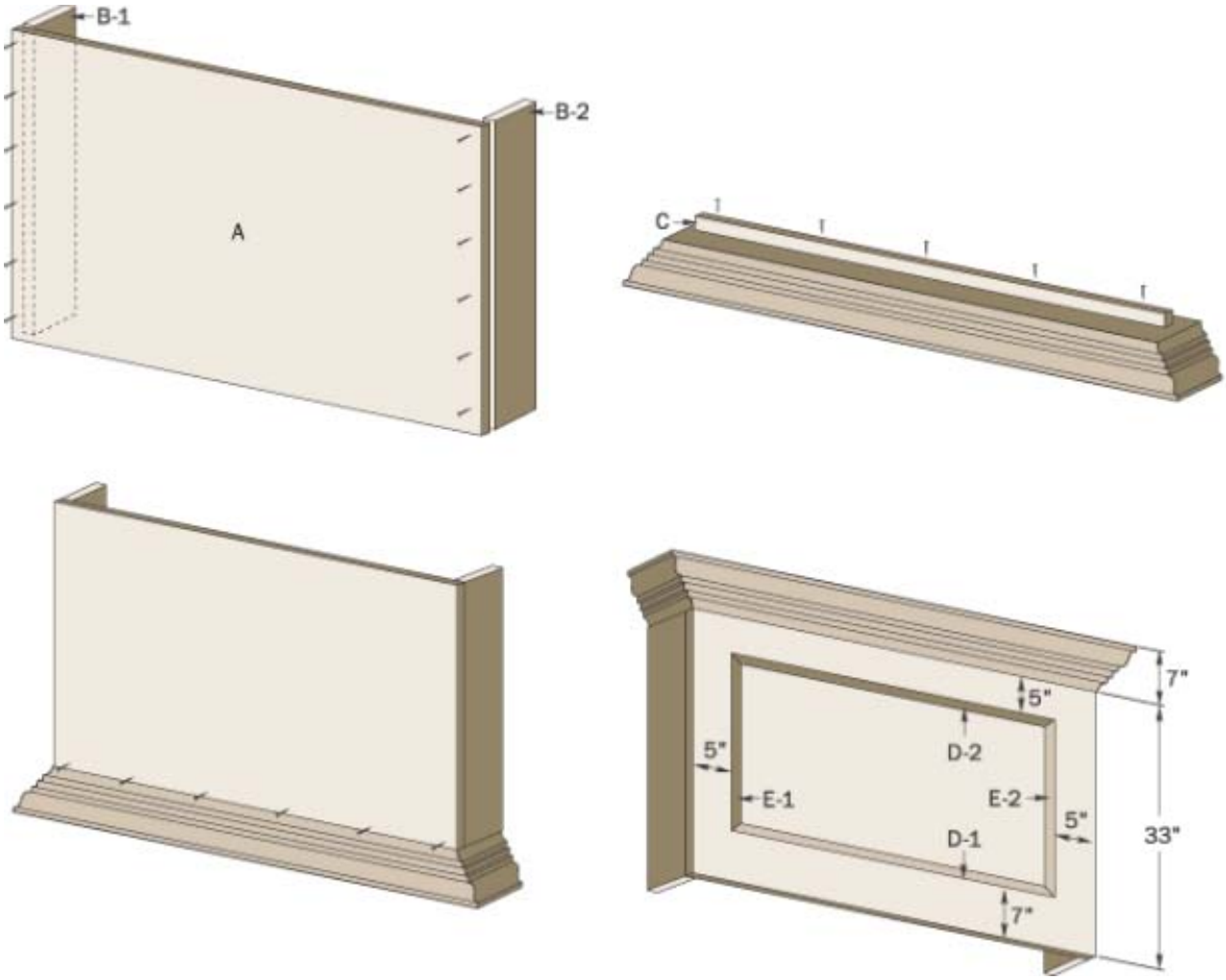
HEADBOARD



Construction Materials

- 1 (76") mantel shelf (special order in millwork department)
- 1 sheet (3/4") birch plywood
- 1 (6') 1 x 3 poplar board
- 1 (8') 2 x 2 furring strip
- 2 (8') lengths of picture molding
- 12 8d sinker nails
- 36 8d finishing nails
- 20 4d finishing nails

Cut List

Part	Material	Cut Size	Qty
(A) Front panel	3/4" plywood	33 x 74-1/2"	1
(B) Side panels	1 x 3 board	33"	2
(C) Nailing cleat	2 x 2 board	73-1/2"	1
(D) Molding strips	picture molding	miter to 66"	2
(E) Molding strips	picture molding	miter to 21"	2

Step 1: Before cutting materials, measure the exact width of the underside of the mantel from inside edge to inside edge. Each mantel is custom made, and you will want your base to fit snugly against it. This will determine the width of the front panel. The mantel pictured here begins with a 74 1/2 x 33" front panel.

Step 2: Cut all other materials per list.

Step 3: Attach side panels to front panel using wood glue and 2 1/2", 8d finishing nails. Set aside for glue to dry. This will be the base of the headboard.

Step 4: (Note: Steps 4 and 6 require at least two people.) Place the mantel upside down on a flat work surface, and position the base on the underside flush with the front inside edges, or lip, of the mantel. Trace with a pencil along the base to indicate where the cleat needs to be attached. This should be approximately 3/4" from the front and two sides of the mantel lip.

Step 5: Attach a 2 x 2 cleat along the guideline with wood glue and 8d sinker nails placed 6 inches apart. Allow to dry.

Step 6: Reposition base on the underside of mantel, and attach to the cleat, nailing from the front of the base into the cleat with 8d finishing nails every 6".

Step 7: Miter and attach picture molding on the front using 4d finishing nails.

Step 8: Countersink nails, fill holes with wood putty, and then sand.

Step 9: Prime and paint headboard to match the room's decor. For the look of the one pictured, begin with a coat of American Tradition, Belle Grove Light Amber #94-1B, satin. Next, dilute some mocha glaze with water, and brush it on generously. Wipe away some of the glaze with smooth clean cotton rags. Apply a second layer to darken the glaze. The more layers applied, the more aged the headboard will appear.

Step 10: Allow to dry for 24 hours. Apply a coat of polyurethane to protect the finish.

Step 11: Hang the headboard per manufacturer's instructions for mounting mantel.

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JEWELRY BOX

Bill of Material

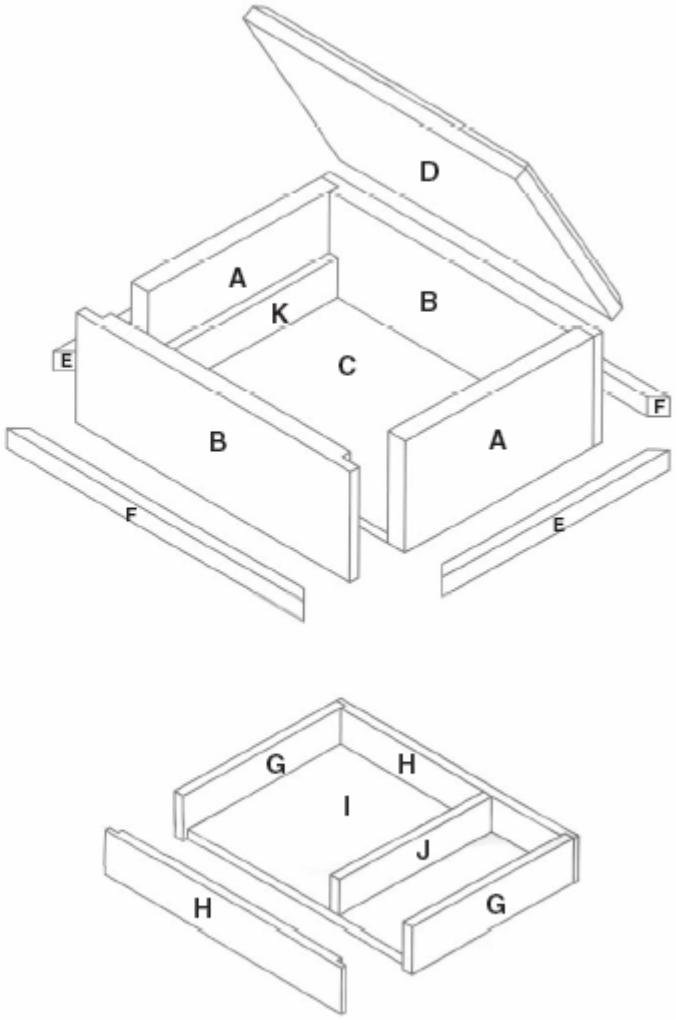
Quantity	Size	Material	Item
1	3/4" x 6" x 6'	Maple	A, B, D
1	3/8" x 6" x 6'	Maple	C, G, H, I, J, K
1	1/2" x 3/4" x 5'	Maple Molding	E, F
1 Pair	1 1/2"	Butt Hinges	
1		Small Box Lock	
1	Small Bottle	Wood Glue	
1	Pint	Finish	

Cutting Schedule

Part	Qty	T	W	L	Material
A	2	3/4"	4 1/4"	8 1/4"	Maple
B	2	3/4"	4 1/4"	12"	Maple
C	1	3/8"	7 1/2"	10 1/2"	Maple
D	1	3/4"	9"	12"	Maple
E	2	1/2"	3/4"	10"	Maple
F	2	1/2"	3/4"	13"	Maple
G	2	3/8"	1 3/4"	7"	Maple
H	2	3/8"	1 3/4"	10 3/8"	Maple
I	1	3/8"	6 5/8"	9 5/8"	Maple
J	1	3/8"	1 3/8"	6 5/8"	Maple
K	2	3/8"	1 1/2"	7 1/2"	Maple

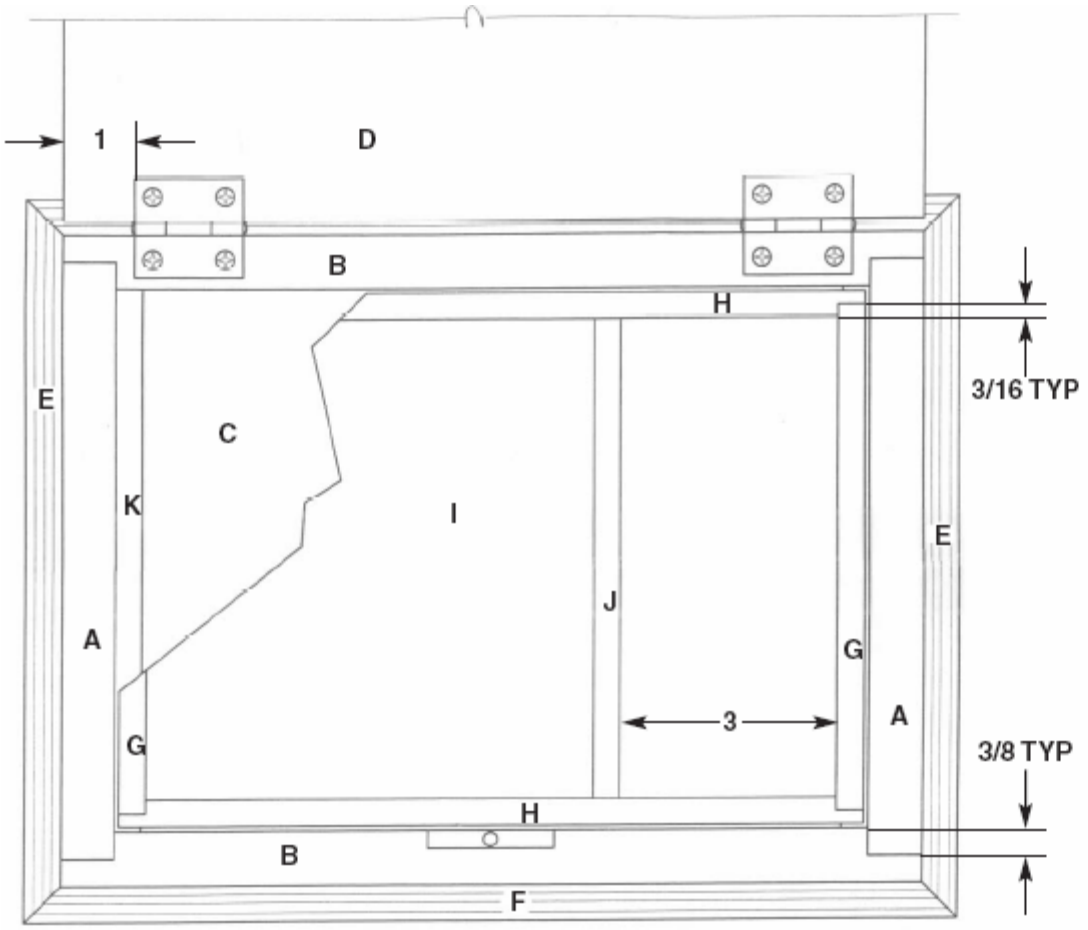
NOTES

1. Although maple is preferred for this project, other wood may be substituted.
2. You may add more partitions to or relocate board (J) in the removable tray.
4. Read manufacturer's instructions before operating equipment.
3. Always wear safety glasses.



Assembly Instructions

1. Read all instructions before beginning any work.
2. Cut all material to sizes shown in cutting schedule. (This is a good time to cut out the area for installing a lock.)
3. Glue and clamp boards (B) to boards (A). Check assembly for squareness.
4. Glue the bottom of the box (C) to assembly (A, B).
5. Glue and clamp boards (G) to boards (H). Check assembly for squareness. Glue the bottom of the box (I) to assembly (G, H).
6. Install board (J) with glue to tray assembly. Cut tray supports (K) to fit box assembly.
7. Cut 45 degree miter on molding pieces (E) and (F) and glue to box.
8. Sand, apply finish and install hardware.


1
D
B
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E
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A
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3/8 TYP
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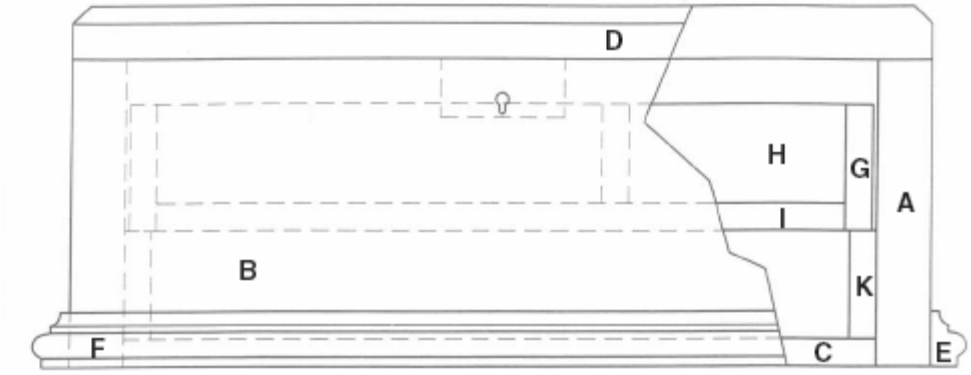
F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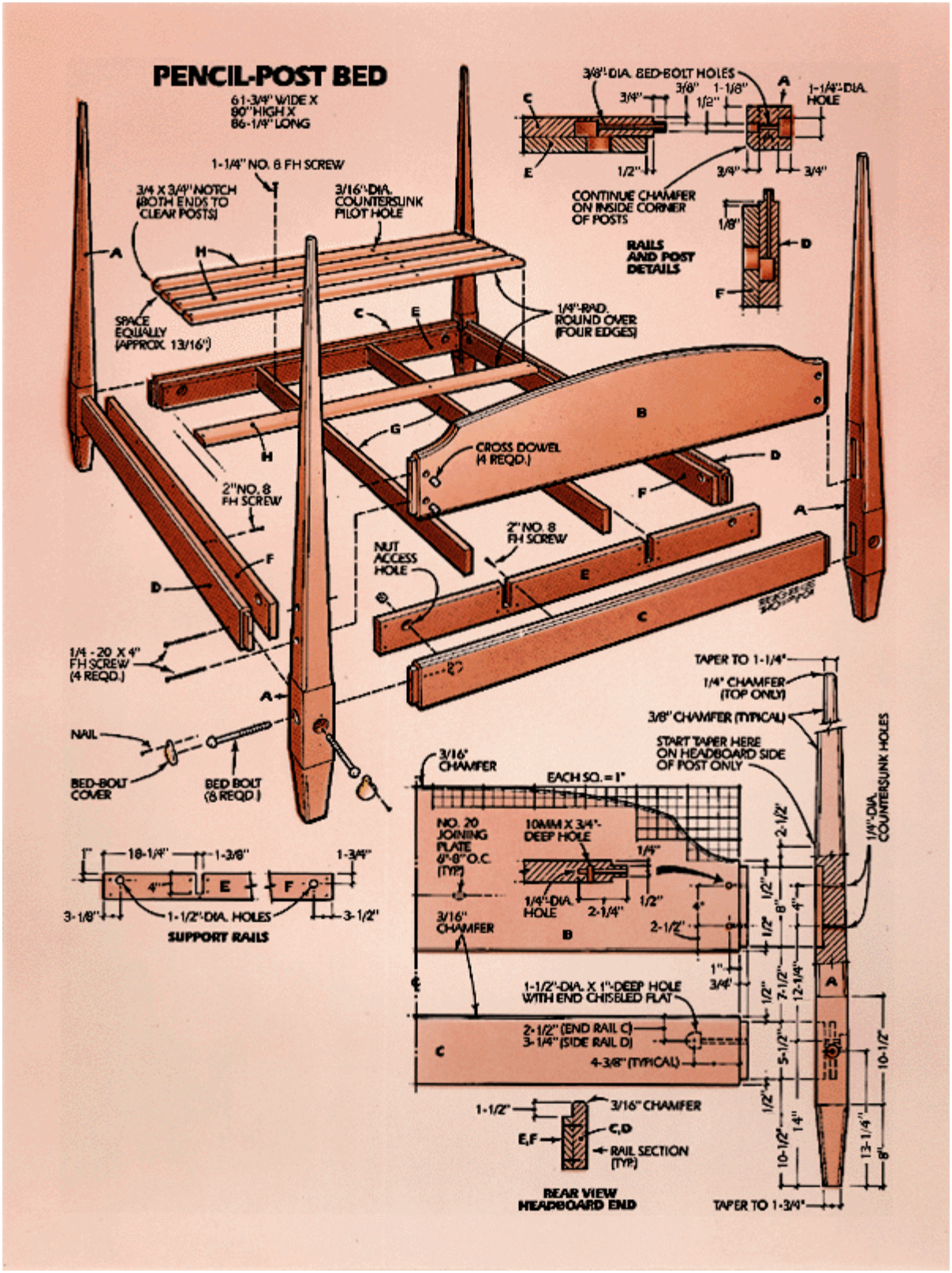
PENCIL BED


PENCIL-POST BED
61-3/4" WIDE X
80" HIGH X
86-1/4" LONG
1-1/4" NO. 8 FH SCREW
3/4 X 3/4" NOTCH (BOTH ENDS TO CLEAR POSTS)
3/16"-DIA. COUNTERSUNK PILOT HOLE
SPACE EQUALLY (APPROX. 13/16")
1/4"-RAD. ROUND OVER (FOUR EDGES)
CROSS DOWEL (4 REQD.)
2" NO. 8 FH SCREW
NUT ACCESS HOLE
1/4 - 20 X 4" FH SCREW (4 REQD.)
NAIL
BED-BOLT COVER
BED BOLT (8 REQD.)
3/8"-DIA. BED-BOLT HOLES
1-1/4"-DIA. HOLE
CONTINUE CHAMFER ON INSIDE CORNER OF POSTS
RAILS AND POST DETAILS
TAPER TO 1-1/4"
1/4" CHAMFER (TOP ONLY)
3/8" CHAMFER (TYPICAL)
START TAPER HERE ON HEADBOARD SIDE OF POST ONLY
1/4"-DIA. COUNTERSUNK HOLES
3/16" CHAMFER
EACH SQ. = 1"
NO. 20 JOINING PLATE 6"-8" O.C. (TYP.)
10MM X 3/4"-DEEP HOLE
1/4"-DIA. HOLE
1-1/2"-DIA. X 1"-DEEP HOLE WITH END CHISELED FLAT
2-1/2" (END RAIL C)
3-1/4" (SIDE RAIL D)
4-3/8" (TYPICAL)
SUPPORT RAILS
1-1/2"-DIA. HOLES
REAR VIEW HEADBOARD END
RAIL SECTION (TYP.)
TAPER TO 1-3/4"

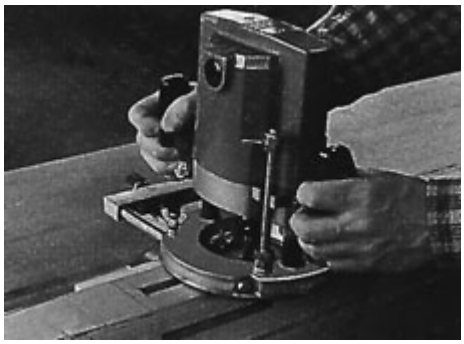
Materials List Pencil-post bed		
Key	**No.**	**Size and Description (use)**
A	4	2 3/4 x 2 3/4 x 80" cherry (post)
B	1	1 x 16 x 60 3/4" cherry (headboard)
C	2	1 1/4 x 6 1/2 x 60 3/4" cherry (end rail)
D	2	1 1/4 x 6 1/2 x 80 3/4" cherry (side rail)
E	2	1 x 5 x 58 1/4" poplar (end support rail)
F	2	1 x 5 x 79" poplar (side support rail)
G	2	1 3/8 x 4 x 80 3/4" poplar (side support)
H	14	3/4 x 5 x 60 3/4" maple (slat)

The Posts

Begin by preparing the blanks for the bedposts. Glue up stock if necessary, then joint, rip and crosscut the blanks to 2 3/4 in. wide € 80 in. long. Use a long straightedge to lay out the tapers on each side of the posts (**Photo 1**). The taper on the inside edge of the headboard posts begins 15 in. higher than the other tapers. This allows for a square joint with the headboard.

1 Rip and crosscut the post blanks, and use a long straightedge to mark the taper. Also mark the mortise positions.

Lay out and cut the mortises in each post at this point -- it's easier to do this now, while the posts are straight, than after the tapers are cut. The quickest way to cut the post mortises is by using a plunge router with a 1/2-in.-dia. straight bit. Clamp the workpiece between bench dogs, and use an edge guide on the router to make the cut (**Photo 2**). Cut each mortise in two or three passes to avoid overloading the router. After making each cut, use a sharp chisel to chop the mortise square (**Photo 3**).



2 Cut the post mortises before sawing the tapers. Use a plunge router or bore out the mortises on the drill press.

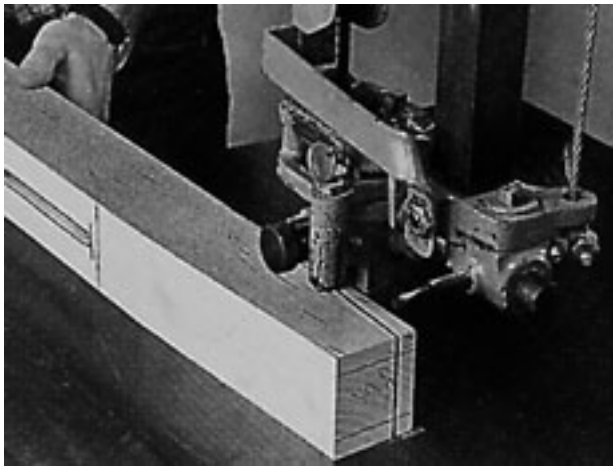
To make the bed easier to move, its joints are bolted together rather than glued. This construction requires that you bore a hole through the mortise bottoms and bore a matching hole into the tenons on the rails and headboard. Use the drill press to bore the 3/8-in.-dia. holes through the rail mortises and the 1/4-in.-dia. holes through the post mortises for the headboard.

Use the band saw to cut the tapers on each post. Note that the tapers are also marked on the posts' ends (**Photo 4**). Cut two tapers, then use the marks on the ends of the posts to draw the tapers on the newly sawed surfaces. Also, use a roller stand or have a second person help you when sawing the tapers. The posts are simply too long to saw without support. Use a sharp and finely set hand plane to smooth the cut surfaces and to refine the tapers (**Photo 5**).

Next, use a Forstner or multispur bit to counterbore the bolt holes on the outside surface of each post (**Photo 6**). Then use a countersink to recess the holes for the headboard screws.

Cut the 3/8-in.-wide chamfers along the tapered edges of each post using a chamfer bit in the router. The chamfers on the inside post corners run the length of the post, while the remaining chamfers are stopped just above the point where the rails join the post. Use a sharp plane or chisel to cut the chamfers at the top of each post.

3 Clamp the posts firmly to the bench, and chop the ends of the post mortises square using a sharp chisel.



4 Saw two tapers, then use the marks on the ends of the posts to redraw the tapers on the sawed surfaces.

5 Smooth the sawed surfaces and refine the taper with a hand plane. Set the plane to take a fine shaving.

6 Counterbore the bed bolt holes and headboard screwholes in the posts. Use a Forstner bit in the drill press.

The Headboard and Rails

Rip, crosscut and joint the stock for the headboard so it forms an oversize blank. Also rip, crosscut and joint the stock for the bed rails and the support rails.

Position the headboard stock so it forms a blank with the grain positioned attractively, then mark it for joining plate slots 6 in. to 8 in. on center along the mating board edges. Don't position a plate too close to the blank edge -- you might expose the plate when cutting the headboard to shape. Hold the headboard pieces firmly to a flat, clean worksurface, center the plate joiner on the mark and make the plunge cut (Photo 7).

7 Rip and crosscut the headboard stock oversize. Cut joining plate slots in the stock, then glue and clamp the stock.

Apply glue to the board edges, slots and the biscuits. Clamp the assembly, and when the glue sets, plane and scrape it smooth.

8 Saw the headboard tenons using a dado head on the table saw. The tenon width here requires great accuracy.

The headboard joins the two front posts with two tenons that run nearly the width of the headboard. To ensure tight-fitting joints, it's important that the headboard be perfectly rectangular. Crosscut the headboard blank on the radial-arm saw or table saw. With either machine, be sure you are making a square cut.

Cut the tenons on the ends of the headboard and on the bed rails using the dado blade in the table saw (Photo 8). The headboard and rails have shoulders on the top and bottom of the tenon. To cut the shoulders on the rails, readjust the blade height on the table saw, stand the rail on edge and cut the shoulder. The headboard shoulders are cut later with a handsaw.

Lay out the curved shape of the headboard, and make the cut with a sabre saw just to the outside of the line. Clamp

the workpiece in a vise, and use a sharp and finely set plane and spokeshave to smooth the cut surfaces and work down to the line (Photo 9). Then mark the shoulders on the top and bottom edges of the headboard tenon, and make the cuts using a dovetail saw (Photo 10).

Next, using a router and chamfer bit, cut chamfers on the top edges of the bed rails and the top and bottom edges of the headboard.

Dry assemble the headboard and head rail to the posts. Clamp the subassembly, and use a long 3/8-in.-dia. bit to bore slowly through the post into the end of the rail tenons (Photo 11). Use a 1/4-in.-dia. bit for the headboard joints. Bore the other holes for each bolted joint.

Now, lay out and bore the pocket holes for the bed bolt nuts on the inside of the bed rails. Use a Forstner bit in the drill press to bore the holes, then use a chisel to square the sides of each hole, forming a flat surface on which the nut can bear (Photo 12).

Using the drill press, bore the 10mm-dia. holes for the cross dowels in the back of the headboard. To get the hole in a cross dowel aligned with the hole in the end of a tenon, poke a screw into the tenon and twist the cross dowel with a screwdriver so you can thread the screw into the cross dowel (Photo 13).

Rip and crosscut the poplar stock for the end support rails. Then, bore the access holes for the rail bolts. Remember to bore the holes so they are offset from those in the outer rails. When the two rails are joined, this allows better access to the rail nuts than if the holes were aligned.

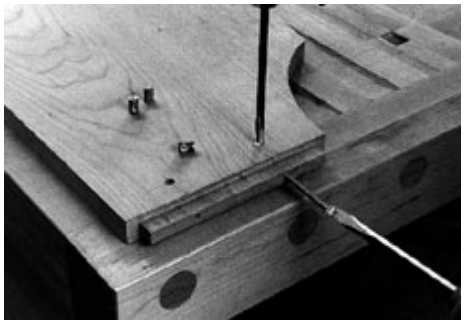
Cut the notches in the end support rails with a handsaw (Photo 14), and then chop the notches square with a chisel.

9 Saw the headboard to shape. Smooth away saw marks and refine the shape using a smooth plane and spokeshave.

10 With the headboard edges smoothed, mark and cut the shoulders at the top and bottom of the tenon.

11 Use a long bit to bore slowly through the post holes and into the headboard and rail tenons.

12 Use a chisel to cut a flat surface into the hole on the side rails. The bed bolt nut bears on the flat surface.



13 Bore 10mm holes for cross dowels in the back of the headboard. Turn the dowel to align its hole with the screw.

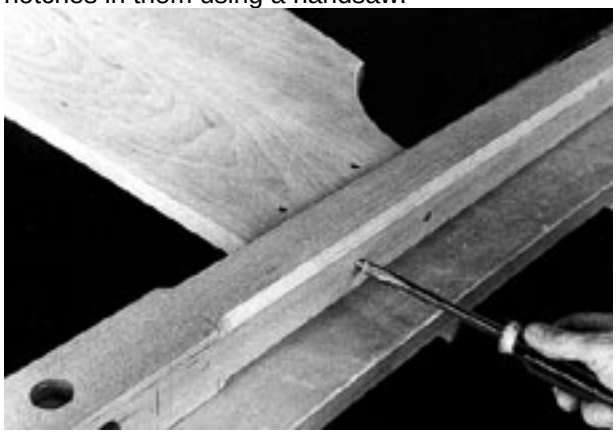
14 Clamp the end support rails firmly together, and cut the cross support notches in them using a handsaw.

Assembly

Bore and counterbore pilot holes through the poplar rails to screw them to the cherry rails. Bore a screwhole below the notches in the head and foot rails. Clamp the rails together, and drive screws through the holes. Screw the headboard to the posts (Photo 15), and use bed bolts to attach the head rail to the posts. Follow the same procedure for the foot rail and posts. Have an assistant help you bolt together the head and foot assemblies with the side rails. Tighten the bolts using a bed bolt wrench (Photo 16).

After the frame is assembled, install the cross supports by sliding each into its notches (Photo 17).

Rip and crosscut the maple bed slats, then cut the notches in the slats at the head and foot of the bed to fit around the posts (Photo 18). Bore and counterbore pilot holes in the slats, then use a 1/4-in.-rad. rounding-over bit mounted in a router table to cut the slats' edges. Screw the slats to the cross supports using 13/16-in. spacer blocks between each (Photo 19).

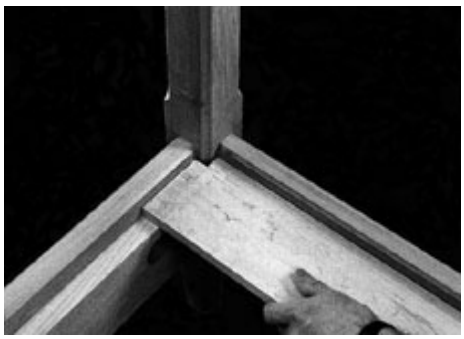


15 Fit the head rail and headboard between two posts. Drive screws through the posts and into the cross dowels.

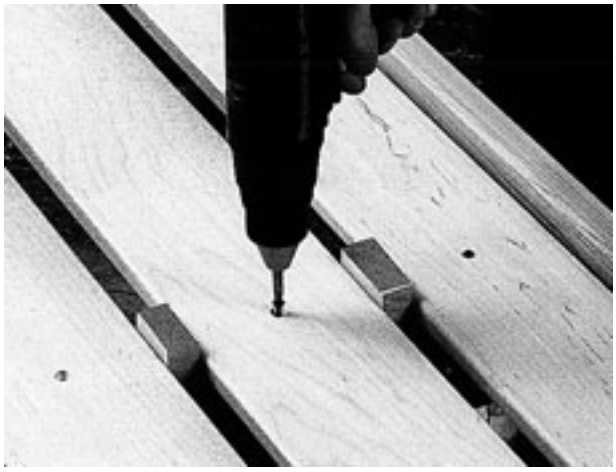
Disassemble the bed, and sand all parts with 220-grit sandpaper followed by 320-grit paper. Apply four coats of Watco Danish Oil Finish using a brush or rag, and let it soak in for 20 to 30 minutes, then wipe it off. Let the piece dry overnight between coats. After the final coat has dried, rub it smooth with 4/0 steel wool. The maple slats need no finish, but a coat of varnish seals them.
Reassemble the bed and nail the bed bolt covers in place. Each cover should be loose enough to swivel.

16 Use a bed bolt wrench and an open-end wrench to tighten the connection between the rails and posts.

17 Prepare for installing the slats by fitting the cross supports into the notches that are cut in the end support rails.



18 Cut the slat stock. Cut notches in the slats at the foot and at the head of the bed so they fit around the posts.



19 Position 13/16-in.-wide spacer blocks between the slats, and screw the slats to the cross supports.

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QUILT RACK

Materials:

- Lumber of your choice sufficient for the pieces listed in the quilt rack dimensions
- Wood screws: 8 flat-head wood screws #6 x 1 1/2"; 4 flathead wood screws #6 x1"
- 3/8" wooden pegs
- Assorted grit sandpaper
- Finishing materials

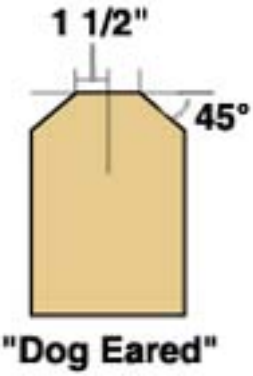
Quilt Rack Dimensions

These dimensions may be altered slightly, but keep in mind that drastic alterations may not work. For example, a quilt rack that is too tall may be top-heavy and likely to topple over.

The quilt rack is made up of eight simple components.

- 2 stiles— 1" x 8" x 32" each. (The main vertical uprights that frame the piece.)
- 4 horizontal cross members— 1" x 2" x 26" each. (3 at the top as hangers for the quilt and one at the bottom as a brace. The inside measurement from stile to stile is 26")
- 2 horizontal feet— 1" x 2" x 10" each. (These are secured to the bottom of the stiles and help stabilize the rack.)

Shaping



Now that the eight pieces are sized, it's time to put the final touches on four of them before assembly.

- Let's start with the feet. Using your power miter saw or miter box, trim the ends of each 1" x 2" x 10" piece at a 45° angle. The angles slant toward each other at the top of each foot.
- Choose the particular cut you want for the top of the stiles. You can use a rounded-top cut, which will require a band saw, jigsaw or scroll saw, or select a simple dog-eared cut. For a rounded-top stile, mark the piece for the round cut by locating and marking the width center. Make another mark the same distance from the top. Use a compass to scribe the curve from the marked center point.
- For a dog-eared look, determine the center of the top edge of one of the 1" x 8" x 32" stiles. From that center point, measure 1 1/2" out on each side. You now have the middle 3" of the top edge of the stile. From each side of that 3" mark, use a combination square and pencil to mark a 45° angle to the long, vertical side of the stile. After you mark and cut one stile, you may use it as a pattern for the second. Place the ends of the pieces against a stationary, vertical surface in order to ensure two equal pieces when cut.

Drilling and Assembling

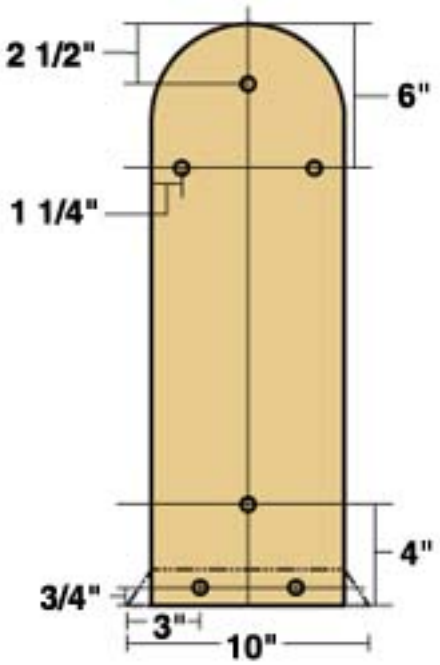
1. First, use a square and pencil to transfer the center mark at the top of the stiles down about 7" on the outside face parallel with the long edges. Determine the side to face out by choosing the most favorable wood grain.

2. Make a mark perpendicular to the first mark 6" from the top all the way across the stile to form an upside-down "T." Make certain that the respective marks are parallel to the top and sides of the stile since the "T" will determine where you will drill the holes for the recessed screws.

3. Measure and mark the spot for each hole, as described below, making a small pencil mark across the respective lines of the "T." The three spots where the lines intersect will mark the centers of your holes.

    - The first hole, which will hold the screw for the top cross member, will be 2 1/2" from the top of the stile, centered on the 7" pencil mark.

    - The other two holes will be located 1 1/4" from each outside edge of the stiles, intersecting the pencil mark running across the piece.



Drill holes as indicated in the drawing.

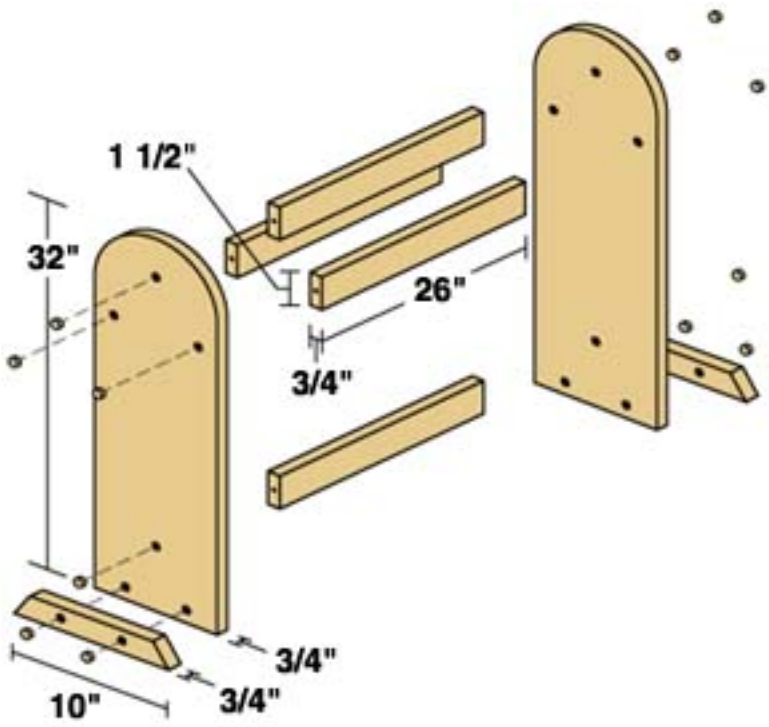
4. For the bottom cross member, which serves primarily as a brace, determine the center point of the stile at the bottom and use a light pencil mark to transfer that point 5" up. Then measure 4" from the bottom, making a small pencil mark across the previous 5" mark. That will be the spot for your bottom brace.

5.

6. Once you have marked one of the stiles, lay it down on a flat, smooth surface. The marks you just made are for countersink holes for the screws that will hold the piece together, so they need to be just 1/4" deep.

7. Now that the countersink holes are drilled, drill pilot holes for the screws. Use a 1/16" twist bit to drill through the center of the countersink holes and all the way through the stiles.

8. After drilling the pilot holes in the stiles, do the same in both ends of each 26" cross member: Determine the center of each end by marking diagonal lines from corner to corner. The intersection of the lines will be the center point. Now drill pilot holes approximately 1/4" deep, using the same 1/16" twist bit used on the stiles.



Exploded view of the quilt rack.

Assembly

1. Start with the top cross member. Place a screw in the top recessed hole of one of the stiles and, using a Phillips screwdriver, turn the screw into the pilot hole until the tip begins to emerge on the other side. Now place one of the cross members against the screw tip, align the pilot hole, and turn the screw into the wood. Repeat for the other stile. Continue until you have put all of the cross members, including the bottom brace, in place. Be sure not to overtighten, so that you can adjust the cross members if needed.

2. After installing the cross members, measure 3" from each end of both "feet." Then measure up from those points about 3/4" (approximately to the center) of the feet. If everything fits together properly and is correctly adjusted, tighten all screws.

Assembled view of the quilt rack.

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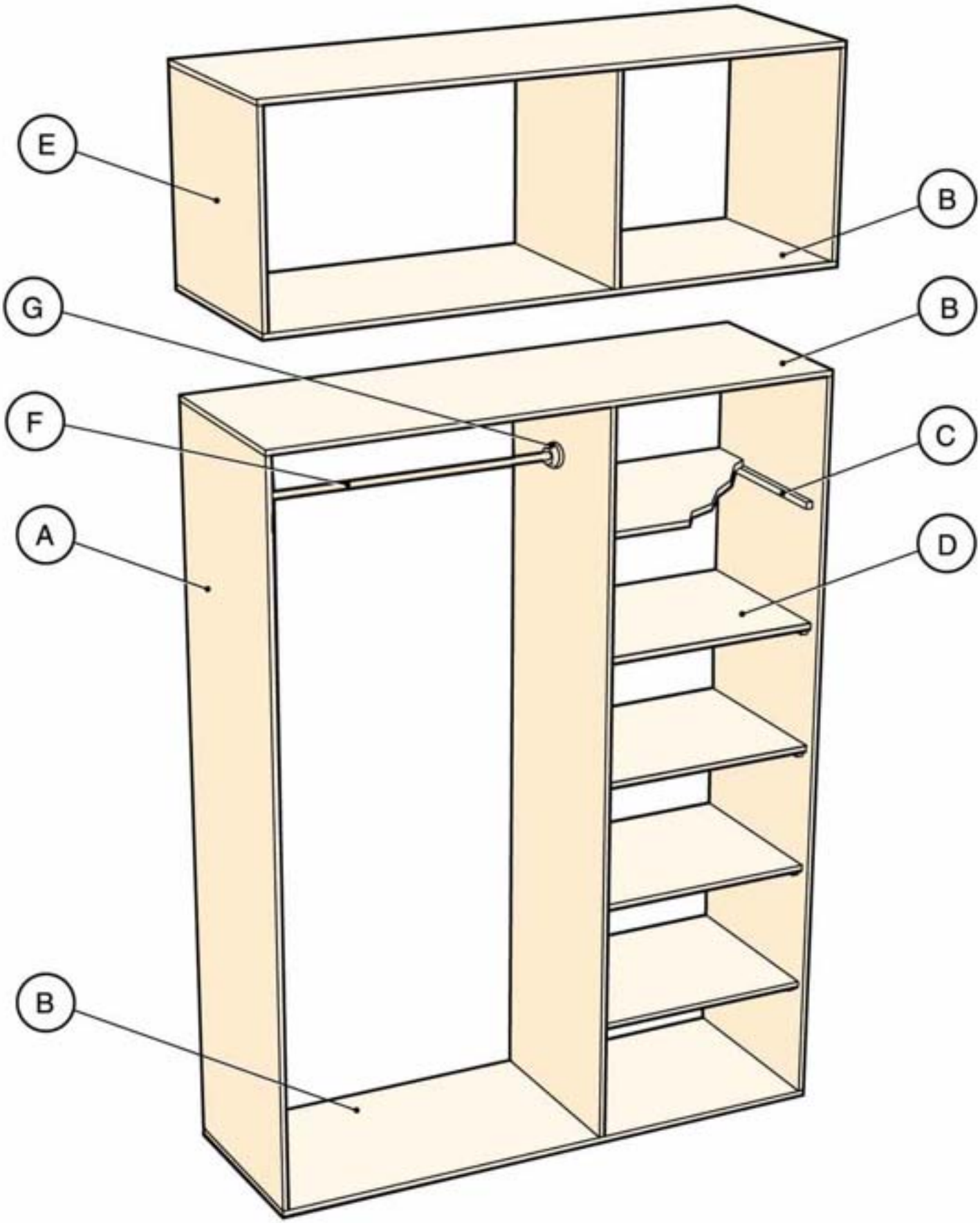
OPEN WARDROBE


E
B
G
B
F
C
A
D
B

You'll need:
Materials

Item	Part	Size	Material
A	Tall sides/divider (3)	2068 x 550 x 16mm	Melamine board
B	Bases/tops (4)	1630 x 550 x 16mm	Melamine board
C	Cleats (10)	19 x 19 x 500mm	pine
D	Shelves (5)	632 x 540 x 16mm	Melamine board
E	Short sides/divider (3)	518 x 550 x 16mm	Melamine board
F	Hanging rail	940 x 19mm diameter	chrome steel rod
G	Rod sockets (2)	19 internal diameter	chrome steel
H	Trim – optional (total)	19 x 19 x 7200mm	pine/maple

You'll also need contact adhesive for gluing, 30mm and 45mm cross-head screws, wet & dry sandpaper and white snap caps. Standard, 16mm thick x 600mm wide, Melamine-coated particleboard shelving is available in sheet lengths of 1.8m and 2.4m. Our unit used 8 x 2.4m sheets.

Here's how:
1. The crucial measurements are the opening where the unit will be built and the size of the chest of drawers you will use. Often walls aren't quite square, so subtract about 20mm all around – this also allows for the thickness of skirtings. Leave enough space above the chest of drawers to hang clothes. We made our unit in two sections for easy installation in a room with a ceiling height of 2.7m. Our two units were 2100mm and 550mm high, by 1630mm wide and 550mm deep, with an opening of 950mm for the drawers.

2. Cut the three tall sides **(A)** and a base **(B)**. Use a power saw for the cuts, setting the blade just deep enough to cut the panels. Work with the good side (the one most likely to be seen) face down, as there is likely to be some minor chipping of the Melamine on the saw side.

3. To fix bottom and top to two sides, pre-drill for four screws per joint and countersink for the screw heads. Working with panels on their back edge, apply a small amount of contact adhesive, then screw together, making sure front edges are flush. It's best to get someone to help hold the panels.

4. From the inside edge of one side, measure 950mm along the top and bottom of carcass. Square a line across the board and use this as a guide to pre-drill and countersink the top and bottom. Glue and screw divider in place.

5. From the top, measure down both sides of the narrow opening at increments of 346mm – that is, 346mm, 692mm, 1038mm, 1384mm and 1730mm. Square a line from the back to within 50mm of the front. Cut the cleats **(C)** with an optional 45° mitre on the front ends, and paint them to match if you wish. Glue and screw the cleats to the sides with the top edges on the lines and the back flush with the rear of the panels. Use the shorter 30mm screws.

6. Cut the shelving **(D)** to suit. Ours is set back 10mm from the front. After pre-drilling, screw shelves to battens with two 30mm screws per cleat.

7. Get help to stand the unit in place – it will be quite floppy - and check the fit. Check with the spirit level to make sure the sides are vertical. Measure the gaps between the sides and the wall; measure the wall in three places and mark these positions. Lay down the unit, and cut offcuts of shelving or plywood to make up the thickness of packing required, and nail to wall studs or plug into masonry. Carefully slide the unit back in

place and screw the sides into the packers to hold it in place.

8. Make the top unit the same way as the bottom one by screwing the top and bottom **(B)** to the sides and the divider **(E)**. Fit packing pieces to the wall near where the top of the unit will be, then slide the unit in place. Screw the top unit into the top of the bottom one with 30mm screws, as well as to the packers.

9. Cut the chrome hanging rail **(F)** with a hacksaw so it fits the wide opening. Smooth the ends with wet & dry sandpaper and loosely fit on the rod sockets **(G)**. Centre and space the rail from the underside of the top to allow easy removal of clothes hangers and mark screw holes at both ends. Pre-drill holes for the sockets, then install with screws provided. Finish off by pressing small snap caps into any exposed screw heads. Slide in the chest of drawers and your open robe is finished.

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KITCHEN BASE CABINET

There are two sorts of kitchen cabinets: base cabinets, which sit on the floor, and wall cabinets. Base cabinets provide both storage space and work surfaces. They often house sinks, such large appliances as dishwashers, and sometimes smaller conveniences, such as slide-out shelves or cutting boards.

Construction: The basic cabinet is made of a plywood case (sides, floor, and back) and a counter top covered with plastic laminate. Hardwood trim defines

Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
A	Right (wall) side	1	¾"	22½"	31"	Birch plywood
B	Left (outer) side	1	¾"	23¼"	35¼"	Cherry plywood
C	Divider	1	¾"	22¼"	31"	Birch plywood
D	Cabinet floor	1	¾"	22½"	46½"	Birch plywood
E	Shelf	1	¾"	8"	22⅞"	Birch plywood
F	Drawer side	6	½"	4½"	22"	Birch plywood
G	Drawer side	4	½"	8"	22"	Birch plywood
H	Drawer front and back	4	½"	8"	21"✲	Birch plywood
I	Drawer front and back	6	½"	4½"	21"✲	Birch plywood
J	Drawer bottom	2	¼"	20⅞"✲	21"✲	Birch plywood
K	Drawer bottom	3	¼"	20⅞"✲	21"✲	Birch plywood
L	Back	1	¼"	31¾"	46¾"	Birch plywood
M	Door panel	1	¼"	19⅝"	21⅞"	Cherry plywood
N	Drawer face	2	13/16"	9⅜"	23"	4/4 cherry
O	Drawer face	3	13/16"	5⅞"	23"	4/4 cherry
P	Kickplate	1	13/16"	3½"	48"✲	4/4 cherry
Q	Trim	9	13/16"	1¼"	†	4/4 cherry
R	Door stile	2	13/16"	2"	25⅛"	4/4 cherry
S	Door rail	2	13/16"	2"	20½"	4/4 cherry
T	Door panel clip	4	⅜"	13/16"	⅞"	4/4 cherry
U	Plug	24	⅜" dia.	—	¼"	4/4 cherry
V	Bracing strip	2	¾"	1½"	45½"	1 x 2 pine
W	Bracing strip	2	¾"	1½"	19½"	1 x 2 pine
X	Batting strip	1	½"	½"	72"✲	1 x 2 pine
Y	Batting strip	1	½"	½"	24½"✲	1 x 2 pine
Z	Platform beam	2	1½"	3½"	46¾"	2 x 4 fir
AA	Platform beam	2	1½"	3½"	16"	2 x 4 fir
BB	Counter top	1	¾"	25"✲	73"✲	Particle board
CC	Backsplash (optional)	1	¾"	18"✲	73"✲	Particle board

✲Measurement is approximate; cut to fit during construction.
†One piece 30¼" long for divider; one 22⅞" long for shelf; and two 22⅜" long, two 32¼" long, and three 45½" long for cabinet face. Check measurements before cutting.

Tools and materials: Radial arm or table saw with dado head Saber saw, backsaw. Router with straight veneer trimmer, bevel veneer cutter, arbor, and pilot, 3/8" rabbeting bit, and 45° chamfer bit. Electric drill with set of twist bits, No. 10 plug cutter, and Nos. 8 and 10 combination pilot, clearance, and Counterbore bits. Wide chisel, 3/16" chisel, fine laminate file Hammer screwdriver. Several 5' pipe or bar clamps, several 6" C-clamps, vise. Framing square, combination square, level, steel tape rule, compass, utility knife, pencil. Rubber-surfaced pressure roller or rolling pin Belt sander with No. 120 sanding belt Nos 80, 100, 150, and 220 sandpaper. Masking tape, carpenter's glue, construction adhesive, contact cement Lacquer thinner or equivalent solvent, tung oil, soft cloths One 4' x 8' panel each of 1/4", 1/2", and 3/4" birch-veneer lumber-core plywood and of 3/4" high-density particle board. One 2' x 4' panel each of 1/4" and 3/4" cherry-veneer lumber-core plywood, 48' of 4/4 cherry, 20' of 1 x 2 clear pine, and 11' of 2 x 4 fir Cedar shingles. Enough 1/16" plastic laminate to cover surface and edges of counter top Two flush-mounted pivot hinges, five pairs of 20" metal drawer slides, one magnetic door catch, six small round drawer/door pulls. 2d, 3d, 4d, 8d, and 12d common nails, 4d and 6d finishing nails, 7/8" No 6 roundhead wood screws and the following flathead wood screws: 5/8" No 4, 1/2" No 6 1", 1 1/2", and 2" No 8, and 1 1/4" No 10

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the openings for the door and drawers and reinforces the case. The case is fastened to a platform that has been leveled with tapered shingles used as shims.

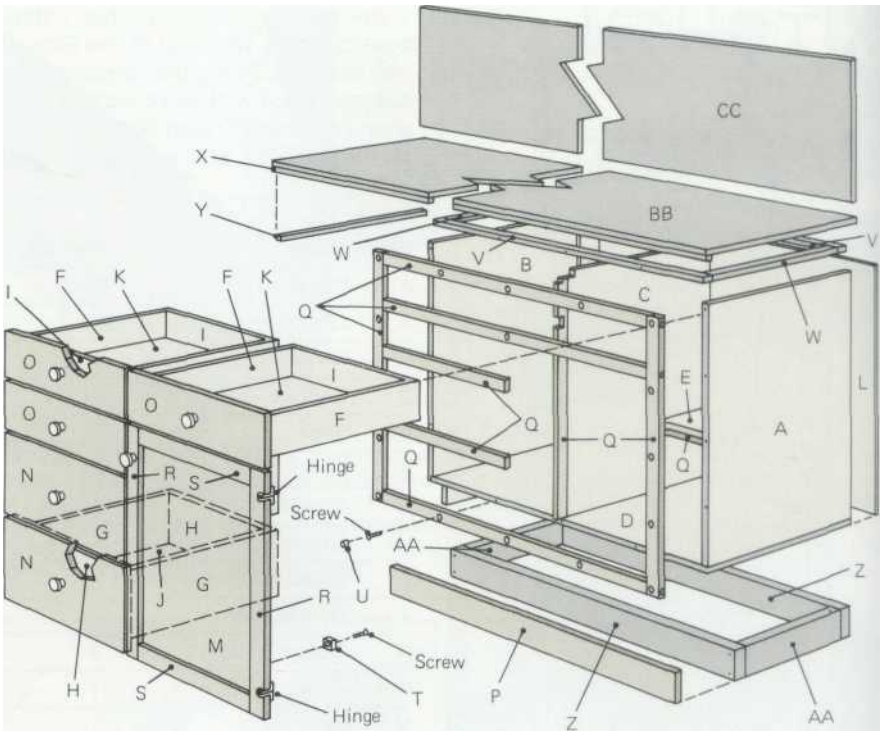
Do-it-yourselfers who build kitchen cabinets often order custom-made counter tops. It is a good idea to do so if you need a large or L-shaped top. Otherwise, you can make your own as shown and save a good deal of money.

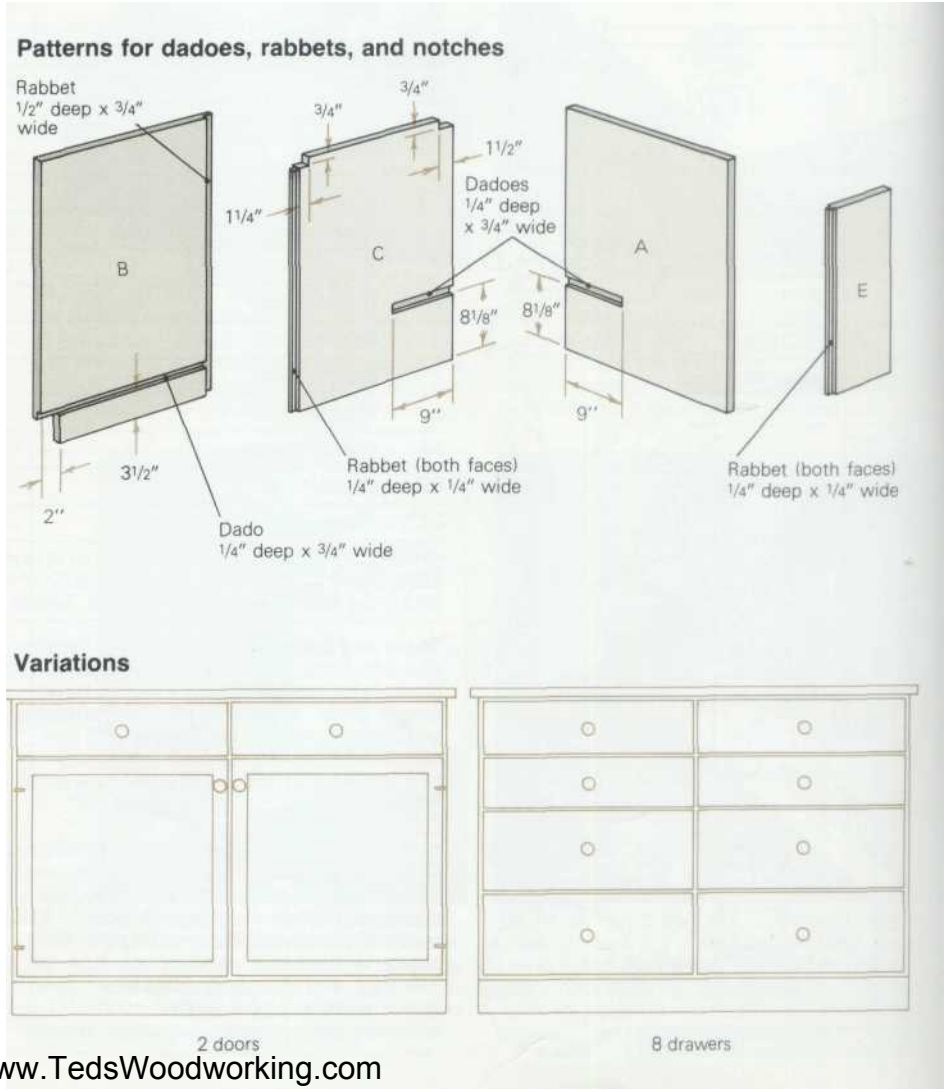
Variations: The base cabinet described in this project has five drawers and a wood-paneled door that opens to reveal a shallow fixed shelf. You can easily rearrange, increase, or eliminate the elements to suit your needs. . You can also redesign the cabinet to house a sink.

The directions that follow are for a cabinet 3 feet high and 2 feet deep that will fit beneath the kitchen wall cabinet in the next project. The counter top is designed to cover not only the cabinet but a dishwasher or other appliance as well. You can build the base cabinet exactly as it is shown here if you wish, but you will have to adapt at least the length of the counter top to fit your own kitchen.

A base cabinet has two types of sides. One side (the right, as described in the directions that follow) reaches only to the cabinet floor, which rests on top of a platform. It should be placed against a wall or butt against another cabinet on a common platform. The other side (the left) reaches all the way to the kitchen floor, masking the platform. It should be placed against a large appliance or be left exposed. If it is exposed, use cherry-veneer plywood and fill the screw holes with cherry plugs as used on the face of the cabinet. If the left side of the cabinet will not be seen, use less-expensive birch plywood and leave out the plugs. If both sides of your cabinet will be visible, use the measurements, techniques, and materials given for the left (outer) side for both sides of your cabinet. If both sides butt against walls or other cabinets, use only the measurements, techniques, and materials shown for the right (wall) side.

You may want to install a backsplash, which will prevent liquids from running off the counter top and down the wall. Although a short backsplash is equal to the task, the 18-inch-high backsplash recommended is easier to keep clean and provides a level support for a wall cabinet. If you plan to install a wall cabinet above your base cabinet, a high backsplash will make the job easier.





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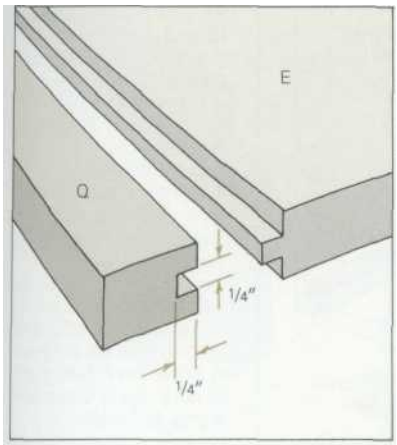
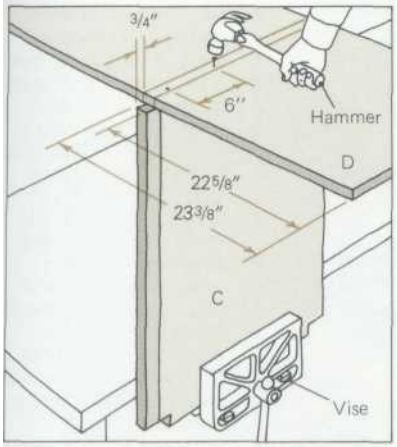
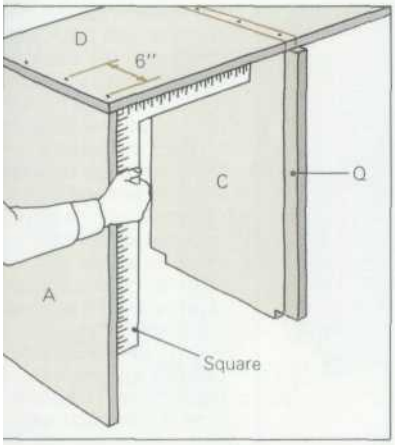


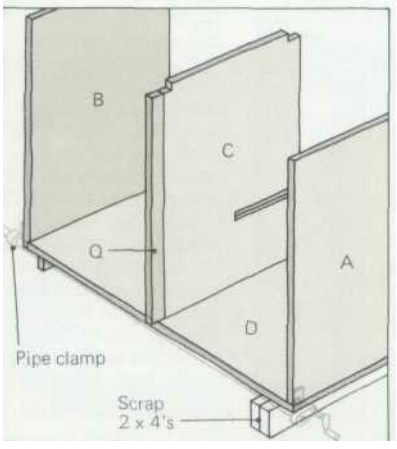
1. Cut parts A-E to sizes in chart Then cut dadoes, rabbets, and notches shown in patterns Cut trim (Q) for divider (C) and shelf (E) and cut a *1/4*- x 1/4-in. dado down center of back edge of each trim piece. Apply glue to dadoes, push trim onto tongues created by rabbets in divider and shelf. Clamp until dry. Belt-sand trim flush with divider and shelf.



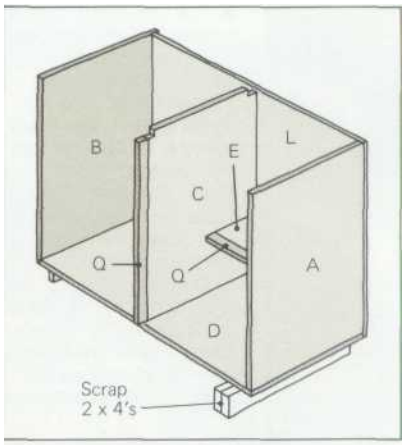
2. Draw lines across top of cabinet floor (D) 22 5/8 and 23 3/8 in. from left edge. Continue lines on bottom of floor Clamp divider (C) upside down in vise and glue floor to its bottom edge so that divider meets floor between lines and divider trim extends 3/4 in beyond front of floor. Using lines on bottom of floor as guide, drive 4d common nails through floor into bottom of divider every 6 in. Keep connection squared while doing so.



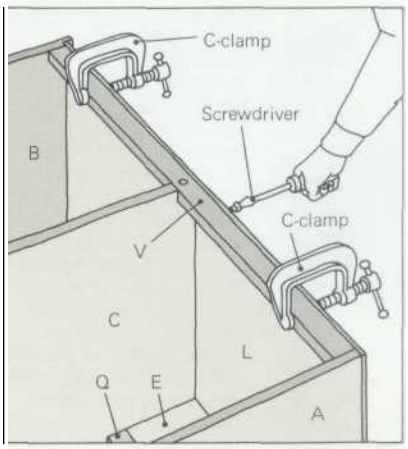
3. Apply glue to bottom edge of right cabinet side (A) and set cabinet floor (D) upside down on top of it so that all outer edges of the two pieces are flush. Drive 4d common nails through cabinet floor into bottom edge of side every 6 in., stopping to check for squareness after driving in each nail. It is of utmost importance that the cabinet be square, as the smooth operation of the drawers and door will depend upon it.



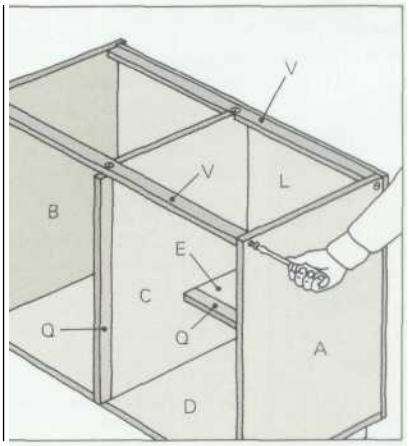
4. Turn assembly right side up Apply glue to long horizontal dado in left cabinet side (B) and insert left edge of cabinet floor into it so that front edges of floor and side are flush. Clamp unit and prop up opposite side of cabinet floor with two scrap 2 x 4's set on edge so that cabinet will sit level until the glue dries.



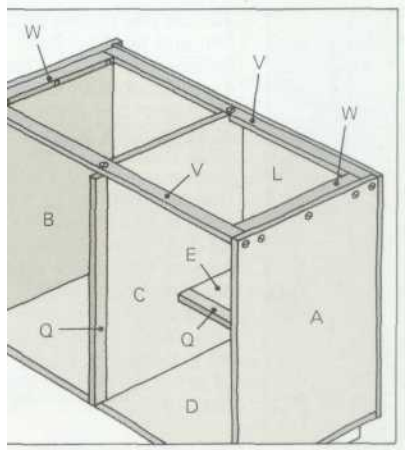
5. Slide shelf (E), with its trim facing the front, into dadoes in divider (C) and right side (A) Cut back (L) to size and glue it in place so that it sits in rabbet in left side and is flush with bottom of cabinet floor (D) and outer edge of right side Tongue of left side will extend a bit beyond back Secure back with 4d common nails.



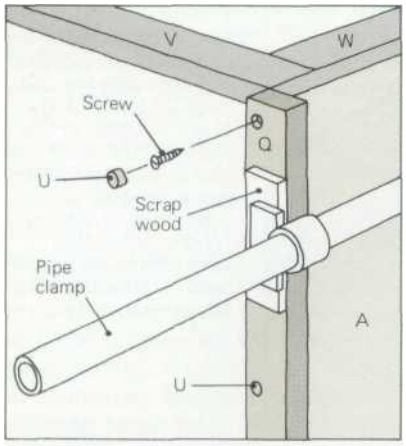
6. Check measurement and cut long bracing strips (V) to size. Clamp one strip along inside of back (L), fitting it into notch at top of divider (C) so that its ends touch insides of cabinet sides (A and B) Use No. 8 combination bit to drill five evenly spaced pilot holes through back into bracing strip Also drill down through bracing strip into top of divider. Drive in 1 1/2**-in.** No 8 screws and remove clamps



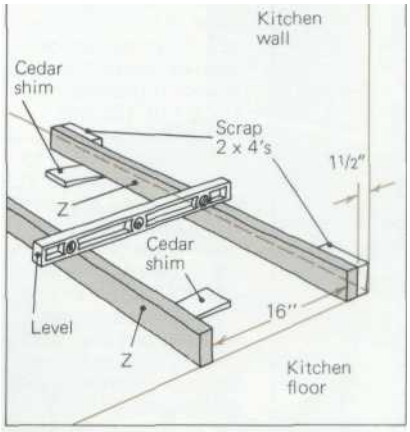
7. Fit other long bracing strip (V) into notch at front of divider so that its ends are flush with tops and fronts of cabinet sides. (Trim on divider will protrude 3/4 in. at front) Use No 8 bit to drill through front bracing strip into divider and drive in a 1 1/2-in No 8 screw. Drill one hole through each side into each end of each long bracing strip and drive 2-in No 8 screws into the holes



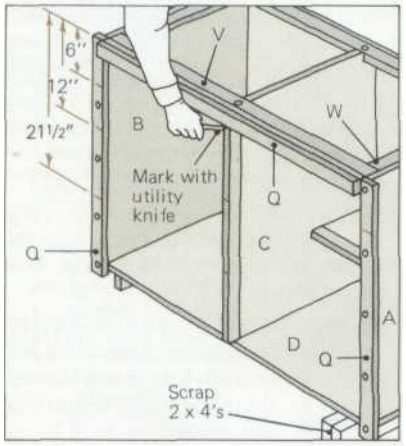
8. Check measurement and cut short bracing strips (W). Clamp one strip against inside of right cabinet side (A) with its ends butting long bracing strips (V). Use No, 8 combination bit to drill three holes through cabinet side into short bracing strip. Clamp other strip to left side. This time, drill pilot holes through strip into side Attach strips with 2-in No 8 screws. Sand inside of cabinet with Nos. 80, 100, 150, and 220 paper



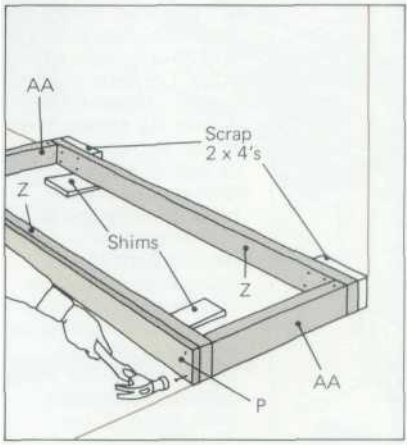
9. Cut trim (Q) for front edges of cabinet sides, and clamp trim flush with inner edges and tops of sides. Use No. 10 bit to drill pilot holes every 8 in. through trim into front edges of sides. Counterbore holes % in. deep. Glue and screw trim in place. Remove clamps when glue is dry. Use No. 10 plug cutter to cut plugs (U) from cherry Glue plugs into screw holes, and chisel and sand their tops flush with trim.



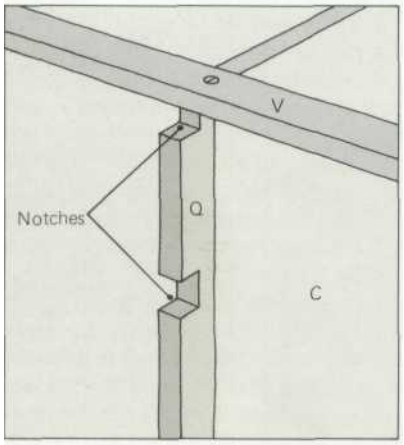
13. Cut platform beams (Z and AA) to size Position one long beam parallel to wall and 1 1/2 in from it Put two short 2 x 4 scraps into gap to maintain spacing and serve as nailing surfaces. Position other long beam parallel to first and 16 in away Level each beam, if necessary, by pushing a cedar shingle under it as far as needed. Level beams with each other in same way, being sure to keep each beam level along its length



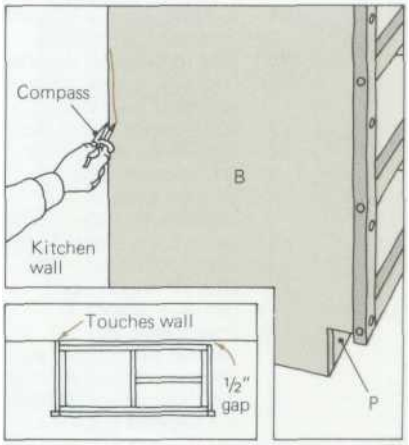
10. Mark trim on cabinet sides 6 in. from top. Mark trim on divider and left side 12 in. and 21 1/2 in. from top. Cut a piece of trim and position it across cabinet front flush with tops of trim on sides. Use a knife to mark divider where trim crosses it. Cut and position a second piece of trim with top edge at 6-in mark and a third piece with top edge flush with top of cabinet floor. Mark divider where these pieces cross it.



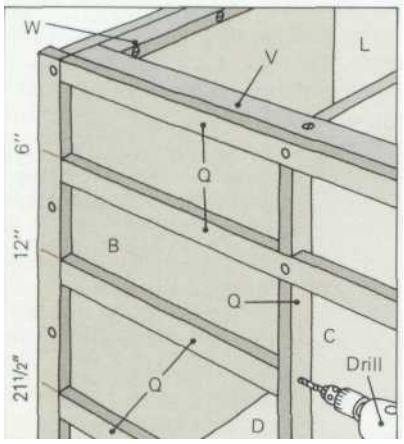
14. Position the short beams (AA) between ends of long ones Level short beams, then level all beams with each other Use 12d nails to toenail the 2 x 4 scraps to wall, face-nail inner long beam to scraps, toenail short beams to inner long beam, and face-nail outer long beam to short beams. Also toenail each piece to kitchen floor Cut kickplate (P), and nail it flush with top of outside beam with 6d finishing nails every 10 in



11. Use saber saw to cut ^{13}/16-in.-deep notches in divider trim where horizontal trim will hit it, using knife marks as guides. With No. 10 bit drill a deep hole through each piece of trim into divider. Glue and screw trim to divider Drill pilot holes and glue and screw top trim to bracing and bottom trim to cabinet floor. Plug all holes. Use No 8 bit to drill through trim on sides into ends of horizontal trim. Drive in 2-in. screws



15. Position cabinet on platform with back edge of left side (B) touching wall and cabinet back (L) 1/2 in. from wall Front of cabinet should be 2 3/4 in from kickplate If there are gaps between left side and wall, set a compass with its point and pencil as wide apart as widest gap Draw point of compass down wall so that pencil will mark contours of wall on left side. Plane or sand away wood behind marks to make side fit flush with wall.



12. Cut two pieces of trim and position them between trim on divider and left cabinet side so that top of one piece is at 12-in. mark and top of other piece is at 21 1/2-in. mark made in Step 10 Use No. 10 bit to drill holes through trim on divider and on left cabinet side into ends of short horizontal trim. Drive in No. 10 screws. Use router with chamfer bit to bevel any edges of trim that will face the door or a drawer.

16. Drive 8d nails through cabinet floor into platform every 10 in Using dimensions in chart on page 115 for parts F-K, make three small and two large drawers To do so, cut drawer faces (N and O) to size, then follow the directions for making drawers in platform bed, but skip Steps 16-18 and use 20-in. slides instead of the larger ones required for the bed Sand and set aside drawers

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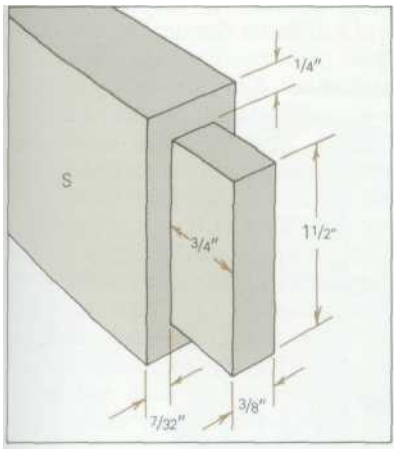
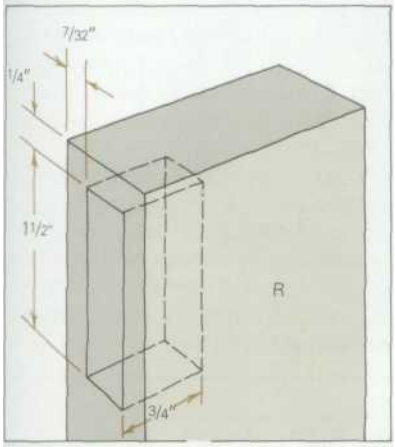
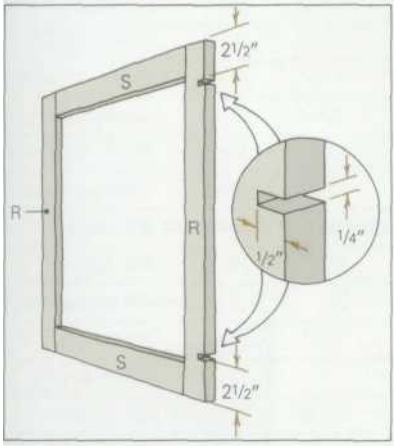


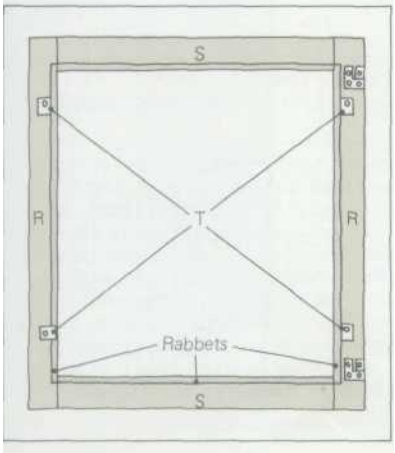
17. Cut door stiles (R) and rails (S) to size. Mark off both ends of both rails for tenons. Each tenon should be 3/4 in. long, 3/8in. thick, and 1 1/2 in. wide, and have four shoulders. The long shoulders should be 7/32 in. wide and the short shoulders should be 1/4 in. wide as shown. Use table or radial arm saw with dado head to cut the tenons.



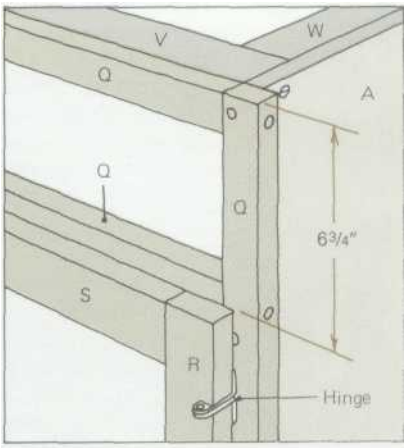
18. Draw cutting lines for mortises on door stiles (R) 1/4 and 1 3/4 in.
from each end of each stile and 7/32 in. from each side edge Test-fit door-rail tenons inside the lines. Cut blind mortises 3/4 in. deep. Glue together, clamp, and square off door frame. When glue is dry, unclamp frame and make rabbets 3/8 in. wide and 1/4 in deep along inside perimeter of door frame to accept panel. Chisel corners of rabbets square



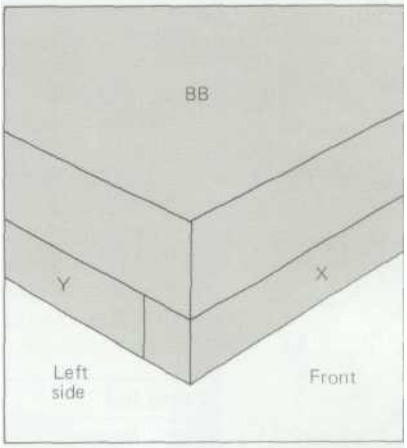
19. Sand door frame with Nos. 80, 100, 150, and 220 paper Cut two slots on outside face of one door stile, each vi in. wide and 1/2 in. deep. Position one slot 2 1/2 in. from top of stile and other slot 2 1/2 in. from bottom. Set hinges into these slots and use pencil to mark positions of hinge screw holes Drill pilot holes, and screw hinges to stile



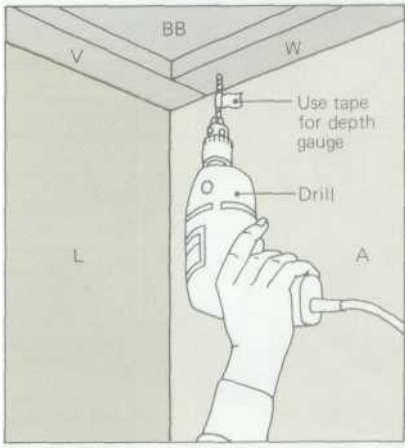
20. Cut door panel clips (T) and drill a 1/8-in. hole 3/16 in from one end of each. Sand clips and position them on inside of door frame so that when screwed on they can be turned one way to cover rabbets and the other to leave rabbets unobstructed. Mark clip holes on frame, drill 5/64-in. pilot holes, and attach clips to frame with No 6 roundhead screws, but leave screws loose enough that clips can be turned.



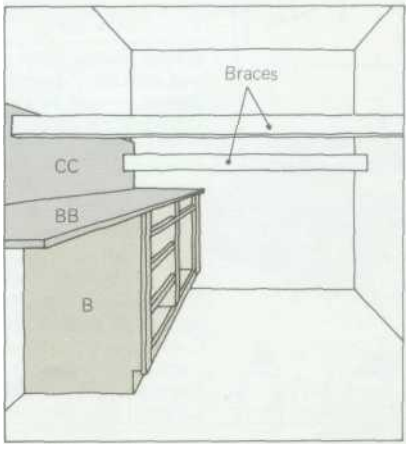
21. Cut door panel (M) to size and test its fit in frame. Trim it to fit if necessary, then sand it. Remove panel and hold frame against cabinet face with rabbets facing in and hinges at right Top edge of frame should be 6 3/4 in. below
top edge of cabinet. Level door frame, then mark cabinet with location of screw holes in hinges. Remove door frame and drill holes for hinge screws. Secure panel in frame, but do not install door yet



22. Cut counter top (BB) and batting strips (X and Y) to size. Attach batting strips to underside of counter top, flush with its front and side edges, with glue and 3d common nails Cut plastic laminate for top surface and exposed edges of counter top, allowing for 1/4-in. overhang on all sides. Apply laminate to side edge, front edge, and then top surface of counter top. Trim each piece and bevel edges



23. Position counter top on cabinet with its long batting strip overhanging cabinet front and its right side flush against wall. Use No 8 bit to drill up through bracing (V and W) into counter top in each corner (Do not drill deeper than 1 1/8 in. or you may pierce top.) Drive in 1 1/4-in screws Sand exterior of cabinet, then rub down wood with tung oil. Attach drawer/door pulls; install door, door catch, and drawers.



24. If you are installing a backsplash (CC). cut it to size and apply plastic laminate to edges that will show, then to front Test-fit backsplash on wall If there are gaps, trim as in Step 15. Glue backsplash to wall with construction adhesive If possible, brace it with lumber wedged against opposite wall until adhesive dries. Drill pilot holes and drive 2-in screws through bottom of the counter top into bottom of the backsplash

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CHERRY END TABLE

Time-honored techniques of hand joinery, executed with the help of modern tools and equipment, make this a project any craftsman can be proud of. Whether your decor is stark contemporary or cozy Early American, this end table's clean, elegant lines, highlighted by the rich tones and delicate figuring of oiled cherry, will fit right in.

Wood: For the greatest economy and the best results in matching color and figure, try to find a single piece of cherry stock that will yield all the solid parts of the table. Brush a little paint thinner on the surface to get an idea of the color and figure—it will dry harmlessly—then look for a matching piece of cherry-veneer plywood for the shelf.

With careful cutting, you can get all the solid pieces from a board that is 2 inches thick, 6/2 inches wide, and 10 1/2 feet long. First, cut a 32-inch length and rip it into two 3-inch widths for the legs . Then cut a 6-inch length and rip it into four 1 /4-inch widths for the wings (B), Cut three 20-inch lengths for the top. Rip the remainder into 2 1/2-inch widths for the aprons (C and D), then rip these pieces to a thickness of 1 *'1/4*inches. The edging (E and F) and screw blocks (H) can be made from the scrap.

Construction: The table is built in three clearly defined phases, each of which is shown on a separate page. First, the legs, wings, and aprons are cut roughly to shape and jointed to make the basic table structure . Then these parts are more carefully shaped, the shelf is fitted into notches in the legs, and the structure is assembled with glue , Finally, the top is formed and joined to the structure by means of slotted screw blocks . Because of the inevitable imprecision of mortise-and-tenon joints, i both the shelf and the top should be cut and shaped to fit the assembled leg-and-apron structure—not cut according to predetermined dimensions

It may be difficult to find 2-inch-thick boards wide enough to make the legs according to the diagram on the opposite page (Step 1). If so, you can cut all four legs 1 3/4 inches square and 24 7/8 inches long and join two wings to each, rather than one as we have done, in order to make the corner units. When rough-cutting the curved part of the tapered legs (Step 3, opposite page), guard against accidents by first making a series of parallel cuts about 1/4 inch apart. If you use a band saw for the job, tape a piece of scrap wood to the lower part of the leg, as shown in Step 3, just thick enough to keep the piece level on the saw table.

Finishing: After construction is completed, use a block plane or spokeshave to gently round all sharp edges—how much you round them is a matter of personal taste and esthetic judgment. Then sand with Nos, 100, 150, and 220 sandpaper to achieve a smooth surface. To bring out the natural color and figure of the wood, apply several coats of penetrating oil, such as linseed oil, tung oil, or a commercially prepared Danish-style natural finish. If you want a protective, glossy surface, wait about a week before rubbing in a coat of wax.

Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
A	Leg	4	1¾"	3"✲	24⅞"	Cherry
B	Wing	4	1¾"	1¼"	8"✲	Cherry
C	Side apron	2	1"	2½"	14"	Cherry
D	End apron	2	1"	2½"	12"	Cherry
E	Side edging	2	½"	⅞"✲	16"✲	Cherry
F	End edging	2	½"	⅞"✲	14"✲	Cherry
G	Top	1	1⅜"	16½"	18½"	Cherry
H	Screw block	10	⅝"	1"	1½"	Cherry
I	Shelf	1	¾"	12⅞"✲	14⅞"✲	A–2 cherry plywood

✲Measurement is approximate; cut to fit during construction.

Tools and materials: Table saw with combination blade. Band saw. saber saw, or coping saw. Backsaw, miter box. Drill with 3/32", 11/64", and 5/16" twist bits. Framing and combination squares, T bevel, steel tape rule, marking gauge, mortising gauge (optional), pencil. Awl, mat knife. Screwdriver. Jack plane, block plane, shoulder plane (optional), spokeshave or drawknife. Straight chisels: 1/8", 3/8", 1/2*", 3/4*", 1", and 1 1/2*".* Mallet. Six 3' bar or pipe clamps, several assorted C-clamps. Orbital sander (optional), sanding block. Nos. 80, 100, 150, and 220 sandpaper Yellow carpenter's glue, penetrating oil. Wax (optional). Wax paper, heavy paper. 3/16*"* washers, 1 1/4" and 1 1/2" No, 8 roundhead screws. A 2" x 6 1/2" x 10 1/2"' board of cherry stock or the equivalent An 18" square of 3/4" A-2 cherry plywood.

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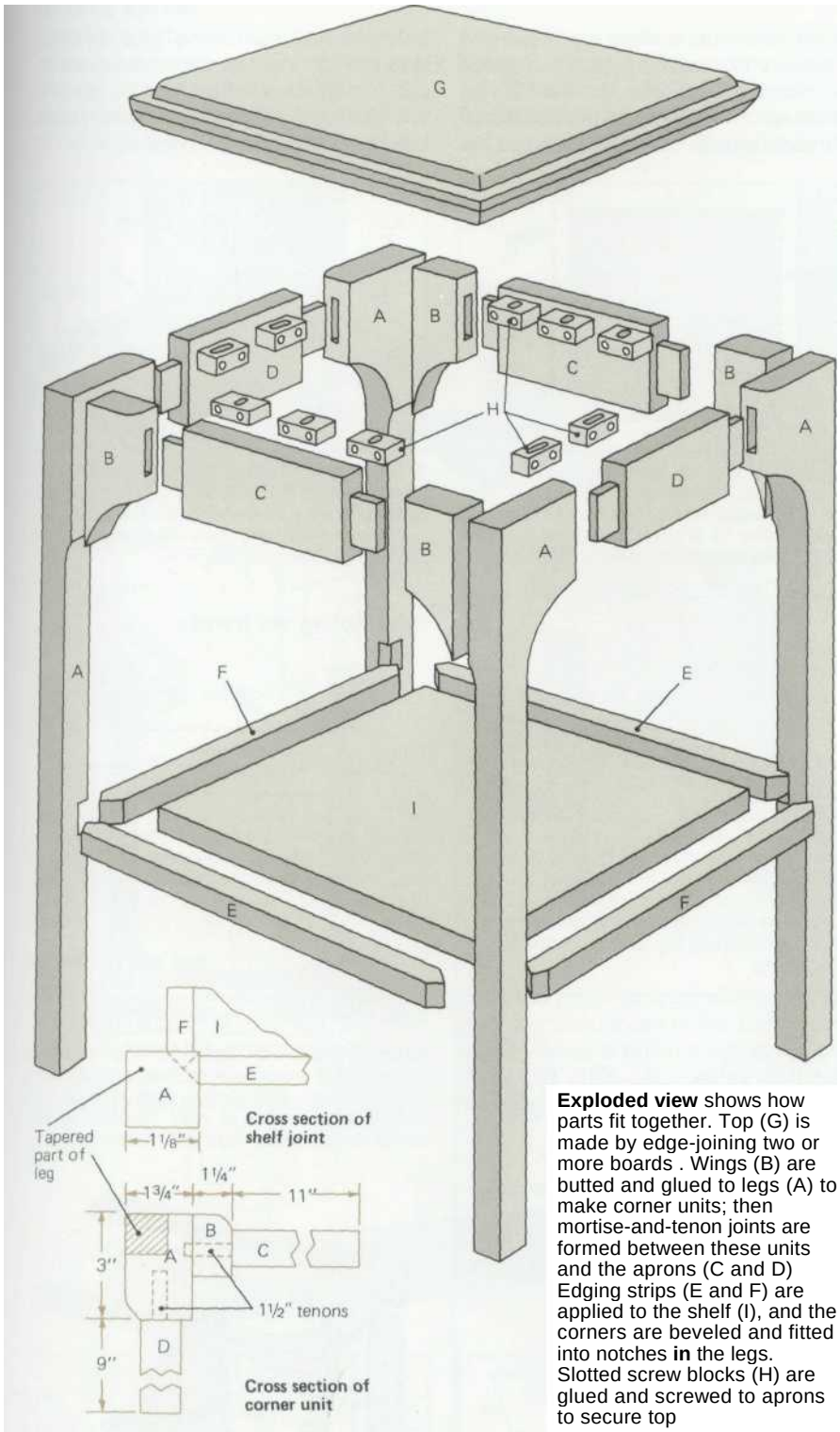
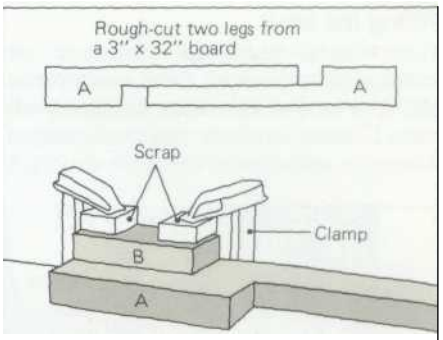
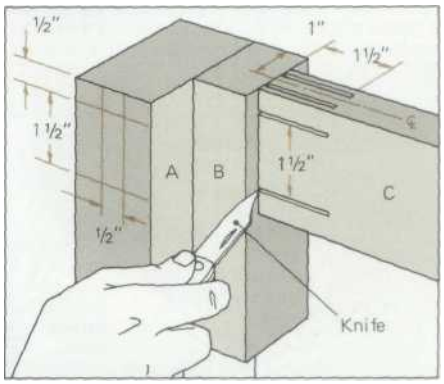


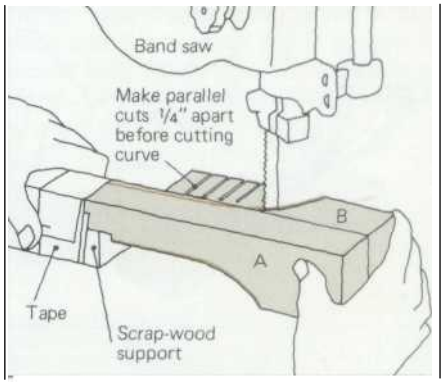
Exploded view shows how parts fit together. Top (G) is made by edge-joining two or more boards . Wings (B) are butted and glued to legs (A) to make corner units; then mortise-and-tenon joints are formed between these units and the aprons (C and D) Edging strips (E and F) are applied to the shelf (I), and the corners are beveled and fitted into notches **in** the legs. Slotted screw blocks (H) are glued and screwed to aprons to secure top



1. Plane stock to thickness for legs (A), wings (B), and aprons (C and D). Cut to length and width. Glue and clamp wings to legs to form corner units, making sure that the top edges are flush and the joints are square

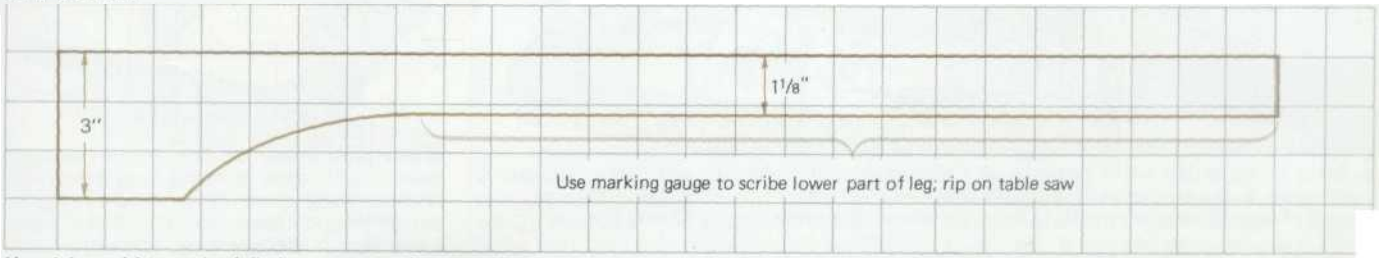


2. Use a table saw to cut cheeks of tenons 1 1/2 in. deep in ends of apron pieces (C and D). Position aprons flush with tops of corner units and mark for mortises Cut tenon shoulders and make mortises



3. Use pattern below to scribe outline of tapered leg on both outer faces of corner units Rough-cut to within 1/8 in. of scribed lines Rip straight sections on table saw, use band, saber, or coping saw to cut curves

Leg pattern



Use 1-in. grid to make full-size pattern of tapered leg on heavy paper. Scribe pattern on both outer faces of corner units.

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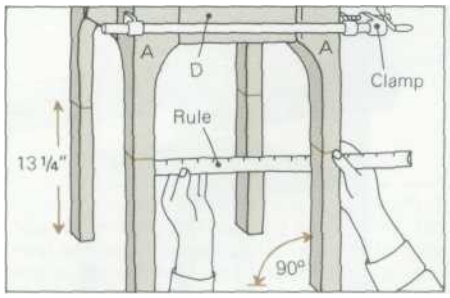
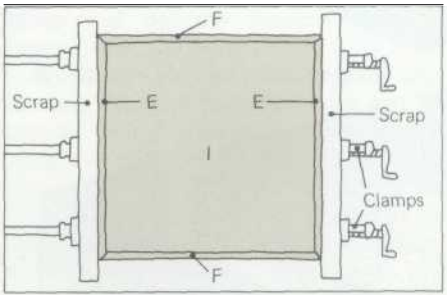
Fitting the shelf

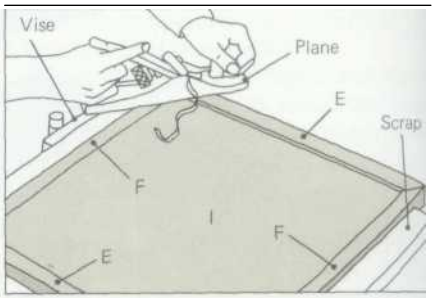
The table's sturdiness depends on custom-fitting the shelf. First, use a plane and spokeshave to reduce the rough-cut corner units to their scribed shapes. Assemble and clamp the table structure dry (no glue) with all four legs square to the ground. Cut and edge the shelf (Steps 1-3). The shelf corners are beveled so that the notches they must fit into can be cut straight across. Mark the bevel points (thickness of the edging plus 1/16 inch), then use the shelf corners themselves as patterns for the notches. After the notches are cut, doublecheck the bevel points before sawing off shelf corners.



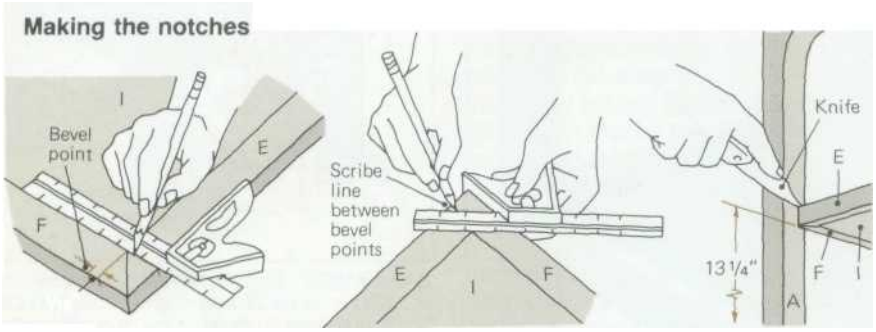
1. Rule a line around each leg 13 1/4 in. from the floor Measure the distances between the legs at these marks. Add 1/8 in. to each dimension to determine the size of the shelf (I). Cut shelf from $^{3}/4$-in plywood.



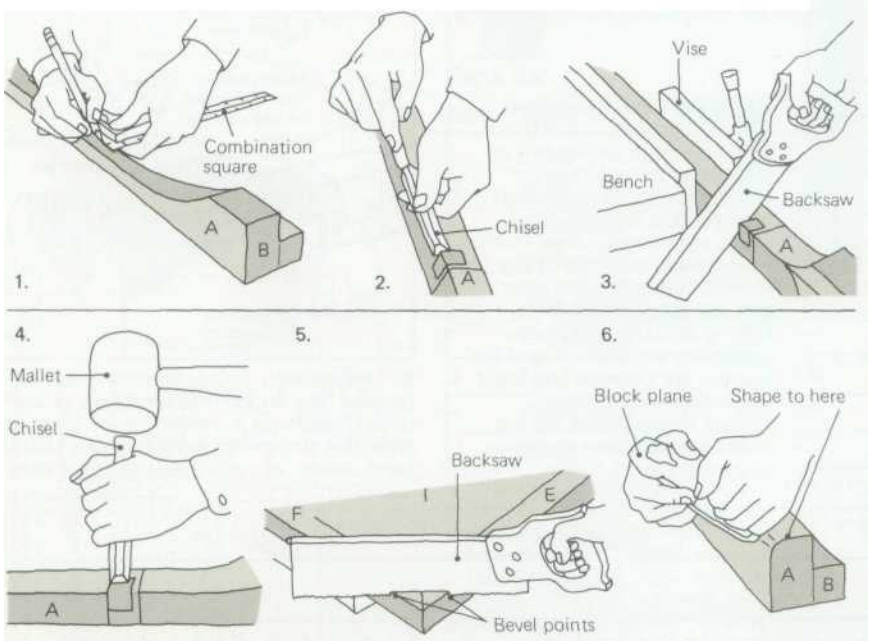
2. Miter one end of each side edging (E). Clamp to sides of shelf and cut an end edging (F) to fit between miters Mark and cut miters on opposite ends of parts E and fit other end edging. Glue and clamp edging in place.



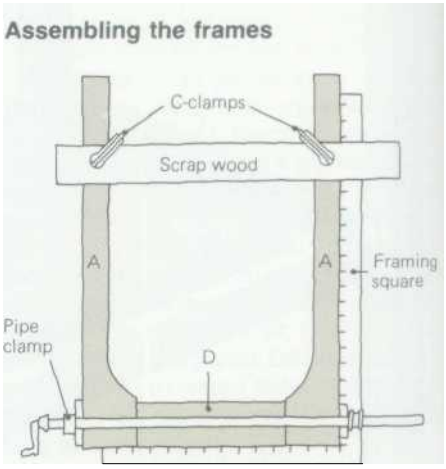
3. Plane parts E and F and sand with No sandpaper so that they are flush with both surfaces of shelf. Label each shelf corner and the corresponding leg before disassembling the table to cut the notches



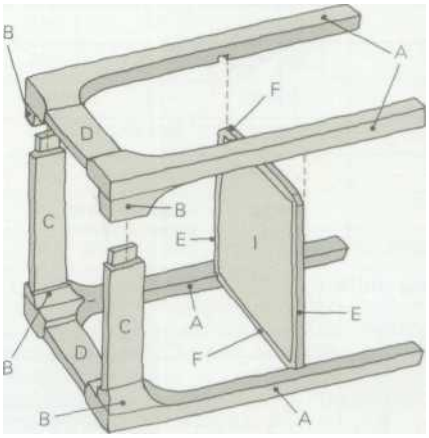
Extend outline of shelf (I) across edging (E and F); mark bevel points 1/16 in farther from corners. Hold each shelf corner against inner faces of its matching leg, and mark shelf thickness plus distance from corner to bevel points on leg



1. Scribe outline of each notch 2. Nick corner of each leg to ensure a clean saw cut 3. Cut notch to depth with backsaw 4. Chisel out notch, making its base flat or slightly concave 5. Doublecheck bevel points and saw off shelf corners. 6. Shape upper corners of legs (A) and wings (B) to the point where they meet the edging.



Sand all parts with Nos. 100, 150, and 220 paper Glue tenons of end aprons (D) into their mortises and apply pipe clamps To ensure squareness of end frames, secure scrap wood across legs with C-clamps



When glue dries, lay one end frame face down Apply glue to mortises and notches and insert side aprons (C) and shelf; then glue the other end frame in place. Stand table frame upright, square it up, and apply pipe clamps across legs.

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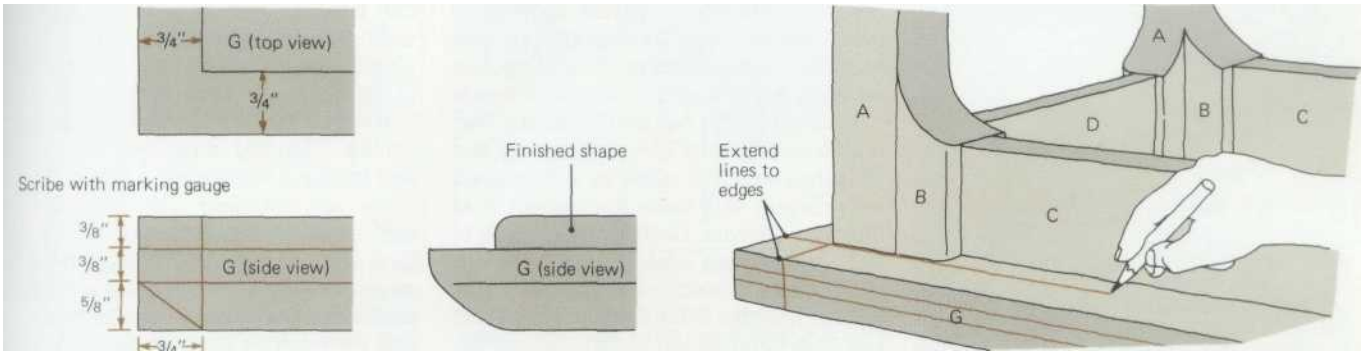
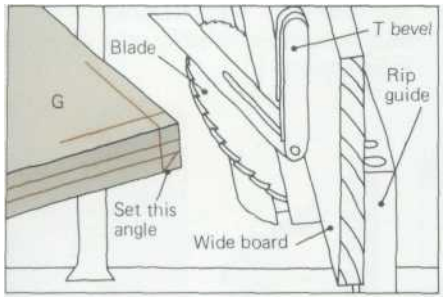
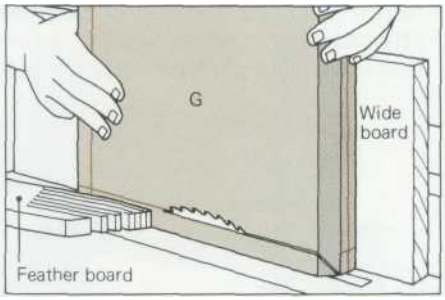
Shaping the top

The upper surface of the top is rabbeted all around to create a raised center panel. Viewed in silhouette, the edges of this panel should align with the outer surfaces of the table legs. The top's lower edge is beveled at an angle of about 40° to meet the upper edges of the corner units (A and B), Before beveling, center the table frame upside down on the underside of the top and outline the corner units; then set the angle of the table saw to cut just a hair outside these lines Gently round all sharp corners with a plane and No. 80 sandpaper to give the top a graceful form. Attach the top as shown below.

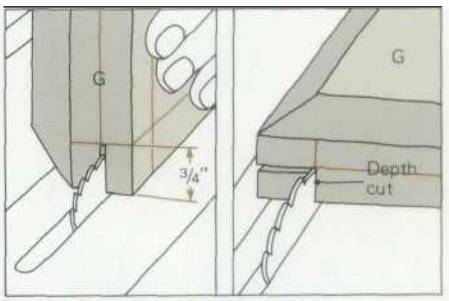




1. Use T bevel to transfer the angle from an edge of the marked-out top (G) to the table saw The blades of most saws can be tilted only to the right, so the rip guide must be moved to the left of the blade



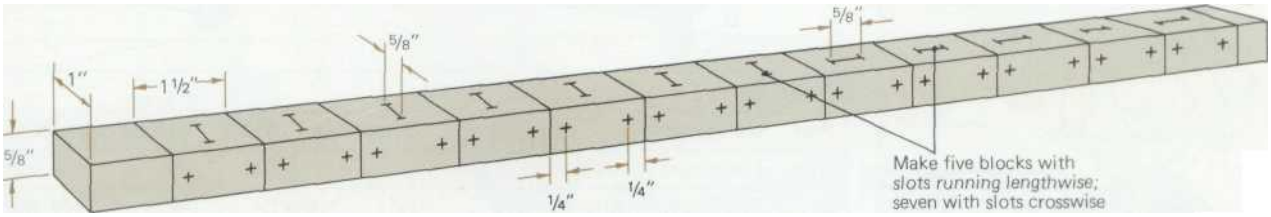
2. Make test cuts with scrap wood to find proper settings, then cut bevels along bottom edges of four sides of top.

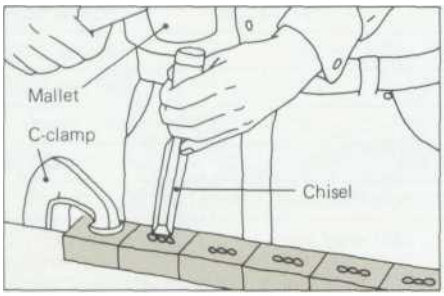


3. Move rip fence back to right side of blade and reset blade to 90°. Cut 3/4-in rabbets in all four edges of top Lower blade to 5/16 in. and adjust rip fence for depth cuts. Finish rabbets with chisel or shoulder plane.

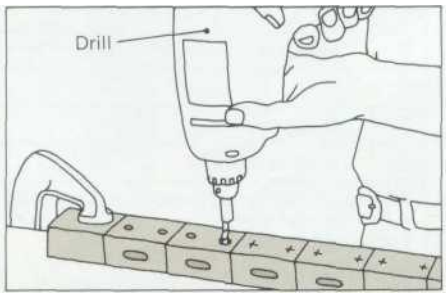
Attaching the top

Changes in humidity will cause the top to swell and shrink. If the top is firmly secured to the table structure, such movement will eventually weaken the mortise-and-tenon joints and may cause the, top to split. The problem is solved by attaching slotted screw blocks to the apron pieces, with all the slots running across the grain of the top, then driving screws through the slots and into the top. Make all the blocks from a strip of hardwood 5/8 inch thick and 1 inch wide that is at least 20 inches long, Mark out a dozen blocks as shown below—10 are needed, the other two are spares.

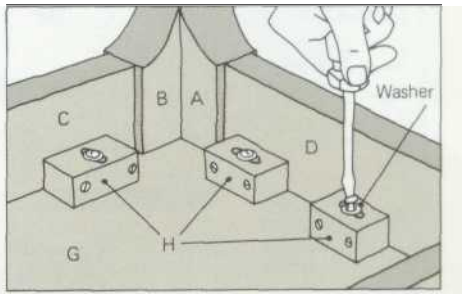




1. To make 5/8-in. slots in blocks, first drill three holes, using an 11/64-in. bit (Drill center hole first.) Then cut through waste from both sides with 1/2-in, chisel Finally, clean out the slots with 1/8-in chisel



2. Use an 11/64-in. bit to drill two shank holes through each block for the screws that will secure the blocks to the aprons Center the holes 1/4 in from the ends of the blocks Then cut the blocks apart.



3. Use glue and 1 1/2-in, No 8 screws to mount three blocks on each side apron (C) and two on each end apron (D). Attach top (G) with 11/4-in. No. 8 roundhead screws and 3/16-in washers. (Use 5/32-in. bit for pilot holes)

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DINING TABLE

An exotic wood from Africa, zebrawood gives a new look to this classic extension-leaf dining table. Zebrawood is not easy to work; your tools and saw blades must be extremely sharp to handle it. But the dramatic gram of zebrawood is unsurpassed by any other. If you prefer a more subdued look, use any hardwood that is available as veneered lumber-core plywood, such as oak, teak, walnut, or cherry.

The veneered plywood top is trimmed with mitered hardwood edge strips; it measures 35/2 inches x 56 inches and rests on a bearer rail and two leaves. Each leaf is 22 1/2 inches x 35 1/2 inches, including the edge strips. The stationary bearer rail supports the top when the two leaves are pulled out. The leaves are screwed to tapered slides, and as they are withdrawn from their storage position, the taper of the slides causes the table top to rise gradually. When the leaves are fully extended, the table top drops onto the bearer rail (see diagrams on opposite page, bottom left). It is a good idea to use your hand to support the top so that it drops gently. Dowels glued into the underside of the top are seated in the bearer rail to keep the top in position To return the leaves to their storage position, lift the table top and slide the leaves back under it (see illustration opposite)

In order to prevent scratches, the underside of the top is covered with felt where it touches the leaves. To compensate for the thickness of the felt at the ends of the top, plastic laminate is glued to the underside of the bearer rail.

In the chart the dimensions for the legs are given as though they were a single piece of wood; actually, each leg is made from two pieces of hardwood, each 1 3/8 inches thick, glued face to face. Be sure the slides are perfectly straight or the leaves will not operate smoothly. Wood of a thickness of the slides (1/2 inches) is likely to change shape after being cut because of the release of fibers. Therefore, it is a good idea to cut the wood close to the required width, joint it again (see Step 7), and then cut it to the final width. When making crosscuts, follow a similar practice; cut close to the line on the first pass, then make the second pass with the

Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
A	Top	1	¾"	33"	53½"	Plywood
B	Leaf	2	¾"	33"	20"	Plywood
C	Top side edge strip	2	¾"✲	1½"	56"†	Zebrawood
D	End edge strip	6	¾"✲	1½"	35½"†	Zebrawood
E	Leaf side edge strip	4	¾"✲	1½"	22½"†	Zebrawood
F	Leg	4	2¾"	2¾"	28½"	Zebrawood
G	Side apron	2	1½"	2¾"	48"	Zebrawood
H	End apron	2	1½"	2¾"	27½"	Zebrawood
I	Bearer rail	1	¾"	8½"	33"	Plywood
J	Bearer end edge strip	2	¾"✲	1½"	32½"†	Zebrawood
K	Bearer side edge strip	2	¾"✲	1½"	11"†	Zebrawood
L	Slide	4	1½"	1⅞"	49⅛"	Hardwood
M	Center support	1	1½"	2¾"	30"†	Hardwood
N	Slide stop dowel	4	⅜" dia.	—	1½"	Dowel
O	Joining dowel	16	½" dia.	—	3¾"	Dowel
P	Positioning dowel	2	½" dia.	—	2"	Dowel

✲Buy 13/16" thick stock and plane to ¾".
†Measurement is approximate; cut to fit during construction.

Tools and materials: Table saw with fine-tooth carbide-tipped blade, carbide-tipped rip blade, miter gauge, and crosscut tray. Circular saw with plywood blade. Router with 1/4" straight bit, 1/2″ or 3/4" straight bit, 1/4″ rounding-over bit, and 3/4″ core-box bit. Drill with 1/2″ twist bit, countersink bit, and doweling jig. Tenon saw, 1 1/2" chisel, wooden mallet, rabbet plane, smooth plane Steel tape rule, combination square, framing square, straightedge, pencil Standard screwdriver, spiral-ratchet screwdriver, awl. Vise, two quick-action clamps, two 6" C-clamps. Bar or pipe clamps as follows: seven 3'. five 4', four 6'. Two sawhorses White glue, contact cement, masking tape Nos. 80, 100, 120. and 150 sandpaper. No, 220 open-coat silicon carbide paper. 0000 steel wool. High-gloss polyurethane varnish, paste wax. paraffin, cloths. A 4' x 8' panel of 3/4" zebrawood lumber-core plywood. Solid zebrawood milled to 13/16", 1 3/8", and 1 1/2″ (see chart and Step 7). Hardwood milled to 11/2" (see chart), 1/2" plywood scraps. Two 1/2" hardwood dowels 3' long, a 3/8" hardwood dowel 6" long. Plastic laminate 8 1/2" x 32 1/2". 2/3 yd felt Four furniture glides for bottoms of legs Flathead wood screws: eight 1 1/2" No 8, four 2" No 10, two 1 3/4″ No 12, ten 2" No 12, and two *2'A″* No 12.

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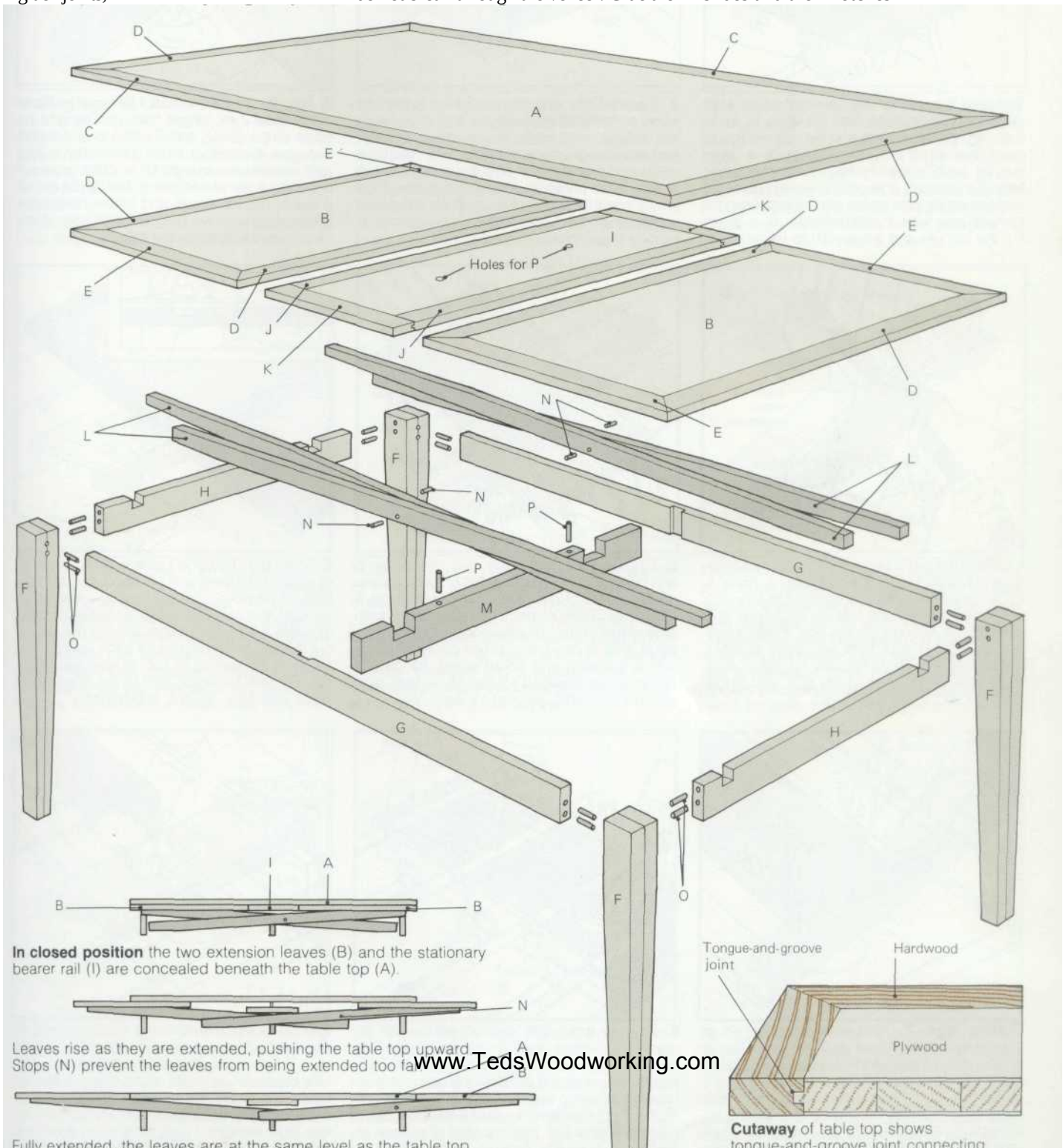
blade on the outer edge of the cutting line. This technique will give the cut a straighter surface.

The project calls for a number of bar or pipe clamps in several sizes. If you use pipe clamps, you will need seven pairs of head and tail pieces; then you can buy black pipe, threaded on one end, cut to the required lengths. Whenever you glue joints, have someone on hand to help wipe off the excess glue, position the clamps, and move heavy assemblies.

After you complete the step-by-step instructions, remove the top and leaves; then sand and finish all parts. Sand the hardwood with Nos. 80, 100, 120, and 150 paper; sand the plywood surfaces carefully with Nos. 100 and 150 paper so that you do not break through the veneer. Glue the felt to the underside of the top and put furniture glides on the legs.

This dining table was finished with four coats of high-gloss polyurethane, sanded between coats with No, 220 open-coat silicon carbide paper. A coat of paste wax was then applied with 0000 steel wool. (Alternative finishes might be tung oil or Danish oil.) Paraffin was used to wax the slides and their notches



In closed position the two extension leaves (B) and the stationary bearer rail (I) are concealed beneath the table top (A).

Leaves rise as they are extended, pushing the table top upward. Stops (N) prevent the leaves from being extended too far.

Fully extended, the leaves are at the same level as the table top.

Tongue-and-groove joint

Hardwood

Plywood

Cutaway of table top shows tongue-and-groove joint connecting

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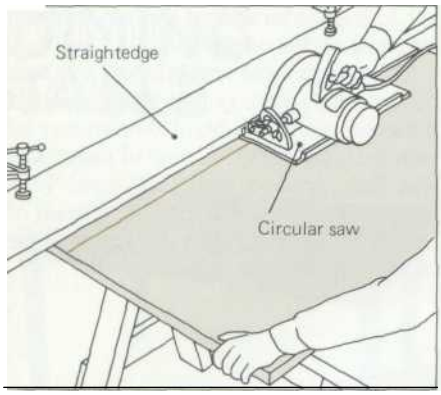
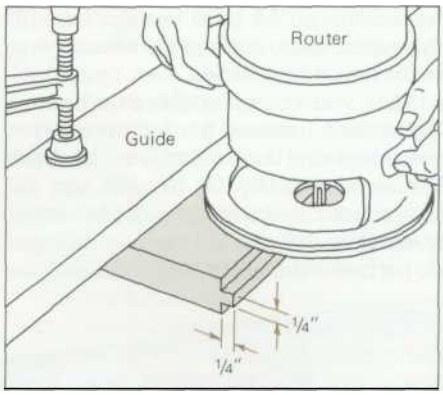
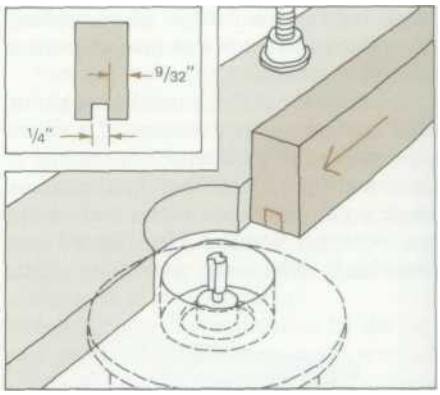


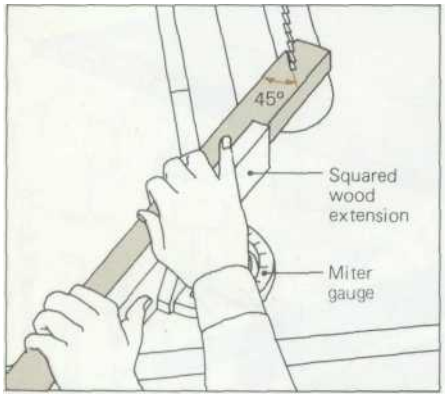
Top and leaves: 1. Rip plywood lengthwise on table saw. making first cut 33 3/8 in wide; then turn piece around and rip other edge to get a final width of 33 in, (This gives a clean cut on both edges) Place cloths on sawhorses to protect plywood, then rest plywood on sawhorses with better side down Using a circular saw with a straightedge as a guide, cut the top (A) and leaves (B) to length.



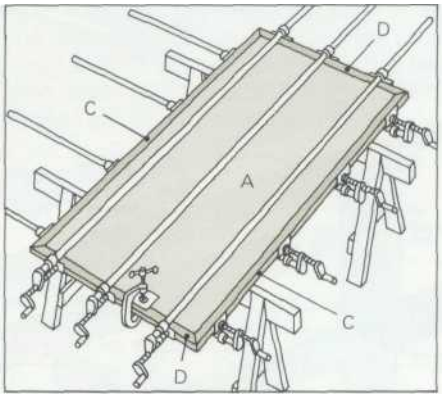
2. Practice this and the next step on scrap wood before cutting tongues and grooves in top, leaves, and edge strips. Using a router and any straight bit larger than 1/4 in., clamp a guide and adjust depth of cut to make a cut 1/4 in. x 1/4 in in plywood edges. If plywood measures less than 3/4 in, thick, reduce the depth of the cut on the underside to leave a tongue exactly *1/4* in. thick.



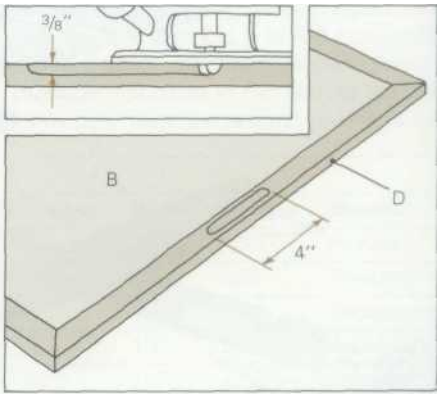
3. Rip 13/16-in. zebrawood 1 1/2 in. wide. Crosscut pieces 2 in longer than final lengths for edge strips (C, D, and E) for top and leaves. Set up a router in a table and use a 1/4-**in.** straight bit to cut a groove in one long edge of each strip Set the bit so that it leaves 9/32 in. above and below the groove (The extra 1/32 in will be planed off later.) Mark all pieces as to their orientation.



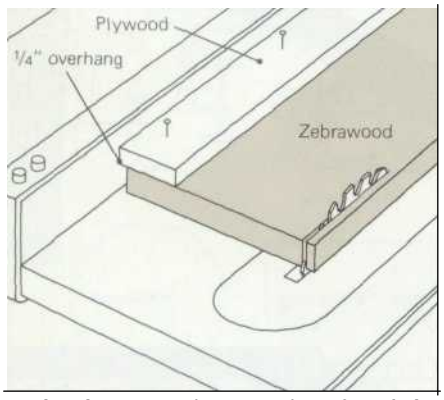
4. Extend the table saw miter gauge by screwing a squared piece of wood onto it Mark a 45° angle on one end of an end edge strip (D); saw in two passes, the first 1/16 in outside the line and the second on the line Place edge strip on top (A) and mark 45° angle at other end, saw as before Repeat for other end edge strip, side edge strips (C), and edge strips (D and E) on leaves (B)



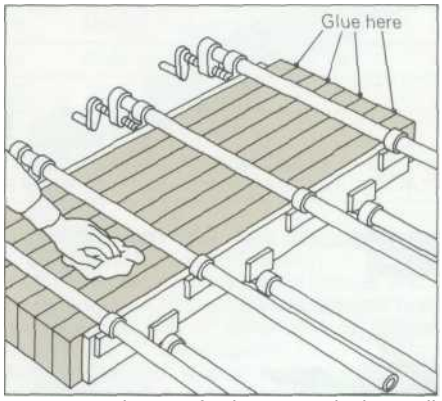
5. To glue each end edge strip to top, run a thin bead of glue on both sides of tongues and on shoulders of grooves. Clamp with three 6-ft. clamps. Then immediately glue and clamp side edge strips. (If plywood is higher than edge strip at any point, press plywood down with a C-clamp and scrap wood; be careful not to break plywood.) Wipe off excess glue with damp cloths. Repeat for each leaf.



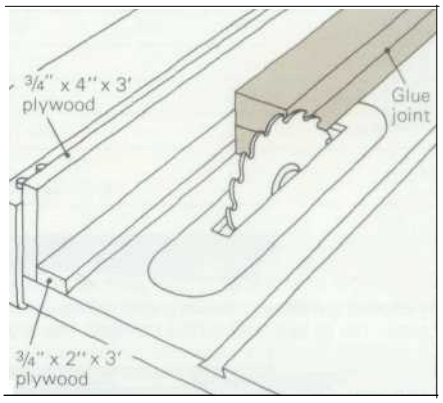
6. When glue has dried, plane upper surfaces of edge strips level with plywood, put masking tape on plywood to avoid nicking veneer Use a router and 3/4-in core-box bit set 3/8 in. deep to make a 4-in -long finger groove (for pulling out leaves) on underside of each leaf Plunge router at beginning of cut; at end turn motor off, wait until bit stops, and lift out. Sand edge strips with Nos. 80 and 150 paper



Cutting legs: 7. Joint one edge of **1 3/8-in.** zebrawood stock Make a straightedge by ripping a strip of 3/4-*in* plywood about 3 in. wide Nail it to one edge of stock so it overhangs 1/4 m Trim 1/4-1/2 **in.** from other edge Then with the edge you just cut riding the fence, rip enough boards to *2 13/16* in wide for eight lengths of 31 in Each leg (F) is made of two well-matched pieces glued together



8. Lay out three 3-ft clamps and place all eight leg pieces across clamps, inner surfaces up Spread glue on these surfaces Turn pieces on edge and press two glued surfaces together, making sure all ends and edges are flush Tighten clamps and add four more clamps across top Wipe excess glue from all surfaces Loosen, remove, and retighten clamps one at a time to wipe beneath them



9. Screw a fence of 3/4- x 4-in. plywood to table saw fence. Screw a second piece of plywood 3/4 in. x 2 in. x 3 ft to this fence as shown. Set saw blade 2 3/4 in high, and set fence so that blade will shave 1/32 in from one surface of each leg where the glue **joint** shows. Saw all four legs; remove small piece of plywood, set saw for a 2 3/4-in. cut, and saw opposite surface of each leg flush.

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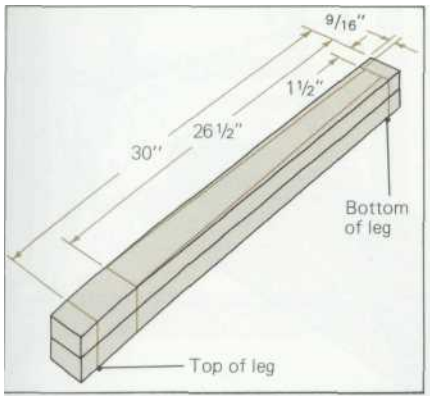
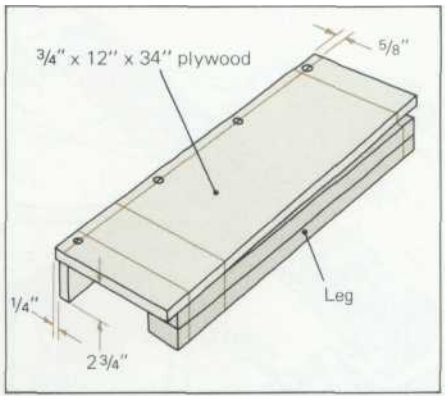
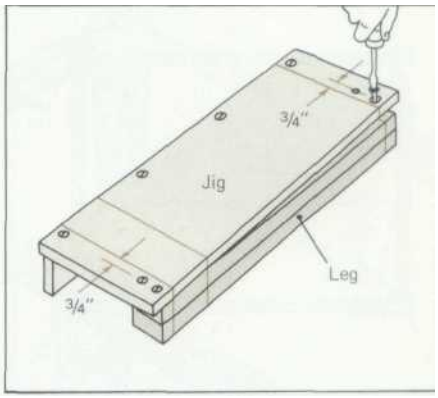


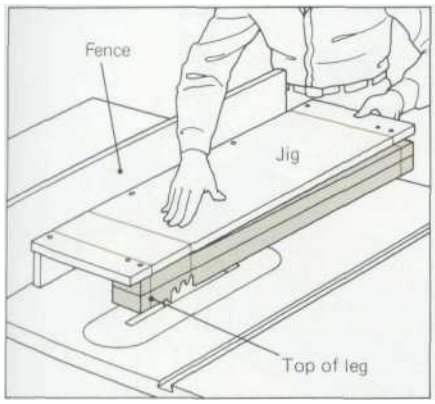
Shaping legs: 10. Use combination square to draw lines around each leg at 1 1/2 in, 26 1/2 in and 30 **in.** from bottom The span between 1 *1/2* in and 30 **in.** is the final length of the legs 28 1/2 in Mark corners of each leg tor taper by measuring in 9/16 in. from each edge along first line from bottom Use a straightedge to draw lines from these points to outer edge of each leg at **26 1/2-in.** line



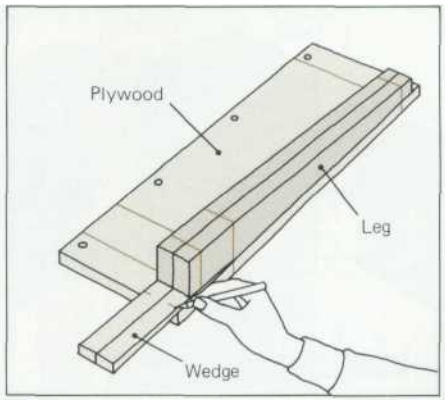
11. Make a jig for cutting tapers from a squared piece of plywood 3/4 x 12 x 34 in. Transfer the lines from one of the legs to the plywood and mark them across plywood. Draw a line 5/8 in, from one edge of plywood. Cut another piece of plywood 3/4 x 2 3/4 x 34 in. Set small piece perpendicular to large piece 1/4 in, from edge and below 5/8-in, line. Insert four 1 1/2-in. No. 8 screws along that line.



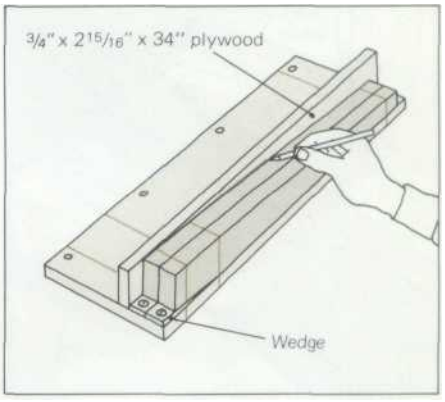
12. Drill four holes with a 3/16-in bit in the large piece of plywood 3/4 in. outside the lines indicating the top and bottom of the leg; drill two holes at each end. Align a leg's taper line, drawn in Step 10, with the edge of the jig and match the top and bottom lines of the leg with the corresponding lines on the jig. Drill into the leg through the four holes in the jig with a 3/32-***in*** bit; insert 1 1/2-in No. 8 screws



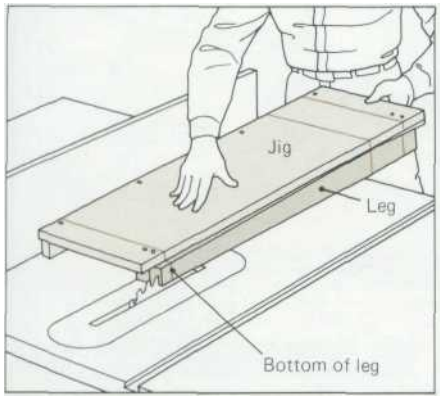
13. Set fence for a 1**2 1/32-in.** rip cut Because of the thickness of the legs, make several passes, raising the blade about 1 in. for each pass Reset fence for a 12-in. cut; shave off final 1/32 in in one pass for a clean cut. Redraw lines across cut surface with combination square Then saw opposite surface of leg by reversing it on jig; redraw lines. Save the wedges Repeat on the other three legs



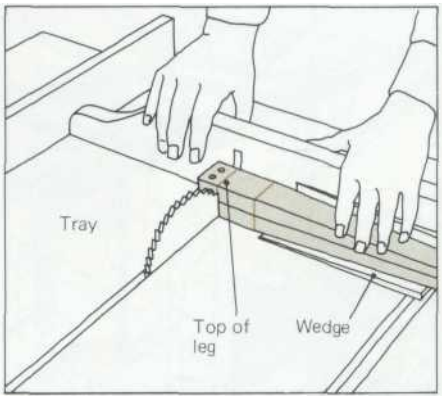
14. Before tapering other two surfaces of legs jig must be remade to fit tapers just cut Unscrew small plywood piece Lay large piece of plywood on table, place a leg on it. lining up top and bottom marks Hold down tapered portion of leg. and fit a wedge between plywood and untapered part of leg Mark wedge where it intersects end of **jig.** saw at this line, and screw wedge to jig



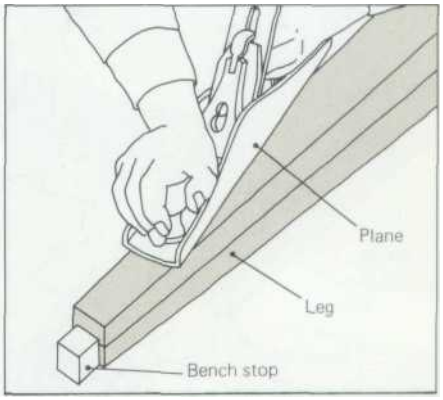
15. Mark taper on remaining surfaces Screw a leg to large plywood piece, tapered surface up. Cut a plywood piece 3/4 x 2 15/16 x 34 in Hold this against leg and mark taper on it Unscrew leg, nail large plywood piece along taper line just marked, and saw along that line with fence set at 12 in Remove nails Screw tapered piece to underside of large plywood piece, as before, with edge just cut down



16. When you cut the final two tapers, the leg must always be oriented the same way on the jig, with the bottom of the leg being fed through the saw blade first Saw the tapers in several passes raising the blade for each pass, with the fence set first at 12 1/32 in., then at 12 in , as you did in Step 13 Once again be sure to redraw all the squared lines as soon as you finish cutting each surface



17. To saw legs to final 28 1/2-in. lengths, you will need a crosscut tray wide enough to accommodate the length of the taper (If you have a radial arm saw, use that instead.) Put leftover wedges beneath and behind each leg to square it with the back and base of tray. Cut off excess at tops of legs. Reverse wedges set a stop on tray so that all four legs will be the same, and make cuts at bottoms



18. To remove saw marks, plane tapered surfaces very lightly with a smooth plane Do not touch untapered parts Decide on placement of legs (glue joints should face ends of table), and number them 1 4, Designate each joint surface as a or b; a will be joined to a side apron, b to an end apron On a plan label aprons I -IV (see next step), and write on each joint face the part to which it will be joined.

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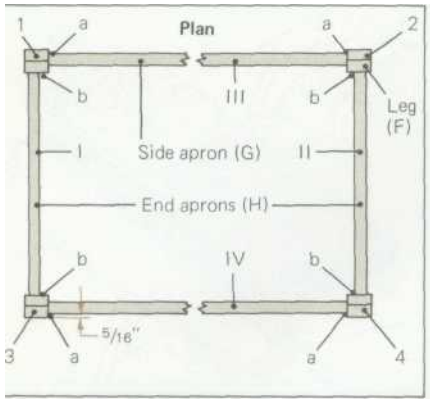
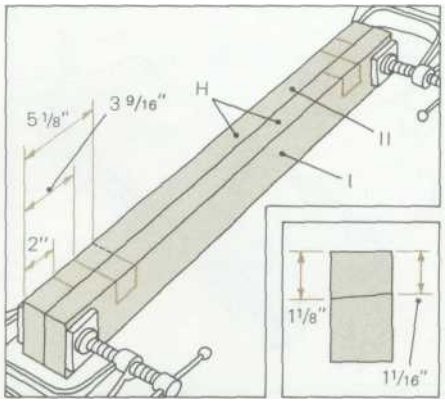
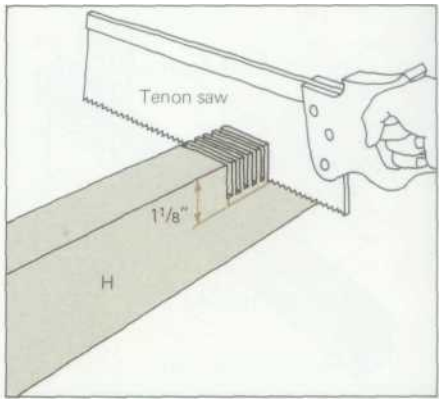


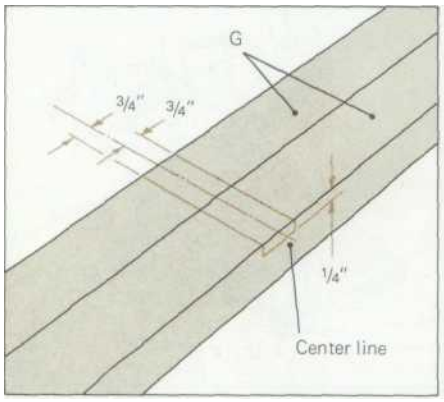
Making the aprons: 19. Joint 1 1'/2-in. stock, using method shown in Step 7. Rip and crosscut aprons (G and H) slightly larger than their final widths and lengths. Then joint each piece; rip and crosscut to final widths and lengths (Jointing twice helps ensure straightness, as wood changes shape when fibers are released by sawing.) Mark end aprons I and II, side aprons III and IV.



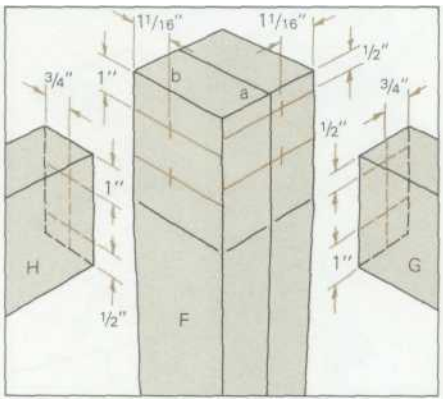
20. To mark end aprons (H) for slide grooves, clamp them inner face to inner face with ends flush. Using combination square, draw lines across top at 2 in., *3 9/16* in., and 5 1/8 in. from each end Unclamp. Draw lines across both faces of end apron I at 3 9/16 and 5 1/8 in.; draw lines across faces of end apron II at 2 in. and 3 9/16 in, Mark depth of grooves: 1 1/16 in. on the outer faces and 1 1/8 in. on the inner faces.



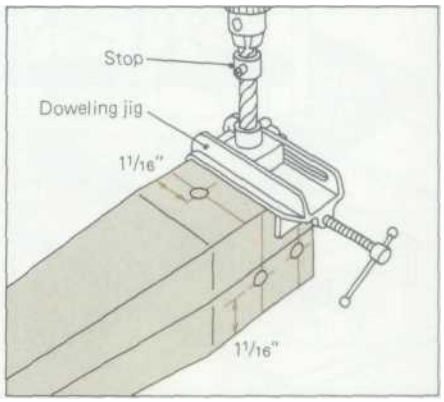
21. Set crosscut blade on the table saw to height of 1 1/16 in and make parallel cuts in the grooves, keeping the blade inside the lines drawn (or use dado head in table saw). Use a tenon saw to angle the cuts to the 1 1/8-in. depth on inner face. Use a 1 1/2-in, chisel and a wooden mallet to chop out the remaining waste. Clean the bottom of the cut with the chisel held beveled side up.



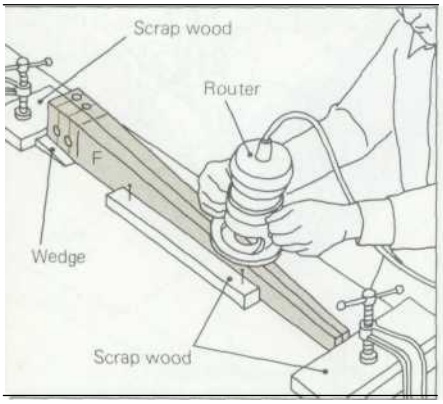
22. Clamp side aprons (G) side by side, and mark a center line across width of their inner faces (those that will face center of table). Draw lines 3/4 in. to each side of center line for grooves. Unclamp pieces; mark grooves for 1/4-in depth Cut these 1 1/2-in.-wide grooves with a dado head in the table saw, or use a router with any straight bit Plane outer surfaces of all aprons to remove saw marks.



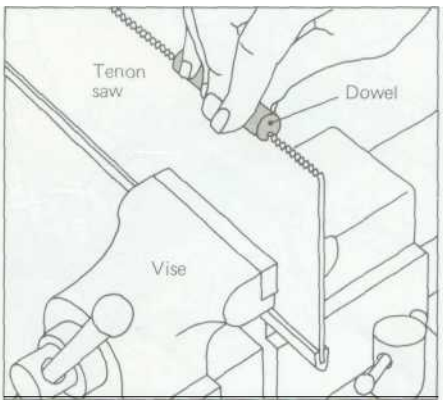
23. Lay out positions of dowel joints on apron ends For joint a on side aprons (G), measure 1/2 in. from top and 1 in. from bottom. Using a combination square, draw lines across ends of aprons. For joint b on end aprons (H), draw lines 1 in. from top and 1/2 in. from bottom. Clamp each leg in vise and hold matching apron at right angles to it. Transfer lines to leg, using sharp pencil. Draw lines across legs



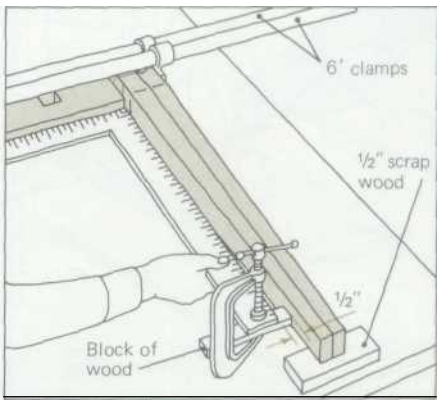
24. Set commercial doweling jig so that dowel holes will be 3/4 in. from outer faces of aprons Use a 1/2-in. twist bit, and set a drill stop at 2 in. plus the thickness of your doweling jig Align the doweling jig with marks made on apron ends. Drill holes, pushing down on drill and withdrawing it several times to get rid of waste. Set jig to drill holes in legs 1 1/16 in. from corners of legs.



25. Round corners of legs with a router and a 1/4-in piloted rounding-over bit. To hold a leg while doing this, wedge it between bench stops or scrap wood clamped to work surface Nail or clamp another piece of scrap behind leg to prevent its moving away from router. Start router at small end of leg and



26. Cut 16 dowels (O), each 3 3/4 in. long. Fit them in joints; if any dowels are too tight, sand them Glue and clamp in each dowel by clamping a tenon saw in a vise, teeth up, and rubbing the dowels on the saw teeth Test-fit legs and aprons. To check squareness of legs during assembly, clamp a small block of



27. When gluing legs to each end apron, apply glue around edges of holes, on ends of dowels, and on joint surfaces Rest bottoms of legs on 1/2-in.-thick scrap wood. Clamp across top and face of apron with **6-ft.** clamps Check squareness of legs to apron Measure from work surface to each leg bottom, distance

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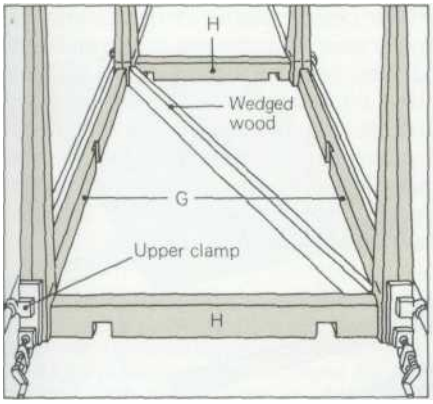
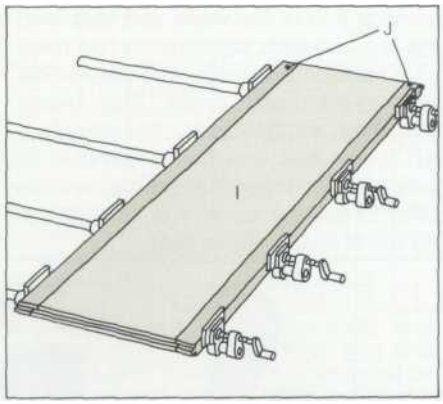
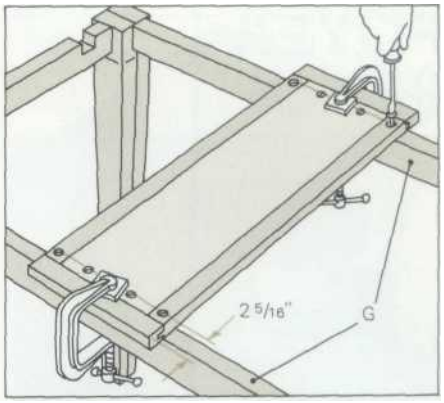


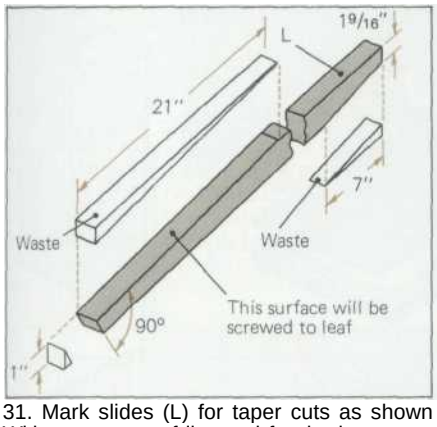
28. Glue side aprons to end assemblies, placing two 6-ft. clamps on each side. Check squareness. Adjust legs by manipulating clamps: tighten upper clamp to bring legs closer; tighten lower one to spread legs. Measure corner to corner; if measurements are unequal, cut a piece of wood the length of shorter measurement plus half the difference between the two. Wedge it diagonally.



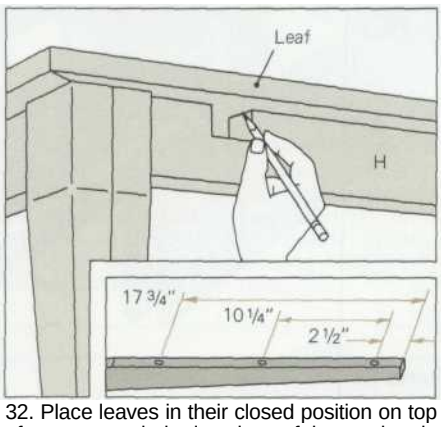
Understructure: 29. Glue plastic laminate to underside of bearer rail (I). Cut grooves in edge strips (J and K) as you did in Step 3. Cut tongues on long edges of bearer rail, and glue on end edge strips (J). Then cut tongues on short edges of bearer rail and across ends of edge strips just attached (corners are not mitered). Glue on side edge strips (K). Plane edge strips flush with plywood and laminate.



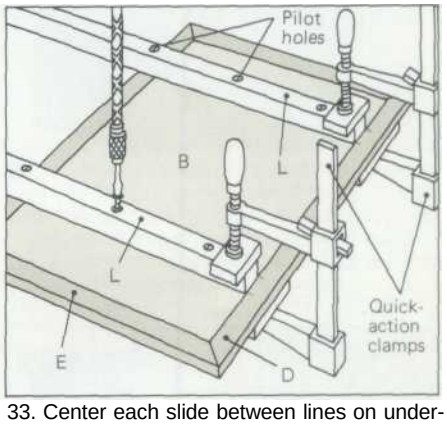
30. Center the bearer rail on side aprons, and make sure it overhangs them exactly the same distance on each side. Clamp the bearer rail in place. Draw a line 2 5/16 in. from each short edge of bearer rail. Drill and countersink pilot holes for four 2-in. No. 12 screws along the line on each side—two through the edge strips and two through the plywood. Insert the screws.



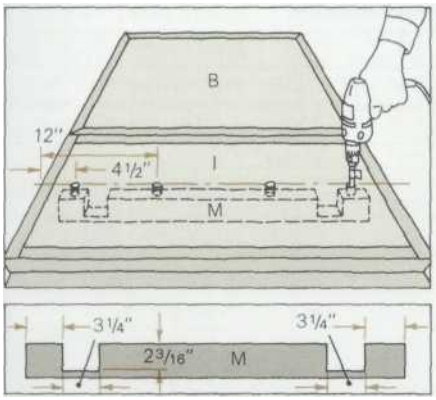
31. Mark slides (L) for taper cuts as shown With same type of jig used for the leg tapers (Steps 11 and 12). cut the long taper on one slide, use this as a template to mark other slides Saw those tapers, then repeat procedure for short tapers Long tapered surfaces will be attached to undersides of leaves and will be horizontal, mark and saw ad|acent ends at right angles to these surfaces



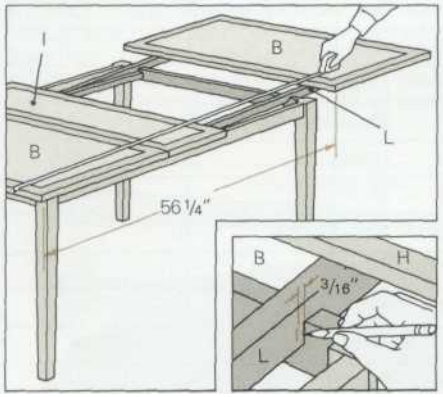
32. Place leaves in their closed position on top of aprons; mark the locations of the notches in the end aprons on undersides of leaves Remove leaves and use a framing square to extend the lines across undersides of leaves Mark undersides of slides at 2 1/2, 10 1/4 and 17 3/4 in. from ends of long tapers. Drill and countersink pilot holes for No 12 screws at these points Screws are inserted in next step



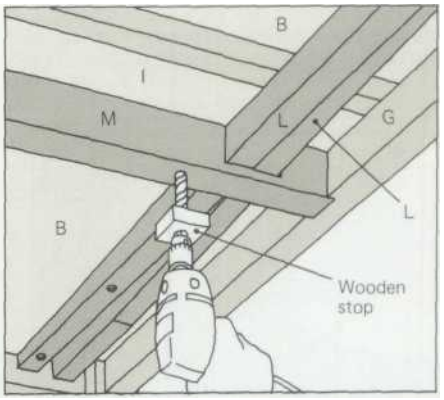
33. Center each slide between lines on undersides of leaves, aligning narrow ends with inner edges of edge strips. Clamp in place. At several points check that distance between them measures the same. Make starter holes in leaves with awl through pilot holes. Starting at narrow ends, use a spiral ratchet screwdriver to drive 1 3/4 in, 2 in., and 2 1/4 in. screws in that order, in each slide



34. Cut center support (M) to fit into dadoes in side aprons. Cut notches for slides in its top 3 1/4 in from ends, 3 /4 in. wide, and 2 3/16 in. deep Glue center support to side aprons. Using combination square, mark its position on top of bearer rail When glue is dry, drill and countersink 7/32-in. pilot holes in bearer rail and center support at 4 1/2 and 12 in from each edge of rail. Insert 2-in. No. 10 screws.



35. Position one leaf so that its inner edge is 56 1/4 in from outer edge of other leaf Mark inner faces of slides where they intersect notches in end aprons Make a second set of marks 3/16 in farther in from the first set Drill 3/8-in. holes 1 in. deep in the centers of the slides at these second marks Insert but do not glue slide-stop dowels (N) Repeat on outer faces of slides for other leaf



36. Top (A) is held in place by dowels (P). Drill holes for them 11 in from one edge of bearer rail and 13 in, from other into and through center support With leaves closed, clamp top in position, making sure all edges are flush. Put a wooden stop on drill bit at 4 in. Drill up through dowel holes into underside of top. Taper dowels to fit holes, sand them, and glue into top only

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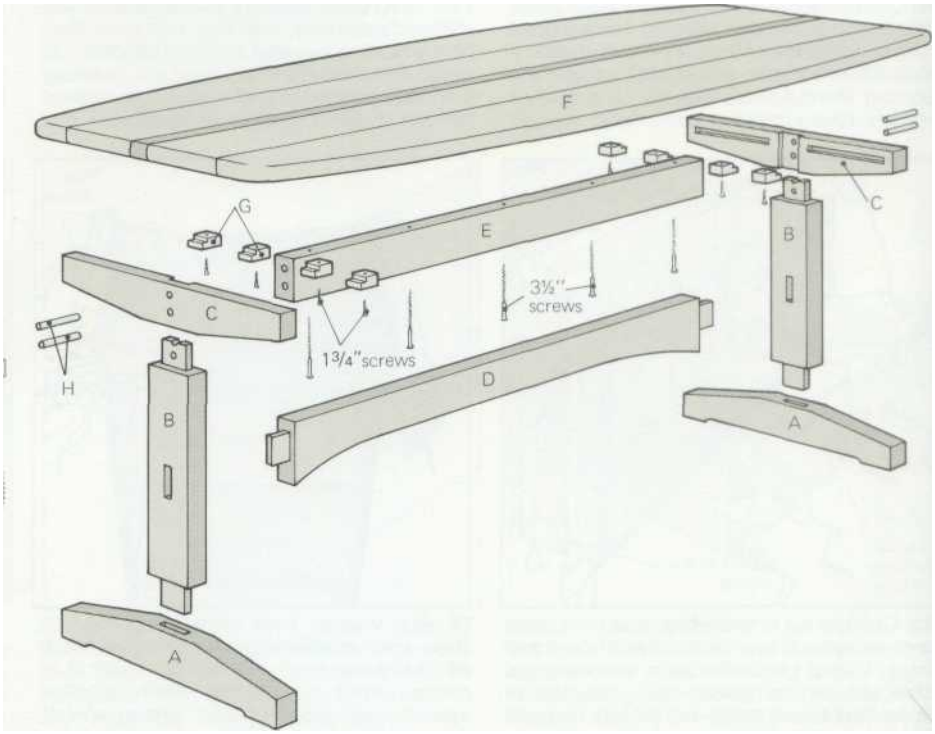
TRESTLE COFFEE TABLE

Subtle shaping brings out the beauty of the birchwood in this coffee table with a trestle base. The top is made of five edge-glued boards. The narrow center board is darker than the others and is 1 5/6 inches wide; the other four boards measure between 4 inches and *5 1/2* inches each—enough to add up to the total width of *20 1/2* inches. Buy the lumber dressed to the thicknesses given below, and rip the boards using a straightedge to ensure that they are square . Order from 25% to 30% more than the amount specified, and spend time matching the boards in different ways before you begin cutting those for the top to the final length.

Measurements given in the chart for the feet (A), crosspieces (C), lower stretcher (D), and top (F) are for the boards before they are shaped. The step-by-step directions show how to cut tapers and shape curves.Be sure to cut all the joints before shaping the parts.

The top is screwed to the base with movable buttons, allowing the wood to contract and expand with changes in humidity while being held fast.



Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
A	Foot	2	1¾"	2¾"	16"	Birch
B	Leg	2	1¼"	3"	15"	Birch
C	Crosspiece	2	1¼"	2½"	14"	Birch
D	Lower stretcher	1	1¼"	3⅞"	32½"	Birch
E	Upper stretcher	1	1⅜"	2½"	29⅞"	Birch
F	Top	1	1¼"	20½"	50"	Birch
G	Button	8	1"	1¼"	⅞"	Birch
H	Dowel	4	½" dia.	—	2⁵⁄₁₆"	Dowel

Tools and materials: Table saw with combination blade, dado head, tenoning jig Crosscut tray (optional) Band, saber, or coping saw. Dovetail saw Router with 3/8" straight bit. Drill with 9/64", 13/64", 25/64" straight bits and 1/2" brad-point bit. Brace with 3/8" auger bit and depth gauge. Drill press and large hand screw (optional). Four 3' bar clamps, tour 6" C-clamps. Smooth plane, fore or jack plane. Rasp, spokeshave or Surform, cabinet scraper, 1" bevel-edged chisel, 3/8" mortise chisel. Framing square, combination square, steel tape rule, mortise gauge, knife. Wooden mallet, standard screwdriver, stubby screwdriver, hammer Carpenter's glue, wax paper. Nos. 80, 120, and 220 sandpaper. Tung oil, 0000 steel wool, hard wax, cloths. Wood (see above). Eight 1 3/4" and five 3 1/2" No. 10 flathead wood screws.

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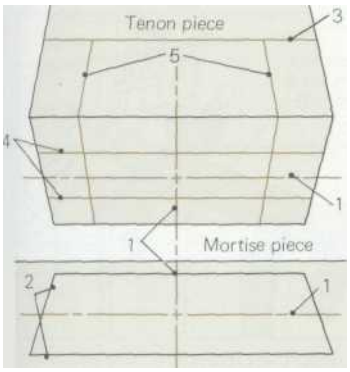
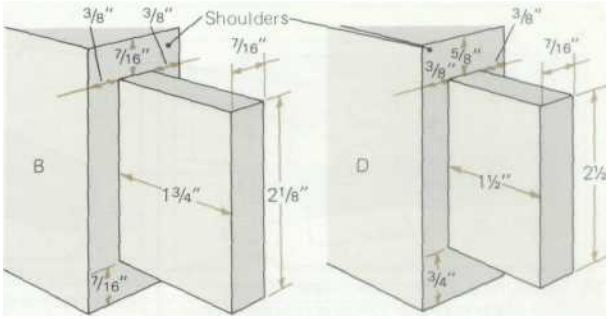
Mortise-and-tenon joints



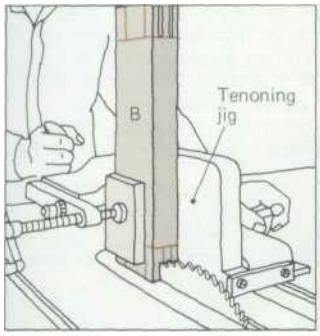
Cut and fit mortises and tenons prior to shaping parts To lay out joints on legs (B), lower stretcher (D), feet (A), and crosspieces (C), mark in numbered order as at left.

1. Mark center lines.
2. Hold each piece that will have a tenon against its mortise piece (see captions at right for placement). Match center lines, and outline tenon pieces on mortise pieces
3. Mark shoulder line of each tenon.
4. Use a mortise gauge to mark the thickness of each tenon on the end and sides of the tenon piece.
5. Mark the length of each tenon. Mark mortises in Steps 7 and 10.

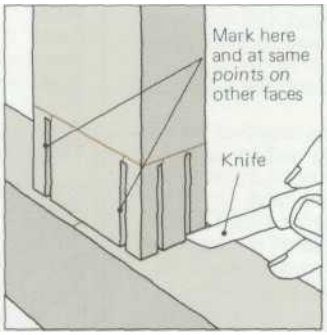


Cut this tenon on both ends of legs (B). Mortises are centered in the feet (A) and the crosspieces (C).

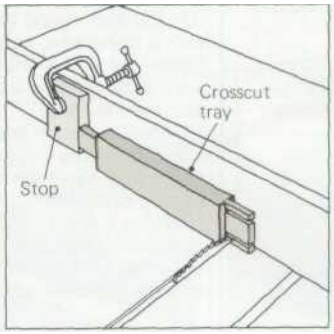
For tenons on lower stretcher (D), measure 4 in from shoulders of top tenons on legs to top of D in Step 2.



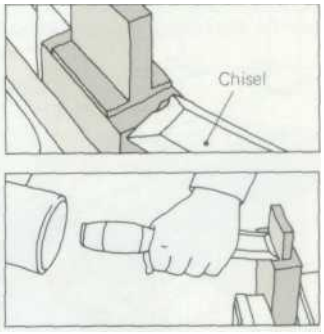
Cutting the tenons: 6. Use a tenoning]ig on the table saw, and set the blade so that it cuts a scant 1/16 in. below the shoulder lines On each tenon on both legs (B) cut one face; then reverse the work in the jig and cut the other face. Make all similar cuts before resetting the jig to make the next cut



7. Before sawing the waste at the shoulders, center each tenon piece over its mortise piece. Hold a knife against the inner surface made by each saw cut and use it to mark the dimensions of each tenon on its mortise piece These lines will later be extended (Step 10) to mark the outlines of the mortises.

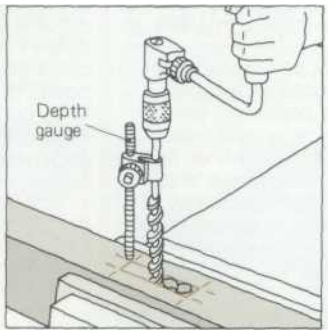


8. Clamp a scrap of wood to the crosscut tray as a stop; position it so that the saw will cut a scant 1/16 in. from the shoulder lines. Adjust the blade height, and cut off all the waste, turning each leg and holding it against the stop. If you do not have a crosscut tray, saw off the waste with a dovetail saw or other fine-tooth saw.

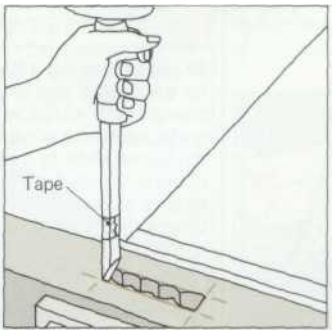


9. Trim each joint to the shoulder line with a narrow chisel, held with its beveled side up Take paring cuts (do not use the mallet), working from one side, then the other. Trim along the long edge with your widest chisel and a wooden mallet. Follow the same procedure for the through tenons on the lower stretcher (D)

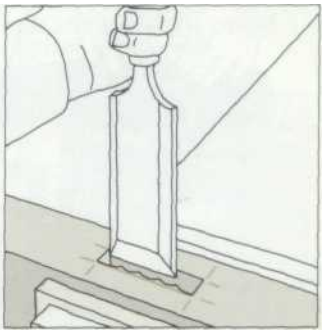
Marking and cutting mortises: 10. Set mortise gauge by marks made in Step 7; mark sides of each mortise. Using a combination square, mark the ends Mark through mortises on each leg (B) the same way, and square markings around to opposite face. Have mortise gauge bear on same edge of each piece.



11. Using a brace and 3/8-in. auger bit, set depth gauge so that the bit will bore a scant amount deeper than each tenon's length. Drill on center line, making several holes. For each through mortise, bit should just pierce opposite surface. Turn work over and drill from that point or from center line.

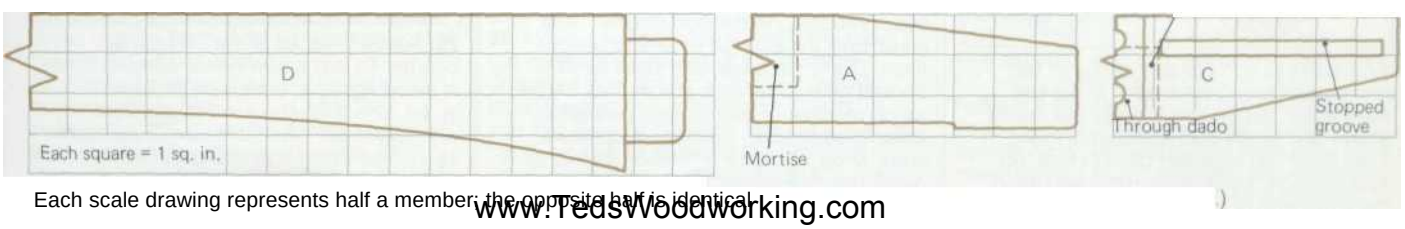


12. Mark the mortise depth on the mortise chisel by wrapping it with tape to match the length of each tenon. Use the chisel and a mallet to chop out the waste at the ends and in the bottom of the mortises. Work inward from both faces of the legs toward the center of the through mortises to clean their ends



13. Use a wide chisel (but not a mallet) to take paring cuts that will smooth the sides of each mortise Pare off 1/32 in. from both sides to allow the tenons an easy fit; keep trying the pieces so that the joints will not be loose. Work from both faces of each through mortise so that the edges will not splinter.

Scale drawings of trestle base parts



Each scale drawing represents half a member; the opposite half is identical.

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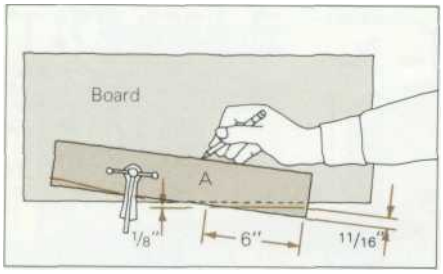
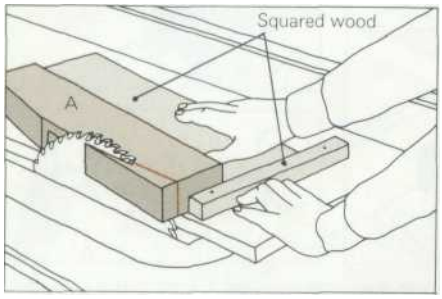
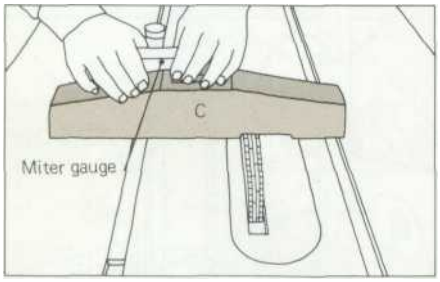


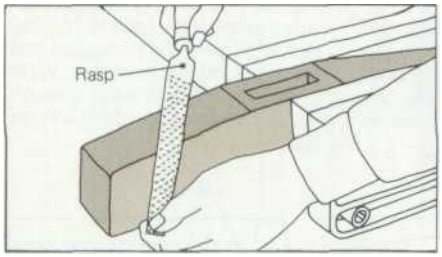
14. Measure 6 in. from each end on top edge of each foot (A), Draw a diagonal line from that point to form a triangle with an 11/16-in. base (see scale drawing, p.73). To construct a jig, clamp one foot to a squared board that is a third longer than the foot so that the taper line is parallel to the board's edge and overhangs it by 1/8 in. Outline the foot on the board, then unclamp it.



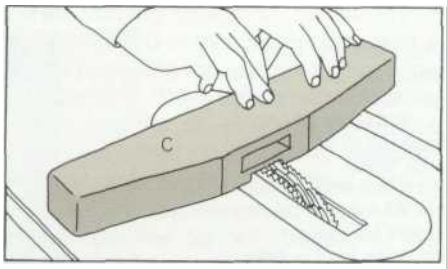
15. Nail two squared pieces of wood to the board along the side and back lines Place each foot in this jig and saw along the taper, reverse each foot to saw the taper on the other end of the foot. Use the same jig for cutting each crosspiece (C); remove a triangle 1 in. at the base and 5 in. along the lower edge of each part C.



16. Shape the underside of each foot by setting the dado head at 5/32 in high and making repeated crosscuts using the miter gauge. Or you can use a Surform tool to remove and shape the wood.



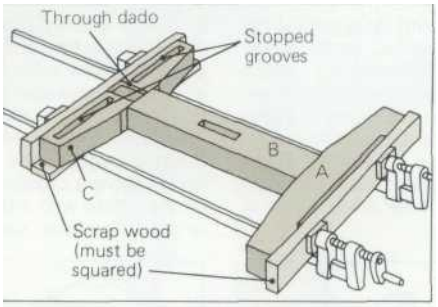
17. Round all corners and edges of feet and crosspieces with a rasp. Make one pass at 45°, and rasp off additional facets above and below until apparently round. Then finish the rounding off with Nos. 80, 120, and 220 sandpaper. Rasp and sand the underside of each foot.



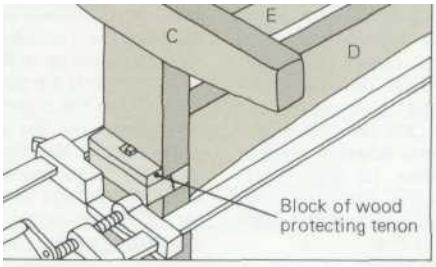
18. Use a dado head in the table saw, or a router and a straight bit, to cut a through dado in each crosspiece (C). Make it 3/16 in. deep and 13/8 in. wide. To cut the stopped grooves in the crosspieces, use a 3/8-in. straight bit in the router.

19. Enlarge the scale drawing on page 73 to make a template for the lower stretcher (D); transfer shape to wood. Cut the curve with a band saw, saber saw, or coping saw. Refine the shape with a rasp using its curved side. Rasp and sand the edges round as in Step 17.

20. Mark a center line the length of the upper stretcher (E) on its bottom surface. Along that line mark the positions of the five screws that will secure the table top to the stretcher—one in the center, one 1 1/2 in. from each end, and the other two halfway between. Drill shank holes with 13/64-in. bit, and Counterbore with 25/64-*in.* bit.



21. Glue one leg into foot and crosspiece for each end. Lay the pieces on two bar clamps with scrap wood protecting the surfaces and a scrap piece on one side of the crosspiece to make it lie evenly on the clamps. Spread glue on all surfaces of the tenons except the ends. Tighten clamps Check that each side of the assembly is the same height; tighten clamp on longer side. Repeat for other end of base.



22. Cut two blocks of wood 3/4 in, x 3 in. x 3 in., and in each make a channel to accommodate the through tenons. Tape these over the through tenons to protect them. Dry-fit the base; trim joints for fit. Spread glue on tenon surfaces that will be inside mortises. Place clamps parallel to lower stretcher with handles at opposite ends. Drop the upper stretcher (E) into its dado, but glue it later. Check diagonally for squareness

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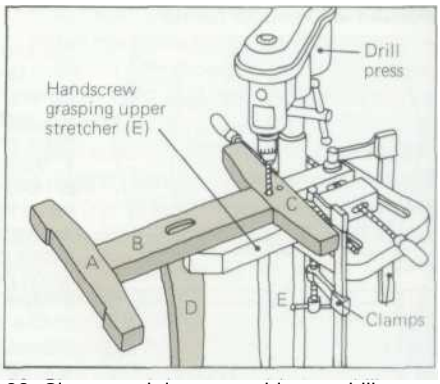
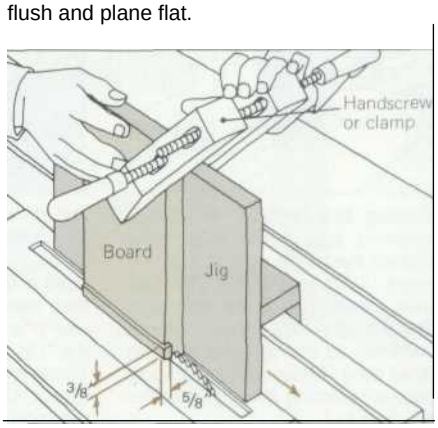
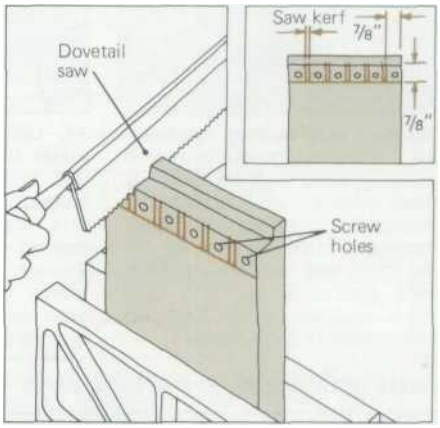


23. Clamp each leg assembly to a drill press table as shown, and drill holes for dowels (H) in each crosspiece with a 1/2-in. brad-point bit. Make holes 21/4 in. deep and center them 5/8 in. from top and bottom of crosspiece. Or use an electric drill with drill guide so hole is straight. Chamfer entering end of each dowel. Spread glue onto dowels and drive them into holes with a mallet. Saw ends almost flush and plane flat.

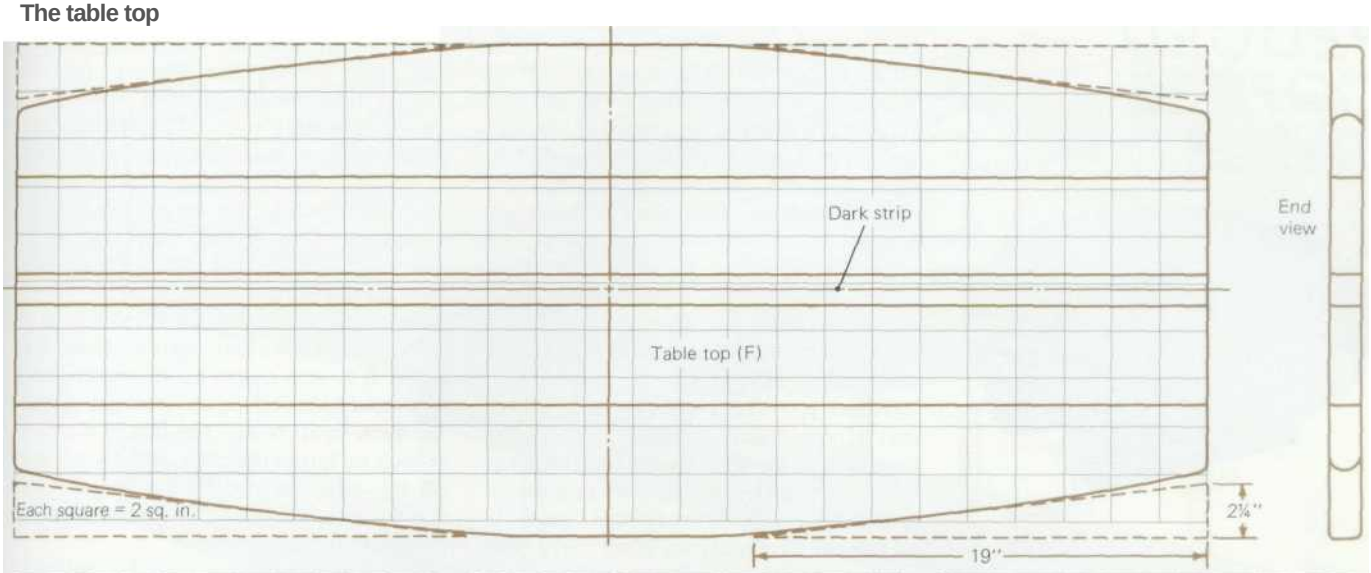


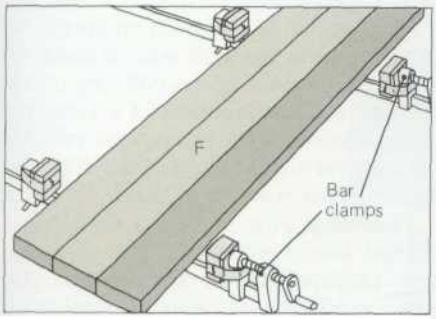
24. To make buttons (G), square and plane a board to 1 in. thick, 5-6 in. wide, and about 1 ft long. Use the table saw to cut a cross-grained rabbet at both ends of the board 5/8 in. deep and 3/8 in. wide. Make the $^{5}/8$-in. cut into the thickness of the board then stand the board on end in tenoning jig and make a $^{3}/8$-in. cut (Rabbet can also be cut with a router.)



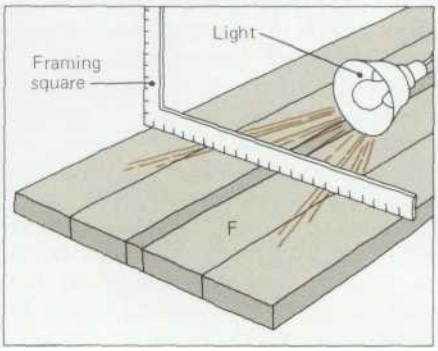
25. Scribe lines, as shown, on top of boards. To drill screw holes, clamp a scrap of wood tightly to underside and use a 13/64-in. bit. Drill through to scrap; Counterbore with $^{25}/64$-in. bit. Use table saw or dovetail saw to cut along right margin of each button to the 7/8-in. line. Saw along that line to separate buttons.

The table top

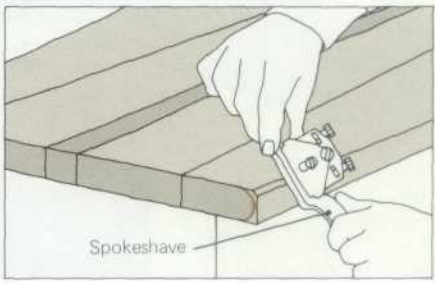




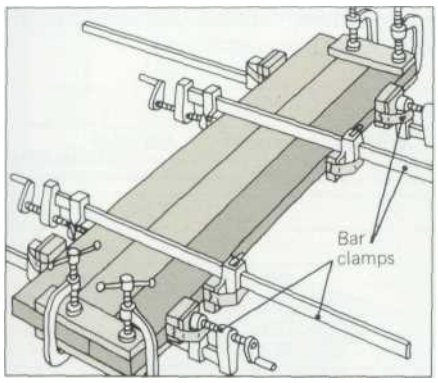
26. Check board for squareness; plane if necessary Leave board from which you will cut center strip its full width until Step 28 to make planing easier. Tape scrap wood to laws of four bar clamps; place two clamps on work surface with wax paper across bars Do a dry assembly to check procedure Apply glue to one edge of dark center board and to two boards flanking that side Join and rest boards on clamps.



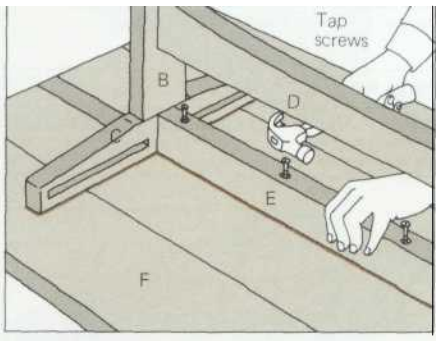
29. Scrape glue from surfaces. Beam a strong light across top, and move a framing square the length of the surface to check that it is level. Make pencil marks on high spots—where light does not show through
29. Plane down these high spots with a fore or jack plane, moving it in the same direction as the grain. Use a smooth plane to remove any remaining rough spots.



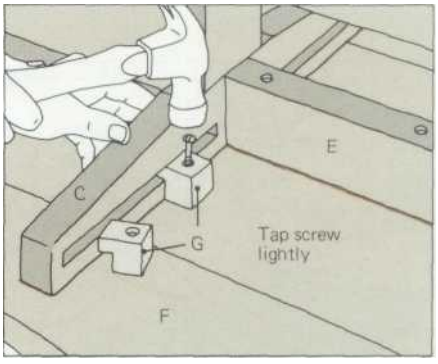
33. If remaining waste is wide enough, saw it off with a dovetail saw, otherwise use a smooth plane. Enlarge the scale drawing at top right. Transfer the curve to the ends of the table top. Use a spokeshave or a Surform tool, followed by a rasp, to shape the curve. Continue rounding along the side edges, but gradually decrease the curve toward the center so that only the corners of the vertical surface are rounded



27. Place C-clamps directly over the glued edges at each end, protecting table top (F) with scraps of wood rubbed with paraffin. Tighten C-clamps to bring edges flush. Check with hand along the length of joint that all edges are flush; pound with wooden mallet to align them. Add bar clamps across top; tighten all bar clamps
27. Remove clamps after 2-4 he, and saw center board to final width. Check for squareness and plane the sawed edge. Glue together the other two boards, as in Steps 26 and 27, then glue them to the first three boards.



31. Center base on underside of table and draw its outline. Insert a 3 1/2-in. screw in each hole in the upper stretcher, then tap screws to mark their positions on underside of table. Drill pilot holes 1 in. deep using a 9/64-in. bit. (Wrap the bit with tape to serve as a depth gauge.)
32. Make a template for shaping the table top from scale drawing at top of page. Construct a jig similar to the one used to taper the feet and crosspieces (Steps 14 and 15). Saw off triangles that are 2 1/4 in. at the base and 19 in. along the table-top edge. Tape the cutoff pieces back in place while sawing triangles from the other end.



34. Place table top face down Set base onto outline made in Step 31. Place buttons in grooves in each crosspiece. Insert a 1 3/4-in. screw in each hole; tap it to mark its position. Remove base and buttons Drill pilot holes 3/4 in. deep with a 9/64-in. bit.
35. Insert 3 1/2-in. screws in upper stretcher and tighten with a stubby screwdriver Screw buttons in place. Sand table with Nos. 80, 120, and 220 sandpaper Wet top with a cloth and let dry overnight. Resand with used No. 220 paper. Apply three or more coats of tung oil; rub each section hard until warm, then wipe dry immediately. Let sit overnight, and remove residue with 0000 steel wool Wax if desired

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JOINTED HARDWOC BOOKCASE

The softly flowing lines and sturdy jointed construction this hardwood bookcase can be achieved only by care workmanship, fitting and shaping each part to blend the whole. It is a job for an experienced craftsman.

The care begins with the selection of wood. The sides are of richly textured cherry, noted for its graceful figuring, and the horizontal members are of light-colored ash, straight grained and durable. These hardwoods are seldom found at reasonable prices in the widths needed for the project; therefore, it is necessary to edge-join narrower boards (see opposite page). Choose the boards carefully so that the colors and figures will blend; to bring up the figure of unplaned wood so that you can see it, brush a little paint thinner on the surface. In any case, the faces of the boards must be planed flat before edge-joining and planed again afterward for a good, flush surface. Buy rough lumber at least *1/4* inch thicker than specified in the chart below; buy dressed lumber at least 1/8 inch thicker.

The joinery looks deceptively simple The shelves are glued into dadoes in the sides with no attempt to conceal the joints. This means that the dadoes must be precisely cut to the thickness of the shelves—there is no tolerance for error. In this project instructions are given for fitting these and the several tongue-and-groove joints when using a dado head on a radial arm or table saw.

All edges and corners are rounded and shaped by hand. This is a matter of esthetic judgment, based in part on the figure and quality of the wood you are using. A spokeshave and drawknife are the tools of choice, but you can use a rasp, plane, Surform tool, and sandpaper to good effect. Note that the edge of the plinth front (H) is 3/16 inch below the upper face of the bottom piece (E) and that both corners are rounded where they meet. This is a traditional way of turning a possible defect into a design advantage. The shelf unit is not joined to the plinth; if the two surfaces were flush, the crack between them would always show. In this way, the crack is concealed at the bottom of a graceful ripple.

Because the weight of a full bookcase will tend to force the joints of the plinth apart, the mitered joints are reinforced with splines, and laminated corner blocks are glued all around.

Finishing: To bring out the warmth of the wood, rub in several coats of tung oil, allowing plenty of drying time.

Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
A	Side	2	¾"	12"✲	44½"	Cherry
B	Top shelf	1	¾"	7¾"	24⅞"	Ash
C	Middle shelf	1	¾"	9⅛"	24⅞"	Ash
D	Bottom shelf	1	¾"	11⅜"	24⅞"	Ash
E	Bottom	1	1 3/16"	11¾"	25⅛"	Ash
F	Top	1	1¼"	10"	27¼"	Ash
G	Back	1	¼"	25⅛"✲	44⅜"✲	A–2 cherry plywood
H	Plinth front	1	1¼"	4"	29"	Ash
I	Plinth side	2	1¼"	4"	14"✲	Ash
J	Plinth back	1	1¼"	3"	26⅝"	Ash
K	Plinth spacer	1	1¼"	3"✲	10⅝"✲	Ash
L	Spline	6	5/16"	1½"	2"	Ash
M	Corner block laminate	28	¾"	1¼"	1¼"	Ash

✲Measurement is approximate; cut to fit during construction.

Tools and materials: Drill with twist bits and countersink. Table saw or radial arm saw with combination blade, dado head, and splining jig Band, saber, or coping saw. Several 6" C-clamps and 6' bar or pipe clamps, quick-action clamps (optional). Smooth plane, jack plane, block plane. Rasp, spokeshave, drawknife. and/or Surform tool. Wooden mallet, 1/4" and 3/8" straight chisels. Try square, combination square, framing square, steel ruler, steel tape rule, wooden extension rule, knife, pencil. Nos. 80, 80, 120, and 220 sandpaper. Paraffin or beeswax, carpenter's glue. Wood (see above). One 2 1/4" No 10 flathead wood screw, 3/4" No 6 panhead wood screws.

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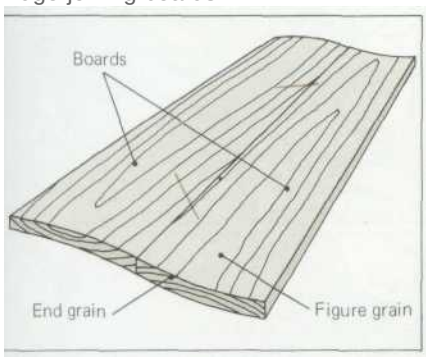
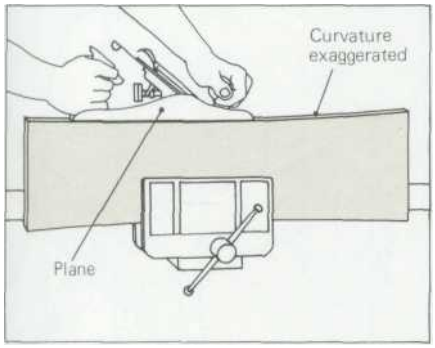
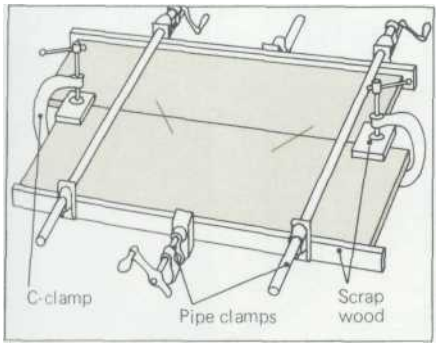
Edge-joining boards



Choosing boards. First, look at the end grain As a board ages, it will tend to cup in the opposite direction from the arch of the annual rings To minimize the effect of this warpage. lay boards side by side so that the direction of the arch alternates. Align boards so that their figures blend into an attractive pattern Use a pencil to make a few slanting lines across each joint to guide in realignment Saw boards to approximate length.

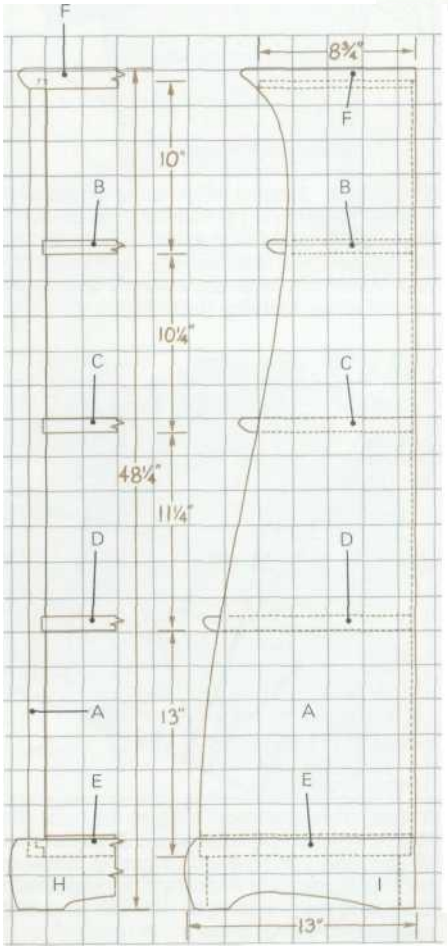


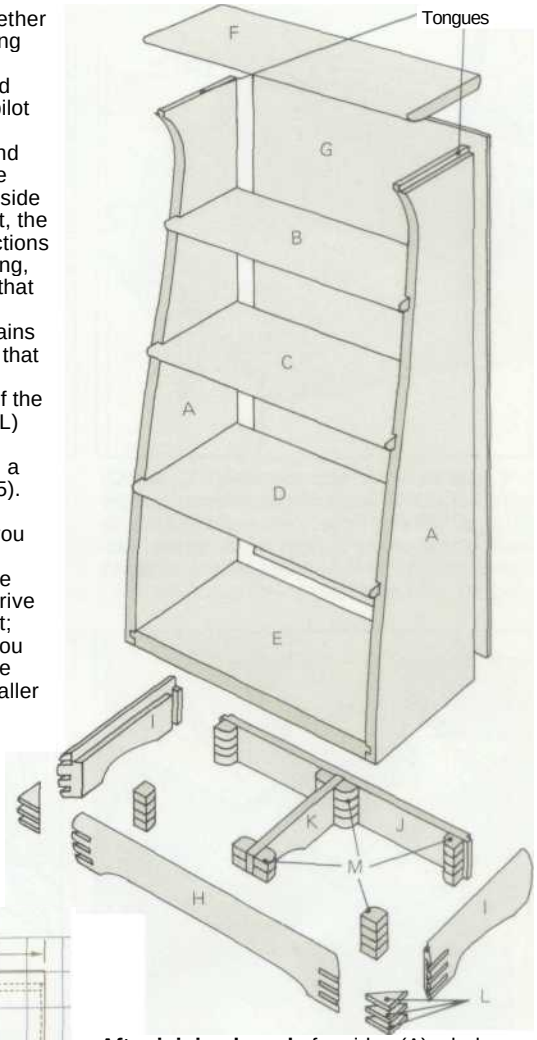
Preparing boards. Plane to within 1/8 in. of final thickness. Plane edges smooth and square The boards will eventually shrink a little more across the ends than across the middle; to prevent the wood from splitting at the ends when this happens, plane both edges of joint slightly concave the center of the **joint** should be separated by a gap that you can squeeze shut with your hands (less than 1/64 **in.)**



Gluing and clamping. Apply all clamps before gluing, mark positons and order of application. Then unclamp and apply a thin even coat of glue to both edges of joint. Reclamp quickly, tightening firmly but not forcing out all glue First, use C-clamps to align faces of boards at both ends Then apply bar or pipe clamp across center, forcing faces of boards into alignment, if necessary, as you tighten. Remaining clamps should alternate top and bottom

Exploded view shows how parts fit together All joints are glued except those securing the back (G) to the shelf unit which are secured with 3/4-in. No. 6 panhead wood screws (Step 18); use a 5/64-in. bit for pilot holes. The shelf unit is not joined to the plinth but rests on the plinth back (J) and spacer (K) and inside the rabbets of the plinth front (H) and sides (I)—if a plinth side were glued to a side (A) of the shelf unit, the fact that the grains run in opposite directions would cause stress, and probably splitting, in the shelf side. The corner blocks (M) that reinforce the joints of the plinth are intentionally laminated with the wood grains running in alternate directions, ensuring that no joint Is compromised by the sole presence of end grain. The front joints of the plinth are further reinforced by splines (L) Vie in. thick; order ash stock planed to thickness, or cut a strip to thickness on a table saw, then dado slots to fit (Step 15). There is little danger of the shelf unit slipping backward on the plinth, but if you wish to ensure its security, drill and countersink a 3/16-in. hole up through the front part of the plinth spacer (K) and drive a 2 1/4-in. No 10 wood screw through it; drill a 1/64-in. pilot hole in the bottom. You can also glue two slotted blocks onto the plinth back (J) to receive additional, smaller screws





After joining boards for sides (A), shelves (B, C. and D), bottom (E), and top (F), cut all stock to final length, and plane to final thickness Rip shelves, top, and bottom to width. Use 2-in. grid (see p.48) to make full-size patterns for sides (A), plinth front (H), and plinth sides (I) and to guide in shaping the protruding edges of the top and shelves (Step 4) To make the pattern for the plinth front, duplicate the section shown and its mirror image, connect the lines for the cutout portion with an arc that rises to the same height as the cutouts in the sides

Trace patterns onto side pieces (A). Before cutting the long S curve, use a table saw or radial arm saw to make a square cut from the top edge of each piece, 83/4 in from the back, for the front of the tongues Then rough-cut the pieces individually with a band saw, saber saw, or coping saw Clamp them back to back, and shape them simultaneously to the line with a rasp drawknife, or spokeshave Cut rabbets into the top outer edges of the sides, leaving tongues 1/2 in. thick and 1/2 in. deep Cut the dadoes for the shelves 1/4 in. deep, marking the width of each dado from the thickness of the shelf that will fit into it. (Measurements between shelf dadoes are given from bottom edge to bottom edge; to achieve dado cuts that match the thickness of the wood, make test cuts in scrap wood inserting paper washers between dado heads as necessary.) To ensure that the shelves will be level, lay the side pieces side by side and mark across both at once

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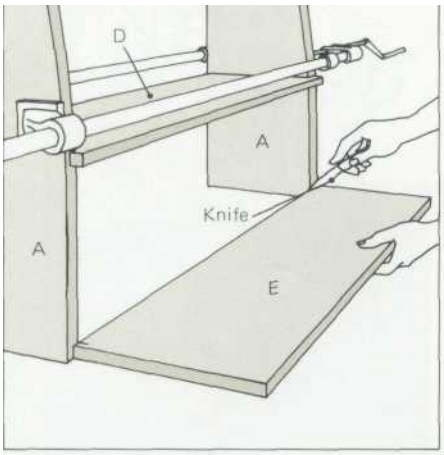
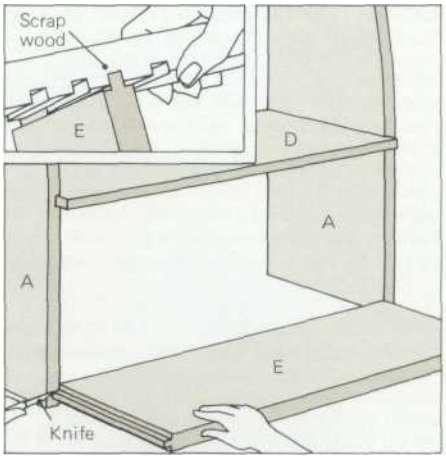
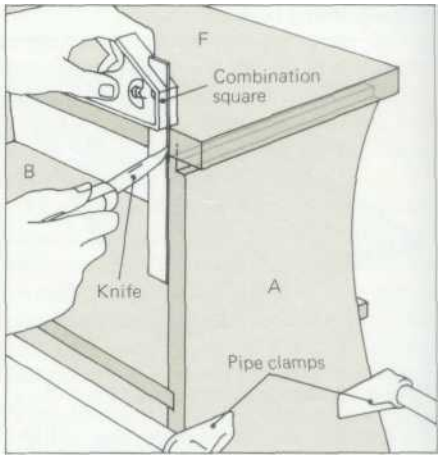


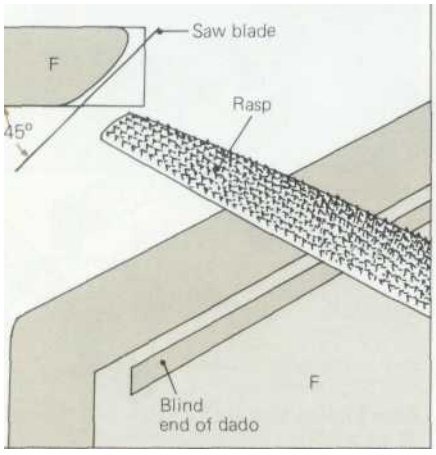
1. Clamp sides (A) and shelves (B, C. and D) together with all joints square. Center bottom (E) against front edge: use a sharp knife to mark points where bottom meets sides. Rabbet both ends of E to these marks, leaving tongues centered and 1/2 in thick.



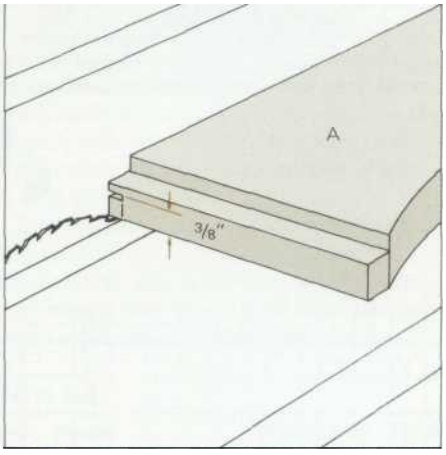
2. With a sharp knife mark position and thickness of tongues on front and back of sides (A). Make test cuts in scrap wood to set dado heads to exact width and depth needed; then cut dadoes in sides to receive tongues of bottom Reassemble unit with bottom in place



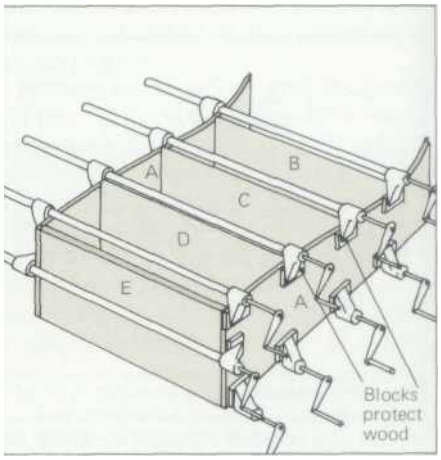
3. Position top (F) so its back is flush and overhang is equal on sides Mark width of tongues on back of top and mark front of tongues on underside Cut dadoes to receive tongues (see Step 2) Dadoes do not go all the way through; finish blind ends with a chisel.



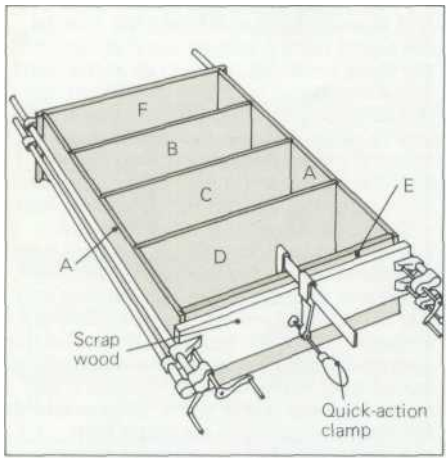
4. With top in place, sketch rounded patterns on edges of top (F) and shelves (B. C, and D) Disassemble unit and shape edges; use table saw set at 45° to remove the main body of wood from lower edge. Finish shaping with jack plane, rasp, and No 60 sandpaper



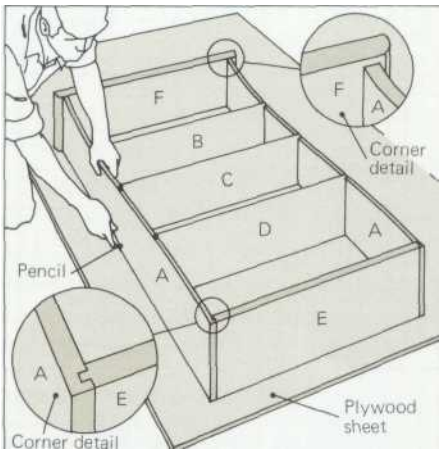
5. Cut 1/4-in rabbets 3/8 in deep in back of sides (A) and top (F) to receive 1/4/-in. plywood back. Sand all interior surfaces with No 80 sandpaper, then with No 120, and finally No 220 Assemble shelves, bottom, and sides without glue, applying all clamps



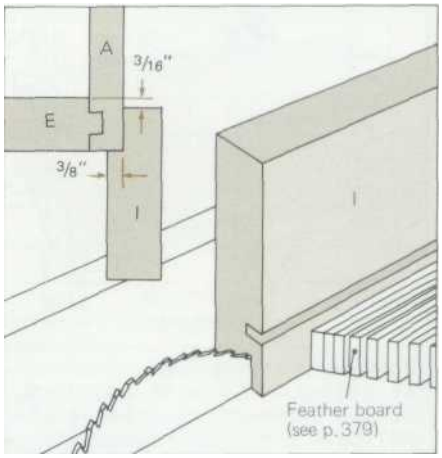
6. Use a bar or pipe clamp across the front and back of each shelf and the bottom, and apply another across center of bottom to prevent buckling Mark placement of clamps and disassemble Appty glue to dadoes and reclamp quickly Let glue dry



7. Before gluing top (F) to its tongues, cut a piece of scrap the same length as top to overhang the bottom and equalize the pressure of clamping Apply glue to dadoes and clamp top in place, using two bar or pipe clamps on each end, running to scrap on bottom



8. To find most attractive figure for back (G) lay shelf unit on plywood sheet. Trace outline of unit, and cut plywood to outline. Then fit back precisely within rabbets on sides and top Sand back with Nos 80, 120, and 220 sandpaper; do not secure it to unit



9. Rip stock for plinth front (H) and sides (I), and plane to width Cut each piece 3-4 in. longer than specified. Cut rabbets 3/8 in. deep along one face of each piece to receive shelf unit; to find width of rabbets, deduct 3/16 in. from thickness of bottom (E).

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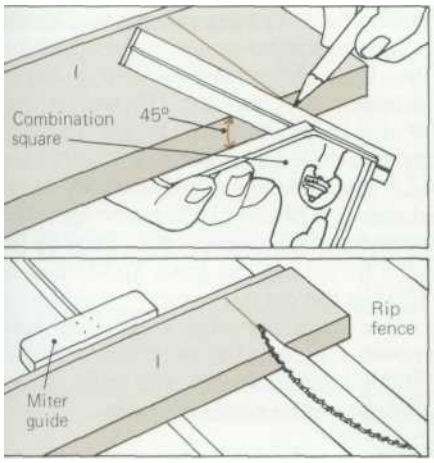
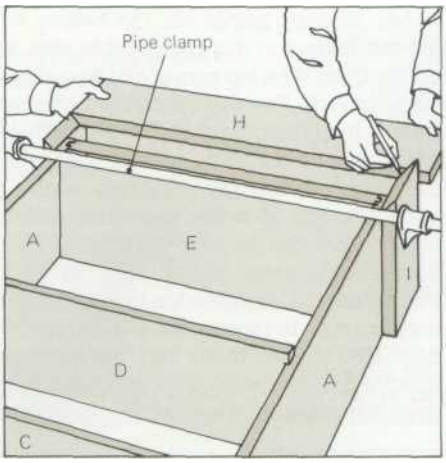
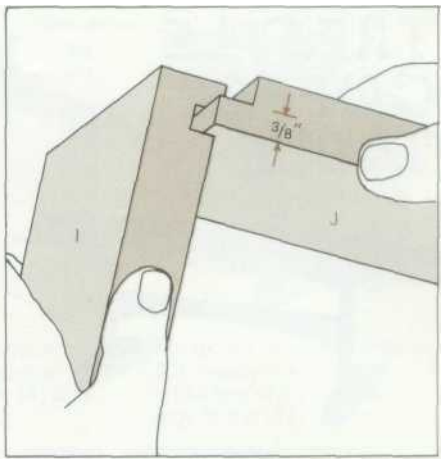


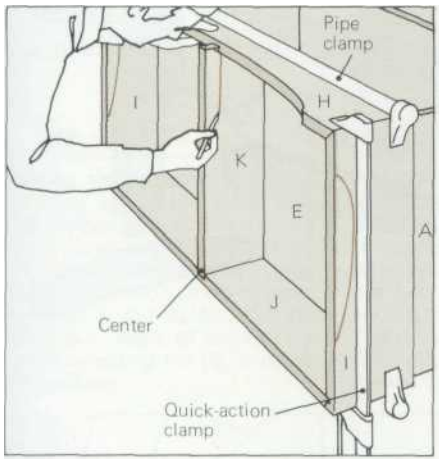
10. Cut 45° bevels on front end of each plinth side (I) and one end of front (H) For accurate cuts, scribe edge of wood first with combination square; set table saw to 45° and cut 1/16 in too long, then shave to line, adjusting blade if needed Check cuts with square



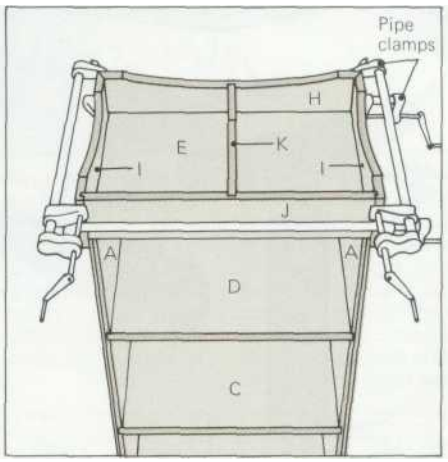
11. Clamp plinth sides (I) to shelf unit so beveled ends align with front of unit Fit plinth front (H) by holding beveled end against one side bevel and marking other end; cut overlong. then shave a little at a time until both mitered joints fit snugly Cut sides to length



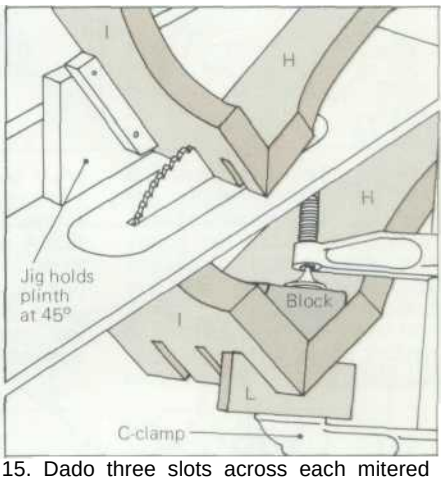
12. Rip and plane stock for plinth back (J) and spacer (K) to width of unrabbeted portion of sides. Cut plinth back to length Rabbet both rear corners, leaving tongues 3/8 in thick Mark and cut dadoes in plinth sides (I) to fit (See Steps 1 and 2.)



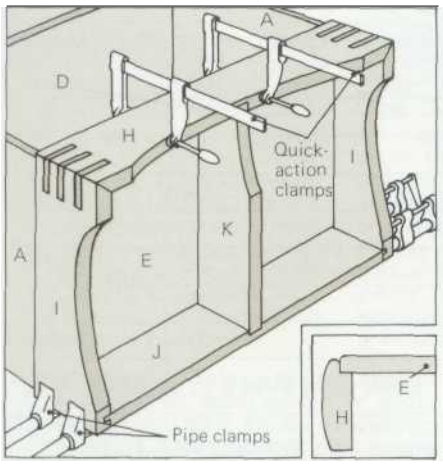
13. Cut dadoes to receive spacer 1/4 in deep across center of inner faces of plinth front and back Clamp plinth pieces in place around shelf unit and cut spacer to fit between dadoes Scribe and rough-cut cutouts on plinth front and sides and front end of spacer.



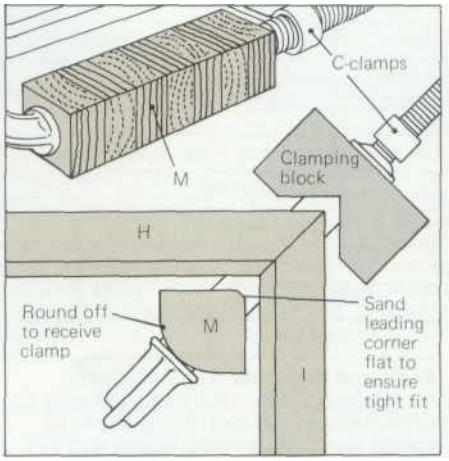
14. Rub wax on front corners of shelf unit. Then, after establishing clamping procedure with a dry run. apply a thin coat of glue to all mitered ends and clamp plinth together around shelf unit. (Put back and spacer in place for clamping, but do not glue them)



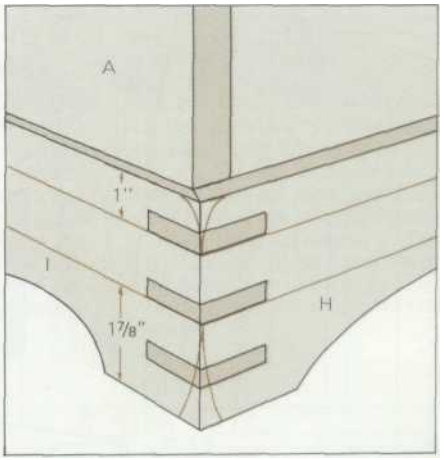
15. Dado three slots across each mitered corner, using scrap wood to set width and depth of saw. Cut splines (L) square to length of slots. Apply glue Use a C-clamp to force each into its slot When glue dries, saw splines parallel to wood surface; plane flush



16. With rasp and sandpaper, shape inner edges of plinth sides and front, finish shaping cutout sections, and round front edge of bottom piece (E). Clamp plinth to unit, gluing tongues of back (J) into their dadoes. When dry, glue and clamp spacer (K) in place.



17. Glue corner block laminates (M) in stacks, alternating grain direction. Saw to lengths needed Glue and clamp into joints of plinth. When glue is dry, begin shaping plinth First, rule lines along face of front (H) and sides (I) 1 in. from top edge and 1 7/8 in from bottom.



18. Trace pattern for rounding plinth onto both faces of front corners and onto rear edge Plane to desired shape Complete shaping all edges with No. 80 sandpaper, then sand with Nos 120 and 220. Finish shelf unit, plinth and back, then screw back in place

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EARLY AMERICA BOOKCASE

This Early American bookcase is versatile enough to blend with almost any decor. If you eliminate the decorative molding, the bookcase is not only easier to build, but it will also fit in with most modern or traditional furnishings. As shown, the bookcase is 7 feet high, 30 inches wide, and about 12 inches deep, but its design can be varied to suit your needs. The bookcase can also be used as a unit in wall-to-wall bookcases.

If you plan to build wall-to-wall bookcases, omit the molding supports where the sides of two units meet, since the moldings will get sufficient support from the adjoining sides. You can also omit the mitered joints and the side sections of the crown and baseboard moldings.

Construction: Begin the construction of the bookcase by cutting and assembling the shell. Cut the two sides (A), bottom (B), and top (C) of the shell from three 8-foot-long 1 x 12's. The top and bottom pieces fit into dadoes in the sides of the shell. The plywood back (E) is fitted into rabbets in the sides. (Directions are given in Steps 4-8 for cutting dadoes and rabbets with a circular saw. Before you assemble the shell, you must drill holes for the shelf supports at uniform 2-inch intervals. It is very impor-tant to space the holes properly, other-wise the shelves will not hang evenly. To avoid problems, use a homemade template as described in Step 9.

After the top, bottom, and sides are assembled, use the actual dimensions of the shell as a guide for cutting the shelves (D), the plywood back (E), the moldings (F-K), and the molding supports (L). Cut the shelves from two 8-foot-long 1 x 12 boards. Make each shelf 3/16 inch shorter than the interior width of the assembled shell and test-fit the first shelf before cutting the other five.

If you do not wish to use the exact moldings shown on the following page, you can substitute other moldings, but be sure to use moldings of the same width as those indicated in the chart, or adjust the measurements accordingly. Cut the shelf molding (F) from two 8-foot lengths. Cut the other molding and molding supports from 7-foot lengths of the appropriate material. Order extra molding to allow for possible errors in mitermg. You may want to substitute simple 3-inch baseboard molding for the crown moldings (J and K), as the latter require an extra-deep miter box in order to be cut.

Never apply clamps directly to the surface of wood or they may leave unsightly marks. Always cushion the clamp by placing bits of scrap wood between the clamp and the good wood.

Before applying stain to the finished bookcase, test it on a piece of scrap wood. The longer you leave the stain on the wood before wiping off the excess, the darker the wood will become, so experiment on scrap wood in order to get the shade you prefer on the finished unit.

Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
A	Side	2	¾"	11½"	82"	1 x 12 knotty pine
B	Bottom	1	¾"	11¼"	29"	1 x 12 knotty pine
C	Top	1	¾"	11¼"	29"	1 x 12 knotty pine
D	Shelf	6	¾"	10⅛"✲	28⅝"✲	1 x 12 knotty pine
E	Back	1	¼"	29¼"✲	78½"✲	Birch plywood
F	Shelf molding	6	—	⅞"	26⅞"✲	Pine
G	Front baseboard molding	1	—	3½"	30½"✲	Pine
H	Side baseboard molding	2	—	3½"	11½"✲	Pine
I	Fluted molding	2	—	1½"	77"✲	Pine
J	Front crown molding	1	—	3"	30½"✲	Pine
K	Side crown molding	2	—	3"	11½"✲	Pine
L	Molding support	2	¾"	¾"	77"✲	1 x 1 pine

✲Measurements are approximate. Parts D–L should be measured against the assembled bookcase shell before cutting.

Tools and materials: Circular saw with adjustable blade depth or table saw or radial arm saw. Electric drill with set of twist bits. Backsaw, deep miter box. Orbital sander (optional). Combination square, framing square, steel tape rule, pencil. Four 5" C-clamps. Hammer, nail set. Paintbrush. Wood putty. Nos. 80, 100, 150, and 220 sandpaper, 0000 steel wool, oil stain, satin finish polyurethane, turpentine, paste wax, carpenter's glue. Tack cloth, soft cloths. Wood and molding (see above) and 3" x 82" scrap of 1/4" pegboard Box of 3/4" 19-gauge wire brads. 3d, 4d, and 6d finishing nails, 3d common nails. Twenty-four metal shelf rests.

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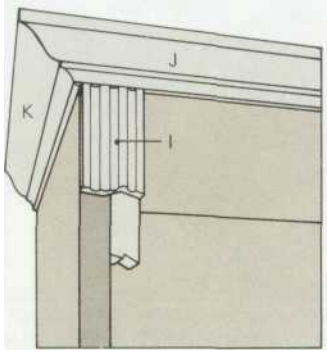
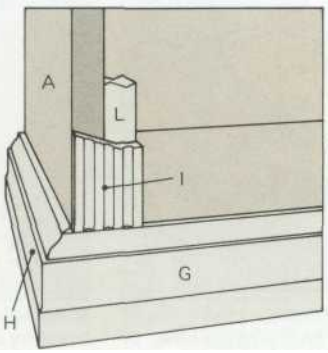
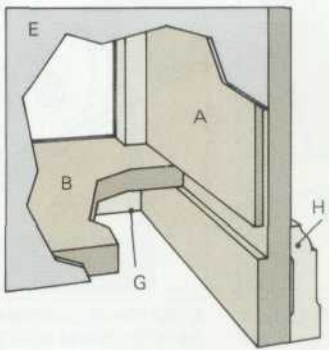
Decorative moldings



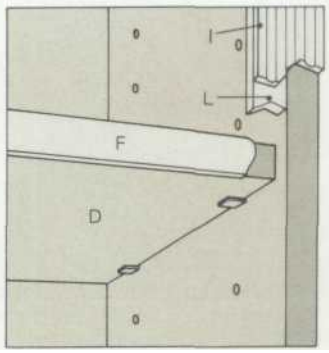
The fluted moldings (I) on the front edges of the bookcase meet the flared crown moldings (J and K) at the top corners.



The fluted moldings (I) also meet baseboard moldings (G and H) and are attached to bookcase sides (A) and supports (L).



The bookcase back (E) fits into the rabbets cut into bookcase sides (A); it is flush with lower edge of bookcase bottom (B).



Each shelf (D) is faced with 7/8-in. pine molding (F) that fits with a small clearance against supports (L) at each side.

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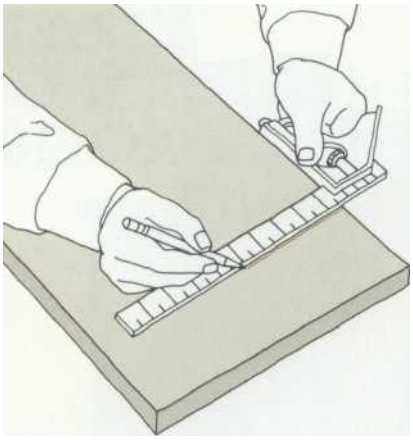
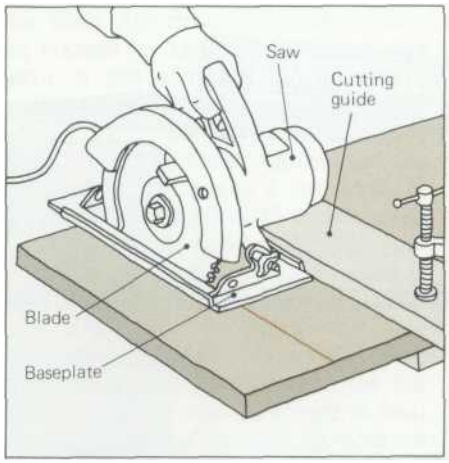
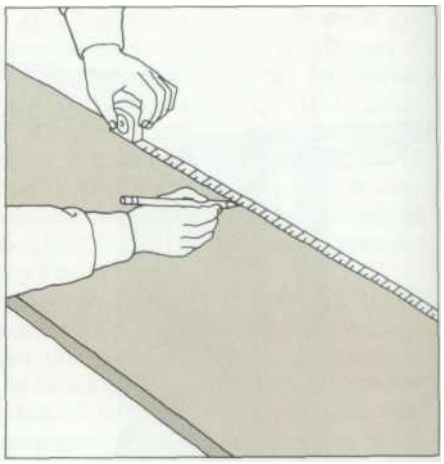


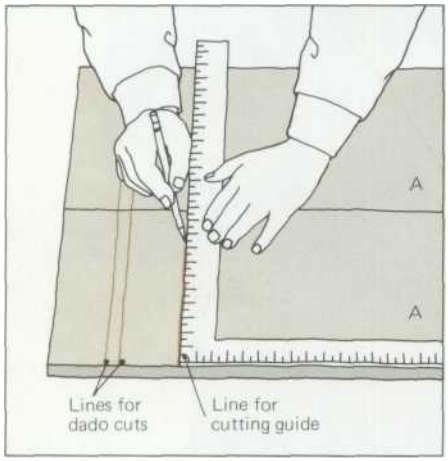
1. Cut 1/4 in from width of lumber for bookcase bottom (B) and top (C) using a circular saw with a rip blade and a guide (see Step 2). Use a combination square and pencil to draw a squared-off line for first crosscut near ends of this lumber and lumber for sides (A).



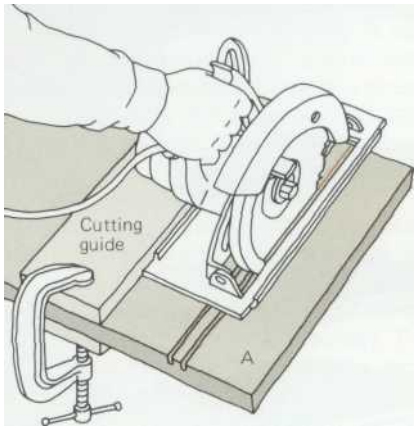
2. Use a circular saw with a crosscut blade to cut along the line Clamp a straight strip of wood to the piece being sawed to act as a cutting guide; the distance between guide and cutting line must equal the distance between the saw's baseplate and blade.



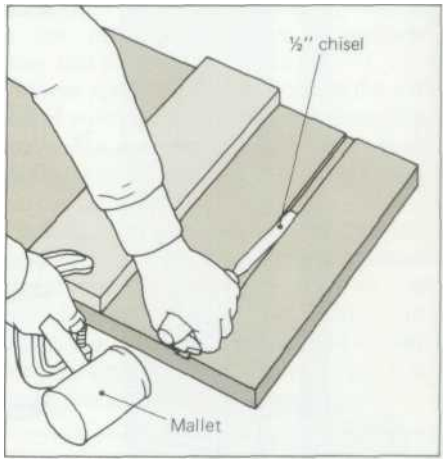
3. Following the dimensions given in the chart, measure the correct distance from the squared end of the board to the next cut, then use combination square to draw a line for the next crosscut and cut along it. Label each piece as you cut it for easy identification.



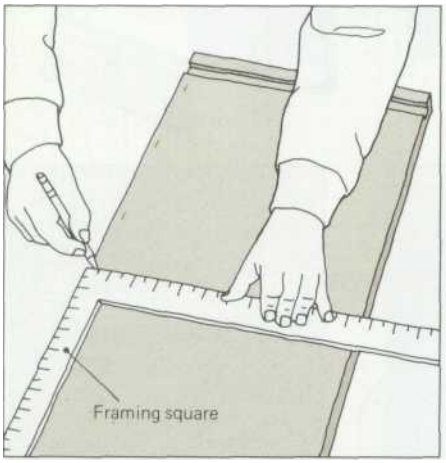
4. Lay the sides (A) side by side. Draw cutting lines for the bottom dadoes across both sides 2 3/4 in. and **3 1/2** in. from one end. Set the blade of the circular saw to cut to a depth of 1/4 in. and cut dadoes between the pairs of cutting lines into one side at a time (Steps 5 and 6).



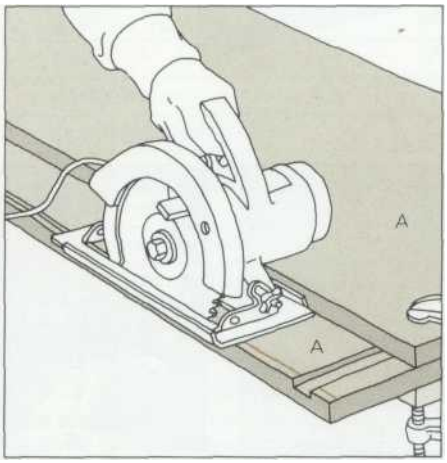
5. Clamp a scrap-wood cutting guide to each side (A), in turn, so that when the baseplate of the saw butts against the guide, the saw blade is just inside one rule. Cut along the rule. Move the guide and cut along the other rule. Make several parallel cuts between these two



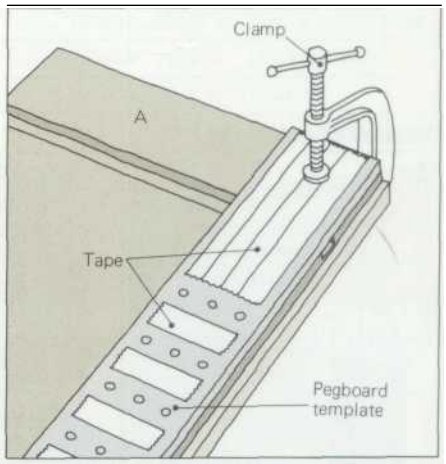
6. Remove the waste wood with the saw or with a chisel and mallet. Measure and mark off cutting lines for the top dadoes 3/4 in. and 1 1/2 in. from the opposite ends of the side pieces Cut 1/4i-in.-deep dadoes between these pairs of cutting lines as you did for bottom dadoes.



7. Use a framing square and a pencil to mark off points along the inside of the two bookcase sides (A) 1/4 in. from the back edges. Draw rules through these points from top dado to bottom dado to serve as cutting lines for the rabbets the plywood back (E) will fit into.



8. Set the circular saw blade for a 3/8-in.-deep cut. Clamp one side (A) on top of the other to serve as a cutting guide and cut along the rule. Reposition the cutting guide and cut the remaining wood from this edge. Repeat this process to cut the rabbet on the other side.



9. Make a template for drilling shelf-support holes by cutting a scrap of 1/4-**in.** pegboard 3 in. wide by 82 in. long with a row of holes at its exact center. Clamp template to the front inside edge of one bookcase side (A). Block alternate rows of holes with tape

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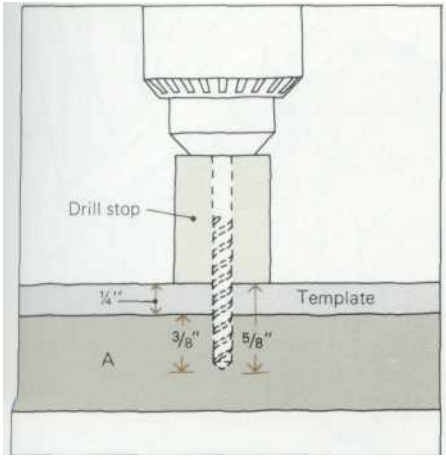
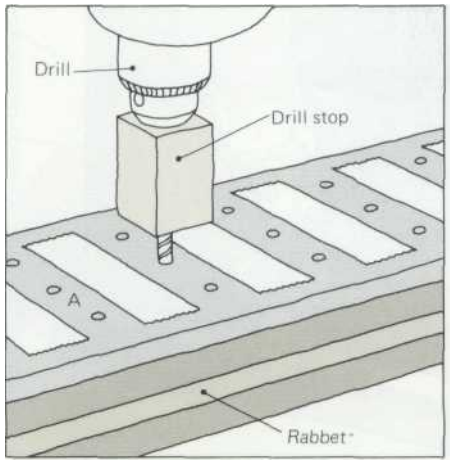
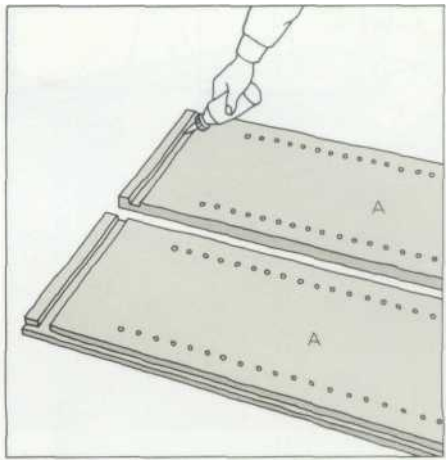


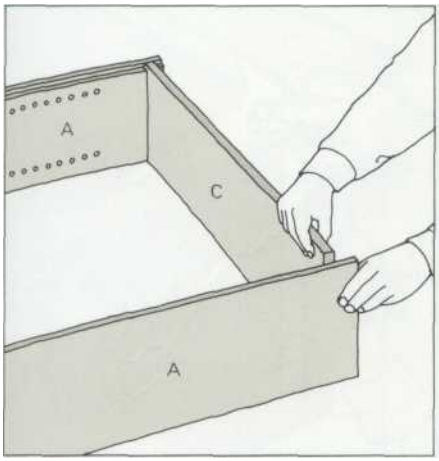
10. Make a drill stop by cutting a piece of scrap wood so that when the drill goes through it, 5/8 in. of the drill protrudes, excluding its point. This will allow the drill to pass through the Win. template and bore exactly 3/8 in. into the side (A).



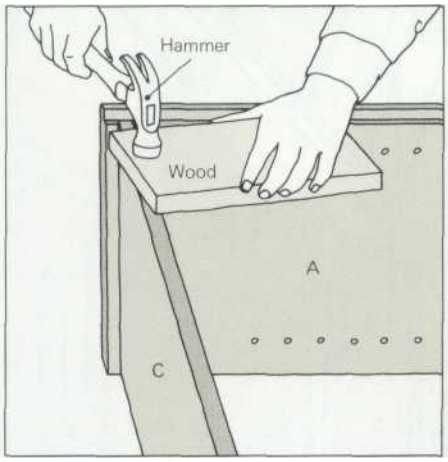
11. Drill into the center holes of the untaped rows in the template. Slide the template to the back edge of the side (A) and drill into the same holes. Move the template, with the same side facing up and its ends pointing in the same direction, to the second side.



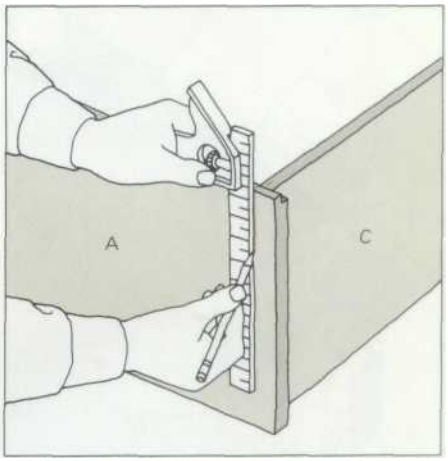
12. Bore shelf-support holes into the second side (A) as you did into the first Sand the inner portions of the sides, bottom (B), and top (C) with Nos. 80, 100, and then 150 sandpaper Lay out the sides, inner portions up, and apply glue to the dadoes



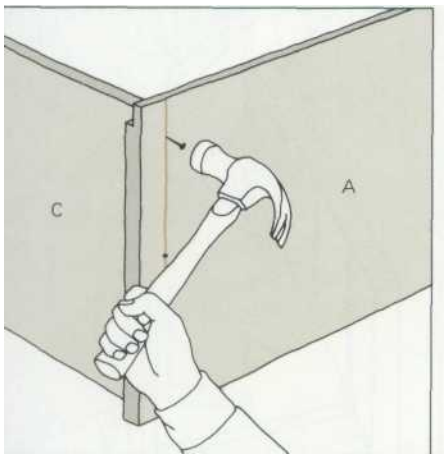
13. Be sure to apply enough glue to completely cover the bottoms and sides of the dadoes, then fit the bookcase bottom (B) and top (C) into the dadoes of one side (A) and then the other. (Position the bookcase shell with the rabbets facing up.)



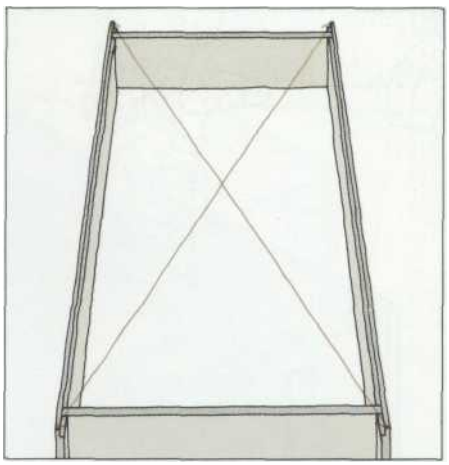
14. Before glue dries, wipe off all excess with a damp cloth. Align the top and bottom of the bookcase with the back edges of the dadoes by tapping them gently near the joints with a hammer that is buffered with a piece of wood, as shown, or with a mallet.



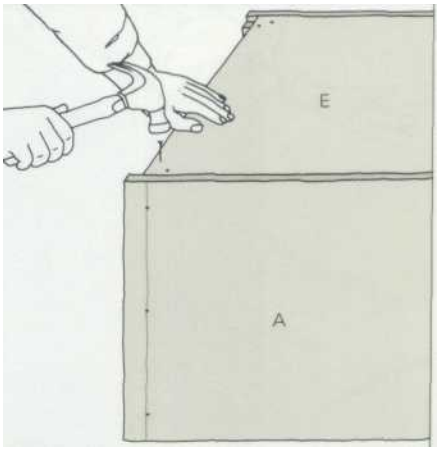
15. Mark the center of the top and bottom dado joints on the outside of the bookcase sides. Use a combination square and pencil to extend each mark along each side, forming rules that can be used to guide the proper placement of the reinforcing nails



16. Nail the bookcase sides (A) to the bookcase bottom (B) and top (C) with 6d finishing nails. Use about three nails for each joint and drive them in along the guide rules that were drawn in Step 15. Use a nail set and hammer to set all the nails



17. Check the bookcase shell for squareness by measuring its front from the upper lefthand corner to the lower right and the upper right to the lower left. If the two measurements are not identical, the bookcase is not square. Adjust the squareness before the glue dries.



18. Get exact measurements for the bookcase back (E) from the shell, cut the plywood accordingly, and sand one side with Nos 80, 100, and then 150 paper Position back over shell, sanded side down, and nail each of its corners to shell with two 3d nails.

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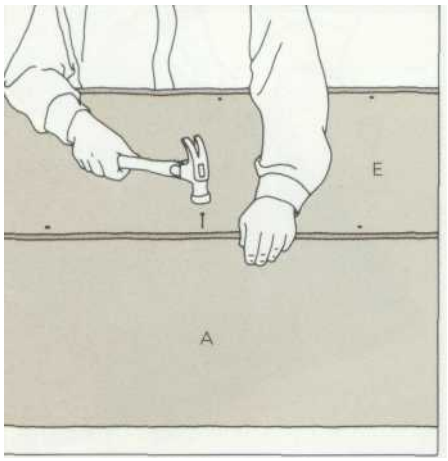
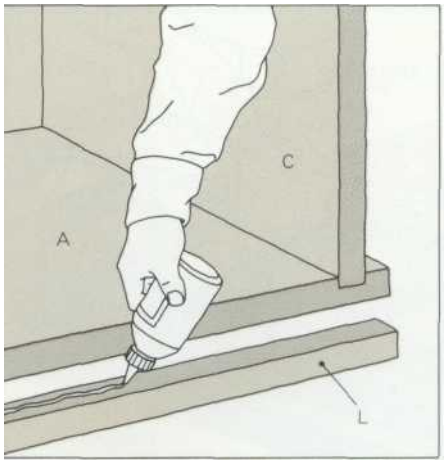
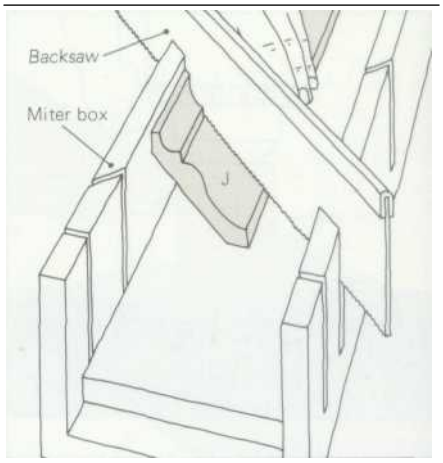


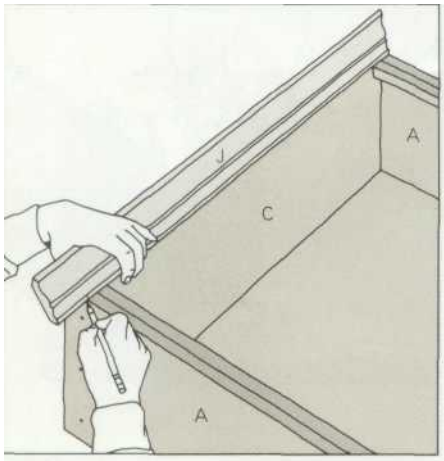
19. Drive more nails through the back into the sides, bottom, and top of the bookcase. Use one nail about every 8 in. If the bookcase sides bow out, pull them inward as you drive the nails home along the center portions of the sides. Do not set the nails



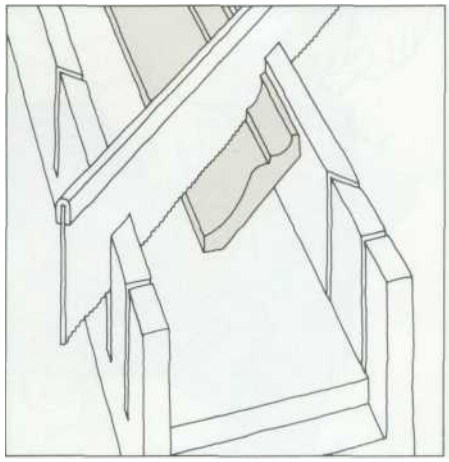
20. Measure and cut the molding supports (L), and then glue and nail them to the inside front edges of the bookcase sides (A), These will support the thin fluted moldings that run down the front of the bookcase Use 3d finishing nails and set them.



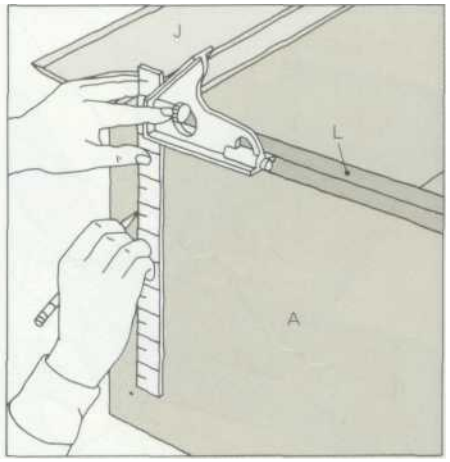
21. Clamp a length of crown molding (J) into a deep miter box with the top of the molding facing down. Angle the molding, as shown, with its bottom flush against the side of the box and its top against the floor of the box. Make a 45° miter cut with a backsaw



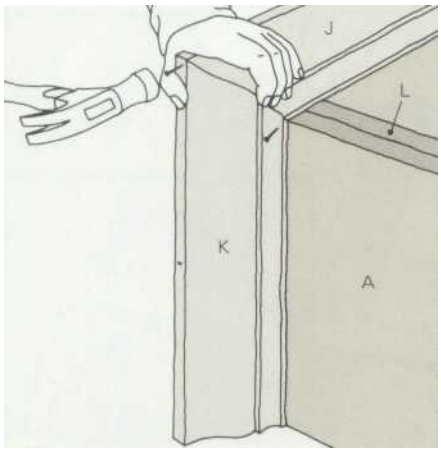
22. Place the cut piece of crown molding against the top of the bookcase shell, with the shorter cut corner of the molding against one front top corner of the shell, Mark the molding for the second miter cut where it meets the other side of the bookcase shell.



23. Return the molding to the miter box, but this time place it against the opposite side of the box with the cutting mark against a saw slot that runs in the opposite direction from the first. Hold the molding firmly in place and make the second miter cut.

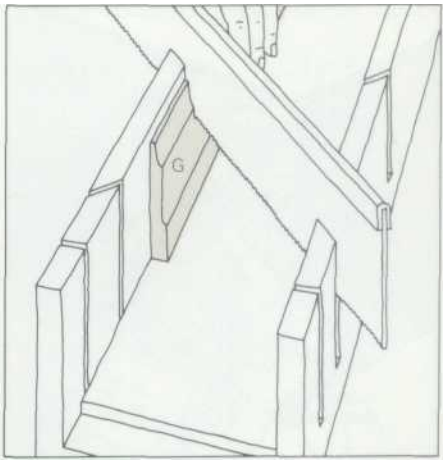


24. Glue and nail the mitered molding to the top of the bookcase with 4d finishing nails, but do not drive the nails all the way in. Use a combination square to draw rules on the sides of the bookcase to extend the bottom line of the front molding (J) along the sides (A)



25. Measure the side crown moldings (K) against the bookcase and cut miters in one side. Cut the opposite side flush with the back of the bookcase. Rub glue into the mitered edges and position the side moldings on the bookcase and nail them on.

26. Align the mitered joints and carefully wipe off all the excess glue with a well-dampened cloth. (The stain will not penetrate the glue, so it is important to remove all the excess.) Drive all the nails home and use a nail set and hammer to set them.



27. Measure, mark, cut, and attach the front and side baseboard moldings (G and H) as you did the crown moldings in Steps 21 -26, but when cutting the miters in the baseboard moldings, hold each molding flush against the side of the miter box, as shown here.

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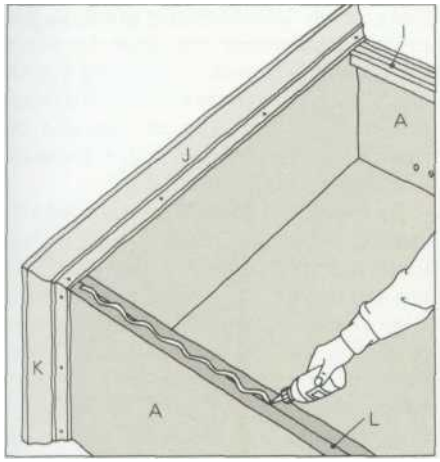
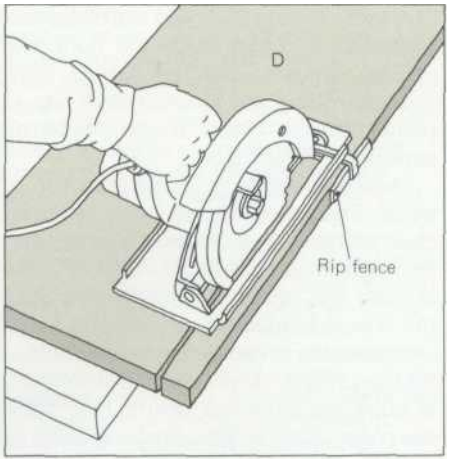
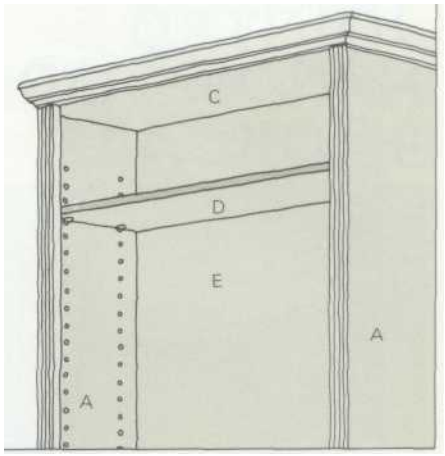


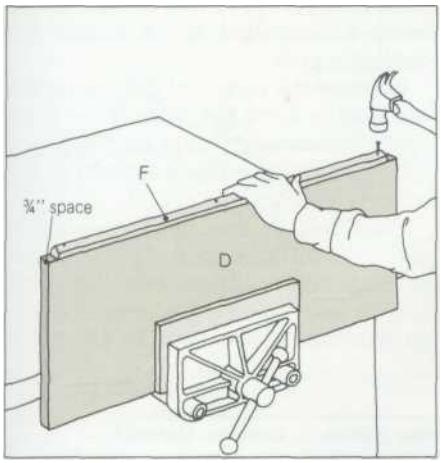
28. Measure the fluted moldings (I) against the sides of the bookcase and cut them. Glue them to the sides and molding supports, and wipe off the excess glue with a damp cloth. Nail the moldings down with 3/4-in. 19-gauge wire brads. Set the brads.



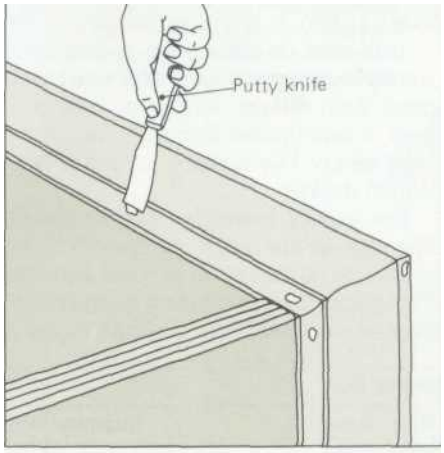
29. In order to fit properly, the shelves (D) must be narrower than the boards they are cut from Use a circular saw with a rip blade and rip fence to cut the boards to a width of 10 1/8 in. Set fence for amount of wood to be removed and cut along length of each shelf.



30. Measure the inside width of the bookcase and cut the first shelf 3/16 in. shorter than the measurement you get. Test-fit shelf by placing it into position. It should fit in easily without forcing. Adjust your measurements, if necessary, and cut the other five shelves

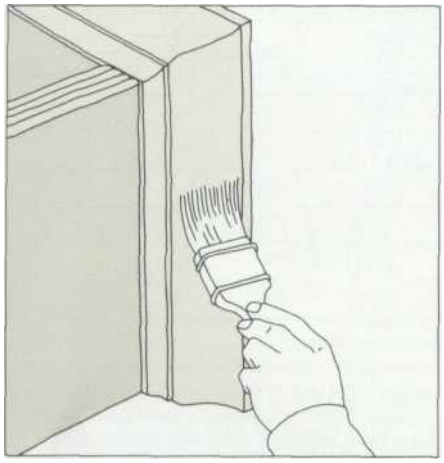


31. Clamp each shelf to the workbench, in turn, with the front edge up Measure the shelf molding (F) against the shelf, leaving 3/4 in. on each side. Cut the molding, and glue and nail it to the shelf with 4d finishing nails Set the nails with a nail set.

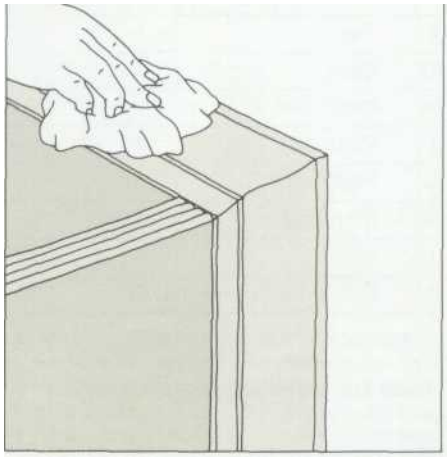


32. Fill all the holes left by these nails with putty. Use your finger or a small putty knife to work the putty firmly into the holes. Leave the putty a little higher than the surface of the wood; it will shrink as it dries, and if it is still too high, you can sand it down.

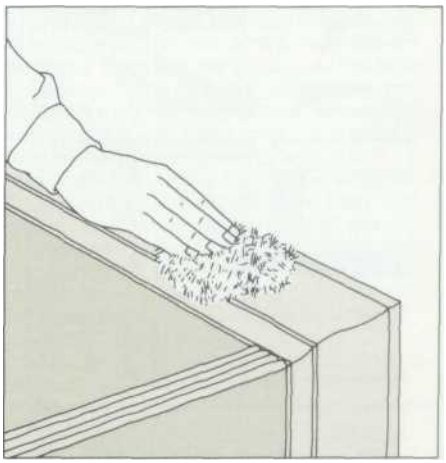
33. When the putty is dry, sand the bookcase and shelves with Nos. 80, 100, and then 150 sandpaper. When sanding moldings, use No. 100, then No. 150 paper and bend it around your finger. When sanding near mitered joints, sand away from joints along molding.



34. Brush the sanded bookcase and shelves with a tack cloth to remove the sawdust created by the sanding. Use a small brush to paint on the stain. Let the stain sit for 10 min., and then wipe off the excess with a clean, soft cloth. Let the stain dry for 24 hr.



35. So that the first coat of polyurethane penetrates more deeply, brush on a coat of sealer made up of 70% satin polyurethane and 30% turpentine. Wipe off the excess after 10 min. After 4 hr. brush on a coat of full-strength polyurethane. Let it dry for 24 hr.



36. Sand all surfaces lightly with No 220 sandpaper, then remove the sawdust with a tack cloth. Brush on another coat of full-strength polyurethane and let it dry for 24 hr Apply paste wax with 0000 steel wool using medium pressure. Buff with a soft cloth.

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ROLLTOP DESK

For the person who hates to clear off a desk, who wants to leave everything where it is overnight yet still have the clutter hidden, a rolltop desk is a godsend. The tambour hides everything! Our design, a modern interpretation of the 19th-century design, goes well with contemporary or traditional furnishings.

Lumber-core plywood is used for most of the desk, supplemented by solid hardwood stock: walnut, maple, oak, or cherry. The edges of the plywood are covered with a matching veneer tape.

The need for extreme accuracy in measuring and cutting cannot be stressed too strongly. With one exception, all the construction is ambitious but straightforward—that exception is the tambour, which is made up of thirty 3/4-inch-wide hardwood slats. A scant 1/4-inch tongue at

Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
Tambour case						
A	Side	2	¾"	15½"	30¼"	Plywood
B	Back	2	¼"	14⅝"	56"	Plywood
C	Top	1	¾"	11½"	56"	Plywood
D	Rail	1	¾"	⅞"	55½"	Plywood
Cubbyhole unit						
E	Top	1	¾"	10"	55½"	Plywood
F	Shelf	1	½"	9¾"	28¾"	Plywood
G	Shelf	4	½"	9¾"	10¼"	Plywood
H	Side	2	½"	9¾"	12¼"	Plywood
I	Back	1	¼"	12¼"	55½"	Plywood
J	Divider	2	½"	9¾"	12¼"	Plywood
K	Divider	5	½"	9¾"	3⅛"	Plywood
L	Divider	2	½"	9¾"	8¼"	Plywood
M	Cleat	1	¾"	¾"	55½"	1 x 6 hardwood
Tambour						
N	Handle	1	1½"	1⅝"	56"	2 x 8 hardwood
O	Slat	30	¾"	¾"	56"	1 x 6 hardwood
P	Retaining strip	1	¼"	1"	55½"	1 x 6 hardwood
Q	Backing	1	—	23⅝"	55½"	Canvas
Desk-top unit						
R	Top	1	¾"	29¼"	60"	Plywood
S	Bottom	1	¾"	29¼"	59"	Plywood
T	Side	2	¾"	5½"	29¼"	Plywood
U	Back	1	¼"	4¾"✲	59¼"✲	Plywood
V	Partition	2	¾"	4½"	29"	Plywood
W	Horizontal trim	2	¾"	¾"	60"	1 x 6 hardwood
X	Side trim	2	¾"	¾"	5½"	1 x 6 hardwood
Y	Partition trim	2	¾"	¾"	4¼"	1 x 6 hardwood
Z	Spline	2	⅛"	¾"	29¼"	1 x 6 hardwood
Base units						
AA	Top	2	¾"	16"	26¼"	Plywood
BB	Bottom	2	¾"	16"	25½"	Plywood
CC	Front	2	¾"	3¾"	16"	Plywood
DD	Side	4	¾"	24½"	27½"	Plywood
EE	Back	2	¼"	16¼"✲	24⅛"✲	Plywood
FF	Pin	8	¼" dia.	—	¾"	Hardwood dowel

✲Measurement is approximate; cut to fit during construction.

Tools and materials: Radial arm or table saw with carbide-tipped or planing blade and dado head. Saber saw. Router with 1/4" straight bit and 5/8" cove bit. Drill with 1/4" twist bit. Hammer, mallet, screwdriver. Two web clamps. Framing square, steel tape rule. Orbital sander and sanding block with Nos. 100, 150, and 220 sandpaper. Hide or resin glue, adhesive sponge. Wood stain, varnish, paste wax. Candle stub. 1 2/3 yards of canvas 55" wide. Veneer tape. Lumber-core plywood: one panel 1/4" x 4' x 8', 1 1/2 panels 1/2" x 4' x 8', three panels 3/4" x 4' x 8'. A 1/8" x 4' x 8' panel of tempered hardboard. Six 5' lengths of 1 x 6 hardwood boards, one 5' length of 2 x 8 hardwood board One 1/4" dowel. Four 1/4" dowel centers. Nine pairs of drawer slides (metal or hardwood). A 55 1/2" length of weather stripping. Four 1/2" No. 6 brass wood screws, four 1 1/2" No 10 brass wood screws, 1" box nails.

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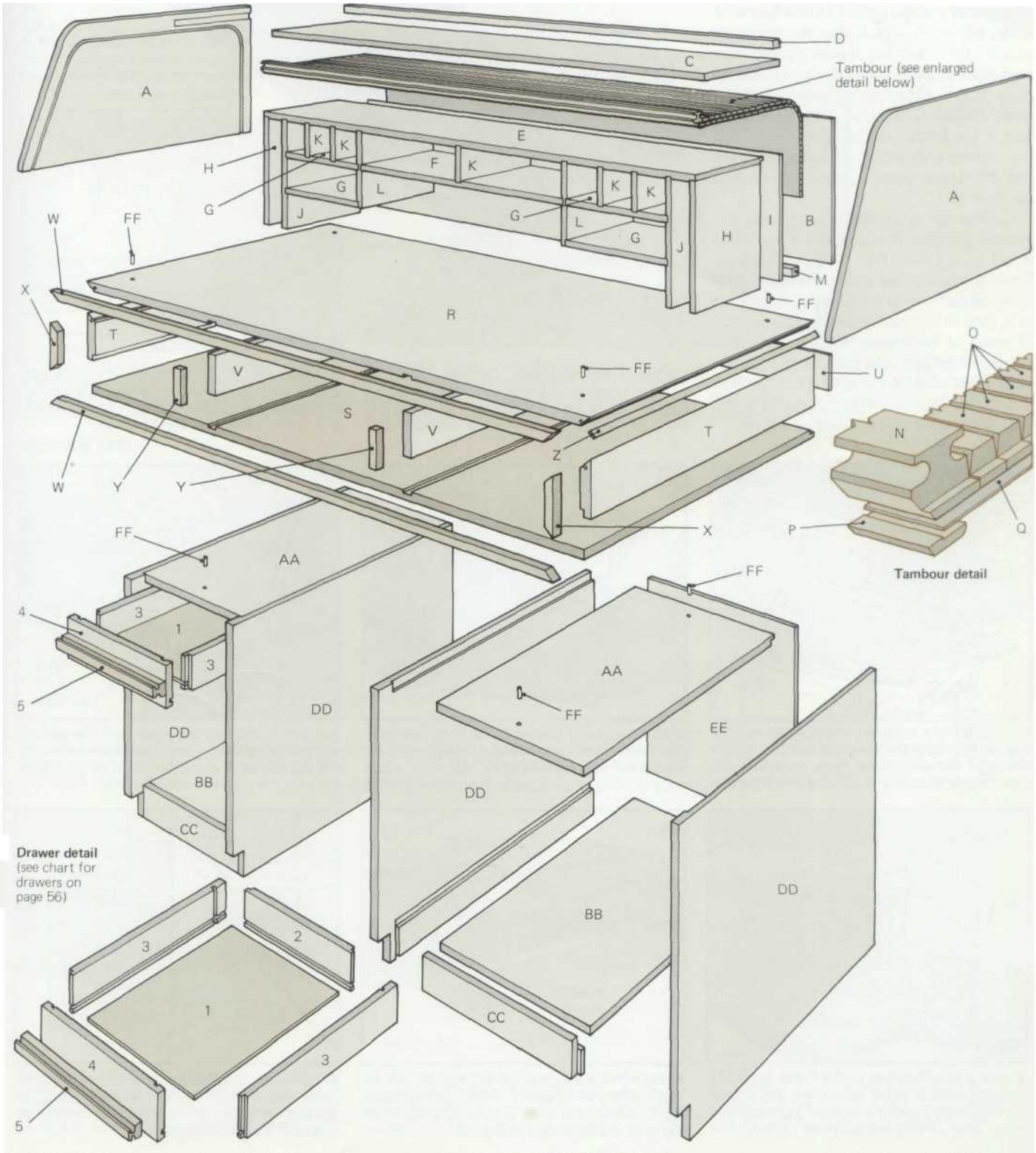
each end of each slat allows the tambour to slide up and down in 1/4-inch grooves that have been routed in the sides of the tambour case (see diagram, p. 55). Where the grooves curve, they will have to be widened a bit to accommodate the width of the slats as they make the turn.

The tambour slats should be finished and waxed before they are glued to the canvas backing; it would be impossible to finish them once they are glued down. However, do not finish the bottoms of the slats; these must accept the glue.

The finish you choose depends on the hardwood you select for the desk. For light woods, such as oak or maple, you may want to apply a stain, followed by varnish and wax. But darker woods may need no more than light sanding and tung oil.

You may find it easier to finish the individual sections of the desk—the tambour and case, desk-top unit, base units, drawers, and cubbyhole unit—before assembly. If so, take extra care during assembly that you do not mar the finish. Build the cubbyhole unit after the tambour case has been built and fitted to the desk top in order to be sure that the cubbyhole unit fits perfectly within the case.



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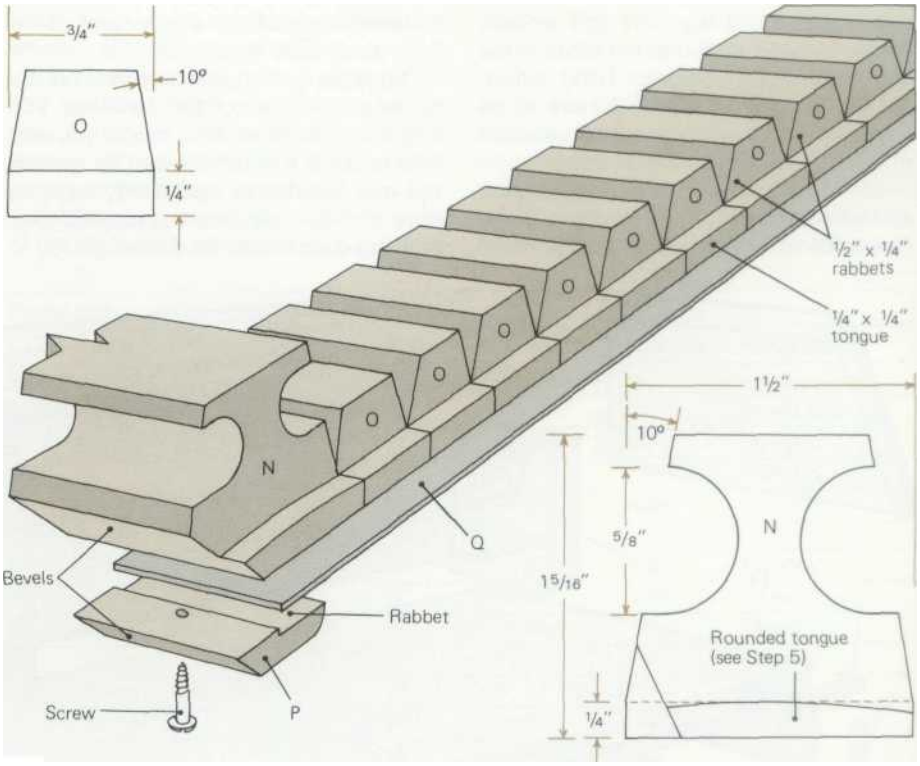
Tambour and case

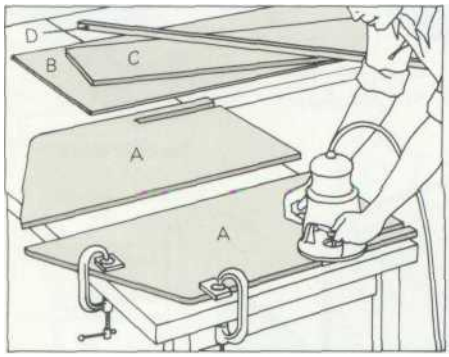
Cut 30 slats (O), 3/4 inch square and 56 inches long, from 1 x 6 hardwood boards. Set the table saw blade at a 10° angle and position the fence so that the blade will cut a 10° bevel, ending 1/4 inch above the base of each slat. Cut a rabbet 1/2 inch deep and 1/4 inch wide into each end of each slat. Finish the slats.

Build a frame of scrap lumber with inside dimensions of 25 x 56 inches. Stretch the canvas tightly over a piece of scrap plywood; check that the frame is square, then nail the frame through the canvas and to the plywood. Apply hide or resin glue to a third of the canvas and put down 10 slats. Clamp the slats against one end of the frame, holding them down on the canvas with weights. When the glue has dried, put down 10 more slats, then the final 10,

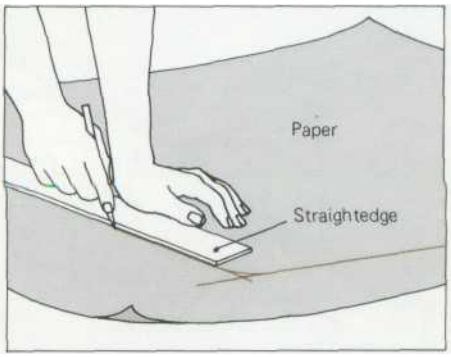
Cut slats for the tambour handle (N) and drawer handles by ripping a 2 x 8 hardwood board into l 1/2- x l 5/16-inch strips. Bevel as shown. Use a 5/8-inch cove router bit to cut grooves in the handles to a depth of 1/2. inch in two passes, removing 1/4 inch of wood at each pass. Cut the tambour handle 56 inches long and cut a rabbet in each end to match the slats. Glue the handle to the canvas. When the glue dries, trim the canvas to the tambour edges.



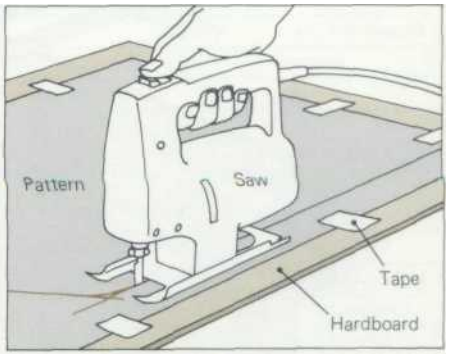
Tambour detail shows canvas (Q) sandwiched between handle (N) and retaining strip (P). Bevel front edge of strip to match the bevel on handle. Cut a shallow rabbet in the retaining strip to accommodate the thickness of the canvas. Finish the lower side of the strip, then glue it to the canvas. Drill pilot holes and screw parts N and P together



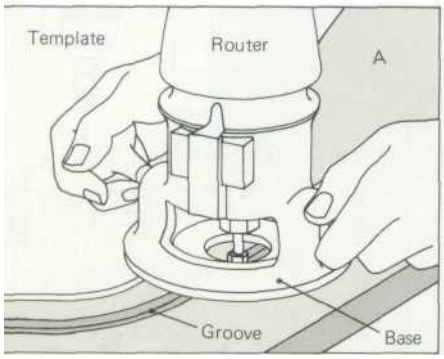
1. Cut sides (A), back (B), top (C), and rail (D) to size. Following the diagram at top of opposite page, cut a 1/4 x 3/4-in. blind dado in each side for top and 1/8- x 3/8-in. rabbet for back.



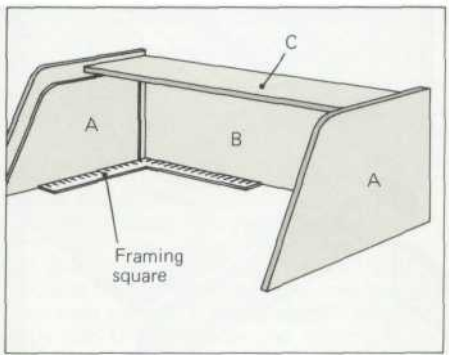
2. Make a paper pattern for cutting tambour grooves with a router and template guide (see illustration, opposite page), allowing clearance needed by your guide



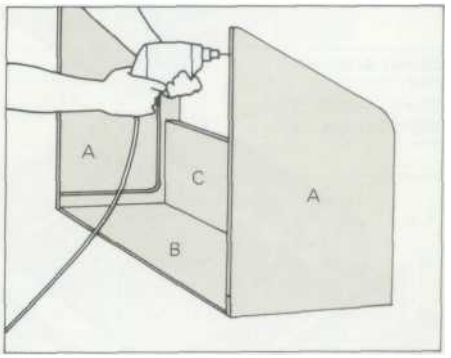
3. Cut a hardboard template from the pattern, using a saber saw. A 2-in. radius is needed on the curves so that the tambour will not bind Be sure the curves flow smoothly.



4. Use a 1/4-in, straight router bit to cut 1/4-in.-deep grooves in sides. Widen the grooves at the curves by making a second pass with the router after shifting the template slightly



5. Round the tongues on the handle (N) so that it will travel smoothly in the grooves. Glue top to sides. Glue back to sides and top, making sure the assembly is square.



6. Nail back to sides and top. Glue rail (D) to sides and top. Drill 1/4-in. holes *1/4* in, deep in the bottom edges of the sides 2 in. from back corners, 3 in. from front

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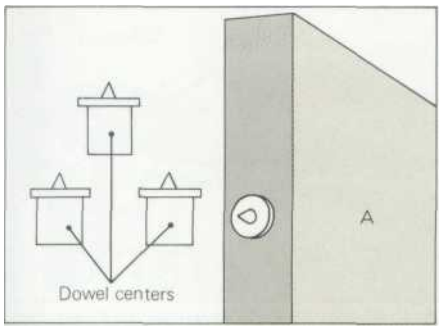
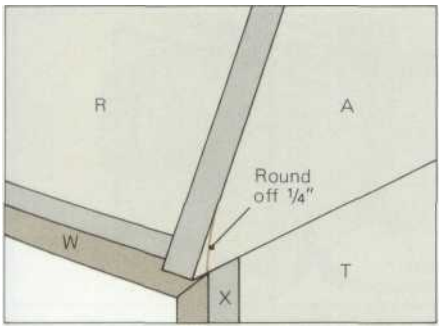
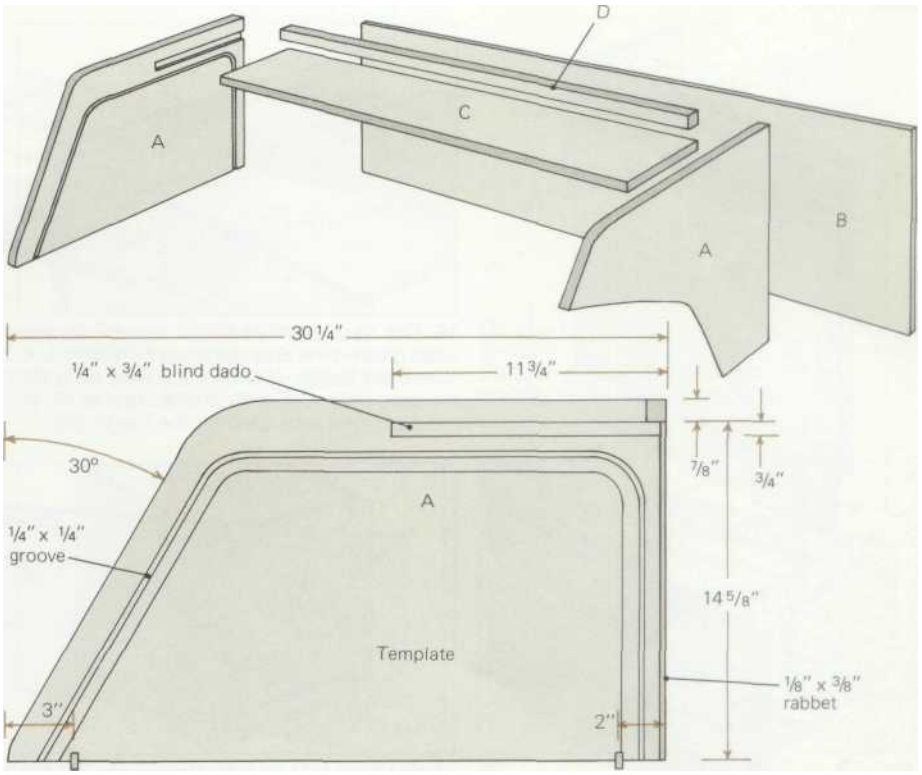


7. Purchase four Win, dowel centers to insert into the holes drilled in Step 6. These will be used in Steps 23-26 to mark the positions of the dowel holes in the desk top.

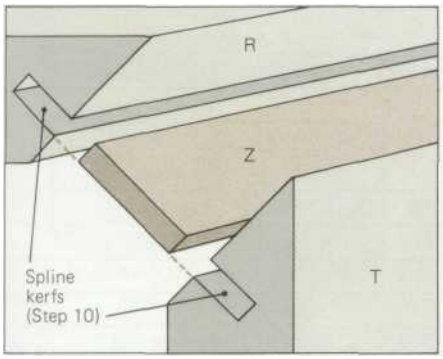


8. After completing desk-top unit (below), position tambour case on desk top (R). Round off front corners of case flush with top. Apply veneer tape to exposed plywood edges.

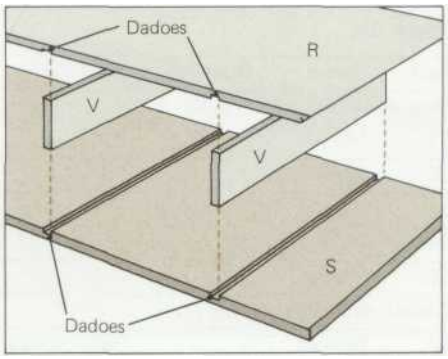


Drawings show assembly of parts for tarnbour case (top) and dimensions and locations for dowel holes, dado, and rabbet (bottom), The template for cutting the grooves in the sides (A) must be made to conform to the thickness of the template guide for your router . Use a 2-in radius for the curves of the grooves

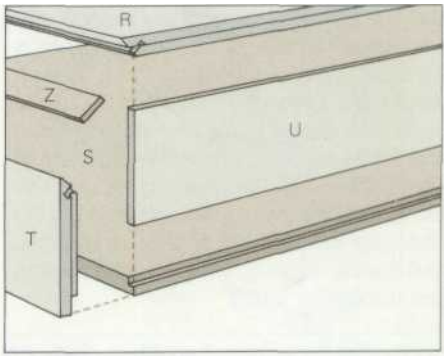
Desk-top unit



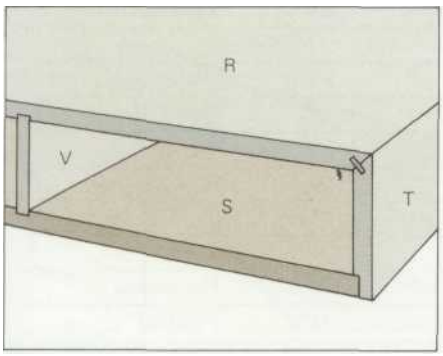
9. Cut parts R-Z to size (see chart, p.52), but do not cut the back (U) yet. Grain must run the length of splines (Z). Cut 45° bevels in top (R) and sides (T) as shown



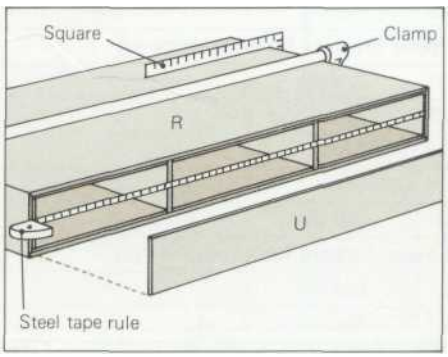
10. Cut 1/8-in.-wide spline kerfs 3/8 in. deep into the top and sides Cut dadoes 1/4 in. deep and 3/4 in. wide into the bottom (S) and top (R) for partitions (V).



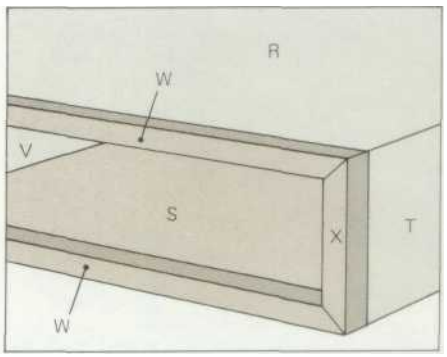
11. Cut a 1/4- *x 3/4*-in. rabbet into the bottom edges of the sides (T) to accept the bottom (S). Cut a $^{3}/_{8}$- x 1/4-in rabbet into the back edges of parts R, S, and T for back (U)



12. Test-fit all pieces, check for squareness, make adjustments; assemble with glue. Glue splines (Z) to top and sides (T); glue partitions (V) to top Glue bottom to parts T and V

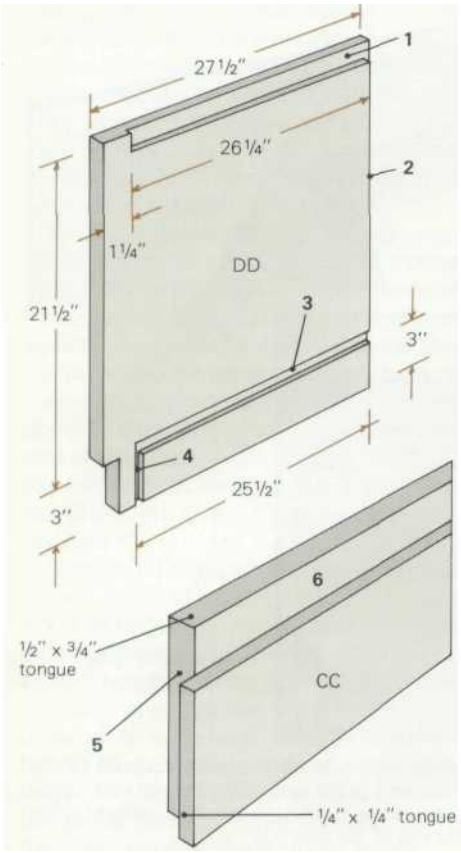


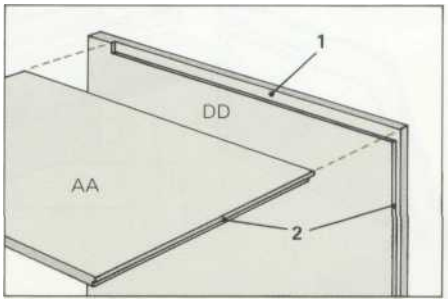
13. Clamp assembly, making certain front is square, and brace it diagonally with scrap wood. Measure opening inside rabbets, then cut back (U) to fit opening exactly



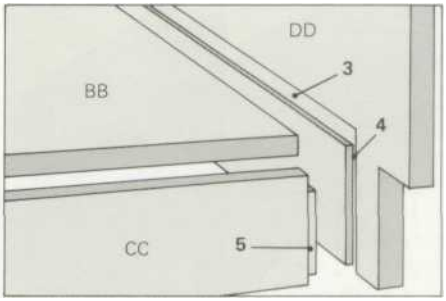
14. Glue the back to parts R, S, T, and V. Check that assembly is still square and nail back piece in place. Test-fit the trim (W, X and Y), then glue trim in position.

Base units

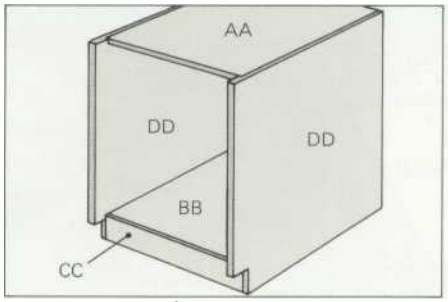




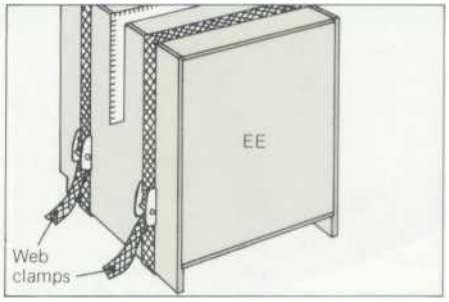
15. Cut base parts (AA-DD and FF) to the sizes given in the chart on page 52. Cut a 1/4- x 3/4in.blind rabbet (1) into each side (DD) for the tops (AA). Cut a 3/8- x 1/4-in. rabbet (2) in the sides and tops (AA) for the backs (EE).



16. Cut a 1/4- x 3/4-in. blind dado (3) into the sides for the bottoms (BB). Cut a 1/4- x 1/4-in. dado (4) in the sides for the fronts (CC) Cut a 1/4- x 1/2-in. rabbet (5) at each end of the fronts (CC) to make 1/4- x 1/4-in. tongues



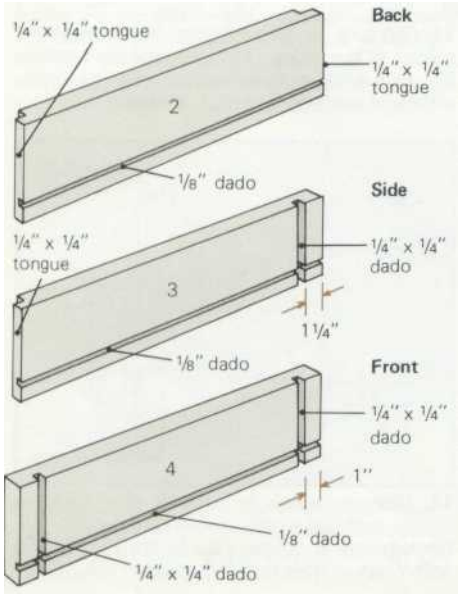
17. Cut a *1/4-* x 3/4-in. rabbet (6) along the top of each front (CC). Test-fit pieces and make any necessary adjustments. Glue the fronts to the bottoms; then glue these and their tops (AA) into dadoes in sides.



18. Clamp each base assembly with web clamps. Square the fronts with a framing square and prop up with diagonal braces. Measure openings and cut backs (EE) to fit. Glue and nail backs in place

Drawers

Cut the drawer fronts from 3/4-*inch* plywood, the sides and backs from /2-inch plywood, and the bottoms from /8-inch hardboard (see chart at right). Cut dadoes and rabbets into the backs, sides, and fronts, following the drawings below. The drawer handles were shaped at the same time as the tambour handle and must now be cut to length.



Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
Side desk-top drawers (2)						
S1	Bottom	2	⅛"	15½"	23⅛"	Hardboard
S2	Back	2	½"	3½"	15½"	Plywood
S3	Side	4	½"	3½"	23⅛"	Plywood
S4	Front	2	¾"	4"	17"	Plywood
S5	Handle	2	1½"	1⁵⁄₁₆"	17"	2 x 8 hardwood
Center desk-top drawer (1)						
C1	Bottom	1	⅛"	21½"	23⅛"	Hardboard
C2	Back	1	½"	3½"	21½"	Plywood
C3	Side	2	½"	3½"	23⅛"	Plywood
C4	Front	1	¾"	4"	23"	Plywood
C5	Handle	1	1½"	1⁵⁄₁₆"	23"	2 x 8 hardwood
Upper drawers for base units (4)						
U1	Bottom	4	⅛"	14"	23⅛"	Hardboard
U2	Back	4	½"	3½"	14"	Plywood
U3	Side	8	½"	3½"	23⅛"	Plywood
U4	Front	4	¾"	4"	15½"	Plywood
U5	Handle	4	1½"	1⁵⁄₁₆"	15½"	2 x 8 hardwood
Lower drawers for base units (2)						
L1	Bottom	2	⅛"	14"	23⅛"	Hardboard
L2	Back	2	½"	11½"	14"	Plywood
L3	Side	4	½"	11½"	23⅛"	Plywood
L4	Front	2	¾"	12"	15½"	Plywood
L5	Handle	2	1½"	1⁵⁄₁₆"	15½"	2 x 8 hardwood

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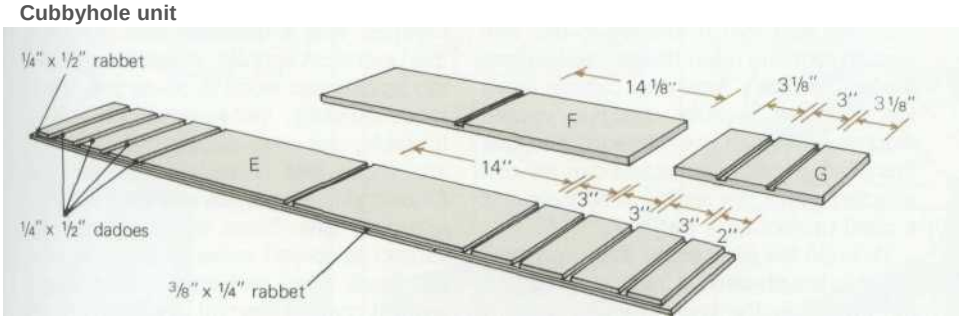
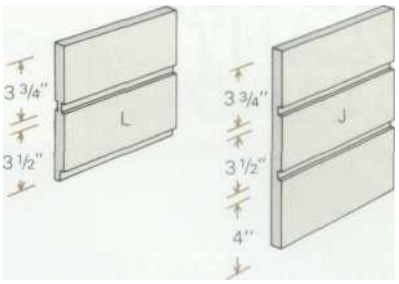
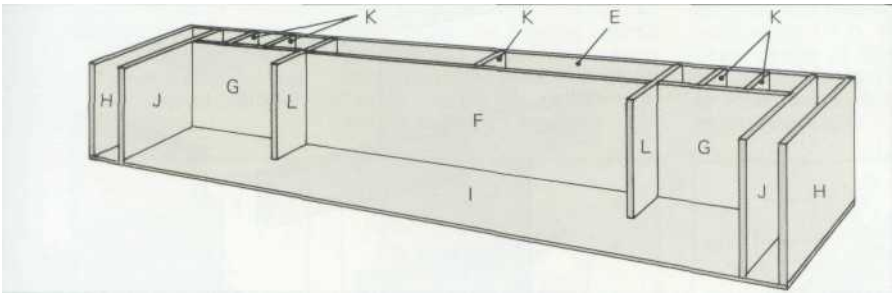
Cubbyhole unit

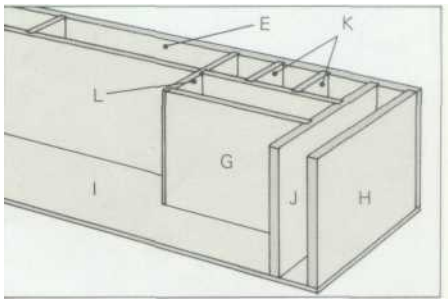




19. Cut the top (E), the shelves (F and G), the sides (H), the back (I), the dividers (J, K, and L), and the cleat (M) to size (see chart). Cut dadoes and rabbets 1/4 in. deep and 1/2 in wide into the top (E) for parts H, J. K, and L. Cut a rabbet 3/8 in. deep and 1/4 in. wide into the top for the back (I). Cut 1/8- x 1/2-in. dadoes into the shelves for dividers K

20. Cut 1/8- x 1/2**-in.** dadoes and rabbets into dividers L to receive the shelves (F and G). Cut 1/8- x 1/2-in. dadoes into dividers J for shelves G Set pieces aside

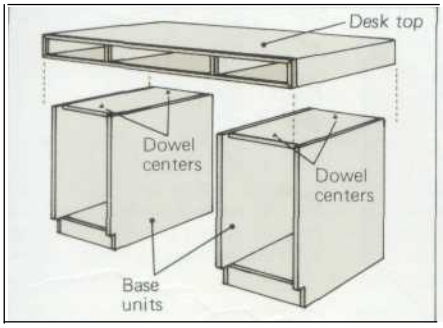


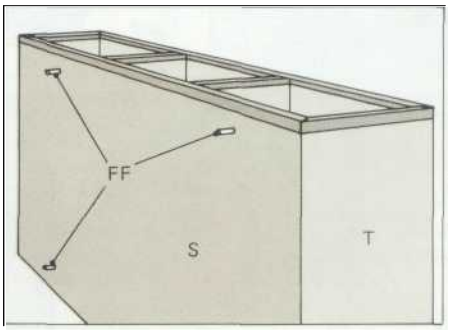


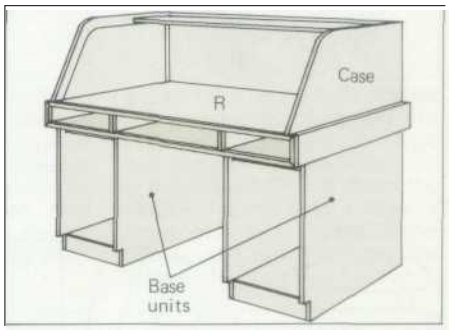
21. Test-fit all pieces and check the fit of the unit within the tambour case. Then glue and nail top (E) to sides (H). Glue back (I) to top and sides; square assembly, then nail. Glue parts L, F, and center divider K to each other and to top. Glue remaining dividers K to top, and upper shelves G to dividers K and L. Then glue dividers J to top and upper shelves G.

22. Glue remaining shelves G to dividers J and L. Square up assembly, draw center lines of parts F, G, J, K, and L on the back (I) Then nail through I into F, G, J, K, and L

Final assembly



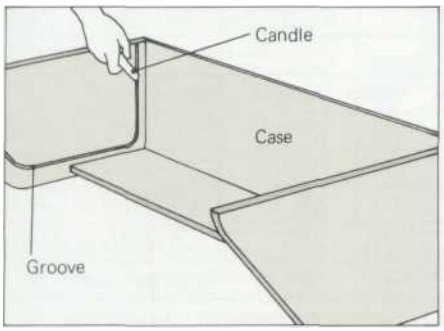


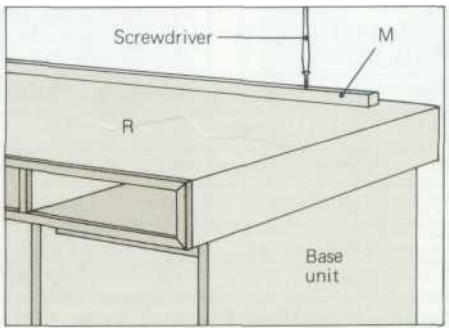


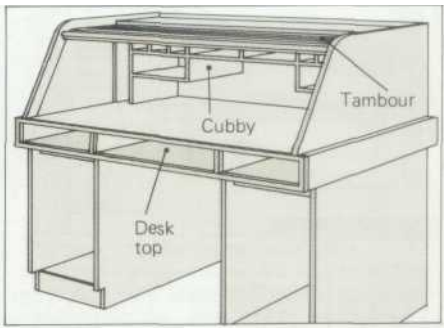
23. Drill 1/4i-in. holes 12 in. deep in the center of the base tops (AA) near the front and back edges Place dowel centers in the holes. Set base units against a wall, 23 in. apart, and carefully center desk-top unit over bases.

24. Press down on desk-top unit, then remove it; dowel centers will make marks on underside of desk-top unit Drill Win. holes 1/4 in deep at these marks. Insert 1/4- x 3/4-in. pins (FF) into holes and set desk-top unit on bases.

25. Place dowel centers into the holes drilled in the tambour case in Step 6. Lightly position the case on desk top (R). When it is in the proper position, press down firmly on the case so the dowel centers mark the top below







26. Remove the case and the dowel centers. At the marks drill four 1/4-in. holes 1/2 in. deep and insert 3/4-in,-long pins. On a clean surface invert the tambour case and rub a candle stub in the tambour grooves

27. Center the cleat (M) on the desk top (R) 2 1/2 in. from the rear edge of the top. Tape or clamp the cleat in place, drill four 7/64-in pilot holes 1 1/2 in. deep, and attach the cleat to the top with No. 10 brass screws.

28. Rub candle wax on tongues of tambour Carefully feed tambour into its case from the front. Lower the case over the pins (FF) in the desk top. Position the cubbyhole unit so that its back touches the cleat (M).

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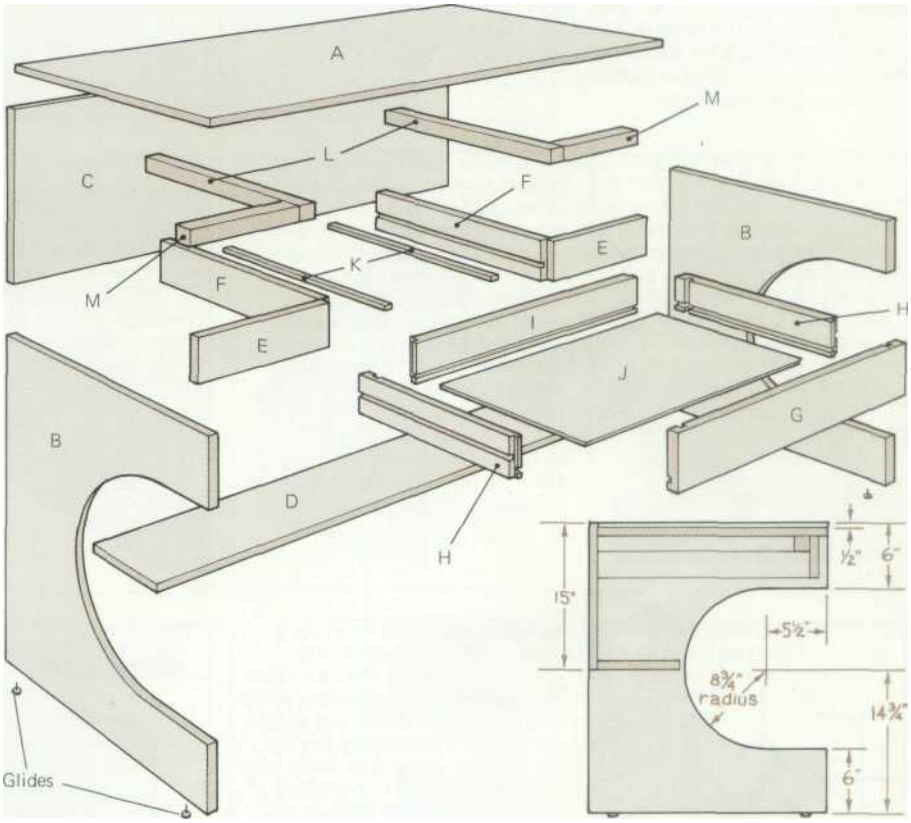
PLYWOOD DESK



Simple in design and inexpensive, this plywood desk is made from a single 4- x 8-foot panel. Plywood is available with many hardwood veneers; it can also be covered with plastic laminate, which is well suited for a work surface. Since you have many options for the materials and colors of the desk, you could use one wood veneer or one laminate throughout, mix wood veneers, or mix a wood veneer and plastic

When you cut plywood with a power saw, the better side of the wood must be kept face down so that it does not splinter as the teeth of the saw pass through it. If you use a handsaw, whose teeth cut on the downward stroke, cut the wood with the good side facing up.

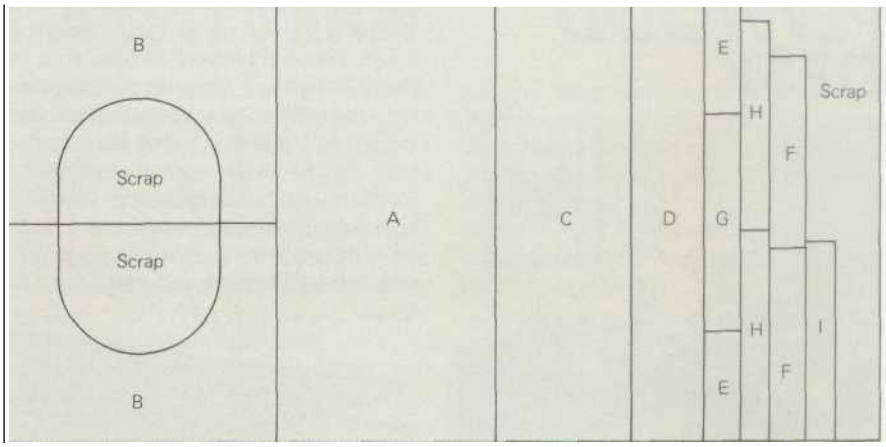
When the desk is completed, cover the exposed edges of the plywood with strips of the same laminate or veneer that cov-ers the faces of the panels.

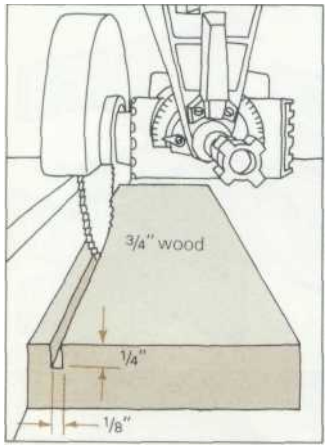
Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
A	Top	1	¾"	23 3/16"	48"	Plywood
B	Side	2	¾"	23 15/16"	29½"	Plywood
C	Back	1	¾"	15"	48"	Plywood
D	Shelf	1	¾"	8"	48"	Plywood
E	Front	2	¾"	4"	12"	Plywood
F	Drawer support	2	¾"	4"	21 3/16"	Plywood
G	Drawer front	1	¾"	4"	23⅞"	Plywood
H	Drawer side	2	¾"	3¼"	23"	Plywood
I	Drawer back	1	¾"	3¼"	21¾"	Plywood
J	Drawer bottom	1	⅛"	21½"	21¾"	Masonite
K	Drawer slide	2	½"	¾"	23⅞"	Maple (or any hardwood)
L	Drawer glue block	2	1½"	1½"	21 3/16"	Maple (or any hardwood)
M	Front glue block	2	1½"	1½"	10¼"	Maple (or any hardwood)

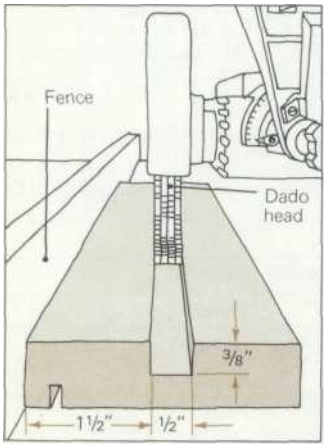
Tools and materials: Radial arm saw with a dado head and a fine-tooth blade Saber saw Electric drill with 2" Screwmate drill bit. Steel tape rule, combination square, pencil. Clamps. Screwdriver, hammer, rubber roller. Sanding block, No, 100 sandpaper Wood glue, contact cement A candle stub Veneer tape 3/4" wide. Wood (see above) Four nail-in metal or plastic glides Four doz 2" No. 10 flathead wood screws.

You can cut all plywood pieces required for this proiect from a standard 4- x 8-ft. panel of 3/4in. plywood Use a steel tape rule to measure off the widths of parts A, B, C, D, E, F, H. and I across the plywood panel Be sure to add the kerf (the thickness of the cut made by your saw blade) to each measurement Make a short test cut in the upper right-hand corner of the panel and measure its width (Or measure, mark, and cut one piece at a time, using the dimensions in the chart on page 49, and always cut just outside the pencil line on the plywood.) Use the framing square to draw cutting lines across the plywood. Measure off the lengths of parts B. E, F, G. H, and I, and use the square to mark off their edges Use a compass, yardstick, or string and nail to draw the circular part of B Use a saber saw for the curves

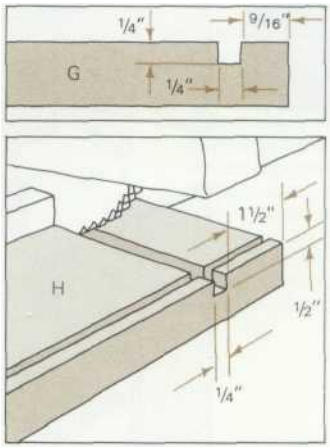




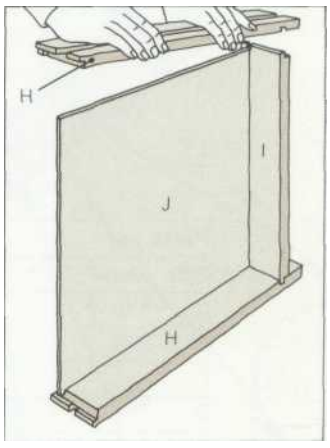
1. To make dado cuts for the drawer bottom on the four sides of the drawer (G, H. and I), fit the radial arm saw with a '1/8-in. dado head Position the dado head 1/2 in above the saw table Cut through a piece of scrap wood 3/4 thick, then measure the cut, it should be 1/8 in, wide and *1/4* in deep Make adjustments, if necessary, until part J fits snugly into the cut Then cut dadoes along the ength of the drawer sides (H), back (I), and front (G) *1/4* in from the bottom edges of each part



2. Ad|ust the dado head for a 1/2-in.-wide cut. Position the blade 3/8 in, above the saw table Cut another piece of scrap wood and measure the cut, adjusting the blade, if necessary, so that the cut is exactly 1/2 in, wide and 3/8 in deep Then cut dadoes along the length of the two drawer sides (H) on the faces opposite the 1/8-in. dadoes cut in Step 1, positioned 1 1/2 **in,** from the lower edges. Make identical cuts on the inner faces of the drawer supports (F)



4. Set the dado head to make a 1/4-in.-wide cut and raise it to 1/2 in above the saw table Cut through a piece of 3/4-in. scrap wood If the tongues you made in Step 3 do not fit snugly into this dado, adjust the saw to make a dado that will fit snugly Then cut two vertical dadoes on the inner face of the drawer front (G) ^{9}/16 in from each end Also cut one vertical dado 1/4 in. wide and 1/2 in. deep on the inner face of each drawer side (H) 1 1/2 in from the back ends



5. To check that the drawer assembly fits snugly, slip together one side and the back and slide in the bottom (J) Then add the other side and the front If they do not fit snugly, make adjustments before you go any further Sand dadoes that are too tight; discard parts that are too loose and cut replacements When everything fits properly, pull the pieces apart and reassemble them in the same sequence, this time gluing all joints as you go

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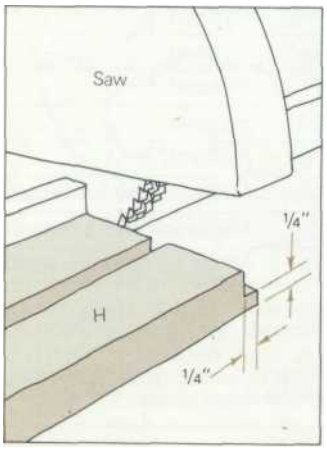
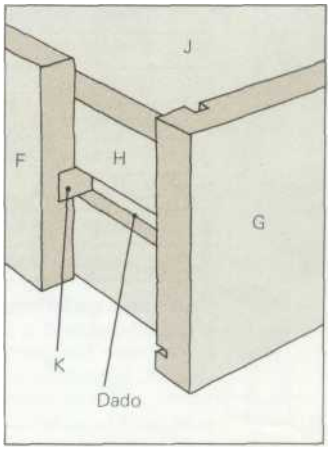
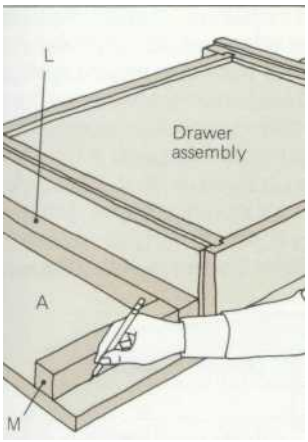


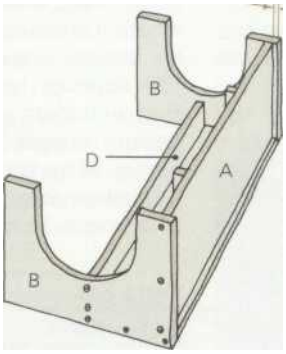
3. Cutting away a section *1/4* in. wide and 1/2 in. deep from the front ends of the drawer sides (H) and both ends of the drawer back (I) will create tongues 1/4 in thick. To do so. lower the dado head to 1/4 in above the table. Make a mark *'1/4* in. from each end of I and from the front ends of parts H Lay each drawer side flat on the table with the 1/8-in. dadoes you have already cut facing down; then cut away the 1/4 in, between your marks and the ends of the parts Lay the drawer back on the table, its Win. dado facing down, and cut 1/4-in. sections from both ends, making two tongues.



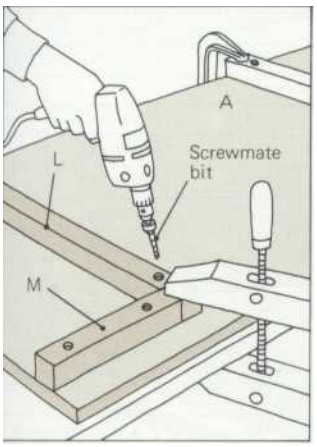
6. Fit the hardwood slides (K) into the dadoes in the drawer supports (F). They should fit snugly. If they are too tight, sand the dadoes. If they are too loose cut new slides When the slides fit properly, glue them in place After the glue dries, place the supports beside the drawer to see if the drawer sits well on the slides and can move easily along them; if not, sand down the slides Rub a candle over the slides and along the dadoes to lubricate them



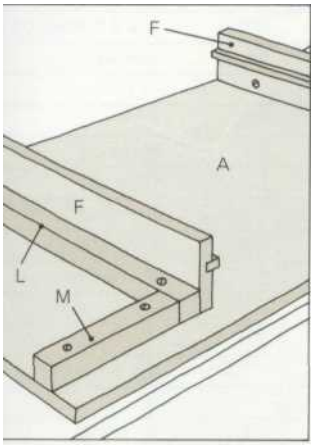
7. Place the desk top (A) upside down Place the supports and slides into the sides of the drawer, leaving a slight clearance on each side, then position this assembly carefully on the desk top. Place two glue blocks (L) beside the supports, and place the other blocks (M) perpendicular to them Mark the positions of the four glue blocks carefully on the desk top.



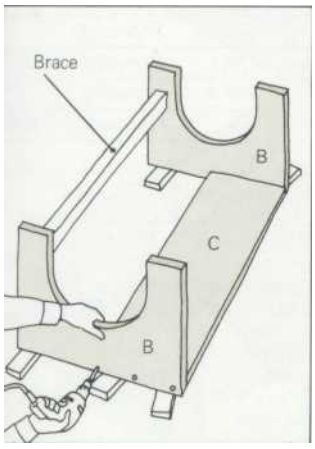
11. Prop the desk top (A) between the sides so that its top surface is vertical and 1/2 in. below the top edges of the back and sides. Drill three holes through each side and into the top, using the Screwmate bit Attach the top with six screws Turn the desk upright and drill six more holes through the back of the desk and into the top, and insert screws Put the shelf (D) in place, its bottom flush with the bottom edge of the back, and attach it to the sides in the same way as the top, using two screws on each end and six along the back



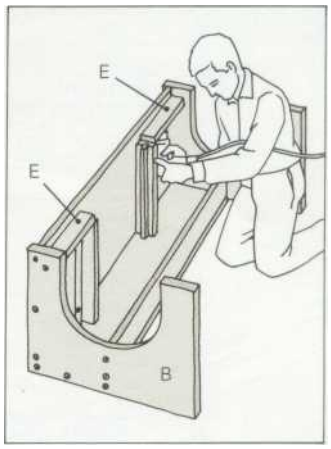
8. Remove the drawer and supports from the desk top. Align the glue blocks on the marks you just drew Use a 2-in No 10 Screwmate bit to drill countersink, clearance, and pilot holes simultaneously through each block and into the desk top. Drill holes for two screws into each glue block about 2 in. from each end.



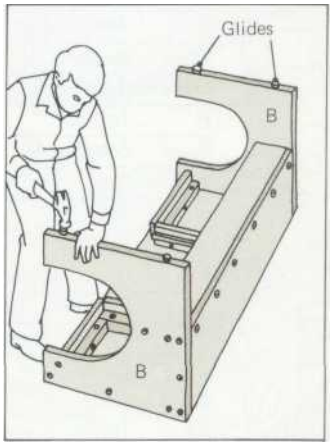
9. Spread glue on the bottom of each block, then screw all four of them to the desk top with 2-in. No. 10 flathead wood screws. Put the drawer supports (F) in place beside the glue blocks. Use the Screwmate bit to drill holes through each drawer support into the glue blocks about 4 in from each end.



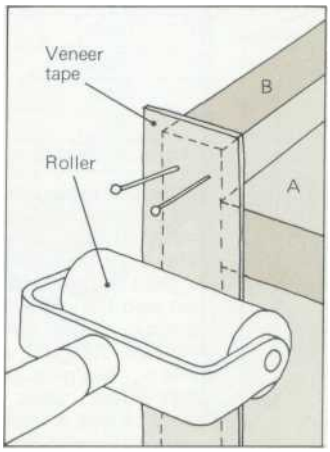
10. Lay the desk sides (B) on their back edges (so the Us face upward) with the back (C) between them. Align the edges and corners, and prop up the sides so they are perpendicular to the back, then nail a temporary brace between the sides. Drill three holes through each side into the back, using the Screwmate bit. Apply glue to the edges of the back and assemble the parts with 2-in screws. Remove brace.



12. Put the fronts (E) in place so that they rest against the glue blocks (M) and the sides (B) of the desk. Use the Screwmate bit to drill a hole through each side into the centers of the edges of the front pieces Drill one hole through the center of each glue block M into each front piece Place glue on the outside edges of the front pieces and over the faces of the glue blocks. Insert **2-in.** screws into pilot holes



13. Turn the desk onto its top, and hammer two glides into the bottom edge of each side (B) about 3 in from the front and back corners



14. Cover the cut edges of the plywood wherever they are exposed with 3/4-in. veneer tape that matches the faces of the plywood. Measure the exposed edges, cut strips of tape to the proper length, cover them with contact cement, and let cement become tacky. Carefully position the tape and press it in place with a rubber roller. If necessary, sand the tape down to the width of the plywood with No. 100 paper. Be careful not to damage the veneer on the faces of the plywood Stain and finish the veneer

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WADDLING DUCK

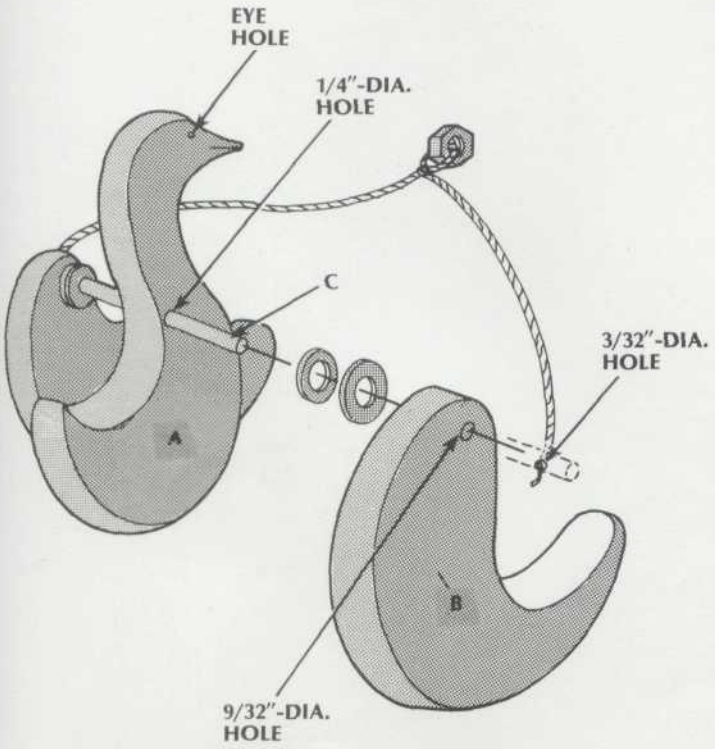
Here's a toy that's sure to fascinate children: a duck that waddles across tabletops. It's powered by a 5/8" steel hex nut that acts as a drive weight. Just hang the hex nut over the edge of a table and give the duck a nudge sideways; it will rock from side to side and walk toward the edge of the table.

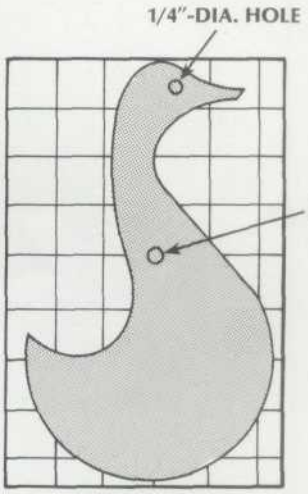
1. Make full-size templates for the body (A) and legs (B) using the patterns provided. Cut out the shapes and rout or sand all edges.
2. Drill a 1/4"-diameter eye hole and a 1/4"-diameter hole to ac commodate the leg pivot (C) in the body where indicated.
3. After cutting the leg pivot to size, drill a 3/32"-diameter hole 3/16" in from each end to accept the drawstrings.
4. Glue the leg pivot in place in the body.
5. Drill a 9/32"-diameter hole in each leg where indicated to accept the leg pivot.
6. Sand the bottom edge of each leg so that it angles 10° up toward the outside.
7. Slide two flat washers and one leg onto each side of the leg pivot.
8. Tie a drawstring to each end of the leg pivot, and tie the free ends of both drawstrings to the hex nut.
9. Finish as desired, and the duck will be ready to waddle.

LIST OF MATERIALS

(finished dimensions in inches)

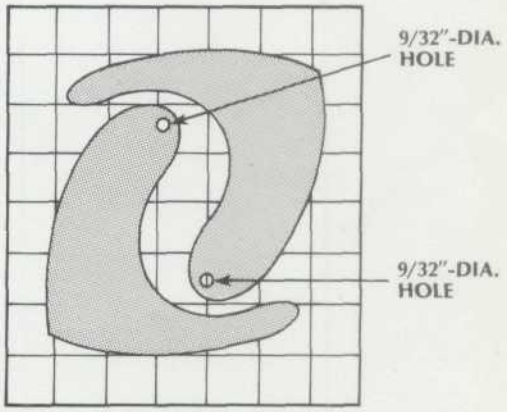
A	Body	3/4 × 5 × 8-1/2
B	Legs (2)	1-1/8 × 4-3/4 × 5
C	Leg pivot	1/4 dia. × 4
	Flat washers (4)	
	Drawstring	#18 nylon cord
	Steel hex nut	5/8
	Wood glue	





BODY CUTTING DETAIL

ONE SQUARE = 1"



LEG CUTTING DETAIL

138
ROCKING HORSE

/\ rocking horse is one of those toys that never goes out of style. The one shown here is designed for sturdiness as well as stability. The runners are spread far enough apart to prevent a small child from tipping over, and the tail is left mostly connected with the body so it cannot easily be broken off. The horse shown in the photo was made from 5/4 Philippine mahogany stepping material, except for the handle, which was formed from a hardwood dowel. Substitute other woods if you like, but always use quality material for a toy that can be passed along in your family for generations to come.

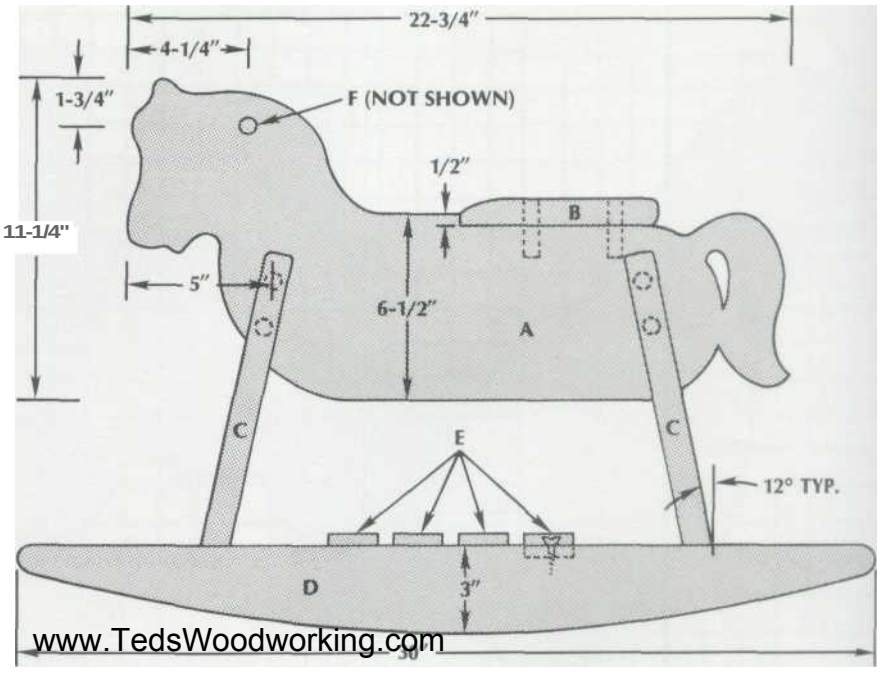
1. Use the pattern provided to make a template for cutting out the horse's body (A). Tape or glue the pattern to a 23" length of 5/4x12 stock, then cut out the profile with a bandsaw or saber saw.

2. Whilethe pattern is still attached to the body, bore a starter hole for the teardrop opening in the tail area, then use a saber saw to completethe cut. Also, mark and drill a 1/2"-diameter hole through the head for inserting the handle (F) and two pairs of holes of the same size in the areas where you want to attach the legs (C). 3. Since exact duplicates are needed for the four legs, it is a good idea to make the leg template out of cardboard. With careful arrangement you should be able to lay out all four legs on an 18" length of 5/4 x 12 stock. Cut out the legs with a bandsaw or saber saw.

NOTE: The edge of the notch at the bottom of each leg must be angled 12° off square so that all four legs will slope in toward the horse's middle. If you prefer, cut out the legs without notches first, then figure out the notches during assembly. The length of the notches is not critical, so long as they are the same on all four legs and the tips of the legs remain above the bottom of the runners after assembly.

4. Lay out the two runners (D) on one side of a 31" length of 5/4 x12 stock. Set them closely together so that enough width remains on the board for cutting out the seat. Use a bandsaw or saber saw to cut out the runners.

5. Lay out the seat (B) on one end of the board from which the runners were taken. Cut out the seat



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with a bandsaw or saber saw, then use a drawknife or other appropriate tool to slope its front so that it ends up only about 9/16" thick at the point where it will join the middle of the horse's back.

6. Rip and crosscut the remainder of the 31"-long board into the four runner spacer slats (E). Then sand all the pieces cut thus far and round over their sharp edges.

7. Begin the assembly by drilling holes in the legs for fastening them to the body. Hold a leg in place and drill through the holes already in the body into that leg. Then remove the leg and repeat the procedure with the leg that fits on the opposite side of the horse.

8. Once all four legs are properly drilled, fasten them to the horse using glue and 1/2"-diameter dowels. Be sure to check the relationship of the dowel length and hole depths before gluing.

9. Once the legs are in place, fit the runners beneath them. Fasten the legs to the runners using glue and #8x1-1/4" flathead wood screws. Counterbore the screws.

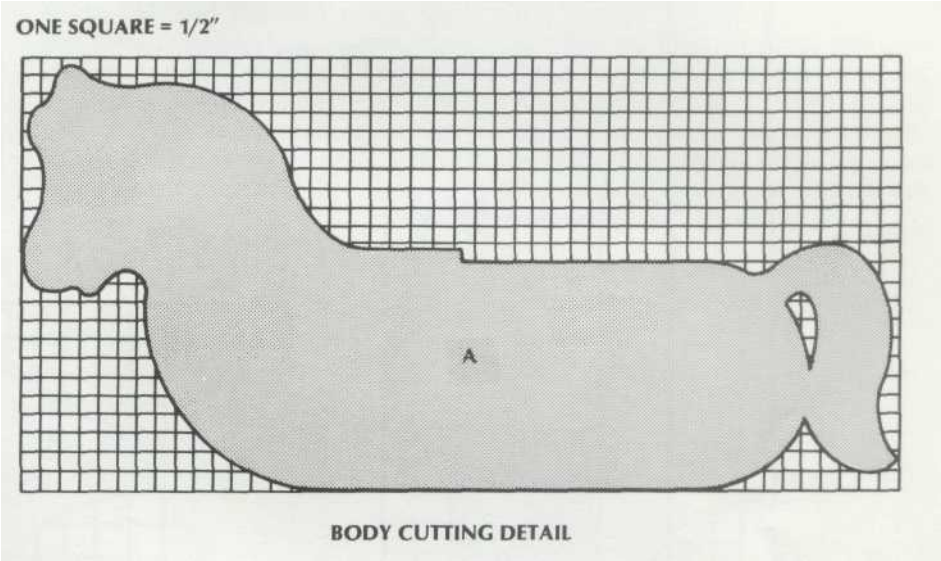
10. Measure the distance between runners, then rabbet the ends of all the runner spacer slats so that they fit snugly into that space. The depth of the rabbets is a matter of taste; just make sure all are cut the same. Center the entire group of slats between the legs and space them about 1/2" apart.

11. Fasten the slats to the runners using glue and #8 x 1-1/4" flathead wood screws. Counterbore the screws slightly below the surface.

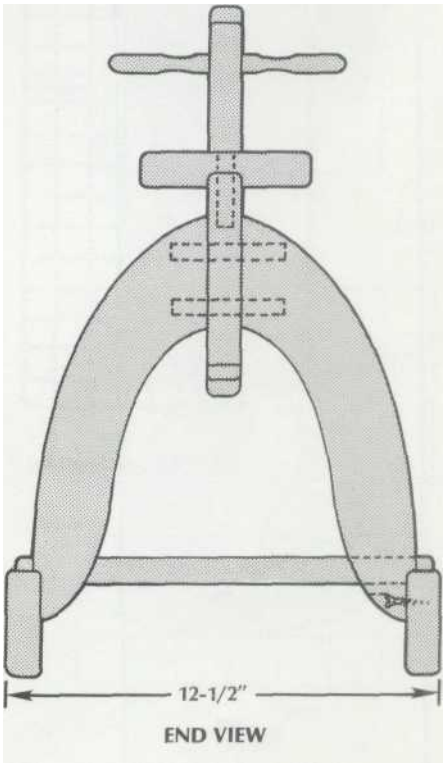
12. Lay out and drill parallel 1/2"-diameter holes in the seat and in the horse's back. Fasten the seat in place using glue and 1/2"-diarneter dowels.

13. Cut a piece of 1/2"-diameter dowel 7" in length and run it through the hole in the horse's head. Center the dowel, then secure it in place by driving a screw down through the head into the dowel. Use a wood rasp and sandpaper to shape the dowel into a form comfortable for small hands.

14. If you wish, fill the counterbored screw holes with wood plugs or putty. Give the horse a final touchup sanding and apply the nontoxic finish of your choice.



BODY CUTTING DETAIL

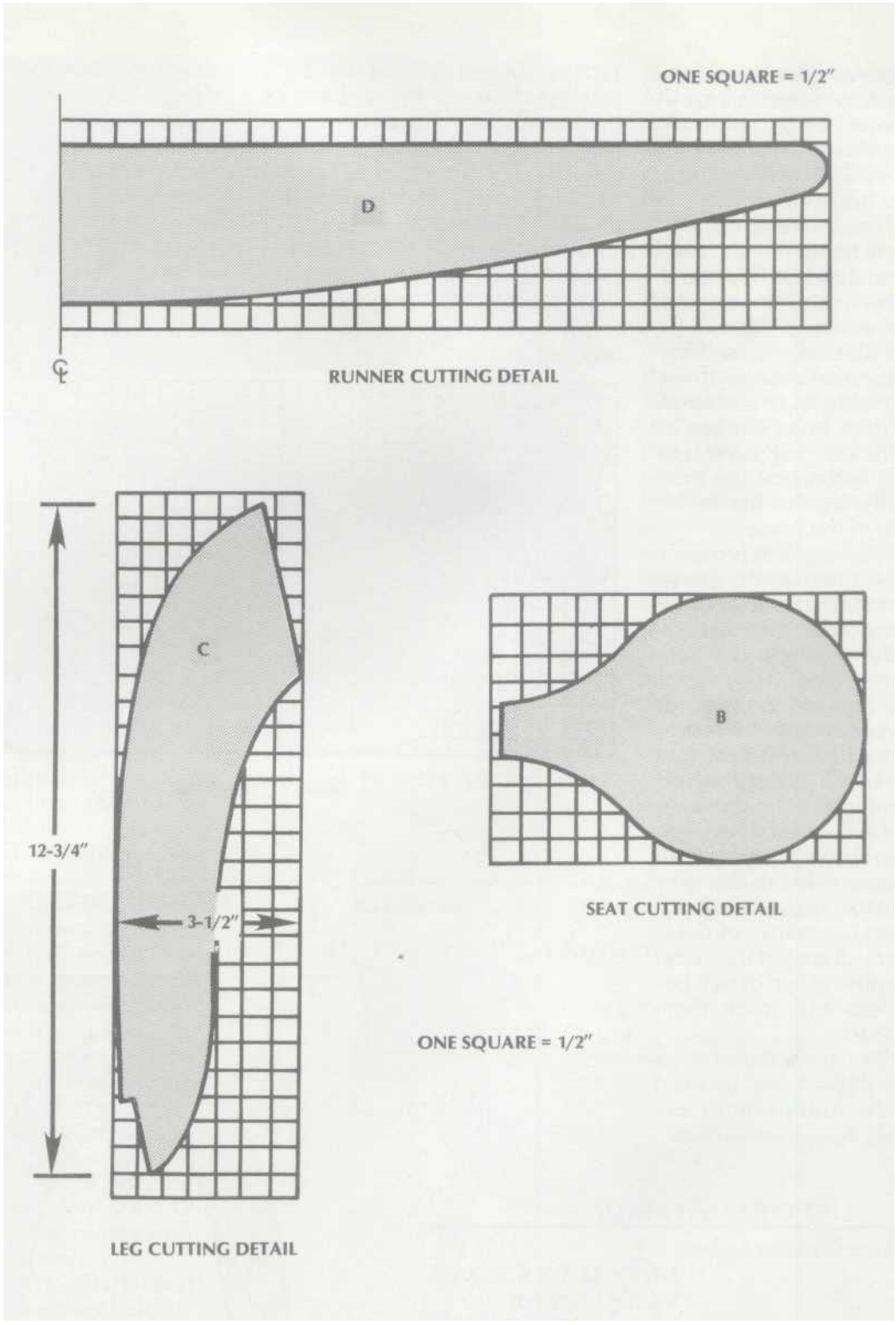


END VIEW

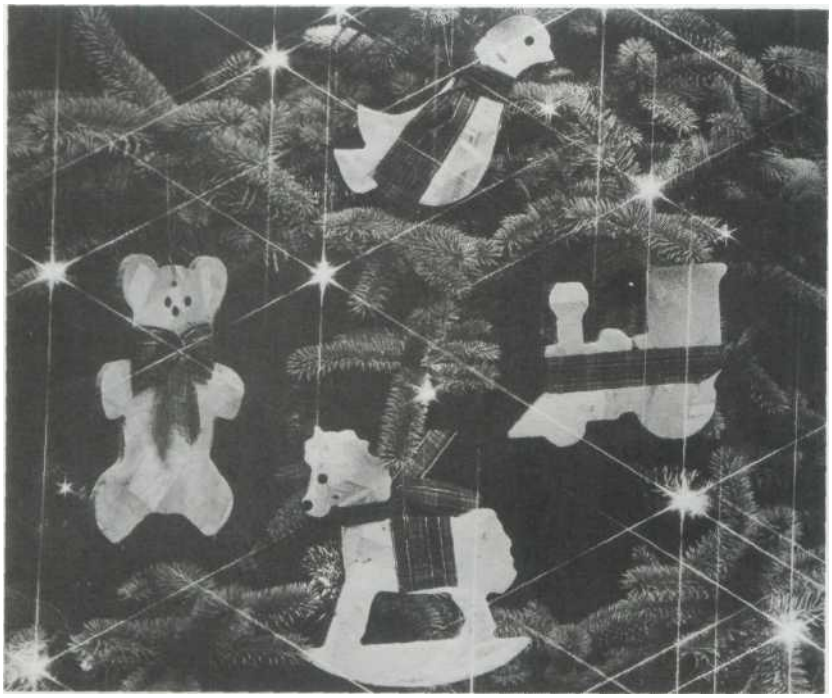
LIST OF MATERIALS

(finished dimensions in inches)

A	Body	1-1/8 × 11-1/4 × 22-3/4
B	Seat	1-1/8 × 5 × 6-7/8
C	Legs (4)	1-1/8 × 3-1/2 × 12-3/4
D	Runners (2)	1-1/8 × 3 × 30
E	Spacer slats (4)	1-1/8 × 1-3/4 × 12
F	Handle	1/2 dia. × 7
	Dowels (4)	1/2 dia. × 5
	Flathead wood screws	#8 × 1-1/4
	Wood glue	

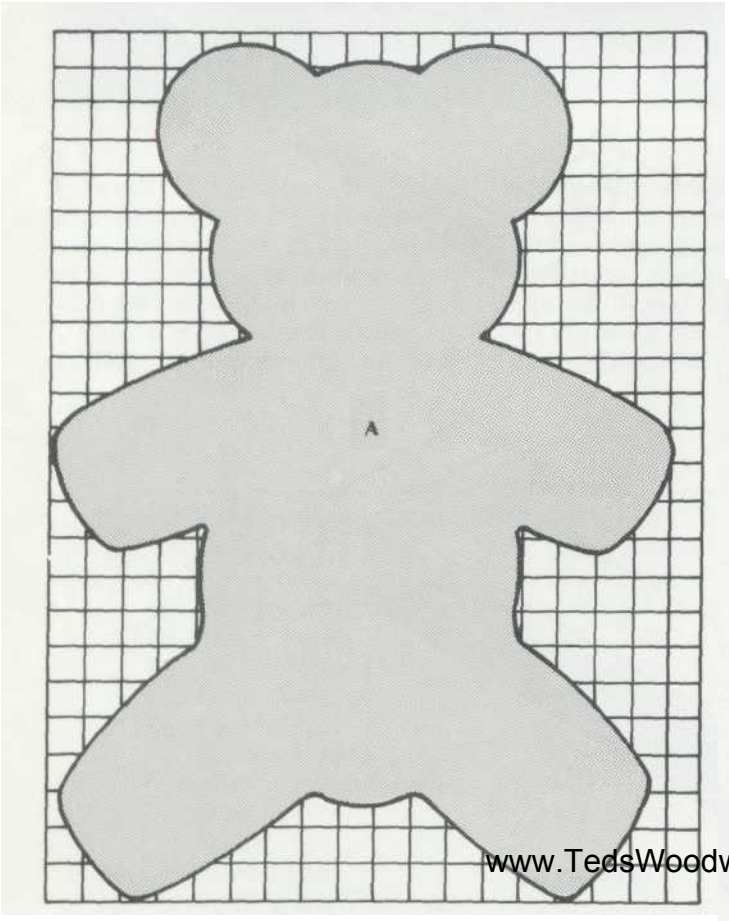

ONE SQUARE = 1/2"
D
℄
RUNNER CUTTING DETAIL
C
12-3/4"
3-1/2"
LEG CUTTING DETAIL
B
SEAT CUTTING DETAIL
ONE SQUARE = 1/2"

139
CHRISTMAS ORNAMENTS



Nothing adds to the beauty and wonder of the family Christmas tree quite like homemade ornaments. These eye-catching figurines can be made easily from 1/2" wood on a bandsaw or jigsaw. Your children are sure to want them all: the bear (A), dove (B), hobbyhorse (C), and train (D).

1. Make a template of the figu rines using the patterns provided.
2. Cut out the shapes on a band saw or jigsaw, then use a disc sand er or belt sander to sand all of the outside surfaces.
3. Finish the figurines as desired, or leave them unfinished for a more rustic look. Add ribbon as shown for a final touch.

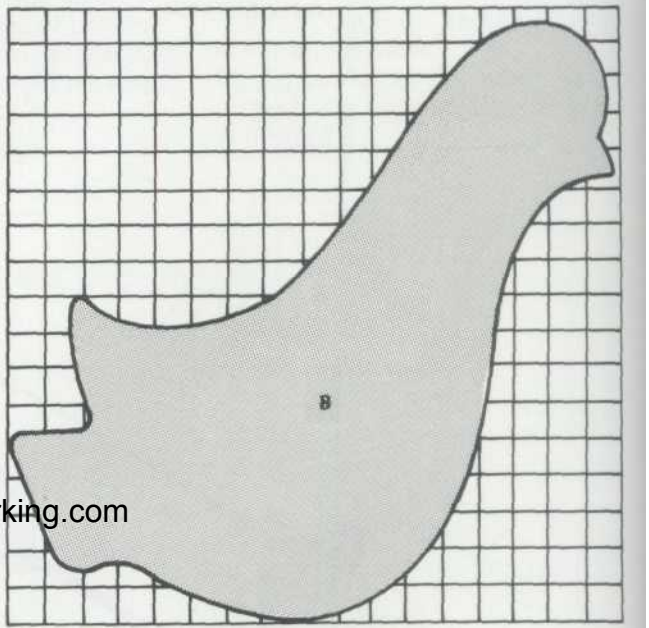


LIST OF MATERIALS

(finished dimensions in inches)

A	Bear	1/2 × 3-1/4 × 4-1/2
B	Dove	1/2 × 3-1/8 × 3-1/8

ONE SQUARE = 3/16"



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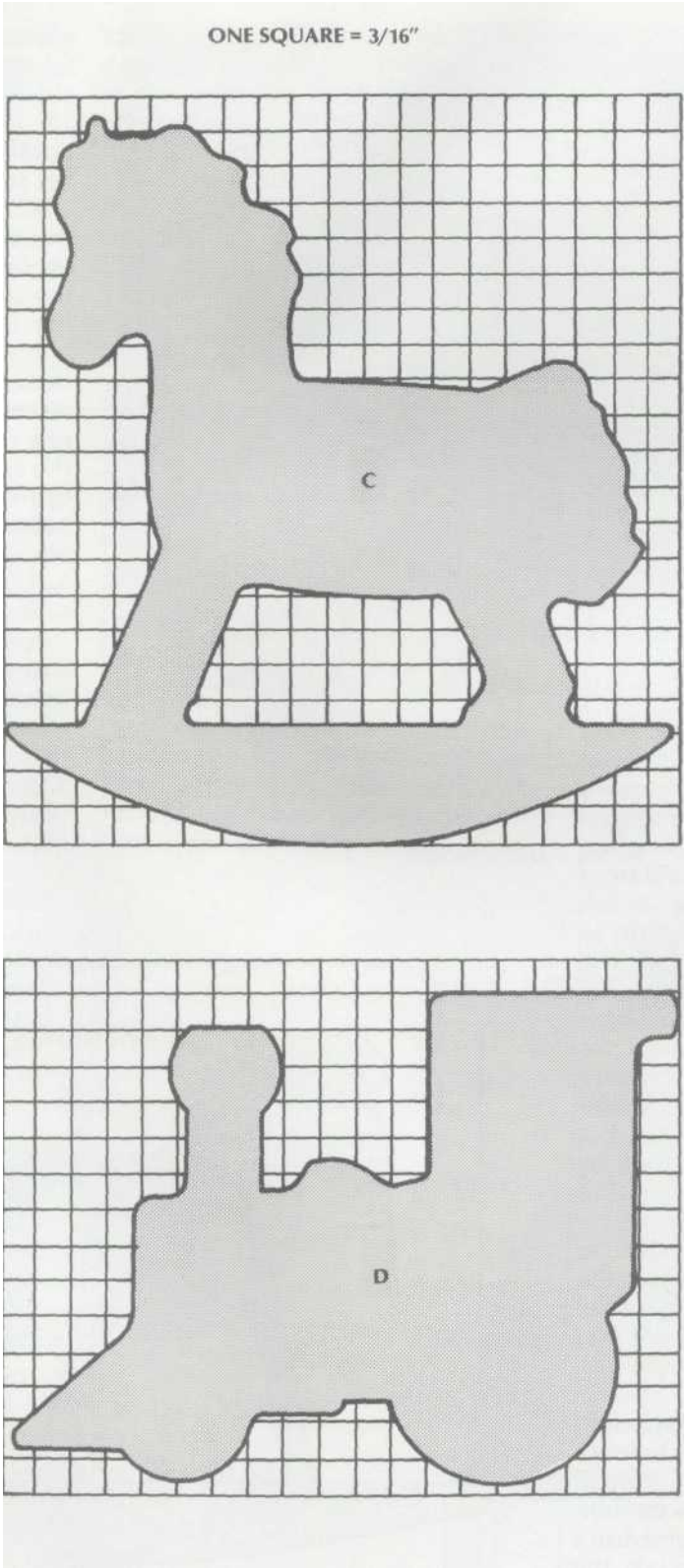

ONE SQUARE = 3/16"
C
D

140
CHILD'S EASEL

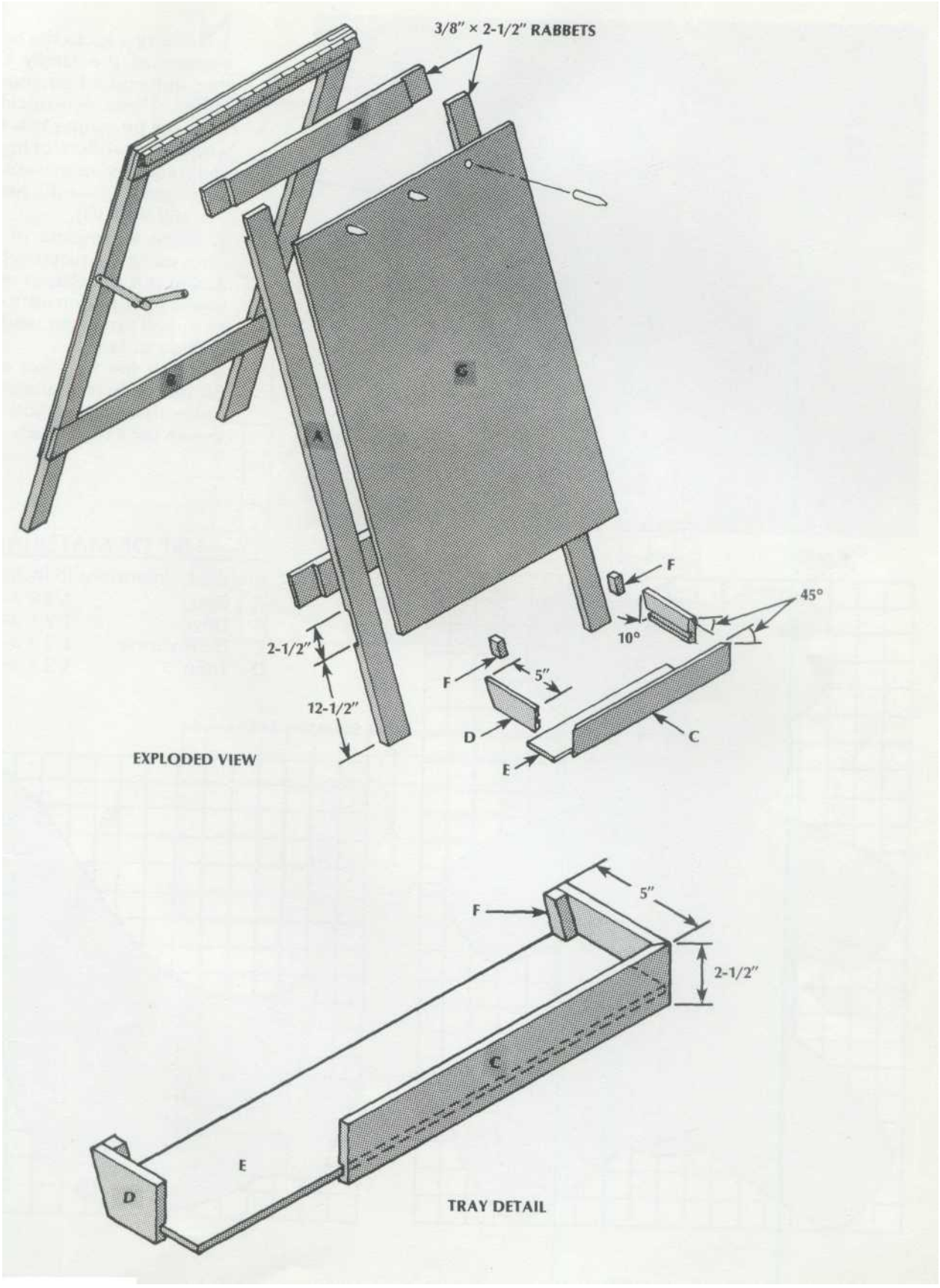
Here's a project guaranteed to provide hours of fun for your children: a lightweight, collapsible easel with a dent-free surface made from 1/4" hardboard. 1. Cut all of the pieces to size according to the dimensions provided. Cut a dado 3/8" deep and 2-1/2" wide approximately 12-1/2" from the bottom of each leg (A). 2. Rabbet the ends of the crosspieces (B) and the tops of the legs to the same dimensions as the dado cuts made in the previous step.

LIST OF MATERIALS

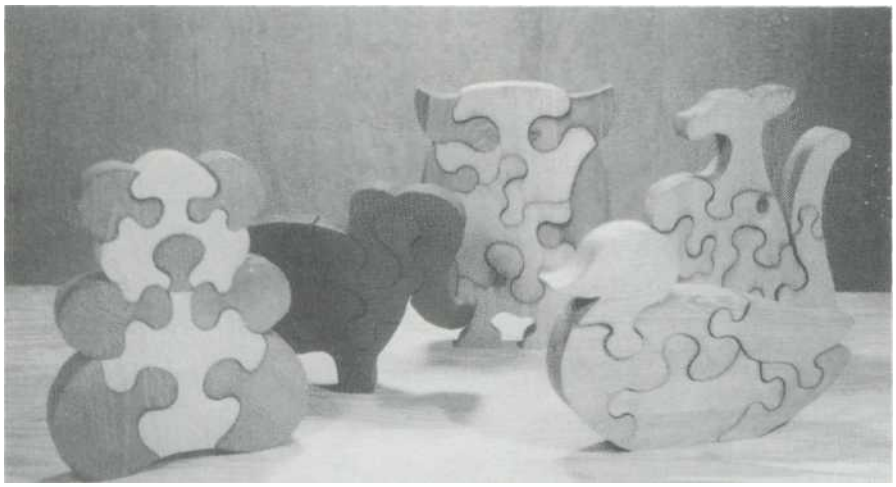
(finished dimensions in inches)

A	Legs (4)	3/4 × 2-1/2 × 60
B	Crosspieces (4)	3/4 × 2-1/2 × 30
C	Tray fronts (2)	3/4 × 2-1/2 × 22
D	Tray sides (4)	3/4 × 2-1/2 × 5
E	Tray bottoms (2)	1/4 × 4-1/2 × 21-1/4
F	Glue blocks (4)	3/4 × 3/4 × 2
G	Faces (2)	1/4 × 30 × 47-1/2
	Flathead wood screws	#8 × 1
	Flathead wood screws	#10 × 1-1/4
	Dowels	1/4 dia. × 2-1/2
	Brads	
	Piano hinge	
	Folding leg braces (2)	
	Wood glue	

3. Glue and clamp the legs and crosspieces together.
4. Cut one end of each tray side (D) at a 10° angle; the other end is mitered 45° as shown. The tray fronts (C) are mitered 45° on each end.
5. Cut a groove 3/8" deep and 1/4" wide 3/8" above the bottom of the tray fronts and sides.
6. With the tray bottoms (E) in place, construct the trays using glue and 1-1/4" brads. Attach two glue blocks (F) to each tray with a slight setback to hold the trays snug when screwed to the frame.
7. Connect the two easel frames with a piano hinge and folding leg braces. Position the braces to allow the easel to open wide enough to prevent it from tipping over.
8. Fasten the faces (G) to the easel frames using glue and #8 flathead wood screws, making their top edges flush. Drill three evenly spaced 1/4"-diameter holes through each face and into the top crosspiece on each side. In each hole, glue a 1/4"-diameter dowel that has been tapered to a dull point.
9. Fasten the trays to the easel faces using glue and #10 flathead wood screws. Center the trays across the width of the faces and make their lower edges flush.
10. To complete the easel, fill all screw holes with putty, and finish as desired.


3/8" × 2-1/2" RABBETS
B
B
A
C
F
45°
10°
2-1/2"
12-1/2"
F
5"
D
C
E
EXPLODED VIEW
5"
F
2-1/2"
C
E
D
TRAY DETAIL

141 PUZZLES



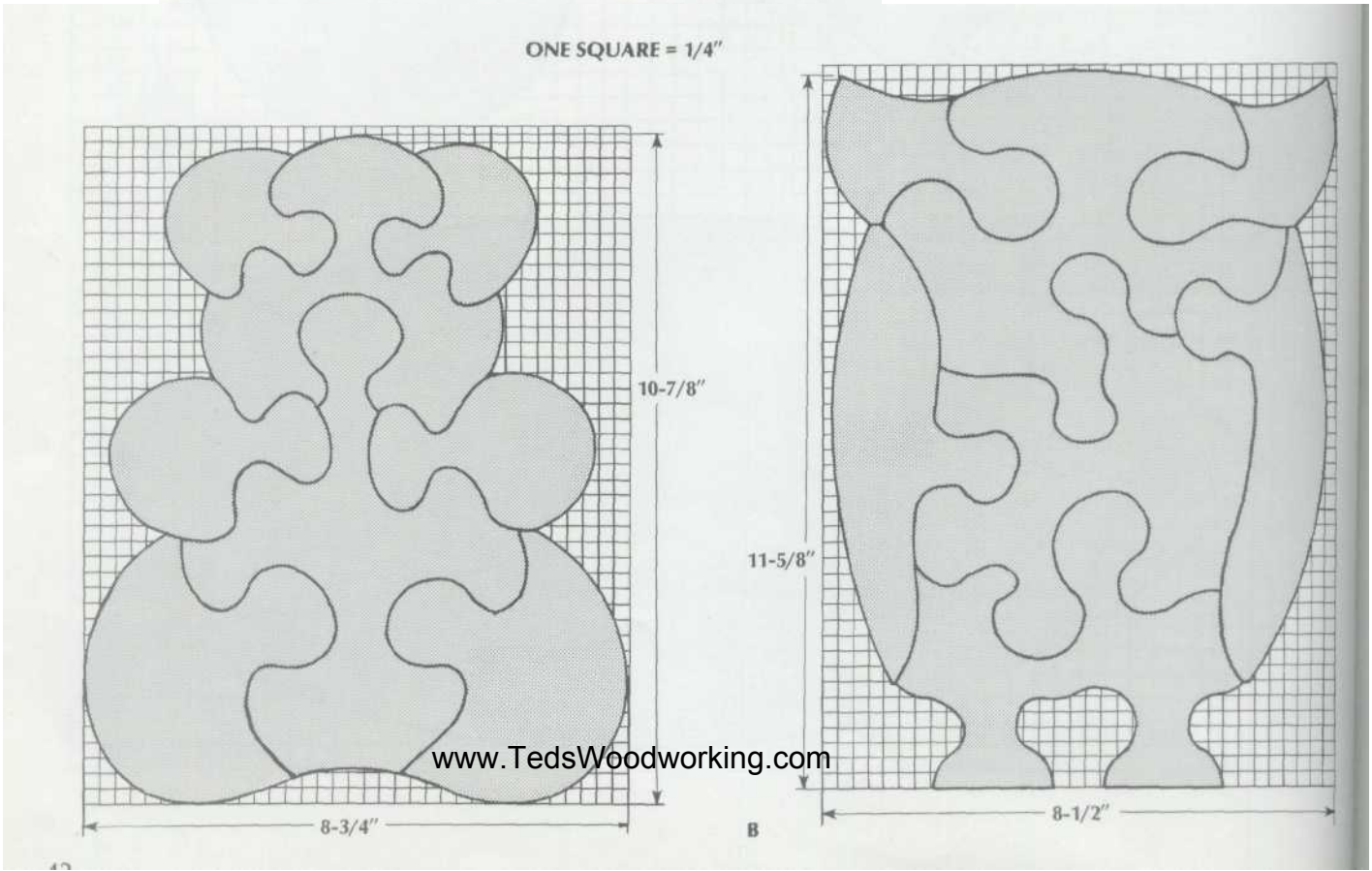
Puzzles have always fascinated children and adults alike. Here are five fun animal puzzles you can make on a bandsaw or jigsaw: a bear (A), owl (B), duck (C), elephant (D), and kangaroo (E).

1. Make two templates of each puzzle design—one template for the outside shape and one for the inside individual pieces. Use 1-1/2"-thick stock or two pieces of 3/4" stock face-laminated together,cutting the pieces 1/4" wider and 1/4" longer than the dimensions called for.
2. Trace the ouside and inside patterns on the workpieces. On a bandsaw or jigsaw, cut the outside shape first, then cut the individual pieces apart.
3. Using a disc sander or belt sander, sand all of the outside surfaces of the puzzle pieces.
4. If desired, use a nontoxic stain, such as food coloring, to highlight certain parts of the puzzles or to create contrasts between parts.

LIST OF MATERIALS

(finished dimensions in inches)

A	Bear	1-1/2 × 8-3/4 × 10-7/8
B	Owl	1-1/2 × 8-1/2 × 11-5/8
C	Duck	1-1/2 × 11-5/8 × 8-3/8
D	Elephant	1-1/2 × 12 × 8-3/8
E	Kangaroo	1-1/2 × 8-1/2 × 11-5/8



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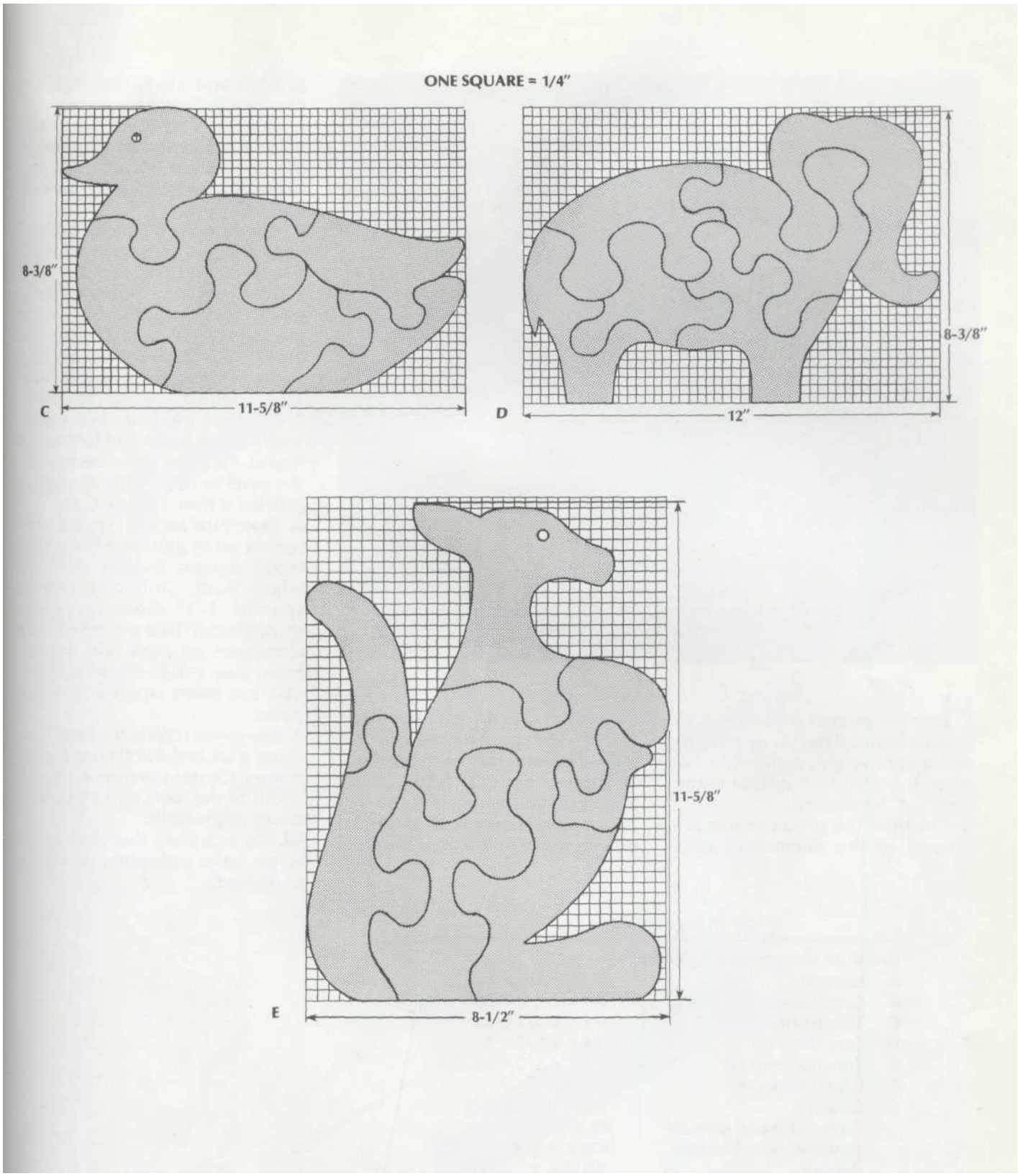
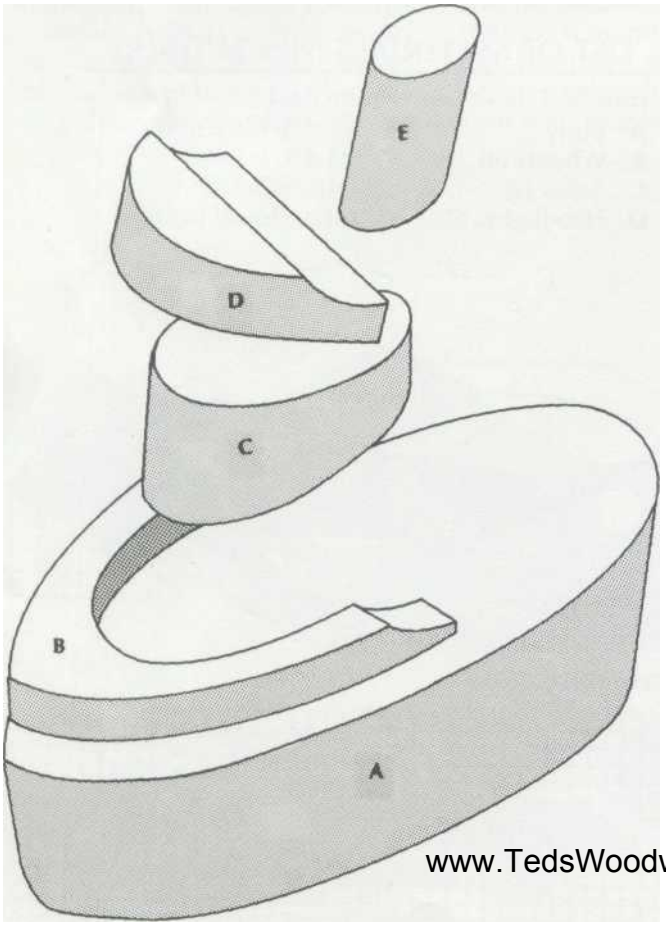
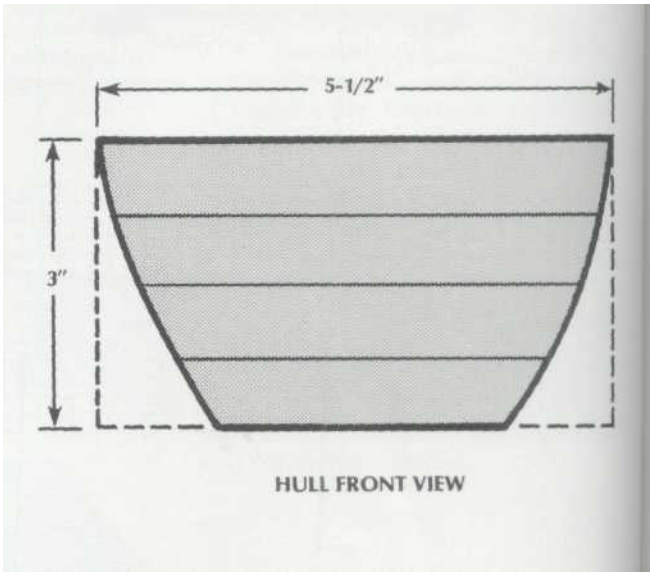

ONE SQUARE = 1/4"
8-3/8"
C
11-5/8"
D
12"
8-3/8"
11-5/8"
E
8-1/2"

142
TUGBOAT

This sturdy tugboat floats on water, so a child can enjoy it in the bathtub or swimming pool. The all-wood design makes it safe to play with, and it can be built in no time at all. Be sure to use waterproof glue when assembling.

1. Cut blanks for the thicker pieces from 3/4" stock face-laminated with water-resistant glue. Cut all pieces to the listed dimensions.
2. Cut out the shapes on a band saw using the patterns provided. When cutting the hull (A), set the bandsaw table at a 10° tilt; this will reduce the sanding needed to shape the contour.
3. Turn the smokestack (E) round on a lathe, then remove stock by sanding or rasping from both sides of the cylinder to make it oval-shaped. Angle the top of the smokestack and the deck house (C)at10°.
4. Use a belt sander with a sanding drum to make the inside concave curves on the railing (B) and pilot house (D). Shape the hull with a convex curve as the sides taper in toward the keel, gradually at first and then sharply toward the bottom.
5. Rough sand all the pieces with coarse sandpaper, then repeat with gradually finer grits. If using a belt sander, always keep the workpiece moving to eliminate any large flat spots in the contour.
6. Before final assembly, test the tugboat to make sure it floats even ly. Attach the railing to the hull and carefully set them in the water. Move the pilot house, deck house, and smokestack into a position that enables the tugboat to float up right and level.
7. Mark the exact position of the parts, then assemble using water proof glue and clamps. Dowelscan also be used for added strength.
8. Finish as desired.





LIST OF MATERIALS

(finished dimensions in inches)

A	Hull	3 × 5-1/2 × 12
B	Railing	3/4 × 5-1/2 × 7
C	Deck house	2-1/4 × 3 × 5
D	Pilot house	1-1/2 × 4 × 3-1/4
E	Smokestack	1-1/2 × 1-1/2 × 4
	Water-resistant wood glue	

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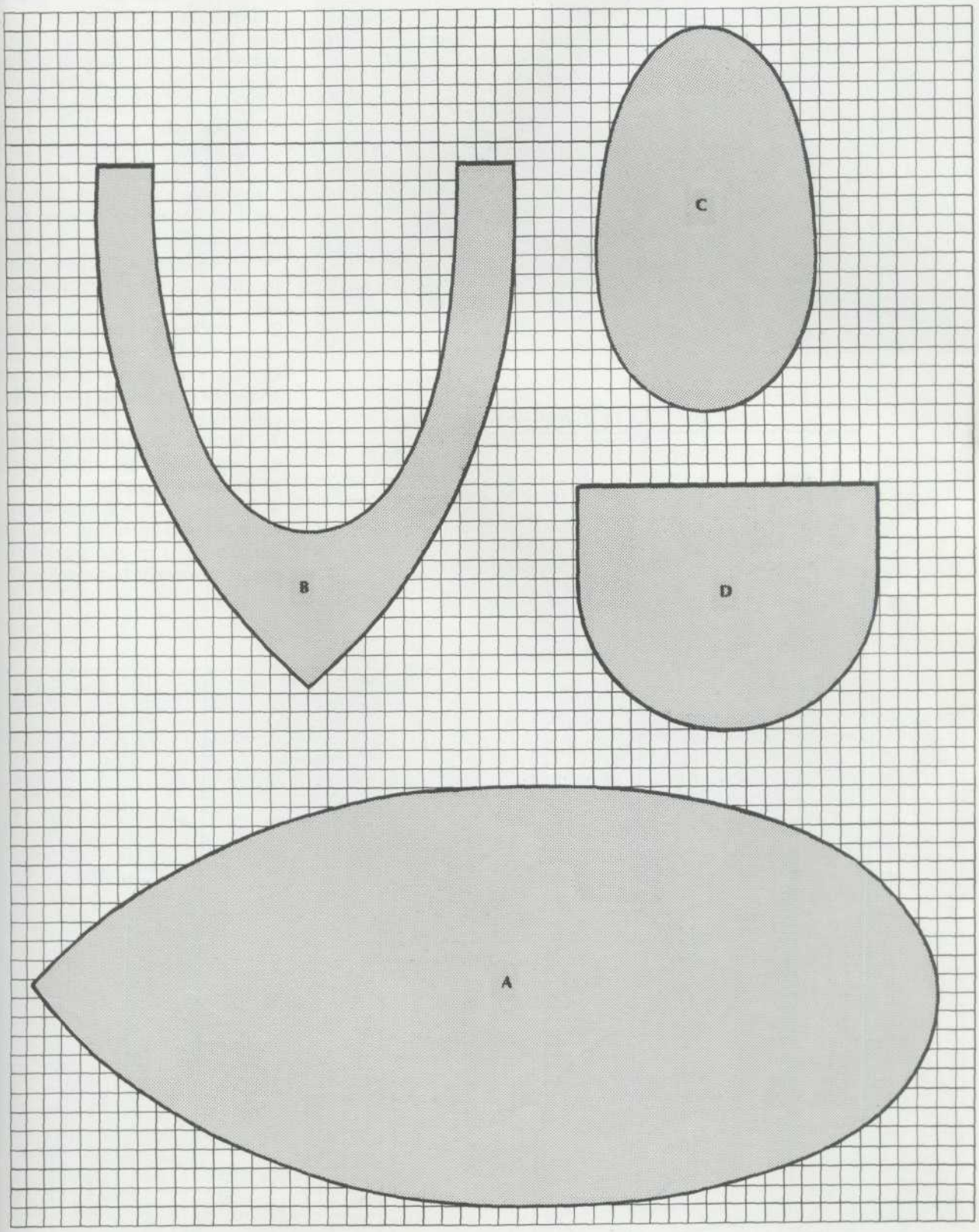
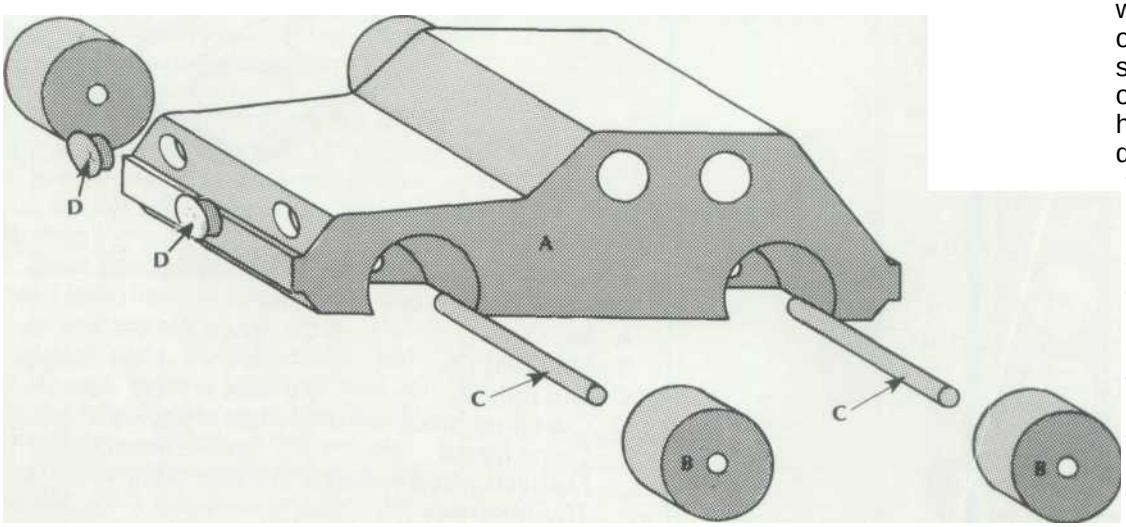
ONE SQUARE = 1/4"



143
TOY CARS

Remember how those toy cars you played with as a child never wore out? Now you can make those sturdy, all-wood toys again by following these simple plans. While specific features vary, each of these toy cars is made in the same fashion. Naturally, you might want to experiment with the designs to suit your own tastes.



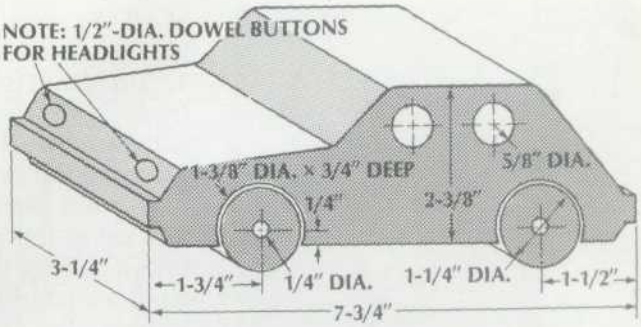
1. Make a cardboard template of the car design. Trace the pattern on a 4 x 4.
2. Cut the desired car body shape (A) with a bandsaw.
3. Drill the various holes for the windows, wheel wells, headlights, and axles. Use a Forstner bit to cut the wheel wells.
4. Using a hole saw, cut four wheels (B) to the dimensions given out of 3/4" scrap stock. The hole saw will simultaneously cut the outside contour and mark the axle hole of the wheel. Drill the 1/4"-diameter axle holes. As an alterna tive, the wheels can also be turned on your lathe. Drill a 1/4"-diameter axle hole through the middle of the block before turning, then turn the cylinder and cut it into wheels.
5. Before assembling the car, power sand and file each of the individual pieces.
6. Finish sand the pieces with a fine sandpaper (100 grit or finer).
7. To assemble the car, rub paraf fin on the middle part of the axles (C) and slide them through the holes in the car body. Glue the wheels to the axle ends. Finally, glue the 1/2"-diameter dowel buttons into the headlight holes.
8. Check to make sure that the wheels and headlights cannot be removed by a child, then give the car a nontoxic finish.

In the future use these guidelines and your imagination to design vans, buses, taxis, fire engines, and other toy vehicles.

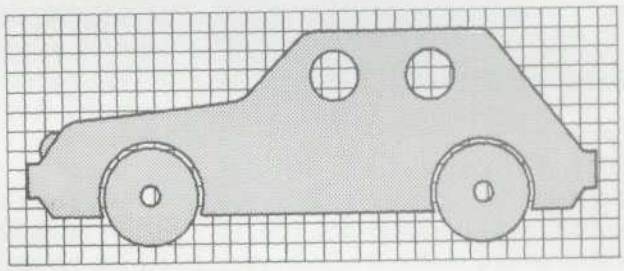
LIST OF MATERIALS (Sedan)

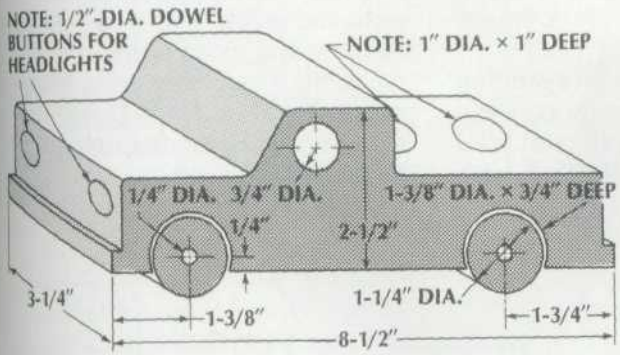
(finished dimensions in inches)

A	Body	2-3/8 × 3-1/4 × 7-3/4
B	Wheels (4)	1/4 dia. × 3/4
C	Axles (2)	1/4 dia. × 3-1/4
D	Headlights (2)	1/2-dia. dowel buttons



ONE SQUARE = 1/4"





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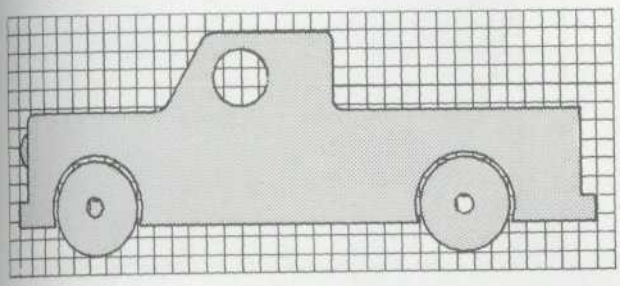
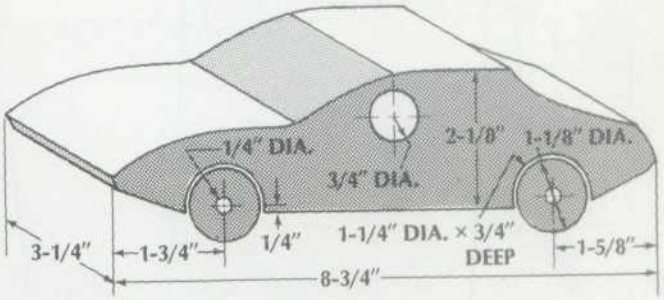


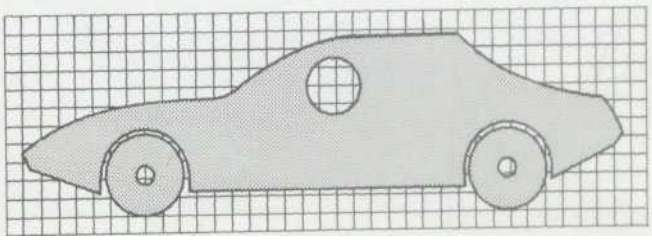
LIST OF MATERIALS (Pickup Truck)

(finished dimensions in inches)

A	Body	2-1/2 × 3-1/4 × 8-1/2
B	Wheels (4)	1-1/4 dia. × 3/4
C	Axles (2)	1/4 dia. × 3-1/4
D	Headlights (2)	1/2-dia. dowel buttons



ONE SQUARE = 1/4"



LIST OF MATERIALS (Sports Car)

(finished dimensions in inches)

A	Body	2-1/8 × 3-1/4 × 8-3/4
B	Wheels (4)	1-1/8 dia. × 3/4
C	Axles (2)	1/4 dia. × 3-1/4

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COFFEE TABLE

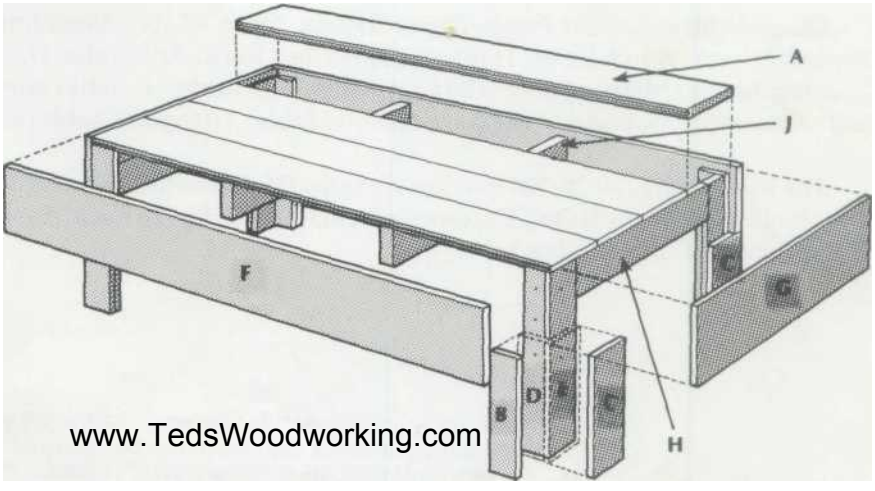
This coffee table can be built from clear grade redwood and features a tongue-and-groove board top. Feel free to use another variety of wood, either stained or left natural color.

1. Cut all of the pieces to size using the dimensions given.
2. Construct the inner legs (D, E) then connect them in two pairs by fastening a top support (H) to the backs of the wide inner leg pieces. The upper edge of the top supports should be flush with the top of the inner legs.
3. Fasten the outer legs (B, C) to the inner legs. To achieve a good corner joint, place a square block inside the inner legs and use band clamps to hold the assembly while it dries.
4. Set the side frame pieces (F) on the outer legs, their ends flush with the corner on the outer legs. Glue and nail in place, then fasten the end frame pieces (G) in position.
5. Rip one top piece (A) down the middle. Set the tongue section on the table and push its ripped edge against the side frame. Then fit the other three uncut pieces in place. Trim the ripped edge of the remaining piece as needed to fit it in and complete the top.
6. Make sure the outer pieces of the top are flush with the top of the side frames, then drive a few finishing nails through the frames into those top pieces. Also, drive nails through the ends of the top pieces into the top supports.
7. Turn the table over on its top. Fit the two cross braces (J) in place, then drive a couple of finishing nails through the side frames into the ends of each brace. Install glue blocks or metal corner bracing between the cross braces and the side frames.
8. Turn the table right side up and drive a pair of finishing nails through each full top piece, then drive one through each narrow piece into the brace.
9. Set all nails, fill the holes with putty, sand, and finish the table as desired.

LIST OF MATERIALS

(finished dimensions in inches)

A	Top pieces (4)	3/4 × 5-1/2 × 52-1/2 (tongue and groove)
B	Outer leg pieces (4)	3/4 × 3-1/2 × 12-1/2
C	Outer leg pieces (4)	3/4 × 2-1/2 × 12-1/2
D	Inner leg pieces (4)	3/4 × 2-1/2 × 17-1/4
E	Inner leg pieces (4)	3/4 × 1-1/2 × 17-1/4
F	Side frame pieces (2)	3/4 × 5-1/2 × 54
G	End frame pieces (2)	3/4 × 5-1/2 × 20-3/4
H	Top supports (2)	3/4 × 3-1/2 × 19-1/4
J	Cross braces (2)	1-1/2 × 3-1/2 × 20-3/4
	Wood screws	#8 × 1-1/4
	4d finishing nails	
	Glue blocks or metal corner bracing	
	Wood glue	



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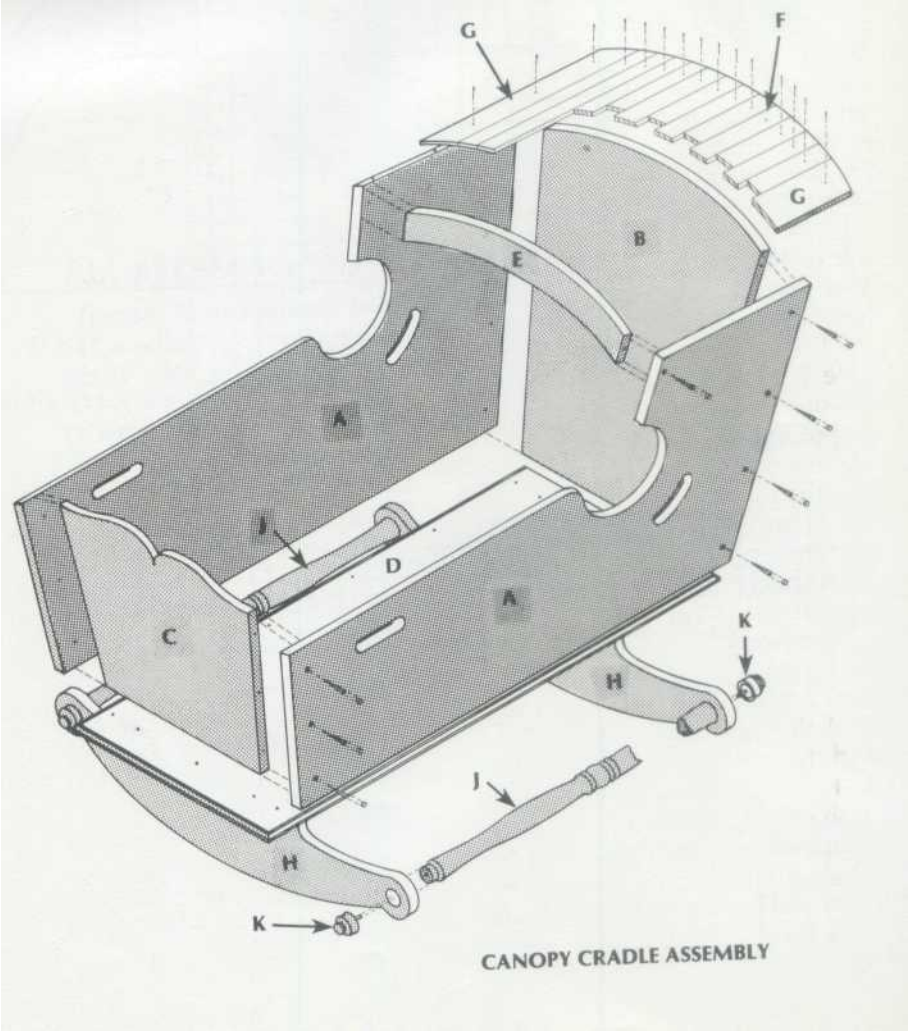
CHILD'S CRADLE

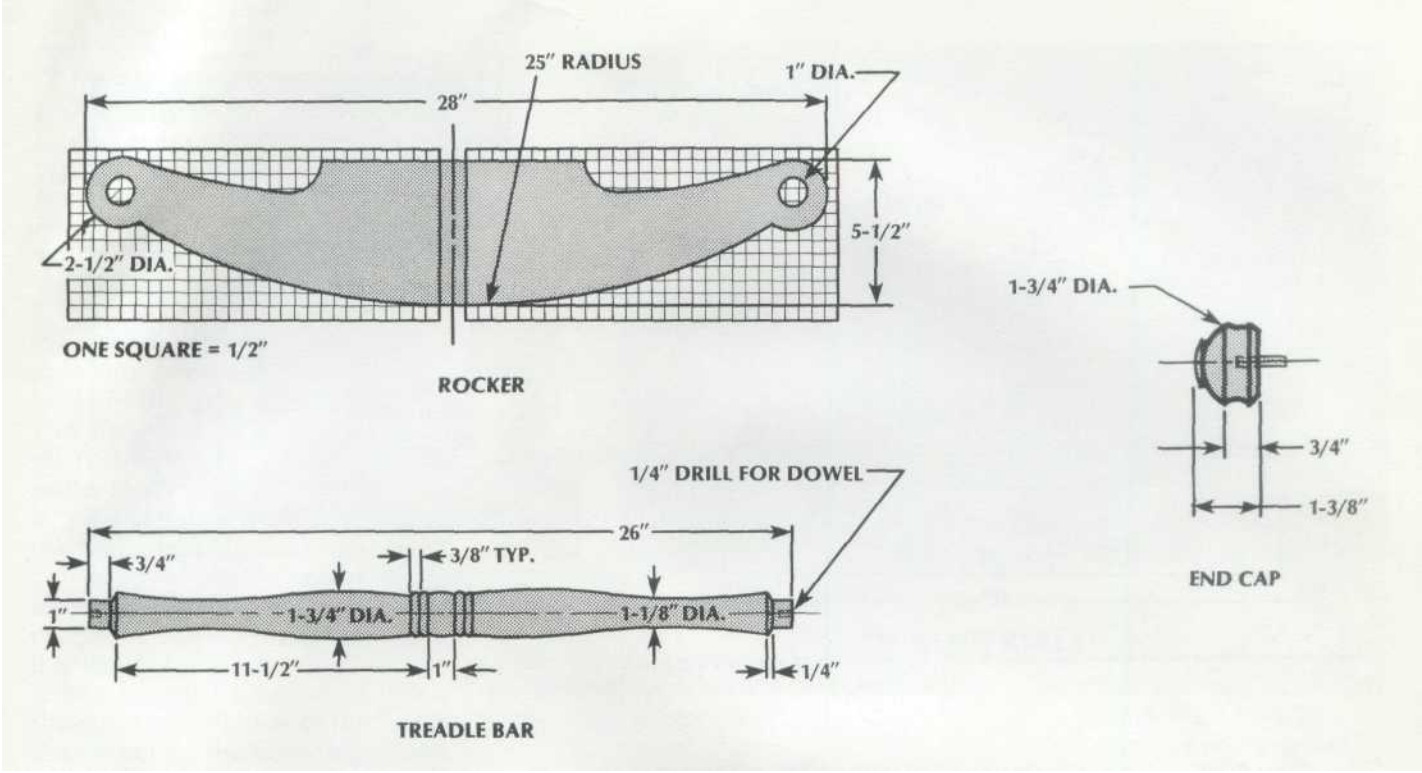


You'll love this old-fashioned cradle as much as your ancestors did. The lightly arched canopy protects a baby's sensitive eyes from harsh light. The convenient treadle bars allow you to rock the cradle with one foot while reading or knitting. In short, it's the perfect way to rock your child to sleep.

1. Use the patterns provided to cut the shapes of the sides (A), headboard (B), and footboard (C) to the dimensions provided. Cut the angle ends and bevel edges as shown.
2. Cut the handles in the sides, and shape the top edge of each piece as shown.
3. Shape the edge of the base (D) to the profile of your choice; the pattern shown is a radius bead. To minimize splintering, shape the ends of the base first, then do the sides.
4. Sand all of the pieces smooth. A drum sander will be necessary to sand the curve in the sides and the pattern cut in the footboard.
5. Assemble the sides to the headboard and footboard with glue and counterbored #8 x 1-1/2" flathead wood screws. Transfer the pattern to the canopy support (E) stock.

Hold it up to the assembled sides to mark the angles on the ends. Span the canopy support between the sides and secure it in place with glue and screws.

6. Attach the base to the bottom edge of the sides, headboard, and footboard with glue and counter bored screws from underneath.
7. Cut the canopy pieces (F, G) to size. While cutting to width, rip a 2° bevel on both edges of the center pieces and on the inner edge of each edge piece so the pieces form an arc as shown.
8. Starting in the center and working toward the ends, attach the canopy pieces with brads. When finished, sand the top for a smooth, rounded contour.
9. Cut two pieces of stock to 1-3/4"



bar (J) and two end caps (K) from each piece. Cut off the end caps and trim each piece to finished length.

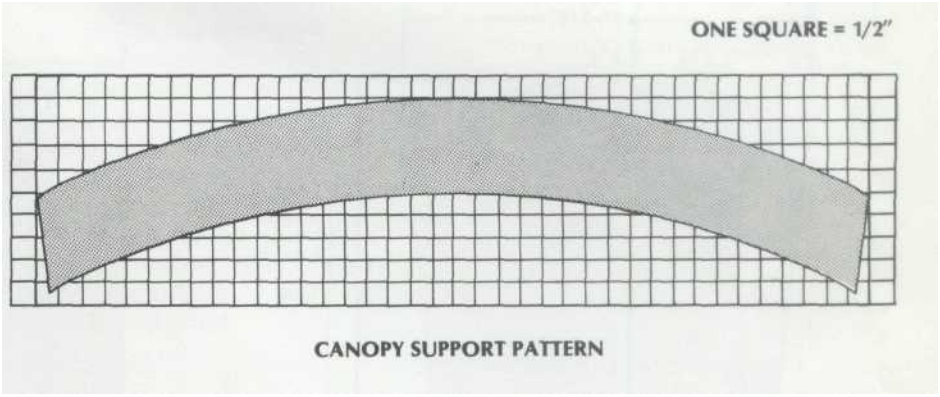
10. Cut two pieces of stock to the listed dimensions for the rockers (H), then shape the pieces according to the pattern provided. Drill 1"-diameter holes in the rockers for the treadle bars.

11. Drill a 1/4"-diameter dowel hole 1/2" deep in each end of the treadle bars and in the adjoining end of each end cap.

12. Insert the ends of the treadle bars through the holes in the rock ers. Attach the end caps with 1/4"-diameter x 1" dowels and glue. Then attach the rockers to the bot tom of the base with glue and counterbored wood screws.

13. Cover all counterbored screws with 3/8"-diameter dowel plugs. Sand the plugs flush, then finish sand the cradle.

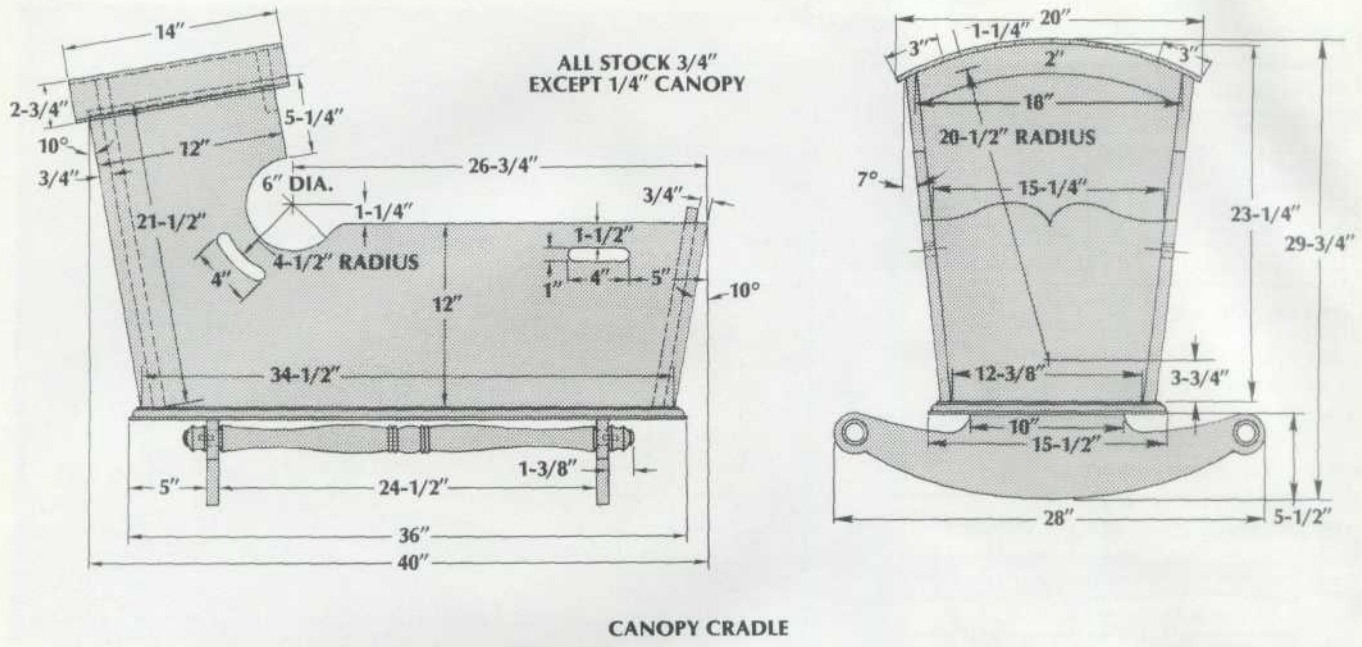
14. Finish as desired; a nontoxic finish is best. Make sure the finish is applied well in advance of the baby's arrival in order for the finish to dry and lose its odor. A polyurethane finish is best.



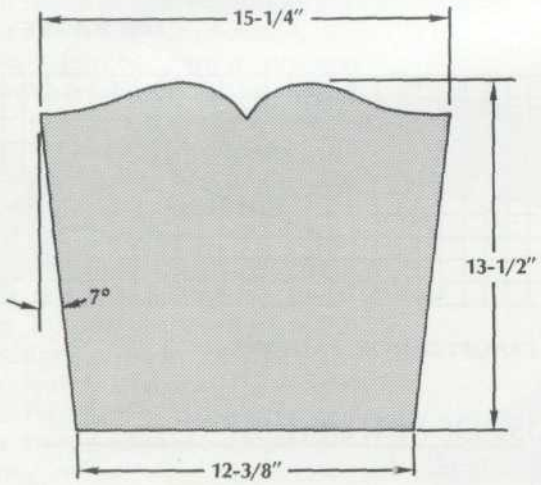
LIST OF MATERIALS

(finished dimensions in inches)

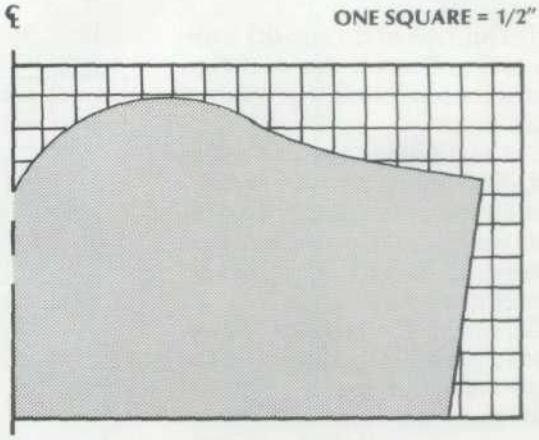
A	Sides (2)	3/4 × 21-1/2 × 40
B	Headboard	3/4 × 23-1/4 × 19
C	Footboard	3/4 × 13-1/2 × 15-1/4
D	Base	3/4 × 15-1/2 × 36
E	Canopy support	3/4 × 4 × 19
F	Canopy center pieces (12)	1/4 × 1-1/4 × 14
G	Canopy edge pieces (2)	1/4 × 3 × 14
H	Rockers (2)	3/4 × 5-1/2 × 28
J	Treadle bars (2)	1-3/4 dia. × 26 dowels
K	End caps (4)	1-3/4 dia. × 1-3/8
	Dowels	1/4 dia. × 1
	Dowel plugs	3/8 dia. × 1/4
	Flathead wood screws	#8 × 1-1/2
	Brads	#18 × 1
	Wood glue	



CANOPY CRADLE



FOOTBOARD



TOP OF FOOTBOARD PATTERN

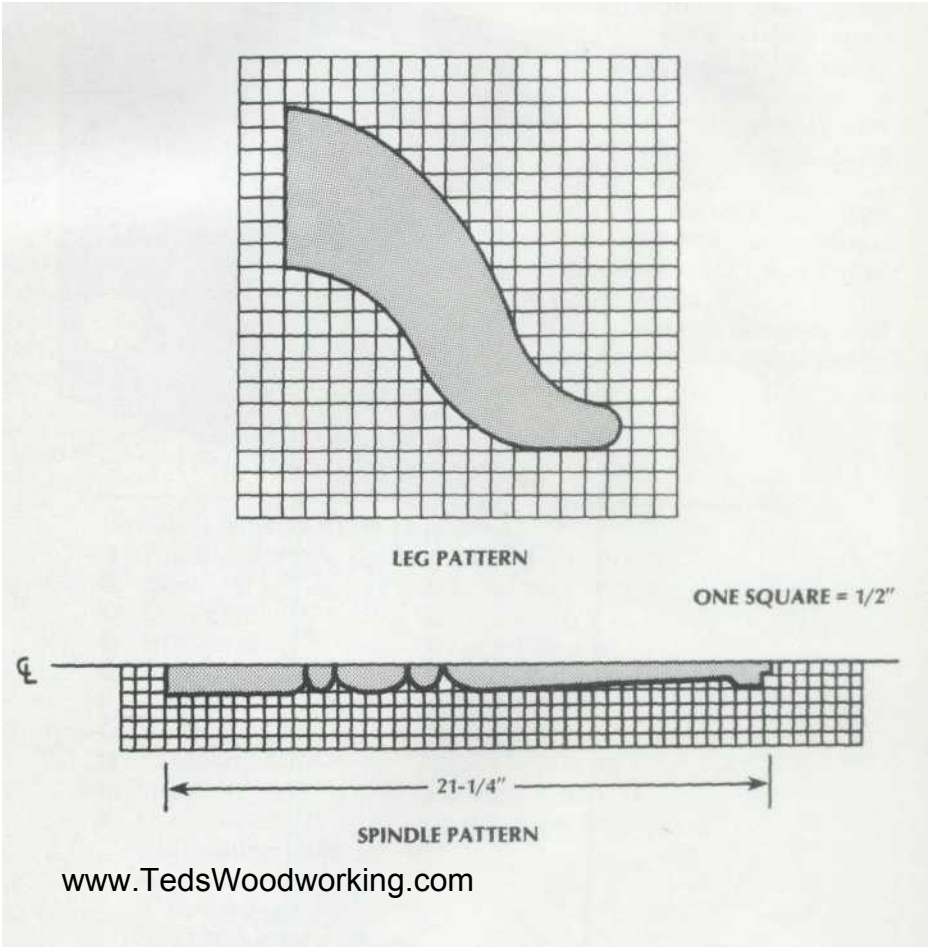
146
CONCORD TABLE

Also known as a candle stand ta-ble, this traditional favorite can be made quickly using a lathe. It lends itself to being a gift item as well.

1. Cut the stock to size according to the dimensions provided.
2. To make the template for the spindle (A), lay out the pattern on a piece of 1/4"-thick stock. Use a scroll saw, bandsaw, or jigsaw to cut out the pattern, and sand the edges smooth.
3. Mount the spindle stock on the lathe, turn the spindle, then sand. (If you glue up stock, it must be clamped for at least 24 hours be fore turning.)
4. Make a template for the legs (C) in the same manner, cut out the legs, and sand the curves on a drum sander.

Drill 3/8"-diameter holes to ac commodate the dowels in the legs as shown.

6. Use a router with a 1/4" round ing over bit to shape the curved edges of the legs. Do not shape the straight sections.
7. On the drum sander, sand a concave curve in the straight por tion of the legs. This will provide a better fit when attaching the legs to the spindle.
8. Mark and drill two 3/8"-diame- ter holes in the spindle base as shown to accommodate the dow els. Glue the legs to the spindle, one at a time, and allow each leg time to set up. Make sure the bot toms of the legs are square to the outside of the spindle.
9. Glue and clamp the stock for the top (B). When the glue has dried, lay out the 16"-diameter cir cle and cut it out using a scroll saw, bandsaw, or jigsaw.
10. Disc sand the edges of the top. The top edge can be shaped with a router and a roman ogee bit.
11. Drill a 1"-diameter hole in the center of the top brace (D) to ac commodate the dowel.
12. Screw the top brace to the spindle, then screw the top to the top brace. Glue can be used for extra reinforcement.
13. Finish the table as desired.



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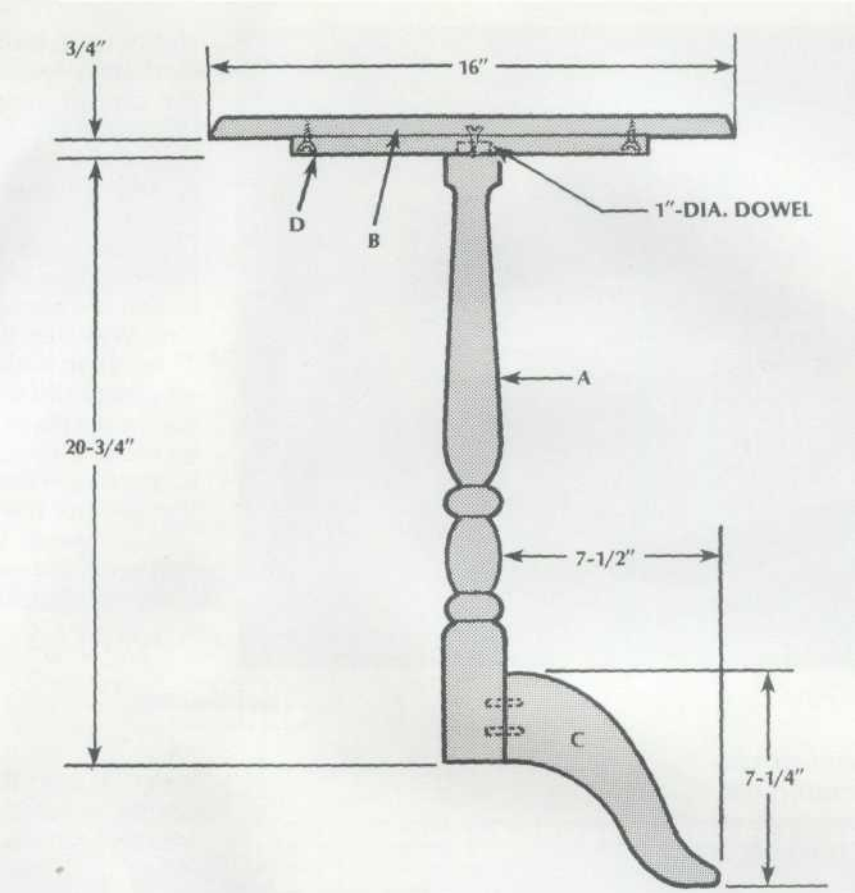
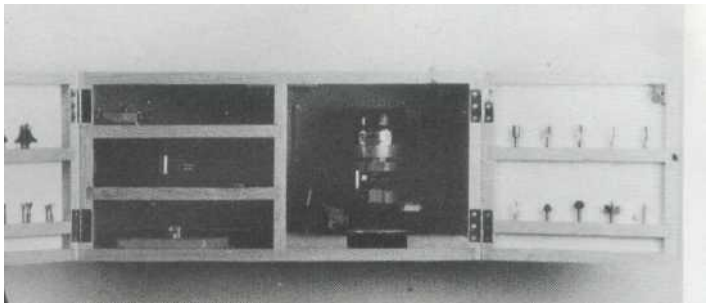


LIST OF MATERIALS

(finished dimensions in inches)

A	Spindle	2 dia. × 21-1/4
B	Top	3/4 × 16 dia.
C	Legs (3)	3/4 × 7-1/4 × 7-1/2
D	Top brace	3/4 × 3 × 12
	Wood screws	
	Dowels (10)	3/8 dia. × 1-1/2
	Wood glue	

147
ROUTER CADDY



The router is one of the most versatile tools in any workshop. There is little you cannot do with a router and the proper accessories. The router caddy shown here is designed to store your router on a pad so that the router bit does not have to be removed from the collet. Extra bits are displayed in the recessed door frames against a white background that makes identification easy. Three shelves are large enough to hold wrenches, guides, and other accessories.

The plans and dimensions given here are for a typical 1 to 1-1/2 horsepower router. If your router requires more or less space, adjust the dimensions to suit.

1. Begin by cutting the top and bottom (A) and sides (B) to length. Rabbet the top and bottom edge of the sides 3/4" wide and 3/8" deep.
2. Machine a 1/4" x 1/4" rabbet in the back edge of the sides, top, and bottom for the back panel. Dado the top and bottom along the centerline 3/4" x 3/8".
3. Cut the divider (C) and shelves (D) to length. Rip 1/4" from the back edge of each to allow room for the back panel. Machine 3/4" x 3/8" dadoes in the divider and left side to accept the shelves.
4. Assemble the sides, top, bottom, divider, and shelves. Glue and nail together with 4d finishing nails.
5. Cut the back (E) to size and let into the back rabbet. Secure with glue and 4d finishing nails.
6. Cut the pads (F) to size and round the front edge using a 1/2" edge rounding router bit. Glue and nail to the bottom of the router compartment as shown. Sand and finish the caddy as desired.
7. Cut the 3/4" x 1" door frame members to size. Rabbet the stiles (G) to accept the rails (H) in a half-lap joint. Machine the notches 3/4" wide and 5/8" deep.
8. Machine 3/4" x 1/4" dadoes in the side frame members to accept the struts (J). Cut the struts to size and drill holes spaced 1" apart to accept the router bit shanks.
9. Cut the door panels (K) to size. Paint the inside of the door panels white.
10. Glue and nail the door frames together. Rout a 1/4" x 1/4" rabbet in the inside edge of the frame.
11. Square the corners and secure the door panel in the rabbet with glue and 2d finishing nails. Sand and finish as desired.
12. Mortise hinges into each door frame and into the caddy sides. Space the doors 1/8" apart and fasten to the caddy.
13. Attach magnetic catches and porcelain knobs. Hang the caddy at chest level.

LIST OF MATERIALS

(finished dimensions in inches)

A	Top and bottom (2)	3/4 × 7-1/4 × 21-1/2
B	Sides (2)	3/4 × 7-1/4 × 10-1/4
C	Divider	3/4 × 7 × 9-1/2
D	Shelves (2)	3/4 × 7 × 10-3/4
E	Back	1/4 × 10-3/4 × 21-1/2 plywood
F	Pads (2)	3/4 × 3-1/2 × 7
G	Stiles (4)	3/4 × 1 × 10-1/4
H	Rails (4)	3/4 × 1 × 10-1/16
J	Struts (4)	3/4 × 3/4 × 10-1/16
K	Door panels (2)	1/4 × 9-1/4 × 10-1/16
	2d finishing nails	
	4d finishing nails	
	2" butt hinges (4)	
	Porcelain knobs (2)	
	Magnetic latches (2)	

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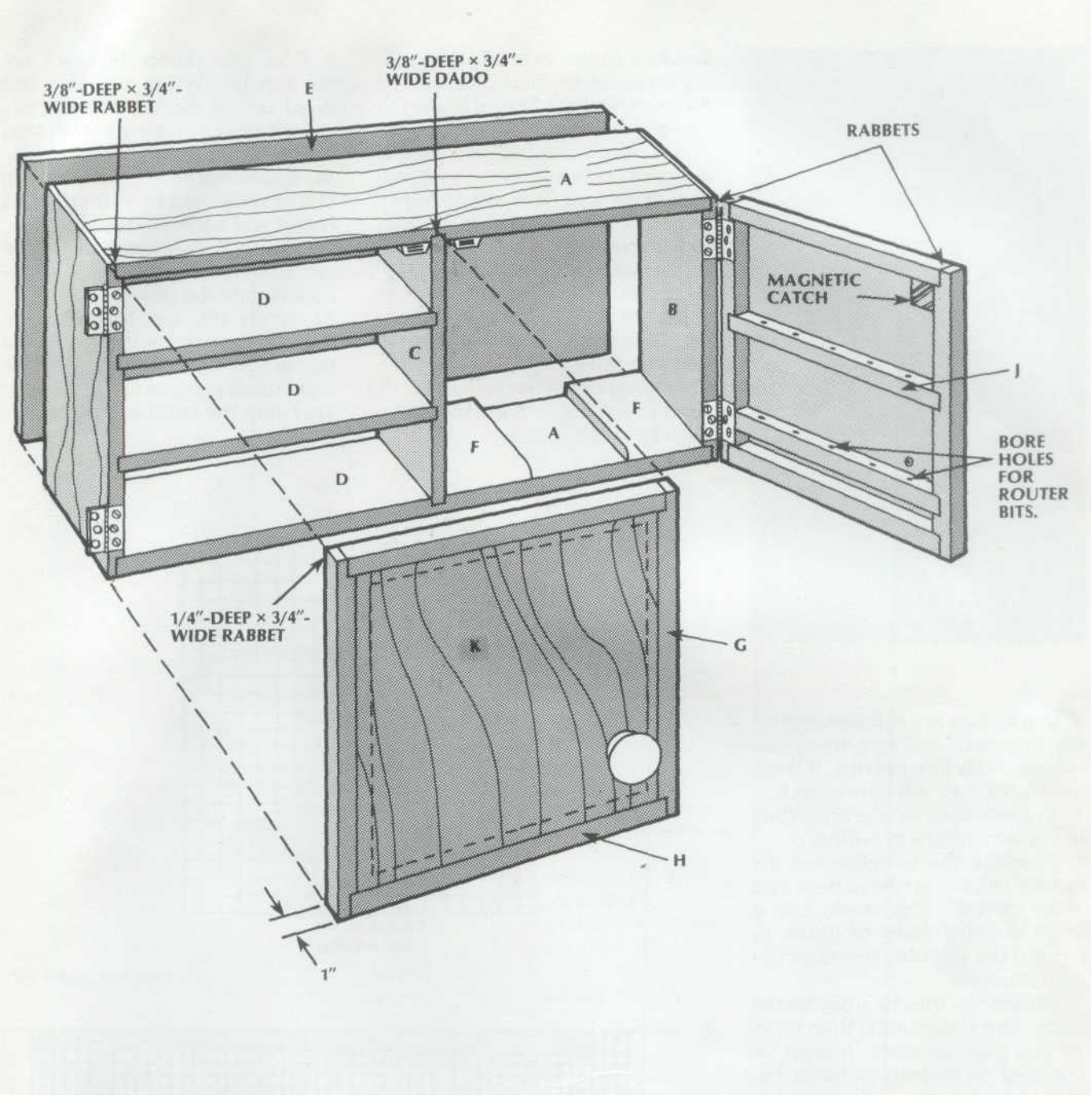
3/8"-DEEP × 3/4"-
WIDE RABBET
E
3/8"-DEEP × 3/4"-
WIDE DADO
RABBETS
A
D
C
D
B
MAGNETIC
CATCH
J
F
A
F
D
BORE
HOLES
FOR
ROUTER
BITS.
1/4"-DEEP × 3/4"-
WIDE RABBET
K
G
H
1"

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HERB DRYING RACK

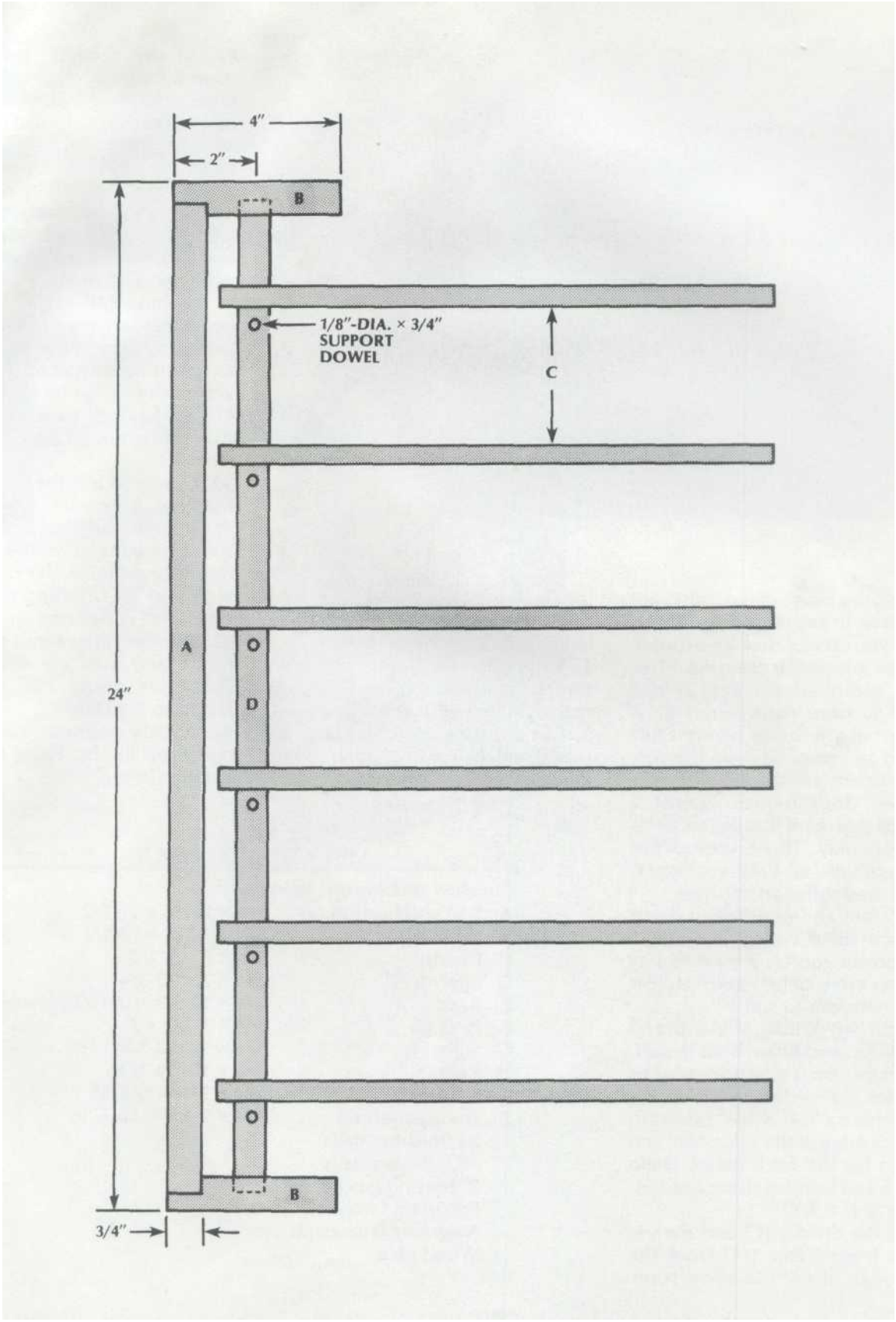
Whether or not you are an herb gardener, you will enjoy the rustic flavor this herb drying rack will add to your kitchen. Designed after a much larger Shaker herb rack, this project can be used to display dried flowers, hanging pots, or whatever else your imagination can muster. The rack is designed to be fastened to a wall. When not in use, the horizontal drying bars fold conveniently against the wall, out of the way of traffic. When in use for the summer herb harvest, it provides a handy place to hang bundles of herbs. Best of all, the simplicity of design allows this project to be completed in an afternoon, with basic hand or power tools. The dimensions can be lengthened or shortened to suit individual tastes.

1. Cut all the pieces to size.
2. Round the front edges of the top and bottom end pieces (B) on a jigsaw or bandsaw.
3. Drill a 1/2"-diameter hole, 3/8" deep, in the middle of the top sur face of the bottom end piece and the bottom surface of the top end piece. NOTE: Drill the holes about 2" away from the back edge to al low the horizontal pieces (C) to piv ot without hitting the wall piece (A).
4. Drill a 1/2" hole through the center of each horizontal piece, 1" from the back edge for insertion of the support dowel (D).
5. Cut a 3/8"-deep * 3/4"-wide rabbet on the back edge of the top and bottom end pieces for joining to the wall piece.
6. Cut a tapering chamfer on all four edges of each horizontal piece. Start the chamfer 5" in from the back edge of the piece, increas ing the taper to a full 1/4" at the front edge.
7. Drill dowel holes in the support dowel at the desired positions un derneath the horizontal pieces (as shown).
8. Sand all pieces. If the support dowel fits too tightly, sand it. Do not redrill the holes or you risk making the horizontal pieces fit in a flimsy way.
9. Assemble the horizontal pieces on the support dowel, place the dowel in the holes in the top and bottom end pieces, then glue and nail the end and wall pieces to gether.
10. Finish as desired.

LIST OF MATERIALS

(finished dimensions in inches)

A	Wall piece	3/4 × 3-1/2 × 23-3/4
B	End pieces (2)	3/4 × 3-1/2 × 4
C	Horizontal pieces (6)	3/4 × 1-1/4 × 20
D	Support dowel	1/2 dia. × 23-3/4
	1/8-dia. × 3/4 dowels	
	4d finishing nails	
	Wood glue	


4"
2"
B
1/8"-DIA. × 3/4"
SUPPORT
DOWEL
C
A
D
24"
B
3/4"

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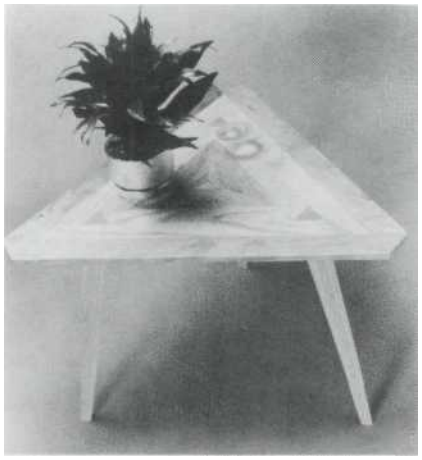
TRIANGULAR TABLE



Here's the solution to uneven tables that constantly wobble: a three-legged triangulartable. While the idea is a simple one, figuring out the angles provided a challenge. The result is a sturdy table with tapered legs that fit into mortises formed by bevels and compound miters. To build it, use the following step-by-step procedure:

1. Choose wood for this project that is both strong and stable. Ash and cherry were used in this example; the harder ash is ideal for the legs and leg mortises, with the cherry serving as a contrast in the areas of less strain.
2. Because the tapered legs (E) go entirely through the tabletop, the mortises into which they fit must be a particular angle and shape. The easiest way to accomplish this is to construct these angled mortises with beveled and angled parts to make up the tabletop. Begin construction by cutting out on a bandsaw the three isosceles triangles that form the inside of the tabletop (A).
3. Disc sand the triangles so they are identical, then mark the bottom of each one with an X. Cut 1/4"-wide x 1/2"-deep spline grooves on the two inside edges of each triangle, making sure that the X is kept away from the rip fence.
4. Glue and clamp the triangles together. After the glue has dried, use a disc sander to touch up the outside edges of this inner triangle.
5. The top middle pieces (B, C) also form the leg mortises. This means that each part must have one beveled edge, one mitered end, and one compound mitered end. First, cut three pieces of stock that measure 1-1/2" x 1-3/4" x 14".
6. Tilt the saw table 5° and bevel one edge of each board. Mark an X on the wide edge of each board to indicate the bottom side. Now return the table to 0°, set the miter gauge at 60°, and miter one end of each board.
7. Place the three boards (B) around the inner triangle and mark
for length. With the miter gauge still set at 60°, tilt the table 14° and cut the opposite end of each board. The undersides should now be longer and wider than the tops.
8. Cut matching spline grooves in each of the boards, identical to those made in step 3. Clue and clamp the boards to the inner triangle.
9. To complete the leg mortises, cut three pieces of stock (C) that measure 1-1/2" x 1-5/8" x 20". Tilt the saw table 5° and bevel one edge of each piece. This bevel matches those made in step 6 on the shorter middle boards (B); the result is that these boards will be wider on the top than on the bottom.
10. Mark the lengths of the three boards from the assembled central section. With the table set at 5° and the miter gauge set at 60°, miter one end of each piece.
11. The final operation on these boards is to bevel the undersides. Tilt the table 30° and, with the 5° beveled side facing up, cut each board so it tapers from 1-1/2" thick on the beveled edge to 3/4" thick on the outside edge.
12. Glue and clamp the boards to the central assembly. When the glue has dried, disc sand the corners on the underside of the table to match the bevel.
13. Drill a 3/8"-diameter hole 3-1/2" deep through the long middle boards as shown, joint, and glue dowels in place to reinforce the joints.
14. The edge pieces (D) complete the top. Cut the pieces to size, then set the table at 0°. With the miter gauge set at 60°, miter one end of each piece.
15. Tilt the table 15° and bevel the bottom side of each piece, tapering the bottom from 3/4" down to a 1/2" edge.
16. Glue and clamp the edge pieces to the main assembly. With the bandsaw, cut off the corners and disc sand to the final dimension.
17. To make the legs (E), start with three 4"-wide pieces of 1-3/4"-thick stock. Tilt the table to 30° and adjust a tapering jig to cut a 2-1/2° taper on a 20"-long piece of stock. Mark an X on the top of each leg, then make one pass on each leg. Use a push stick for this to keep the wood secure.
18. Flip the stock over end for end;
the X should now be on the underside of the legs. Move the rip fence about 1/2" closer to the blade; the triangle formed by the saw kerf and the blade should be 3/4" on each side.
19. Cut the remaining tapers, then test-fit the legs in the mortises. Mark the legs where they come through the bottom of the table top, then remove them. With the miter gauge set at 14°, disc sand the legs to equal length.
20. Apply glue to the legs and the mortises, then tap the legs in place. Cut off the top remainder of the legs with a handsaw.
21. Belt sand the top to make the tabletop surface flush. Finish as desired.

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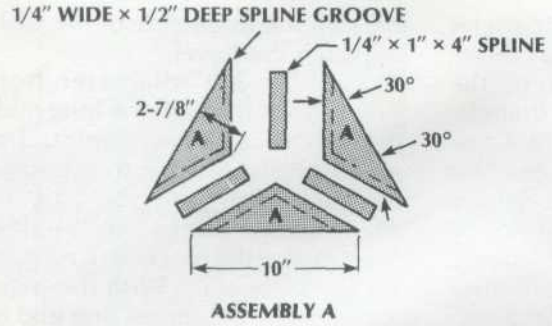
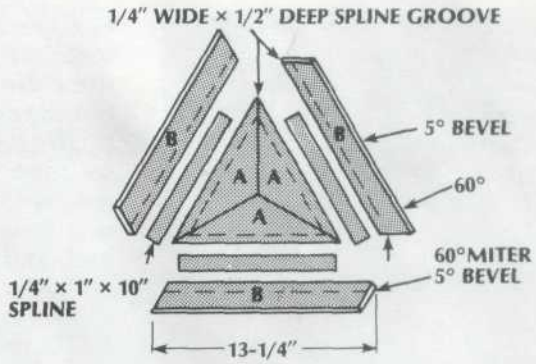
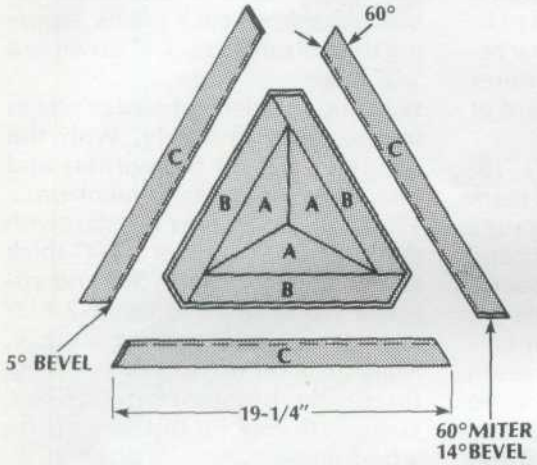


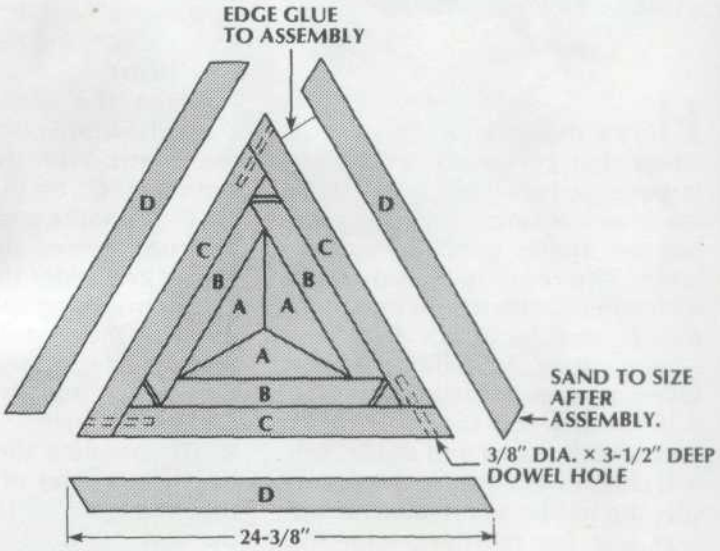
ASSEMBLY A



ASSEMBLY B

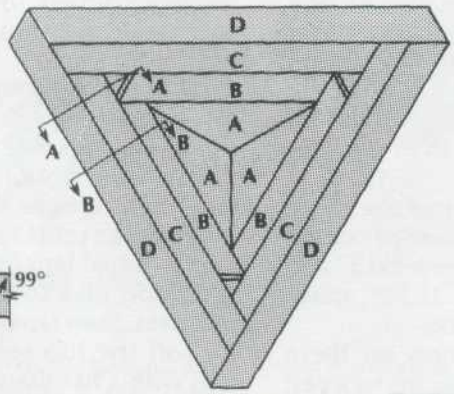


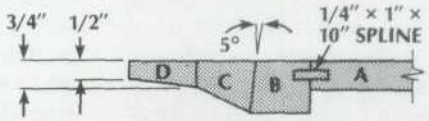
ASSEMBLY C



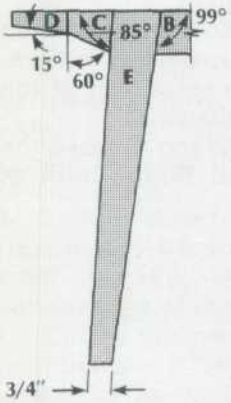
ASSEMBLY D

FINAL ASSEMBLY DETAIL





SECTION B–B



SECTION A–A

LIST OF MATERIALS

(finished dimensions in inches)

A	Top, inside pieces (3)	3/4 × 2-7/8 × 10
B	Top, middle pieces (3)	1-1/2 × 1-3/4 × 13-1/4
C	Top, middle pieces (3)	1-1/2 × 1-5/8 × 19-1/4
D	Top, edge pieces (3)	3/4 × 2 × 24-3/8
E	Legs (3)	1-3/4 × 2 × 16
	Dowels (3)	3/8 dia. × 3-1/2
	Spline material	1/4 × 1 × 42 tempered hardboard
	Wood glue	

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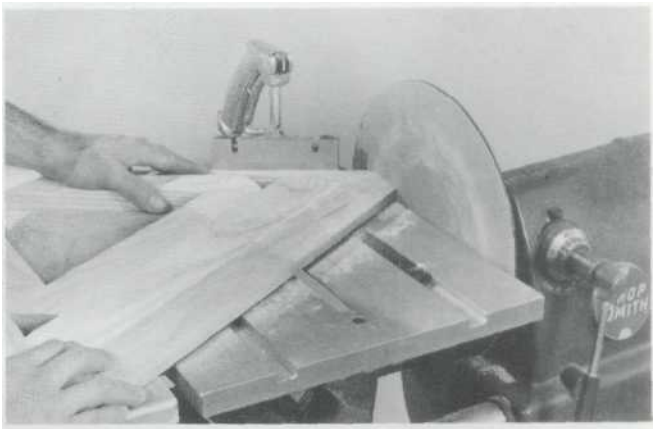
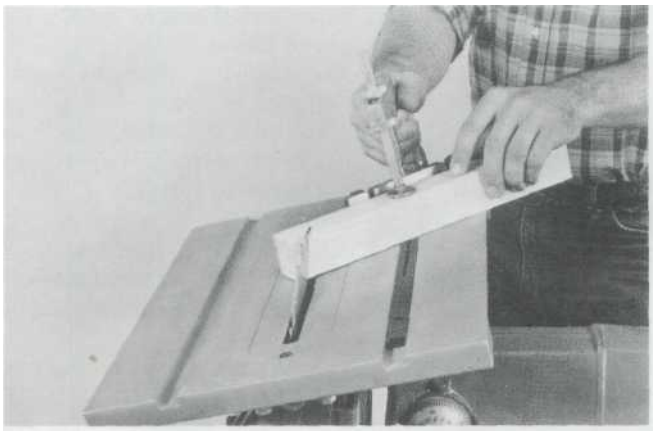
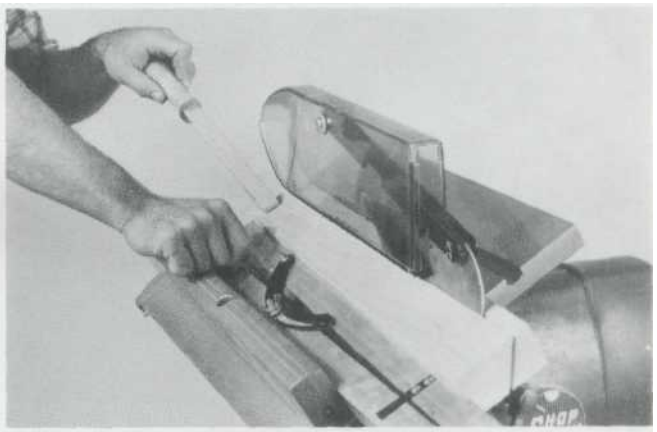
Glue and clamp triangles together.



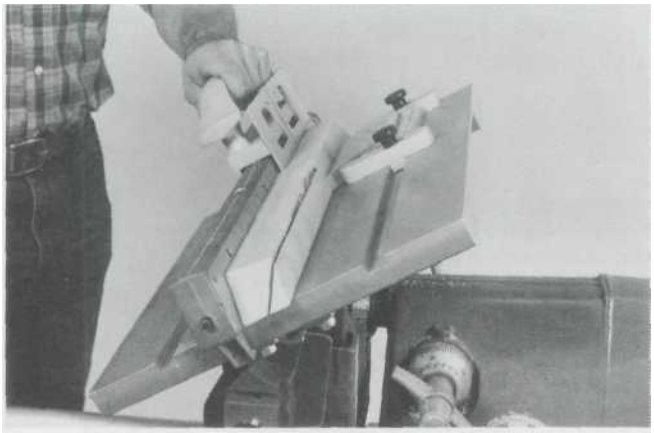
With bandsaw, cut off corners and disc sand to final dimension.



With miter gauge set at 60°, tilt table 14° and cut other end of each part. (Saw guard removed for clarity only.)



Make one pass on each leg.



Cut stock so it tapers from 1-1/2" thick on beveled edge to 3/4" thick on outside edge. (Saw guard removed for clarity only.)

Triangle formed by saw kerf and blade should be 3/4" on each side. (Saw guard removed for clarity only.)

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ARTIST EASEL

Here's a materials list with everything you need to follow the plans. I'll explain in more detail later, but the easel I built will hold a 7' tall painting, has a 4' wide shelf and stands about 7 1/2' tall total.

Wood:

(8) 2x4, 8' pine
(1) 1x2, 8' poplar

(1) 1x2, 2' pine
(1) 1/2" hardwood dowel

Hardware:

approx. 50 3" all-purpose phillips coarse thread screws
(1) 3/8" thumb screw (about 1.5" in length should do)
(4) 3 1/2" door hinges with screws
(4) lockable wheel casters (2 1/2" diameter)
(2) 4" long, 1/2" diameter carriage bolts
(6) 1/2" washers
(2) 1/2" hex lock nuts (nylon insert)
(2) 4" long, 3/8" diameter hex bolts
(2) 3/8" washers
(2) 3/8" wing nuts
(1) 3/8" square nut

Tools:

smallish crosscut hand saw
backsaw w/ mitre box
dovetail saw (optional)
1/2" wood chisel
phillips screwdriver
adjustable carpenter's square (with bubble level)
tape measure
power drill w/ bit set (up to 1/2")
jigsaw with wood cutting blade
a table or bench to construct on
some clamps

Below you'll find the plans to the easel I built, with all the lengths, dimensions, etc. However, as we go along, I'll point out what you need to do to extend this design to suit any size painting.

fig. 1: side angle

fig. 2: front angle

Above are pictures of the finished easel and its supporting measured drawing below. I will stick with this format throughout the site. The diagrams are fairly self-explanatory, but let me explain the few possibly confusing things. In figure 4, notice where it says 'chisel for ctr. support'. If you look at the photo above, you may be able to tell that the carriage bolt is resting inside of the bottom

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horizontal brace, so that its face is flush with the brace. Here's a closeup of the front of the bottom brace:

fig. 3: bottom brace with chiseled center support recess

This is essential so that the adjustable shelf, which isn't attached to that center support in any way, lies flush against it. This way, if you have a painting which is narrower than 3 feet, it can simply lay against the center support. Also notice the spacers in Fig. 5. These are narrower than the center support so that the top clamp can easily slide up and down the center support (more later).

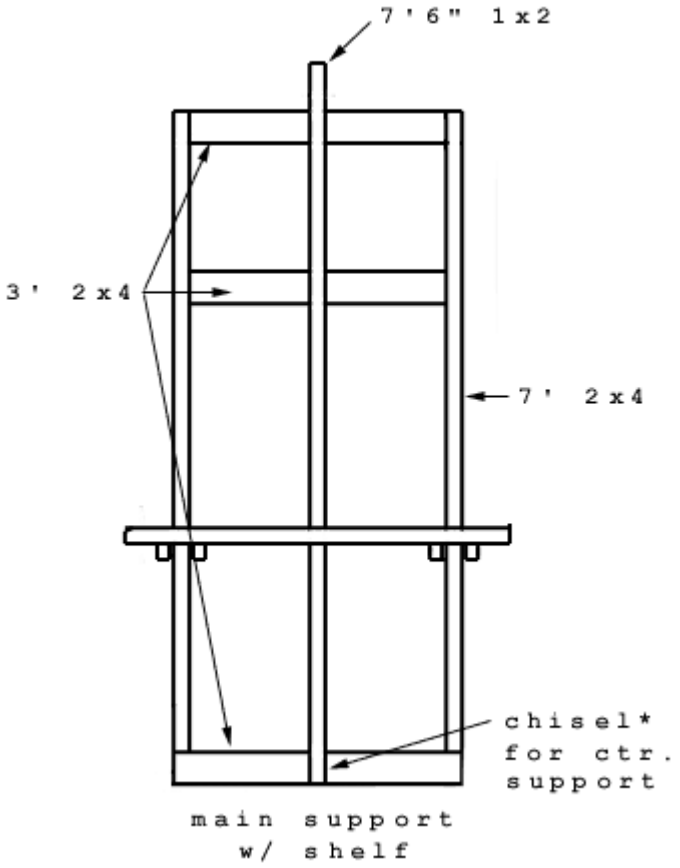


fig. 4: front angle (measurements)

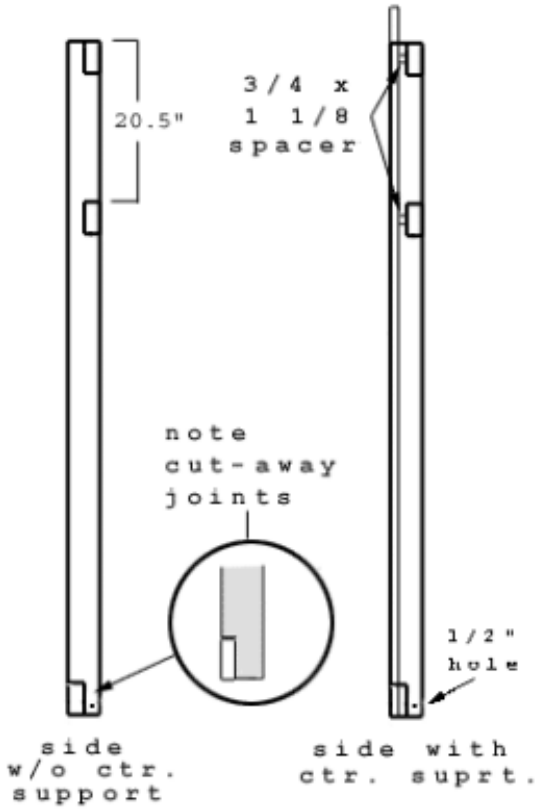


fig. 5: side angle (measurements)

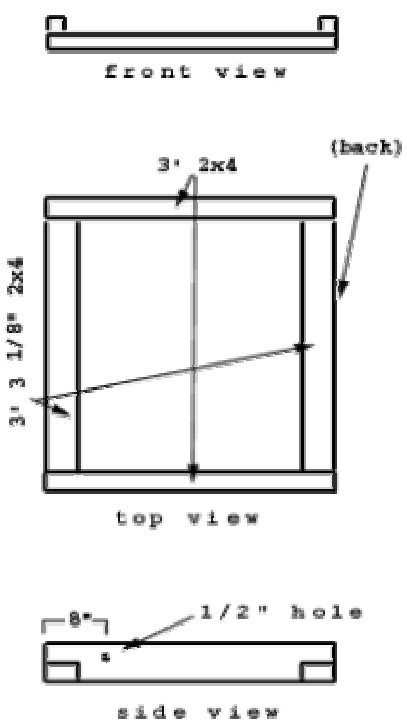
All of the lengths of the pieces for this section of the easel are listed in the drawings above. All pieces are screwed together with No. 8 x 3" screws (as listed in the materials list). Make sure you drill pilot holes for each screw before you drive it...something like 3/32 should do it. You might want to experiment on a test piece first.

Notice the joints--I've cut out pieces of the vertical supports to hold the horizontal supports in place. The top two supports are attached on the back half of the vertical supports so that the shelf can slide freely up and down the vertical supports. See the close-up drawing in Fig. 5 or look closely at the joints in the easel pictures.

NOTE: This is the piece you want to modify if you want this easel to hold taller paintings. Essentially all you need to hold a taller painting will be a taller center support. Simply change the 7'6" support to whatever height you want. However, if you think you will go *much* higher, say 10'+, you might want to consider increasing the length of the whole piece by extending the two outside vertical supports as well.

fig. 1: side angle

fig. 2: front angle



The base is very simple to build. Its side pieces are 3' each and attached in a tall orientation. Its front and back are 3' 3 1/8" each in a laid-down orientation. The extra length on the front and back is so that the distance between the two side pieces is large enough to accomodate the 3'-wide frame in addition to a bit of wiggle room for a couple washers. Notches are cut into each side piece to accomodate the flat front/back pieces (see side view). One hole is drilled on each side piece, 8 inches back from the front of the base. This hole will accept a 1/2" x 4" hex bolt w/ washers to bolt the main support to the base. By using a bolt here, the main support's angle is adjustable (and secured with the back-side slot setup--more later).

fig. 3: front/top/side angle (measurements)

Not much more to it than that for the base. The locking casters will attach to the bottom of this piece, but I put those on last. Not sure if that made the most sense, but I didn't want the thing rolling around while I was trying to put it together. For the casters, I used 2 1/2" tall locking casters and some wood screws to screw them directly into the base on each corner. You need to make sure they are close enough to the corners so that you can get at the locks with your feet. In hindsight, larger casters might have been a better choice.

The rear supports allow you to tilt the angle of the main support to a comfortable position. By loosening the two wing nuts, you can adjust the angle from 90 degrees (straight up) to 45 degrees back, to even a little forward (i.e. 90+)--good for pastels..

The rear supports look more complicated in the diagrams than they really are. Each support basically consists of two 2x4's, one slotted and one with a bolt that slides in the slot. By tightening the wing nut on the bolt, you can set the adjustment where you want.

fig. 1: rear supports

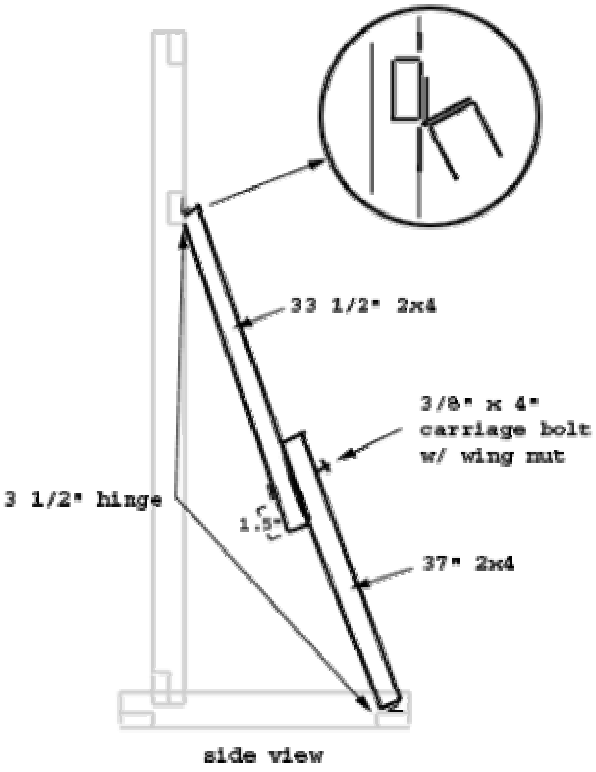


fig. 2: side view of rear supports (measurements)

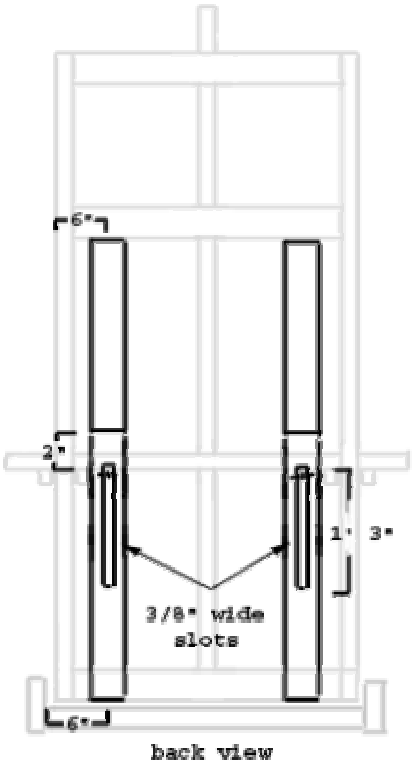


fig. 3: rear view of rear supports (measurements)

Cut two 33 1/2" 2x4's and two 37" 2x4's. 1.5" from the end of the 33" 2x4's, drill a 3/8" hole in the center. This hole will hold a 4" long, 3/8" diam. carriage bolt. The carriage bolt has a square bit under the head so that it digs into the wood. This enables you to tighten the wing nut w/o having to hold onto the other end of the bolt. Kind of like embedding the bolt into the wood. On the other end of each of these pieces, attach one side of a 3 1/2" wide hinge. This hinge will eventually get attached to the appropriate brace on the main support.

fig. 4: rear support detail (front)

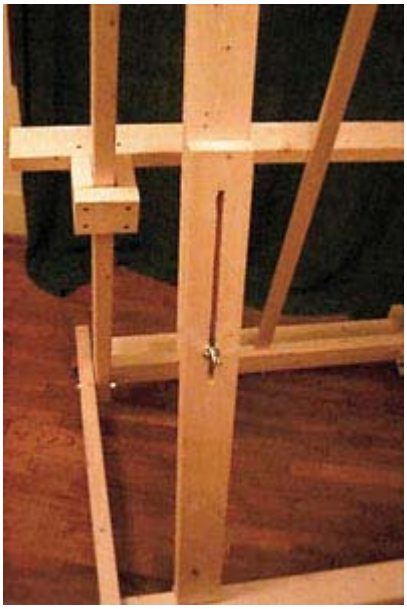


fig. 5: rear support detail (rear)

In the 37" 2x4 you will need to cut a 1' 3" long slot which is 3/8" wide. This is the slot that the carriage bolt will slide through when you adjust the angle. I cut this slot using a jigsaw (also called a scroll saw). First, mark the beginning and end of the slot. Using a 3/8" drill bit, drill a hole at the beginning and end of the slot. This will give you a starting and ending point from which to insert the jigsaw blade. Draw an outline of the slot between each hole so you have a guide and saw out the slot. I found this a bit tough (hadn't used a jigsaw before), but as long as you don't go way outside the lines, you can always fix it up. Once you've drilled out the slot, take a 3/8" bolt and slide it through the length of it to make sure you have sufficient width along the entire length. (Those with routers already know how easy this will be for them).

Steve Baird from Australia sent in the great suggestion of clamping down another board to act as a guide for the jigsaw to ride against. He says "simply measure the distance between the blade and the edge of the base on the saw to calculate the position to clamp the guide. Don't forget to allow for the width of the saw blade. If the rear support is not wide enough then clamp another piece of timber next to it to support your guide."

Attach another hinge to the bottom of this piece, in the same manner you did to the top piece. Leave the assembly until we've completed a few more steps.

The adjustable shelf is just that; it allows you to change the height at which the painting is supported; both to allow accomodate large supports, as well as to provide a comfortable painting height for sitting and standing.

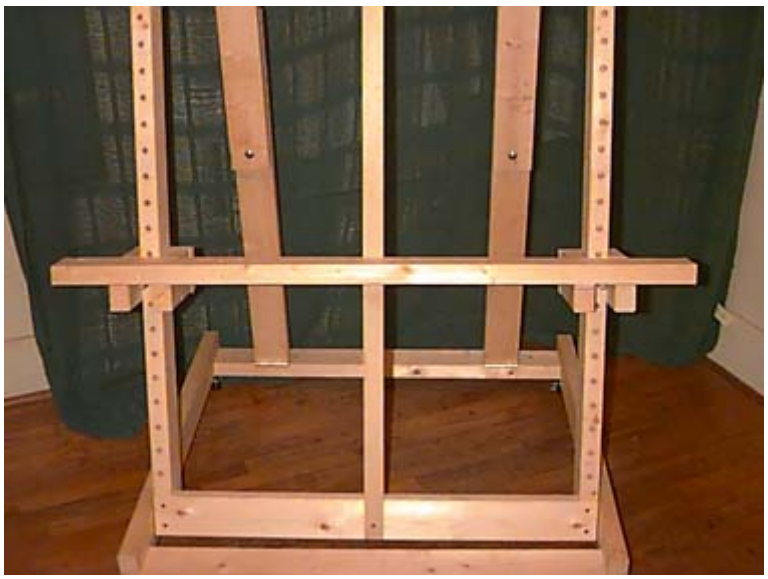


fig. 1: shelf front angle

Admittedly, the shelf design is a potential weak spot in my design. It doesn't slide up and down as easily as I would like. Once you get the hang of it, it works. This is really the part that could benefit from some higher-end tools. If you look at easels in stores, you'll see the shelf design either utilizes wood cuts that you can't do by hand or specialized metal components. I will say one thing for my shelf, though--its is VERY sturdy. I figure with huge paintings, I also won't be raising and lowering all the time either. If someone has an improvement on this design that can be made with (or without) fancier tools, I'd be happy to include it here.

Others who have built this easel have tried various modifications of this shelf design. One person used joist hangers to support the shelf. Another put a slot in the main support and tightened the shelf into

place, like I do with the rear supports.

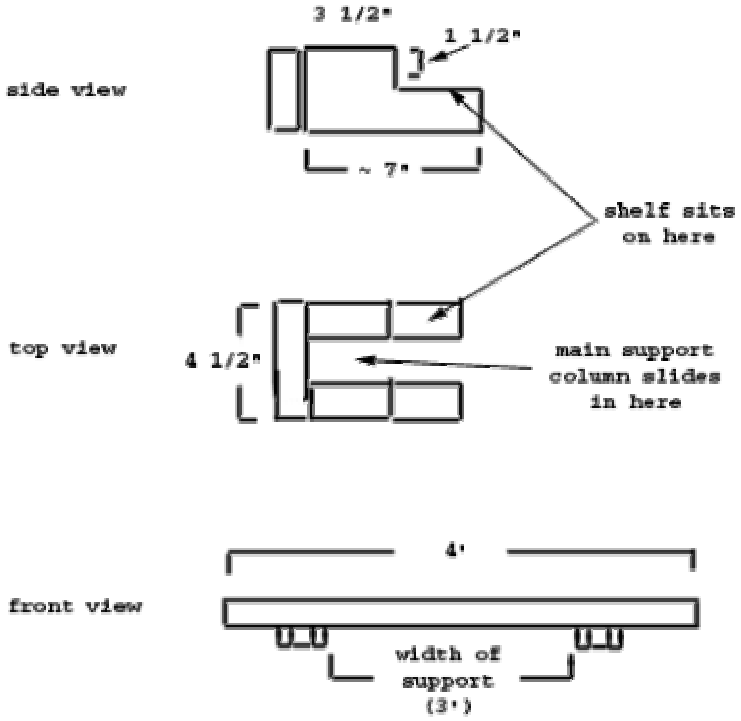


fig 2: shelf diagram (measurements)

The shelf is made up of two identical U-shaped pieces which attach to the shelf itself. The shelf is a simple a 4' 2x4. Each U piece wraps around the vertical outer pieces of the main support (see figure 3). The best way to measure up this piece is to lay the pieces up against your actual support and mark the pieces so they fit just right. However, my measurements should be close and give you a starting point. The idea is to make the center gap *just* the width of the main support piece, so that the U piece can slide firmly up and down the support.

The order to build this is to build each U-shaped piece first. Then, once you have those done, put them in place on the main support, lay the shelf on and try it out while holding the shelf and U-pieces together with your hand. If it's satisfactory, put a couple screws in each shelf while its actually in place (at his point, you have no other way to actually get the shelf on the thing).

fig 3: shelf support detail (rear)

fig 4: shelf (up)

The final piece of the shelf system is the shelf support rods. Each side of the shelf is locked into place by placing a 1/2" diameter dowel rod into a pre-drilled hole along the main support (see Fig. 4). The holes are drilled in the face of the main support and each hole is 2" apart, and centered horizontally. The holes are 1/2" in diameter. Drill them up as high as you want the shelf to go. This does hold the shelf very sturdily in place.

I borrowed a tool called a 'dowel-cutting jig' to drill the holes accurately. The jig is basically a clamp with a guide in it. You set the guide where you want (in this case, so that the center of the hole is in the center of the support), clamp it into place, and drill away. This helped me keep each hole nicely lined up. You could do this w/o, but if you can borrow one of these things, it makes it easier. They cost about $30 (too much for one use), but my dad had one in his basement he hadn't used in 30 years that worked perfectly (and the pricetag on the box was $6!).

Finally, cut a couple pieces of 1/2" dowel and slip them into place.

The top clamp allows you to clamp down a canvas once it's on the shelf. This keeps it from flopping around or falling forward. The way I did it, the clamp is a bit tricky to make, but not too bad. One could easily substitute multiple pieces instead of cutting out the 'T' shape like I did (as Pat B.--see the gallery).

fig. 1: clamp (front)

The clamp is made from two pieces; a 5" 2x4 and a 1' 1x2. The 2x4 has a "T" shape cut out of the back of it (see Fig. 2). The top of the T slides down the center support, and thus is just a bit larger than the 1x2. The skinny part of the T is about 1" wide, just a bit wider than the spacers that sit between the center support and the horizontal braces on the main structure.

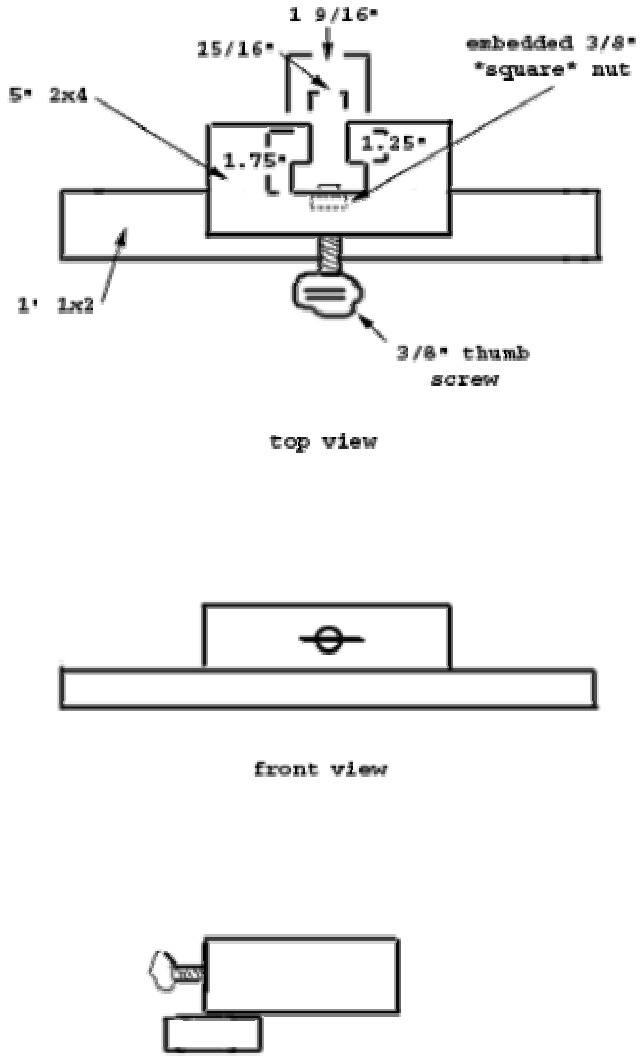


fig 2: top clamp diagram (measurements)

To cut the slot out of the 2x4, I cut a 1 9/16" cut all the way back 1.75". Then, I used a my jigsaw to rough-cut the larger portion and finished it off with a chisel (see Fig. 3). Not easy and takes some to get it to fit, but it works. Then, in the center of the back of the cut, you need to chisel out a square hole *just* big enough for a square 3/8" nut. This nut is what the thumb-screw screws into. It's square so that when you turn the screw it doesn't also turn the nut (the square nut stays firm in its square hole). Finally, drill a 3/8" hole directly into the center front, through to the newly-cut opening.

To finish it off, glue the 1x2 to the bottom of the 2x4 as shown, screw the thumbscrew into place and you're set for the clamp.

Note that it's really best to measure against your exact pieces here, instead of following my directions. Hold the 2x4 up against the center support and draw around it. Do the same with one of the spacers behind the center support (or measure if you can't get to it). My measurements should work for you, but you'll get a better fit if you measure against the actual pieces. This piece works best if it really *just* fits. That way, you can raise the clamp and don't have to tighten the screw just to keep it up for a minute while you raise the shelf, etc.

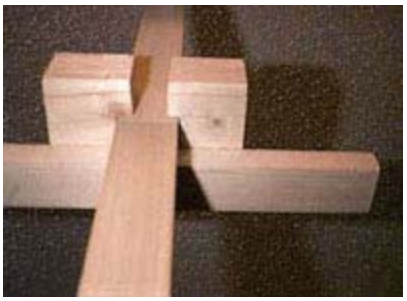


fig 3: clamp cutout detail (rear)

As an aside, I should say that my first clamp finally broke one day. While wood glue will fix it up just fine, the point at which it broke is in the middle where I had cut out the most wood. For this reason, I highly suggest trying the multiple piece design illustrated so well by Pat B.

You now have all the pieces and can put the whole thing together!

fig. 1: side angle

fig. 2: front angle

If you want wheels, now is the easiest time to add them. Turn the base over and lay it on the floor. Get your casters, line them up on the edges of each corner and screw them in.

Now you need to screw the main support into the base. You'll want the easel against a wall, or actually, a doorway works well, so you can get behind the easel easily. This way the main support has something to rest on. Take your 4" x 1/2" bolt and stick it into the hole so it just pokes through the other side of the base. Then get one of your washers and hang it on the bolt so that it obscures the bolt. Then you can slide the main support into place. Wiggle around a bit and you should be able to get the bolt all the way through the main support. On the other end, place another washer, and then a 'locking' hex nut. The locking nut 'locks' because it has a bit of nylon on the outer end, which gives it some good anti-slip once it's on (you can still remove it if you need to). Lock-tight or other similar products would work here as well. Follow the same procedure for the other bolt on the other side.

Now you want to add the rear supports. If you followed the directions previously, you have hinges screwed to the supports already. Now you need to screw the other end of the hinge into the appropriate place on the base for the 37" pieces, and the second horizontal piece on the main support. Look back at the diagrams in 'rear supports' if you don't remember (the placement of the hinges is presented there in fig. 3). Once you have the hinges screwed in, you can put the carriage bolt of each top piece into the slotted bottoms pieces--add a washer and your wing nut.

If you didn't actually screw on the shelf before, now's the time to do it. Place the U-shaped pieces around the vertical pieces on the main support. Place the shelf into place--measure each side to make sure you have it centered, and put a couple screws on each side to screw the shelf onto the U-shaped pieces.

If you haven't already, go ahead and slide the clamp onto the center support...

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BABY CHANGING TABLE

Construction

Tools required: router, drill, sander

Wood required: pine and plywood

Description	Qty	Width	Thickness	Length
Front frame				
Small verticals	2	2 1/4"	3/4"	32"
Long verticals	2	2 1/4"	3/4"	35 1/2"
Top/Middle long horizontals	3	2 1/4"	3/4"	30 1/2"
Base plank	1	2 1/4"	3/4"	47"
Top/Middle short horizontals	2	2 1/4"	3/4"	14"
Rear Frame				
Small verticals	2	2 1/4"	3/4"	32"
Long verticals	2	2 1/4"	3/4"	35 1/2"
Top long horizontals	1	2 1/4"	3/4"	30 1/2"
Base plank	1	2 1/4"	3/4"	47"
Top short horizontal	1	2 1/4"	3/4"	14"
Side panel (small)				
Verticals	2	2 1/4"	3/4"	32"
Top/bottom	2	2 1/4"	3/4"	16 1/2"
Side panel (large)				
Verticals	2	2 1/4"	3/4"	35 1/2"
Top/bottom	2	2 1/4"	3/4"	16 1/2"
Middle panel (plywood)	1	16 1/2"	1/2"	4"
Tops				
Large (plywood)	1	19 1/2"	1/2"	34 1/4"
Small (plywood)	1	19 1/2"	1/2"	18 1/2"
Edging (large top)	1	3/4"	1/8"	55"
Edging (small top)	1	3/4"	1/8"	60"

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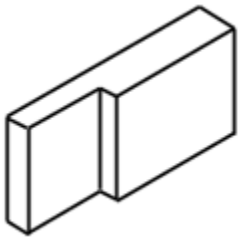
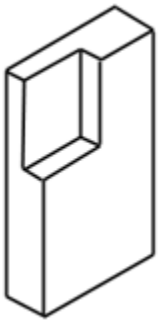
Molding (large top)	1	3/4"	3/4"	55"
Molding (small top)	1	3/4"	3/4"	60"
Base board				
Front	1	3"	3/4"	51"
Side	2	3"	3/4"	19"
Large drawers				
Sides	6	5 1/2"	3/4"	16 1/2"
Inner Front/back	6	5 1/2"	3/4"	26"
Front	3	9"	3/4"	30 1/2"
Knobs	6			
Narrow drawers				
Sides	4	10"	3/4"	16 1/2"
Inner Front/back	4	10"	3/4"	9 3/4"
Front	2	14"	3/4"	16 1/2"
Knobs	2			
Back panels				
Large (hardboard/plywood)	1	32"	1/8"	32"
Small (hardboard/plywood)	1	16"	1/8"	35 1/2"</TD< tr>

1. Prepare front frame pieces (left side)

Firstly, cut lap joints that are 1 1/2" in from each end into the two top pieces (long and short), the middle drawer pieces (two long, one short) and the base plank. Next, cut a slot out of the base plank 13" from the right and 29 1/2" from the left (hence, 4 1/2" wide). Note that when deciding which end is the right and left of this plank, lie the plank flat on the ground with the cut out lap joint part facing upwards (see diagram).





Now that all of the horizontal pieces are prepared, we need to prepare the vertical planks. Firstly, take one of the two shorter vertical pieces and nominate it as the left vertical. Cut out grooves that are 3/8" deep and 1 1/2" in (matching the cut on the horizontal pieces) at the following positions from the bottom:

- Bottom to 2 1/4" high
- 10 3/4" to 13"
- 20 1/2" to 22 3/4"
- 29 3/4" to top

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Next, take the second small vertical and nominate it as the middle-right vertical. Make a mirror image of the above grooves in this piece, so that the horizontal planks will slot in. The one difference is that the base to 2 1/4" high cut should be made as a lap joint (i.e. all the way across the wood, rather than just 1 1/2" in) in order to slot into the middle groove cut out of the base plank.

2. Prepare front frame pieces (left side)

Now take one of the two longer vertical planks and nominate it as the right vertical. Cut out grooves that are 3/8" deep and 1 1/2" in (matching the cut on the horizontal pieces) at the following positions from the bottom:

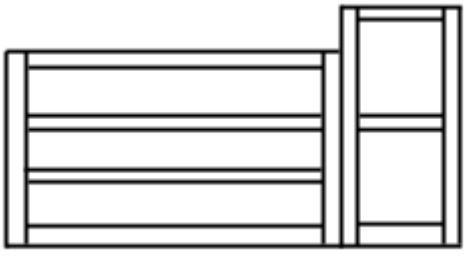
- Bottom to 2 1/4" high
- 17 1/2" to 19 3/4"
- 33 1/4" to top

Next, take the second long vertical and nominate it as the middle-left vertical. Make a mirror image of the above grooves in this piece, so that the horizontal planks will slot in. The one difference is that the base-to-2 1/4" high cut should be made as a lap joint (i.e. all the way across the wood, rather than just 1 1/2" in) in order to slot into the middle groove cut out of the base plank.

Finally, take the middle-right and taller middle-left planks and glue them together, side by side. To make this joint use either dowel joints or biscuits. The result should be a double width piece that has one side taller than the other. Not that when looking at this piece from the front, it should look like one solid piece - the grooves should be in the back, not the front.

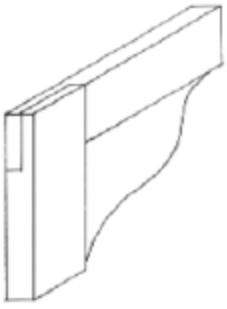
3. Glue front frame together

Once the middle, double plank has dried, it is time to connect the rest of the front together. Glue and screw the pieces together, ensuring that the finished frame is square. To help build a solid frame, clamp overnight to ensure a strong bond.



4. Prepare back frame

The back frame is relatively simple to construct as it consists only of an outer frame. Repeat step 2, but omit the horizontal planks that define the drawer spaces (but include the inner-left and inner-right vertical planks that are glued together as on the front). One prepared, glue the pieces together (as with the front). Again, ensure that the frame is square.



5. Build left (small) side panel

Take the two vertical side pieces and cut lap joints into them, and matching lap joints in the two small horizontal pieces. By so doing, the four pieces should fit together into a rectangular frame (see diagram). Next, rout out a groove on the inner, back edge of all four pieces. This groove should be 1/2" in and be 1/2" deep.

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By making this groove all the way around the inside edge, the plywood sheet that forms the side panel can rest in place. Once routed, glue and screw the four side planks together - making sure the joints are square - and then glue the plywood panel into place in the center (which will help strengthen the unit.

6. Build right (larger) side frame

Repeat step 5 for the right hand panel. Remember that this panel is larger due to the fact that the right side of the front frame is also taller.

7. Build main frame

Now that the two sides, front and back have been built, it is time to put them together. Sandwich the left hand side panel between the front and back panels and screw the three pieces together by driving screws through the front frame into the side as well as from the back frame into the side panel. Then attach the right hand panel to complete the frame. Make sure that the completed frame is square.

8. Add middle panel

Next, add the small middle panel, gluing and screwing it into place. This panel should fill the small void at the point where the front/back steps up from the lower height to the taller level. At this time you should also add a small strengthening bar to the bottom middle of the frame, running from front to back. To add it, glue and screw into place from the front and back.

9. Add tops

The final strengthening trick is adding to table tops. First add the larger, lower top. This should overhang the front and left hand side by 1", over-hanging the back by 1/2". To attach this top, glue and nail - or screw - down into the frame.

Add the smaller top to the higher part of the table next. Again, the overhang should be 1" to the front and both sides.

10. Add edging strip and molding to top

Add the edging strip to front and sides of both tops. Use glue and small finishing nails to hold the strip into place against the plywood edge of the table top. Next, add the small molding to the meeting point between the top and the main frame, thus making the two look more like one unit.

11. Make base panel and attach to base.

To finish off the main unit we need to add a base board that will serve as feet. This is one solid plank that runs the entire length of the unit. Route a curve out of the top side to round it off (see diagram). Add to from and sides - using a mitered cut at each end - using screws and glue. The board should overlap 1" with the frame, providing adequate bonding space.

12. Make drawers

Take the two side pieces, the back and the inner front piece. Cut a groove in each one that is 1/4" from the bottom of each piece and is 1/4" wide. This groove will allow the base to slot into the drawer frame. Once you have cut the groove, glue and screw the sides to the back piece, slot the base into the groove and then glue and crew the inner front board. Make sure that the unit is square. The result is a box without a lid.

Attach a 16" drawer runner mechanism to each side of the drawer, and to the corresponding "hole" in the main unit of the chest. Ensure that all drawer mechanisms are attached at the same height, so that the drawers are interchangeable in the unit. To attach the runners to the main frame, you may need to add a strip of wood to the rear verticals.

Finally, you need to add the front of the drawer to the box unit. However, before doing this, you need to shape the front of the drawer. The edge of this should be rounded using the same router bit as you used for the edging around the bottom of the main unit. Once you have routed all four sides of the drawer front, attach it to the drawer unit by gluing and screwing from the inside of the drawer outwards.

13. Finishing

Finally, nail the two back panel pieces on to the back of the unit and sand the entire unit thoroughly and paint.

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BIRDHOUSE

ITEM #	QTY	DESCRIPTION
1	1	1" x 6" x 5'-0" LONG CEDAR FENCE BOARD
2	35	1-1/2" LONG FINISH NAILS
3	1	OUTDOOR WOOD GLUE
4	4"	3/8" DIAMETER ROUND WOOD DOWEL

NOTE: All parts to be made from 1"x6" (3/4" thick by 5-1/2" wide) cedar fence board. Therefore, all dimensions shown 5-1/2" will not require cutting. If a board other than 5-1/2" wide will require additional cuts.

STEP #1

Make (2) side wall panels as shown in Figure #1.

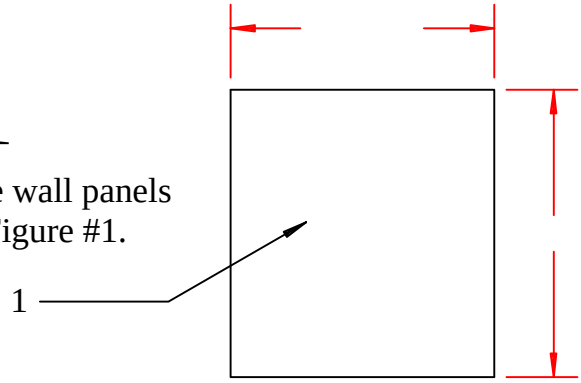

FIGURE #1

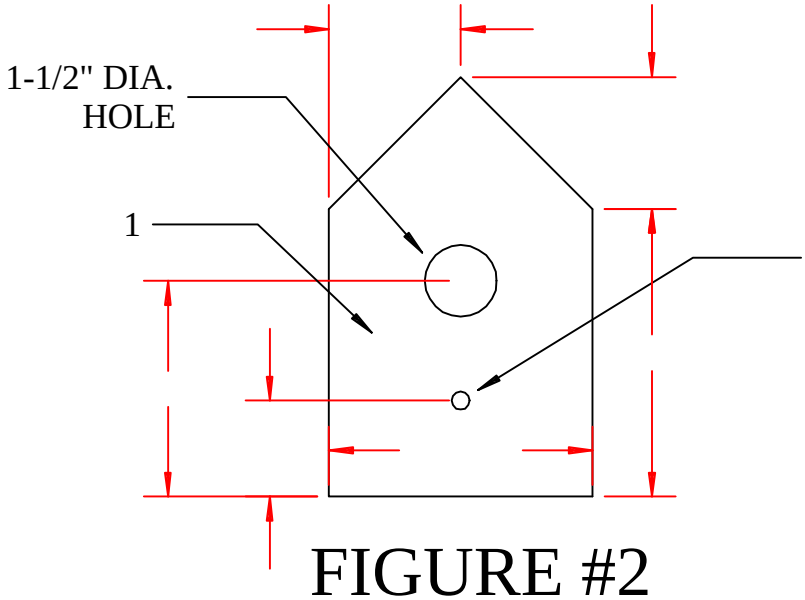

FIGURE #2

STEP #2

Make (1) front wall panel as shown in Figure #2.

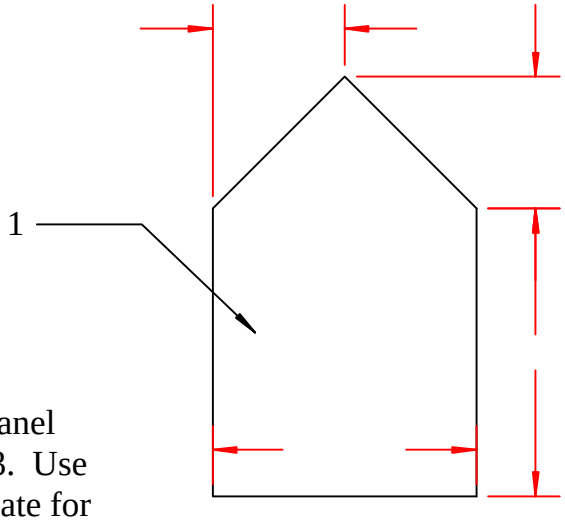

FIGURE #3

STEP #3

Make (1) back wall panel as shown in Figure #3. Use front panel as a template for back panel to ensure both panels are identical.

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STEP #4

Assemble (2) sides, front, and back panels as shown in Figure #4. Glue and nail (3 nails per joint) each joint.

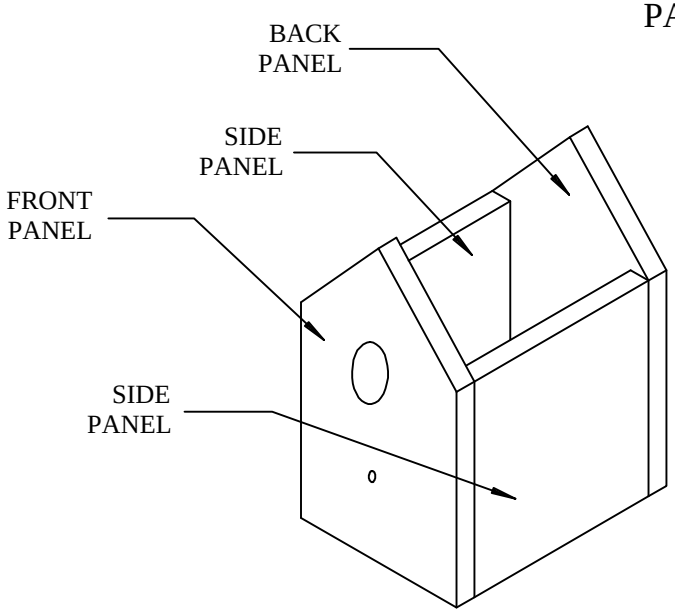

FIGURE #4

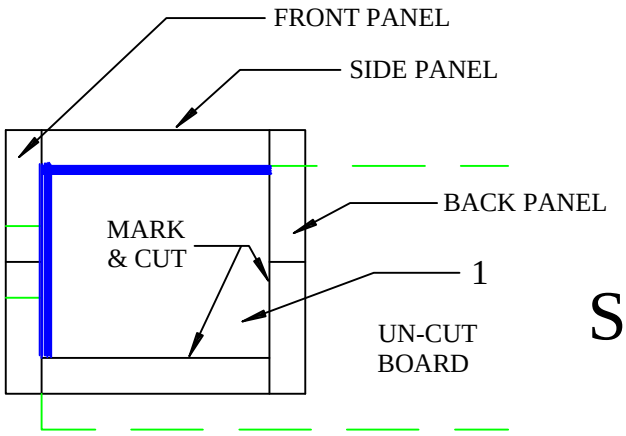

FIGURE #5
TOP VIEW

STEP #5

Make (1) bottom panel by placing assembled walls on top of oversized, future bottom panel, board as shown in Figure #5. Mark (2) edges to be cut from inside of birdhouse as shown in Figure #5. Cut on marked lines. Install bottom panel inside assembled walls with glue and nails (2 nails per side).

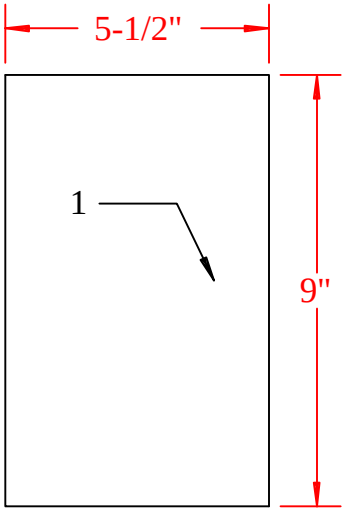

FIGURE #6a
RIGHT ROOF PANEL

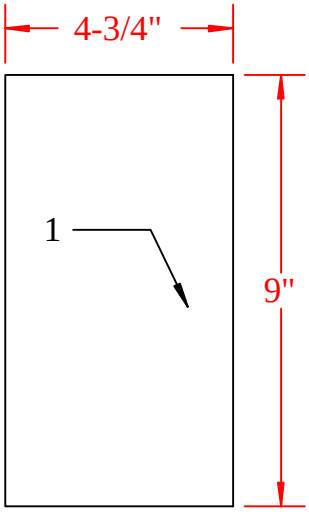

FIGURE #6b
LEFT ROOF PANEL

STEP #6

Make (1) right roof panel and (1) left roof panel as shown in Figure #6a and Figure #6b.

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STEP #7

Install roof panels on house walls as shown in Figure #7a and Figure #7b. Glue and nail (2 nails per end and 3 nails along ridge) roof panels.

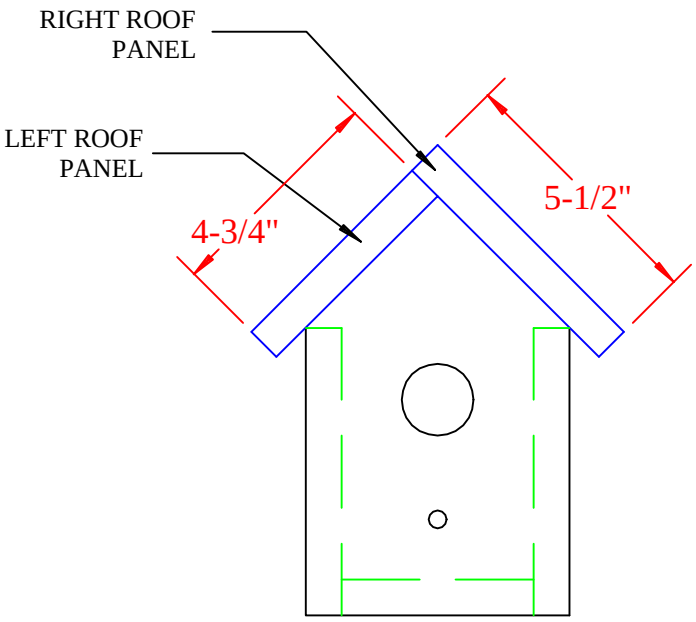

FIGURE #7a
FRONT VIEW

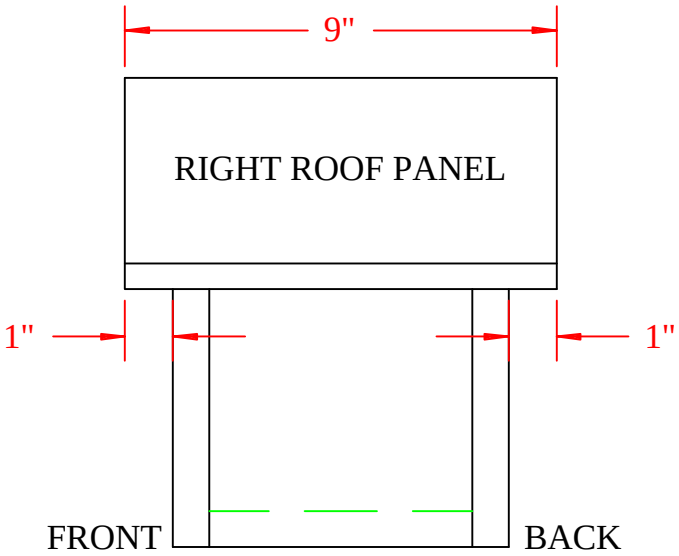

FIGURE #7b
SIDE VIEW

STEP #8

Cut a 4" long piece of 3/8" diameter wood dowel. Glue and insert dowel into 3/8" diameter hole previously cut into front panel of bird house.

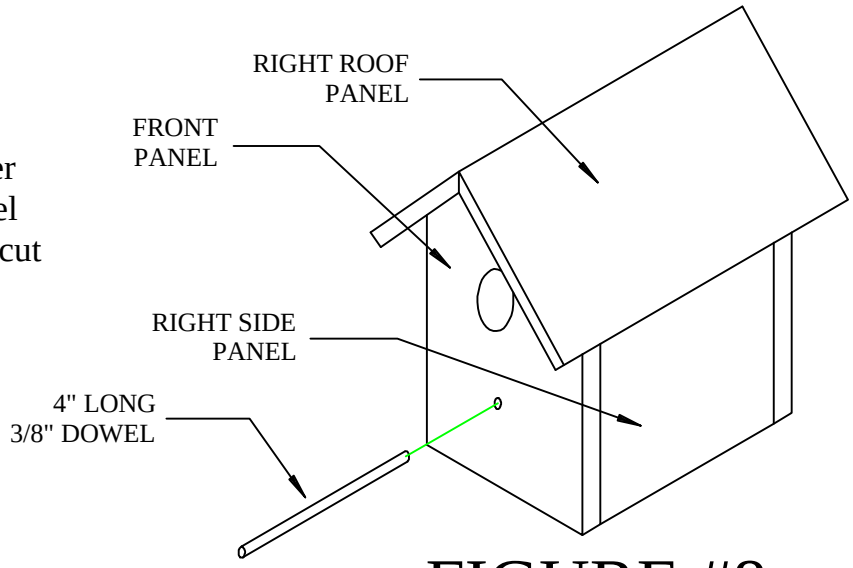

FIGURE #8

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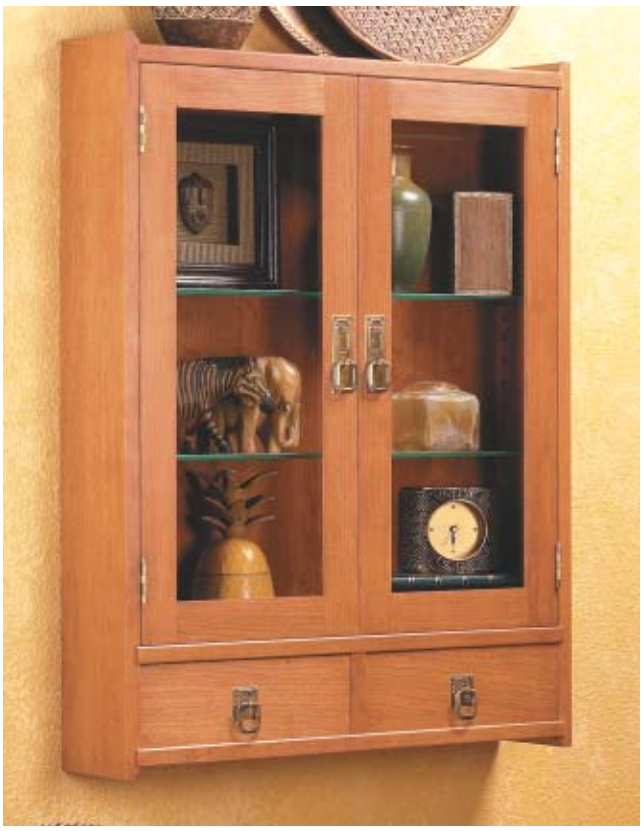
DISPLAY CABINET



Though this case has some unique features, it's built with basic dado construction. For more on cutting dadoes and grooves, see our ***Woodworking Basics*** *series at PlansNOW.com*

Case

The basic case of this display cabinet is quite simple — just a pair of sides that trap a top, bottom and a single, fixed shelf, as you can see in Fig. 1. Later, you'll add a vertical divider to create the drawer openings, a cleat for hanging the cabinet, and a plywood back. But for now, you can focus on the basic case pieces.

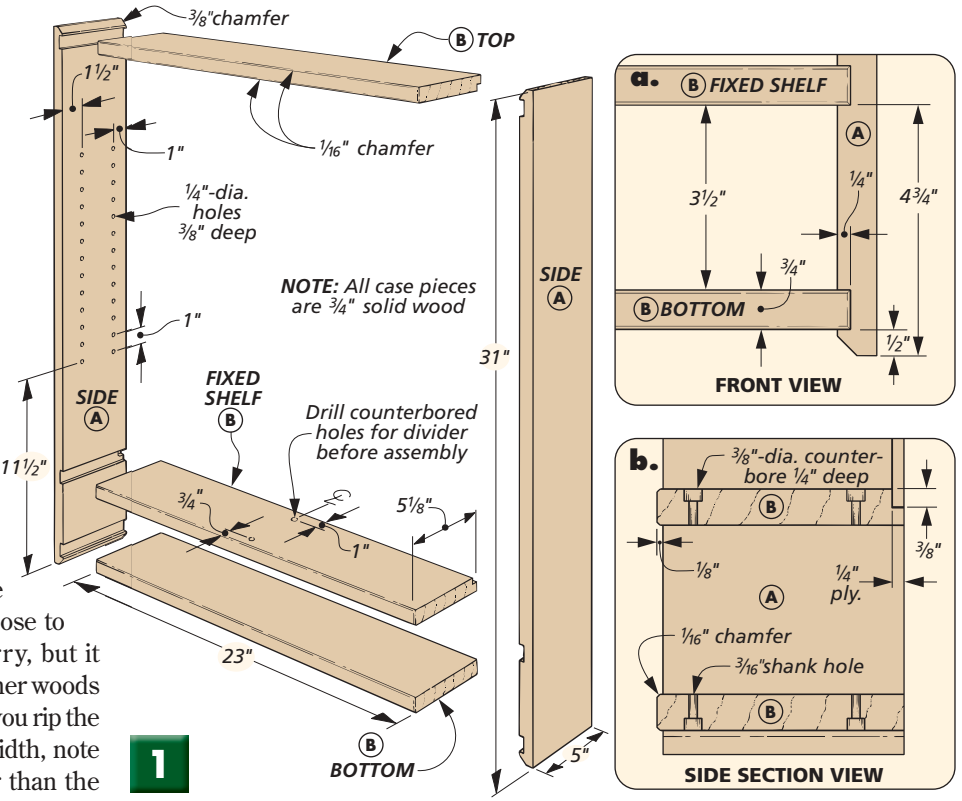
SIDES, TOP, BOTTOM & SHELF. The first thing to do is cut the *sides (A)* and the *top, bottom* and *shelf (B)* to size from ¾"-thick stock. (I chose to build this cabinet in cherry, but it would also look great in other woods like oak or maple.) Before you rip the top, bottom and shelf to width, note that they're slightly wider than the sides so they will stand ⅛" proud, as shown in the photo at left and Fig. 1b.

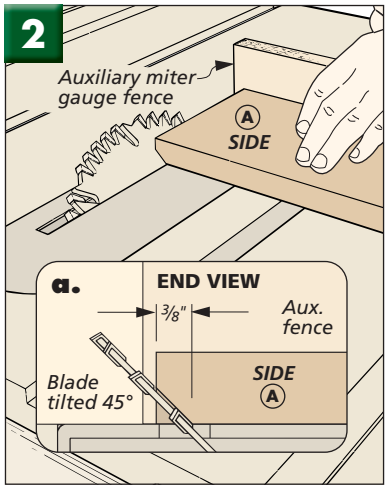
The sides require the most work, so I started with them. First, I cut a chamfer on both ends, as shown in Fig. 2. This is a fairly deep chamfer, so instead of cutting it in multiple passes with a router bit, I cut it on the table saw using an auxiliary miter gauge fence to support the piece.

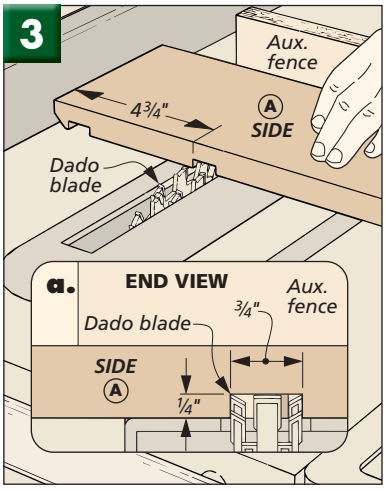
You can leave the auxiliary fence in place while you cut the dadoes to hold the top, bottom, and shelf, as shown in Figs. 1a and 3. And to make sure the dadoes line up across from each other, you'll want to either add a stop to the end of the auxiliary fence or use the rip fence as a stop, as I did in Fig. 3. (You can do this because the cuts don't go all the way through, so there are no waste pieces to kick back at you.)

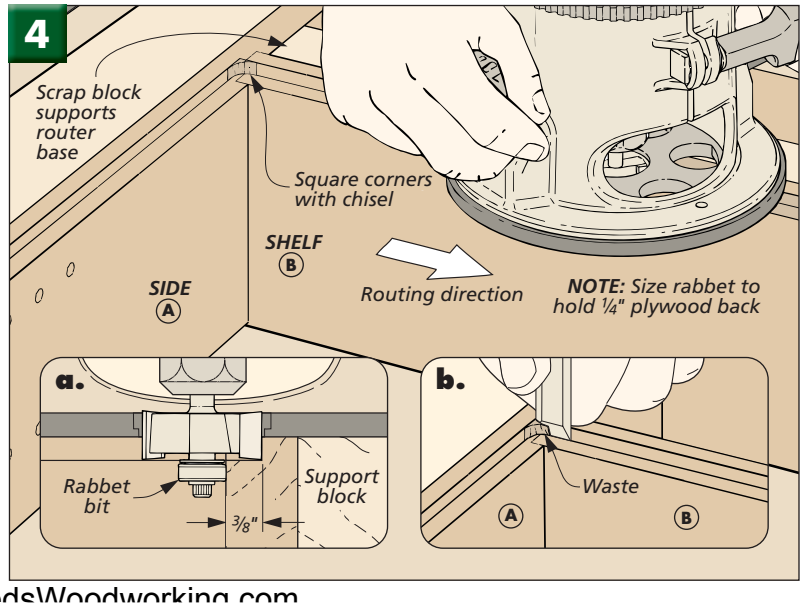
The last thing to do on the side pieces is drill the series of ⅜"-deep holes for the L-shaped shelf supports that will hold the glass shelves.

Before the case can be assembled, you'll need to do a little work on the top, bottom and shelf. First, the front edge of each needs a 1/16" chamfer, as indicated in Fig. 1b. Then in the shelf and bottom pieces, you'll want to drill the two counterbored shank holes that will hold the drawer divider.









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(It would be a bit awkward to do this after assembly.)

Gluing this case together isn't hard. Just remember the top, bottom and shelf stand proud in front of the case and are flush in back.

After the glue on the case is dry, the next thing to do is rout the rabbet for the ¼" plywood back panel. As you can see in Figs. 4 and 4a, I did this with a hand-held router, using scrap blocks to help support the router base so it wouldn't tip. Then I came back and cleaned up the corners with a chisel (Fig. 4b).

DRAWER DIVIDER. Before you cut the back to size, there are two other pieces to make. First I cut a *drawer divider (C)* to fit between the shelf and bottom, as shown in Fig. 5. But note that the front of the divider sets back ⅛", just like the sides (Fig. 5a).

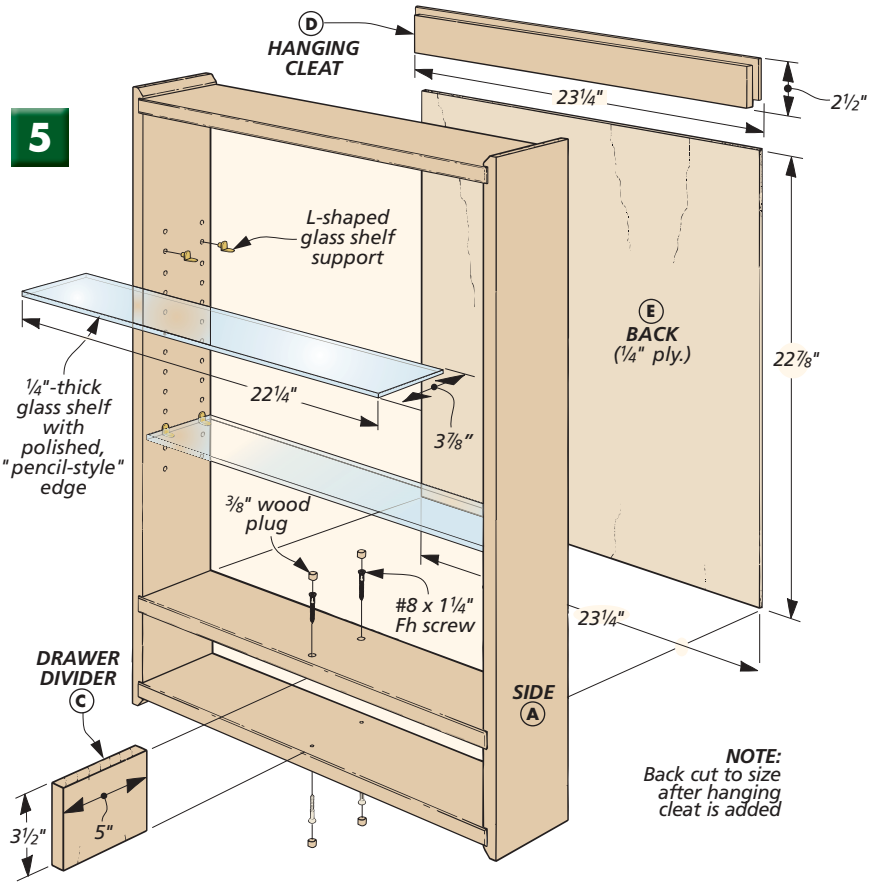
After screwing the divider in place (Fig. 5a), the screws can be covered with ⅜"-dia. wood plugs. (I'd recommend you use face grain plugs here so they'll be less noticeable.)

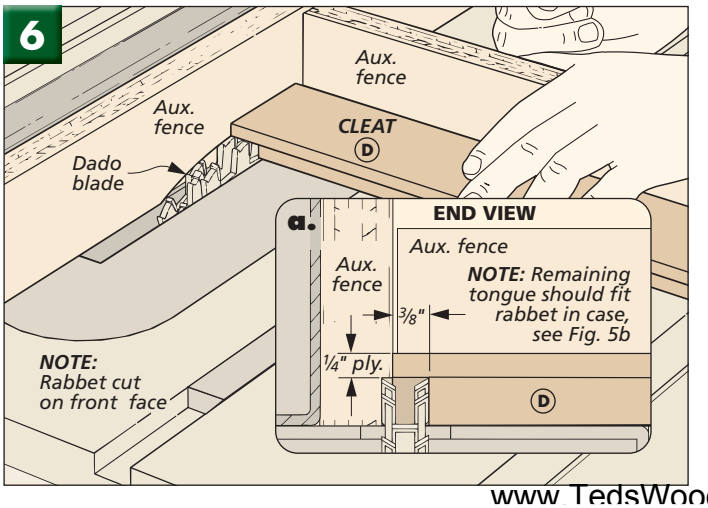
HANGING CLEAT. The next piece I added was a *hanging cleat (D)*, as you can see in Fig. 5. This way, when hanging the cabinet on the wall later, I had a ¾"-thick solid-wood piece to screw through, instead of the ¼" plywood back.

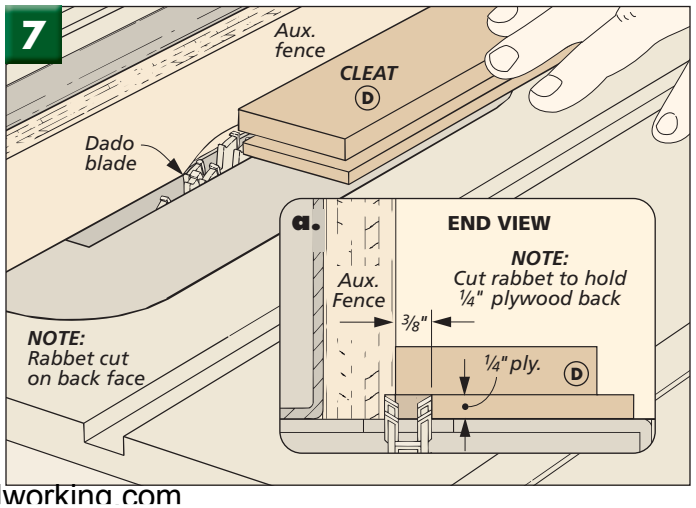
Making the cleat is a two-step process. It's cut to fit between the rabbets for the back, but to get it to fit flush with the back, you'll need to cut a rabbet around three edges of its front face, as shown in Figs. 5b and 6. The second step is just cutting another rabbet — this time, to match the rabbets in the case for the back, as you can see in Fig. 7.

BACK. When the cleat has been glued in place, you can cut the plywood *back (E)* to size and glue it into the rabbet (Fig. 5b).

GLASS SHELVES. You really don't need to order the glass for the shelves until you order the glass for the doors later. But I'll just mention here that I used ¼"-thick glass that had polished, "pencil-style" edges.







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Doors

At this point, the case is ready for the doors, and whether you build them with glass or wood panels, the procedure starts out the same. The door frames are built with a grooved bridle joint. But more on that in a minute.

CUT TO SIZE. Before cutting the *door stiles (F)* and *rails (G)* to size (Fig. 8), measure your case so the door pieces can be cut to fit its opening. The stiles are sized so there will be a 1/16" gap at the top and bottom of each door. The rails are a bit more work, but at least with a bridle joint, they're the full width of the door. Here, I allowed for a 1/16" gap on the sides of the case but no gap between the two doors. (Later, you'll trim the edges where the doors meet, as in Fig. 8b.)

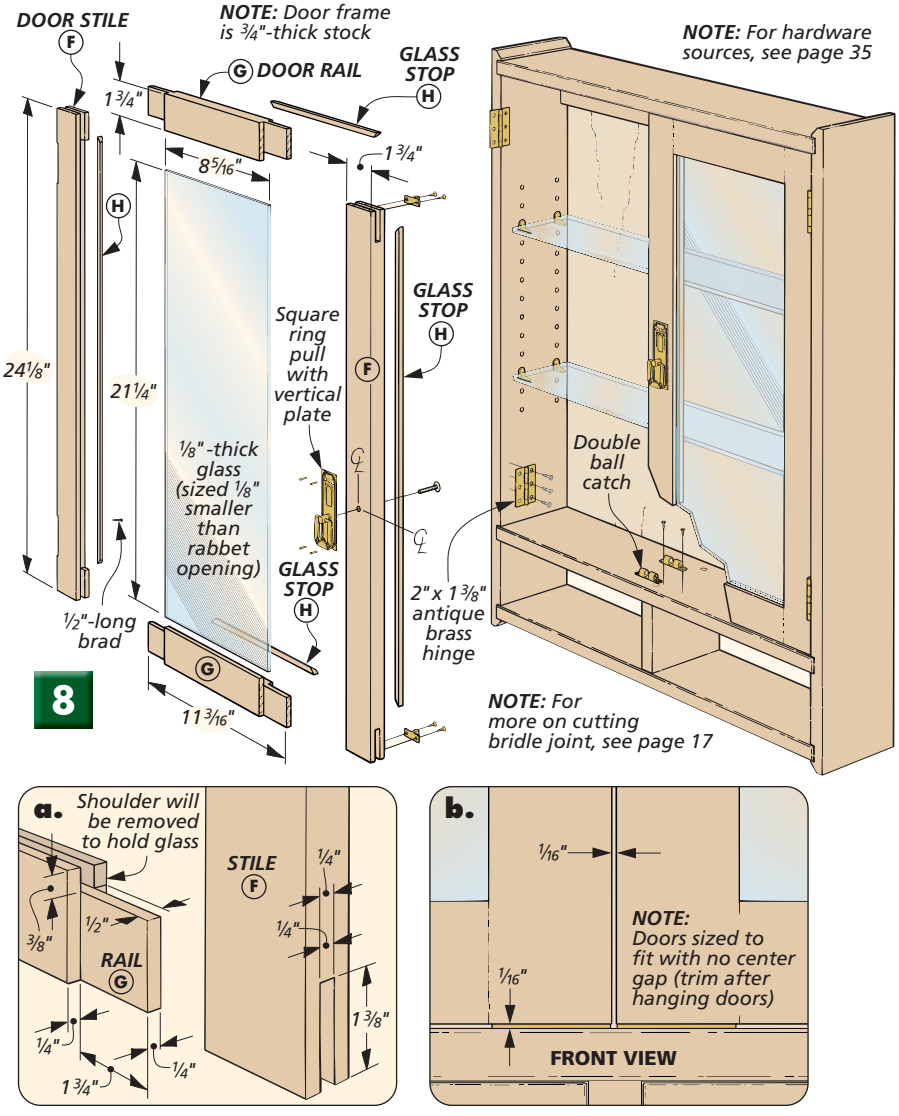
BRIDLE JOINT. With the pieces cut to size, you're ready to cut the bridle joint, see Fig. 8a. I came up with a quick jig (shown in the margin photo) that eliminates one of the setups. And I've described the jig (and how to cut the bridle joint) on page 8 and 9.

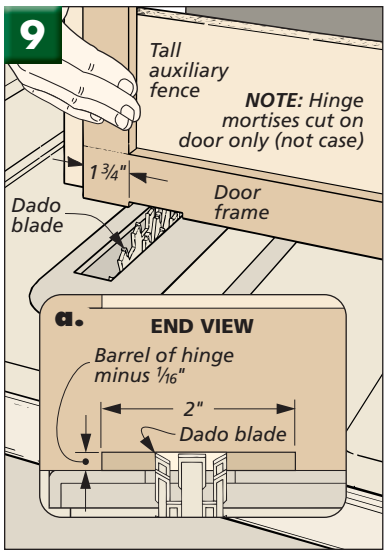
DOOR PANELS. If you're building the doors with wood panels, you'll need to make them *before* you glue up the frame, see bottom of page 6. For glass doors, you can glue up the frames now. (Later, you'll rout a rabbet for the glass to fit into.)

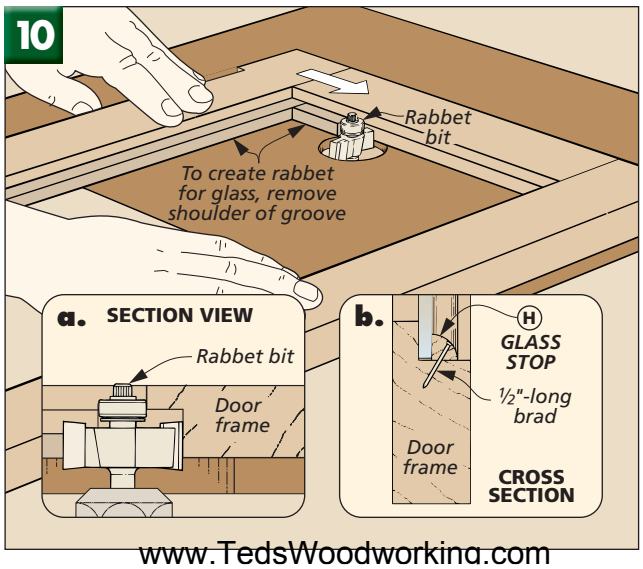
HINGE MORTISES. With the door frames glued up, I cut the mortises for the hinges next, as shown in Fig. 9. This can be done at the table saw, and I sized the mortises to match the full depth of the hinge barrel, minus 1/16" for the gap. (The hinges are simply screwed to the inside of the case.)

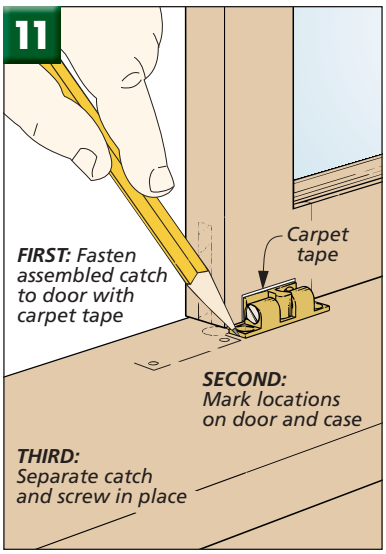
Now you can rout the back edges of the doors to hold the glass, as in Fig. 10. I used 1/4" *glass stop (H)* to mount the glass (Fig. 10b). And on page 8, there's a "miter box" I used to cut the stops to length. (But you don't want to add the glass until the finish has been applied to the project.)

HANG DOORS. At this point, the doors can be hung in the case. Then you can trim their inside edges to create the 1/16" gap (Fig. 8a) and add the pulls









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and catches. The double ball catches I used can't be adjusted after they're screwed in place, so for an accurate installation, I positioned them with carpet tape, as described in Fig. 11.

DRAWERS

All that's left now is to build the two small drawers, as shown in Fig. 12. I sized the ½"-thick *fronts (I)* and *backs (I)* so the drawers would be 1/16" smaller than the openings in height and width. And the *sides (J)* are sized so the drawers would stop ¼" short of the back of the case.

LOCKING RABBET. To create a strong drawer without a lot of fuss, I decided to use a locking rabbet joint (Fig. 12a). It looks more complicated than it really is. In fact it can be cut in three quick steps on the table saw.

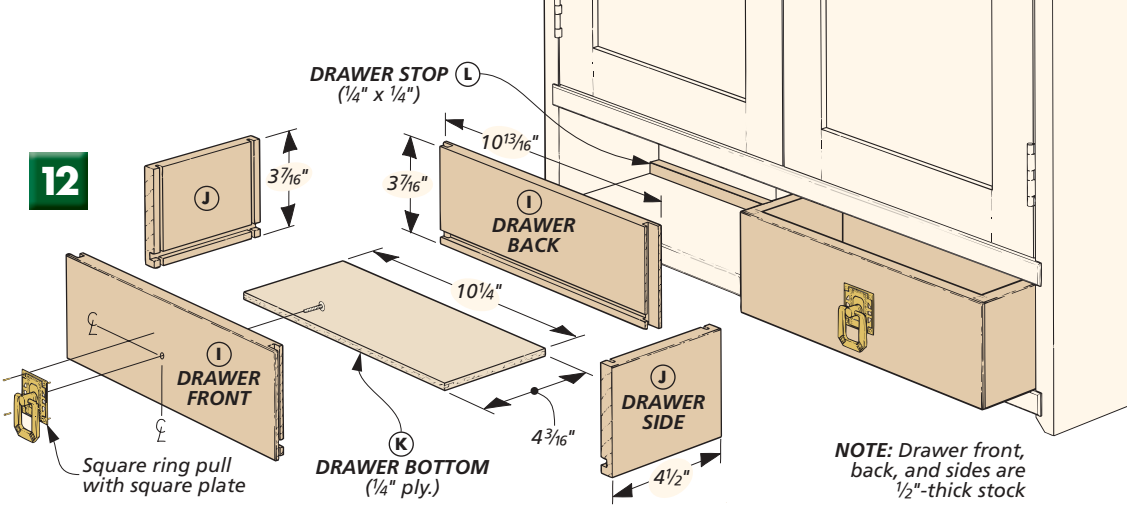
First, a centered groove is cut on the ends of the front and back pieces, as shown in Fig. 13. The key here is that the height of the blade matches the thickness of the drawer sides.

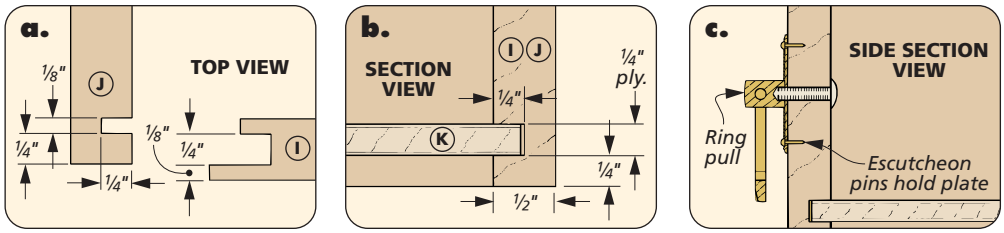
Next, I trimmed the inside face of the front and back pieces to create a ¼"-long tongue, as shown in Fig. 14.

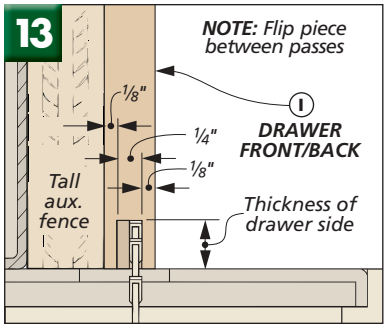
The last step is to cut dadoes on the sides (Fig. 15). Just position the dadoes to line up with the tongues cut in the fronts and backs (Fig. 12a).

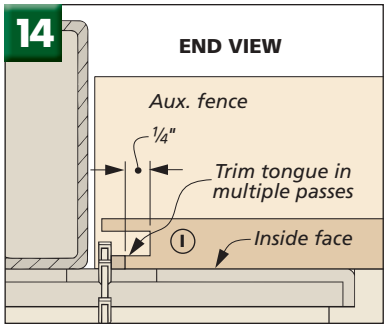
BOTTOM. Now each drawer piece is ready for a groove that will hold the ¼" plywood *bottom (K)*, as in Fig. 12b. Then when the bottoms are cut to size, you can glue the drawers together and add the pulls (Fig. 12c).

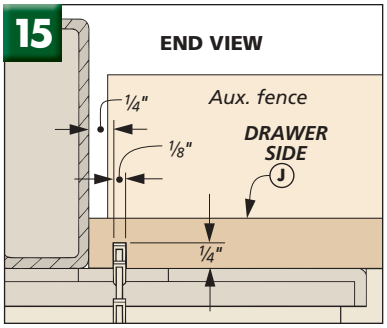
STOP. All that's left now is to cut two *stops (L)* for the back of the case. They're sized so the drawer will end up flush with the *sides* of the case. (Mine were ¼" wide.)







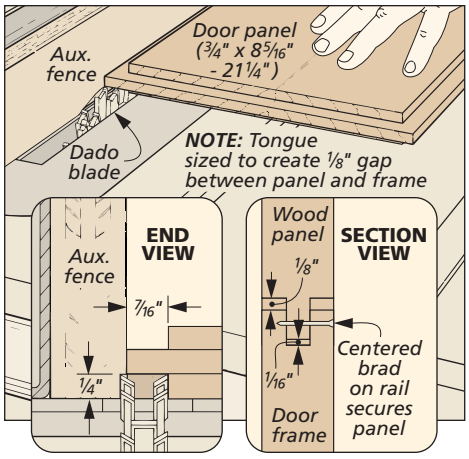




WOOD PANEL DOOR

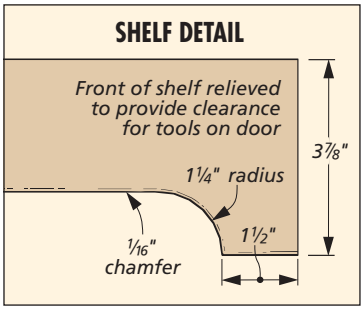
For an elegant *storage* cabinet, you can build the doors with wood panels instead of glass. (You can also add wood shelves inside.)

Each panel is sized so it'll fit in the grooves when the door is glued together. (Be sure to allow a small gap on each side so the panel can expand and contract.) To create the tongue, all you need to do is rabbet each face, see drawing. And when assembling the frame and panel, remember *not* to glue the panel into the frame.



Storing Hand Tools

The display cabinet is sized just right to make a great tool cabinet for those special hand tools you want to keep accessible — and protected. Of course, whether you build a "fine" cabinet (with cherry and ash, like the one here) or choose less expensive wood is up to you. Either way, there are a few things to keep in mind as you're adapting this cabinet for tool storage.



WOOD PANELS. To make the best use of the space inside the cabinet, I decided to build the doors with solid-wood panels instead of glass. This way, I could store tools on the doors, as well as on the shelves (and back). But to do this, you have to make sure there will be enough clearance inside the cabinet. This means cutting shallow recesses in the front edges of the shelves or cutting narrower shelves (and changing the locations of the holes for the shelf pins), as in the drawing above.

ORGANIZING TOOLS. In order to get the most use out of the doors, I decided to spend a little time planning which tools would work best where. To do this, I simply laid the cabinet on its back with the doors propped open. This lets you shuffle the tools around easily until you have the most efficient layout. Then after you have chosen which tools will go where, you can begin making some custom tool holders.

TOOL HOLDERS. It's not hard to design and build your own custom tool holders. The goal is to get them to hang securely so they don't fall (or swing) whenever the door is opened. At the same time, you want them as easy to lift off and set back on as possible. Plus, if there are sharp edges, like the teeth on a hand saw or the point of an awl, you want to be sure that other tools (and your hands) are protected.

There are a number of ways to accomplish this, as you can see in the photos below. Simple kerfs are great for holding the blades of saws, squares, and rulers. For awls, chisels, and files, I drill counterbored holes that trap the handles and then cut slots for easy access. And for marking gauges and block planes, you can make a small shelf platform. Here, you'll want to add small cleats to the edges so the tools won't slide off as the door is opened and closed.

When you're making these small holders, it's best to do as much work as you can with the pieces oversized. This keeps your hands as far away from the blade as possible.

The photos below show just a few of the tool holder ideas we came up with for our cabinet. To see some more ideas, go to the Online Extras section on our web site:

***Scratch awl**. An open hole traps the handle of this awl. And to protect your hands (and other tools), the point sits in a base.*

***Hand saw**. A kerf can be used to protect the teeth of a hand saw. To support the saw, I added a simple base, see main photo.*

***Marking gauge**. For this marking gauge, a notched block supports the head, and a small lip keeps the tool from sliding off.*

***Combination square**. A small angled block with a shallow kerf is all you need to capture a combination square.*

Shop Notes

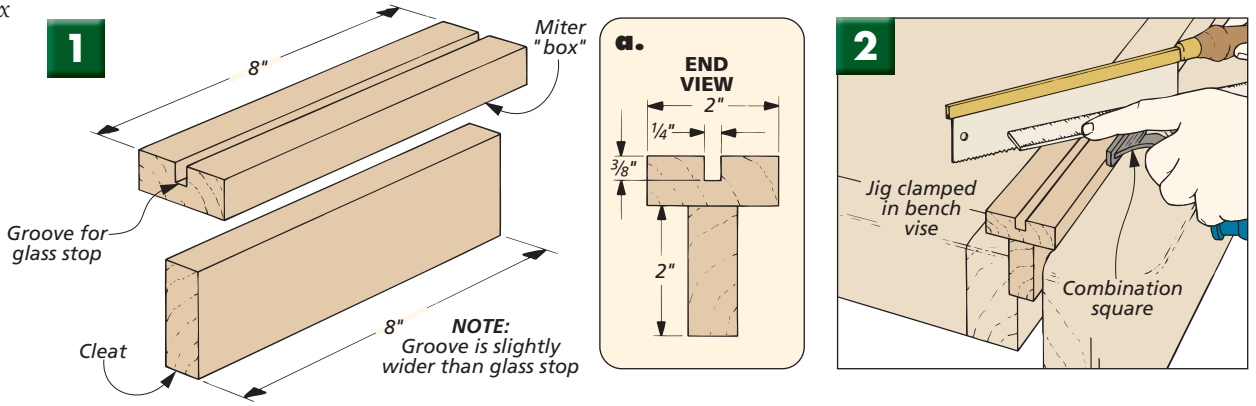
▲ *To allow my hand saw to slide smoothly in this miter "box," I applied a little wax to each face.*

Mitering Glass Stop

When mitering glass stop, the trick is to work with the fragile ¼" x ¼" strips safely. So when it was time to cut the stop for the glass doors on the display cabinet, I decided to leave my table saw turned off and miter the pieces with a hand saw, as shown in the photo at right.

MITER BOX JIG. To do this accurately, I made a quick miter "box" sized for small strips. As you can see in Fig. 1, this is just a piece with a groove cut in it to hold the glass stop blanks. (The stops shouldn't fit the groove tight, or you'll have a hard time adjusting them from side-to-side.) This miter "box" is glued to a cleat so the T-shaped jig can be clamped into a bench vise.

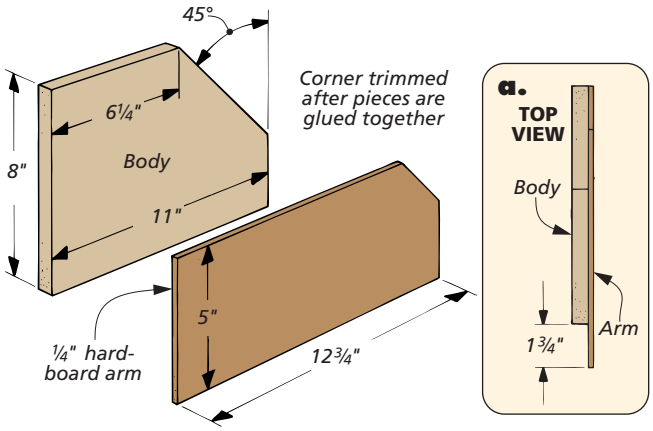
Of course the critical part of making this jig is accurately cutting the kerfs that guide the hand saw. And to do this, I used my combination square, as shown in Fig. 2. Then to hold the small strips in place, I gripped them with my fingers. But I found that the saw tended to bind in the kerf. So for a quick solution, I rubbed a little wax on the blade, as in the margin photo at left. W



▲ *This push block lets you cut the mortises without having to reset the fence.*

Make a Bridle Jig

I needed a simple push block to support the stiles while the mortises were being cut. Plus, I wanted to use the same fence setting as the groove setup so the mortises would align with the grooves. This push block does the trick. Its body matches the stile's thickness (¾"), and the hardboard arm extends past the front of the body to prevent the piece from tipping as it's pushed across the blade.



Bridle Joint

This display cabinet has door frames with grooves on their inside edges to hold a panel. As you can see in the upper photo at right, a bridle joint (or open mortise and tenon) is a good choice for this type of frame. It's plenty strong to hold a glass panel, and the whole process can be done on the table saw. All you need is the simple bridle jig (see page 8). Be sure to build the jig *before* you get started on the joint.

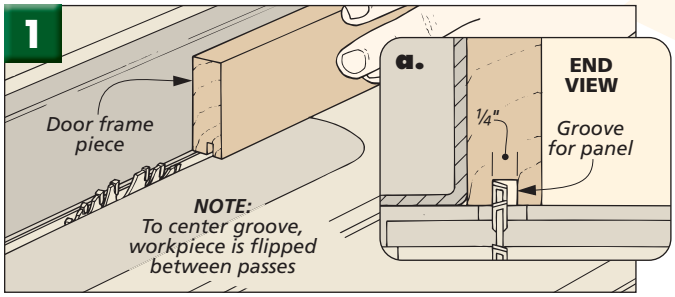
GROOVE. The first step to building the frames is to make a centered groove on each piece, as in Fig. 1. Technically, this isn't part of the joint, but you'll use this same fence setting to cut the mortise next.

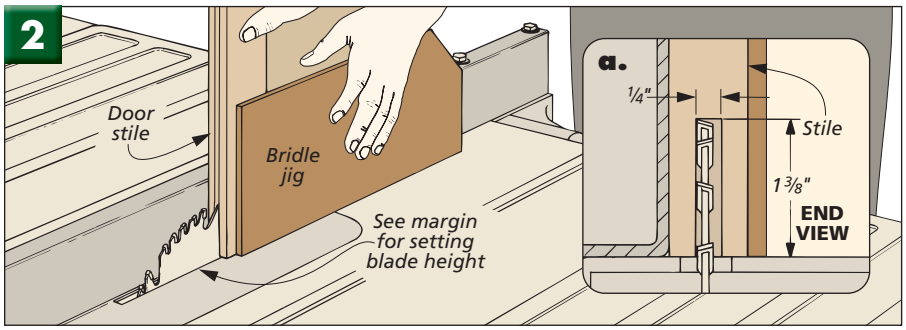
To cut the groove, I made a couple passes over a regular blade. Flipping the pieces between passes automatically centers the groove. And you'll want to sneak up on the position of the fence until the grooves are ¼" wide.

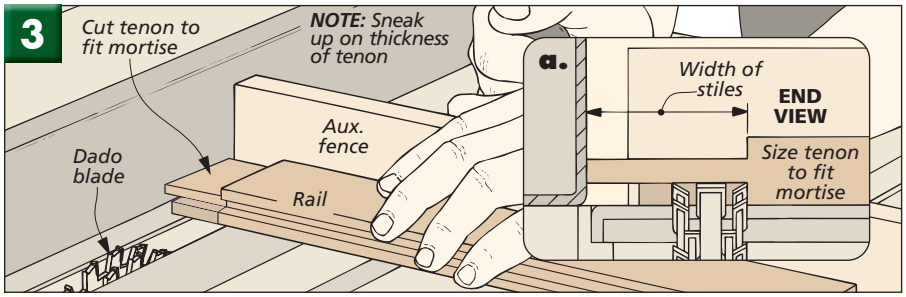
MORTISE. Now you can cut the mortises in the stile pieces, as in Fig. 2. You don't want to change the fence for this step. The mortises should align with the grooves. But you will need to raise the blade to set the depth of the mortises, as indicated in the lower margin photo. This way, the mortise's depth will automatically match the width of the tenon.

Cutting the mortises is the same two-step process you used when cutting the grooves. Only this time, the workpieces will be cut standing on end (supported by the jig).

TENON. All that's left now is to cut a tenon to fit the mortise. As you can see in Fig. 3, I laid the rails down for this step, making multiple passes over a dado blade. Set the fence so the tenon matches the width of the stiles. Then sneak up on the height of the blade until the tenon fits snug in the mortise.







▲ *Unlike a traditional mortise and tenon, a bridle joint can be cut completely on the table saw.*

▲ *To set the blade at the right height for the mortise of the bridle joint, raise it until it aligns with the groove in one of the rail pieces.*

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BREAD BOX

Bread Box

Bread boxes are very easy to make and it is almost a crime to consider buying one -- unless for some reason wood will not go in your kitchen. This particular bread box is based on one of the more common designs and is therefore easier to build than one with a roll-top lid. Bread box fanatics (presuming such a person exists) are split into two camps: those that want air holes and those that don't. We're not about to pin our colors to either side of the argument and, instead, offer a choice depending upon your own preference.

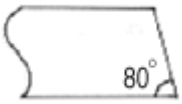
Construction

Tools required: Drill, sander, jigsaw, router

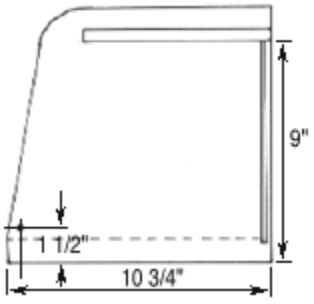
Wood required (pine):

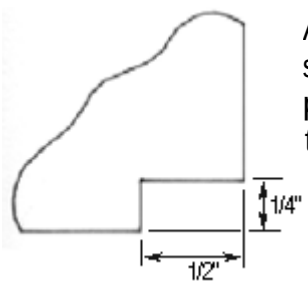
Description	Qty	Thickness	Width	Length
Base	1	3/4"	10 3/4"	18 5/8"
Sides	2	3/4"	10 1/2"	10 3/4"
Top**(see note)**	1	1/2"	8 9/16"	19 1/8"
Door	1	1/2"	8 1/8"	18 5/8"
Back (plywood)	1	1/8"	9 1/2"	19 1/8"
Hinge (dowel)	2	1/8"	1/8"	1 1/2"
Handle	1	3/4"	1"	5 1/2"

Note: When cutting the top to shape, the front length should be cut at a 80 degree angle. This is to ensure that the bread box door rests against the top evenly, rather than on a very thin edge (see diagram on left).



Cut the two side pieces to the correct shape (see diagram on right), rounding off the top with a smooth curve. Decide which face of each side piece is the inside face and mark it accordingly. Then cut the groove in each of these inside faces. The groove should be 1/2" wide, 1/4" deep and 8 1/16" long (measured from the back edge): it should be cut parallel to the bottom of the side piece at a height of 9" to 9 1/2" from the bottom. [The top of the bread box slots into this groove, thus strengthening the construction.] Finally, drill a 1/8" hole in either side piece, as shown in the diagram. This should be 1 1/2" from the bottom of the side piece, and in 1/4" from the front. The purpose of this hole is that the hinge dowel will pass through this, into each side of the door.





As mentioned above, the top piece slots into the side-wall groove. However, for the sake of neatness, you will notice that the side groove is not quite as long as the top piece is wide. Because of this, it is necessary to cut a small niche out of each end of the top piece (see diagram on left).

It is now necessary to make a groove in the top of the base piece, the inside of both sides and the underside of the top piece. This groove should be 1/8" wide, and 1/4" deep and should be 1/4" from the back of each piece. The back panel slots into this groove, ensuring a nice tight fit. When creating the groove for the two side pieces, do not extent the slot all the way to the top of the sides. Instead, only run the vertical 1/8" slot up to where it intersects the 1/2" horizontal groove.

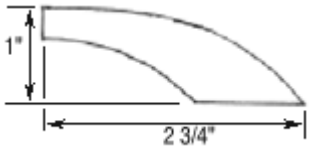
The final step prior to putting everything together is to prepare the bread box' door. Dry fit the sides, base and top and make sure that the door is the correct length to fit snugly between the sides. Then, round off the bottom length of the door, so that the side profile looks like a semi circle (see diagram).

Now, glue and nail (use small pin nails so that they won't show) the sides to the base. Then, glue in the back plywood and add the top, so completing the box shape. Clamp until the glue is dry. Once everything is dry, remove the clamps and place the door into place. Then, drill through the 1/8" holes in each side, into the side of the door. Put a little bit of glue onto each dowel, at least 1/2" from the end, and then slide the dowel hinges through the side pieces into the door. The idea is to glue the dowel into the side pieces, while leaving the door to rotate smoothly around the dowel hinge (it is a good idea to wax the very end of the dowel before gluing it).

Sand everything down, ensuring that the top of the door is flush with the top piece. Screw and glue the handle onto the front and then oil the bread box. To finish the bread box, we recommend mineral oil as it is a non-toxic oil.

Air Holes

If you have decided to add air holes to the bread box, drill 1/8" holes into the upper part of the back plywood.



Handle

If you cannot find a satisfactory handle for the bread box, you may decide that you want to make one from scratch. If so, this is the plan for the handle used on the above box. Note that the thickness of the handle is 3/4". Also note that the plan provided is only half a plan. Simply sketch this out onto a block of wood, and then turn the plan over to sketch out the other side. This approach helps to ensure that the handle is uniform. Once you have cut out the shape, carefully sand it until you have a nice rounded shape.

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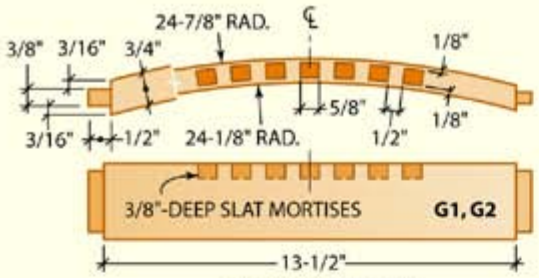
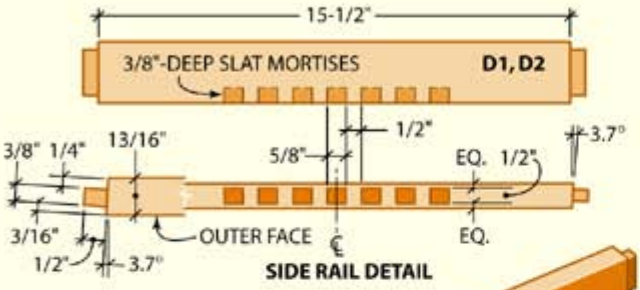
CLASIC ROCKER

ARTS & CRAFTS ROCKER

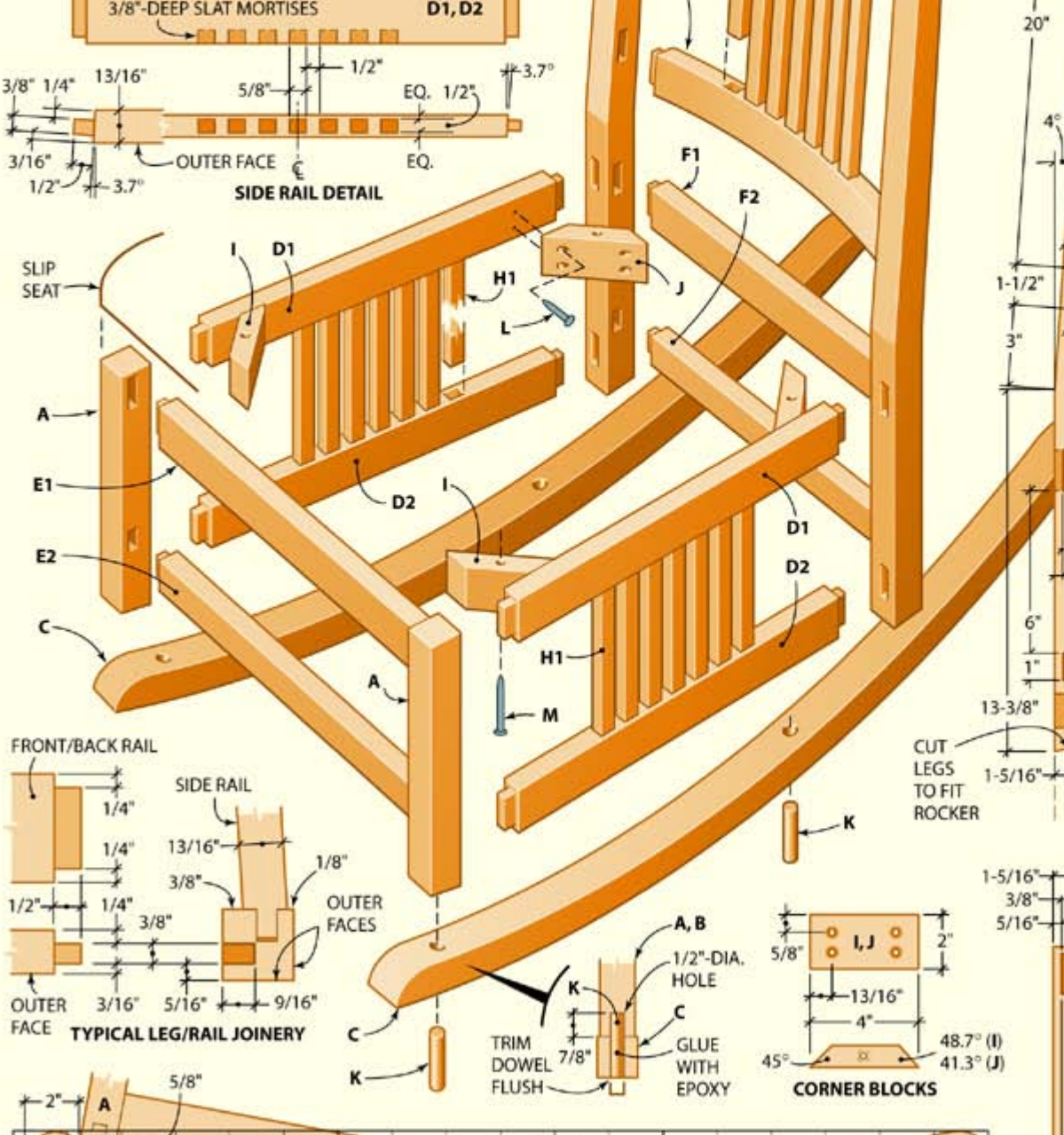
18-5/8" WIDE X 35-1/2" DEEP X 40-3/4" HIGH



CURVED RAIL DETAIL

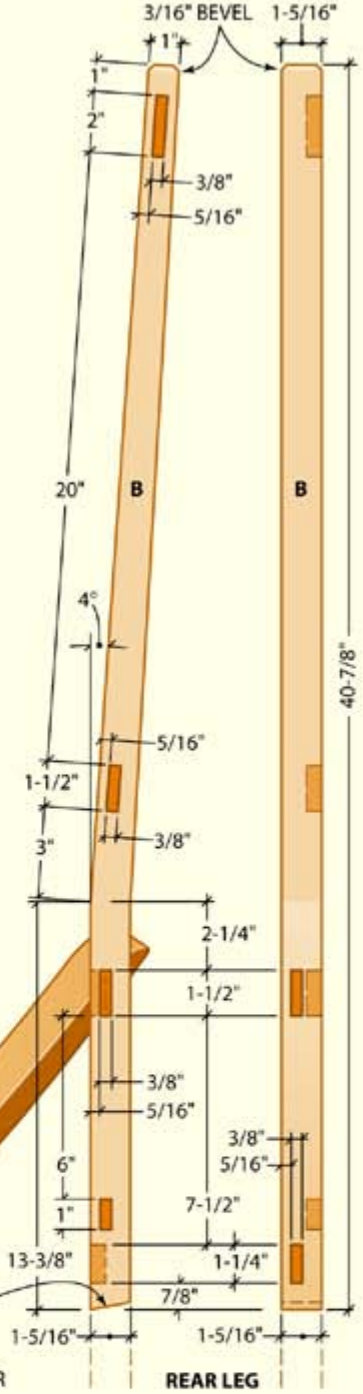


SIDE RAIL DETAIL

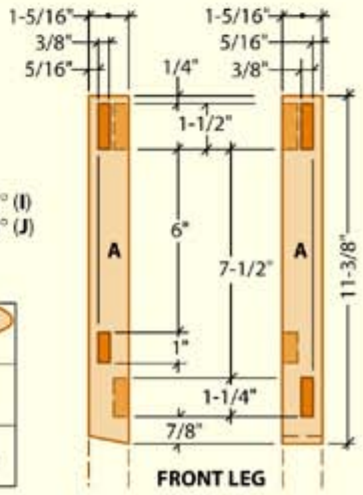


TYPICAL LEG/RAIL JOINERY

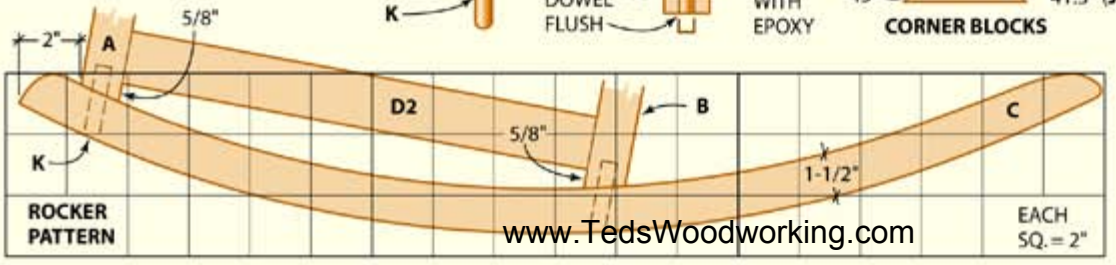
CORNER BLOCKS



REAR LEG



FRONT LEG



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Materials List--Rocker		
Key	**No.**	**Size and description (use)**
A*	2	1-5/16 x 1-5/16 x 11-3/8" oak (front leg)
B*	2	1-5/16 x 3 x 40-7/8" oak (rear leg)
C	2	1-1/2 x 5-1/2 x 35-1/2" oak (rocker)
D1	2	13/16 x 2 x 16-1/2" oak (side top rail)
D2	2	13/16 x 1-3/4 x 16-1/2" oak (side bottom rail)
E1	1	13/16 x 2 x 16-1/2" oak (front top rail)
E2	1	13/16 x 1-1/2 x 16-1/2" oak (front bottom rail)
F1	1	13/16 x 2 x 14-1/2" oak (rear top rail)
F2	1	13/16 x 1-1/2 x 14-1/2" oak (rear bottom rail)
G1	1	1-3/4 x 2-1/2 x 14-1/2" oak (back top rail)
G2	1	1-3/4 x 2 x 14-1/2" oak (back bottom rail)
H1	14	1/2 x 5/8 x 7-3/4" oak (side slat)
H2	7	1/2 x 5/8 x 20-1/4" oak (back slat)
I	2	13/16 x 2 x 4" oak (corner block)
J	2	13/16 x 2 x 4" oak (corner block)
K	4	1/2"-dia. x 3"-long dowel (rocker pin)
L	16	1-1/2" No. 8 fh woodscrew
M	4	2-1/2" No. 8 fh woodscrew
* Leave leg bottoms several inches longer to be trimmed when rockers are installed.		

Preparing The Pieces

Use a ripping guide and circular saw to bring your stock down to the required widths (Photo 1). To make the cuts safely and accurately, clamp the wide stock to some scrap blocks on your worktable and use two hands to control the saw. Rip the slat and rail blanks slightly oversize, and use a plane and sandpaper to smooth the sawn surfaces. Then use a speed square as a guide to crosscut the stock to size (Photo 2). When cutting the chair legs, leave the blanks several inches longer than specified. You'll trim the legs to finished size after assembling the frame.

Use a circular saw and ripping guide to rip the stock. Clamp the work to your table so both hands control the saw.

Next, make a template for the rockers from a piece of 1/4-in.-thick plywood or hardboard. Trace the outline of the template onto the rocker stock. By nesting the two rockers on the blank, you'll minimize waste. Cut the rockers from the blank with a sabre saw (Photo 3), keeping the blade on the waste side of the line.

Clamp one of the rockers to the worktable and use a sharp spokeshave to smooth the inside curve (Photo 4). Turn the rocker over and use either a plane or the spokeshave to smooth the other side.

Make a template for the rear leg, trace the shape onto the

leg blanks and cut out the legs with a sabre saw. Clamp two legs together, plane away the saw marks and bring them to final shape. On the back sides, you'll have to use a spokeshave and sandpaper in the area where the straight bottom portion of the leg meets the tapered top section.

Clamp a speed square to the chair rail stock, and use it to guide the saw and ensure accurate crosscuts.

After marking the rocker shapes with a template, use a sabre saw to cut to the waste side of the lines.

Use a spokeshave to smooth the inside surface. A spokeshave or plane will work on the other side.

Chair Joinery

Mark the locations of rail mortises in the chair legs, and use a plunge router with a spiral up-cutting bit and edge guide to cut the mortises (Photo 5). You could also bore a series of holes using a doweling jig to guide the drill. In either case, use a sharp chisel to finish the mortises.

Carefully lay out the tenons on the ends of the straight chair rails. Note that the side rails have angled tenons and tenon shoulders. Clamp a rail against the edge of the worktable with one end facing up, then use a backsaw to cut the tenon cheeks (Photo 6). Keep the saw kerf on the waste side of the layout line.

After making all the cheek cuts, make a guide from a 2-in.-thick block of wood for cutting the tenon shoulders. For the side rails, cut the end of the guide block at the specified angle (Photo 7). Lay out and cut the shoulders at the top and bottom edges of each tenon. Finally, use a sharp chisel to pare the tenon cheeks so the tenons fit their respective mortises.

Lay out the curved back-rail shape, including the tenons, on the appropriate blanks, then cut the tenons using the same technique. Clamp one of the blanks, inside face up, to the worktable and make a series of cuts with your circular saw to define the inside face of the rail (Photo 8).

Use a plunge router and edge guide to cut the mortises. Clamp a second leg to the workpiece for extra support.

Clamp a chair rail to the side of your worktable and use a backsaw to make the tenon cheek cuts.

Make a guide by cutting the side-rail angle on 2-in. stock. Clamp it to the rail and hold the saw against its end.

Use your circular saw to make a series of cuts that stop about 1/16 in. above the inside curve of each back rail.

Keep the cuts about 1/16 in. above the layout line. Then chop away the large waste chunks with a chisel (Photo 9). Smooth the concave surface with a spokeshave, working from both ends toward the center to keep the grain from tearing (Photo 10).

Then, use a sharp chisel and a mallet to chop away the waste from the inside curve of the back rails.

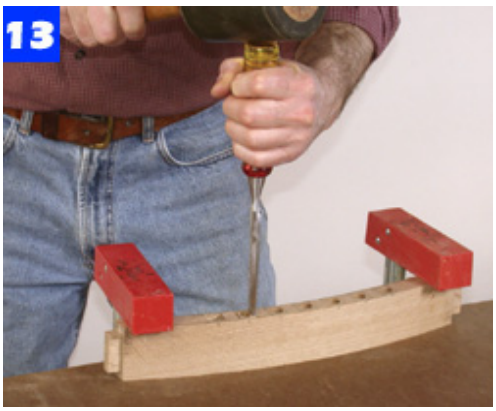
Turn the blank over, chop away most of the waste from the convex surface of the rail (Photo 11) and smooth with a block plane or spokeshave.

Lay out the slat mortises in the side and back rails, and use a 1/2-in.-dia. drill bit, depth stop and doweling jig to bore away most of the waste from each mortise (Photo 12). Finish the mortises with a chisel (Photo 13) and chamfer the top of each rear leg as shown in the drawing.

Smooth the curve with a spokeshave. Work from both ends toward the center to avoid tearing out the grain.

Use a chisel to remove most of the waste from the convex side. Then smooth with a plane or spokeshave.

Use a 1/2-in.-dia. bit, doweling jig and depth stop to bore out most of the waste from each slat mortise.



Securely clamp a rail to the worktable, square the mortise walls and remove the remaining waste.

Assembly
Install the slats in a bottom side rail (Photo 14), then fit the top rail over the slat ends. Repeat for the opposite side and set the two subassemblies aside. You don't need any glue if the slats fit snugly.

Assemble the slats with the curved back rails. Then, apply glue to the upper and lower back-rail tenons and leg mortises, and join the back parts. Clamp the joints and compare opposite diagonals to check that the frame is square (Photo 15).

Apply glue to the front-rail/leg joints, assemble the parts and clamp. When the glue has set, join the side-rail/slat subassemblies to the front and rear legs (Photo 16). Stand the chair on a flat surface to check that the legs are even. If necessary, adjust the clamps to pull the frame into alignment.

Lay out the corner-block angled ends and cut them to length with a backsaw. Bore and countersink pilot holes as shown in the drawing, and install the blocks with 1-1/2-in. flathead screws (Photo 17).

Lay the chair on its side and clamp one of the rockers to the legs, positioning it as shown in the drawing. Mark the location of the rocker on two of the legs (Photo 18), remove the rocker and cut the legs with a backsaw. Repeat for the other rocker. Test the fit between the legs and the rockers, and make any necessary adjustments so the rockers fit tightly against the leg ends.

When you're satisfied with the fit, clamp the rockers to the chair and drill a 1/2-in.-dia. hole through the rockers into the bottom end of each leg (Photo 19). Cut a dowel for each joint about 1/2 in. longer than the hole depth. Use a sharp chisel to cut a small groove down the length of each dowel to allow any trapped glue to escape.

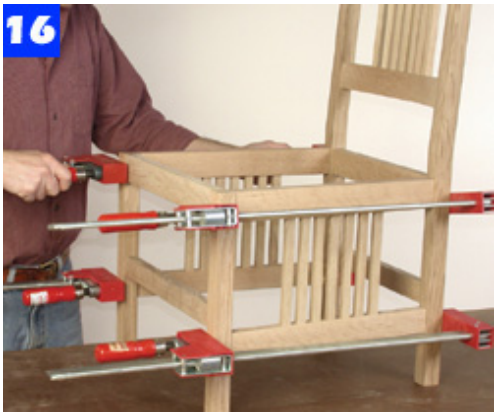
To ensure a strong joint, we used epoxy for the leg/rocker joints. Mix the epoxy according to the instructions and spread some in the holes and on the dowel surfaces. Tap the dowels into the holes and allow the epoxy to cure. Saw the protruding dowels about 1/16 in. above the rockers, and pare the remaining waste with a sharp chisel.

Finishing
Sand all of the chair surfaces with 120-, 150-, 180- and 220-grit sandpaper, dusting off thoroughly when changing grits.

To achieve a traditional medium brown finish, we stained our chair with Behlen Solar Lux American Walnut. This solvent-based stain dries very quickly, so for application

Install slats in the rails. You don't need glue unless the slats are too loose. Then add the remaining rails.

Spread glue and assemble the back frame. Clamp and compare diagonals to check that the assembly is square.



Join the front and rear leg assemblies to the side rails. Set the chair on a flat surface and clamp the joints.

with a brush or rag it is best to add Behlen's retarder to slow drying and prevent lap marks. Follow the manufacturer's directions for application.

Allow the stain to dry thoroughly before applying a surface finish. We used three coats of Waterlox Original Sealer/Finish. Liberally coat all surfaces using a brush or rag. Allow the finish to soak into the wood for about 30 minutes, then wipe off any excess and let it dry overnight. Lightly sand the surface with 320-grit sandpaper and remove sanding dust before applying a second coat. Apply the third coat the same way. After overnight drying, burnish with 4/0 steel wool and polish with a soft cloth.

Take your chair to an upholsterer to have a slip seat made. While we chose a leather seat, you can use any material that suits your decor. Fasten the seat to the chair with screws driven through the corner blocks into the seat base platform.

Cut corner blocks and countersink pilot holes. Install the blocks to the chair rails with 1-1/2-in. flathead screws.

Clamp a rocker to the chair legs and mark the position of the rocker joint. Carefully cut the legs and test the fit.

Clamp the rockers in place and bore a 1/2-in. hole through the rockers into the legs. Epoxy a dowel into each hole.

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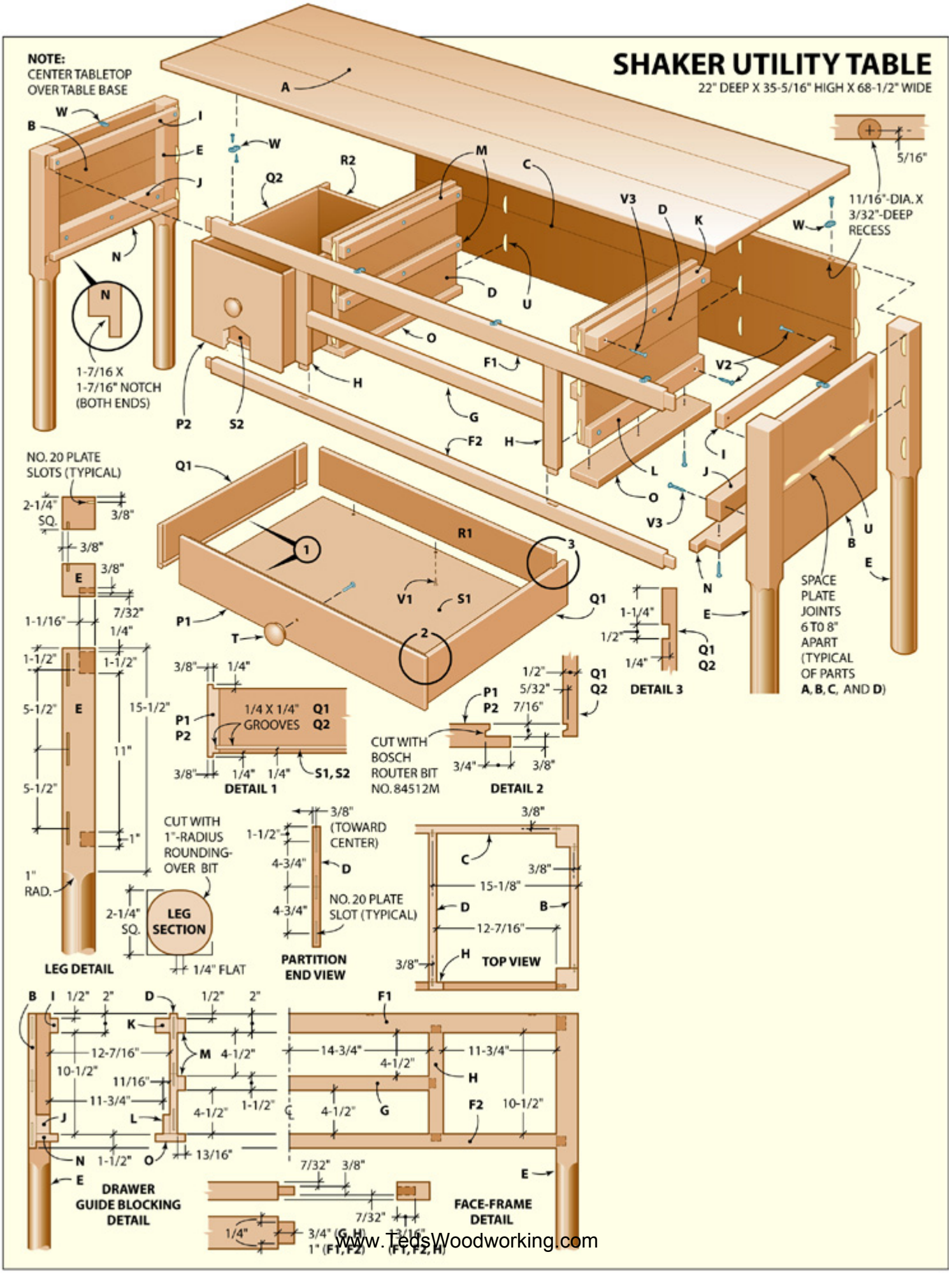
SHAKER STYLE TABLE

SHAKER UTILITY TABLE

22" DEEP X 35-5/16" HIGH X 68-1/2" WIDE



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MATERIALS LIST--SHAKER TABLE		
Key	**No.**	**Size and description (use)**
A*	1	13/16 x 22 x 68-1/2" maple (top)
B*	2	13/16 x 14 x 15-1/2" maple (end)
C*	1	13/16 x 14 x 56" maple (back)
D*	2	13/16 x 12-1/2 x 18-3/8" maple (partition)
E	4	2-1/4 x 2-1/4 x 34-1/2" maple (leg)
F1	1	13/16 x 2 x 58" maple (top rail)
F2	1	13/16 x 1-1/2 x 58" maple (bottom rail)
G	1	13/16 x 1-1/2 x 31" maple (center rail)
H	2	13/16 x 1-1/2 x 12" maple (mullion)
I	2	13/16 x 1-1/2 x 18-3/8" maple (runner)
J	2	1-7/16 x 2 x 15-1/2" maple (runner)
K	2	1-1/2 x 1-1/2 x 18-3/8" maple (runner)
L	2	11/16 x 2 x 18-3/8" maple (runner)
M	4	13/16 x 1-1/2 x 18-3/8" maple (runner)
N	2	13/16 x 2-1/4 x 18-3/8" maple (runner)
O	2	13/16 x 3-1/8 x 18-3/8" maple (runner)
P1	2	13/16 x 4-15/16 x 29-7/8" maple (drawer face)
P2*	2	13/16 x 10-15/16 x 12-1/8" maple (drawer face)
Q1	4	1/2 x 4-7/16 x 19-3/16" maple (drawer side)
Q2*	4	1/2 x 10-7/16 x 19-3/16" maple (drawer side)
R1	2	1/2 x 3-15/16 x 28-7/8" maple (drawer back)
R2*	2	1/2 x 9-15/16 x 11-1/8" maple (drawer back)
S1	2	1/4 x 17-3/4 x 28-7/8" plywood (drawer bottom)
S2	2	1/4 x 17-3/4 x 11-1/8" plywood (drawer bottom)
T	4	drawer pull
U	as reqd.	No. 20 joining plate
V1	as reqd.	1" No. 6 rh woodscrew
V2	as reqd.	1-1/2" No. 8 fh woodscrew
V3	as reqd.	2" No. 8 fh woodscrew
W**	10	tabletop fastener, Rockler No. 21650

Stock Preparation
The first step is to straighten, or joint, the edges of the pieces you'll glue together to make the wide panels. To do the job with a router, first make a straightedge guide. A 4- or 5-in.-wide piece ripped from the edge of a sheet of plywood or hardboard should work.

Clamp the straightedge guide to each maple piece and run the base of the router against the guide to trim the edges of the boards (Photo 1).

Determine the widths of the pieces you'll need for the tabletop and the side and back panels. Then, use a circular saw with a ripping guide to cut the stock to width. Leave each piece about 1/16 in. wider than necessary so you can joint the cut edge and remove the saw marks. Crosscut the pieces at least 2 in. longer than the finished panel lengths.

While you don't need them for strength, your assembly will be easier if you use joining plates to align the panels. Mark the locations of the plates and cut the slots (Photo 2).

Apply glue to the mating edges of the panels and also spread glue in the plate slots and plates. Assemble the panels, clamping the joints to pull them tight (Photo 3). After the glue on each panel has set for 20 to 30 minutes, scrape off any excess.

When the glue has completely set, remove the clamps and crosscut the panels to length (Photo 4).

Install a straight 1/2-in. bit in your router and use a straightedge guide to joint the edges of the maple stock.

Clamp your work to the table, and cut the joining plate slots for assembling the wide top, side and back panels.

Use clamps to pull the panel joints tight. A clamp every 10 to 12 in.should provide adequate pressure.

Clamp a straight board squarely across each panel and use it as a guide for crosscutting with your circular saw.

Making The Legs
While your circular saw may have the capacity for a 2-1/2-in. cut, maple is very hard and can be tough on a saw. It's best to rip the table legs in two stages. Using a ripping guide, cut halfway through the stock, then flip the piece over and finish from the other side (Photo 5). Repeat for each leg. Rip the leg blanks 1/16 in. wider than finished dimension and use a plane to bring the pieces to correct size. To make shaping the legs easier, leave the leg blanks several inches longer than required.

Mark the round-to-square transition points on each leg, and leave at least 2 or 3 extra inches at the bottom end of the blanks for clamping. Clamp one of the blanks to your worktable and use a 1-in.-rad. rounding-over bit to rout each corner of each leg (Photo 6). Stop the cuts about 1/4 in. shy of the transition points.

After routing all of the legs, use a gouge or rasps and files to shape the transition between the rounded and square portions of the legs (Photo 7).

Note that the legs won't be perfectly round, but will have a small flat surface on each side. When sanded smooth, however, you'll barely notice that they are not shaped to a perfect cylinder.

Cutting The Joints
Lay out and rout the mortises in the legs and square the ends with a chisel (Photo 8). Then, crosscut the legs to finished length. Locate and cut the plate slots for joining the back and side panels to the legs (Photo 9).

Rip and crosscut the face-frame parts to size, and lay out the mortise-and-tenon joints according to the plan. Rout the mortises in the mullions and the top and bottom rails, and square the ends with a chisel.

Install a straight bit in a router table, and use a miter gauge to guide the pieces as you cut the tenon cheeks (Photo 10).

Mark the tenon shoulders on each piece, and use a dovetail saw or backsaw to make these cuts. Test fit each joint. If one is too snug, sand the cheeks until the parts slide together smoothly. If a joint is too loose, glue a veneer shim to the tenon cheek.

Use a ripping guide to help saw the leg stock. Cut half the depth from each face to avoid overloading the saw.

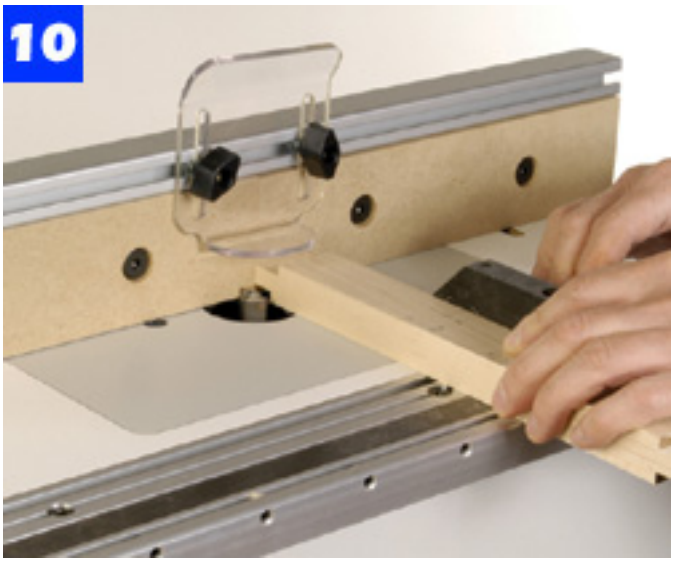
For the look of lathe-turned legs, use a router with a 1-in.-rad. rounding-over bit on each leg corner.

Use a gouge or rasps and files to shape

the transition between the round and square sections of each leg.

Rout the leg mortises with a 3/8-in.-dia. spiral up-cutting bit. Then, square the mortise ends with a sharp chisel.

Cut the plate slots in the legs for joining the sides and back. Cut corresponding slots in the side and back panels.



Use a router table and a 1/2-in. bit to shape the tenons on the face-frame ends. A miter gauge guides each cut.

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Assembly

Spread glue in the face-frame mortises and on the mullion and center-rail tenons (Photo 11). Assemble the frame, apply clamps, and compare opposite diagonals to see if the frame is square. Next, glue and assemble the leg/face-frame parts (Photo 12).

Glue and clamp the rear leg to the back-panel joints. When the glue has set, lay out the positions of the partitions and joining plate slots. Clamp a straightedge to the back and face frame as a guide for cutting these slots.

Apply glue for securing the sides and partitions with the face-frame assembly. Position the panels, clamp them to the frame, and use a square to check that the panels are perpendicular to the face (Photo 13). Next, join the back-leg assembly to the side and partition panels. Apply clamps and check for square (Photo 14).

Cut the drawer runners to size. Bore and countersink pilot holes in each piece and install them to the side and partition panels (Photo 15).

Coat all face-frame joint surfaces with glue. A small brush and wooden applicator make the job go smoothly.

After assembling the face-frame parts, join the frame to the front legs. Keep the clamps in place until the glue has set.

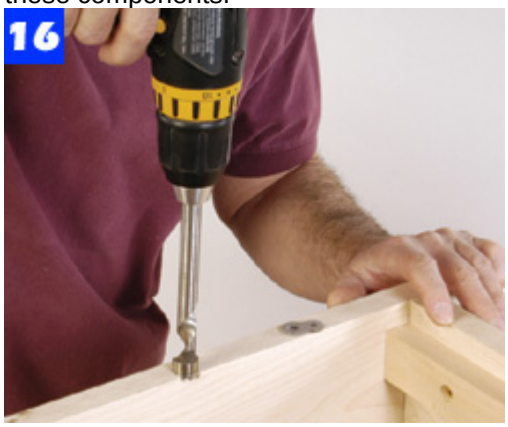
Join the partitions and sides to the face-frame assembly with plate joints. Check the assembly with a square.

Complete the table base by joining the back subassembly to the sides and partitions. Then check for square.

After cutting the drawer runners to fit, bore the pilot holes for the screws and install these components.

Mark the locations of tabletop fasteners along the top edge of the table base. Use an 11/16-in.-dia. multispur bit to bore the 3/32-in.-deep recess for each fastener (Photo 16), then bore pilot holes for the screws and install the hardware.

Invert the tabletop on a padded surface and position the base over it with the proper overhang on each edge. Bore holes for tabletop-fastener screws, and attach the top to the base.



Bore recesses for the tabletop fasteners. Install the fasteners and mark their

Drawer Construction

Glue up the face, side and back panels for the deep drawers, then rip and crosscut all drawer parts to size. We cut the joints between the drawer sides and faces with a

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drawer-lock-joint router bit (Bosch No. 84512M). Install the bit in the router table and use it to cut the locking joint on the drawer-face ends (Photo 17). Since this is a deep cut, take two or three passes to reach the full profile.

Readjust the router table to cut the mating joints on the drawer sides (Photo 18). Clamp a backer board to the trailing edge to prevent chipping.

Use a 1/2-in.-dia. straight bit in the router table to cut the rabbet at the top and bottom edges of the drawer faces, and the dado in drawer sides for the backs. Then, install a 1/4-in. bit and cut the grooves for drawer bottoms.

Assemble the drawers with glue and clamps (Photo 19). When the glue has set, remove the clamps and slide the bottoms in place. Fasten them with screws driven into the drawer backs. Bore pilot holes for the drawer pulls and install them.

Finishing

Remove the tabletop from the base and sand all table parts to 220 grit. To achieve our golden brown color, we first applied a coat of Bartley Country Maple Gel Stain. Spread the stain with a brush or rag, allow it to set for a few minutes, then wipe off any excess. Allow the stain to dry overnight.

Then, apply two coats of Zinsser Bulls Eye amber shellac. Use a good-quality, natural-bristle brush, and avoid excessive brushing. Allow the shellac to dry for at least 2 hours before lightly sanding with 220-grit sandpaper. Remove any dust and apply two more coats.

Burnish the dry surface with 4/0 steel wool and then buff with a soft cloth. Reattach the tabletop to the base and install the drawers.

positions on the underside of the top.

Use a drawer-lock-joint bit in the router table to shape joints on each end of the front drawer panels.

Hold the stock on end to rout the drawer joint on the drawer sides. A backer board clamped in place prevents tearout.

After routing the drawer-face rabbets and the grooves for the bottoms, apply glue and assemble the drawers.

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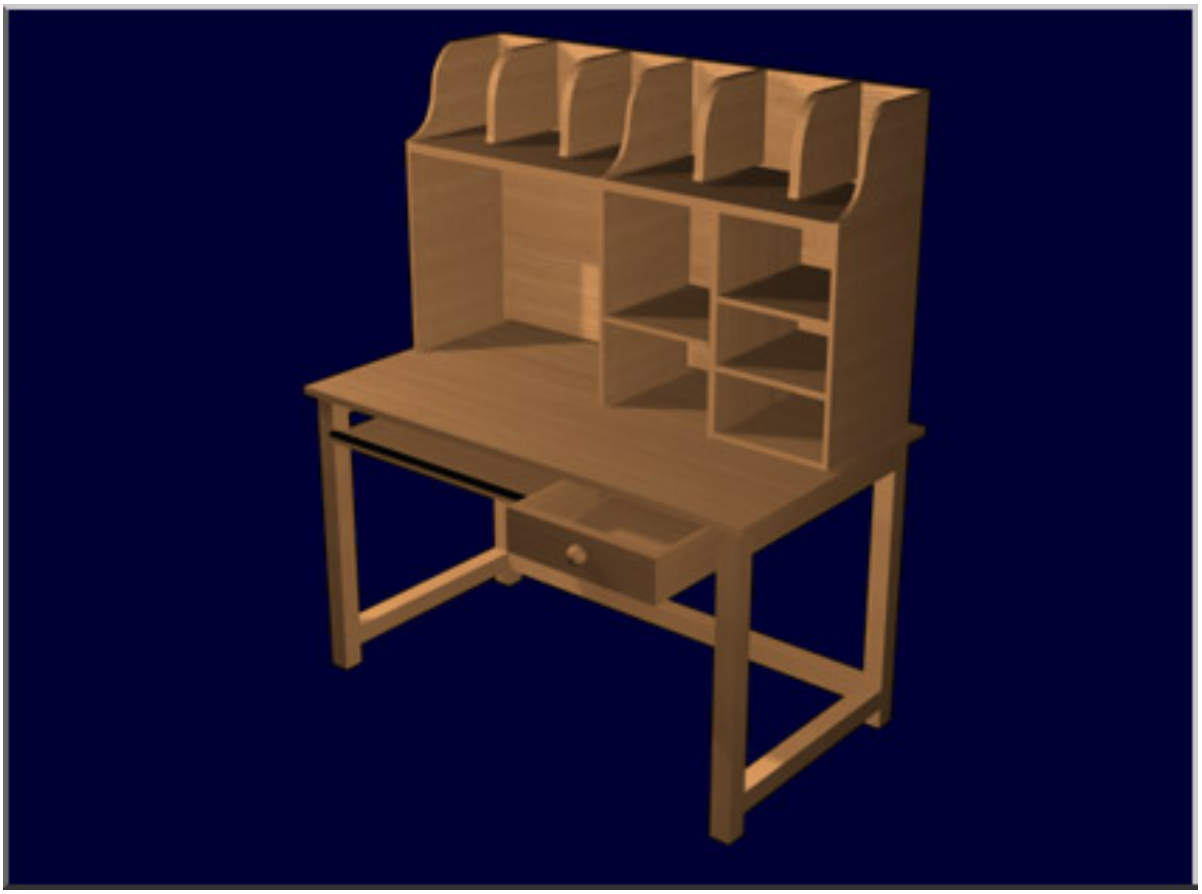
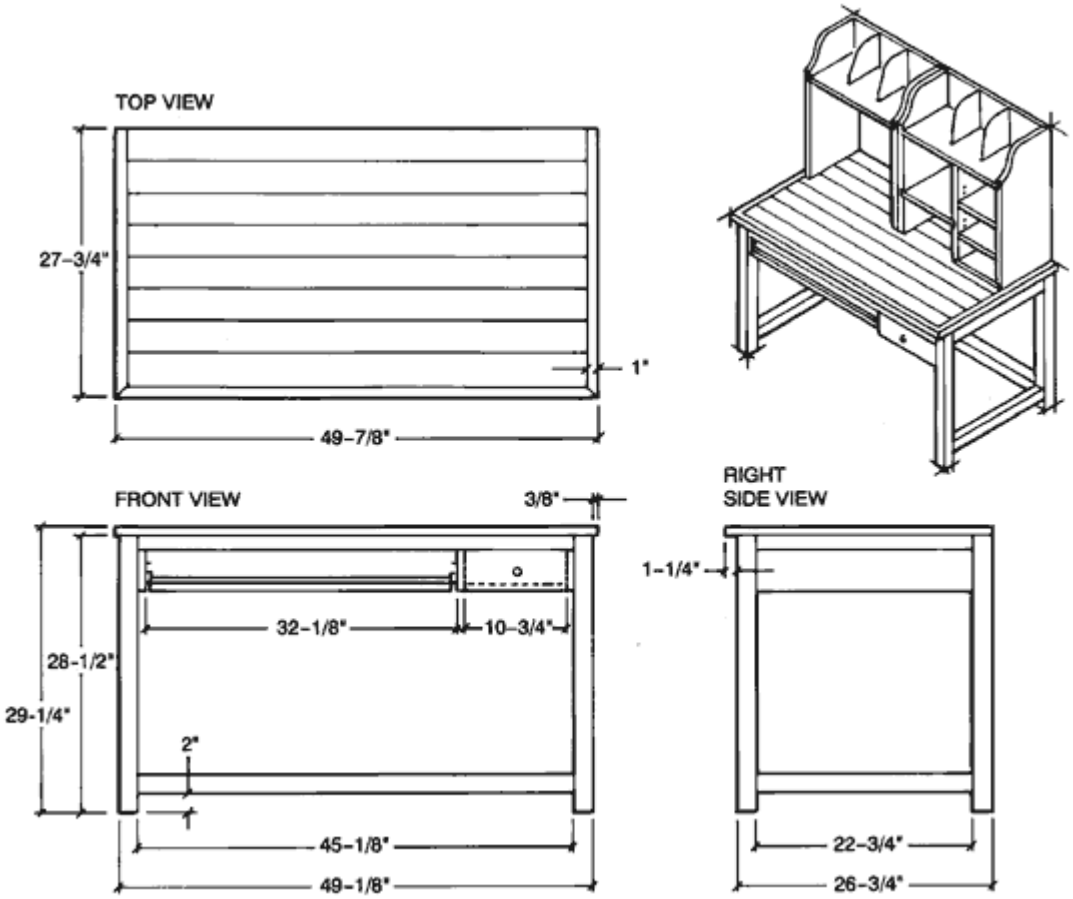
COMPUTER WORKSTATION





Computer Workstation Buying and Cutting List

Key	Parts	Pcs.	Size	Material	Cut From (buy) *see Notes
A	Top	1	3/4 x 26-3/4 x 47-7/8" (OA)	Pine	4/8, 1 x 4
B	Edging, ends top	2	3/4 x 1 x 27-3/4"	Pine	All edging from 1/5, 1 x 6
C	Edging, front top	1	3/4 x 1 x 49-7/8"	Pine	"
D	Legs	4	2 x 2 x 28-1/2"	Pine	1/5, 8/4 x 6
E	Top rails, front and rear	2	3/4 x 1-1/2 x 47-1/8"	Pine	All rails from 1/7, 1 x 4
F	Top rails, ends	2	3/4 x 1-1/2 x 24-3/4"	Pine	"
G	Rear stretcher	1	1-3/4 x 1-5/8 x 47-1/8"	Pine	All stretchers cut from 1/7, 8/4 x 8" board
H	End stretchers	2	1-3/4 x 1-5/8 x 24-3/4"	Pine	"
I	Dividers	3	3/4 x 4-1/4 x 26-1/2"	Pine	1/8, 1 x 6
J	Cleat	1	3/4 x 1-1/2 x 22-3/4"	Pine	Scrap box
K	Drawer shelf	1	3/4 x 12-1/4 x 26-1/4"	Pine	1/5, 1 x 8
Drawer					
L	Drawer sides	2	1/2 x 2-5/8 x 12-1/2"	Pine	1/5, 1 x 4
M	Drawer back	1	1/2 x 1-7/8 x 10-5/8"	Pine	1/1, 1 x 4
N	Drawer front	1	3/4 x 4-3/16 x 12-1/4"	Pine	1/18, 1 x 6
O	Drawer bottom	1	1/4 x 10-1/16 x 11-15/16"	Plywood	1 sq. ft.
Keyboard Platform					
P	Keyboard platform	1	3/4 x 14-5/8 x 30-7/8"	Pine	1/5, 1 x 4
Q**	Hand rest	1	3/4 x 2 x 30-7/8"	Pine	1/1, 1 x 4
R	Stop blocks	2	3/4 x 3/4 x 3-1/2"	Pine	1/18, 1 x 6

Procedure

Construction begins with the workstation table. Be aware that the dimensions used are standard, since the aim is to create a piece of furniture that provides optimum comfort for the person working at it. The monitor and keyboard elevations are of primary importance. You may want to evaluate the most comfortable heights for working at a computer and, should they vary from the shown dimensions, make changes on the drawings so you can custom-build the table to suit your own needs.

You are advised to work with the dimensions given on the drawing, however, since these are in accord with accepted architectural standards.

START WITH THE TABLE

1. Start by cutting the 1 x 4 stock for the top slightly longer than the top's finished length.

2. Check all edges for warp, cupping and square: Board edges must be perfectly true if you are to achieve almost-invisible joints in edge-joined work. To be sure that yours will be, run all board edges through the jointer.

3. Next, lay out the boards on your worktable and arrange them so they produce the most pleasing grain appearance. At the same time, make sure you flip the boards so that the annular rings in abutting boards alternate (i.e.: The rings of the third board should be positioned the same as the rings of board number one, and, so on). Annular rings are alternated in edge-joining to further minimize chance of warping or cupping.

4. When satisfied with board arrangement for the top, using a pencil, make marks where the biscuits are to go.

5. Using a plate joiner and the marks you just made, plough the biscuit grooves to suit no. 20 biscuits.

6. Assemble the table top using glue and no. 20 biscuits.

7. Use at least three bar clamps to hold the setup securely while the glue dries. Place one near each end and the third, centered on the opposite side of the table top.

8. Allow clamped setup to dry for 24 hours.

9. The next day, remove clamps and scrape off any glue squeeze-out using a sharp cabinet scraper. Finish the smoothing step by belt-sanding the complete top; first with 80-grit abrasive, then with 100-grit.

10. Finally lay out the top for exact width and length. Using either a table or circular saw, cut the ends to produce top's exact length. Then, rip the top to its exact width on the table saw. Note that the top (at this point) is cut to the dimensions shown in the drawing--without the edging strips in place on front and side edges. Set top aside.

11. Rip edging strips B and C to size and install them on the top using glue and 1-1/2 in. finishing nails. Use miter joints at the corners and be sure to use glue in those joints. The next day, after the glue has dried, secure the miter joints by driving a pair of opposing 1-1/4 in. brads through each mitered corner. Finally, set all nailheads slightly below the surface. Set top aside.

Cabinetmaker's Tip: When gluing up a table top, professionals never use boards wider than 1 x 4 nominal. Be aware that wider boards greatly increase the risk of warping and cupping as the wood dries, generally during the winter months or in a heated home.

12. Cut the remaining structural members for the table to size and length. Notice that the legs are a full 2-in. square. You may be required to alter the leg dimensions, depending upon what your lumberyard has in stock. If you cannot get full 8/4 stock, it may be necessary to trim the stock you have to create legs either 1-3/4 or 1-7/8 in. square.

Cabinetmaker's Tip: Do not cut any of the materials for either the keyboard platform or drawer until after your basic table is built and assembled. At that time you can take actual dimensions, sizes, etc. for these members directly from the table. This will ensure both perfect fit and minimal wasted materials.

13. Carefully lay out for the mortises in the legs. If available, use a bench top mortiser to bore the mortises in the legs. If your shop lacks this useful tool, create the mortises by boring overlapping 1/2-in.-dia. holes and cleaning the holes square using sharp chisels.

14. Lay out the stretchers (to legs) and make mating match marks where each stretcher meets a leg. (Note: Use marks that won't confuse later like I, II, III and so on.) Then mark each piece for tenon to be cut so it will mate tightly with its mating leg mortise. Carefully cut the tenons using a back saw; clean up tenons as necessary with a sharp wide chisel. Test-fit all undercarriage pieces with tenons in their respective leg mortises. Do this testing dry, without glue, before proceeding with final assembly.

15. Next, set up the table saw with dado head and rip fence so you can plough the grooves, which will receive the tabletop hold-downs. These will be ploughed in the inside surfaces of the front and back rails.

16. Because it goes a lot faster with the parts disassembled, sand all parts smooth using a belt sander and 120-grit paper.

17. Assemble the table as shown in the drawing, using glue. Working quickly, locate the dowel positions on the legs and bore the necessary holes so that the fully seated dowels will be inserted through the tenons and into the leg on the far side. Apply glue to dowels before inserting them into their holes; tap dowels home with a wooden mallet.

18. Check the table setup for square using a framing square. When satisfied with squareness, secure the carcass by tacking diagonal braces across opposing corners. Then clamp the setup so the joints will be immobile while glue sets.

19. Use appropriate-length bar clamps: You will need two with 5-ft. capacity and three with 30-in. capacity.

20. The next day, the top can be positioned on a worktable, bottom-side up, and the table undercarriage (also turned upside down) located on it. Check with a ruler to make certain the top's ends are equally distant from the end stretcher plane, and that the top's rear edge is flush at back. When the undercarriage is properly positioned, hold it that way with a couple of c-clamps while you position and install the hold-downs with wood screws. When all is secured, remove the c-clamps and flip the table right side up.

Cabinetmaker's Tip: Though it is a basic technique, make sure you protect the wood surfaces when clamping. If your clamps do not have plastic shields, use scrap wood between clamp jaws and wood surface to prevent jaw marks from clamp pressure.

21. Cut parts I and K for the drawer compartment to size and install on the table using carpenter's glue and 1-1/4 in. screws (or air-driven 1-1/2 in. nails). (see illustration)

22. Cut the parts for the drawer and sand all members smooth, working up to 120-grit paper before assembling the drawer. Take time to study the drawing to be sure you understand how the drawer front is rabbeted; i.e., the drawer front should conceal the compartment members (parts I in illustration).

23. Lay out and bore the hole for the drawer knob in the drawer front.

24. Insert drawer into its recess and position it in the closed position. Check the front to make sure that it fits, and conceals the vertical members behind the front. Make any necessary adjustments.

25. To prevent the (short) drawer from falling out if pulled forward too vigorously, install the shaped 1/4-in. plywood stop as shown. Bore a pilot hole through the plywood. Then, hold the stop in place with a 5/8-in. rh screw. Tighten the screw until the stop can be rotated to stay in the vertical position. Finally, install the drawer and rotate the stop to the vertical (drawer stop) position, and tighten the screw a tad more to ensure it remains vertical.

26. Next, go to work on the keyboard platform. Cut the boards for it and edge-join them using glue and no. 10 biscuits. As you did for the tabletop, alternate the annular rings of abutting boards to minimize chance of warping. Apply clamp pressure and leave the setup overnight.

27. Next, lay out and install the platform's slide hardware on table and platform sides. Install the keyboard platform's stop blocks at the ends of the table-mounted slides. Note: Do not use glue on the stop blocks since you may have to reposition them in the future.

28. Insert platform into the table.

29. Push platform to the closed position to make sure it is flush with table front; adjust stop blocks if it is not.

30. Cut the piece of lumber for the hand rest and shape it using a block plane and belt sander. When satisfied with its contour, install it on the platform using glue and countersunk wood screws from below.

Except for its final sanding and the finishing steps, your table is now complete.

Optional: You may want to install furniture glides on the bottom surface of all legs to prevent (or, at least minimize) the table from rocking should it eventually be placed on an uneven floor. If you do decide to add glides, buy the 3-prong type of at least 7/8-in. dia.

Building the Hutch Top

The hutch top for the Computer Workstation is easier to build than the desk. However, since the upper section of this project is in prominent view, build and finish it with the same care, patience and precise workmanship that you used in building the table.

Build the hutch top in two sections; these are then joined for maximum rigidity after being installed on the desktop. By doing this, it's possible to alter the design of one or both units to suit your equipment and taste.

The hutch size, overall, is determined by two factors:

(a) The left unit is sized to accommodate a 21-in. monitor and,

(b) The right hutch will store computer-related paraphernalia such as CDs, floppies, notepads, etc.

As mentioned earlier, hutch sizes can be altered. If your monitor varies from 21 in. or if you want to customize the unit to adapt it for other uses or storage, you may take some liberties in its design.

Before You Begin

1. Start by cutting the boards for the legs (sides) to length, but cut them slightly longer than the finished sides will be. (In this case, that means about 30 in.) Note that each side consists of two lengths of 1 x 6 and one length 1 x 4. This will give you four stacks of three boards each which, when joined, will be both longer and wider than the required 13 in.

2. Lay out each set of three boards to achieve the best grain match for each leg and, at the same time, try to alternate annular rings on abutting boards to minimize chance of warping or cupping. When satisfied with arrangement, lightly draw a cabinetmaker's triangle across the face of each of each setup: This way each set of three boards can be quickly returned to your preferred layout of them.

3. Next, joint all edges in the four piles; check the mating edges as you go (an easy step because you have the cabinetmaker's triangle for reference) to ensure that joints will be tight and neatly matched when the boards are joined.

4. Align the first set of three boards for the first leg and carefully mark biscuit locations. Important: make sure you do not position a biscuit in the top portion of each leg area, which is shaped later; you do not want the shaping to expose a biscuit in the edge. Plough the mortises to receive the no. 20 biscuits. Then, making certain you keep the three boards together as a set, put them aside on the work bench while you repeat this procedure for the following three sides (legs).

5. Start by gluing-up the boards for the 13-in.-wide "legs" or sides. Refer to your cabinetmaker's triangle to quickly return the boards to the preferred grain layout you selected earlier. Position each set of boards as you work. For legs glue-up, you will need at least 12 bar clamps, 3 per setup. Have these, as well as the glue, a glue brush and biscuits at hand before starting the assembly step.

6. Apply glue to mating board edges and biscuits and assemble the first three boards. Ends should be aligned and boards should lie flat against bars (i.e., no bow) when clamp pressure is applied. To minimize the chance of cupping or bowing occurring when clamp pressure is applied, use a pair of clamps on one side of the boards, positioned about 4 in. from each end and one clamp at center on the opposite side. Put the clamped setup aside and allow to dry for 24 hours. Repeat assembly procedure for the remaining three sides.

7. The next day, remove the clamps and trim the four legs so all four are exactly the same size--13 in. wide by 29 in. long. Crosscut all boards to length on the radial arm saw, using a stop block to ensure all are the same length. Then, on the table saw, rip boards to width, taking some stock off both front and back edges (this will remove any edges dented during handling, clamping, etc.).

8. Tack two of the legs together for the right hutch (R1) and two for the left (L1) after aligning each pair so all edges are flush. Hold them that way for the shaping which follows, using a half-dozen or so 1-1/4 in. brads driven flush.

9. Refer to the drawing of the shaped top, shown on 1-in. squares in the drawing, to make a template of 1/4-in. hardboard or plywood. When satisfied with template's layout, cut it out using saber or scroll saw. Sand the cut edge smooth.

10. Use this template to trace the shaped tops to the two pairs of legs you previously tacked together. Cut out the shape using saber or scroll saw.

11. Sand the scroll shapes smooth using either a spindle or drum sander chucked in the drill press.

Note: Since the dividers used on the fixed top shelves repeat the symmetry of the scroll shape used on the legs, set the scroll template aside for reuse later. When you come to make the dividers, you can simply refer to the drawing for shape then re-cut the template for use as a divider template.

12. Repeat the board layout and edge-joining steps to make all the shelves for your two units both finished and adjustable. All of these should be slightly oversize overall when they're glued-up; they will be trimmed to fit exactly after hutch units are assembled.

Cabinetmaker's Tip: You can edge-join the boards for both hutch tops in a single session as long as you use identifying marks. Make marks lightly with a soft pencil on the back edges of boards. (Use R for right cabinet; L for left.)

Cabinetmaker's Tip: Since you have cut your boards so that each side (leg) setup will be slightly oversize when assembled, there is no need to place scrap blocks between the clamp faces and wood (to prevent marred edges). Board lengths and widths will be trimmed in the next step, and clamp marks will be cut off.

Note: The following instructions take you through the steps for building the left hutch, the one that houses the monitor. The same construction steps are used to build the right hutch except for the addition of the adjustable shelves. The required steps for installing these are explained below.

13. Before laying out the shelf dadoes on the legs for the left hutch, measure the monitor that will be used on your workstation. Everything begins with that dimension. Make sure that the distance from leg bottom edge to bottom plane of dado provides adequate clearance for your monitor's height. (Your monitor size determines the fixed shelf location in the left hutch.) You will have to alter the right hutch dimensions so the two fixed shelves remain in line. Also, if the left hutch width dimensions are altered, the right hutch must be adjusted a corresponding measurement so that the hutch sits on the table with a 1-in. setback from table edge, left and right.

14. Since the legs (L1) for the unit have already been sized (step 7), you can now lay out the dadoes to receive the fixed shelf (L2).

15. The dadoes for the fixed shelf should be perfect mirror images in left and right legs, so make sure the legs will be exactly opposite each other in the finished cabinet. Here's how to do it:

16. Position the two legs on your worktable back-edge to back-edge and clamp them so they cannot move.

17. Lay out for the dado to be rabbeted in both legs and plough it using a 3/4-in. straight router cutter set to a depth of 3/8-in.

Cabinetmaker's Tip: On work such as this, where there is no room for error, you must always use a guide when ploughing with a router. Be certain you clamp on a guide which puts the router cutter right on the mark. Hold the router shoe firmly against the guide as you cut and, to further minimize chance of a cutting error, push the router with a slow, easy-to-control feed rate. To be extra safe, you can clamp a guide so both sides of the router shoe will be guided and to eliminate any possibility of the router "walking" off the cutting mark. If you opt to cut your dadoes using the table saw, make certain you use a miter gauge hold-down to prevent lateral movement of the work piece as the saw blade does its cutting. You must use a stop to position each workpiece accurately before it is pushed into the spinning blade. This ensures that the dadoes in both legs are positioned the exact distance from the leg end. If you have never done repetitive crosscutting on the table saw, discuss this step with your instructor before proceeding.

18. Next, insert a 3/8-in. rabbet cutter in your router and plough the blind rabbets in the back edges of both legs to receive the back (L3).

19. Assemble the two legs, fixed shelf and back without glue so you can check all for fit; use small (1-1/4 in.) brads if necessary to temporarily hold the parts together so you can do your visual check. Now lay out for the 5/16-in.-wide dadoes that will hold the dividers used in the fixed top shelf. Mark both the shelf and the back at this time.

20. When satisfied with fit, disassemble the hutch and abut the fixed shelf and back with the marks for the dadoes lined up. Clamp the boards together so they will not move and, starting at the back edge, rout the dadoes across, stopping shy of the front edge in order to create the blind dado as shown in the drawing. After routing, the front round corner can quickly be made square (to receive the divider) using a sharp 1/4-in.-wide chisel.

21. Reassemble the hutch using glue and fasteners of choice. Note: Because of their superior holding ability, you can use pneumatically driven 1-1/2 in. nails to join parts here. These are driven slightly below the surface and the indents can be filled with Wood Filler. Or, if preferred, 1-1/2 in. fh wood screws which are then covered with dowel plugs. If you opt for the latter, remember that you must lay out for the screw pilot holes - for body, shank and counterbore - before you start the assembly step.

22. With left hutch complete, stand it upright on the workstation table, flush at back and with approximately 1-in. setback from the left table edge. Then, measure the distance from the outside plane of the right leg to the same width setback at the right table edge. This measurement is the outside (i.e., overall) width dimension of your right-hand hutch. As stated earlier, this measurement may differ from our drawing depending upon how the left-hand hutch is sized. If there is variance with the plan drawing, now is the time to calculate all dimensional changes and to mark them on your drawing--before starting any work on your project wood for the right hutch.

23. The right-hand hutch is constructed using the same procedure as for the left--except for two steps you must take before assembly: a) The holes for the adjustable shelves should be drilled; you won't be able to fit a drill between legs

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R1 and R4 after the unit is assembled. And, b) the dado for the middle leg (R4) must be routed in the underside of fixed shelf. Attempting this after assembly could result in damage to shelf legs. When the right unit is complete, set it atop the table abutting the left unit. Recheck both the left and right setbacks, the tabletop reveal, to make sure the left and right legs are equally distant from table edge. If the distance varies, even slightly, move units left or right to achieve that goal.

24. When satisfied with their location, position a pair of handscrew clamps on the legs at center to hold the two units together. With a pencil, lightly mark the front corner of both the left and right (outside) legs and make match marks on tabletop. Next, carefully locate the points and make marks on both the tabletop and the legs to indicate where you must bore the holes to receive the dowels, which serve as keepers when the unit is assembled. Note that this is back about 1 in. from front edge of vertical and centered on leg width.

25. With handscrew clamps still in place, lay out for the Teenuts® to be installed on the middle legs. The fastener's locations aren't critical but, for the sake of craftsmanship, they should look precisely placed. Then bore the needed holes.

26. From the left side (i.e., the monitor's hutch), start by boring the large dia. holes to suit the Teenut, to 1/2-in. depth. Then insert a 5/16-in. bit and bore through at center of each counterbore to receive the machine screw.

27. Then switch to a countersink and, in the right hutch, countersink all four holes to receive the machine screw head.

28. Tap the Teenuts in place and secure them with the machine screws.

29. With the hutch unit still aligned on the table, position the mending plates on the three legs; one on each outside leg and the third on the center leg. Mark the four screw hole locations for each plate. Bore all screw pilot holes but do not install the mending plates as yet.

30. Carefully tilt the hutch back until it is fully supported and resting on its back. Next, bore the 3/8-in.-dia. holes in outside legs and the table top to receive the keeper dowels. Then, glue the dowels into the legs so just about 3/4-in. of dowel protrudes. Glue is used in the one side only so the hutch can be lifted off whenever necessary (i.e., for a move).

31. Wait one day, to make certain dowels are permanently affixed into the legs, then, bring the hutch to the upright position and insert the dowels into the mating holes in the table top. Now you can install the mending plates using the screw holes you bored earlier.

32. Your Computer Workstation is now complete. We also give instructions for an optional box which can be used to hold CDs close at hand. You may, however, prefer to custom design a box to suit the "extras" you frequently work with. In this case, the box shown here is a good starting point for your box.

Note: Leave your workstation assembled until you have completed constructing all the peripheral parts (CD holder, dividers, etc.), because you want to be able to test fit these pieces before finishing the table. When satisfied all parts fit as they should, you can disassemble the hutch and table to simplify the finishing step. Be sure to save all of the hardware and fasteners in a covered container so you won't have to hunt for them when it is time to reassemble your workstation.

Dividers for Top Shelves

To ensure the wood in the dividers matching the wood used in the workstation, we planed 3/4-in. stock from the same pile to 1/2-in. thickness, then created tenons on the bottom and back edges (see below). You could use 1/4-in. plywood here and save a little work, but because of the exposed ply edges, the finished look will not be nearly as handsome.

Since the table saw is used to remove a scant amount of material from the divider stock to create the tenons, read the Cabinetmaker's Tips below to learn the safe way to do this.

Here are the steps for making the dividers:

1. Cut the 1/2-in. stock to the divider size given in cutting list.

2. Next, to work production-fashion, align the edges of the four pieces. Then, while holding them fast, drive three 1-in. brads through the pile.

3. Using your previously made pattern, trace the divider's scroll shape onto the top work piece.

4. Cut all four at one time using the bandsaw.

5. Sand all edges smooth using the stationary belt sander along the straight edges and the spindle sander for the scroll shape. Lacking a spindle sander, chuck a sanding drum in either portable drill or drill press.

6. Separate the pile, remove and discard nails and set dividers aside.

7. Set up the table saw so you can safely remove about 1/8-in. from both sides of each divider, along the bottom and back edges. See Cabinetmaker's Tips, below. Note: The exact thickness to remove will be determined by the actual thickness of your stock and the width of the dadoes ploughed in shelf and back. The tenons you create on the dividers must fit freely in those dadoes.

Cabinetmaker's Tips: Never lay out a shape on your project wood; always make a template or pattern first. You can use either 1/4-in. hardboard or plywood--or even sturdy cardboard. Lay the shape out on your template material following the pattern given in the plan. Cut it out using saber or scroll saw (or razor knife if template is cardboard). File and sand all cut wooden edges to remove "whiskers" before using the pattern to transfer the shape to your project wood.

When a small, identical amount of wood must be removed from a number of surfaces, the most accurate technique is to set up the saw so that the waste is between the blade and fence. That is the case here, where approximately 1/8-in. is removed from both sides of the bottom and back edges. This creates tenons to fit in the dadoes provided for them. However, whenever the saw blade is this close to the fence, there is very real risk of the blade engaging the metal fence: this can be dangerous at worst, blade damaging at best.

For safety, always install and work with a wooden auxiliary fence whenever you are faced with doing this type of cutting on the table saw. In order to cut the dadoes on the 7 x 9-in. dividers, make an auxiliary fence from a length of 1 x 6." Line the board up with the rip fence and with an awl, make prick marks through the holes on your fence. Use 3/16-in. dia. fh machine screws and wingnuts to secure the auxiliary fence to rip fence. Caution: Make certain the screw heads are perfectly flush with the wood's surface when the board is secured tight against the fence by the wingnuts: the work piece must be able to slide past without interference when you make your cuts.

If you have never installed and worked with an auxiliary fence on a table saw, make sure you discuss the setup with your teacher before its installation and use.

The CD Box

The box shown in the plan was built to house a commercially available plastic CD box (see Materials list). Slotted plastic sheets are created for CD storage. Many mail order woodworker's supply houses offer these. They are available in both end and center CD holder configurations and are installed using polyurethane glue. If you want to build a custom CD box, make sure the box (i.e., its overall dimensions) fits in the right-hand hutch.

Making the Box

1. After cutting all parts to sizes shown in drawing, sand them smooth starting with 100-grit and finishing with 120-grit abrasive paper.

2. The corners are mitered and held secure with no.0 biscuits. Or, if preferred, you can use splines. Here, simply pass the miter faces through the table saw blade to a depth of about 3/4-in. and join the mitered corners using 1-1/2 in.-wide splines. If you opt for the latter technique, you may want to cut thin strips of molding to glue on the front edge to conceal the splined corners.

3. The back is of 1/4-in. cabinet grade plywood; install it using glue and 1-in. brads.

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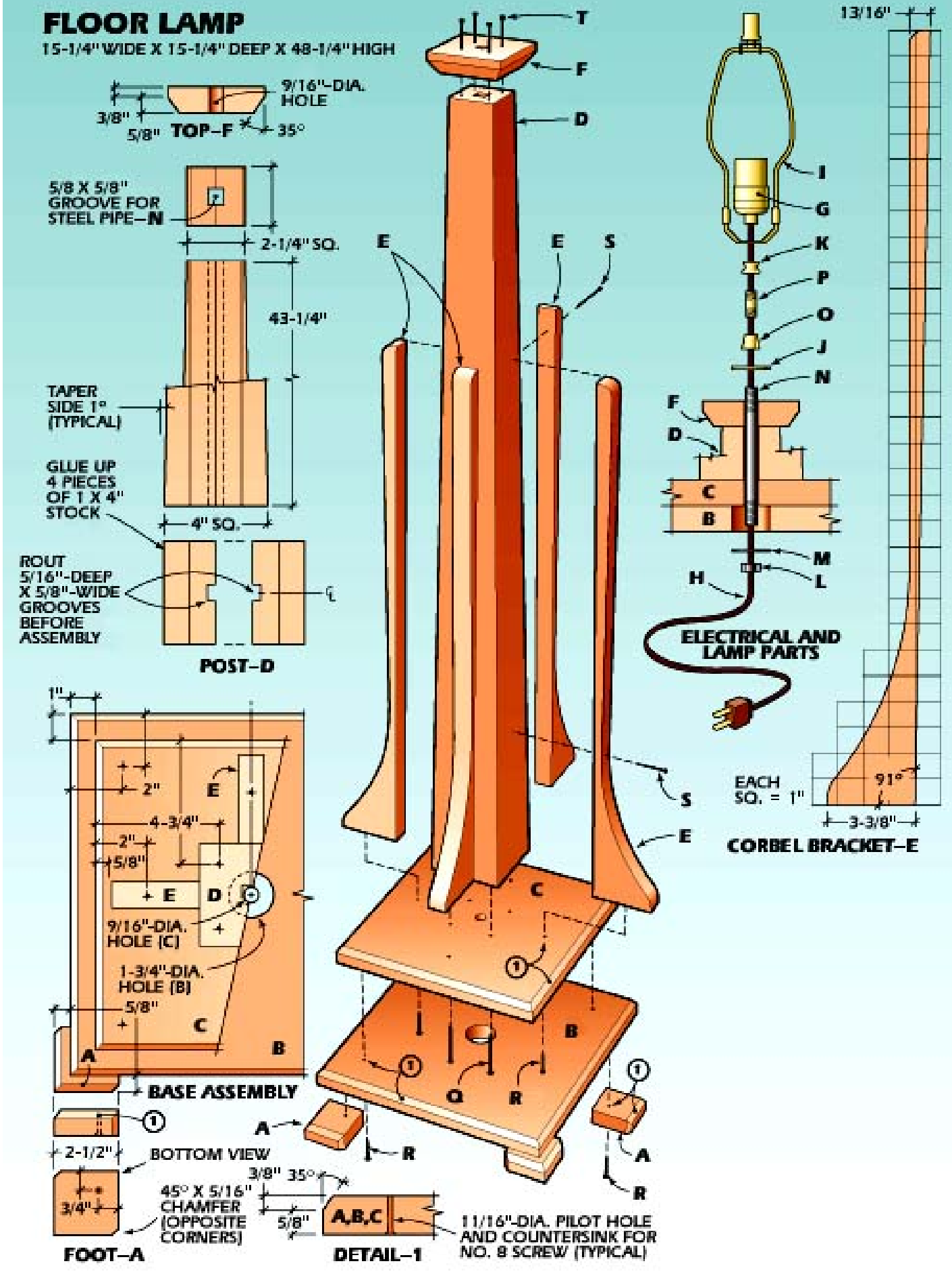
FLOOR LAMP

FLOOR LAMP

15-1/4" WIDE X 15-1/4" DEEP X 48-1/4" HIGH



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MATERIALS LIST—FLOOR LAMP		
Key	**No.**	**Size and description (use)**
A	4	1 x 2 1/2 x 2 1/2" oak (foot)
B	1	1 x 14 x 14" oak (lower base)
C	1	1 x 12 x 12" oak (upper base)
D	1	4 x 4 x 43 1/4" oak (post)
E	4	1 x 4 x 30" oak (corbel bracket)
F	1	1 x 3 3/4 x 3 3/4" oak (top)
G	1	3-way-turn knob socket
H	1	10-ft. brown cord set
I	1	10" harp (size depends on shade)
J	1	1/4 IP x 1 1/2" brass check ring
K	1	1/4 IP x 7/16" tapped brass spindle
L	1	1/4 IP steel hexnut
M	1	1/4 IP x 1 1/2" steel washer
N	1	1/2" O.D. x 46" steel pipe with 1/4 IP threads on both ends
O	1	1/4 IP female x 1/8 IP female brass tapered coupling
P	1	1/8 IP x 1" steel nipple
Q	4	3" No. 8 fh screws
R	8	1 1/2" No. 8 fh screws
S	8	4d finishing nails
T	4	6d finishing nails

Stock preparation

Begin by ripping the four post boards to size and crosscutting them 2 or 3 in. longer than the finished length. Spread glue on the mating surfaces of two of the boards, then clamp them together with their edges perfectly aligned. Repeat this process with the remaining two boards.

Set up the router with a 5/8-in. straight bit and an edge guide. Clamp one of the post halves between bench dogs, then rout a 5/16-in.-deep groove down the center of the blank (Photo 1). Repeat for the

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second post half. Then, crosscut each half of the post to finished length. Spread glue on the mating faces of the post halves, then clamp them together. Be sure to align the ends and edges of the post halves before setting the assembly aside.

Lay out the post taper on two opposite sides of the blank, then use a band saw to make the cuts (Photo 2). Remember to keep the saw kerf to the waste side of the layout lines. Next, clamp the post between bench dogs and use a sharp plane to remove the saw marks and bring the taper right to the layout lines. Transfer the tapered profile to the other two sides and repeat the procedure to finish shaping the post. Sand the surfaces smooth.

Cut the lamp top cap from a piece of 1-in.-thick stock, then use a table saw and miter gauge to cut a 35 degrees bevel on all sides (Photo 3). Next, bore a 9/16-in.-dia. hole through the center of this cap and sand the piece smooth. Then place the cap on top of the post, adjusting it for an even overhang on all edges. Bore pilot holes for 6d finish nails, then apply glue and nail the cap in place (Photo 4). Set the nails below the wood surface and fill the holes with a stainable wood filler.

Glue two oversized blanks together for the base panels. You can use joining plates to align the boards while gluing them. Just be sure to keep the plates far enough back from the finished ends of the panels so they will not be exposed when you make the final cuts. After the glue cures on the panels, rip and crosscut them to size. Make sure that both panels are perfectly square. Use a table saw to cut the bevels around the panel edges. Bore a 9/16-in.-dia. hole in the center of the upper panel, then bore and countersink pilot holes for fastening it to the post. Sand this panel smooth, then use 3-in. No. 8 fh screws and glue to fasten this panel to the post (Photo 5).

1--Rout a groove down the center for both halves of the lamp post. Use a 5/8-in.-dia. straight bit and a router edge guide.

2--Lay out the taper on opposite sides of the post. Then, cut off the waste with a band saw. Mark the other sides and cut them.

3--Cut the top cap to size, then use a table saw to cut a bevel on the bottom edge. Clamp the block to the miter gauge.

4--Bore a 9/16-in. hole through the top cap, then glue and nail the cap to the top of the post. Bore pilot holes for the nails.

Next, make a template for the corbel brackets from 1/4-in.-thick plywood or hardboard. After cutting out your template, hold it in place against the lamp post and base. Once you are satisfied with the fit, use it to trace the shape onto oversized blanks for the actual brackets. Clamp a blank between bench dogs, with the bracket outline overhanging the bench. Then, use a sabre saw to make the cut (Photo 6). Repeat the same process for each bracket. Sand all the brackets.

5--Cut the upper base to size and bore a 9/16-in. hole through its centerpoint. Attach it with glue and screws.

6--Lay out the corbel shapes on a board. Then clamp the stock between bench dogs and cut the outline with a sabre saw.

Assembly

Place small guide marks on the post and base to indicate the locations of each bracket. Then apply glue to the back and bottom edges of each bracket and use 4d finish nails to pin them to the post (Photo 7), making sure to bore pilot holes and set the nailheads. Then bore and countersink pilot holes and drive one 1 1/2-in. No. 8 fh screw through the base into the bottom end of each bracket.

Cut the feet to size and shape, then bore and countersink pilot holes for attaching them to the lower base. Set the feet aside and bore a 1 3/4-in.-dia. hole through the

7--Attach the corbel brackets to the post sides with glue and nails. Attach them to the base with screws driven from below.

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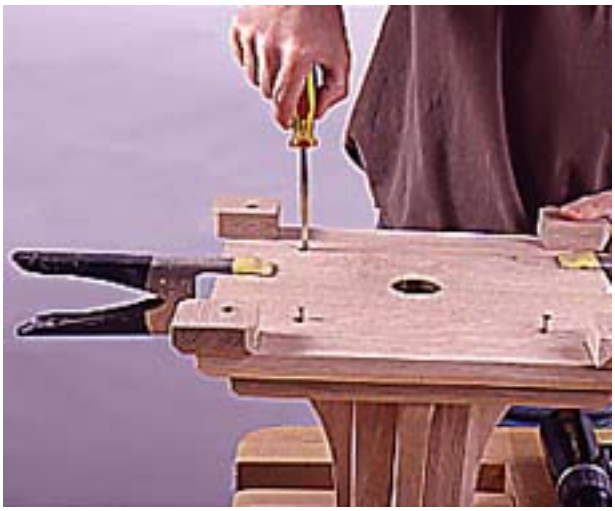
center of the lower base panel. Then, bore and countersink pilot holes for fastening this panel to the upper base panel. Sand the panel smooth, mark the location of each base foot, then apply glue to the joints and fasten the feet with screws.

Clamp the lamp post upside down in the bench vise, then spread glue and position the lower base panel over the upper base panel. Adjust the parts for equal overhang on all edges. Then temporarily clamp them together and fasten the parts together with screws (Photo 8).



8--Cut the feet and lower base to size. Then attach the feet-and join the two base pieces-with glue and screws.

Installing lamp parts

Next, lay the lamp post on a padded table and slide the threaded steel pipe into the base hole (Photo 9). Before pushing the pipe all the way into the base, slip a washer over the end and thread on the steel nut. You can adjust how much the pipe protrudes past the top of the hole by tightening or loosening the nut. The pipe should extend about 3/8 in. beyond the top cap.

9--Install a washer and nut on one end of the steel pipe, then slide it into the post's hole. Adjust the height by turning the nut.

Place the brass check ring over the top end of the tubing, then thread on the tapered brass coupling. This fitting makes the transition between the 1/4 IP thread of the long pipe and the 1/8 IP thread of the steel nipple that connects the lamp fixtures. Next, thread the 1-in.-long steel nipple into the top end of the coupling. Allow this nipple to extend out of the coupling by about 3/4 in. Then place the tapped brass spindle over the nipple and tighten it against the coupling (Photo 10). The spindle will lock the nipple in place.

10--Slide the brass check ring over the steel pipe. Then thread on the tapered coupling, steel nipple and brass spindle.

Push the lamp cord through the bottom of the steel pipe until it extends out the top of the nipple by about 3 in. Then feed the cord through the socket base and thread the base onto the nipple until it bottoms out on the harp bracket. Tighten the lockscrew on the base.

Connect the lamp cord to the terminals on the socket (Photo 11), and push the excess cord back down through the post so that the socket can sit firmly on its base.

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Then, snap the socket cover in place by pushing it down until you hear a click. Install the harp by compressing it and slipping each end into its bracket. Then, slide a locking ring over each bracket.

Before staining the lamp, apply masking tape to the parts for protection during the finishing process. Apply stain and finish, using the techniques described in "Rocking Chair." Once the finish has cured, remove the masking tape and install a bulb and lampshade. Our shade came unfinished, so we could match the finish on the rest of the piece (Photo 12).

11--Slide the lamp cord through the pipe and thread the socket onto the nipple. Attach the wires to the socket screws.

12--The lampshade comes unfinished. Remove the glass panels, then stain and apply a finish to match the lamp base.

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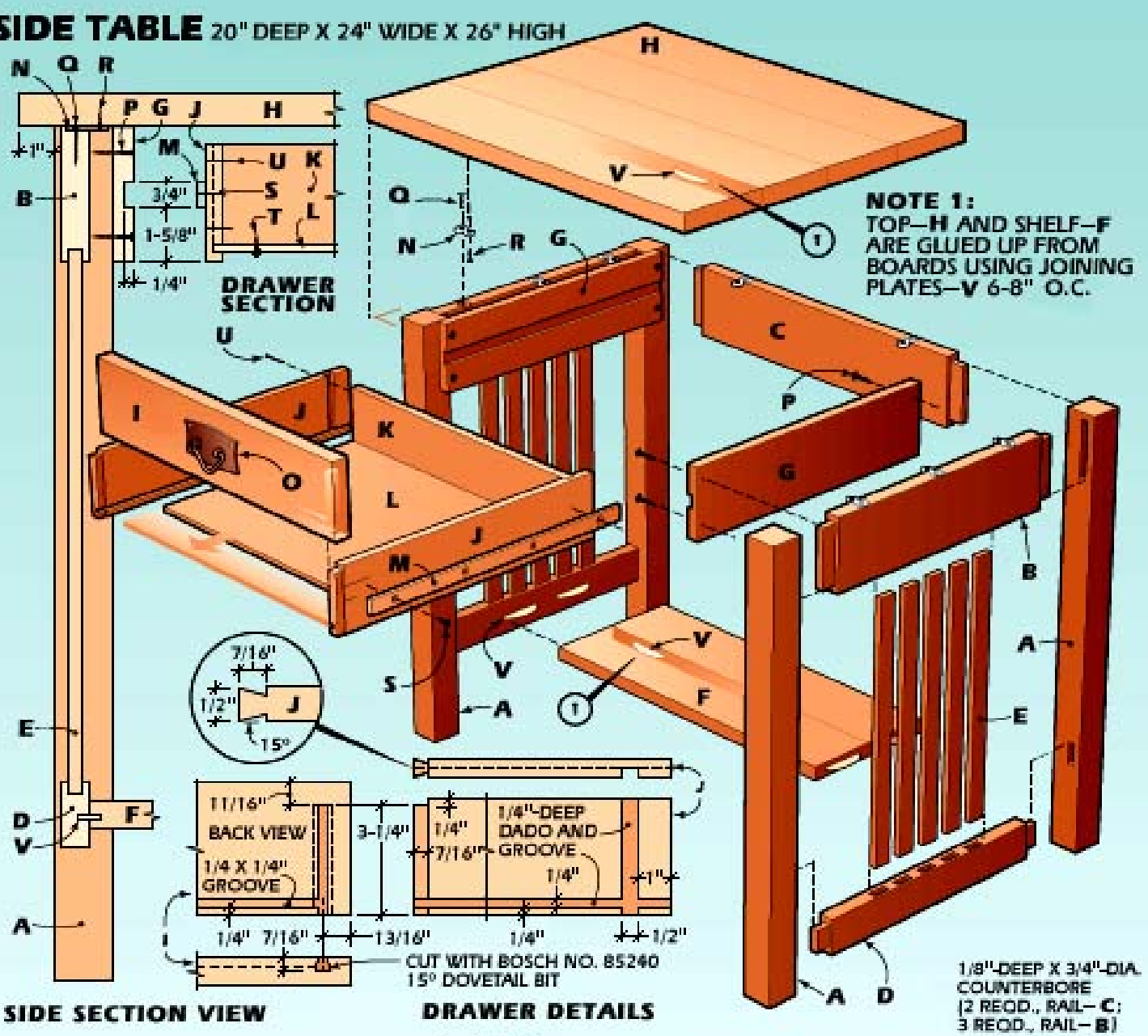
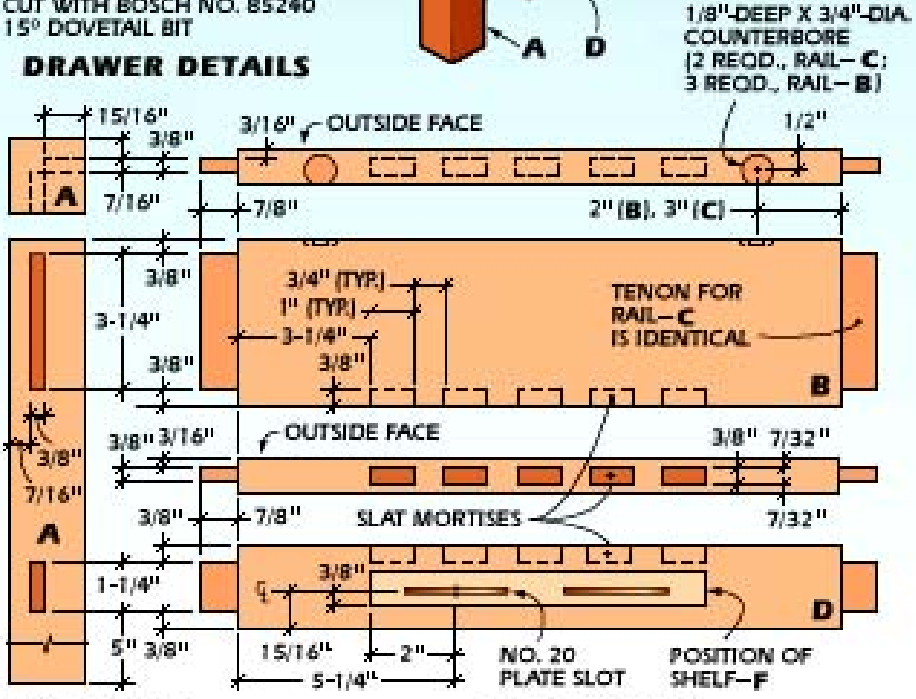
SIDE TABLE

SIDE TABLE 20" DEEP X 24" WIDE X 26" HIGH





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Stock preparation

Like the rocker and bookcase, the material used in this table is quarter- sawn white oak. The legs are cut from 8/4 solid stock, the top from 5/4 material and the rest from 4/4 lumber. For the drawer sides, you will have to either plane 4/4 stock to 1/2-in. thickness or have your lumber dealer plane the lumber to the finished size. The same holds true for the drawer guides, which are 5/8 in. thick.

The panels for the bottom shelf and tabletop are glued up from narrow boards. Cut stock slightly longer and a bit wider than required to yield the finished panel. Edge-joint each piece, then lay out the locations of the No. 20 joining plate slots every 6 to 8 in. along the mating edges. Keep the end slots about 3 in. from the finished ends of the panels.

Use the plate joiner to cut the slots, registering the cuts against a flat work surface. Then apply glue to the slots, plates and edges and assemble the panels. Use clamps to pull the joints tight, then let the glue set for about 20 minutes. After the glue fully cures, rip and crosscut the panels to finished dimension.

Joinery

Rip and crosscut the remaining parts for the table base to finished dimension. Then, lay out the mortise in the table legs. Use a router with an edge guide and 1/2-in.-dia. up-cut spiral bit to make these cuts (Photo 1). Use a sharp chisel to square the ends of each mortise (Photo 2).

Use a dado blade in your table saw to cut the tenons on the side and back rails. Since the tenons are 7/8 in. long, you will have to make two passes for each tenon cheek. Readjust the blade height to cut the shoulders at the top and bottom edges of the tenons (Photo 3). Check the fit of each tenon in its matching mortise.

Mark the locations of the slat mortises in the side rails. Clamp a tall fence to the drill-press table to help locate the rails,

1--Use a router with an up-cut spiral bit and an edge guide to cut the rail mortises in the table legs. Make several passes.

2--When the routing is done, carefully square the ends and flatten the sides of each mortise with a sharp chisel.

3--Use a dado blade in a table saw to cut the rail tenons. First cut the cheeks, then readjust the saw to cut the shoulders.

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then bore overlapping 3/8-in.-dia. holes to remove most of the waste (Photo 4). Complete the mortises by smoothing the walls and squaring the ends with a sharp chisel.

4--Cut the slat mortises in the rails using a drill press to remove most of the waste and a sharp chisel to finish the cuts.

Lay out the joining plate slots on the bottom shelf and side rails. Use the plate joiner to cut the slots in the shelf ends, registering the cut on a flat workbench or on the top of your table saw (Photo 5). To cut the slots in the side rails, you must use a spacer block under the plate joiner to yield the proper slot position (Photo 6).

Before beginning to assemble the base, sand all the parts with 120- and 220-grit sandpaper, then dust off the pieces thoroughly. It is much easier to do a good job of sanding at this stage than it is once the base is together.

5--Clamp the bottom shelf securely to a workbench. Then use a plate joiner to cut joining slots in both ends of the shelf.

Base assembly

Position the side slats in their mortises in one bottom side rail (Photo 7). If the parts fit properly, you need not apply glue to these joints, since the slats will be held captive between the rails. Place the top side rail over the slat ends, then clamp the assembly temporarily to be sure that the slats are completely seated in the mortises.

Apply glue to the rail tenons and leg mortises, then assemble the table side. Clamp the joints tight, then compare opposite diagonal measurements to be sure that the assembly is square (Photo 8).

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6--Clamp the bottom rails to your table

Follow the same procedure for the other side. Apply glue to the joining plate slots, mortises, tenons and plates for assembling the shelf and back rail to the sides. Join the rail and shelf to one side (Photo 9), then place the opposite side over the shelf and rail ends. Stand the base on a flat work surface and clamp the joints tight (Photo 10). Check for square.

Use a router with an edge guide to cut a 1/4-in.-deep x 3/4-in.-wide dado in each drawer guide (Photo 11). Bore and countersink pilot holes for mounting screws in the guides, then sand the guides with 220-grit sandpaper before fastening them to the table legs (Photo 12).

saw fence. Then use a plate joiner to cut joining slots in one side of both rails.

7--Test fit the side slats in the rail mortises. Sand or trim the joints, if necessary, to achieve a tight fit for each slat.

8--Apply glue to the mortises and tenons, then clamp the parts. Check for square by comparing diagonal measurements.

9--To join the sides to the back rail and bottom shelf, apply glue to the slots and plates, and to the mortises and tenons.

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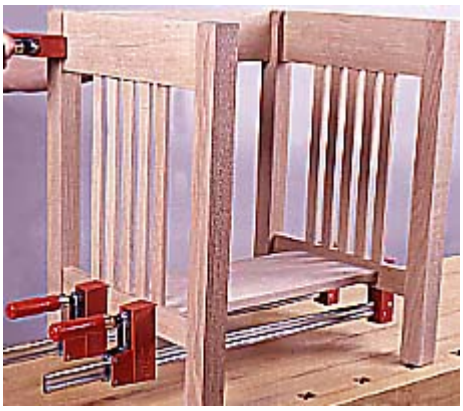

10--Clamp the side assemblies to the back rail and shelf and check the parts for square. Readjust the clamps if necessary.

Mark the locations of the tabletop fasteners on the top edge of the side and back rails. Use a 3/4-in. Forstner or multispur bit to bore the 1/8-in.-deep recess for the fasteners. Bore a pilot hole for each, then attach the fasteners with 1-in.-long No. 8 fh screws.

Drawers

Cut stock to finished size for the drawer sides and back, and rip stock for the drawer face, but don't cut it to length yet. Instead, leave the drawer face blank about 12 in. long. The drawer sides are joined to the face with sliding dovetails. These joints are not difficult to cut, and they provide a nice compromise when you do not want to invest the time required for traditional dovetail corner joints. In order to cut these stopped dovetail slots, construct a U-shaped jig to guide the router. You can build this jig by screwing together three strips of scrap lumber or plywood. The dimensions of these pieces are not critical. But it is important that the three pieces are assembled square to each other.

Set the dovetail bit–we used a Bosch No. 85240–to cut 7/16 in. deep, then make an indexing cut into the fence of your jig to make locating your cut easy. Mark the position of the two slots–along with an end mark for each slot–on the inside surface of the drawer face, centered on the length of the face blank. Clamp the face to the routing jig with the indexing cut centered

13--Rout slots in the drawer face for the drawer sides with a dovetail bit. Use a square U-shaped jig to guide the router.

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14--Use the same dovetail bit in a router

on one mark. Slide the router bit into the slot, turn on the motor and guide the tool along the jig to the end mark of the slot (Photo 13). Turn off the router and slide the bit back to the indexing cut to remove it. Repeat for the other slot. Cut the face to finished length.

Use the same dovetail bit in the router table to cut the dovetail shape on the ends of the drawer sides (Photo 14). For the joint with the drawer back, use a dado blade in the table saw to cut a simple dado. Then use a 1/4-in.-dia. straight bit in the router, and an edge guide, to cut the grooves for the drawer bottom in the face and drawer sides (Photo 15). Note that the groove in the face runs only between the dovetail slots.

Use a small backsaw to cut the shoulder at the top of the dovetail on each drawer side. Then dry assemble the drawer box to be sure that all joints fit properly. If all the joints are correct, sand all drawer parts, then apply glue and reassemble the drawer (Photo 16). Use brads to reinforce the glue joints between the back and drawer sides. Then clamp the drawer parts together. Check that the assembly is square.

Cut the drawer bottom from 1/4-in.-thick plywood, then slide it into place, and fasten it to the bottom edge of the drawer back with screws. You can remove the bottom later to make finishing the drawer easier.

Cut the drawer hanger strips to size, then bore and countersink pilot holes for attaching them to the drawer sides. Clamp the strips to the drawer sides, then fasten them with screws (Photo 17). Finish the drawer assembly by marking the locations of mounting screws for the drawer pull. Bore pilot holes and attach the pull.

table to cut both sides of the dovetails on the ends of each drawer side.

15--Cut a dado between the dovetail slots on the drawer face for the bottom panel. Cut matching dadoes in the drawer sides.

16--Apply glue to all the drawer joints, then clamp the box together. Reinforce the side-to-back joints with brads.

17--Slide the drawer bottom in place and attach it to the back with screws. Also, screw the guide strips to the sides.

18--Center the base over the top and mark the fastener holes. Then bore pilot holes in the top and attach the base.

Assembly

Sand the tabletop smooth with 220-grit sandpaper, then place it upside down on a padded surface. Invert the base on the top and adjust it for an even reveal on all sides. Next, mark the locations of the screwholes for the tabletop fasteners (Photo 18). Use a clamp to maintain the proper spacing between the front table legs.

Remove the base from the top and bore pilot holes for the tabletop fastener screws. Then, replace the base and install the screws. You'll need a screwdriver with a magnetic tip to start the screws between the drawer guides and side rails. Apply the same stain and finish that's described in "Rocking Chair."

MATERIALS LIST–SIDE TABLE

Key	No.	Size and description (use)
A	4	1 3/4 x 1 3/4 x 25" oak (leg)
B	2	13/16 x 4 x16 1/4" oak (rail)
C	1	13/16 x 4 x 20 1/4" oak (rail)
D	2	13/16 x 2 x 16 1/4" oak (rail)
E	10	3/8 x 1 x 15 1/8" oak (slat)
F	1	13/16 x 8 x 19 7/8" oak (shelf)
G	2	5/8 x 4 x 15 7/8" oak (drawer guide)
H	1	1 x 20 x 24" oak (top)
I	1	13/16 x 3 15/16 x 18 3/8" oak (drawer face)
J	2	1/2 x 3 1/2 x 16 1/4" oak (drawer side)
K	1	1/2 x 3 x 16 3/4" oak (drawer back)
L	1	1/4 x 15 1/16 x 16 3/4" oak plywood (drawer bottom)
M	2	1/4 x 3/4 x 15 13/16" oak (drawer guide strip)
N	8	Knape & Vogt No. 1547STL tabletop fastener
O	1	Whitechapel No. 106STH2 drawer pull
P	8	1 1/4" No. 8 fh screws
Q	8	1" No. 8 fh screws
R	8	5/8" No. 8 fh screws
S	8	1/2" No. 6 fh screws
T	3	5/8" No. 6 rh screws
U	8	3/4" x 16-ga. brads
V	16	No. 20 joining plates

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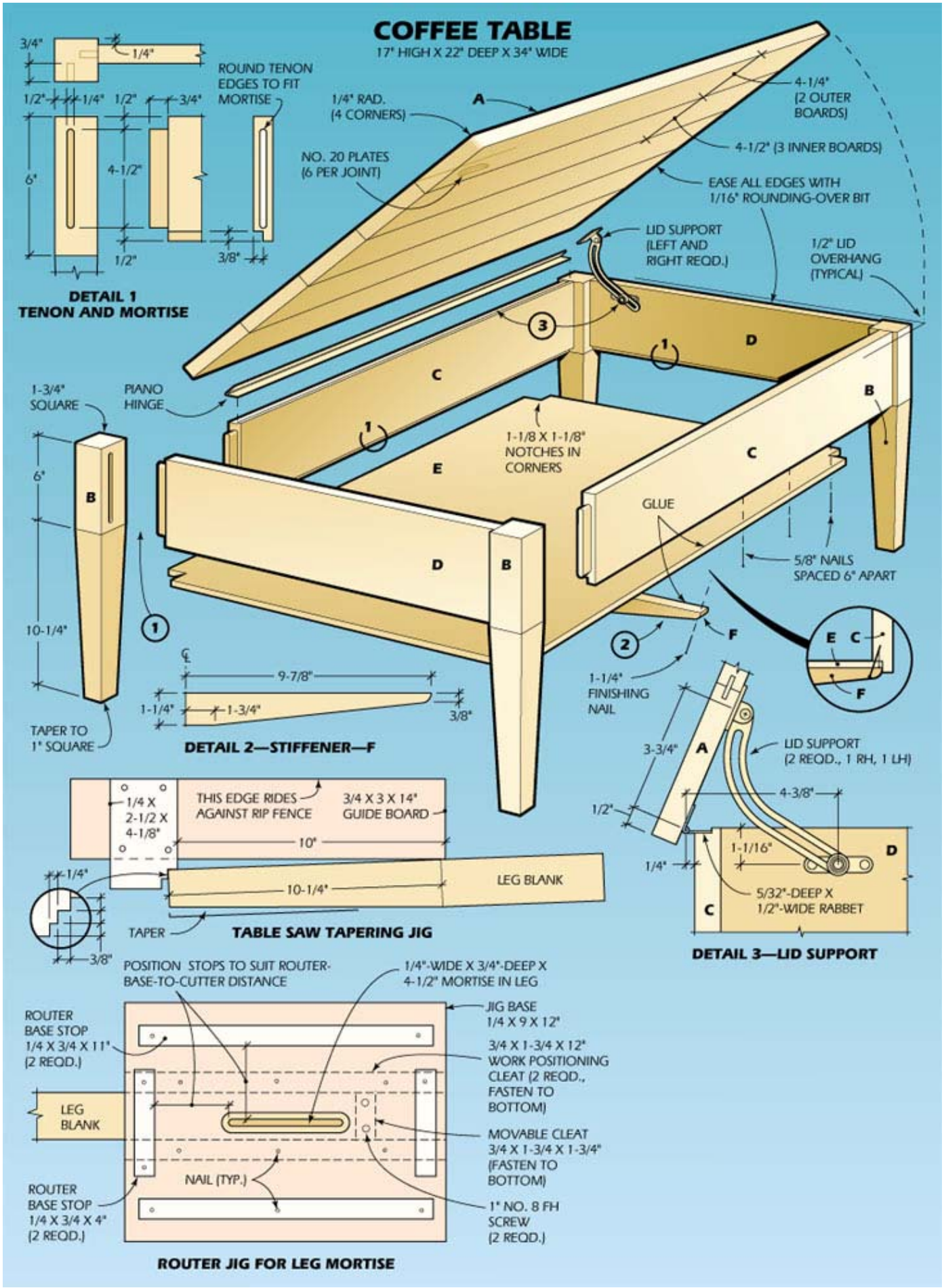
COFFEE TABLE



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MATERIALS LIST—COFFEE TABLE		
Key	**No.**	**Size and description (use)**
A	1	3/4 x 22 x 34" maple (lid)
B	4	1 3/4 x 1 3/4 x 16 1/8" maple (leg)
C	2	3/4 x 5 1/2 x 31" maple (apron)
D	2	3/4 x 5 1/2 x 19" maple (apron)
E	1	1/4 x 19 3/4 x 31 3/4" lauan plywood (bottom)
F	1	3/4 x 1 1/4 x 19 3/4" maple (stiffener)
Misc: Curved friction lid supports, Part Nos. 25619 and 25627, brass 1 1/2-in.-wide x 48-in.-long piano hinge,		

The Top And Legs

The panel for the tabletop is assembled by edge gluing five boards. Begin construction by ripping and crosscutting the stock slightly oversize, 4 1/2 in. wide x 35 in. long.

If you have a plate joiner, use it to cut the slots for six joining plates for each edge joint. Arrange the boards to produce the most attractive grain pattern. And make sure the endgrain growth ring directions alternate between the boards.

Mark centerlines for the slot positions along each joint line, then clamp each board to a flat benchtop while the slots are cut (Photo 1).

1--Joint the edges of the boards for the tabletop and cut the slots in them to receive the joining plates.

Inserting the plates and applying and evenly spreading the glue on eight edges can be difficult to do before the glue begins to set. To make the job easier, preglue the plates in each board. Use a small-nozzle squeeze bottle to apply glue in the slots without getting any on the edges (Photo 2).

To assemble the panel, you'll need four or five long clamps, six smaller clamps and six cauls. This arrangement will apply even pressure across the panel to prevent it from cupping. Rub paste wax on each caul's contact surface to prevent it from sticking to the boards.

Apply glue to the edges and plates, slide the boards together, then apply pressure to the cauls and the long clamps (Photo 3).

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2--Save glue application time by pregluing

Remove the hardened glue that has squeezed from the joint using a scraper, belt sander and finishing sander, in that order. Next, crosscut the panel to finished size.

Rip and crosscut the legs to size and joint their four faces so they are square to one another and smooth. Lay out the mortise positions on adjacent faces and install a 1/4-in.-dia. straight bit in your plunge router for cutting the mortises. You can use a router edge guide to make the cuts, but the simple jig shown enables you to do the job more quickly and easily. The jig is made of 1/4-in. plywood with cleats attached to the bottom to secure the leg. A removable end cleat allows the leg to be repositioned so that one jig can be used to cut the mortises on both leg faces. On top of the jig, four strips guide the router and stop its travel.

Make mortise cuts in several passes (Photo 4). When the first mortise has been cut on each leg, reposition the jig's end cleat, insert the blank from the other end and proceed to cut the mortise on the adjacent face.

The tapers are cut on the table saw with the aid of a simple step jig. The taper is cut on two adjacent faces with the leg positioned in the first step of the jig. The end of the leg is placed in the second step to cut the two remaining tapers (Photo 5).

the joining plates in their slots. A small-nozzle bottle is handy here.

3--Glue and clamp the top using cauls above and below. Wax the cauls to prevent glue from sticking to them.

4--Use a jig and a plunge router to cut the leg mortises. The stops are positioned to suit the router's base.

5--Use a stepped jig on the table saw to cut the leg tapers. Each step positions the leg to cut two tapers.

Smooth the inner leg surfaces using a sander, but sand the mortised faces gently by hand to avoid distorting the surface surrounding the mortise. The mortise surface has to remain flat and square.

To complete the legs, set up a 1/16-in.-rad. rounding-over bit in a router table and round the corners (Photo 6).

Aprons And Assembly

Rip and crosscut the aprons, then set up a dado blade on the table saw to cut the apron tenons. Clamp a stop-block to the miter gauge fence, elevate the blade for a 1/2-in.-deep cut, and cut the tenon in four passes (Photo 7). Next, cut the rabbets for the bottom panel on the inside edges of the four aprons.

After using a chisel to round the ends of the tenons to match the mortises, the table is ready for assembly. Use four clamps and four cauls to assemble the legs and aprons (Photo 8). Apply glue sparingly to the tenons, and draw the assembly together. Check the assembly for square. If necessary, adjust the clamps to make the assembly square.

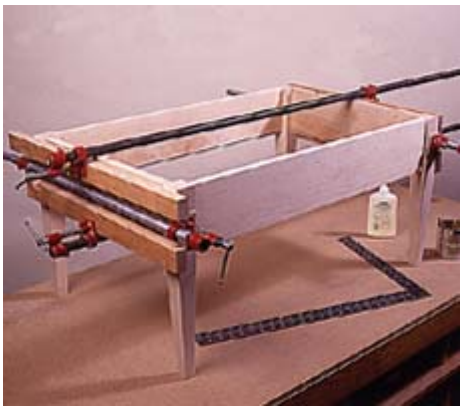
After the glue has set, use the router with a straight bit to cut the hinge rabbet. To do this, clamp two pieces of scrap flush with the apron's top edge to provide a stable surface for the router. Set the router to make a 5/32-in.-deep cut (Photo 9). Note that the rabbet's 1/2-in. width is critical. It positions the hinge so the top can tilt without striking the leg's corner.

Next, crosscut the piano hinge to fit the rabbet and install it temporarily. Do this by placing the lid on the workbench with the bottom facing up. Then place the table, bottom up, onto the lid and mark the position of the hinge on the lid. Remove the hinge, mark the screw centers, and bore the screw pilot holes. Attach the hinge to the table first, then to the lid.

Once the hinge is installed, mark and bore the screw pilot holes for lid supports. Attach the supports to the aprons first,

6--Round the bottom of the leg corners on the router table. Don't round the top of the leg where it abuts the apron.

7--Use a stopblock clamped to the miter gauge and a dado blade in the table saw to cut the apron tenons.



8--Glue and clamp the aprons and legs. Heavy cauls distribute clamping pressure across each apron.

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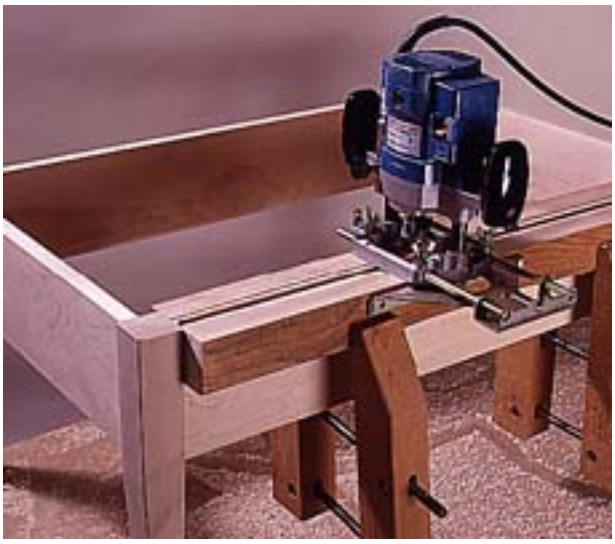
then the lid (Photo 10).

Cut the plywood bottom to size and install it with glue and nails. Also, glue the stiffener strip to the bottom. Remove the lid to allow finishing.

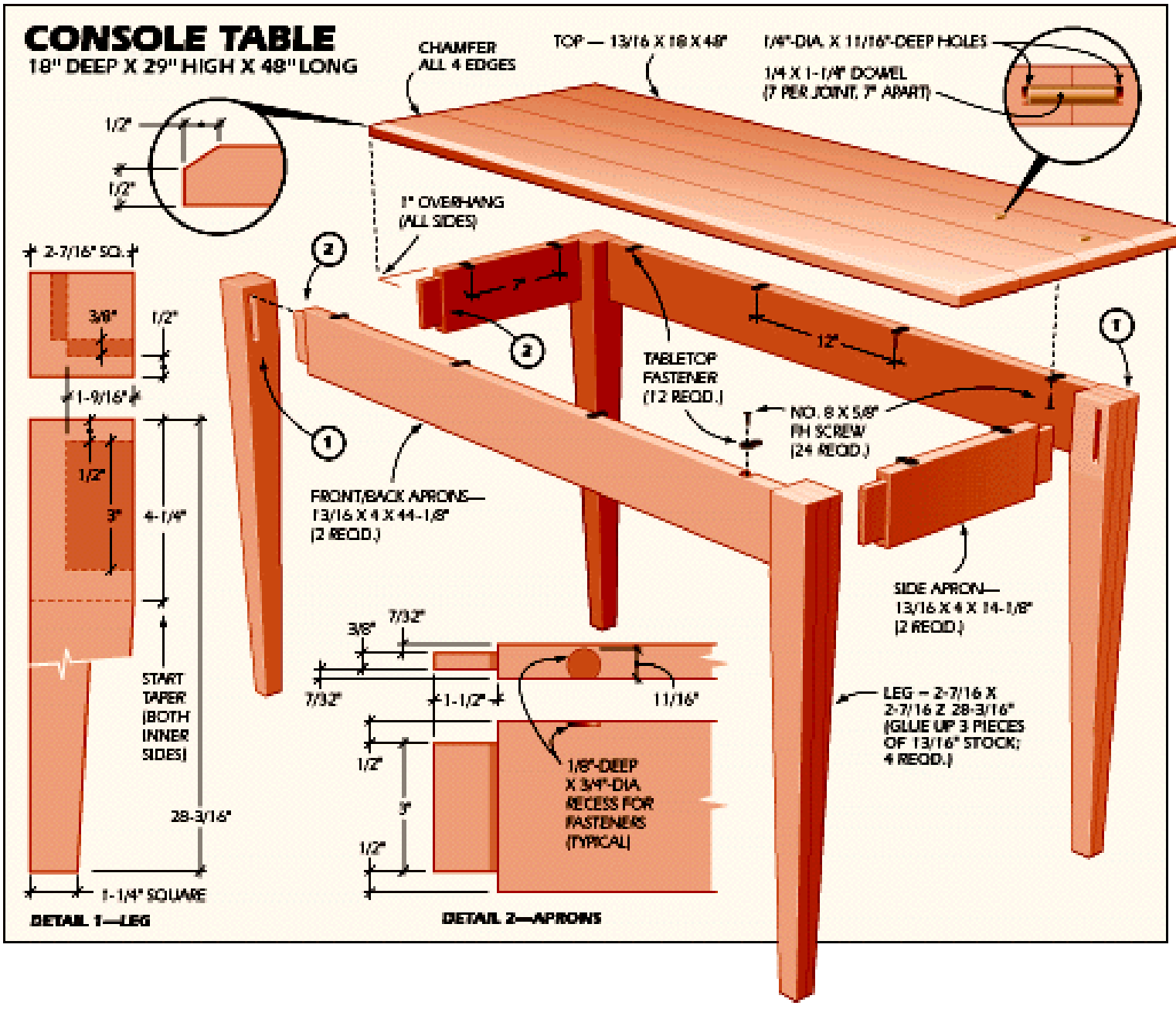
We finished the table with three coats of polyurethane lightly tinted with a few drops of yellow ochre to give it a warm honey color.



9--Clamp scrap to the rear apron to provide a base for the router, then cut the hinge rabbet using a straight bit.

10--Sequence is important when attaching the top's support hardware. Attach it to the apron first, then the top.

CONSOLE TABLE



This simple console table is a great beginner's project. Its straightforward lines are reminiscent of Shaker pieces built over 100 years ago. But simple doesn't have to mean unsophisticated. This solid cherry piece is well-tailored, crisply built and can fit just about anywhere: your front hall, behind a living room sofa, in an upstairs bedroom, or even in your bathroom if it's blessed with enough extra space.

But good design isn't the whole story. This piece is also easy for a beginner to build. It has only nine parts: four legs, four rails and a top. And we show you how to build it with nothing more than hand tools and a few portable power tools. Everything you need is described in "Beginner's Toolbox".

Perhaps the best part of this design, however, is that it puts to good use everything that comes before it in this Woodworking Guide. If you start this table now, your gratification won't be delayed much longer. You should be able to finish it up in just a few weeks of spare time–even if you just learned how to sharpen a chisel or cut a mortise-and-tenon joint.

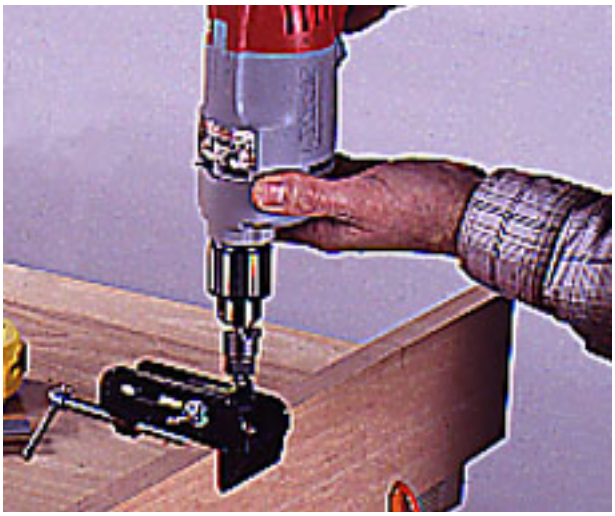
Cherry Stock

The material we used for this piece is solid cherry stock that we bought flattened on both sides and jointed on one edge. You'll have to pay more for this service, but it's worth the cost. The standard thickness for this type of hardwood is 13/16 in.

The first step in preparing the lumber is to crosscut all parts to rough length, a couple of inches longer than their finished lengths. Then check the jointed edge of each piece for flatness and square. If some refinements are required, clamp the board to the side of your worktable and use a bench plane to true the edge (Photo 1). Next, cut the boards to finished width using a circular saw with a rip guide (Photo 2). Clean up any saw marks with a bench plane.

1--Begin the top by flattening one edge of each board, using a bench plane. Make sure the edge is planed square to the face.

2--Cut each top board to width using a circular saw and rip guide. Make sure the rip guide follows the planed edge.



3--Lay out the location of the alignment dowels on the board edges. Then use a doweling jig and drill to bore the holes.

4--Cover the edges and dowel holes with glue, insert the dowels and bring the boards together with pipe clamps.

Tabletop

This tabletop was made from four smaller boards that were glued together. Using multiple boards helps keep the top flat over time. If your stock is wide enough to use only three boards, that's fine. Begin work by laying the boards on a flat surface and choosing the most attractive grain pattern by arranging the boards in several ways. Then lay out the dowel locations on all the joints and bore the dowel holes using a doweling jig and a portable drill (Photo 3).

Next, place a drop of glue in each dowel hole and gently tap the dowel in place. Then spread the glue evenly on all the mating edges and push the boards together. Tighten the joints, using pipe clamps (Photo 4), and check that the panel is flat before letting the glue set. If it's not, readjust the clamps until the surface is flat. After 20 minutes scrape off any excess glue from the joints and let the panel dry overnight.

5--When the glue is dry remove any squeeze-out, then let the assembly cure. Flatten joints if necessary with a plane.

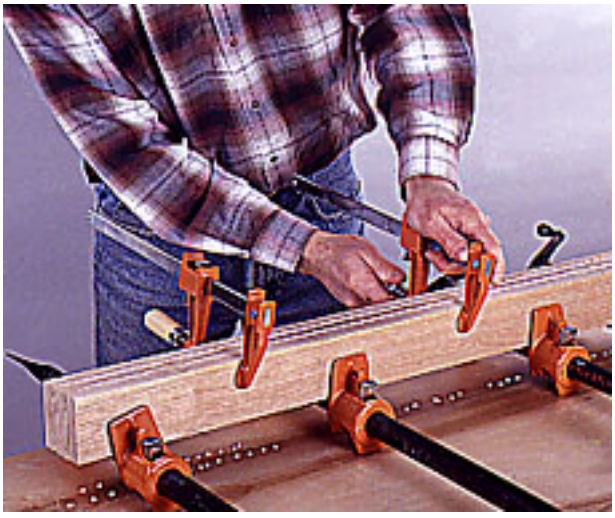
When you remove the clamps, check the panel surface carefully. If the joints are flush, set the panel aside. If they aren't, use a bench plane to smooth the surface (Photo 5). Hold the plane at a 30 degrees angle to the wood grain and make shearing cuts.

6--Mark the finished length on both ends of the top panel. Then make the cuts with a saw and straightedge guide.

Next, cut the panel to finished length, using a circular saw and a straightedge guide (Photo 6). Make sure that both ends are square to the sides before making the cuts. Next, mark guidelines for the edge chamfer around the perimeter of the top and use a block plane to create these bevels (Photo 7). Be sure to clamp a scrap block to each long edge to keep them from splitting when you're working on the end grain.

Complete the tabletop by sanding smooth both sides and all the edges. Begin with 120-grit paper and move through a sequence of 150-, 180- and 220-grits.

7--Mark the chamfer around the top and plane the edges to this line. A scrap block keeps the side edge from splitting.



8--Cut the leg stock to size, then apply glue to the mating surfaces. Keep the board edges flush when clamping.

Legs And Rails

Crosscut the leg stock to finished length. Note that each leg is formed from three pieces of stock that are glued together. Apply glue to the three boards that make up each leg and clamp them together (Photo 8). Scrape off the excess glue after 20 minutes, and leave each leg assembly clamped for at least an hour. Don't do any further work on these pieces until the glue has cured for 24 hours.

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Lay out the mortises on the corresponding

9--Lay out the tenons on the ends of the table rails with a marking gauge. Keep the

legs with a marking gauge. Then use a doweling jig and a portable drill to remove most of the waste (Photo 12). Finish up the mortise by squaring the ends and sides with a sharp chisel.

Once the joinery is done, cut the tapers on both inside edges of each leg, as shown in the drawing below. Use a circular saw and be sure to cut on the waste side of the layout lines. Finish these tapers with a bench plane (Photo 13), making sure to check for square as you work. Before the legs and rails are assembled, it's a good idea to finish sand all the parts with the same progression of grits that was discussed earlier.

gauge base flat on the board surface.

10--Make the cheek cuts on the tenons using a backsaw. Keep the blade kerf just to the waste side of the layout lines.

11--Make the tenon shoulder cuts with a backsaw. Clamp a scrap block to the board to help guide the saw blade.

12--Remove the waste from the mortise using a drill and dowelling jig. Square the ends and walls with a sharp chisel.

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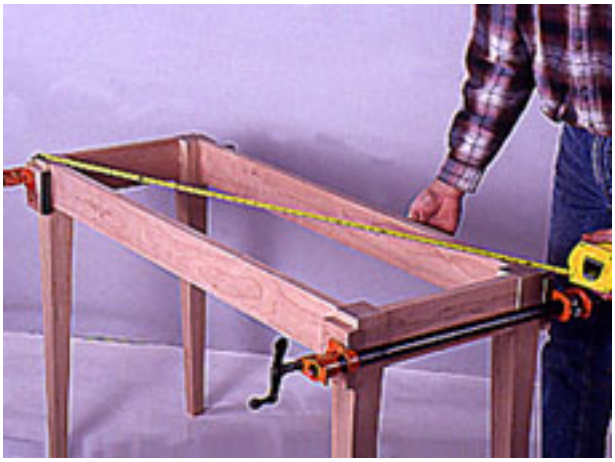
Assembly

Begin by joining a long rail to a pair of legs. Spread the glue evenly on the tenons and mortises, and then clamp the pieces together. Do the same with the other legs and long rail. When the glue has cured on these two assemblies, join them together with the short rails. Assemble the parts on a flat surface. Once the clamps are in place, compare opposite diagonal measurements to check for square (Photo 14). If the assembly isn't square, readjust the clamps until it is.

When the base joints have cured, lay out and bore the holes in the rails for the tabletop fasteners. Then turn the top upside down on a padded table and place the inverted base assembly on the underside of the top. Adjust the base so it's centered on the top. Then mark the location of the fastener holes. Bore pilot holes and screw the base to the top (Photo 15).

13--Rough cut the leg tapers with a circular saw. Then reduce the edges to finished thickness with a bench plane.



14--Glue and clamp the legs to the rails. Then check for a square assembly by comparing diagonal measurements.

15--Attach the tabletop fasteners to the rails. Then turn the table parts over and screw the fasteners to the underside of the top.

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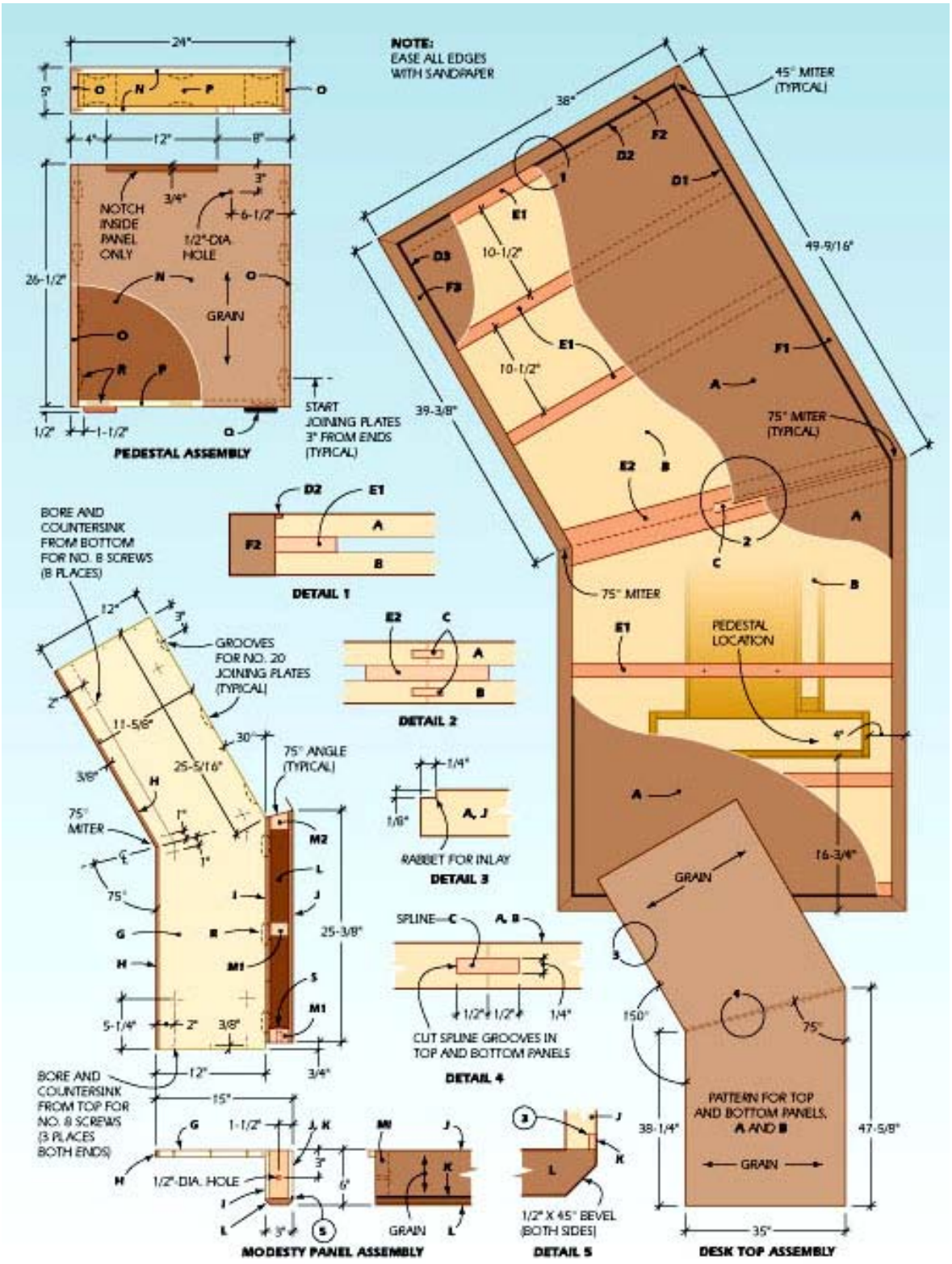
OFFICE DESK



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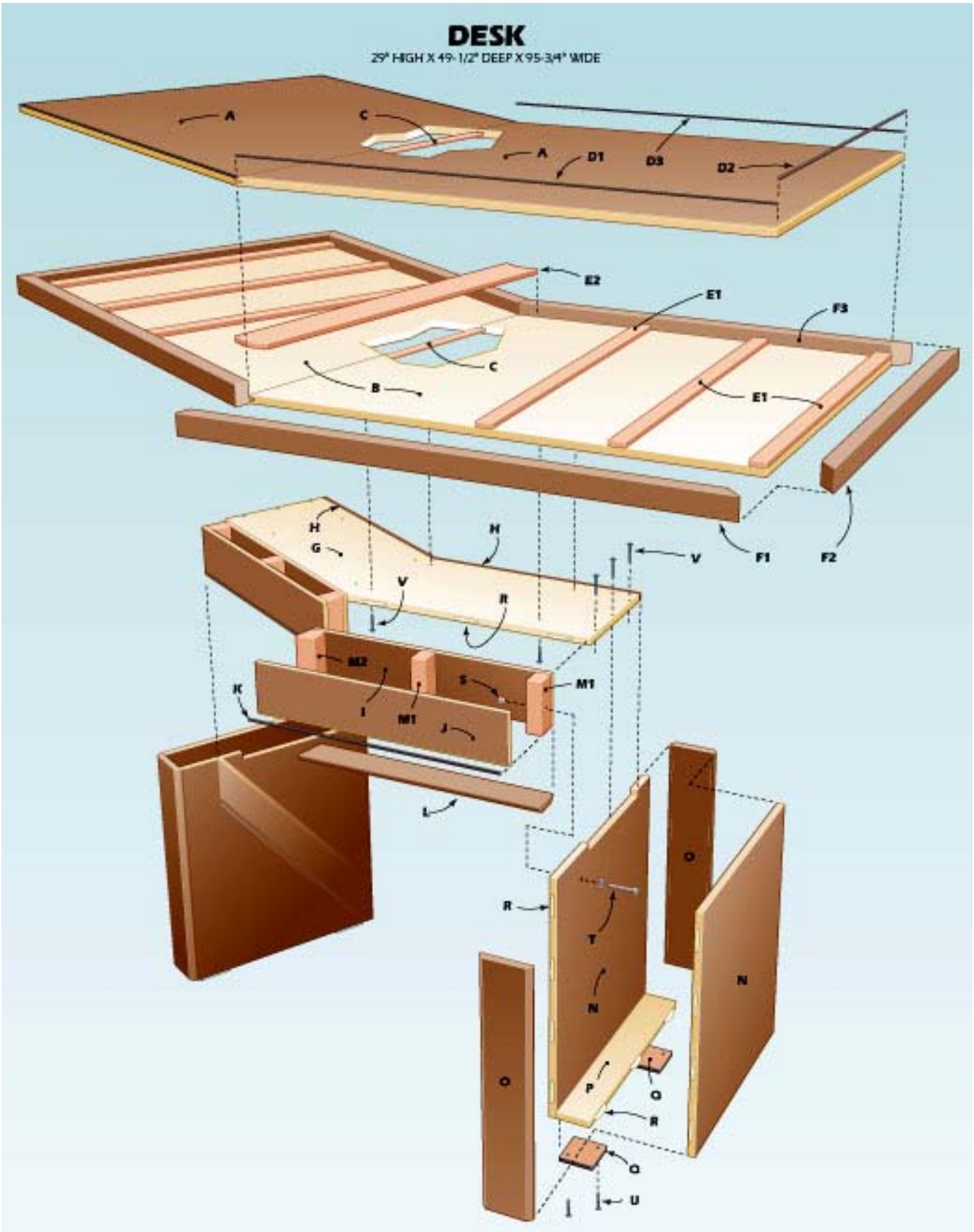
DESK
29" HIGH X 49-1/2" DEEP X 95-3/4" WIDE
A
C
A
D1
D3
D2
E2
E1
F3
C
B
E1
H
G
H
V
F1
F2
V
R
M2
S
M1
K
I
M1
J
L
O
R
T
N
N
P
Q
R
O
Q
U

MATERIALS LIST–OFFICE DESK

Key	No.	Size and description (use)
A	2	3/4 X 35 X 47-5/8" walnut panel stock* (upper top)
B	2	3/4 X 35 X 47-5/8" panel stock** (lower top)
C	2	1/4 X 1 X 36-3/8" maple (spline)
D1	2	1/8 X 1/4 X 47-5/8" maple† (inlay)
D2	2	1/8 X 1/4 X 35" maple† (inlay)
D3	2	1/8 X 1/4 X 38-5/16" maple† (inlay)
E1	6	1/2 X 1-1/2 X 35" poplar (spacer)
E2	2	1/2 X 4 X 36-3/4" poplar (spacer)
F1	2	1-1/2 X 2 X 49-9/16" walnut (edge)
F2	2	1-1/2 X 2 X 38" walnut (edge)
F3	1	1-1/2 X 2 X 39-3/4" walnut (edge)
G	1	3/4 X 17-13/16 X 48-15/16" panel stock** (subtop)
H	2	3/8 X 3/4 X 22-1/4" walnut (edge band)
I	2	3/4 X 5-1/4 X 24-11/16" walnut panel stock (inner panel)
J	2	3/4 X 5-1/4 X 25-3/8" walnut panel stock (outer panel)
K	2	1/8 X 1/4 X 25-3/8" maple† (inlay)
L	2	3/4 X 3 X 25-3/8" walnut (bottom cap)
M1	4	1-1/2 X 2 X 5-1/2" poplar (block)
M2	2	2 X 2 X 5-1/2" poplar (block)
N	4	3/4 X 22-1/2 X 26-1/2" walnut panel stock (pedestal side)
O	4	3/4 X 5 X 26-1/2" walnut (pedestal endcap)
P	2	3/4 X 3-1/2 X 22-1/2" poplar (pedestal base)
Q	4	1/2 X 3-1/2 X 3-1/2" maple†† (foot)
R	50	No. 20 joining plate
S	2	3/8" T-nut
T	2	3/8 X 2-1/2" hexhead bolt and washer
U	8	1-1/4" No. 8 fh woodscrew
V	14	2" No. 8 fh woodscrew

The modern executive office desk isn't simply a place to hold a telephone. These days, it's the launching platform for grand ideas and big decisions. It's the basic real estate for projects, proposals, plans and programs. And, like any other business commodity, the more you have, the more work you get done.

Our custom desk is designed with a generous surface area and is ideal for those who need to spread out their work. While the broad V shape imparts a strong, dynamic visual effect, it also makes the space more accessible.

Of course, a high-end desk needs to look the part, as well. Our design features matched walnut-veneer panels with a decorative black inlay. The result is an elegant surface that's as functional as it is eye-catching.

To achieve the mirrored effect of the matched veneer panels, you'll need to order stock that has walnut veneers cut sequentially from the log. When you order the panels, specify that they be "sequence matched

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and numbered." The panel manufacturer will glue each veneer to its panel substrate in the same order that the veneers were cut. Each panel has a number that indicates its place in the sequence. When you plan the material for your desk, lay out your cut lines to make the best use of matching grain.

For our piece, we used walnut veneer on an MDF (medium-density fiberboard) core. These panels tend to be flatter and more stable than those with a veneer core (plywood). They also are about twice the weight of veneer-core panels, so you'll need a helper to move the parts around the shop.

The Pedestals

The two pedestal bases that support the desktop are constructed of veneered side panels with solid-walnut caps, all joined over a solid-poplar base. Study the plans to be sure you understand the construction details, then cut the pedestal sides (N), endcaps (O) and bases (P) to exact size. Mark the position of the joining plate slots in these pieces and use a plate joiner to make the cuts.

Lay out the notches on the two inner pedestal panels and cut these with a sabre saw. Then lay out and bore the hole in each panel for the bolt that connects each pedestal to the modesty panel assembly.

Apply glue to the slots, plates and edges of one of the poplar base pieces (P), install the plates and join two sides to the base. Use clamps to pull the joints tight and let the glue set. Repeat the process for the second pedestal.

Next glue the endcaps to the pedestal subassemblies using plate joints as shown. When the glue has dried, use a router and chamfer bit to cut the 1/2-in. bevel along the vertical edges of the pedestal faces.

The Modesty Panel

Cut the parts for the modesty panel to size. Pay close attention to the veneer on the front panels (J) so that, when assembled, one side of the modesty panel is a mirror image of the other. Begin assembly by joining the two mitered poplar blocks (M2) that form the core of the panel. Apply glue to the mating surfaces and clamp the blocks together. While the glue is drying, bore the 1/2-in.-dia. holes in the two end blocks (M1). Install a 3/8-in. T-nut on the inner surface of each block by tapping it into the hole with a hammer.

Next, glue and clamp one of the inner panels (I) to the center block assembly. Join the end and middle spacer blocks in the same way. Note that the end block must have the T-nut on its inner surface. Join the opposite inner panel to the center block and add the two spacers. When the subassembly is dry, glue the outer panels in place. Pay close attention to the quality of the miter joint at the front as this spot is quite prominent.

Use a router with straightedge guide to cut the rabbet along the bottom front edge of the modesty panel. Cut pieces of 1/8 X 1/4-in. black inlay strips (K) to size, and then apply glue to the rabbet and position the strips. Use pieces of masking tape placed about 2 in. apart to clamp the strips in place. Let the glue set for about 30 minutes, then remove the tape and scrape off any excess glue.

Apply glue to the bottom edges of the modesty panel and to the solid-walnut bottom caps (L). Then clamp the caps to the panel. After the glue sets, use a chamfer bit in the router to bevel the bottom edges of the cap.

Cut the subtop (G) to size and shape. Rip 3/8 X 3/4-in. edgeband strips of solid walnut (H) and glue them to the exposed edge of the subtop. Lay out and cut the joining-plate slots in the subtop edge and on the inside surface of the modesty panel. Then apply glue and join the parts. Bore and countersink holes in the subtop for fastening it to the pedestals and to the desktop.

The Desktop

In order to guarantee accuracy in cutting the desktop parts, make a template for one-half of the assembled desktop panel. You can then use this template to first outline and then cut the panel parts to finished dimension. Use a sheet of 1/4-in. tempered hardboard for the pattern, trimming it to exact size with a router and straight bit guided by a straightedge.

Lay out the desktop panels (A, B) by tracing around the template. Pay particular attention to achieving a good veneer match across the center joint of the top panel pieces. The bottom panels can be made out of a less expensive material or you can stick to walnut for consistency.

To accurately cut the panels, first use a sabre saw to rough cut them within 1/4 in. of finished dimensions. For final trimming, clamp the template to the panel and use the router with a flush-trimming bit to make the cuts. This leaves the smoothest possible surface with the least chance of chipped veneer.

Use a slotting cutter in the router to cut the spline grooves along the central panel joints. Then cut the poplar blocking strips (E1, E2) and maple splines (C) to size. The splines should be snug in their grooves, but not so tight that they need to be forced into place.

Join the two halves of the bottom panel first, so that you can get the feel for the process before moving on to the more critical top joint. Apply glue to the spline, spline groove and mating edges. Insert the spline and bring the two halves together. Use long bar clamps to gently pull the joint tight. Place pads under the clamp jaws to be sure that the clamps don't damage the panel edges. Follow the same procedure for the top panel. Handle these panels very carefully because the joint is rather fragile until the entire top is assembled.

Apply glue to the poplar spacing blocks and position them on the top surface of the bottom panel as shown in the drawing. Use clamps to hold the blocks in place until the glue sets. Then apply glue to the top of the blocks and position the top panel. Carefully check that the top and bottom panels are perfectly aligned before clamping them together.

Use long cauls across the width of the top to distribute the clamping pressure. The cauls work best if they have a slight bow and are used with the convex side toward the work. If the cauls happen to be straight, place a veneer shim under the center of each caul to ensure adequate pressure in the middle of the panel.

Use a router and straightedge guide to cut the rabbet around the desktop. Cut the black-dyed inlay strips (D1, D2, D3) to size, then apply glue to the rabbet, position the strips and use masking tape to clamp them until the glue sets. Carefully scrape off any excess glue from the top and edge of the panel.

Cut the solid walnut edge (F1, F2, F3) for the desktop from 2-in. stock. Installing one walnut edge at a time, apply glue to the mating surfaces and clamp each piece in place. At the ends, use special edging clamps that grip the panel surfaces to apply pressure on the edge.

Finishing

Sand the desktop, modesty panel and pedestals with 120-, 180- and 220-grit sandpaper, dusting off thoroughly between grits. Be sure to ease all edges and corners. Remove all sanding dust, then wipe the surfaces with a tack cloth.

In order to achieve a glass-smooth finish on the desktop, we used a paste filler on the top to fill the open grain of the walnut. These open pores are not a problem on the vertical surfaces, but on a horizontal surface, they would catch the light and be a distraction from the veneer pattern.

We used Behlen's Pore-O-Pac paste wood filler in Van Dyke Brown. Spread the filler across the grain of the top with a brush or rubber squeegee. Then, lightly reapply the filler with the grain. When the filler takes on a dull appearance, use a plastic scraper to remove the excess, and vigorously wipe the surface with burlap cloths to remove any remaining filler. Let the top dry overnight to allow any solvent to evaporate.

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To provide a tough, yet attractive, finish for the desk, we used three coats of Behlen's Rockhard Table Top Varnish. Thin the first coat approximately 20% with the appropriate reducer and use a quality bristle brush to apply the finish. Allow the finish to dry at least 12 hours, then sand lightly with 400-grit paper and dust off thoroughly. Allow the second coat to dry overnight, then lightly sand before flowing on the final coat.

While you wait for the finish to dry between coats, you can cut, bore and countersink the maple feet for the pedestals. Sand the edges smooth, then use black enamel paint to finish the feet. Apply two or three coats as required for a good finish. When the paint and varnish are dry, screw the feet to the bottom of the pedestals.

To achieve a smooth, satin finish, you should rub out the varnish, especially on the desktop. Since this varnish is extremely hard, it should be rubbed and polished within 20 hours of applying the last coat. First, sand the top with 600-grit waterproof paper, using paraffin oil as a lubricant. When all dust particles and uneven spots are leveled, wipe the surface with a clean cloth and use No. 0000 steel wool to burnish the surface to an even satin glow. Polish the top with a soft cloth.

Join the modesty panel to the two pedestals. Use 3/8 X 2-1/2-in. hexhead bolts with washers to connect the parts. Then install screws through the subtop into the pedestal sides. Position the desktop over the base and fasten it with 2-in. No. 8 screws.

*****Walnut-veneer MDF or veneer-core panel
****** Walnut-, maple- or birch-veneer MDF or veneer-core panel
† Black-dyed inlay strips available from Dover Inlay Mfg. Co. Inc., Box 151, Williamsport, MD 21795
†† Painted black
Misc: Glue; 120-, 180-, 220- and 400-grit sandpaper; 600-grit waterproof paper; Behlen's Pore-O-Pac paste wood filler (Van Dyke Brown) No. B744-IF346; Behlen's Rockhard Table Top Varnish No. B603-28507; Behlen's Rockhard Varnish Reducer; black satin enamel paint.

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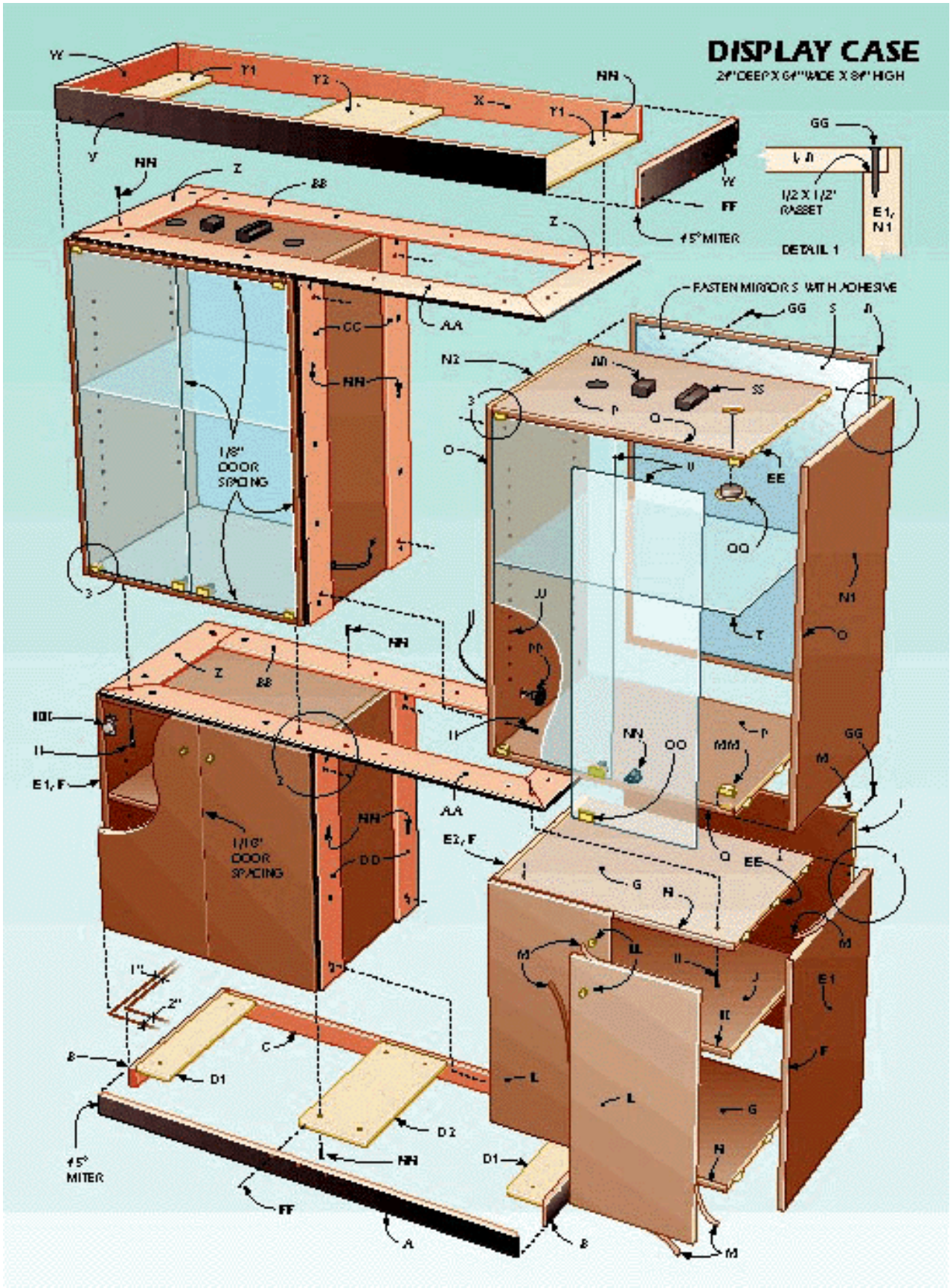
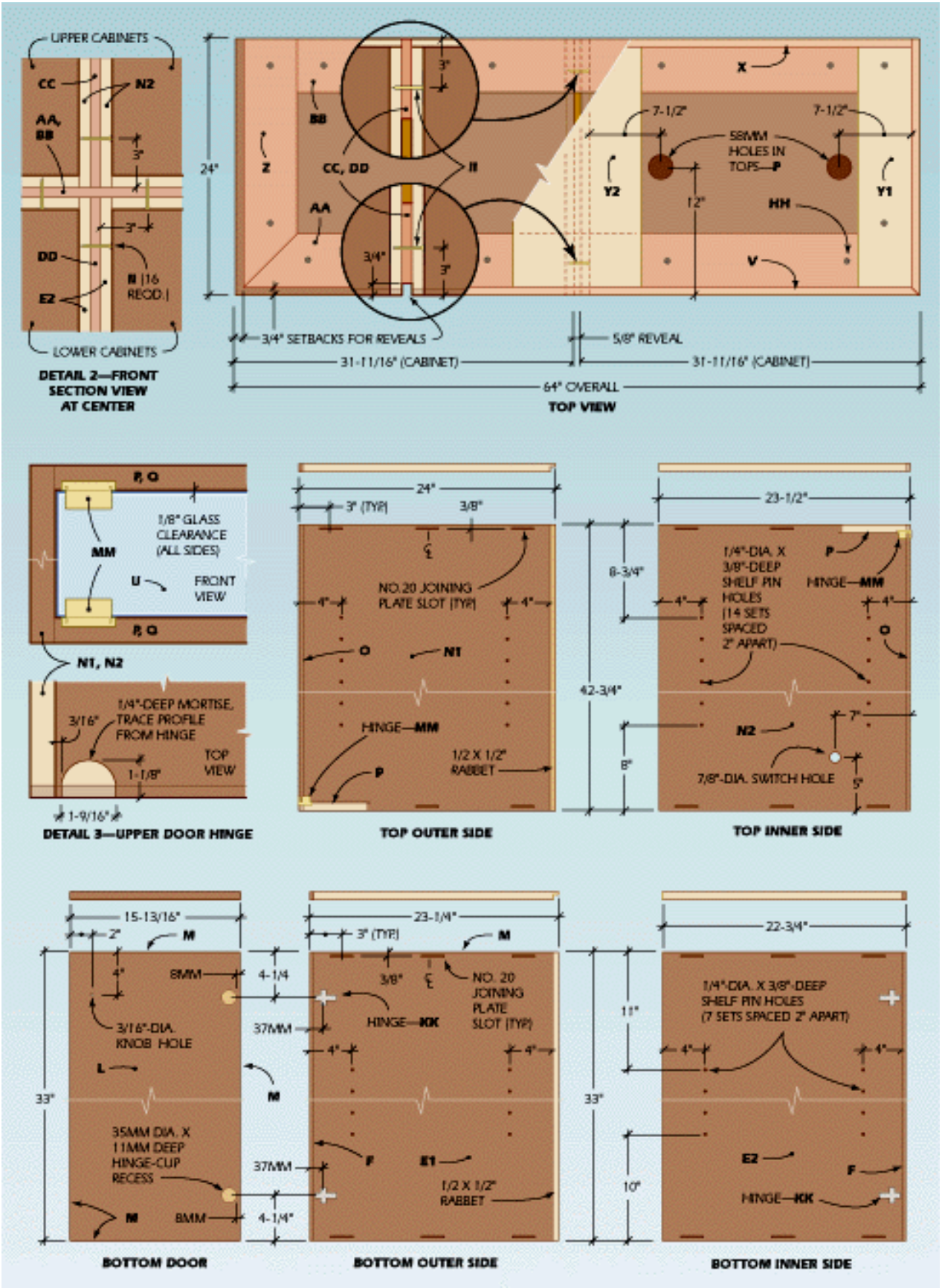
DISPLAY CABINET


DISPLAY CASE
24" DEEP X 64" WIDE X 84" HIGH
DETAIL 1
1/2 X 1/2" RABBET
45° MITER
FASTEN MIRRORS WITH ADHESIVE
1/8" DOOR SPACING
1/16" DOOR SPACING
45° MITER



MATERIALS LIST–OFFICE DISPLAY CABINET

Key	No.	Size and description (use)
		www.TedsWoodworking.com
A	1	3/4 X 3 X 62" maple† (base front)

B	**2**	**3/4 X 3 X 22" maple† (base side)**
C	**1**	**3/4 X 3 X 60-1/2" maple† (base back)**
D1	**2**	**3/4 X 5 X 20-1/2" panel stock**(side gusset)**
D2	**1**	**3/4 X 10 X 20-1/2" panel stock** (center gusset)**
E1	**2**	**3/4 X 22-7/8 X 33" walnut panel stock* ††(outer side)**
E2	**2**	**3/4 X 22-3/8 X 33" walnut panel stock* (inner side)**
F	**4**	**3/8 X 3/4 X 33" walnut (edge band)**
G	**4**	**3/4 X 22-3/8 X 30-3/16" walnut panel stock* (top/bottom)**
H	**4**	**3/8 X 3/4 X 30-3/16" walnut (edge band)**
I	**2**	**1/2 X 31-7/16 X 33" panel stock** †† (back)**
J	**4**	**3/4 X 22-5/16 X 30-1/16" walnut panel stock* (shelf)**
K	**4**	**3/8 X 3/4 X 30-1/16" walnut (edge band)**
L	**4**	**3/4 X 15-13/16 X 33" walnut panel stock* †† (door)**
M	**as reqd.**	**walnut-veneer tape**
N1	**2**	**3/4 X 23-5/8 X 42-3/4" walnut panel stock* (outer side)**
N2	**2**	**3/4 X 23-1/8 X 42-3/4" walnut panel stock* (inner side)**
O	**4**	**3/8 X 3/4 X 42-3/4" walnut (edge band)**
P	**4**	**3/4 X 23-1/8 X 30-3/16" walnut panel stock* (top/bottom)**
Q	**4**	**3/8 X 3/4 X 30-3/16" walnut (edge band)**
R	**2**	**1/2 X 31-7/16 X 42-3/4" panel stock** (back)**
S	**2**	**1/4 X 30-1/8 X 41-3/16" mirror**
T	**6**	**1/4 X 23-1/8 X 30-1/16" tempered glass (shelf)**
U	**4**	**1/4 X 14-7/8 X 41" tempered glass (door)**
V	**1**	**3/4 X 4 X 64" maple† (soffit front)**
W	**2**	**3/4 X 4 X 24" maple† (soffit side)**
X	**1**	**3/4 X 4 X 62-1/2 maple† (soffit back)**
Y1	**2**	**3/4 X 5 X 22-1/2" panel stock** (gusset)**
Y2	**1**	**3/4 X 12 X 22-1/2" panel stock** (gusset)**
Z	**4**	**5/8 X 5 X 23-1/4" maple† (side horizontal spacer)**
AA	**2**	**5/8 X 5 X 62-1/2" maple† (front horizontal spacer)**
BB	**2**	**5/8 X 5 X 52-1/2" maple† (back horizontal spacer)**
CC	**2**	**5/8 X 5 X 42-3/4" maple† (upper vertical spacer)**
DD	**2**	**5/8 X 5 X 33" maple† (lower vertical spacer)**
EE	**as reqd.**	**No. 20 joining plates**
FF	**as reqd.**	**4d finishing nails**
GG	**as reqd.**	**1" No. 5 fh woodscrews**
HH	**as reqd.**	**1-1/4" No. 8 fh woodscrews**
II	**as reqd.**	**2" No. 8 fh brass woodscrews**
JJ	**40**	**1/4" shelf pin–No. 62067†††**
KK	**4**	**pair bottom cabinet hinges–No. 34710†††**
LL	**4**	**polished brass door pull–Sugatsune No. GLA-16**
MM	**4**	**pair upper cabinet hinges–Hafele No. 361.49.809**
NN	**4**	**touch latch–Hafele No. 245.80.310**
OO	**4**	**touch latch strike–Hafele No. 245.63.826**
PP	**2**	**light switch–Hafele No. 823.78.327**
QQ	**4**	**halogen lamp–Hafele No. 823.29.850**
RR	**2**	**transformer–Hafele No. 823.24.436**

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SS	2	mounting block–Hafele No. 823.24.418

*Walnut-veneer MDF or veneer-core panel
**Walnut-, maple- or birch-veneer MDF or veneer-core panel (plywood)
† Painted black
†† Dimension includes walnut veneer-tape edge
††† Available from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374

Case Construction

Begin by cutting the walnut panels for the upper and lower cases. Pay special attention to matching the veneer on the outer sides so that the grain runs continuously from the lower- to upper-case side. Cut the panels slightly oversize, add the solid-walnut edge band (O, F) to the front edges of all panels and add the walnut veneer tape (M) to the top edges of the lower-case outer sides (E1). Then cut the panels to finished size.

Use the router with straightedge guide to cut the rabbet in the outer case sides (E1, N1) that hide the cabinet backs. Lay out the joining-plate slots in sides, tops and bottoms, and cut the slots with the plate joiner.

Make a boring template for the shelf-pin holes in the lower cabinets and a second template for the pin holes in the upper cabinets. A strip of 1/2-in. plywood or MDF is perfect for the template. Clamp the appropriate template to a cabinet side, and use it as a guide in boring the holes. A stop on the drill bit ensures uniform hole depth.

Mark the locations of the glass-hinge mortises on the upper-case top and bottom panels (P). Trace the hinges for the proper mortise shape. Use a router and straight bit to remove most of the waste from the mortises and finish with a sharp chisel and gouge. Test fit the hinge bases and make any necessary adjustments.

Lay out and bore the 7/8-in.-dia. holes for the light switches in the upper-case sides (N2). Use an adjustable circle cutter to bore the 58-mm-dia. holes for the halogen lights in the upper-case tops.

Sand the interior surfaces of the cabinet parts before assembly, finishing with 220-grit paper. Then, completely dust off the parts.

To assemble one of the cases, spread glue on each plate and in its slot before inserting the plate. Join the top and bottom to one of the case sides, then position the opposite side and apply clamps to pull the joints tight. Compare opposite diagonal measurements to check that the cabinet is square and adjust the clamps if necessary. Let the glue set for at least 30 minutes before removing the clamps. Repeat the process for the remaining cases.

Cut the 1/2-in. panels for the case backs (I, R). Note that the top edge of the lower-case backs must be covered with walnut-veneer tape. Apply the tape to the edge before cutting the panel to finished size. Bore pilot holes and temporarily fasten the backs to the cases with 1-in. No. 5 fh screws.

The Spacers, Base And Soffit

Prepare the maple spacers that fit between the cabinets and between the upper cases and the soffit. Temporarily screw the upper vertical spacers (CC) to an upper-case side and attach the lower vertical spacers (DD) to a lower case.

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Cut the maple parts for the base and soffit, as well as the 3/4-in. gussets (Y1, Y2, D1, D2). Assemble the base and soffit with 4d finishing nails and glue. Set and fill the nail holes. When the filler dries, sand the assemblies.

Lay the two bottom cases on their backs and clamp them together so that they are properly aligned. Bore pilot holes and temporarily screw the two cases together. Next, temporarily screw the base to the case bottoms. Stand the assembly on the floor. If necessary, shim the base so the assembly is level and stable.

Bore and countersink pilot holes in the spacers that separate the top and bottom cases. Then temporarily screw them to the top of the lower case assembly. Position the upper cases over the lower subassembly. Screw the upper cases together and fasten the upper half to the lower half by screwing through the tops of the lower cabinets. Then, temporarily install the top spacers (Z, AA, BB), place the soffit in position and temporarily secure it.

The Doors And Shelves

Select the panels for the lower cabinet doors so there will be a uniform, matching grain pattern across the lower cases. Cut the panels to size and apply walnut-veneer tape on all edges. Bore the 35mm recesses for the hinges in each door and mount the hinges on the doors. Attach the hinge mounting plates to the lower-case sides, mount the doors and adjust the hinges for proper spacing. Bore 3/16-in. holes for the door pulls and fasten the pulls to the doors.

For safety's sake, it's best to use tempered glass for the display case doors. Tempered glass must be specially ordered and cannot be altered once the tempering process is complete. Specify that the glass have polished edges and "dubbed" (slightly rounded or chamfered) corners.

Mount the glass-door hinge base plates to the cabinet, then attach the hinges to the tempered glass panels. First install the self-adhesive pressure plates to the corners of the glass doors. Then slide the hinges over the glass and gently tighten the screws. Carefully slide the door assembly into the base-plate tracks and thread in the door stops. Adjust the position of the glass doors for even spacing on all edges. Then install the strikes along the bottom edges of the glass doors. Mount the magnetic touch latches to the upper-case bottom panels.

Cut walnut panels for the lower-cabinet shelves and glue a walnut edge band to the front edge of each panel. Install shelf pins in the lower cases and test the fit of each shelf.

Use a dark pencil to outline the inside profile of each upper cabinet on the 1/2-in. backs. These marks will serve as registration guides for the mirrors. At this point, you can disassemble the cabinet for finishing. Any final adjustments and fitting can be done later. Remove all hardware, spacers, and the soffit and base. Sand all parts with 120-, 180- and 220-grit sandpaper, dusting off thoroughly between grits. When the sanding is complete, wipe all surfaces with a tack cloth.

Finishing

Paint the spacers, soffit and base with three coats of black satin enamel. Sand lightly between coats to achieve a smooth, even finish.

Apply three coats of varnish to the walnut case parts. We used Behlen's Rockhard Table Top Varnish. Thin the first coat 20% with Behlen's Rockhard Varnish Reducer and sand lightly with 400-grit paper after drying for 12 hours. Apply two more coats, full strength, again sanding lightly between coats. Let the last coat cure for no longer than 20 hours. Then wet-sand with 600-grit waterproof paper and paraffin oil to remove any dust particles. Wipe dry with clean cotton cloths, then buff with No. 0000 steel wool. Polish the finish with a clean, dry and soft cotton cloth.

Final Assembly

Use mirror mastic to mount the mirrors to the upper-cabinet backs. Lay the backs flat on a worktable and apply the mastic to the panels. Position the mirrors over the backs, aligning them within the registration marks. Let the mastic cure overnight before reinstalling the backs.

Reattach the spacers to the lower- and upper-cabinet sides. Join the lower cabinets together and reattach the base assembly.

Install the halogen lights in the tops of the upper cabinets and connect the wiring according to the diagrams that come with the lights. The halogen low-voltage system includes the lamps and a separate transformer, mounting block and light switch for each case. Fasten the transformers and mounting blocks to the top of each cabinet. Locate these parts so that they do not interfere with the placement of the spacers or soffit gussets. Install the switches on the case sides and route the wires up the sides and behind the vertical spacers. Use small electrical staples to hold the wires in place. Plug in the lights and check their operation before completing the cabinet assembly.

Replace the horizontal spacers on the lower-cabinet tops. Next, place the upper cabinets on the base, join them to each other and fasten them to the lower half. Reinstall the top spacers and attach the soffit. You can bore a 1-1/2-in. hole centered in the back of the soffit to allow the light cords to pass through, or you can simply let the cords drape over the top of the soffit.

Mount the hinges and mounting plates for the lower-case doors and rehang the doors. Rehang the glass doors and attach all door pulls. Finally, install the shelves.

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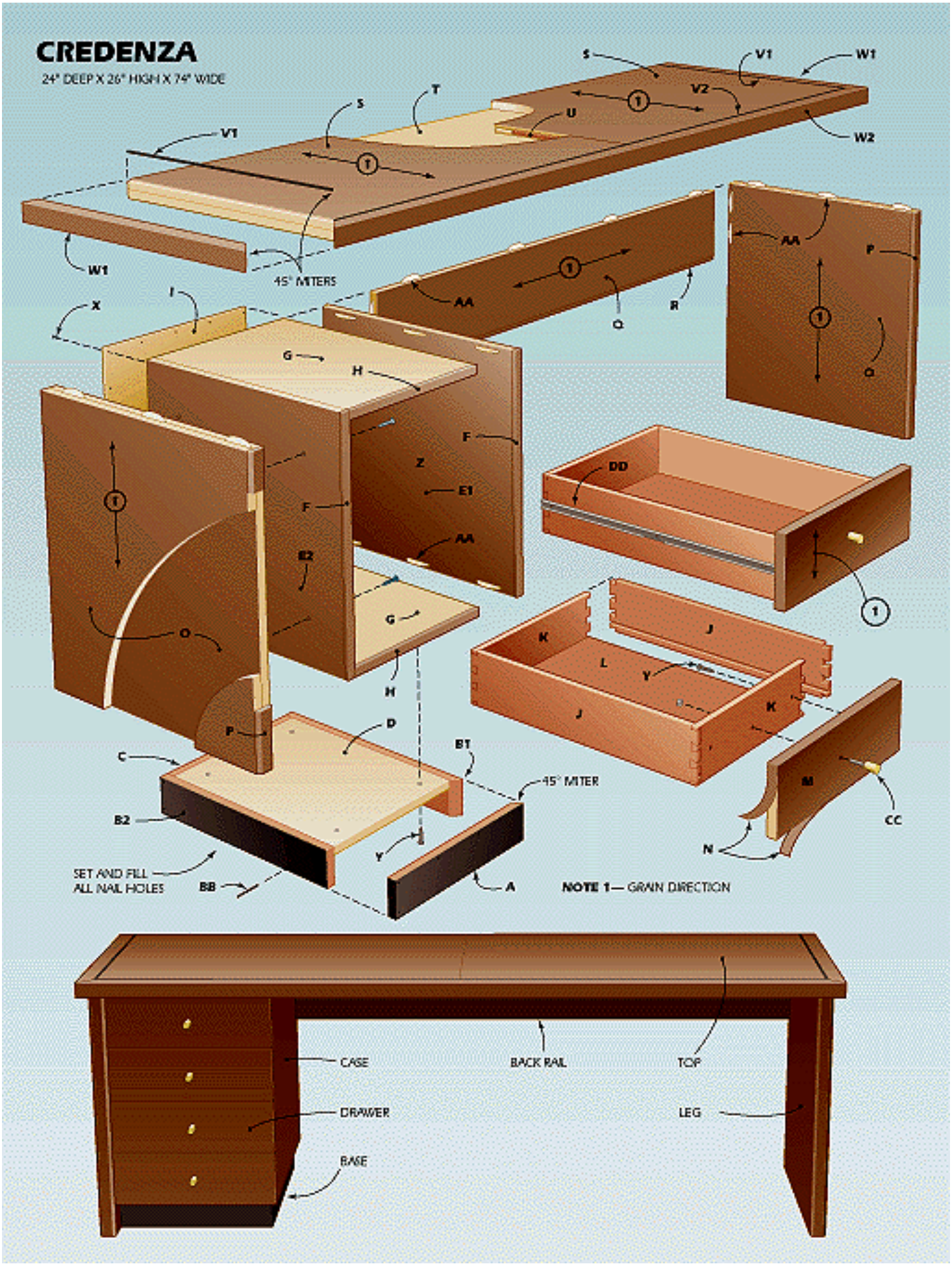
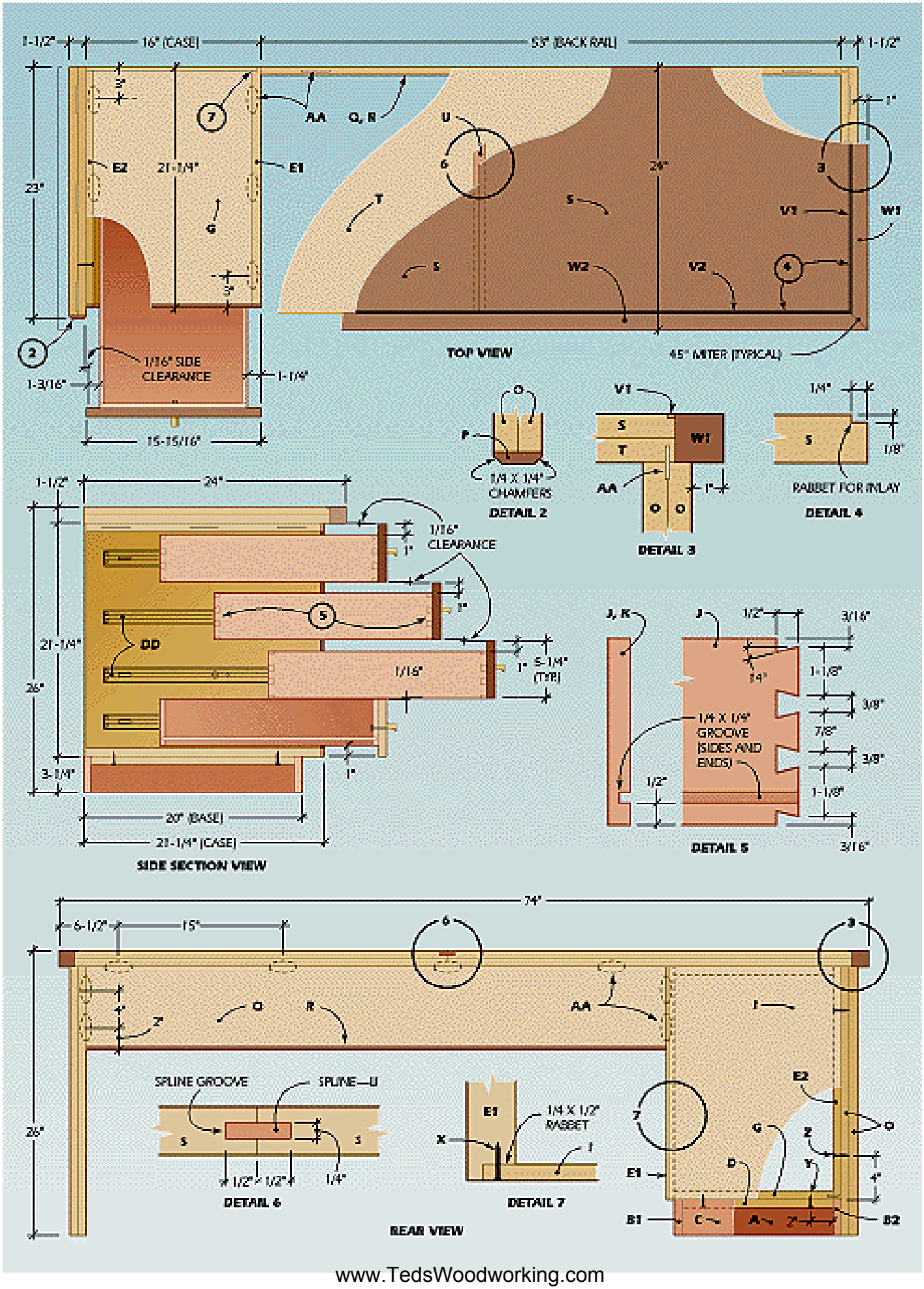
CREDENZA


CREDENZA
24" DEEP X 26" HIGH X 74" WIDE
45° MITERS
45° MITER
SET AND FILL ALL NAIL HOLES
NOTE 1— GRAIN DIRECTION
CASE
BACK RAIL
TOP
DRAWER
LEG
BASE



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MATERIALS LIST–CREDENZA

Key	No.	Size and description (use)
A	1	3/4 X 3-1/4 X 15-1/4" maple†† (base front)
B1	1	3/4 X 3-1/4 X 20" maple†† (base right side)
B2	1	3/4 X 3-1/4 X 19-1/4" maple†† (base left side)
C	1	3/4 X 3-1/4 X 13-3/4" maple†† (base back)
D	1	3/4 X 13-3/4 X 18-1/2" panel stock** (base top)
E1	1	3/4 X 21-1/4 X 20-7/8" walnut panel stock* (case right side)
E2	1	3/4 X 21-1/4 X 20-5/8" walnut panel stock* (case left side)
F	2	3/8 X 3/4 X 21-1/4" walnut (edge band)
G	2	3/4 X 14-1/2 X 21-3/8" panel stock** (case top/bottom)
H	2	3/8 X 3/4 X 14-1/2" walnut (edge band)
I	1	1/4 X 15-3/4 X 21-1/4" plywood (case back)
J	8	1/2 X 4-1/4 X 20" maple (drawer side)
K	8	1/2 X 4-1/4 X 13-1/2" maple (drawer end)
L	4	1/4 X 13 X 19-1/2" maple plywood (drawer bottom)
M	4	3/4 X 5-1/4 X 15-15/16" walnut panel stock*††† (drawer front)
N	as reqd.	walnut veneer tape
O	4	3/4 X 22-5/8 X 24-1/2" walnut panel stock* (leg panel)
P	2	3/8 X 1-1/2 X 24-1/2" walnut (edge band)
Q	1	3/4 X 7-5/8 X 53" walnut panel stock* (rail)
R	1	3/8 X 3/4 X 53" walnut (edge band)
S	2	3/4 X 22-1/2 X 35-1/2" walnut panel stock* (upper top panel)
T	1	3/4 X 22-1/2 X 71" panel stock** (lower top panel)
U	1	1/4 X 1 X 22-1/2" maple (spline)
V1	2	1/8 X 1/4 X 22-1/2" maple† (inlay)
V2	1	1/8 X 1/4 X 71" maple† (inlay)
W1	2	1-1/2 X 1-1/2 X 24" walnut (edge)
W2	1	1-1/2 X 1-1/2 X 74" walnut (edge)
X	as reqd.	3/4" No. 5 fh wood screw**
Y	as reqd.	1-1/4" No. 8 fh wood screw**
Z	as reqd.	1-1/2" No. 8 fh wood screw**
AA	as reqd.	No. 20 joining plate**
BB	as reqd.	4d finishing nail**
CC	4	drawer pull–Sugatsune No. GLA-16, polished brass
DD	4	20" full-extension drawer slide–No. 32839 ††††

*Walnut-veneer MDF or veneer-core panel
**Walnut-, maple- or birch-veneer MDF or veneer-core panel (plywood)
† Black-dyed inlay strips available from Dover Inlay Mfg. Co. Inc., Box 151, Williamsport, MD 21795
†† Painted black
††† Dimension includes walnut veneer-tape edge
†††† Available from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374

Begin by cutting the case parts (E1, E2, G) to size. Cut edge band strips (F) from solid walnut and glue them to the front edges of the panels. Use a router with an edge guide to cut the rabbet along the back edge of the exposed side of the base.

Lay out the joining-plate slots in the case parts and use a plate joiner to cut the slots. Apply glue to the slots and joining plates, install the plates and assemble the case. Use bar or pipe clamps to pull the joints tight and check that the assembly is square by comparing opposite diagonal measurements. Adjust the clamps if necessary and allow the glue to cure for at least 30 minutes before removing the clamps. Cut the 1/4-in. back panel (I) to size, bore pilot holes and install it on the case with 3/4-in. No. 5 fh wood screws.

Cut solid-maple stock to size for the base (A, B1, B2, C), and cut the 3/4-in. plywood base top panel (D) to size. Join the maple pieces to the panel and to each other at the corners with 4d finishing nails and glue. Make sure that the miter joint on the exposed corner is tight. Set and fill the nail holes. When the filler is completely dry, sand the base smooth with 120-, 180- and 220-grit sandpaper. Bore pilot holes in the base top and fasten the base to the case.

The Legs And Rail

Cut walnut panels to size for the legs (O). Apply glue to a pair of panels for each leg, then clamp them together until the glue sets. Cut a walnut edge band (F) for each leg assembly. Apply glue to one of the strips and the front edge of one of the legs, then clamp the strip in place. Repeat for the other leg. After the glue sets, scrape off any excess. Use a router and chamfer bit to cut the bevels along the front edges of the legs.

Cut the back rail to size and glue the walnut edge band (R) along its bottom edge. Lay out and cut the joining-plate slots in the ends and top edge of the rail and also in the leg panels and inner case side. Set these parts aside until the top is complete.

The Top

Cut the panels to size for the desktop. The top is formed by sandwiching together two pieces of 3/4-in. stock. The grain of the top panel (S) runs across the top, so the upper panels must be joined in the center. Pay close attention to matching the grain. Since the bottom panel (T) is not visible, cut it in one piece with the grain running along its length.

Use the router with a slotting cutter to cut the spline grooves in the mating edges of the top panels. Cut a maple spline to fit the groove, apply glue to the grooves, edges and spline and assemble the panel. Pull the joint tight with clamps and allow the glue to set. Spread glue on the desktop panels and stack them together with all edges perfectly flush. Use enough clamps and cauls to distribute even pressure across the top. Let the glue set for at least 1 hour.

Use a router and edge guide to cut the rabbet around the front and ends of the top. Trim the black inlay strips (V1, V2) to size. Since the strips come in 3-ft. lengths, there will be joints along the front edge of the top. To keep these seams hidden, use 45 degree scarf joints instead of butt joints. Apply glue to the rabbet and install the inlay strips. Use masking tape spaced 2 in. apart to hold the inlay while the glue sets. After 30 minutes, remove the tape and scrape off excess glue.

Cut the solid-walnut edge (W1, W2) to size from 2-in. stock. Spread glue on both the panel edge and one of the solid edge pieces, and clamp the piece in place. Be sure to keep the top surfaces of the veneered panel and walnut edging perfectly flush. Repeat the process for each edge.

Assembly

Lay out the joining-plate slots on the bottom side of the desktop and use the plate joiner to cut the slots. Sand the desk parts with 120-, 180- and 220-grit sandpaper.

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Spread glue in the joining-plate slots at the ends of the back rail and in the mating slots at the case and right leg. Spread glue on the joining plates, install the plates and join the rail to the case and leg. Use bar clamps to pull the joints tight. While the glue sets, bore and countersink pilot holes through the left case side to attach the left leg and fasten the leg with screws.

Apply glue to the slots in the desktop and on the top edges of the base parts. Spread glue on the joining plates, install them and place the top on the base. Be sure to use pads under the clamp jaws when pulling the joint tight.

Drawer Construction

Cut maple to size for the drawer parts. We used a Leigh dovetail jig and a router to cut the drawer joints. If you use another type of jig, or decide to cut the joints by hand, the layout may vary. Follow the directions that come with your jig for cutting the joints.

Use a dado blade in the table saw to cut the drawer-bottom grooves in the other drawer parts. Cut the bottoms from 1/4-in. maple or birch plywood. Sand the inside surfaces of each drawer part with 120-, 180- and 220-grit sandpaper, but be careful to not sand the joint surfaces or the dovetails will not fit properly.

Use a small brush to spread glue on the dovetail-joint surfaces, then assemble one of the sides to a front and back. Slide the drawer bottom into position, then join the remaining side. If the joints fit properly, you will not need to clamp the drawer together. Just compare opposite diagonal measurements to be sure that the drawer is square and set it aside until the glue sets. When the glue is fully cured, sand the exterior of all drawers.

Cut the drawer faces from a single walnut panel so the grain will run continuously when the drawers are in place. Number the faces on the back side so that you can keep them in the proper order and apply walnut-veneer tape on all edges. The tape comes with hot-melt glue applied to its back side so you can use a household iron to adhere it.

Sand the drawer faces, then attach them to the drawer boxes with 1-in. No. 8 screws. Note that the position of the bottom face, relative to the drawer box, is different from that of the other faces. Install the drawer slides according to the instructions that come with them. Bore pilot holes for the drawer pulls and install them with the appropriate screws.

Remove the drawers and sand the credenza to eliminate any scuffs and scratches and thoroughly remove all dust. Wipe all surfaces with a tack cloth.

Finishing

First, finish the case base by applying two or three coats of satin black enamel. Lightly sand between coats to ensure a smooth surface.

Apply Behlen's Pore-O-Pac (Van Dyke Brown) paste wood filler to the top using a brush or rubber squeegee. Spread the filler across the grain, then re-apply it with the grain. When the paste takes on a dull appearance, remove the excess with a plastic scraper, then buff the surface vigorously with burlap cloths. Let the top dry overnight before proceeding.

Use three coats of Behlen's Rockhard Table Top Varnish for the final finish. Thin the first coat 20% with Rockhard Varnish Reducer. After 12 hours drying time, lightly sand the surface with 400-grit paper and wipe with a tack cloth. Apply two more coats, allowing overnight drying and light sanding between coats.

Let the final coat cure for no longer than 20 hours, then wet-sand the surface with 600-grit paper and paraffin oil. When all dust and uneven spots are gone, wipe the surface with a soft cloth to remove the oil and slurry. Use No. 0000 steel wool to burnish the surface, then polish the desk with a soft, lint-free cloth.

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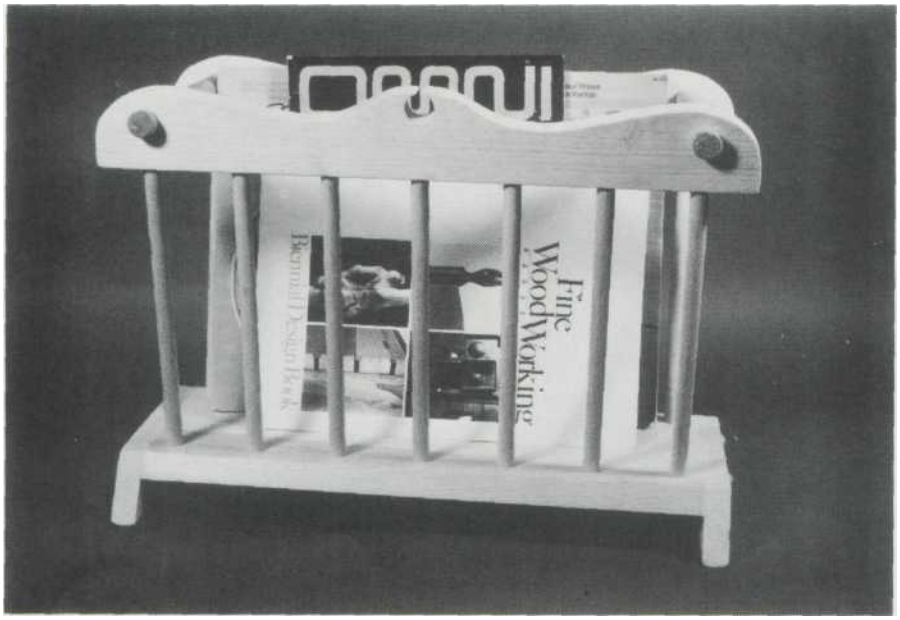
MAGAZINE RACK



What better place to store your periodicals than in this inexpensive magazine rack? Using standard size left over from other projects, you can build it in no time at all.

1. Sand all stock with 1OO-grit paper to remove mill marks.

2. Mark the location of all holes to be drilled. The fourteen 1/2"-diameter column holes in the base (A) and the four 3/4"-diameter brace holes in the rails (C) must be drilled at 10° angles.

3. Change the drill press table back to 90° to drill the fourteen 1/2"-diameter column holes and the 3/4"-diameter decorative holes in the top rails.

4. Using the patterns provided, cut the contours of the top rails and the feet (B).

5. With a handsaw or table saw, cut a 60° bevel on the edges of the base and the ends of the feet. Make sure the pieces are exactly the same width and the same angle where they join.

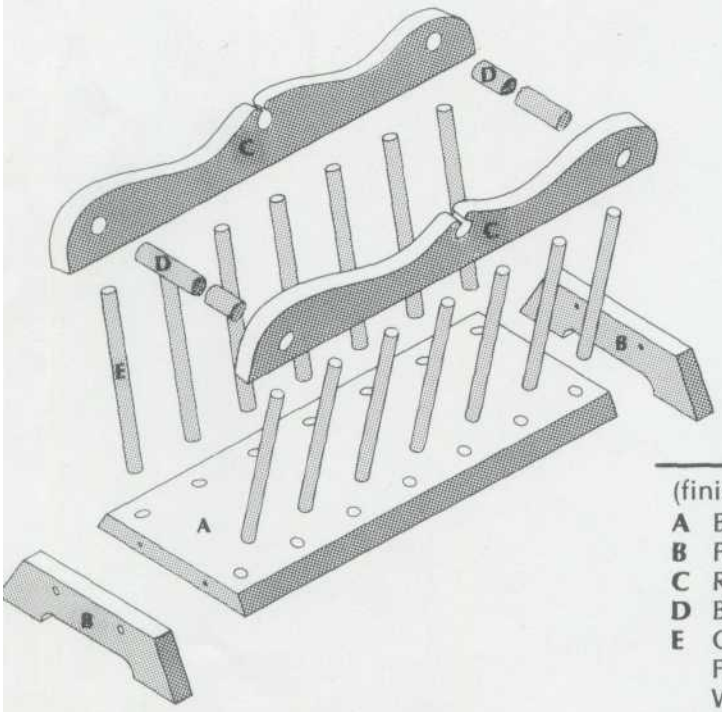
6. Cut the braces (D) and columns (E) to length, making sure to knock off any burrs on the ends.

7. To assemble, first attach the feet to the base using glue and #8 x 1-1/2" flathead wood screws. Countersink the screws.

8. To complete the rack assembly, use glue to fasten the ends of the columns and braces. Be sure to wipe off any excess glue immediately with a damp rag.

9. Use a sanding block to round over all sharp edges, including the protruding ends of the braces, and to smooth the joints between the base and legs.

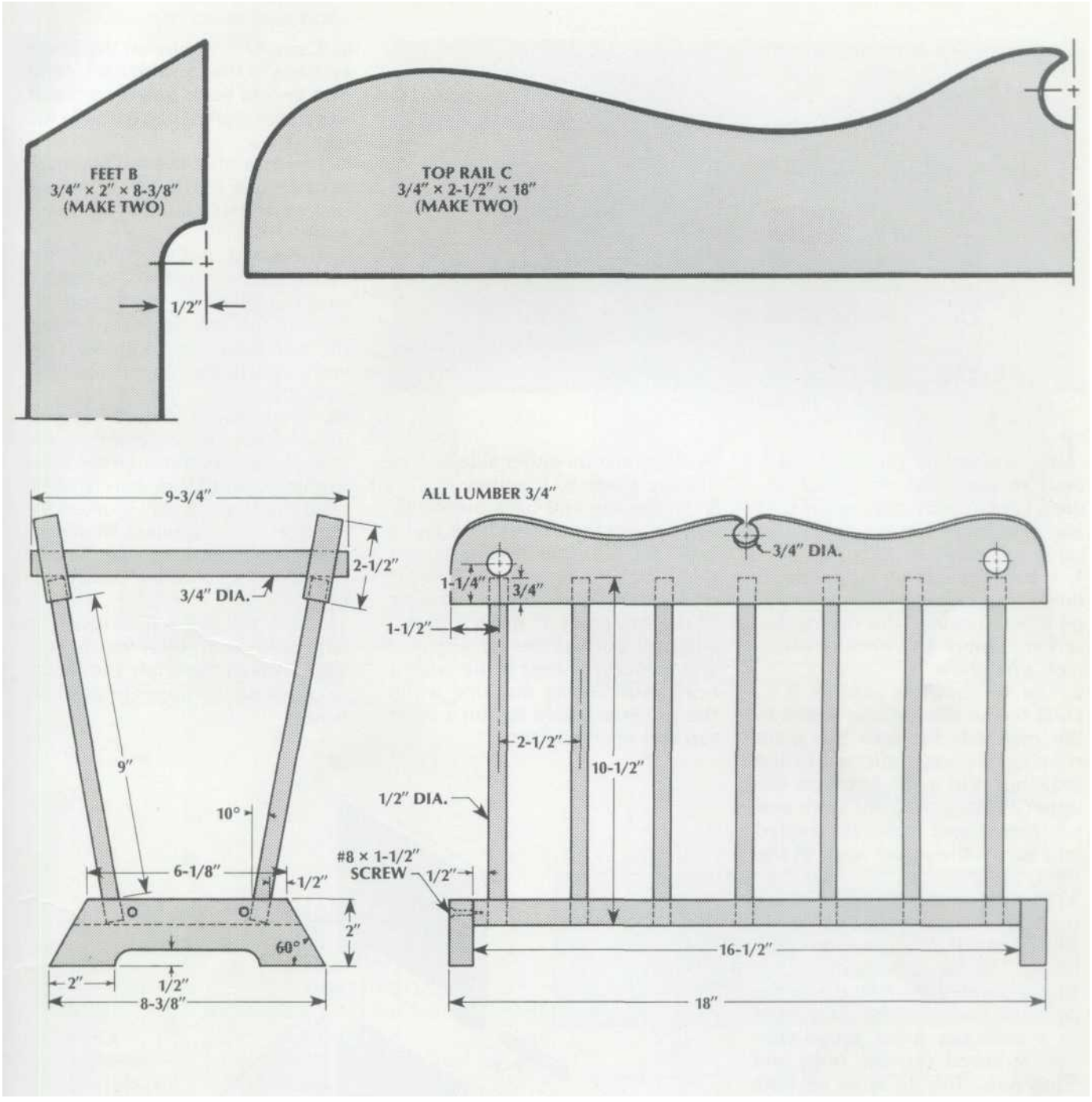
10. Stain the rack with an Early American stain. Natural oil is recommended for the finish.



LIST OF MATERIALS

(finished dimensions in inches)

A	Base	3/4 × 7 × 16-1/2
B	Feet (2)	3/4 × 2 × 8-3/8
C	Rails (2)	3/4 × 2-1/2 × 18
D	Braces (2)	3/4-dia. × 9-3/4 dowels
E	Columns (14)	1/2-dia. × 10-1/2 dowels
	Flathead wood screws	#8 × 1-1/2
	Wood glue	


FEET B
3/4" × 2" × 8-3/8"
(MAKE TWO)
1/2"
TOP RAIL C
3/4" × 2-1/2" × 18"
(MAKE TWO)
9-3/4"
2-1/2"
3/4" DIA.
9"
10°
6-1/8"
1/2"
2"
60°
2"
1/2"
8-3/8"
ALL LUMBER 3/4"
3/4" DIA.
1-1/4"
3/4"
1-1/2"
2-1/2"
10-1/2"
1/2" DIA.
#8 × 1-1/2"
SCREW
1/2"
16-1/2"
18"

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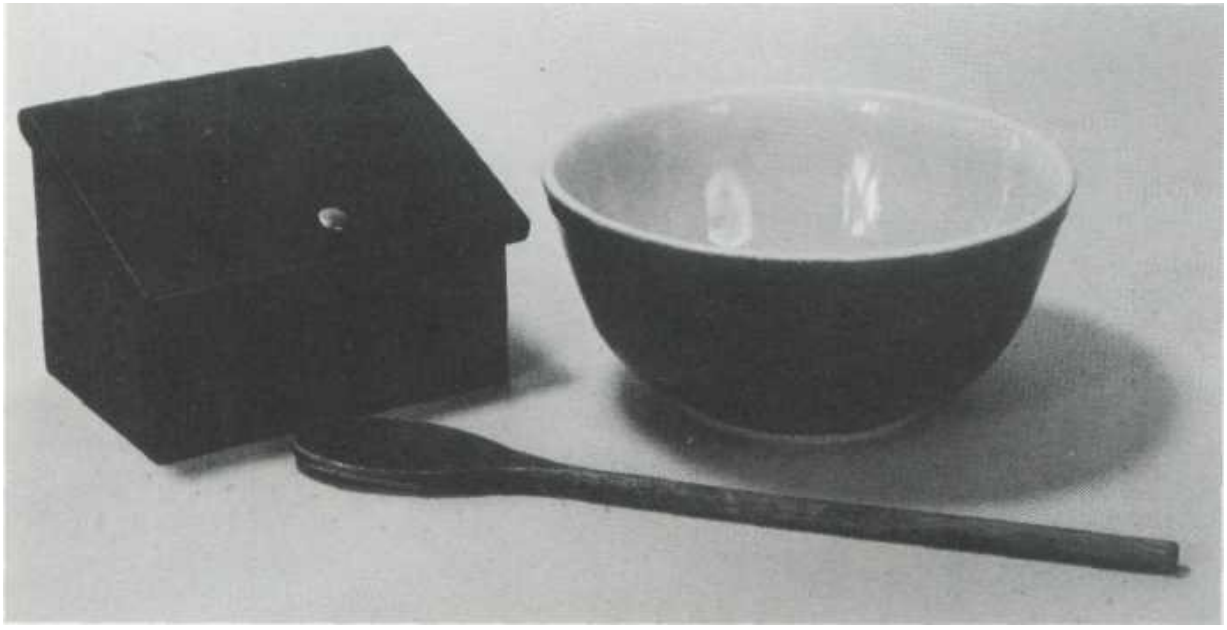
RECIPE BOX

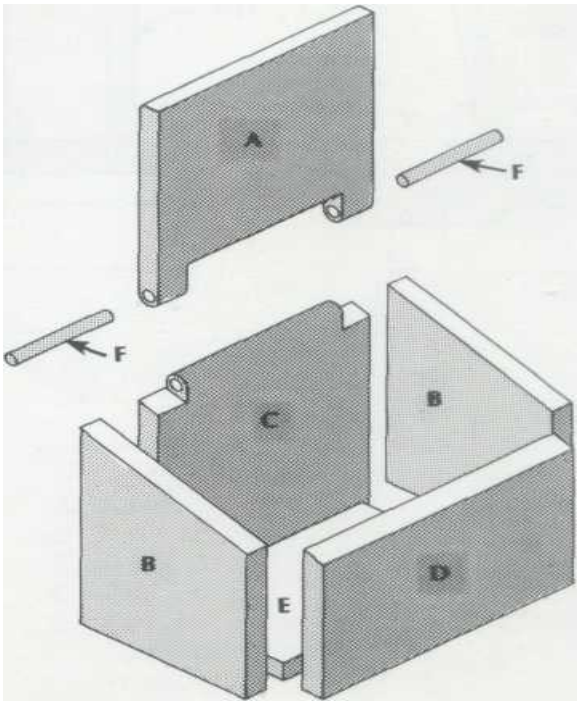


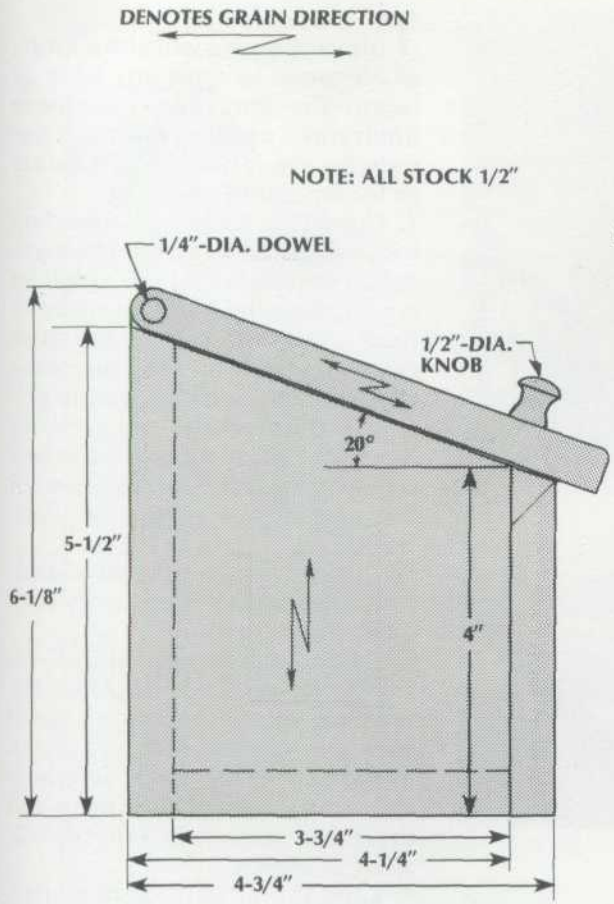
This recipe box can hold more than recipe cards—buttons, address cards, candy, crayons, almost any little thing around the house can find a home in it.

1. If you are unable to purchase the 1/2" stock needed for the recipe box, custom plane the necessary amount of 3/4" stock or resaw t on a bandsaw.
2. Cut the basic box parts (A, B, C, D, E) to the dimensions found in the materials list with the grain running the way indicated in the drawings. Rip a 70° bevel on the upper edges of the front, back, and top pieces and make 70° angled cuts across the upper ends of the sides.
3. Make a simple jig to hold the top and back pieces at a 70° angle while you make the cutouts for the hinge. The jig consists of a 2 x 4 with a beveled front face (see the jig layoutend view) that is fastened to a table saw miter gauge with counterbored carriage bolts and wing nuts. The jig must be long enough to be used on either side of the saw blade. (A 12" length should suffice for most saws.)
4. Cut the notches on the top and back pieces with your saw blade (or dado blades, if you have them) set to a height of 9/16". Hold each piece firmly against the jig and keep its beveled edge flush with the table top while cutting. Make the notch at the center of the top piece wide enough to create 1/64" of clearance on either side where the two pieces fit together.

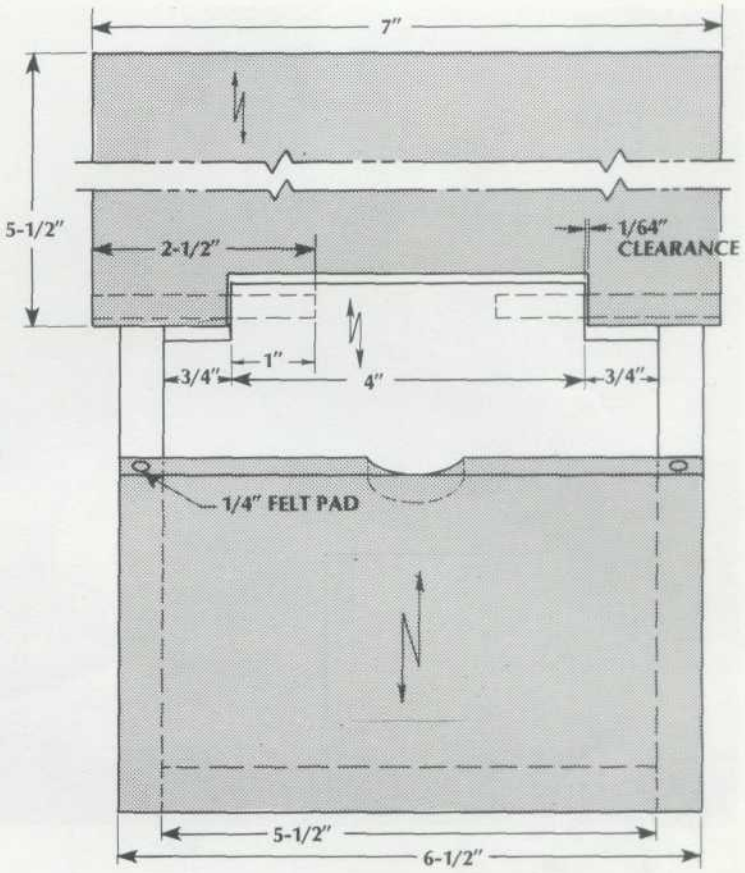
Fit the top and back pieces together with their faces flush and a 1/16"-thick spacer holding them slightly apart. Center and drill 1/4"-diameter holes through each wing of the top piece 1" deep into the adjacent part of the back piece. This process is best done with a horizontal boring machine while the prices are held flat on a table top and against a fence.

6. Cut a 1/2" radius on the hinge sections of the top and back. Sand one end of each dowel so that it will rotate easily when fit inside the back.
6. Dry assemble the top and back to make sure the dowels fit and the hinge operates properly. Sand parts as needed.
7. If desired, cut a scallop in the inside edge of the front to make it easier to get to the front cards.
8. Glue the box together without the top. Keep excess glue off the visible parts and clamp until the glue dries.
10. Set the top in place lining up its dowel holes with those of the back.Push the dowels through the holes in the top until they barely penetrate the back. Apply glue on the last 3/4" of each dowel, then push them the rest of the way in until they are flush with the sides of the top.
11. Give the box a final touch up with sandpaper, then finish as de sired. Attach the knob and mount felt pads on the upper edge of the front.





SIDE

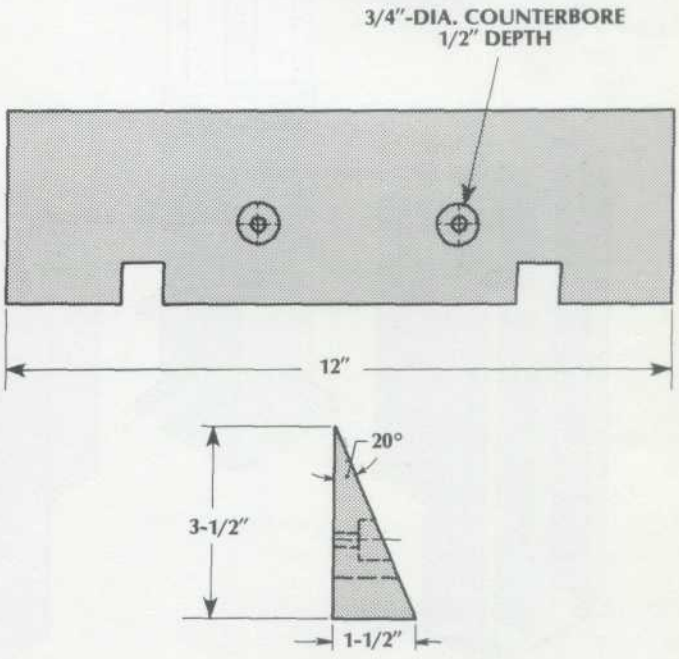


FRONT

LIST OF MATERIALS

(finished dimensions in inches)

A	Top	1/2 × 7 × 5-1/2
B	Sides (2)	1/2 × 4-1/4 × 5-1/2
C	Back	1/2 × 5-1/2 × 6-1/8
D	Front	1/2 × 6-1/2 × 4
E	Bottom	1/2 × 3-3/4 × 5-1/2
F	Dowels (2)	1/4 dia. × 2-1/2
	Felt pad (2)	
	Knob (optional)	
	Carriage bolts	
	Wing nuts	
	Wood glue	



SAWING JIG LAYOUT

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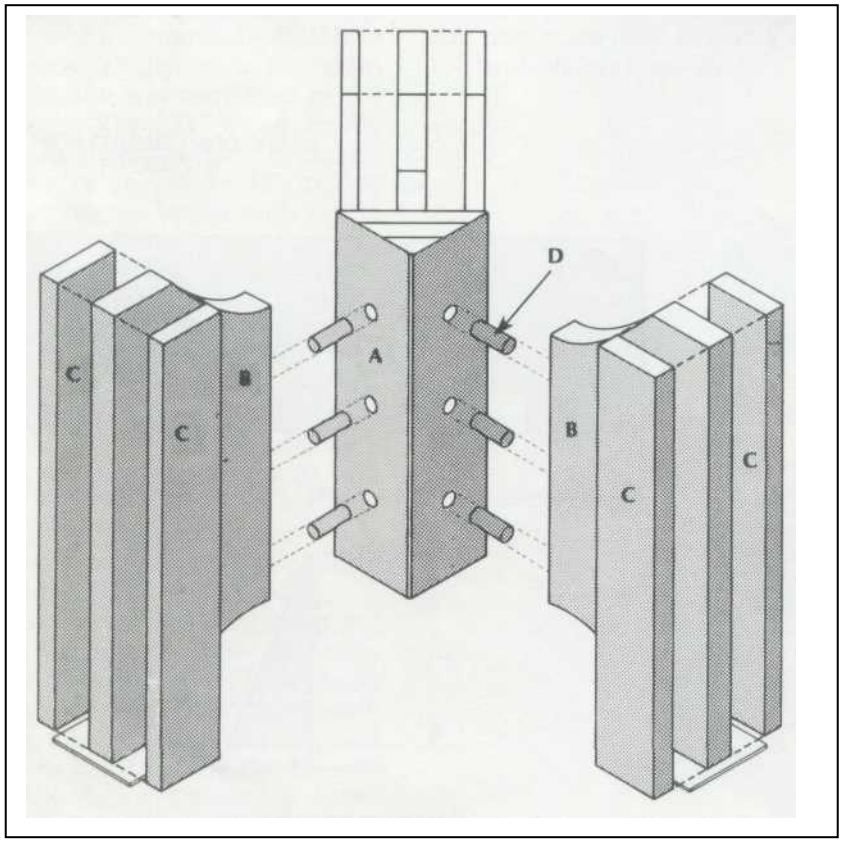
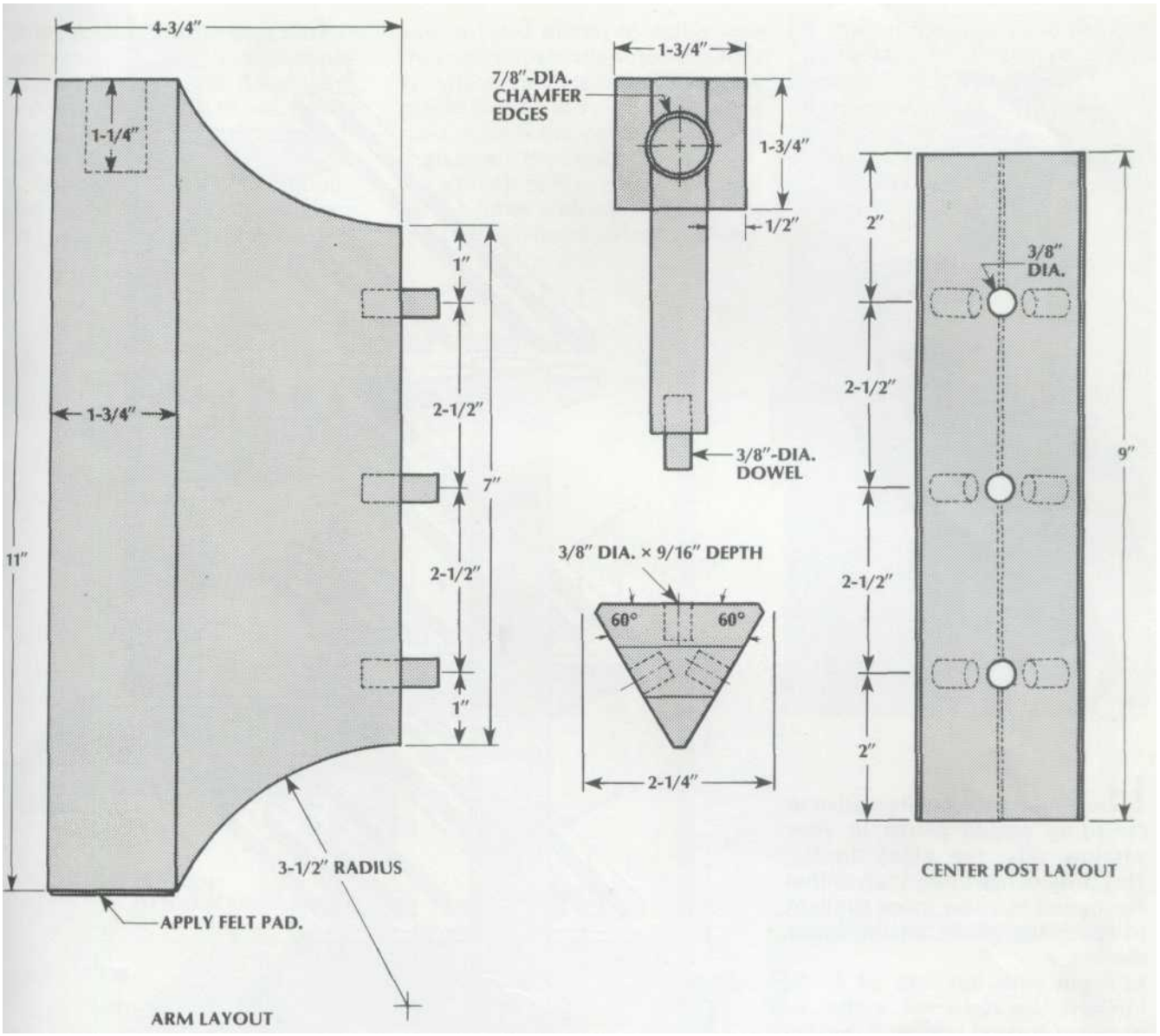
CANDELABRA

This candelabra will add a touch of elegance to most any table or room. The attractive centerpiece holds three candles, making it just right for a quiet candlelight dinner or for emergency lighting.

1. Cut all pieces to size according to the dimensions given. The trian gular center post (A) can either be cut from a solid piece of wood or from glued-up stock. In the latter case, it is a good idea to make some of the 60° beveled cuts prior to glu ing up the material and finishing the job with a hand plane and belt sander. Flatten the sharp corners of the post with a sander or block plane.
2. Cut out the arms (B) on a band-saw, then sand the edges smooth with a drum sander.
3. Drill matching sets of 3/8"-di-ameter holes 9/16" deep into the center post and the inside edge of each arm for doweling the pieces together. Center the middle hole along the length of each piece and space the remaining holes 2-1/2" apart as shown.
4. Glue the sides (C) to the arms, keeping their outer edges flush. After the glue has dried, sand the assembled arms.
5. Center and drill a 7/8"-diameter hole 1-1/4" deep in the top of each arm to hold a candle. Chamfer the edges of the holes with a 1"-diam-eter countersink or by hand sand ing; this will allow the candles to fit in more easily.
6. Attach the arms to the center post using glue and dowels (D). Clamp until the glue has dried.

Finish the candelabra as desired. Glue felt pads to the bottoms of the arms to prevent furniture from be ing scratched.





LIST OF MATERIALS

(finished dimensions in inches)

A	Center post	2-1/4 × 2-1/4 × 2-1/4 × 9
B	Arms (3)	3/4 × 4-3/4 × 11
C	Sides (6)	1/2 × 1-3/4 × 11
D	Dowels (9)	3/8 dia. × 1
	Felt pads (3)	1-3/4 × 1-3/4
	Wood glue	

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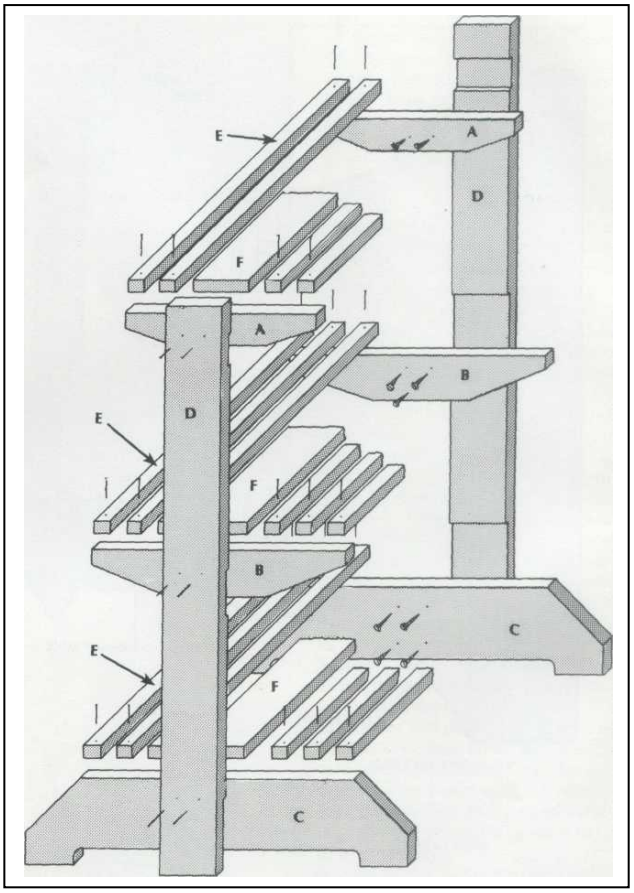
PLANT DISPLAY

Here's the perfect alternative to crowding potted plants in your window sills: the plant display. This project has three shelves that are slatted to allow more sunlight to reach the plants on the lower shelves.

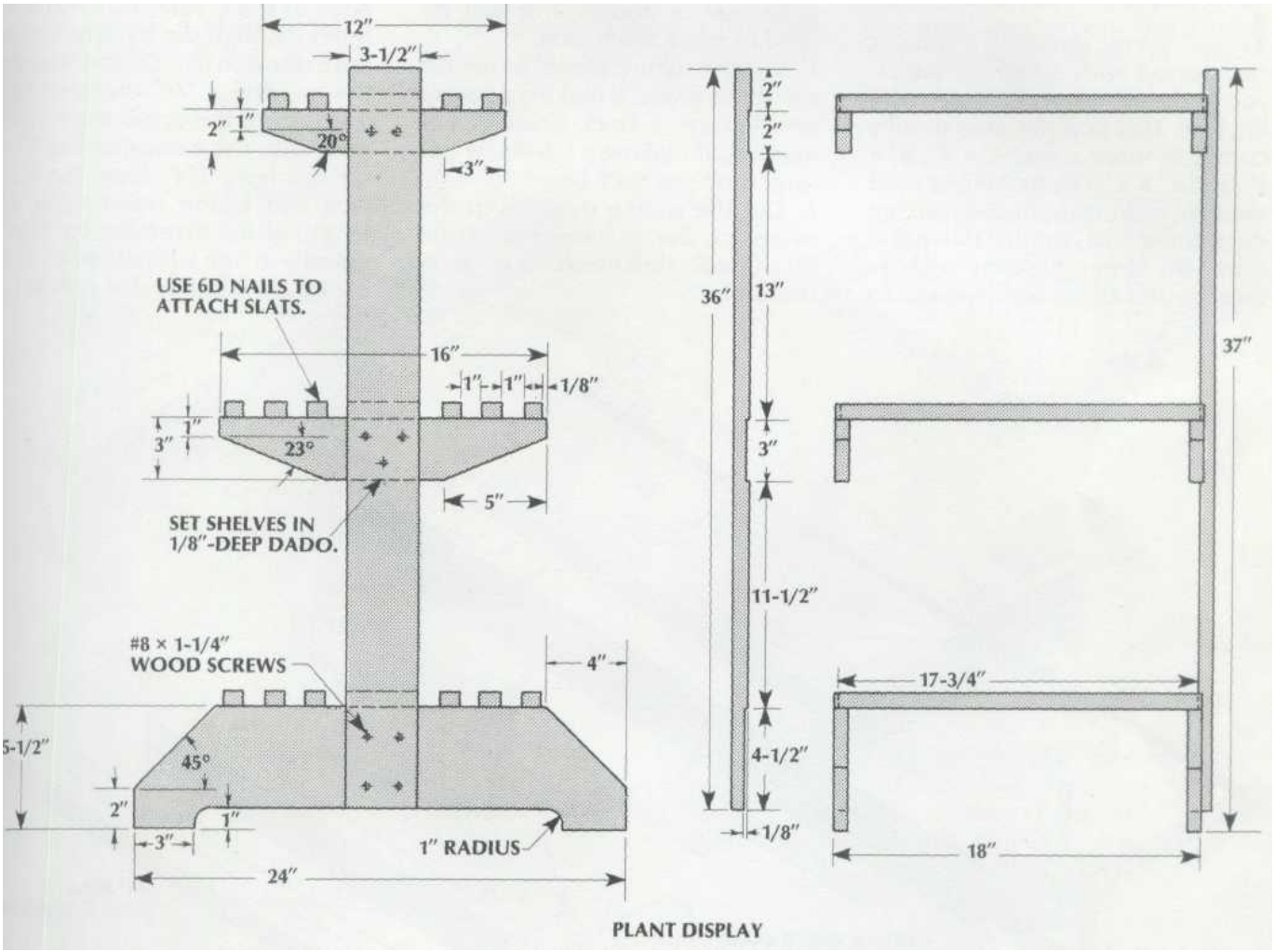
1. Begin with ten feet of 1 x 12 lumber. Use redwood, cedar, or pressure-treated lumber if the dis play is intended for outdoor use.
2. Cut all pieces to size on a table saw.
3. Lay out and mark the various angles on the ends of the top shelf sides (A), middle shelf sides (B), and the base pieces (C). Cut these angles using a bandsaw and 1/4" blade.
4. Using a router or a saw fitted with dado blades, cut 1/8"-deep dadoes and rabbets in the posts (D) for the shelf sides and base pieces.
5. Dill screw holes in the shelf sides and the base pieces, and cor responding pilot holes in the posts Drill pilot holes in the shelf slats (E) and center pieces (F) to accommodate 6d finishing nails. (Use one of the nails as a drill bit to assure that the diameter of the pilot holes is drilled accurately.) 6. Sand all of the pieces smooth. The sawed edges should be given an extra sanding, or be touched up
with a hand plane, to make sure they are sufficiently smooth. 7. Attach the slats and shelf center pieces to the sides with 6d finishing nails. Attach the centers first, and then install the slats at 1" intervals. Set all nails below the surface and fill the holes with wood putty that matches the finish you plan to use.
8. Attach the shelves to the posts using #8 x 1-1/4" flathead wood screws.
9. Finish the plant display with poly-urethane or some other water-resistant finish if it is not made of redwood, cedar, or pressure-treated lumber.



LIST OF MATERIALS

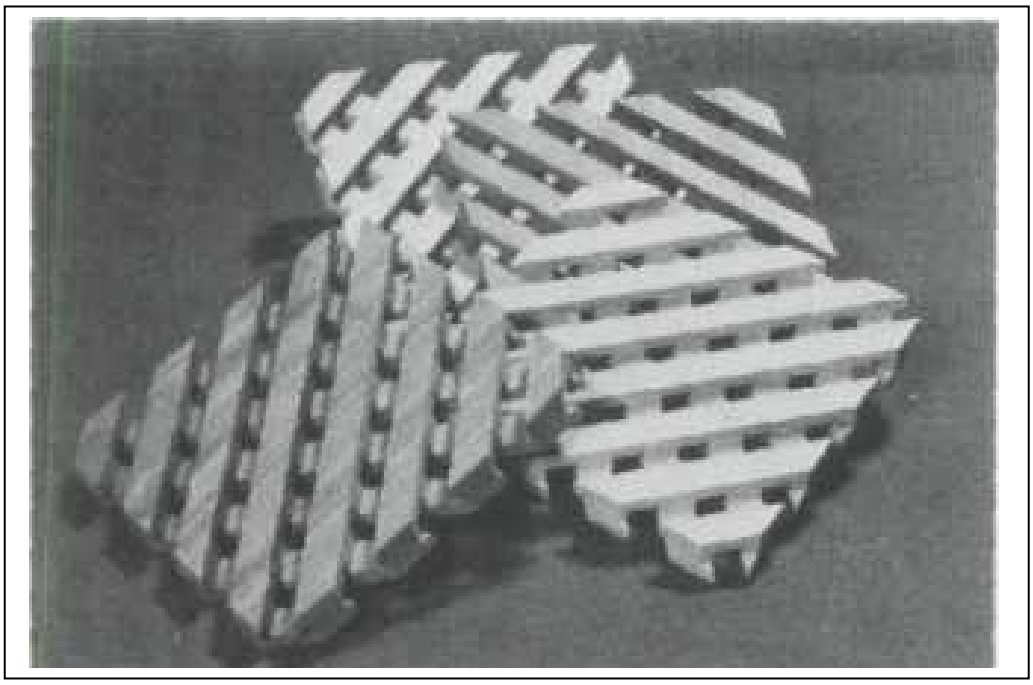
(finished dimensions in inches)

A	Top shelf sides (2)	3/4 × 2 × 12
B	Middle shelf sides (2)	3/4 × 3 × 16
C	Base pieces (2)	3/4 × 5-1/2 × 24
D	Posts (2)	3/4 × 3-1/2 × 36
E	Shelf slats (16)	3/4 × 1 × 18
F	Shelf center pieces(3)	3/4 × 3-1/2 × 17-3/4
	Flathead wood screws	#8 × 1-1/4
	6d finishing nails	



PLANT DISPLAY

173 TRIVETS

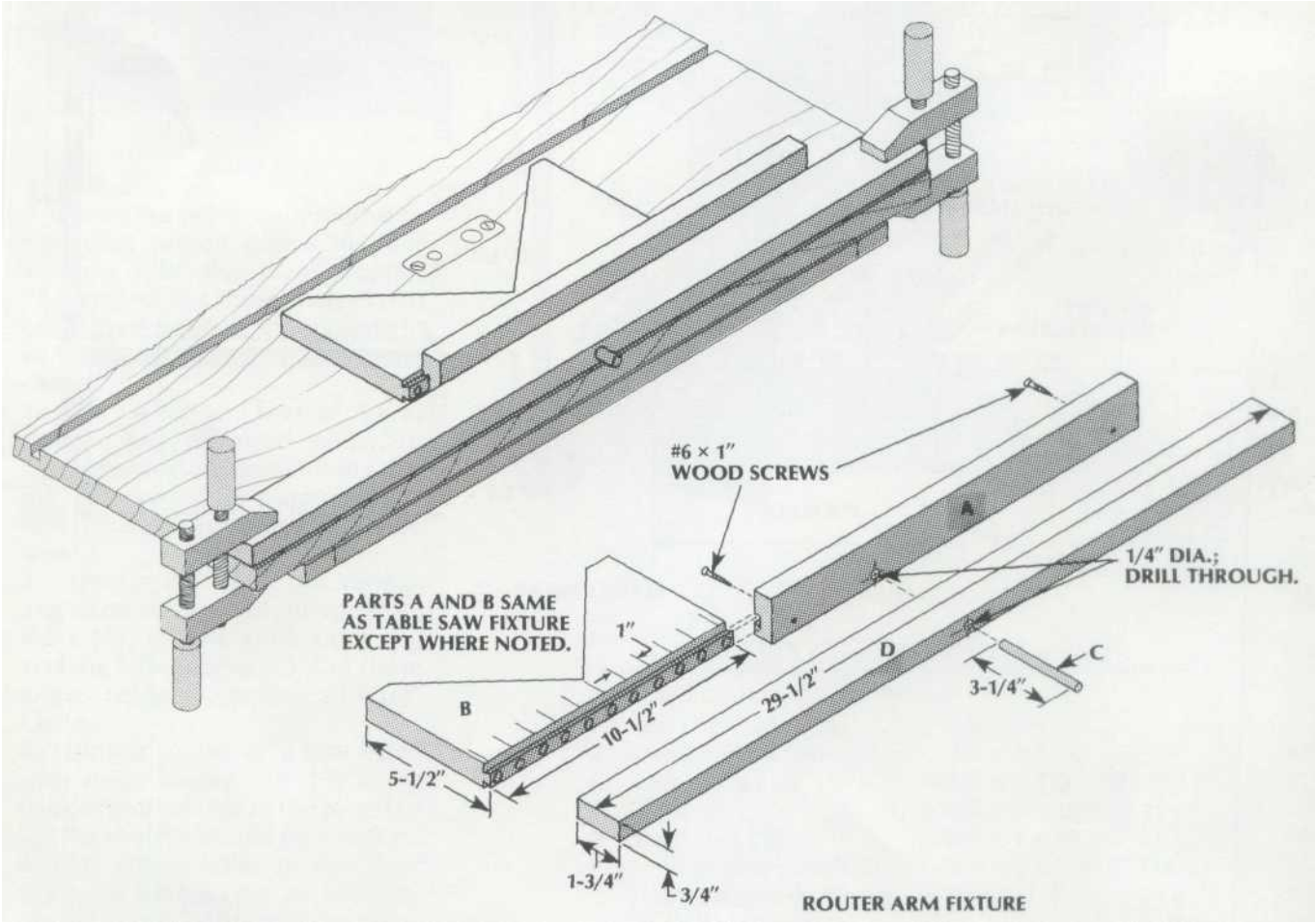


If you've ever scorched a table or countertop with a hot container, you know the value of trivets in the kitchen. This popular item usually comes in three sizes: 4" x 4", 6" x 6", and 8" x 8". The technique used involves making multi-intersecting decorative cuts, similar to what is done on larger projects such as door panels and room dividers. To do this, you will need a simple fixture and a table saw or router arm, such as the homeowner model made by Shopsmith.

MAKING THE FIXTURE

The purpose of the fixture is to make straight, accurate cuts while holding the blanks securely in place. Construction of the fixture varies, depending on whether a table saw or router arm will be used to make the trivets.

1. Cut the fixture pieces to the dimensions given. If making a router arm fixture, a back brace (D) is needed; if making a table saw fixture, omit the back brace.
2. Cut the sliding dovetail in the extension bar (A) and the cradle (B). Check the fit—it must slide smoothly.
3. Place the extension bar and cradle on the table saw or router arm table, lining up the center of the cradle V-notch with the cutter. Mark a centerline on the cradle and extension bar, then mark one inch increments on both sides of the centerline.
4. On the router arm fixture, center and drill 1/4"-diameter indexing holes 3/8" deep into the back edge of the cradle; drill matching holes through the back brace and the extension bar. On the table saw fixture, drill a 1/4"-diameter hole down from the upper edge 2-1/4" deep into the extension bar. Center the hole 1/4" from the front face and at the point along the length of the extension bar that is directly in line with the saw's dado blades. Make indexing notches in



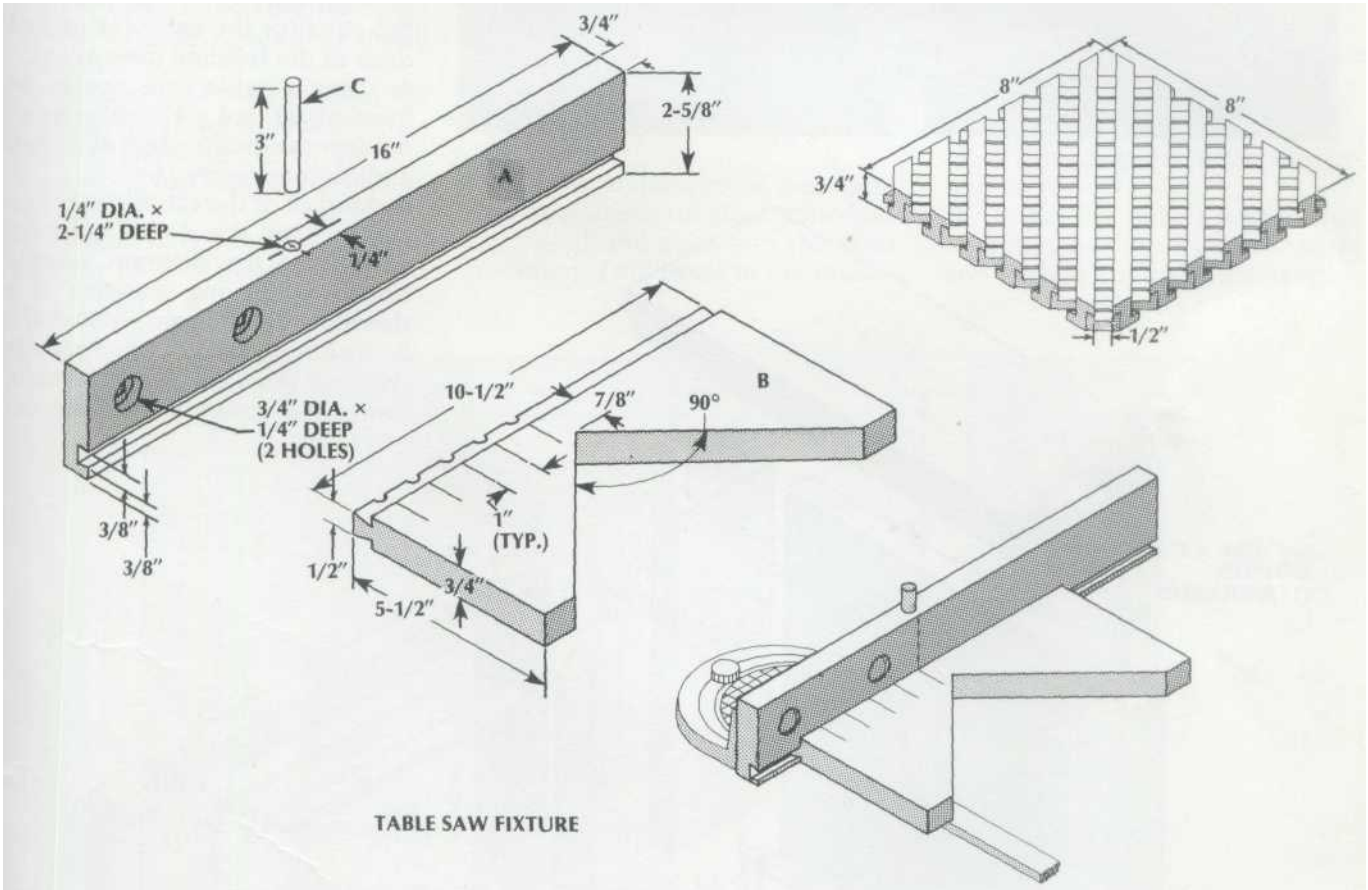
the back edge of the cradle by sliding it along the slot in the extension bar and drilling through the hole in the bar.

5. Clamp the router arm fixture on the saw table. For the table saw fixture, drill two holes in the extension bar and attach it to the miter gauge with carriage bolts and wing nuts.

MAKING THE TRIVETS

Trivets utilize 3/4"-thick stock cut into blanks of 4" x 4", 6" x 6", and 8" x 8". Only one blank at a time can be inserted into the fixture and cut.

1. If using a table saw, set dado blades to cut a 1/2" kerf. If using a router arm, use a carbide-tipped straight router bit or any decora tive bit without a pilot.
2. All cuts are 1/2" deep. Start at one corner, make the first cut, then rotate the blank 180° and cut across the other corner.
3. Remove the stop pin (C), then slide in the cradle and blank one inch. Reinsert the pin and cut the next groove. As before, turn the blank 180° and cut the second groove on the other side. Continue in this manner until you reach the middle of the blank and the top is completed.
4. Turn the blank over, rotate it 90°, and begin the same cutting procedure from corner to middle.
5. Sand the edges of the trivets with a disc sander. For overall sand ing, use flutter sheets. Use a good heat- and water-resistant finish.



LIST OF MATERIALS
(Router Arm Fixture)

(finished dimensions in inches)

A	Extension bar	3/4 × 1-3/4 × 16
B	Cradle	3/4 × 5-1/2 × 10-1/2
C	Stop pin	1/4 dia. × 3-1/4
D	Back brace	3/4 × 1-3/4 × 29-1/2
	Flathead wood screws	#6 × 1

LIST OF MATERIALS
(Table Saw Fixture)

(finished dimensions in inches)

A	Extension bar	3/4 × 2-5/8 × 16
B	Cradle	3/4 × 5-1/2 × 10-1/2
C	Stop pin	1/4 dia. × 3
	Carriage bolts	
	Wing nuts	

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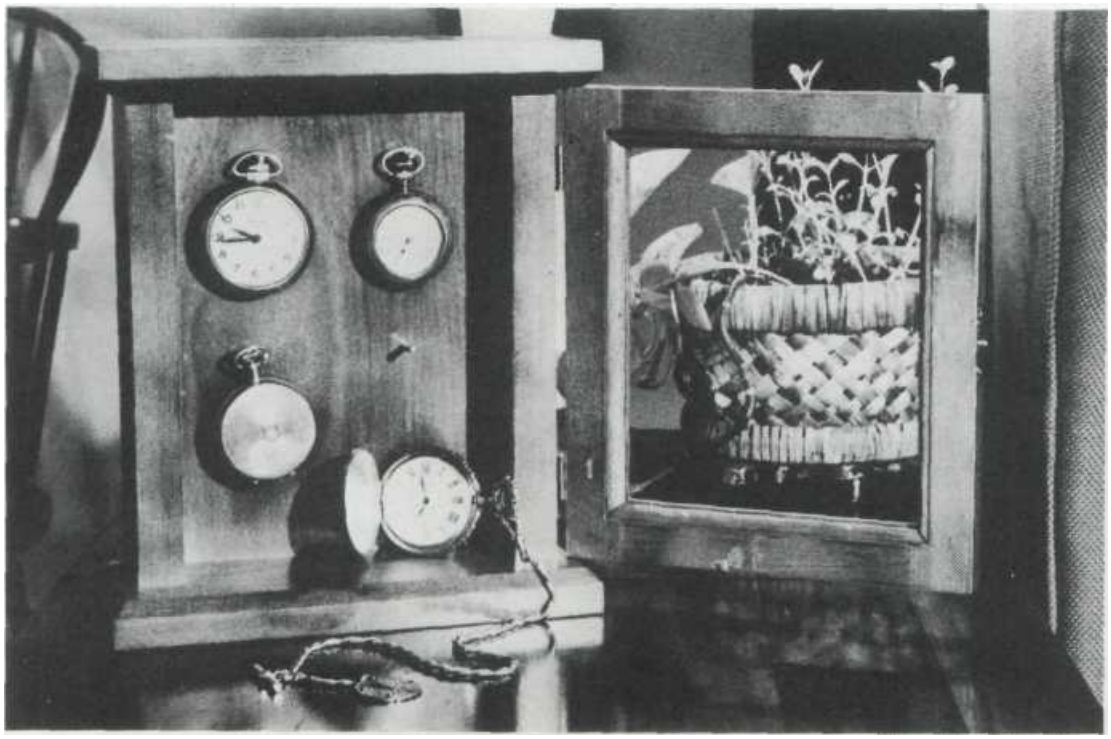
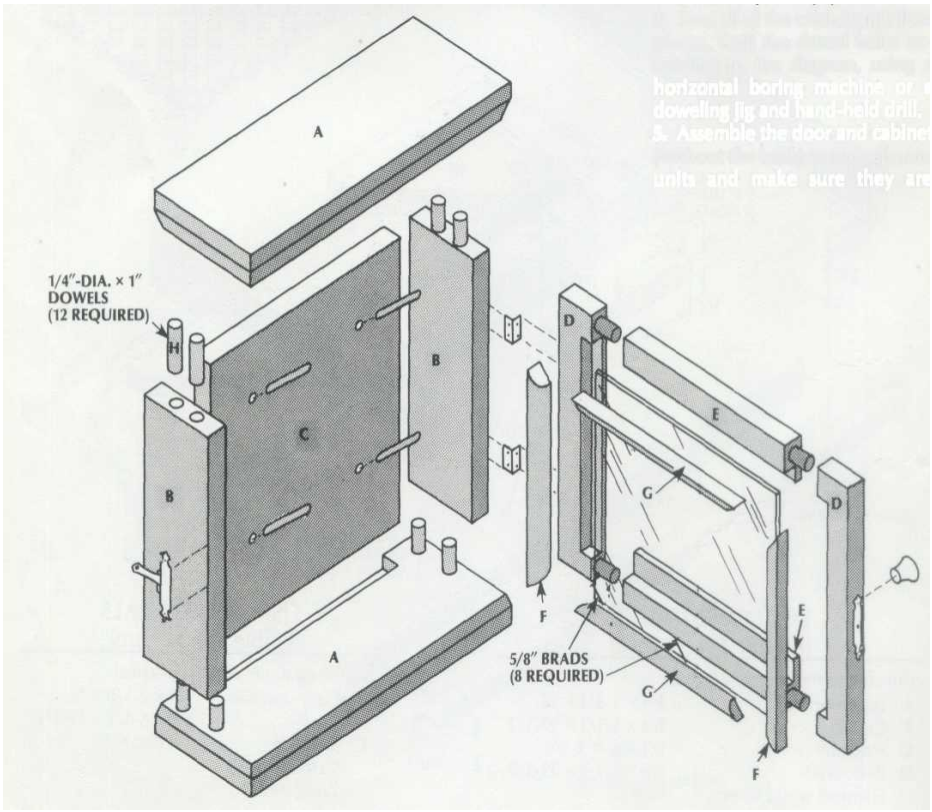
WATCH KEEP





Pocket watches are a beautiful link to the past, and this watch keep is ideal for displaying these old treasures.

1. This project is constructed of 1 x 4 stock and 1/4"-radius quar ter-round molding. The material used for the cabinet sides (B) and back (C) and the door stiles (D) and rails (E) must be planed or resawn and sanded down to 1/2" thickness.
2. Begin by edge-gluing two 9" lengths of 3/4" stock to serve as the basis for the back panel. After the glue has dried on the panel, cut all the parts for the cabinet case and door to the finished dimensions.
3. Using a table saw, router, or hand plane, cut a 45° chamfer on the front and side edges of the top and bottom pieces (A).
4. Sand all of the cabinet and door pieces. Drill the dowel holes ac cording to the diagram, using a horizontal boring machine or a doweling jig and hand-held drill.
5. Assemble the door and cabinet (without the back) as two separate units and make sure they are

square. Clamp them together until the glue dries.

6. Rout a 1/4"-wide x 1/4"-deep rabbet in the back of the door, us ing a straight router bit. Square the corners using a hand chisel.

7. Cut a 1/4"-deep x 1/2"-wide x 6"-long stop rabbet in the back edge of both the top and bottom cabinet pieces.

8. Prior to installing the back, drill 1/8"-diameter holes in the back for the hanging pegs. Drill the holes at a 5° slant to the depth of 3/8". If using wooden pegs, install them; if using brass rods, wait until after fin ishing the watch keep to install them.

9. Nail and glue the back into the cabinet. Miter the ends of the glass retainer molding (F, G) for the door while you wait for the glue to dry.

10. If necessary, sand the top and bottom of the door to prevent them from rubbing or binding. Sand the sides so they fit flush with the cabinet.

11. Finish all the pieces, including the quarter-round glass retainers.

12. Install the glass with the glass retainers. Drill holes in the retainers for brads, then attach the retainers with brads.

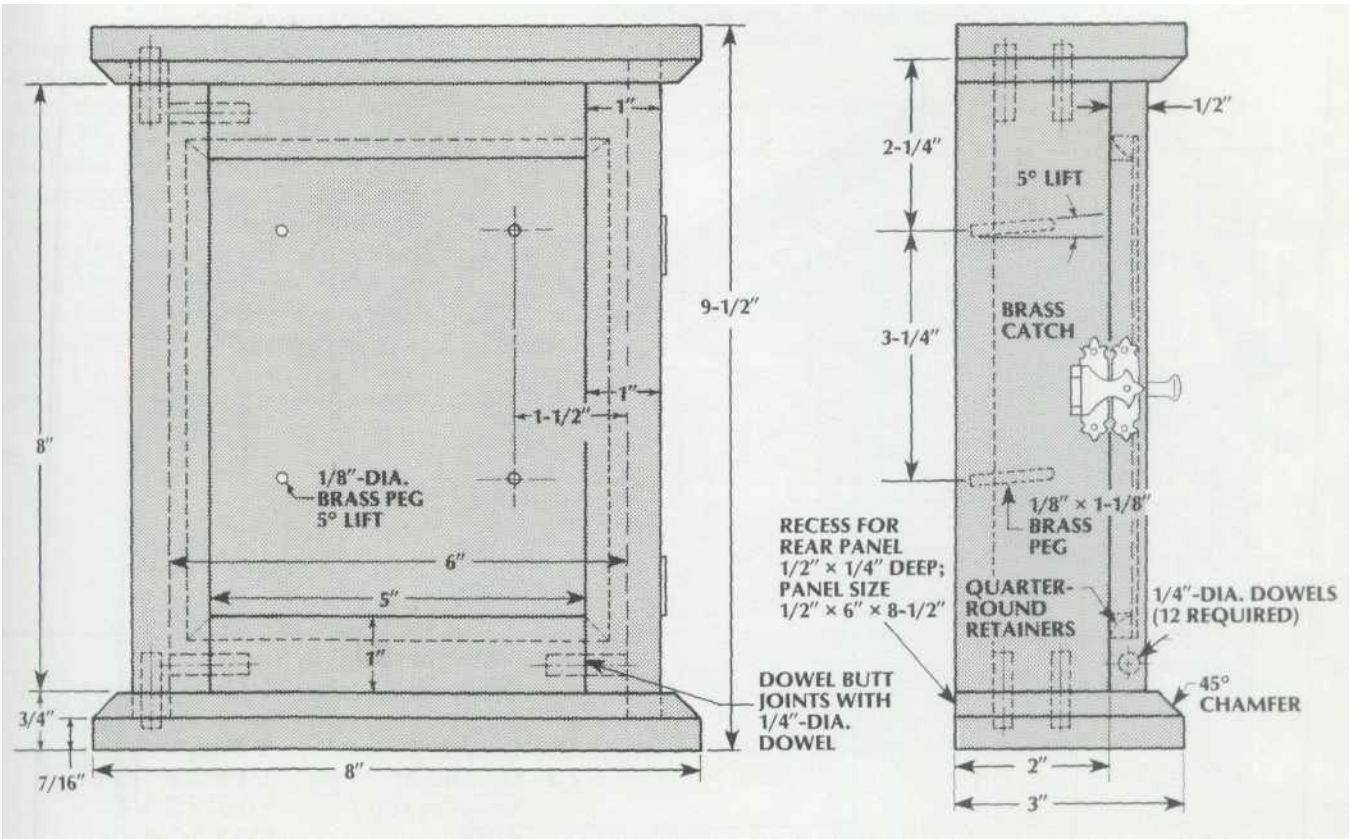
13. If using brass hanging pegs, in stall them now.

14. Install the hinges with screws to mount the door. Install the knob and latch to complete the keep.

LIST OF MATERIALS

(finished dimensions in inches)

A	Top and bottom (2)	3/4 × 3 × 8
B	Sides (2)	1/2 × 2 × 8
C	Back	1/2 × 6 × 8-1/2
D	Door stiles (2)	1/2 × 1 × 8
E	Door rails (2)	1/2 × 1 × 5
F	Side glass retainers (2)	1/4 × 1/4 × 6-1/2
G	Top & bottom glass retainers (2)	1/4 × 1/4 × 5-1/2
H	Dowels (12)	1-1/4 dia. × 1
	Knob	1/2 dia.
	Hanging pegs (4)	1/8 dia. × 1-1/8
	Glass	1/8 × 5-3/8 × 6-3/8
	Brads	#18 × 5/8
	Hinge with screws (pair)	
	Door latch	
	Wood glue	



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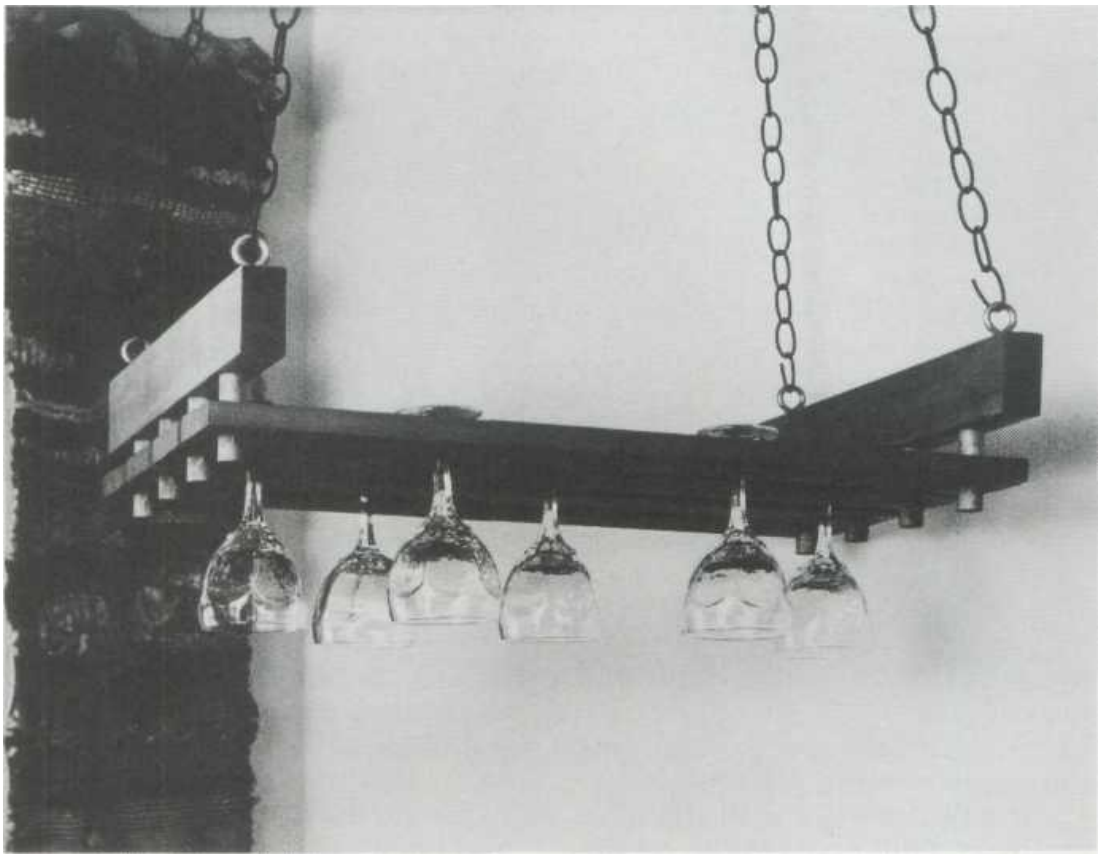
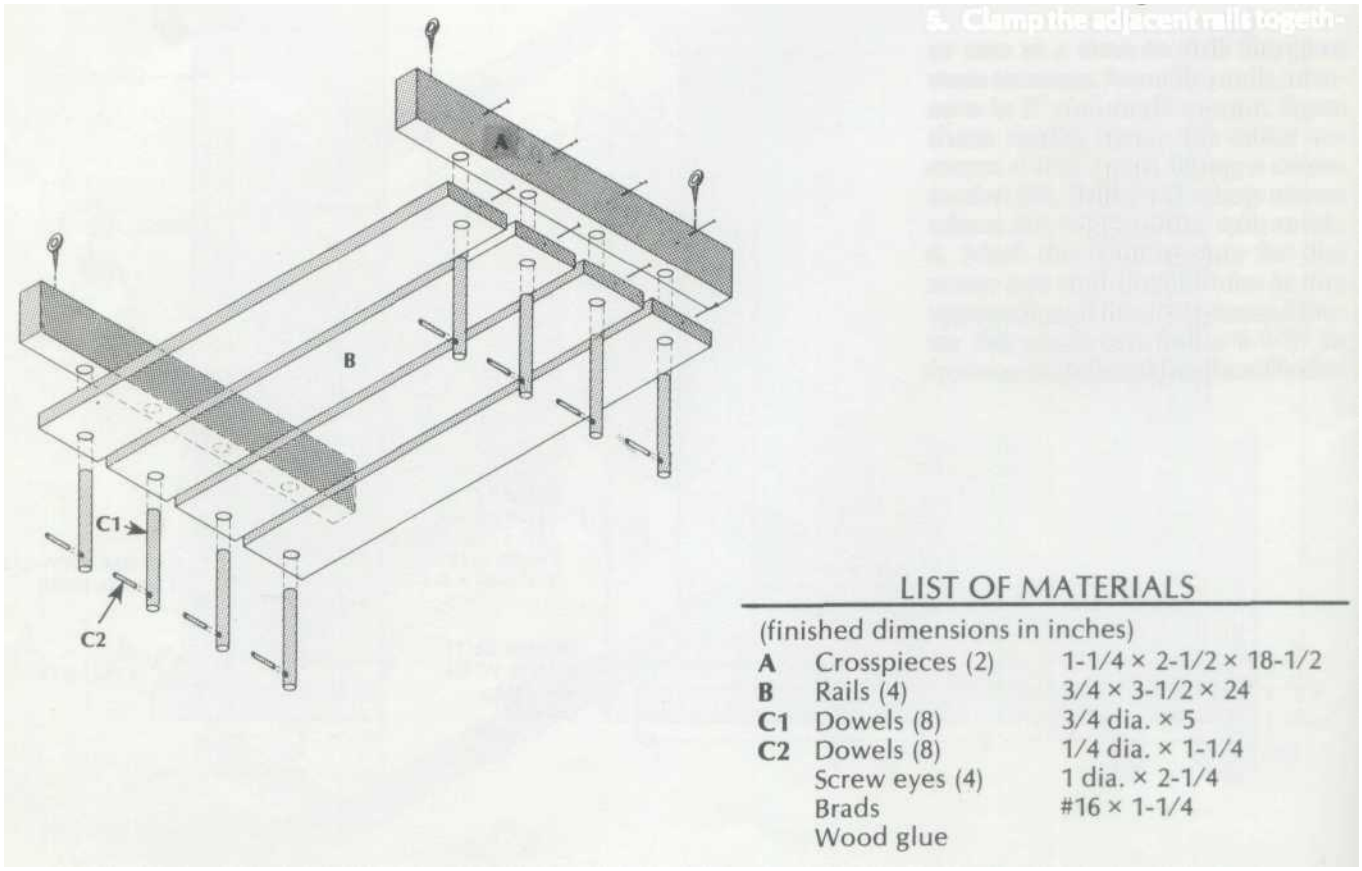
HANGING WINE GLASS RACK



With this decorative hanging rack you can show off your fine wine glasses. It's useful in any kitchen or above any bar; it is attractive, and also helps solve your storage problems.

1. To make the wine glass rack, start with a 38" length of 2 x 4, a 49" length of 1 x 8, and two dowel rods (one 1/4" in diameter and one 3/4" in diameter).
2. Crosscut the 2 x 4 into two 18-1/2"-long pieces. Rip, then plane or sand these pieces to a thickness of 1-1/4" and a width of 2-1/2" to make the crosspieces (A).
3. Crosscut the 3/4"-thick stock into 24"-long boards, then rip these boards into 3-1/2"-wide pieces for the rails (B).
4. Cut the 3/4"-diameter dowel rod (C1) into eight 5"-long pieces. Cut the 1/4"-diameter dowel rod (C2) into eight 1-1/4"-long pieces. To make sure that the pieces are the same length, use a stop block when crosscutting.
5. Clamp the adjacent rails together two at a time to drill the glass stem recesses. From the ends, mea sure in 3" and mark a point. From these marks, space the other re cesses 4-1/2" apart. Using a coun tersink bit, drill a 1/4"-deep recess where the edges of the rails meet.
6. Mark the centerpoints for the screw eye and dowel holes in the upper edge of the crosspieces. Cen ter the screw eye holes 1-1/2" in from each end and the dowel holes



LIST OF MATERIALS

(finished dimensions in inches)

A	Crosspieces (2)	1-1/4 × 2-1/2 × 18-1/2
B	Rails (4)	3/4 × 3-1/2 × 24
C1	Dowels (8)	3/4 dia. × 5
C2	Dowels (8)	1/4 dia. × 1-1/4
	Screw eyes (4)	1 dia. × 2-1/4
	Brads	#16 × 1-1/4
	Wood glue	

3-1/4" in from the ends and 4" apart. Mark the dowel hole centers 1" from the ends and midway across the lower faces on the rails.

7. Drill pilot holes for the screw eyes 1" deep into the crosspieces. Drill 3/4"-diameter dowel holes completely through the cross-pieces and the rails. To avoid tear-out when drilling the dowel holes, drill only until the tip of the bit penetrates the far side of each piece, then flip the piece over to complete the hole.

8. Center and drill a 1/4"-diameter hole through each 3/4"-diameter dowel 5/8" from one end. Hold the dowels steady for drilling by plac ing them in a V-groove plowed down the middle of a block of scrap lumber. Position the block so that the drill bit will strike the cen ter of the groove, then clamp it to the table or hold it firmly against a fence.

9. Sand all pieces before assem bling.

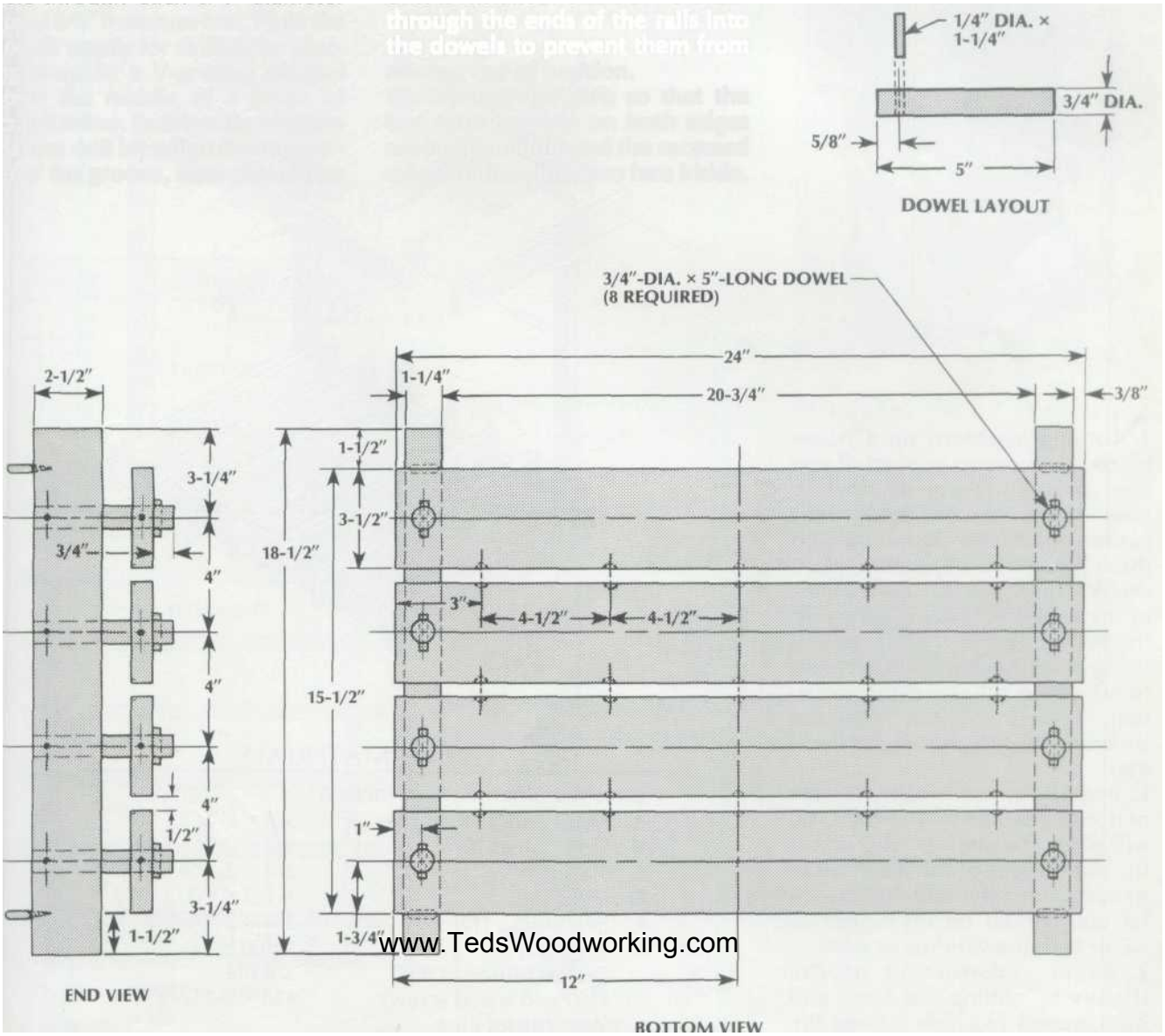
10. Drive the 1/4"-diameter dowels through the ends of the larger dowels so that their ends extend the same distance to either side. Then fit the rails onto the larger dowels and push them down until they are stopped by the smaller dowels.

11. Make sure the rails are turned so that the tapered recesses on their edges will face up when the unit is installed. Then drive brads through the ends of the rails into the dowels to prevent them from moving out of position.

12. Arrange the rails so that the two with recesses on both edges are in the middle and the recessed edges of the other two face inside. Spread glue inside the dowel holes in the crosspieces and the upper ends of the dowels. Then insert the dowels into the underside of the crosspieces, pushing them up until their upper ends barely emerge from the crosspieces. After the glue dries, sand the dowel ends flush with the crosspieces.

13. If you want to stain the assem-bly, do it at this time, then rub with steel wool.

14. Finally, install the screw eyes and hang the rack.



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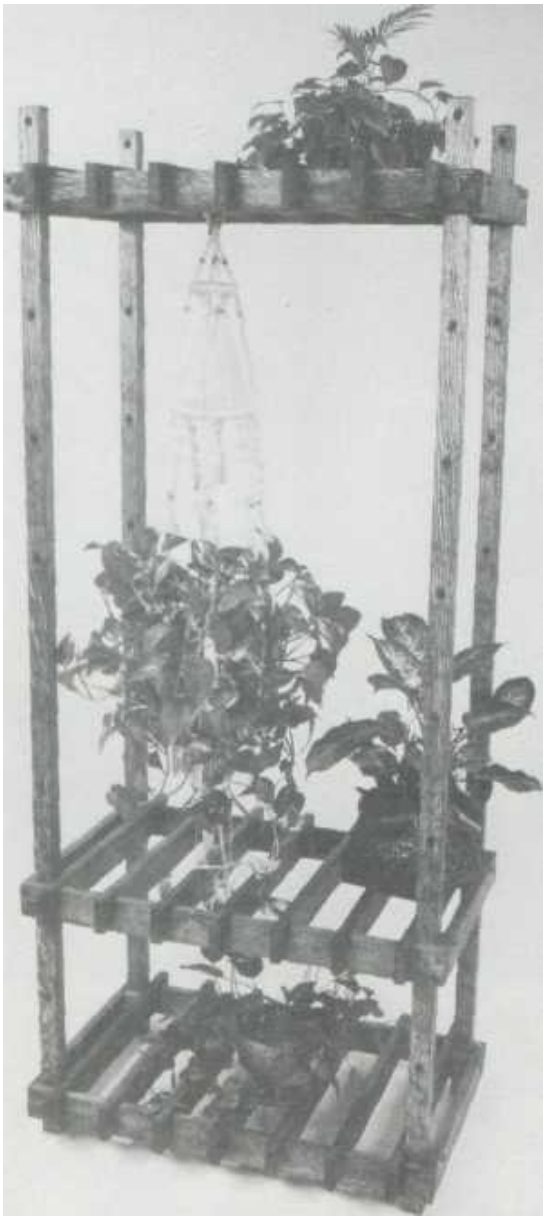
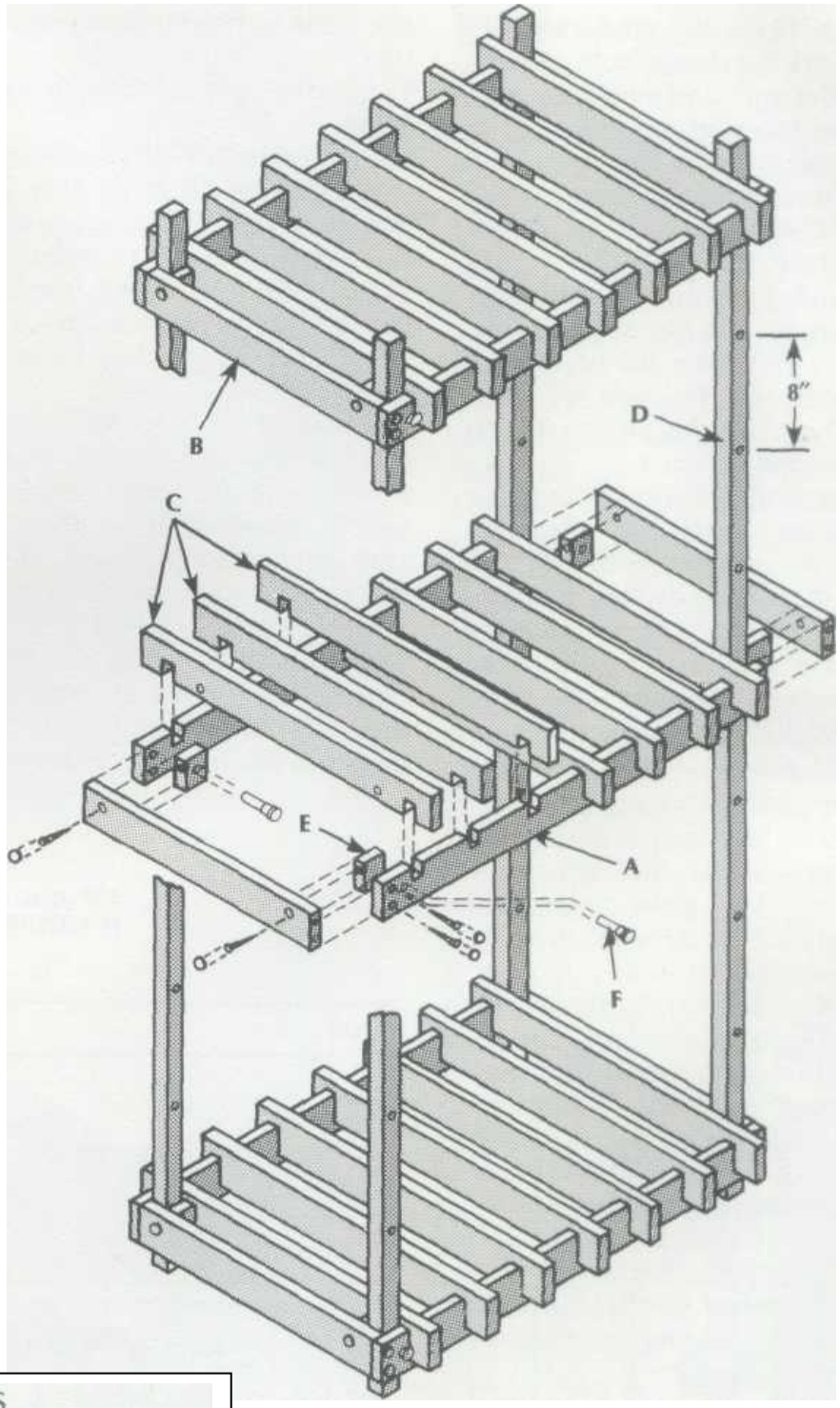
ADJUSTABLE PLANT SHELVES



Nothing brightens up a home better than a hanging plant. If you have a south-facing window or glass doors, you can bring your garden indoors for the winter with these attractive adjustable plant shelves. The shelves are slatted rather than solid so that the plants on the bottom can receive more light. If you build the shelves with cedar, redwood, or other weather-resistant lumber, you can keep the shelves outdoors during the summer.

1. Begin by measuring the window or door opening next to which you will place the shelves, and adjust the dimensions of the materials as needed. Keep in mind that the to tal unit should be no higher or wider than the window or door.
2. Begin construction of the shelves by cutting the front and back frames (A), side frames (B),
3.



LIST OF MATERIALS

(finished dimensions in inches)

A	Front and back frames (6)	3/4 × 2-1/2 × 30
B	Side frames (6)	3/4 × 2-1/2 × 17
C	Slats (21)	3/4 × 2-1/2 × 21-1/2
D	Stiles (4)	1-1/2 × 1-1/2 × 72
E	Peg blocks (12)	3/4 × 2 × 1-1/2
F	Pegs (12)	1 dia. × 2-1/2
	Dowel buttons (36)	3/8 dia.
	Flathead wood screws	#10 × 1-1/2
	Waterproof glue	

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slats (C), and peg blocks (E) to size from 1 x 3 stock.

3. The slats and the front and back frame members are joined togeth er using cross lap joints as shown in the exploded-view drawing. These joints are formed by cutting 3/4"-wide dadoes 1" deep in both sets of pieces.

4. Lay out and cut the dadoes on the front and back frames as shown in the front frame and shelf layout drawings. Note that the middle dado is centered along the length of the frames and that all dadoes are 3-3/8" apart.

5. Lay out and cut a pair of dadoes on each slat as shown in the slat detail drawing. Note that these da does are set 1-1/2" from the ends of the pieces.

6. Drill 1/2"-diameter peg holes through the front frames and back peg blocks. The holes in the front frames are centered 1" below the upper edge and 1-1/2" from each end. The holes in the blocks are centered on both width and length. Counterbore screw holes in the front and back frames, side frames, and the outermost slats of each shelf. Then sand all the shelf pieces.

7. Assemble the frames, using wa terproof glue and #10 x 1-1/2" flat-head wood screws. Do not glue in the five middle slats of the top shelf; with these slats left unglued and detachable it is much easier to put up and take down your plants.

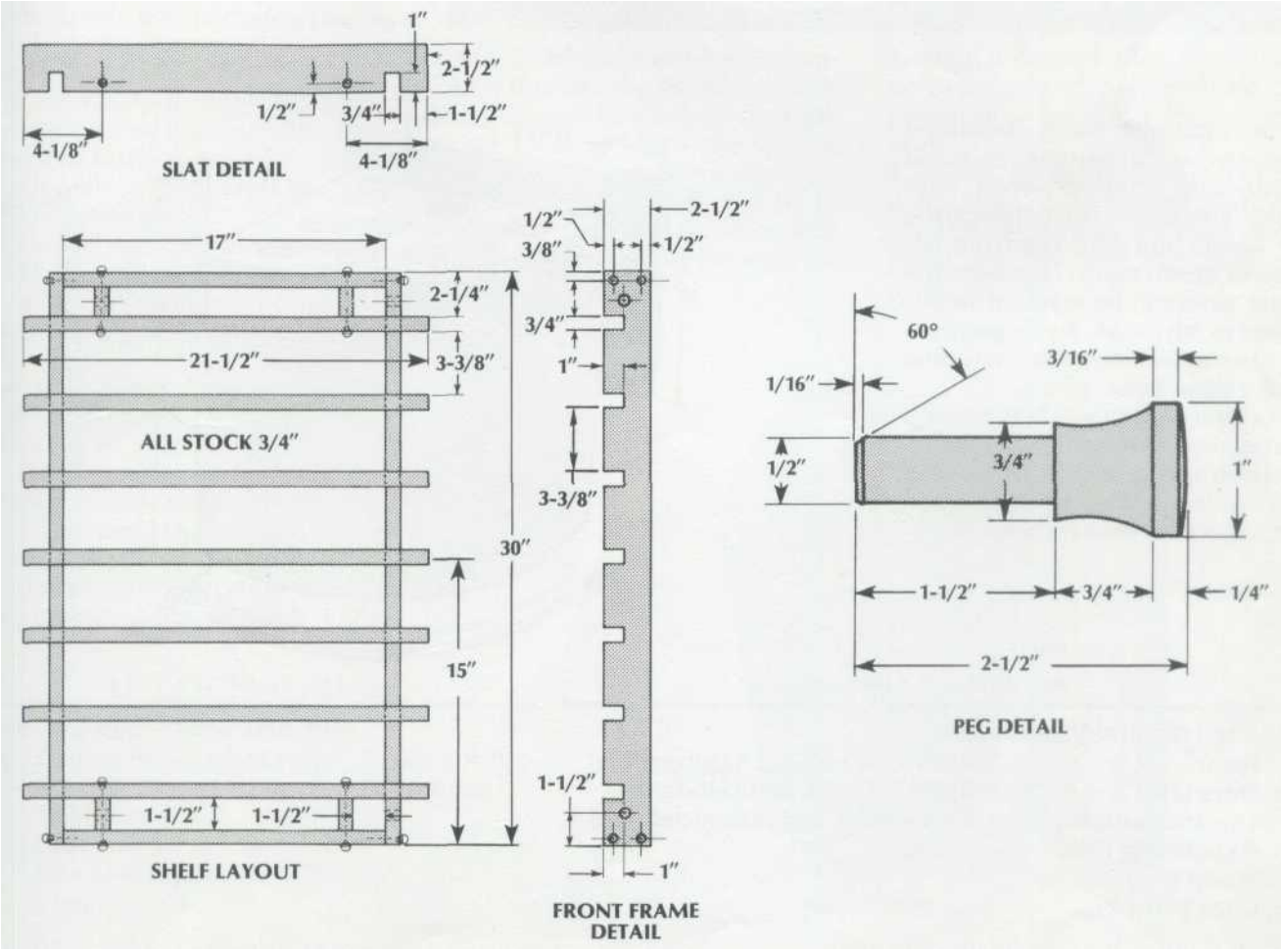
8. Cover the counterbored screws with 3/8"-diameter dowel buttons.

9. Cut the four stiles (D) from 2 x 2 stock. Center and drill 1/2"-diame-ter peg holes at 8" intervals along the length of each stile, beginning 4" from either end. Sand the stiles.

10. Turn the pegs (F) on a lathe from scrap 2 x 2 stock to the profile shown in the peg detail. Sand and finish the pegs on the lathe.

11. If you are planning to use the shelves outdoors, finish with a good outdoor finish such as spar varnish or polyurethane. (If you used ce dar, redwood, or weather-resistant lumber, no finish is necessary.)

12. Finish the assembly by sliding the shelves over the ends of the stiles. Position the shelves and se cure them with the pegs.



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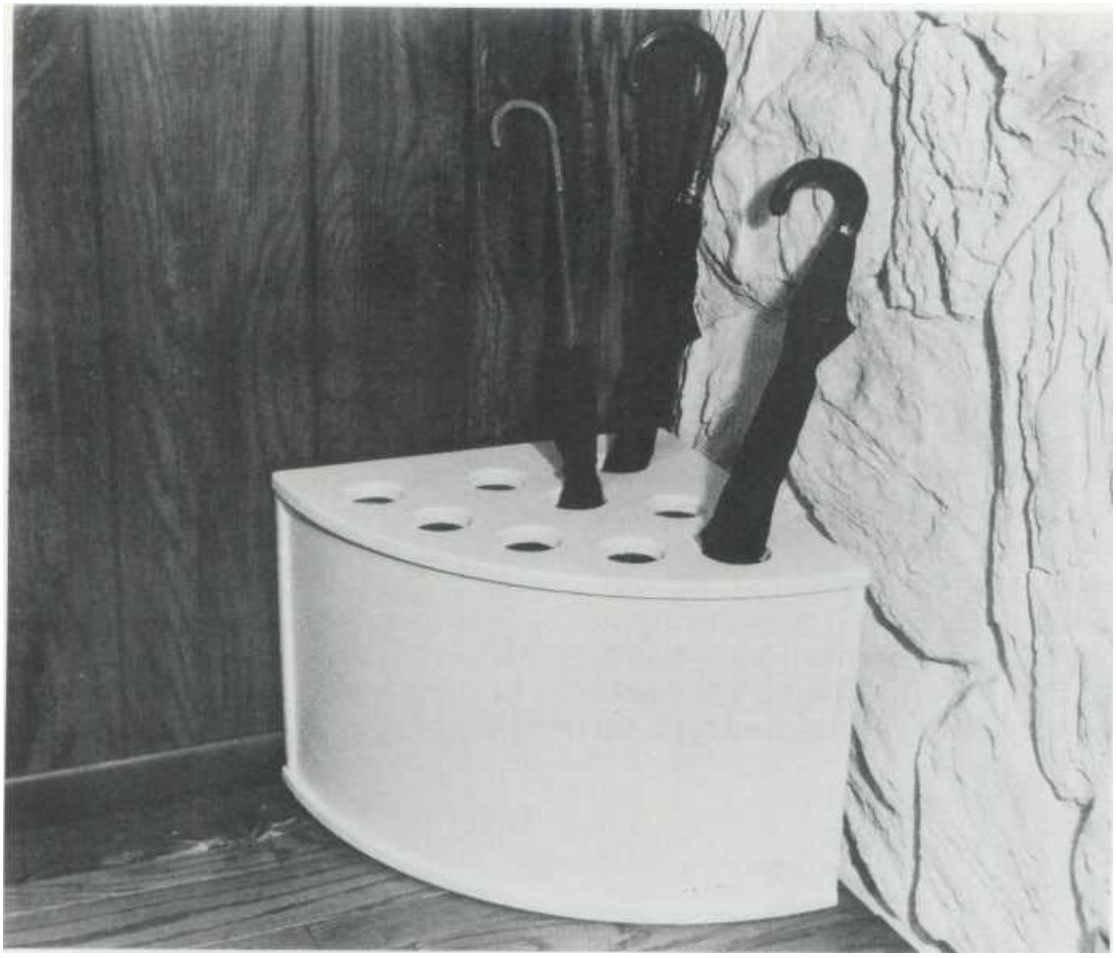
CORNER UMBRELLA STAND



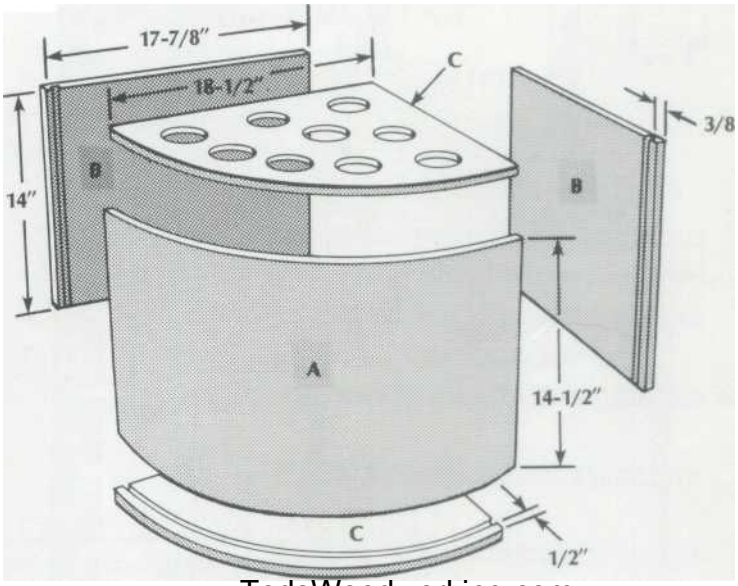
The umbrella stand described here was built of particleboard and hardboard, then covered with white latex paint. The hardboard is the ideal choice for the front because it bends easily. However, the other parts can be made of waferboard or plywood, if you prefer.

1. Cut the pieces to size according to the dimensions given.
2. Lay out and cut an 18-1/2" radius across the front corner of the top and bottom pieces (C). Then rout a 1/8"-wide x 1/4"-deep groove in each piece to receive the front (A). Set the grooves 1/2" back of the radiused edges of the pieces.
3. Rout a 1/8"-wide x 1/4"-deep dado across each side piece (B) 3/8" in from the front edge to receive the ends of the front panel.
4. Lay out and cut nine 2-1/2"-diameter holes in the top, arranged as shown in the drawing. Sand the edges of the holes and any other rough edges on any of the pieces.
5. Dry assemble the stand to check the fit. Keep the outside faces of the sides flush with the straight edges of the top and bottom. Trim one end of the front panel if necessary to get a good fit.
6. Run a bead of glue inside the grooves and dadoes and along all edges where parts will join. Assemble the stand, using 4d finishing nails to fasten the top and bottom to the sides while the glue dries.
7. Finish the stand with two coats of latex paint.

LIST OF MATERIALS

(finished dimensions in inches)

A	Front	1/8 × 14-1/2 × 28-1/2 hardboard
B	Sides (2)	1/2 × 14 × 17-7/8 particleboard
C	Top and bottom	1/2 × 18-1/2 × 18-1/2 particleboard
	4d finishing nails	
	Wood glue	
	Latex paint	



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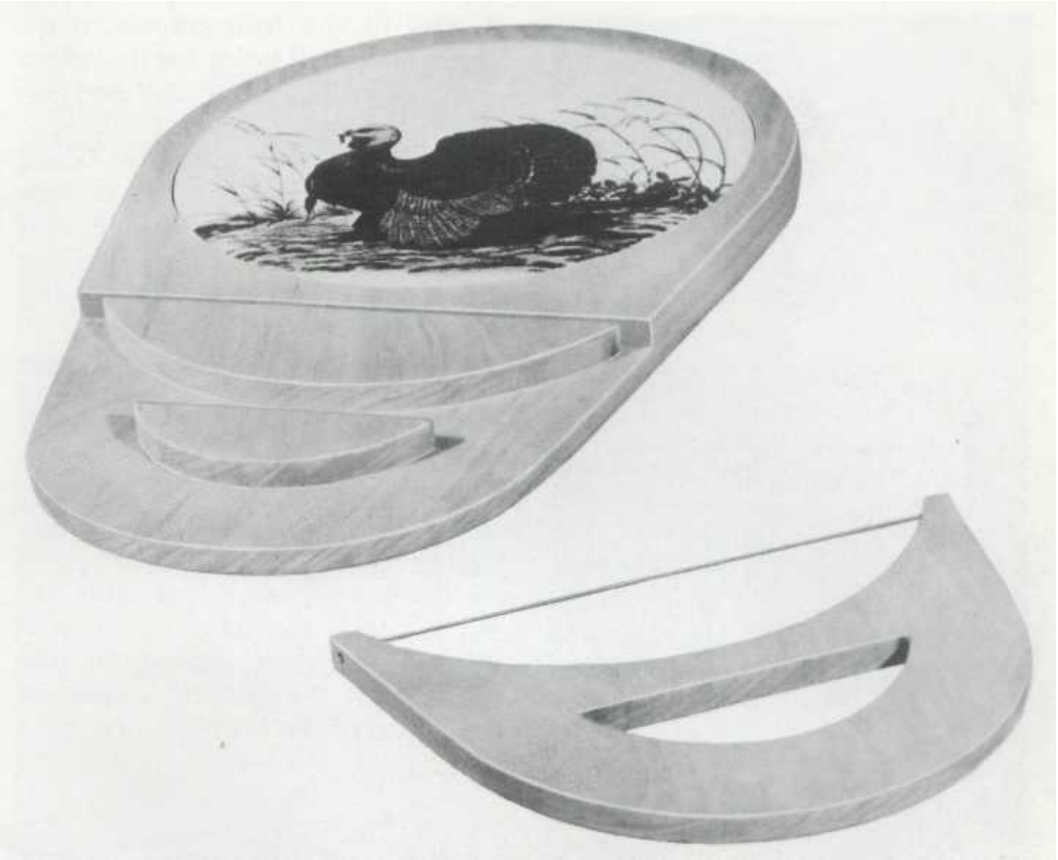
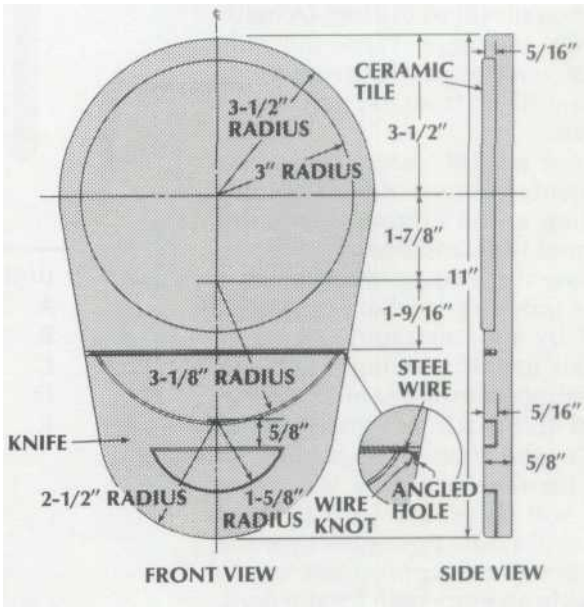
CUTTING BOARD



A brightly colored, round ceramic tile makes the perfect working surface for this wooden cutting board. As an added attraction, the wire bladed knife is designed to fit right into the board, so it's at your fingertips when you need it.

1. The cutting board is made from two 7" x 11" pieces of maple or cherry. Begin the project by resawing or planing both boards to 5/16" in thickness and trimming them to the overall shape shown in the drawing.
2. Leave one board whole to serve as the base. Cut the knife handle, the two knife holders, and the opening for the tile out of the other piece following the instructions given in the drawings. Adapt the dimensions as needed to fit the precise dimensions of your ceramic tile.
3. Since the pieces cut out of the knife handle are used as the knife holders, the cuts must be made with minimal waste. Begin by drilling a tiny hole through the piece on one cutting line and slipping a jeweler's blade through. Then fasten the blade in a scroll saw and complete the cut.
4. Use glue to fasten the tile holder and knife holder pieces to the cutting board base, clamping the pieces until the glue dries. Use the knife handle to properly position the knife holder pieces, but be careful not to accidentally glue it in place.
5. When the glue has set, sand the cutting board and knife handle with fine sandpaper to round all sharp corners.
6. Use an unwound steel musical instrument string for the knife blade. Drill holes for the wire diagonally through the tips of the knife handle to minimize chances of the wood splitting when the wire is tensioned. Counterbore the outside ends of the holes slightly to make room for the anchor on one end of the string and the knot on the other end.
7. Stain if desired, then apply one or two coats of polyurethane or penetrating oil finish for protection.
8. Attach three small tack feet to the bottom of the cutting board to prevent it from sliding when in use. Install the tile, and the board is ready for use.



LIST OF MATERIALS

(finished dimensions in inches)

A	Cutting board blanks (2)	5/16 x 7 x 11
	Ceramic tile	3/8 x 6 dia.
	Steel wire	
	Tack feet	
	Fine sandpaper	
	Wood glue	

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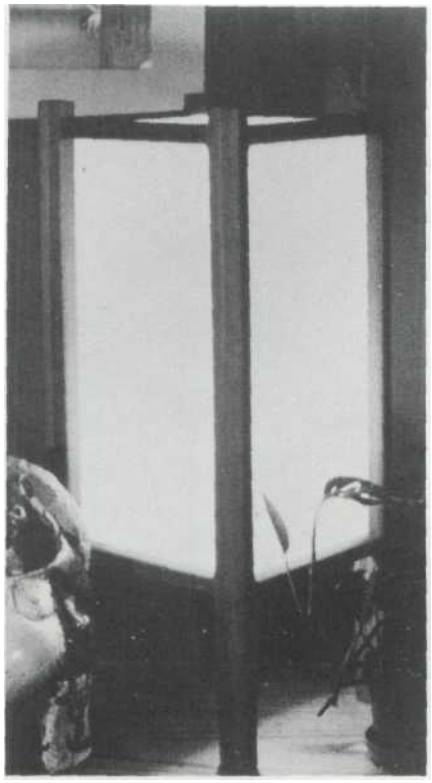
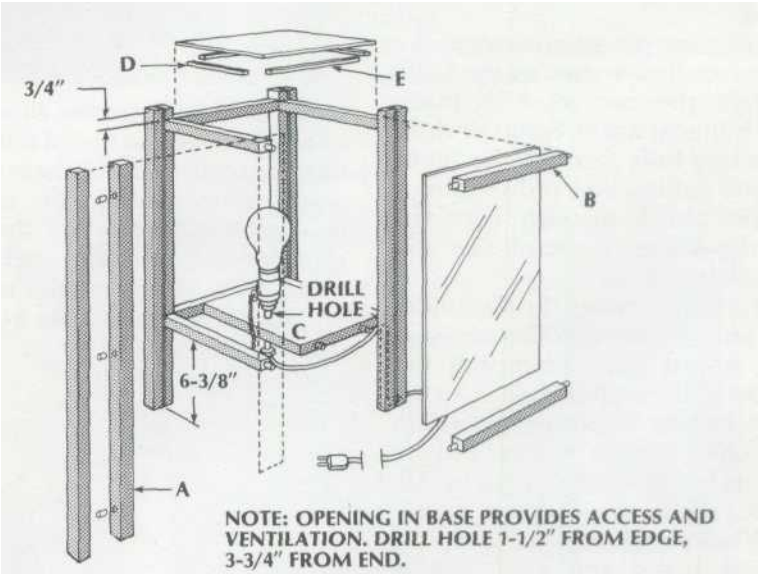
SHOJI LAMP



This lantern-style lamp and shoji screen can be used indoors or out. It's constructed easily with glue and small brads; however, remember to nail carefully to avoid splitting the wood.

1. After cutting all the pieces to size, assemble the frames by attaching the rails (B) to the legs (A) with dowels and glue. Place the rails 3/4" down from the tops of the legs and 6-3/8" up from the bottoms as shown.
2. Rout a 6-1/4"-long channel up the center of one of the legs, beginning at the bottom. Make the channel wide and deep enough to enclose the lamp cord and place it on an outside edge that can be covered by an overlapping frame as shown in the drawing. Then, on the adjacent inside face of the leg, drill a hole that intersects the upper end of the channel to provide an exit for the cord. Pick the frame that will cover the cord channel and drill a hole through it near the bottom of the appropriate leg to provide an entry path for the cord.
3. Dry fit the four frames, mark them, and drill holes for doweling them together. Then sand and finish the frames as desired.
4. Cut a piece of fiberglass fabric large enough to cover the rectangular opening in each frame. Fasten the fiberglass panels to the inner face of each frame using small wire nails.
5. Drill a hole through the base (C), centered along its length and 1-1/2" from one side. Size the hole to accept the pipe nipple found in the lamp socket kit.
6. Fasten the base between the frame with the cord channel and one other frame using dowels and glue. Make the base side that is farthest from the pipe nipple hole flush with the outside edges on one side of the frames to create a ventilation and access space on the other side.
7. Lace the lamp cord through the holes and channel in the two frames, pulling enough out the upper end for connecting with the socket. Fasten the four frames together using glue and dowels. Then glue and tack the support strips (D, E) to the backs of the upper rails, keeping their lower edges flush.
8. Insert the pipe nipple into the base, keeping the nut on the lower end. Run the cord up through the nipple and fasten it to the socket, then mount the socket on the nipple. Rotate the socket to place the pull chain side next to the ventilation hole, then tighten the nut.
9. Cut a piece of fiberglass to serve as the top of the lamp. Glue and tack it to the top edges of the support strips.



NOTE: OPENING IN BASE PROVIDES ACCESS AND VENTILATION. DRILL HOLE 1-1/2" FROM EDGE, 3-3/4" FROM END.

LIST OF MATERIALS

(finished dimensions in inches)

A	Legs (8)	3/4 × 3/4 × 24
B	Rails (8)	3/4 × 3/4 × 7-1/2
C	Base	3/4 × 6 × 7-1/2
D	Support strips (2)	5/16 × 1/2 × 7-1/2
E	Support strips (2)	5/16 × 1/2 × 8-3/8
	Dowels	3/8 dia. × 1-1/2
	Wire nails	
	Lamp socket kit (socket, pull chain, cord, pipe nipple, and nut)	
	Fiberglass fabric	

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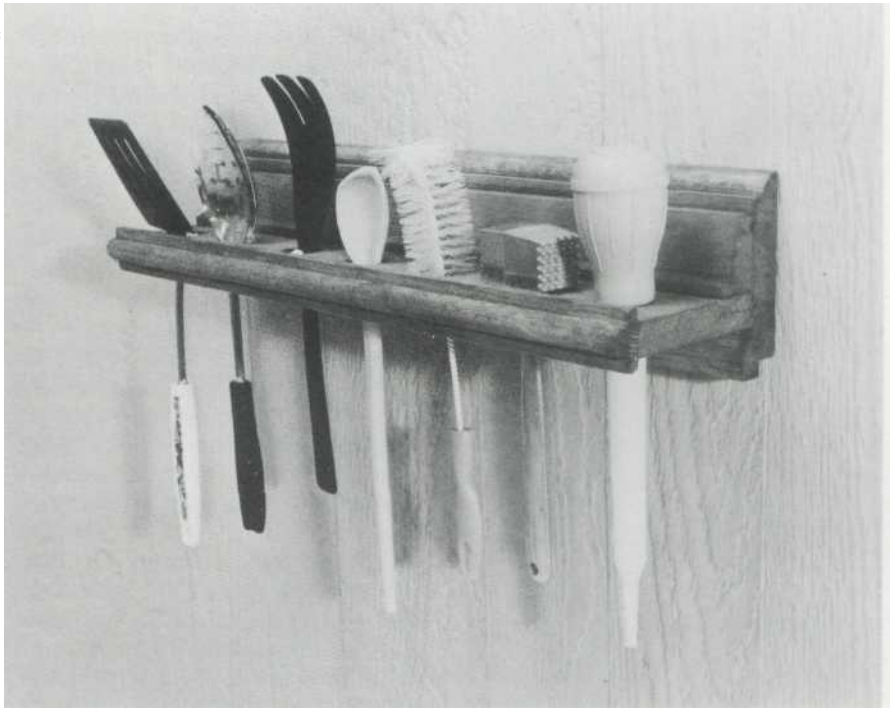
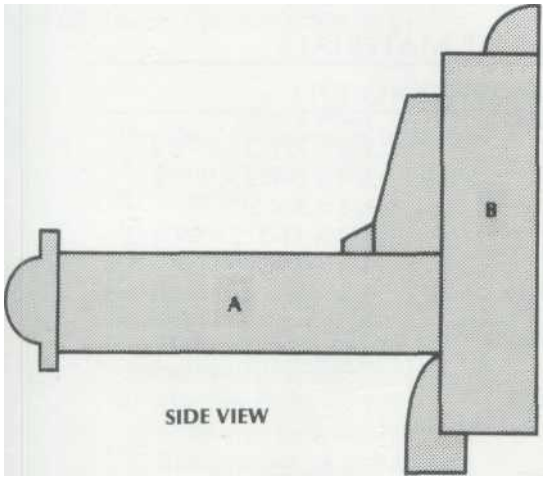
UTENSIL HOLDER



kitchen utensils have a way of getting lost just when you need them. Such confusion can be avoided by building this special holder for them.

1. Cut the rack (A) and base (B) to size.
2. Drill appropriately sized holes in the rack to accommodate large spoons and other utensils.
3. Glue and tack a piece of decora tive molding to the front of the rack as shown.
4. Butt the rack against the base, or rout a shallow groove for it. Fasten them together using glue and screws inserted from behind.
5. Dress up the holder by nailing various moldings to the front, top, and bottom edges of the base. The ones used on the original are pro filed below, but choose moldings to suit your own taste.
6. Finish the holder as desired, then mount it on the wall or the side of a cabinet.



LIST OF MATERIALS

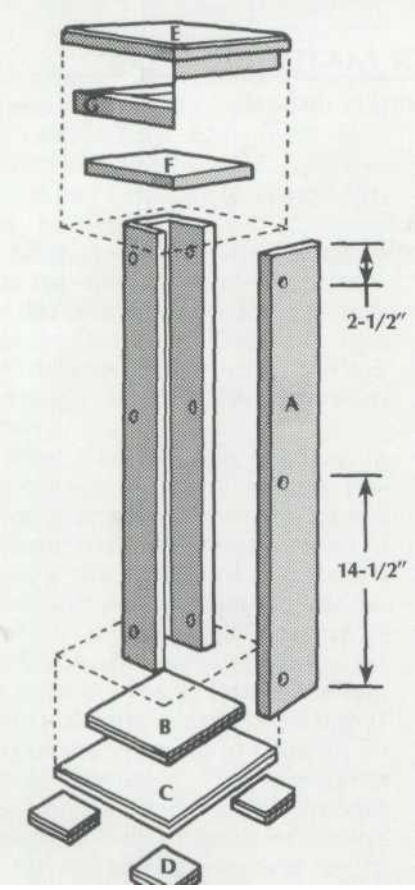
(finished dimensions in inches)

A	Rack	3/4 × 3-1/2 × 12
B	Base	3/4 × 3-1/2 × 12
	Wood screws	
	Finishing nails	
	Decorative moldings	
	Wood glue	

181
PLANT STAND

Here's a handsome pedestal to display your favorite plant. The original was made of clear grade redwood. The wider pieces were glued up from narrower stock and custom cut to the dimensions listed.

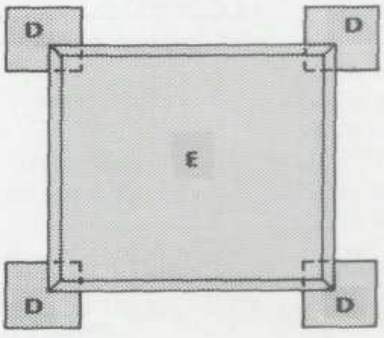
1. Cut all of the pieces to size according to the dimensions given.
2. Cut three plug holes in each column side (A) as shown. Locate the holes 2-1/2" from each end, with the remaining hole in between. All of the holes should be centered 3/8" from one edge of the piece.
3. Drill pilot holes for the wood screws in the center of the plug holes.
4. Assemble the column by gluing and screwing one corner at a time. Be sure that the assembly is square.
5. Round the edges of the column by sanding or routing with a 1/4" radius bit.
6. Cut 45° miters at the corners of the apron pieces (G).
7. Round or bead the upper edges of the top (E), then center the apron pieces on the underside of the top. Glue and screw through the apron into the top.
8. Center the bracket (F) on the column; then glue and screw it in place. Center the top/apron assembly on the bracket; glue and screw through the bracket into the apron.
9. Round or bead the upper edges of the base pieces (B, C) and feet (D); then sand.
10. Center the small base piece on the bottom of the column. Glue and screw it in place from underneath. Repeat with the large base piece.
11. Position the feet so they extend beyond the corners of the base as shown; secure with glue and screws.
12. Sand the completed plant stand; finish as desired.



LIST OF MATERIALS

(finished dimensions in inches)

A	Column sides (4)	3/4 × 4 × 29
B	Base piece	3/4 × 7-1/2 × 7-1/2
C	Base piece	3/4 × 9-1/2 × 9-1/2
D	Feet (4)	3/4 × 3 × 3
E	Top	3/4 × 11-1/2 × 11-1/2
F	Bracket	3/4 × 7 × 7
G	Apron pieces (4)	3/4 × 3/4 × 10-1/2
	Flathead wood screws	#6 × 1-1/4
	Wood plugs	3/8 dia.
	Wood glue	

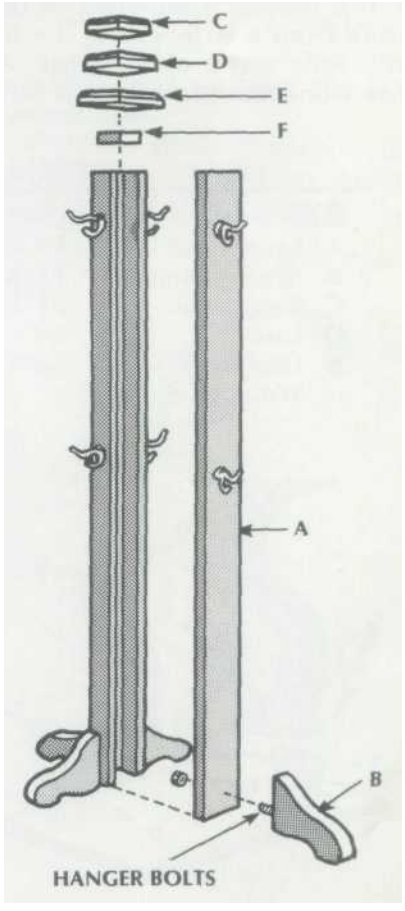


FOOT DETAIL

182
HALL TREE

You'll always have a place to hang your hat with this easy-to-build hall tree. And by replacing the brass hooks with pot clips, you can turn it into a plant pole that is perfect for hanging vines. Either way, it's a useful addition to any home.

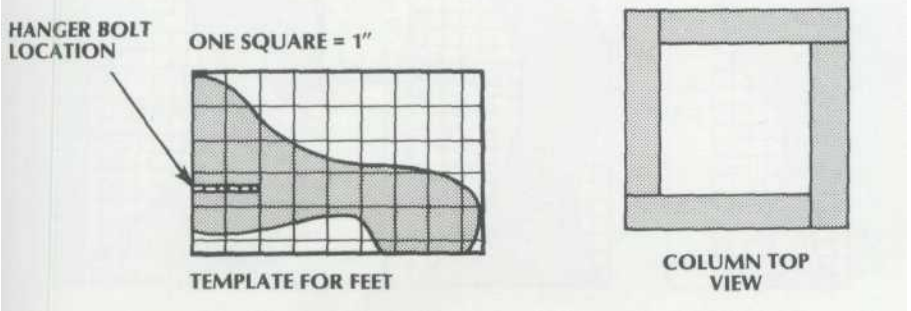
1. Begin by cutting all pieces to the listed dimensions.
2. Arrange the column sides (A) so their edges chase one another, creating a square column. Counterbore pilot holes and fasten the column sides together using wood glue and flathead wood screws. Fill the holes with wood plugs. (To avoid counterboring and plugging, use finishing nails instead of screws.) Sand the column, making the plugs flush with the other surfaces.
3. Center and drill a 5/16"-diameter hole through each column side 1-1/2" from the bottom to allow insertion of hanger bolts.
4. Lay out the final shape for the feet (B) using the template provided. Drill 7/32"-diameter pilot holes for the hanger bolts in the back edge, then cut out the feet. Round over all edges except those that will meet the column.
5. Chamfer the upper edges on each of the three top pieces (C, D, E), then attach them to the bracket (F) using wood glue and finishing nails. Begin by fastening D to C, then E to D, and finally F to E. Make sure the smaller pieces are centered on the larger ones.
6. Round over the corners of the column and the sharp lower edges on the largest top piece. Spread glue on the bracket edges and fit it inside the upper end of the column.
7. Finish the tree and the feet as desired.
8. Screw the hanger bolts into the feet, then mount them on the tree, securing them with lock washers and nuts.
9. Install brass hooks and the tree is ready for your hats and coats.



LIST OF MATERIALS

(finished dimensions in inches)

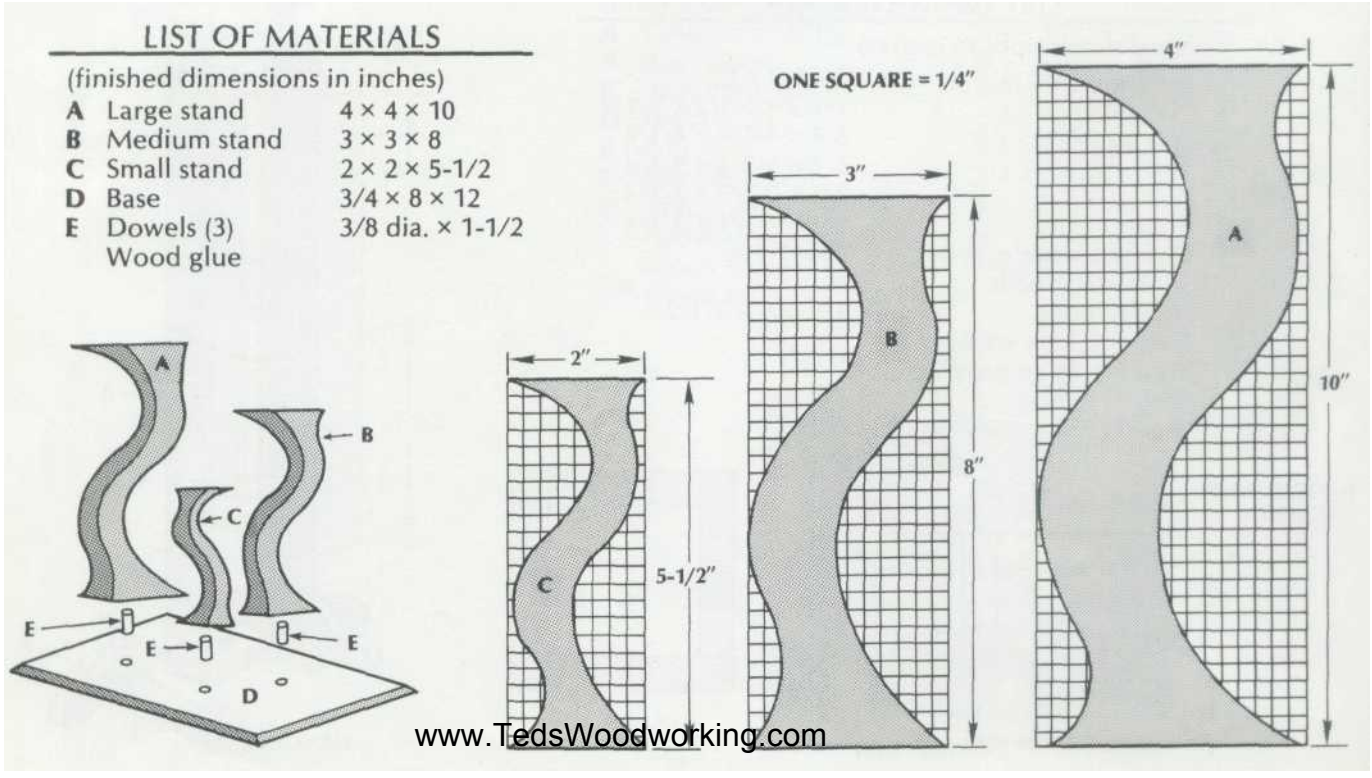
A	Column sides (4)	3/4 × 4 × 63
B	Feet (4)	1-1/2 × 5-1/2 × 8-1/2
C	Top	3/4 × 4-1/4 × 4-1/4
D	Top	3/4 × 5-3/4 × 5-3/4
E	Top	3/4 × 7-1/4 × 7-1/4
F	Bracket	3/4 × 3-1/4 × 3-1/4
	Flathead wood screws	#8 × 1-1/4
	3d finishing nails	
	Hanger bolts	1/4 dia. × 2-1/2
	Nuts and lock washers	
	Brass hooks or pot clips	
	Wood plugs	3/8 dia.
	Wood glue	



183
CANDLE STANDS

Candles lend elegance and beauty to any occasion, and these attractive wooden candle stands will enhance all your candlelit moments.

1. This project is designed to be made from a 6' length of 1 x 10 with little waste of materials. A dark wood, such as walnut, is particularly nice, but pick the material you prefer.
2. Begin by cutting off a 12-1/2" length for the base (D). To minimize cupping, rip this piece into two or three pieces, square the edges, then glue the pieces back together, alternating the direction of the growth rings from piece to piece.
3. Next, cut a 33" length from the board. Rip the piece down the middle, then cut each half into three equal lengths. Face laminate the six pieces to create a blank for the large stand (A).
4. Rip a 2-1/4"-wide piece off the remainder of the board. Cut it into three equal lengths. Face laminate the three pieces to create a blank for the small stand (C).
5. Rip the rest of the board down the middle, then cut two equal lengths out of each half. Face laminate the four pieces to create a blank for the medium stand (B).
6. After the glue has dried, square up the four sides of each block. Cut the blocks to the finished dimensions in the list, then sand both ends smooth on each. Center and drill 3/8"-diameter holes 3/4" deep into the bottom of each for later mounting on the base.
7. Make full-size templates for the blocks out of stiff cardboard or thin plywood. Trace the pattern onto two adjacent sides of each block.
8. Cut the blocks to their final shape on a bandsaw. Cut carefully along the lines on one face, then tape the waste back in place, flip the block 90°, and cut along the lines on the other marked face.
9. Cut the base to its final width and length, beveling the edges in about 15° toward the upper face.
10. Arrange the stands on the base and mark their position. Center and drill 3/8"-diameter holes through the base at the appropriate points for inserting the mounting dowels (E).
11. Sand the stands and base smooth, then assemble using glue and 3/8"-diameter dowels. After the glue dries, remove any dowel protruding through the bottom of the base. Apply your choice of finish.



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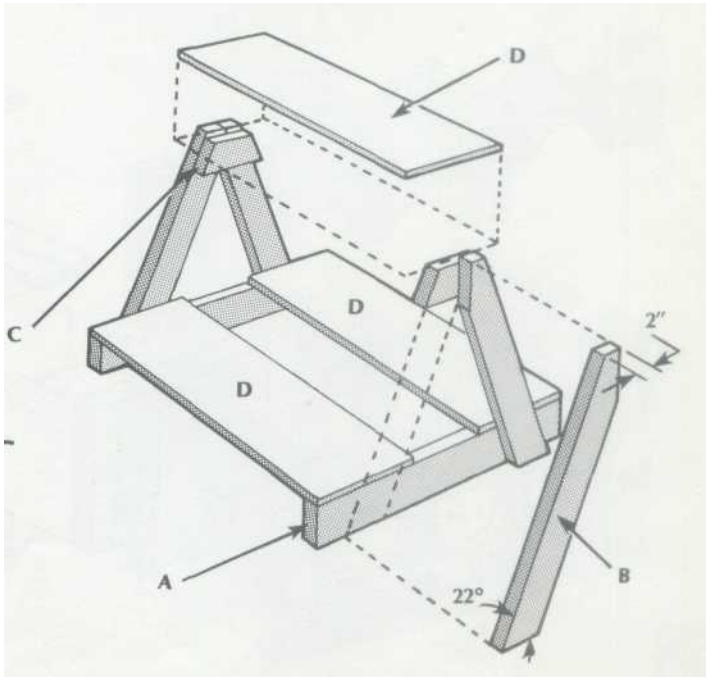
184

STEPLADDER PLANT STAND

If space is a problem around your home, this handy little plant stand could be the answer. The two bottom shelves provide ample space for small and medium size plants, while the top shelf can accommodate plants of slightly larger size.

1. Cut all the pieces to size according to the dimensions given.
2. Cut a 22° bevel on each end of each leg (B) so that, when installed, the legs will slant in but their ends will remain parallel.
3. Measure from the outside edge 2" across the beveled end at the top of each leg and square a line down from that point. Cut along those lines to create the joints between legs shown in the drawing.
4. Place a pair of legs together on a flat surface and lay a brace (C) across their upper ends. Adjust the brace so that its upper edge is parallel to and 3/4" below the upper ends of the legs. Mark and trim the ends of the brace so they will be flush with the outside edges of the legs. Repeat with the other brace and pair of legs.
5. Begin the assembly of the stand by laying each pair of legs across its brace and base piece (A). Make sure the bottom edges of the legs and base are flush and that the base extends an equal distance to either side. Fasten the legs to the base and brace using water-resistant wood glue and 10d galvanized nails. If working with redwood, blunt the ends of the nails before using.
6. Set the two leg units upright and fit the shelves (D) between them. Make sure the outer edge of each lower shelf is flush with the ends of the base and that the upper shelf is centered over the braces. Fasten the shelves in place using water-resistant wood glue and 10d galvanized nails.
7. Blunt any penetrating nail ends and break over all sharp edges. Apply a water-resistant finish.

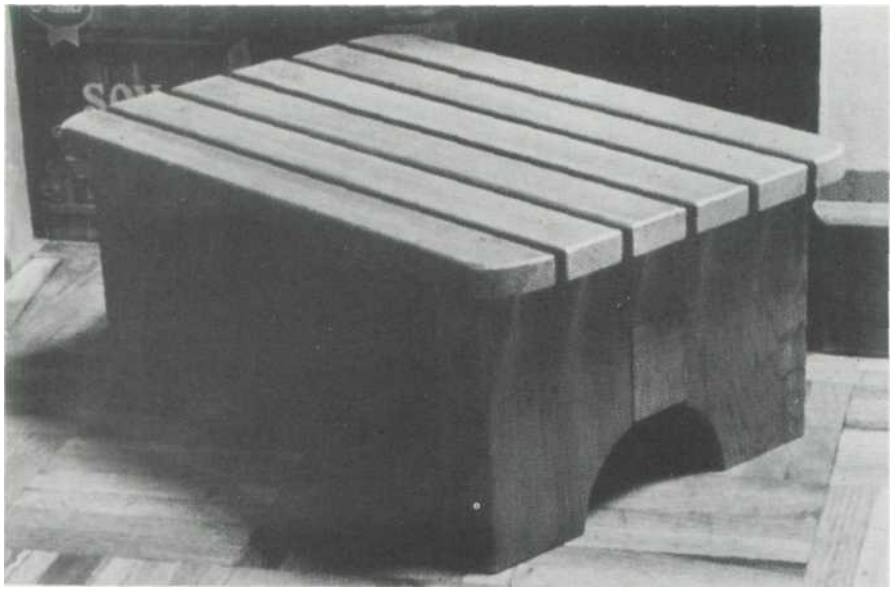


LIST OF MATERIALS

(finished dimensions in inches)

A	Base pieces (2)	1-1/2 × 3-1/2 × 22
B	Legs (4)	1-1/2 × 3-1/2 × 20
C	Braces (2)	1-1/2 × 3-1/2 × 7-1/2
D	Shelves (3)	3/4 × 7-1/4 × 30
	10d galvanized nails	
	Water-resistant wood glue	

185
GARDENING BENCH



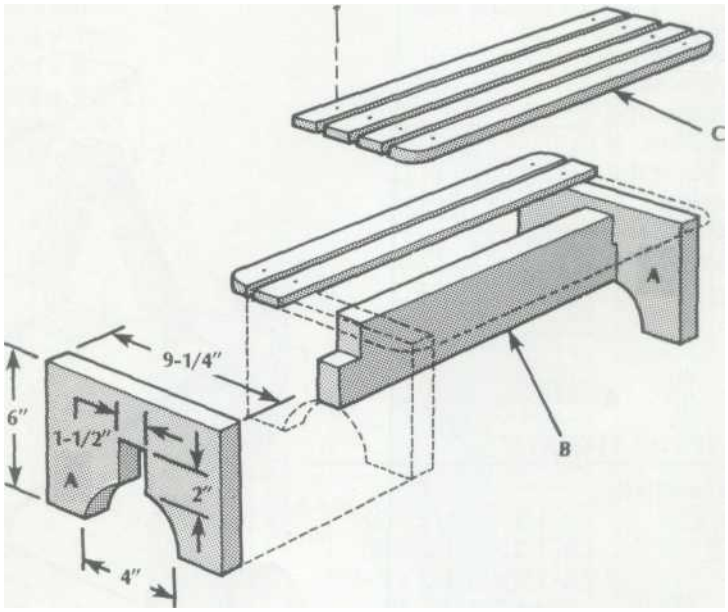
The functional design of this simple bench provides comfortable seating close to the ground, so you won't have to stoop or kneel. Besides being ideal for the garden or patio, it's also a natural in the bath or shower, if redwood or special-treated wood is used.

1. After cutting all of the pieces to size, round off the ends of the two outside top pieces (C).
2. Cut a 1-1/2" x 1-1/2" notch on each end of the cross brace (B) as shown to accommodate the legs (A).
3. Cut a 4"-diameter opening and 1-1/2" x 2" slot in the bottom of each leg as shown.
4. Glue and nail the legs to the cross brace. If working with red wood, blunt the ends of the nails before using.
5. Evenly space the top pieces on the legs,and secure them with glue and nails.
6. Sand and apply the water-resis tant finish of your choice.

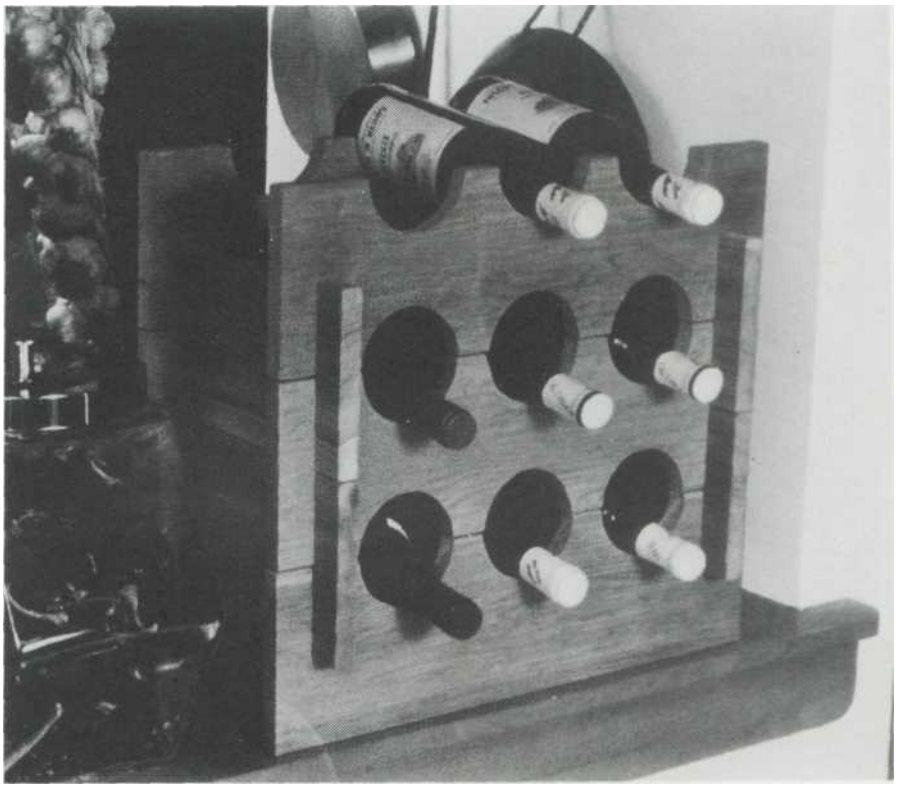
LIST OF MATERIALS

(finished dimensions in inches)

A	Legs (2)	1-1/2 × 9-1/4 × 6
B	Cross brace	1-1/2 × 3-1/2 × 12
C	Top (6)	3/4 × 1-1/2 × 15
	Galvanized nails	
	Wood glue	



186
WINE BOTTLE RACK



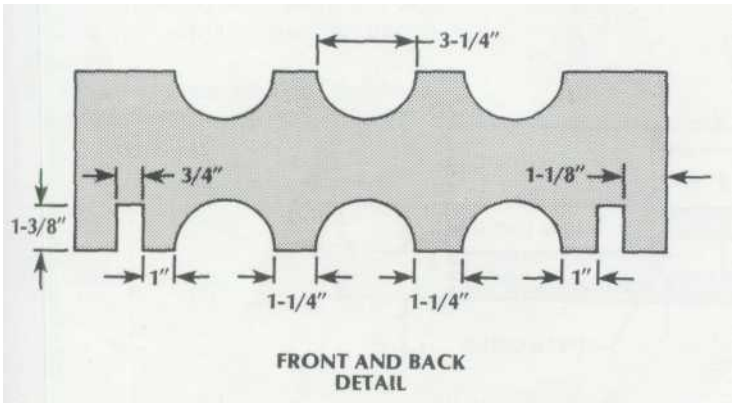
This wine bottle rack is expandable, so you can build the original three-tier module and add on later as your wine collection grows. Slotted construction enables it to go together quickly and be disassembled just as fast when it must be moved.

1. Make cardboard patterns of the front and back (A) and side pieces (B). Note that the front and back pieces have a 3/4" x 1-3/8" slot cut in each end, and three evenly spaced 3-1/4"-diameter cutouts as shown. The side pieces also have 3/4" x 1-3/8"slotscutintheirends.
2. Transfer the patterns to red wood (or any other wood of your choice), and cut as many pieces as needed for the number of tiers de sired. Clamp the side pieces to gether to assure a uniform fit, and cut the slots on a table saw or radial arm saw. Note that the bottom edges of the bottom tier pieces and the upper edges of the top tier pieces need no slots.
3. Use a saber saw to make the round cuts on the front and back pieces. No round cuts are needed on the bottom edges of the bottom tier pieces.
4. Assemble the rack by fitting the slots together as shown. No glue or nails are required.

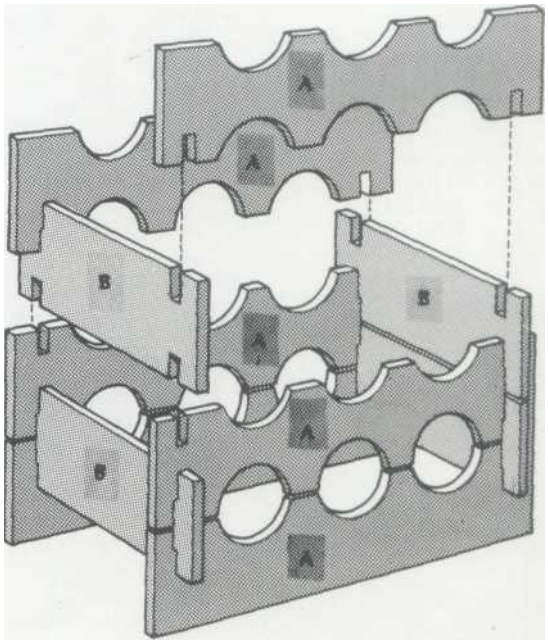
LIST OF MATERIALS

(finished dimensions in inches)

A	Front and back pieces (6)	3/4 × 5-1/2 × 18
B	Side pieces (4)	3/4 × 5-1/2 × 10-1/2



FRONT AND BACK DETAIL

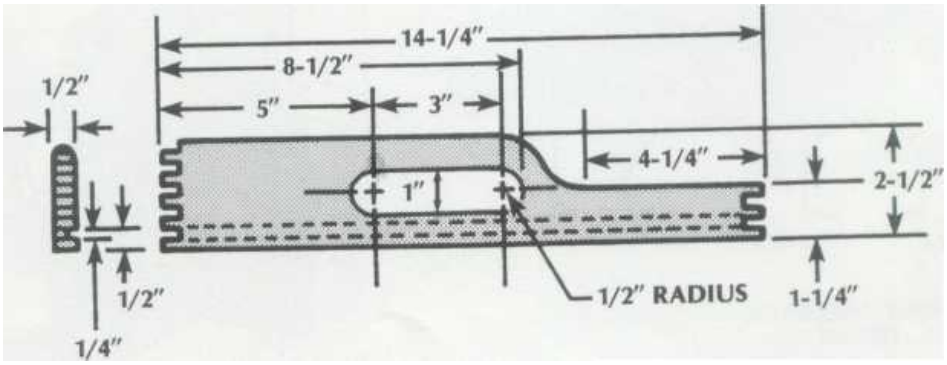


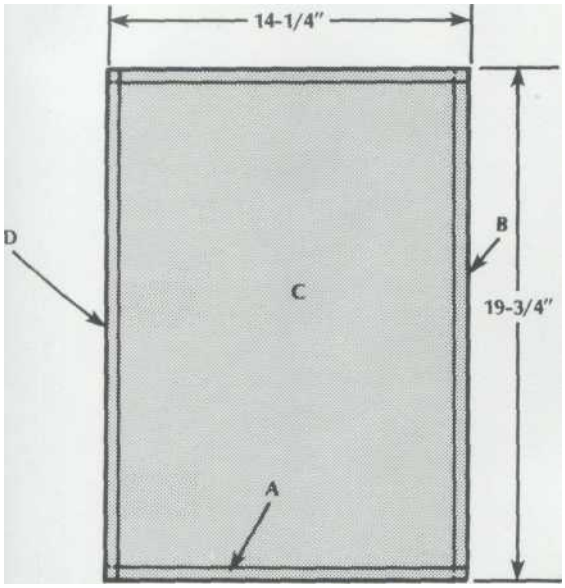
187
LAP TRAY AND COASTERS

F o r serving everything from snacks to meals, this handsome ap tray will be a welcome addition to your kitchen. And, to complement the tray, the easy-to-make coasters are perfect. Once the coaster project is properly set up, you can make numerous sets to give as gifts.

LAP TRAY

1. Cut the various parts to size us ing the dimensions given.
2. Make a template for the sides (A) using the pattern provided. Use a scroll saw, bandsaw, or jigsaw to cut out the sides, then cut out the handle holes.
3. Smooth the curved surfaces with a small drum sander.
4. Using a router with a 1/4" round ing over bit, shape the top edge of the sides and the handle holes. Shape the top edge of the front (B) and back (D) as well.
5. Using a 1/4" dado head set to a depth of 1/2", cut the fingers for the box joint corners on both ends of the sides, bottom, and back.
6. Reset the dado head to a depth of 7/32", then cut the 1/4"-wide grooves in the sides, front, and back to accept the bottom (C).
7. Assemble the tray using glue in the corner joints, but leaving the bottom free to respond to move ment of the other parts.
8. Sand the tray and finish as desired.

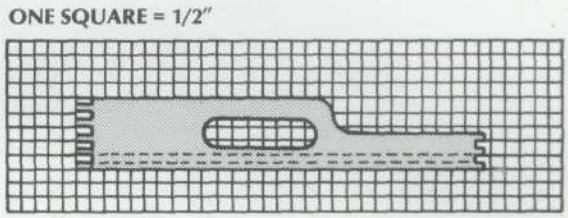




LIST OF MATERIALS (Lap Tray)

(finished dimensions in inches)

A	Sides (2)	1/2 × 2-1/2 × 14-1/4
B	Front	1/2 × 1-1/4 × 19-3/4
C	Bottom	1/4 × 13-5/8 × 19-1/8 plywood
D	Back	1/2 × 2-1/2 × 19-3/4
	Wood glue	



SIDE PATTERN

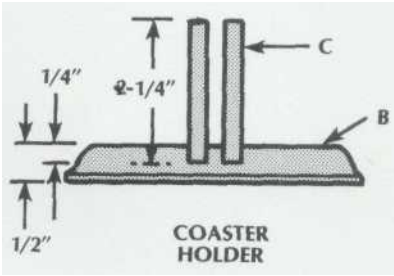
COASTERS

1. Cut the parts to size using the dimensions given, then sand smooth. Cut the coasters (A) so that the grain runs diagonally to all four edges.
2. Shape the edges of the base (B) usinga hand-held router equipped with a roman ogee bit.
3. Use a 1/4"-inch dado head set to a depth of 9/32" to cut the grooves in the coasters. Cut grooves 1/4" apart on one side of each piece, flip the piece over, rotate it 90°, and cut a second set of grooves.
4. Drill 1/4"-diameter holes 1/4" deep in the base to accommodate the dowels (C).
5. Glue the holders in place and check for squareness. Finish as desired.
6. Finish the coasters and holder as desired.

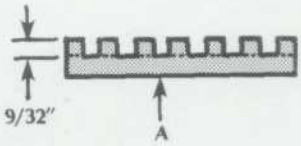
LIST OF MATERIALS (Coasters)

(finished dimensions in inches)

A	Coasters (4)	1/2 × 3-1/4 × 3-1/4
B	Base	1/2 × 4-1/4 × 4-1/4
C	Dowels (2)	1/4-dia. × 2-1/4
	Wood glue	



COASTER HOLDER



COASTER END VIEW

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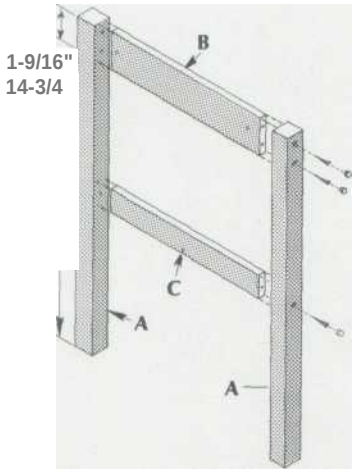
BUTCHER BLOCK MICROWAVE OVEN STAND

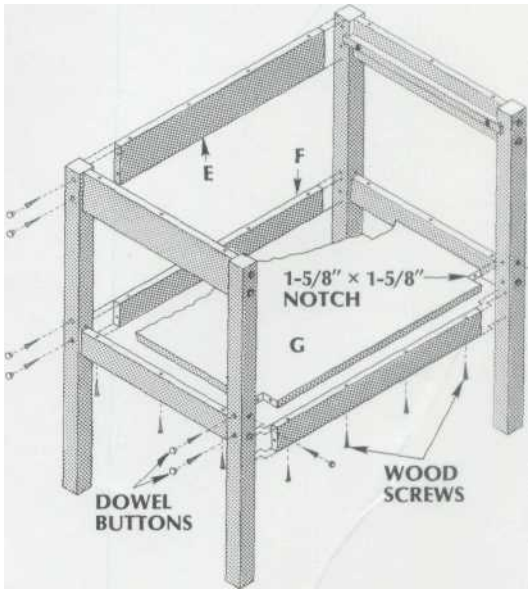
The butcher block has fallen out of favor in recent years, replaced by the countertop cutting board in an attempt to save space. This design, however, makes the butcher block a useful part of the kitchen once again. It has a drawer and shelves for storage, it can be moved to provide a cutting surface or extra counter space wherever needed, and it even has space for a microwave oven. In addition to the stand, plans are included for building a storage unit on the lower shelf in place of the oven.

MAKING THE STAND

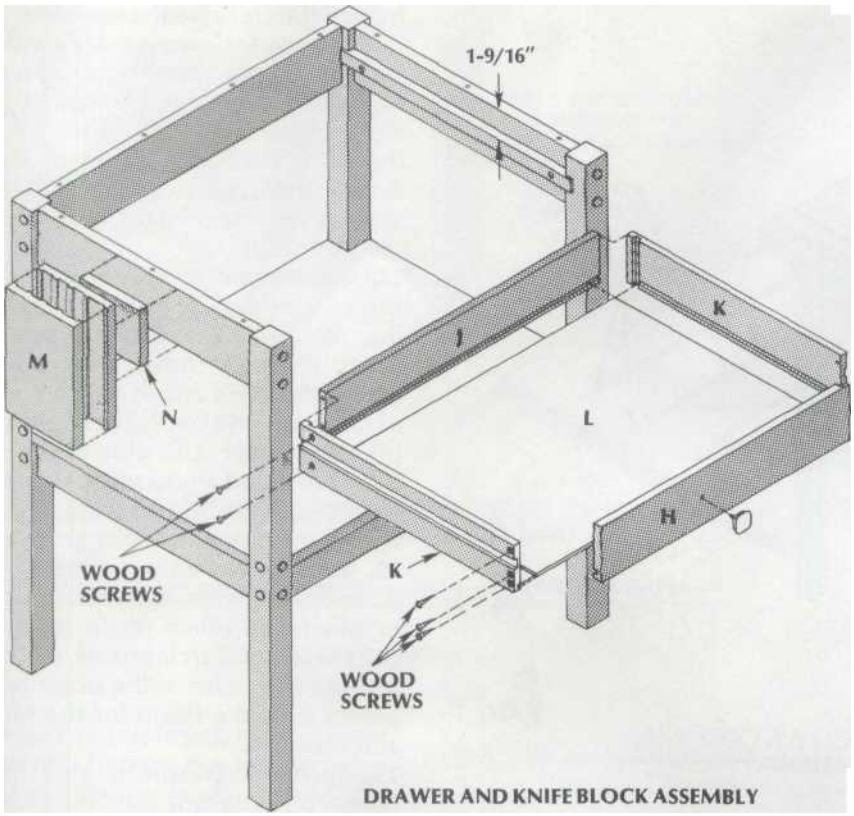
1. Cut all pieces to size according to the dimensions given.
2. If you want to make the stand mobile and add casters to the legs (A), cut 2" off the length of the legs and drill a center hole in the bot tom of each one to accept the cast er shaft.
3. Lay out the positions of the rail joints on the legs as indicated in the drawings. Note that all rails are centered on the width of the legs and that the tops of the upper rails (B, E) and legs are flush. The lower rails (C, F) should be set 14-3/4"



LEG AND RAIL ASSEMBLY



BASE ASSEMBLY



DRAWER AND KNIFE BLOCK ASSEMBLY

above the bottoms of the legs, unless the shelf (G) will house a microwave oven. In that case, drop the lower rails 4".

4. Drill, countersink, and counterbore pilot holes for a pair of #8 wood screws at each joint between rails and legs. Drill through the legs into the ends of the rails and make the counterbores 3/8" in diameter and 3/4" deep.

5. Drill another set of counterbored pilot holes for #8 screws through each of the lower rails—three holes in each end rail and four in each front and back rail. Run the holes through the width of the rails, from the lower to the upper edges, and make the counterbores 1-3/8" deep. It might help to drill the counterbores first, then use a long, thin bit to complete the pilot holes.

6. Cut 3/8"-wide x 1/2"-deep rabbets across the rear ends and 1" x 1/2" rabbets across the front ends of the drawer guides (D). Also, cut 1-5/8" x 1-5/8" notches on each corner of the shelf for fitting it between the legs.

7. Fasten the legs and rails together using wood glue and #8 x 1-3/4" wood screws. Then fasten the shelf in place, running #8 x 1-3/4" screws through the rails into its underside.

8. Position the drawer guides against the inside faces and 1-9/16" below the upper edges of the upper end rails. Fasten the guides to the rails using wood glue and #6 x 1-1/4" wood screws. Countersink the screws so their heads will not interfere with the operation of the drawers.

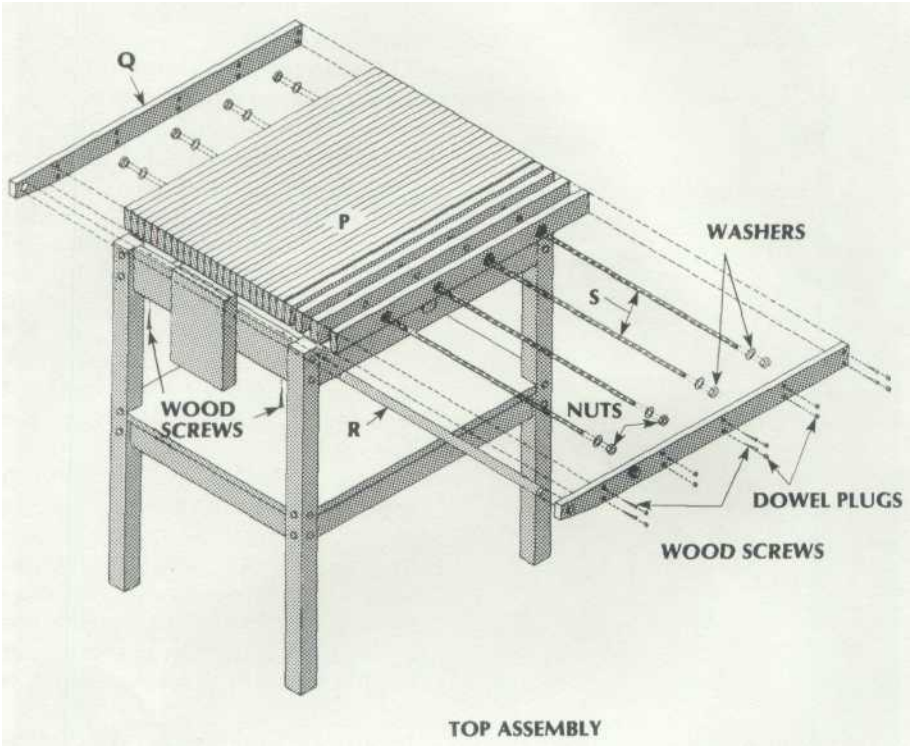
9. Cut a 3/4"-wide x 1/4"-deep groove 1" below the upper edge along the outside face of each drawer side (K). Check the fit between these grooves and the drawer guides. If necessary, widen the grooves to allow the drawer sides to slide smoothly back and forth on the guides.

10. Cut 1/2"-wide x 1/2"-deep rabbets across the ends of the drawer

LIST OF MATERIALS (Stand)

(finished dimensions in inches)

A	Legs (4)	1-3/4 × 1-3/4 × 34
B	Upper end rails (2)	3/4 × 4 × 18-3/4
C	Lower end rails (2)	3/4 × 2-1/2 × 18-3/4
D	Drawer guides (2)	3/4 × 3/4 × 20-1/8
E	Upper back rail (2)	3/4 × 4 × 24-3/4
F	Lower back and front rails (2)	3/4 × 2-1/2 × 24-3/4
G	Shelf	3/4 × 22 × 28
H	Drawer front	3/4 × 4 × 24-5/8
J	Drawer back	1/2 × 3-1/2 × 24-1/8
K	Drawer sides (2)	1/2 × 3-1/2 × 18
L	Drawer bottom	1/4 × 17-1/2 × 24-1/8 plywood
M	Knife block (2)	3/4 × 6 × 9
N	Spacer block	5/8 × 5 × 4
P	Butcher block top pieces (28)	3/4 × 2 × 28-1/2
Q	Top facings (2)	3/4 × 2 × 32-1/2
R	Handle	1 dia. × 22-1/2
	Threaded metal rods (4)	3/8 dia. × 20-7/8
	Flathead wood screws	#6 × 1-1/4
	Flathead wood screws	#8 × 1-1/2
	Flathead wood screws	#8 × 1-3/4
	Washers and nuts	
	Dowel buttons and dowel plugs	3/8 dia.
	Drawer pull	
	Wood glue	



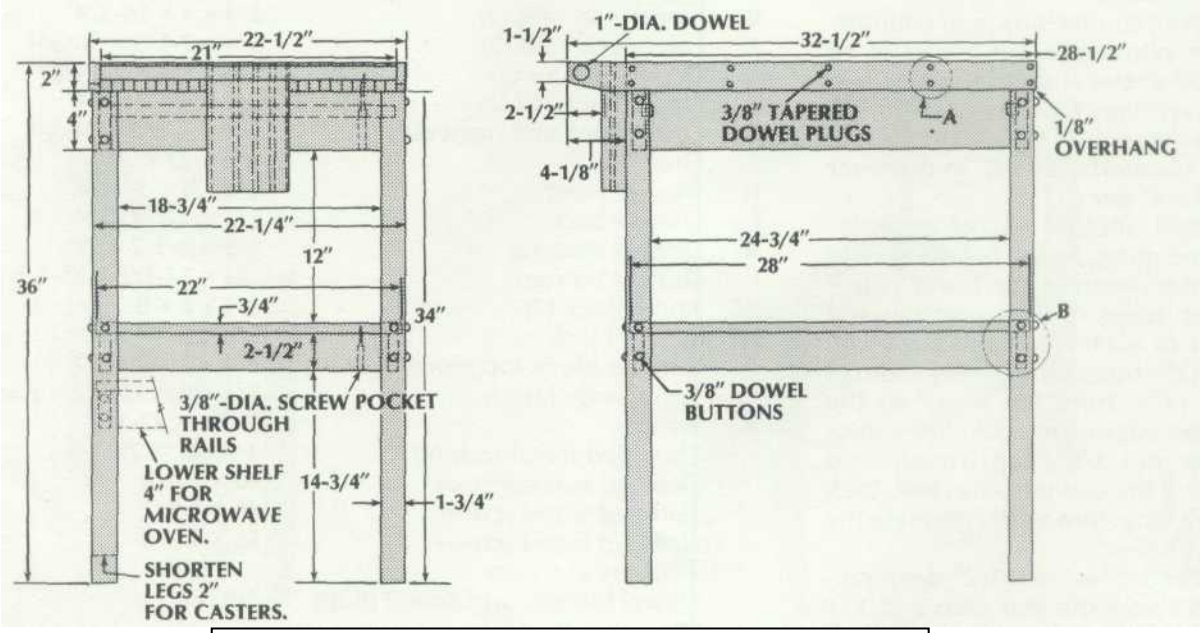
TOP ASSEMBLY

front (H) to receive the ends of the sides. Cut 1/4"-deep x 1/2"-wide dadoes across the drawer sides, 1/2" in from the rear, to receive the ends of the back (J). Cut 1/4"-deep x 1/4"-wide grooves in the drawer front, back, and sides, 1/4" above their lower edges, to receive the bottom (L).

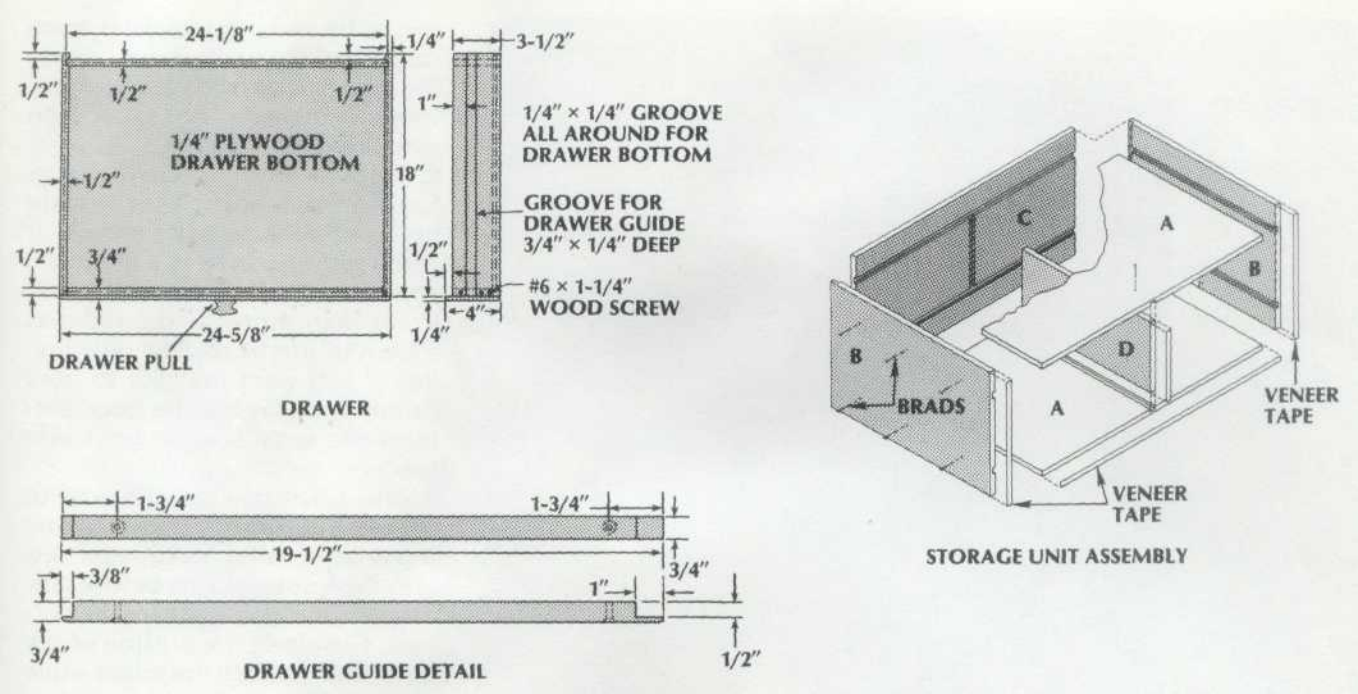
11. Center and drill a screw hole through the drawer front for attaching the pull. Countersink screw holes through the drawer sides where they will attach to the ends of the front and back. Then assemble the drawer. Use glue and #6 x 1-1/4" flathead wood screws to join the sides, front, and back, but leave the bottom unglued in the grooves.

12. Drill four evenly spaced 3/8"-diameter holes through each butcher block top piece (P) to receive the metal reinforcing rods. Counterbore the holes in the outer two pieces to make room for the nuts and washers.

13. Spread waterproof glue between all adjacent butcher block top pieces. Thread the rods through



BUTCHER BLOCK MICROWAVE STAND LAYOUT



the pieces and install the nuts and washers. Tighten the nuts to align and clamp the pieces while the glue dries.

14. Trim one end of each facing (Q) to the profile shown in the stand layout drawing and drill holes for the ends of the handle (R). Begin the tapers 3" from the ends and center the holes 1-1/4" from the ends of the facing pieces.

15. Fasten the facings to the top using waterproof glue and #8 x 1-1/2" flathead wood screws, making their right ends and upper edges flush. Glue the handle in place at the same time. Position the screw holes where you will not hit the metal rods. Counterbore the holes and fill them with 3/8"-diameter plugs.

16. Sand the top and facings flush, then finish them with mineral oil or a similar non toxic finish. Sand the rest of the stand, fill the counterbored holes with wood buttons, then apply polyurethane or another finish of choice.

17. Center the top on the frame and mark the position of the screw holes in the upper edges of the rails. Drill pilot holes into the underside of the block top, then fasten it to the rails using #8 x 1-3/4" flathead wood screws. 18. Cut matching 1/16"-deep grooves in the two halves of the knife block (M). Then glue the pieces together, aligning the grooves. Nail or screw the 5/8"-thick spacer block (N) to the left end rail, then glue the knife block to the spacer, making its top flush with the upper surface of the butcher block.

LIST OF MATERIALS (Storage Unit)

(finished dimensions in inches)

A	Top and bottom (2)	1/2 × 16-3/4 × 24 plywood
B	Sides (2)	1/2 × 11-1/2 × 17 plywood
C	Back	1/2 × 11-1/2 × 24 plywood
D	Divider	1/2 × 7 × 16-3/4 plywood
	Wire brads	#17 × 1
	Veneer tape	
	Wood filler	
	Wood glue	

MAKING THE STORAGE UNIT

1. Cut all pieces to size from 1/2"-thick veneer plywood.

2. Cut 1/2"-wide x 1/4"-deep rabbets across the rear ends of the sides (B) and 1/2" x 1/4" grooves, spaced 6-1/2" apart, along the length of the sides and back (C). Also, cut 1/2" x 1/4" dadoes across the center of the top and bottom (A) and back. The dado on the back should only connect the two grooves.

3. Assemble the unit with glue and #17 x 1" wire brads. Set the brads and fill with a wood filler that matches the finish you will be using.

4. Cover all exposed edges of the plywood with veneer tape.

5. Finish the drawer to match the stand and storage unit, then install.

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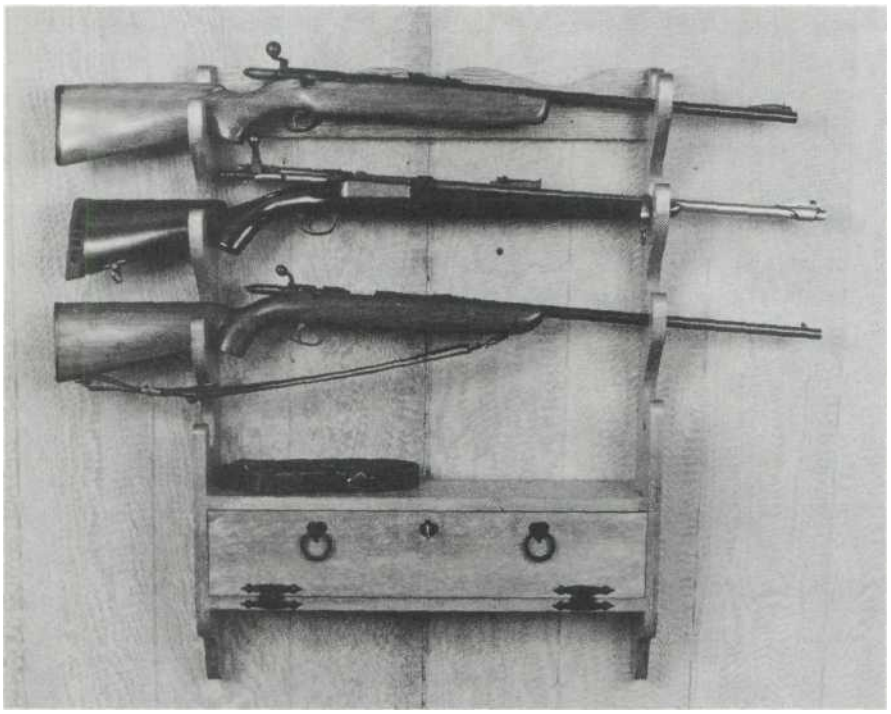
SPORTSMAN'S RACK



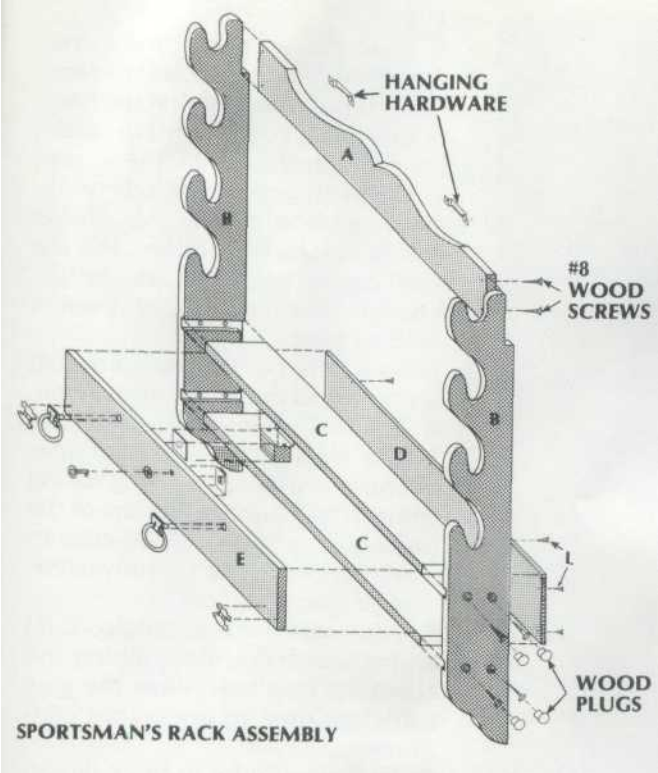
Here's the ideal method of storing those prized rifles and fishing rods—the sportsman's rack. Not only does it make an eye-catching display, but it also has a locking compartment for storing shells, lures, and other items.

1. Select two 8' lengths of good quality 1 x 6 lumber, hardwood or softwood. Cut the top (A), sides (B), shelves (C), and door (E) to length, then rip them to width. Rip the pieces 1/16" wide at first, then use a jointer or hand plane to clean up the ripped edges.
2. Cut a pair of 1/2"-wide x 1/4"-deep dadoes across the inner face of each side piece to receive the ends of the shelves. Space the dadoes 5" apart and set the lower one 5-1/2" above the bottom end of each board, as shown in the front view drawing.
3. Cut a 1/4"-wide x 1/4"-deep rabbet along the back edge of each side piece in the area between the dadoes to make room for the ends of the plywood back panel.
4. Cut 1/4"-wide x 1/4"-deep rabbets along what will become the inside rear edges of the shelves to accept the upper and lower edges of the back panel.
5. Cut a 4"-long notch 3/4" deep into the rear edge at the upper end of each side piece to make room for the ends of the rack's top rail (A).
6. Dry assemble the pieces to make sure everything fits correctly. Fine tune the joinery as needed.
7. Begin the layout of the curved shapes on the top rail and side pieces by making templates from cardboard or heavy paper using the patterns provided as guides. Then use the templates to trace the patterns onto the boards.
8. Before laying out the hook patterns on the side pieces, decide how you want to use the rack. If you want it to serve as a gun rack, set the hooks on the left side 1 -1/2" lower than those on the right, as shown in the front view drawing. But, if you want the rack to hold fishing gear, lay out the hook patterns the same way on both side pieces.
9. Use a bandsaw or saber saw to cut out the patterns traced on the top rail and sides. Make relief cuts into the hook pockets before cutting around the tight inside corners. Cut along the outside of the lines, then smooth the edges while sanding down to the lines.
10. Center the latch plate part of the lock next to the front edge on the underside of the top shelf. Mark around it, then chisel out the shelf as needed for mounting the plate.
11. Clamp the top rail, sides, and shelves together while drilling pilot holes for #8 wood screws. Drill 3/8"-diameter x 1/4"-deep counterbore holes over the pilot holes in the sides and countersink the holes that run through the back of the top rail.

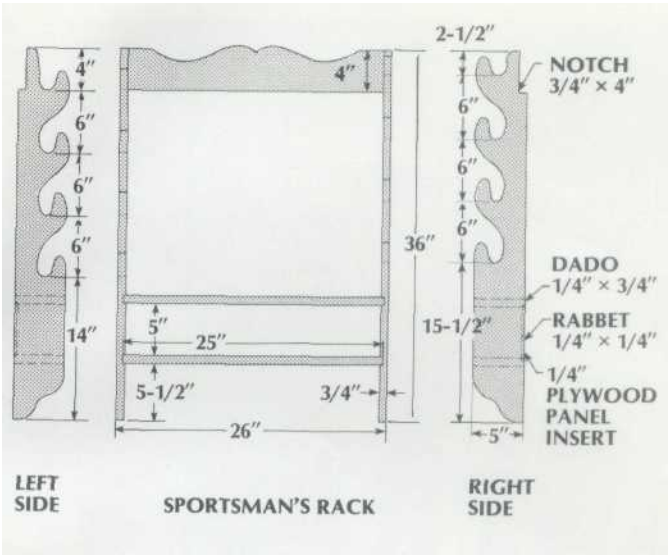
LIST OF MATERIALS

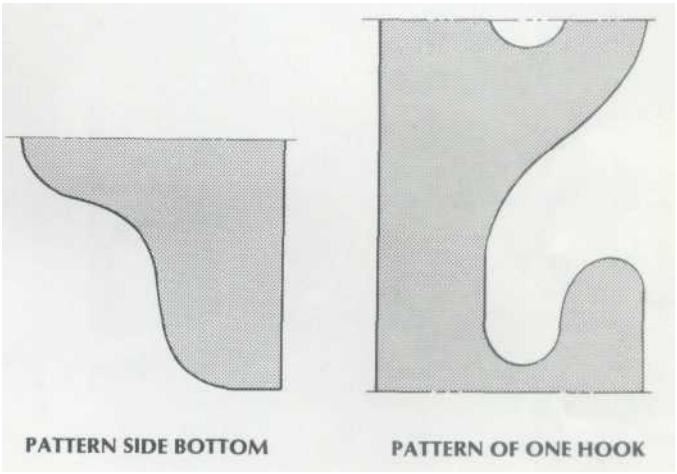
(finished dimensions in inches)

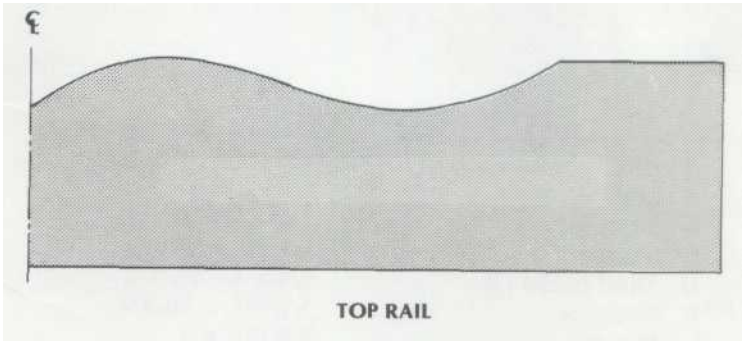
A	Top	3/4 × 4 × 26
B	Sides (2)	3/4 × 5 × 36
C	Shelves (2)	3/4 × 5 × 25
D	Back	1/4 × 5-1/2 × 25
E	Door	3/4 × 4-15/16 × 24-7/16
	Dowel buttons or plugs	3/8 dia. × 1/4
	Flathead wood screws	#8 × 1-1/4
	Wire nails	
	Hinges with screws (2 sets)	
	Magnetic catch and plate	
	Lock and key	
	Door pulls	
	Hanging hardware	
	Wood glue	



SPORTSMAN'S RACK ASSEMBLY







12. Disassemble the rack and sand all the parts. Lightly round over all sharp edges that will be exposed after assembly. Then, reassemble the shelves, sides, and top rail us ing wood glue and #8 x 1-1/4" flat-head wood screws.
13. Cut a piece of 1/4" plywood to size for the back (D). Fasten the back to the shelves and sides using glue and wire nails.
14. Glue 3/8"-diameter wood plugs in the counterbored screw holes. After the glue dries, sand the plugs flush with the sides.
15. Temporarily mount the hinges on the door, then fit the door in place and fasten the hinges to the bottom shelf. Check to see that the door operates properly, then mark the location for the lock keyhole.
16. Remove the hinges from the door and shelf. Drill the keyhole in the door, as well as holes for the door pulls.
17. Sand the door, breaking all sharp edges. Apply the desired finish to the door and the rest of the rack. After the finish has dried, mount all the hardware on the door and rack, including your choice of hardware for hanging the rack on the wall.

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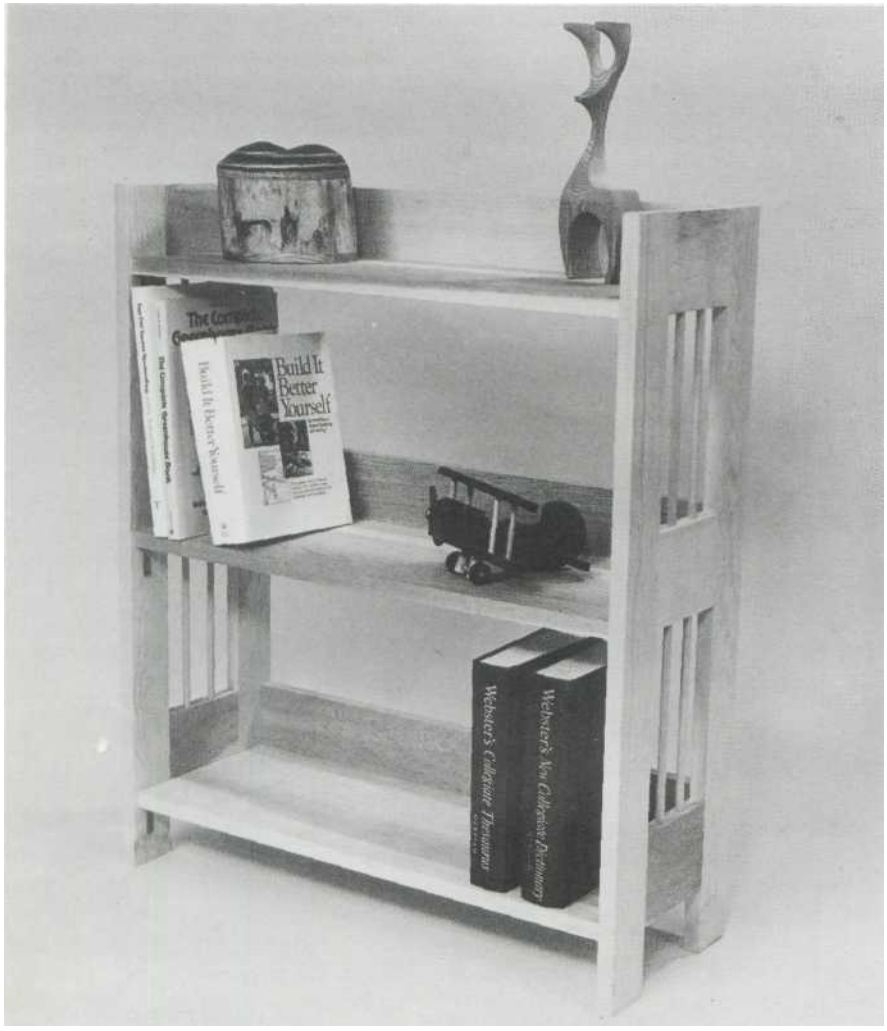
CHAIRSIDE BOOKCASE



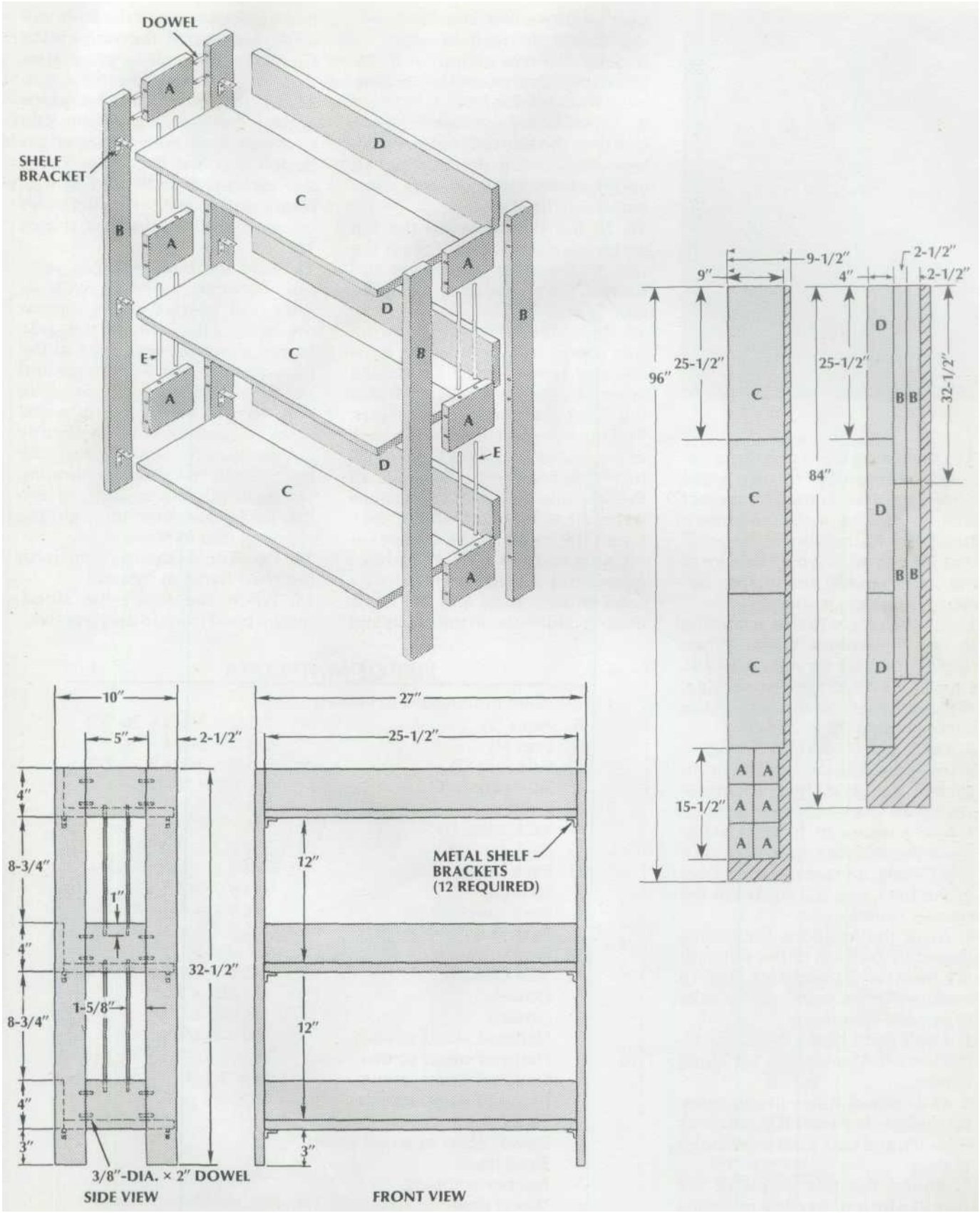
LIST OF MATERIALS

(finished dimensions in inches)

A	End rails (6)	3/4 × 4 × 5
B	Stiles (4)	3/4 × 2-1/2 × 32-1/2
C	Shelves (3)	3/4 × 9 × 25-1/2
D	Shelf backs (3)	3/4 × 4 × 25-1/2
E	Rods (8)	3/8 dia. × 10-3/4
	Dowels	3/8 dia. × 2
	Metal shelf brackets (12)	3/8 × 1-1/2 × 1-1/2
	6d finishing nails	
	Wood glue	

How many times have you stretched out on your favorite easy chair, only to realize that the book or magazine you wanted to read is on the other side of the room? With this attractive chairside bookcase, reading material is always within reach. In addition, the top shelf can be used to display knick-knacks, small plants, or even a reading lamp.

1. To begin, cut the pieces to size according to the dimensions given.
2. Drill 3/8"-diameter dowel holes 1-1/16" deep in the ends and sides of the end rails (A). Using dowel centers, transfer the centers of the holes to the stiles (B). Be sure to mark the centers accurately to en sure proper assembly.
3. Assemble the end rails, rods (E) and rails with dowels by gluing and clamping in place. Allow the glue sufficient time to dry before con tinuing.
4. Drill pilot holes in the rails and shelves (C) for the bracket screws, and attach the brackets to the stiles.
5. Attach the shelf backs (D) to the stiles with 6d finishing nails.
6. To complete the assembly, at tach the shelves to the brackets with screws.
7. Sand with 150-grit paper, fol lowed by 180-grit. Finish as desired.



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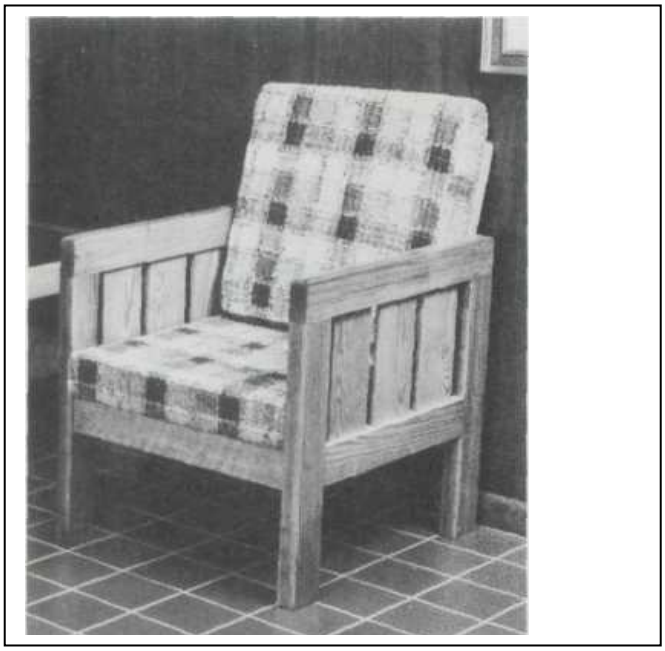
ARMCHAIR



It's becoming more and more expensive these days to own good handcrafted furniture. This project enables you to make your own armchair at a fraction of the retail cost. What's more, you'll be sure of the craftsmanship and quality, because you made it yourself.

1. Cut the pieces to size according to the dimensions given. When ripping the back cleat (L) to width, cut a 16° bevel on the ripped edge. Also, cut tapers on the ends of the back supports (K) as shown.
2. Drill 1-3/8"-deep x i"-wide x 2-1/4"-long mortises in the arms (A) and legs (B) as shown. Remove any excess stock with a hand chisel.
3. Use a router or hand chisel to make the 1/2"-deep x 3/8"-wide x 2-1/2"-long mortises in the edges of the back rails (G, H). Leave the corners round.
4. Mark the locations for cutting tenons in the ends of the side rails (C), front rail (E), and back rails. To mark, score the wood with a knife to prevent splintering.
5. Use a dado blade to cut the 1"-thick x 2-1/4"-wide x 1-1/4"-long tenons.
6. Drill dowel holes in the arms, side rails, side panels (D), and back stiles (F), and rails. Drill these holes 1" deep.
7. Round the side edges of the slats (J) with a router and rounding over bit. This will enable them to fit the mortises in the back rails.
8. Sand all pieces smooth with 150-grit paper. Dry-assemble the arm chair to check for fit.
9. Assemble the side frames. Begin by fitting the side rails between the legs, then install the side panels and the arms. Use glue in all joints and clamp until dry.
10. Fit the slats between the top and bottom back rails. Fasten the rails to the stiles using glue and dowels. Clamp and set aside for the glue to dry.
11. Assemble the front rail and the side frames using glue in the mor tise and tenon joints. Clamp the assembly, then immediately install the front (M) and side (N) cleats. Butt the side cleats against the back of the front rail and set them 1/16" to 1/8" below the upper edges of the side rails. Drill pilot holes counterbored at least 1/4" deep, then fasten the cleats to the frames us ing glue and #10 x 2-1/4" flathead wood screws. If you prefer, dry as semble the frames and rail while drilling pilot holes in the cleats and frames, then remove the front rail while you install the side cleats. Glue the front rail in place after that.
12. Fit the back cleat in place against the tail ends of the side cleats, making their upper edges flush. Fasten the back cleat to the side cleats using #10 x 2-1/4" flathead wood screws set in pilot holes counterbored to a depth of at least 1/2".
13. Hold the back frame in posi tion between the sides with its lower rail pressed firmly against the back cleat. Mark the side frames along the rear edge of the back. Remove the back frame and install the back supports using glue and #8x1-1/4" flathead wood screws, countersunk or slightly counterbored. Then fasten the back frame in place by running screws through its bottom rail into the back cleat and through the supports into its stiles.
14. Doallfinalsanding,thenfinish the chair frame as desired.
15. When the finish has dried, mount band irons to the cleats with

LIST OF MATERIALS

(finished dimensions in inches)

A	Arms (2)	1-1/2 × 3-1/4 × 26-1/2
B	Legs (4)	1-1/2 × 3-1/4 × 24
C	Side rails (2)	1-1/2 × 3-1/4 × 22-1/2
D	Side panels (6)	1/2 × 5 × 10-1/4
E	Front rail	1-1/2 × 3-1/4 × 24
F	Back stiles (2)	3/4 × 3 × 24
G	Back top rail	3/4 × 3 × 15-1/2
H	Back bottom rail	3/4 × 3 × 15-1/2
J	Slats (3)	3/8 × 2-1/2 × 19
K	Back supports (2)	3/4 × 3/4 × 8
L	Back cleat	1-1/4 × 2 × 21-1/2
M	Front cleat	1-1/4 × 1-1/2 × 19
N	Side cleats (2)	1-1/4 × 1-1/2 × 17-1/2
	Dowels	1/4 dia. × 2
	Dowels	3/8 dia. × 2
	Flathead wood screws	#10 × 2-1/4
	Flathead wood screws	#8 × 1-3/4
	Flathead wood screws	#8 × 1-1/4
	Panhead wood screws	#6 × 3/4
	Tacks	
	Dowel plugs or wood putty	
	Band irons	
	Rubber webbing	
	Wood glue	

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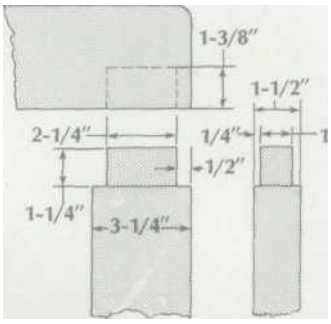
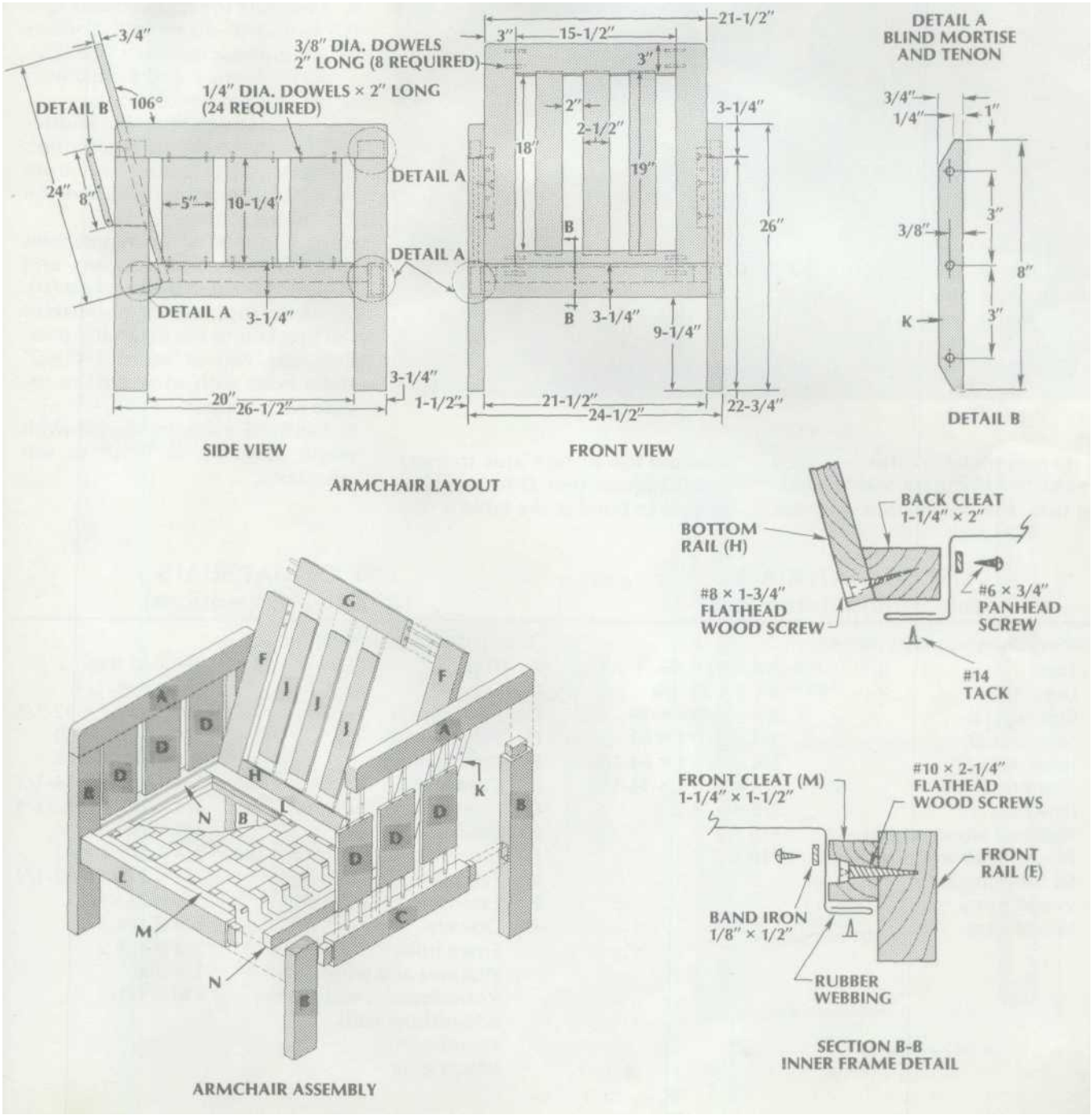
#6 x 3/4" panhead screws. Do not screw the irons tight against the cleats; leave a 1/16" gap to pull the rubber webbing through. 16. Mark the proper spacing of the rubber webbing strips. Starting on one side, pull one strip through, double the end over, and tack fast. Repeat for each strip.

17. Stretch the strips across to the other side, and feed the end be tween the iron and cleat. Pull tight, then double the ends over and tack. Repeat this procedure for stretching the strips from front to back. Remember to interweave the webbing as shown.

18. Buy or make cushions to fit the armchair.





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PARSONS TABLE

This parsons table offers a surface area of 19-1/4 square feet. By adding two table extensions, you can ncrease the surface area to more than 32 square feet. Either way you choose to build it, the table is sure to be a welcome addition to your dining room or kitchen.

1. Cut all pieces to size according to the dimensions given.
2. Drill 3/8"-diameter dowel holes in the legs, side rails (D) and end rails (C), as shown.
3. Construct the frame (C,E,F) us ing 6d finishing nails, then nail and glue the top (A) in place. Be sure to fill all nail holes with wood putty.
4. Assemble the legs and side rails (D) with 3/8"-diameter x 2" dow els, glue, and screws (see Detail A).

NOTE: Steps 5 and 6 deal with tables that have extensions.

5. The extension table has shorter end rails (C) to allow the extension supports (G) to extend out from the ends. The supports receive the extensions as shown.
6. Drill four 9/16"-diameter holes in each extension support and matching holes in the brackets (H). When the supports are mounted to the brackets in the extended posi tion, use two or more 1/4" x 2" stove bolts with wing nuts to se cure each support.
7. Sand all surfaces. Cover with plastic laminate or finish to suit your taste.

LIST OF MATERIALS (Table without Extensions)

(finished dimensions in inches)

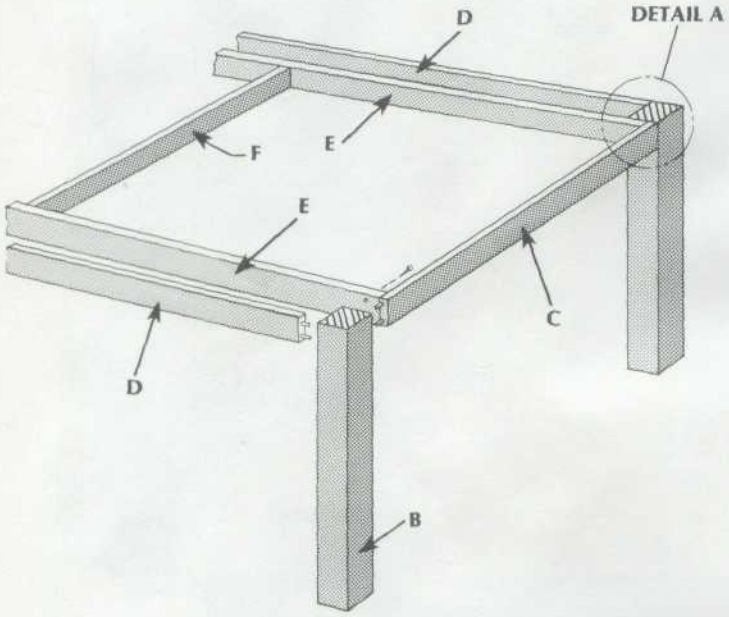
A	Top	3/4 × 42 × 66
B	Legs (4)	3 × 3 × 28-1/4
C	End rails (2)	3/4 × 2-1/4 × 36
D	Side rails (2)	3/4 × 2-1/4 × 60
E	Inner rails (2)	3/4 × 2-1/4 × 64-1/2
F	Center rail	3/4 × 2-1/4 × 34-1/2
	Dowels	3/8 dia. × 2
	Flathead wood screws	#10 × 2
	Roundhead wood screws	#10 × 2
	6d finishing nails	
	Wood putty	
	Wood glue	

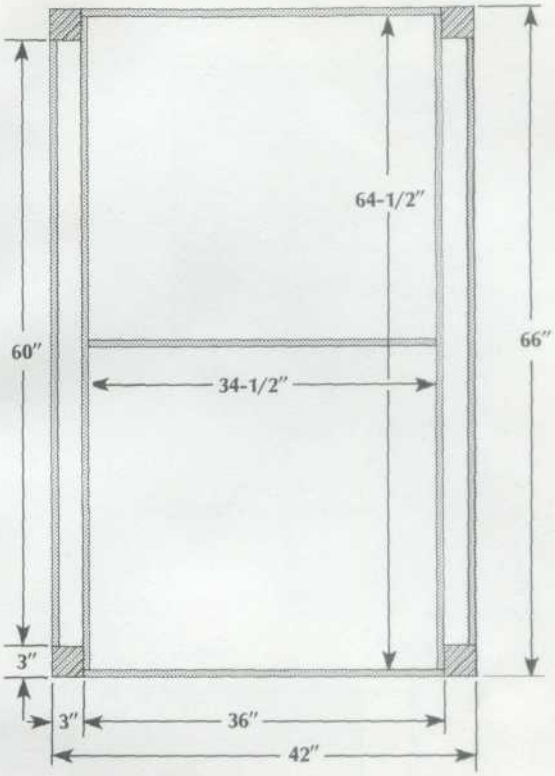
LIST OF MATERIALS (Table with Extensions)

(finished dimensions in inches)

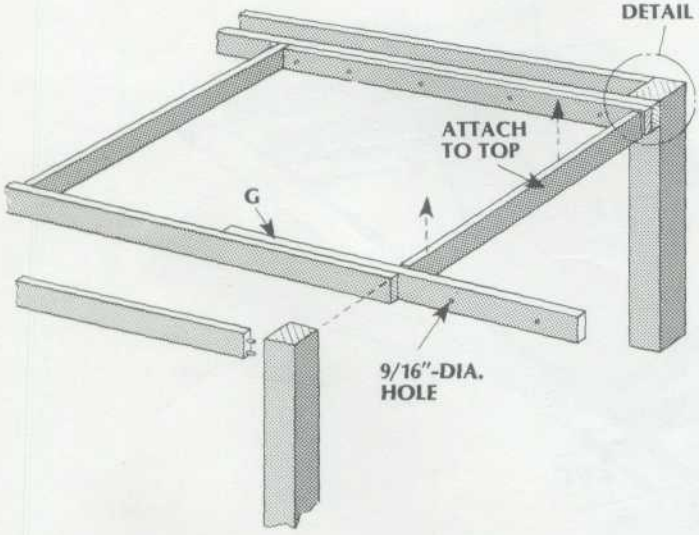
A	Top	3/4 × 42 × 66
B	Legs (4)	3 × 3 × 28-1/4
C	End rails (2)	3/4 × 2-1/4 × 32-7/8
D	Side rails (2)	3/4 × 2-1/4 × 60
E	Inner rails (2)	3/4 × 2-1/4 × 66
F	Center rail	3/4 × 2-1/4 × 34-1/2
G	Extension supports (4)	3/4 × 2-1/4 × 32-3/4
H	Brackets (8)	3/4 × 2 × 16
J	Extension side rails (2)	3/4 × 2-1/4 × 42
K	Extension end rails (4)	3/4 × 2-1/4 × 22-1/4
L	Extension tops (2)	3/4 × 23 × 42
	Dowels	3/8 dia. × 2
	Stove bolts	1/4 dia. × 2
	Washers and wing nuts	1/4 dia.
	Roundhead wood screws	#10 × 1-1/2
	6d finishing nails	
	Wood putty	
	Wood glue	

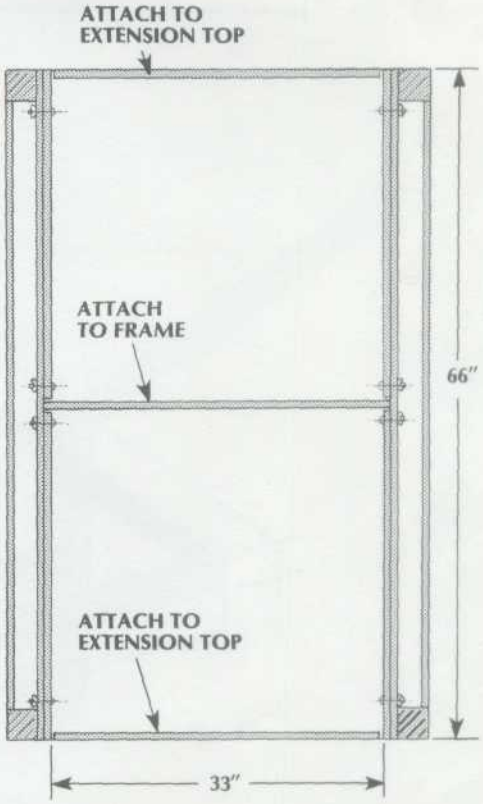
FRAME ASSEMBLY DIAGRAM
(WITHOUT EXTENSION)

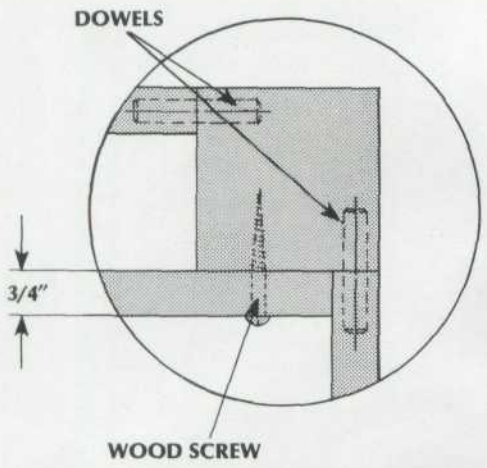




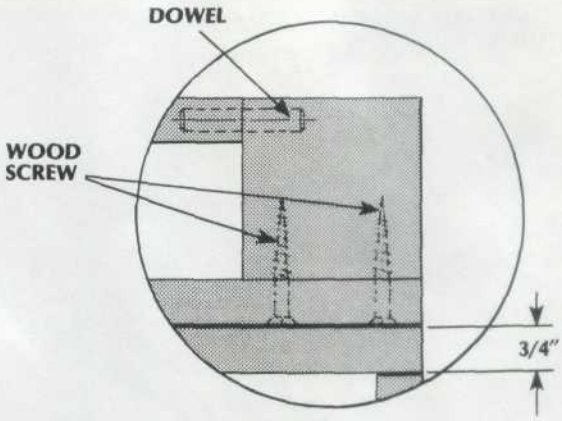
FRAME ASSEMBLY DIAGRAM
(WITH EXTENSION)



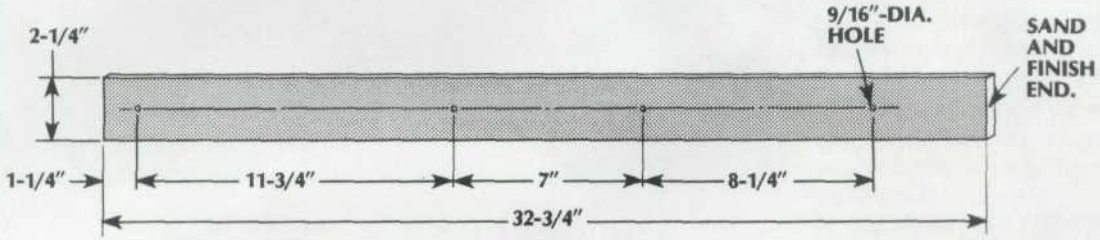




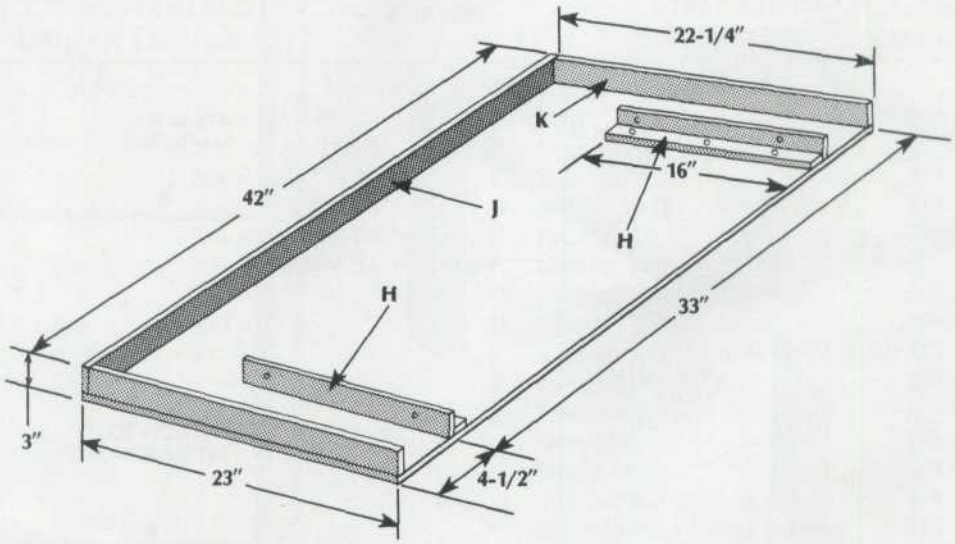
DETAIL A
(WITHOUT EXTENSION)



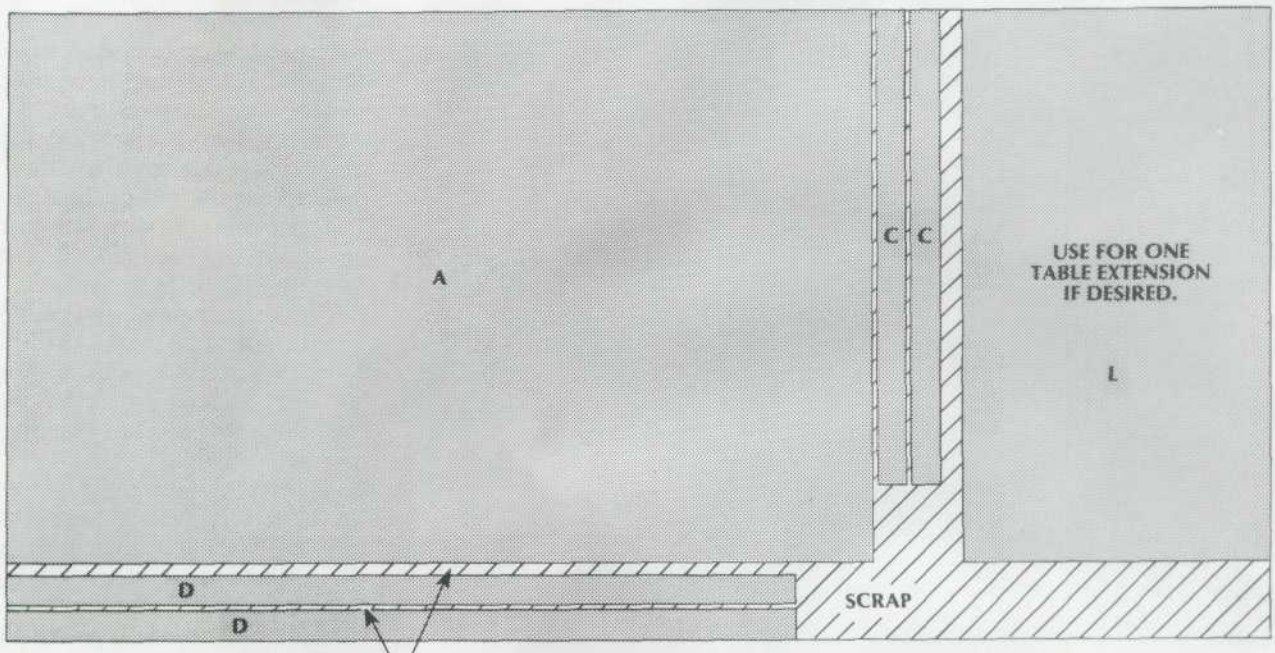
DETAIL B
(WITH EXTENSION)



EXTENSION
SUPPORT (G)



EXTENSION DETAIL



NOTE: AMPLE ALLOWANCE NEEDED FOR SAW KERF.

3/4" × 4' × 8' PLYWOOD CUTTING LAYOUT

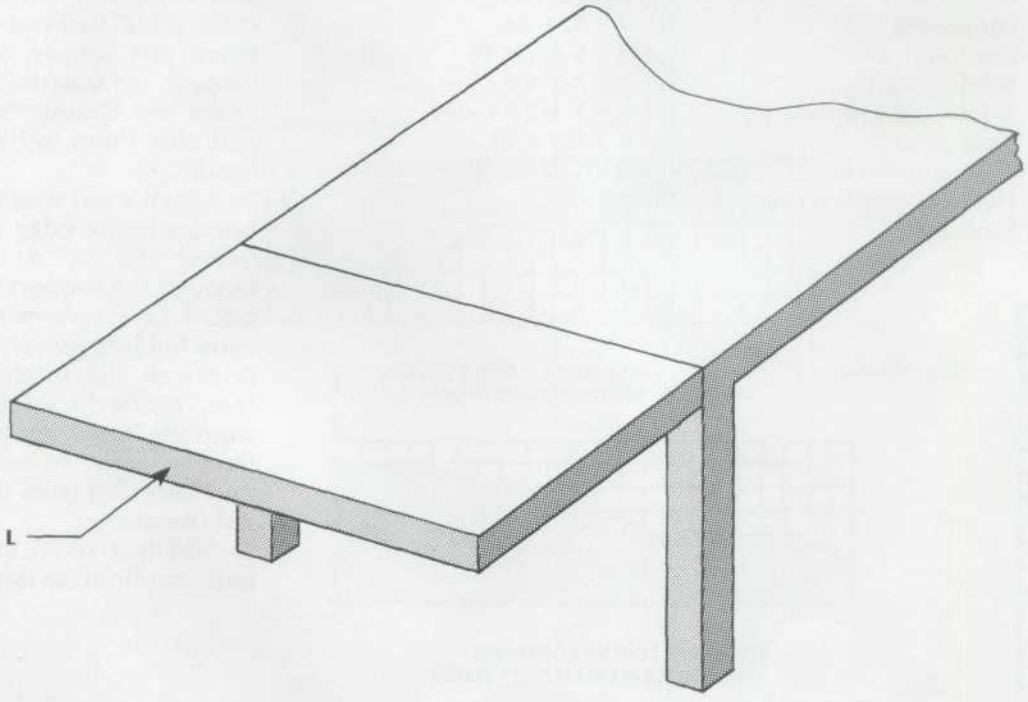
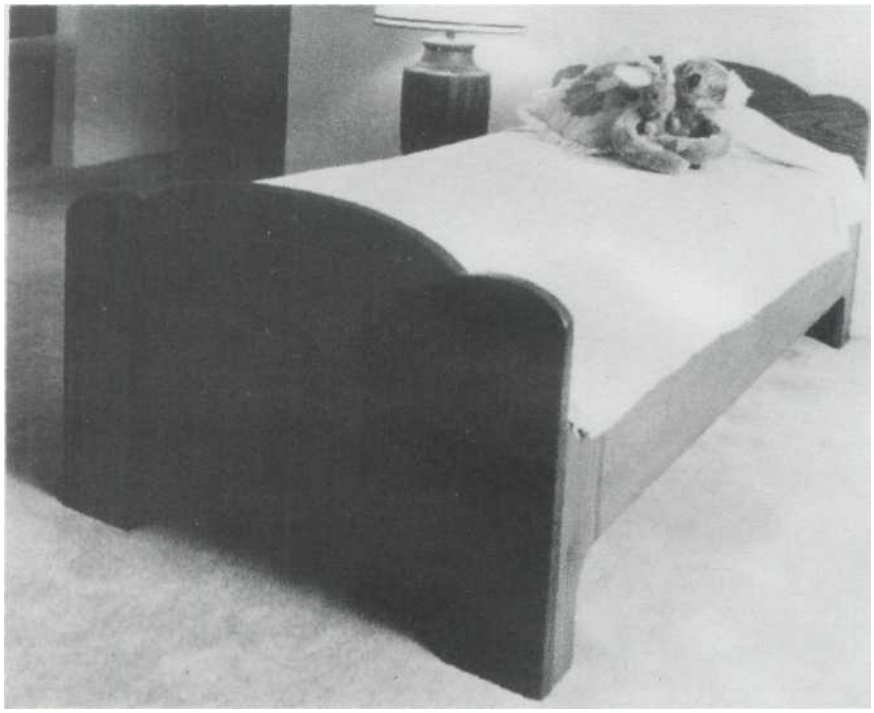


TABLE EXTENSION IN
MOUNTED POSITION

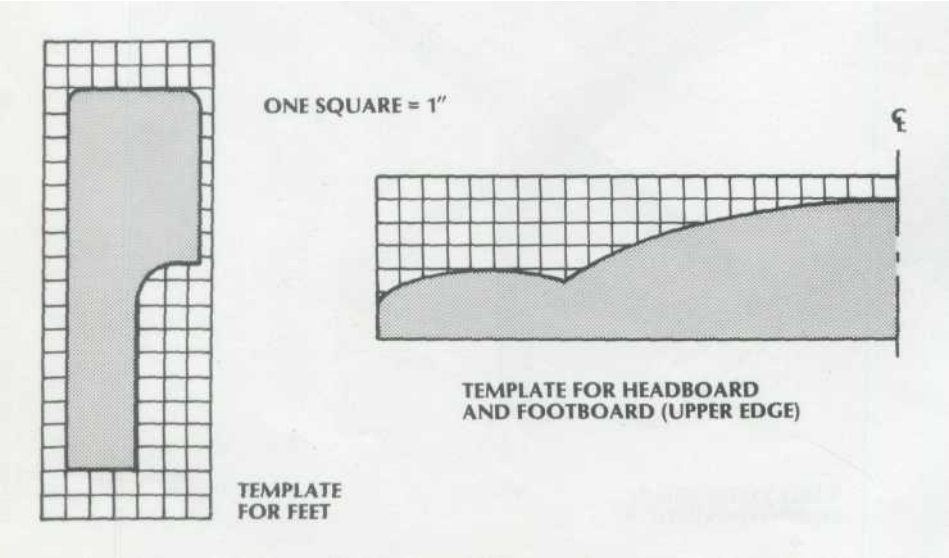
193
TWIN BED



LIST OF MATERIALS

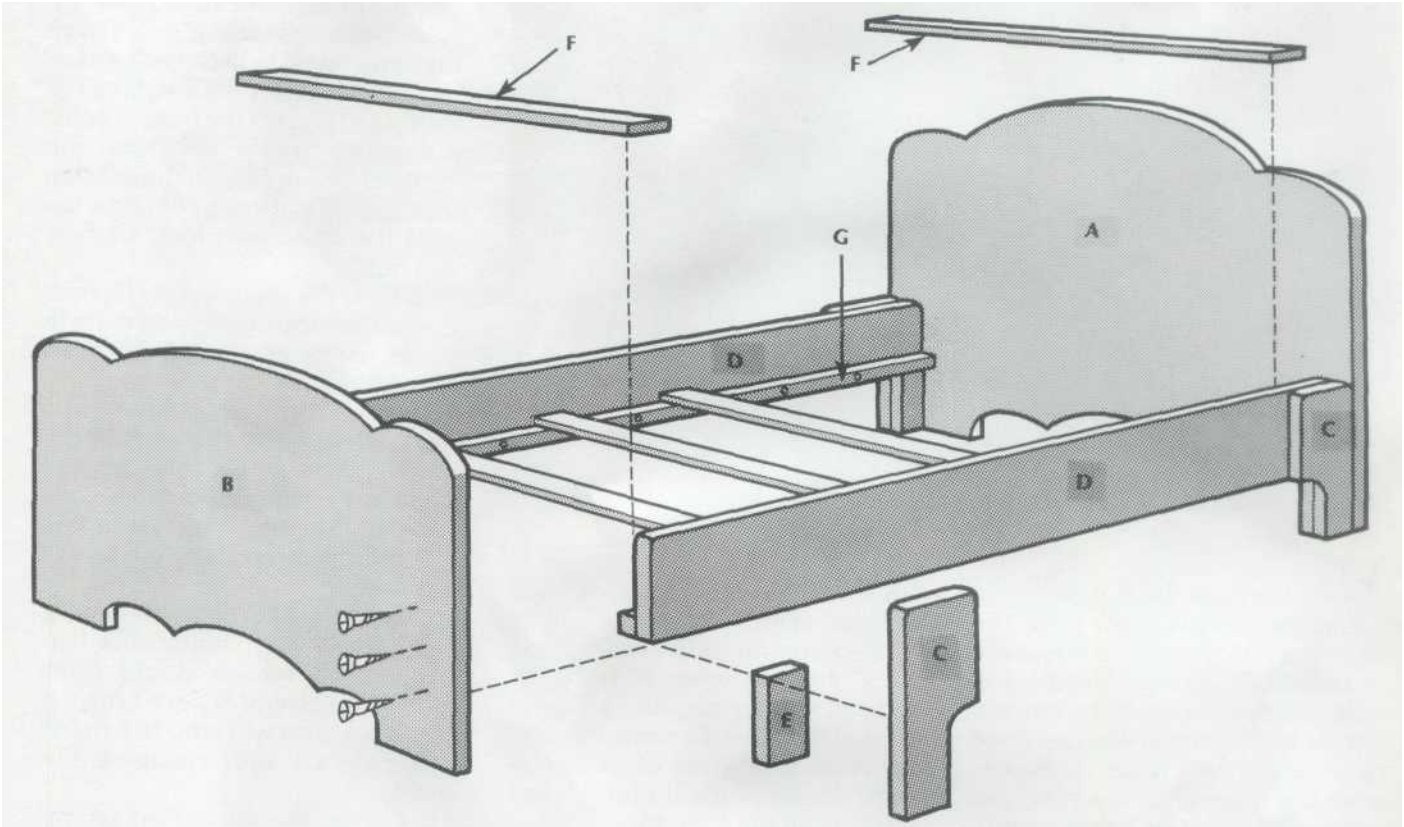
(finished dimensions in inches)

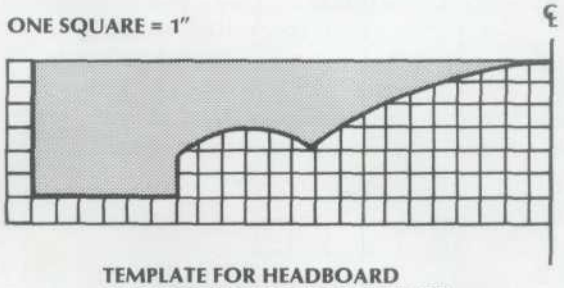
A	Headboard	1-1/2 × 38 × 44
B	Footboard	1-1/2 × 32 × 44
C	Feet (4)	1-1/2 × 5-1/2 × 16
D	Sideboards (2)	1-1/2 × 7-1/4 × 75
E	Sideboard supports (4)	1-1/2 × 3-1/2 × 6-3/4
F	Slats (5)	3/4 × 3-1/2 × 38
G	Slat supports (2)	1-1/2 × 1-1/2 × 75
	Flathead wood screws	#10 × 2-1/2
	Wood glue	



The basic design of this twin bed is very simple and sturdy. While templates are provided for the headboard and footboard, you can create your own pattern if you prefer. In fact, it might be a good idea to select a mattress first and then adjust the dimensions to fit.

1. Make full-size templates for the headboard (A) and footboard (B) using the patterns provided.
2. Glue up a pair of panels for the headboard and footboard from 2 x 6 and/or 2 x 8 stock. When the glue has dried, sand the panels smooth and cut them to the di mensions given.
3. Transfer the template designs to the panels. Cut out the headboard and footboard pieces, then sand their edges smooth.
4. Cut the remaining pieces to size using the dimensions provided.
5. Attach a sideboard support (E) to each foot (C) using flathead wood screws. Make two right-fac ing feet and two left-facing feet.
6. Fasten the feet to the headboard and footboard using glue and #10 x 2-1/2" flathead wood screws. Drive the screws counterbored through the boards into the edges of the feet. Counterbore the holes and plug them to hide the screw heads.
7. Attach a slat support (G) to the bottom inside edge of each side board (D) by driving screws through the support into the side board. Counterbore the screws for extra holding power.
8. Attach the sideboards to the feet, resting the sideboards on the supports inside the feet. Use four flathead wood screws at each cor ner, fastening from the inside. Do not use glue.
9. Add the slats (F), sand the entire bed, and finish as desired.





TEMPLATE FOR HEADBOARD
AND FOOTBOARD (LOWER EDGE)

194
READING TABLE

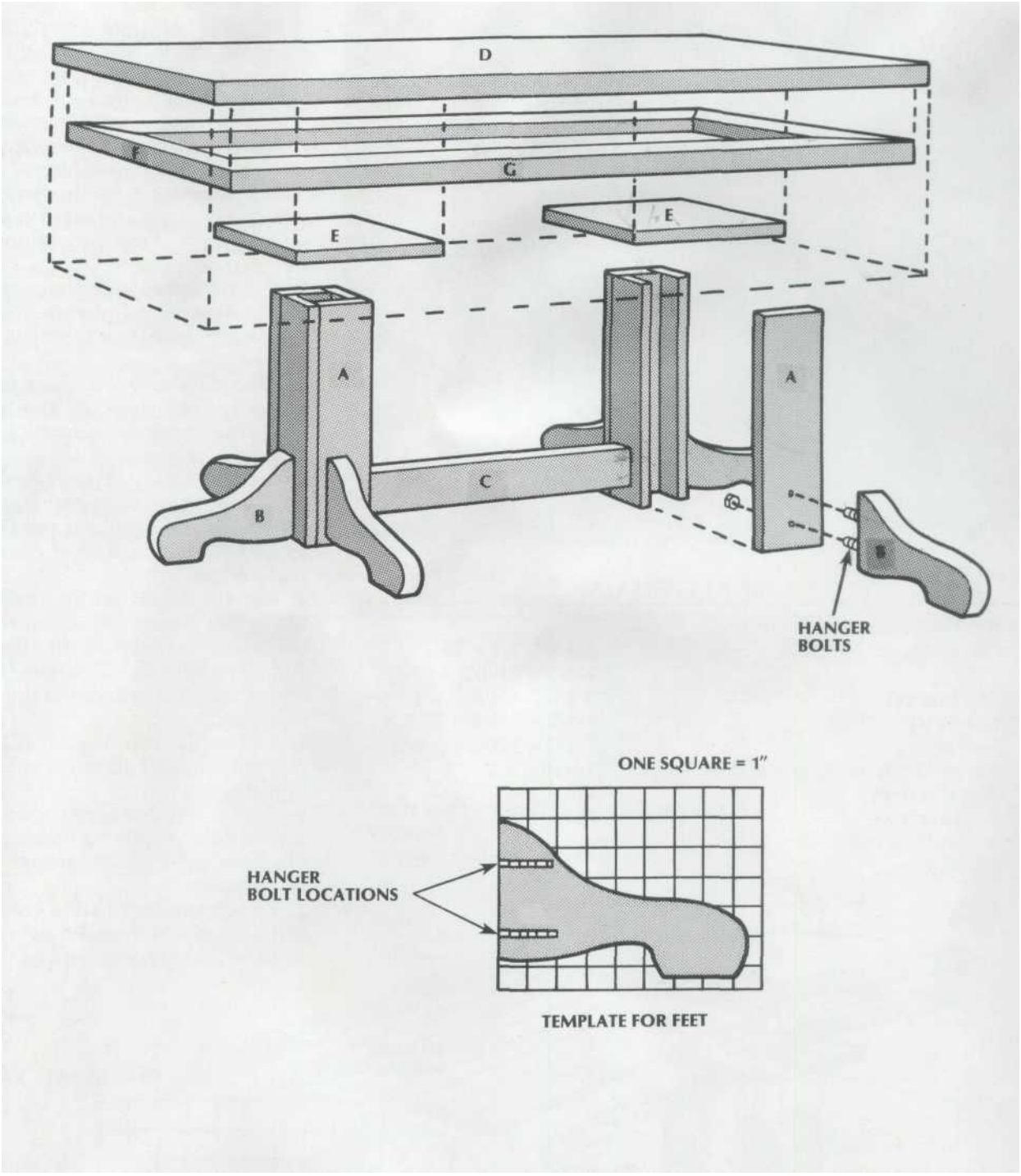
Here is a basic table design that can accommodate many uses. The table shown in the photo was made of redwood and assembled using waterproof glue and galvanized fasteners. Because it was designed to serve as a deck table, it is somewhat low in height. However, you can easily substitute other woods, use standard glue and fasteners, and raise the column height a few inches to create a handsome reading or dining table for the interior of your home.

1. Use the pattern provided to make a template for the feet (B), then lay them out on the lumber. By alternating directions and overlapping the feet, you can cut them out of 2 x 8 stock with minimal waste.
2. Form the top (D) by edge-gluing three pieces of 2 x 8 stock (or more numerous pieces of narrower stock). After the glue dries, sand the panel flat and trim it to the finished dimensions given in the list. Round overall edges with a router.
3. Cut the remaining parts to the dimensions provided.
4. Arrange the column sides (A) with their edges chasing each other, then fasten them into square columns using wood glue and 3d finishing nails. Set the nails just below the surface.
5. On the stretcher face of each column, center and drill a pair of 5/16"-diameter pilot holes, one 2-1/2" and the other 5" from the bottom. Center and drill a pair of holes of the same diameter through the remaining faces of each column; locate these holes 1" and 3-1/2" from the bottom.
6. Center and drill a pair of 7/32"-diameter pilot holes into each end of the stretcher(C) and into the back of each foot, using the same 2-1/2" center-to-center spacing used on the columns. Set the lower holes in the feet 1" above the bottom edge of their backs as indicated in the template pattern. Locate the holes in the stretcher 1" up from the bottom and 1" down from the top edges. Drill these holes as deep as necessary for installing the lag-thread ends of the hanger bolts.
7. Lag the hanger bolts into the feet and the stretcher, then fasten these parts to the two columns. Secure the bolts with lock washers and nuts.
8. Center the top brackets (E) over the column tops and fasten them in place using #8x1-1/2 flathead wood screws.
9. Lay the top upside down on a flat surface. Miter the ends of the apron pieces (F, G), then arrange them in a rectangle on the underside of the top. Make sure the apron is centered along the length and width.
10. Fasten the apron to the top using #10 x 2-1/2" countersunk flathead wood screws. Avoid using glue in this assembly since both the top and apron will tend to expand and contract with changing humidity.
11. Center the apron/top assembly over the leg/column assembly. Fasten them together by driving #8 x 1-1/2" flathead wood screws through the brackets into the top. (You will find this easier to do with the entire assembly turned upside down.)
12. Sand the table and finish according to taste.

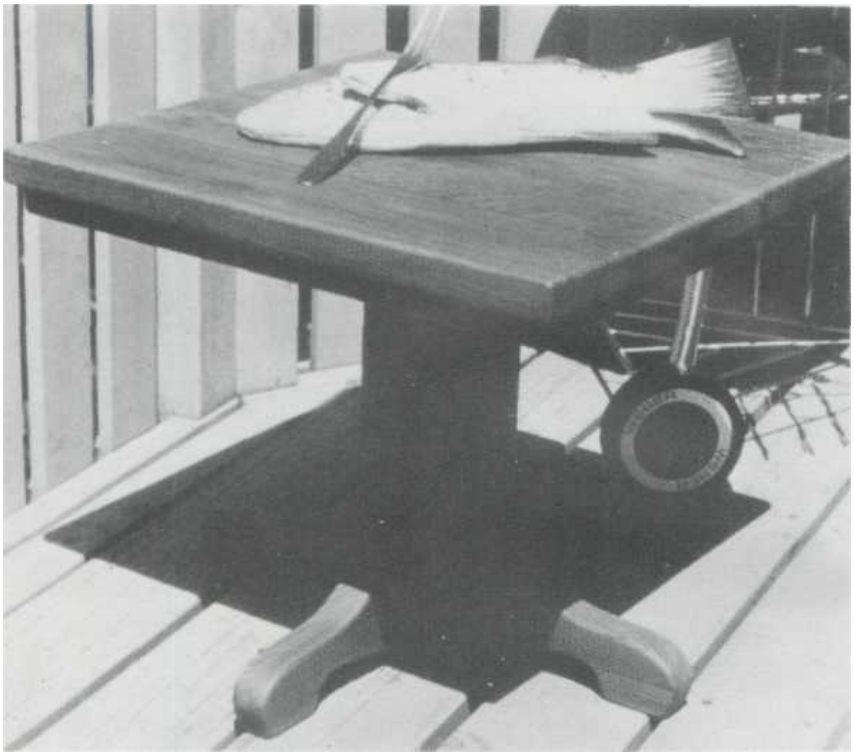
LIST OF MATERIALS

(finished dimensions in inches)

A	Column sides (8)	3/4 × 3-1/2 × 14
B	Feet (6)	1-1/2 × 5-1/2 × 8-1/2
C	Stretcher	1-1/2 × 3-1/2 × 19
D	Top	1-1/2 × 21-1/2 × 44
E	Top brackets (2)	3/4 × 7-1/4 × 7-1/4
F	End aprons (2)	1-1/2 × 3-1/2 × 18-1/2
G	Side aprons (2)	1-1/2 × 3-1/2 × 41
	Hanger bolts (with nuts and lock washers)	1/4 dia. × 2-1/2
	Wood screws	#8 × 1-1/2
	Wood screws	#10 × 2-1/2
	3d finishing nails	
	Wood glue	


D
F
G
E
E
A
A
C
B
B
HANGER
BOLTS
ONE SQUARE = 1"
HANGER
BOLT LOCATIONS
TEMPLATE FOR FEET

195
END TABLE



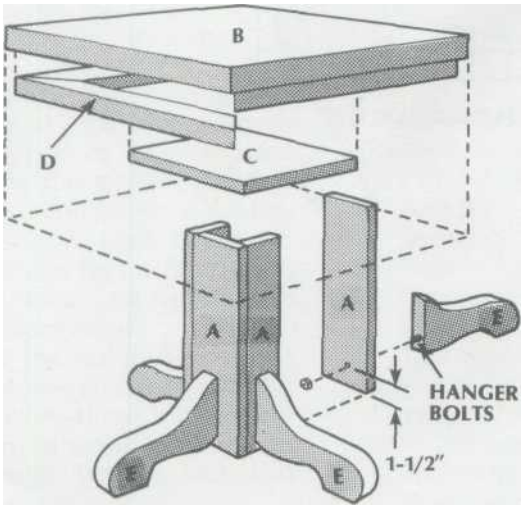
This table will add beauty and convenience to any setting, indoors or out. The one shown here was made of redwood and assembled with waterproof fasteners. However, you can use the wood of your choice with conventional fasteners to create a lovely piece of indoor furniture. Adjust the column height and top dimensions to suit your tastes.

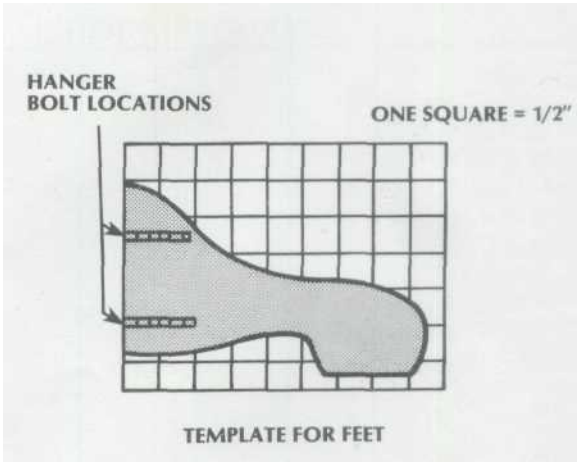
1. Cut the pieces to size according to the dimensions provided. Use the pattern to make a template for the feet (E).
2. Glue and screw or nail one edge of the column sides (A) at a time until the column is complete. Check for squareness.
3. Glue up the top (B) from 2 x 8 or narrower stock. After the glue dries, sand the panel flat and cut it to 21-1/2" square. Round over all sharp edges.
4. Cut 45° miters on the ends of the apron pieces (D). Center the pieces on trie underside of the top, and drive #10 x 2-1/2" screws from underneath the apron into the top to secure.
5. Center the top bracket (C) on the column, and glue and screw it in place.
6. Center the top/apron assembly on the column, gluing and screw ing from underneath through the top bracket.
7. Attach the feet to the column using hanger bolts and nuts.
8. Sand and finish as desired.

LIST OF MATERIALS

(finished dimensions in inches)

A	Column sides (4)	3/4 × 3-1/2 × 16
B	Top	1-1/2 × 21-1/2 × 21-1/2
C	Top bracket	3/4 × 7-1/4 × 7-1/4
D	Apron (4)	1-1/2 × 3-1/2 × 20-1/4
E	Feet (4)	1-1/2 × 5-1/2 × 8-1/2
	Hanger bolts, nuts, and lock washers	1/4 dia. × 2-1/2
	Wood screws	#10 × 2-1/2
	Wood screws	#8 × 1-1/2
	3d finishing nails	
	Wood glue	





196
DROP TABLE

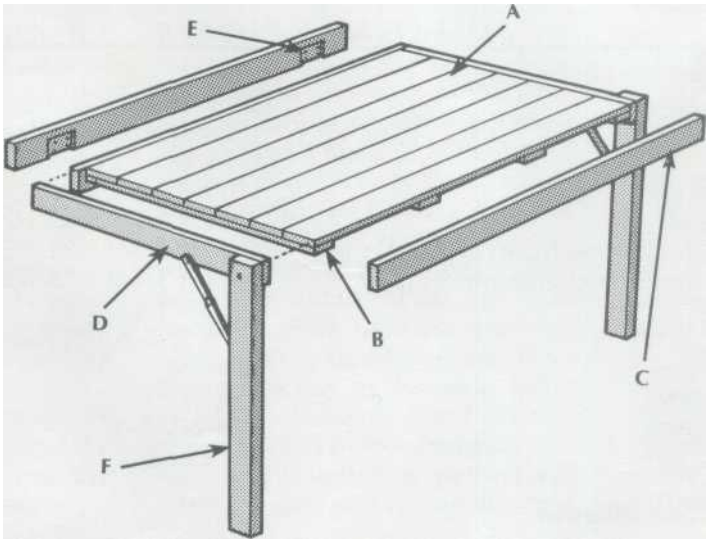
This multi-purpose table drops flush to the wall when not in use. The hinged legs fold out of sight when the table is down, and you can even mount it on a wall to use it as a serving table.

1. Cut the pieces to size according to the dimensions given.
2. Nail the top pieces (A) to the top supports (B), then add the sides (C) and ends (D).
3. Attach the legs (F) with carriage bolts. Use a washer between the leg and the table at the pivot point so the leg can swing up properly for storage.
4. Mount hinges to the table and hinge piece (E). Attach the hinge piece to the wall at the proper leg height as shown.
5. Finish the table according to in dividual preference.

LIST OF MATERIALS

(finished dimensions in inches)

A	Top pieces (7)	3/4 × 3-1/2 × 46-1/2
B	Top supports (4)	3/4 × 3-1/2 × 24-1/2
C	Sides (2)	3/4 × 3-1/2 × 48
D	Ends (2)	3/4 × 3-1/2 × 24-1/2
E	Hinge piece	3/4 × 3-1/2 × 48
F	Legs (2)	3/4 × 3-1/2 × 30
	Carriage bolts and washers	1/4 dia. × 3-1/4
	3d finishing nails	
	Collapsible leg supports	



197
WORKBENCH

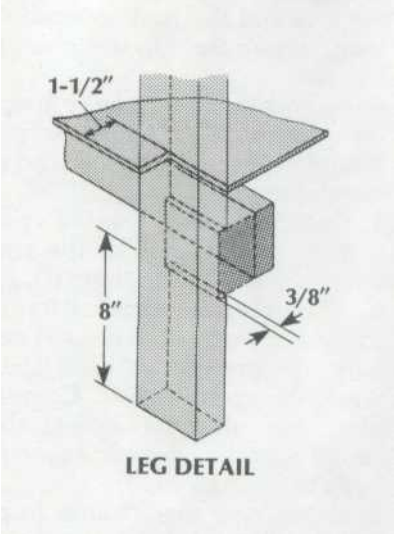
Any home handyman knows the value of a workbench. This one provides plenty of work space, a large shelf, and a perforated peg-board backing for hanging tools. The tabletop is made of 3/4" waf-erboard covered with 1/4" hard-board. The workbench shown here is 8' long, but you can make it any length to fit your work space.

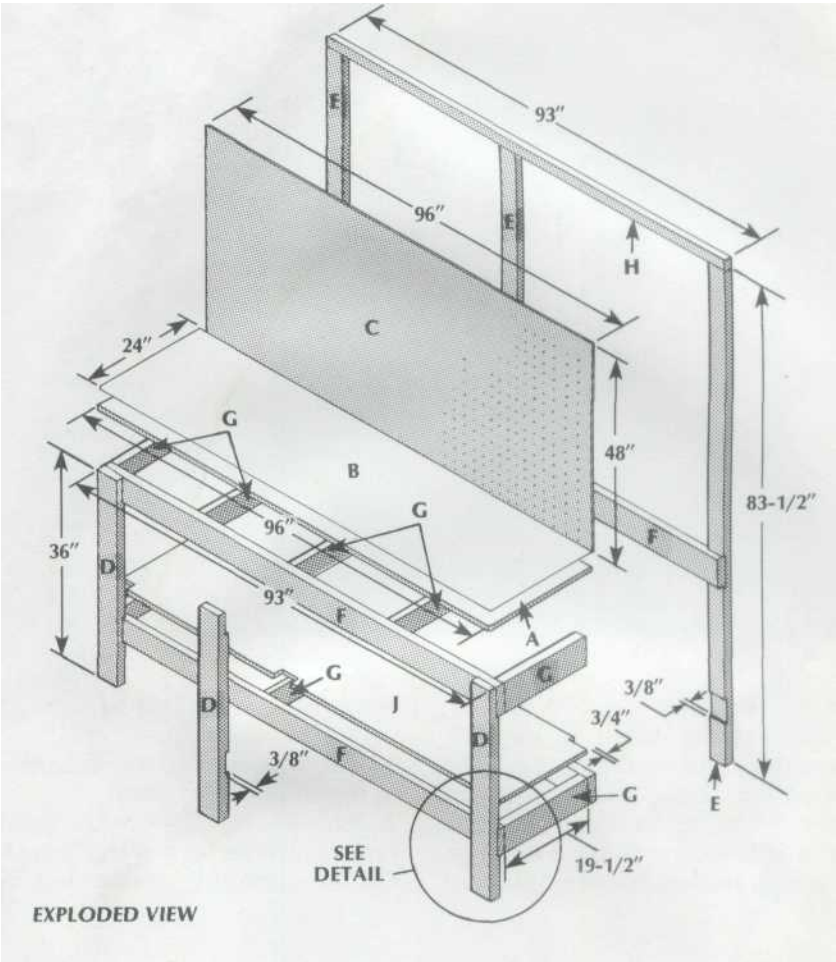
1. Cut all pieces to size according to the dimensions given.
2. Assemble the support frames (F) for the tabletop (B) and the shelf (J) by fastening the fronts and backs to the crosspieces (G) using 12d nails. In both cases, position one cross-piece at each end and one across the middle. Add two more cross-pieces to the top frame to help stiffen the tabletop work surface.
3. Cut a 3-1/2"-wide x 3/8"-deep rabbet across the top of each front leg (D) for fitting the top frame on the legs. Then cut dadoes of the same dimensions at a parallel loca tion across each of the back legs (E). Also, cut parallel dadoes across each leg about 8" above the bot tom for fitting the shelf frame be tween the legs.
4. Fasten the legs to the frames us ing #8x2-1/2" flathead wood screws countersunk flush with the leg surface. Use at least two screws per joint and offset them for in creased frame stability.

LIST OF MATERIALS

(finished dimensions in inches)

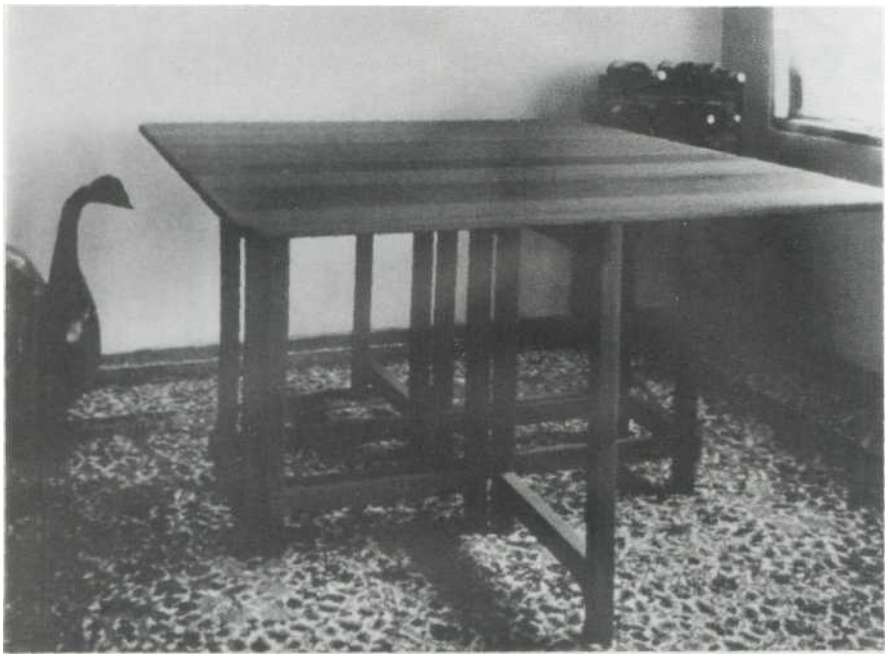
A	Tabletop base	3/4 × 24 × 96 waferboard
B	Tabletop	1/4 × 24 × 96 hardboard
C	Backing	1/4 × 48 × 96 perforated hardboard
D	Front legs (3)	1-1/2 × 3-1/2 × 36
E	Back legs (3)	1-1/2 × 3-1/2 × 83-1/2
F	Top and shelf frame fronts and backs (4)	1-1/2 × 3-1/2 × 93
G	Top and shelf frame crosspieces (8)	1-1/2 × 3-1/2 × 19-1/2
H	Crossbar	1-1/2 × 1-1/2 × 93
J	Shelf	3/4 × 23-7/8 × 93 waferboard
	Wood screws	#6 × 7/8
	Wood screws	#8 × 1-1/2
	Wood screws	#8 × 2-1/2
	Angle irons	1-1/2 or 2
	12d nails	
	Construction adhesive	





5. Cut 3-1/2"-wide x 1-1/2"-deep notches in the front edge of the shelf, one at each end and one in the middle, in order to fit the shelf around the front legs. Cut parallel notches of the same width, but 3/4" in depth, on the back edge of the shelf for fitting around the back legs.
6. Insert the shelf between the legs and fasten it to the support frame using #8 x 1-1/2" flathead wood screws, countersunk flush or driv en slightly below the shelf surface. If you like, run a bead of construc tion adhesive along the upper edge of the frame before installing the shelf.
7. Set the tabletop base (A) on the top frame. Push the top against the back legs and center it along the length of the support frame.
8. Clamp or tack the top in place while drilling countersunk pilot holes for #8 screws through it into the frame. Space the holes about 12" apart. If you want to use con struction adhesive, remove the top and spread a bead of adhesive on the top of the frame. Then reposi tion the top and fasten it in place using #8 x 1-1/2" flathead wood screws. Drive all the screws slightly below the surface of the tabletop.
9. Position the tabletop over the base, making all edges flush. Then fasten the top to the base using #6 x 7/8" flathead wood screws, driven slightly below the outer sur face. This installation method will allow for periodic replacement of the tabletop. For permanent instal- lation, apply construction adhesive to the base, position the tabletop over it, and press it flat, then tack it in place.
10. Place the bench in the desired location and shim the legs as needed to make the top complete ly level and to stabilize the bench. Then use angle irons to fasten the legs to the floor, or run fasteners through the back legs into the wall, or do both.
11. Set the backing (C) on the table top. Center it along the length of the bench, then fasten it to the upper section of the back legs and to the crossbar (H) using #6 x 7/8" flathead wood screws.

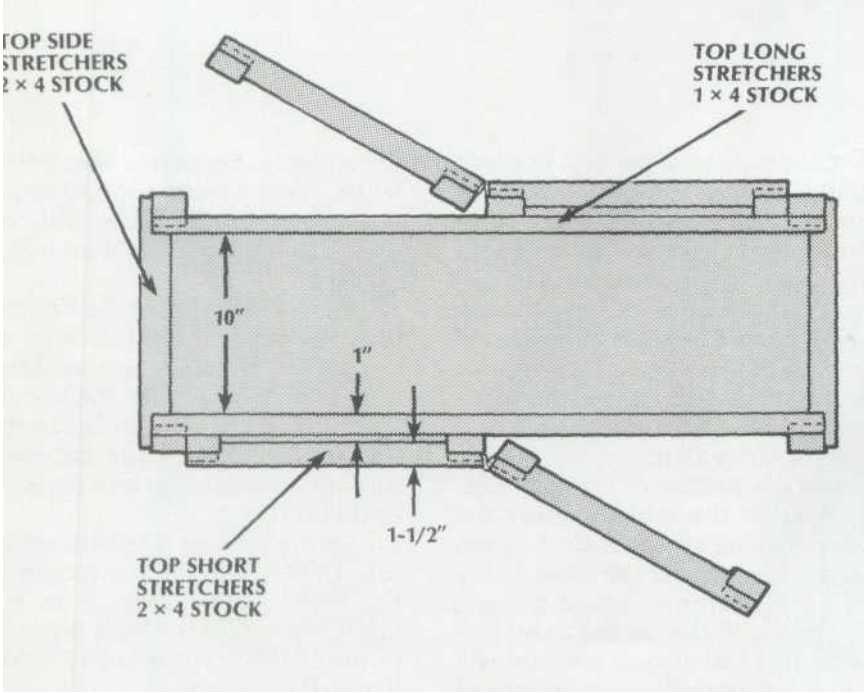
198
GATELEG TABLE

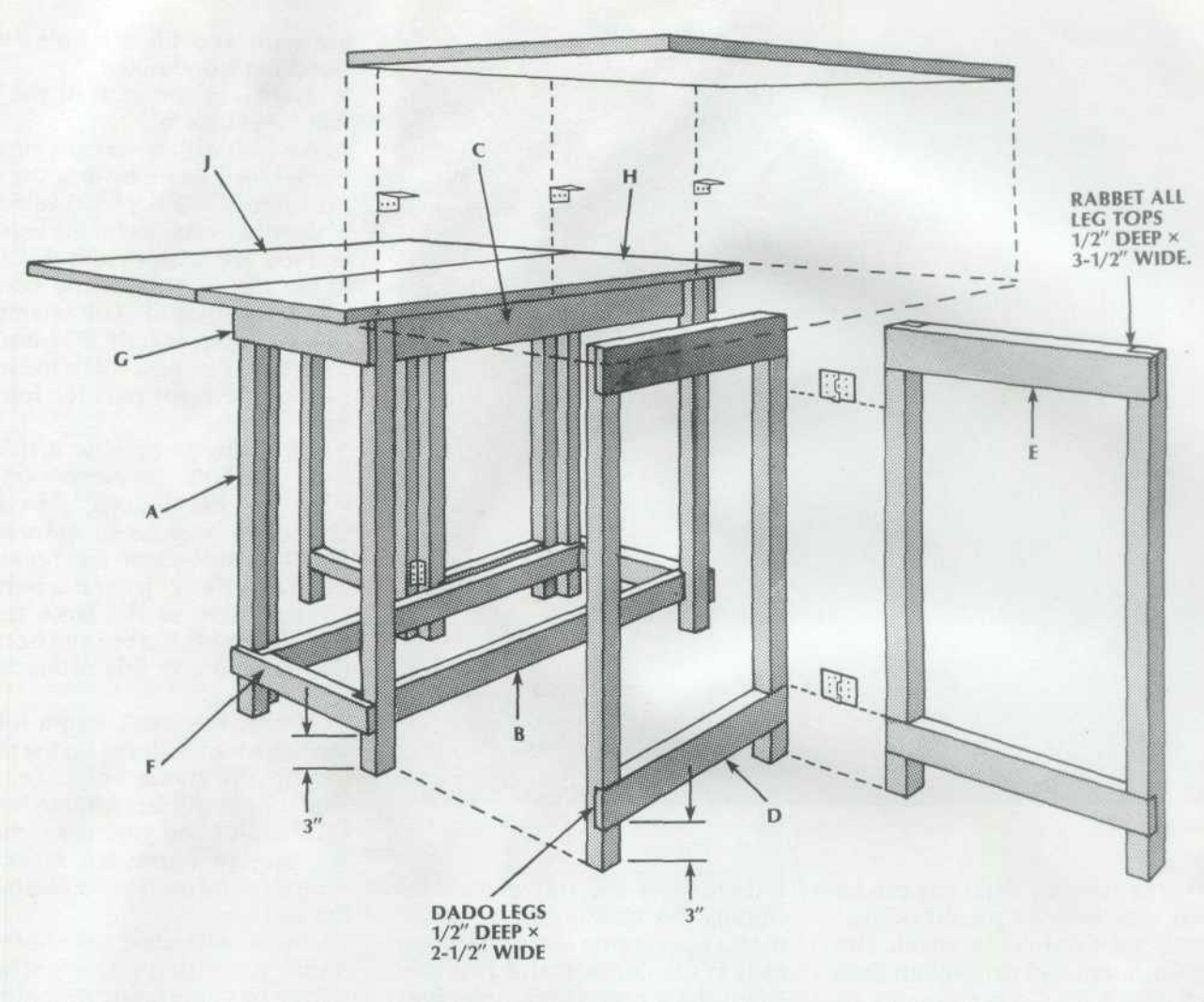


This gateleg table is elegant enough for indoor dining, yet light enough to be carried outdoors when the occasion arises. It opens up to a surface area large enough to accommodate four people and is the perfect project to show off your craftsmanship.

1. Cut the pieces to size according to the dimensions given.
2. Cut 1/2"-deep x 3-1/2"-wide rabbets on the tops of the legs (A). On the same side of each leg, cut 1/2"-deep x 2-1/2"-wide dadoes 3" up from the bottom.
3. Round and sand the edges of the legs and the back sides of the long bottom and top stretchers (B, C).
4. Assemble the two large frames using glue and wood screws. Round over the edges and sand the faces of the frames.
5. Cut 3/4"-deep x 1-1/2"-wide rabbets in the ends of the short bottom and top stretchers (D, E).
6. Assemble the four small frames, using glue and two screws at each joint. The stretchers should lap the legs and protrude 1/4". Counter-bore and plug the holes; then round over the edges and sand the faces of the frames.
7. Fasten one small frame to the left side of each large frame. The leg on the small frame should sit against the leg on the large frame as shown. To do this, drive two screws from the back through the stretcher into the top and bottom of each leg.
8. Cut 3/4"-deep x i-i/2"-wide laps in the ends of the bottom and top side stretchers (F, G). Sand the stretchers; then attach them to the frames using glue and screws. Plug the screw holes.
9. Attach the two remaining small frames to the base using butt hinges. This completes the base of the table.
10. Glue up stock for the top and leaf pieces (H, J). The top will over hang the base 1-1/4" on each side to accommodate the hinges.
11. Mount the top to the base by screwing and plugging through the top into the stretchers.
12 Use three hinges to attach each
leaf to the top, making sure that the center hinge is in front of the stationary frame so it will not inter fere with the movement of the gate leg.

13 Sand the entire table and finish as desired.





LIST OF MATERIALS

(finished dimensions in inches)

A	Legs (12)	1-1/2 × 1-1/2 × 28-1/2
B	Bottom long stretchers (2)	3/4 × 2-1/2 × 38-1/4
C	Top long stretchers (2)	3/4 × 3-1/2 × 38-1/4
D	Bottom short stretchers (4)	1-1/2 × 2-1/2 × 17-1/2
E	Top short stretchers (4)	1-1/2 × 3-1/2 × 17-1/2
F	Bottom side stretchers (2)	1-1/2 × 2-1/2 × 13
G	Top side stretchers (2)	1-1/2 × 3-1/2 × 13
H	Top	3/4 × 17-1/2 × 47-1/2
J	Leaves (2)	3/4 × 18-1/2 × 47-1/2
	Wood screws	#8 × 1
	Tabletop fasteners	
	Brass butt hinges (7)	1-1/2 × 2
	Wood plugs	
	Wood glue	

199
FOLDING TRAY

This generously sized tray can be used separately or placed permanently on the folding stand. The classic design and rich walnut goes well with either contemporary or country furnishings.

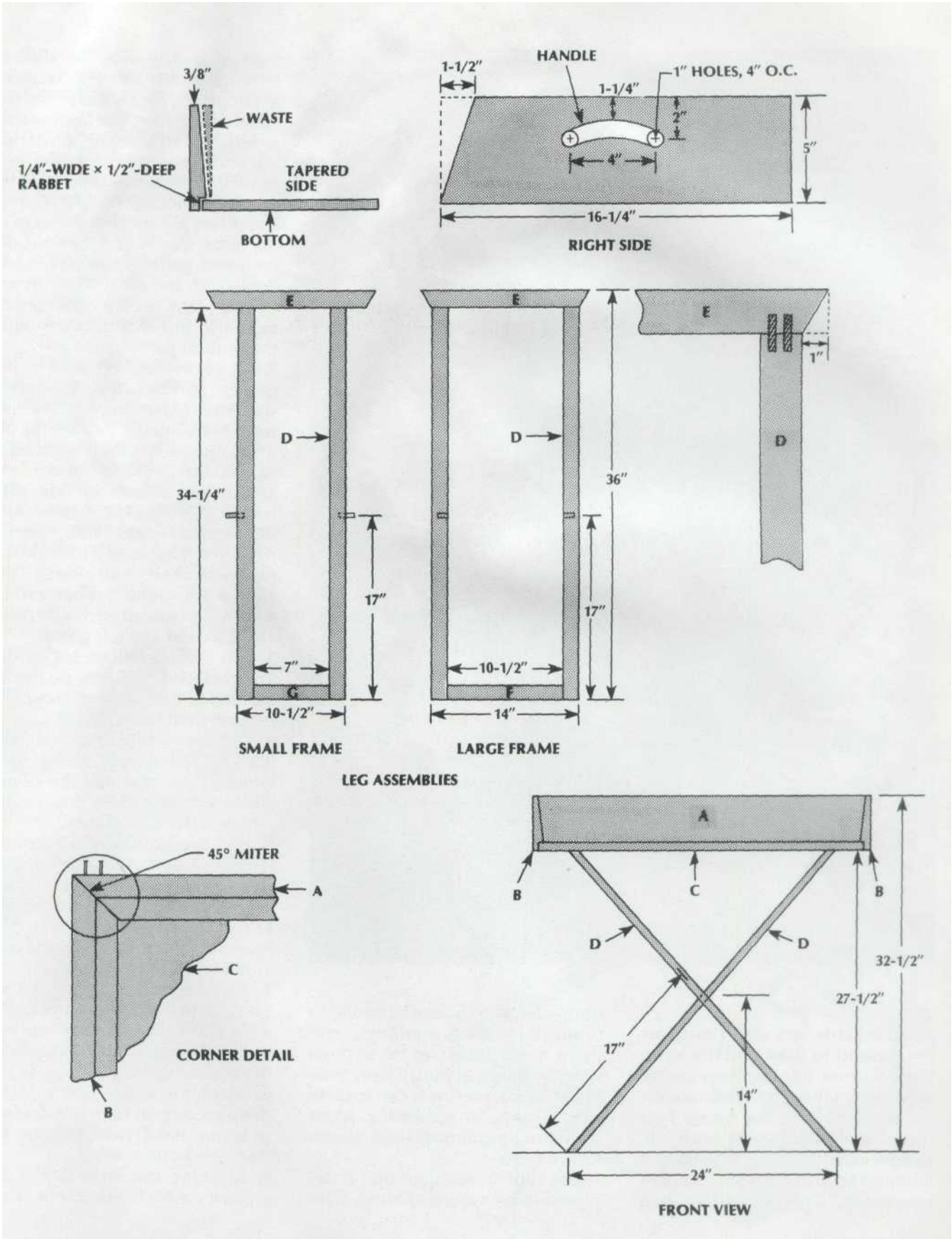
1. Cut all stock to size according to the dimensions provided.
2. Glue up random width stock to make the tray bottom (C) slightly oversized. When the glue has dried, sand on both sides and trim the bottom to final size.
3. Miter the corners for connecting the back (A) and the tray sides (B).Cut1/4"-wide x 1/2"-deep rabbets on the lower inside edges of the back and sides. Taper the inner face on each piece down to 3/8" thickness, beginning the taper at the top of the rabbet as shown.
4. Drill and cut out the handholes on the tray sides as shown.
5. Final sand the tray pieces, including the handholes. Assemble the tray using glue and 4d finishing nails at the corners, and glue and 2d finishing nails through the bottom into the sides. Predrill all nail holes for easier construction; set the nails and fill the holes with matching wood putty.
6. Angle-cut the ends of the top rails (E) as shown.
7. Assemble the narrow inside frames first. Begin by locating and drilling 1/4"-diameter dowel holes 1" deep at the joints for the legs (D) and top and bottom rails (E, G).
8. On the outside of the narrow frame legs, drill 1/4"-diameter holes 1" deep exactly 17" from the bottom of the legs. This is the location of the pivot pins for folding the stand.
9. Glue the pivot pins in place, then assemble the narrow frame. Glue the dowel joints and clamp until dry. Check for squareness.
10. Drill 1/4"-diameter holes 1" deep exactly 17" from the bottom of the inside of the large frame legs. Assemble the top and bottom (F) rails and one side of the large frame.
11. Insert the small frame inside the large frame, lining up the pivot pins in the frame holes. Do not glue pins in the large frame legs.
12. Position and glue the remaining outside frame leg in place. Sand all stand parts at the joints and the surface.
13. Finish with clear polyurethane finish. When dry, you might want to tack or staple fabric strapping to the underside of the top rails so the frame opens up to 24" in width.

LIST OF MATERIALS

(finished dimensions in inches)

A	Back	3/4 × 5 × 30
B	Tray sides (2)	3/4 × 5 × 16-1/4
C	Tray bottom	1/2 × 16 × 29
D	Legs (4)	3/4 × 1-3/4 × 34-1/4
E	Top rails (2)	3/4 × 1-3/4 × 16
F	Bottom rail	3/4 × 1-3/4 × 10-1/2
G	Bottom rail	3/4 × 1-3/4 × 7
	Grooved dowel pivot pins	1/4 dia. × 2
	Fabric strapping	1-1/2 × 2 × 32
	2d finishing nails	
	4d finishing nails	
	Wood putty	
	Wood glue	

www.TedsWoodworking.com


3/8"
WASTE
1/4"-WIDE × 1/2"-DEEP RABBET
TAPERED SIDE
BOTTOM
1-1/2"
HANDLE
1" HOLES, 4" O.C.
1-1/4"
2"
4"
5"
16-1/4"
RIGHT SIDE
E
D
34-1/4"
17"
7"
G
10-1/2"
SMALL FRAME
E
D
36"
17"
10-1/2"
F
14"
LARGE FRAME
E
1"
D
LEG ASSEMBLIES
45° MITER
A
C
CORNER DETAIL
B
A
B
C
B
D
D
32-1/2"
27-1/2"
17"
14"
24"
FRONT VIEW

200
PLANT SHELF

Smart gardeners don't wait for the ground to thaw and the air to warm before starting their spring gardening. The first seeds are always sown inside the house in a spot that gets plenty of sunshine. Unfortunately, space is usually a limiting factor in most seed starting operations. Only a few windows normally get sufficient sunshine to produce healthy seedlings, and there never seems to be enough window ledge to satisfy your aspirations. However, you can expand your preseason gardening space with the suspended seed starter shown here.

This four-tiered shelf unit is designed to be mounted into a standard window frame. The shelves, which are removable to facilitate larger plants, are supported by two metal side frames. The bottom shelf is designed to rest on the window sill; consequently, this and all other shelf dimensions must be sized to your particular window. The unit receives plenty of light, takes up no floor space, and can be dismounted easily when not in use. Tools, soil, and miscellaneous gardening materials are conveniently stored in the two drawers under the bottom shelf.

1. To begin building your indoor garden, start by cutting the bottom shelf back (A) to length. Cut a 1/2"-wide x 3/8"-deep groove in the back, one inch from the top edge, to hold the plywood bottom.
2. Cut the bottom shelf sides (B) to length. Cut a 1/2"-wide x 3/8"-deep groove in each side, one inch from the top edge, to hold the plywood shelf. Machine a 3/4"-wide x 3/8"-deep rabbet on the back inside end of each side piece. Make a right and left piece.
3. Cut a blind rabbet 3/4" wide x 3/8" deep x 1-1/2" long on the un cut end of each side to accept the bottom shelf front (D).
4. Cut the middle drawer support (C) and the drawer glides (E) to length. Glue and nail the drawer glides to the middle drawer sup port and the side pieces.
5. Cut the bottom shelf front to length. Cut a 1/2"-high x 3/8"-deep rabbet in the bottom inside edge to accept the plywood shelf.
6. Cut the bottom shelf (F) to size. Assemble the shelf unit parts using glue and 5d finishing nails.
7. Cut the drawer fronts (G) and sides (H) to length. Machine a 3/4"-wide x 3/8"-deep rabbet on each end of the drawer fronts to accept the drawer sides.
8. Machine a 1/4"-wide x 3/8"-deep groove on each drawer front to accept the drawer bottom, 1/4" from the bottom edge.
9. Machine the same 1/4" x 3/8" groove on each side piece. Cut a

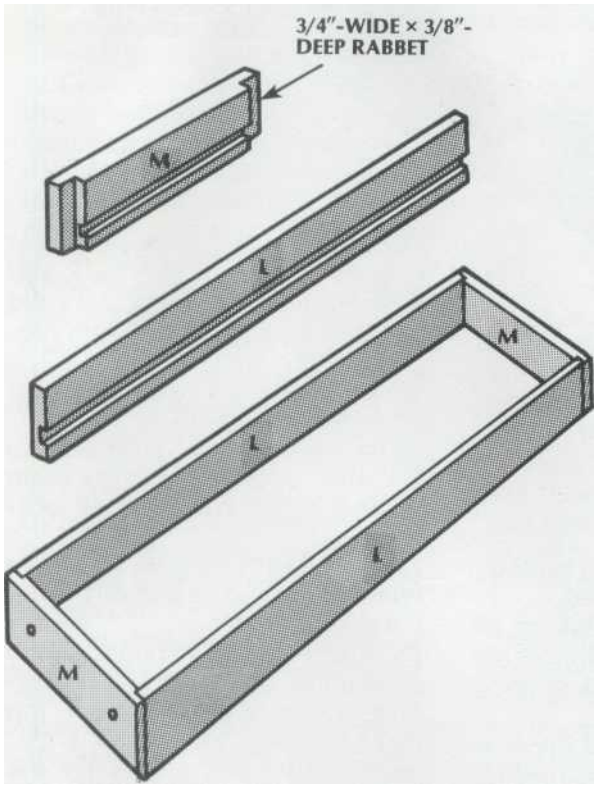
LIST OF MATERIALS

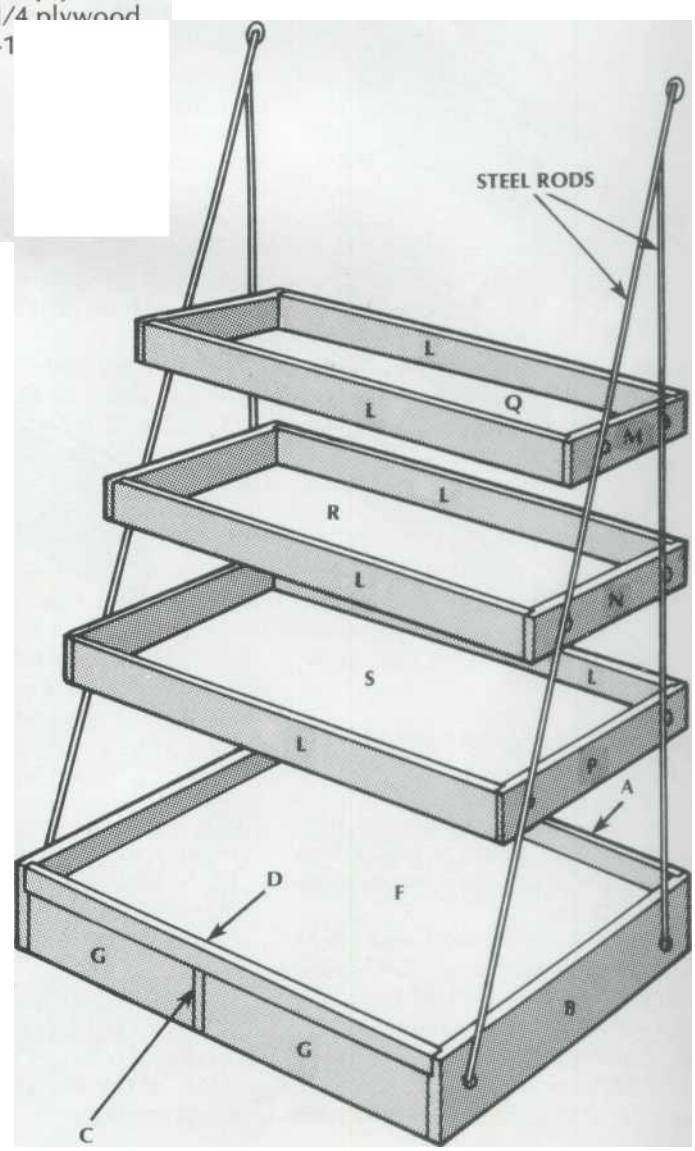
(finished dimensions in inches)

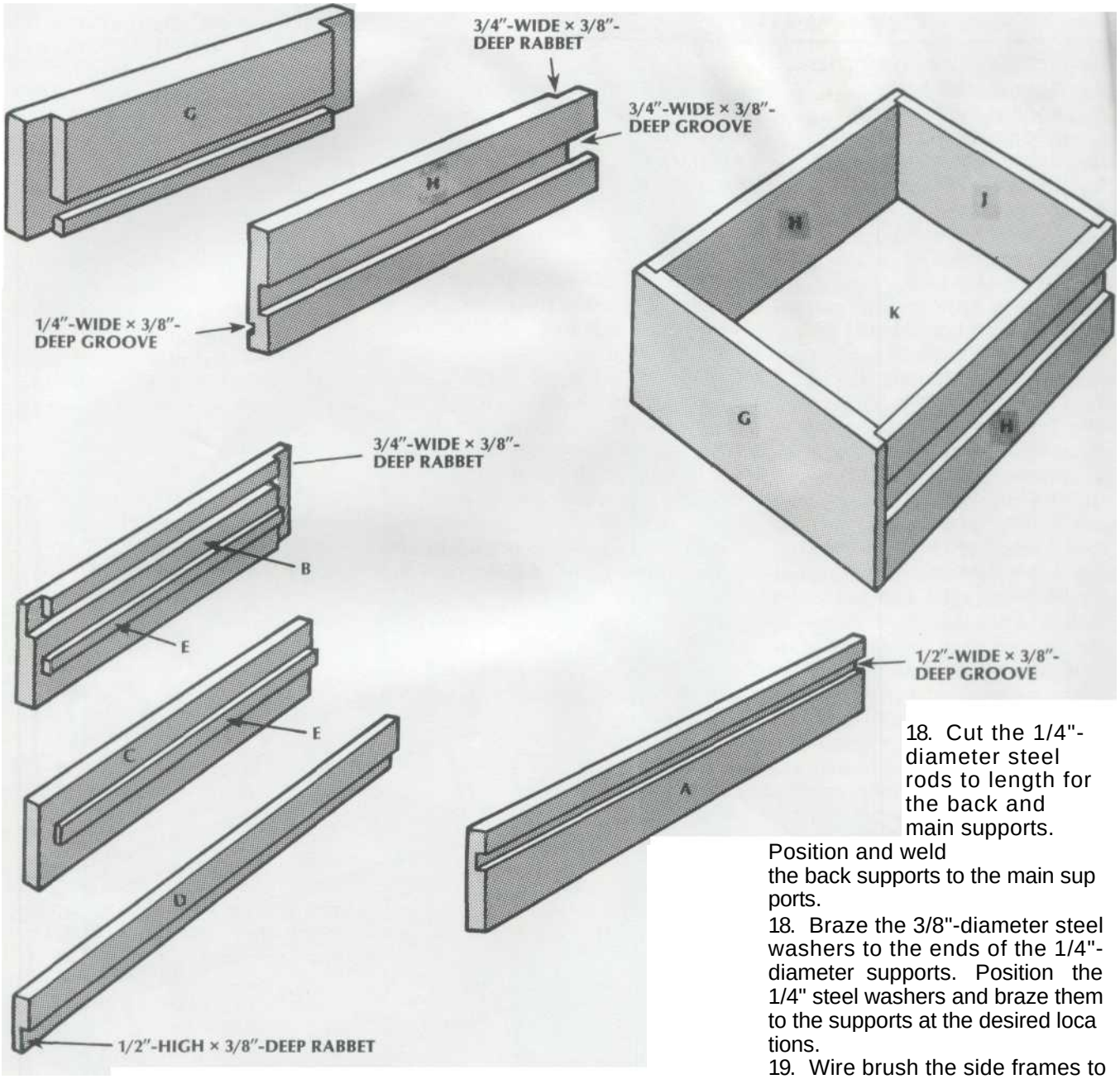
A	Bottom shelf back	3/4 × 5-1/2 × 35-1/4
B	Bottom shelf sides (2)	3/4 × 5-1/2 × 18
C	Middle drawer support	3/4 × 4 × 17-1/4
D	Bottom shelf front	3/4 × 1-1/2 × 35-1/4
E	Drawer glides (4)	3/8 × 3/4 × 16-7/8
F	Bottom shelf	1/2 × 17-1/4 × 35-1/4 plywood
G	Drawer fronts (2)	3/4 × 4 × 16-7/8
H	Drawer sides (4)	3/4 × 4 × 16-7/8
J	Drawer backs (2)	3/4 × 3-1/2 × 16-1/8
K	Drawer bottoms (2)	1/4 × 16-1/8 × 16-7/8 plywood
L	Shelf fronts and backs (6)	3/4 × 1-1/2 × 35-1/4
M	Top shelf ends (2)	3/4 × 1-1/2 × 7
N	Middle shelf ends (2)	3/4 × 1-1/2 × 10-1/2
P	Lower shelf ends (2)	3/4 × 1-1/2 × 14
Q	Top shelf	1/4 × 6-1/4 × 35-1/4 plywood
R	Middle shelf	1/4 × 9-3/4 × 35-1/4 plywood
S	Lower shelf	1/4 × 13-1/4 × 35-1
	1/4"-dia. steel rod	
	Finishing nails	
	Roundhead wood screws	
	Clear silicone caulk	
	Wood glue	

3/4"-wide x 3/8"-deep groove on the outside face of each drawer side for the drawer glides.

10. Machine a 3/4"-wide x 3/8"-deep rabbet on the end of each side piece to accept the back panel.
11. Cut the drawer backs (j) and drawer bottoms (K) to size.
12. Assemble the drawer sides, front, back, and bottom with glue and nails. Note that the back must be installed flush at the top; also, the bottom cannot be glued; it must always be nailed.
13. Cut the top, middle, and lower shelf ends (M, N, P) to length. Ma chine a 3/4"-wide x 3/8"-deep rab-







bet on each end of the pieces. Machine a 1/4"-wide x 3/8"-deep groove 1/4" from the bottom edge of each piece.

14. Cut the shelf fronts and backs (L) to length. Machine a 1/4"-wide x 3/8"-deep groove 1/4" from the bottom edge of each piece.

14. Cut the top, middle,and lower
shelf bottoms (Q, R, S) to size. As semble all the shelf elements with glue and nails, except the bottom, which should not be glued.

16. Machine a 1/4" radius on all sharp edges of the shelf frames, or round them over with a sanding block.

16. Sand all surfaces and finish as desired; polyurethane varnish is recommended. Caulk the inside joints of the shelves with clear silicone caulking.

18. Cut the 1/4"-diameter steel rods to length for the back and main supports. Position and weld
the back supports to the main sup ports.

18. Braze the 3/8"-diameter steel washers to the ends of the 1/4"-diameter supports. Position the 1/4" steel washers and braze them to the supports at the desired loca tions.

19. Wire brush the side frames to remove loose scale and dirt. Paint the side frames.

20. Attach the side frames to the shelf units. Use #12 x 3/4" round head wood screws for the top three shelves and #12x1-1/4" roundhead wood screws for the shelf with drawers.

21. Mount the unit to the window with #14 x 2-1/2" wood screws.