Outdoor Project

Modular Patio Seating

With deep, inviting seats, this modular outdoor furniture can be arranged to fit any outdoor space. It will become your favorite lounging spot.

When summertime is on the horizon, I start daydreaming of boating, get-togethers, and barbecues. But one of my favorite things is those summer nights that are nice and cool after a warm day. These are the nights that we often find ourselves lounging around the fire pit. And when I first saw the design for this seating, I knew the deep seats were the perfect place to curl up on and enjoy one of those nights.

MODULAR DESIGN. One of the things that I like about this seating is it's modular. The chairs are designed to fit together to create sofa-type seating, as you can see above. The combination of corner and side chairs means you can build as many as you like to fit anywhere.

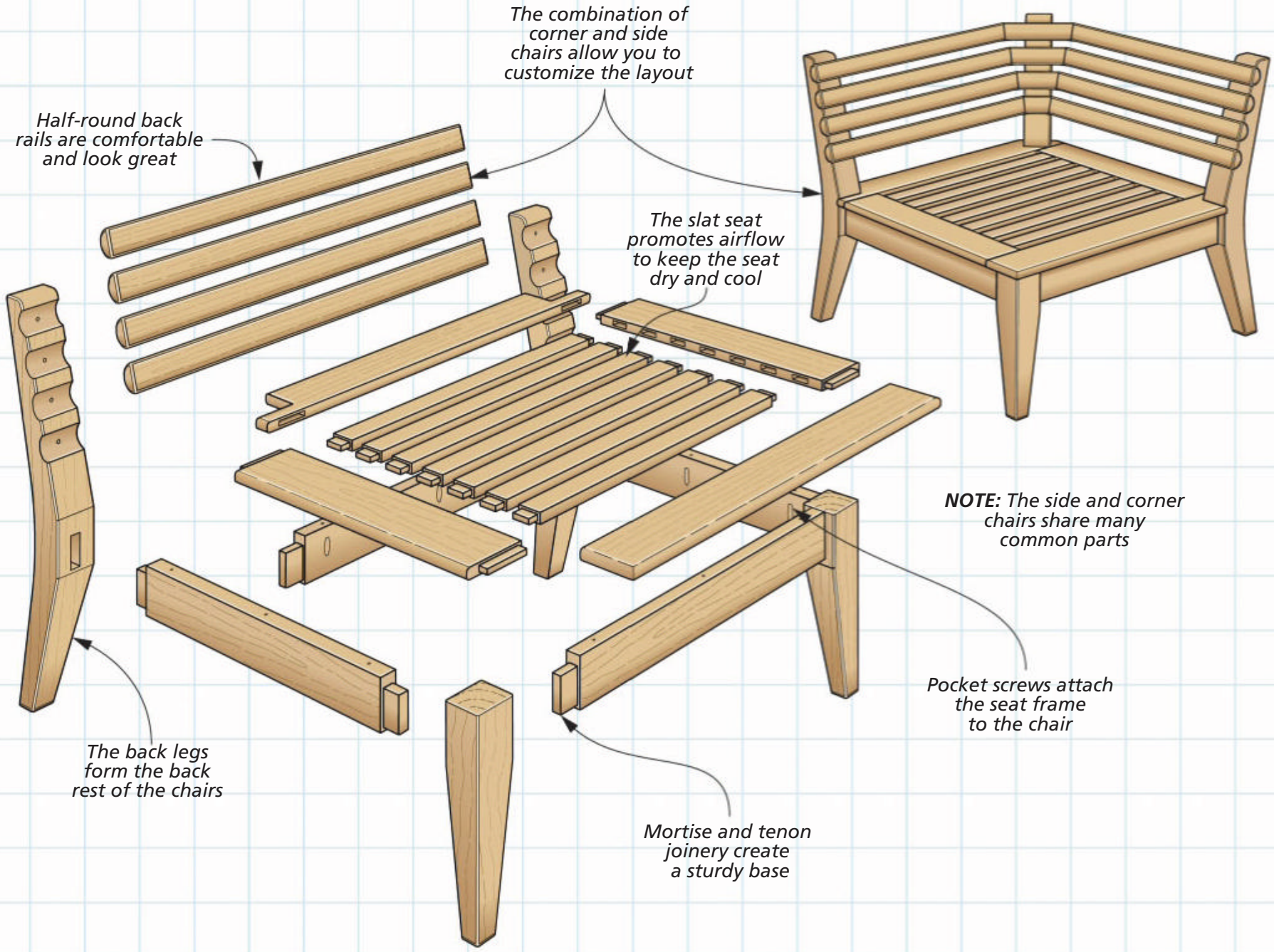
Beyond the modular design, the hardwood construction offers some great and unique woodworking challenges as well. So turn the page to get started, because you'll want to have them ready for that first cool summer night.

▲ The deep seat of the chairs creates the perfect platform for a cushion. There's plenty of room to curl your legs up and lounge.

▲ The gentle angle of the backrest makes the chair a comfortable place to relax. The miters are reinforced with a pair of splines.

Written by: Logan Wittmer; Project Design: Chris Fitch

Construction Overview / OVERALL DIMENSIONS: 32"W x 30"H x 35½"D

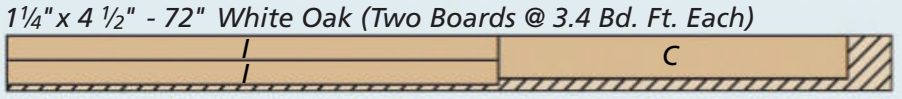


Materials, Supplies & Cutting Diagram (1 Side Chair & 1 Corner Chair)

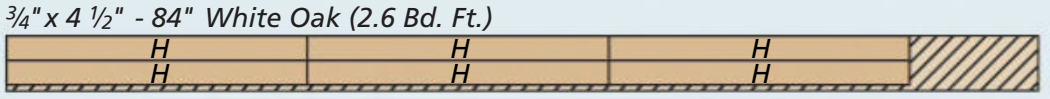
A	Front Legs (3)	3 x 3 - 14¼
B	Back Legs (4)	3 x 6⅜ - 30
C	Chair Rails (6)	1¼ x 3½ - 28½
D	Rear Corner Leg (1)	3 x 5 - 30
E	Corner Rails (2)	1¼ x 3½ - 27⅛
F	Seat Fronts/Backs (4)	¾ x 4½ - 32
G	Seat Sides (4)	¾ x 4½ - 24½
H	Seat Slats (14)	¾ x 2 - 24½
I	Back Rails (13)	1¼ x 2 - 32 (rgh)

- (24) #8 x 1¾" Pocket Screws
- (20) #8 x 1¾" Rh Woodscrews

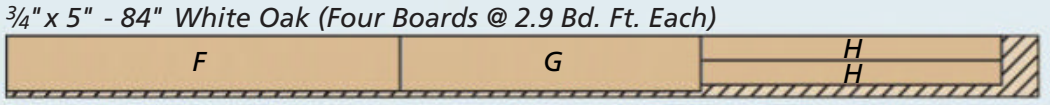
1¼"x 4 ½" - 72" White Oak (Two Boards @ 3.4 Bd. Ft. Each)



¾"x 4 ½" - 84" White Oak (2.6 Bd. Ft.)



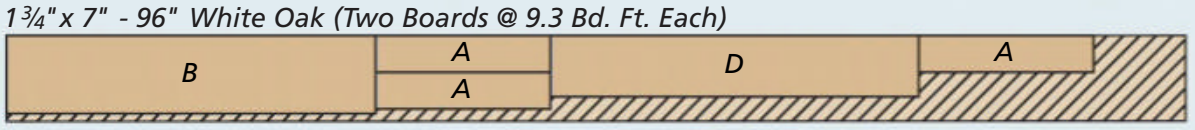
¾"x 5" - 84" White Oak (Four Boards @ 2.9 Bd. Ft. Each)



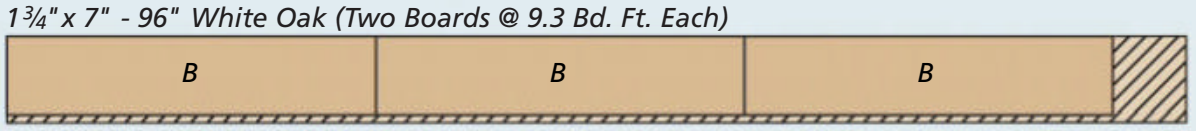
1¼"x 6 ½" - 72" White Oak (Two Boards @ 4.9 Bd. Ft. Each)

1¼"x 7 ½" - 96" White Oak (Two Boards @ 7.5 Bd. Ft. Each)

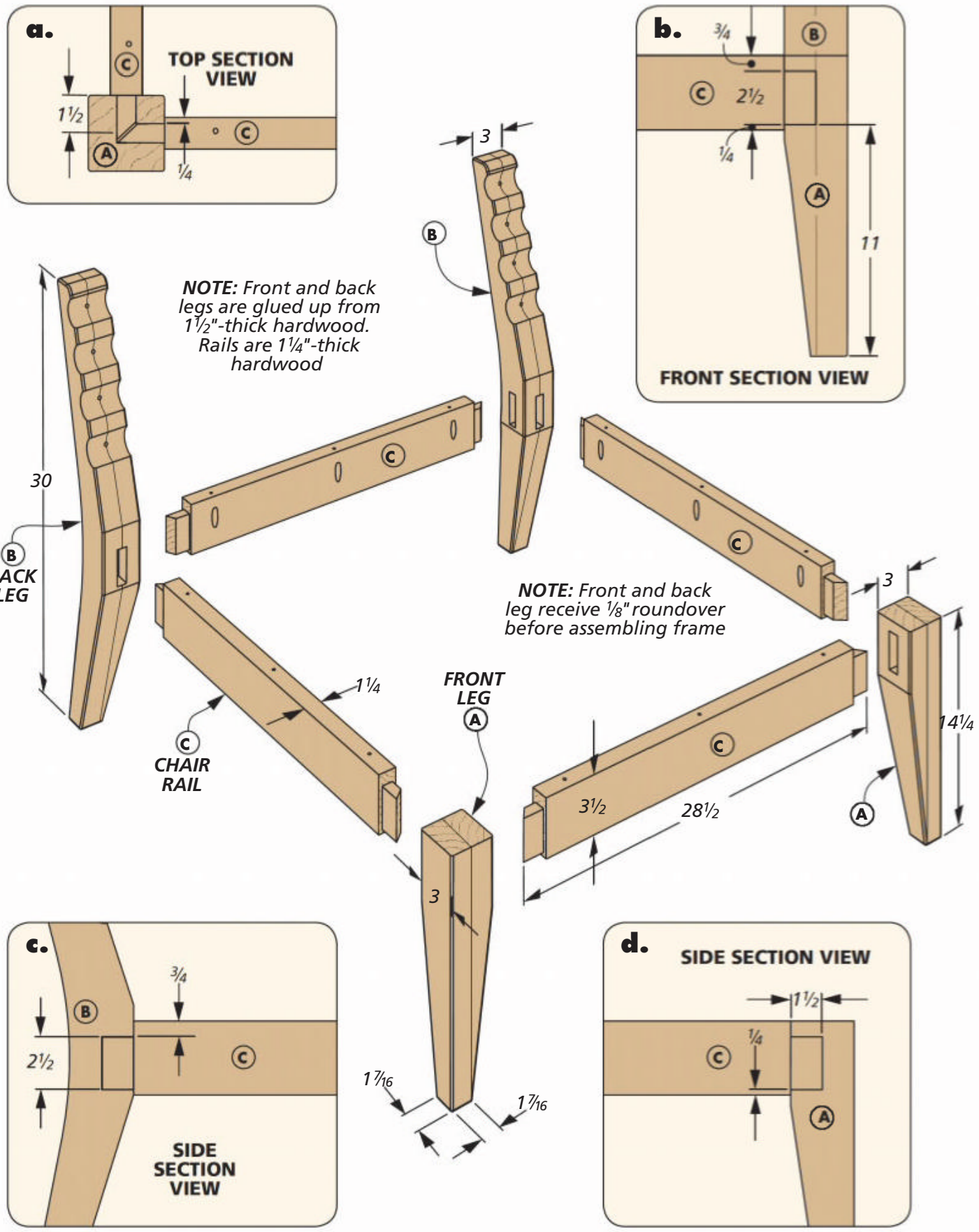
1¾"x 7" - 96" White Oak (Two Boards @ 9.3 Bd. Ft. Each)

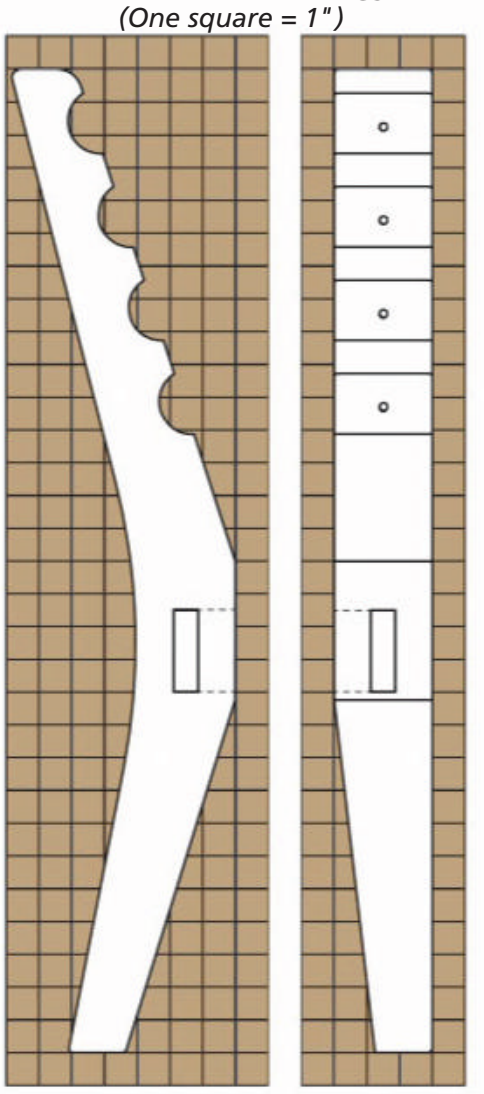


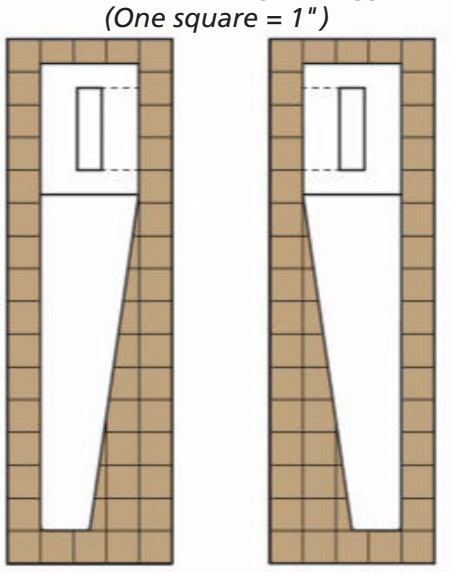
1¾"x 7" - 96" White Oak (Two Boards @ 9.3 Bd. Ft. Each)



Illustrations: Peter J. Larson







Start with the SIDE CHAIR FRAME

For the outdoor seating I built, I decided on two side and two corner chairs. The chairs share many of the same frame parts, but the side chair is a little more straightforward, so I started with that frame. Before you head out to the lumberyard, give a little thought to your material selection. Outdoor projects are exposed to the elements, so the material selection is extremely important. Here, I used durable white oak. For some tips on material and building for the outdoors in general, see the article on page 10.

BEEFY FRAME. As you can see in the drawing above, the frame consists of three different parts — front and rear legs connected by rails. The legs are made of glued up blanks that are tapered on the inside faces. The rails are joined to the legs with mortise and tenon joinery, and will later be used to attach the seat frame to the chair. Up first are the front legs.

SQUARE BLANKS. After gluing up the stock for the front legs, I planed them to final size and cut them to length. I held off on cutting any tapers yet. Laying out and cutting the mortises is easier with everything still square. After marking the mortise locations, I cut the mortises using a mortising machine (Figure 1, next page). If you don't have a mortising machine, you can drill out the mortises and square them up with a chisel.

At this point, I want to mention that the front legs are common to both chairs. The corner chairs each require one front leg, and the side chairs require two each. So while I was making one set of front legs, I went ahead and made all six legs that were needed for my configuration.

FREEHAND TAPERS. With the mortises cut on the inside faces of each front leg, you can now convert the square blank into the tapered leg. The pattern on the previous page acts as a guide. After laying out the pattern on the leg, I cut the tapers at the band saw, as seen in Figure 2. A few quick swipes with a hand plane removes the band saw marks. After routing a small roundover on the edges of the front legs, you can set them aside and turn your focus to the rear legs.

A GOOD ANGLE. The back legs form the back of the seat frame and also the support for the back of the chair. Round notches on the upper portion of the legs will hold the back slats that are added later. As with the front legs, the back legs are common between the chairs. The side and corner chairs each require two of these legs, so I made eight total.

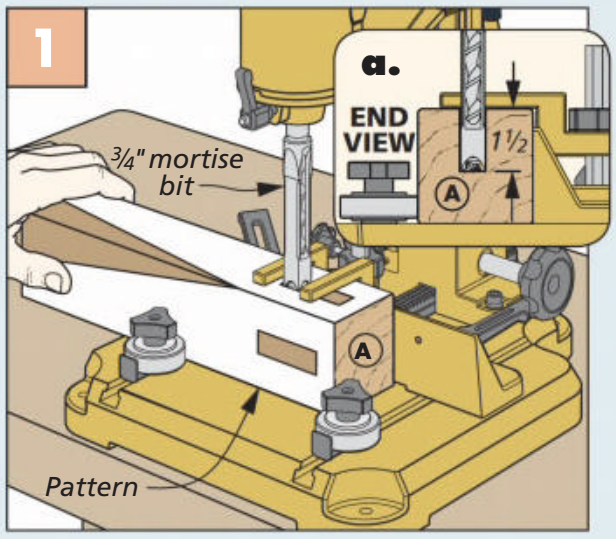
Like the front legs, the back legs start as glued up stock to make the blanks. After laying out the pattern on the bank, you'll want to drill the notches for the back slats. I did this with a Forstner bit at the drill press, as seen in Figure 3.

The leg can now be cut to shape at the band saw. I followed the pattern closely, but made sure to leave a little material so I could sand right up to the line. The leg blanks are large, so take your time here.

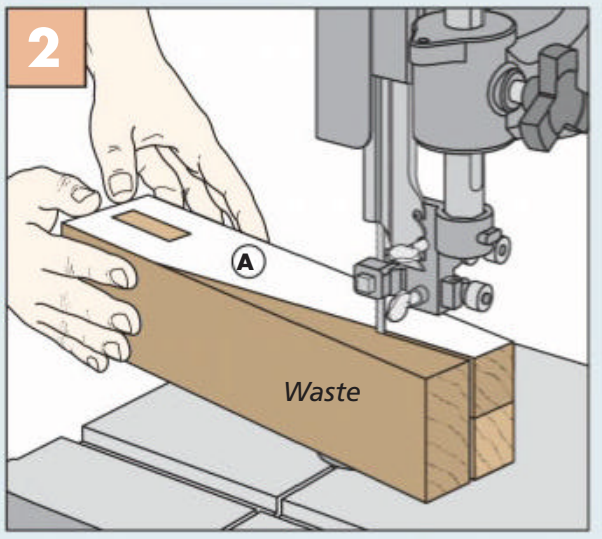
MORTISES NEXT. Now, it's back over to the mortising machine (or drill press) to cut the mortises. Cutting the mortise on the inside face is straightforward — just remember that you need left and right legs (four of each in my case). These require the inside mortise on opposing faces. The mortise on the front is a little trickier due to the curved back not allowing the leg to lay flat. But a little blocking will have you on your way. You can see how I set this up in Figure 4 below.

FINALLY, RAILS. With the legs complete, making the rails for the frame is straightforward. With the rails cut to size, I cut a tenon at the table saw, as seen in Figure 5. Just note the tenon is offset. After mitering the ends of the tenons, finish up the rails by drilling three pocket screw holes in each one (Figure 6).

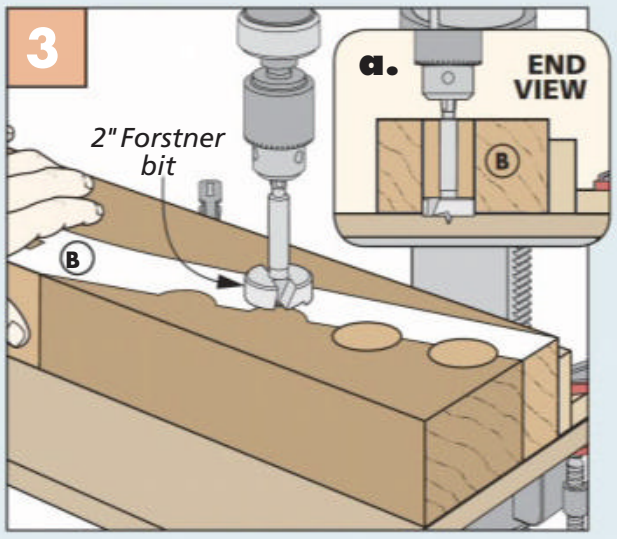
How-To: CUT & SHAPE THE CHAIR LEGS & RAILS



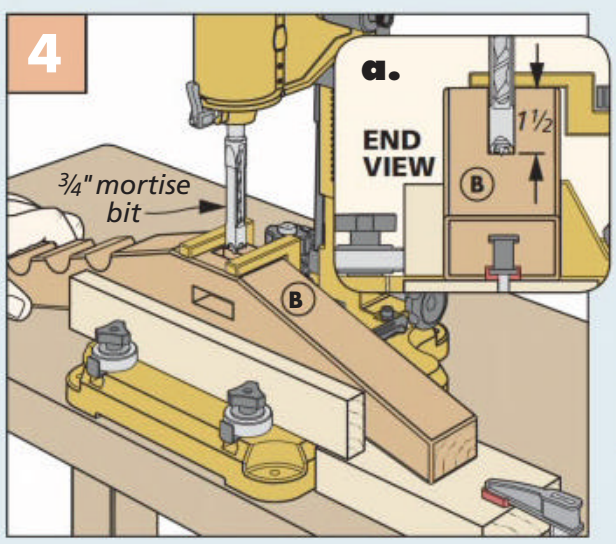
Front Leg Mortises. Use a mortising machine to cut the mortises in both adjoining faces of the front legs.



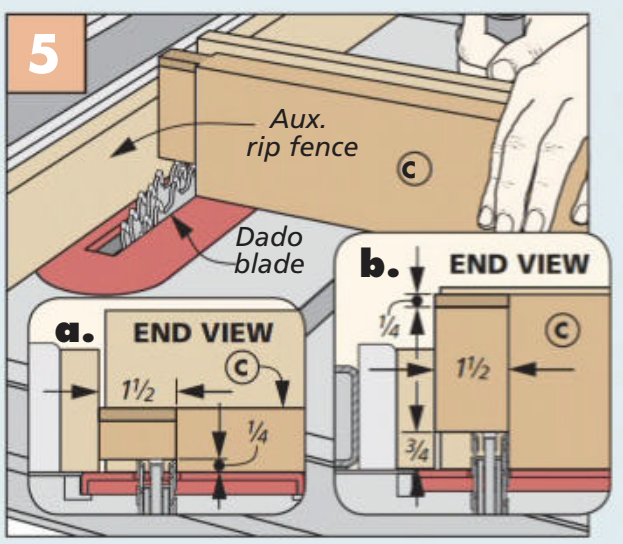
Taper the Legs. At the band saw, taper the legs, staying to the waste side of the line. Then sand or plane to the line.



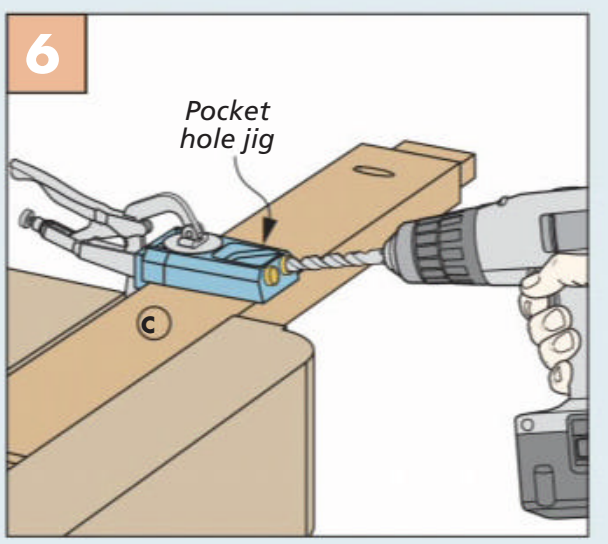
Drill the Back Legs. After laying out the back legs, use a Forstner bit to drill the notches. Then cut the leg to shape.



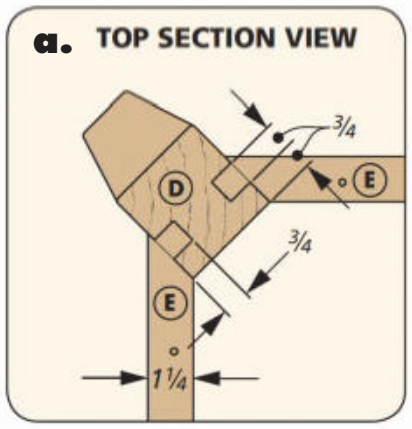
Rear Leg Mortises. Back at the mortising machine, square the leg to the bit before cutting the mortises.

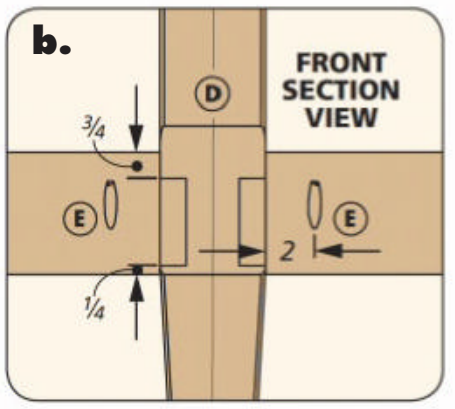


Rail Tenons. A dado blade and auxiliary rip fence can be used to cut the tenons on the ends of the rails.

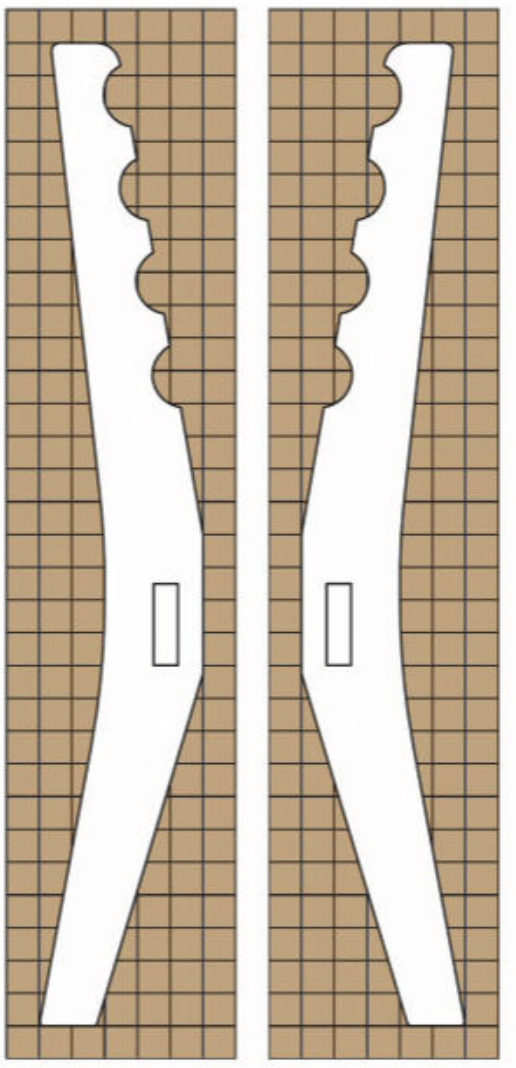


Pocket Screw Holes. Before assembling the chair frames, drill the pocket screw holes in the chair rails.

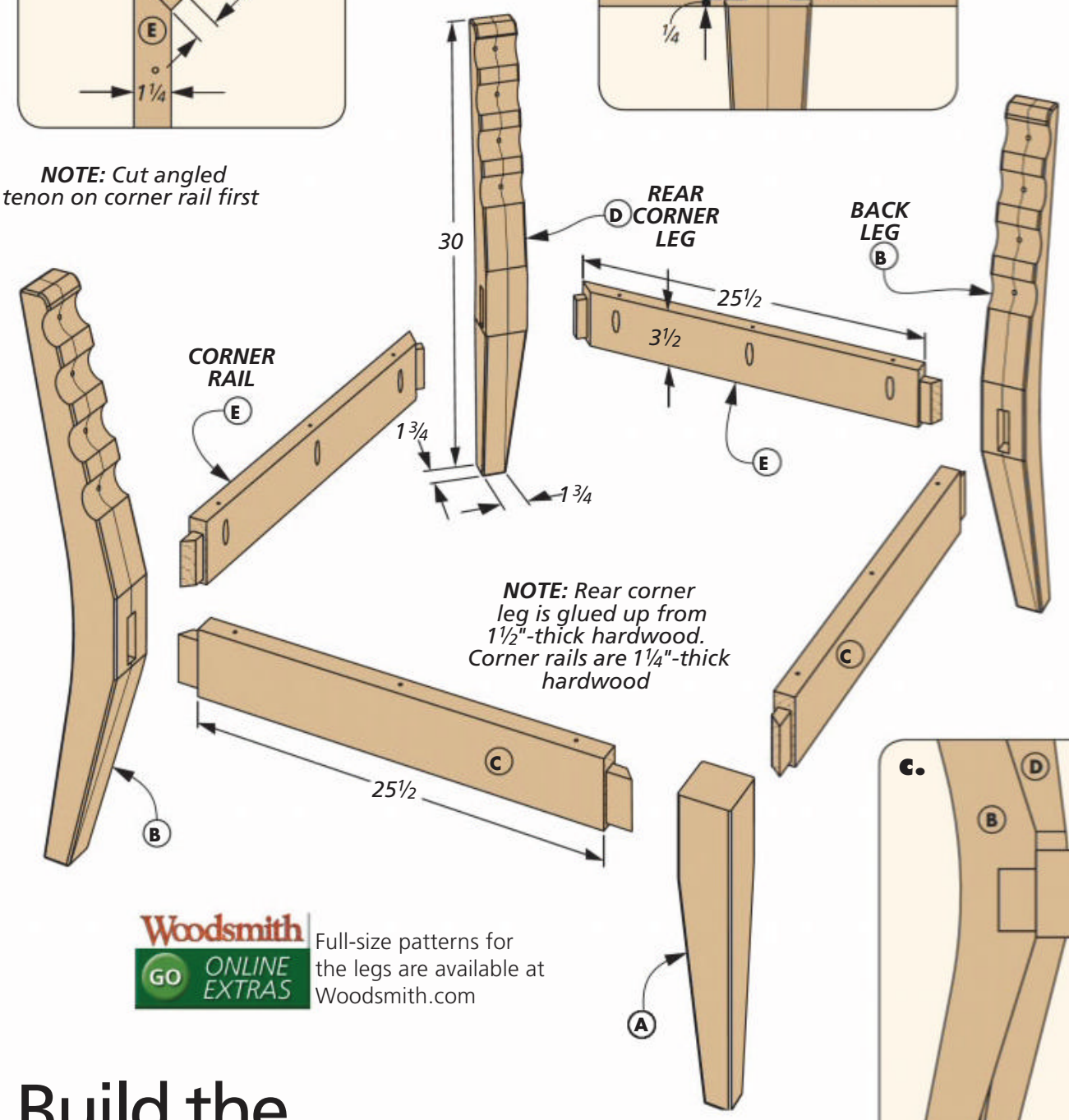




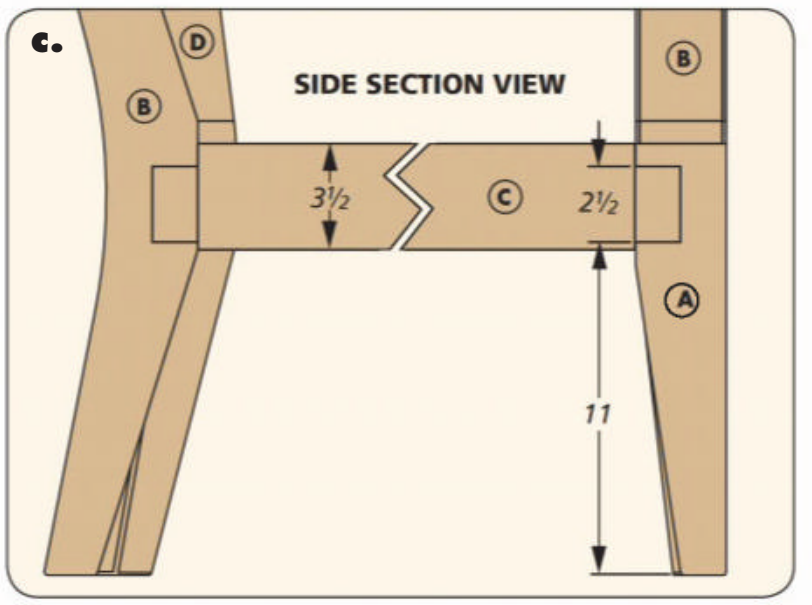
PATTERN *CORNER REAR LEG*
(One square = 1")



NOTE: *Cut angled tenon on corner rail first*



NOTE: *Rear corner leg is glued up from 1½"-thick hardwood. Corner rails are 1¼"-thick hardwood*



Woodsmith GO ONLINE EXTRAS
Full-size patterns for the legs are available at Woodsmith.com

Build the CORNER CHAIR FRAME

After building the side chair frame, you'll find many of the same parts on the corner chairs. Both chairs share common front legs, back legs, and front rails. To build the corner chairs, you'll add a rear corner leg and a pair of rails with angled tenons.

REAR LEG POSITIONING. The process of making and adding a rear corner leg will look quite familiar. It follows the same steps that are used in the rear legs that you already built. There are two differences, however. The first is the angle of the back support. This leg is slightly more upright. This allows the back slats that you add later to flow at the same angle as they turn around the corner of the chair.

The second difference is the orientation that the leg sits in relation to the rest of the frame. Instead of the rails meeting this leg at a right angle, they meet it at a 45° angle. You can see what I mean in detail 'a' above. To accept those rails, the mortises on this leg gets cut on opposite faces rather than adjoining faces. Finally, the orientation of the leg allows you to add short back rails in the corner, and avoid a backrest that pinches in the corner.

BLANKS AGAIN. Now that you understand the difference between the rear and corner legs, the rest of the process should be pretty clear. It starts by laying out the pattern onto the blanks and drilling the back slat locations. You can see this in Figure 1 on the next page. Cutting the leg to shape is next. Once you have everything smooth and matching the pattern, it's time to cut the mortises. I started by cutting the left side mortise, as seen in Figure 2. With that done, you can flip the blank over to cut the mortise on the opposite face (Figure 3).

ANGLED RAILS

The two front rails that make up the corner chair frame are the same as the ones you made previously. The rear rails however, have a standard tenon on one end, and an angled tenon and shoulder on the other. The angled tenon matches the mortise on the rear corner leg, and allows that leg to sit at a 45° angle in relation to the chair frame.

ANGLED TENONS. When you're sizing your stock for the rear rails, leave the blank a couple of inches long. I cut the angled tenon first, and then trimmed the rail to final length and cut the opposing tenon.

The key to cutting the angled tenons here is to sneak up on the fit. This is done over at the table saw. I set the rip fence to act like a stop block, and used a miter gauge and a dado blade to define the top and bottom shoulders of the tenon first (Figure 4). After the shoulders are cut, you can tilt the dado blade 45° and cut the cheeks of the tenon (Figure 5). You'll have to make two passes, cutting the inner cheek first and then flipping the piece over and raising the saw blade.

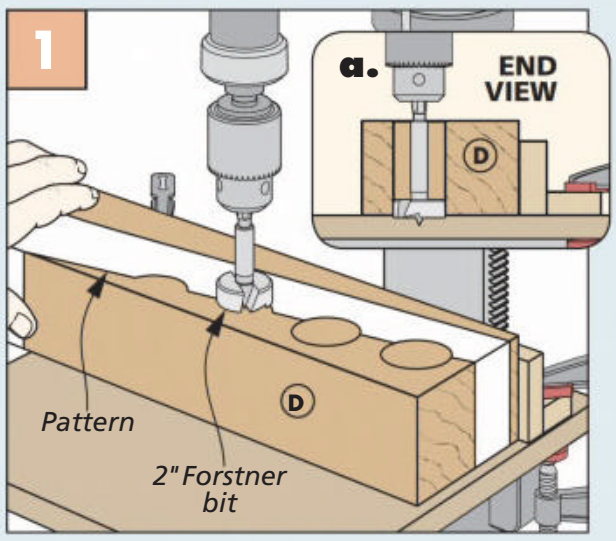
With the angled tenons cut, you can cut the rail to final length and cut the final tenon (Figure 6). A quick miter on the straight tenon and a series of pocket holes finish out the rails.

BASE ASSEMBLY. Now that you have a pile of various parts, it's time to assemble the chair frames. A quick note on glue, however. As with any outdoor furniture project, make sure to use a quality waterproof glue, such as *Titebond III* or epoxy.

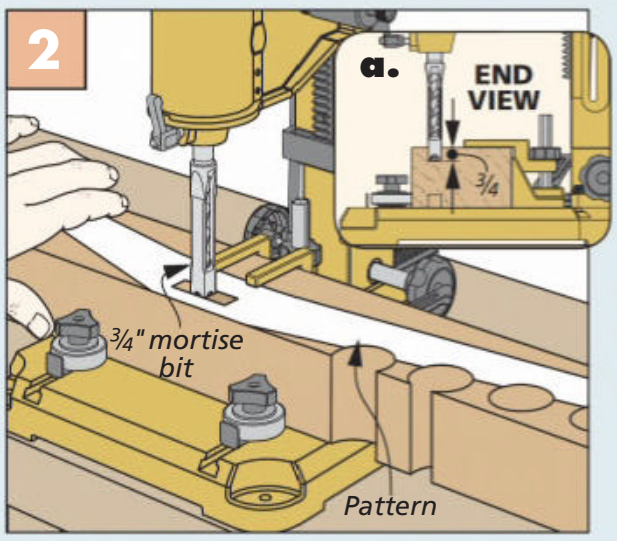
I started assembling the side chair frames first. I applied glue to both the inside of the mortise, and on the surfaces of the tenons. Four clamps across the corners of the chairs hold everything tight while the glue dries.

After assembling the side chairs, the assembly of the corner chair follows suit. Here however, I glued the angled tenon on the rear rails into the rear corner leg first. A couple of wedge-shaped cauls will help keep the clamp in place on the angled surfaces of the rails. Then, you can work your way around the chair until you have all of the rails and legs in place. Now that the chair frames are assembled, up next is tackling the slatted seat frames. Finally, we'll finish out the chairs by making and installing the back rails.

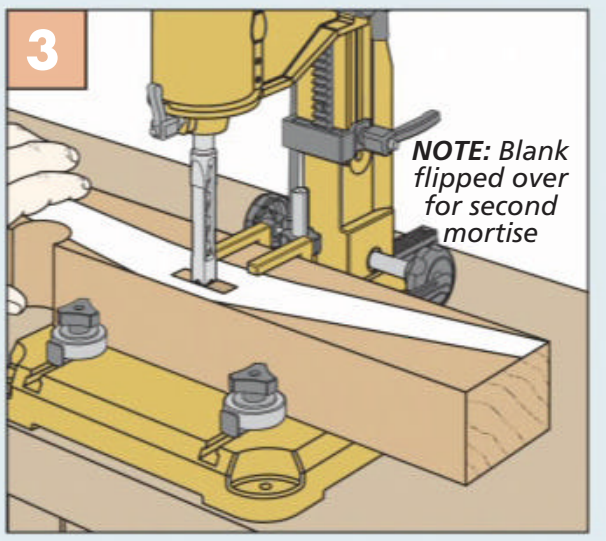
How-To: CUT & SHAPE THE REAR CORNER LEG & RAILS



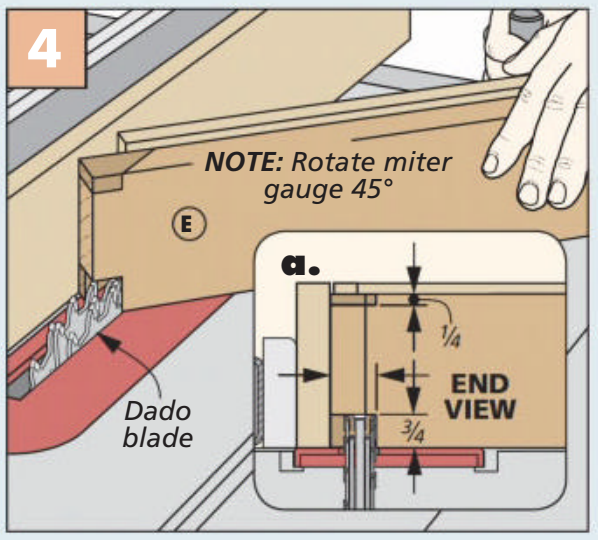
Drill Rail Recesses. At the drill press, drill the notches in the rear corner leg blank using a Forstner bit.



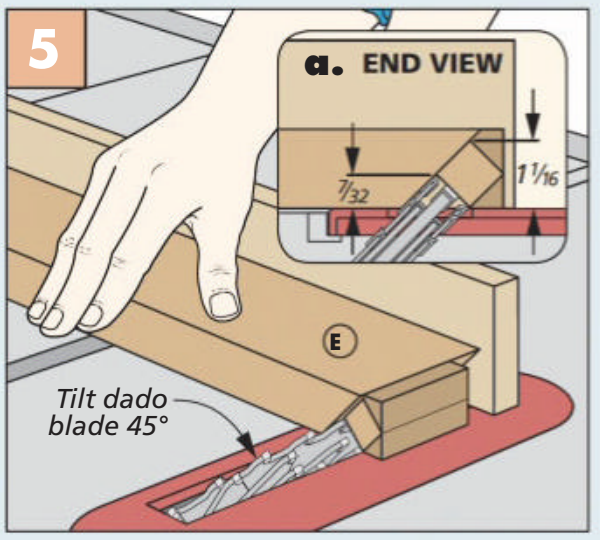
Left Side Mortise. Use the mortising machine to cut the mortise in the left side of the rear corner leg blank.



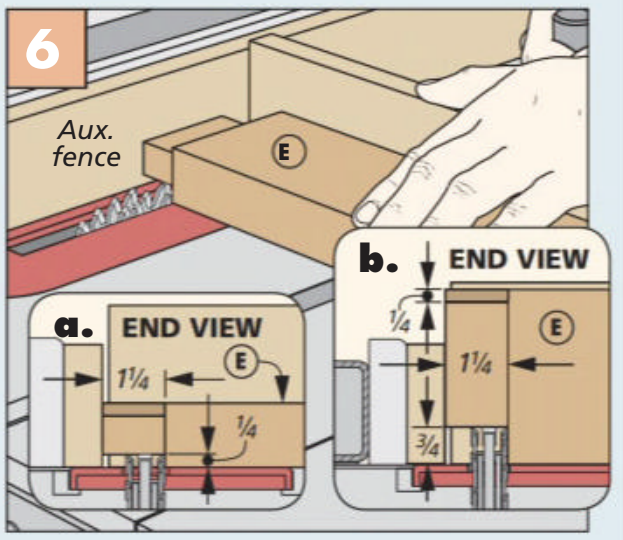
Right Side Mortise. Flip the blank over and cut the mortise in the right hand side of the rear corner leg.



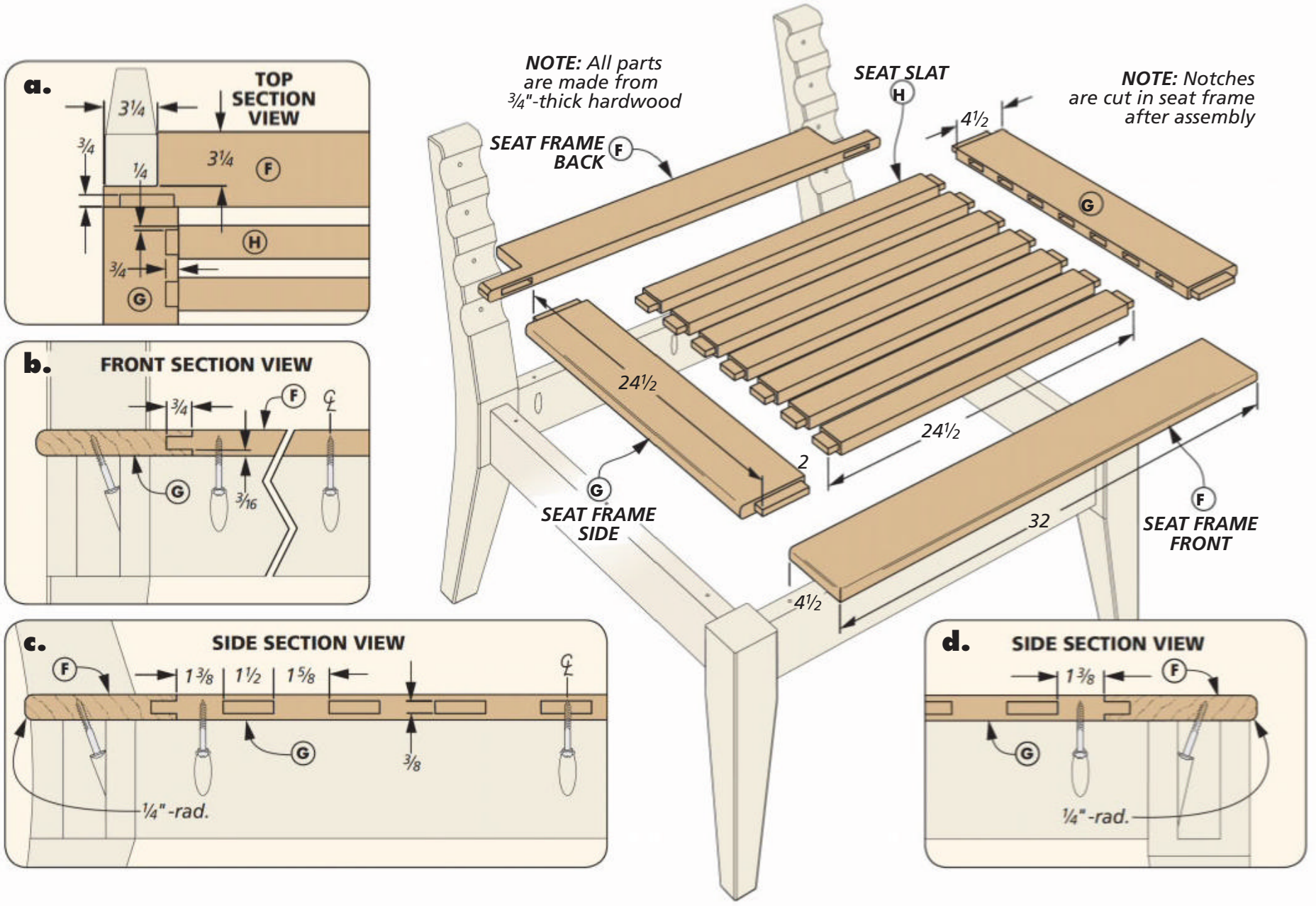
Define Shoulders. Using a dado blade in the table saw, define the shoulders of the angled tenon.



Cut Cheeks. Tilt the dado blade and cut the cheeks of the tenon. Sneak up on the cut until the cheeks meet the shoulders.



Straight Tenons. After trimming the rail to length, cut the straight tenon on the end of the rear rails.



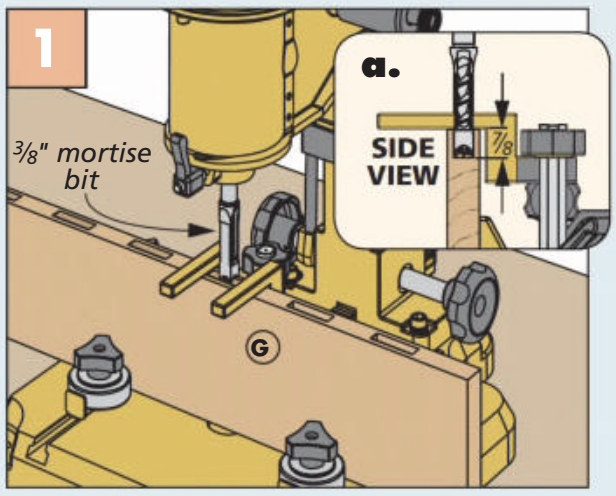
Making the SEAT

For outdoor seating, a slatted seat works well. Even with a cushion, it allows water to drain off and also promotes air flow to help things dry out after getting wet. For the seats on my chairs, I made a frame using mortise and tenon joints. Inside this frame, mortises will be used to capture the tenons on the end of the seat slats. Then, the entire seat assembly is attached to the chair frame.

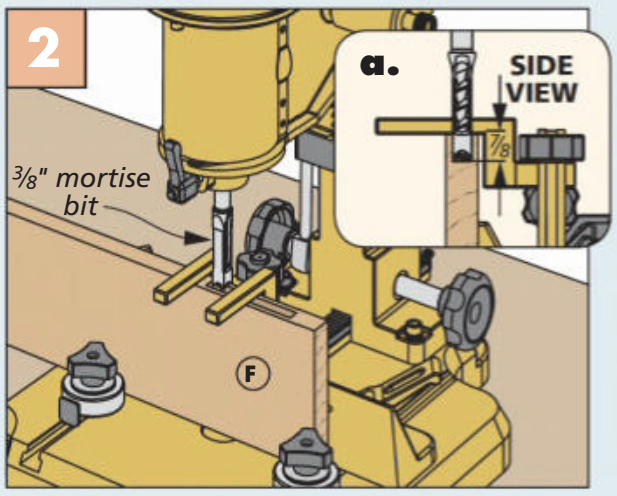
FRAMES FIRST. As you'll notice in the drawing above and the main drawing on the next page, the seat frames have notches cut in them to wrap around the legs. The seat frames for the chairs are identical, but the notches are different between the side and corner chairs.

After cutting the frame parts to size, I laid out the mortises for both the seat slats and the frame assembly. Then, I used the mortising machine to cut the mortises in both frame sides (Figure 1 below). While you're there, go ahead and take care of mortises in the seat front and back, as seen in Figure 2. Finally, the tenons can be cut on the ends of the slats and the frame sides (Figure 3).

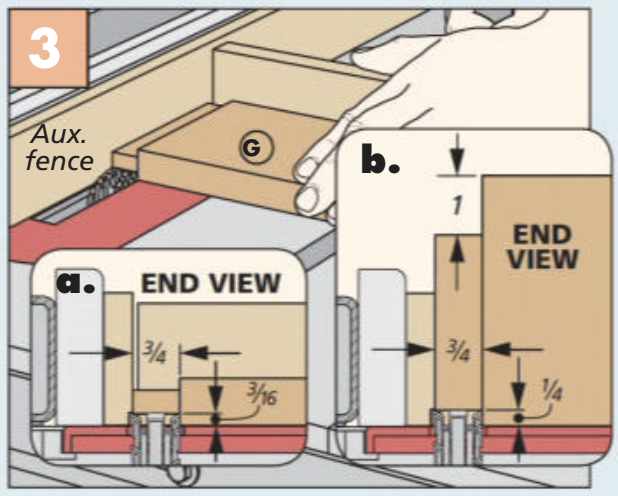
How-To: BUILD & ATTACH THE SEAT



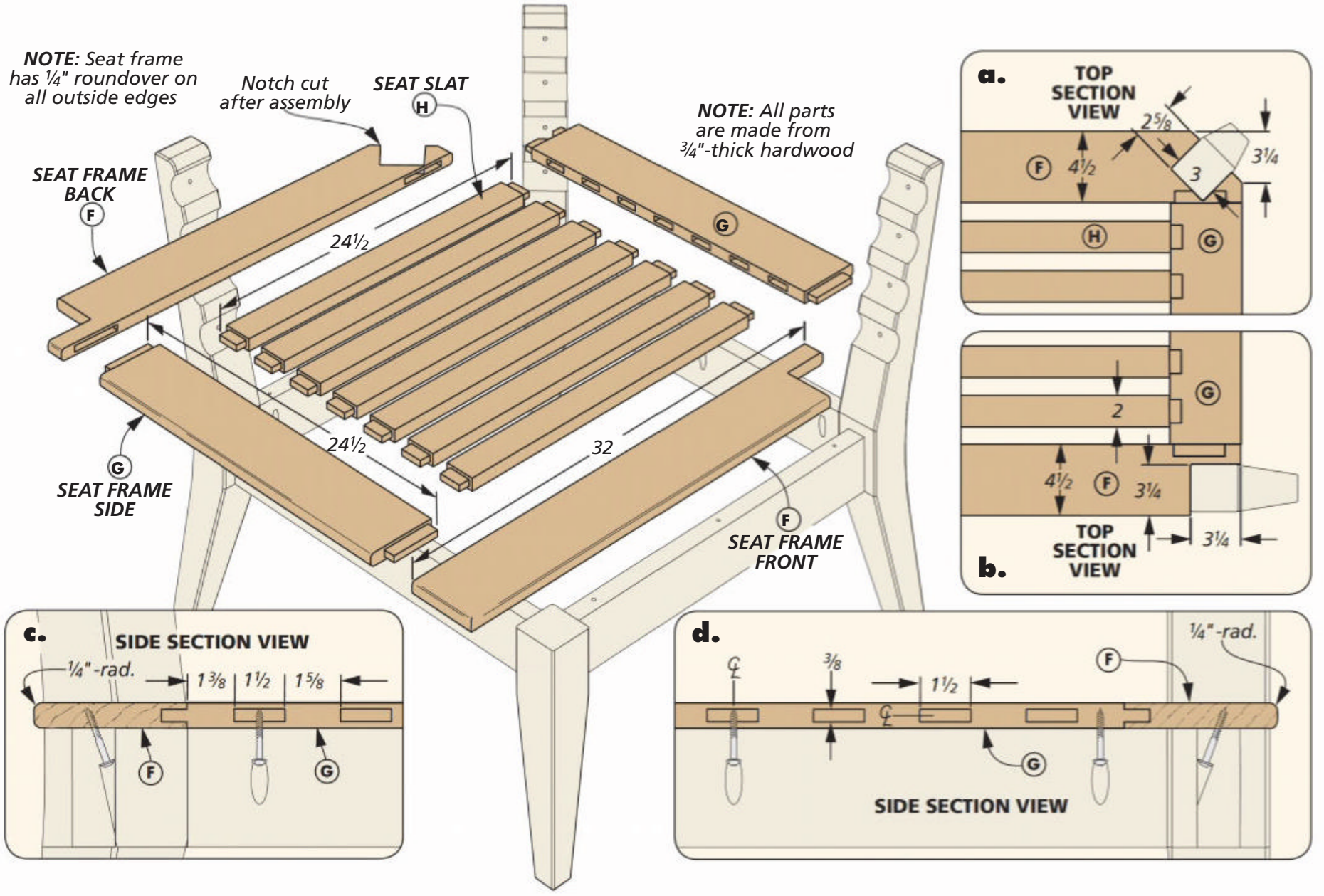
Slat Mortises. Use the mortising machine to cut the series of mortises on the inside of the seat frame sides.



Frame Mortises. While still at the mortising machine, cut the mortises in the seat frame fronts and backs.



Frame Tenons. Use a dado blade in the table saw to form the tenons on the ends of the seat frame sides and slats.



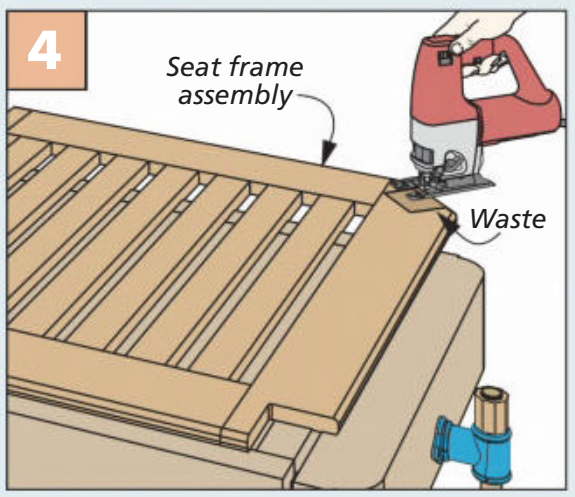
ASSEMBLE THE SEAT. With the joinery cut on the parts, you can assemble the seats. You'll cut the notches after the glue is dry. The process I used to glue up the seat is as follows. I first assembled the seat slats into the rails. After the slats are in place, I used a couple of clamps to hold the rails and slats together. Then, the tenons on the rails can be glued into the seat front and back.

CUT THE NOTCHES. Once the glue on the frames is dry, you can tackle cutting the notches. I used a jig saw with a fine-toothed blade to cut these (Figure 4), but a hand saw and coping saw would work just as well. No matter which method you choose, take your time and stay as close to your layout line as you can. That way, the seat will fit with little fuss. For the side chair, the two notches are square into the frame, as seen in detail 'a' on the previous page.

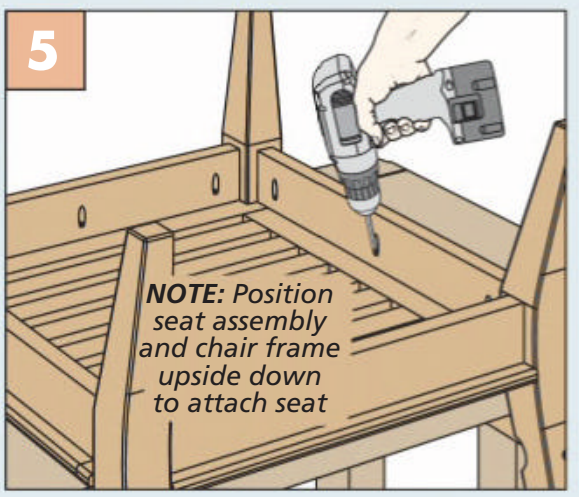
The corner seat frame is a little different. Two of the notches are cut square into the frame, as seen in detail 'b' above. The notch for the rear corner leg is a little different. First, the corner is cut off at 45°. That angle then becomes the base for cutting the notch (detail 'a').

One thing to mention is the seat slat orientation. You can see how I have the slats oriented in the drawing above. To keep the slats traveling in a consistent direction, one of the corner chair seats simply needs to be flipped over. Now, this isn't a big deal if you put cushions on the chairs, as shown in the photo on page 34. But for uniformity, I made sure the slats were all in the same direction in my finished layout.

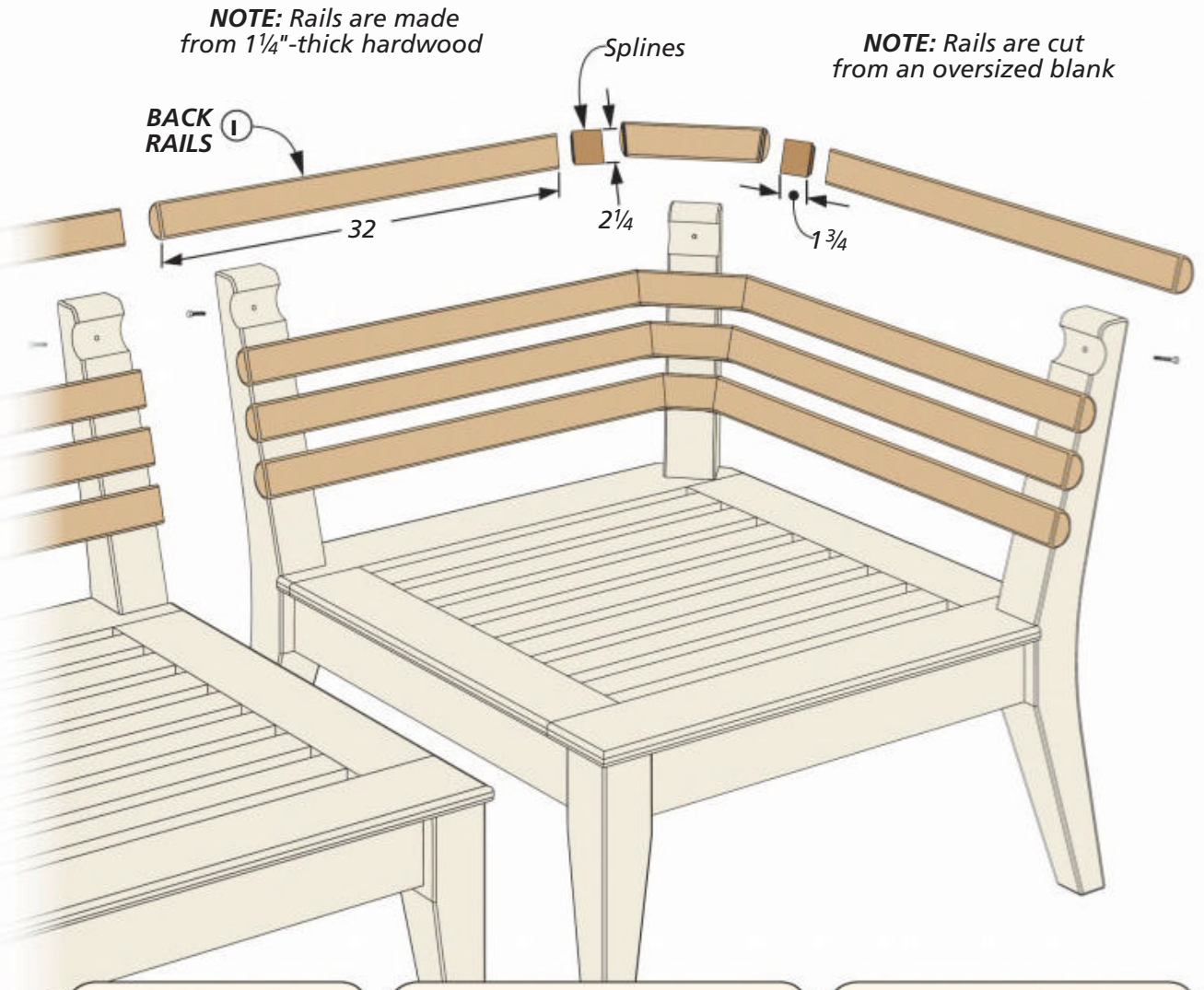
ATTACH 'EM. Now that the notches are cut, the seats are ready to be attached to the chair frame. The seats simply fit around the legs and are attached with screws through the pocket holes (Fig 5). If you need to, a pair of clamps can lend a helping hand to hold the seat down to the frame as you drive the screws home. The final thing to add is the back rails.

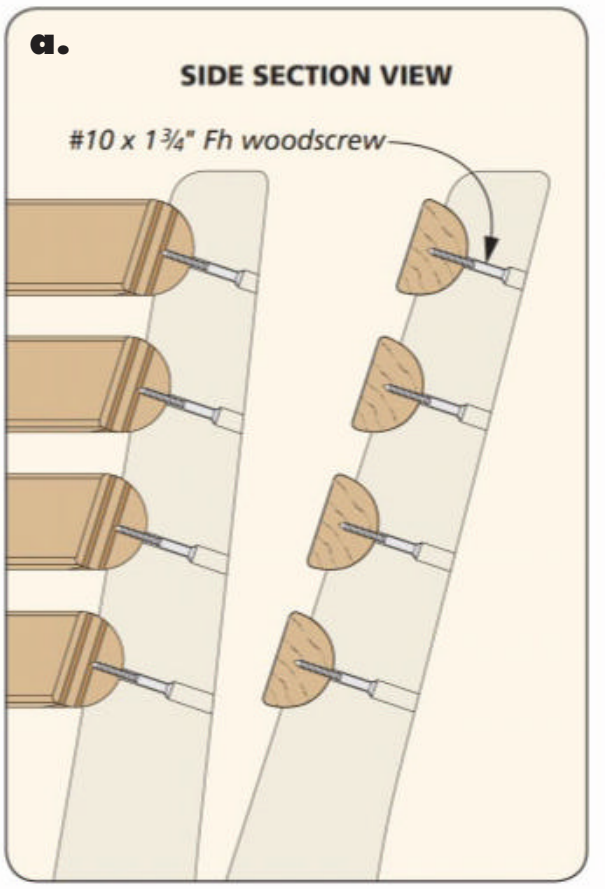


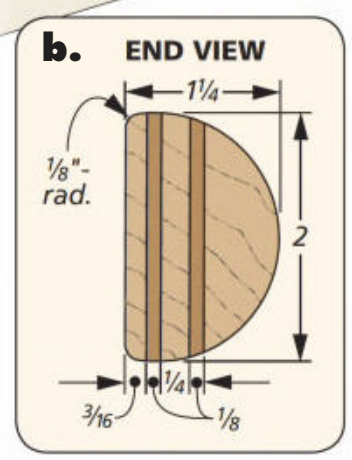
Notch the Seats. Use a jig saw with a fine-toothed blade to cut the leg notches in the seat frame.

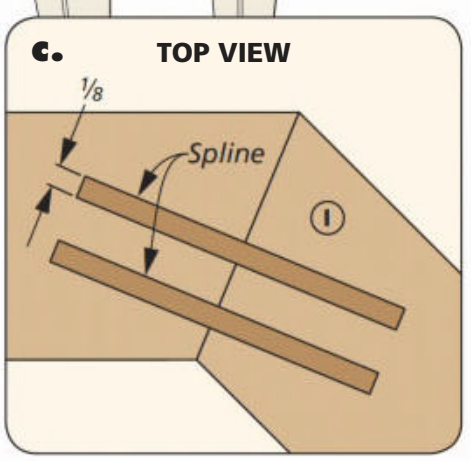


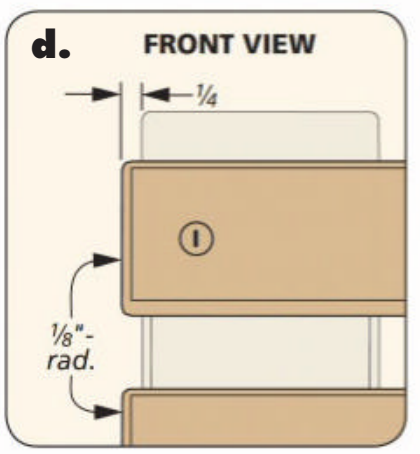
Attach the Seat. Position the seat onto the chair frame and attach it with screws through the rails.

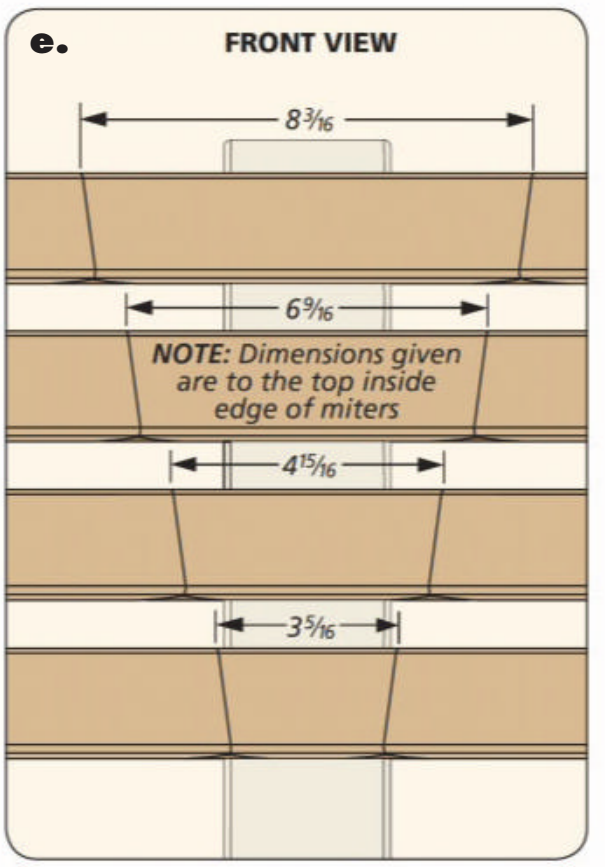












Add the **BACK RAILS**

To add comfort to the chairs, a series of rails are installed into the notches of the back legs. As you can see in the drawing above, the rails are shaped into a half-round profile and stand slightly proud of the legs.

STOCK FIRST. Because each chair has four rows of rails, you'll need quite a bit of stock for these. I started making the rails by cutting blanks that were twice as long as the finished rails and more than twice as wide. This yields four rails from each blank. After rounding over the edges of the blank (Figure 1), the rails can be ripped free at the table saw, as seen in Figure 2. I then trimmed the side chair rails to length. The corner chair rails were left extra long. More on that later. Then, I routed a small roundover on all the edges of the rails (Figure 3). You can then set the side chair rails aside for now.

CORNER CHAIR. The back rails for the corner chair require a little more finessing than just screwing them in place. The recesses in the rear corner leg create a spot to attach the shorter back rails. This gives the corner chair a backrest that's comfortable all the way around. As you can see in the drawing above and in detail 'e', the corner rails also flare out towards the top. The bottom is the shortest and the top is the longest.

COMPOUND MITERS. Upon first looking at the rails on the rear corner leg, you might think the joint is a simple 22.5° miter. That's true, but you also need to take into account that the legs (and rails) tilt back. That turns the miter into a compound miter. This isn't as bad as it sounds, and Figure 4 shows how I did this. It's a simple matter of setting the miter gauge and tilting your saw blade to the correct angle. The first thing I cut here was the rear corner rails.

I trimmed them all to final length with the appropriate miters on each end. Then, I trimmed the matching miters on the long rails the same way. Remember, the opposite end of these rails are left long for now.

A PAIR OF SPLINES. Because miter joints are relatively weak, each one gets a pair of splines. You can see the spline locations in details 'b' and 'c'. The spline slots are easy to cut at the table saw using a jig, as seen in Figure 6. Shop Notes on page 64 explains the details of the jig and how it works. The splines are cut from a small piece of scrap.

CLAMPING FIXTURE. Clamping the sections of back rail together with the splines poses a small challenge. With the length and the angles, it's almost impossible to get a clamp on them. That is, unless you clamp them together using a fixture like I did. You can see my setup in Figure 7.

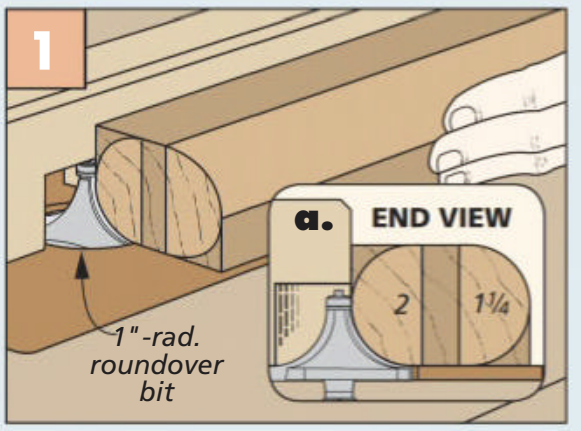
The fixture consists of a corner brace and a couple of fences clamped to my workbench. You can reposition the corner brace depending on which length of corner rail you're gluing up. The combination of braces and fences allows good clamping pressure. Glue up all of the corner back rails and make sure to get good glue coverage on the spline and slots.

INSTALL THE BACKS. To install the back rails on the side chairs, I clamped all of the rails in place using a caul. Then, after drilling some counterbores, they can be installed with screws (Figure 8). Just make sure the faces of the rails are parallel to the face of the legs (detail 'a').

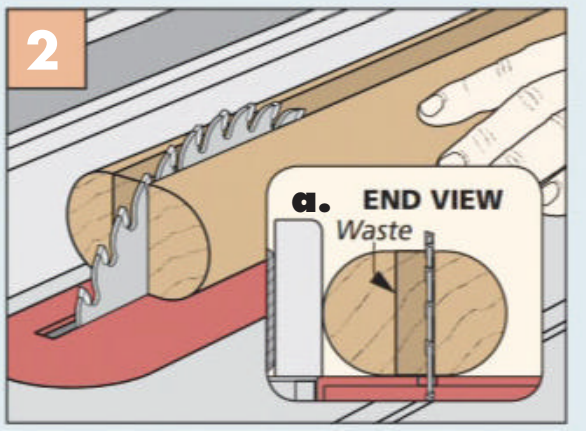
For the corner chair, you'll want to install the rail assemblies one at a time. I started with the bottom rail. First, loosely position and clamp the corner section in place. Then position the long rails, flexing them if needed, and clamp them in place so the face is parallel with the leg. The corner rail will not be parallel to the rear corner leg (detail 'a'). After tightening the clamps, drill and install the screws as before. Rinse and repeat for all the back rails. Finally, trim the ends of the long rails using a hand saw, and sand a small roundover (detail 'd').

After applying a couple of coats of outdoor finish, you can toss on a set of cushions and pillows. Then sit back, relax, and enjoy the summer. W

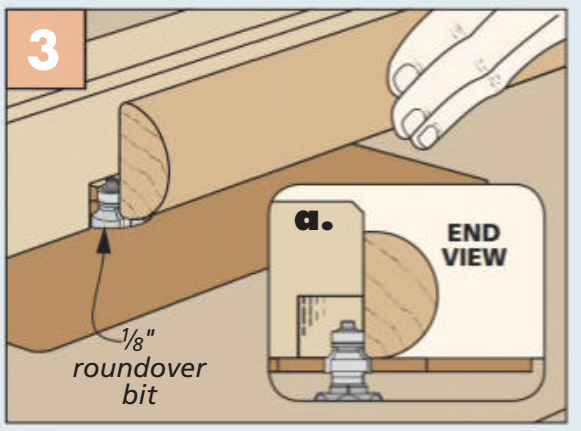
How-To: CREATE THE BACK RAILS



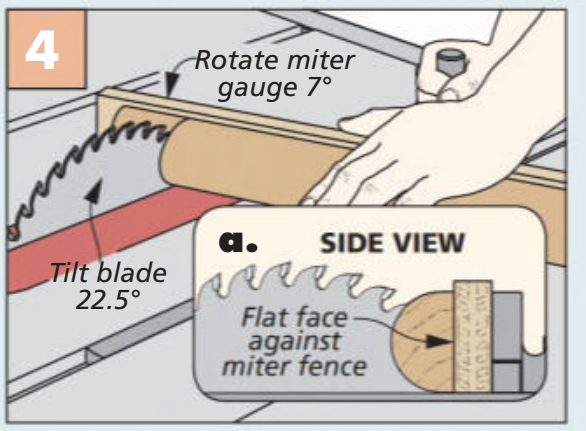
Large Roundovers. Use a large roundover bit in the router table to round all corners of an oversized blank



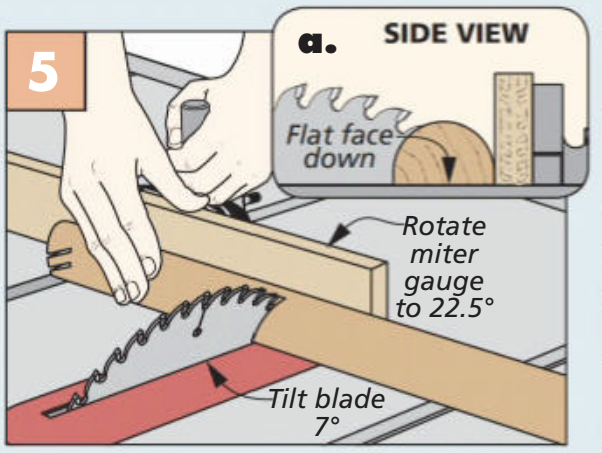
Rip to Size. At the table saw, cut the back rails apart, keeping the flat waste firmly against the table.



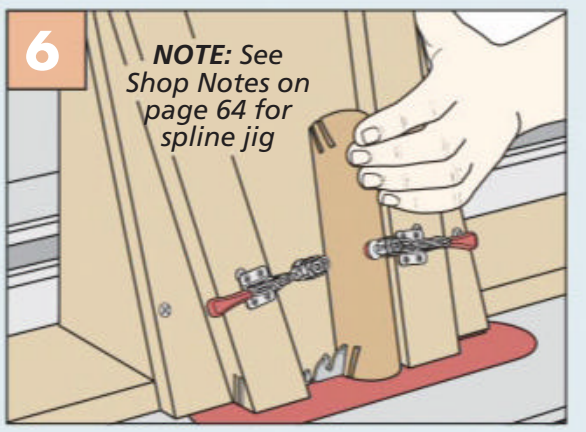
Small Roundovers. Back at the router table, use a small roundover bit to ease all the edges of the rails.



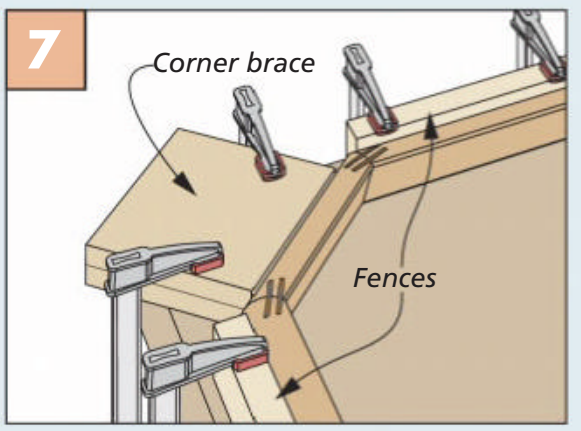
Compound Miter. Rotate miter gauge 7° and tilt blade to cut the miter. Keep the flat face against the miter gauge.



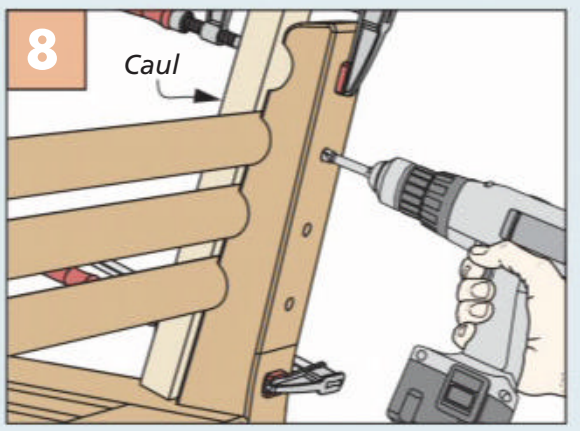
Second Miter. Reset the miter gauge to 22.5° and tilt blade 7°. Make the cut with the flat face down.



Spline Slots. Cut a pair of spline slots in the mitered ends of each back rail using the spline jig at the table saw.



Glue Up Miters. Use a pair of fences and a corner brace to clamp the miters and splines in place as the glue dries.



Fit & Drill Holes. Clamp the rails in place to the legs and drill the holes before attaching them with screws.