

WORKSHOP SETUP & UPGRADES™



Storage, Workstations & Tools

- Tool Chest
- Clamping Station
- All-In-One Workstation
- Small Shop Router Station
- and Many More!

WORKSHOP

Setting Up & Upgrades

EXECUTIVE EDITOR Phil Huber

SENIOR EDITOR Erich Lage

ASSISTANT EDITOR Rob Petrie

EXECUTIVE ART DIRECTOR Todd Lambirth

SENIOR ILLUSTRATOR Dirk Ver Steeg

SENIOR GRAPHIC DESIGNERS Bob Zimmerman,
Becky Kraicek

CONTRIBUTING ILLUSTRATOR Erich Lage

CREATIVE DIRECTOR Chris Fitch

PROJECT DESIGN EDITOR Dillon Baker

PROJECT DESIGNER/BUILDER John Doyle

CAD SPECIALIST/BUILDER Steve Johnson

SHOP MANAGER Marc Hopkins

CONTRIBUTING PHOTOGRAPHER Chris Hennessey

ADVERTISING DIRECTOR Jack Christiansen

847-724-5633

jchristiansen@aimmedia.com

AD PRODUCTION COORDINATOR Julie Dillon

GRAPHIC DESIGNER Anna Otto



Workshop Setting Up & Upgrades is published by the Home Group of Active Interest Media Holdco, Inc., 2143 Grand Ave., Des Moines, IA 50312. Canada Post Agreement 40038201. Canada BN 84597 5473 RT. ©Copyright 2025 Active Interest Media Holdco Inc.

An Active Interest Media Company.

All rights reserved. No part of this book may be reproduced in any form or by any electronic or mechanical means, including information storage and retrieval devices or systems, without prior written permission from the publisher, except that brief passages may be quoted for reviews.

Woodsmith® and ShopNotes® are registered trademarks of Cruz Bay Publishing, Inc.

For subscription information about Woodsmith, visit us online at: Woodsmith.com or call (800) 333-5075

A Supplement to Active Interest Media Publications
2143 Grand Ave., Des Moines, IA 50312
Printed in U.S.A.



CHAIRMAN & CEO Andrew W. Clurman

CHAIRMAN EMERITUS Efrem Zimbalist III

CHIEF OPERATING OFFICER Brian Van Heuverswy

CHIEF FINANCIAL OFFICER Adam Smith

SENIOR VP, MARKETING Erica Moynihan

VP, MARKETING Amanda Phillips

VP, CIRCULATION Paige Nordmeyer

VP, SALES OPERATIONS Christine Nilsen

VP, EVENTS Julie Zub

VP, DIGITAL PRODUCT DEVELOPMENT Ashley MacDonald

VP, STRATEGY & RESEARCH Kristina Swindell

DIRECTOR, HUMAN RESOURCES Scott Roeder

DIRECTOR, PRODUCTION Phil Graham

DIRECTOR, RETAIL SALES Susan A. Rose

DIRECTOR, INFORMATION TECHNOLOGY Andrew Shattuck

SHOP SAFETY IS YOUR RESPONSIBILITY

Using hand or power tools improperly can result in serious injury or death. Do not operate any tool until you read the manual and understand how to operate the tool safely. Always use all appropriate safety equipment as well as the guards that come with your tools and equipment, and read the manuals that accompany them. In some of the illustrations in this book, the guards and safety equipment have been removed only to provide a better view of the operation. Do not attempt any procedure without using all appropriate safety equipment or without ensuring that all guards are in place. Active Interest Media Holdco, assumes no responsibility for any injury, damage, or loss suffered as a result of your use of the material, plans, or illustrations contained in this book.

Sawy

Storage



14

Quick Storage Solutions 6

Sometimes the simple option is the best one. Here you'll find three easy-to-make answers for your storage needs.

Sturdy Lumber Cart 14

Whether it's long boards, cutoffs, or plywood panels, this roll-around organizer is great for storing and moving it all.

Drill Bit Storage Center 20

A clever system of racks and shelves helps this cabinet provide space for your drill bits and drill press accessories.

Machinist's Tool Chest 28

A few design modifications turn this garage staple into a great tool chest. Refine your handtool skills with this build.

Premium

Workstations



46

Three Plywood Projects 36

These three easy-to-build projects are the perfect way to set up your shop, or add on to your existing workspace.

Bladesmith's Anvil Stand 46

A solid support for heavy hitting — and mobile? You bet. Create a metalworking centerpiece for your shop.

Mobile Assembly Center 52

This center is an assembly table and clamp rack all in one. Bonus storage space makes this a valuable addition.

All-in-One Workstation 60

This workstation combines three power tools into one mobile station, making it a great space-saver for any shop.

Upgrades &

Tools



80

Mobile Planer Cart 74

Take your milling to the next level. This cart creates a workstation for organizing parts while planing them down.

Small Shop Router Table 80

The clamp-on, stow-away design of this router table provides big-time features without taking up any floor space.

Drill Press Table 84

In just a weekend, upgrade one of your essential tools. A large table and fence adds support and holding options.

Narrow Belt Sander 90

This custom-built power tool can refine wood parts just as well as it shapes metal, and at a surprisingly low cost.





Savvy Storage

One of the best ways to revitalize your shop is to optimize your organization. From clamps and bits to lumber and plywood panels, the projects in this section will ensure each has its proper place.

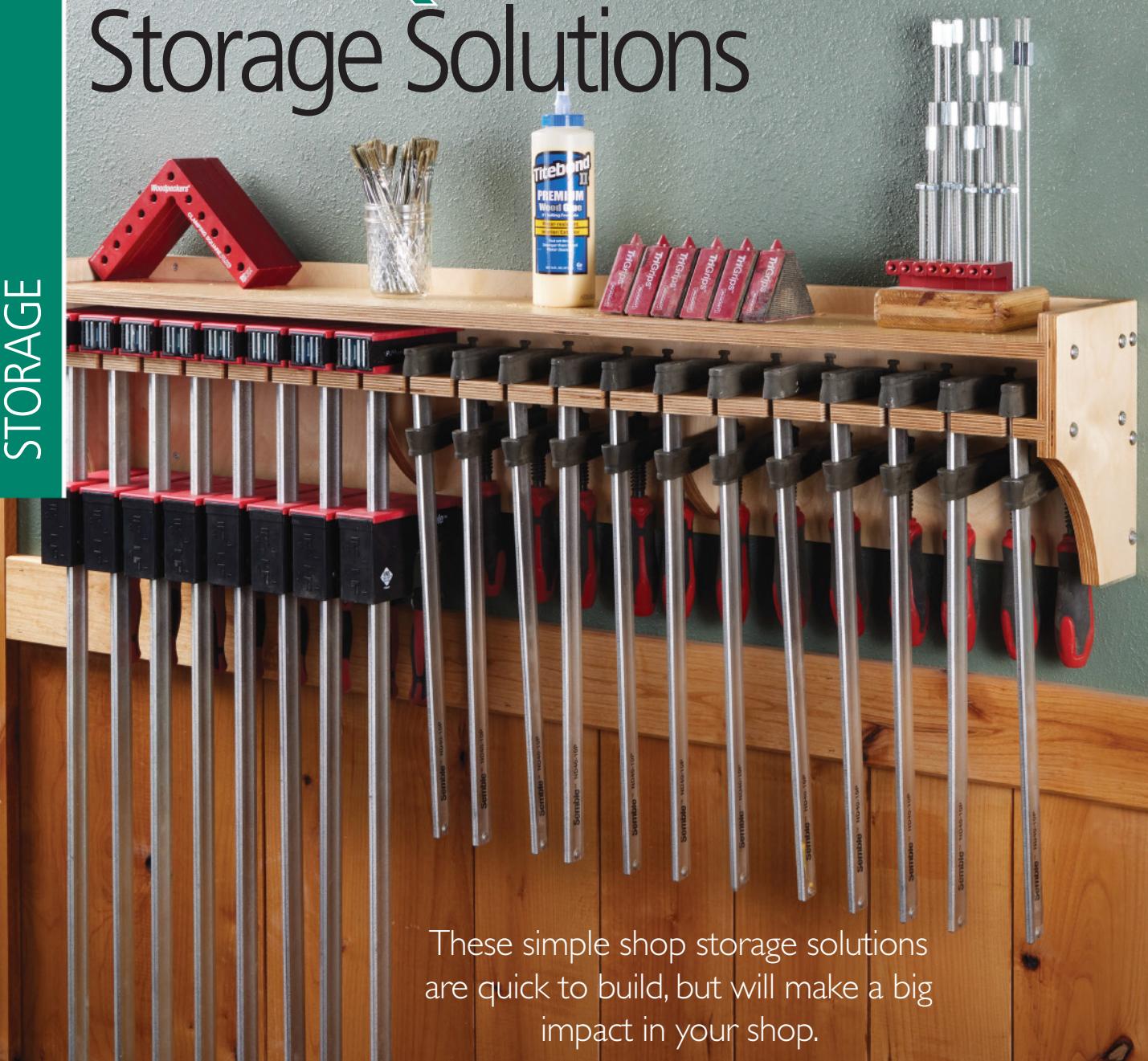
QUICK STORAGE SOLUTIONS 6

STURDY LUMBER CART 14

DRILL BIT STORAGE CENTER 20

MACHINIST'S TOOL CHEST 28

Three Quick Storage Solutions



These simple shop storage solutions are quick to build, but will make a big impact in your shop.

Sometimes, it's the simplest things that make your life better. That holds true in the shop as well. Often times, putting in the extra effort to build a simple storage project or shop fixture exponentially increases the "quality of life" in the shop.

To begin this book, I wanted to introduce three of my favorite shop storage solutions. These are easy to make and will go a long way toward improving

your time in the shop. The first is the clamp rack you see above. It not only holds twenty of your clamps (of course, you have many more than that, right?) but also offers a bit of storage on top in the form of a shelf.

The next project is out of left field — a drill bit index. Using some fancy wood and the lathe, you can create a great way to house a quality set of drill bits.

Finally, there is a basic utility shelf. If you have ever been in my shop, you'll find these little shelves scattered all over. Some hold accessories beside my lathe, others push pads by the jointer and router table, and one even holds my coffee cup at the bench. I can guarantee you this: the projects here won't take you long to make, but you'll find plenty of uses for them in your shop.



Clamp Storage

The first of these three projects is one that I'm sure you'll need to build multiple of—it's the clamp storage rack that you see on the previous page. This rack is designed to hold either F-style or parallel clamps. To be completely transparent, I load all of my parallel clamps on one rack and all my F-styles on the other;

on the previous page, I simply combined them for the sake of the photo.

The things we need to contend with for a clamp rack are weight capacity and clamp accessibility. I think this design does both well. Slots hold the clamp bars, allowing for easy retrieval, and plywood along with stout joinery means

Panel Breakdown. I use a track saw to break down the full-sized sheet of plywood. It allows me to make straight, accurate cuts, without needing to worry too much about precise measurements yet.

that it will take as much weight as you can stack on it. Having a bit of extra storage on top for the “miscellaneous clamps and accessories” is nice as well.

PANEL BREAKDOWN. The approach to breaking down the plywood is a personal choice. For smaller pieces, I use the table saw. However, for full sheets, I will break out the track saw. Even though you can get finish-quality cuts with a track saw, I still cut my panels a little oversized before moving to the table saw for sizing parts.

The first parts to break down are the side panels. As in the photo on the previous page (and the illustration on the next) the sides have a set of dadoes and rabbet in them. The top dado will capture the shelf, while the bottom dado holds the clamp rack. The rabbet along the back edge will be for the back piece.

After breaking down the sheet, I trimmed the side panels to the final size at the table saw. Then, swapping out for a dado blade, I tackled the joinery. I took my time to make sure that the dado blade was set up the proper size for the Baltic birch plywood that I was using. Then, attaching an auxiliary fence on the rip fence (Step 2 below), I cut the rabbet along the back edge.



Side Panel Rabbet. A dado blade buried in an auxiliary rip fence makes forming the rabbet along the back edge of the sides easy.



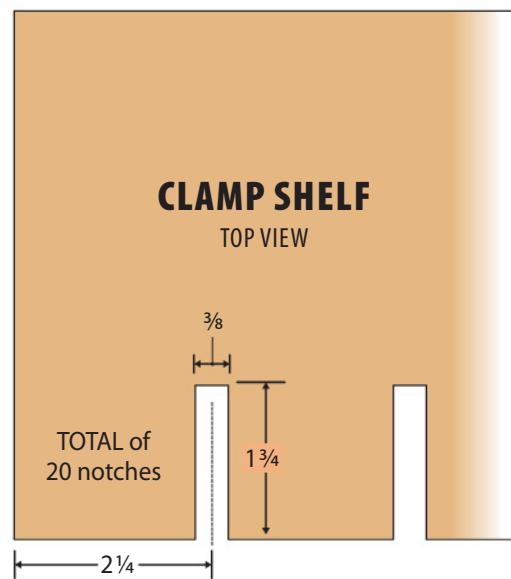
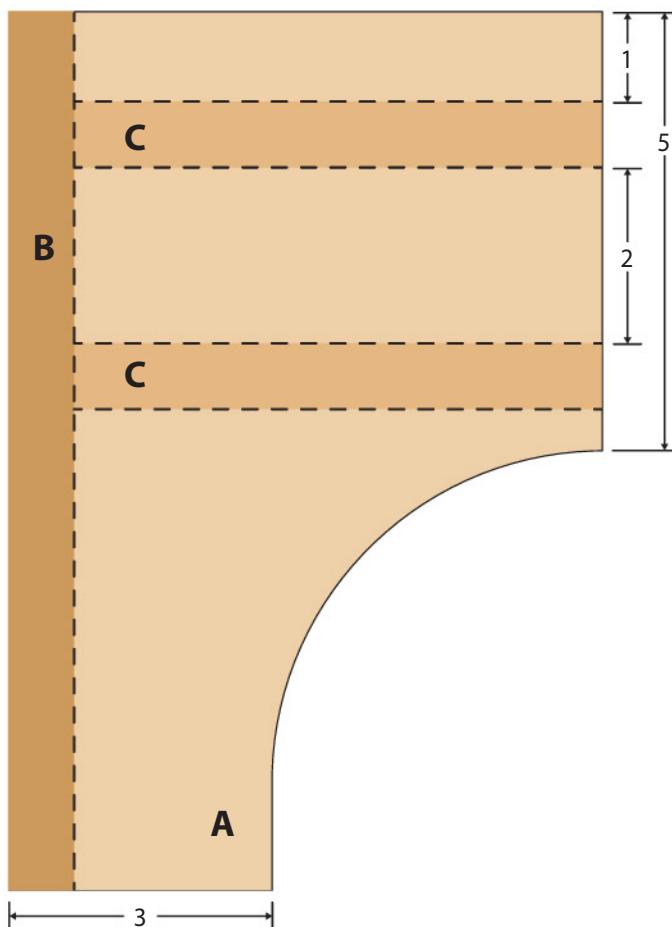
Shelf Dadoes. Use the fence to position the part to form the dadoes. Guide the workpiece with the miter gauge.



Back Groove. After cutting one dado in the side, cut the matching groove in the back before adjusting the fence settings.



Cutting the Curves. Use double-sided tape to stick the sides together and gang cut them at the band saw.



MATERIALS & SUPPLIES

A Sides (2)	$\frac{3}{4}$ -ply. - $6\frac{3}{4} \times 10$
B Back (1)	$\frac{3}{4}$ -ply. - 10×46
C Shelf/Clamp Shelf (2)	$\frac{3}{4}$ -ply. - 6×46

After the rabbets are cut, remove the auxiliary fence and cut the dadoes in the sides (Step 3 on page 7). I used the miter gauge to guide the workpiece through the blade here. After cutting the first dadoes on each side, don't change the setup. First, you'll want to use this same fence setting to cut a groove along the back panel (as you can see in Step 4 on the previous page). With that done, you can change the fence and finish out the final dado, as well as the groove on the back.

To add a little shape to the sides, I roughed in an arc with a pencil and cut it out at the bandsaw. You can see how I did this in Step 5. To ensure the pieces would be identical, I taped both sides together before cutting these at once. Keep the off cuts, as you'll use these for braces in a bit.

CLAMP HOLDER. Before any assembly can happen, you need to take a moment to create the clamp holder. As you can see in Step 6, I did this at the table saw. Setting up a dado blade to match my clamp bars ($\frac{3}{8}$ " in this case), I raised the blade as far as possible before making my cuts. I spaced out the clamp holder kerfs to give a little bit of room between the clamp heads. The spacing shown here works well for either parallel or F-style clamps, but feel free to size them to the clamps they'll be carrying.

ASSEMBLING THE RACK. Now, the clamp rack can be assembled. I began by gluing the clamp holder into the lower dado on the back. Countersunk screws from the back will hold it in place. Remember the offcuts from the sides? Those get used for some extra support under the clamp holder, as shown in Step 7. These get glued and screwed in place.

The top and shelf of the rack get glued in next, as well as screwed in place. The sides come in after. They're glued in place, capping off either end. As you can see in the main photo on page 6 and Step 8 at right, I decided to drive screws through the sides to hold everything together. Instead of countersinking these, I opted for some trim-washers on the screw heads. These are little metal rings that cradle the screw head and add a finished look. Now, the clamp can get sprayed with a couple of coats of lacquer. Then mount it to studs in the wall — all those clamps get quite heavy.



Dado Notches. Raise the dado blade as high as possible and cut the clamp notches.



Assembly. The rack gets glued together and held firmly with screws. Finish washers on the outside give a clean look.



Drill Bit Index

I mentioned at the beginning of this article that this project was out of left field. But there's a backstory. Let me explain:

I received a nice set of drill bits for Christmas — *Fisch* brand, and by far the nicest I've had. However, they came in a disposable plastic package. So, I set out to buy a metal drill bit index. To my dismay, I couldn't find one to fit this 7-piece set. Instead, I took inspiration from some of the old wooden, shop-made indexes I've found in flea markets and turned this one.

A ROUNDED BLANK. This index starts with a blank — maple burl in this case. It's held between centers and turned round. A tenon is cut on each end to fit in the chuck and the base is parted off of the lid (Step 1). To hollow out the base and lid, I used a Forstner bit held in a Jacob's chuck in the tailstock, as shown in Step 2. A bit extension will let you drill to the complete depth — no extra hollowing necessary.

CUSTOM INSERT. The insert is what holds the drill bit shanks. I turned this from a separate piece of boxwood so that I could hide a magnet under it to "snap" the shanks in place. Turn it round, so that it fits into the base. You're looking for a friction fit. Make sure to leave a shoulder on the insert, as you see in Step 6.

This shoulder will get turned down in a little bit to fit into the lid so it pops nicely in place. Drill the holes for the shanks at the drill press (holding the insert in a hand screw clamp). Note that many larger bits have a smaller shank (my $\frac{3}{8}$ " through $\frac{1}{2}$ " bits all have the same shank).

With the insert glued in place, turn it down to fit snugly inside the lid. You're just concentrating on the shoulder here — leave the base material untouched.

FINISH. Once it fits, give everything a sanding and apply a coat of finish. I used shellac and Danish oil. After the finish has dried, put the top in place and wrap a couple of layers of tape around the joint of the index. This acts like a jam chuck and will allow you to do some final shaping on the end of the index. As you see in Step 7, I use my hand for a little extra support while making this cut. Once the tip is done, you can part the base away from the tenon. I slightly dished out the base with some hand sanding after, allowing the index to sit flat on the workbench without tipping over.



1



Round the Blank. A blank is held between centers. A spindle roughing gouge will work well for the heavy material removal. I switched over to a skew chisel to making planing cuts — this leaves a very smooth surface that can be sanded starting with 240-grit.

2



Tailstock Drilling. The easiest way to hollow a box like this is with a Forstner bit and a Jacob's chuck. The chuck turns the part, and the tailstock feeds in the drill bit.



Test Fitting. Check the fit of the insert inside the base as you turn. You're looking for a good, friction fit so that the shoulder seats on the edge of the base.



Magnetic Hold. To help secure the drill bits in the index, I added a rare-earth magnet, held in the bottom with a round piece of double-sided tape.



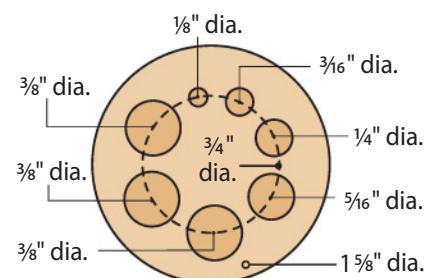
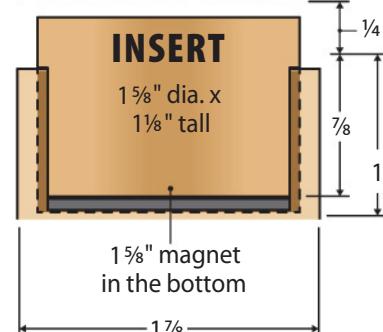
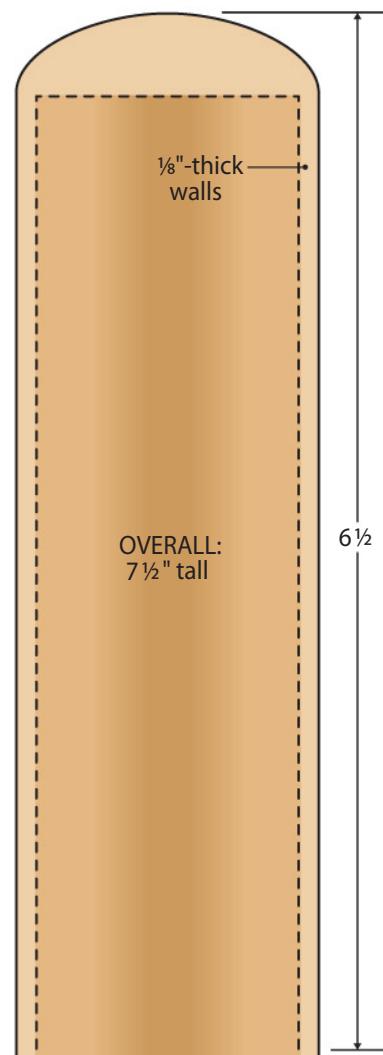
Hole Placement. How you locate the holes is a matter of personal preference. I like the "Fibonacci Spiral" that the graduated shank holes create.



Friction Fit. The insert is glued in place. It's a bit oversized on the top, allowing for it to be turned to final diameter. You're looking for a firm "pop" fit in the lid. Remember that sanding will loosen it slightly.



Rounded Lid. I found it aesthetically appealing to dome over the top of the lid. Blue painter's tape held the two halves together as I made the cut, and I supported the lid with my hand.



INSERT
TOP VIEW



Magnet Mounting. A shelf with a magnetic back can be attached directly to a machine.

Utility Shelves

Finally, and arguably the most useful little shop project, are the utility shelves you see here. I use them all over my shop, and the basic design for each one is the same. However, each serves its own specific purpose.

There's no fancy joinery here. The back support is attached to the platform with glue and screws. That's right, a simple butt joint. This is the beginning and end of these shelves — a place to rest things, and a way to mount it. Now, what treatment you add to the shelf will dictate how it's used.

PUSH PAD HOLDER. In the photo above you can see a push pad holder. With this shelf, I flipped it upside down. The platform is on the bottom and the back support has a

few embedded magnets on it to mount to a machine. This shelf is the home for one of my push pads at my jointer (or, to be more specific, it's stuck on the side of my planer, which is next to my jointer.) The platform here is two layers. I cut an opening in the top one to match the shape of the push pad, then I glued it to the bottom layer. The push pad slips right in place and doesn't fall off.

SHOP VALET. The next shelf is my little "valet." It's shown in the left photo at the top of the next page, and it lives beside my table saw. This orientation has the platform on top, with another two-layer construction. Cutouts create a pencil groove and two dishes — one usually has a tape measure and the other earplugs.

Both are things I use at the table saw where this shelf is. You'll notice the inside edges of the trays are black. I cut this out on the laser cutter, however you could do it by hand with a scroll saw. If you have several of these to make, you could also use a template and rout out dishes with a bowl and tray bit and a handheld router.

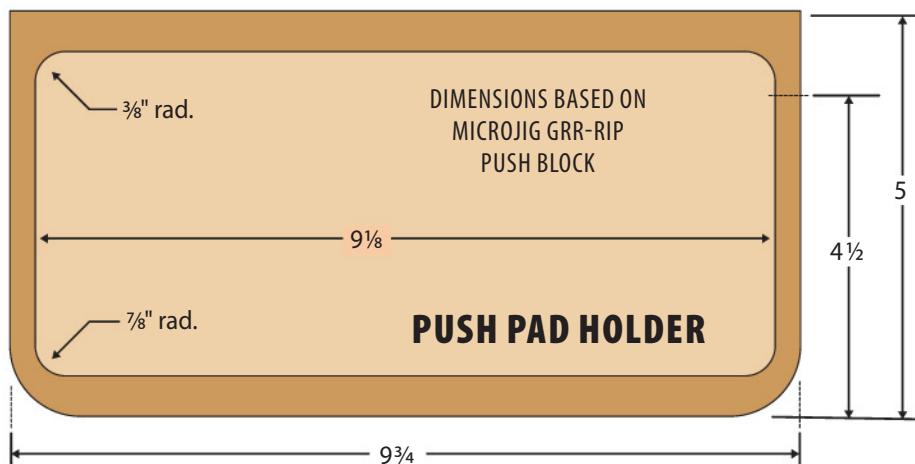
LATHE CADDY. Last is my holder at the lathe. This shelf is a little bit longer and adorned with six holes to hold various centers for turning. Drive spurs, cup centers, et cetera all live here. Now, the beauty of these is that you can make them any size you want, and to hold whatever you want. You'll see my dimensions on the next page, but treat these as starting points and build them to fit your needs.



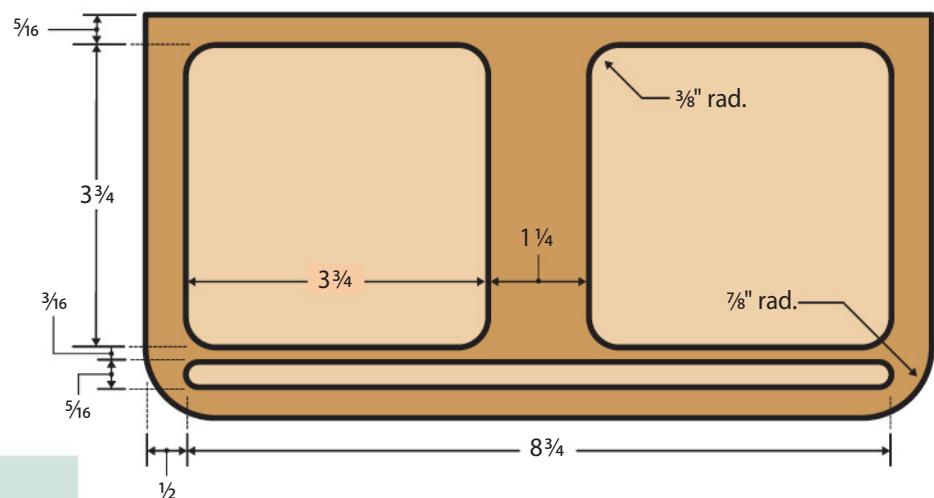
Recessed Wall Shelf. Simple dishes and pencil holders make for a handy shop companion near common workstations.



Keep It Simple. Through holes are quite functional, and this shelf can be scaled to fit as many items on it as you'd like.



SHOP VALET



MATERIALS & SUPPLIES

A	Top Cutout (2)	$1/4 \times 5 - 9 \frac{3}{4}$
B	Top Shelf (1)	$3/4 \times 5 - 9 \frac{3}{4}$
C	Back (2)	$3/4 \times 9 \frac{3}{4} - 5$



Sturdy Lumber Cart

This versatile cart earns its place in the shop by providing handy storage while also serving as a project staging center.

Lumber storage is one of those shop needs that always seems to be in short supply. Like clamps, you can never have enough of some things. And if you do happen to be lucky enough to have storage space for your wood and supplies, it's usually at the opposite end of the

shop from where you're working. This little gem is the perfect solution when wrestling with that dilemma.

Between bins, shelves, and drawers, this cart has all manner of storage options. It also serves as a staging center for any project that you're working

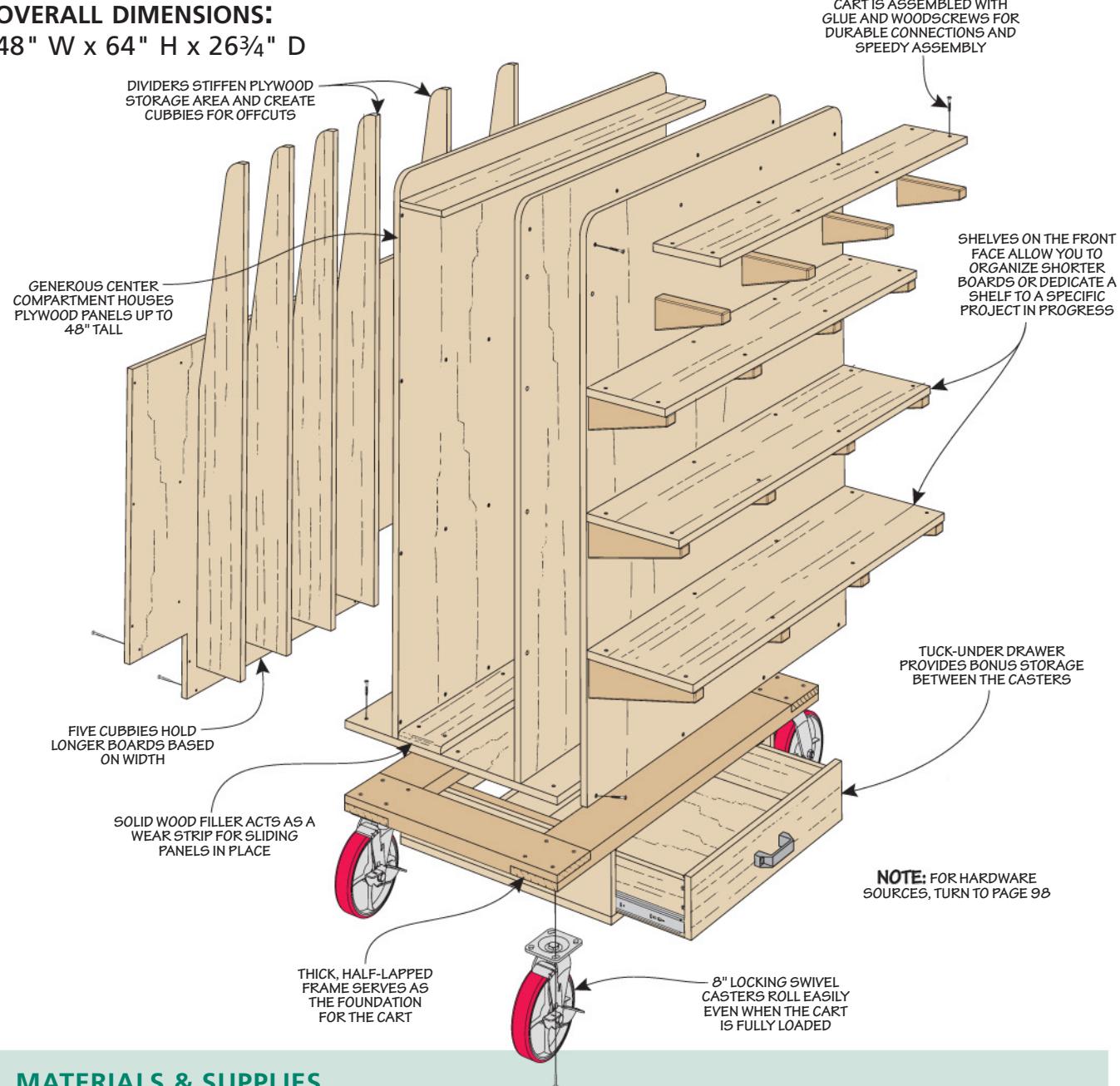


on. Stout and mobile, the cart is easy to move around your shop so it's right where you need it. I made my cart from maple and $\frac{3}{4}$ " Baltic birch plywood. But don't hesitate to choose other options. You can build it with construction grade plywood and "two-by" material.

CONSTRUCTION DETAILS

OVERALL DIMENSIONS:

48" W x 64" H x 26 $\frac{3}{4}$ " D



MATERIALS & SUPPLIES

A Base Frame Ends (2)	1 $\frac{1}{2}$ x 5 $\frac{1}{2}$ - 26	M Second Bracket (4)	1 $\frac{1}{2}$ x 3 $\frac{1}{2}$ - 10 $\frac{1}{2}$	• (18) #8 x 1 $\frac{1}{4}$ " Fh Woodscrews
B Base Frame Sides (2)	1 $\frac{1}{2}$ x 5 $\frac{1}{2}$ - 48	N Third Bracket (4)	1 $\frac{1}{2}$ x 3 $\frac{1}{4}$ - 9	• (117) #8 x 1 $\frac{1}{2}$ " Fh Woodscrews
C Base (1)	26 x 48 - $\frac{3}{4}$ ply.	O Fourth Bracket (4)	1 $\frac{1}{2}$ x 3 - 7 $\frac{1}{2}$	• (4) #8 x 2" Fh Woodscrews
D Drawer Box Sides (2)	6 x 26 - $\frac{3}{4}$ ply.	P First Shelf (1)	12 x 48 - $\frac{3}{4}$ ply.	• (8) #8 x 2 $\frac{1}{2}$ " Fh Woodscrews
E Drawer Box Cleats (2)	$\frac{3}{4}$ x 1 $\frac{1}{4}$ - 25 $\frac{1}{4}$	Q Second Shelf (1)	10 $\frac{1}{2}$ x 48 - $\frac{3}{4}$ ply.	• (16) $\frac{3}{8}$ " x 5" Lag screws
F Drawer Box Btm (1)	26 x 30 - $\frac{3}{4}$ ply.	R Third Shelf (1)	9 x 48 - $\frac{3}{4}$ ply.	• (16) $\frac{3}{8}$ " Washers
G Back (1)	48 x 36 $\frac{3}{4}$ - $\frac{3}{4}$ ply.	S Fourth Shelf (1)	7 $\frac{1}{2}$ x 48 - $\frac{3}{4}$ ply.	• (1) 4" Drawer Pull
H Dividers (6)	$\frac{3}{4}$ x 6 - 51 $\frac{1}{2}$	T Drawer Sides (2)	5 x 24 - $\frac{3}{4}$ ply.	• (2) #8 x $\frac{3}{4}$ " Ph Woodscrews
I Spacer (2)	$\frac{3}{4}$ x 5 $\frac{1}{4}$ - 48	U Drawer Front/Back (2)	5 x 26 $\frac{1}{2}$ - $\frac{3}{4}$ ply.	• (1 pr.) 22" Full-extension Drawer Slides
J Divider Panel (1)	48 x 54 - $\frac{3}{4}$ ply.	V False Front (1)	5 $\frac{3}{4}$ x 28 $\frac{1}{4}$ - $\frac{3}{4}$ ply.	• (4) 8" Locking Swivel Casters
K Main Panel (2)	48 x 54 - 1 $\frac{1}{2}$ ply.	W Drawer Bottom (1)	26 $\frac{1}{2}$ x 23 - $\frac{1}{4}$ ply.	• (16) $\frac{3}{8}$ " x 1 $\frac{1}{4}$ " Lag Screws
L First Bracket (4)	1 $\frac{1}{2}$ x 3 $\frac{3}{4}$ - 12			

A Robust Base Frame & Drawer Box

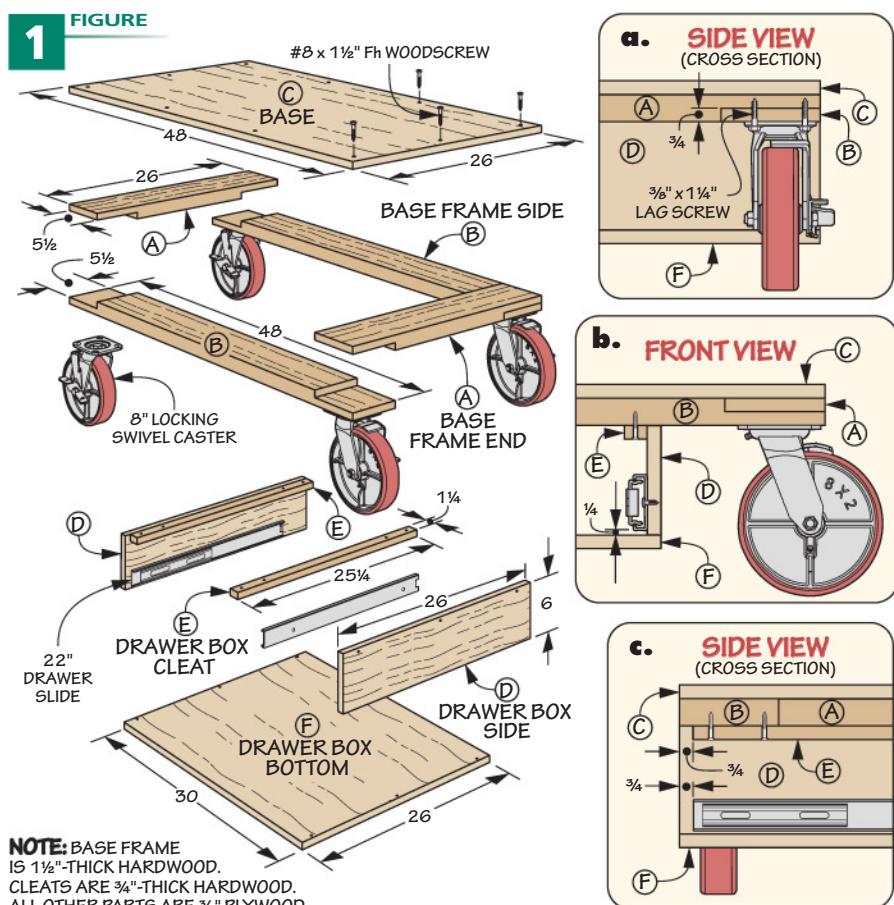
It stands to reason that a lumber cart requires stout construction if it's going to bear up under the weight of a bunch of boards and cut-up plywood sheets. So don't be too surprised by the amount of material it's going to take to build this.

CONSTRUCTION OBJECTIVES. On furniture pieces, I like using interlocking joinery to create rigid structures. With a shop project, that often seems like overkill.

In order to get similar benefits, you'll notice that this cart makes use of a layered approach relying on woodscrews and glue to join parts together. Each new subassembly builds on, and reinforces, the previous one. The result is a cart that can take whatever you throw at it.

BASE FRAME. Let's see how this plays out. The starting point for the cart is a solid-wood frame. It's shown in Figure 1. The four thick pieces are joined with half-laps. In spite of what I just said, taking the time to cut half-laps makes sense at this initial stage. First of all, this type of joint is easy to cut. Secondly, the large shoulders build in registration for a square assembly.

A dado blade in the table saw makes short work of these rather large half-laps (Figure 2). There are a few things to note here. You want to spend some time dialing in the height of the dado blade. The cut should be half the thick-



NOTE: BASE FRAME IS 1 1/2"-THICK HARDWOOD. CLEATS ARE 3/4"-THICK HARDWOOD. ALL OTHER PARTS ARE 3/4" PLYWOOD

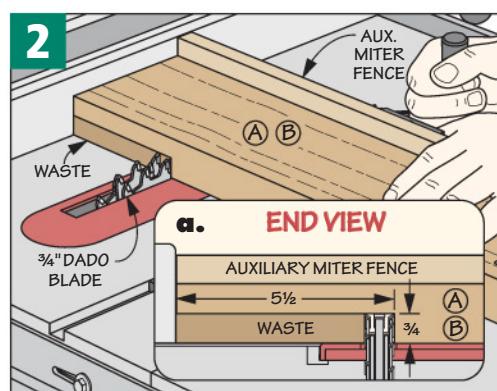
ness of the parts — hence the name. Consistency is the other key. I used the rip fence as an end stop so that all the joints are cut to the same width. The distance from the fence to the outside edge of the blade should match the width of the frame pieces, as in Figure 2a. Since this isn't a through cut, you're safe using this setup.

ASSEMBLY. As you glue up these four pieces, check them for square. Tight

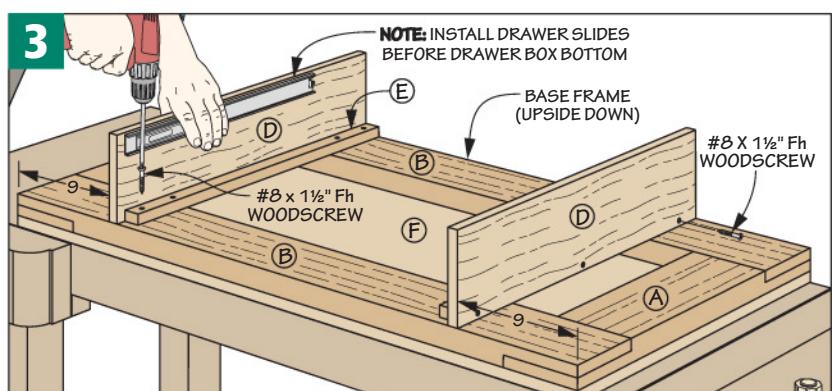
shoulders are a good benchmark, but verifying with a square once the clamps are in place is a good idea, too.

While the glue dries, you can use the frame as a guide for sizing the base. Attach it to the frame with glue and screws, as in Figure 1.

DRAWER BOX DETAILS. The super-size casters this cart rolls on creates an inviting space between the wheels. Rather than let the space go to waste, I added a drawer.



Base Frame Half Laps. Set the rip fence to create the shoulder of the half lap. Then nibble away the remaining waste material.



Drawer Box Cleats. After gluing the drawer box cleats flush to the back end of drawer box sides, you can attach them to the underside of the base frame with screws. The cleats serve as a stop for the drawer false front also.

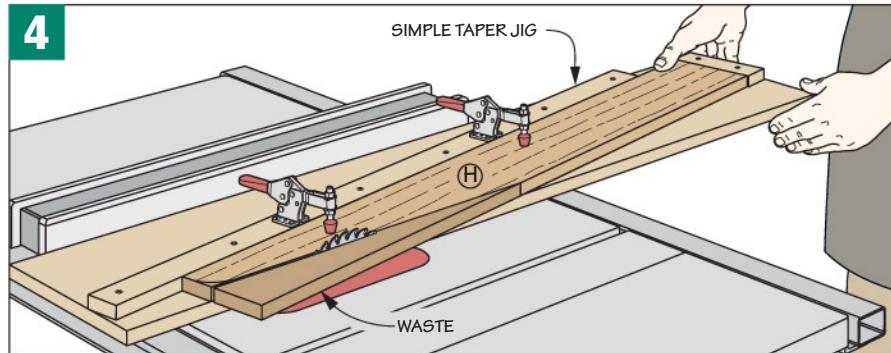
The drawer is housed in a simple enclosure consisting of two sides and a bottom (Figure 1). This hangs centered on the underside of the base frame. A back for the drawer box is incorporated into another piece that's made later on.

The easiest way to build this box is to lay the base frame upside down on your workbench, as illustrated in Figure 3. Start by gluing and screwing the cleats to the drawer box sides. Then, fasten the cleats to the base frame with screws. What's important here is that the box sides are parallel to each other.

Since the next few steps will close off the drawer box, I decided to install the drawer slides now as opposed to the challenge of working in a confined area later. The trick here is to install the slides $\frac{1}{4}$ " up from the bottom of the drawer box, as in Figure 1b.

Later, when the drawer is added, the slides will be installed flush with the bottom of the drawer sides. This will give the clearance needed for the drawer so it doesn't bind. Notice in Figures 1 and 1c that the setback of the slides and cleat matches the thickness for the drawer front.

Normally, I save this next step until later in the construction. However,



Tapered Dividers. The taper on the dividers are best cut at the table saw. To keep the dividers uniform, use a taper jig. The jig holds the dividers firmly at the proper angle as you pass them over the blade.

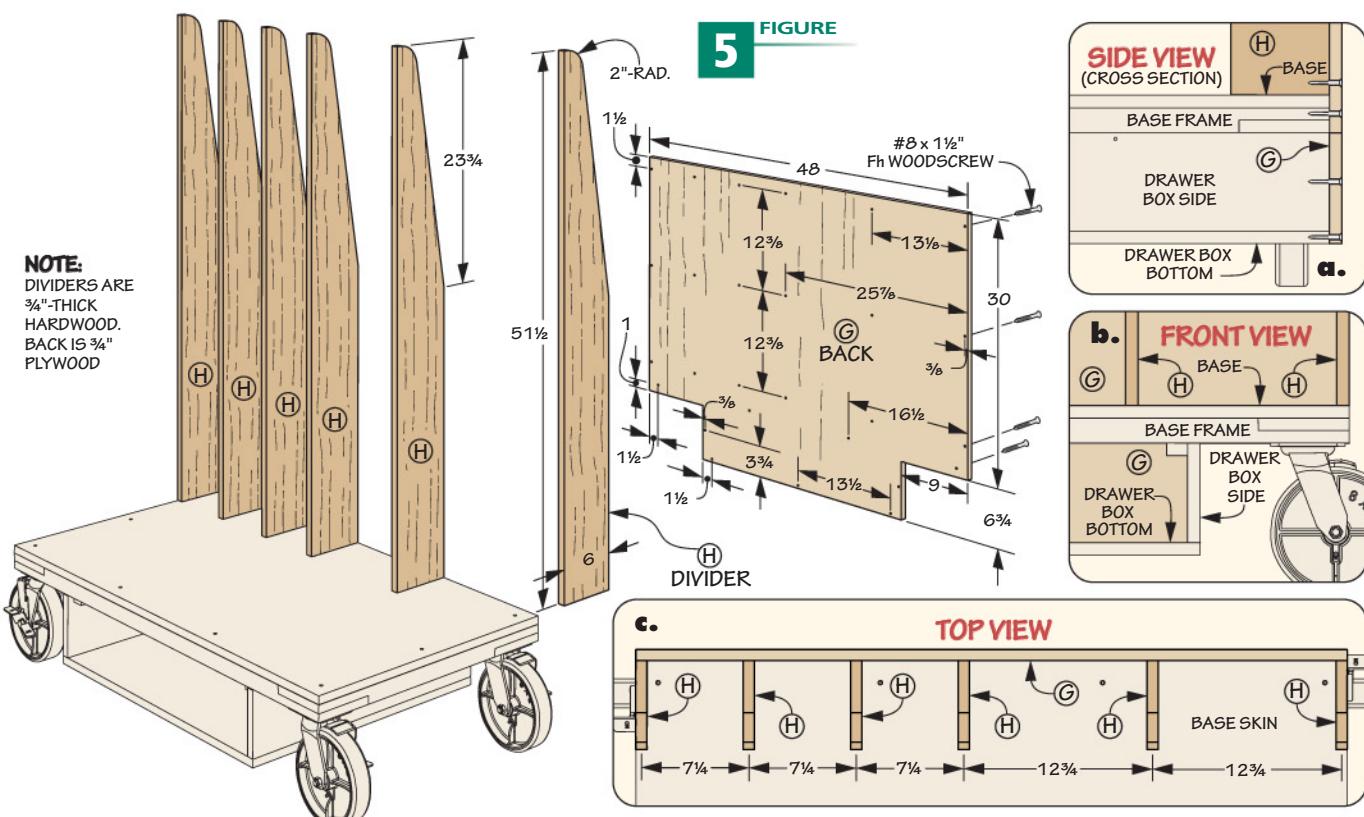
while the cart is still light and manageable, I added the casters by screwing them to the base frame (Figure 1b). With that done, you can take the cart off the workbench and move on to the storage structure that's above the base.

PANEL POWER

The upper portion of the cart starts with a large back panel and set of solid-wood dividers, as shown in Figure 5 below. The back runs the length of the cart and features two large notches to provide clearance for the casters. The resulting tab at the bottom also encloses the back of the drawer box.

Six long dividers are attached to the back of the cart to create five compartments. Figure 4 above provides the details for fashioning the tapers. The upper corners of the dividers are rounded to ease a sharp edge.

After cutting and notching the back, I marked and drilled all the screw holes (these are shown in Figure 5), and attached the back to the cart. This made it easy to install the dividers. To get the ball rolling, I clamped a scrap across the base to trap the dividers against the back. Then it was just a matter of spacing and screwing the dividers in place, as you can see in Figure 5c.





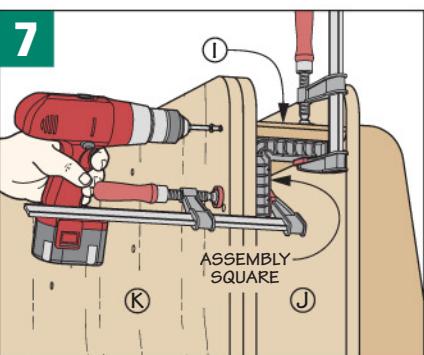
Now a Plywood Storage Compartment

Three plywood panels form the backbone of this project, as you can see in Figure 6. The rear-most panel attaches to the dividers. The other two panels are sandwiched together and become the main panel. They're doing the double duty of forming the front wall of

the storage cavity and the support for the four shelves at the front of the cart. Between the panels are two hardwood spacers. They form a large sheet goods storage cavity in the center of the cart. They both have generous roundovers on the ends to funnel material into the cavity — more on those in a bit.

PANEL DETAILS. All three panels are identical in size and have the same finished radius on the top corners. Focusing first on the divider panel, lay out and drill the pilot holes and countersinks that are needed. Note that you need to drill pilot holes and countersinks from both faces (Figures 6b and 6c).

The main panel has fasteners and lag screws running through it, so the easiest way to keep it all orderly is to glue and screw them together. Then, from the back face, drill the counterbored holes for attaching the shelves.



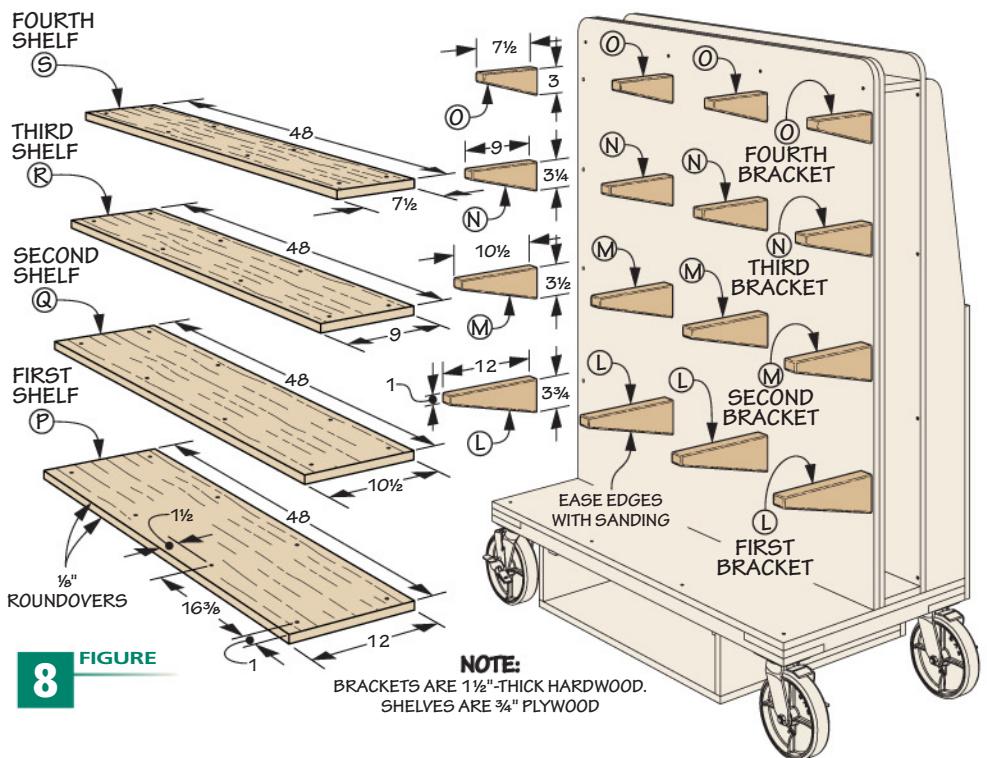
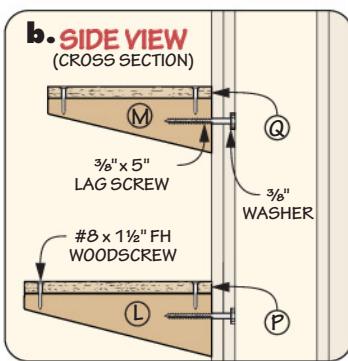
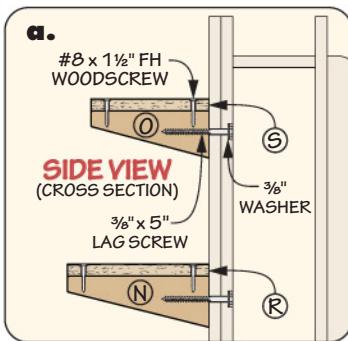
Square Up. Use an assembly square to hold the spacer square to the main panel while fastening.

ASSEMBLY TIME. The divider panel is glued and screwed to the upright dividers. The upper spacer attaches through the back of the divider panel, as in Figure 6b. The lower spacer is screwed directly to the cart base (Figure 6a). Then you can attach the main panel, as in Figure 7.

BRACKETS & SHELVES

The front of the cart features four shelves that rest on thick brackets, as you can see in Figure 8 on the next page. The shelves and brackets graduate in width from top to bottom.

MOUNTING THE BRACKETS. You can shape the brackets with a taper jig at the table saw similar to making the dividers. The mounting guide shown in Figure 9 helps to position the brackets and mark the locations for the pilot holes in the back of each bracket. For ease of installation, I mounted the brackets from the



8 FIGURE

bottom up. I also put a little beeswax on the threads of the lag screws to smooth the installation process. Sixteen brackets later, you can focus on the shelves.

SHELVES. You'll see that the shelves are the same width as the brackets they sit on. Once I cut them to size and rounded over the edges, I drilled the pilot holes and countersinks. As with the brackets, I installed the shelves from the bottom up.

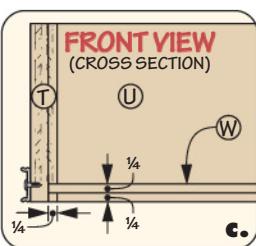
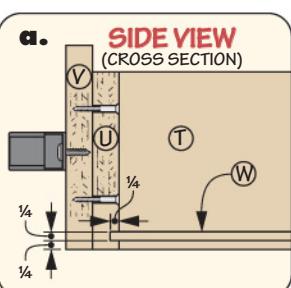
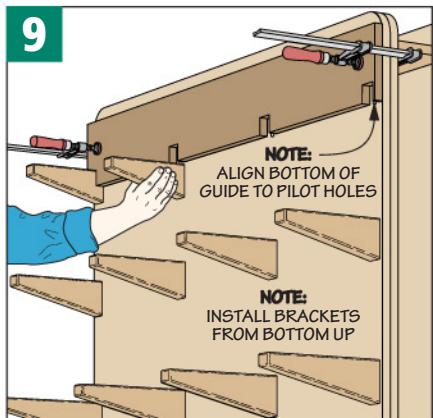
DRAWER DYNAMICS

The generously sized drawer is made

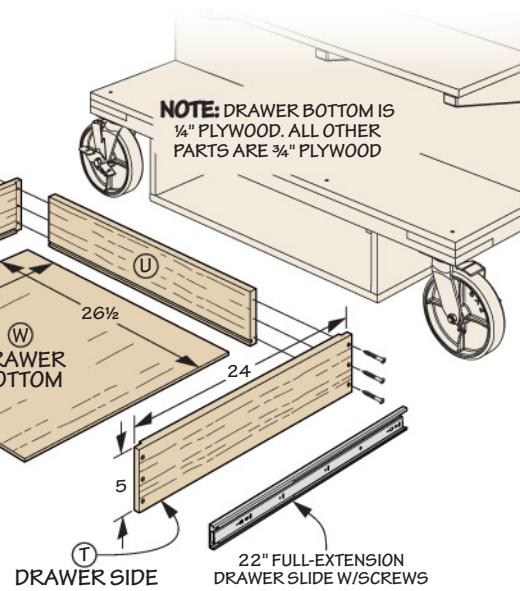
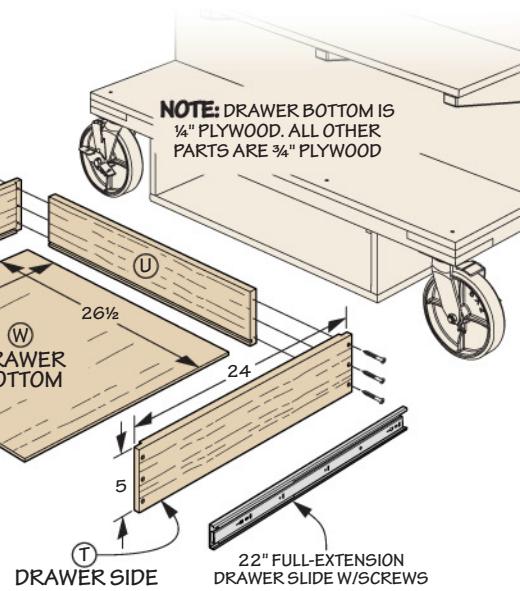
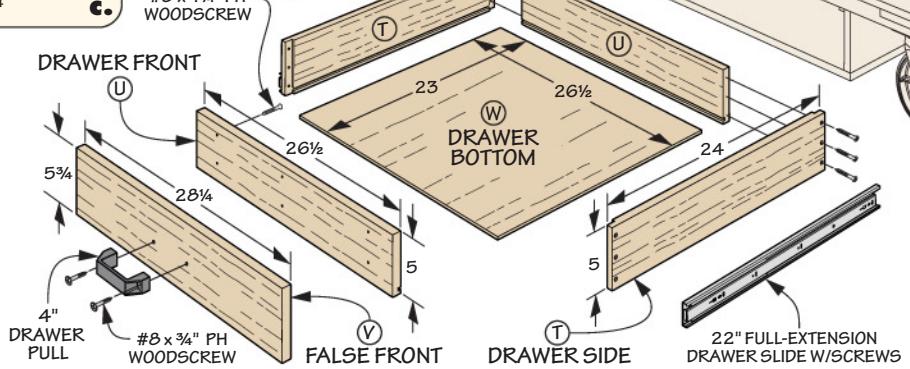
from Baltic birch plywood. It's constructed with a simple rabbet in the drawer sides (Figure 10b). Before screwing the drawer together, cut the grooves for the drawer bottom in all four pieces, as in Figures 10a and 10c.

I attached the false front with screws from the inside, as in Figure 10a. The drawer slides fit against the false front and flush with the bottom edge.

I applied lacquer to the whole unit. That was an easy choice. Choosing what wood to save and which to send to the fire pit is a dilemma that's ongoing.



10 FIGURE



Drill Bit Storage Center

You'll never "misplace" a drill bit or accessory again with this combination, wall-mounted storage cabinet and chest.

Most of us strive to get our work done in an efficient manner. Having tools and accessories well organized is critical to meeting that goal. That was the inspiration behind this drill bit storage center. It's big enough to hold all of your drill bit sets and drill press accessories, yet small enough to mount close to your drill press for convenient access.

DESIGN OPTIONS. The beauty of this storage center is the multiple ways in which it can be customized to suit your needs. There's a series of drill bit holders that can be made any size you need to hold your drill bits. The holders slip over the cleats in the cabinet and doors. And speaking of those cleats, they have embedded magnets to hold other metal



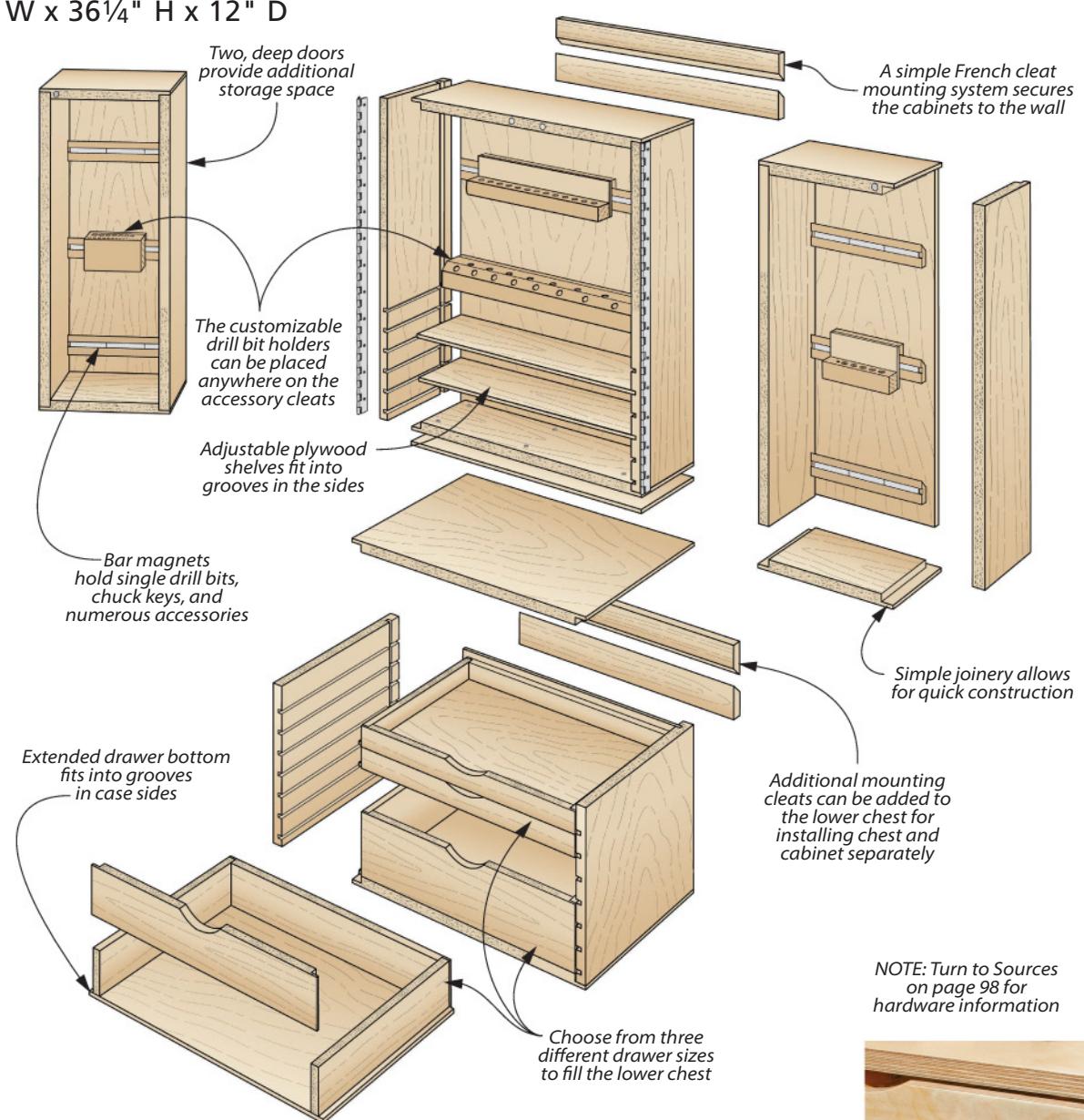
Removable Housing. The drill bit holders can be lifted out of the cabinet and brought right to the drill press for easy access.

accessories. The drawers in the chest can be made in three different sizes to catch any miscellaneous items. To top it off, you can build one, or both sections, to fit your needs.

CONSTRUCTION DETAILS

OVERALL DIMENSIONS:

18" W x 36 1/4" H x 12" D



NOTE: Turn to Sources on page 98 for hardware information



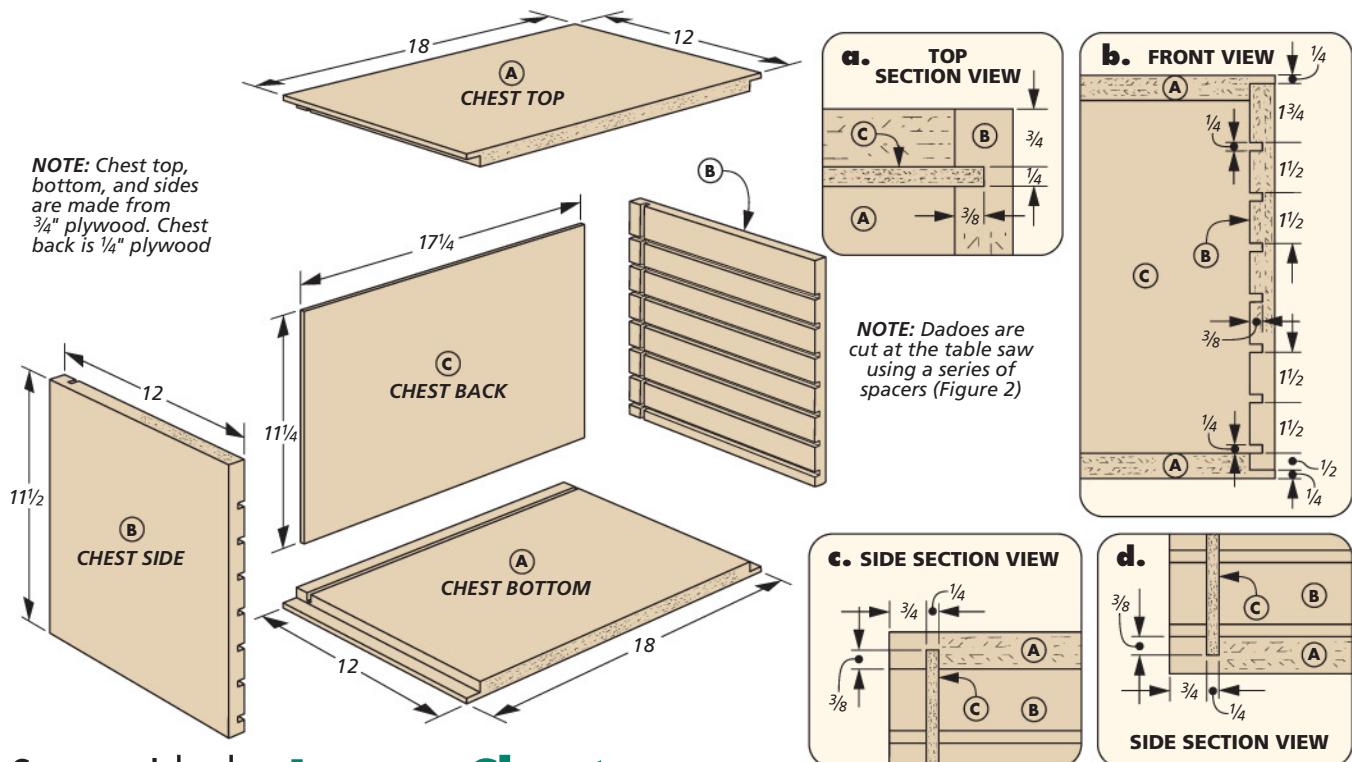
Adjustable Shelving. Multiple grooves in the upper cabinet sides provide a spot for a couple of adjustable plywood shelves.



Cleats. French cleats make the holders easy to remove from the cabinet and doors.

Drawers. Narrow dadoes cut in the sides of the lower chest are spaced to accommodate three different sizes of drawers. You can mix-and-match the drawers by building several different sizes to best meet your storage needs.





Start with the Lower Chest

As shown on the previous pages, the storage center consists of two different components — the lower chest is filled with drawers and the upper cabinet with two doors that enclose the space. To customize for your individual needs, the lower chest is designed with a series of evenly spaced dadoes in the side pieces that let you mix and match the drawer sizes.

PLYWOOD CASEWORK. The majority of the parts for this project are made from ply-

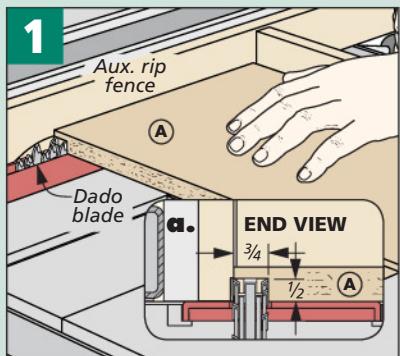
wood, with just a few hardwood parts here and there. This keeps the cost down and means less planning and gluing up panels.

Start the lower chest construction by cutting all of the parts to size. The top and bottom pieces both require rabbets along the outer edges to hold the sides. Install a dado blade in the table saw to knock out this joinery (Figure 1, below).

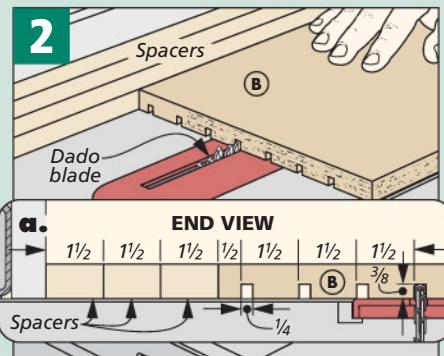
CONSISTENT SPACING. Cutting the dadoes in the sides could be done by simply mov-

ing the rip fence the proper distance after each cut. However, this doesn't always guarantee the most accurate results. So, in order to get consistent spacing between my dadoes (which is critical for the drawers to fit properly), I ripped several $1\frac{1}{2}$ "-wide strips to act as spacers and placed them between my workpiece and the rip fence. After making each pass, I simply removed one strip and then made the next cut. Figure 2 at the in the box below shows what I mean.

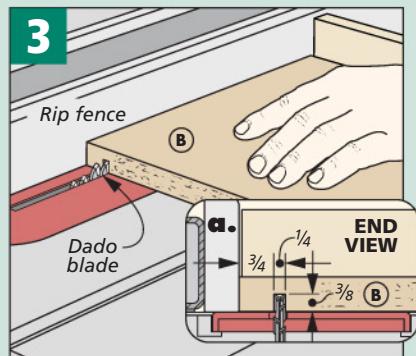
Cut the Joinery For the Lower Chest



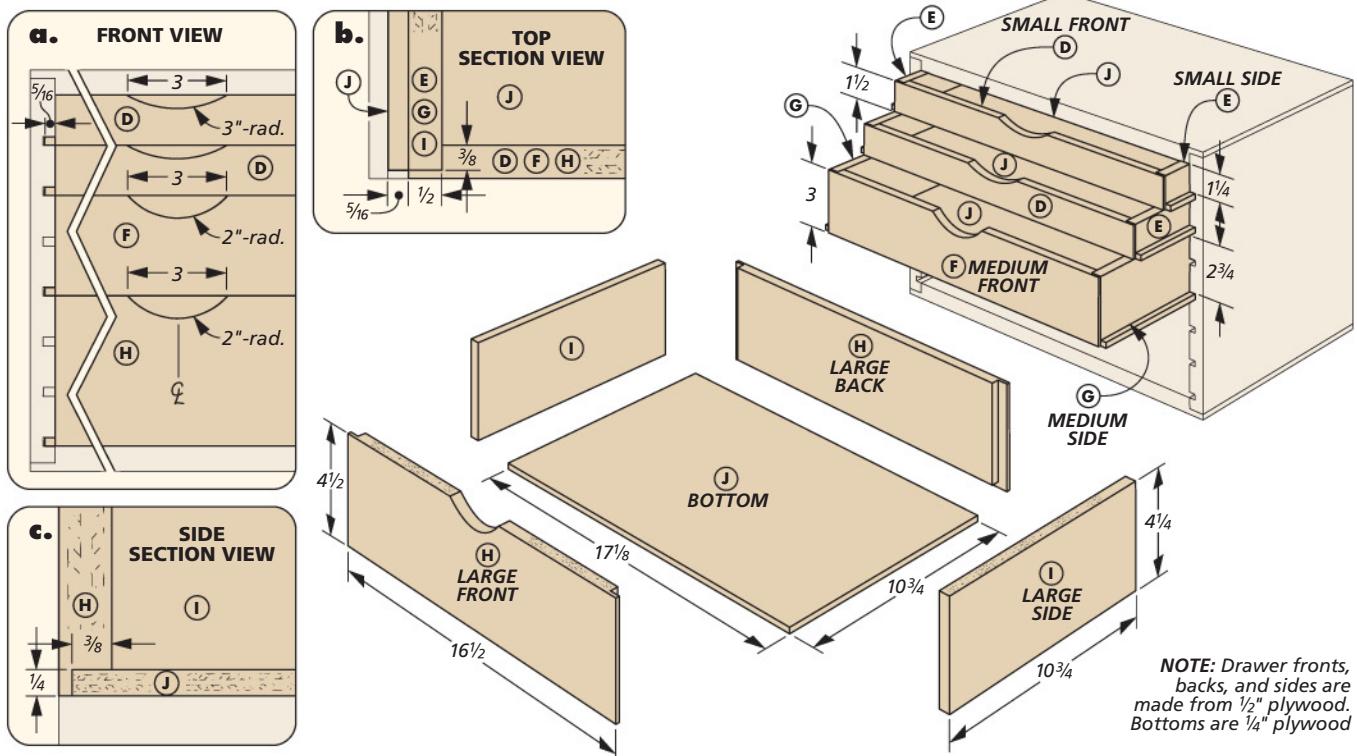
Rabbet Top & Bottom. Using a dado blade and auxiliary rip fence, cut the rabbets in the top and bottom.



Runner Dadoes. Use $1\frac{1}{2}$ "-wide strips to get consistent spacing between the drawer runner dadoes.



Groove for Back. Cut a groove in the top, bottom, and sides to hold the back in place.



All that's left before assembly is to cut the grooves in the top, bottom, and sides for the back (Figure 3). The lower chest can now be put together with glue.

CUSTOM DRAWERS

You have a decision to make before beginning work on the drawers. You'll need to choose from the three different depth options — small, medium, and large. I opted for the four-drawer combination shown above. The construction process is

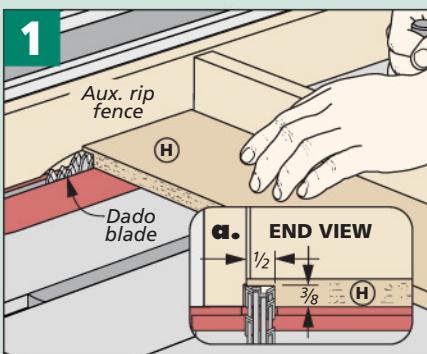
the same for each size, so it's easy to build whichever configuration works best for your shop and tools.

SIMPLE JOINERY. The drawers use similar joinery as the chest. The fronts and backs have rabbets along the ends to trap the side pieces (as in Figure 1 below). A shallow groove along the bottom of the front and back workpieces is for the bottom panel to rest in (Figure 2). Take note that the sides are actually $\frac{1}{4}$ " shorter than the front and back. This is because they rest on

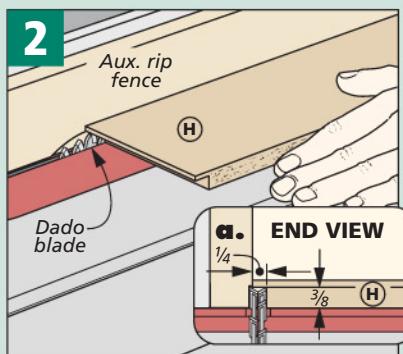
the bottom, allowing the bottom panels to stick out on the sides to form the drawer runners. You can see how this functions in detail 'a' above. Once you have all of the joinery complete, you'll once again assemble the drawers with glue.

FINGER PULLS. You could install drawer pulls if you desire, but I opted for a simple cutout along the top edge of each drawer to form a finger pull. As in Figure 3 below, I rough-cut these at the band saw, then finished them up at the spindle sander.

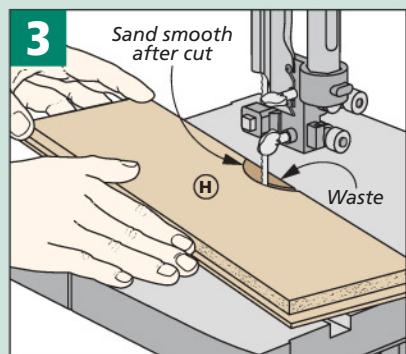
Cut & Shape The Drawer Parts



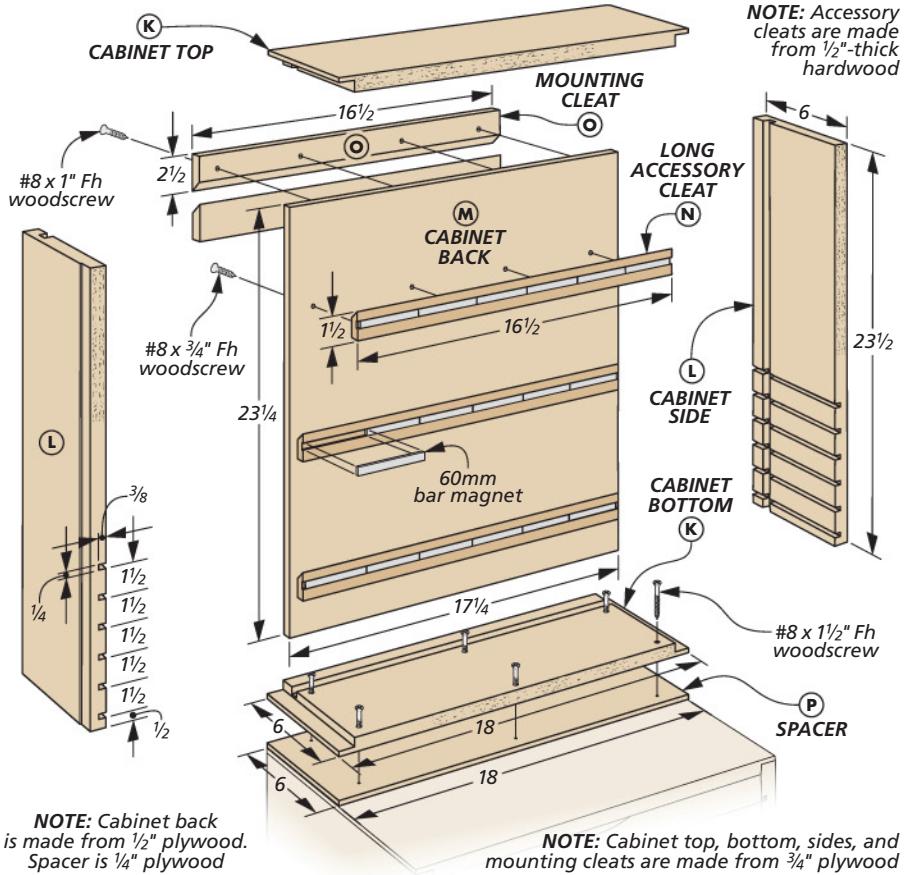
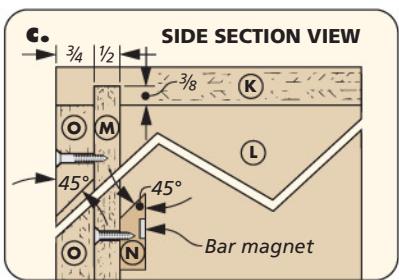
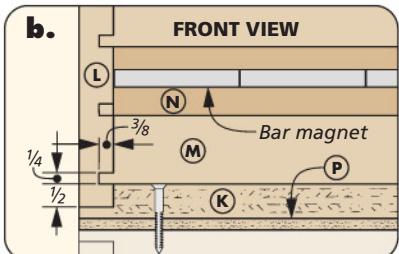
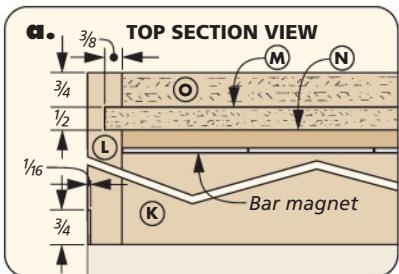
Drawer Rabbets. Rabbets on the ends of the drawer fronts and backs hold the drawer sides in position.



Rabbet for Bottom. A rabbet along the lower edge of the fronts and backs houses the drawer bottom.



Finger Pull Cutout. A simple cutout along the top edge of each drawer front creates a handy pull.



NOTE: Cabinet back is made from 1/2" plywood. Spacer is 1/4" plywood

NOTE: Cabinet top, bottom, sides, and mounting cleats are made from 3/4" plywood

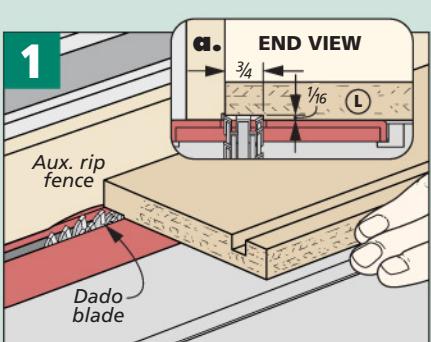
Building the Upper Cabinet

Moving on to the upper cabinet will be somewhat familiar territory. The sides of this cabinet have evenly spaced grooves for a shelf, much like the lower chest. And the grooves are made the same way. The difference with this cabinet, however, is the addition of

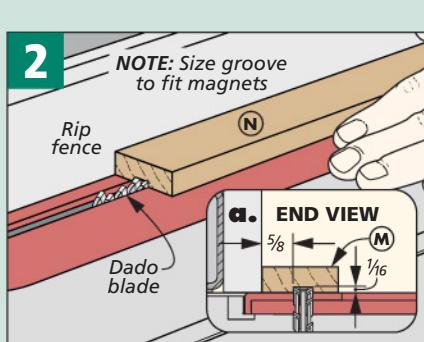
several accessory cleats mounted to the back. These cleats are used to hold customized drill bit holders. The cleats also have a row of rare-earth magnets embedded in a groove that allow you to store other steel odds and ends that don't fit in the customized holders.

SIMILAR CONSTRUCTION. After cutting the parts to size for the upper cabinet, go ahead and cut all of the joinery as before. Then, there's just one more thing that needs to be done before assembling this cabinet. And that's a shallow rabbet along the outside edge of each cabinet side. This rabbet is essentially a hinge

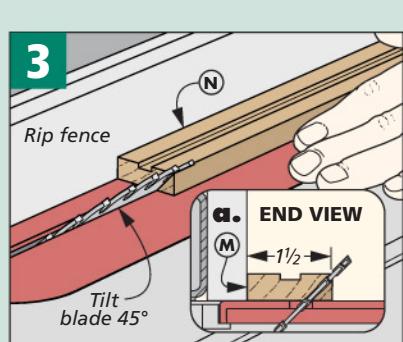
Make the Parts For the Upper Cabinet & Doors



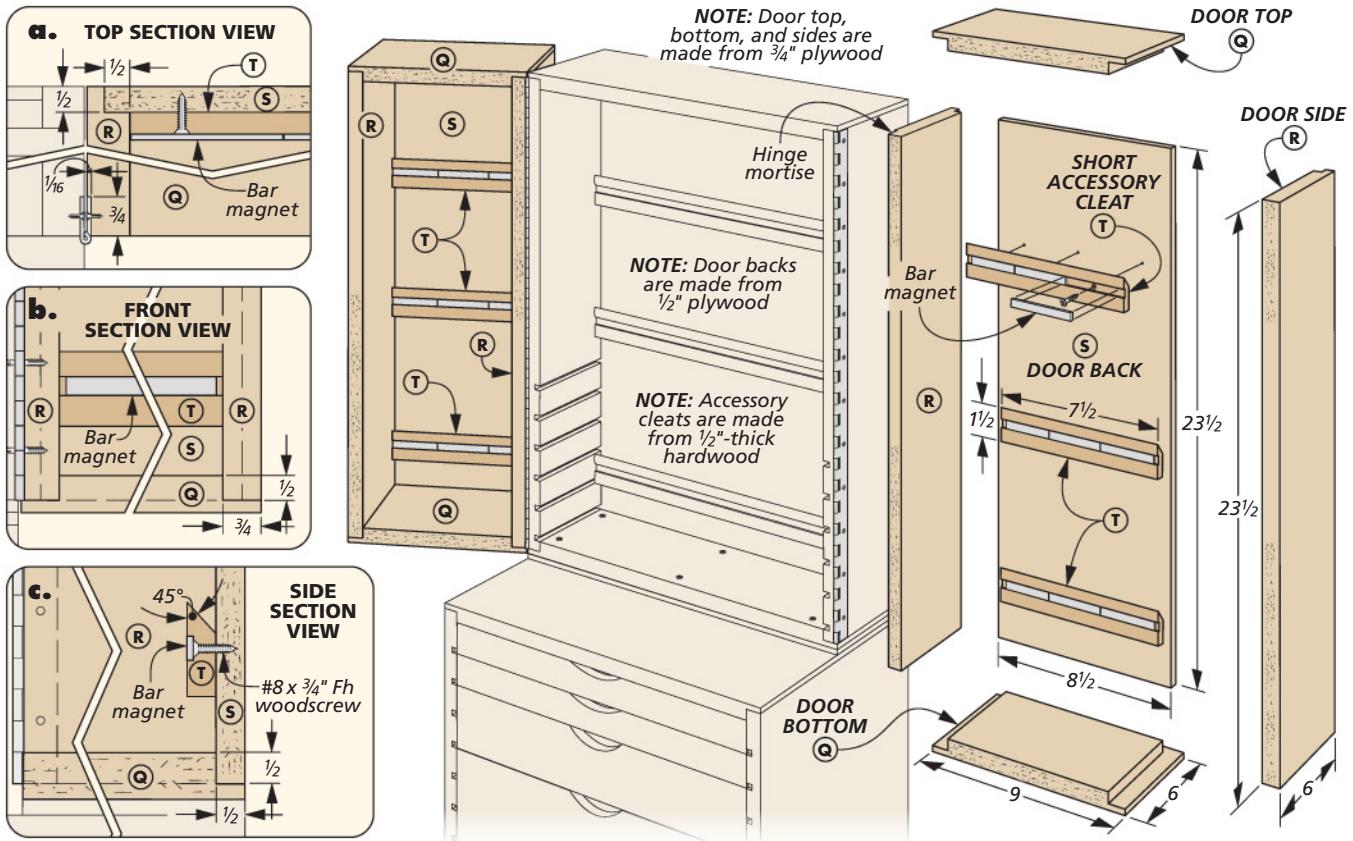
Hinge Rabbet. Each of the upper cabinet sides needs a rabbet along the outside edge for the hinges.



Magnetic Strip. Cut grooves in the accessory cleats using a dado blade. Size the stack to match the width of the magnet.



Bevel the Cleats. Rip one edge of the accessory cleats at an angle to secure the drill bit holders.



mortise that houses a continuous hinge for the doors. Figure 1 on the previous page shows the process for cutting these rabbets. It's a good idea to have the hinges on hand to ensure the rabbet is the correct width and depth.

After assembling the cabinet, I went ahead and made the three accessory cleats and the wall mounting cleats before moving on. Figures 2, 3, & 4 below hit the highlights for these parts.

Again, before cutting the groove in the accessory cleats, it's a good idea to purchase the magnets first to ensure a snug fit. A little epoxy can be used to hold the magnets in place if necessary. I used screws driven in from the back to secure the accessory cleats (detail 'c').

The cabinet portion of the wall mounting cleat can be glued in place on the back. The other half of the cleat is mounted to the wall when the cabinet

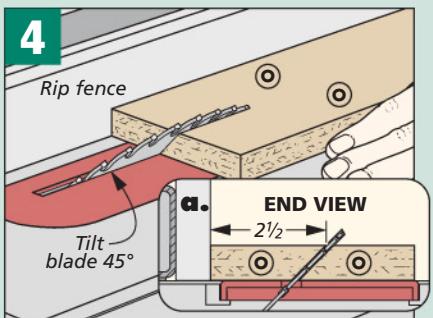
is complete. I also made a spacer to fit between the chest and the cabinet. This keeps the doors from rubbing on the top of the chest when opening and closing the doors.

DEEP DOORS

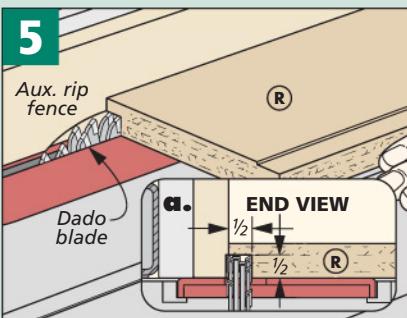
To finish up the upper cabinet, two deep doors help to keep the dust at bay, as well as providing more storage space. There's nothing new to cover here as far as the joinery is concerned. The doors follow the same methods used on the chest and cabinet. This includes making the shallow rabbet on the door edges for the other half of the hinge (shown in detail 'a' above).

The only exception on the door construction is that the backs are held in rabbets (as opposed to grooves) so they fit flush with the door sides. Figure 5 shows this process. Using rabbets instead of grooves provides a clean look when the doors are closed.

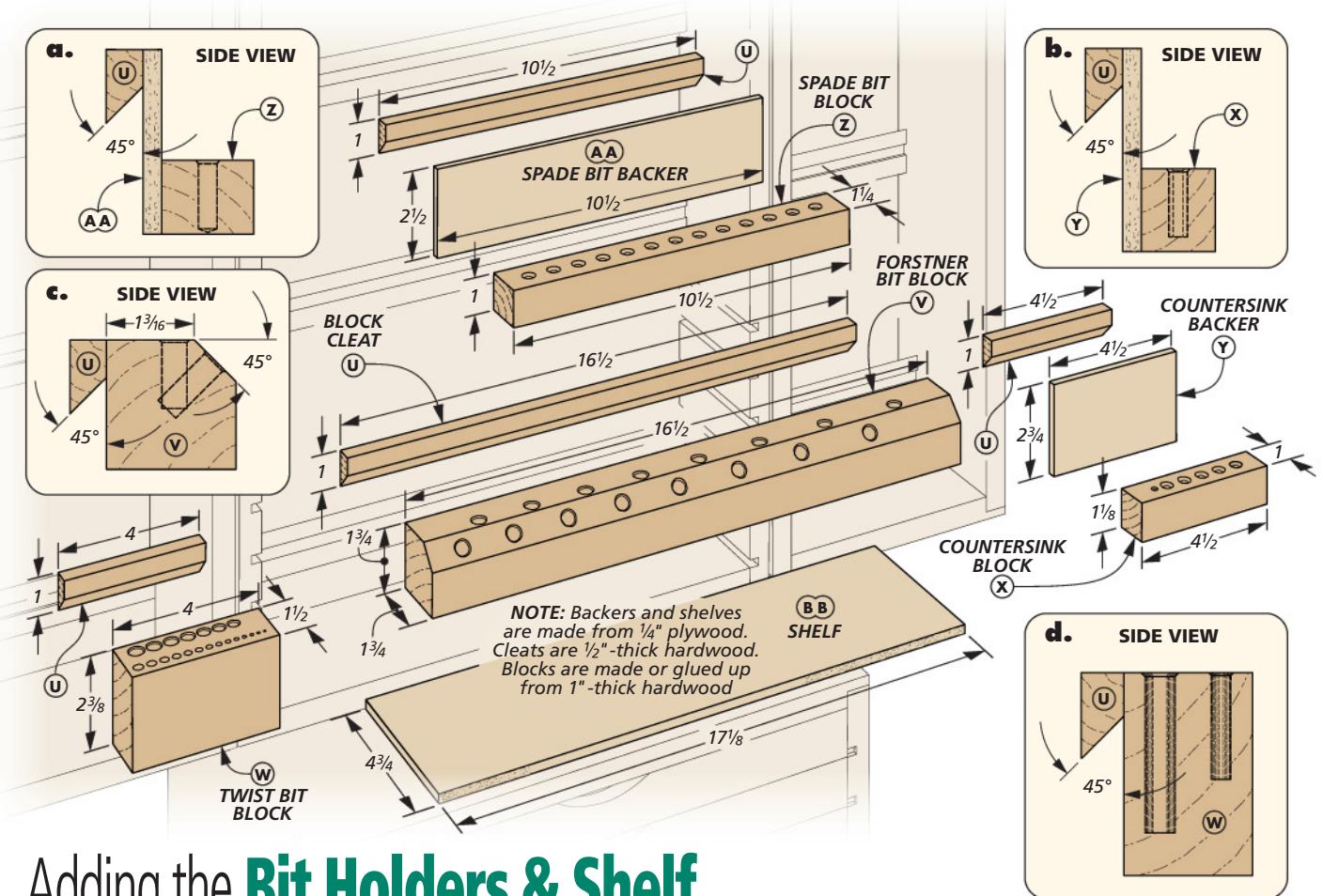
Once the doors are assembled and mounted, the short accessory cleats wrap up this portion of the storage cabinet. Next, the customizable drill bit holders finish things up.



Wall-Mount Cleats. To make the wall-mounting cleats, begin with them as a single blank, then rip the stock at a 45°.



Back Rabbets. Rabbets in the door sides hold the back panel. As with the hinge rabbets, cut these with a dado blade.



Adding the Bit Holders & Shelf

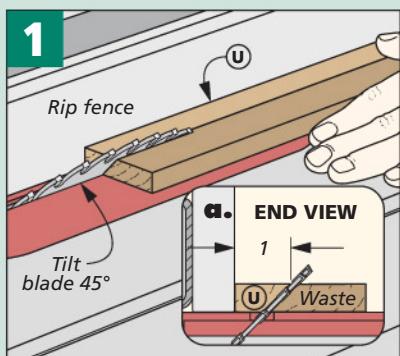
With the upper cabinet complete, it's time to create the drill bit holders and adjustable shelves. The holders are made from a combination of plywood and hardwood blocks, as shown above and in the materials list on the next page.

Now is when you'll want to pull out all of the drill bits and accessories you own to figure out the best way to configure the holders to suit your tools. I fashioned my holders as shown above and on the next page. They consist of a

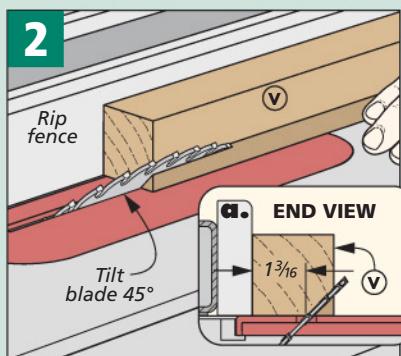
Forstner bit holder, a twist bit and spade bit holder, and even one that holds all of my countersink bits.

CUSTOM CONSTRUCTION. The one common part that's shared by all of the holders is a hardwood cleat secured to the back

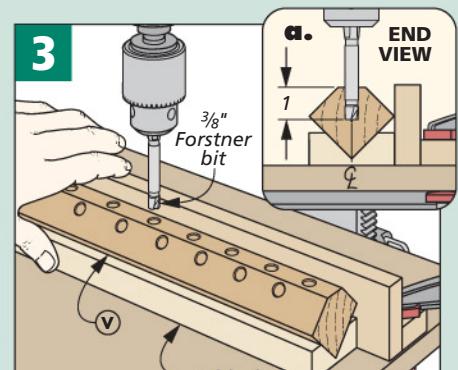
Shape the Bit Holders



Beveled Block Cleats. The cleats attached to the holders are beveled the same way as the other cleats.

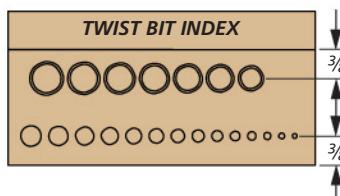


Forstner Bit Block. Chamfering one corner of the Forstner bit block increases the usable storage space.

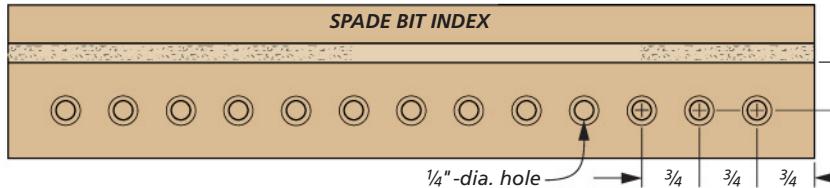
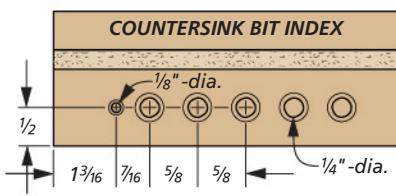


Angled Bit Holes. A scrap board with a V-notch in one face works well to hold the block in the correct position.

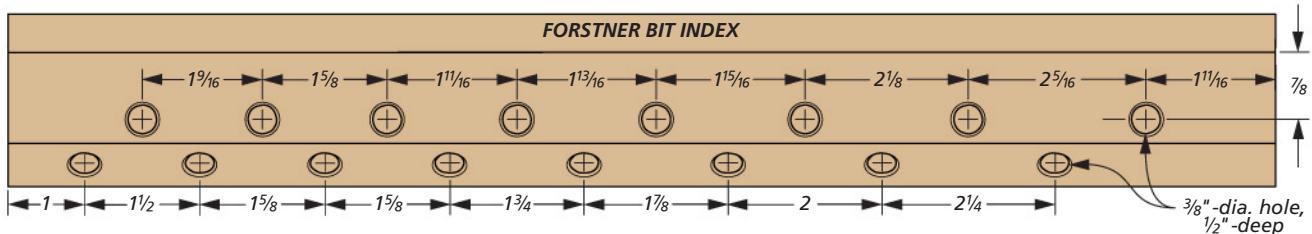
PATTERNS (Enlarge 250%)



NOTE: All holes slightly chamfered on top



For full-size patterns of the drill bit index blocks, go to: WoodsmithSpecials.com



of each one. Figure 1 at the bottom of the previous page shows the process for making the angled rip cut.

Making the blocks for the twist bit and spade bit holders is pretty straightforward. Here, it's just a matter of drilling slightly oversized holes in each one to hold the drill bit shanks. (The oversized holes make it easier to put the drill bits in and take them out.)

FORSTNER BIT HOLDER. The block that holds the Forstner bits is just a little bit trickier

to make. To get maximum storage out of this block, I chamfered one corner of the Forstner bit block to store some of the bits at an angle. Figure 2 shows this cut.

The trouble is, that means you're left having to drill holes in an angled face. To make that process easier, I cut a V-groove in a scrap board to hold the Forstner block at the proper angle while drilling the holes (Figure 3).

PLYWOOD SHELF. All that's left is to cut a plywood shelf to size. There's room for

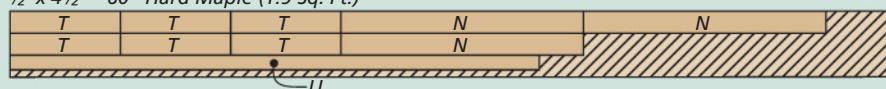
two if you'd like. These simply slip into the dadoes in the cabinet sides.

MOUNTING OPTIONS. This storage project was designed to be mounted on the wall as one unit, as I did in the main photo on page 20. However, you could make a separate set of wall-mounting cleats and attach them to the wall independently. Whichever choice you make, I can guarantee that you'll have a much easier time when you next go looking for a particular drill bit.

MATERIALS, SUPPLIES & CUTTING DIAGRAM

A	Chest Top/Bottom (2)	3/4 ply. - 12 x 18	L	Cabinet Sides (2)	3/4 ply. - 6 x 23 1/2	W	Twist Bit Block (1)	1 1/2 x 2 3/8 - 4
B	Chest Sides (2)	3/4 ply. - 12 x 11 1/4	M	Cabinet Back (1)	1/2 ply. - 17 1/4 x 23 1/4	X	Countersink Block (1)	1 x 1 1/8 - 4 1/2
C	Chest Back (1)	1/4 ply. - 11 1/4 x 17 1/4	N	Long Acc. Cleats (3)	1/2 x 1 1/2 - 16 1/2	Y	Countersink Bckr. (1)	1 1/4 ply. - 2 3/4 x 4 1/2
D	Small Front/Back (4)	1/2 ply. - 1 1/2 x 16 1/2	O	Wall Cleats (4)	3/4 ply. - 2 1/2 x 16 1/2	Z	Spade Bit Block (1)	1 x 1 1/4 - 10 1/2
E	Small Sides (4)	1/2 ply. - 11 1/4 x 10 3/4	P	Spacer (1)	1/4 ply. - 6 x 18	AA	Spade Bit Backer (1)	1/4 ply. - 2 1/2 x 10 1/2
F	Med. Front/Back (2)	1/2 ply. - 3 x 16 1/2	Q	Door Top/Bottom (4)	3/4 ply. - 6 x 9	BB	Shelves (2)	1/4 ply. - 43/4 x 17 1/8
G	Med. Sides (2)	1/2 ply. - 2 3/4 x 10 3/4	R	Door Sides (4)	3/4 ply. - 6 x 23 1/2	•	(6) #8 x 1 1/2" Fh Woodscrews	
H	Large Front/Back (2)	1/2 ply. - 4 1/2 x 16 1/2	S	Door Backs (2)	1/2 ply. - 8 1/2 x 23 1/2	•	(4) #8 x 1" Fh Woodscrews	
I	Large Sides (2)	1/2 ply. - 4 1/2 x 10 3/4	T	Short Acc. Cleats (6)	1/2 x 1 1/2 - 7 1/2	•	(24) #8 x 3/4" Fh Woodscrews	
J	Bottoms (4)	1/4 ply. - 10 3/4 x 17 1/8	U	Block Cleats	1/2 x 1 - 36 rgh.	•	(2) 24" Continuous Hinges	
K	Cabinet Top/Bottom (2)	3/4 ply. - 6 x 18	V	Forstner Bit Block (1)	1 3/4 x 1 3/4 - 16 1/2	•	(36) 60mm x 10mm Bar Magnets	

1/2" x 4 1/2" - 60" Hard Maple (1.9 Sq. Ft.)



1" x 3" - 36" Hard Maple (Two boards @ .9 Bd. Ft. each)



ALSO NEEDED: One 48" x 96" sheet of 1/4" Birch plywood. One 48" x 96" sheet of 1/2" Birch plywood. One 48" x 96" sheet of 3/4" Birch plywood



Machinist's Tool Chest

With conscious plans for materials and a few design modifications, you can turn this garage staple into a showcase tool chest.



A few years ago, I found a dusty, beat-up, three-drawer machinist's tool box in the basement of my 1900-built farmhouse. Originally made by noted tool manufacturer, C.E. Jennings, it had been modified several times and wasn't in very good condition. After cleaning out the contents, I've used the box to store numerous things over the years, most recently my collection of files and rasps and various other small tools. It's been a valued part of the way I work but it had some limitations that made it less than perfect for a woodworker.

I decided to build a slightly modified version of the chest to address those limitations. The biggest changes are having two drawers instead of three, and a deeper top well. These changes allow me to store saws, planes, and chisels in the box — something that was quite difficult to do with the limited storage space in the original.

DOWEL JOINERY

The original box is built from chestnut and finished with a dark stain. When studying the original, I was unable to intuit much about the way the case of the box was constructed. Unfortunately, no joinery is visible from the outside. However, I could put together the clues. Given that this early 20th Century box was produced in a factory, I figured that the box was either splined or doweled together. Due to the ease of doweled construction in a hand-tool only shop like mine, I chose this method.

BUILDING THE CASE. The construction begins by laying out and cutting the parts to the dimensions listed in the cutting list on page 31. To hold the case together, I used $\frac{1}{4}$ " dowels: two at each of the top corners and three in each of the bottom corners. I use a marking gauge to lay out the drilled holes in each piece. There are dowel center points available commercially, but I personally get better results if I lay out each hole with scribed lines and carefully drill them.



Preparing the Stock. I ripped all of the parts for this project by hand. Ripping with a handsaw isn't much fun, but it is a foundational skill. In some cases, I'll knock down stock with a hatchet to move things along quickly before approaching my line with a plane



Side Rabbets. Cutting the rabbets for the side panels depends as much on layout as it does skill with the cutting tools.



Case Frames. Test-fit the frames before assembling them. Once the side frames are together, plane the outsides flush.

Test fit the two side frames together without glue and make any necessary adjustments. Once that's done, lay out and cut the $\frac{1}{2}$ " deep $\times \frac{3}{8}$ " wide rabbets in the top and bottom pieces that make up the two side frames (Step 2 above). Then, glue and clamp up the side frames and set them aside to dry. The side panels will simply float in the rabbet for now. Later on they will be held in place with the drawer runners, so you can make the panels and fit them while the frames are still in the clamps. For now, aim for a gap-free fit on the vertical pieces and rely on the top and bottom edges to hold the panel in place.

The two front pieces are constructed in exactly the same fashion as the side pieces. Crosscut and plane them to precise length, then dowel them in place. Dry-fit the joinery, using a clamp to draw it all together, then make any necessary adjustments to ensure two square sides with gap-free corners. Once you're satisfied with how the pieces are fitting, glue up a board wide enough for the case back and carefully fit it into the dry-assembled frame to determine the proper size. After that, dowel it into place with four $\frac{1}{4}$ " dowels (one at each corner). With all the corners fit to your specification, glue up the case.

Case Braces

After an hour or so in the clamps, install the four bottom corner braces on the inside of the case. This is somewhat of an unusual technique, but the original has them so I followed suit. The original had steel braces but I chose to spend the extra money and go with brass to match the rest of the hardware (Step 4).

TOP WELL. The top corners will also get these brackets, but they must wait until the top well's bottom board is in place. The next step is to make $\frac{1}{2}$ " square strips

which will support the top well's bottom from below. These are screwed into place with 1" long #6 woodscrews, as in Step 5. To make sure that each strip is installed squarely, I butted each strip against the end of a combination square rule set to the proper depth, with the fence resting on the top edge. Be sure to pre-drill each strip as the woodscrews will likely split the strips otherwise.

With the strips in place, cut a piece of $\frac{1}{4}$ " plywood to fit the opening and plane

it so that it just drops in and rests on the strips. Once you're happy with that fit, attach the top corner brackets so that the brackets hold the bottom tightly down onto the strips below (Step 6). It can be a bit finicky to get the screws installed due to the limited clearance but it's possible if you pre-drill screw holes of the proper size and take your time.

DRAWER RUNNERS

The drawer runners which support the top drawer actually perform four separate duties. In addition to providing the running surface for the top drawer, the runners serve as drawer stops. They help hold the side panels in place as well, and will also ultimately hold the screws which attach the side handles. They're made from $\frac{3}{4}$ " square strips of beech and are placed so that the center of the runner is precisely in the middle of the front drawer opening.

To mark out their precise length, set the case on its back, then take a scrap piece of $\frac{3}{4}$ " material and put it on the inside face of the backboard. You can see this in action in Step 7 on page 32. I use a piece of $\frac{3}{4}$ " scrap here because the drawer faces are $\frac{3}{4}$ "-thick, and this will ensure that the drawer stops with its face flush to the case sides. Put the runner in place on top of the scrap, then use a pencil to draw a line on the runner where the runner intersects with the front edge of the case. Cut the runner on this line using a fine crosscut backsaw.

INSTALLATION. The runners are screwed into place using countersunk, $\frac{3}{4}$ " #6 wood screws: one in each of the case side stiles and one into the center of each of the side panels (as in Step 8 on page 32).

BOTTOM RUNNERS. The bottom drawer runners are the same width as the bottom front case rail but require a notch on each end to clear the lower brackets.

Once the runners are affixed, rough cut a piece of $\frac{1}{4}$ " plywood to fit the case bottom. Screw it into place using $\frac{3}{4}$ " wood screws. Once the bottom is in place, plane the edges flush to the case using a sharp block plane.



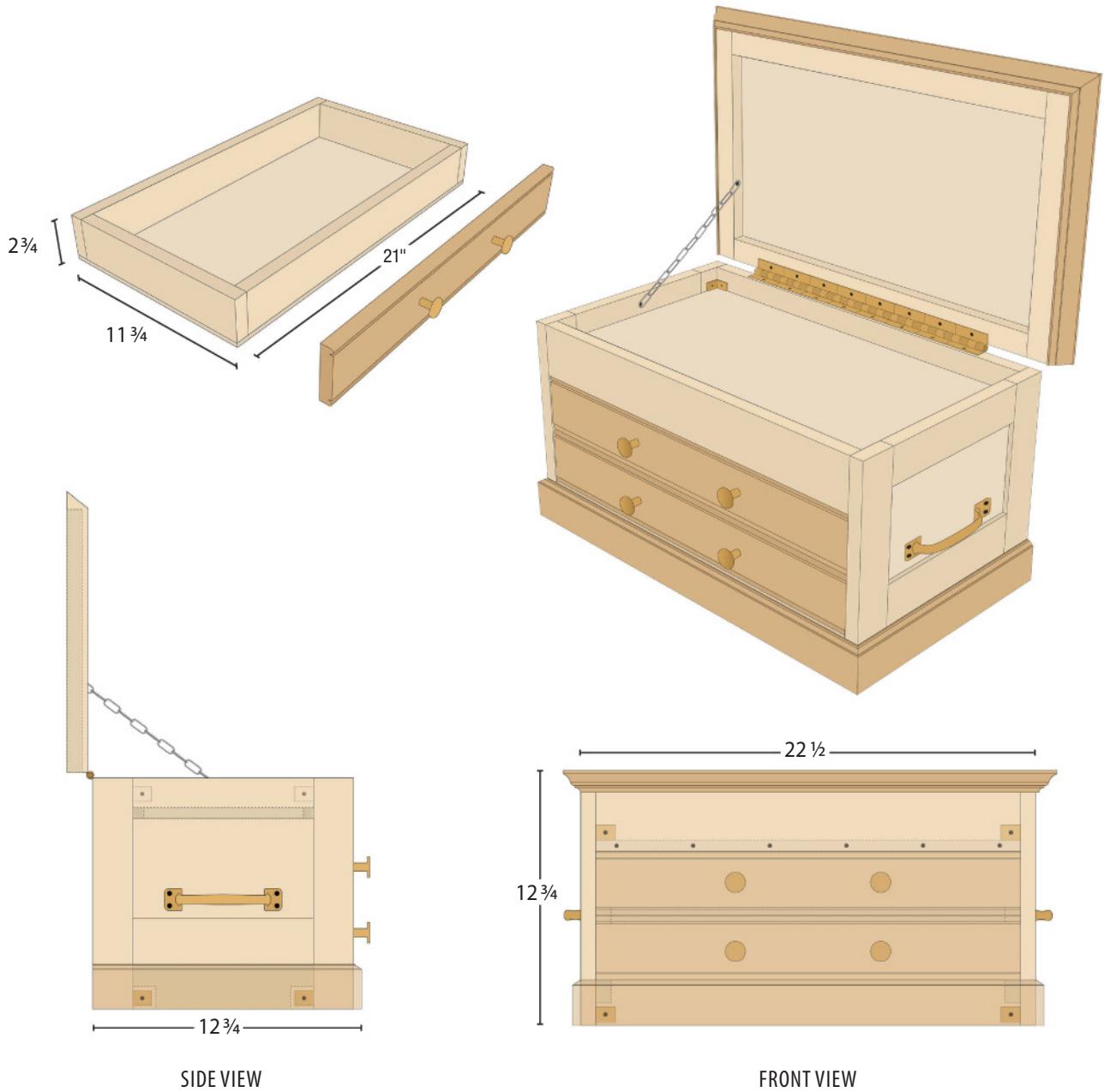
Brass Brackets. The corner brackets were steel on the original but I opted for brass.



Supporting Strips. Pre-drill the ledger strips that will support the well bottom. Once these are in place, you can add the bottom for the top well of the box.



Pinned in Bottom. Size the bottom of the well to fit snugly in its opening. Once it's sized, attach the corner brackets to pin it in place on top of the ledger strips.



MATERIALS & SUPPLIES

CASE

A	Side Upper Rails (2)	$\frac{3}{4} \times 2 - 9$
B	Side Bottom Rails (2)	$\frac{3}{4} \times 4\frac{1}{2} - 9$
C	Side Stiles (4)	$\frac{3}{4} \times 2 - 11\frac{1}{4}$
D	Side Panels (2)	$\frac{1}{4} \text{ ply.} \times 6 - 10$
E	Front Top (1)	$\frac{3}{4} \times 2\frac{7}{8} - 21$
F	Front Bottom (1)	$\frac{3}{4} \times 2 - 21$
G	Case Back (1)	$\frac{3}{4} \times 11\frac{1}{4} - 22\frac{1}{2}$
H	Case Bottom (1)	$\frac{1}{4} \text{ ply.} \times 13 - 22\frac{1}{2}$
I	Top Well Bottom (1)	$\frac{1}{4} \text{ ply.} \times 11\frac{1}{2} - 21$
J	Top Well Side Strips (2)	$\frac{1}{2} \times \frac{1}{2} - 10\frac{1}{2}$
K	Top Well F&B Strips (2)	$\frac{1}{2} \times \frac{1}{2} - 21$

LID

L	Subframe Sides (2)	$\frac{3}{4} \times 1\frac{1}{4} - 13$
M	Subframe F&B (2)	$\frac{3}{4} \times 1\frac{1}{4} - 22\frac{3}{4}$
N	Panel (1)	$\frac{1}{4} \text{ ply.} \times 13 - 22\frac{3}{4}$

DRAWERS

P	Top Drawer Runners (2)	$\frac{3}{4} \times \frac{3}{4} - 11\frac{1}{2}^*$
Q	Bttm. Drawer Runners (2)	$\frac{3}{4} \times 2 - 11\frac{1}{2}$
R	Drawer Sides (4)	$\frac{3}{4} \times 2\frac{1}{2} - 11$
S	Drawer Backs (2)	$\frac{3}{4} \times 2\frac{1}{2} - 21\frac{1}{2}$
T	Drawer Fronts (2)	$\frac{3}{4} \times 2\frac{1}{2} - 19\frac{1}{2}$

U Drawer Bottoms (2) $\frac{1}{4} \text{ ply.} \times 11\frac{3}{4} - 21$

CASE MOULDINGS

V	Case Moulding Sides (2)	$\frac{3}{4} \times 2 - 13$
W	Case Moulding Front (2)	$\frac{3}{4} \times 2 - 21\frac{1}{4}$
X	Top Moulding Front (1)	$\frac{3}{4} \times 1 - 24\frac{1}{2}$
Y	Top Moulding Sides (2)	$\frac{3}{4} \times 1 - 13$

*Centered to opening, screw to side and set $\frac{3}{4}$ " from opening

Runners. Use a $\frac{3}{4}$ "-thick scrap to precisely mark out the drawer runner length.



Locating the Runners. Use a piece of sandpaper to ensure that the runner is just slightly higher than the bottom case inside rail. This prevents hangups when fitting the drawer.



With the drawers finished, bead the top and bottom edges of both drawers.

Drawer Construction & Mouldings

On the original, the drawers were simply butt nailed together from plywood with an added front made from chestnut. I've chosen to replicate this in my chest (the original did survive a century of use), but you may choose to dovetail them together. To produce nailed-together drawers that approximate the original ones, I planed up stock to the proper width, which must accommodate the $\frac{1}{4}$ " drawer bottoms, then I crosscut them to length. Nail them into a square drawer box and nail on the $\frac{1}{4}$ " plywood drawer bottoms as well.

Test fit the drawers and adjust as needed to ensure they operate smoothly. The boxes should stop about $\frac{1}{4}$ " from the front edge of the drawer runners.

DRAWER FRONTS. Once the drawer boxes fit properly, it's time to make the faces. I used beech for these. Shoot the ends so that they just slip into the opening, and then screw each face onto their respective drawer box. On the top drawer, the face should overhang the bottom of the box by $\frac{3}{8}$ " to engage the drawer runner/stop. On the bottom drawer, the opposite is true, the top edge of the drawer face should stick up that same $\frac{3}{8}$ " over the top of the drawer box. Fit the drawers at the same time to identify any clearance issues. Once any issues have been corrected with a sharp plane, cut a $\frac{5}{16}$ " bead along the top and bottom edge of each drawer, four beads in all. When that is done, the drawers are finished.

BOTTOM MOULDING. The final step on the case is to produce a run of moulding to wrap around the case along the bottom. This helps to hide the plywood bottom and provides a finished look. The moulded board should be slightly narrower, perhaps $\frac{1}{8}$ ", than the bottom front rail. Miter the mouldings and then attach them with wood screws from the inside. You may find it beneficial to temporarily remove the plywood case bottom when attaching the mouldings. If you do so, make sure to use a scrap piece of plywood as a spacer to ensure that you overhang the mouldings over the bottom case edge far enough to account for the thickness of the bottom.

THE TILTING TOP

The top subframe is made from $\frac{3}{4}$ " x $1\frac{1}{4}$ " beech. Each corner is half lapped and then held together with a single wood screw driven in from the top face (this way no screwheads are visible on the inside). I made the top so that it overhangs about $\frac{1}{8}$ " over the case front and sides while holding the back edge flush with the case back. This will make the top easy to open later on without significantly impacting its ability to protect the contents inside from dust and moisture.

Begin by measuring the top of the case and then add $\frac{1}{4}$ " to the width and $\frac{1}{8}$ " to the depth and cut the pieces to those newly revised lengths. Half lap the corners by laying the front and back frame pieces on top of the two side pieces in a square, then marking the shoulders on the components. You'll be cutting away

10



Lid Panel. Trim the plywood skin so that it's flush with the frame pieces. Once the whole assembly is square, it's ready to be covered with molding.

11



Lid Hinge. Scribe the top hinge prior to mortising. Temporarily attach one side to the case, then use spacers to mark out the other half of the hinge.

12



Handles. Brass sash handles are screwed through the sides and into the drawer runners. This gives the handles plenty of support when moving the chest, even if it's full.

half the thickness of each frame piece, so mark out $\frac{3}{8}$ " away from the bottom face on each using a marking gauge. Using a rip-filed backsaw, remove the bottom $\frac{3}{8}$ " on the front and back pieces and the top $\frac{3}{8}$ " on the two side pieces. Cut the shoulders with a crosscut-filed backsaw. Use a sharp chisel to refine the joint, then test fit the frame. Each corner should overlap properly, producing a flat frame that's square. Then, pre-drill each corner for a screw and drive in a $\frac{3}{4}$ " woodscrews.

TOP PANEL. The frame is skinned on the top with a $\frac{1}{4}$ " piece of plywood. Use whatever species you desire (I went with an attractive piece of red oak). Cut it to rough size, then glue it down to the top of the frame using long beads of wood glue. Clamp it down and set it aside to dry. When it's dry, plane all four sides of the top skin flush to the frame using a sharp block plane. Install the top using a continuous hinge, mortising as necessary to ensure a flush, tight fit between the top and the lid (Step 11).

When you've got the hinge installed correctly, remove the top from the hinge, cut and fit another piece of $\frac{1}{4}$ " plywood to the inside of the frame so that it fits inside the center edge of the frame, and glue it down to the inside of the top skin. This provides a more attractive inside surface than whatever is on the back side of the upper plywood panel.

Once the top is reinstalled, cut a length of $1\frac{1}{4}$ " tall by $\frac{3}{4}$ " wide moulding. The profile for the moulding is up to you but I used a small ogee with a fillet. Miter cut the moulding to wrap around the two sides and the front edge of the top, then glue and nail it in place with the top edge of the moulding flush to the plywood top skin.

FINISHING TOUCHES

With the chest constructed, it's time to install the handles. I used brass sash handles from the hardware store but feel free to be as fancy or as modest as you like. The important consideration here

is to ensure that the handles are at least partially screwed into the side drawer runners. This provides a much stronger substrate for the screws over just attaching them into the $\frac{1}{2}$ " side panels. It's acceptable to have a few screws that only go into the panel but at least half of them truly need to enter the runner.

LOCATING THE PULLS. Before installing the drawer pulls, you'll need to lay out their locations. Mark out small pencil lines on the top edge of the case approximately 5" in from the sides of the case. Next, take a square and draw a light pencil line to extend both marks down across both of the drawer faces. Then, divide each drawer width in half and strike a light horizontal line across the previously drawn vertical lines. Those intersections mark the points where the pull knobs should be installed. Pre-drill and test fit the pulls to ensure they line up properly.

FINISH. Remove the hardware before finishing. Erase any stray pencil lines then sand the entire project to #220 grit. I finished the chest with my favorite wood finish ("boat soup"), which is nothing more than equal parts pine tar, turpentine and linseed oil. I wiped three coats on the exterior and, after it dried, applied a coat of paste wax. I also applied paste wax to the drawer runners to help the drawers operate smoothly.

Once the finish has dried, the fun part begins: filling the chest with your prized collection and figuring out the best way to fit everything inside. Enjoy!





Premium Workstations

The heart of a shop is where you get things done: the workstations. The projects you'll find in this section range from exceedingly simple to intriguingly intricate, catering to a wide variety of shops.

THREE PLYWOOD PROJECTS.....36

BLADESMITH'S ANVIL STAND46

MOBILE ASSEMBLY CENTER52

ALL-IN-ONE WORKSTATION.....60



3 Plywood Projects

The simple plywood construction and solid design of this workbench and the following workstations makes a quick, low-cost addition to your workshop.

One of the most overwhelming feelings that a new woodworker can have as they're starting this hobby is the need for room to work and shop storage. You've spent time researching, looking at, and buying tools. Now, you need worksurfaces and a place to store those tools.

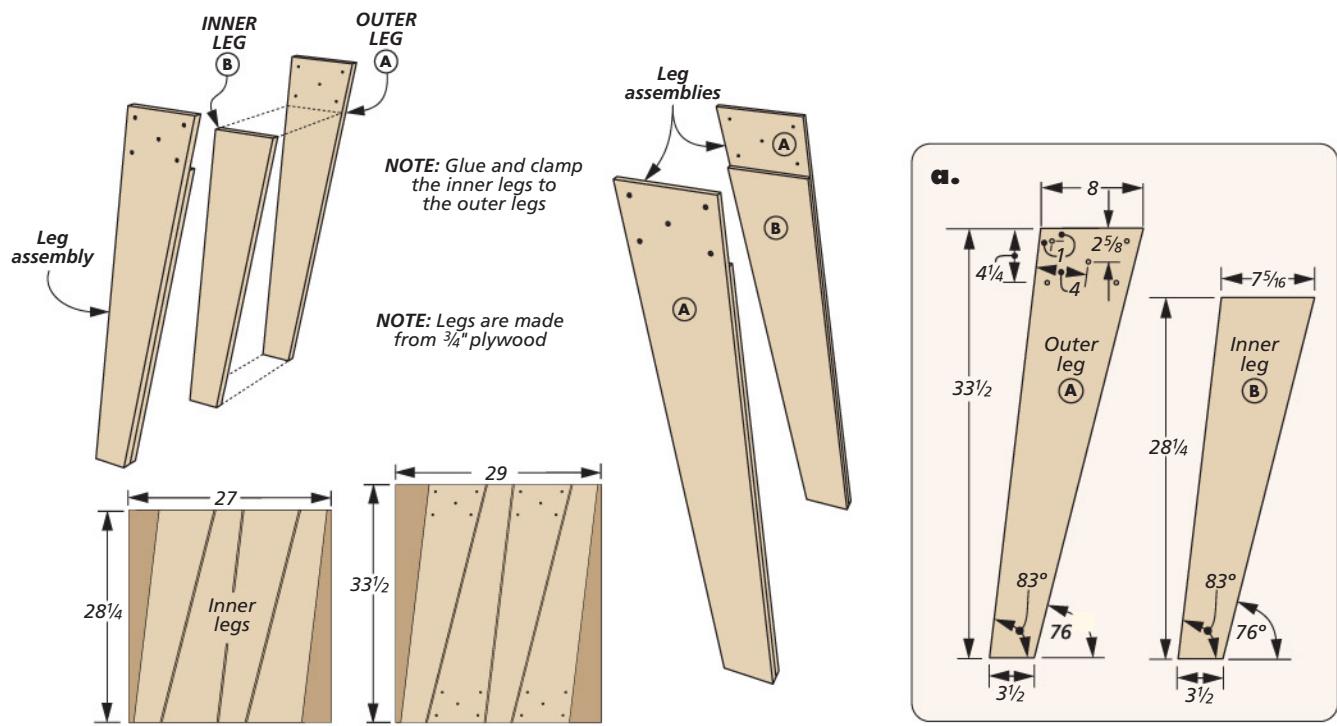
This plywood shop ensemble is the perfect project for the new woodworker, or the seasoned shop pro that needs additional work space or storage. It includes a workbench, a pair of power

tool workstations, and a rolling cart, which you can build with a few sheets of plywood and a couple basic tools.

When looking at the group of projects, the logical place to start is with the workbench. A workbench tends to be the center of any shop and this plywood workbench is no exception. The bench is light enough to move around, but its splayed legs and supporting ribs (located under the top) give this bench a solid, stable worksurface, ensuring it

will be the perfect platform for all your projects down the road.

In addition to the three projects you'll find here, we also designed a wall shelf and a pair of adjustable supports. The wall shelf features a built-in tool rack (handy for all of those tools that you need close by while working at the bench) while the supports can function as either sawhorses or outfeed supports. You can find the plans for these online at WoodsmithSpecials.com.



LEG CONSTRUCTION

All of the projects in this series are built out of $\frac{3}{4}$ " pine plywood. Any $\frac{3}{4}$ " plywood will work, but the key is to make sure that it's flat and has at least two true edges. Keep in mind that higher quality plywood will have less voids and defects. If you'd like a little bit more weight in your workbench, MDF could be used for the top and shelf instead of plywood. However, MDF is not quite as durable as plywood and could wear faster.

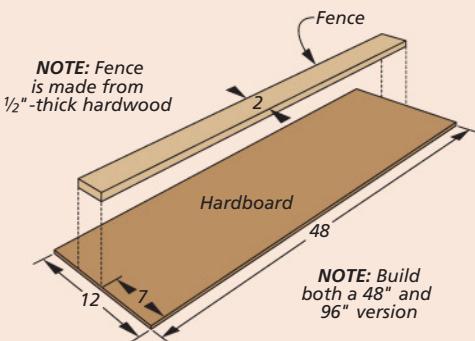
SPLAYED LEGS. Like I mentioned earlier, the splayed legs on this workbench are the key to its stoutness. As you can see in the illustration above, the legs are made from two layers of plywood that are glued up to create a $1\frac{1}{2}$ "-thick leg assembly. Note that the outer leg is longer than the inner leg to create a ledge for the top assembly later on.

The layout of the legs is about the trickiest part of this bench, but don't let the angles scare you. Simply cut a couple pieces of plywood to the

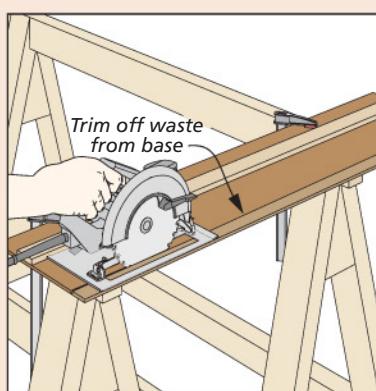
dimensions shown above. You can then use the dimensions shown in detail 'a' to layout the legs. This method results in a minimal amount of cuts and less waste. And speaking of cuts, I used a simple, shop-made guide for use with a circular saw. The details for the cutting guide are shown in the How-To box below.

The outer leg gets predrilled at the top, as shown in detail 'a'. Then, the outer and inner legs are glued and clamped together. With the leg assemblies ready, you can move on to the top.

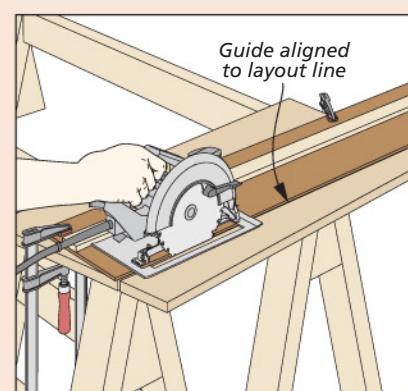
How-To: Make a Cutting Guide



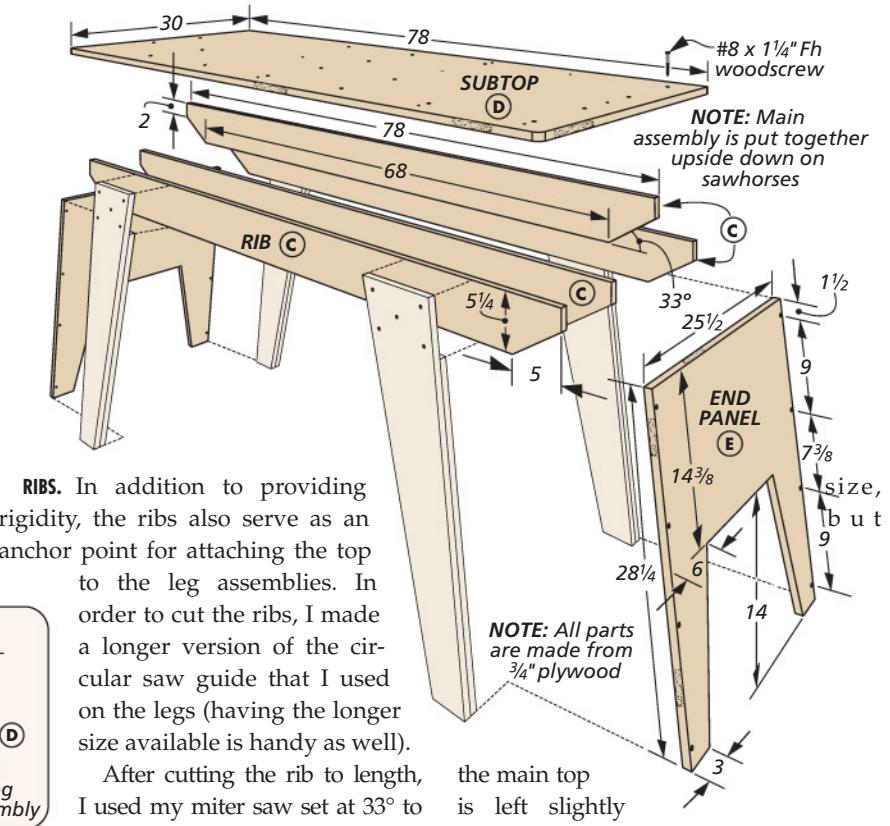
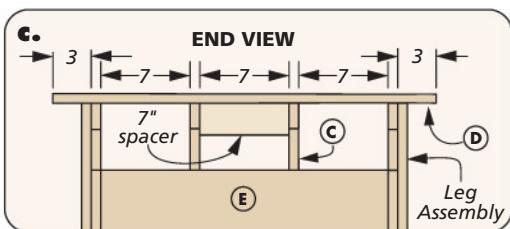
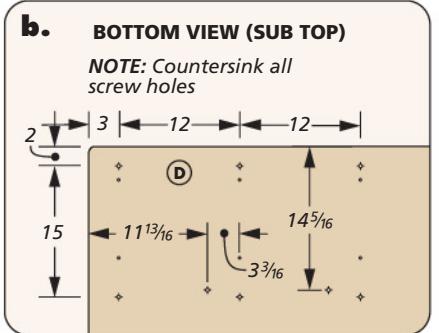
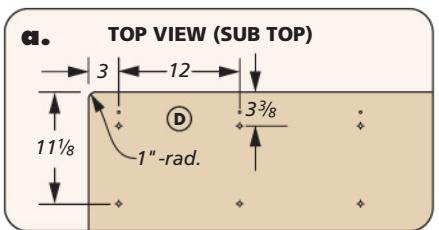
Build the Guide. Using a piece of $\frac{1}{4}$ " hardboard as a base, glue and clamp a hardwood fence on top.



Trim Waste. Clamp the guide down and use your circular saw against the fence to remove the waste.



Making Cuts. Simply align the edge of the guide to your layout line, clamp it down and make your cut.



RIBS. In addition to providing rigidity, the ribs also serve as an anchor point for attaching the top to the leg assemblies. In order to cut the ribs, I made a longer version of the circular saw guide that I used on the legs (having the longer size available is handy as well).

After cutting the rib to length, I used my miter saw set at 33° to clip the corners. The exact angle of the taper on the end of the ribs isn't important. Just chose an angle that you feel is aesthetically pleasing and is easy to cut on your miter saw.

SUB & MAIN TOP. The two-layer top is key to adding weight to the workbench. The main top acts as your worksurface while the subtop is fastened to the ribs below. To cut out both tops, I used the circular saw guide. The subtop is cut to finished

the main top is left slightly oversized and set aside for now.

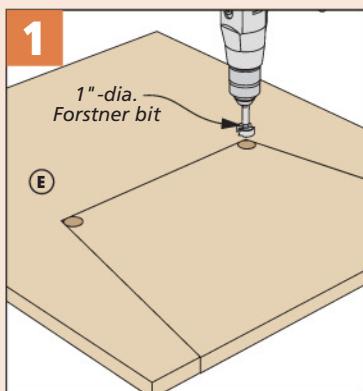
The corners of the subtop are rounded. I cut a 1" radius with a jig saw and sanded to the line. Layout lines are then drawn on the subtop for locating the screw holes needed to attach the ribs. Details 'a' and 'b' provide all the information you'll need.

END PANELS. The leg assemblies are connected by two end panels. The dimensions for the end panels are shown in the illustration above. To cut the opening in

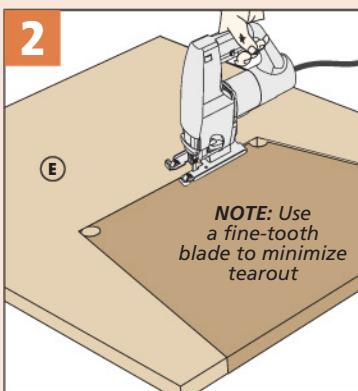
Add the Top & Shelf

With the legs completed, you can turn your focus to the rest of the workbench. The top is made from two layers of plywood—the main top and subtop. Underneath the top are four ribs that provide support along the length of the top to prevent sagging.

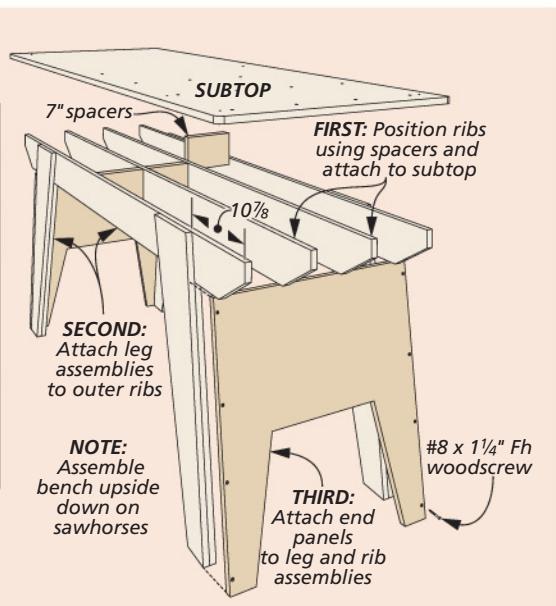
How-To: Cut End Panels & Assembly

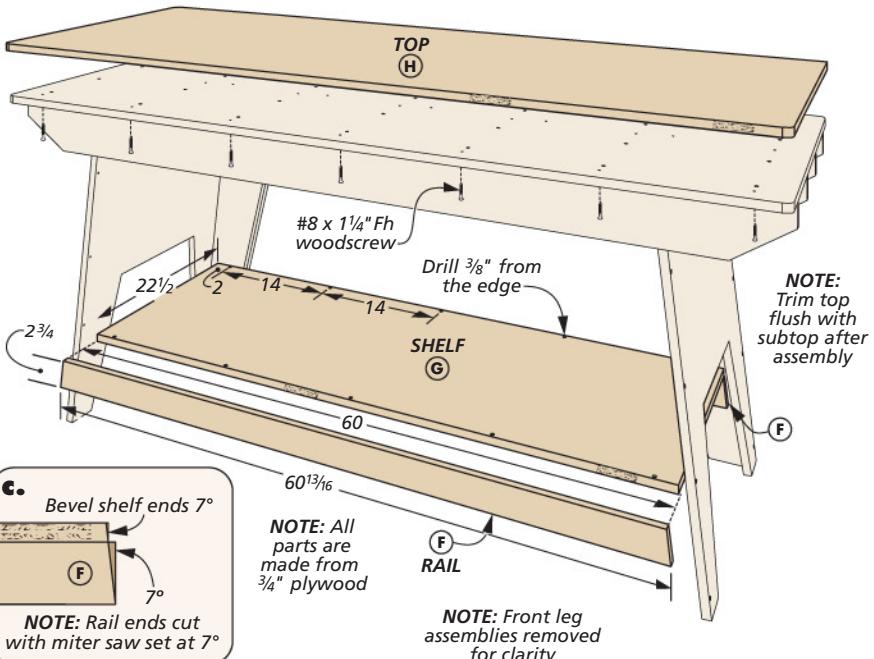
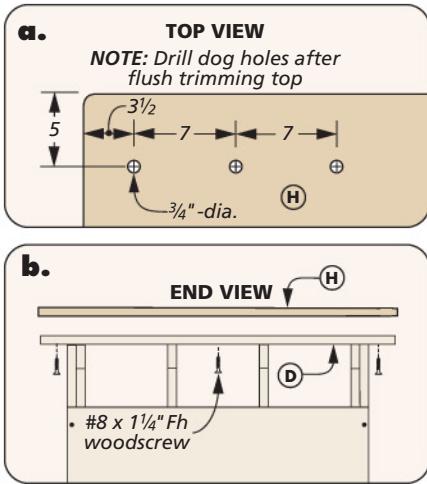


Clean Corners. Define the inside corner of the end panels using a 1"-dia. Forstner bit.



Clean Cuts. After drilling the corners, the waste is removed using a jigsaw with a fine-tooth blade.





each end panel, check out the How-To box on the previous page.

PUTTING IT ALL TOGETHER. Now you're ready to do a little preassembly. The first order of business is to attach the ribs to the subtop. See the lower right drawing on previous page. This procedure is best done on a pair of sawhorses, with the subtop upside down.

Using the layout marks, carefully align the first rib and glue it and secure it through the top using screws from below. Next, I positioned the rest of the ribs using 7" spacer blocks, as shown in detail 'c' on the previous page. After all the ribs are attached, the leg assemblies can be added. Use glue and screws to attach the legs to the outermost ribs. Once the legs have been attached to the rib and subtop assembly, you can

install the end panels. These are simply screwed in place.

SHELF & RAILS

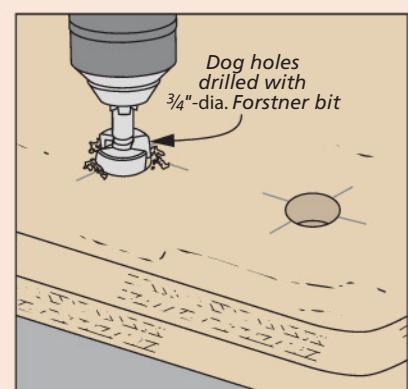
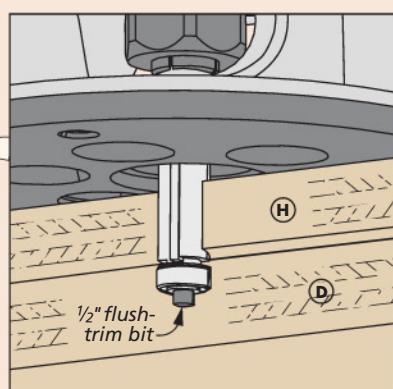
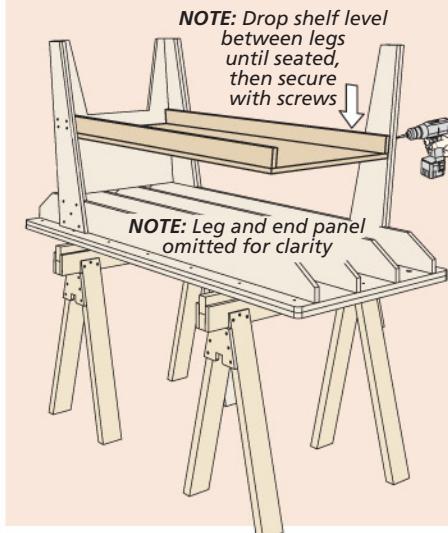
A pair of rails support the shelf between the leg assemblies. The ends of the rails are cut at a 97° angle to seat inside the angle of the legs, as shown in the main drawing and detail 'c' above. The shelf is also beveled along both ends to match the angle of the bench rails. Holes along the front and back allow it to be attached to the rails.

With the bench still upside down, drop the shelf assembly into place between the two sets of legs, as shown in the leftmost

drawing in the box below. Secure the shelf rails to the legs with screws.

RIGHT SIDE UP. From here, you can turn the bench upright once more. Center the main top on the subtop and glue and screw them together from underneath. Next, grab a router with a flush trim bit and trim around the main top, making it flush with the subtop (middle box below). Lay out the dog holes according to detail 'a' above in order to avoid screws and the ribs. Drill the dog holes using a Forstner bit, as shown in the right box below. Take care when drilling the dog holes to keep the drill square to the benchtop.

How-To: Finish the Top



Trim Main Top. Using a router and a flush trim bit allows you to trim the top flush with the subtop.

Dog Holes. Following the layout lines to avoid hitting screws, drill dog holes using a $\frac{3}{4}$ "-dia. Forstner bit.



Dual Stands

Two of the tools that I constantly use in my shop are the miter saw and router table. So, it was only natural that those tools were up near the top of the list when building this plywood shop set. The miter saw stand brings work up to a convenient height, and the router table — well, let's just say my router table has become one of the most used tools in

my shop. I started by building the base for the stand. Both the router table and miter saw station use the same base; if you're planning on building both, go ahead and make two. Screws and butt joints make these quick to put together.

SIDE ASSEMBLIES. The stand is made up of two side assemblies, joined with a shelf and top. Each assembly consists

of an inside and outside leg, connected by a panel. The legs are simply butted together at a right angle, as shown in detail 'a' on the next page. Here again, a circular saw and cutting guide make quick work of ripping the legs to size. Then, the legs can be cut to length on the miter saw.

I beveled the bottom of each leg with a jigsaw. Detail 'b' provides the dimensions



Great Router Table. Adding a router insert and a clamp-on fence converts the tool stand from a miter saw station into a versatile router table.

Miter Saw Station. A pair of adjustable supports are the perfect complement to the miter saw station and can lend an extra hand anywhere in the shop.

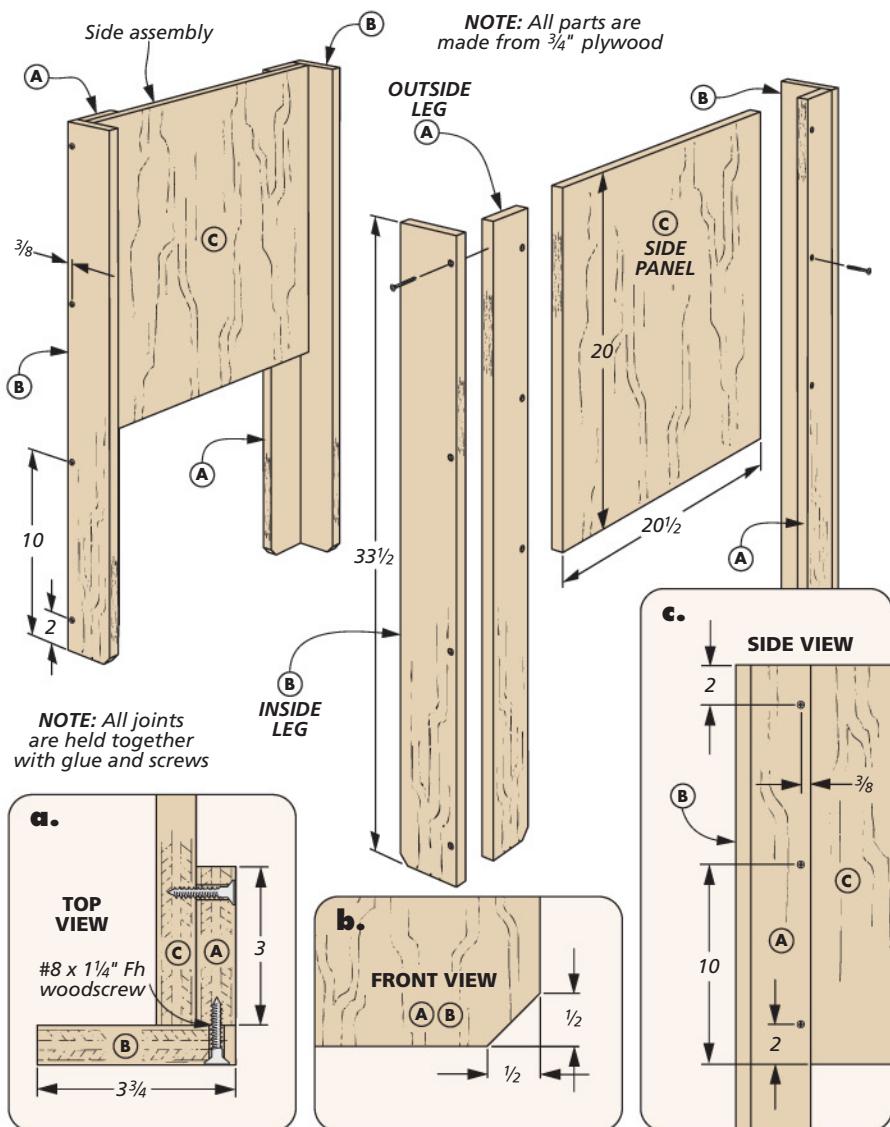


for the bevel cuts and Figure 2 below outlines the cuts with the jig saw. A few screws and some glue are all that's needed to secure the legs together.

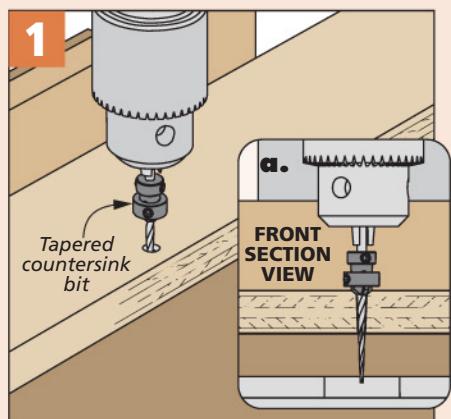
The front and back leg assemblies are connected with a plywood panel. After cutting the panel to size, you can attach it to the legs. Here, you'll want to raise the panel off the bench to get the legs attached to the panel. I found it's easiest to use spacers to lift the panel off the bench (Figure 3 below). With the panel elevated, glue can be applied to the edge of the panel and the leg assemblies can be held in place with screws.

PRE-FINISHING. At this point, I chose to add a coat of finish to the sides. As you can see in the photo on the previous page, I painted all of the shop projects. I knew that by prefinishing the side assemblies (and back panel), I could avoid a lot of masking work to keep the paint off of the unpainted areas such as the top and the shelf.

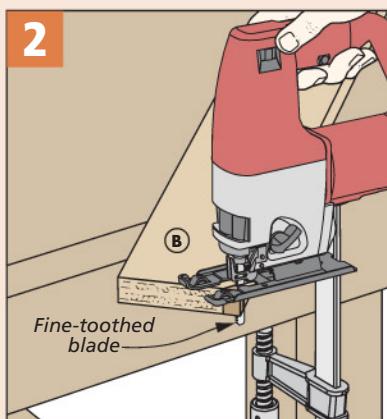
However, there is one thing to note if you're going to finish the sides at this point. Make sure to take a second to add tape where the cleats will be glued and screwed in place. (You can find these locations on the next page.) This way, you can pull the tape off after finishing. It leaves a paint-free surface that the glue will be able to adhere to, instead of gluing onto paint.



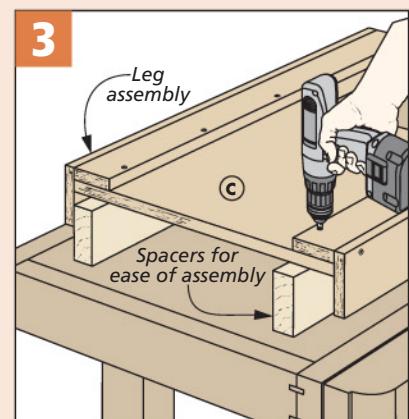
How-To: Assembly the Base Parts



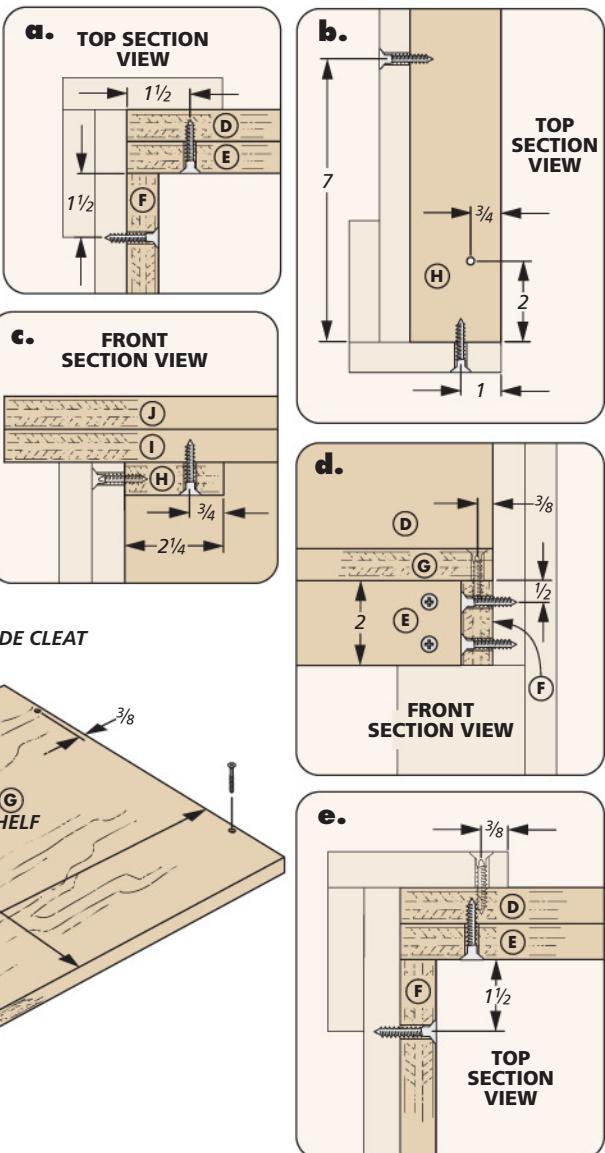
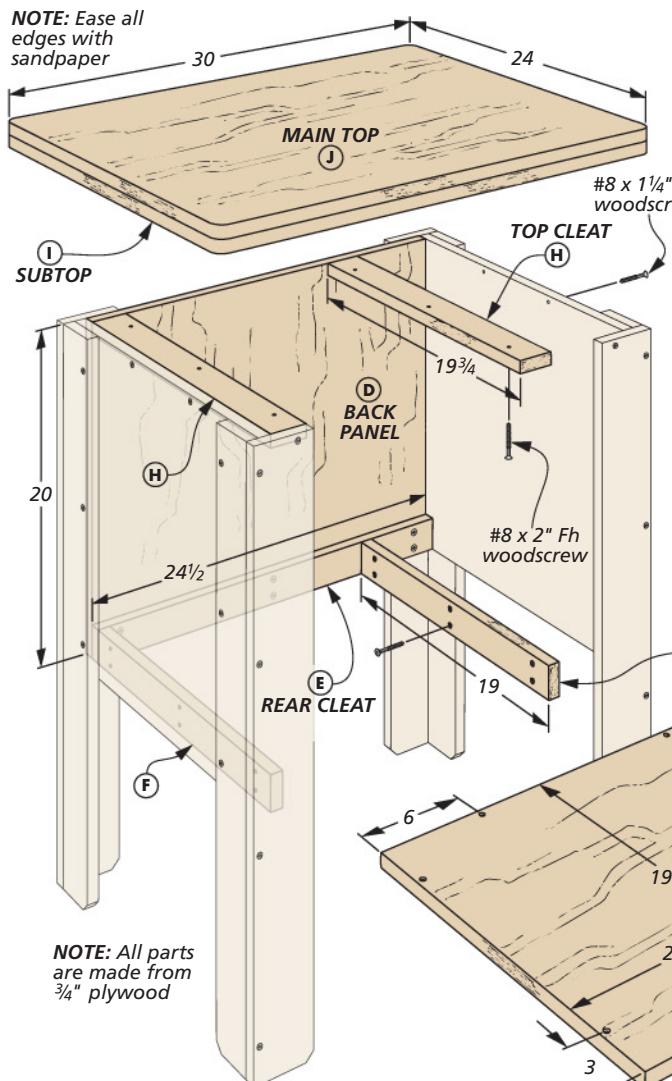
Perfect Holes. In order to drill chip-free holes that won't split, drill all holes with a tapered countersink bit.



Bevel Leg Ends. The ends of each leg are beveled. Use a fine-tooth blade in a jigsaw to minimize tear out.



Side Panels. Use spacers to lift the panels off the workbench. The leg assemblies can then be screwed in place.



Completing the Stand

With the side assemblies complete, you can next work on connecting them, then adding a worksurface to the top. A two-layer top is strong enough to support heavy loads while a shelf below the top provides additional storage.

BACK PANEL. The two side assemblies are connected the same way as the legs—with a plywood panel. Luckily, the process for attaching this back panel is also the same. Spread glue on the inside of the legs and drive screws through them into the back panel to secure it.

SHELF. It would be a shame to waste the area underneath the top of the station, so I added a shelf for extra storage. The shelf rests on three cleats. The cleats are attached to the back and side panels. Because the cleats are narrow, be sure

to predrill the mounting holes to avoid splitting them. After installing the cleats, the shelf can be dropped into place and held in with screws, as well.

TWO-LAYER TOP. As I mentioned earlier, the two-layer top on the stand adds additional weight and rigidity. To make it, I began with the lower portion, the subtop. The subtop is cut to finished size and a 1" radius is marked on the corners. Using a jig saw with a fine-toothed blade, round the corners, making sure to leave the layout lines. Then sand each corner to the line to finish them.

MAIN TOP. The main top is cut slightly oversized, and is attached to the subtop using glue and screws from the underside. Make sure the main top is centered on the subtop, with equal overhang on

all four sides. After I had the two tops attached together, I used a hand-held router with a flush-trim bit to trim the main top flush to the subtop. The flush-trim bit has a bearing that guides the router bit along the subtop, ensuring a perfectly flush edge. With the top at final dimensions, you are ready to attach it to the stand. A pair of cleats secured to the side panels (detail 'c') is the ticket here. Simply screw the cleats to the sides, then attach the top to the cleat.

If you are planning on using the station as a miter saw stand, stop here. However, if you're going to make the stand into a router table, there are additional details on the next page for cutting an opening for the router plate insert and building the fence.

ROUTER TABLE

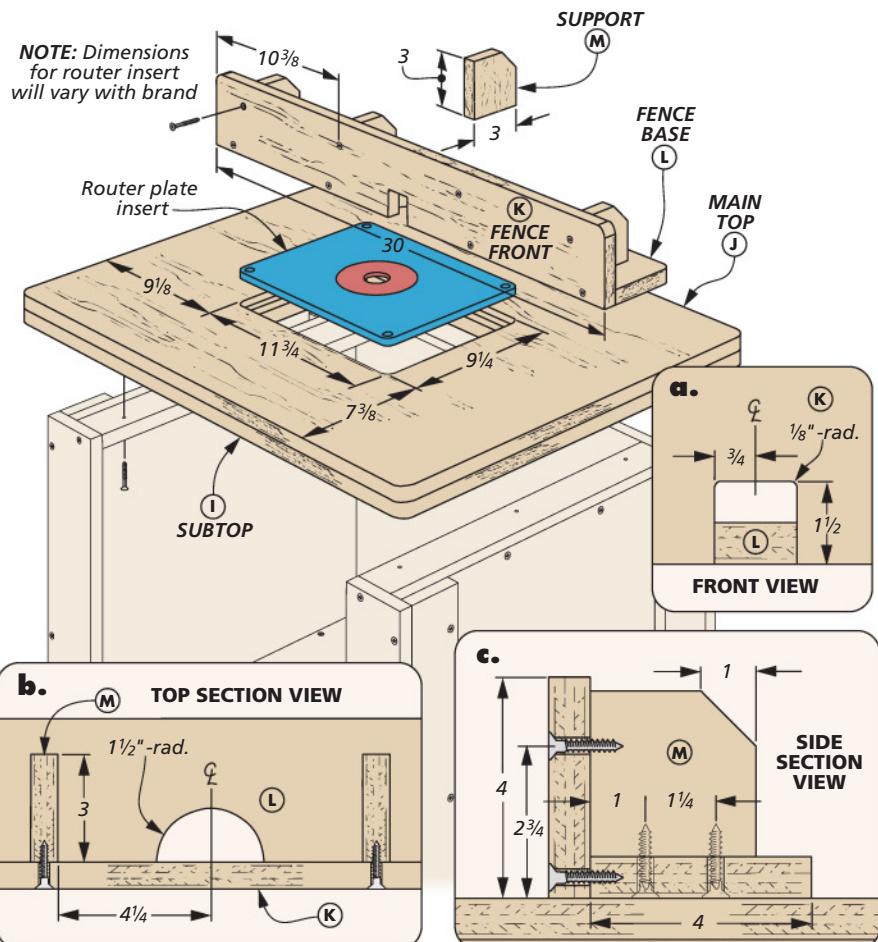
It can be argued that a router table is one of the most useful tools in a shop. You can cut joinery, joint boards, and add decorative profiles. By taking a few additional steps, we can convert the basic two-layer top from the previous page to a fully functional router table top, complete with a fence.

ROUTER INSERT. The first step to install a router insert is to use a drill and jig saw to cut an opening 1" smaller in both dimensions than your insert, as shown in Figure 1 below. With the opening cut, you can grab your router plate and move to the next step.

RABBETED OPENING. The insert plate rests in a recess around the edge of the opening. To achieve this, a rabbet is cut around the opening in the main top using a router and a dado clean-out bit. Make sure that your router bit matches the radius of the corners of your router plate insert. This will allow the router plate to sit in the rabbet and be flush to the top. All the details you need to create this rabbeted opening are outlined in the How-To box below.

FENCE. With the router plate insert installed in the top, the next thing you'll need is a fence. The fence I've created here is nothing more than a pair of plywood strips. A notch is cut in the center with a jig saw to make room for the router bit. The strips are held together with screws and have supports on the back side.

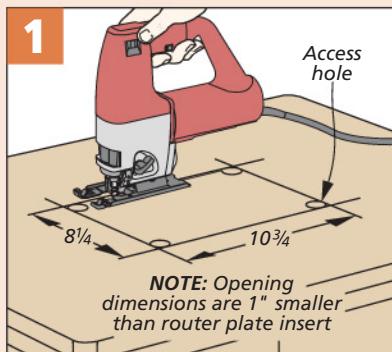
To attach the supports, glue them in place and drive screws from the front



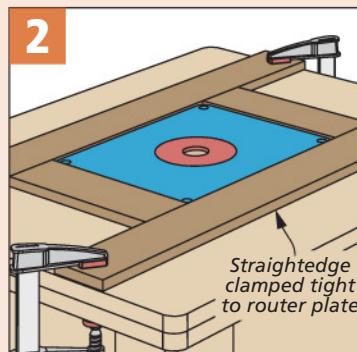
and the base. The supports serve a few purposes. First, they keep the fence from flexing. They also ensure that the fence face stays square to the tabletop. To lock the fence in place, simply attach it to the

tabletop with a clamp on each end. Fine adjustments to the fence can be made by pivoting one end. With the tool stand and router table complete, we can move on to the rolling cart.

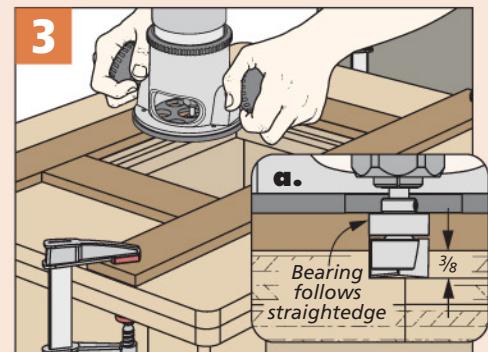
How-To: Create the Insert Plate Opening



Insert Hole. Use a Forstner bit to define the corners for the insert. Remove the waste using a fine-toothed jig saw blade.



Add Fences. Position the router plate, and clamp straightedges as a bearing surface for the router.



Rabbet Opening. Remove the plate and use a dado clean-out bit to rout along the straightedges, forming the rabbet.

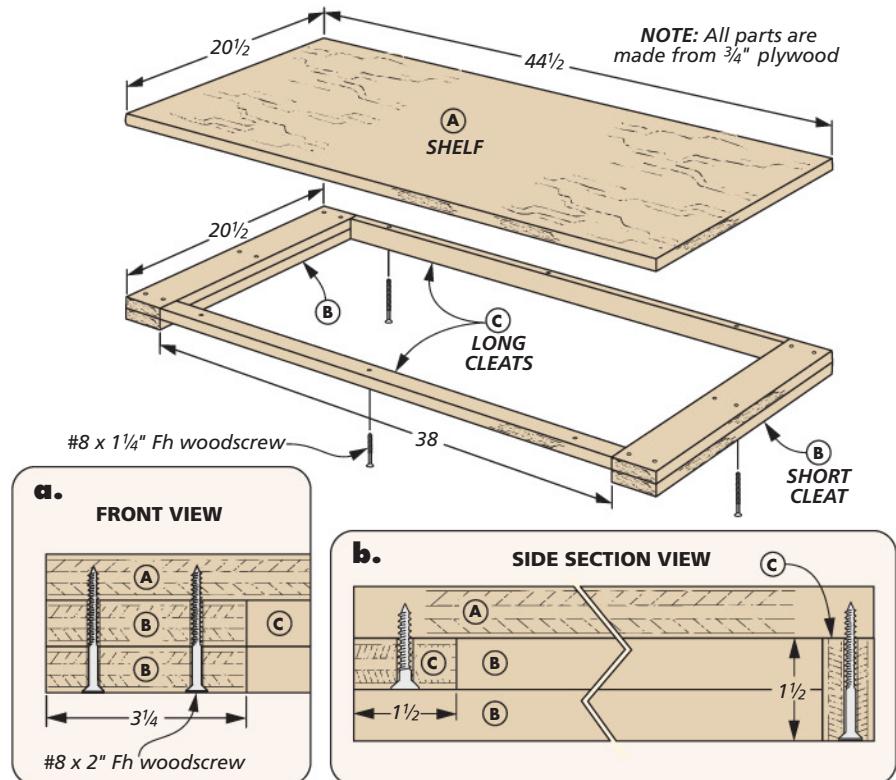
Building the Rolling Cart

The next project, a rolling cart, provides a mobile worksurface that can be moved where you need it. In addition, it provides a solid surface for assembling projects. The cart is made of a few basic parts. A plywood case houses a pair of shelves that offer extra storage space. The top of the cart is two layers, like the tool stand. The base of the cart has a set of heavy-duty casters to easily move it around the shop.

LOWER SHELF. While there are several different ways you could go about building this cart, I chose to start with the lower shelf and work from the ground up. Starting with the shelf allows you to have a good solid base.

The lower shelf consists of a plywood panel and a series of cleats that the shelf is attached to. Because the casters will be attached to this framework, the short cleats are made up of two layers of plywood glued together. The casters are added after the assembly is complete.

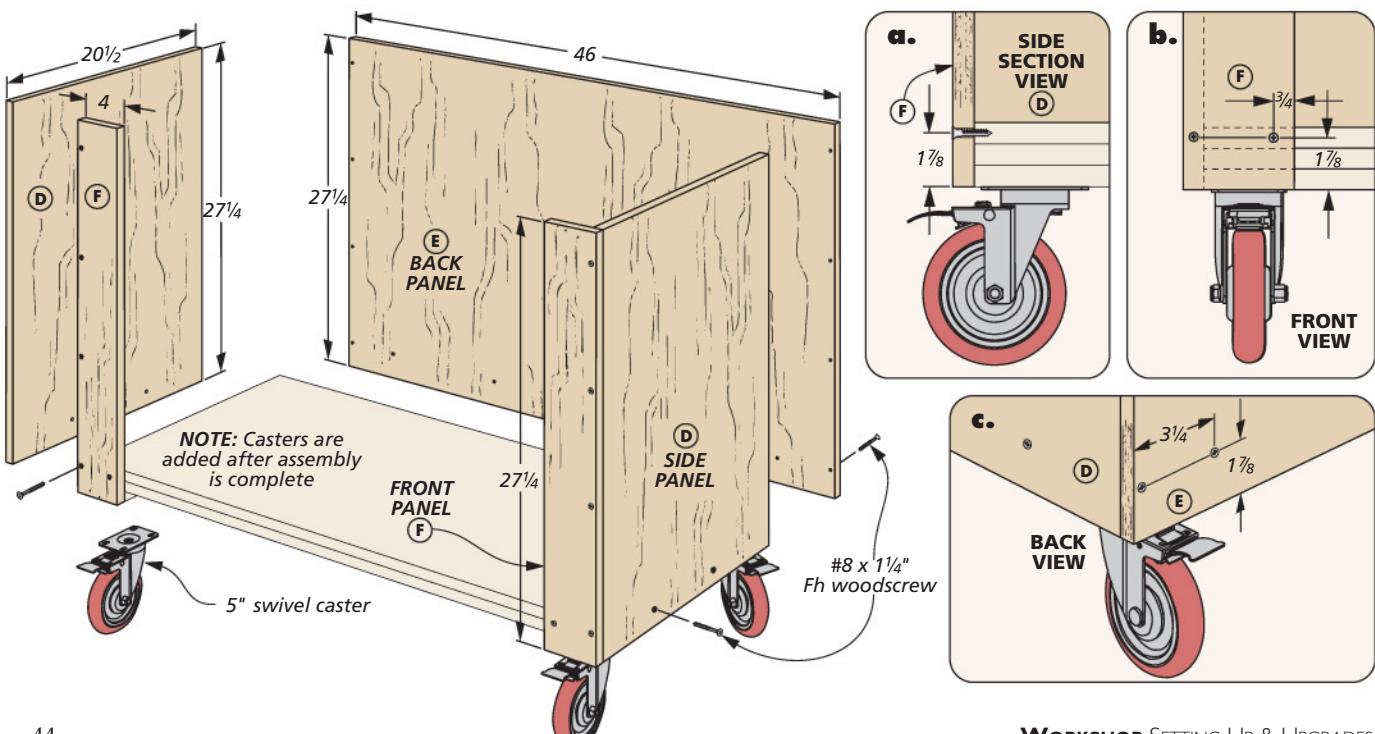
After the short cleats are glued together, they can be attached to the shelf using glue and screws. Detail 'a' provides the information. This is easily

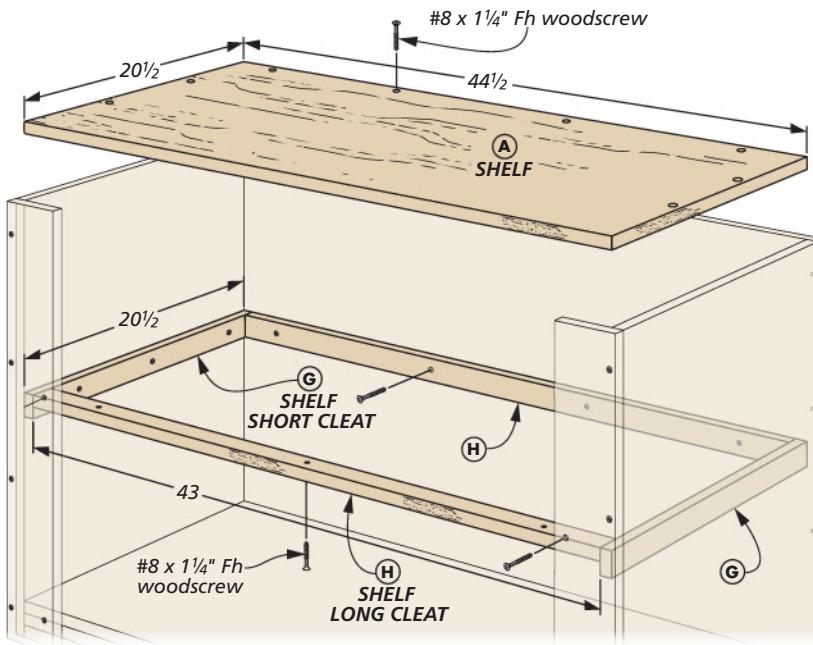


done by flipping the lower shelf over while attaching all of the cleats. Longer, narrower cleats run the length of the lower shelf to add some rigidity. Note that the back cleat and front cleat are in different orientations (detail 'b').

CART PANELS. With the cleats attached to the lower shelf, you can flip the shelf back over and start building the case around the shelf. I found it easiest to

attach all of the panels with the shelf laying flat on my workbench. Each panel can then be stood on end and clamped in place while driving the screws home. The side panels are attached to the cleats with screws. Next, add the back panel in the same manner. See main drawing below. Finally, you can attach the two smaller front panels. These attach to the side panel and the shelf.





TOP & MIDDLE SHELF

Now that the case of the cart is starting to take shape, you can add a little extra storage with an additional shelf. After installing the shelf, you'll install a top and some casters to wrap up the construction of the rolling cart.

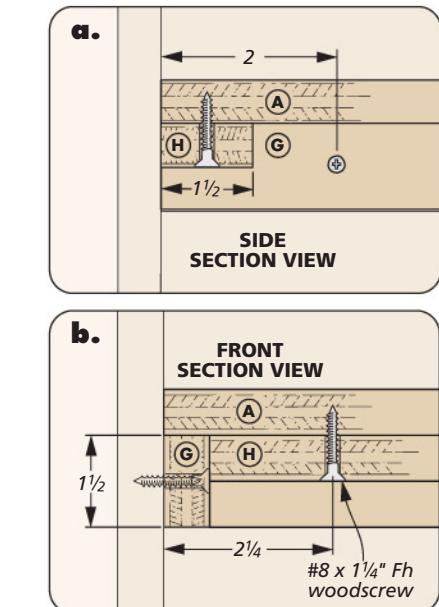
MIDDLE SHELF. The construction and assembly of the middle shelf is nearly identical to the lower shelf (drawing above). A series of cleats around the interior of the case provide a place for the shelf, as well as an attachment point.

As with the cleats that we used in the tool stand, drill all of the mounting holes to prevent the cleats from splitting. With the cleats in place, the shelf can be dropped in from above and held in place with screws.

TOP. The top of the cart is built like the tool stand, as shown in the drawing below. As with the previous tops, the subtop gets rounded corners. The main top is left oversized and then attached to the subtop. A pass with the router and a flush-trim bit cleans up the top.

There are a pair of cleats that are attached to the sides and front of the cart. The top is then attached to the cleats with screws. Like the middle shelf, no glue is used when attaching the top. This allows the top to be easily removed or replaced if it becomes damaged. Ease the edges of the top with sandpaper.

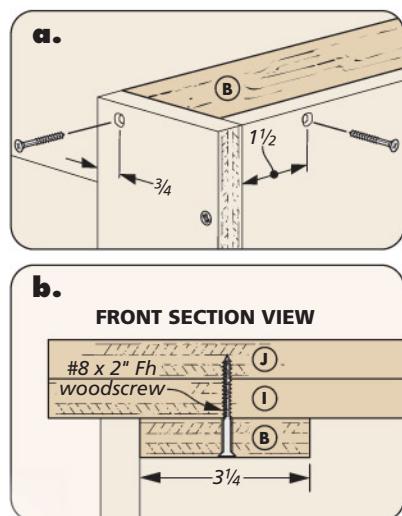
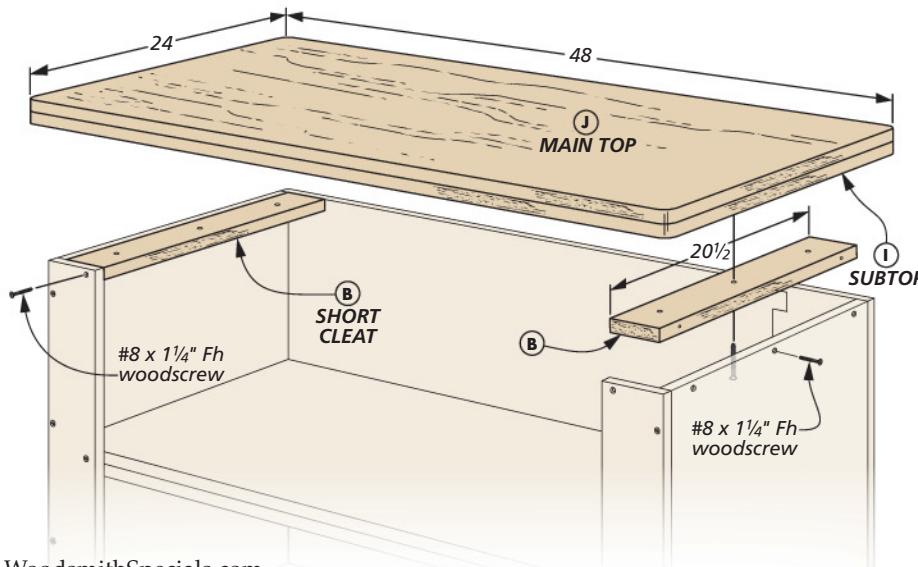
LET'S GET ROLLIN'. The beauty of this cart is its utility. A lot of the versatility comes from the ability to move it around via the swivel casters that are attached to



the underside of the cart (main drawing, previous page). The swivel casters allow for greater maneuverability in tight areas. The casters I chose also feature a locking mechanism to keep the cart in place when you want it stationary.

To attach the casters, it's best to get a helper to flip the cart onto its top. With the cart upside down, the four casters can be installed at each corner. It's important to keep the casters on the double-layer cleats. This provides the most support, which will bear the weight of the cart and its contents.

With the casters attached, flip the cart upright and ease the remaining edges with sandpaper. All this cart needs now is a nice coat of paint, then it's ready to get to work in your shop.



Bladesmith's Anvil Stand



Recessed Top. The top of the stand is recessed to fit the anvil. This provides a sturdy seat to keep the anvil from moving while you pound away at a metal blank.

I find that, as a woodworker, the work I do often expands beyond just the craft of woodworking. Nonferrous metals are an easy pivot, as are acrylics and plastics, and working with steel can be done simply enough with a few additions. It's in this vein of thought that the anvil stand you see above came about.

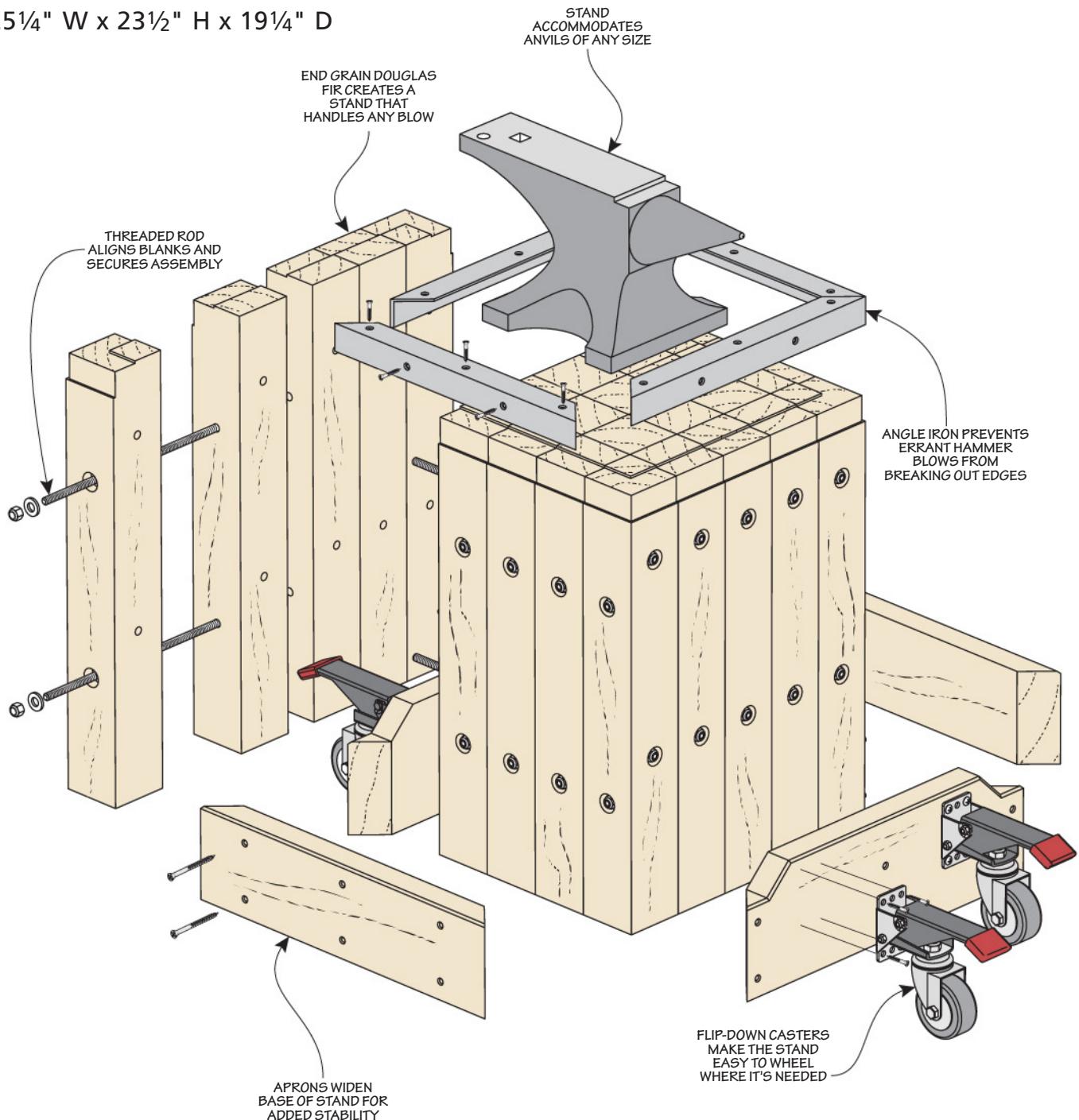
Our photographer, Chris Hennessy, is a woodworker as well as a metalworker — knives in particular. What you see above is his creation for his own shop.

This anvil stand is made of sturdy Douglas fir, and custom fit for his 66-pound, knife-making anvil. Thick aprons add stability to the bottom, while flip-down casters make the stand easy to move as needed. The result is a portable, strong stand that — thanks to using dimensional lumber — won't cost nearly as much as you might think. Though this project may only take a few days to complete, it'll serve your metalworking for decades to come.

CONSTRUCTION DETAILS

OVERALL DIMENSIONS:

25 $\frac{1}{4}$ " W x 23 $\frac{1}{2}$ " H x 19 $\frac{1}{4}$ " D



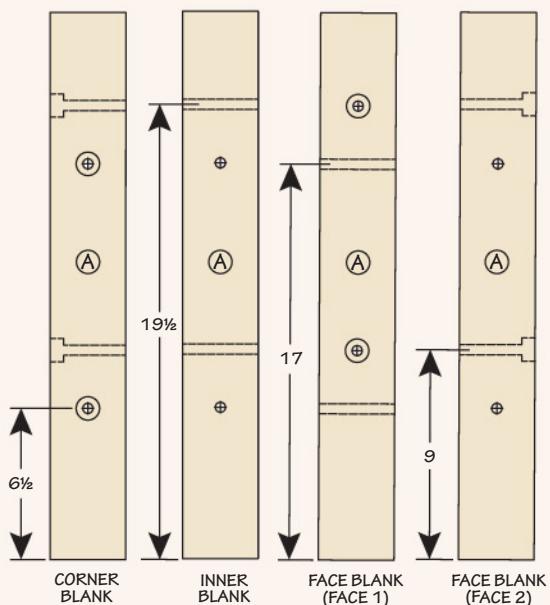
MATERIALS & SUPPLIES

A Stand Blanks (25)	3 $\frac{1}{4}$ x 3 $\frac{1}{4}$ - 23 $\frac{1}{2}$	• (20) 3 $\frac{1}{8}$ " x 16 $\frac{1}{4}$ " Threaded Rod
B Wide Aprons (2)	1 $\frac{1}{2}$ x 6 $\frac{1}{2}$ - 19 $\frac{1}{4}$	• (40) 3 $\frac{1}{8}$ " Fender Washers
C Narrow Aprons (2)	1 $\frac{1}{2}$ x 5 - 19 $\frac{1}{4}$	• (40) 3 $\frac{1}{8}$ "-20 Lock Nuts
		• (24) #8 x 3" Fh Woodscrews

- (4) 1 $\frac{1}{4}$ " x 1 $\frac{1}{2}$ " - 16 $\frac{1}{4}$ " Angle Iron
- (4) 3" Flip-Down Casters
- (1) Cast Steel Anvil
- (24) #10 x 1 $\frac{1}{2}$ " Fh Woodscrews

a.

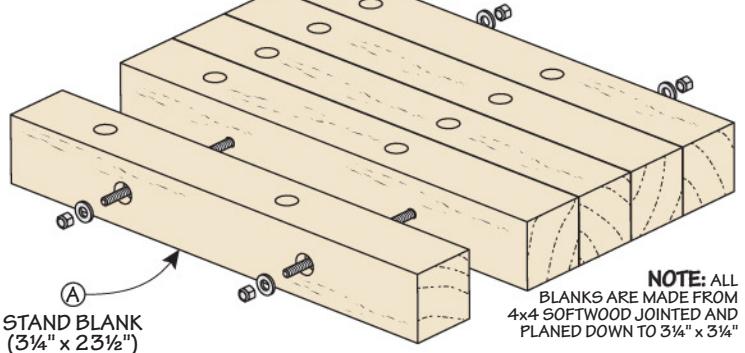
SIDE SECTION VIEW



1 FIGURE

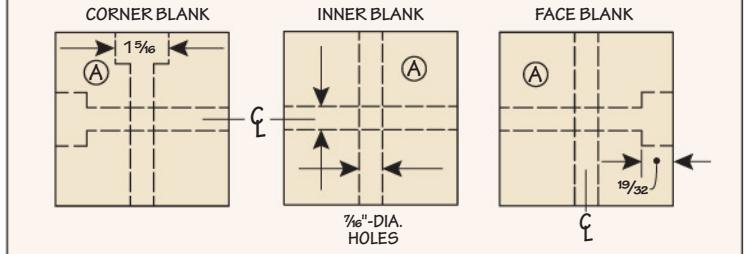
NOTE: USE THREADED ROD TO AID ALIGNMENT

NOTE: OPPOSITE CORNER AND FACE BLANKS ARE MIRROR IMAGES



b.

TOP SECTION VIEW



Beginning with the Blanks

The stand is constructed from twenty-five softwood blanks. Softwood will absorb the blows from a hammer far better than hardwood. They're together on edge so the force drives into the end grain. My wood of choice here was Douglas fir. The long grain patterns of this wood are less prone to seasonal movement (compared

to yellow pine, for example). Considering the assembly you see above, that was precisely what I wanted.

STAND BLANKS. I cut the blanks from 4x4 material (five 10' posts). First, I cut them down to a workable size near their final length. While the illustrations above provide the length I used,

it won't be the same for everyone. Your own height, the length of your arm, and the height of your anvil all come into play when determining how long these blanks should be. To find out, hold your blacksmith hammer in your dominant hand and let your arm sit relaxed at your side — the surface of the anvil should be at the end of the hammer's head.

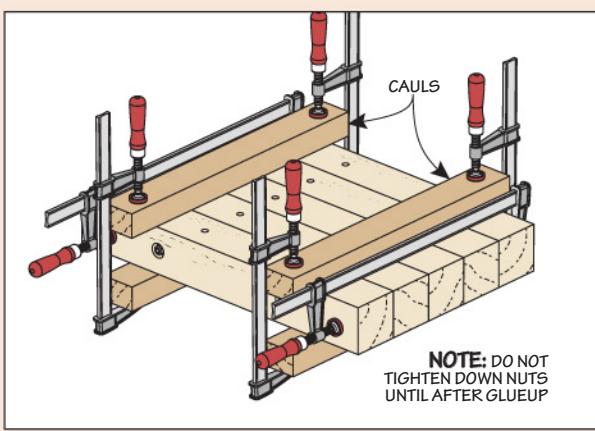
After chopping the posts down, joint and plane the blanks to a uniform 3 1/4" x 3 1/4". To ensure these are straight and square, start by jointing two adjacent faces, then use those to plane their opposite faces to width and thickness.

BLANK ORIENTATION. Before continuing on, I recommend taking some time to look at the grain orientations on the ends and faces. Select the most attractive faces for the outside and put together a pattern of the end grain that you find pleasing — you'll be looking at it quite a bit once this stand is done.

HOLES & COUNTERBORES. As you can see in Figure 1 above, the blanks are joined together by threaded rods along with lock nuts and washers.

Making Layers

After sizing the softwood blanks and drilling the through holes and recesses, epoxy the blanks into five strips. Use the threaded rods to keep the blanks aligned, along with cauls to ensure an even, flush layer after assembly.



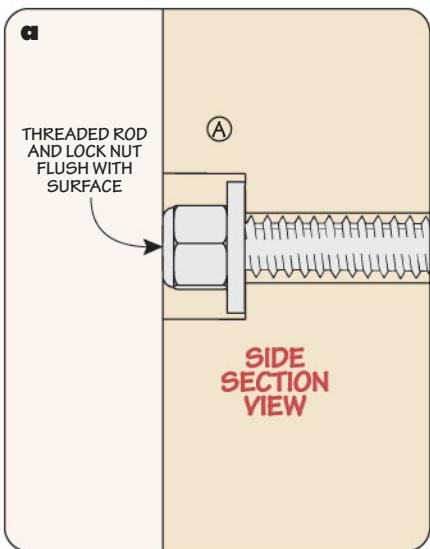
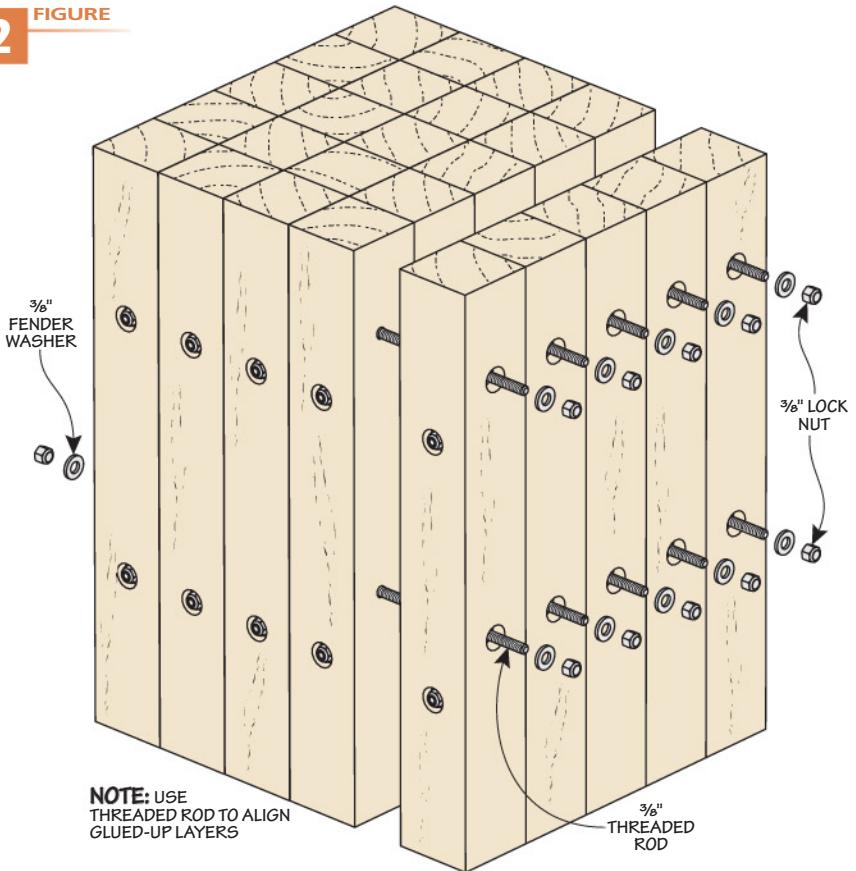


FIGURE 2



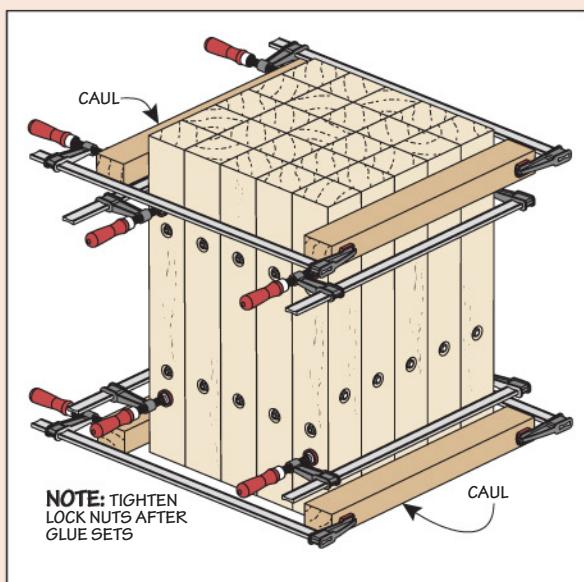
These aren't going to be the only thing holding the blanks together, but they will help register them for the glueups and reinforce the structure once assembled. Before any of that though, you'll need to lay out the locations of the through holes in each piece as well as the counterbores on the outside faces. You can find the dimensions and locations of these in Figures 1a and 1b on the previous page.

Now, drill the through holes and counterbores. I used a fence and stop at the drill press to keep the locations of the through holes consistent. With that done,

you can begin the first part of the assembly: creating five layers from the blanks. The box on the bottom of the previous page explains how I did this.

Layered Stand

Once the glue has set on the five layers, they can be joined together in a similar fashion to the individual blanks. Use the threaded rod to align the adjacent blanks; clamps and cauls help finish the glueup. I recommend using epoxy for its strength and long open time, so you can ensure all layers are flush and square before the epoxy begins to set.

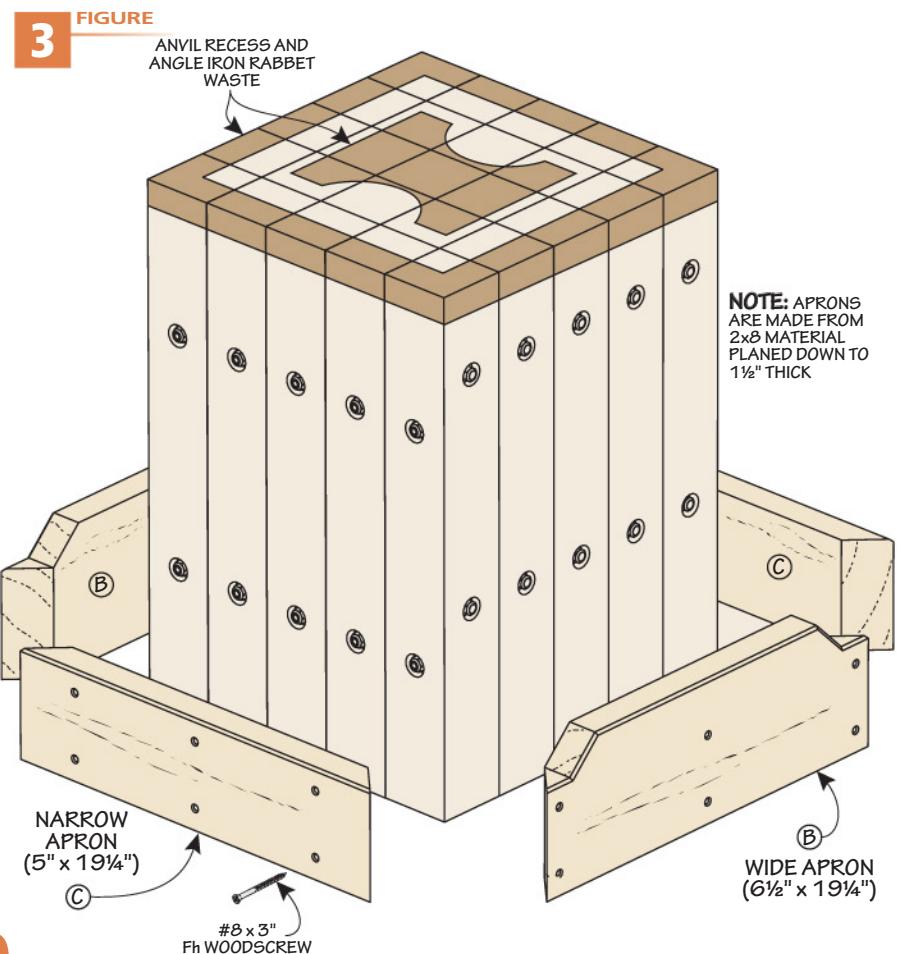
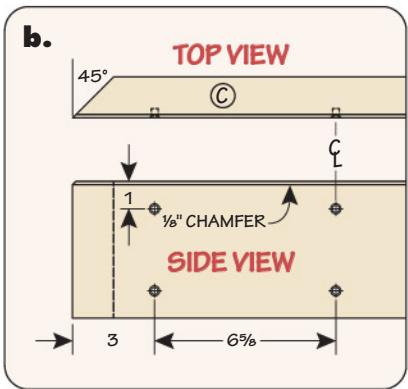
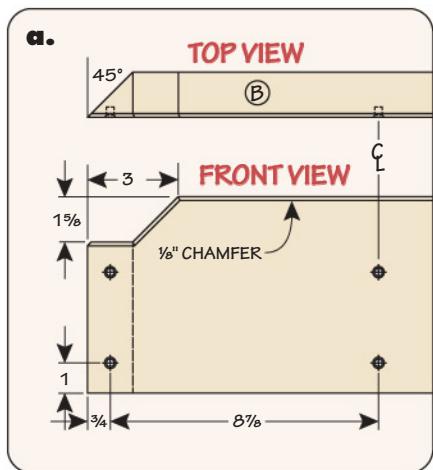


BRINGING THEM TOGETHER

After the clamps come off, it's time to join the five layers into one united stand. As with the individual layers, after applying the epoxy I used the threaded rod to align each of the assemblies with the other. I put on the washers and lock nuts to hold everything in place, but I refrained from tightening them down yet. While they work well to hold things at the moment, tightening them now may cause hydraulic action, shifting the pieces before the epoxy is fully cured.

FINAL GLUEUP. Next, I applied the clamps. Cauls work great here to keep things aligned and flush, and I kept a square nearby so I could check my corners as I went. Once everything was in place (and I was happy with the placement), I called it a day and let the epoxy cure.

When I returned to the shop (24 hours later) I pulled off all my clamps and cauls, I tightened down the lock nuts on the threaded rod. This provides additional strength to the structure. Get them nice and snug, but don't crank them down. If you go too hard, you might start sinking the washers into the softwood.



Aprons & Hardware

The stand you've just completed would be functional on its own, but there are a few more details on this page and the next that will take it to the next level.

APRONS. The next thing I addressed were the four aprons you see above. Adding weight and girth to the lower portion of the stand will make it far more stable while you work. Two of the aprons are wider than the others in order to accommodate the mounting plates for the casters, which you can see illustrated on the following page.

There are three items on the docket with these aprons; the first was cutting them to size. When cutting them to length, be sure to miter the ends to fit each other. The second step was to create the "arch" on top of the wide aprons.

While this could be done entirely with the band saw or jig saw, I chose to make the initial 45° cut at the table saw. This gave me a precise, clean 45° and was easy enough with a tall, auxiliary fence on my miter gauge to stabilize the

workpiece. After that, I cut the waste piece free at the band saw and used my block plane to remove the blade marks and trim the shoulders of the wide aprons flush with the narrow ones.

Last on these aprons was the chamfer across the top — a simple thing to rout in place as long as you have a chamfer bit. With the wide and narrow aprons done, set them side for now. There's something we need to take care of before attaching them.

RECESSES, HARDWARE & ANVIL

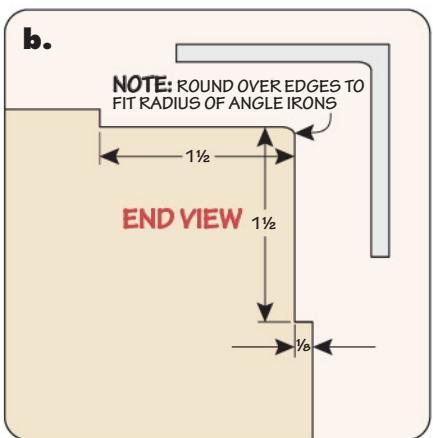
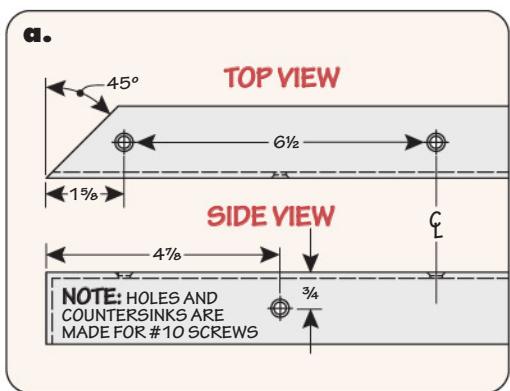
Figure 4 on the next page shows the last parts of this stand. Angle irons across the top are rabbeted into the edges, keeping stray hammer blows from knocking a chunk out. The top also contains a custom recess for your anvil, which will help keep it seated whether you're wheeling the stand across the shop or pounding at a blank on the anvil's horn.

IRONS. The irons are first here — in particular, their rabbets. I routed these

around the upper corners of the stand. When doing this, be sure to start at the edge and rout inward to keep the router base stable and prevent it from tipping. Rout from the top down, setting the stand on its side and rotating it as necessary. The inner corners of the irons are rounded which meant I needed to rout a roundover along the upper corners of the stand (Figure 4b). After that you can attach the aprons (Figures 3a and 3b).

ANVIL RECESS. The next detail I chose to add was the recess for the anvil. The box on the bottom of the following page shows how I made and used a hardboard template to form the recess; it's an easy process to do with a jig saw, a router (and bit), a piece of hardboard, and a long plywood scrap. After routing along the template, I used a chisel to complete the corners.

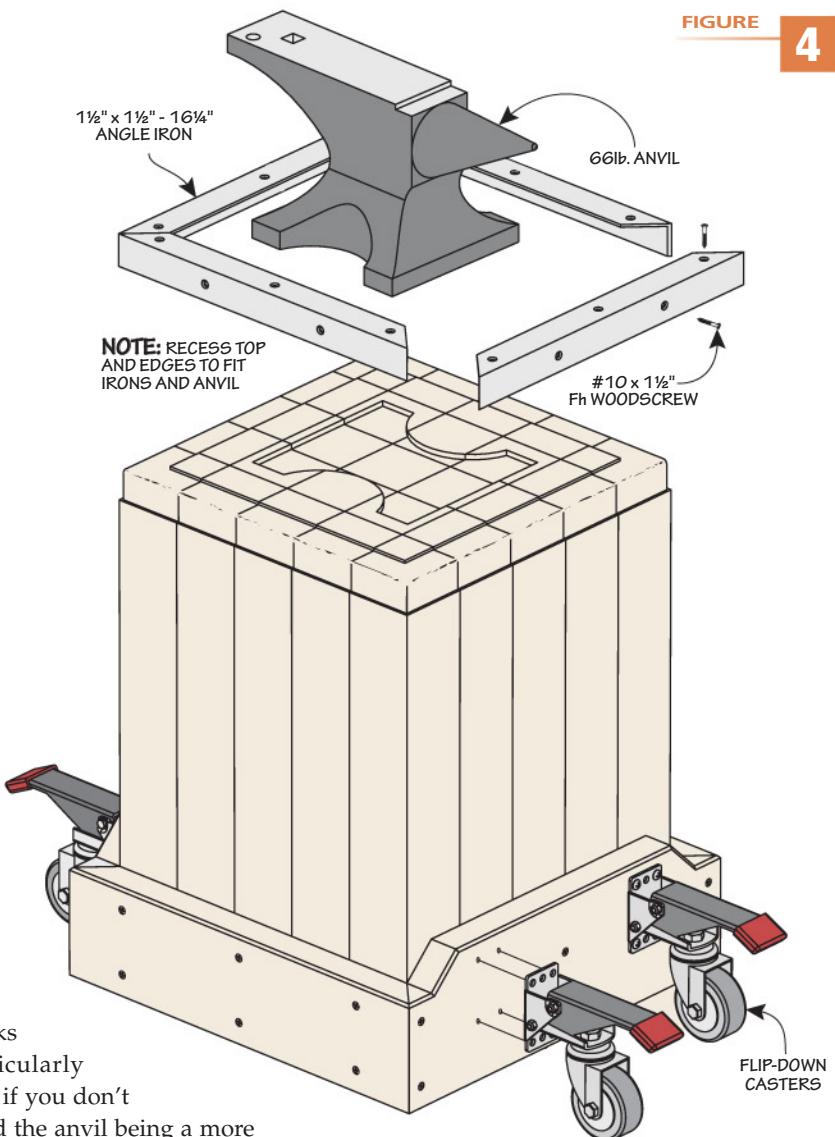
HARDWARE. Now the irons can be cut to length and mitered to fit together. I used an abrasive cutoff saw, but if your saw doesn't tilt (or you don't have a cut-



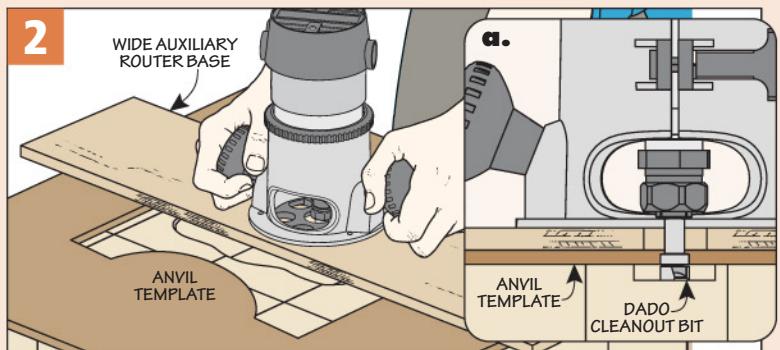
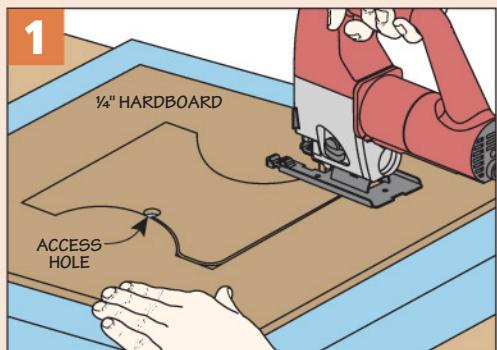
off saw) an angle grinder with a cutoff wheel works just as well.

After that, clamp the angle irons in place and screw them on (Figure 4a). The casters can then be attached as well. For seating the anvil, you have a few options. Anything firm yet forgiving, such as leather, will deaden the ring without reducing force. Though caulking

works particularly well if you don't mind the anvil being a more permanent fixture in the stand.



Cutsom-Fit Recess



Template. To create a custom recess for your anvil, trace its footprint onto a piece of hardboard, then remove the waste to form a template.

Routed Recess. With the template in hand, secure it to the top of the stand with double-sided tape. Use a router and a dado cleanout bit to create the recess. To support my router, I used a wide, plywood auxiliary base.



Custom-Made Mobile Assembly Center



Storage. As you see here, the other side of the cart is put to good use with a set of drawers and extra storage behind the door.

The adage “there’s no such thing as having too many clamps,” is quite true. But keeping track of such wealth is another matter. The cart you see here lets you organize all things assembly-related.

360° STORAGE. As detailed in the drawings on the next page, every side of the cart is put to use. The front has a trio of drawers for the tools you want to keep close at hand. To the right of the drawers, there’s a storage area for bulkier items that’s hidden behind a door.

As for the back — just spin the cart 180° as you see in the lower drawing,

it’s designed to hold nail guns and hand drills. The designer, John Doyle has arranged this space to fit standard tools, but you can easily make it a custom fit for your gear.

Speaking of custom fits, flanking the central case on either side are open wings — blank canvases waiting to hold needed items nearby. We’ve placed clamp racks and a tray for glue bottles and such. Attached to the wings is the top, it’s made of two layers of plywood and protected with a layer of plastic laminate. Let’s head to the shop.

CONSTRUCTION DETAILS

OVERALL DIMENSIONS:

48" W x 36" H x 28" D

NOTE: SEE SOURCES ON PAGE 98 OR HARDWARE AND MATERIAL INFORMATION

LARGE HANDLES MAKE IT EASY TO OPEN DRAWERS AND DOOR

STORAGE WINGS CAN BE TAILORED TO STORE THE CLAMPS AND TOOLS YOU USE THE MOST

FIGURE-8 FASTENERS HOLD TOP TO CART

FULL-EXTENSION DRAWER SLIDES ALLOW COMPLETE ACCESS TO CONTENTS

PLASTIC LAMINATE PROTECTS THE TOP

ARRANGE CLAMP RACKS TO SUIT YOUR NEEDS

5" CASTERS ALLOW YOU TO MOVE THE CART WITH LITTLE EFFORT

FRONT OF CART

BACK OF CART

DOG HOLES AND CLAMPING SLOTS OFFER INFINITE OPTIONS FOR SECURING PARTS AND ASSEMBLIES WHILE YOU WORK

STURDY TOP WON'T SAG UNDER PRESSURE

OPEN CAVITY ADDS STORAGE OPTIONS TO CART

GLUE TRAY STOWS YOUR FAVORITE ADHESIVES

CUSTOMIZE THE DRILL/DRIVER SHELF TO YOUR COLLECTION OF TOOLS

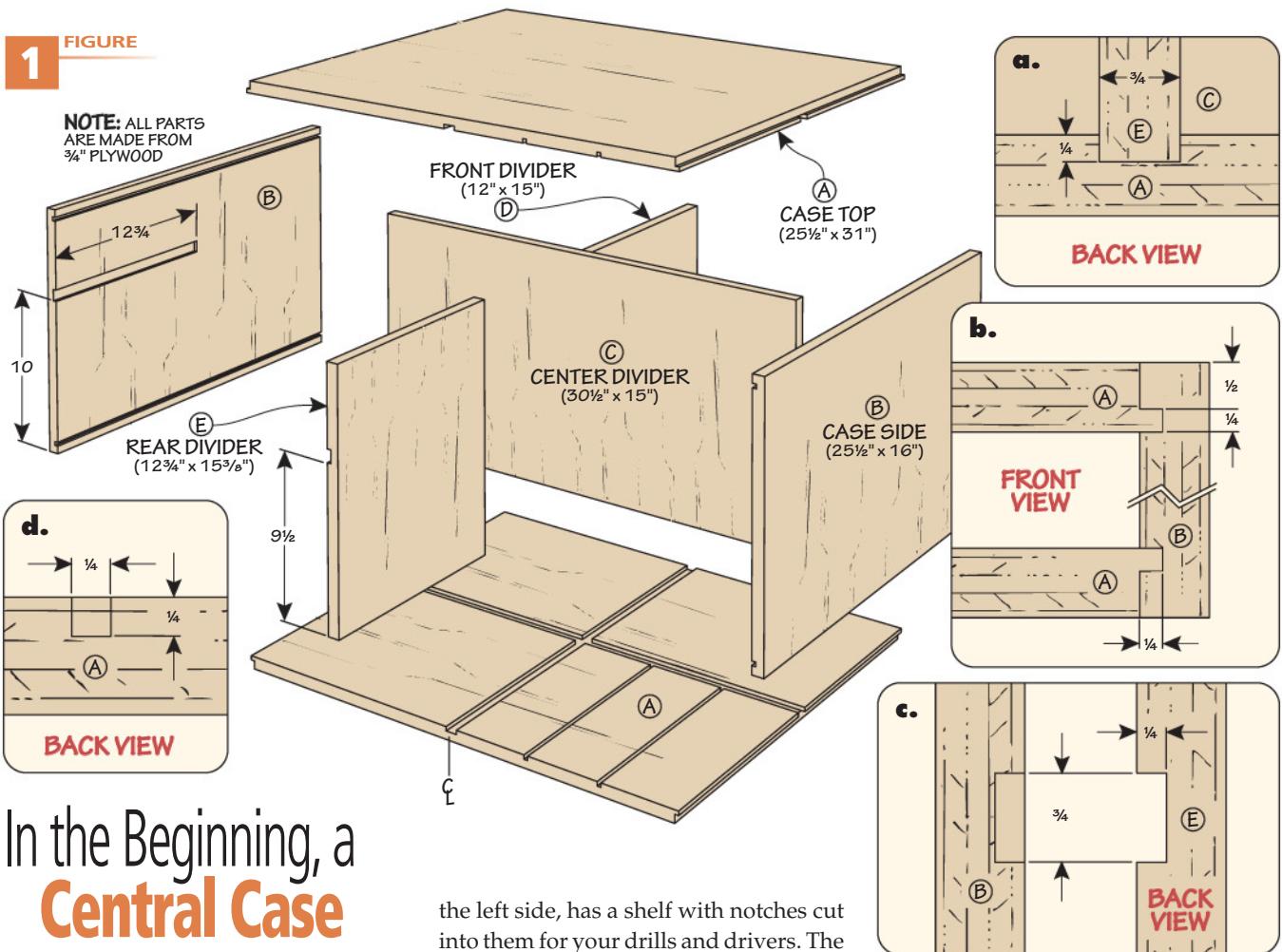
CONVENIENT CUBBIES FOR NAILERS AND PINNERS

WING CLEATS PREVENT TOOLS FROM FALLING OFF THE CART

MATERIALS & SUPPLIES

A	Case Bottom/Top (2)	25½ x 31 - 3/4 Ply.
B	Case Sides (2)	25½ x 16 - 3/4 Ply.
C	Center Divider (1)	30½ x 15 - 3/4 Ply.
D	Front Divider (1)	12 x 15 - 3/4 Ply.
E	Rear Divider (1)	12¾ x 15¾ - 3/4 Ply.
F	Drill Shelf (1)	12¾ x 15 - 3/4 Ply.
G	Nailer Dividers (2)	12¾ x 15 - 1/4 Ply.
H	Base (1)	28 x 48 - 3/4 Ply.
I	Wing Backs (2)	25½ x 27½ - 3/4 Ply.
J	Wing Sides (4)	7 x 27½ - 3/4 Ply.
K	Wing Cleats (2)	¾ x 25 - 3/4 Ply.
L	Tray Front/Back (2)	4 x 12½ - 3/4 Ply.
M	Tray Sides (2)	4 x 5 - 3/4 Ply.
N	Tray Bottom (1)	5 x 11½ - 1/4 Ply.
O	Plugs (2)	1/4 x 1½ - 1/4 Ply.
P	Clamp Rack Tops (4)	4 x 12½ - 3/4 Ply.
Q	Clamp Rack Backs (4)	3½ x 12½ - 3/4 Ply.
R	Clamp Rack Sides (8)	3½ x 3½ - 3/4 Ply.
S	Drawer Sides (6)	4 x 12 - 3/4 Ply.
T	Drawer Fronts/Backs (6)	4 x 12¾ - 3/4 Ply.
U	Drawer Bottoms (3)	11 x 12¾ - 3/4 Ply.
V	False Fronts (3)	5½ x 15¾ - 3/4 Ply.
W	Door (1)	15¾ x 15¾ - 3/4 Ply.
X	Top (1)	28 x 48 - 1½ Ply.
• (34) #8 x 1¼" Fh Woodscrews		
• (12) #8 x 1½" Fh Woodscrews		
• (16) #8 x 1" Fh Woodscrews		
• (4) 5" Locking Casters with screws		
• (8) Figure-8 Fasteners		
• (3 pr.) 12" Self-Closing Drawer Slides		
• (4) Drawer Pulls		
• (2) 110° Full Overlay Hinges		
• (1) 4' x 8' Sheet of Plastic Laminate		

1 FIGURE



In the Beginning, a Central Case

The heart of the assembly center is the central case you see in the drawing and details on this page. It's a box that's divided into quarters and screwed to a plywood bottom that has large casters (more on that later) allowing you to move the cart to either the center of the action — or in the corner, out of the way.

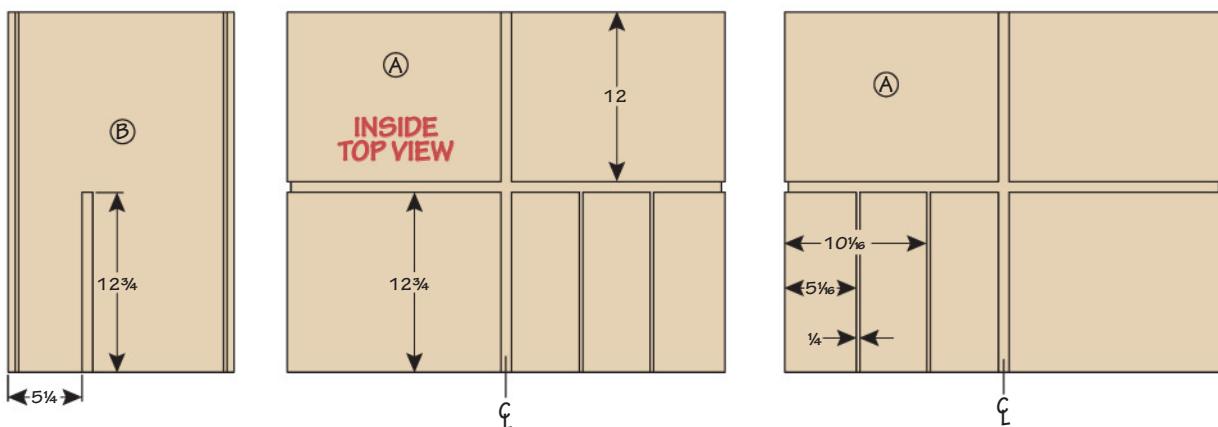
FOUR SQUARE. Each quarter provides a unique and easily accessible solution to your storage needs. Figure 1 above shows the back side of the cart that, on

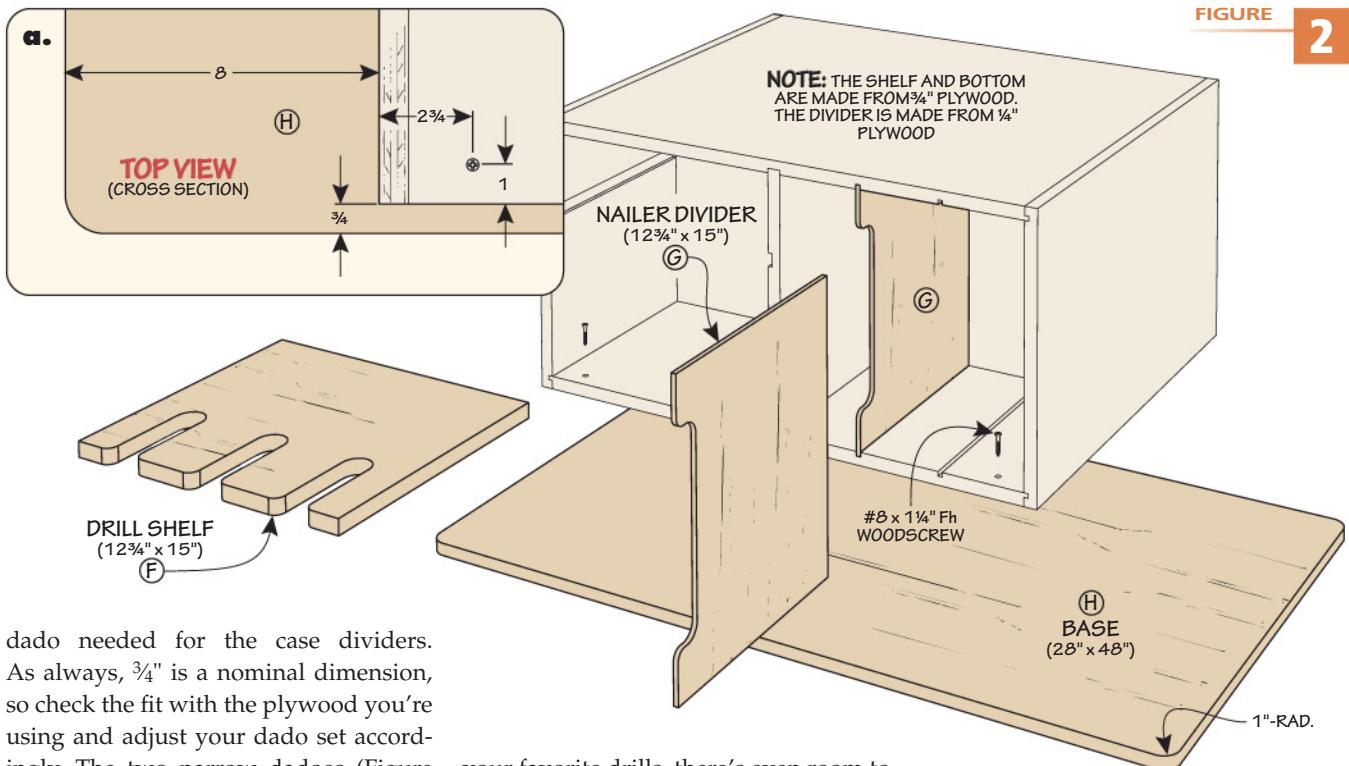
the left side, has a shelf with notches cut into them for your drills and drivers. The right side is designed to hold your nailers. The front of the case is where you'll add drawers and a door later. There's no joinery on the front, other than for the dividers. Let's start working on the top and bottom.

TOP & BOTTOM. The largest parts of the central case are the top and bottom. In Figure 1 above you see these two parts in relation to the other pieces that connect to them. In the Front View drawing below you'll notice that the joints

on the inside faces mirror each other. The dado is centered in the case side to side. While the placement of the groove allows a little more room to the rear of the case. Both of these joints are for the dividers. The two narrow dados are for the nailer dividers. Let's start by cutting all the parts to size, then get to work on the top and bottom joinery.

GROOVE & DADOES. Figure 1a above shows the size of the groove and the





dado needed for the case dividers. As always, $\frac{3}{4}$ " is a nominal dimension, so check the fit with the plywood you're using and adjust your dado set accordingly. The two narrow dadoes (Figure 1d) were made with a router guided by a straightedge clamped in place. The last bit of joinery to do for the top and bottom is making the tongues along the edges (Figure 1b) for the sides, which are made next.

THE SIDES. The sides of the case need dadoes to join with the tongues you just cut in the top and bottom. Also, refer to the bottom of the previous page and Figure 1c for the dimensions of the stopped dado that holds the drill shelf in the case. I routed this in the same manner as the dadoes for the nailer dividers, but with a larger bit this time.

THE DIVIDERS. Three of the four dividers have no joinery at all. There's no need for the extra work of joining the front and rear dividers to the center one since all the pieces are trapped in the grooves and dadoes of the top and bottom. Figures 1 and 1c show the dado that runs the width of the rear divider (to anchor the other side of the drill shelf), when that's cut you can glue up the case of the assembly center.

DRILL SHELF & DIVIDERS

While the glue and clamps are doing their work on the case you can spend some time shaping the parts shown in Figure 2 above. There's the drill shelf for

your favorite drills, there's even room to store that corded $\frac{3}{8}$ " drill you drag out to confuse your grandkids. To the right of that are the dividers for the nailers you'll often need for assembling projects. And lastly, the base of the cart. We'll start with the drill shelf.

A SHELF FOR DRILLS. The shelf you see in Figure 2 and the Top View below, has three slots for hand drills. This is the first of several parts of the cart that you'll want to customize to the tools you use. The slots we show here may work just fine for you. If so, it's just a matter of drilling the stop holes and removing the waste to form the slots, then sanding the profile smooth.

If the configuration doesn't jibe with your drills, you'll want to make a test shelf out of piece of scrap plywood. The important thing to remember is to

account for the space needed around the tool to slide it in and out of the shelf while setting next to other drills. When your prototype is working, you can use it as a template on the shelf.

THE DIVIDERS. The plywood dividers have a recessed profile on the front, which allows a little clearance for your hand while reaching for the tool (Side View below). Drill the end holes first at the drill press. Then remove the waste between with a jig saw.

To wrap up this stage of the project you'll need to make the base. As you see in Figure 2a the base is long enough to accommodate the storage wings you'll be making next. Once it's cut to size, round the corners and screw the case in place on the base.

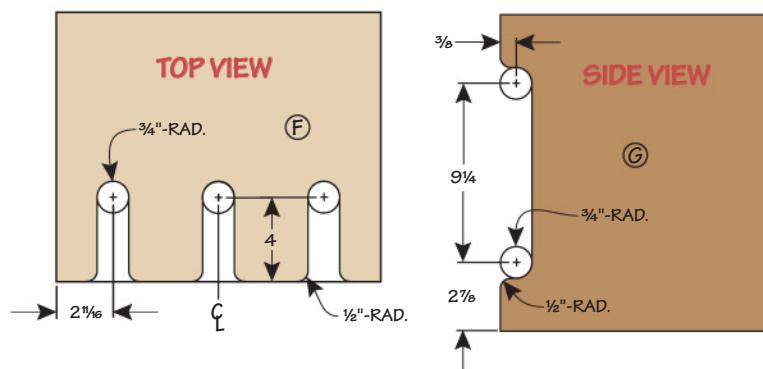
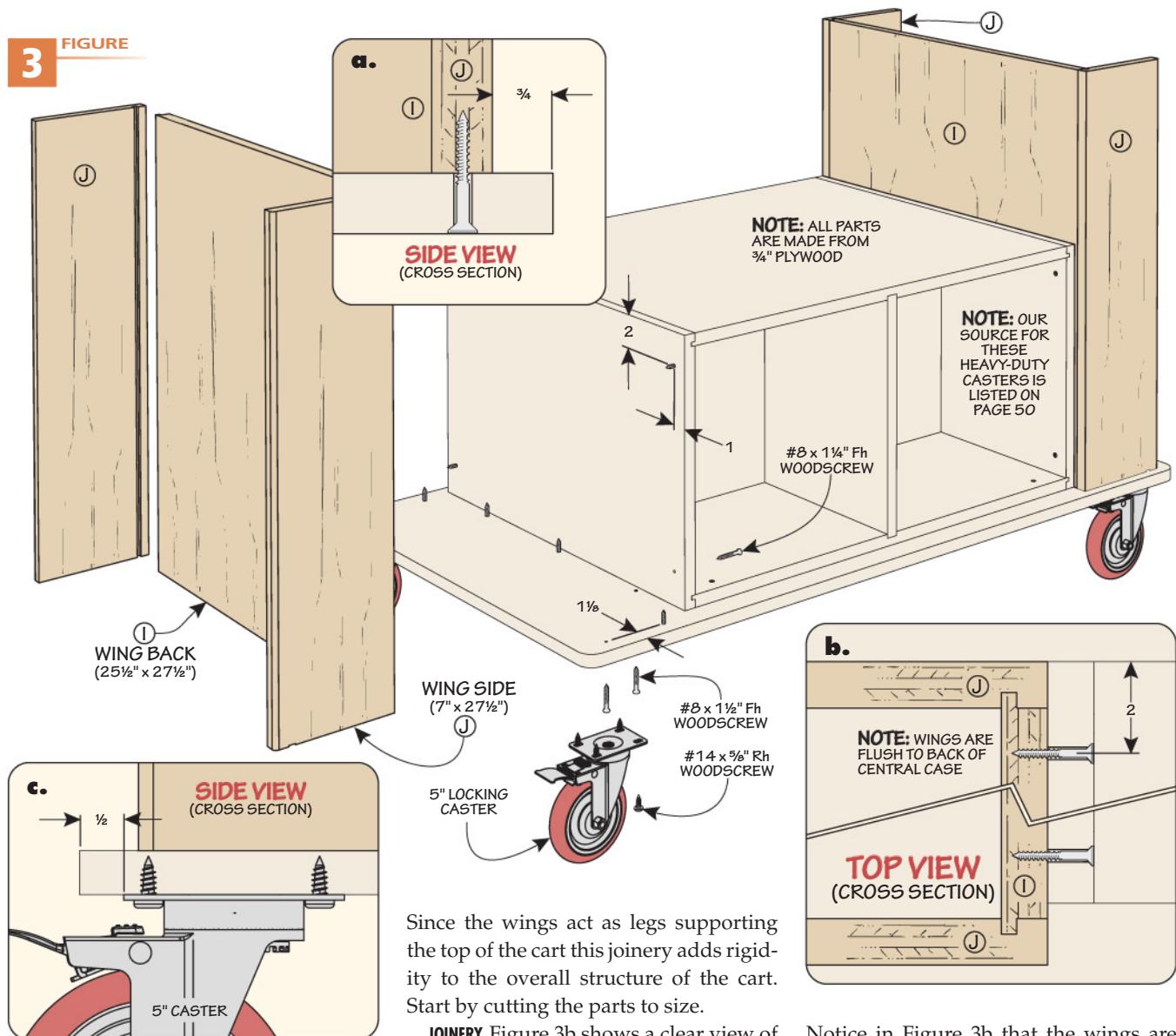


FIGURE
3



Since the wings act as legs supporting the top of the cart this joinery adds rigidity to the overall structure of the cart. Start by cutting the parts to size.

JOINERY. Figure 3b shows a clear view of the grooves you need to cut in the sides. This is easily done at the table saw with your trusty dado blade. As for cutting the tongues in the wing back, bury your dado set in an auxiliary fence clamped to your rip fence. Then it's time to glue up the wings. It's a good idea to use clamping squares to ensure the sides stay square to the back.

After the clamps are stowed, and any squeezeout is scraped away, you're ready to mount the wings to the cart. Start off by drilling the countersunk pilot holes in the cart bottom and sides of the case. Note that the screws fastening the wings to the cart bottom are $1\frac{1}{2}$ ", while $1\frac{1}{4}$ " screws are used through the case sides. To reduce friction, I always scrape a little beeswax on the threads of the screws before driving them home.

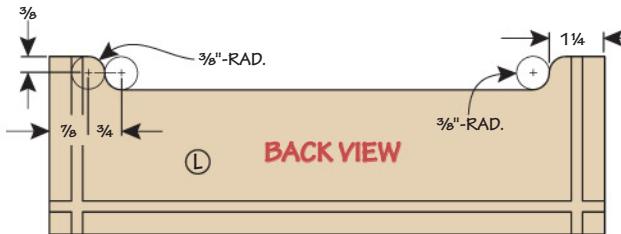
The plywood wings — and the storage compartments that reside inside — are the parts that are next in line to be added to the cart. As with the drill shelf before, don't feel locked in to how we've utilized the space in the wings. You've got your own shop life to manage so make the space your own. Maybe shelves for hardware bins, or hooks for extension cords. You do you.

THE WINGS FIRST. The wings you see in Figure 3 are made of three pieces of plywood that are connected in the corners with tongue and groove joinery.

Notice in Figure 3b that the wings are flush to the back of the case. On the front, the wings protrude enough to cover the edge of the drawers and door. I installed the screws through the sides first, then flipped the cart over to install the screws on the underside of the bottom (Figure 3a). While the cart is upside down it's a good time to install the casters.

CASTERS NEXT. The casters that were chosen for the cart are sized to roll smoothly around the shop. All four have locking mechanisms that can be toggled on and off with your foot so you can maneuver the cart easily where you want it, then lock it in place.

The large, short screws that fasten the casters to the bottom of the cart take a little care to install properly. First, position the casters and mark a starting hole with an awl in the center of each opening.



Then it's a good idea to use a stop collar on the pilot hole bit. The bit should be the same diameter as the root of the screw. It's wise to do a test run in a scrap of the same plywood you're using for the bottom. Drill the pilot hole, scrape a little beeswax on the screw, then use a screwdriver to drive the screw. Using a drill gun runs the risk of stripping out the hole. With the test run under your belt, it's time to attach the casters.

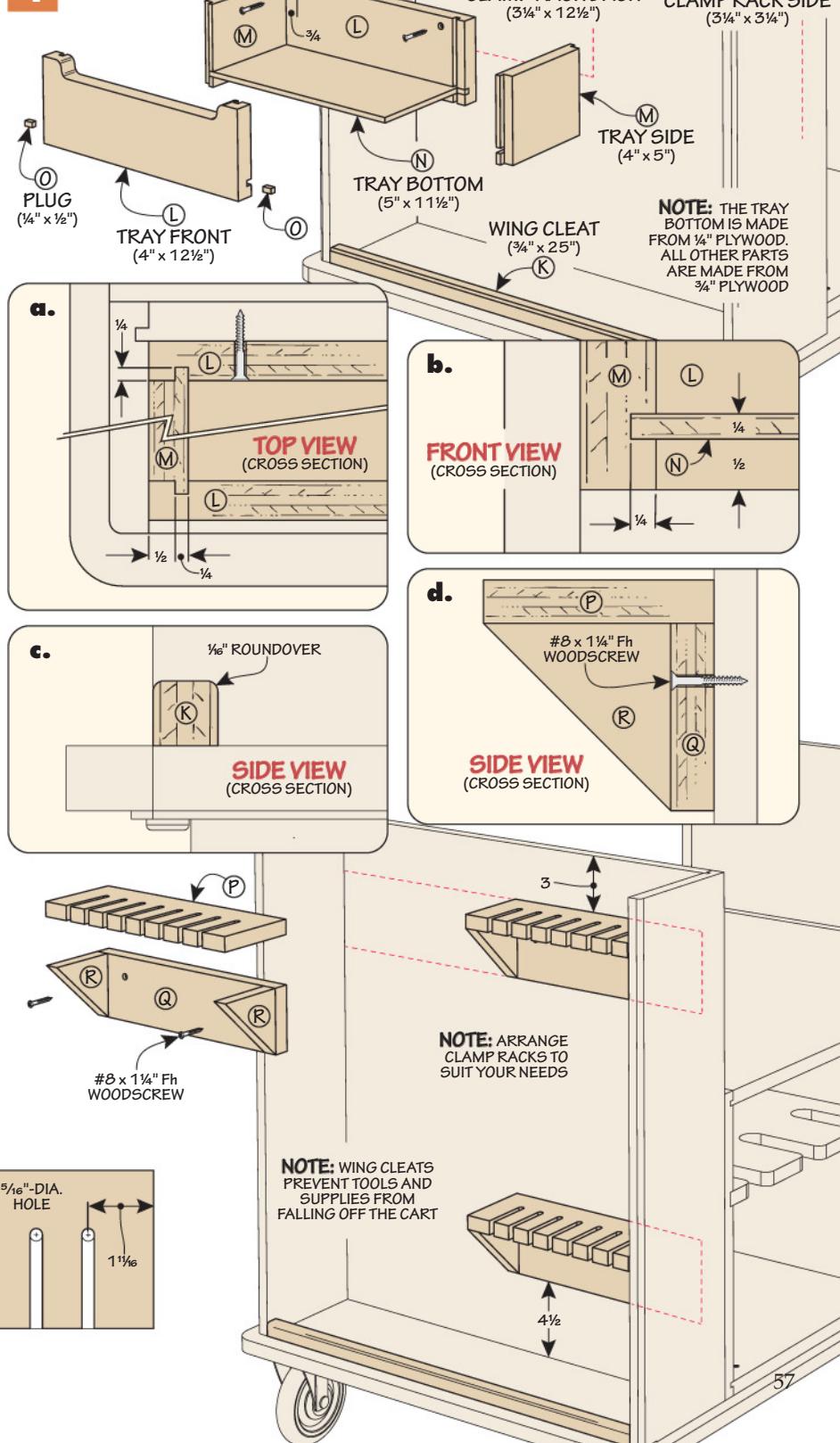
STORAGE OPTIONS

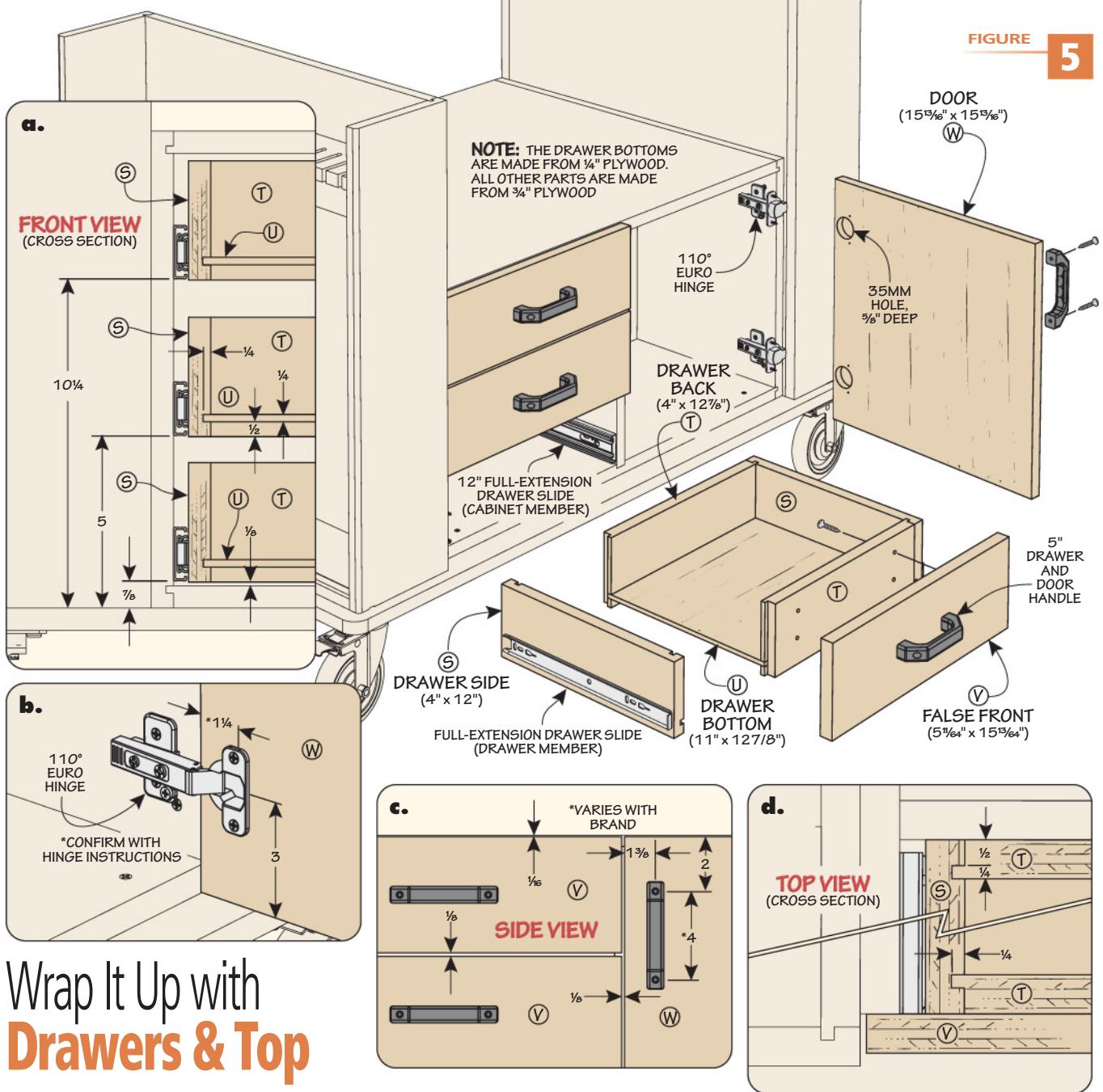
Now it's on to making the accessories that reside in the wings. But before you do that, you can make and install the wing cleats you see in Figure 4 and 4c. They act as a curb to prevent any objects from falling off the cart when you're moving it around the shop. The cleats are glued and pin-nailed in place.

GLUE TRAY. The glue tray is similar to a drawer box: start out by sizing the pieces. Then cut the grooves in the front and back for the tongues on the sides. (Figure 4a). Refer to Figure 4b for details on cutting the groove along the lower edge of the front, back and sides. Now tackle the tongues on the sides. Before gluing up the tray, shape the top edge of the front as is shown in the Back View above, then drill the countersunk pilot holes in the back.

CLAMP RACKS. The clamp racks are designed to hold F-clamps. The Top View below shows the spacing details. Figure 4d shows the brackets that support the top. Where you place the racks depends on the collection of clamps you have (or wish to have).

4 FIGURE





Wrap It Up with Drawers & Top

We've come to the equivalent of the seventh-inning stretch of the cart project. While we're taking this breather let's review what's left to do.

You've got three drawers and a door to add to the central case. That means a little time at the table saw and drill press. Then you'll wrap up the cart by adding the top you see on the next page. Making the top will give your drill, jig saw, and router a work out.

DRAWERS FIRST. The drawers for the cart are designed for heavy-duty use. The tongue and dado joinery is standard fare for drawers, but using $\frac{3}{4}$ "-thick mate-

rial for the boxes is a step up from the usual $\frac{1}{2}$ "-thick stock. Combine this with attaching the drawers to the case with heavy-duty, full-extension drawer slides and you have three drawers that are ready for whatever you throw at them — or in them.

Start by making a stack of fronts, backs, and sides that are cut to size. Then set up your table saw to cut the dadoes in the sides as is shown in Figures 5 and 5d. Follow this task up with cutting grooves in all the parts for the drawer bottoms (Figure 5a). Next, set up the saw to cut the tongues in the fronts and backs. Cut-

ting three drawer bottoms to size is the last task required before gluing up the drawer boxes — check them for square as you go.

DRAWER SLIDES. Following the directions from the manufacturer, it's time to install the drawer slides. I will interject one tip — when installing the cabinet members (the parts that are attached to the cabinet), it's best to start at the top and use a spacer to ensure each set is perfectly parallel to its partner. Back at the bench you can install the drawer members to the sides of the drawer boxes then slide

each drawer in place. Making the false fronts is next on your list.

FALSE FRONTS. Figures 5 and 5c provides a peek at what's involved in adding the false fronts. Once they're cut to size, you can start with the bottom drawer. Place a strip of double-sided tape on the front of the drawer box. You'll need a $\frac{1}{8}$ " shim to properly gap the false front from the bottom of the cart. Then press the false front firmly against the drawer box to stick them together. To finish, take the drawer out and screw them together. Repeat this process for the other drawers (notice in Figure 5c that the gap between the drawers is a little wider). To complete the drawers, attach the centered handles to the face.

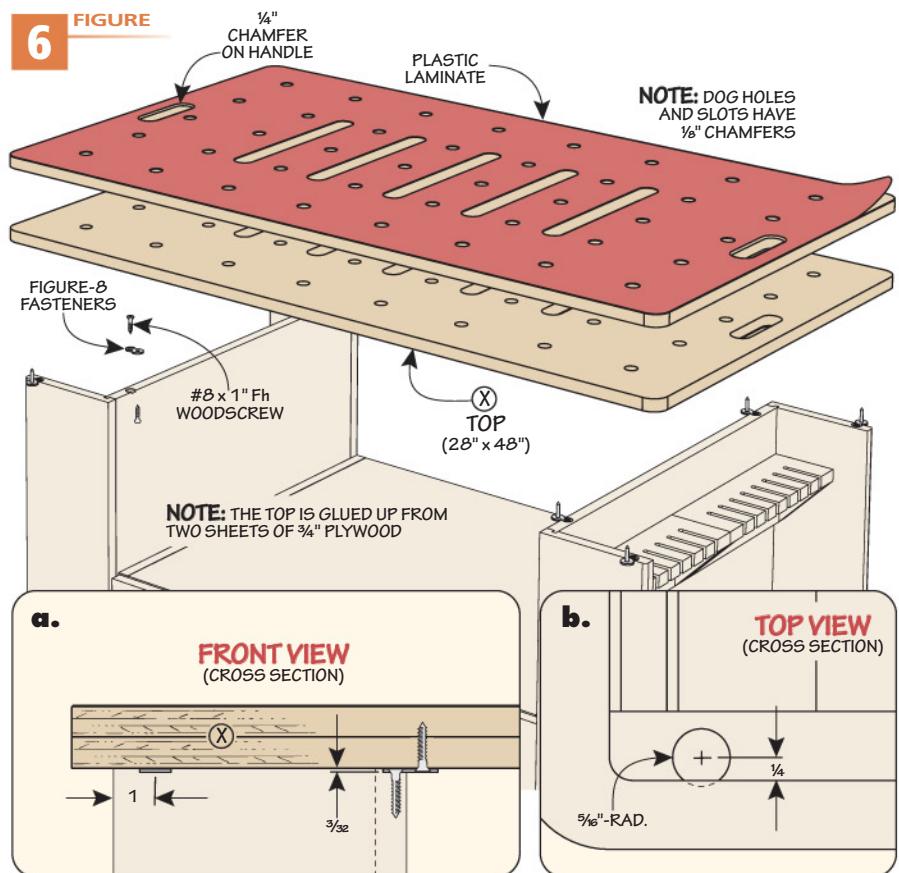
THE DOOR. Once the door is cut to size you'll need to drill the shallow holes in the edge for the Euro-style hinges (Figure 5b). After you've hung the door you can fine tune the gaps by adjusting the hinges. Now, you can install the handle. Figure 5c shows its location.

THE TOP

It's time to make the working surface of the assembly cart. The top is comprised of two layers of plywood that are protected by a skin of plastic laminate.

To ensure the two plywood layers are uniform to each other, you'll cut one layer to its finished size and shape, then glue a slightly oversized second layer to the first and use the former as a template to guide a flush-trim bit.

CAULS HELP. A note about gluing up large panels. It's a good idea to use several



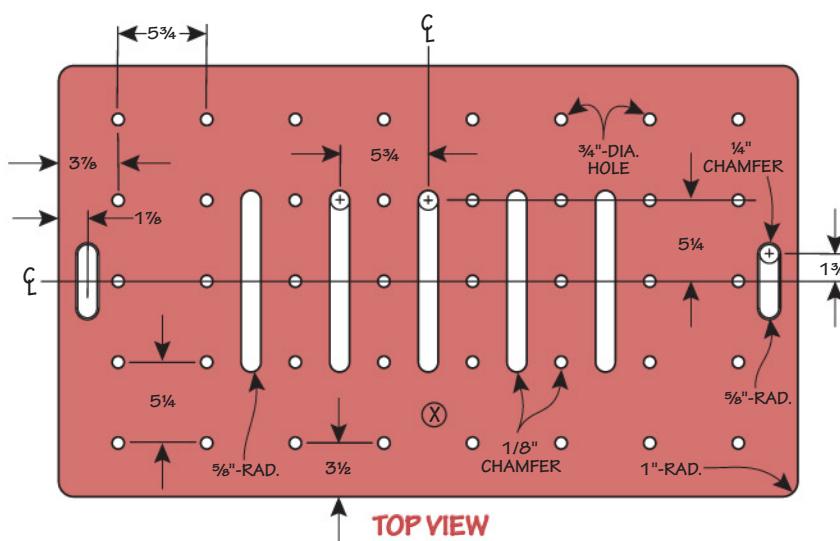
cauls. If you're not familiar with cauls and how they aid in gluing up large panels, you can do a search at Shop-Notes.com for "Clamping with cauls." The article goes into detail about this handy clamping aid. A flush-trim bit in your router is the ideal tool for shaping the second layer of plywood.

PLASTIC LAMINATE. You could leave the surface of the cart as is, but to really extend the life and use of the top, plastic lami-

nate is the way to go. As with the cauls, when you do a search at our website, there are plenty of details and tips on working with this product.

I will say that contact cement is the adhesive of choice when working with laminate. All you need to do is apply it to both surfaces, then, when they're dry to the touch, you lower the laminate onto spacers you've placed across the top. Remove the spacers one by one to attach the two.

A WORKING TOP. After you've flush-trimmed the outer edge of the top, use a fine-tipped permanent marker to lay out the handles, slots, and dog holes (Top View, at left). Then it's just a matter drilling the end holes for the handles and slots. Remove the remaining waste with your jig saw. To make the dog holes, a sharp Forstner bit is in order. Chamfering the edges is next up. Notice that the chamfer on the handles is larger than the other openings. Figure 6 and its details show how to attach the top with figure-8 fasteners. With that task done, you've got an assembly cart that's ready for action.





Drawer Storage. A bundle of drawers (main photo) offers storage for nearly everything you need in your shop. The large drawer beneath the table saw creates the perfect storage space for those large, bulky items like portable power tool cases.

Rolling Router Table. A built-in router table is housed inside the cabinet, which offers a large surface to rout long workpieces. An adjustable fence with integrated dust collection attaches directly to the top of the station.



Workstation. By attaching a tool to the flip-top section of the workstation, you can quickly and easily rotate it into working position. A pair of shop-made latches lock the top in position for use. It's a perfect option for those heavy tools that you use often.

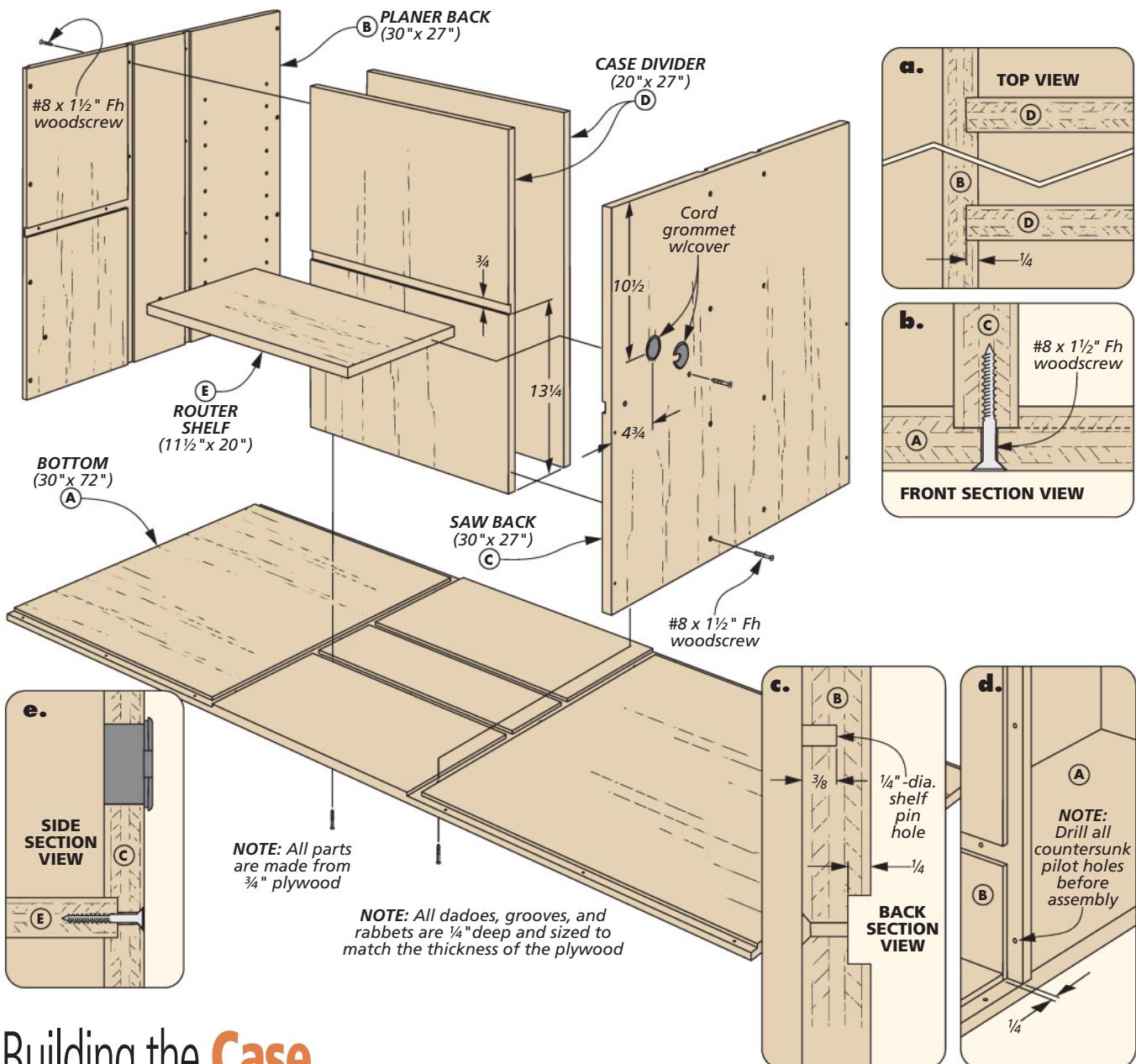
All-in-One Workstation

Get the most out of your shop space by combining tools into a compact station. This workstation packs loads of storage and tools in a mobile bundle.

Thinking back to my first shop, it was set up in the garage of my house. Living in the Midwest, weather often forced me to move my tools out of the way to make room for vehicles. I must say —when I was in the middle of a project, it was a big hassle. I would have to move everything from my bench to my table saw. Not to mention cleaning up all the dust and power cords that I had strung all over. When I first saw the design for this workstation, and all the features packed into the compact footprint, I realized how much easier my life could have been.

Three tools, one footprint. Looking at the photos to the left, you'll notice this mobile workstation packs (at least) three tools into one. On one end, a benchtop table saw sits on a low table. The main worksurface of the station acts as the perfect outfeed support for the saw. On this worksurface, there's an opening for a router plate that turns the top into a router table. Finally, opposite the table saw is a flip-top with a thickness planer mounted to one side.

But wait, there's more. One thing that you might not think about as you look at the mobile workcenter is the size of the worksurface itself. It's the perfect canvas for assembling projects and serving as your main or auxiliary workbench. That's not to mention the vast amounts of storage packed below the top in the form of drawers and shelves.



Building the Case

One of the things I like about this mobile workcenter is that it's made mainly out of plywood. This means in a short amount of time you can have all of the panels cut and ready to tackle the joinery.

When breaking down plywood sheets, I use a shop-made guide with my circular saw, but a commercial track saw could also easily do this job. Once that was done, I started the workstation by first tackling the main case of the cabinet. This is simply a bottom and a series of dividers and partitions.

THREE ZONES. The mobile workstation can be divided into three areas — the table

saw base, the router table, and the planer section. The router table is the center of the whole operation, so it's a good point to build out from.

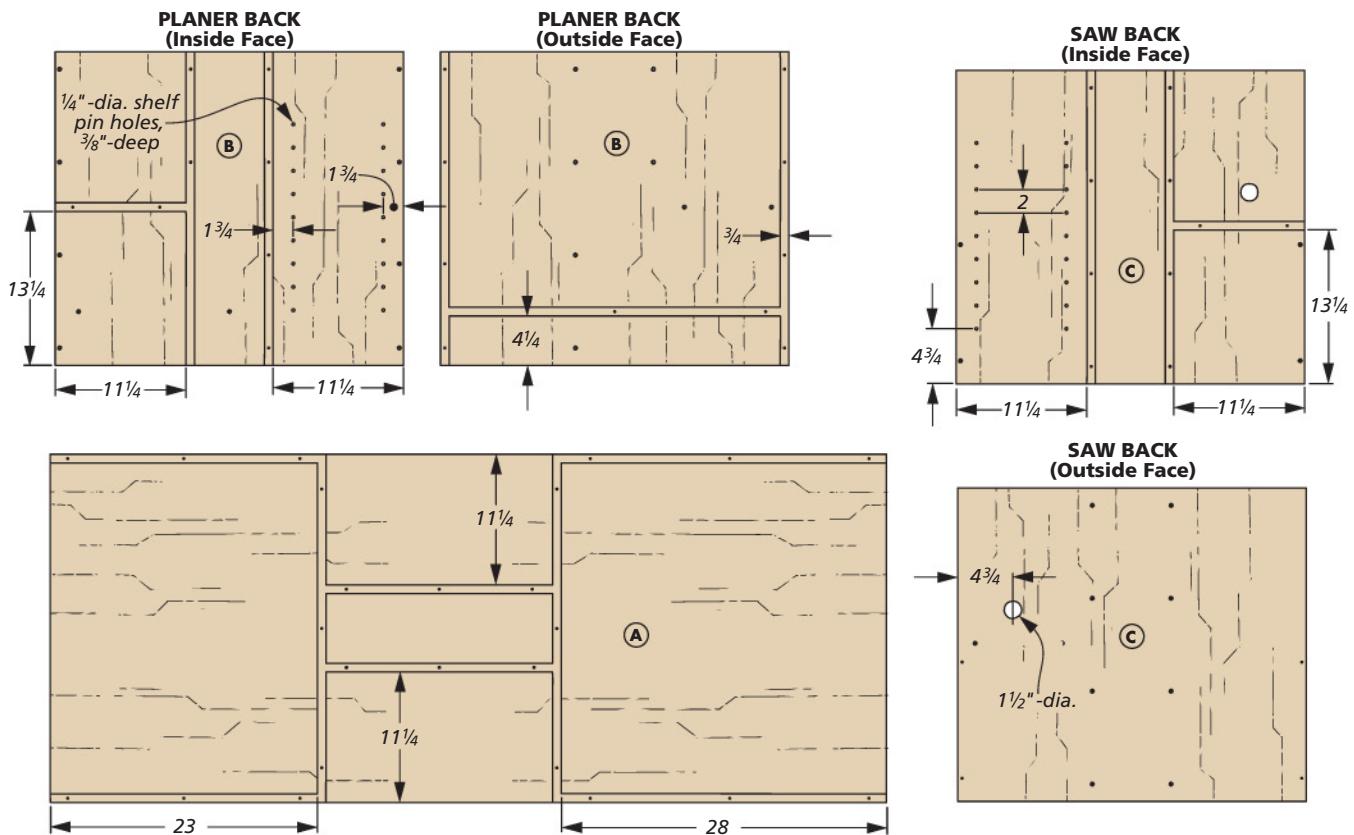
After cutting the bottom, planer back, and table saw back to size, I wanted to tackle all of the joinery needed to connect everything. The joinery consists of a series of grooves, dadoes and rabbets in nearly every part of the case.

To cut the dadoes and grooves in the large workpieces, I decided to use my router with a shop-made dado jig. You can see the jig and how it gets used with a router in the box on the next page.

After laying out the joinery, I cut the dadoes in the base for the backs first. Then, I repositioned the dado jig to cut the grooves for the case dividers. These grooves start and end in the dadoes for the backs, so be careful as you start and finish these cuts.

While I had my router in hand and was working on the base, I went ahead and cut the rabbets for the planer and table saw sides. Here again, these rabbets start and end in the dadoes. Now set the base aside while you work on the backs.

SHELF HOLES & GROOVES. Both of the backs get a couple of grooves cut in them for



the case dividers. Also, there's a dado in the backs and one divider for the router table shelf (see main drawing). Again, I cut these with the router and guide.

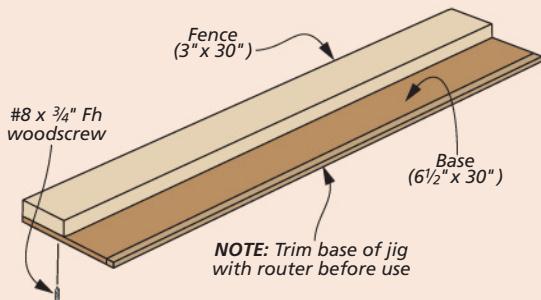
Now you can trade your router out for a drill. On the opposite side of the router shelf, there's a series of shelf pin holes that will hold pins for adjustable shelves. Take

care of drilling those holes next. Use some tape or a stop collar to keep from drilling through the back of the panels. Finally, a hole is drilled in the table saw back that you'll feed the router's power cord through later.

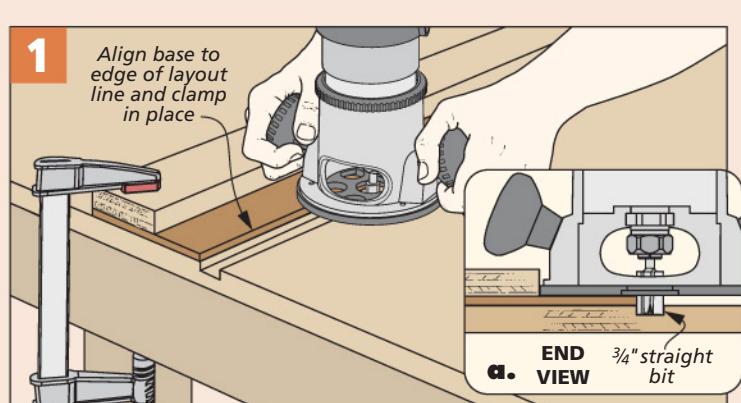
ASSEMBLY. Now you're ready to assemble the backs with the case dividers and

router shelf. Use a good bead of glue in each of the dadoes and grooves, then drive some screws home to hold everything tight. At this point, I flipped the center assembly over so I could install the bottom. An extra set of hands will help in positioning the bottom before gluing and screwing it in place.

Routing Dadoes & Grooves



Rout Next. Use a router with a $\frac{3}{4}$ " plywood bit to rout the dadoes and grooves. Rout left to right, cutting the grooves and dadoes in one pass.



Router Jig. To cut the dadoes and grooves in the panels, first lay out the position of each one. Clamp the guide along one side of the layout lines. Rout the dadoes and grooves in one pass, from left to right.

Add the Sides

With the core of the workcenter complete, you can turn your focus to each end. On one end, a short case and drawer will support a top for your saw. On the opposite end, a large cubby makes room for the flip-top with attached planer. Below that, a smaller drawer offers some storage. The first thing is to finish the ends in preparation for the tops.

PLANER WALLS. Focusing on the planer end first, I cut the sides and shelf to size. Then, I cut the dadoes in the side panels for the shelf. Here, I used my router and the same dado jig from before. The last thing to do with the panels is to drill pocket holes along the top edge. These will be used to attach the top that will be added later.

With the parts cut, you can install them on the case. Here again, everything is glued into the dadoes and rabbets

and installed with screws. The sides are screwed from the bottom and along the inner edge (details 'b' and 'c').

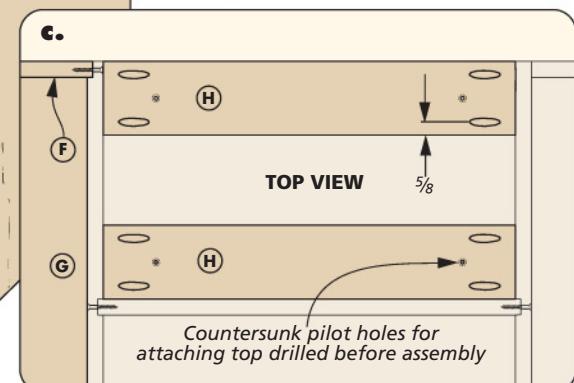
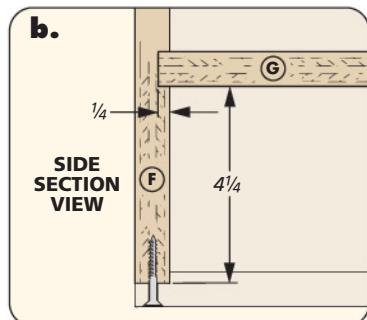
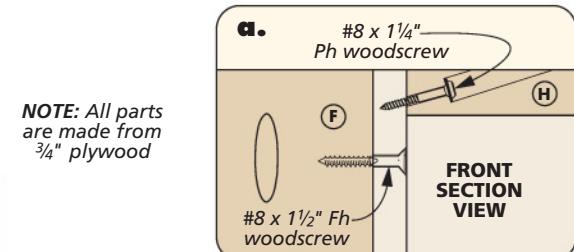
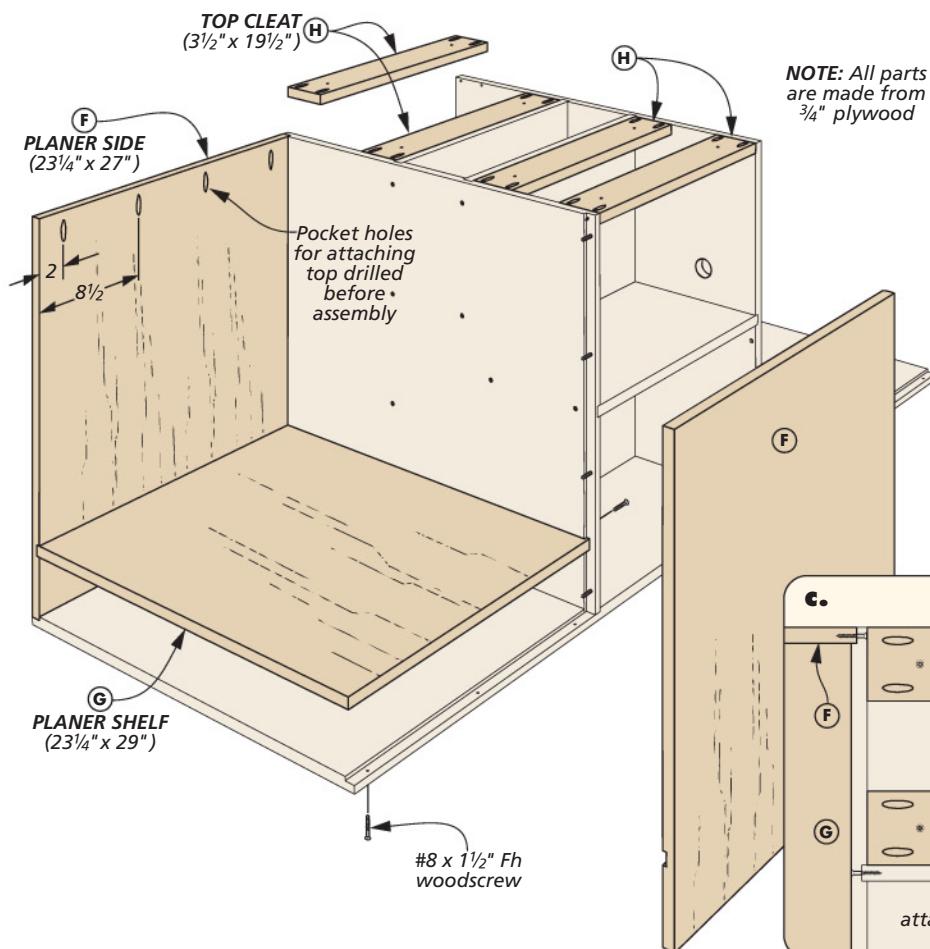
CROSS BRACES. To support the assembly, I cut four cleats for the center of the case. To install them, drill a pair of pocket holes on each end and attach them with screws. See the drawing below for the final positioning. These will also be used as attachment points for the top.

TABLE SAW PLATFORM

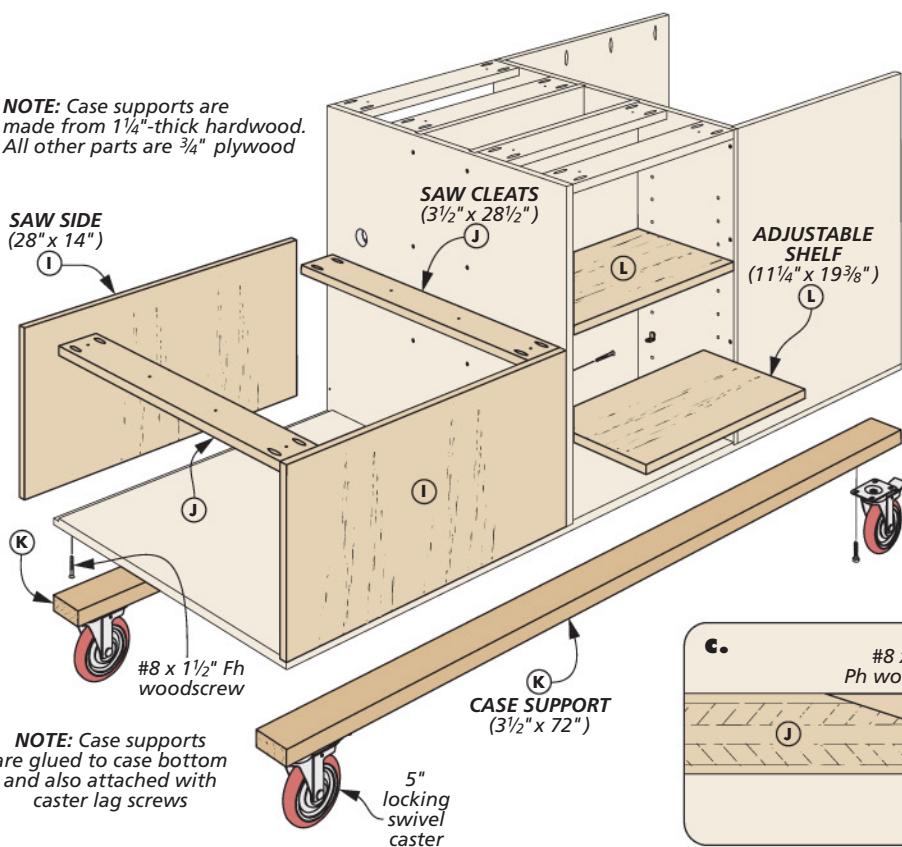
Now move to the other end of the workcenter. Here, you'll work on the platform for the table saw top. The construction follows suit from the planer end. The sides are cut and installed using screws and glue. A pair of cleats, similar to the ones you just installed, connect the two sides (upper drawing, next page).

MAKE IT MOBILE. After finishing and installing the side panels on both ends, you're done driving screws through the bottom. Now you'll add a pair of hardwood support strips along the bottom edge. These help support the weight of the cart, add rigidity, and provide a mounting point for a set of casters. You can see these in the illustration on the next page. After gluing the strips in place, install the casters with a handful of lag screws (detail 'a' on the next page).

ADD STORAGE. With the foundation of the cart in place, let's talk about storage. Keeping everything close to where you work is a good idea. With that said, there are a few storage options here that will make your work in the shop easier. The first, and easiest, is cutting a pair of shelves for the center section. These rest



NOTE: Case supports are made from $1\frac{1}{4}$ "-thick hardwood. All other parts are $\frac{3}{4}$ " plywood



NOTE: Case supports are glued to case bottom and also attached with caster lag screws

on shelf supports that you can position where you'd like.

TABLE SAW DRAWER

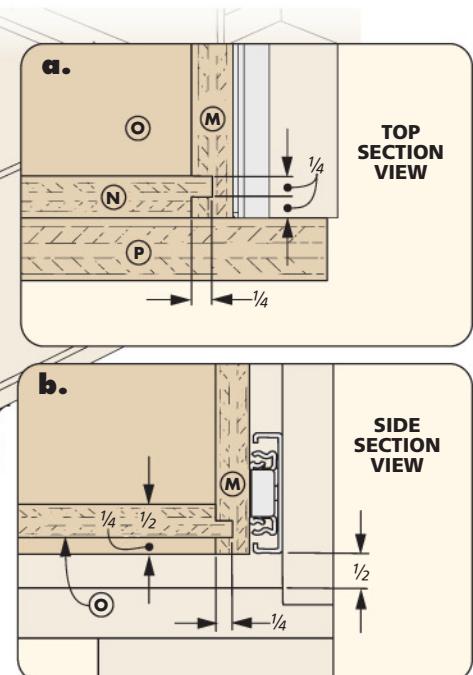
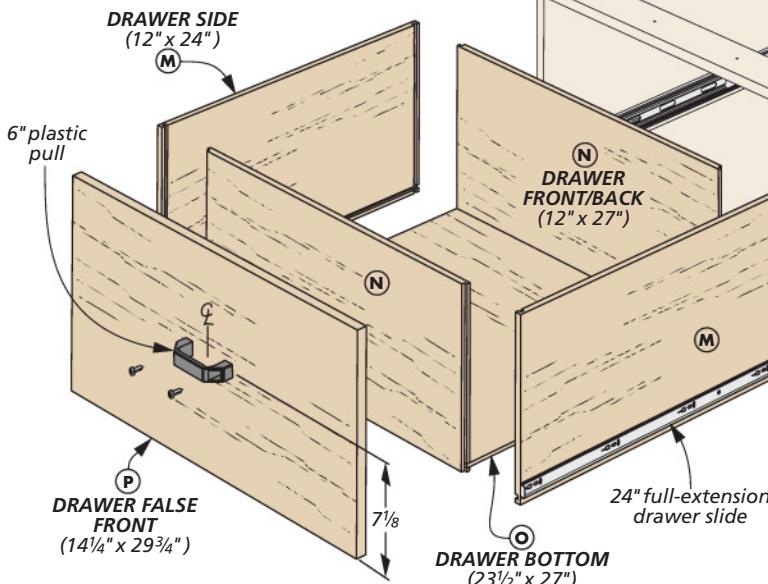
The drawer on the table saw side of the cart is quite large. However, solid tongue and dado joinery holds everything

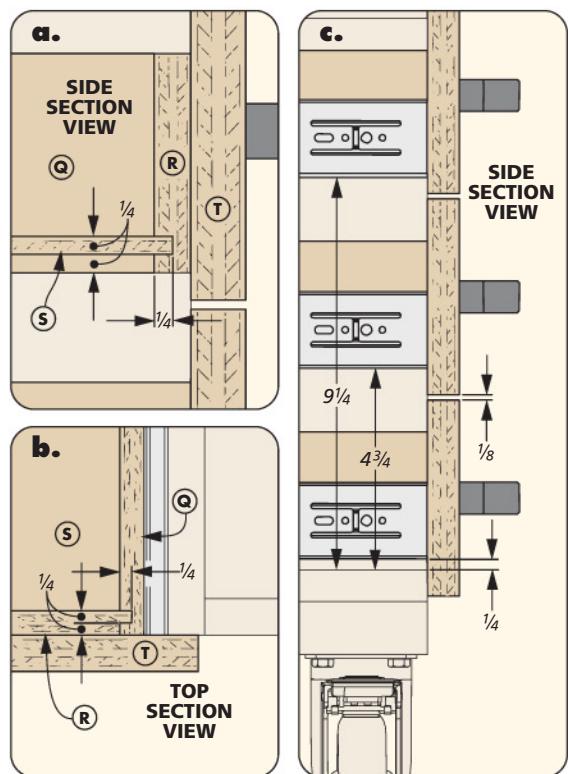
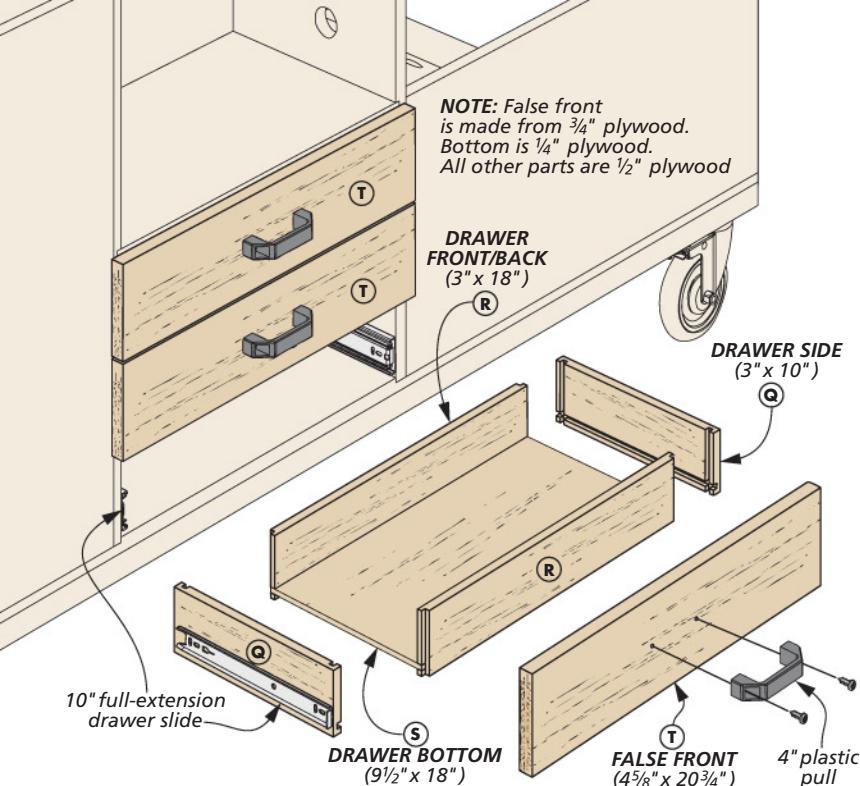
together. The only quirk is the bottom, which I beefed up using thicker plywood to help hold the extra weight of the items that will inevitably get stacked in the deep drawer.

After cutting a groove for the bottom, the bottom itself will need a little work to

slide into place. This is done by cutting a rabbet around the lower edge of the bottom panel at the table saw. Now, the box can be assembled and installed into the case. It's mounted on metal slides (shown in detail 'b' below), and the false front is screwed in place.

NOTE: False front is made from $\frac{3}{4}$ " plywood. All other parts are $\frac{1}{2}$ " plywood





A Few More Drawers

There are a few more drawers to take care of before you switch gears to the doors. A series of drawers sits below the router table, and another large, shallow drawer lives under the planer.

A TRIO OF DRAWERS. The drawers under the router table are up to bat now. These are the perfect size to store router bits, insert rings, wrenches, and all the other accessories you need close at hand while at the router table.

The construction of these mimics the joinery used on the table saw drawer. The fronts and backs of these drawers have a tongue cut on each end. These tongues fit into dadoes that are cut in the sides. Again, a groove is cut around the lower edge to hold the bottom drawer panel. Here, I found it helpful to make all the drawer boxes first and install them. Then, you can position the three false fronts for even spacing and attach them with screws before installing the pulls.

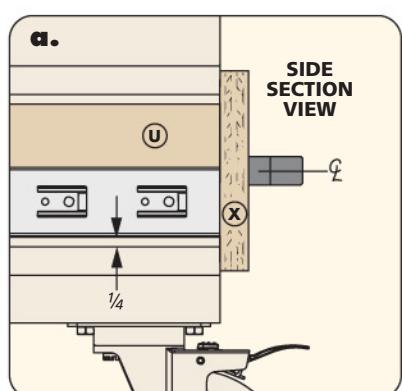
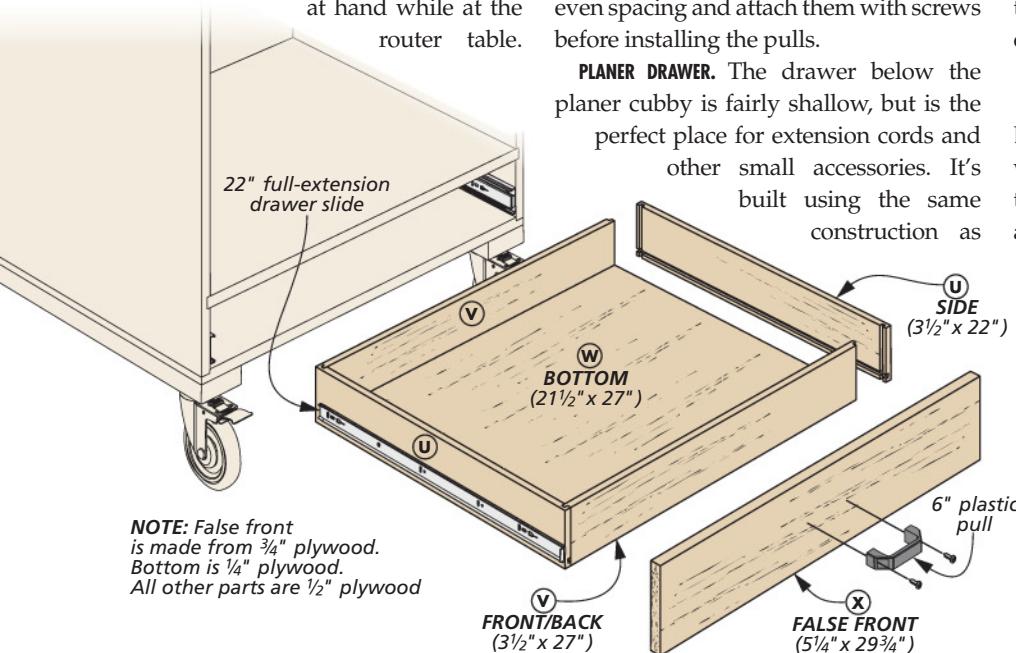
PLANER DRAWER. The drawer below the planer cubby is fairly shallow, but is the perfect place for extension cords and other small accessories. It's built using the same construction as

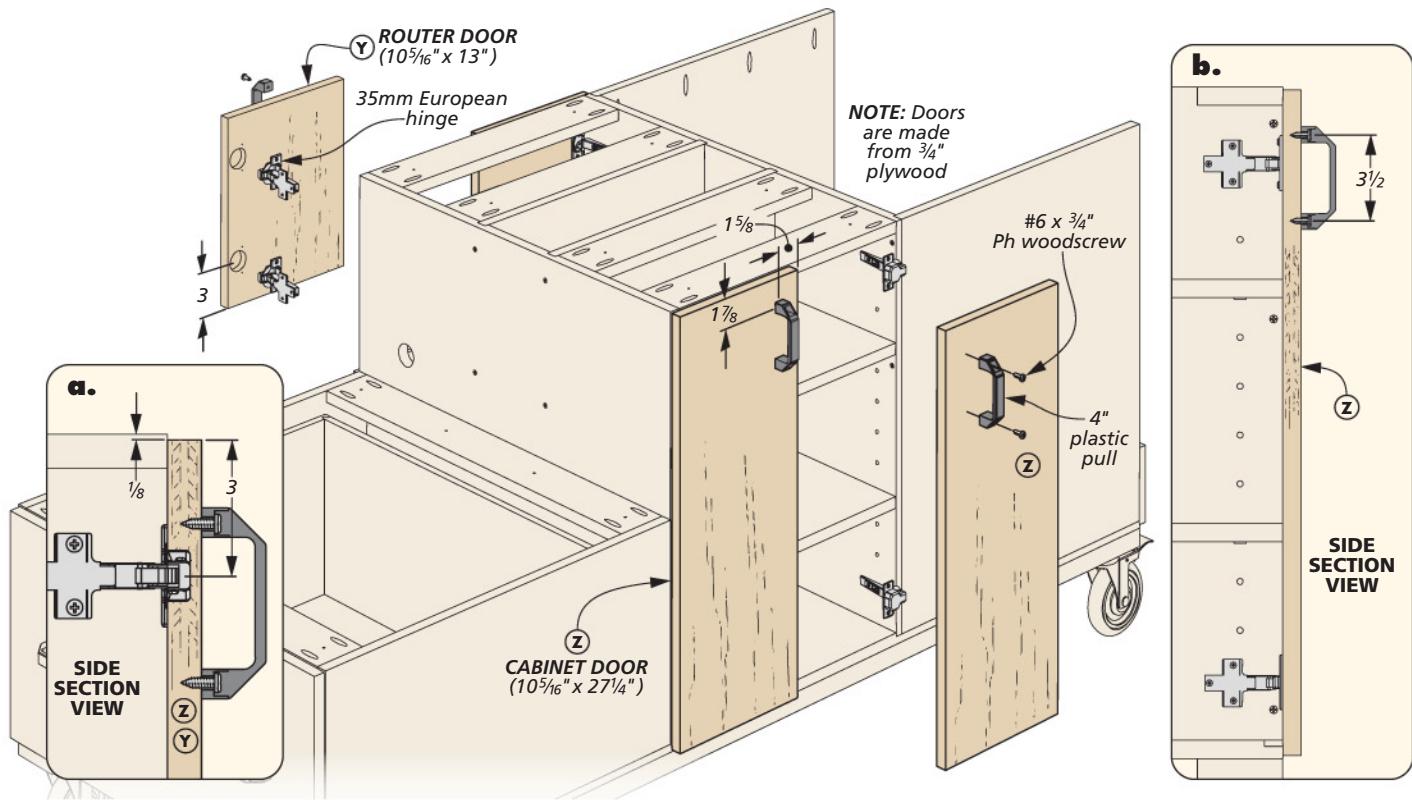
the drawers you've already built. All of the joinery is easy to cut at the table saw using a dado blade.

After the drawer is built, install it with slides, as shown in detail 'a' below. The slides are installed flush with the front of the case and slightly off the bottom of the cart. Once you have the drawer in place, position the false front with double-sided tape and attach it with screws. The final thing is to install a plastic pull on the front of the drawer.

FOUR DOORS

Before starting work on the different worksurfaces, you'll want to wrap up the doors of the workcenter. You'll have a total of four doors to make. Two smaller





doors are on the router side of the workcenter and they enclose the router when it's installed. On the opposite side, a pair of tall doors hide the adjustable shelves that you've already installed.

The construction of the doors couldn't be simpler. They're just plywood panels cut to finished size. The only thing that takes a little bit of attention is drill-

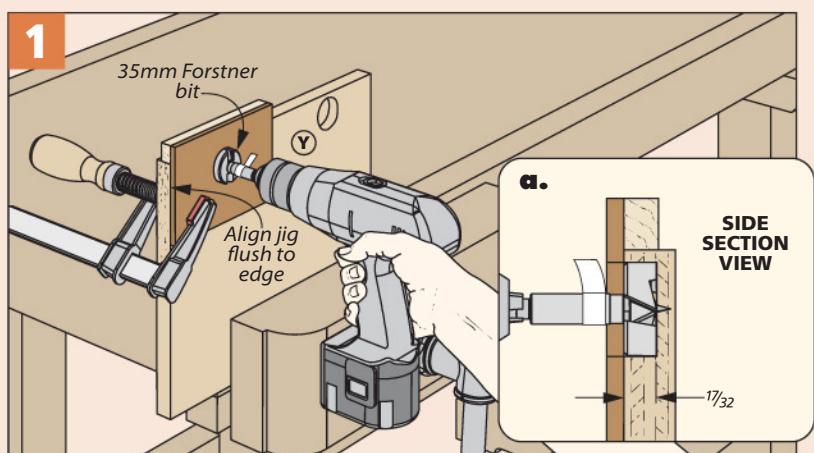
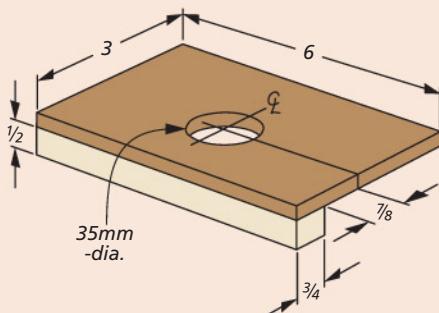
ing the recesses for the European hinges used to mount them to the case. Here, a jig is your best bet. It'll help you locate the hinge position so you can accurately install the hinges. You can see how the jig is constructed and how it's used to make the mortises in the box below.

DOOR INSTALLATION. With the hinges installed on the doors, they're ready to

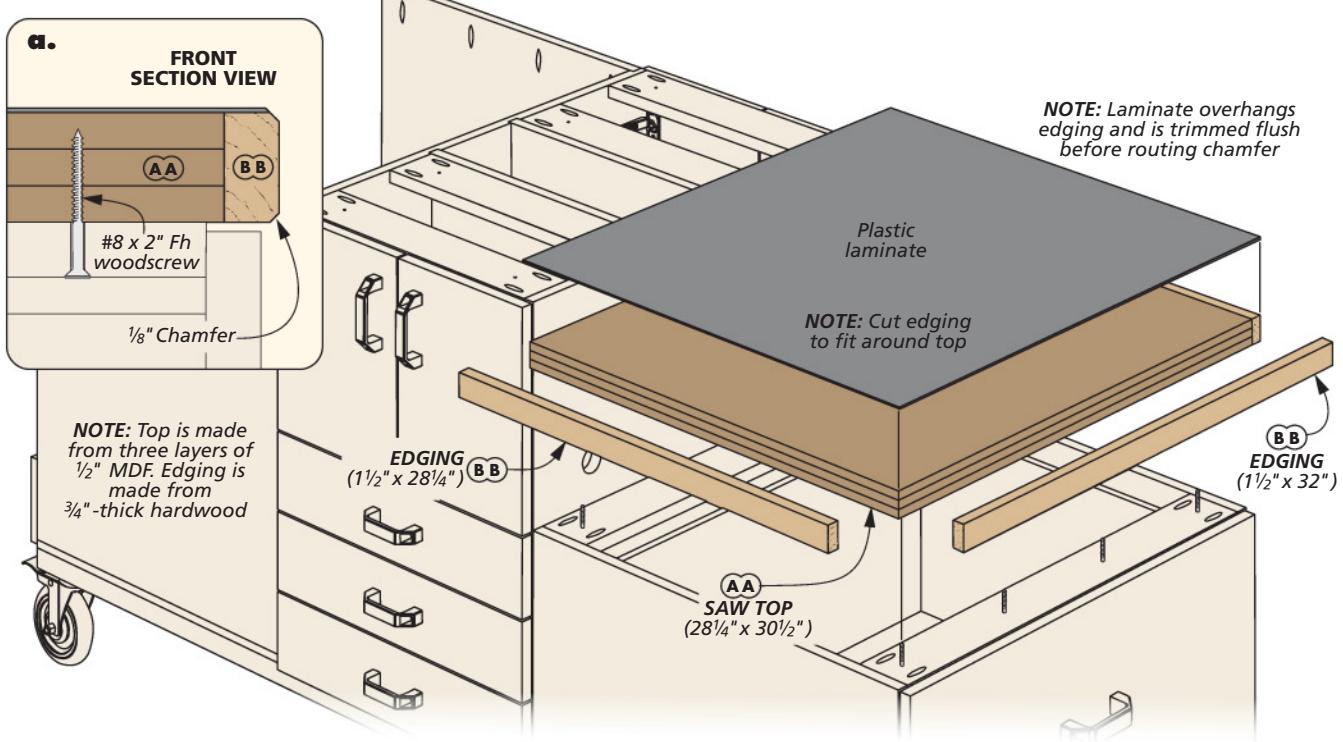
mount on the case. I like to position the door and mark the screw locations with an awl and then predrill them. Just pay attention to where you're installing the door, as you don't want it to rub on the top once it's installed. After getting the handles in place on each door, you're ready to start on the next task: tackling the top of the workcenter.

Door Hinge Jig

NOTE: Top is 3/4" hardboard. Cleat is 3/4"-thick hardwood



Hinge Pockets. With the door clamped in a vise, position the jig over the hinge location and secure it with a clamp. Then, use a Forstner bit to drill the hinge pockets, using tape on the bit shank as a depth indicator.



Adding the Fixed Top

The tops for the workcenter can be broken into three sections. The first is the table saw top. Next, is the main top that has the router plate installed. Finally, there's the portion of the top that holds the planer and rotates to reveal an additional work-surface. Up first is the table saw top.

MDF LAYERS. I used three layers of MDF glued together to form a sturdy platform.

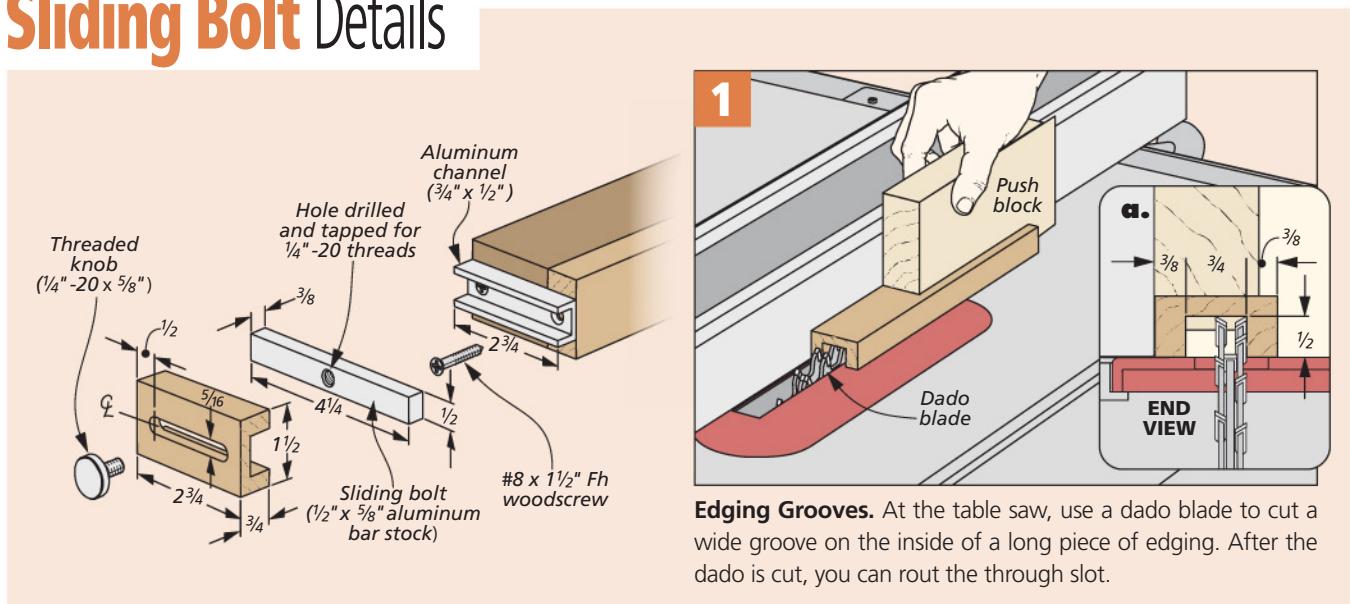
After gluing the layers together, I cut it to size using a circular saw, due to the weight. Then, I installed some hardwood edging around the three exposed edges (see main drawing).

Before installing the top, I used spray adhesive to attach a piece of plastic laminate to it, then chamfered the edge with a router. The top can be installed by driving

a few screws through the cleats and into the top (as in detail 'a').

MAIN & FLIP-TOP. The next two tops are the main top and the flip top. These are glued up as one assembly and are then cut apart. Before slapping some MDF together, take a look at the drawings to the right on the next page. To create the pivot point for the rotating top, you'll want to cut the middle

Sliding Bolt Details



Edging Grooves. At the table saw, use a dado blade to cut a wide groove on the inside of a long piece of edging. After the dado is cut, you can rout the through slot.



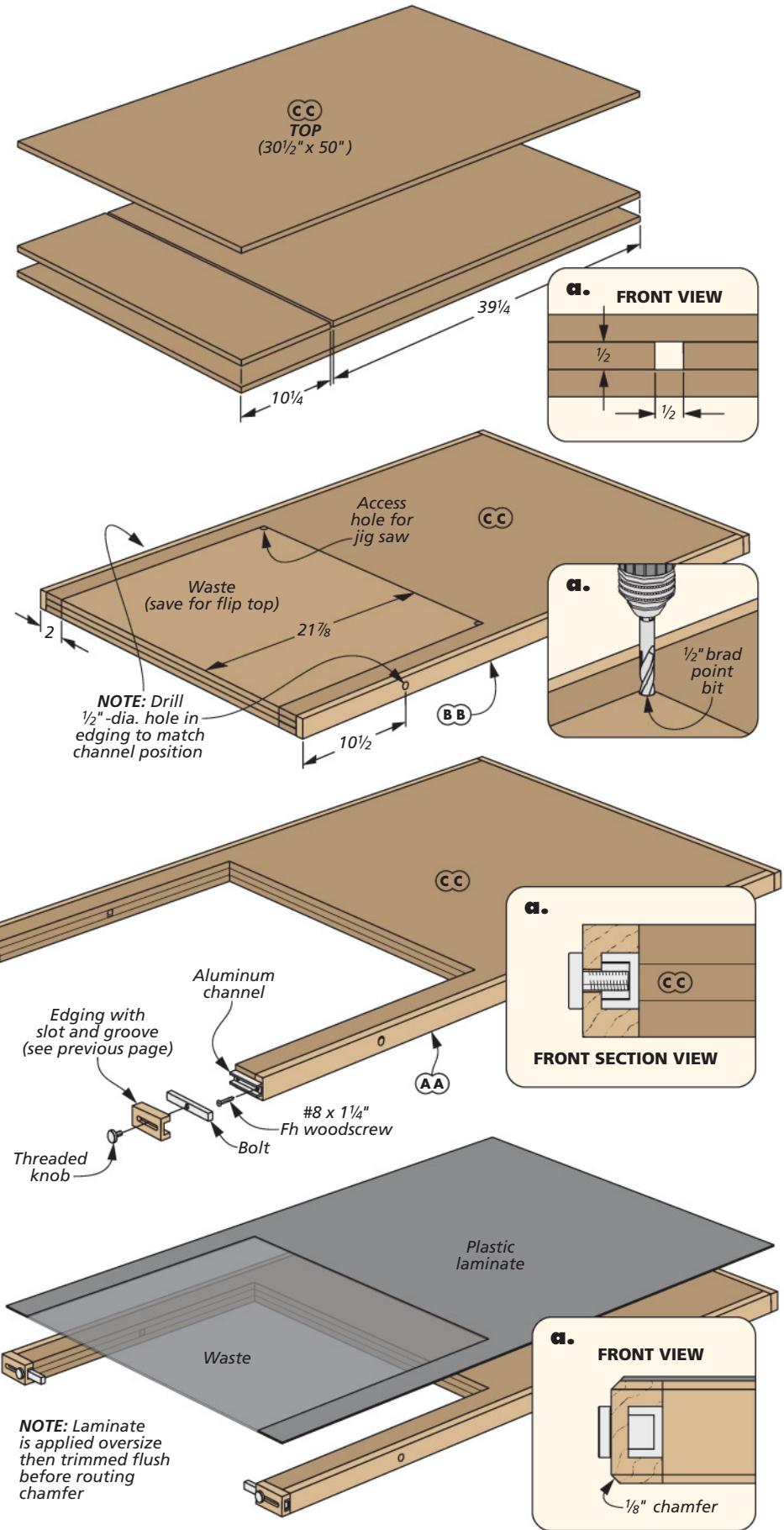
Flip-Up Top. The sliding bolt rides in an aluminum channel. By sliding it in place, it locks the top in both positions.

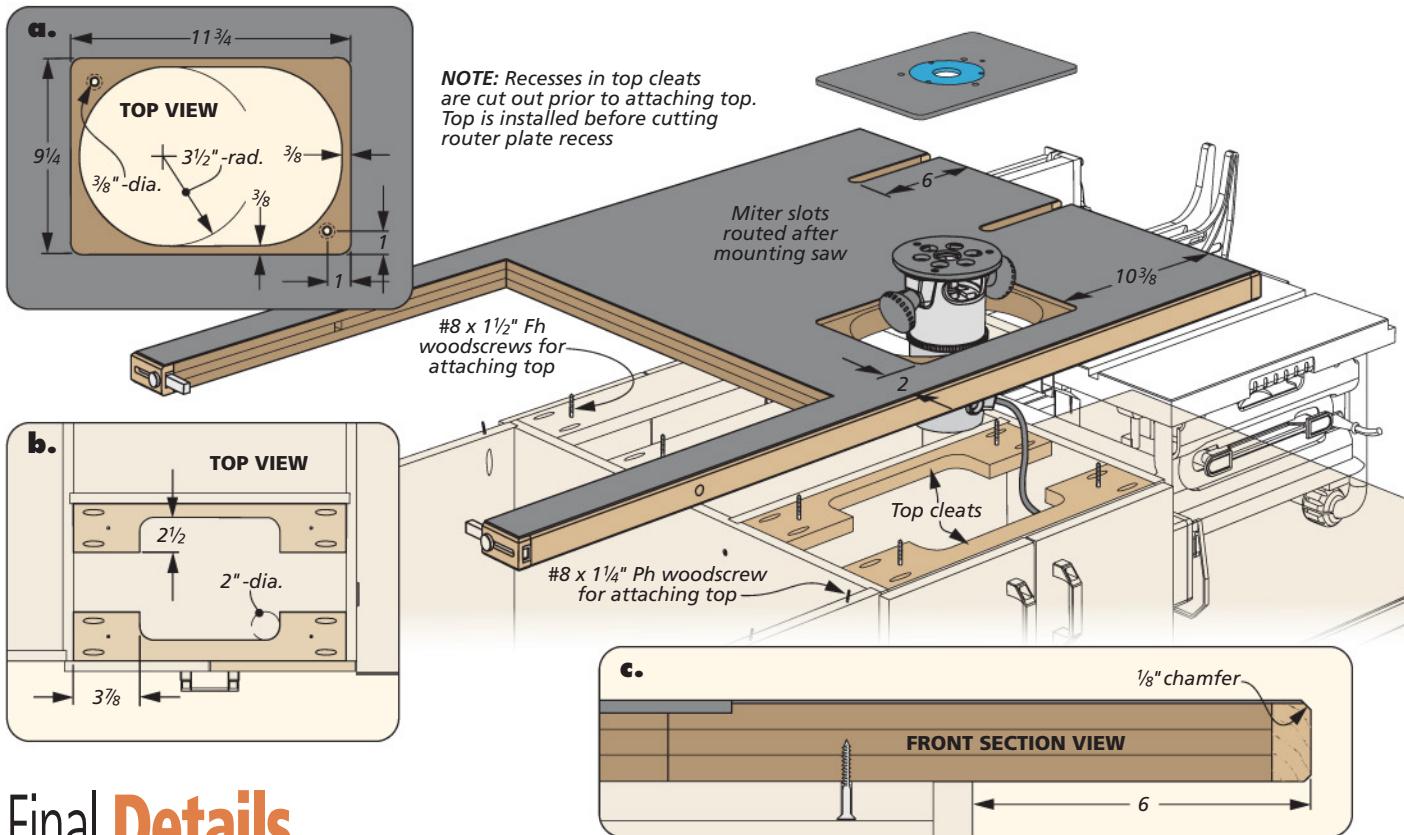
layer into two pieces. This creates a channel through the top that the pivot rod can be installed in. I simply used the rod as a spacer while gluing the top together and removed it after the glue dried.

CUT IT APART. After the glue is dry, you can split the top into the two different sections, but first edge the three sides as shown at right. Then, use a jig saw with a straightedge guide to cut the flip section loose. The back edge of the flip section will get trimmed down a little bit, so you can drill a couple holes in the corners to help you make the turn with the saw. Once you have the flip top free, set it off to the side for now.

GROOVY EDGING. Now you can add the remaining edging to the top. This edging is grooved to receive the latch mechanism that locks the flip-top in place. I cut this groove with a dado blade, and then used the router table with a straight bit to cut a through slot into the edging.

Before cutting the edging apart and installing it, make the sliding bolt mechanism and install it. The box on the previous page shows how to make the bolt. The channel is screwed to the top, and the bolt slides into the channel. A knob is threaded into the bar through the slot in the edging. To finish the top, add laminate with spray adhesive.





Final Details

At this point, you can install the main top onto the workcenter. There are just a few more details to take care of before you start putting it to use though.

ROUTER INSERT. With the top installed, I positioned the router plate and marked the location (detail 'd'). Then, it was a simple matter of using a jig saw to cut the main opening for the router. But first, you'll have to size the top cleats (detail

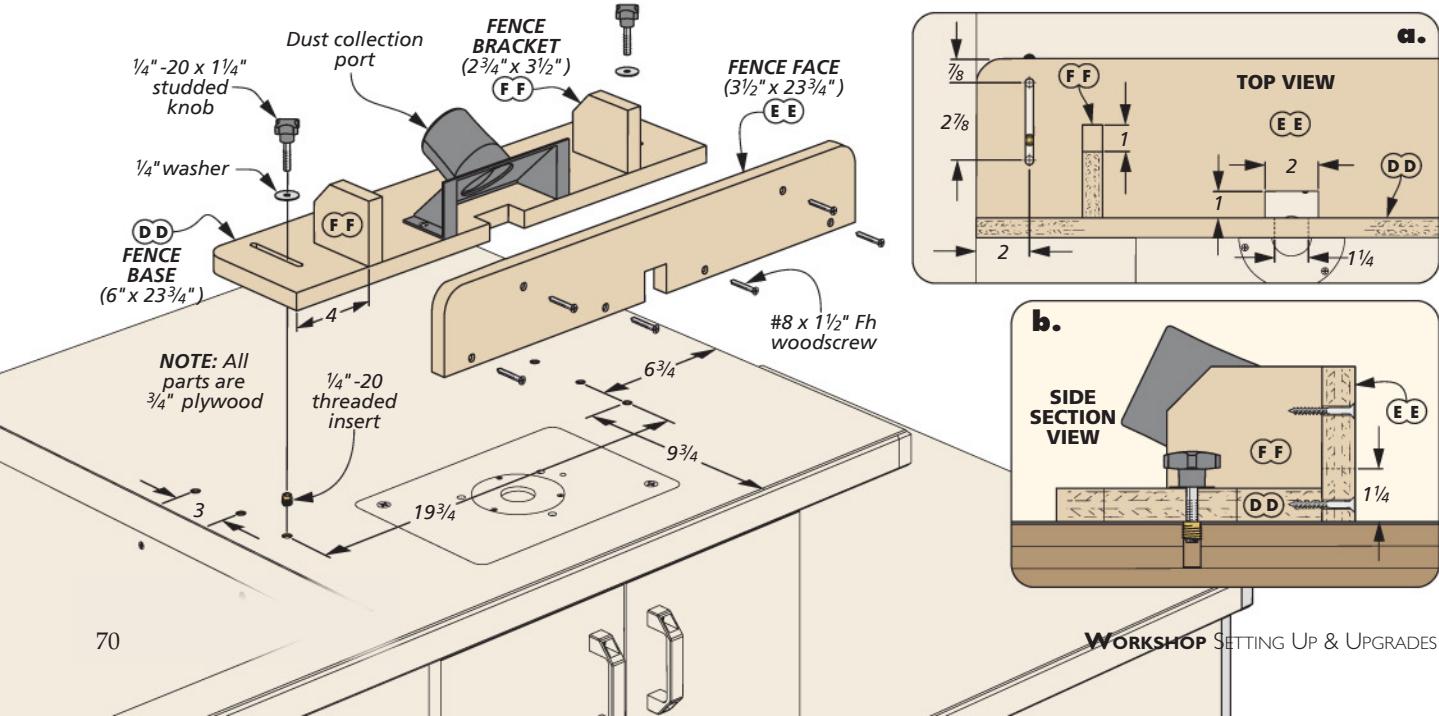
'b'). Finally, you can use a couple of fences and a dado cleanout bit to form the rabbet for the router plate.

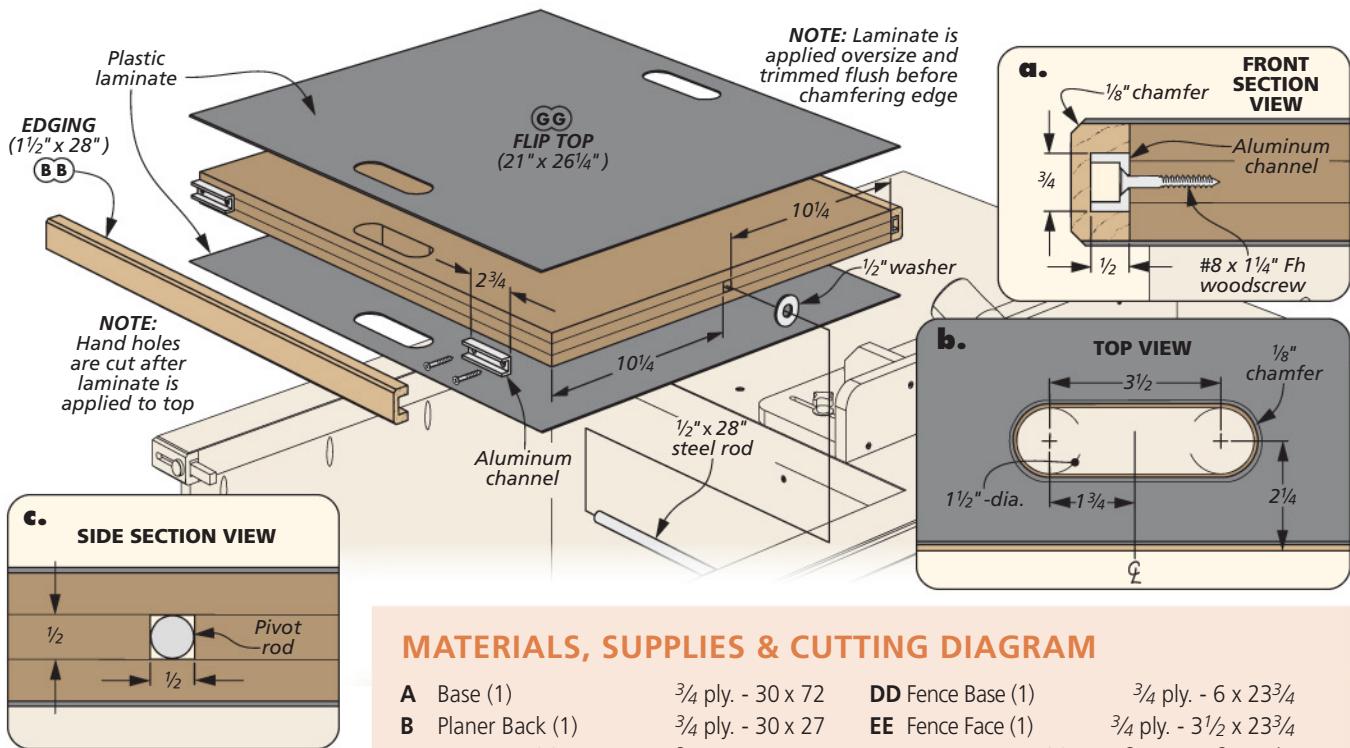
ROUTER FENCE. The fence for the router table is next. It consists of a base, face, and a pair of brackets. After cutting the face and base to size, I cut the notches with a jig saw. While I had my jig saw in hand, I used it to form the slots in the base — I simply cut between two holes I had drilled

to form the ends. Then, after cutting the brace angles with a jig saw, I assembled the fence with glue and screws.

To attach the fence to the table, I drilled holes in three different locations in the top and installed threaded inserts into them. That way, I could use studded knobs to attach the fence to the top.

FINISH THE FLIP-TOP. Now you're ready to finish the flip-top that you set aside earlier.





The first thing to do is trim the top down to its final dimensions then make a little more edging with a groove in it. After attaching some aluminum channel to the outside edges (as shown in the main drawing and detail 'a,' above), the edging can be attached to the top.

After mounting laminate on both sides of the flip top and routing the chamfers, the final thing to do is cut a pair of hand holes. Define the ends with a Forstner bit, then remove the waste with a jig saw. Then, you can install the top by sliding in the pivot rod with a pair of washers and plugging the holes with a dowel.

With the top finished, the workcenter is ready to start punching the time clock. Now of course, you'll have to mount your tools. We designed the flip top for a planer, but any tool of relative size that you want to store out of the way would be the perfect candidate to install there. However you utilize the flip top, this workstation is the perfect space-saving solution for your shop setup.

MATERIALS, SUPPLIES & CUTTING DIAGRAM

A Base (1)	3/4 ply. - 30 x 72	DD Fence Base (1)	3/4 ply. - 6 x 23 3/4
B Planer Back (1)	3/4 ply. - 30 x 27	EE Fence Face (1)	3/4 ply. - 3 1/2 x 23 3/4
C Saw Back (1)	3/4 ply. - 30 x 27	FF Fence Brackets (2)	3/4 ply. - 2 3/4 x 3 1/2
D Case Dividers (2)	3/4 ply. - 20 x 27	GG Flip-Top (1)	1 1/2 MDF - 21 x 26 1/4
E Router Shelf (1)	3/4 ply. - 11 1/2 x 20		• (1) 1 1/2"-dia. x 36" Steel Rod
F Planer Sides (2)	3/4 ply. - 23 1/4 x 27		• (4) 5" Casters
G Planer Shelf (1)	3/4 ply. - 23 1/4 x 29		• (16) 5/16"x 1 3/4" Lag Screws
H Top Cleats (4)	3/4 ply. - 3 1/2 x 19 1/2		• (2) 48" x 96" Plastic Laminate
I Saw Sides (2)	3/4 ply. - 28 x 14		• (66) #8 x 1 1/2" Fh Woodscrews
J Saw Cleats (2)	3/4 ply. - 3 1/2 x 28 1/2		• (7) 4" Plastic Handles
K Case Supports (2)	1 1/4 x 3 1/2 - 72		• (2) 6" Plastic Handles
L Adjustable Shelves (2)	3/4 ply. - 11 1/4 x 19 3/8		• (1) Router Insert Plate
M Saw Drawer Side (2)	1/2 ply. - 12 x 24		• (6) 1/4"-20 x 1 1/4" Threaded Inserts
N Saw Dwr. Frt/Bk (2)	1/2 ply. - 12 x 27		• (2) 1/4"-20 Studded Knobs
O Saw Dwr. Bottom (1)	1/2 ply. - 23 1/2 x 27		• (1) Dust Collection Port
P Saw Dwr. False Fr. (1) 3/4 ply.	- 14 1/4 x 29 3/4		• (3 pr.) 10" Full-Extension Drawer Slides
Q Router Dwr. Sides (6)	1/2 ply. - 3 1/2 x 10		• (1 pr.) 22" Full-Extension Drawer Slides
R Router Dwr. Frt/Bk (6)	1/2 ply. - 3 x 18		• (1 pr.) 24" Full-Extension Drawer Slides
S Router Dwr. Bottom (3)	1/4 ply. - 9 1/2 x 18		• (1) 1/2" x 3/4"-12" Aluminum Channel
T Router Dwr. False Fr. (3) 3/4 ply.	- 4 5/8 x 20 3/4		• (1) 1/2" x 3/8"-10" Aluminum Bar Stock
U Planer Dwr. Sides (2)	1/2 ply. - 3 1/2 x 22		• (2) 1/4"-20 Threaded Knobs
V Planer Dwr. Frt/Bk (2)	1/2 ply. - 3 1/2 x 27		• (8) 35mm European Hinges
W Planer Dwr. Btm. (1)	1/4 ply. - 21 1/2 x 27		• (8) Shelf Supports
X Planer Dwr. False Fr. (1) 3/4 ply.	- 5 1/4 x 29 3/4		• (18) #12 x 3/4" Ph woodscrews
Y Router Doors (2)	3/4 ply. - 10 5/16 x 13		• (2) 1/2" Washers
Z Cabinet Doors (2)	3/4 ply. - 10 5/16 x 27 1/4		• (2) 1/4" Washers
AA Saw Top (1)	1 1/2 MDF - 28 1/4 x 30 1/2		Also needed:
BB Edging	3/4 x 1 1/2 - 278 rgh.		Three 48" x 96" sheets of 3/4" Baltic birch plywood
CC Top (1)	1 1/2 MDF - 30 1/2 x 50		One 48" x 96" sheet of 1/2" Baltic birch plywood

3/4" x 5" - 96" Hard Maple (3.3 Bd. Ft.)

BB

1 1/4" x 7 1/2" - 72" Hard Maple (2.2 Bd. Ft.)

K





Upgrades & Tools

The quality of your work is largely defined by the tools you use. In this section, you'll find upgrades to some of the most essential power tools in a woodshop, and even the plans to make one yourself.

MOBILE PLANER CART 74

SMALL SHOP ROUTER TABLE 80

DRILL PRESS TABLE 84

NARROW BELT SANDER 90



Mobile Planer Cart

A thickness planer allows you to work with lumber in thicknesses you can't find in a hardware store or home center. Portable planers, sometimes called lunch box planers, like these are a common choice for many woodworkers. But there's one issue with them — they're just too darn heavy to really fulfill that portable part.

That's where the cart shown here comes in handy. No more backbreaking lifting as you lift your planer in and out of storage, and since it has wheels you can move it anywhere you'd like to accommodate any length of board.

Every bit of space in the shop is valuable, so we've made sure that every inch of space in this cart is utilized. There are

Have it Both Ways. The side wings are convenient in use, but they easily fold down for storage.

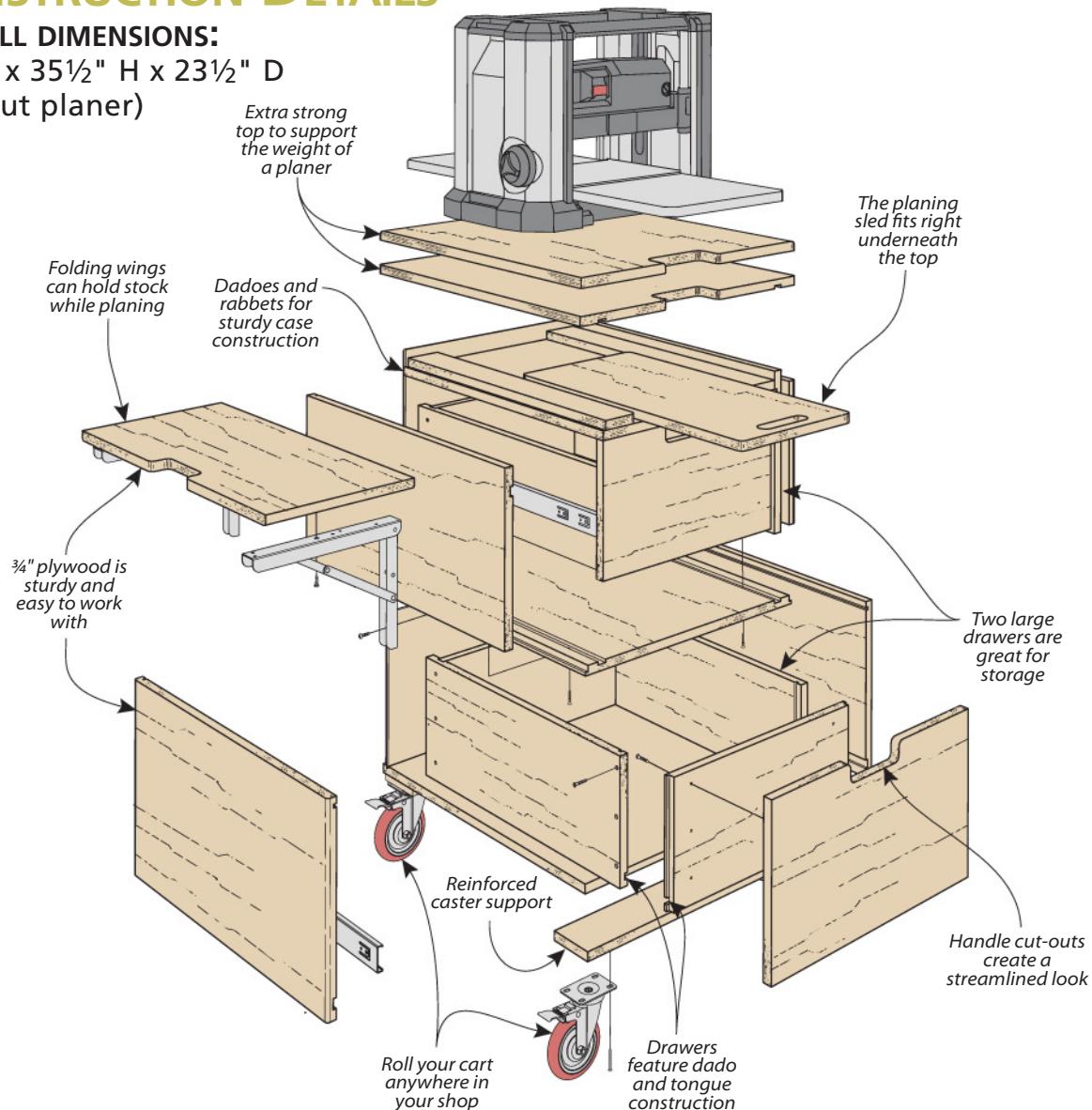
two large drawers for storage of common shop supplies. Folding side wings provide extra work space (when you need it), and an on-board planing sled is perfect for small, thin boards that would otherwise be unsafe to run through the machine. To get the build rolling, it's time to head to the shop and start breaking down plywood.

CONSTRUCTION DETAILS

OVERALL DIMENSIONS:

27" W x 35½" H x 23½" D

(without planer)



Extra Storage. There's no wasted space with these deep drawers. They work great to hold tools and accessories.

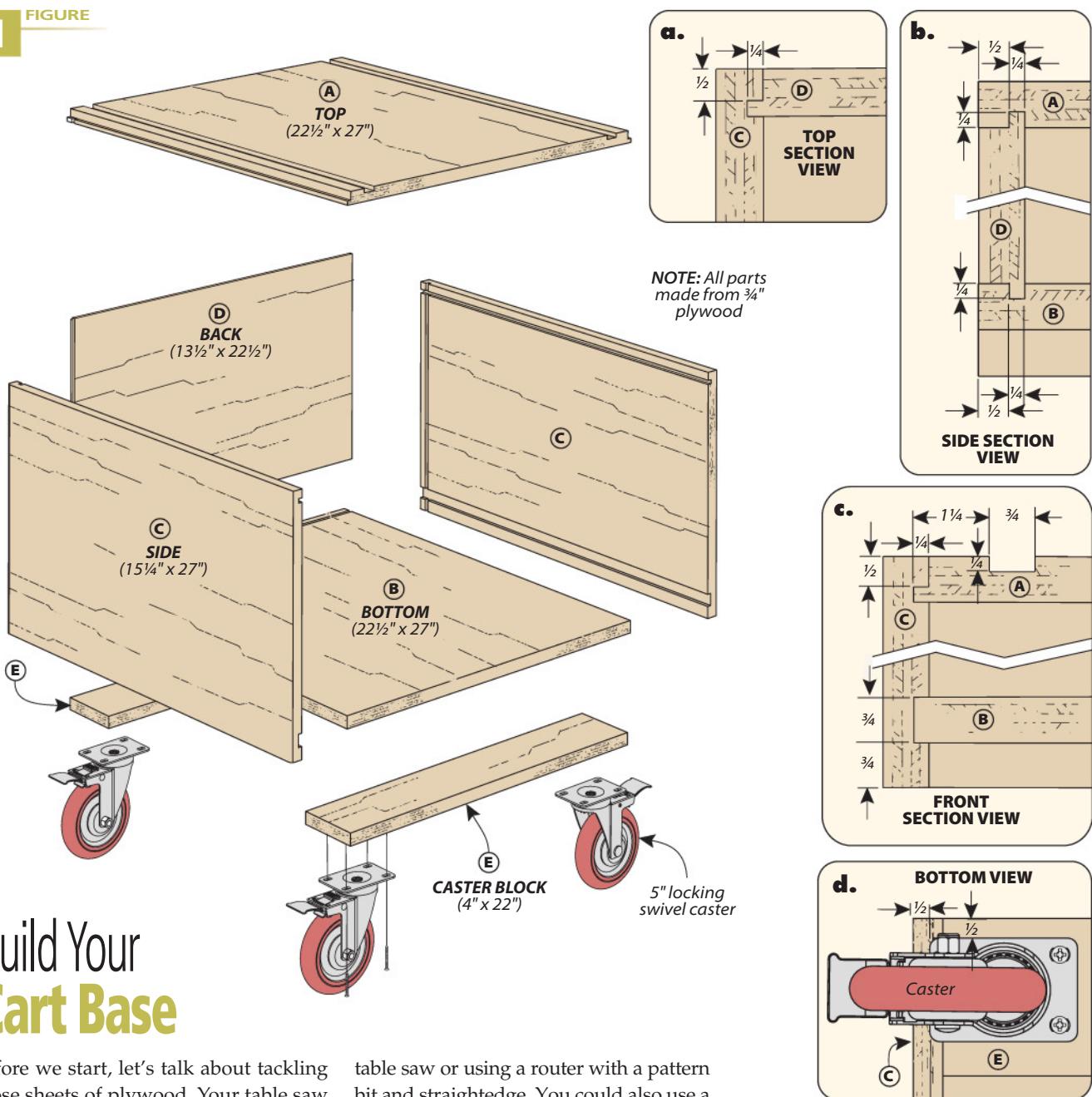


Safety First. Attaching short or thin stock to the simple sled you see here allows you to run them safely through the planer.



Planer Party Trick. The planing sled conveniently fits right underneath the top when you're done.

FIGURE 1



Build Your Cart Base

Before we start, let's talk about tackling those sheets of plywood. Your table saw or track saw will make quick work of this step. Be sure to take the time to label each piece clearly as you cut it. Trust me, you'll thank yourself for this later.

This cart starts, basically, with a pair of boxes. These boxes are built on top of each other, one at a time. This construction method is approachable, and allows you to work on this in chunks.

LOWER CASE. The construction of the planer cart cabinet features almost no screws at all. Ample use of rabbets, dadoes, and grooves create mechanical strength and glue does the rest. You can make these various cuts on either the

table saw or using a router with a pattern bit and straightedge. You could also use a combination of the two, keeping one set at $\frac{1}{2}$ " and the other at $\frac{1}{4}$ ". I'm using nominal dimensions throughout the build, but you'll want to set your tools to match the material you're actually using. Most plywood, including the Baltic birch used here, is slightly undersized.

CASE JOINERY. To make my life easier, I try to make all of my identical cuts at the same time so I didn't have to keep resetting for each piece. Looking at the lower case in Figure 1, that meant the $\frac{1}{4}$ " dadoes in the top, bottom, and sides are first (See Figure 1b). These dadoes hold the back piece in place, and are

located in the same place on all four pieces. You'll use the rip fence to form the dado in two passes. Set the fence to the correct measurement for your stock, then cut all four pieces. Once the outside edge is defined, move the fence over a nudge and finish the cut. Cutting a test piece is essential to a proper fit.

You should cut the grooves that run near the top of the side pieces at the same time you cut those dadoes. You can see how they're positioned in Figure 1a. Now, let's get the back rabbet to fit in the dadoes.

Since I had to swap in a dado stack already, I went ahead and took care of that. Then I buried the dado blade in a sacrificial fence attached to the rip fence and cut the rabbets all the way around the back. I used the same setup to cut the two rabbets that run along the outside edges of the top. Remove the sacrificial fence to cut the remaining grooves in the sides and top.

I decided to clean up all of the ridges left behind from the dado blade with a sanding block. This gives the joint a cleaner look and ensures a strong glue bond — even if no one else sees it.

GLUEUP. Now it's time for some assembly. Apply a slow setting glue to the dadoes and grooves, then clamp everything up, making sure it's all square.

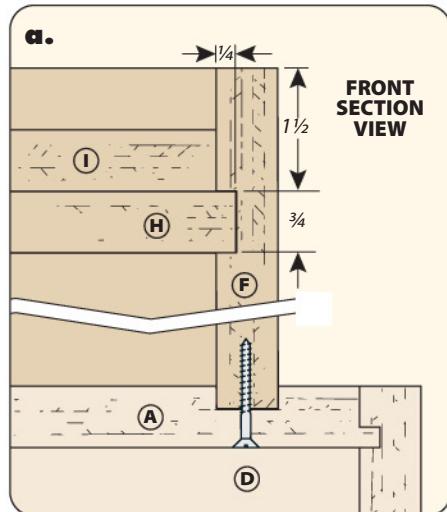
Since planers are quite heavy, I decided to reinforce the bottom a bit with caster blocks. After the glue was all dry, I screwed the casters in place and started the upper case.

One quick note on casters: you might be tempted to get the small, inexpensive ones, but that's usually not a good idea. A bigger caster is much less likely to get caught on something and tip your entire cart onto the floor.

UPPER CASE

Building the upper case is similar to the lower. Cutting in the correct order will make quick work of your time at the table saw. I started with the smaller $\frac{1}{4}$ " dadoes on the sides.

RABBETS. Now it's back to a wide dado blade and sacrificial fence again.



Cut the rabbets on the three sides of the end panel. The bottom edge will simply sit flat on the lower case.

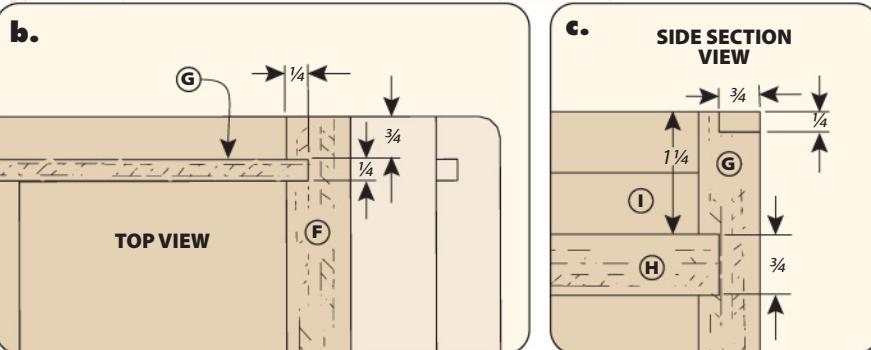
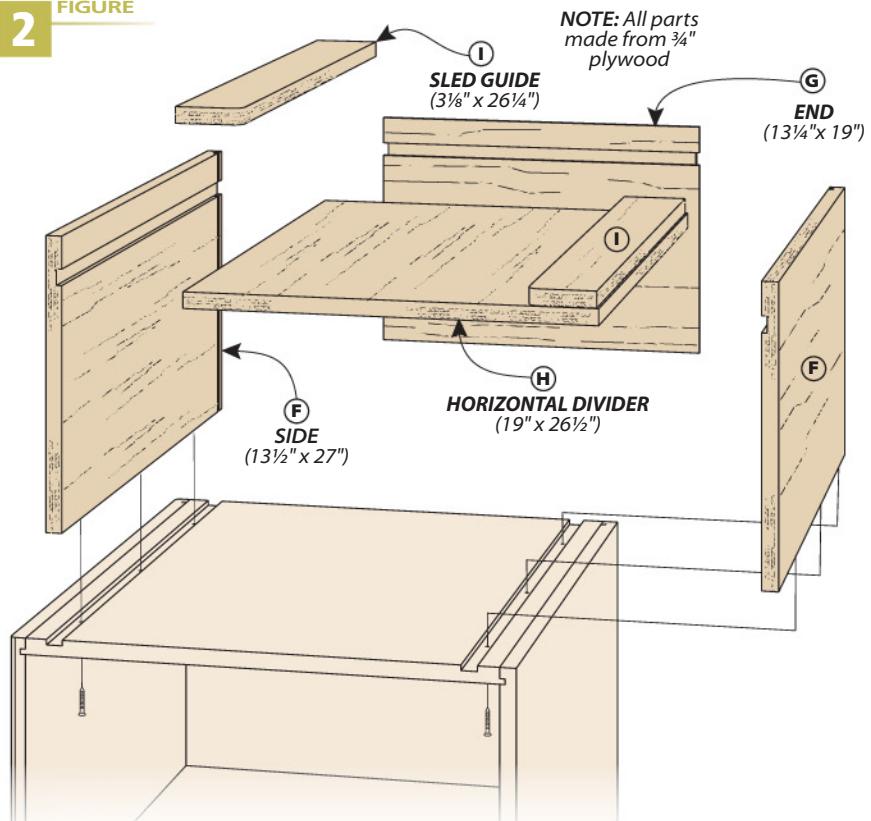
GROOVES. There are two different grooves to cut — the two on the side panel and one on the end. The cuts on the side panels are located $1\frac{1}{2}$ " from the top, and are on same face as the narrower dadoes you cut earlier. The groove on the end panel is also located $1\frac{1}{2}$ " from the top, but it's located on the opposite face as the rabbets. This layout is visible in Figure 2c below. Like before, I cleaned up the bottoms of all my cuts with a sanding block before assembling. You could also use a small rabbet plane.

ASSEMBLY. For assembly, start with dropping the sides in to the grooves

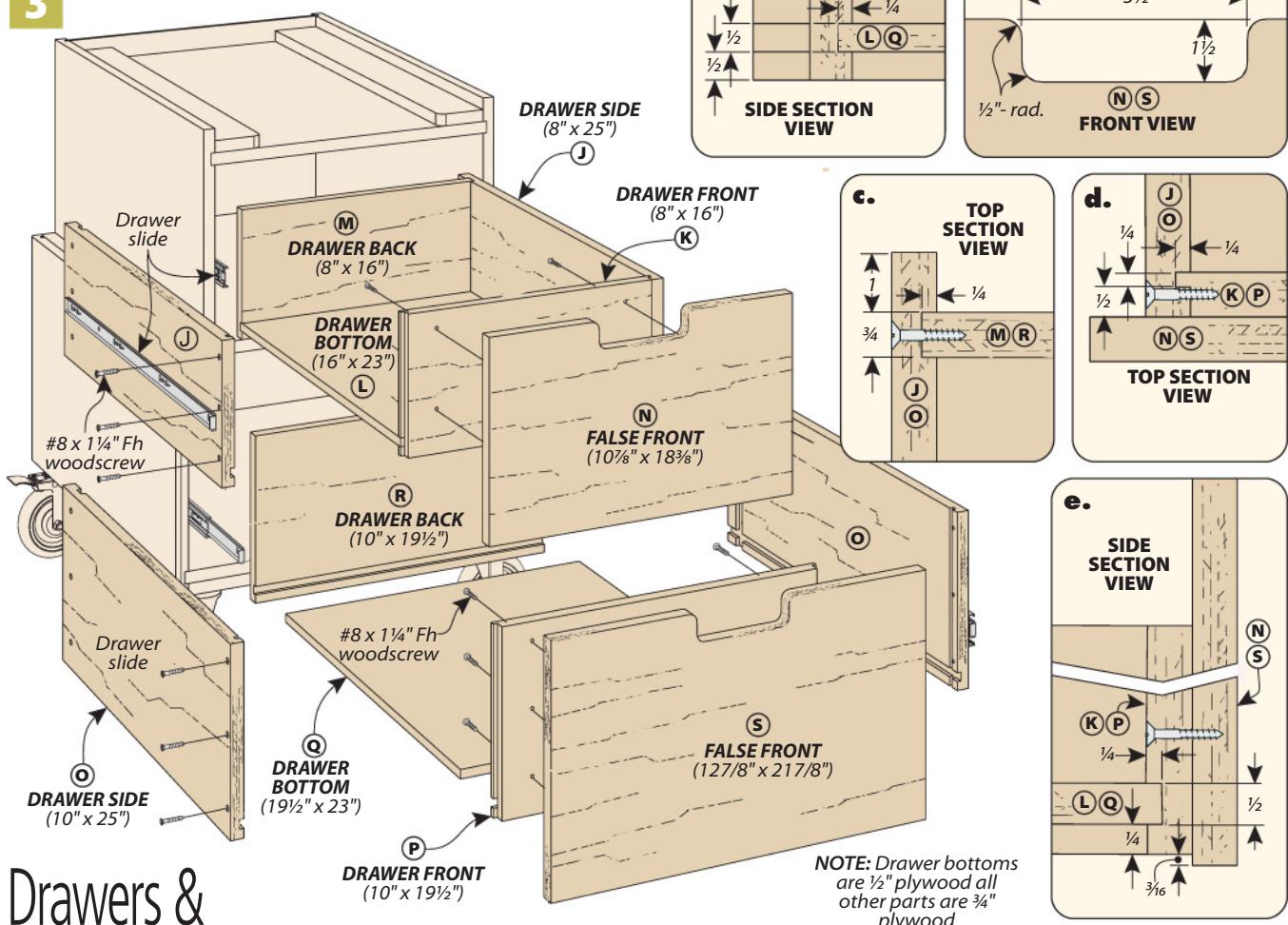
that run along the top of the lower case. Each side gets glued and screwed from the bottom — but don't tighten them all the way yet. Leaving them loose will give you play to install everything else. Add glue and drop the end panel into place. Make sure the rabbeted end is facing up. Spreading the sides slightly will allow the horizontal divider to be installed. Lightly clamp everything together, check for square, then finish driving in the screws.

SLED GUIDES. The final detail to take care of is a pair of sled guides. These will "block out" the area for the sled. For these, simply cut them to size, then glue and pin nail them in place. Up next is creating a set of storage drawers.

FIGURE 2



3 FIGURE



Drawers & Final Details

I wanted the drawers for this cart to be sturdy, yet quick to build, so I used simple tongue and dado joinery to hold everything together. These are great mechanical joints, and provide a positive connection that won't pull apart over time as you open and close the drawers.

Cut a narrow dado along the front end of each of the drawer sides, as in Figure 3d. A wider dado at the rear captures the drawer back (Figure 3c).

Next, take care of the rabbets (which create the tongues) on the drawer fronts. Adjust the dado blade setup to cut the grooves for the drawer bottom, as shown in Figures 3a and 3e. Glue everything up and finish with screws.

DRAWER INSTALLATION. Installing the drawer slides will go more smoothly if you use spacer blocks to mount the slides inside the case. You'll need to measure the offset to figure out exactly where you

want to mount the mating drawer slide on the drawer box. You want to take into account the distance (up and down), as well as the distance front-to-back.

When mounting the slides, you want to drive your screws into the slotted screw slots first. This gives you some wiggle room when positioning the slide to ensure perfect alignment. After you've test fit the drawer in the case, make any adjustments needed and drive a few screws into the "non-slotted" holes.

FALSE FRONTS. Now move onto the false front. The idea behind a false front is two-fold. It's a clean look on the front of the cart, but it also is actually easier to build. This is because now that you have the drawer box mounted to the case, you can fine-tune the position of the false front before you actually attach it, which leads to an even reveal all the way around.

The hand cutout for the front can be made by drilling out the corners and finishing the cut with a jigsaw. However,

you'll get much better results if you make a router template to finish everything up.

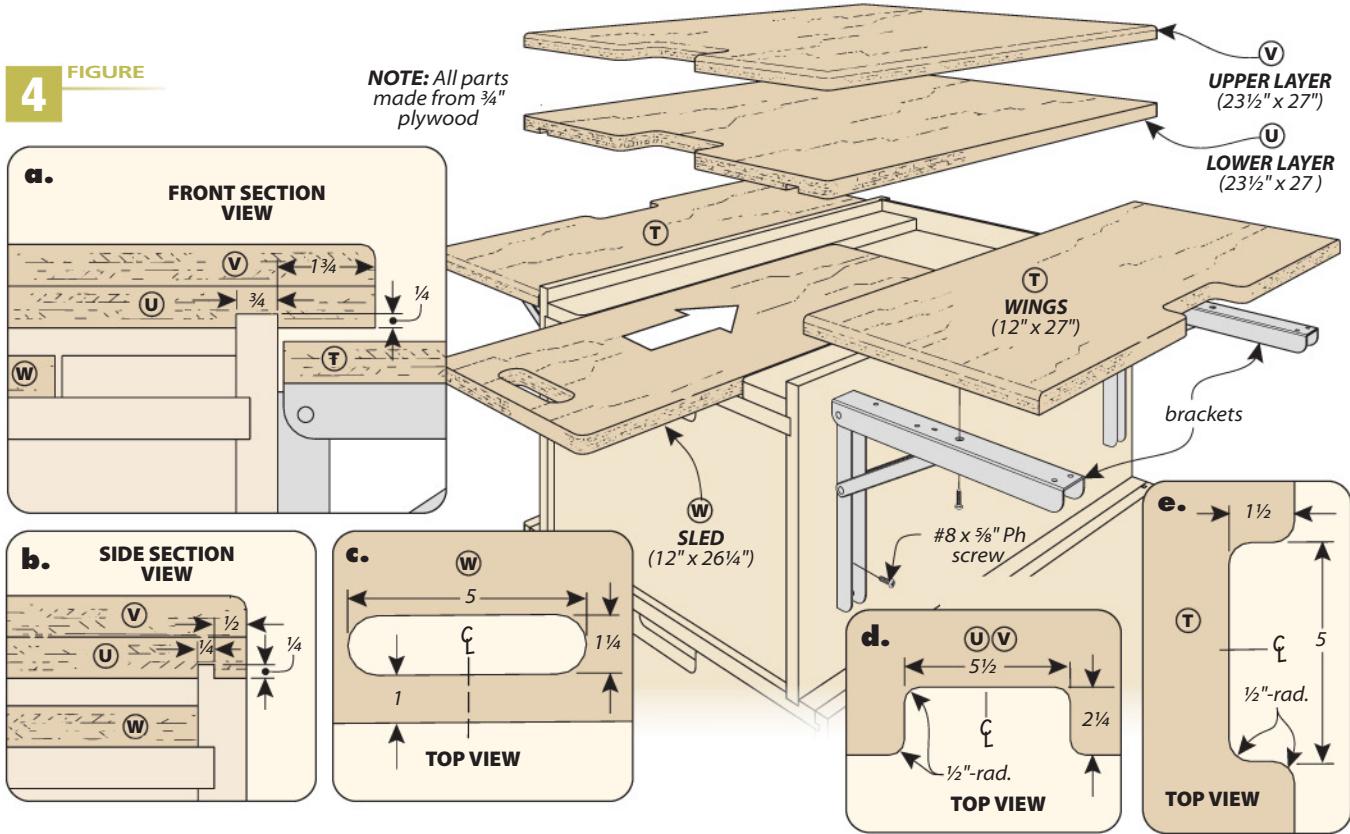
There are a few different sized cutouts in this build, so I actually made a half template. It includes the inner radius, outer radius, and a few inches on either side of those. Clamp it in place and clean up half of the handle, then flip it to the opposite side of the cutout to finish up.

Lastly, ease the edges with sandpaper. Now you're ready to mount it. Use double-sided tape on the false front. Position it for an even reveal, then push it onto the drawer box. Open the drawer and drive four screws from the back side. Repeat the same process for the other drawer.

FOLD-UP WINGS

The side wings of the cart are a convenient place to stack stock when using your planer, and fold away for equally convenient storage for the cart itself. Handholds on the wings are made using

FIGURE
4



the same method as the drawer cutouts. The dimensions are shown in Figure 4e. Use your router template to create a smooth, even profile.

The wings aren't difficult to install, but can be a bit finicky to get lined up correctly. After struggling for some time, I decided to turn the cart on its side. From there, I screwed the hardware to the cabinet itself first, attaching the wings afterward. I used a paper wedge to shim the wings out a bit so there was just enough clearance between it and the cabinet to fold without binding (as you can see in Figure 4a).

The top itself is constructed of two layers of plywood. The bottom face features a pair of grooves and a dado that interlock with the upper case (Figures 4a and 4b). Up until this point all my joinery had been cut on the table saw. However, I decided last minute that I didn't want the ends of the dadoes to be exposed on the sides of my top. So I broke out my compact router, attached an edge guide, and cut a stopped dado for a cleaner overall look.

With the lower layer complete, I glued on the top layer before making the cutout. The process is effectively the same;

drill out the corners, rough out with jigsaw, finish with router—you'll need to make a new template since the opening is deeper. You're finally ready to glue the top to the cabinet.

The planing sled is the last bit to build. After cutting to size you need to radius the outside corners and cut a handhold, as in Figure 4c. Like the cutouts, I made a router template to clean up the edges.

Two coats of spray lacquer protect the plywood surfaces. After installing your planer on top, you're ready for your next project with the ideal milling station.

MATERIALS & SUPPLIES

LOWER CASE

A Top (1)	3/4 Ply. - 22 1/2 x 27
B Bottom (1)	3/4 Ply. - 22 1/2 x 27
C Sides (2)	3/4 Ply. - 15 1/4 x 27
D Back (1)	3/4 Ply. - 13 1/2 x 22 1/2
E Caster Blocks (2)	3/4 Ply. - 4 x 22

UPPER CASE

F Sides (2)	3/4 Ply. - 13 1/2 x 27
G End (1)	3/4 Ply. - 13 1/4 x 19
H Horizontal Divider (1)	3/4 Ply. - 19 x 26 1/2
I Sled Guides (2)	3/4 Ply. - 3 1/8 x 26 1/4

UPPER DRAWER

J Drawer Sides (2)	3/4 Ply. - 8 x 25
K Drawer Front (1)	3/4 Ply. - 8 x 16

L Drawer Bottom (1)	1/2 Ply. - 16 x 23
M Drawer Back (1)	3/4 Ply. - 8 x 16.
N False Front (1)	3/4 Ply. - 10 7/8 x 18 3/8

LOWER DRAWER

O Drawer Sides (2)	3/4 Ply. - 10 x 25
P Drawer Front (1)	3/4 Ply. - 10 x 19 1/2
Q Drawer Bottom (1)	1/2 Ply. - 19 1/2 x 23
R Drawer Back (1)	3/4 Ply. - 10 x 19 1/2
S False Front (1)	3/4 Ply. - 12 7/8 x 21 7/8

WINGS

T Wings (2)	3/4 Ply. - 12 x 27
--------------------	--------------------

TOP

U Lower Layer (1)	3/4 Ply. - 23 1/2 x 27
V Upper Layer (1)	3/4 Ply. - 23 1/2 x 27

PLANING SLED

W Sled (1)	3/4 Ply. - 12 x 26 1/4
-------------------	------------------------

- (4) 5" Locking Swivel Casters
- (16) 1/4" x 1 1/4" Lag Bolts
- (16) 1/4" Flat Washers
- (34) #8 x 1 1/4" Fh woodscrews
- (2) 24" Full-Extension Slides
- (44) #8 x 5/8" Ph Woodscrews
- (4) 12" Folding Shelf Brackets

Small Shop Router Table

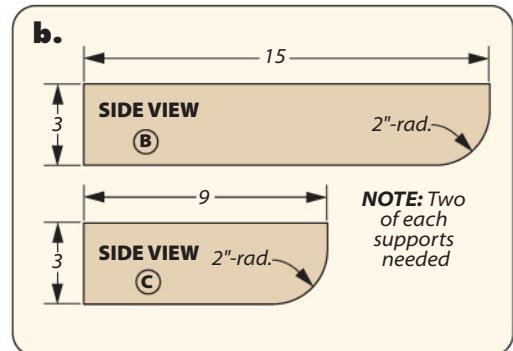
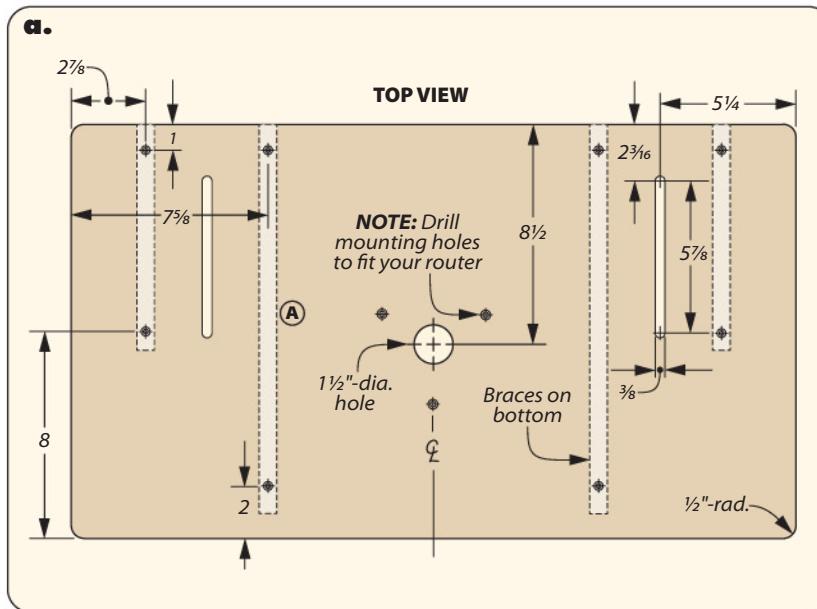
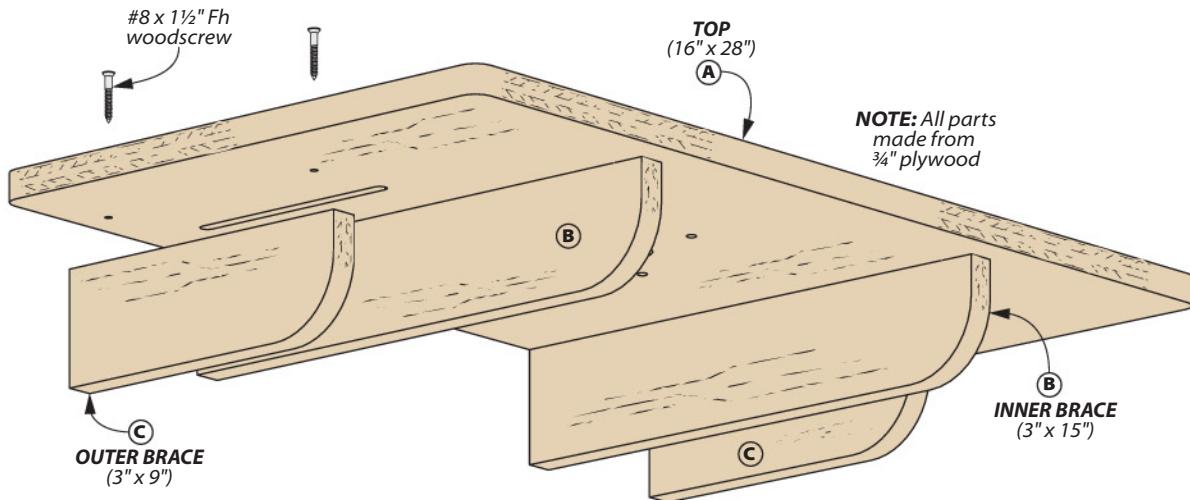


Clever clamp-on design turns any surface into a router table workcenter.

"I have too much space" — said no one ever. Each tool, storage cabinet, workbench, and machine has to earn its place. One common expectation is that important machines require a permanent position. The second tier of tools can be smaller, benchtop varieties.

I fell into the permanent tool trap. A router table serves as a joinery station and shaping tool that gets used in nearly every project I work on. However, the catch is that a standalone router table just doesn't fit in the space I have. I've tried several different options, but none were satisfactory. Enter this candidate. Chris Fitch's design works by keeping the top generously sized. Below the surface, the support and clamping system makes setup speedy.

Raised Up & Locked Down. A system of braces and cleats elevates the top and allows it to be secured with clamps.



A side benefit: Your router table isn't tied to a fixed location—or even to your shop. You can take it out for site work as easily as you move it around the shop.

TOP COMES FIRST

Many portable router tables skimp on the size of the worksurface. This one doesn't. For rigidity, the top is made from $\frac{3}{4}$ " plywood. Baltic birch was our choice, but what's important is that the piece is flat.

Besides cutting the top to size, it's a good idea to round the corners. These will be less likely to ding your workpieces, as well as being a little gentler should you bump into the table.

ROUTER OPENING. The agenda moves to fitting your router to the table. The first step is to locate and drill a hole for a bit to pass through (detail 'a'). The size shown handles most bits. However, if you use a slot cutter or a large rabbeting bit, you may want to upsize this hole.

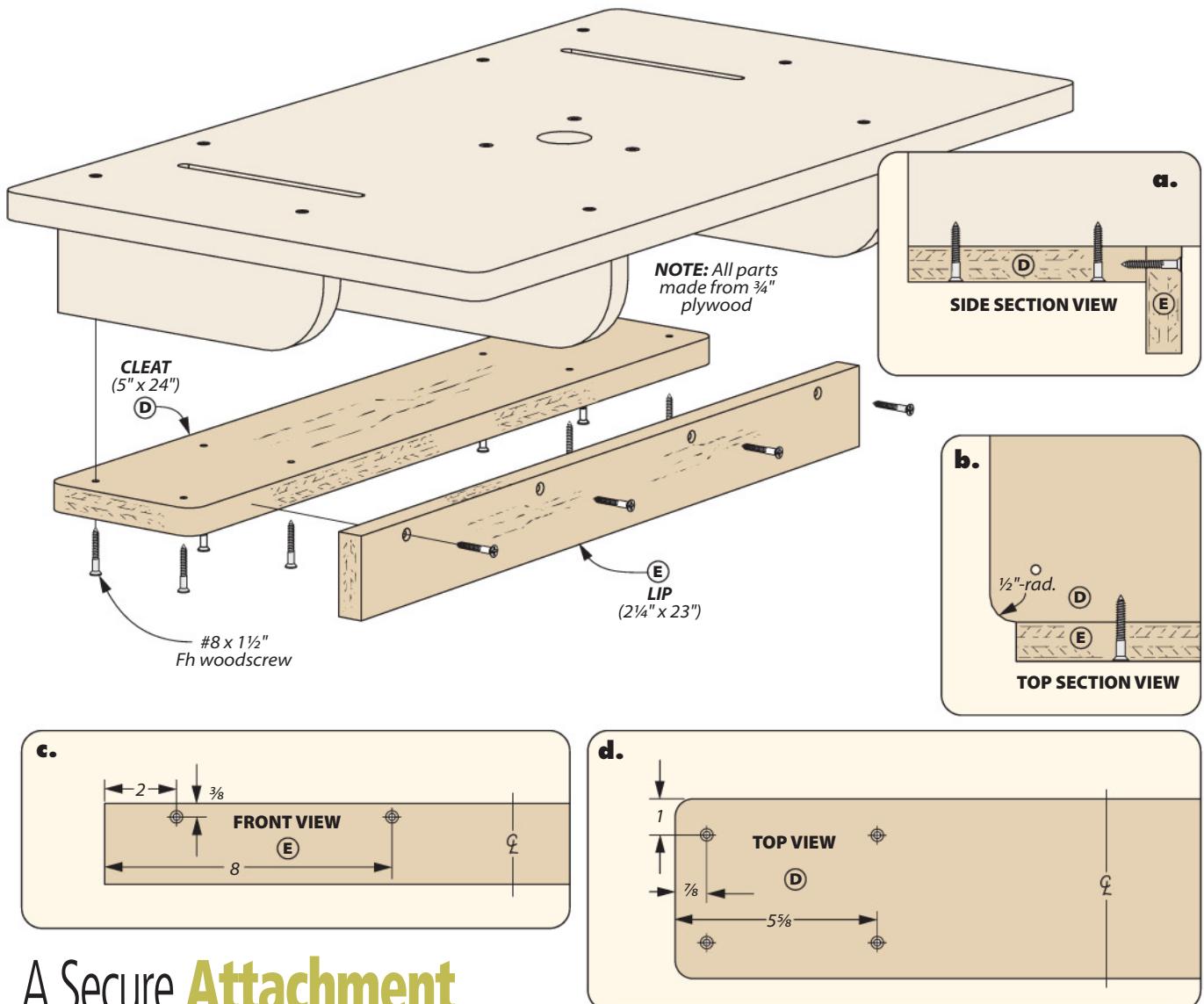
Allow me to point out that the hole isn't centered. It's offset towards the front of the table. This provides clearance for the router body from the support structure that is coming shortly.

The second part of this is to drill smaller holes to attach your router base (or a lift). I did this from the bottom side by centering the base on the hole and marking the locations of the

mounting screw holes. Be sure that the motor clamp faces towards the front for easy access to change the bit height.

FENCE SLOTS. A slot near each end of the top accommodates the fence (detail 'a'). To create slots like this, use a handheld plunge router with an attached edge guide. Work in several passes, lowering the bit between each pass.

BRACES. Two pairs of braces support the top from below. These are shown in the main drawing and detail 'b.' In addition to increasing rigidity, the braces also raise the top of the router table so it's at a more comfortable working height. The lower front corner of each brace is eased with a large radius.



A Secure Attachment

A flex-free tabletop is critical to a router table. However, there are other components that are just as important. The first one to tackle is the mounting system. Since this portable table doesn't have a base, you need a way to attach it to another surface.

The drawing above shows the parts required to clamp it to a table. A wide cleat is cut to size. Ease the sharp corners with an edge sander or a corner rounding router template, as shown in detail 'b.'

Woodscrews join the cleat to the braces. Drill two countersunk clearance holes in the cleat at each brace location before adding the screws. The cleat is centered on the braces side-to-side.

Don't just drive the screws in. The screws could split the braces since they are in the "edge grain" of the plywood. Instead, clamp the cleat to the braces so it's all flush at the back (detail 'a'). Then drill pilot holes in the braces through the clearance holes.

LIP. The cleat allows you to clamp the table in place. To act as a bench stop and ensure that the table overhangs the surface enough to allow for the router, a lip is screwed to the front of the cleat. The lip is centered on the cleat, as shown in detail 'a.' The clearance hole locations are given in detail 'b.' I know this is a shop project, but careful placement provides a better look in the finished piece.

EASY ADJUSTING FENCE

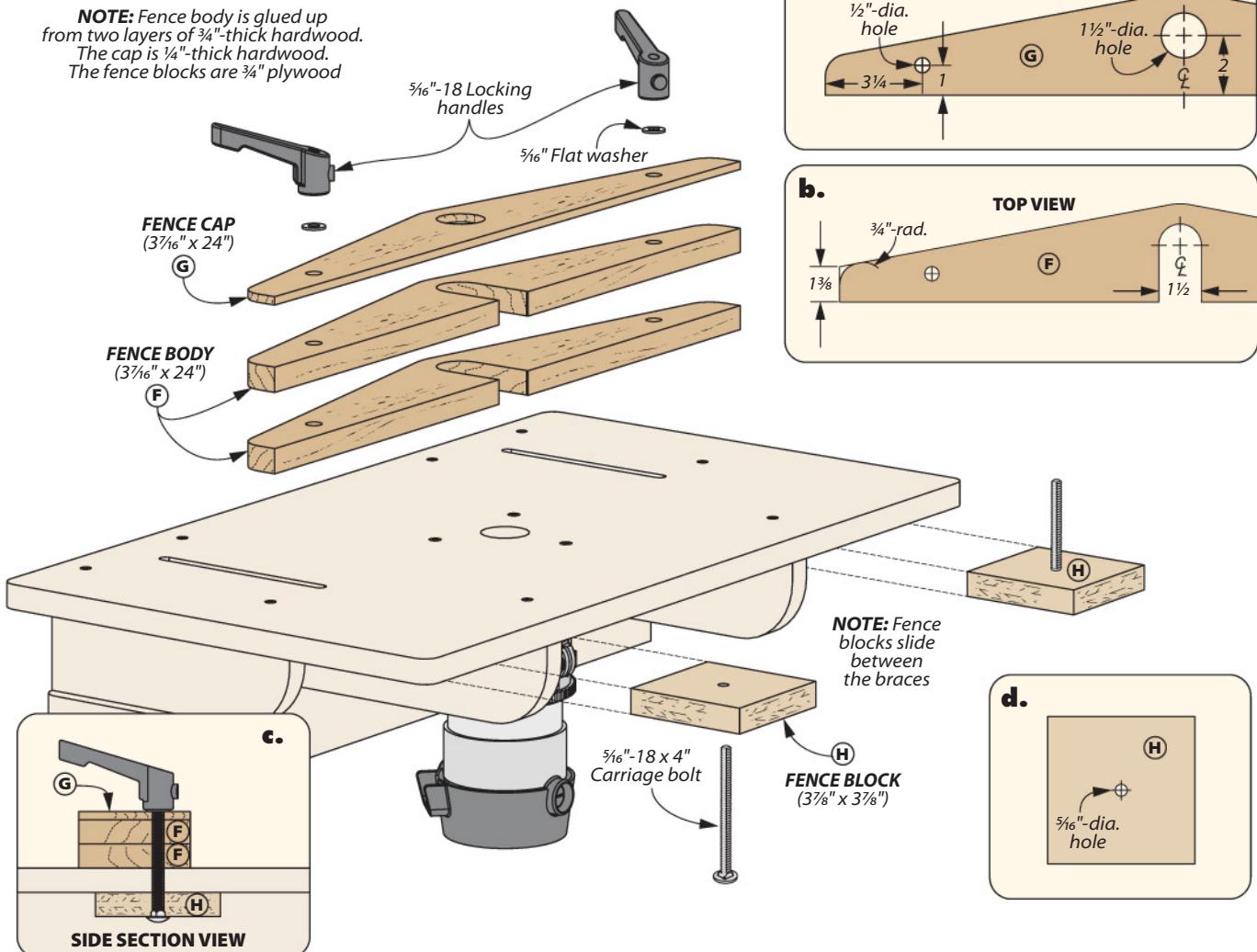
A good router table requires a solid fence to match. The one shown on the next page offers several features without becoming cumbersome.

FENCE BODY. The body of the fence is glued up from two layers of hardwood. Plywood would work as well, but I like the smooth edge of the hardwood compared to the edge of plywood.

A rounded notch in the center accommodates a recessed router bit as well as dust collection, as you can see in detail 'b.' I drilled out the end of the notch and cut away the waste at the band saw. I smooth the edges with a file.

A thin cap layer is glued on top of the body. This piece has a hole to accept the

NOTE: Fence body is glued up from two layers of $\frac{3}{4}$ "-thick hardwood. The cap is $\frac{1}{4}$ "-thick hardwood. The fence blocks are $\frac{3}{8}$ "-thick plywood



hose from your shop vacuum, as shown in detail 'a.' Size the hole for your vacuum hose. Be sure to center it over the notch you formed in the fence body.

At this stage, drill a hole at each end that aligns with the adjustment slots in the table. Locate the holes so that the

bit opening in the table and fence are aligned. At the band saw, cut the tapers on the back edge of the fence, as shown in details 'a' and 'b.' These aren't strictly necessary, but add visual appeal.

CLAMPING BLOCKS. The fence is attached to the table with carriage bolts, wash-

ers, and locking handles. The carriage bolts pass through blocks to increase the bearing surface to add stability. Size the blocks to slide smoothly between the braces. And, just like that, you're ready to clamp this table in place and get to routing.

MATERIALS, SUPPLIES & CUTTING DIAGRAM

A Table Top (1)	$\frac{3}{4}$ ply. - 16 x 28	• (20) #8 x 1 $\frac{1}{2}$ " Fh Woodscrews
B Inner Braces (2)	$\frac{3}{4}$ ply. - 3 x 15	• (2) $\frac{5}{16}$ "-18 x 4" Carriage Bolts
C Outer Braces (2)	$\frac{3}{4}$ ply. - 3 x 9	• (2) $\frac{5}{16}$ "-18 Locking Handles
D Cleat (1)	$\frac{3}{4}$ ply. - 5 x 24	• (2) $\frac{5}{16}$ " Flat Washers
E Lip (1)	$\frac{3}{4}$ ply. - 2 $\frac{1}{4}$ x 23	
F Fence Body (2)	$1\frac{1}{2}$ x $3\frac{7}{16}$ - 24	
G Fence Cap (1)	$\frac{1}{4}$ x $3\frac{7}{16}$ - 24	
H Fence Blocks (2)	$\frac{3}{4}$ ply. - $3\frac{7}{8}$ x $3\frac{7}{8}$	

$\frac{3}{4}$ " x 5" - 49" Hardwood (1.7 Bd. Ft.)



$\frac{1}{4}$ " x 5" - 25" Hardwood (.87 Sq. Ft.)



ALSO NEEDED: One 48"x 48" Sheet of $\frac{3}{4}$ " Baltic Birch Plywood



Drill Press Table



Recessed Holders. Behind the fence there's a recessed area that's handy to store drill bits and other small items that otherwise would roll off and end up under the drill press base.



Clamping Slots. The long slots in the surface of the table provides you with multiple ways to safely secure workpieces while drilling operations are going on.

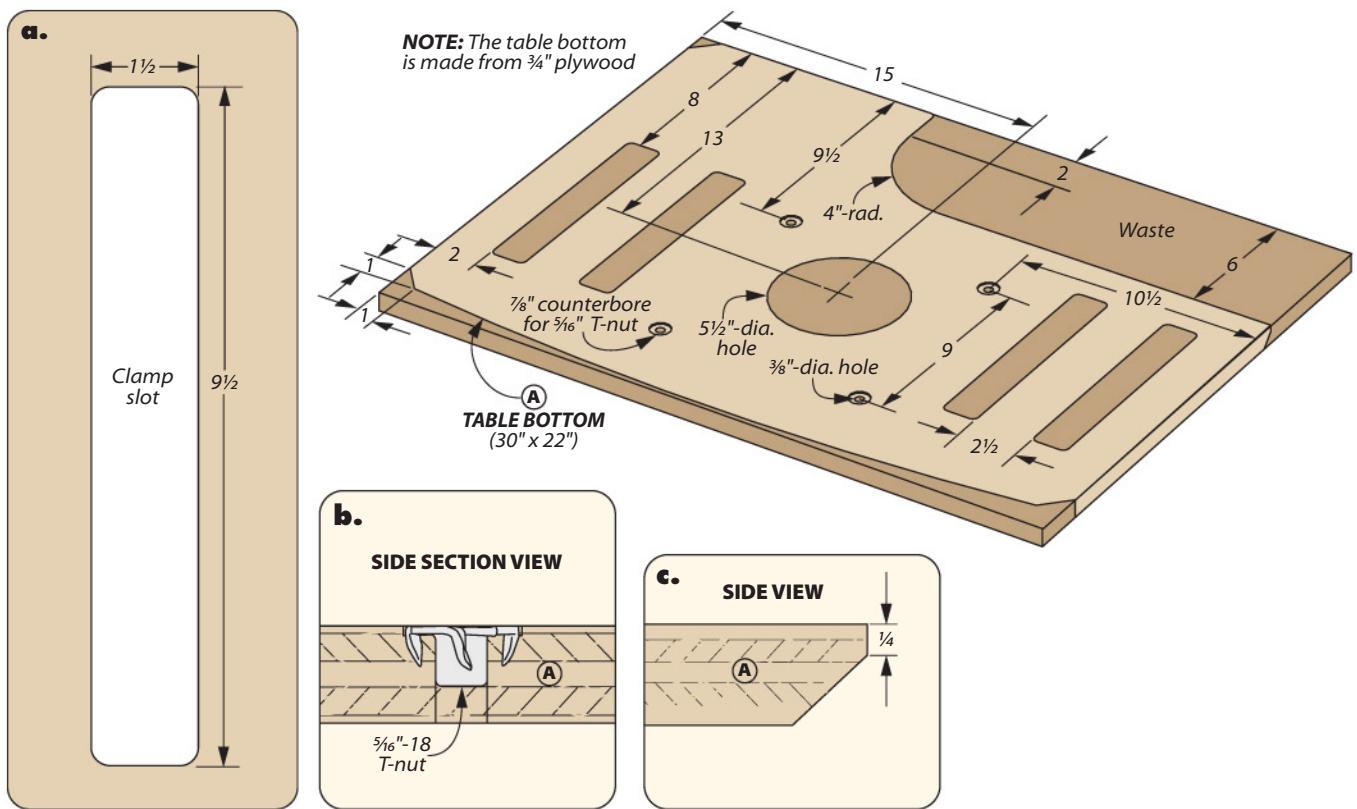
There's no doubt that a drill press is an indispensable tool in the shop. Let's kick it up a notch with this versatile add-on.

I don't think there's a more sparse definition of "default settings" than what you get when you unpack the box containing your new drill press. Once assembled, the chunky cast iron table stares blankly at you as if to say: "What — I'm a drill press, what did you expect?"

And once it's up and running, don't let the purring of a drill press fool you. Unless you clamp the workpiece — or hold it firmly against a fence — you can get hurt quickly by the bit grabbing the material. Most cast iron tables have slots to hold workpieces to the table while drilling, but it won't be long before you start daydreaming about a table that makes it a joy to drill holes. Well, you can wake up now. As you see here, we've done all the design work for you.

BUILDING IN LAYERS

The drawings here show the first of three layers of Baltic birch plywood that make up the table. The bottom two layers are $\frac{3}{4}$ "



thick, and the top layer is $\frac{1}{4}$ " thick. This method of construction gives you a flat, stable surface to work on.

To keep the three layers uniform I started by shaping the bottom, then used it as a pattern for the middle layer. Next, the combined lower layers are used as a pattern for the top layer.

BOTTOM LAYER. Get the ball rolling by cutting the bottom piece of plywood to its final size. Its overall size is shown in the main drawing above.

Start by laying out the interior dimensions first. Then slots for clamping (detail 'a') and the large hole for the insert. Follow up with the centerpoints for the counterbored holes — holes for the table-mounting T-nuts. (Note: the pattern shown is for the Rikon drill press that's in the main photo.)

Next, work on the outer profile. Begin by laying out the back edge, starting in the upper left corner. From there, draw the arc that accommodates the shaft of the drill press. Then, move on to the front of the table, laying out the location of the chamfered corners. Lastly, I used a couple of clamps and a thin board to strike the wide arc across the front edge of the table that you see above.

With that you can pack away your layout tools and start shaping the outer profile with the tools of your choice. When the dust settles, you'll focus on the five inner openings — four clamping slots and the insert.

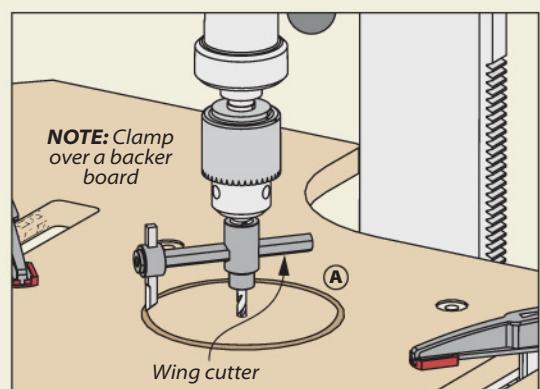
CLAMPING SLOTS. Since there are four slots to shape, I made a hardboard template using the dimensions in detail 'a.' Rough out the waste of each slot. Use the template in combination with a flush-trim bit installed in your router table to smooth out the slots.

INSERT OPENING. Maybe you're building this table to replace an outdated or worn-out table. Maybe it's for a brand new drill press — regardless, for this next step you'll need to clamp the bottom in place while you use a wing cutter to make the hole where the replaceable insert resides. The drawing in the box to the right shows you a safe way to do this.

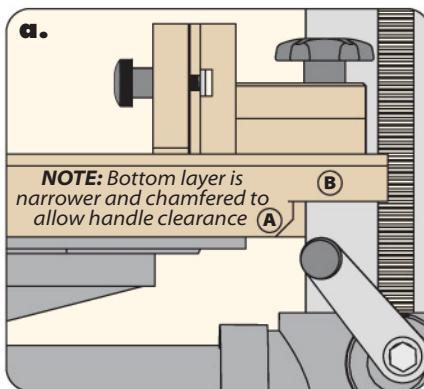
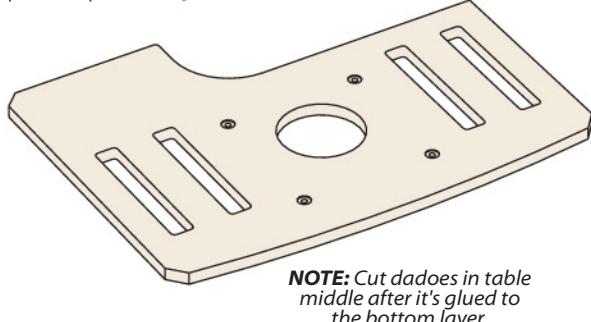
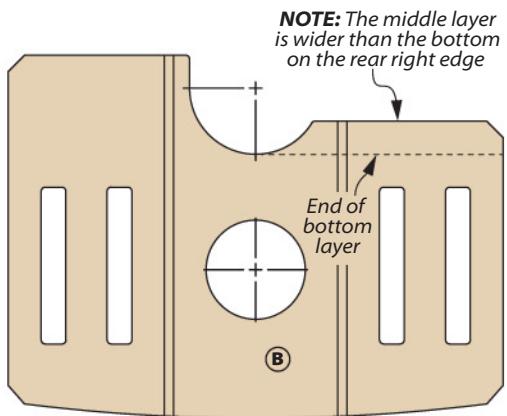
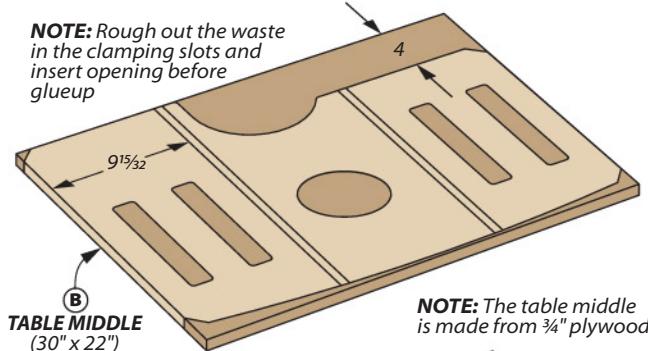
Next up you'll need to drill the shallow counterbores for the heads of the T-nuts that will allow you to mount the table to your drill press. Then drill the shank holes (detail 'b').

Complete the bottom by routing the chamfer that's on the underside of the back edge (detail 'c'). Now you can move on to the middle layer.

Making the Insert Hole



Insert Opening. Always take your time when working with a wing cutter. Clamping the workpiece in place is a must, along with a sharp cutting blade.



Making a Multi-Layered Table

As you can see in the main drawing above, the middle layer of the drill press table is slightly different than the bottom. Notice that the back edge on the right side is wider. Also, there are two dadoes on either side of the insert open-

ing that form the base of the slot for the fence's flange bolts to ride in.

COPY CAT. Start with a plywood blank that is cut to the same overall size as the bottom table. You're going to use the completed bottom layer as a template.

Align the two pieces flush and trace the locations of clamping slots, the insert opening, and the front edge.

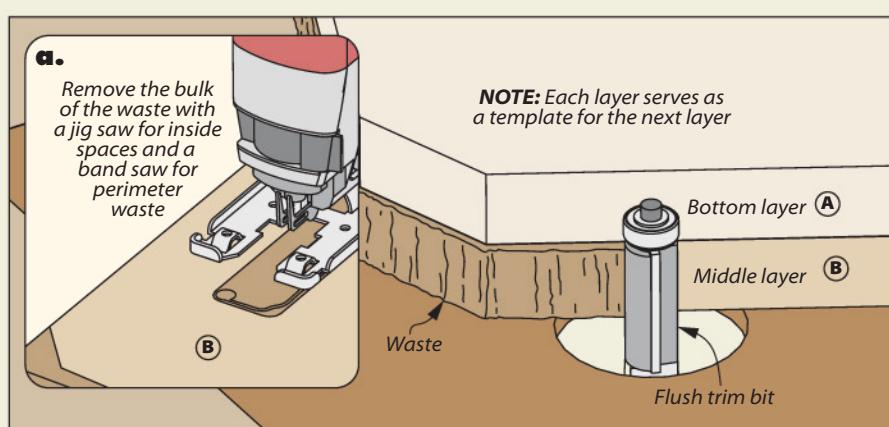
The first thing to address is the back edge on the right. As you can see in detail 'a,' it's wider than the bottom layer (as the bottom needs clearance for the handle). After drawing in this tab-like feature, head over to the table saw and make that cut first. Then you can rough out the waste areas of the middle layer.

GLUE UP. Now it's time to glue the middle layer to the bottom layer. Align the layers flush on the back and the sides before clamping them up.

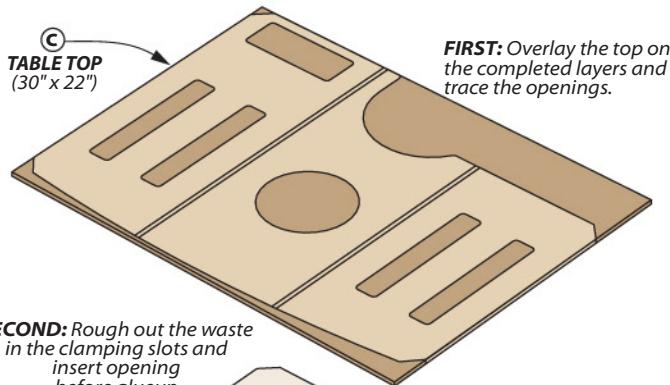
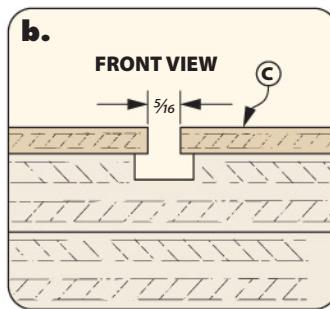
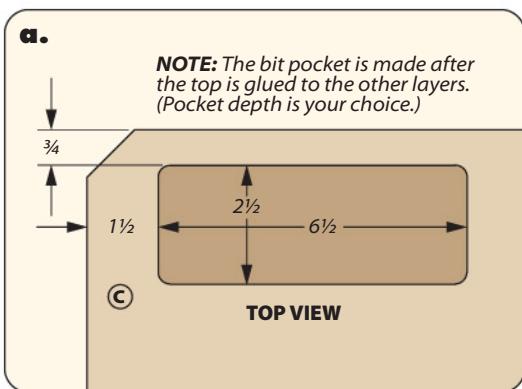
When the clamps come off and any excess glue is scraped away, head to the router table. As you see in the box to the left, I used a flush-trim bit riding against the bottom layer as a pattern to shape the middle layer.

To complete the work on the middle layer, install a dado blade in your table saw and cut the dadoes for the fence (detail 'b').

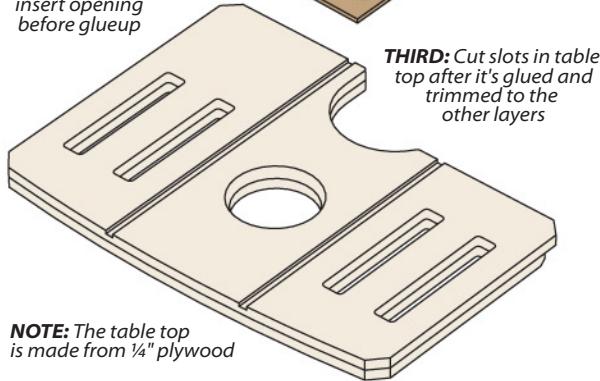
Shaping The Layers



Smooth Operation. After roughing out the waste on the inside openings of the middle layer, glue it to the finished bottom layer. Then install a flush-trim bit in your router table and use the bottom layer as a pattern to shape the middle layer.



SECOND: Rough out the waste in the clamping slots and insert opening before glueup



TOP LAYER

Now you're ready to tackle the last layer. The top layer is $\frac{1}{4}$ inch plywood that will be glued to the middle layer. Like the layers before, the top layer is slightly different. First, notice the pocket on the left side at the back — this is a place to store bits and other things that you want close at hand while working on the drill press. Second, the slots that are centered on the dadoes you cut in the middle layer are narrower. The two of them create a T-shaped slot in the table for the bolt.

ROUGH OUT FIRST. As with the layers before, the first thing to do is trace the finished profiles on to the top layer. Then rough cut the openings and glue the top layer in place. After routing the top to match the table profile at the router table, you have a few more things to do to call the table ready for finish.

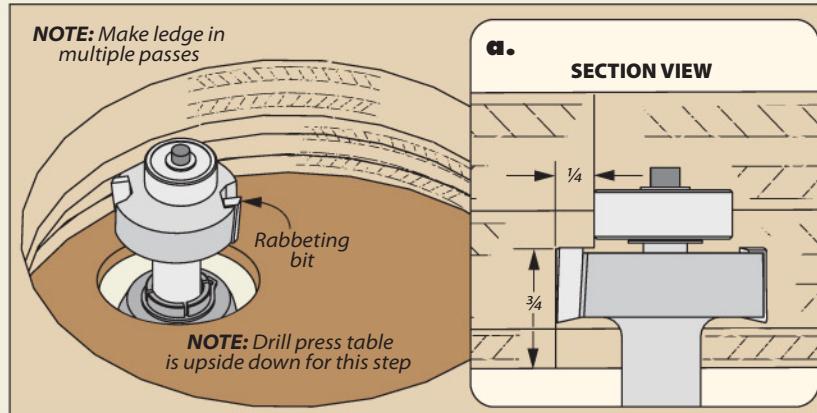
Start over at the table saw by cutting the narrow slot that are centered on the dadoes in the middle layer (detail 'b'). Then you can focus on the bit pocket that's in the rear of the table (detail 'a'). Making that opening is just a matter of taping guide strips around the perim-

eter and using a dado clean-out bit to create the recess.

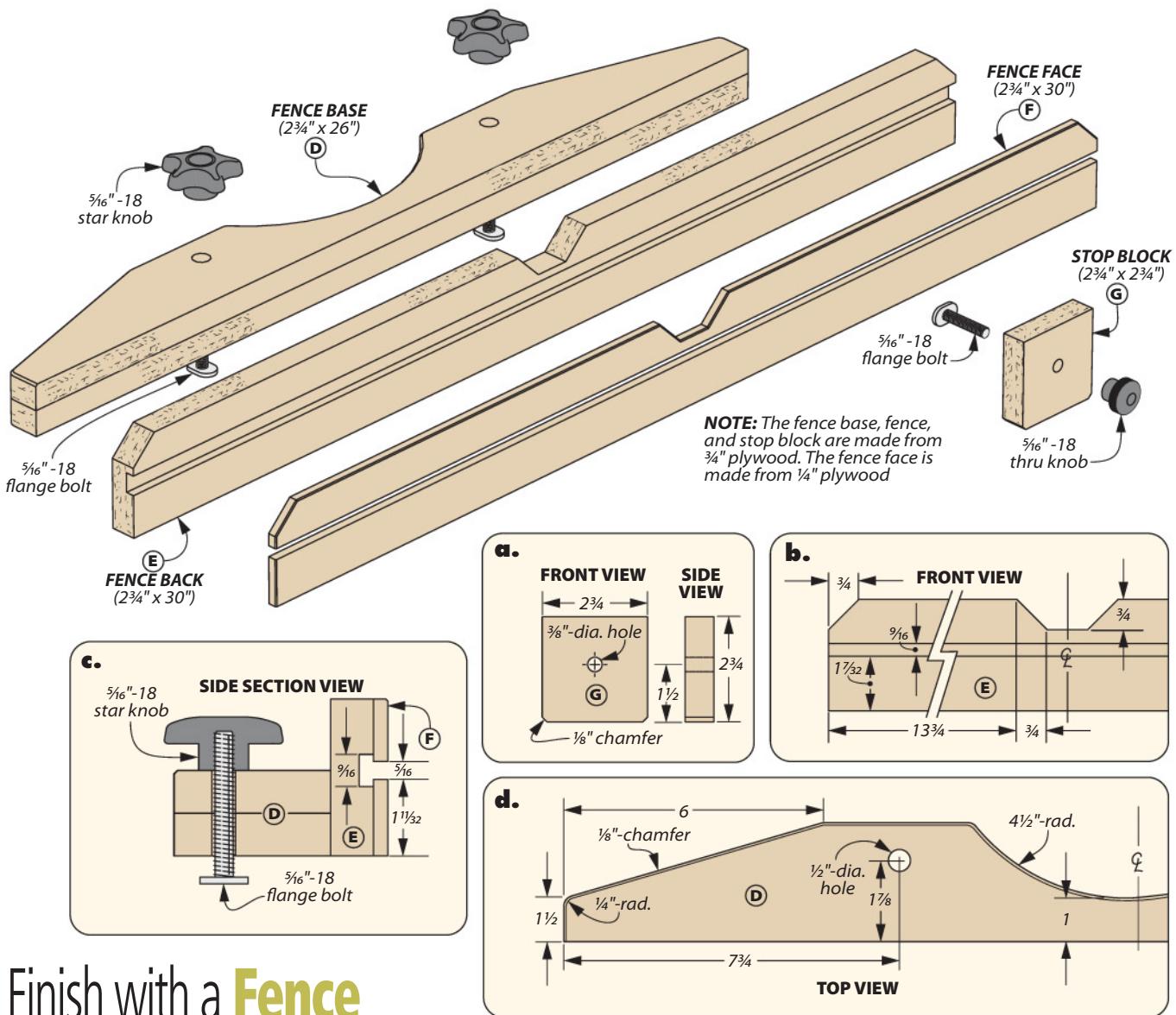
ADD A RABBIT. The last thing to do on the table is to rout the rabbet in the insert opening. The box below gives you the details. You might have to change out

the bearing on your rabbeting bit to size the ledge properly (detail 'a,' in the box below). The ledge supports a replaceable insert that you can rotate in the opening for a fresh drilling surface. Next — the fence and inserts.

A Ledge For the Insert



Make a Ledge. A rabbeting bit chucked into your router table is the easiest way to make the ledge that supports the insert. You'll have to make the ledge in multiple passes. You'll want the insert to set flush with the surface of the table.



Finish with a Fence

No drill press table is complete until it has a fence to back up its abilities. The fence you see above runs the length of the table, and has a slot in the fence for a stop block. Let's start by making the parts for the base.

FENCE BASE PARTS. Rip to width the parts for the fence base and fence back — they're all the same width. The base of the fence is made of two layers of plywood to provide rigidity.

After laying out the dimensions on the top layer of the base, (detail 'd') glue the two pieces together. When the glue has dried, cut away the waste at the band saw. Once the profile is done, chamfer the exposed edges. To complete the base, drill the holes for the flange bolts. Now

it's on to the fence back.

THE FENCE BACK. Making the fence back involves a similar process to the one you used to make the table. Start by cutting the fence back to its final length and trim the corners (detail 'b').

A dado blade makes the bottom of the notch in the center of the fence back (for chuck clearance). It's just a matter of standing the fence upside down on edge, and nibbling away the recessed area (detail 'b') . Then with the same blade, bring in your rip fence and cut the groove in the front.

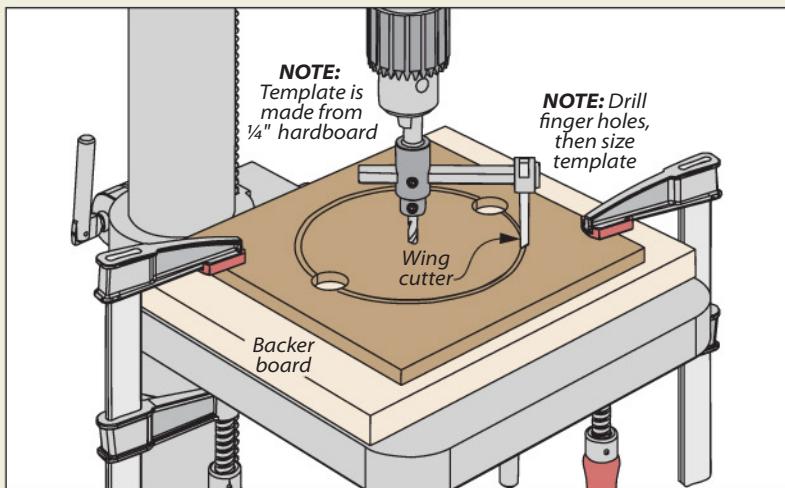
The last bit of work to do on the fence back is to cut the angled sides of the center recess. After that you can clean up any left over waste with a file.

FENCE FACE. Adding the fence face is the next step. Glue a slightly oversized piece of $\frac{1}{4}$ " plywood to the fence. Then trim it flush to the fence in the same manner you did on the table — with a flush-trim bit installed in your router table. Lastly, cut the centered slot in the fence face (detail 'c'). Then you can glue the two parts of the fence assembly together.

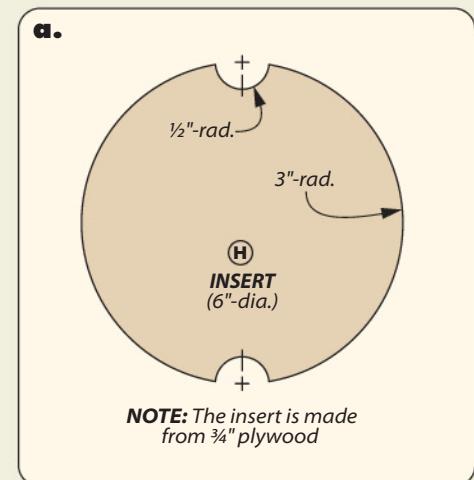
Detail 'a' above gives you all the information you need to make the stop block. Don't skip on the little detail of chamfering the corners — this provides a little clearance against dust build up against the stop block.

To complete the work on the fence (and the table), paint the surfaces of both parts. When the paint is dry, spray

Making Inserts From a Template



Three Circles. The first thing to do after laying out the profile of the insert template is drill the finger holes with a Forstner bit. Then you can cut the clamped template to size with a wing cutter.



Simple Details. The template matches the opening in the table and has finger holes that let you rotate or remove the insert.

all the pieces with two coats of lacquer for protection.

MAKE THE INSERT

The insert for this table is centered in the table, but offset from the center of the chuck. This detail allows you to extend the life of the insert by rotating it when you need a fresh surface to support drilling.

Still, inserts will wear out over time. With that in mind, I made a template that allows me to quickly make extra inserts. The box at the top of the page shows you the details.

Like back at the beginning of this project, a wing cutter is employed to make the template. After laying out the template on a piece of hardboard (detail



Template Routing. After the template is taped to the insert blank, drill the finger holes. Then shape the profile with a flush trim bit.

'a,' above) you'll first drill the finger holes. Then clamp the workpiece to the drill press and cut out the shape with the wing cutter.

To make an insert, tape the template to a blank, drill the finger holes first,



Insert. The insert drops in the opening in the table and can be rotated for a fresh drilling surface. When worn out, replace the insert.

then shape the insert at the router table (photo above left). For the sake of convenience, I made multiple copies of the inserts that I could simply swap in as needed. With that, you've made a major upgrade to your drill press.

MATERIALS & SUPPLIES

A Table Bottom (1)	3/4 ply.- 30 x 22	E Fence Back (1)	3/4 ply.- 2 3/4 x 30	• (4) 5/16" T-nuts
B Table Middle (1)	3/4 ply.- 30 x 22	F Fence Face (1)	1/4 ply.- 2 3/4 x 30	• (2) 5/16"-18 x 2 1/2" Flange Bolts
C Table Top (1)	1/4 ply. - 30 x 22	G Stop Block (1)	3/4 ply.- 2 3/4 x 2 3/4	• (2) 5/16"-18 Star Knobs
D Fence Base (2)	3/4 ply.- 2 3/4 x 26	H Insert (1)	3/4 ply.- 6 x 6	• (1) 5/16"-18 Thru Knob

ALSO NEEDED: One 48"x 48" Sheet of 1/4" Baltic Birch plywood, One 48"x 48" Sheet of 3/4" Baltic Birch Plywood

Narrow Belt Sander



"Why build a power tool when you can just buy one?" I get that question a lot. The easy answer is to save money. And it's true that the power tools shown in *ShopNotes* cost far less than commercial versions. There's more to it.

Building your own tools allows you to customize the features: you can add qualities that improve your work — and leave off the bells and whistles that offer little benefit to you.

This sander offers a great case study. As you'll see in the following pages, the sander is built with a ruggedness that's tough to match. We use high-quality components inside the machine so that it works right and is enjoyable to operate (thank you McMaster-Carr). We picked a well-made motor that provides plenty of power and runs quietly.

The platen behind the belt is easily adjusted (or removed) to suit the task at

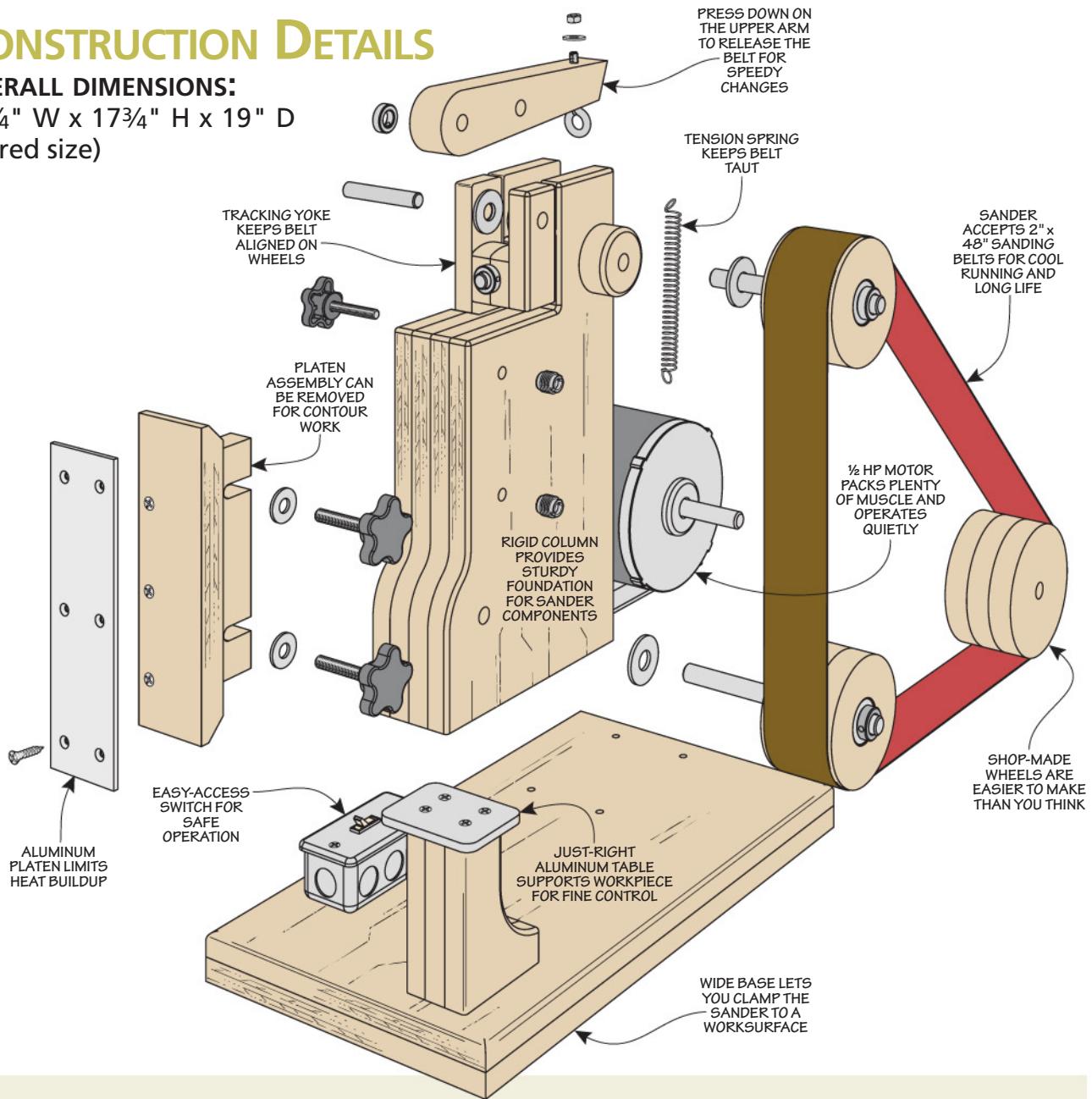
hand. And speaking of the belt, there's a very simple mechanism that applies tension and allows fast belt changes without requiring tools.

There's one last thing you can do to take the project up a notch: give it a solid paint job. We like using the "hammered" finish spray paints that leave a wrinkled surface behind. It's reminiscent of old tools and transforms bland plywood into a sharp-looking machine.

CONSTRUCTION DETAILS

OVERALL DIMENSIONS:

11 $\frac{1}{4}$ " W x 17 $\frac{3}{4}$ " H x 19" D
(stored size)



MATERIALS & SUPPLIES

A	Inner Columns (2)	8 $\frac{1}{2}$ x 13 $\frac{1}{2}$ - $\frac{3}{4}$ Ply.	O	Lever Spacer (1)	$\frac{7}{8}$ x 2 - 2	• (1) 2 $\frac{3}{4}$ " Steel Extension Spring
B	Tall Column (1)	8 $\frac{1}{2}$ x 15 $\frac{3}{4}$ - $\frac{3}{4}$ Ply.	P	Idler Wheels (2)	3 $\frac{1}{2}$ x 3 $\frac{1}{2}$ - 2 $\frac{1}{4}$ Ply.	• (1) 1 $\frac{1}{2}$ " Dia. x 24" Steel Shaft
C	Short Column (1)	5 $\frac{1}{2}$ x 11 $\frac{1}{2}$ - $\frac{3}{4}$ Ply.	Q	Drive Wheel (1)	4 x 4 - 2 $\frac{1}{4}$ Ply.	• (6) 1 $\frac{1}{2}$ " Washers
D	Cover (1)	3 x 15 $\frac{1}{2}$ - $\frac{3}{4}$ Ply.		• (7) #8 x 1 $\frac{1}{4}$ " Fh Woodscrews	• (6) 1 $\frac{1}{2}$ " Shaft Stop Collars	
E	Base (1)	11 x 19 - 1 $\frac{1}{2}$ Ply.		• (6) #8 x 1 $\frac{1}{2}$ " Fh Woodscrews	• (4) 1 $\frac{1}{2}$ " I.D. x 1 $\frac{1}{8}$ " O.D. R8-2Rs Bearings	
F	Table Support (1)	3 $\frac{1}{2}$ x 5 - 2 $\frac{1}{4}$ Ply.		• (3) #8 x 1 $\frac{1}{2}$ " Fh Woodscrews	• (1) Steel Switch Box	
G	Table (1)	2 $\frac{1}{2}$ x 3 $\frac{1}{2}$ - $\frac{1}{4}$ Aluminum		• (10) #8 x 2 $\frac{1}{2}$ " Fh Woodscrews	• (1) Switch Cover	
H	Arm (1)	$\frac{3}{4}$ x 1 $\frac{3}{4}$ - 5 $\frac{3}{4}$		• (1) 2 $\frac{1}{2}$ " x 12" Aluminum Bar (1 $\frac{1}{4}$ " Thick)	• (1) Toggle Light Switch	
I	Upright (1)	$\frac{3}{4}$ x 1 $\frac{3}{4}$ - 3 $\frac{3}{4}$		• (2) $\frac{1}{4}$ " Flat Washers	• (3) $\frac{3}{8}$ " Conduit to $\frac{1}{2}$ " Straight Adapters	
J	Block (1)	1 $\frac{1}{2}$ x 1 $\frac{3}{4}$ - 1 $\frac{3}{4}$		• (3) $\frac{5}{16}$ "-18 Threaded Inserts	• (1) 1 $\frac{1}{2}$ HP, 1725 RPM Motor	
K	Lever (1)	1 $\frac{1}{4}$ x 2 - 9		• (3) $\frac{5}{16}$ "-18 x 2" Studded Knobs	• (4) $\frac{5}{16}$ "-18 x 1" Lag Screws	
L	Platen Support (1)	2 $\frac{1}{4}$ x 8 - $\frac{3}{4}$ Ply.		• (2) $\frac{5}{16}$ " Washers	• (1) 14 ga. x 9' Power Cord	
M	Platen Side (1)	2 $\frac{1}{2}$ x 6 $\frac{1}{8}$ - $\frac{3}{4}$ Ply.		• (2) $\frac{1}{4}$ "-20 x 2" Eyebolts	• (1) $\frac{1}{4}$ "-20 x $\frac{3}{4}$ " Set Screw	
N	Platen Face (1)	2 $\frac{1}{4}$ x 8 - $\frac{1}{8}$ Aluminum		• (2) $\frac{1}{4}$ "-20 Hex Nuts	• (1) 2" x 48" Sanding Belt	

Strong Support Big Column

The first part of the sander to make is the column. It reminds me of the stone tower formations so iconic in Western movies — or road runner cartoons. This column is more than a visual treat. It provides the main structure for the sander and supports the mechanical elements. Which means it has to be solidly constructed.

PLYWOOD CORE. Figure 1 shows that it consists of four layers of plywood. We used Baltic birch plywood for its consistent, void-free plies. You can use standard veneer core plywood as a lower cost alternative. Just be a little choosy in the pieces.

You'll also notice that the four layers aren't all identical. The two inner pieces are the same overall size, but the outer two are different. This has to do with the various parts of the sander that mount to the column. What the four parts do share is the front profile.

The two inner layers make a good jumping off point. Glue them up, then cut them to the size and shape, as shown in the drawings below. On one face there's a shallow pocket that houses a tracking yoke you'll get to later.

A good way to make it is by taping strips of plywood to define the perimeter of the pocket with double-sided tape. Then rout away the waste with a pattern bit. The bit won't reach into the corners, so you need to square those up with a chisel. I left the guide strips in place as a way to keep the chisel square to the surface.

When adding the outer layers, I cut the back edge to the shape required. At

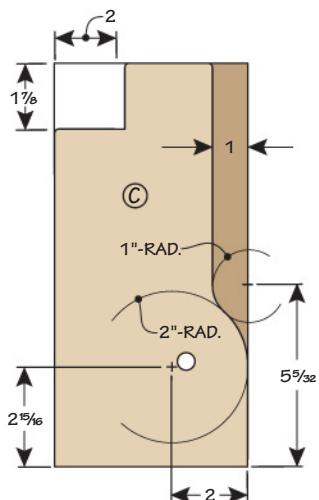
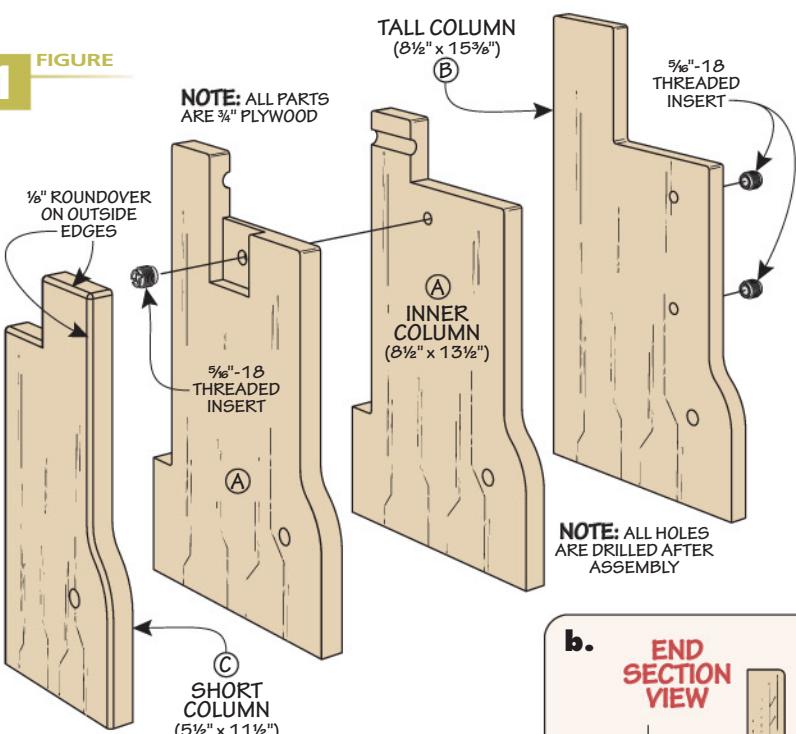


FIGURE 1

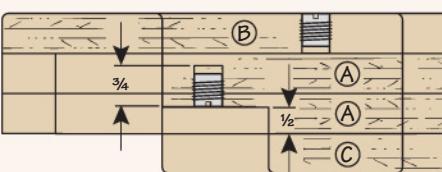
**NOTE: ALL PARTS
ARE $\frac{3}{4}$ " PLYWOOD**



NOTE: ALL HOLES
ARE DRILLED AFTER
ASSEMBLY

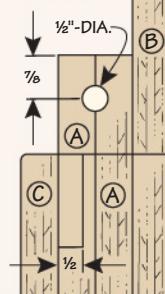
g.

TOP SECTION VIEW



b

END
SECTION

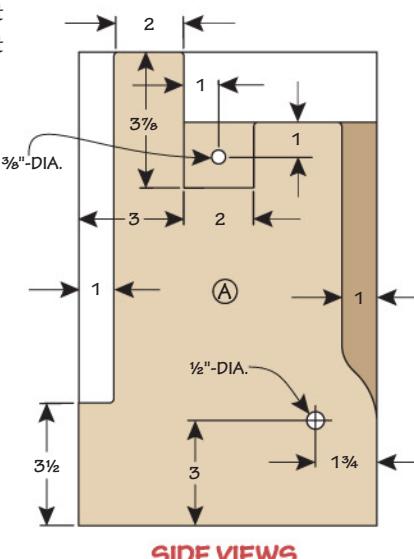


the front, I traced the profile of the inner pieces and rough cut the waste. Once the new piece was glued on, a flush trim bit blended the two together.

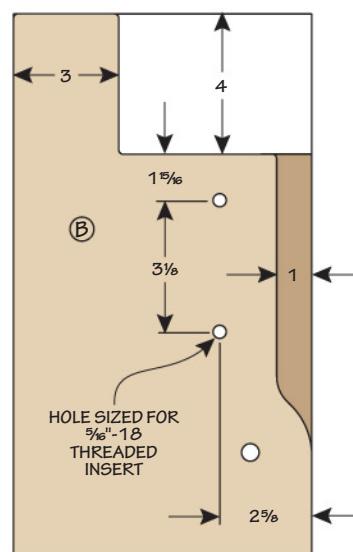
HOLES. Take your column over to the drill press to drill the holes necessary for adding the mechanicals. A through hole near the bottom houses the lower wheel's shaft.

Another through hole near the top accommodates the shaft for the tracking yoke assembly. This is shown in Figure 1b.

The other holes that are required are for threaded inserts. The locations are shown in the drawings on the bottom of the previous page. One pair is used for attaching



SIDE VIEWS



the sander's platen and another is drilled into the pocket you routed earlier for the tracking adjustment knob, as shown in Figure 1a. Size the holes to match the "root" of the threaded insert.

TENSION & TABLE

You aren't done with the hole drilling yet. In Figures 2a and 2b you'll see a hole on the back side of the column. An eyebolt threads in here. It anchors a spring that applies tension to the upper wheel (and thus the sanding belt).

A cover strip conceals the channel for the spring (Figure 2). It's attached with screws for easy maintenance access.

STABLE BASE. With the work on the column wrapped up, it's time to make a base. You can see the base in Figure 3. It's cut to final size from a blank made up of two layers of plywood. A round-over softens the upper edges.

Figure 3b shows the locations for the screws that connect the column to the base. It's a good idea to drill pilot holes in the base before driving the screws. Otherwise you risk splitting the plywood layers.

TABLE. The next component on the to-do list is the table assembly (Figure 3). Think of it as the sidekick to the main column. The table support is glued up from three layers of plywood to resist flexing. The

FIGURE 2

a. BACK VIEW

5½" (Total height of the column assembly)

COLUMN ASSEMBLY

1/4"-20 x 2" EYE BOLT

b. TOP SECTION VIEW

1 1/2" (Width of the eye bolt opening)

1 (Depth of the eye bolt)

COVER (3" x 15 1/2")

#8 x 1 1/2" Fh WOODSCREW

back of the support is relieved to allow the belt to run close to the table, as shown in Figure 3a.

The tabletop is a piece of aluminum. Using aluminum provides a durable, rigid surface. I find that it's easy to work either by hand or with regular wood-

working power tools. The four corners of the tabletop feature a radius to eliminate sharp edges.

Like the column, Figure 3b shows the locations for the screws to attach the table support to the base. Then it's on to the fun parts.

FIGURE 3

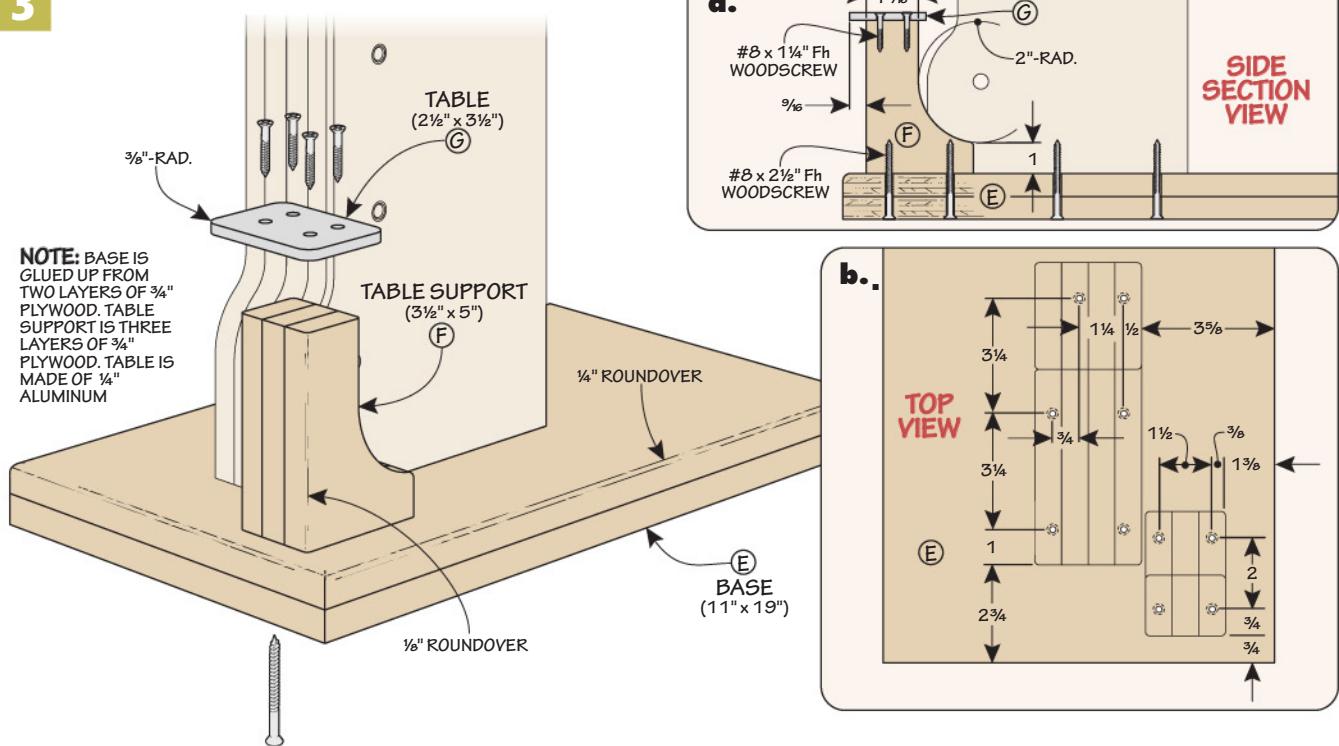
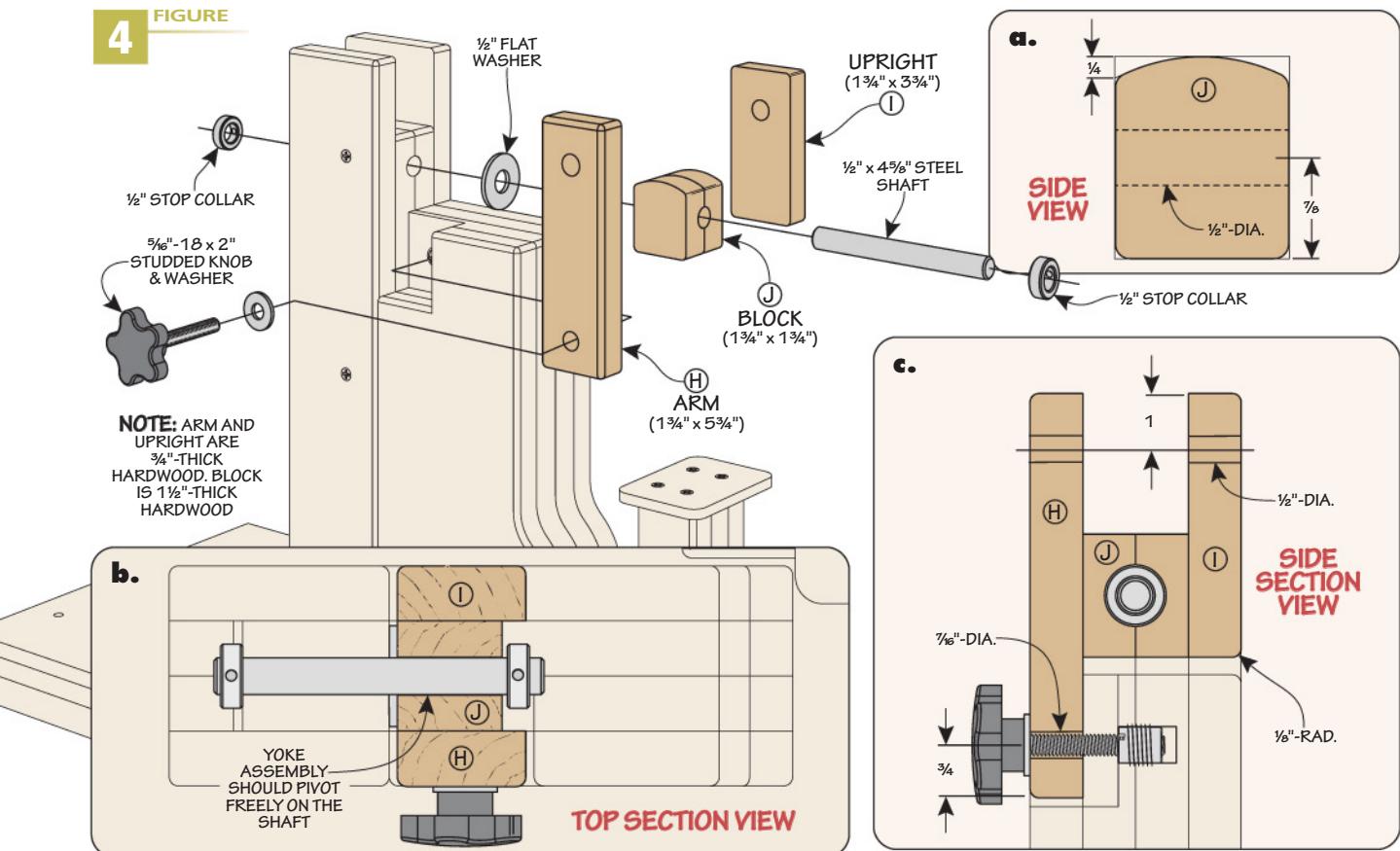


FIGURE
4



The Right Amount of Tension

The fixed portion of the sander is complete and we can turn our attention to the clockworks. Up first is a dual-purpose tracking mechanism located at the top of the sander column.

TRACKING YOKE. The tracking yoke is the Y-shaped hardwood assembly you see in Figure 4 above. It pivots around a steel shaft and allows an upper wheel to tilt side to side in order to keep the sanding belt running true in use.

The long arm of the yoke has a pair of holes, as shown in Figure 4c. The lower

hole accommodates a studded knob used to dial in the tracking with finesse. The upper hole is for a steel shaft that holds a tension lever. Opposite the arm is an upright that also includes a shaft hole. The outside edges of these parts are eased with a roundover.

Sandwiched between the arm and upright is a thick block. A front-to-back hole in this block fits over a pivot shaft that runs through the column, as you can see in Figure 4b.

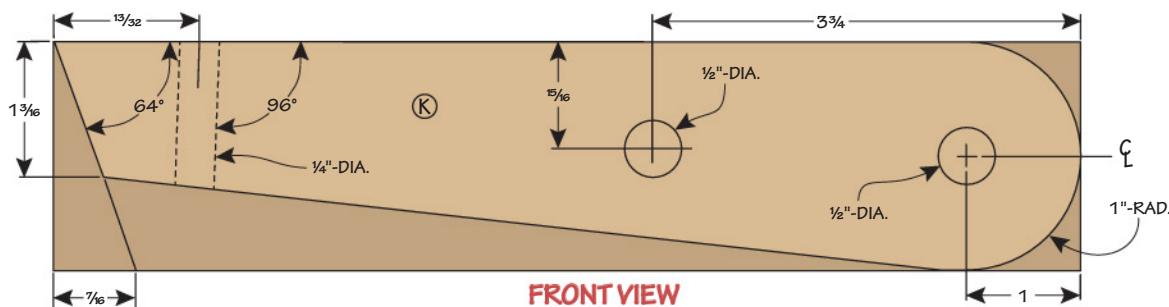
The upper edge of the block is rounded slightly to account for the tension lever (which is coming up soon). This curve is shown in Figure 4a.

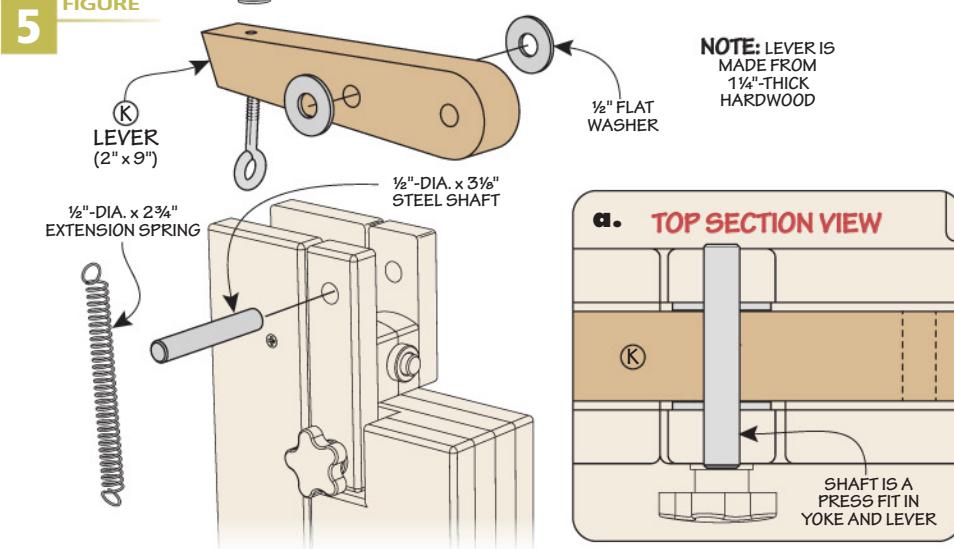
ASSEMBLY & INSTALLATION. Glue up the yoke, making sure the shaft holes are aligned. A

good way to do this is to slip a length of the shaft into the holes while the parts are clamped. The bottom of the block is held flush with the end of the upright.

Speaking of the shafts, $\frac{1}{2}$ " steel rod is used throughout this project. The first of these connects the yoke to the column. On one end, tighten down a stop collar. Fit that through the column from the back. Set the yoke into the pocket and thread the shaft through the block with a washer in between (Figure 4b). A second stop collar on the front end of the shaft completes the puzzle.

All that's left is to add the studded knob and washer that twists into the threaded insert in the column, as in Figure 4c. The knob and yoke may seem loose now, but



FIGURE

once a tension spring is added, it will all make sense.

TENSION LEVER

With the tracking portion addressed, it's time for some tension — the good kind. A stout hardwood lever holds the upper wheel of the sander on one end. On the other, is an extension spring that keeps the belt tight.

Let's get going on the hardwood lever first. Figure 5 above shows the finished part and how it fits in with the hardware elements. The drawing on the bottom of the previous page dives into the nitty gritty of making it. The comet-like shape allows it to clear the yoke.

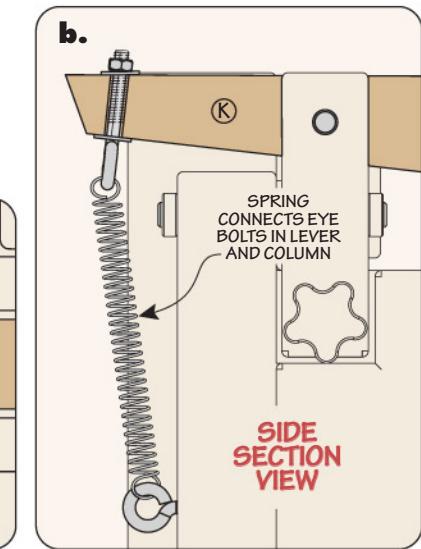
Take note of the two holes that run side to side. One of these is for mounting to

the yoke (Figure 5a). The other houses the shaft for the upper wheel (coming soon). Figure 5b highlights the hole at the tail to accept an eyebolt for the tension spring.

INSTALLATION. There's nothing complicated about installing the lever. A pair of hex nuts and washers lock the eyebolt in place on the tail.

Slip the shaft through the yoke, a pair of washers, and the lever. Then you can hook the spring over the eyebolt.

PLATEN ASSEMBLY. Working our way down the sander, we come to the platen assembly, as shown in Figure 6 below. This system backs up the belt, providing reinforcement for creating smooth, flat surfaces. However, there are times when you want to create a softened shape. So the platen is easily removable.



The platen support is plywood with beveled ends (Figure 6b). It's screwed to the edge of the platen side. This piece has a pair of open slots that line up with the threaded inserts in the column.

I made the slots by drilling the ends at the drill press. After marking lines that run to the edge, I used a hand saw to remove the remaining waste. A little file work cleans up the edge.

SMOOTH, DURABLE FACE. Combine the whizzing belt with the heat of sanding and you end up with something that would quickly wear down plywood. To compensate for that, the platen is faced with a piece of aluminum — this is shown in Figure 6a. Be sure to use screws to attach the face. This way you can replace it down the road if it wears out.

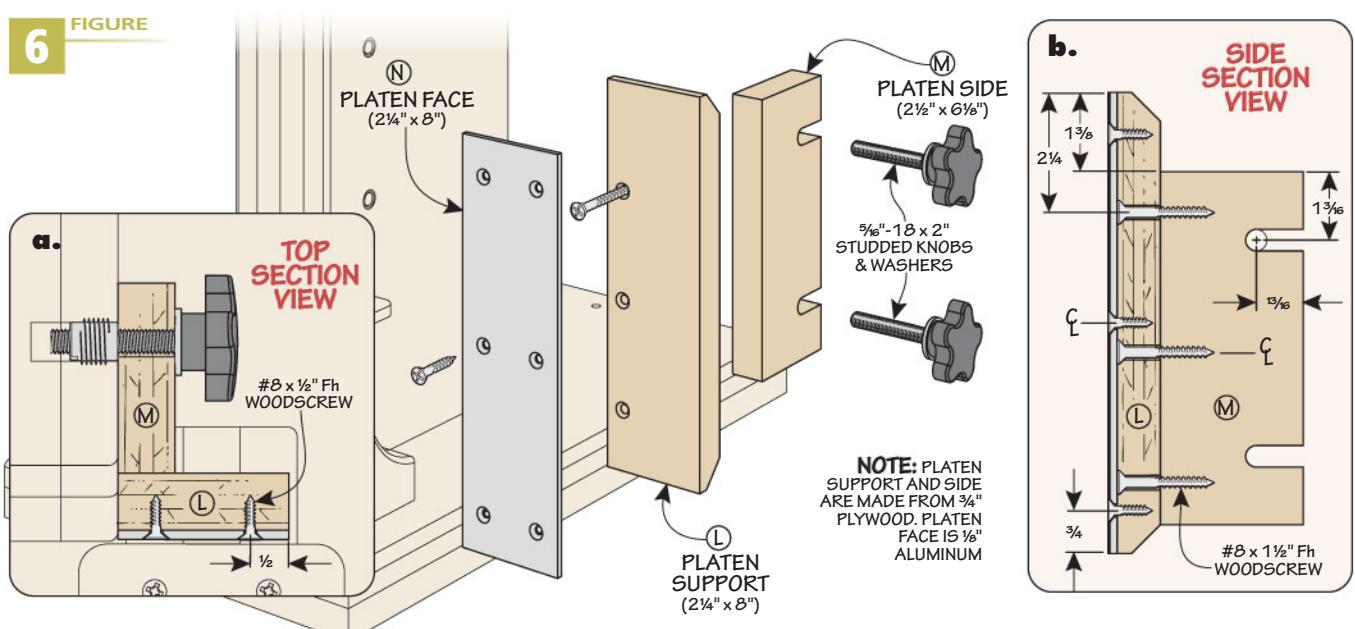
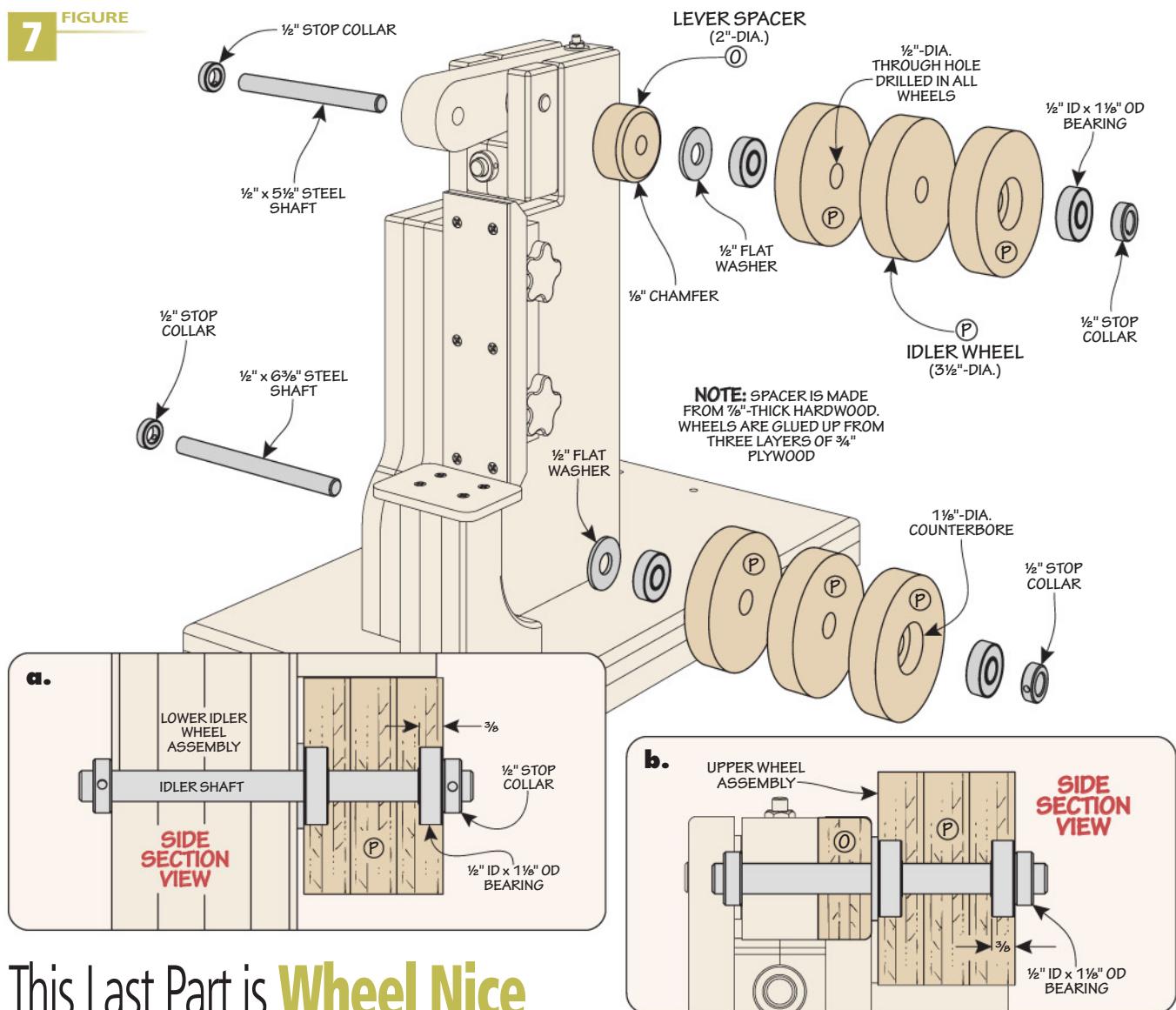
FIGURE

FIGURE
7



This Last Part is **Wheel** Nice

The final parts of the sander to make are the wheels. Using three wheels on this machine permits the use of a longer belt. The longer belt disperses heat better and results in longer life while reducing burning on the workpiece.

But first, a spacer. Before diving into the wheels, you need to add a spacer to the lever that you just made. The purpose of this piece is to align the upper wheel with the other two.

This round piece matches the radius of the lever's nose (1"). A center hole is sized for the shaft. The "wheel side" of the spacer is chamfered, as shown in Figures 7 and 7b.

Take care when gluing the spacer to the lever. The holes need to align. Here again, using a shaft to ensure alignment.

IDLER WHEELS. Now it's time to make wheels. And this process has a choose-your-own-adventure element to it.

THE PATH OF THE LATHE. For those with a lathe, you can glue up wheel blanks made from three layers of plywood. Drill the through holes and counterbores that house the bearings (Figures 7a and 7b). After an interesting time at the lathe turning plywood, you have smooth, perfectly centered wheels.

NO LATHE, NO PROBLEM. If, like me, you don't turn, then a different approach is necessary. You can use a wing cutter in the drill press to create the six discs for the idler wheels. Use the $1/4$ " pilot holes to align the discs and glue them up in three layers.

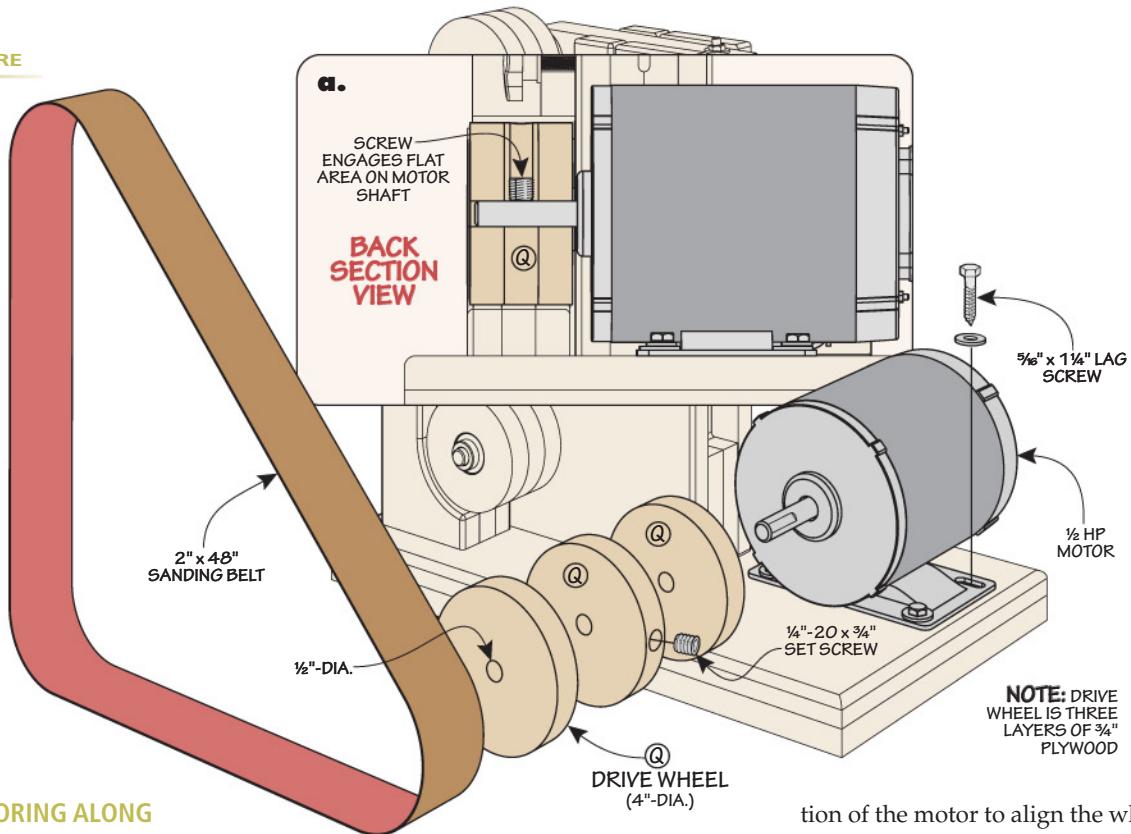
Head to the drill press and use a $1/4$ " bit to center the wheel and clamp it down.

Drill a counterbore for a bearing. This is shown in Figures 7a and 7b. This is a dance since you need to re-center the wheel for each counterbore. The final step is to drill out the through hole to account for the size of the shaft.

SPIN IT RIGHT ROUND. The two paths converge here. Press a bearing into each of the counterbores. Next, it's time to install the wheels. The two idler wheels are installed the same way. First, cut the shafts to length then install a stop collar at one end. One passes through the lever, the other through the column.

Slide on a washer followed by the wheel. Cap off each shaft with a second stop collar. The wheels should spin without binding. Nor should they have much play side to side.

FIGURE
8



MOTORIZING ALONG

At this point, most of the sander is constructed, and we're ready to bring this machine to life. For that to happen, we need one more wheel to serve as the drivetrain — and a motor, of course. Chris Fitch, the designer, spec'd a $\frac{1}{2}$ hp motor. It's easy to find and reliable.

DRIVE WHEEL. The drive wheel is made similar to the others. Just note that it's larger, as you can see in Figure 8. You don't need to add bearings, so that makes it simpler.

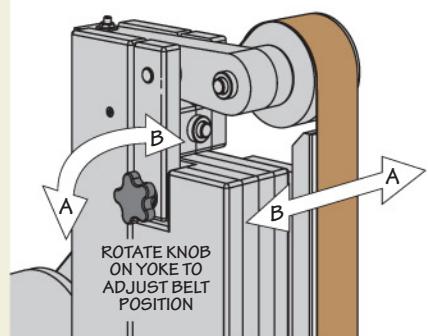
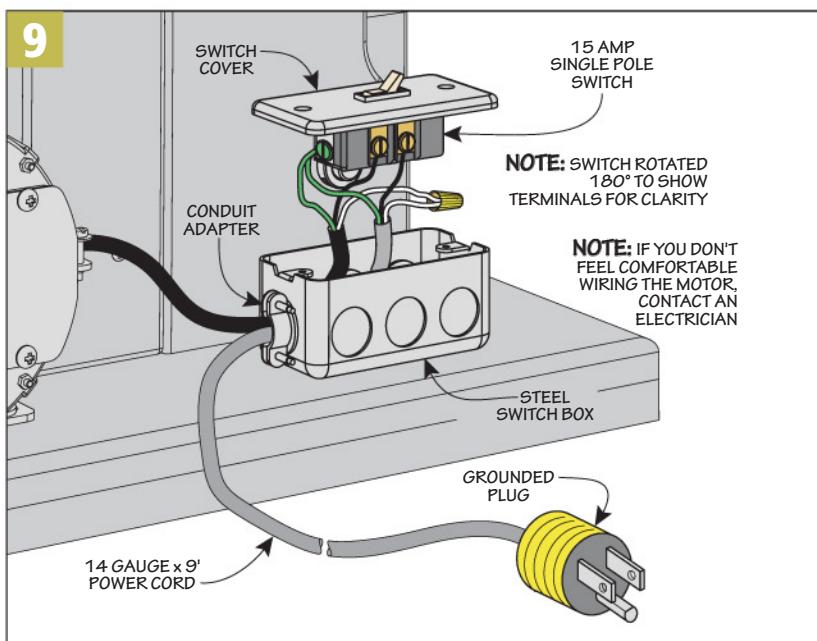
You do need to lock it to the drive shaft on the motor. Our motor includes a flat spot on the shaft for this purpose. In Figure 8a, you can see the solution. Drill a hole into the edge of the wheel and thread in a set screw. The screw will tap its own threads to secure it.

INSTALLING THE MOTOR. Set the motor on the back of the base. Now slip a sanding belt on the wheels. Adjust the posi-

tion of the motor to align the wheels and determine its location on the base. Mark the location of the mounting holes. Drill pilot holes and attach the motor with lag screws. You'll need to use a box wrench as the holes are partially obscured by the motor housing.

POWERED UP. I wired the motor to a switch mounted on the side of the base (Figure 9). At last it's time to fire up the sander and put it to work — after you give it a paint job.

Track It



Now You're Tracking. The side knob allows for fine control of the belt's position on the wheels. Make any adjustments slowly.

Workshop Set Ups & Upgrades

Project Sources

MAIL ORDER SOURCES

Amazon
amazon.com

Cabinetmaker Warehouse
866-322-3835
cabinetmaker
warehouse.com

Essentra Components
800-847-0486
essentracomponents.com

Grainger
800-472-4643
grainger.com

Grizzly
grizzly.com

Harbor Freight
harborfreight.com

McMaster-Carr
Mcmaster.com

Rust-Oleum
rustoleum.com

Rockler
rockler.com

Most of the supplies you'll need for projects in this book are available at hardware stores or home centers. For specific products or hard-to-find items, take a look at the sources listed here.

LUMBER CART (P. 14)

- Rockler

24" Drawer Slides 44583

- Grizzly

8" Casters G8179

- Essentra Components

Drawer Handles 0861

We used Baltic birch on this cart, though using home center birch plywood or even fir plywood will work just as well. As for the finish, we used lacquer, but paint or even nothing are also solid options.

DRILL BIT STORAGE (P. 20)

- Amazon

Bar Magnets B07DFZH4WT

ANVIL STAND (P. 46)

The anvil stand was given a fire-treated finish. To create this, char the wood with a propane blowtorch, let it sit for ten minutes, then brush the wood with a nylon brush, going with the grain to remove the outer layer of charred wood.

- McMaster-Carr

Threaded Rod 3313N768

Lock Nuts 90099A031

Steel Angle Irons 9017K484

- Amazon

Flip-down Casters B08FDFJXK5

- Harbor Freight

Cast Steel Anvil 58924

ASSEMBLY CENTER (P. 52)

- Amazon

110° Hinges B004K807JC

Figure-8 Fastener B07G38HYQH

Drawer Slides B0CKKYR6QV

Drawer Pulls B08X39FDN3

Locking Casters B0BG9PG211

- Cabinetmaker's Warehouse

4' x 8' Laminate 845-58-4X8

The mobile assembly center could go without finish, but two coats of lacquer will protect its good looks.

ALL-IN-ONE STATION (P. 60)

To finish the workstation, I sprayed it with multiple coats of spray lacquer. The remaining hardware for the workstation is available at most local hardware stores.

- McMaster-Carr

Threaded Knobs 2454K62

10" Drawer Slides 11435A11

20" Drawer Slides 11435A26

24" Drawer Slides 11435A28

- Rockler

Grommet 57058

5" Caster 81359

- Amazon

4" Plastic Pulls B00N3UMSDQ

6" Plastic Pulls B07R46LQCN

MOBILE PLANER CART (P. 74)

The flatness and consistency of Baltic birch plywood is why we use it. However, you can use another plywood product if that suits your tastes and budget. The key is selecting sheets that are as flat as you can find. This is especially true for the auxiliary bed — which might be one place to splurge on Baltic birch.

- Rockler

Polyurethane Caster 81359

Full-Extension Slides 45861

12" Folding Bracket 65798

SMALL ROUTER TABLE (P. 80)

- McMaster-Carr

Quick Clamp Handles 6385K31

There's a strong case for just putting the router table to work as soon as you attach the fence. The table will develop a lived-in look in short order. The table in the article has our now-standard satin lacquer finish. This offers protection and makes the project shine in photos.

DRILL PRESS TABLE (P. 84)

- Amazon

T-Nuts B07NCXKY9V

T-Bolts B0756B35MQ

Star Knobs B0B11X8HHV

Through Knobs B0CC8NZTGM

The faces of the drill press table and the fence are painted black. When the paint was dry all the parts were finished with two coats of lacquer

NARROW BELT SANDER (P. 94)

- McMaster-Carr

Studded Knobs 59625K43

Threaded Inserts 90016A030

Eyebolts 9489T19

Steel Shaft 1346K18

Bearings 60355K704

1/4" Aluminum 8975K599

5/8" Aluminum 8975K532

Stop Collar 6432K16

Extension Spring 7383N753

Power Cord 70355K36

Switch Box 71695K21

Switch Cover 71695K24

Toggle Switch 7030K32

Adapters 8180K21

- Grainger

1/2 Hp Motor 5K984

The sander works great as soon as you've wrapped up the construction. However, it really snaps after you give it a paint job. We like using Rust-Oleum's "Hammered" spray paint. The wrinkled look gives plywood the appearance of vintage cast iron tools. We used the gray color on the sander.

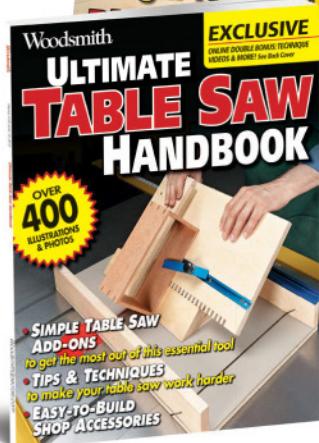
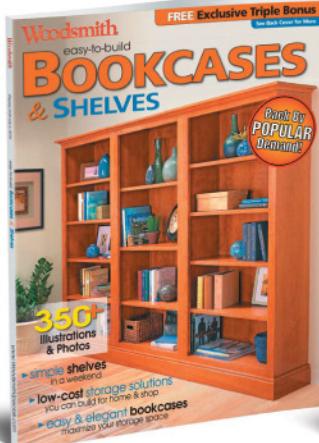
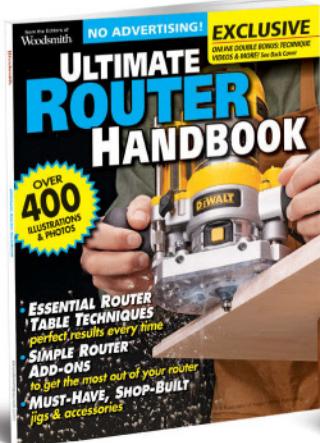
The plywood parts are Baltic birch. It's stronger and more consistent than other plywood and stands up to use for longer.

Woodsmith

BOOKS & DVDS

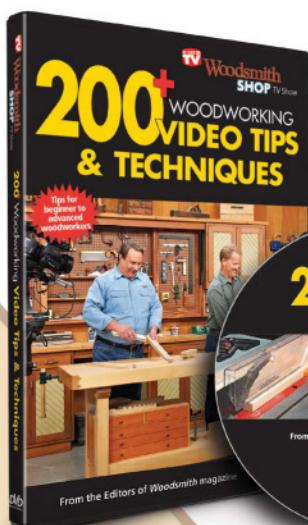


Discover More Great Books
from the publisher of
Tools, Tips, Tricks & Techniques



See these and all Woodsmith books at
WoodsmithLibrary.com

Digital-only versions now
available — **Only \$7.95!**



200+ Top Video Tips & Techniques
from the
Woodsmith
SHOP TV Show

**ONLY
\$19.95**
PLUS FREE
SHIPPING!

- Single DVD contains 200+ Top Video Tips from the Woodsmith Shop TV Show
- On-screen menu of tips categorized for quick and easy access
- Categories include table saw, routing, joinery, finishing, and more!

Order this DVD & more at **STORE.WOODSMITH.COM**

14**28**

Projects, Tools, & Inspiration
to build your dream shop.

**52****90**