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Downdraft Workbench

In this plan you will be getting:

- Step by Step construction instruction.
- A complete bill of materials.
- Exploded view and elevation drawings.
- How-to photos with instructive captions.
- Tips to help you complete the project and become a better woodworker.

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“The benefits of this downdraft work-bench far outweigh any initial guilt you may have in building it.”

Downdraft Workbench

Contributing editor Rick White admitted a little guilt when he designed and built this project just for his shop. But he'd been pining for a work center large enough to assemble big casework projects on and strong enough to withstand some serious pounding. He also needed more storage space ... and a downdraft table was still the missing link in his pursuit of a truly dust-free shop.

Meanwhile, Rick's trusty old workbench was making the discussion somewhat irrelevant, since it was already occupying most of the space in the center of his shop.

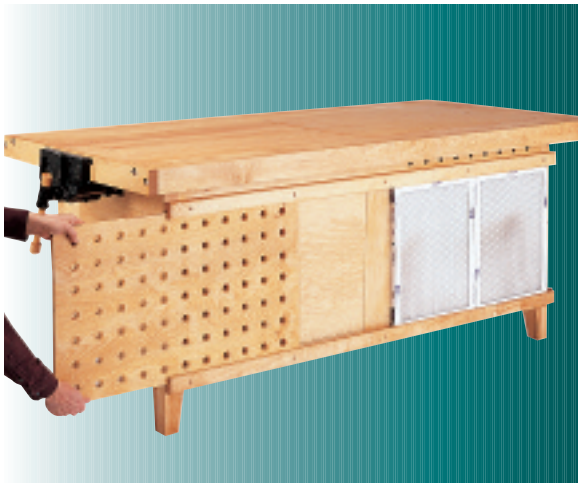
When the answer came to him, it was just too simple: Make a new work center that serves all these functions! A workbench that also incorporates a downdraft table. Sometimes when you can't get what you want, you have to settle for something even better! Rick's downdraft workbench features a power strip, full-extension pullout shelves and room for sanders, drill drivers and routers, in addition to an efficient, built-in downdraft unit. For durability and strength, it has a solid maple top, and for good measure he tossed in a vise and an interchangeable second top. As you can see in the finished project, Rick's downdraft workbench turned out great, and his guilt melted away quickly.

From the Bottom Up

Start this project with basic casework joinery on the carcass. The stiles and rails as well as the end and back panels (pieces 1 though 9) are made from solid hardwood lumber. Rick used hard maple to match the top. Find the dimensions for all these pieces in the Material List on page 23. The machining details and the subassemblies you'll be creating are shown in the Elevation Drawings, also on the following pages.

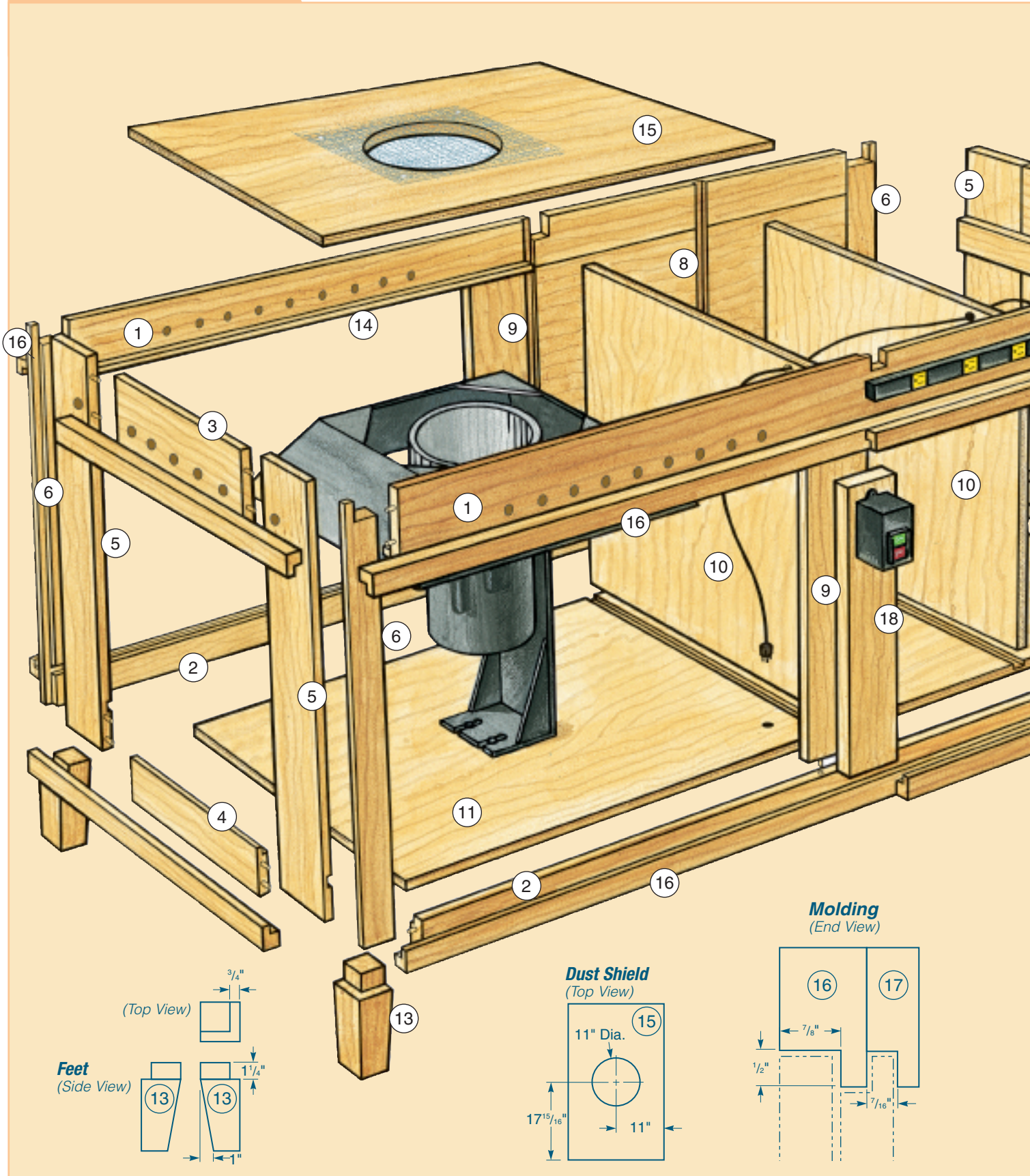
Make the front, back and end subassemblies separately. Where the stiles and rails meet, Rick joined them with dowels so the joints would really stand up to a beating. Glue up the solid panels (pieces 7 and 8) a bit oversized, then trim and sand them smooth after the glue cures. Form 1/4" tongues on their edges, as shown in the *Drawings*. Note that where the stiles and rails capture the end and back panels, you will need to rout stopped grooves (Rick used a hand-held router and a slot cutter for this task) to accept the tongues on the panels' edges. Glue and clamp up the four separate subassemblies, checking to be sure they are square as the glue cures.

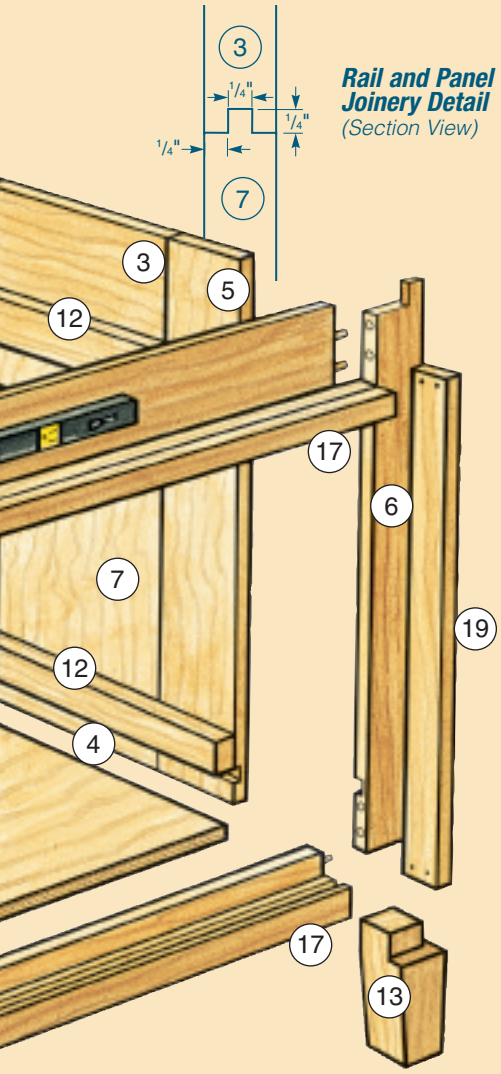
While you wait for the glue to dry, grab your plywood sheetstock and slice up the dividers and the bottom (pieces 10 and 11).



The worktop of this bench has two inserts that fit into a rabbeted opening over the downdraft unit. When not in use, either insert can easily be stored on the back face of the bench.

Carcass Exploded View



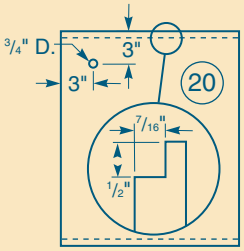


Rail and Panel Joinery Detail
(Section View)

MATERIAL LIST—*CARCASS*

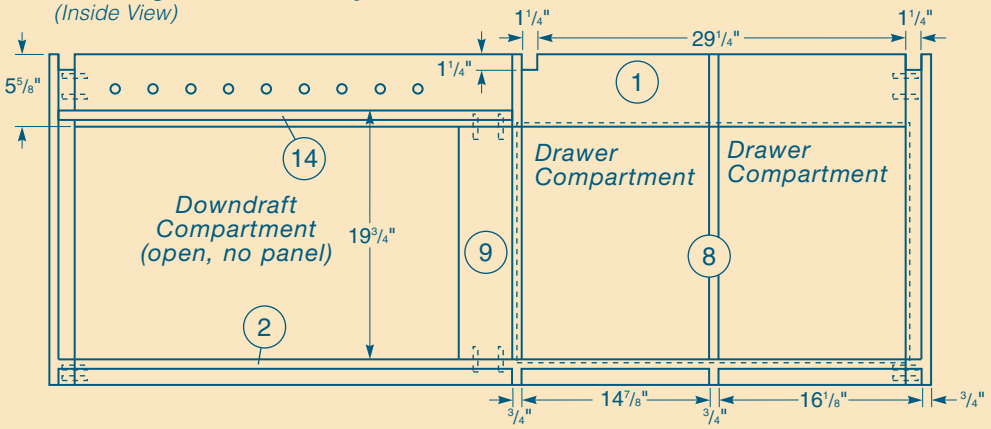
		T x W x L
1	Upper Long Rails (2)	¾" x 5⅝" x 66"
2	Lower Long Rails (2)	¾" x 2" x 66"
3	Upper Short Rails (2)	¾" x 5⅝" x 14½"
4	Lower Short Rails (2)	¾" x 2" x 14½"
5	End Stiles (4)	¾" x 3⅞" x 26¼"
6	Front & Back Stiles (4)	¾" x 2" x 26¼"
7	End Panel (1)	¾" x 19" x 15"
8	Back Panel (1)	¾" x 19" x 31"
9	Center Stiles (2)	¾" x 5" x 18½"
10	Dividers (2)	¾" x 22½" x 24½"
11	Bottom (1)	¾"x 22½" x 69"
12	Spacers (2)	1¼" x 2¼" x 22"
13	Feet (4)	2¾" x 2¾" x 6¾"
14	Cleats (2)	¾" x ¾" x 36"
15	Dust Shield (1)	¾" x 22" x 35⅞"
16	Large Molding (1)	1¼" x 2" x 328"
17	Small Molding (1)	¾" x 2" x 72"
18	Door Cap (1)	¾" x 2" x 23"
19	Door Stop (1)	1¼" x 3⅛" x 19"
20	Sliding Doors (2)	¾" x 16½" x 19⅞"

Door
(Front View)

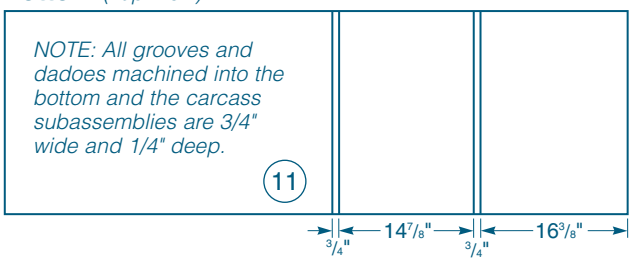


NOTE: Rabbet top and bottom edges of one of the doors.

Back Long Wall Subassembly
(Inside View)

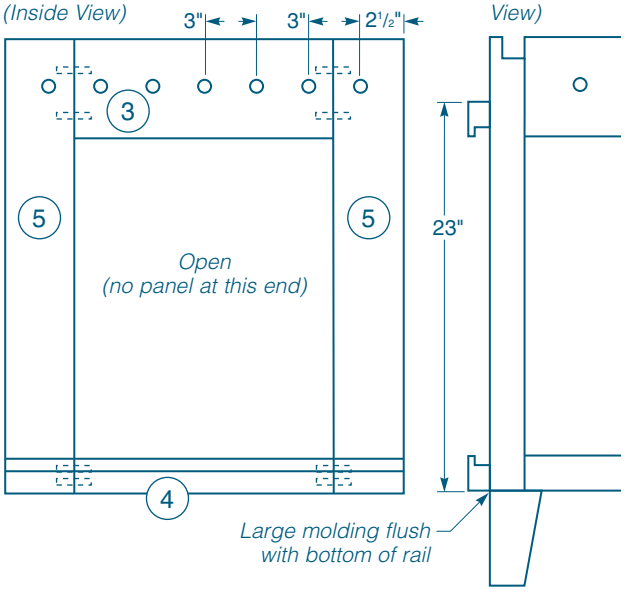


Bottom *(Top View)*



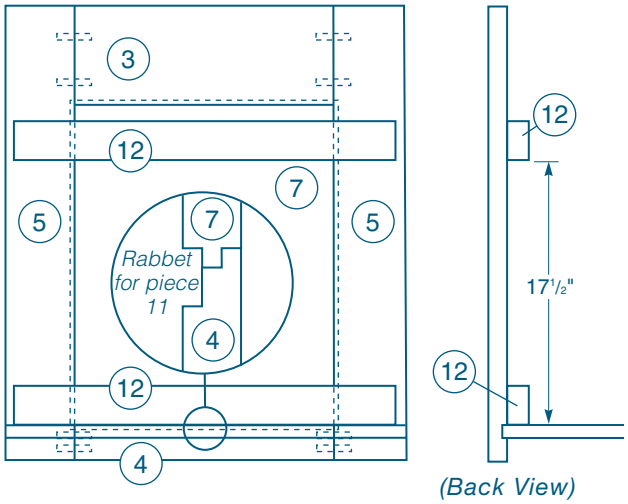
End Wall Subassembly Downdraft Compartment

(Inside View)



End Wall Subassembly Drawer Compartment

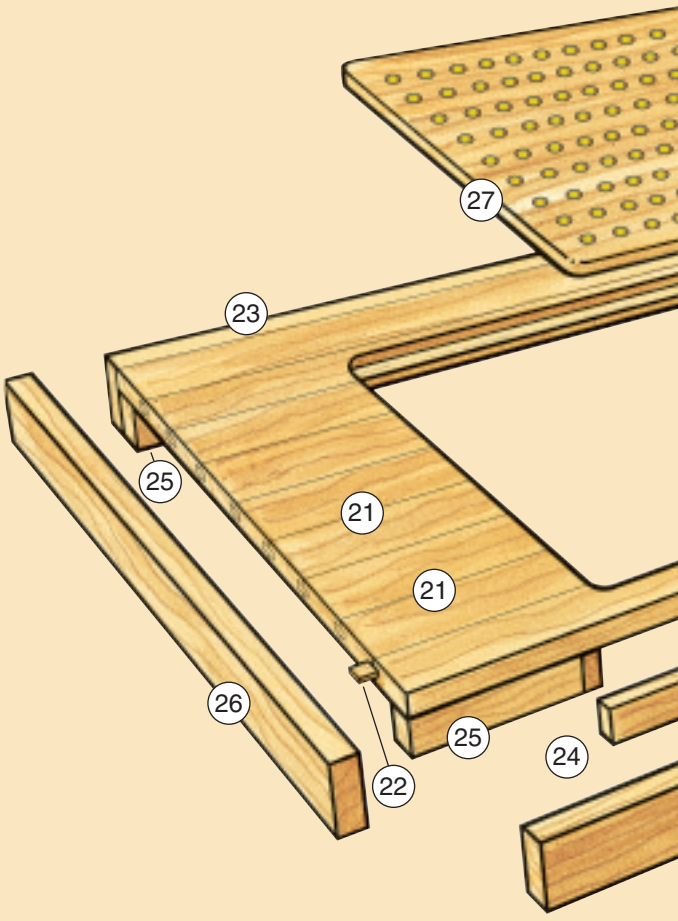
(Inside View)

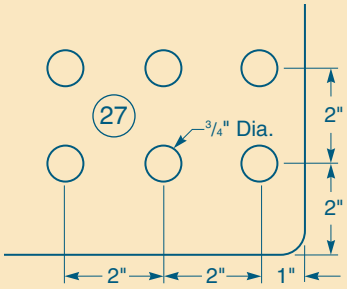


Top Exploded View

MATERIAL LIST—*TOP SUBASSEMBLY*

		T x W x L
21	Laminated Top Pieces (9)	1 1/4" x 3 5/8" x 79 1/2"
22	Splines (8)	1/2" x 1" x 79 1/2"
23	Side Rails (2)	1 1/4" x 2 7/8" x 79 1/2"
24	Cross Braces (3)	1 1/4" x 1 1/2" x 32 3/8"
25	Long Cleats (2)	1 1/4" x 1 1/2" x 79 1/2"
26	End Caps (2)	1 1/4" x 2 7/8" x 34 7/8"
27	Draft Vent (1)	3/4" x 20" x 36"
28	Cover (1)	3/4" x 20" x 36"
29	Vise Block (1)	1 1/4" x 5 1/2" x 15"
30	Vise (1)	*Steel screw type*

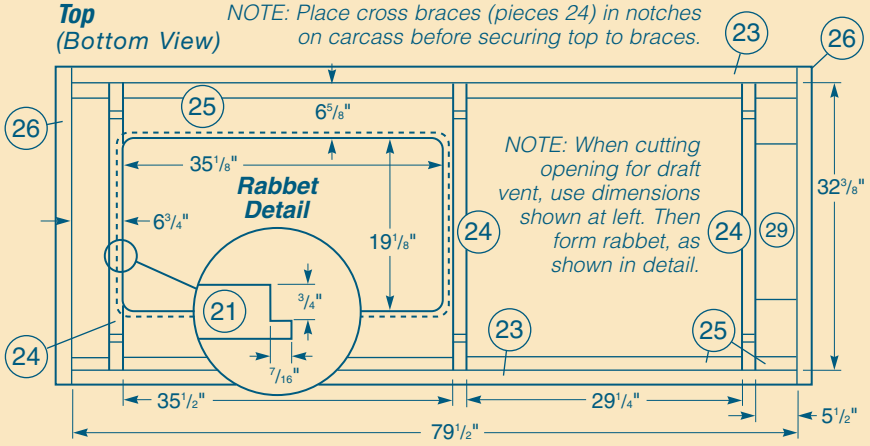


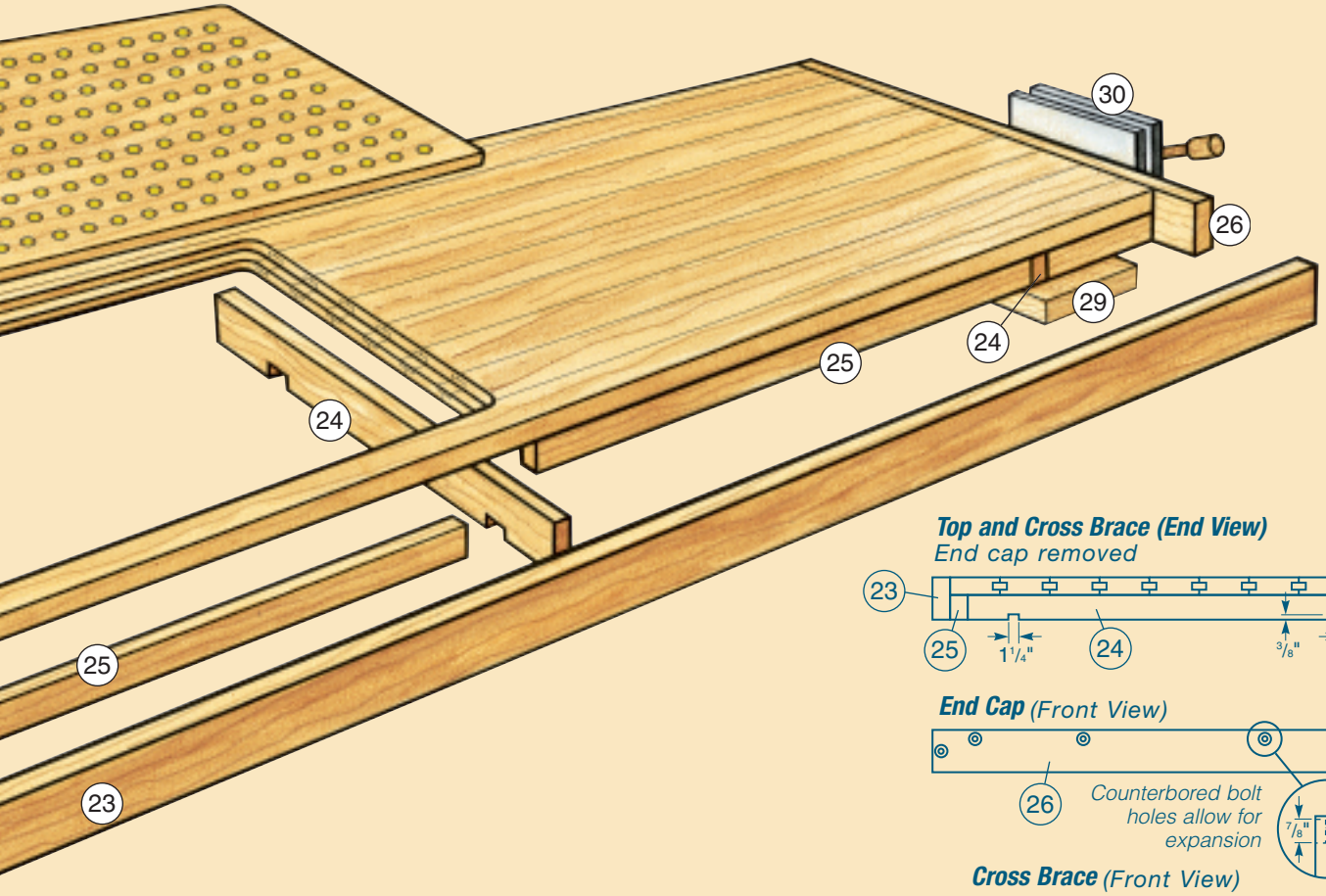


Draft Vent
(Hole Layout)
Begin laying out holes from center. Distance from last hole to edge of panel is not critical.

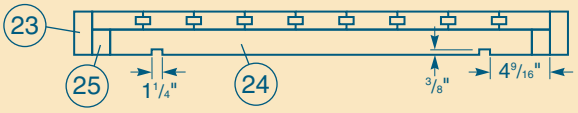
Top
(Bottom View)

NOTE: Place cross braces (pieces 24) in notches on carcass before securing top to braces.

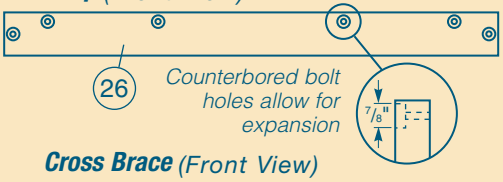




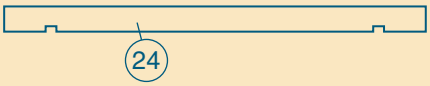
Top and Cross Brace (End View)
End cap removed



End Cap *(Front View)*



Cross Brace *(Front View)*



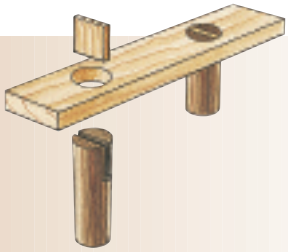
These notches nest into the notches formed on the upper long rails (pieces 1).

Grooves, Holes and Rabbets

Now that the subassemblies have cured, you need to do a little more machining to each of them. With a hand-held router and straight edge, plow matching grooves and dadoes for the bottom and dadoes for the dividers (there are dadoes in the bottom, too). Don't worry when the grooves and dadoes nip into the panels' tongue and groove joints; it will work out fine. Using the same setup, form the rabbets at the edges of the front and back stiles (pieces 6).

Put the router aside and grab your jig saw to cut the six notches on the top edges of the two long rails. These will serve to capture the notched cross braces later on. The last bit of machining before you put together the subassemblies is to drill the safety vent holes in the upper rails. (Note: If all the holes on the draft vent happened to get covered, these holes will prevent the motor from overheating.) These safety holes are best bored on the drill press, so you'll need either a buddy to help you hold up the frames as you drill or use a couple of roller stands.

Now predrill the counterbored screw holes though the front and back stiles and test-fit the carcass together. (This is another process that a helper will make much easier.) Once everything fits together, assemble the carcass with glue, screws and clamps. While the carcass is clamped-up and the glue is curing, make the spacers, feet, cleats and dust shield (pieces 12, 13, 14 and 15). As shown in the *Elevations* on the previous pages, the feet have tapers on their inside faces and a rabbet on the opposing faces. When the carcass is out of its clamps, attach the feet, cleats and spacers with glue and screws. Plug all the exposed screw holes and sand them flush.



SANDING DOGS

When using the downdraft table, Rick finds these sanding dogs very useful. They fit into the vent holes and keep your stock from moving during sanding.

Monster Moldings

The filters, sliding doors and spare insert are all held in place with molding. It's not hard to make; you just need to make a bunch of it. First rip enough stock to make the large and small molding (pieces 16 and 17), then get your table saw set up with a dado blade and a featherboard. Plow the rabbet into the large molding stock as shown in the *Drawings*. Readjust the saw setup to make the small molding and create enough to make the two pieces required to hold the second sliding door. Now is also a good time to make the door cap, door stop and sliding doors (pieces 18 through 20). The door stop and cap are simply sticked up hardwood, but one of the doors has a couple of rabbeted edges and both have finger holes to be machined. Look to the *Elevation Drawings* for these details. Again, predrill counterbored screw holes and mount the molding and assorted parts as shown in the *Exploded View* and *Elevation Drawings* — you are really making progress now. Plug the screw holes, sand them flush and get ready to do some laminating.

A Laminated Top

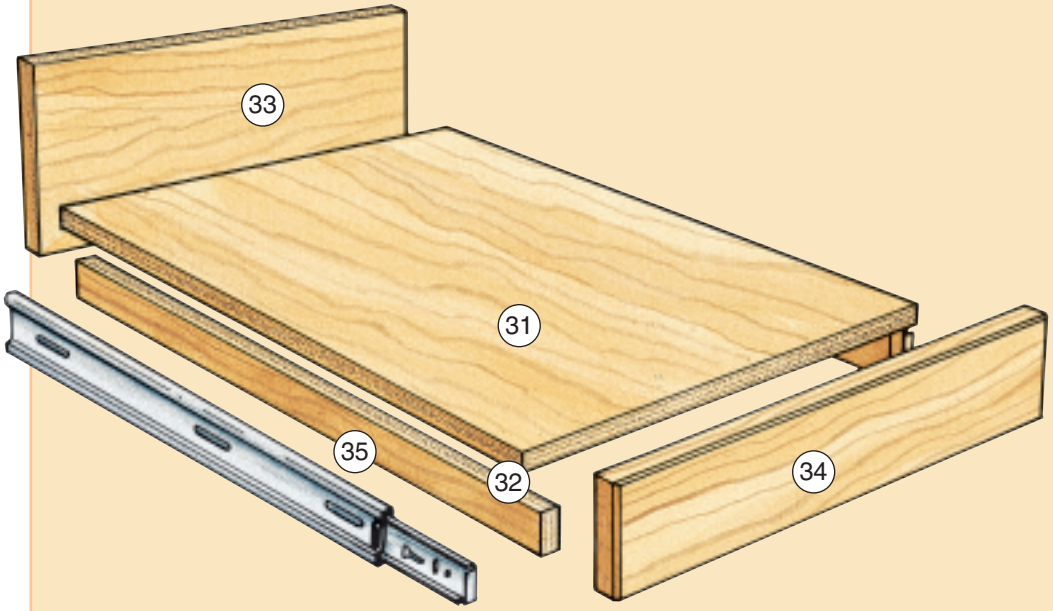
The glued-up maple top on this bench is a substantial bit of work. The basic top is made of nine pieces of maple with splines to help align the glue-up (pieces 21 and 22). Take care to surface this wood to very close tolerances — it will help you in the long run. Once you glue up the top and trim it to size, you will need to determine how you will flatten it. See the sidebar on page 28 for some options and techniques that will help with this process.

When the top is flat, glue the side rails (piece 23) in place. Scrape the squeeze-out off and install the cross braces (pieces 24). As mentioned earlier, the cross braces have notches cut into them that fit into the notches you formed earlier in the long rails (pieces 1). You'll need to rip the long cleats (pieces 25) from solid stock and then cut and fit them once the cross braces are in place. Gluing and clamping are sufficient to secure these cleats in place.

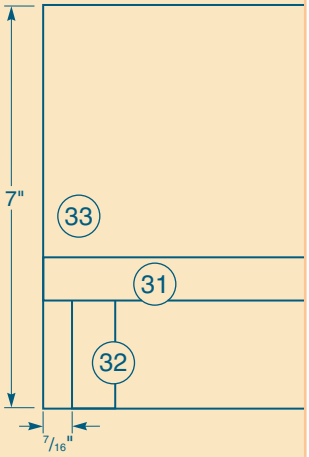
Next, form the end caps (piece 26) boring the two-step holes for the lag bolts that attach the end caps to the top. Make the through holes for the bolts oversized to accommodate seasonal wood movement.

After a little experimentation, the author arrived at the perfect number of holes for the draft vent top. See the Draft Vent Hole Layout Detail on page 25.

Pullout Shelf Exploded View



Pullout Shelf Runner Location
(Section View)



Form a simple chamfer on the front edge of the shelf fronts. Only the lower pullout shelves have backs glued and nailed in place.

MATERIAL LIST—*PULLOUT SHELVES*

		T x W x L
31	Shelves (4)	¾" x 14¾" x 20½"
32	Shelf Runners (8)	¾" x 1¾" x 20½"
33	Shelf Backs (2)	¾" x 7" x 14¾"
34	Shelf Fronts (4)	¾" x 3" x 14¾"
35	Drawer Slides (4 pairs)	*Accuride 3832, 20"*

The Downdraft Opening

Cutting a huge gaping hole in a perfectly good top is an admittedly disturbing task, but you can't have a downdraft table without it. Use a straight bit in your hand-held router and make a template (see the Drawings for the proper opening size) to guide the router to the dimension of the inside of the opening. Use several passes to cut through the top. Then switch to a rabbeting bit to create a rabbet around the upper edge of the opening. The rabbet will hold the draft vent.

Make the draft vent and the cover (pieces 27 and 28) to fit your opening. Lay out the vent holes and use a sharp Forstner bit to bore them, as shown in the photo on page 26. Follow behind with your router and a roundover bit to soften the upper edges of the vent holes. Bore a single finger hole in the cover and round over the top and bottom edge of that hole. If you choose to put an end vise on the top, install the vise block and vise (pieces 29 and 30), as shown in the Drawings on page 25.

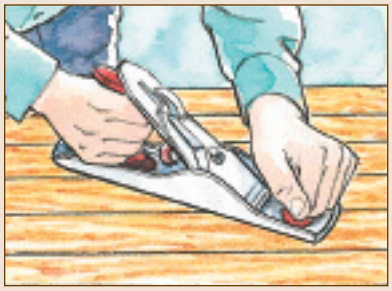
Pullouts and Shelves

Pullout shelves make it possible to store tools in this bench without also having to climb in to get them. The top shelves serve as a little extra tabletop to place your in-use tools on, and the bottom pullouts feature a high back to keep power tools from shifting and falling off the back.

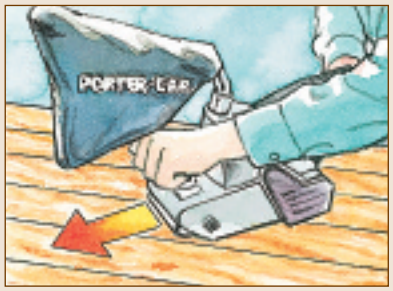
Cut the shelves, runners, fronts and backs (pieces 31 through 34) to size and set up a "mini-assembly line" to build them. Before you continue, ease the sharp edges

FLATTENING A BENCHTOP

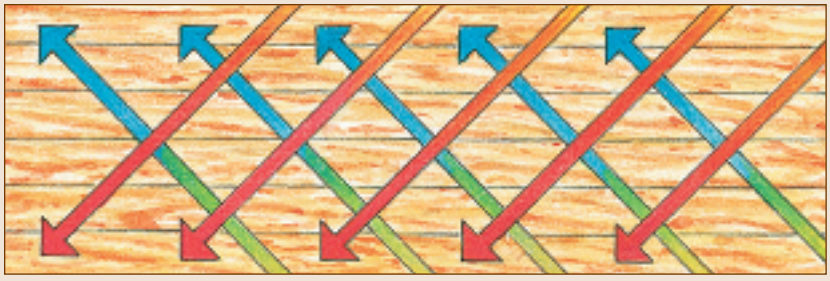
With a straightedge, establish and mark the low areas of the glued-up top with a pencil.



A well fettled plane is the best tool for removing the high areas of the work-bench's top. Work diagonal to the grain for best results.



Another option is to use coarse-grit paper and your belt sander to remove the high spots. Work in the pattern shown below.



First mark the low areas in the glued up top. Next, with your plane or belt sander, remove the high areas as you work in an opposing diagonal pattern. Again, using your straightedge, mark the low areas once more and repeat the pattern. Repeat this process until you flatten the top.

A dead-flat work surface is an essential element in any work-bench. Flattening a glued-up top is not too hard if you take it one step at a time. You can cart your glued-up top to a cabinet shop and have it surfaced by a large stationary belt sander, but if you choose to do it yourself, here's how to go about it.

and ends of the front pieces with a chamfer bit in the router. Use finish nails and glue to attach the runners and fronts to the shelves. Inset the runners 7/16" from the edge of the shelves to accommodate the drawer slides (pieces 35). On the two lower pullouts, glue and screw the backs in place. Mount the drawer slides in their proper places and you are ready to move on to the final details.

Now is as good a time as any to do a once-over sanding and surface preparation. Rick sealed his bench with several coats of a hard-drying oil finish. He wanted something that would seal the wood but also be easy to retouch whenever necessary. (Don't use linseed or mineral oils, which don't cure hard enough to repel dust.)

High-tech Hardware

The downdraft hardware and power strip are final touches that make this project sing (or at least hum). You can find these items as well as the finishing supplies and drawer slides by contacting Rockler at (800) 610-0883 or www.rockler.com.

Rick mounted the power strip over the pullout shelves and eventually mounted a second strip on the back side of the table as well. There's no limit to how much access to power you can have — especially at the workbench. For more convenience, wire the power strip through the ON/OFF switch of the downdraft unit so there will be a single power cord exiting the bench.

Add-Ons and Personal Preferences

Workbenches should be tailor-made to suit the main user. Bench height is one area where people differ. Most woodworkers prefer the bench top to sit at half their height. (If you are 6' tall, the top should be 36".) Perhaps you would like bench dogs in your workbench ... this top is designed so that is an option. You can drill additional holes or you can use the sanding dogs (shown on page 26) along with your vise to secure longer stock or panels while machining.

Even though this project was just for Rick, he got over the guilt really fast ... let us know how you feel when you're done with yours!

Quick Tip

Holder for a Drafting Lamp

Having supplemental task lighting at the workbench is essential, especially for spotting flaws during finishing and for doing other detail work. Here's a quick way to retrofit a drafting lamp onto any workbench with bench dog holes. Just take a piece of 2 x 4 and drill two holes several inches apart. One should fit the lamp base, while the other should be the same diameter as a bench dog. Glue a dowel into the second hole so you can mount your lamp into any hole on the benchtop. From there, the hinged arm allows you to focus light wherever you need it most.