SHOP PROJECT

A HEAVY-DUTY WORKBENCH

A large, heavy-duty workbench that's easy to build. Combining traditional joinery and modern materials is the key.

Although the size of this bench is what you first notice (it's nearly eight feet long and three feet wide, not including the vise), it's really the construction that makes it interesting. It's a blend of old and new technology.

The base is built of heavy, solid lumber, using traditional mortise and tenon joinery. But the top is constructed primarily of MDF (medium- density fiberboard). So as well as being flat and stable, it has the additional benefit of being quick and easy to make (unlike a top that is glued up from solid wood).

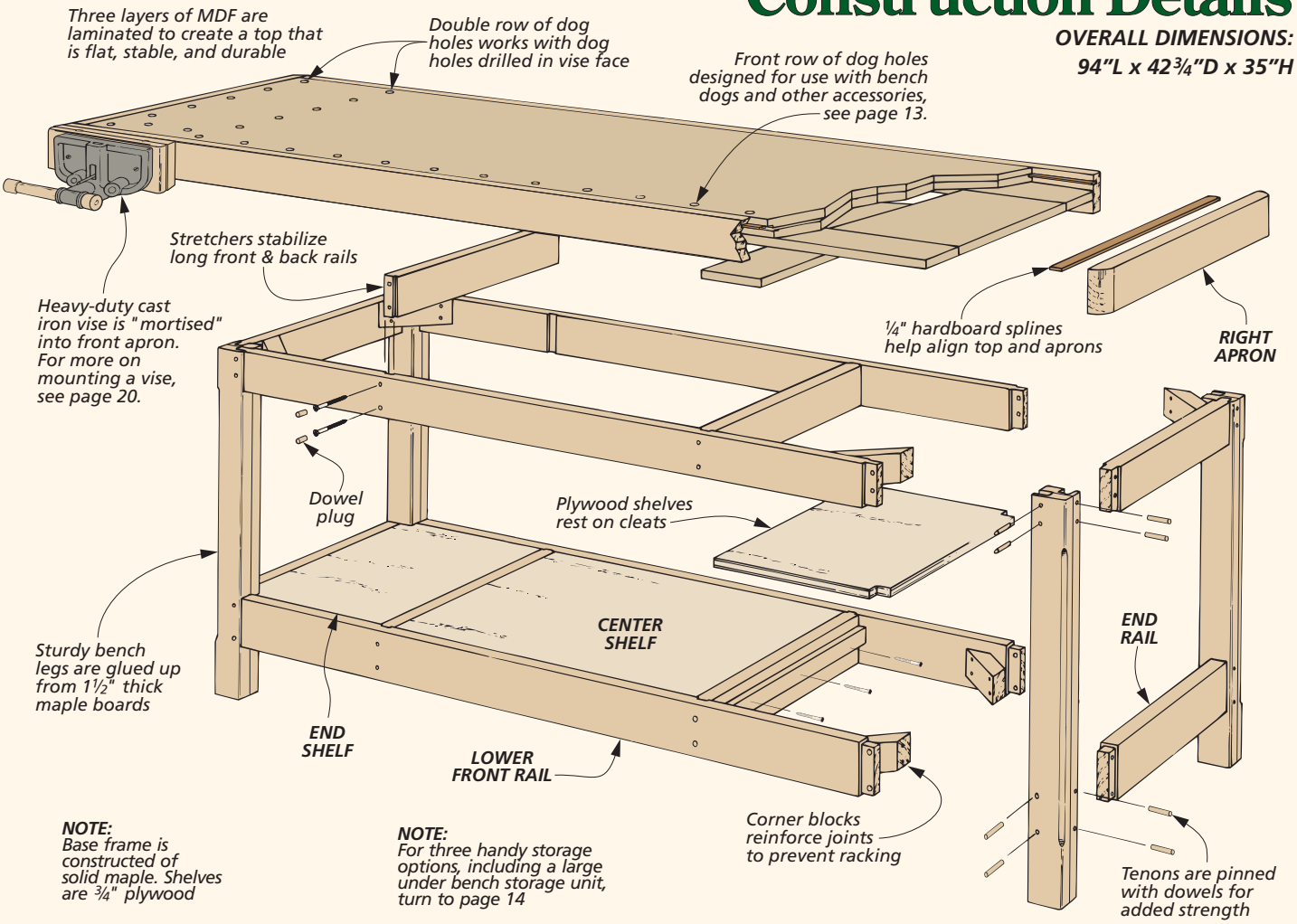
Another nice feature are the rows of dog holes along the front and left side of the bench. Combined with a few simple accessories (which are described on page 13), these make it easy to hold a workpiece while routing, sanding, or planing.

OPTIONAL STORAGE. As great as this workbench is to work on, you can make it even better by adding some optional storage units underneath (see inset photo below). With the bank of drawers, the cupboards at each end, and the open shelving at the back, you won't be running out of space anytime soon. You can read the story behind these storage units on page 14.

Tired of looking for your tools? They'll always be within reach if you build this slide-in storage unit. Turn to page 14 for complete plans.

Construction Details

OVERALL DIMENSIONS:
94"L x 42¾"D x 35"H



NOTE:
Base frame is constructed of solid maple. Shelves are ¾" plywood

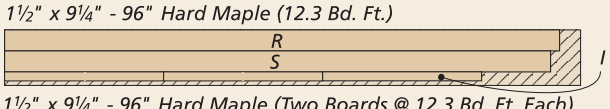
NOTE:
For three handy storage options, including a large under bench storage unit, turn to page 14

MATERIALS, SUPPLIES & CUTTING DIAGRAM

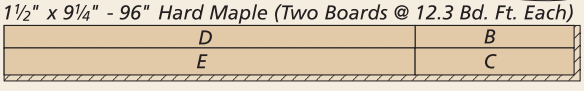
A	Legs (4)	3 x 3 - 32¾	**L**	Top Layers (2)*	¾ MDF - 33 x 91	**W**	Top Cleats (2)	¾ MDF - 1½ x 26 7/16
B	Upper End Rails (2)	1½ x 3¾ - 26½	**M**	Support Block (1)	1½ x 6 - 15	•	(50) #8 x 1¼" Fh Woodscrews	
C	Lower End Rails (2)	1½ x 4½ - 26½	**N**	Top End Pieces (2)	¾ MDF - 15 x 21	•	(12) #8 x 1½" Fh Woodscrews	
D	Upr. Fr./Bk. Rails (2)	1½ x 3¾ - 68½	**O**	Top Frt. Piece (1)	¾ MDF - 6 x 76	•	(48) #8 x 2½" Fh Woodscrews	
E	Lwr. Fr./Bk. Rails (2)	1½ x 4½ - 68½	**P**	Top Bk. Piece (1)	¾ MDF - 6 x 91	•	(4) #14 x 2" Fh Woodscrews	
F	Upper Stretchers (2)	1½ x 3¾ - 27	**Q**	Top Ctr. Pieces (2)	¾ MDF - 6 x 21	•	(2) 5/16" x 4½" Hex Head Bolts	
G	Lower Stretchers (2)	1½ x 4½ - 27	**R**	Front Apron (1)	1½ x 3½ - 92½	•	(2) 5/16" Lock Nuts	
H	Corner Blocks (8)	1½ x 2½ - 7½	**S**	Back Apron (1)	1½ x 3½ - 91	•	(4) 5/16" Flat Washers	
I	Shelf Cleats (4)	1½ x ¾ - 26½	**T**	Left Apron (1)	1½ x 3½ - 34¼	•	(1) Woodworking Vise	
J	Ctr. Shelf (1)	¾ ply. - 26 7/16 x 32 7/16	**U**	Right Apron (1)	1½ x 3½ - 35½	•	(1) ⅜"-dia. Hardwood Dowel (48" long)	
K	End Shelves (2)	¾ ply. - 26 7/16 x 16 7/16	**V**	Face Block (1)	3 x 4½ - 18	•	(1) ¼" Hardboard (1" x 240" ln. in.)	

*Note: One top layer starts out oversized.

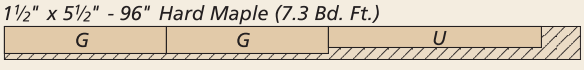
1½" x 9¼" - 96" Hard Maple (12.3 Bd. Ft.)



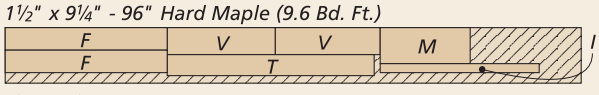
1½" x 9¼" - 96" Hard Maple (Two Boards @ 12.3 Bd. Ft. Each)



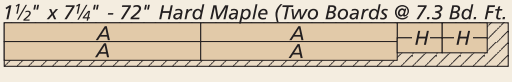
1½" x 5½" - 96" Hard Maple (7.3 Bd. Ft.)



1½" x 9¼" - 96" Hard Maple (9.6 Bd. Ft.)



1½" x 7¼" - 72" Hard Maple (Two Boards @ 7.3 Bd. Ft. Each)



ALSO NEEDED: *Two 4x8 sheets of ¾" MDF and one 4x8 sheet of ¾" maple plywood*

Base

When it comes to building a workbench, the base has to meet two requirements. It needs to be strong. And it needs to be stable. I decided to use hard maple for the base because of its strength and the added mass it gives the bench. But a good, less expensive substitute would be "two-by" framing lumber. (I would suggest Douglas fir.)

LEGS. The first step in building the base of this bench is to make the legs. As you can see in Fig. 1, each *leg (A)* is glued up from two pieces of 1½"-thick stock. I ripped these pieces slightly wider than the finished width of the legs. This way, you don't have to worry about keeping the two pieces exactly aligned when gluing them up. After squaring up each blank, you can cut the legs to final length (32¾").

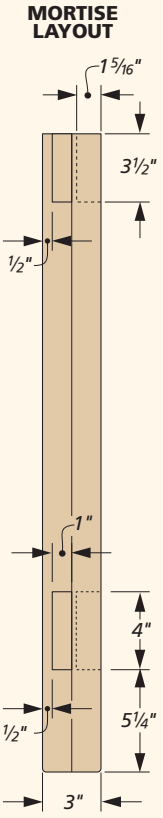
MORTISES. Large mortise and tenon joints are used to join the rails of the bench with the legs. Before making the mortises, I laid them all out on the legs, like the drawing in the left margin shows. The important thing to notice when laying out the mortises is that the legs aren't identical. The right-hand legs and left-hand legs mirror each other. This way, the jointline won't show from the front of the bench (Fig. 1a).

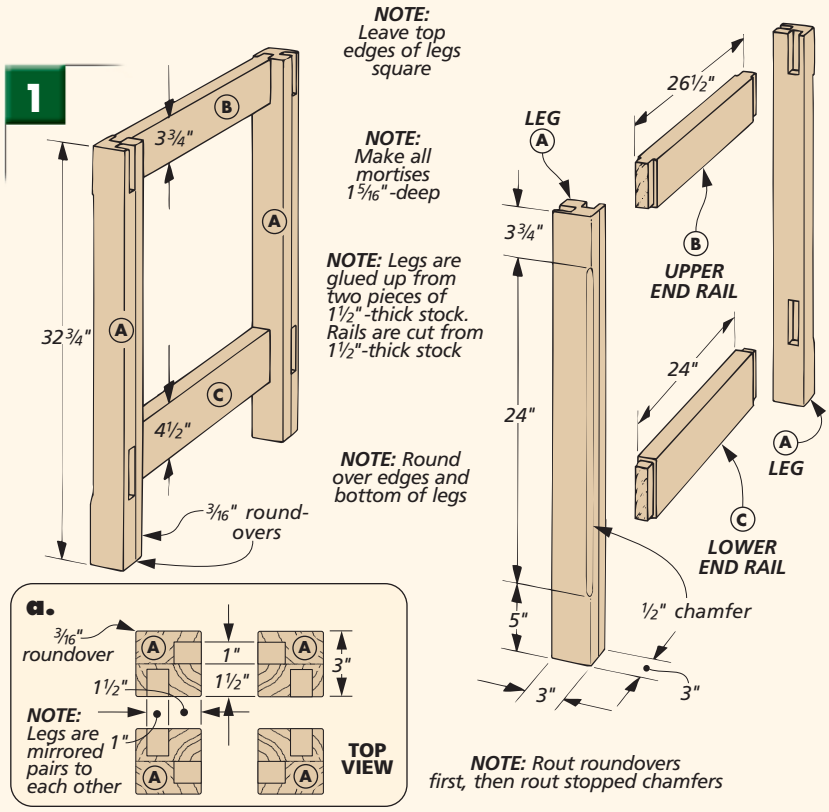
After the mortises are laid out, you can begin drilling out the waste. I did this on a drill press, using a Forstner bit. Drilling overlapping holes removes most of the waste, and what little is left behind can be quickly removed with a chisel. You can see in the drawing at the left that the mortises at the top of each leg are open on one end. This way, you won't have to worry about "blowing out" the mortise at the top of the legs during assembly.

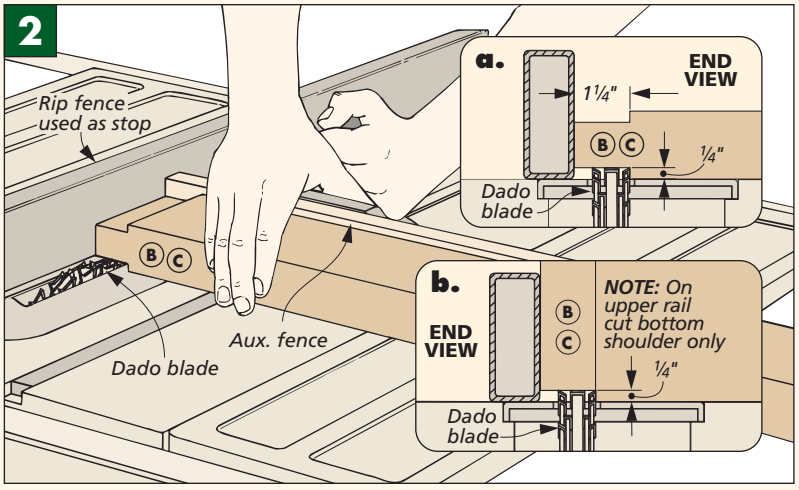
To complete the legs, a 3/16" roundover is routed along the edges of each leg and on the bottom. Then a ½" stopped chamfer is routed on the outside corner of each leg.

RAILS. The legs are connected by two sets of rails at the top and bottom. I started by making the end rails. (All the rails are made from 1½"-thick stock.) You'll need two *upper end rails (B)* and two *lower end rails (C)*. After cutting the rails to size, you can cut tenons on the ends to match the mortises in the legs, as shown in Figs. 1b and 1c. Since each tenon has ¼" shoulders, one set up on the table saw is all you need, as shown in Fig. 2. Note that the tenons on the upper rails are bare-faced — to match the open mortises at the top of each leg. Finally, the two ends of the base can be glued up.

FRONT/REAR RAILS. Except for their length, the rails at the front and rear of the bench are practically identical to the end rails (Fig. 3). The *upper front/back rails (D)* and *lower*







front/back rails (E) are cut to size, and tenons are cut on the ends. These tenons are identical to the ones cut on the end rails. (For a tip on cutting tenons on long workpieces, see page 21.)

Before assembling the ends and rails, there's one other detail to take care of. To hold some stretchers that will be added between the front and back rails, a couple of shallow dadoes are cut on the inside face of each rail, as shown in Fig. 3. Once this is done, the rails and ends of the bench can all be glued together.

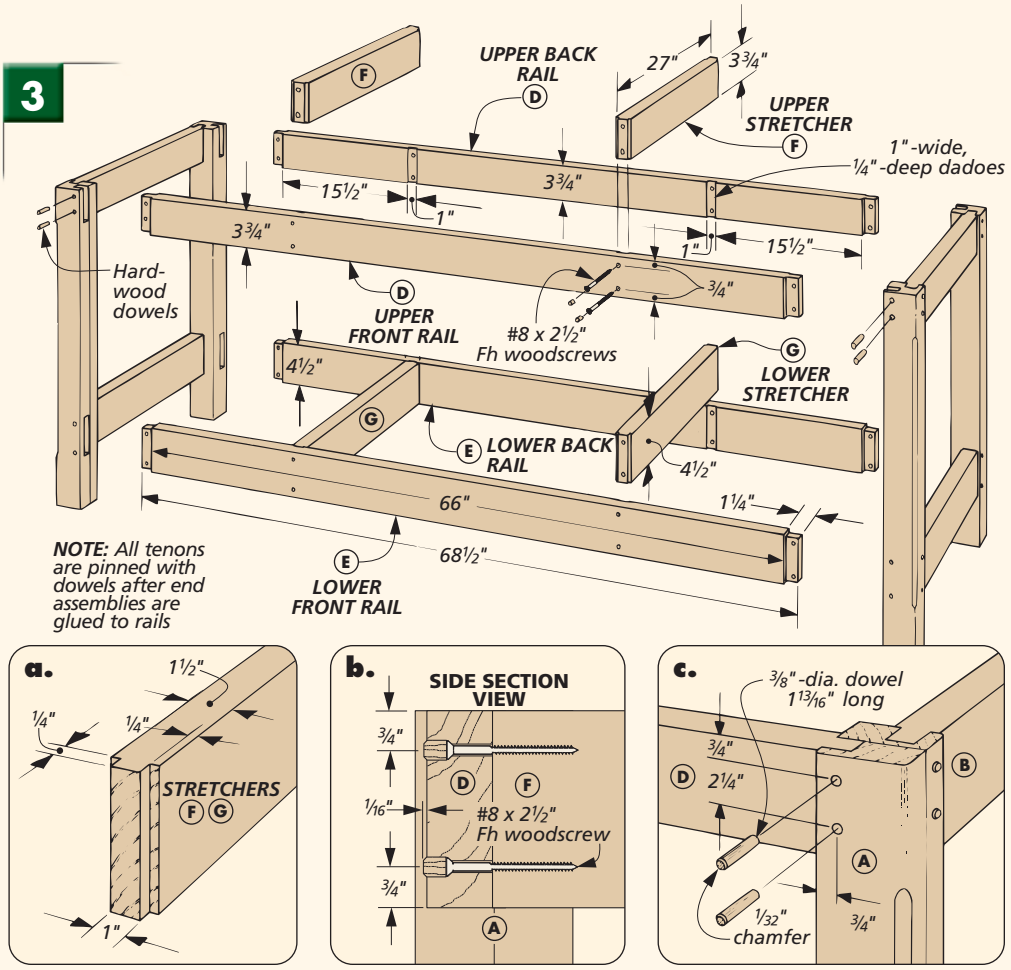
STRETCHERS. The *stretchers (F, G)* that I just mentioned are cut to size from 1½"-thick stock. Stub tenons are cut on the ends of the stretchers, and then after brushing a little glue on the tenons, each stretcher is slipped in between the front and back rails. A few screws help to hold the stretchers in place.

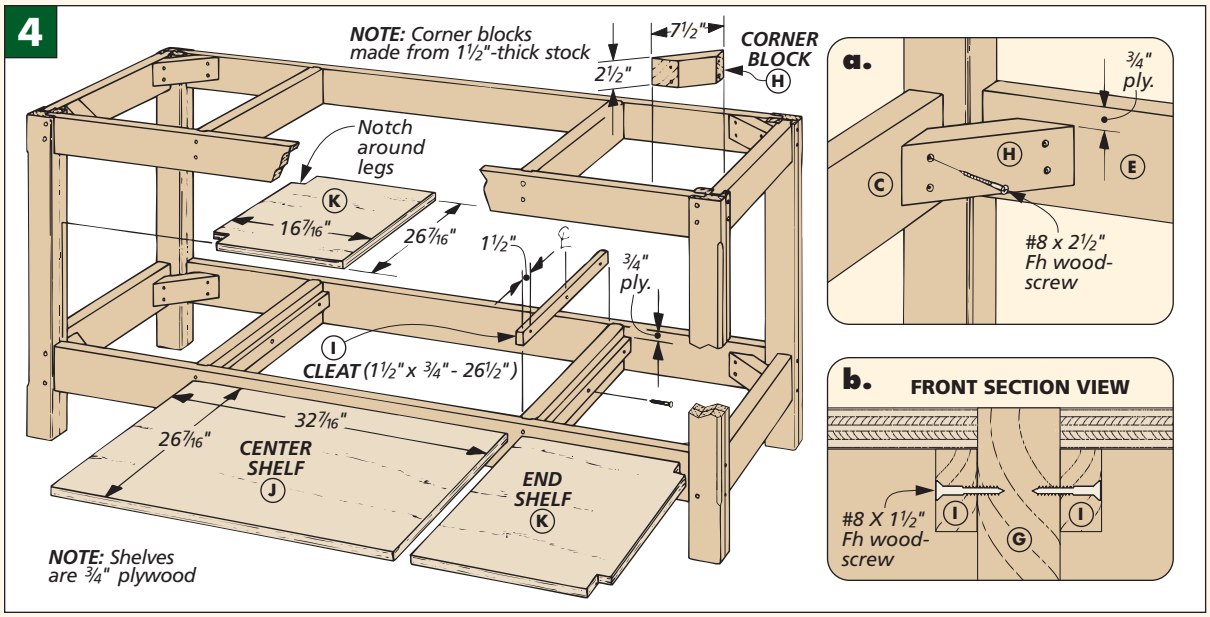
Once the stretchers are screwed in place, the screws can be plugged (Fig. 3b). While you're at it, go ahead and drill holes in the legs and pin the tenons with ⅜"-dia. dowels (Fig. 3c). I sanded a slight chamfer on the exposed ends of the plugs (and pins), then glued them in place so they stood slightly proud of the surface (about 1/16").

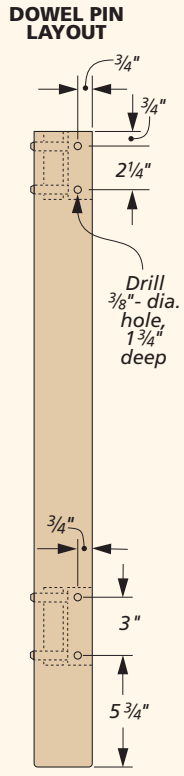
CORNER BRACES. Each corner of the base is reinforced with a couple of *corner blocks (H)* (Fig. 4). In addition to beefing up the corners, the lower blocks serve an extra purpose. They provide support for some shelves that are added next.

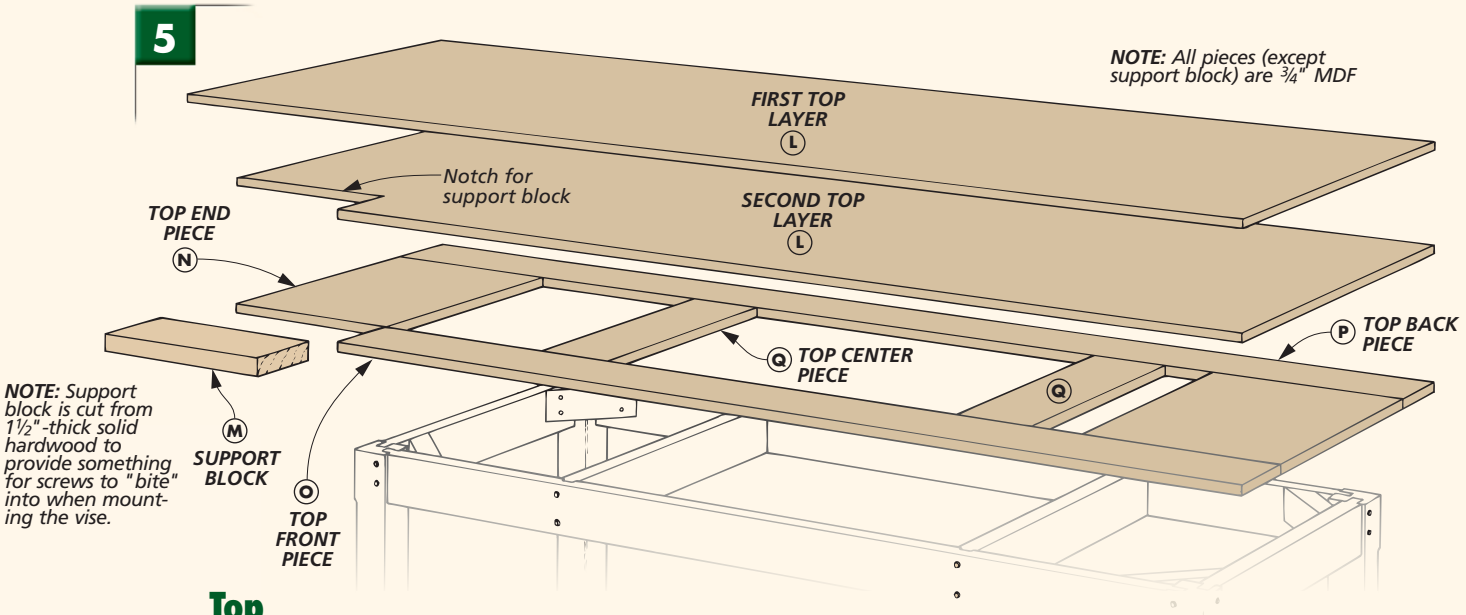
SHELVES. Shelves are fitted into the bottom of the bench for storing tools and equipment. Or if you're going to add the optional storage units, the shelves provide a flat, solid base.

The shelves rest on *cleats (I)* that are glued and screwed to the lower stretchers (Fig. 4). Once these are in place, you can cut a *center shelf (J)* and two *end shelves (K)* from ¾" plywood. The center shelf is simply cut to size and dropped in place. But the two end shelves have to be notched in the corners to fit around the legs of the bench.









Top

▲ *Hard maple aprons wrap around three layers of MDF to protect the hard, flat work surface.*

It goes without saying that the top of a workbench needs to be strong and sturdy to stand up to all the abuse it will receive. But it also needs to be flat. I rely on the top of my workbench as a reference when assembling a project or dimensioning stock. So it's important that the top be perfectly flat *and* stay that way.

Although solid wood is a more traditional choice for bench tops, I decided to use MDF. It's heavy, tough, and very flat. And unlike solid wood, you don't have to worry about MDF twisting or warping out of shape over time. Plus as an added benefit, MDF is a whole lot less expensive than solid wood.

In order to beef up the thickness, I built up the top out of three separate "layers" of MDF, as you can see in Fig. 5 above. This makes the top plenty thick for mounting a vise and for holding bench dogs.

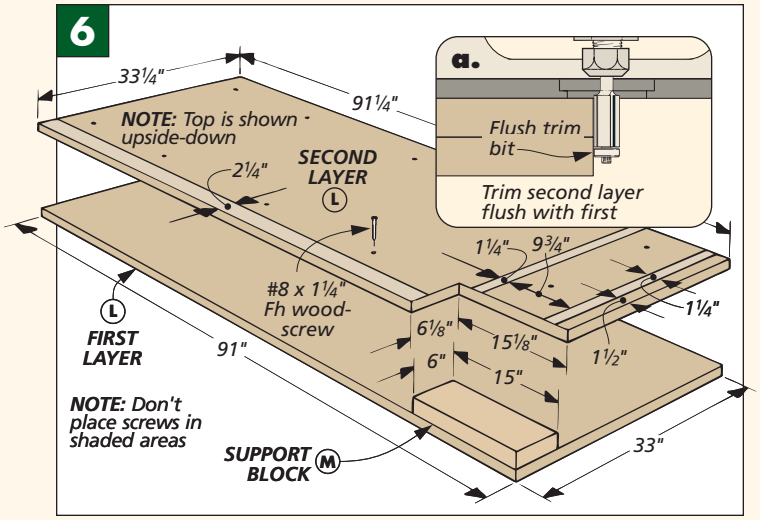
To make the top, start by cutting the first *top layer (L)* to finished size (Fig. 6). Then before adding the second layer, I glued a hardwood *support block (M)* to the corner where the vise will get mounted. (This block will give the screws something to bite into when you're mounting the vise later.) However, as you can see in Fig. 6, the top piece is upside-down when you glue this block in place. (That's why the block is shown in the right corner.)

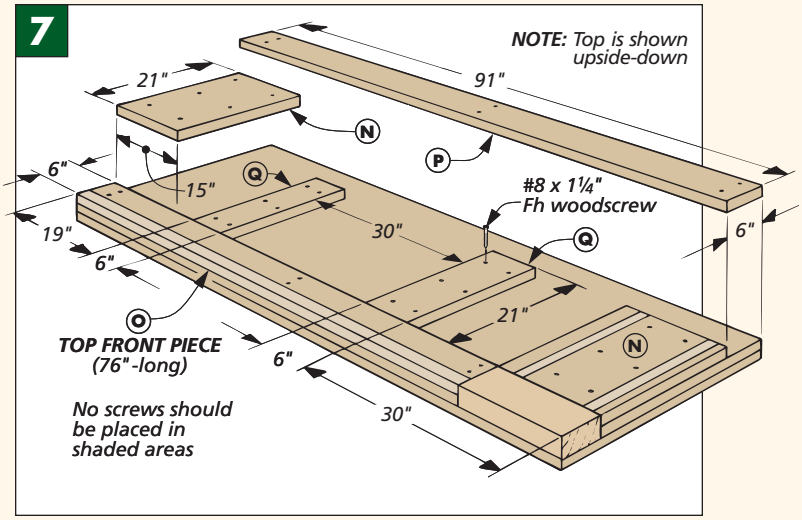
SECOND LAYER. The *second layer (L)* ends up the same size as the first layer. But trying to keep two large, identically-sized workpieces aligned when gluing them together can be tricky. So I cut the second layer slightly oversize (¼" in both length and width). After it's glued to the first layer, it will be trimmed flush.

In addition to making the second layer oversized, a notch needs to be cut in one corner to allow it to fit around the hardwood block that's glued to the first layer. This can be done with a sabre saw or a hand saw, and you don't need to be too fussy with the fit. (My notch was ⅛" larger than the block.)

Once the notch is cut out, the two layers can be glued and screwed together. I used yellow woodworking glue, spreading it on the large surfaces with a 3" paint roller.

The screws help to hold the MDF layers together while the glue sets up. There's just one thing to be aware of when you're adding the screws. Later on, you'll be drilling dog holes in the top of the bench,





and you don't want to accidentally drill into a screw. So I laid out some "no screw zones" to make sure this wouldn't be a problem (Fig. 6).

Once the two layers are laminated together, you can trim the second layer flush with the first using a router and a flush trim bit (Fig. 6a).

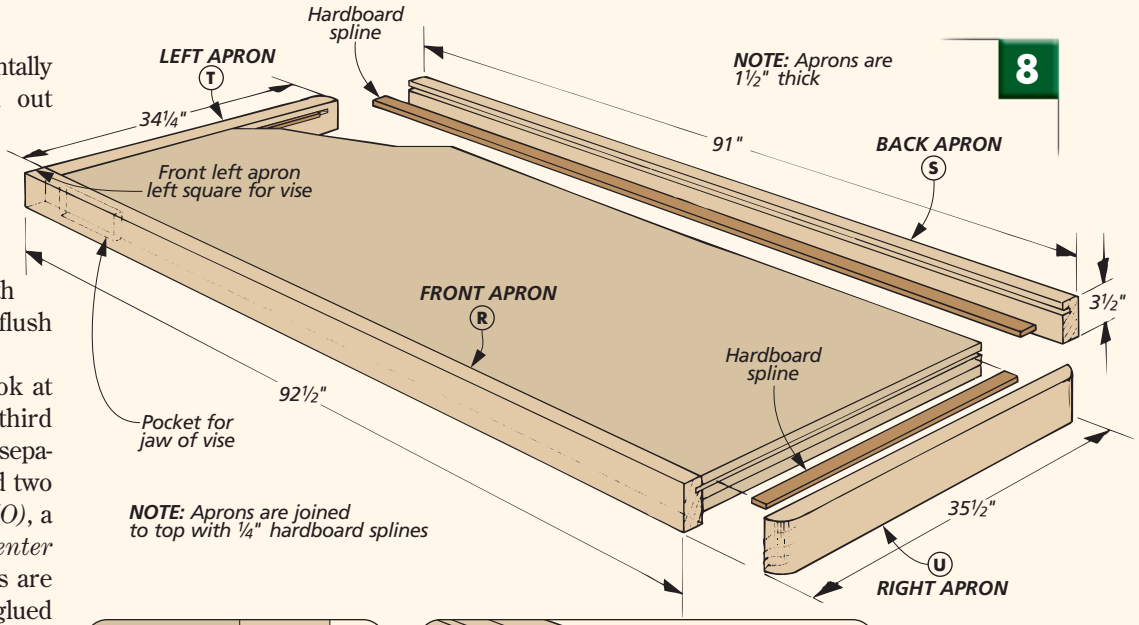
THIRD LAYER. If you take a look at Fig. 7, you'll see that the third "layer" is really made up of six separate pieces of MDF. You'll need two *end pieces (N)*, a *front piece (O)*, a *back piece (P)*, and two *center pieces (Q)*. Once these pieces are cut to exact size, they can be glued and screwed to the second layer.

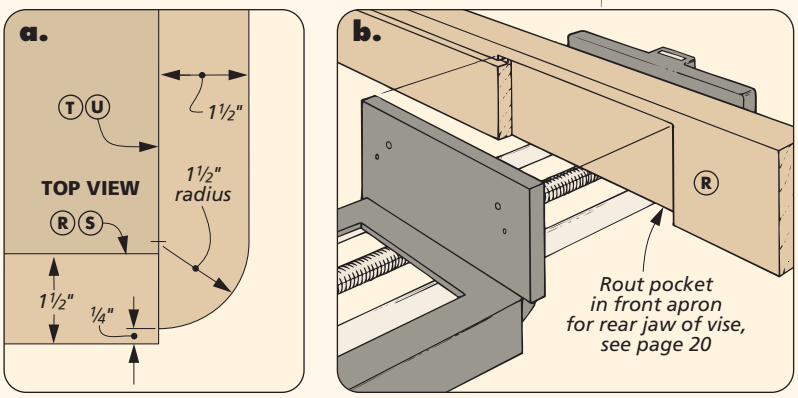
APRONS. To protect and conceal the edges of the MDF, the top is wrapped with 1½"-thick hardwood *aprons (R, S, T, U)* on all four sides. If you look closely at Fig. 8, you'll see that each apron is a little different. To begin with, the ends of the right apron and one end of the left apron are rounded over (Fig. 8a). (This roundover will also be created on the face block that will be added to the vise.)

Second, a "pocket" is routed in the back face of the front apron to accommodate the back jaw of the bench vise (Fig. 8b). (The size of this pocket will depend upon the vise you are using, see page 20.)

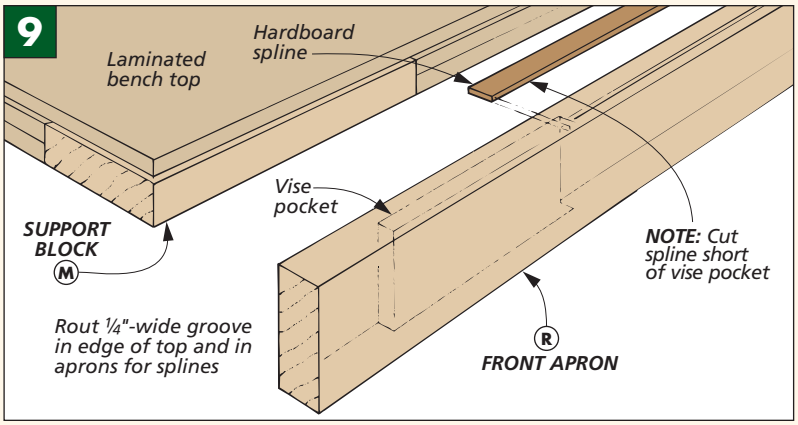
After routing the pocket, you can rout a groove around the top of the bench as well as on the aprons (Fig. 9). These grooves will hold splines that help align the aprons with the top of the bench. A router and a slot cutter is all you need to make the grooves. But note that the grooves in the aprons are stopped short of the exposed ends (Figs. 9 and 10).

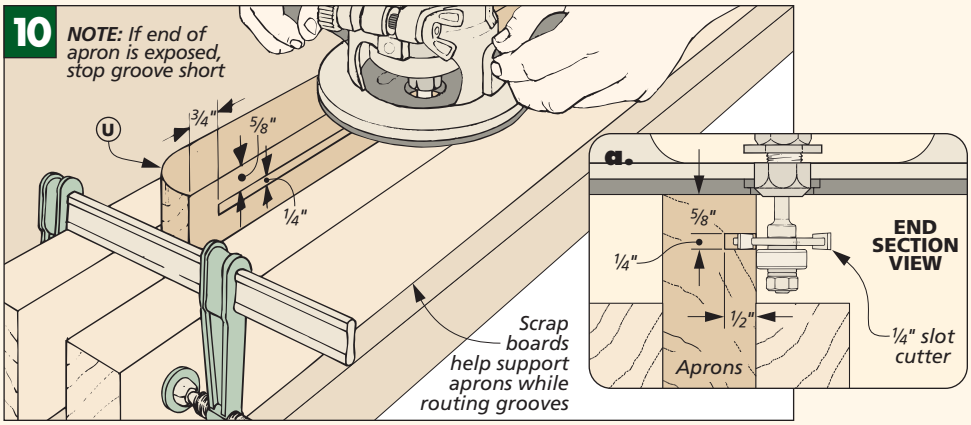
SPLINES. Once the grooves have been routed, you can glue the aprons to the top using splines cut into strips from a sheet of ¼" hardboard. Clamping the front and back aprons in place is no problem. But clamping across the length of the bench is a challenge, unless you have some extra long clamps. For a simple solution, see the margin photo at right.





▲ *A couple of cleats clamped to the top of the bench allow you to clamp the end aprons in place.*





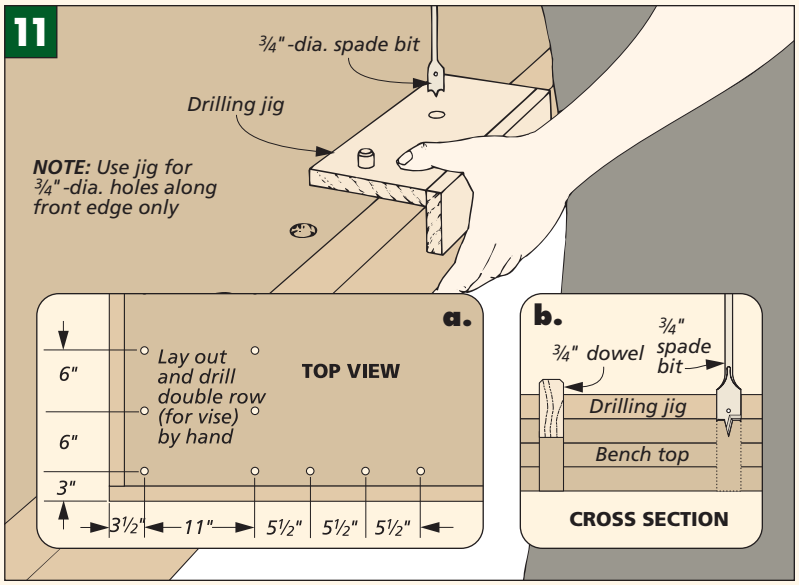
Top (continued)

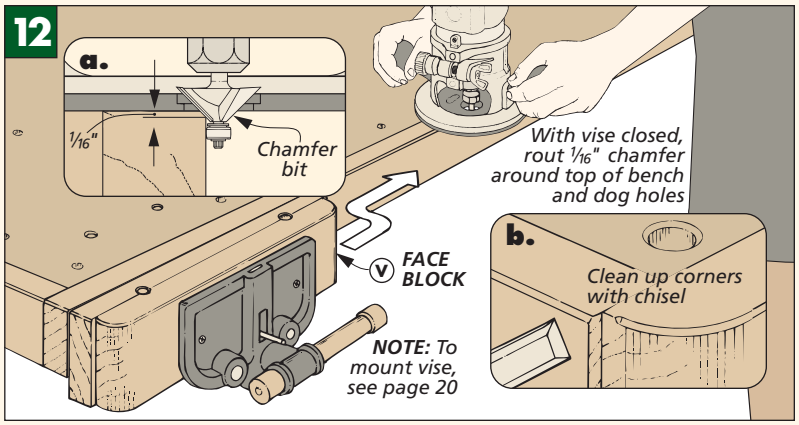
With the aprons attached, the ¾"-dia. dog holes can be drilled. There's one row along the front edge and a double row at the end (for the vise). To keep the hole spacing consistent on the long front edge (as well as to guide the drill bit), I made the simple indexing jig shown in Fig. 11. For the few holes at the end of the bench, I carefully laid out each one individually.

With the top just about complete, I added the vise. Depending on the size of the vise you plan to install, you may need to mount a spacer block to the underside of the bench beforehand. Then after mounting the vise, I added a wood *face block (V)* to the front jaw. You can read more about the vise mounting procedure on pages 20 and 21.

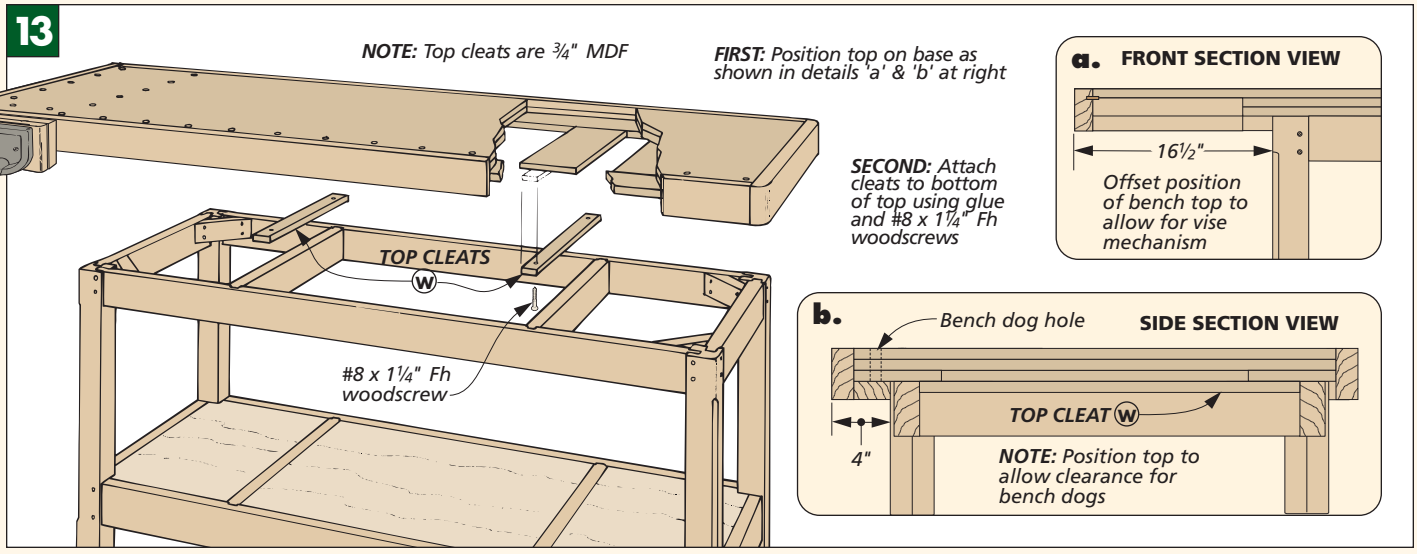
The last step to complete the top is to rout a small (1/16") chamfer around the top of the bench and around the inside edge of the dog holes. I wanted to incorporate the vise into this chamfer detail as well, so before turning on the router, I closed the face block against the front apron. Then I routed the chamfer around the top and the face block, as well as around the inside of each dog hole (Fig. 12).

The bearing on the chamfer bit doesn't allow you to rout the chamfer all the way into the corners of the face block or the ends of the bench. So after you're done routing, you can clean up these inside corners with a chisel (Fig. 12b).





ATTACHING THE TOP. The top of this workbench is heavy enough that it will stay put without being attached to the base. But to keep the top from shifting or sliding, I added a couple of cleats to the underside of the top. These *cleats (W)* are just strips of MDF that butt against the upper stiles, locking the top in position. But before the cleats are attached, you should make sure that the top is set squarely on the base (Figs. 13a and 13b). Then the cleats can be screwed in place.



SHOP PROJECT

WORKBENCH STORAGE

Want to store a shopful of tools at your fingertips? Here's the answer.

How do you make a great bench even better? The answer is to add a storage unit to the base. Actually, the design we came up with features *two* storage units — a front cabinet with drawers and doors and an open shelving unit in back. And if that's not enough, you can add an optional pegboard storage panel to each end. Build them all, and you'll be able to put a shopful of tools at your fingertips.

The reason for dividing the storage space into two separate units is simple. First, it allows you to have accessible storage on both sides of the bench. And second, it keeps the drawers in the front cabinet at a manageable depth, so items don't get lost at the back.

Of course, there's no reason you have have to build both storage units. If you're planning to place the bench up against a wall, you may only want to build the cabinet in front. So let's start with that one.

FRONT CABINET

The front cabinet is really just a plywood box that's sized to fit in the space beneath the top of the workbench. It's divided up into compartments for the drawers and cupboard storage areas. The center section is constructed first, and then the sides are added later.

CENTER SECTION. The center section of the cabinet is plywood framework that creates the openings for the drawers. You can begin by cutting the *top* and *bottom (A)*, two *vertical dividers (B)*, a *horizontal divider (C)*, and a *drawer divider (D)* to size from ¾" plywood, as shown in Fig. 1 on the next page.

The front edges of all these plywood panels need to be covered with strips of ¼"-thick hardwood

Bank of drawers. *Keep your hand tools clean and organized in these generously-sized drawers. Plus, they open on full-extension slides so you can fill them from front to back.*

Shelving Unit. *Use every inch of the bench by adding this shallow shelving unit at the back. It's a perfect place for jigs, hardware, and other supplies. (Plans start on page 19.)*

Pegboard End Storage. *In just a few minutes, you can have this optional pegboard storage panel mounted at each end of the bench. See page 19 to find out how.*

edging (E), as shown in Fig. 1. I chose to do this before assembly because I found it a lot easier to attach and trim the edging flush with each panel lying flat.

Once the edging is in place, you can set up your dado blade to match the thickness of the plywood you're using (Fig. 1a). All the dadoes are the same depth and width, so when the blade is set up, it's just a matter of adjusting your rip fence to position the dadoes according to Fig. 1.

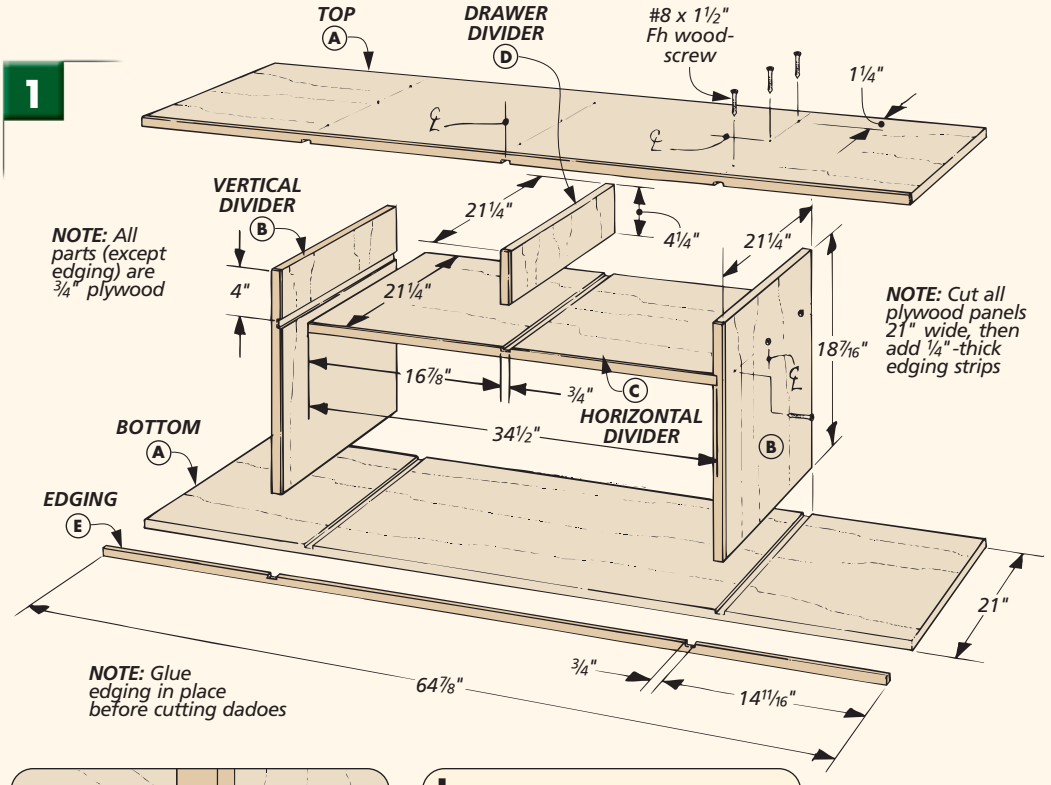
With all the dadoes cut, now is a good time to assemble the center section. I used both glue and screws to do this, drilling all the pilot and shank holes beforehand (Fig. 1b). It makes sense here to work from the inside out, starting by assembling the horizontal divider between the two vertical dividers. Then you can add the short drawer divider and the top and bottom panels.

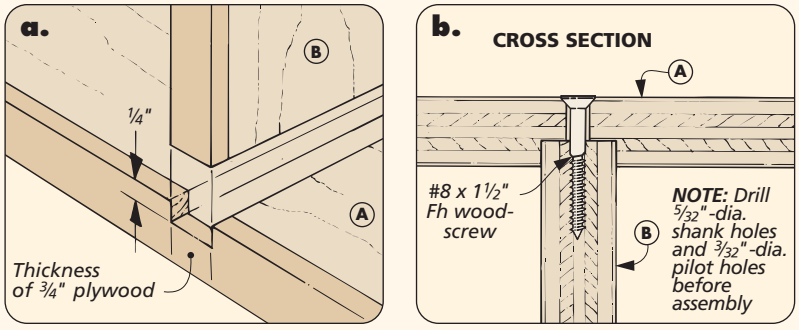
SIDES. All you have to do now to complete the case of the cabinet is to add a couple of sides (Fig. 2). Like the other panels you cut earlier, the *sides (F)* are also cut from ¾" plywood. But these panels are cut ¼" wider than the other plywood panels. That's because they'll be rabbeted along the back edges later to hold a plywood back.

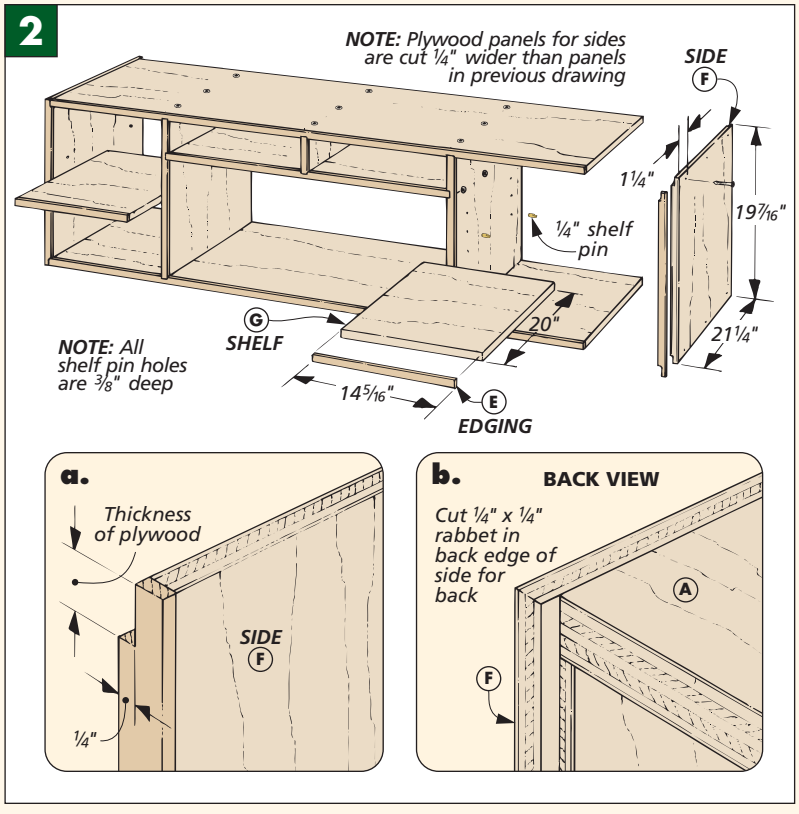
After cutting the sides to size, hardwood edging is added to the front edges. Then a rabbet is cut along the ends of each side to hold the top and bottom (A) of the cabinet (Fig. 2a). Before assembling the sides to the rest of the cabinet, a ¼"-wide rabbet is cut along the back edge of each side piece to hold a ¼" plywood back that will be added later (Fig. 2b). Then the sides can be glued and screwed in place.

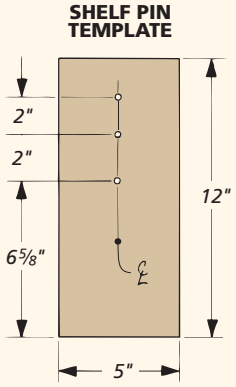
SHELVES. With the case of the front cabinet completed, the next step is to add the *shelves (G)*. These are nothing more than a couple of pieces of ¾" plywood with hardwood edging attached to the front.

The shelves are supported by brass shelf pins. To ensure that the holes are spaced evenly and line up accurately, I used a simple drilling template that is shown in the drawing in the margin at right.









▲ *A hardboard template allows you to accurately drill holes for the shelf pins.*

Drawers & Doors

The center section of the cabinet is designed to hold five drawers. These are graduated in size to accommodate different types of tools. But the nice thing is that the method of construction is identical for all of them. So other than a few dimension changes, the procedure is the same.

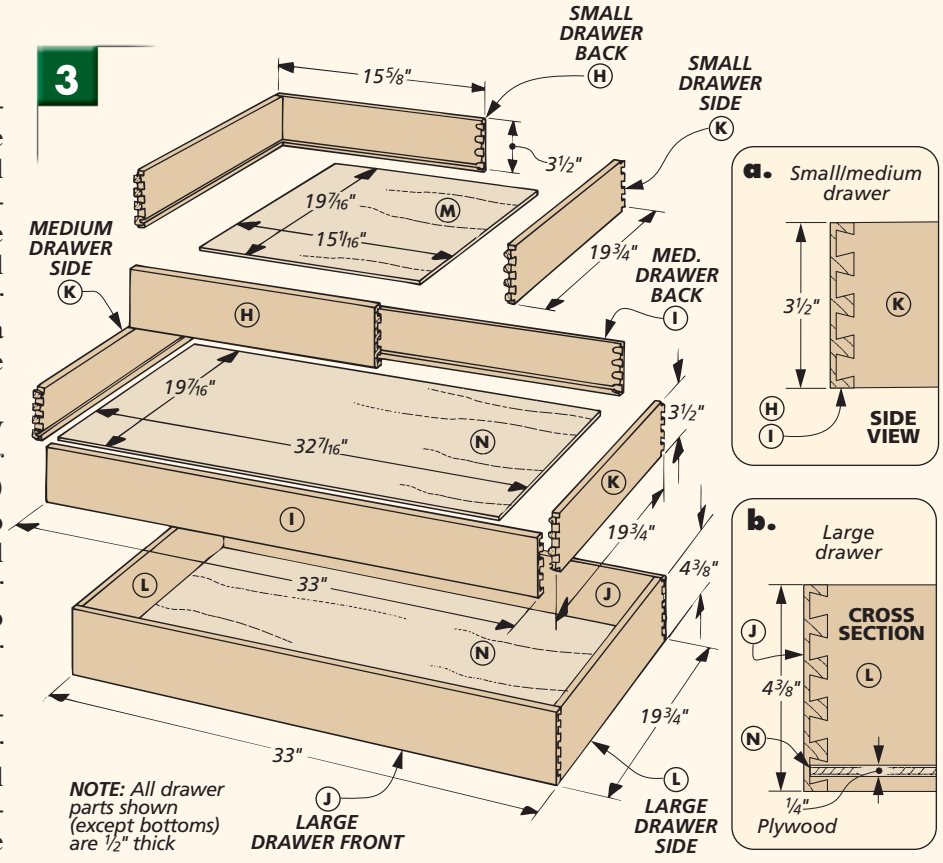
DRAWER PARTS. I started by cutting the ½"-thick *drawer fronts* and *backs (H, I, J)* and *drawer sides (K, L)* to size (Fig. 3). The fronts and backs are cut 1" narrower than the cabinet opening so there will be clearance for the full-extension slides.

Next the half-blind dovetails that hold the drawer together can be routed. And a groove for the drawer bottom can be cut on the inside face of each drawer piece. This groove is centered on the bottom pin of the drawer sides. This way, it won't be visible on the ends of the workpieces after the drawers are assembled.

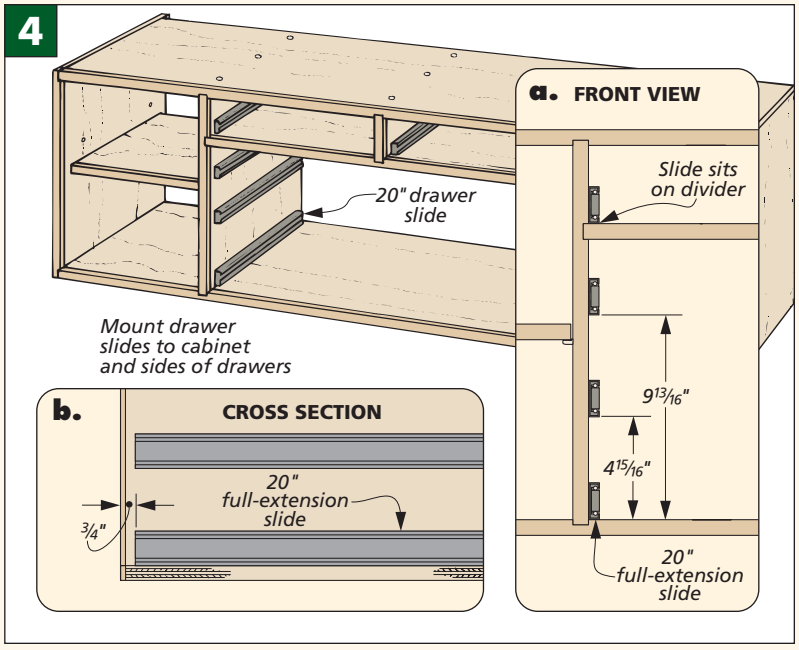
DRAWER BOTTOMS. The *drawer bottoms (M, N)* are all cut from ¼" plywood. After they're cut to size, the drawers can be glued up.

DRAWER SLIDES. Because I wanted to be able to get to items stored at the back of the drawers with ease, I used full-extension metal drawer slides to mount the drawers (Fig. 4). One half of the slide is screwed to the side of the drawer, and the other half is screwed to the side of the cabinet. The important thing is that when mounting the slide to the cabinet, you allow ¾" clearance between the slide and the front edge of the cabinet (Fig. 4b). This space is for the drawer false fronts that will be added next.

FALSE FRONTS. The *false fronts (O, P, Q)* are cut from ¾"-thick hardwood (Fig. 5). They are simply screwed to the front of each drawer so that there is a 1/16" gap all around the front of the drawer. To make it easier to adjust the false fronts, try drilling oversize screw holes through the ½"-thick drawer fronts



How many tools can you pack into five drawers? Plenty. With heavy-duty, full-extension drawer slides you can make good use of every inch of each drawer.



first. Then attach the false fronts using screws and finish washers. The oversize holes in the drawer fronts should provide enough "play" to adjust the false fronts for a perfect fit. Once the false fronts are in place, you can add the metal drawer pulls.

DOORS. To enclose the shelves on either side of the drawers, I added two doors. These are frame and panel doors, assembled with simple stub tenon and groove joinery.

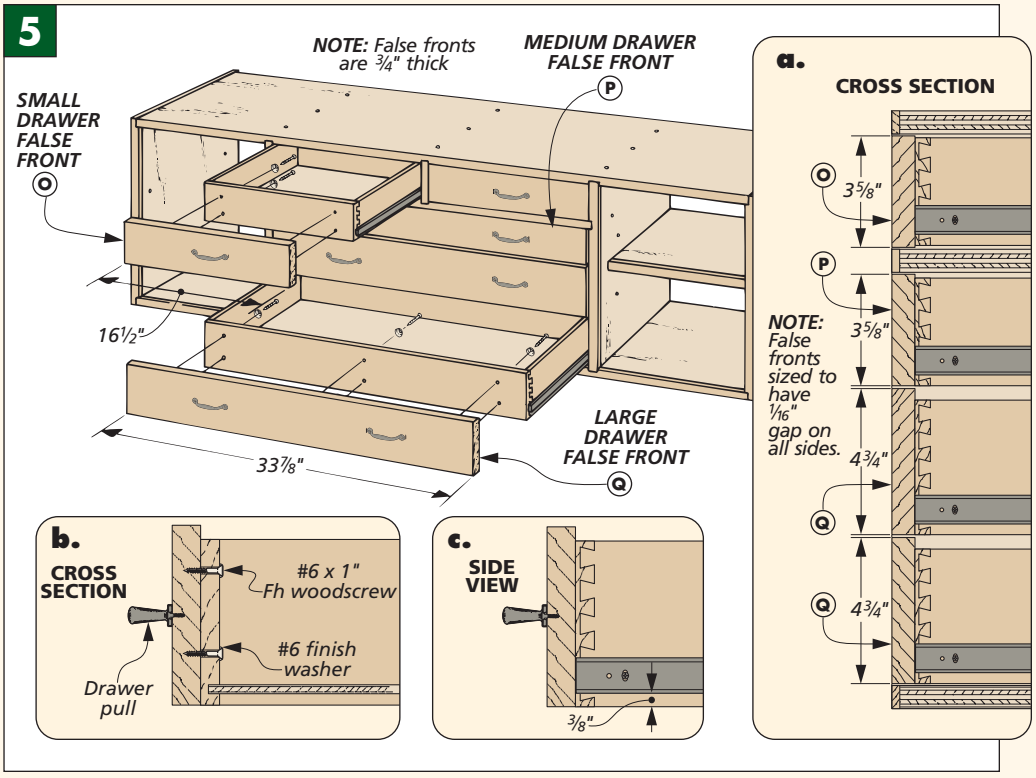
To make the doors, start by cutting the *door rails (R)* and *stiles (S)* to size (Fig. 6). Next, a groove is cut on the inside edge of each piece to hold a plywood frame. When these grooves are complete, stub tenons are cut on the ends of the rails to fit in the grooves in the stiles.

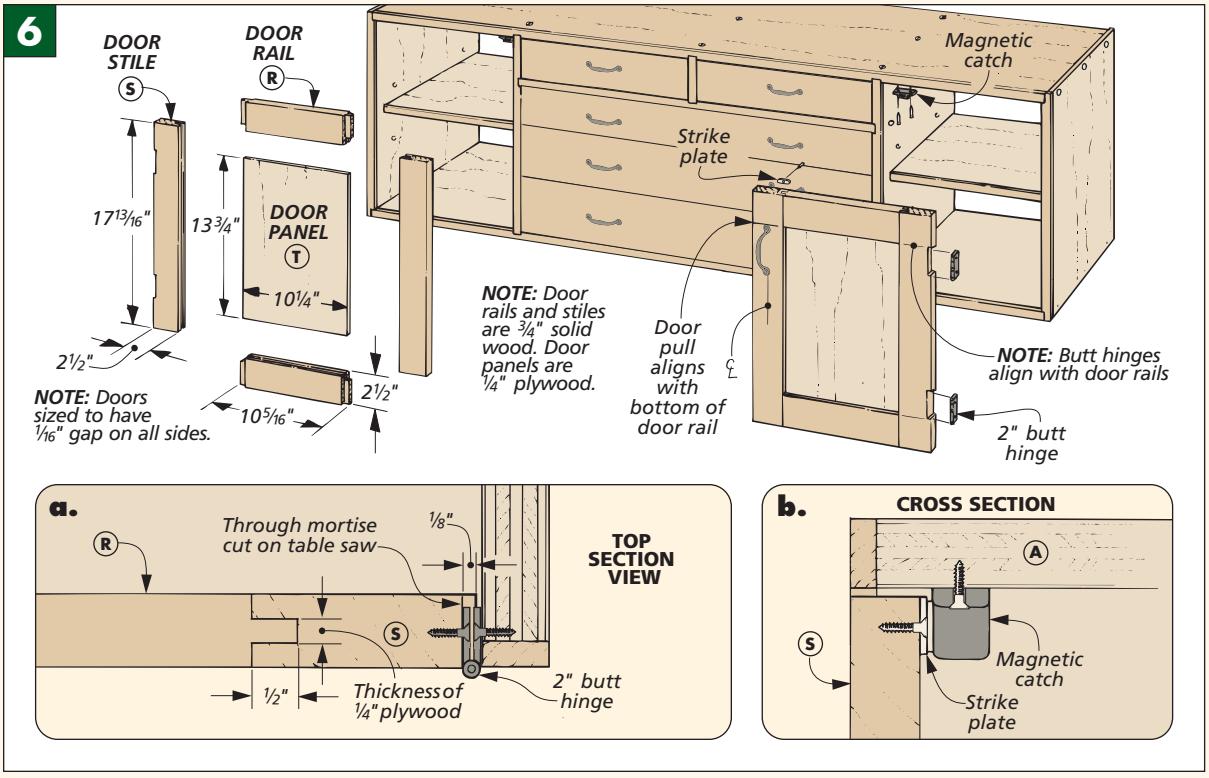
PANELS. Each door panel is just a piece of ¼" plywood. After cutting the *door panels (T)* to size, the doors can be assembled.

HINGES. The cabinet doors are mounted on common butt hinges. I wanted the hinges to match the other hardware, so I spray painted some ordinary steel hinges black.

After the spray paint has dried, the hinges can be attached to the cabinet. To make this as easy as possible, I mortised each hinge into the door stile, but screwed it directly to the side of the cabinet (Fig. 6a). And creating the mortises in the door stiles is easy. I simply set the door on edge and ran it across a dado blade on my table saw. (A tall auxiliary miter gauge fence will help support the door while you do this.)

Now that the doors are hung, a pull can be added to each. Then to keep each door closed, I installed a small magnetic catch (Figs. 6b). These catches are mounted to the underside of the top of the cabinet, and the strike plates are mounted to the back of each door.





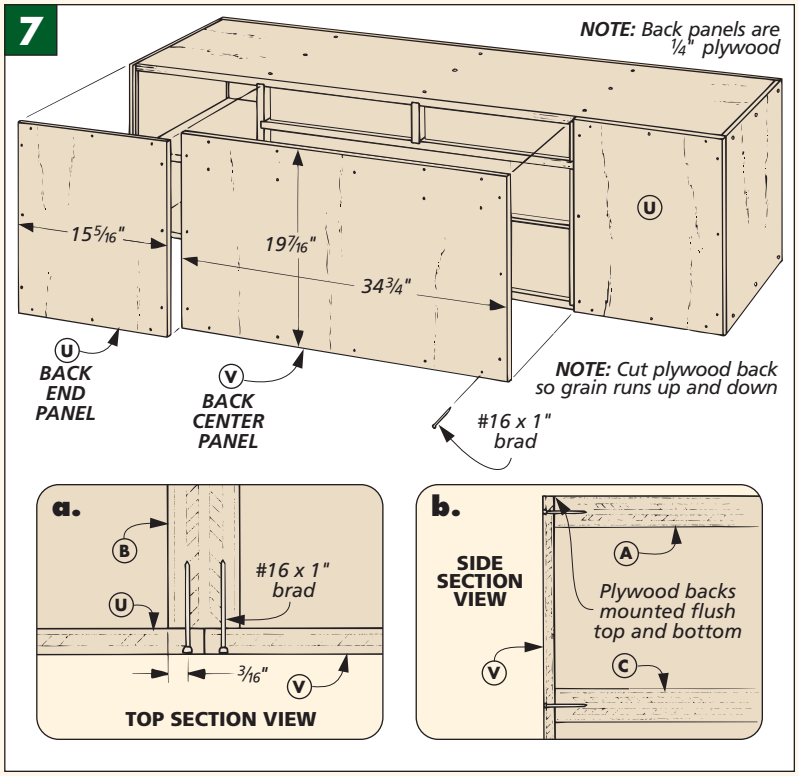
Back

At this point, the front storage cabinet is practically complete. The only thing that's left to do is add a back. If you take a look at Fig. 7, you can see that the back is made up of three separate pieces of 1/4" plywood. There are two *back end panels (U)* and a larger *back center panel (V)*.

When measuring to determine the sizes of these back panels, keep in mind that they fit in between the rabbets cut in the sides of the cabinet but completely cover the back edges of the cabinet top and bottom.

After the panels are cut to size, they're simply glued and nailed to the back of the cabinet with wire brads (Figs. 7a and 7b).

INSTALLING THE CABINET. Installing the cabinet in the bench couldn't be much simpler. It just slides into place until the front edge is flush with the lower front rail of the bench.



MATERIALS

Front Storage Cabinet

A	Top/Bottom (2)	3/4 ply. - 21 x 64 7/8
B	Vertical Dividers (2)	3/4 ply. - 21 x 18 7/16
C	Horiz. Divider (1)	3/4 ply. - 21 x 34 1/2
D	Drawer Divider (1)	3/4 ply. - 21 x 4 1/4
E	Edging (1)	3/4 x 1/4 - 48 lin. ft.
F	Sides (2)	3/4 ply. - 21 1/4 x 19 7/16
G	Shelves (2)	3/4 ply. - 20 x 14 5/16
H	Sm. Drawer Fr./Bks. (4)	1/2 x 3 1/2 - 15 5/8
I	Med. Drawer Fr./Bk. (2)	1/2 x 3 1/2 - 33
J	Lg. Drawer Fr./Bks. (4)	1/2 x 4 3/8 x 33
K	Sm./Med. Drawer Sides (6)	1/2 x 3 1/2 - 19 3/4
L	Lg. Drawer Sides (4)	1/2 x 4 3/8 - 19 3/4
M	Sm. Drawer Btms. (2)	1/4 ply. - 19 7/16 x 15 1/16
N	Lg. Drawer Btms. (3)	1/4 ply. - 19 7/16 x 32 7/16
O	Sm. Drawer False Fronts (2)	3/4 x 3 5/8 - 16 1/2
P	Med. Drawer False Front (1)	3/4 x 3 5/8 - 33 7/8
Q	Lg. Drawer False Fronts (2)	3/4 x 4 3/4 - 33 7/8
R	Door Rails (4)	3/4 x 2 1/2 - 10 5/16
S	Door Stiles (4)	3/4 x 2 1/2 - 17 13/16
T	Door Panels (2)	1/4 ply. - 10 1/4 x 13 3/4
U	Back End Panels (2)	1/4 ply. - 15 5/16 x 19 7/16
V	Back Center Panel (1)	1/4 ply. - 34 3/4 x 19 7/16

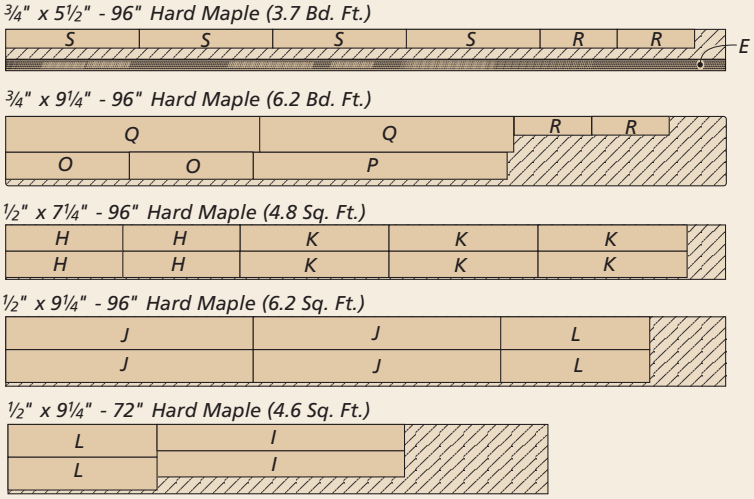
Shelving Unit

W	Top/Bottom (2)	3/4 ply. - 7 1/2 x 64 7/8
X	Sides (2)	3/4 ply. - 7 3/4 x 19 7/16
Y	Divider (1)	3/4 ply. - 7 1/2 x 18 7/16
Z	Back Panels (2)	1/4 ply. - 32 11/16 x 19 7/16
AA	Shelves (2)	3/4 ply. - 7 1/4 x 31 11/16

SUPPLIES

- (48) #8 x 1 1/2" Fh Woodscrews
- (16) 1/4" Brass Shelf Pins
- (5 pr.) 20" Full-Extension Drawer Slides w/Screws
- (26) #6 x 1" Fh Woodscrews
- (26) #6 Finish Washers
- (10) 4 7/8" Door Pulls w/Screws
- (2 pr.) 2" x 1 1/2" Butt Hinges w/Screws
- (2) Magnetic Catches w/Strikes and Screws
- (76) #16 x 1" Wire Brads

CUTTING DIAGRAM



ALSO NEEDED: *Two sheets of 3/4" maple plywood and two sheets of 1/4" maple plywood*

Shelving Unit

The front storage cabinet doesn't completely fill the space under the bench. So I added an open shelving unit at the back. This unit starts off as a basic box and features the same construction as the front cabinet. But the unit isn't as deep as the front cabinet, and there aren't any drawers or doors. So it's quite a bit easier to build.

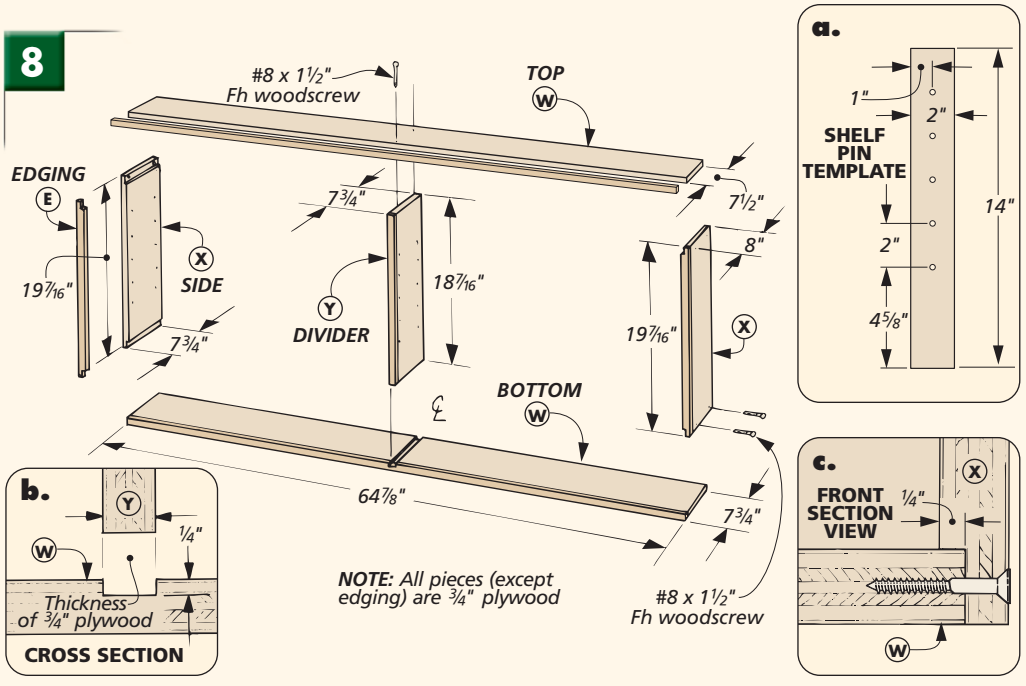
I started building the shelving unit by cutting the main pieces to size. As you can see in Fig. 8, there's a *top* and *bottom (W)*, two *sides (X)*, and a *divider (Y)*. These panels are all cut from ¾" plywood and then ¼" hardwood edging is applied to the front edges of each piece.

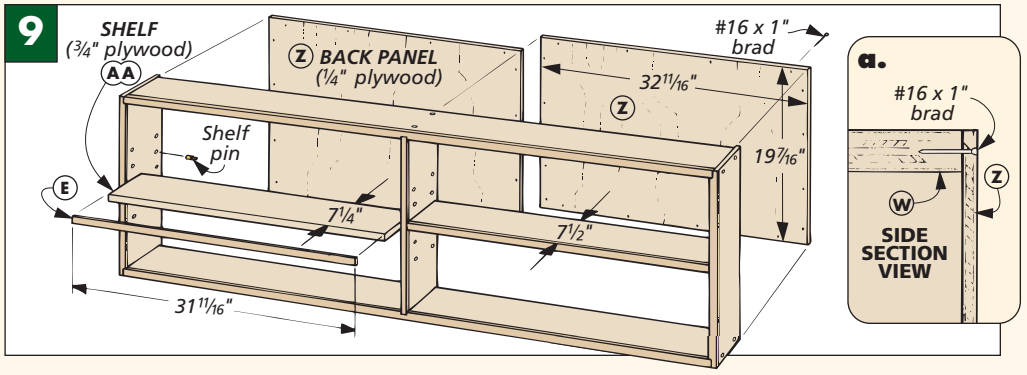
Once the edging is in place, you can begin on the joinery. Rabbets are cut on the ends of the sides to hold the top and bottom panels. A rabbet is also cut along the back edge of each side to hold the back panels that will be added later.

The top and bottom panels each receive a dado to hold the divider panel (Fig. 8b). This dado is centered on the length of the panels.

When you've finished cutting all the rabbets and dadoes, the shelving unit can be assembled. Like the cabinet, these pieces are just glued and screwed together (Fig. 8c).

SHELF PIN HOLES. Before adding the back, some shelf pin holes need to be drilled in the cabinet sides. Again I used a simple template to do this. But since the spacing of these holes isn't the same as the front cabinet, you'll need a new template (Fig. 8a).





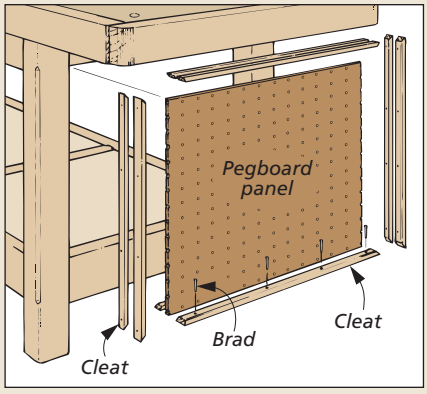
Once the shelf pin holes have been drilled, you can add a back to the unit. This time, the back is made up of two identically-sized panels of ¼" plywood, as shown in Fig. 9. After cutting these two *back panels (Z)* to final size, they can be nailed in place with brads (Fig. 9a).

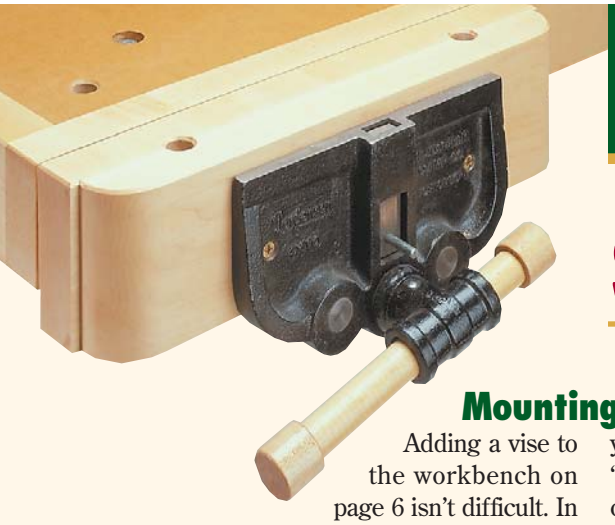
SHELVES. All that's left now is to add two *shelves (AA)*. These are pieces of ¾" plywood with a strip of hardwood edging glued to each front edge (Fig. 9). When the shelves are in place, you can slide the shelving unit into the bench just like you did with the front cabinet. W

PEGBOARD STORAGE

If you're looking for additional storage, these pegboard panels provide a convenient place to hang a few extra tools at the ends of the workbench. The best part is that there's hardly anything to them.

All you need to do is nail some cleats to the legs and upper and lower end rails of the bench. Then place a piece of pegboard against the cleats and tack a second set of cleats down to hold the pegboard in place. Add a few hooks, and you're ready to hang some tools.





Shop Notes

Mounting a Vise

Adding a vise to the workbench on page 6 isn't difficult. In fact, it's just a three-step process. First, a pocket is cut in the front apron to accept the rear jaw of the vise. Then the vise is attached to the bench. And finally, a wood face block is added to the front jaw.

But why even go to this trouble? Why not just bolt the vise to the front apron and screw a wood pad to each jaw? There are a couple of reasons. By burying the rear jaw in the apron, you have a smooth, "padded" face the length of the bench for clamping. The large face block has dog holes that align with the holes in the bench so you can secure wide workpieces. It also spreads clamping pressure.

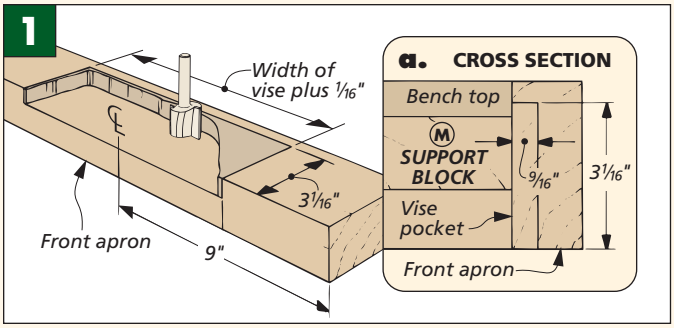
To install the vise, you'll need to take it apart first. This isn't as scary as it sounds. By removing a cotter key, I was able to separate the front jaw of my vise (along with the guide rods and threaded shaft) from the rear jaw.

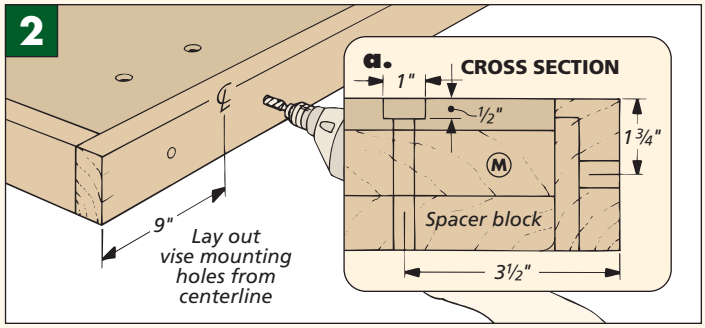
Installation of the vise begins before you attach the front apron. As you can see in Fig. 1, a pocket is laid out and routed in the back face of the apron. Position this pocket so the vise will be centered between the dog holes in the bench. Its size is 1/16" wider and taller than the rear jaw of the vise.

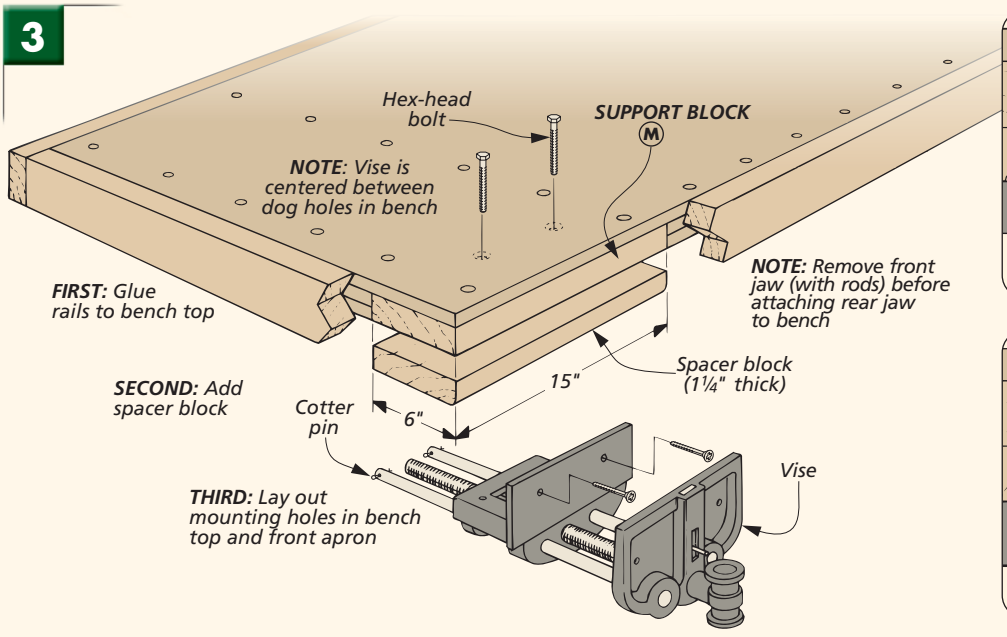
Once the pocket is done, the apron can be attached to the bench top and you can move on to the second step — attaching the vise.

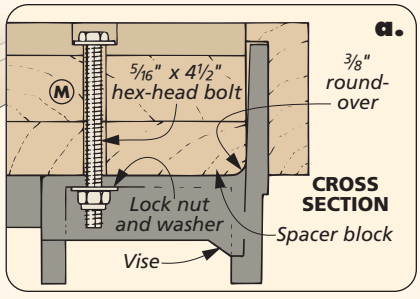
Start by adding a spacer block under the bench top. This piece fills the gap between the *support block (M)* and the vise mounting plate (Fig. 3). I routed a 3/8" roundover on one edge so it would fit snugly behind the jaw. After the spacer is cut to size, it's glued in place.

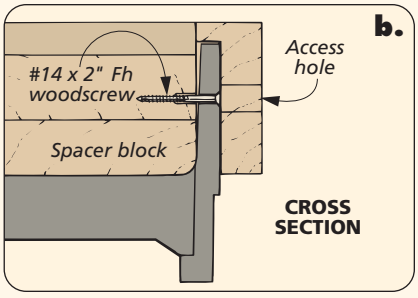
Next, a series of holes needs to be drilled. If you look at Fig. 2, you'll see two counterbored holes in the top of the bench. These accept hex-head bolts that pass through











the vise. And two holes through the front apron allow access to screws that attach the rear jaw to the bench (Fig. 3b).

To lay out the holes in the bench top, you want to work out from the centerline of the pocket in the apron *and* the centerline of the mounting plate.

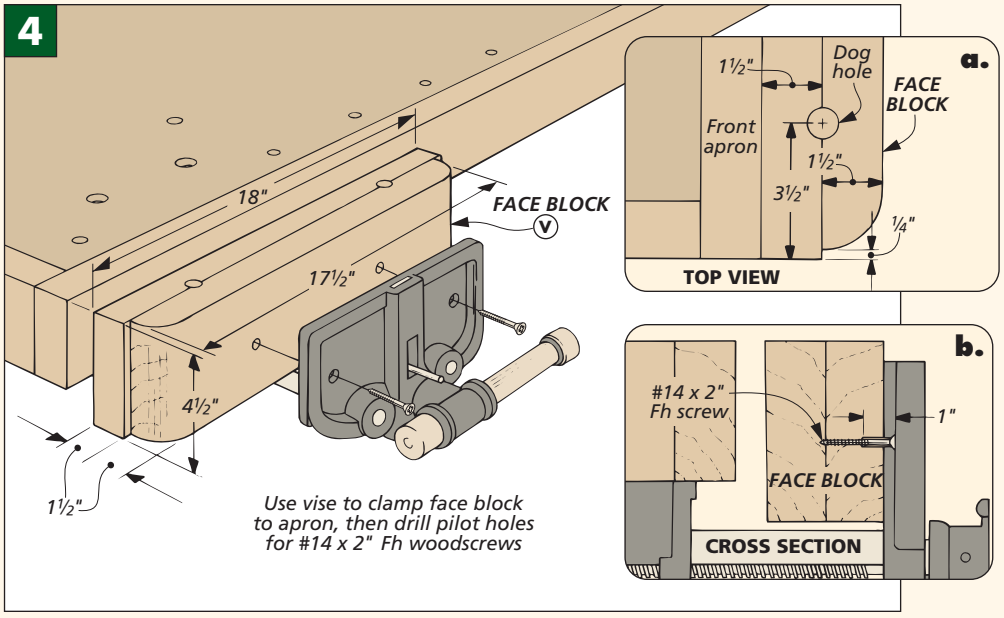
The next thing to do is to drill the access holes through the front apron (Fig. 2). These holes need to be big enough to allow the screws to pass through. Here again, lay out the holes by working from the centerlines of the rear jaw and the pocket.

The third step is making and mounting the wood *face block (V)*. This consists of two slabs of 1½"-thick maple glued together (Fig. 4). Before doing that, a radius needs to be cut on each end of one block as you can see in Fig. 4a. I did this on the band saw, then sanded the curves smooth.

After gluing the pieces together, lay out and drill a couple of dog holes in the jaw so that they align with the holes in the bench. Then to mount the face block, just use the vise to clamp the block against the apron with the top edges and ends flush (Figs. 4a and 4b). Two screws secure it to the jaw.

When you close the jaws of the vise, you'll notice a small gap between the apron and the bottom of the face block, like you see in the photo at right. Don't worry. The vise jaws cant (tilt) in slightly at the top. The reason is that as you clamp a workpiece, it forces the top of the vise apart. This tilt keeps the jaws parallel.

▲ *The top edges of the jaws tilt in slightly to counteract the forces of clamping that tend to drive the top edges apart.*

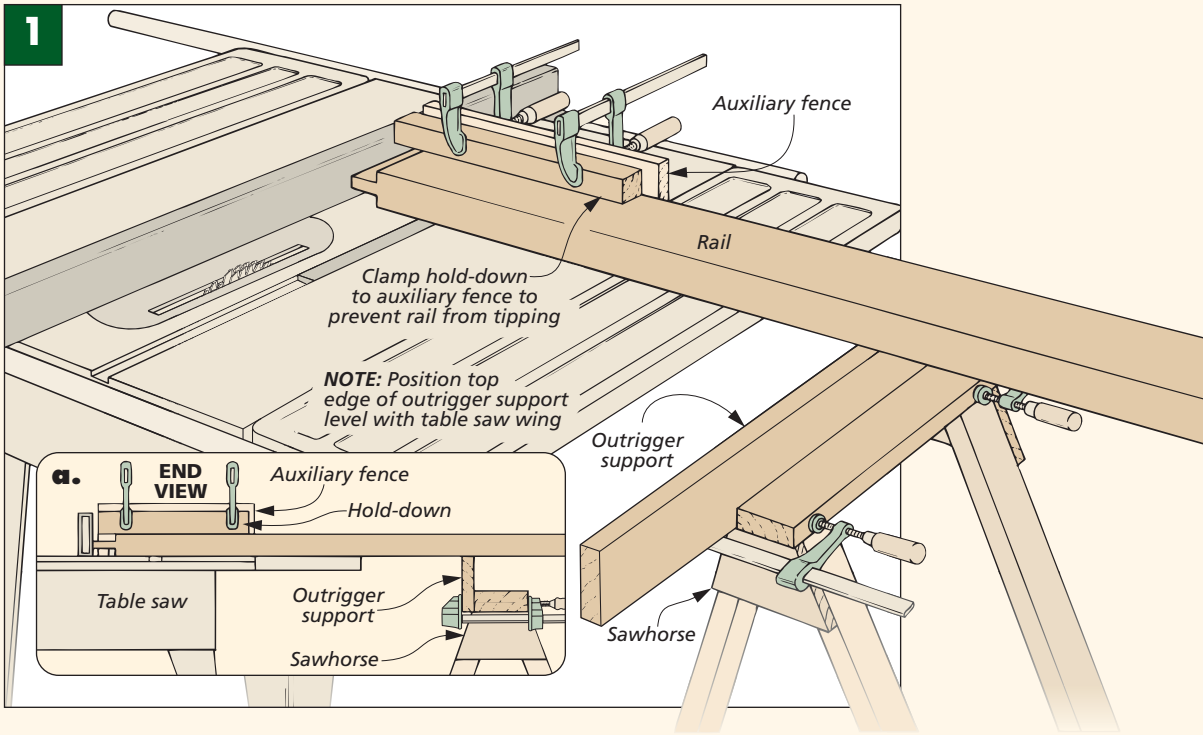


Cutting Tenons on Long Rails

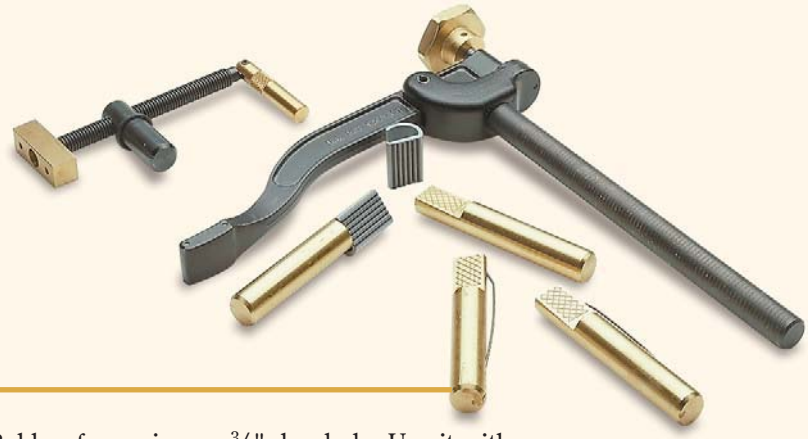
When it was time to cut the tenons on the rails for the workbench on page 6, I needed a way to handle the long pieces safely.

Fig. 1 shows the "outrigger" system I came up with to support the ends that extend past the wing of the table saw. Just clamp a board to a saw horse so that it matches the height of the wing.

An auxiliary fence attached to the miter gauge helps support the piece. And a hold-down clamped to the fence keeps the rail pressed firmly to the table. This lets you use both hands to push the workpiece through the cut.



Workbench Accessories



When you need an extra pair of hands, these bench accessories help you get a grip on your projects.

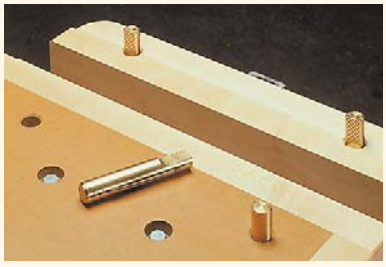
Even the sturdiest bench is nothing more than a fancy table if you can't hold your work to it securely. That's where all the holes drilled through the top of the workbench come in. These holes accept accessories that keep your work where you want it.

BENCH DOG. The simplest of these items is a type of bench dog, shown in the left photo below. It's just a cylinder with a flat face at one end and a spring in the side. A single dog can be used as a stop when planing or scraping a board. And since the dog is brass, it's less likely to damage a cutting edge if your plane or chisel slips. (Rubber face pads are also available, see the photo above.) By using dogs in the face block of the vise and a couple more dogs in the bench, you can clamp wide panels easily.

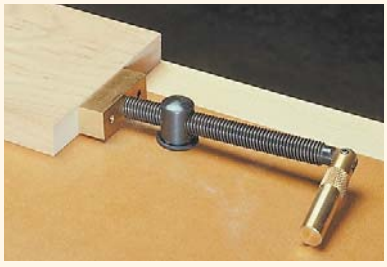
WONDER PUP. Bench dogs alone won't handle every clamping situation. What if you want to hold a long piece from each end? Or need a board clamped along the front edge of the bench? That's where a *Wonder Pup* comes in handy (middle photo). The name might sound like a kid's toy or a super hero's pet, but it's actually a small vise that fits in any ¾" dog hole. Use it with a bench dog (or another *Wonder Pup*) to secure a workpiece. And two holes in the head of the Pup let you screw a shop-made block to it.

HOLD-DOWN. Sometimes you just need to hold a workpiece flat to the bench top. In these cases, you need a hold-down (photo below). The long shaft allows you to clamp items up to 8" thick. Turning a threaded knob gradually adjusts the pressure the arm places on the workpiece.

Note: These accessories are manufactured by *Veritas*. See page 35 for mail-order sources. W



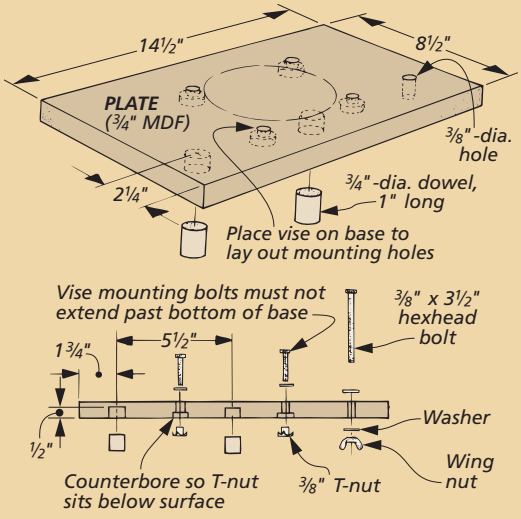
Round bench dogs. *Put dogs in the bench top and vise, and you can clamp workpieces in a variety of ways.*



Wonder Pup. *With its threaded shaft, the Pup serves as an end vise that can be placed in any dog hole.*

Veritas hold-down. *To keep your work clamped firmly to the bench, just tighten the knob on the top.*

VISE MOUNTING PLATE



When you need to cut metal pieces, it's best to use a machinist's vise to hold them. The wood faces of the workbench and vise can be scarred if you nick them with a hack saw or try to clamp down on a threaded rod. But since I don't use my machinist's vise very often, this plate lets me mount it to the bench temporarily, as shown in the photo.

In the bottom of the plate are two ¾"-dia. dowel pins, spaced to fit a pair of dog holes. A bolt and wing nut secure the assembly to the bench top through a third dog hole.