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Larry Clayton  
Editor  
*WOOD*<sup>®</sup> magazine

## Adobe Acrobat Troubleshooting Guide

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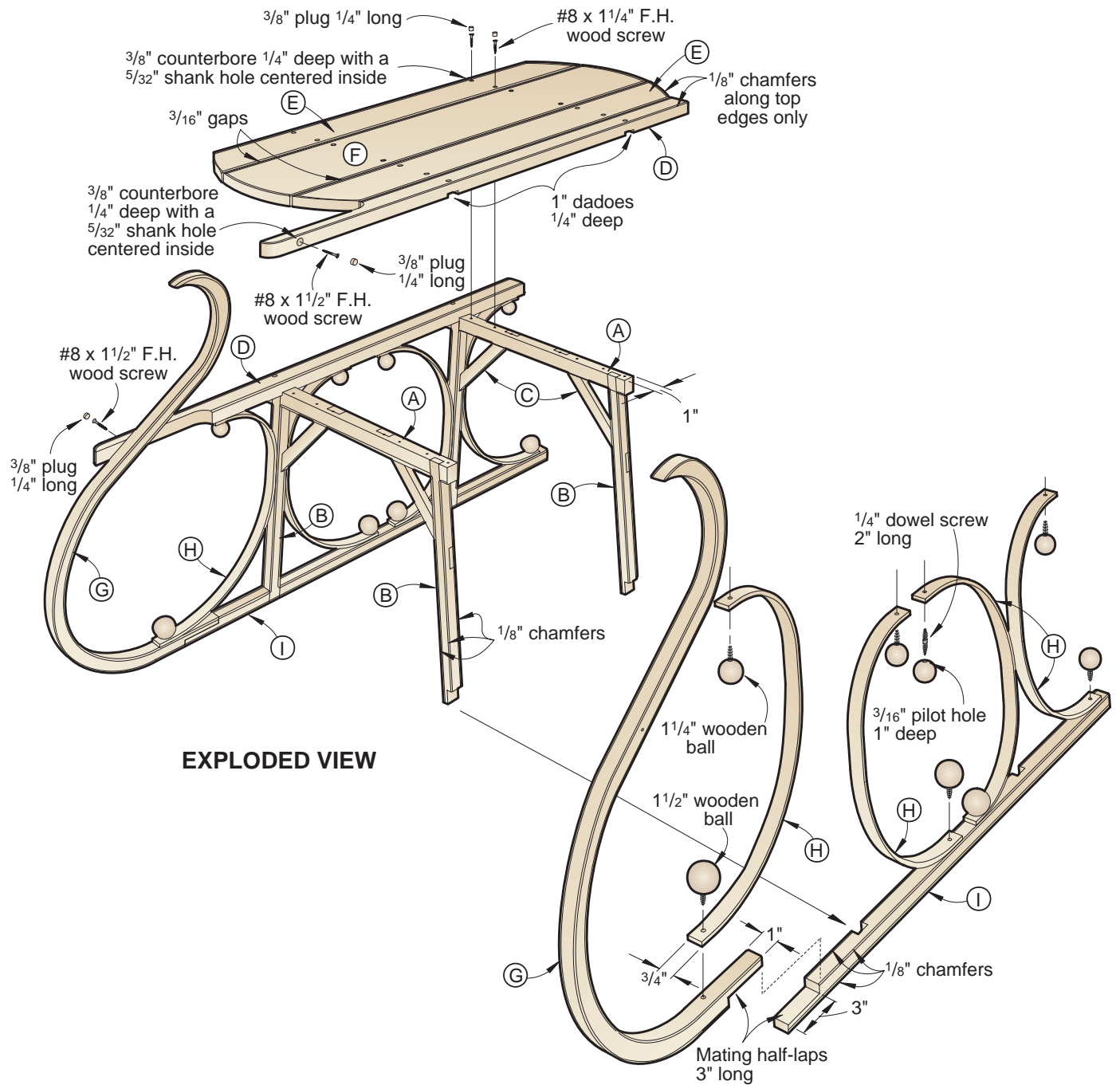
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## Yuletide Sleigh Coffee Table

*With styling reminiscent of Victorian-era horse-drawn sleighs, this finely crafted showpiece will draw rave reviews. We wrapped thin ash strips around shop-built bending forms to laminate the shapely runners. Choose stock to match your existing woodwork, or use our striking cherry/walnut/ash combination. And be sure to keep your bending forms on hand. You'll be getting requests to build more of these beauties.*



**EXPLODED VIEW**

## Bill of Materials

Part	Finished Size			Mati.	Qty.
	T	W	L		
FRAME ASSEMBLY					
A beams	1"	1¼"	21¾"	C	2
B legs	1"	1"	17¾"	C	4
C* knee blanks	½"	1"	12¾"	C	4
DECK/TABLETOP					
D rails	1"	2"	42"	W	2
E* side slats	¾"	4½"	37½"	C	2
F* center slat	¾"	8"	38¾"	C	1
RUNNERS					
G curved runner fronts	1"	1"	54"	LA	2
H braces	¼"	¾"	30"	LA	8
I runners	1"	1"	38½"	A	2

\*Cut parts marked with an \* oversized. Trim to finished size according to the how-to instructions.

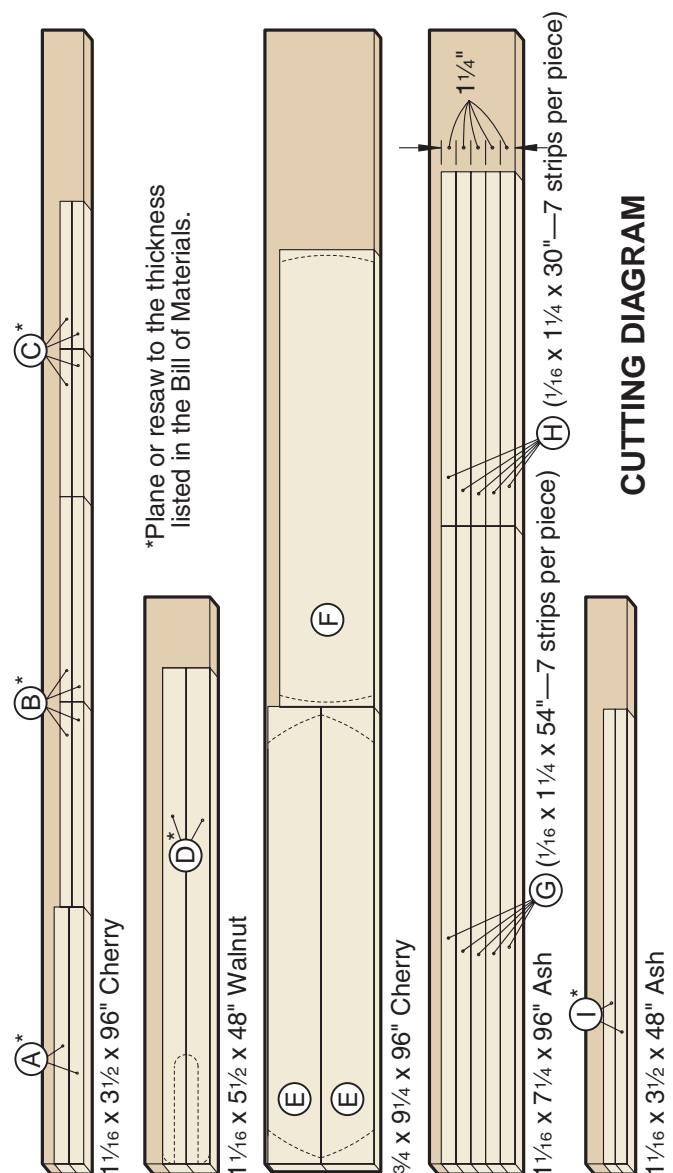
### Materials Key:

C—cherry, W—walnut, A—ash, LA—laminated ash.

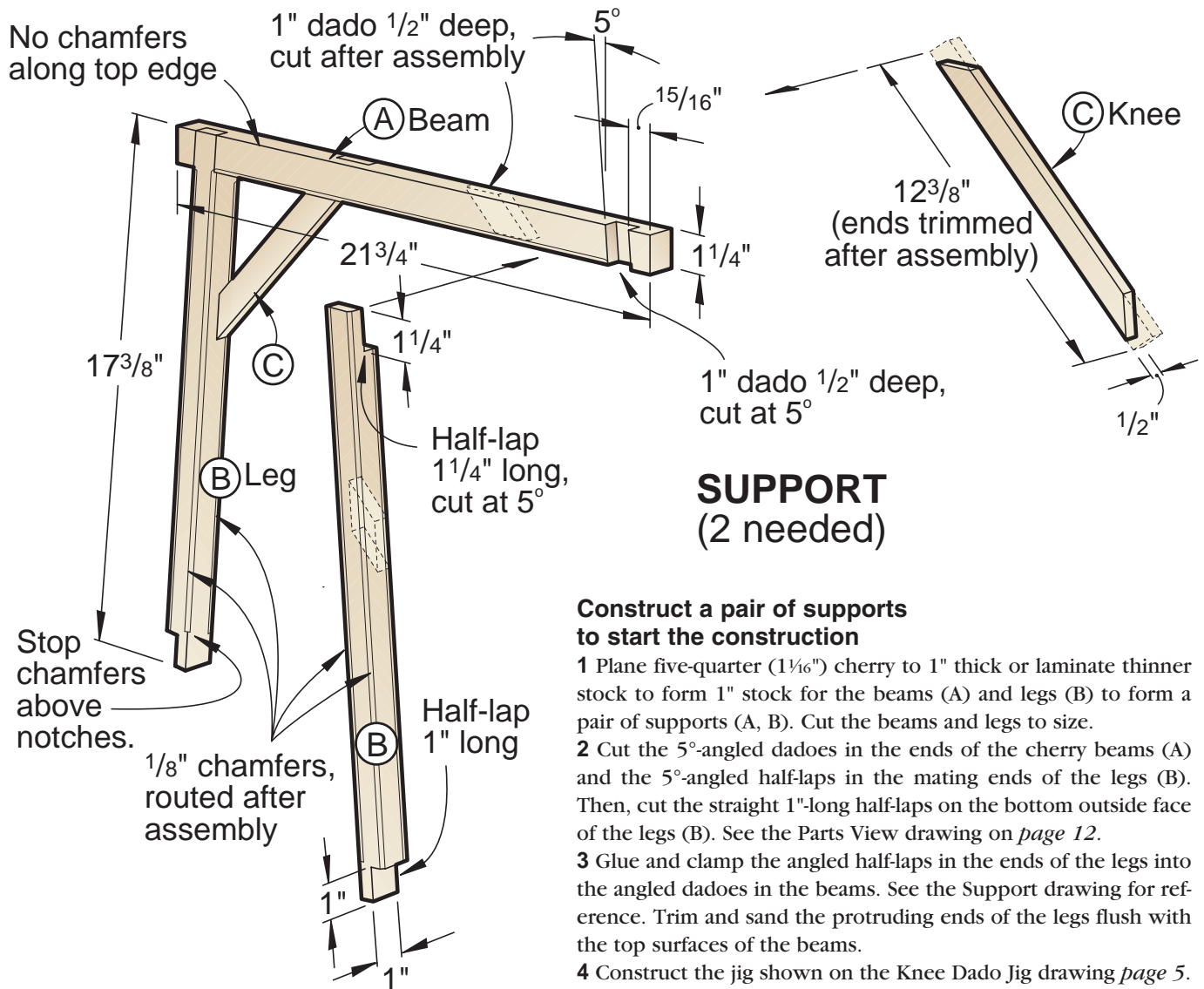
**Supplies:** #8×1¼" flathead wood screws, #8×1½" flathead wood screws, 16–¼" dowel screws 2" long, 8–1¼" wood balls, 8–1½" wood balls, clear finish.

### Buying Guide

**Hardwood kit.** All the individual pieces shown on the Cutting Diagram cut slightly oversized from the thickness and species listed in the Bill of Materials. This includes the ash being resawn into the necessary ¼" strips. Plus, 8–1¼" wooden balls, 8–1½" wooden balls, and 16–¼" dowel screws 2" long. Kit no. W118, \$199.95 ppd. Heritage Building Specialties, Fergus Falls, MN 56537. Or, call 800/524-4184 to order.







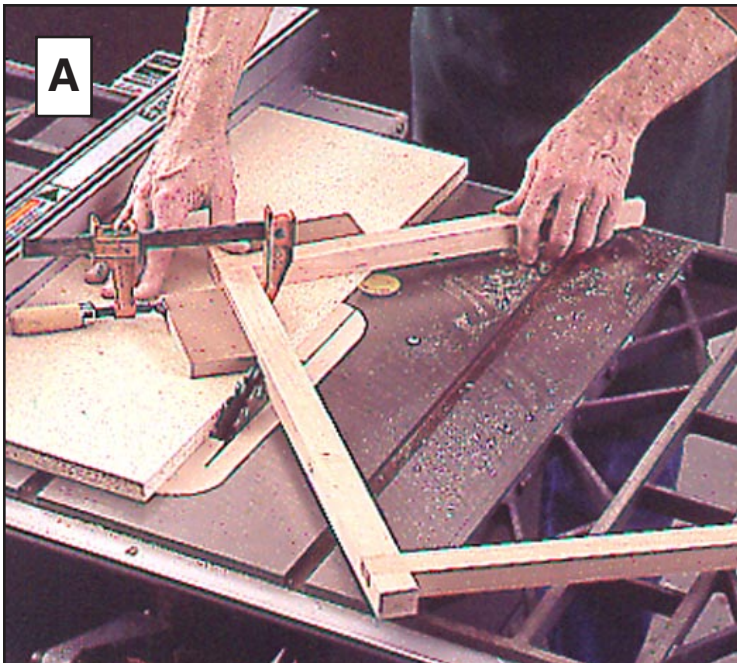
## SUPPORT (2 needed)

### Construct a pair of supports to start the construction

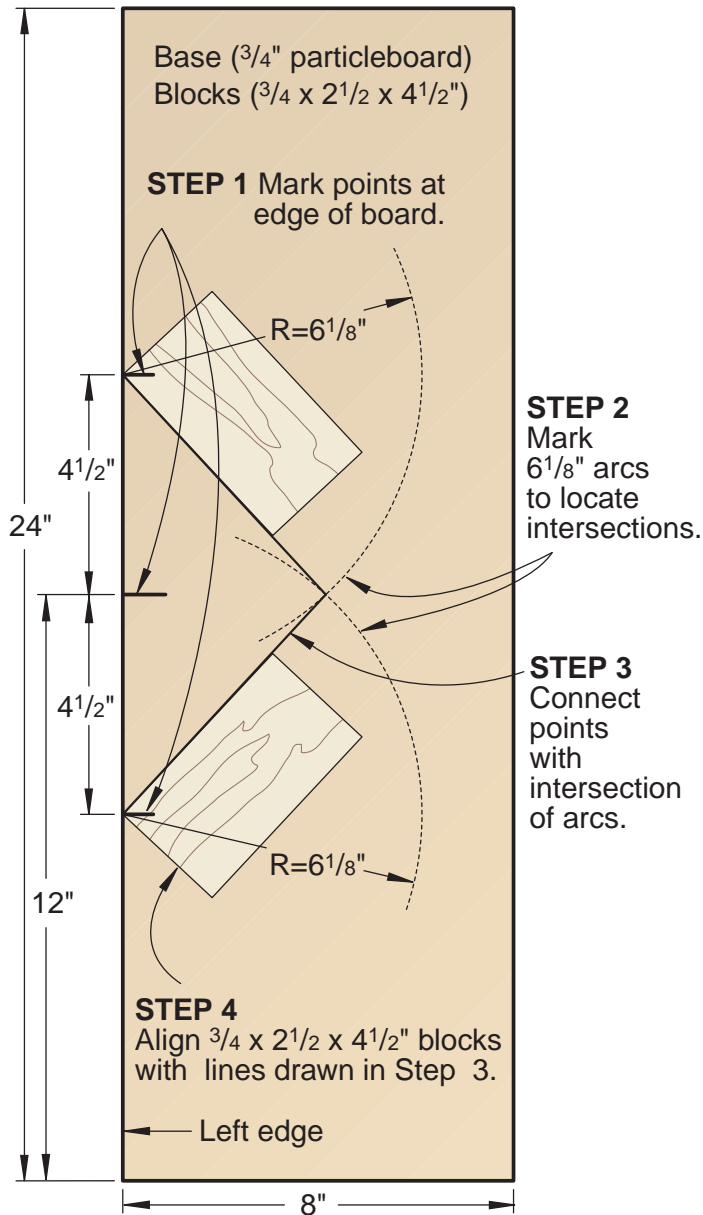
- 1 Plane five-quarter (1 1/16") cherry to 1" thick or laminate thinner stock to form 1" stock for the beams (A) and legs (B) to form a pair of supports (A, B). Cut the beams and legs to size.
- 2 Cut the 5°-angled dados in the ends of the cherry beams (A) and the 5°-angled half-laps in the mating ends of the legs (B). Then, cut the straight 1"-long half-laps on the bottom outside face of the legs (B). See the Parts View drawing on *page 12*.
- 3 Glue and clamp the angled half-laps in the ends of the legs into the angled dados in the beams. See the Support drawing for reference. Trim and sand the protruding ends of the legs flush with the top surfaces of the beams.
- 4 Construct the jig shown on the Knee Dado Jig drawing *page 5*.

- 5 Fit your tablesaw with a 3/4" dado blade, and position the rip fence so the right side of the dado blade is flush or just grazes the left edge of the jig base as shown in *Photo A* at left. Adjust the dado blade to cut 1/2" above the surface of the jig base.
- 6 As shown in *Photo A*, clamp a support (A, B) to the knee dado jig, and cut a dado, angled through two of the adjoining pieces. Repeat the cut on the remaining corners of the two supports. Now, reposition the rip fence, and make a second pass to widen the dados to 1" (width of the legs).
- 7 Cut the knees (C) to fit the dados plus 1" in length.
- 8 Glue and clamp the knees (C) into the dados. Later, trim and sand the protruding ends of the knees flush with the outside edges of the beams and legs. Finish-sand both supports.
- 9 Rout 1/8" chamfers along the edges of the supports, where shown on the Support and Exploded View

To cut the dados in the beams (A), use our knee dado jig for accurately located and angled cuts.



## KNEE DADO JIG



drawings. Stop the chamfers where the half laps in the bottom ends of the legs will fit into the runners later. There's also no chamfer along the top edges of the beams (A).

### Start the deck/tabletop with the outside rails

**1** Cut the outside deck rails (D) to size. Cut 1" dados  $\frac{1}{4}$ " deep on the bottom surface of each rail, where dimensioned on the Parts View drawing on *page 12* and shown on the Exploded View drawing.

**2** For screwing the rails to the support

beams (A) later, drill counterbored mounting holes in each rail, where dimensioned on the Parts View.

**3** Mark and cut the 1" radius on the front outside corner of each rail (D). Note that you're making a pair of rails, and that one rail is a mirror image of the other rail.

**4** Bevel-rip (we used the tablesaw) the bottom edge of both rails, where shown on the End View of the rail (D) on the Parts View drawing. The bottom edge is beveled so it will be aligned and parallel with the top edge of the runners (I) later.

**5** Lay out and mark the  $9\frac{1}{4}$ "-long cutout on the top (unbeveled) surface of each outside rail. Bandsaw and then drum-sand to the line with the beveled side down.

**6** Rout a  $\frac{1}{8}$ " chamfer along the top edge of all but the  $9\frac{1}{4}$ " cutout section of each rail.

### Complete the deck with the remaining slats

**1** Cut side slats (E) and the center slat (F) to width by  $39\frac{3}{4}$ " long.

**2** Clamp the three deck boards edge-to-edge with  $\frac{3}{16}$ " spacers between the slats. Using trammel points or a beam compass, mark a 14" radius at each end of the clamped-together slats, where shown on the Parts View. Remember that the slats are cut long. The final length of the center slat needs to be  $38\frac{3}{4}$ ". Unclamp, then bandsaw and disc-sand the end of each slat to the marked radius.

**3** For screwing the deck slats (E, F) to the support beams later, drill counterbored holes in each slat, where dimensioned on the Parts View. Chamfer the top edges of the slats.

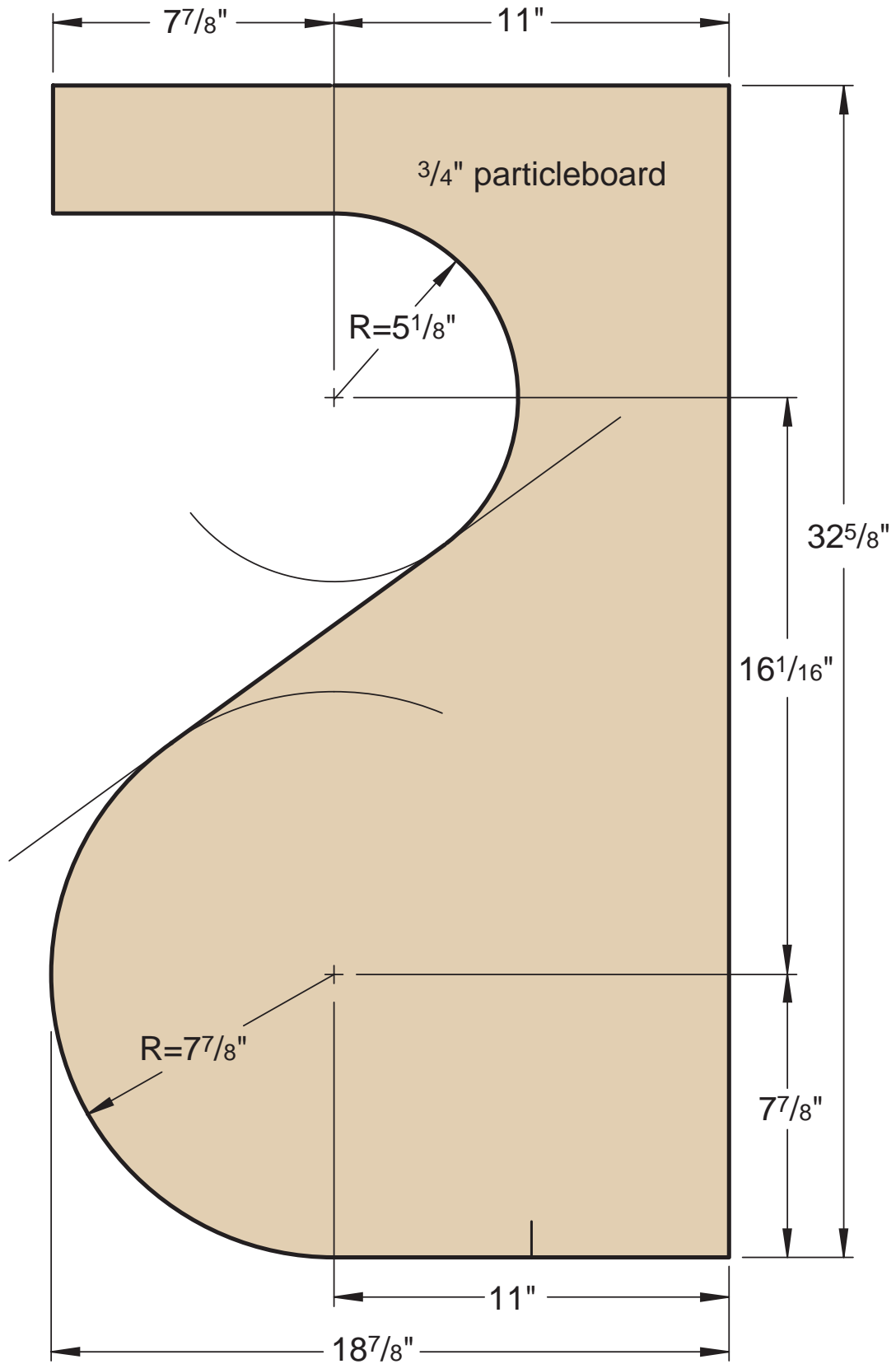
### Use templates to create the runner-front and brace forms

**1** On  $\frac{3}{4}$ " particleboard, mark the shapes of the runner front S-curve template and the brace template using the Template drawings on *pages 6* and *9* for reference.

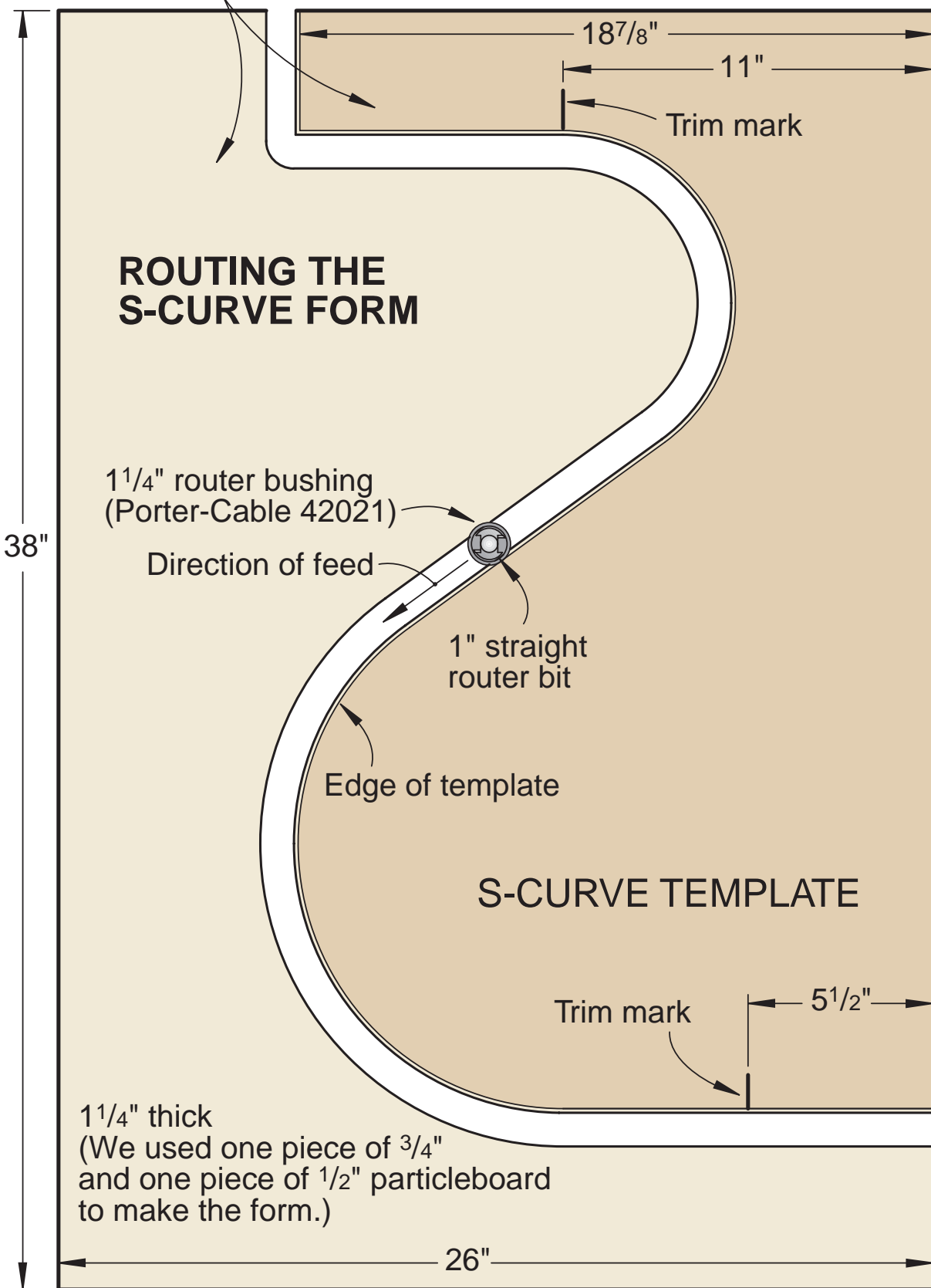
**2** Bandsaw the two templates to shape, cutting just outside the marked cutlines. Sand to the line with a drum or spindle sander.

**3** Cut one piece of  $\frac{3}{4}$ " particleboard and another of  $\frac{1}{2}$ " particleboard to  $26 \times 38$ ". With the edges and ends of the two pieces of particleboard flush, glue and clamp the pieces together face-to-face to form the runner front S-curve form blank. Repeat the process with two pieces of particleboard measuring  $16 \times 22\frac{1}{8}$ " for the brace form blank. See the Routing the Brace Form drawing for reference. Keeping the forms the same thickness ( $1\frac{1}{4}$ ") as the initial width of the laminations for G and H makes it much easier to keep the edges of the laminations aligned when gluing.

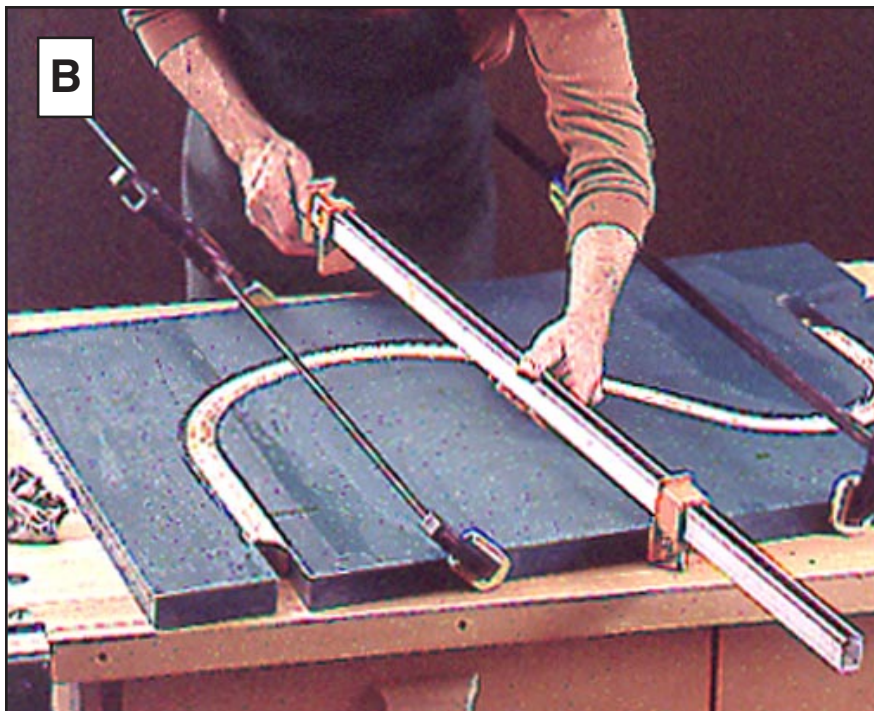
# S-CURVE TEMPLATE



S-curve template is used to make the two halves of the jig.







**Use quick-action clamps to pull the two form halves together; then use bar clamps to pull them tight.**

**3** Attach the S-curve template to the form blank with brads or finish nails. Don't use large nails as you'll need to remove the template later.

**4** Fit your hand-held router with a 1¼" O.D. bushing and a 1" straight bit. Adjust the depth to cut about ⅛" into the form blank. Now, with the bushing riding against the edge of the template, rout a 1" groove in the blank, as illustrated on the Routing the S-Curve Form drawing on *page 7*. Repeat this operation, lowering the bit ⅛" each pass until about ¼" of the blank is left at the bottom of the groove.

**5** Remove the S-curve template from the jig blank, and use a jigsaw to cut down the center of the groove, separating the two halves of the blank. Now, install a flush-trim bit in a hand-held router, and rout the ¼"-thick edges flush with the previously routed faces of the form halves.

**6** Repeat the routing and cutting process with the brace form blank and template, using a ½" guide bushing and a ¼" straight bit.

**7** Transfer the locations of the trim marks to the particleboard forms. Apply a couple coats of varnish to seal the wood and prevent the glue from

sticking to the forms later. (We also adhered 2"-wide plastic packing tape to the mating edges of the forms for further insurance.)

### Laminate thin strips to create the runner fronts and braces

**1** From straight-grain ash, bandsaw 32 strips measuring ⅙×1¼×54" for the curved runner fronts (G), and 32 strips measuring ⅙×1¼×30" for the braces (H). Keep the strips in order as you saw them to get the best color and grain match in the finished laminations.

**2** Glue and clamp *just enough strips between the two S-curve form pieces to create a 1"-thick runner front (G). If your lamination is thicker than 1" delete strips as necessary.* (We used white glue for a longer working time.) Draw the form halves together with quick-action clamps, making sure the ends of the laminations are beyond the trim marks on the form, as shown in *Photo B*. While quick-action clamps work great for pulling the form halves together, you'll need to add bar clamps to get enough pressure to pull the lamination tight. Position one clamp across the ends of the forms

(perpendicular to the other clamps) to counteract the tendency of the form halves to spread slightly. Let the lamination dry for 24 hours before repeating with the other runner front.

**3** Hand-plane and sand flat *one edge* of one of the curved runner fronts. Position your bandsaw fence 1" from the blade. Running the planed (flat) edge of the curved runner front against the fence, bandsaw the curved runner front to 1" wide. Repeat for the second runner front.

**4** Place the runner front back on the form. Transfer the trim marks from the form onto the runner. *Do not* trim the ends of the runner front yet. The extra length on the bottom will help keep the lamination flat on the table-saw when cutting the 3" laps later.

**5** Repeat the process in Steps 1-4 above to form the eight braces (H). Bandsaw the braces to ¾" wide. Trim the ends of the braces where marked. Sand smooth.

**6** Transfer the full-size pattern on *page 13* to the top end of each runner front. Bandsaw them to shape.

**7** Mark the 3"-long lap on the bottom end of the runner fronts, marking forward from the trim line 3". Fit your table-saw with a dado blade and cut the lap in each. With the laps cut, crosscut the bottom ends of the runner fronts at the trim mark.

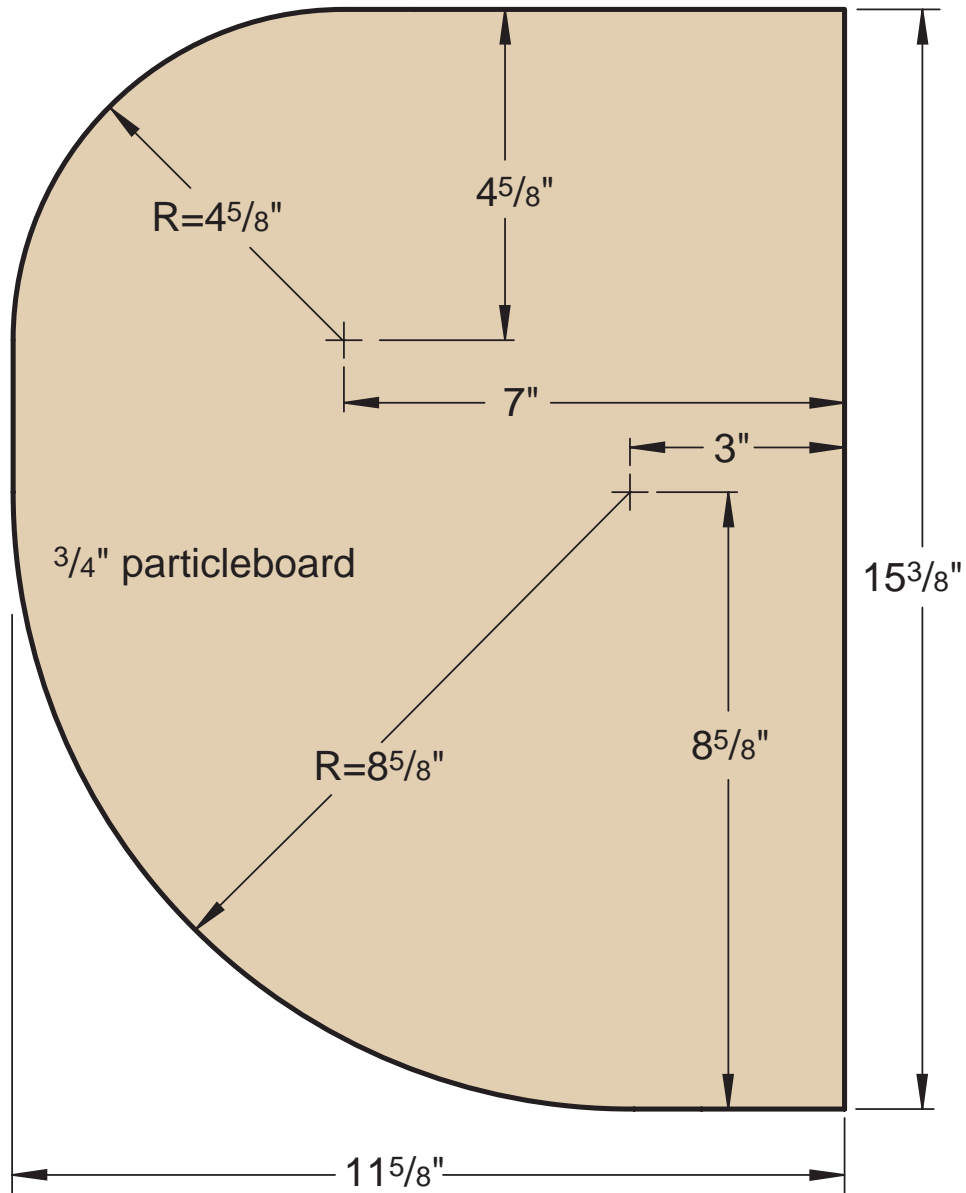
**8** From solid stock, cut the runners (I) to size, making sure the thickness and width match that of the curved runner fronts.

**9** Cut a mating lap on the front end of each runner. Then, cut dadoes on the inside face of each runner, where dimensioned on the Parts View drawing. The spacing between the dadoes must match the spacing between the dadoes in the rails (D).

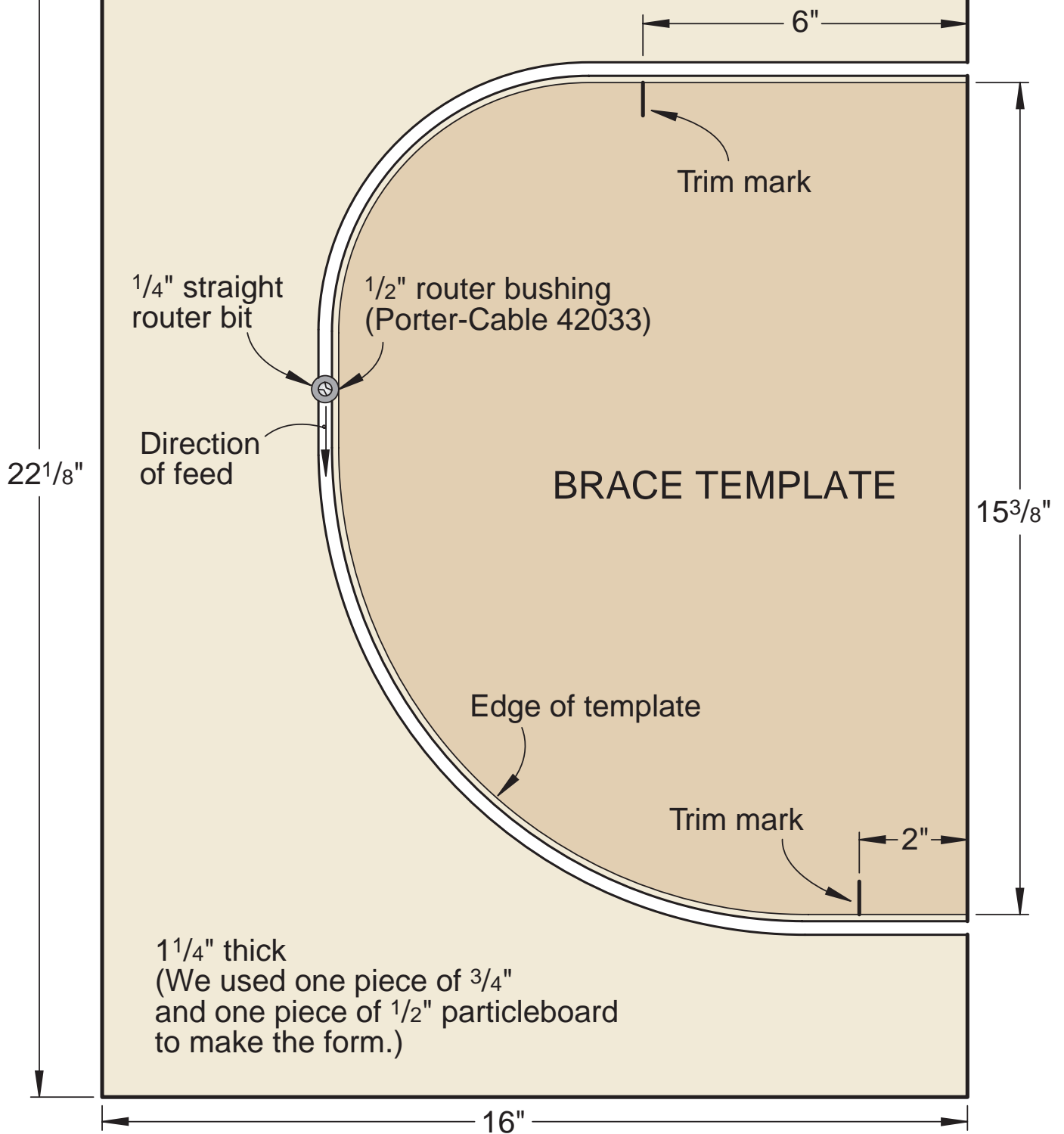
**10** Glue and clamp the curved runner fronts (G) to the straight runners (I). Later, sand the joint smooth, and sand the bandsaw marks off the runner (G/I) sides.

**11** Rout a chamfer along all the edges of each runner (G/I), stopping at the dadoes for capturing the legs (B) later.

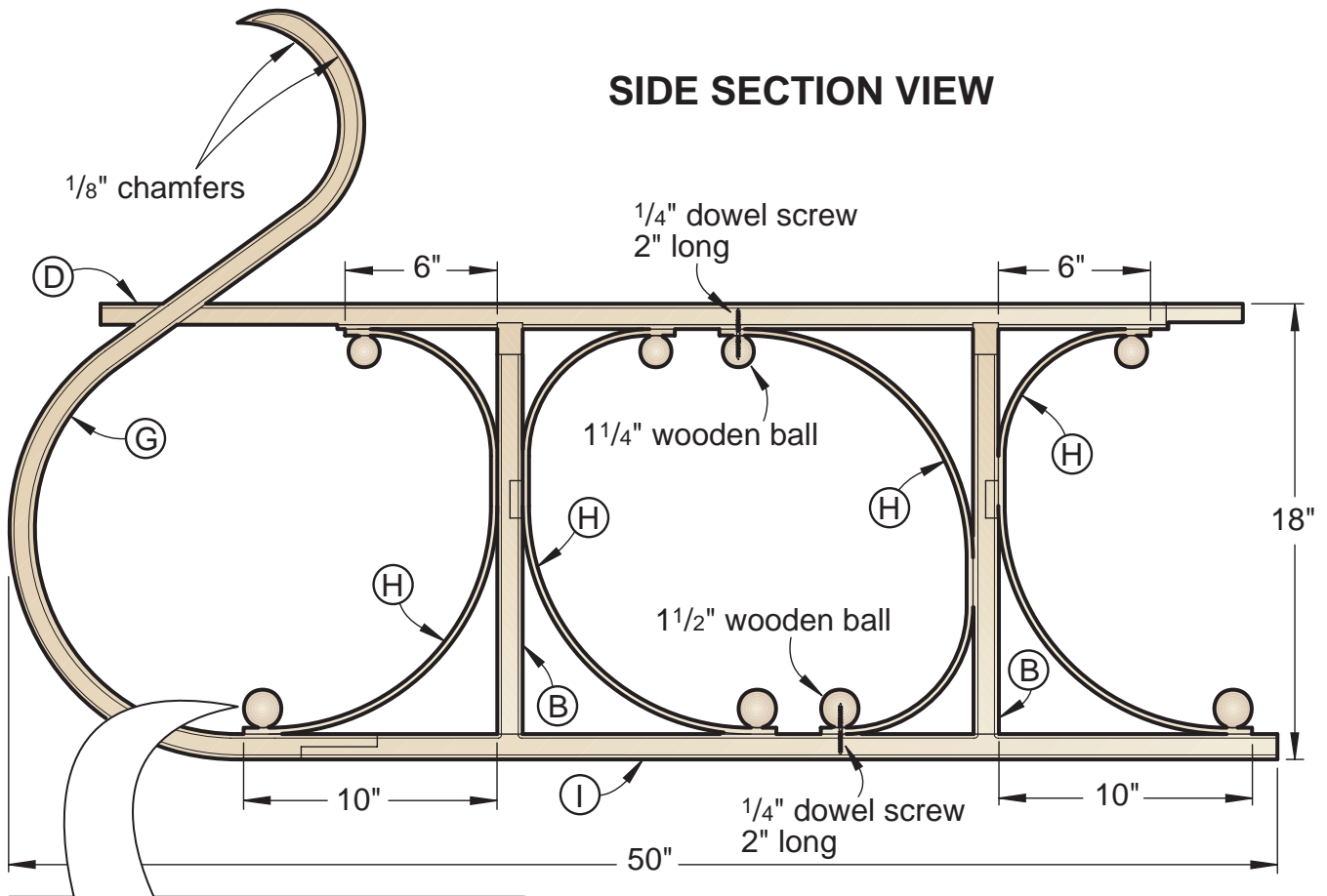
# BRACE TEMPLATE



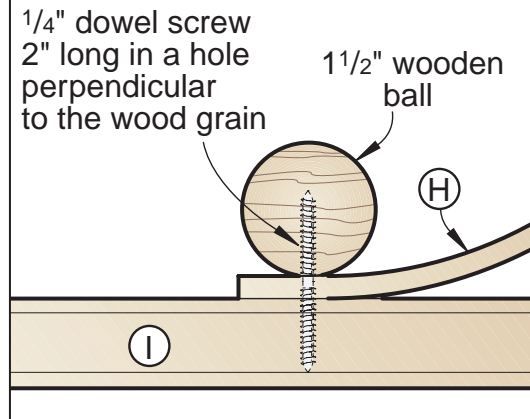
# ROUTING THE BRACE FORM



## SIDE SECTION VIEW



### BALL DETAIL



### Final assembly:

#### It's all downhill from here

**1** Glue and clamp the rabbeted ends of the supports (A, B, C) into the dadoes in the runners (G/T), keeping the supports perpendicular to the runners. Complete routing the chamfers where the runners meet the legs.

**2** Fit the beams (A) into dadoes in the rails (D), and clamp the rails in place flush with the ends of the beams. Using the shank holes previously

drilled in the rails as guides, drill pilot holes into the beams, and screw the rails to the beams.

**3** Fit the slats (E, F) in place using  $\frac{3}{16}$ " spacers to hold them in position. Using the shank holes previously drilled as guides, drill pilot holes into the beams, and screw the slats in place. Remove the spacers.

**4** Clamp the curved runner fronts to the rails (D) where they cross. Check that the runner fronts cross both rails the same distance back from the front end of each rail. Drill counterbored holes in the rails, and screw them to the curved runner fronts.

**5** Plug the holes in the rails (D) and slats (E, F). Later, sand the plugs flush.

**6** Glue and clamp the braces (H) in place, where shown on the Side Section View drawing.

**7** One at a time, clamp a  $1\frac{1}{2}$ " wood ball in a handscrew clamp, and drill a  $\frac{3}{16}$ " pilot hole 1" deep, centered in

each ball. Drill the holes perpendicular to the grain. See the Ball detail accompanying the Side Section View for reference. Do eight total. Switch to  $1\frac{1}{4}$ " balls and drill pilot holes in eight of them. Thread a  $\frac{1}{4}$ " dowel screw 2" long into the pilot hole in each ball.

**8** Drill pilot and shank holes through the braces (H) and into the runners (I) and rails (D). Thread the dowel screws (with balls attached) to the sled assembly.

**9** Finish-sand the entire project. Apply a clear finish. We used Minwax Antique Oil Finish, rubbing between coats with a gray (superfine) Scotch Brite pad. ♣

Produced by Marlen Kemmet

Project Design: Jan Hale Svec

Illustrations: Roxanne LeMoine; Lorna Johnson

Photographs: Hetherington Photography;

Steve Struse

Graphic Design: Jamie Downing

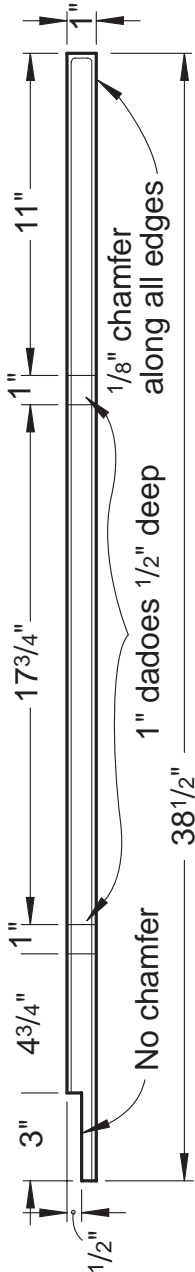
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# PARTS VIEW

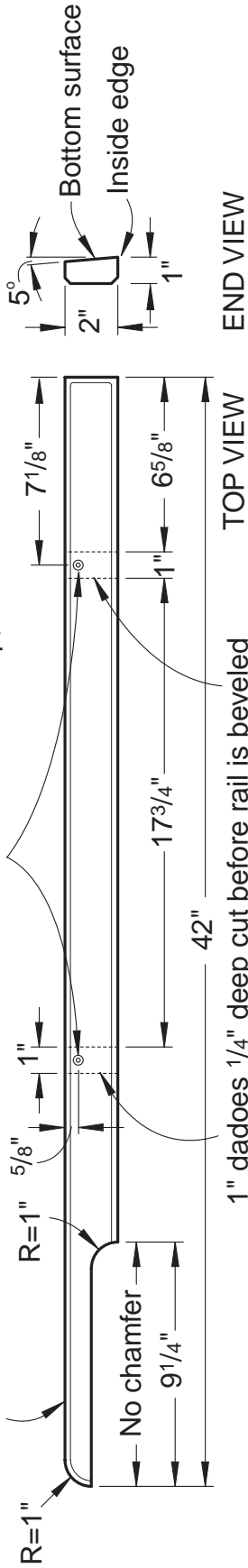
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## ① RUNNER



## ④ OUTSIDE RAIL

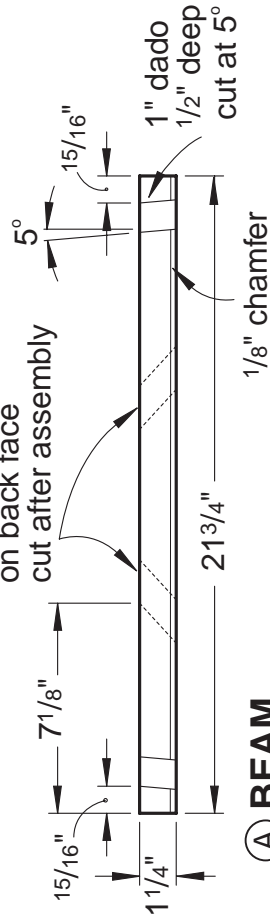
1/8" chamfer along top edges only R=1" 3/8" counterbores 1/4" deep, with a 5/32" shank hole centered inside



END VIEW

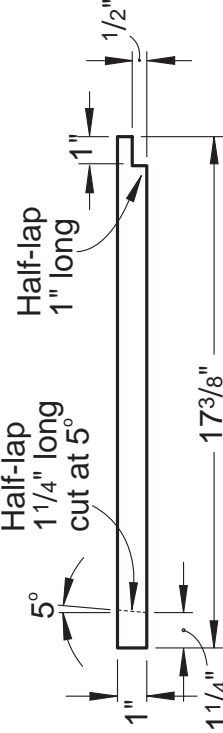
TOP VIEW

1" dados 1/2" deep on back face cut after assembly

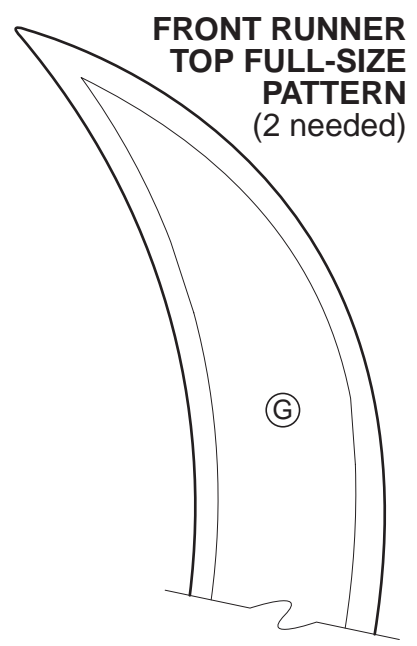
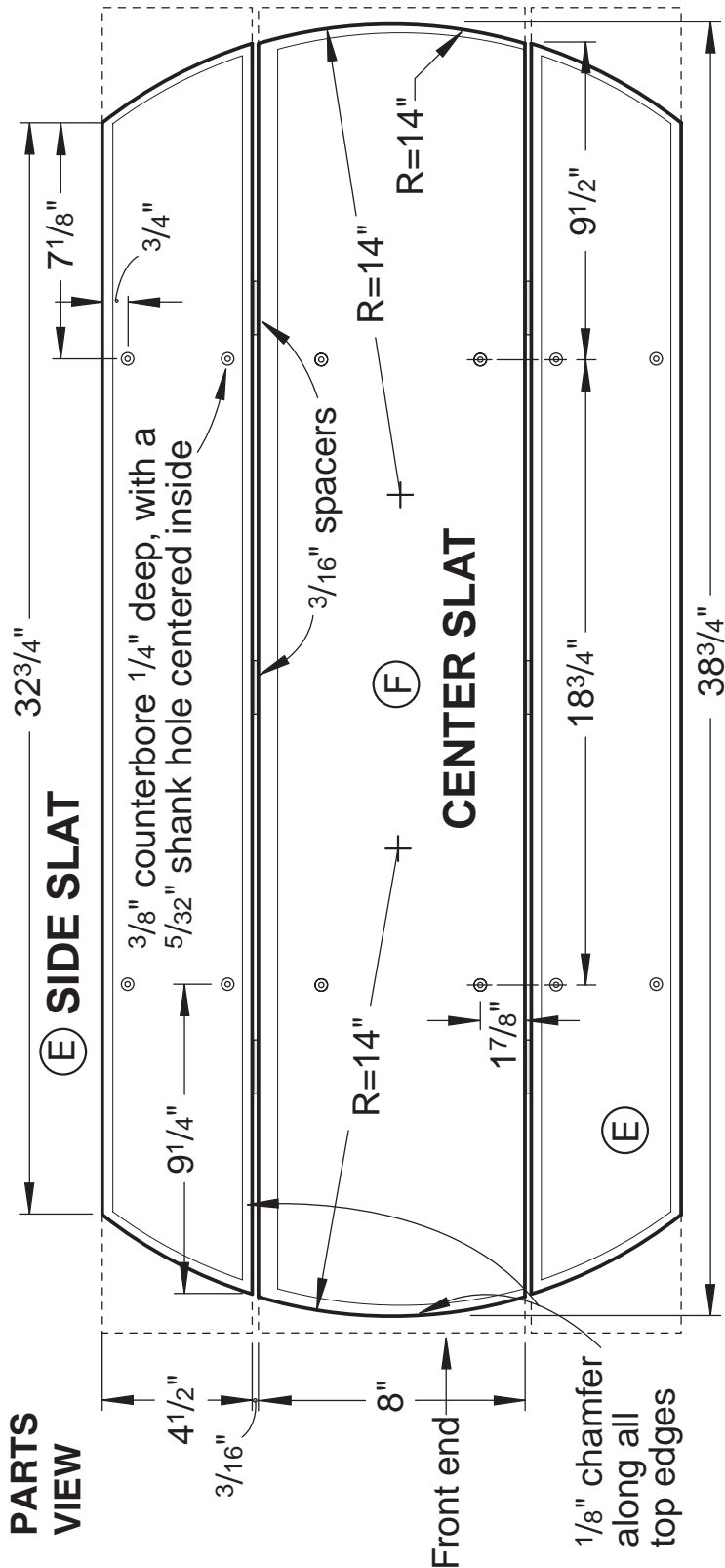


## ③ BEAM

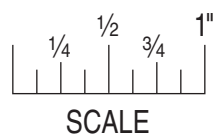
Half-lap 1 1/4" long cut at 5°



## ② LEG



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