

The Practical Workbench

I'm sure there are one hundred ways to build a workbench, and all of them are correct if they meet your needs. Here's a workbench that fills all my requirements and one that will hopefully be useful in your workshop.

A bench doesn't have to be pretty. A good hardwood that's straight and flat, with a few blemishes, is just fine. After all, we're going to be pounding, clamping, dragging and abusing the top in the years to come. The bench should be strong and heavy enough to withstand a bit of pushing and pulling when we are working wood.

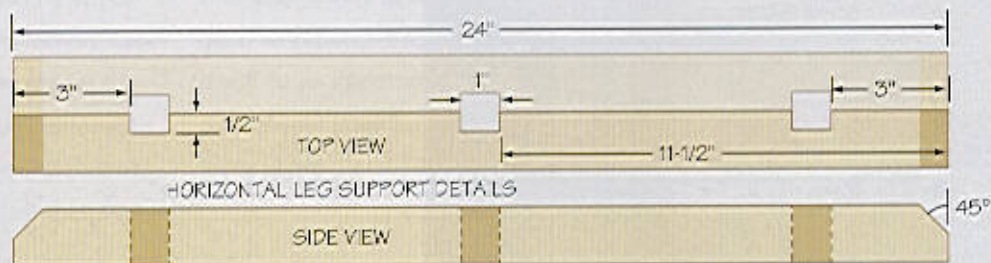
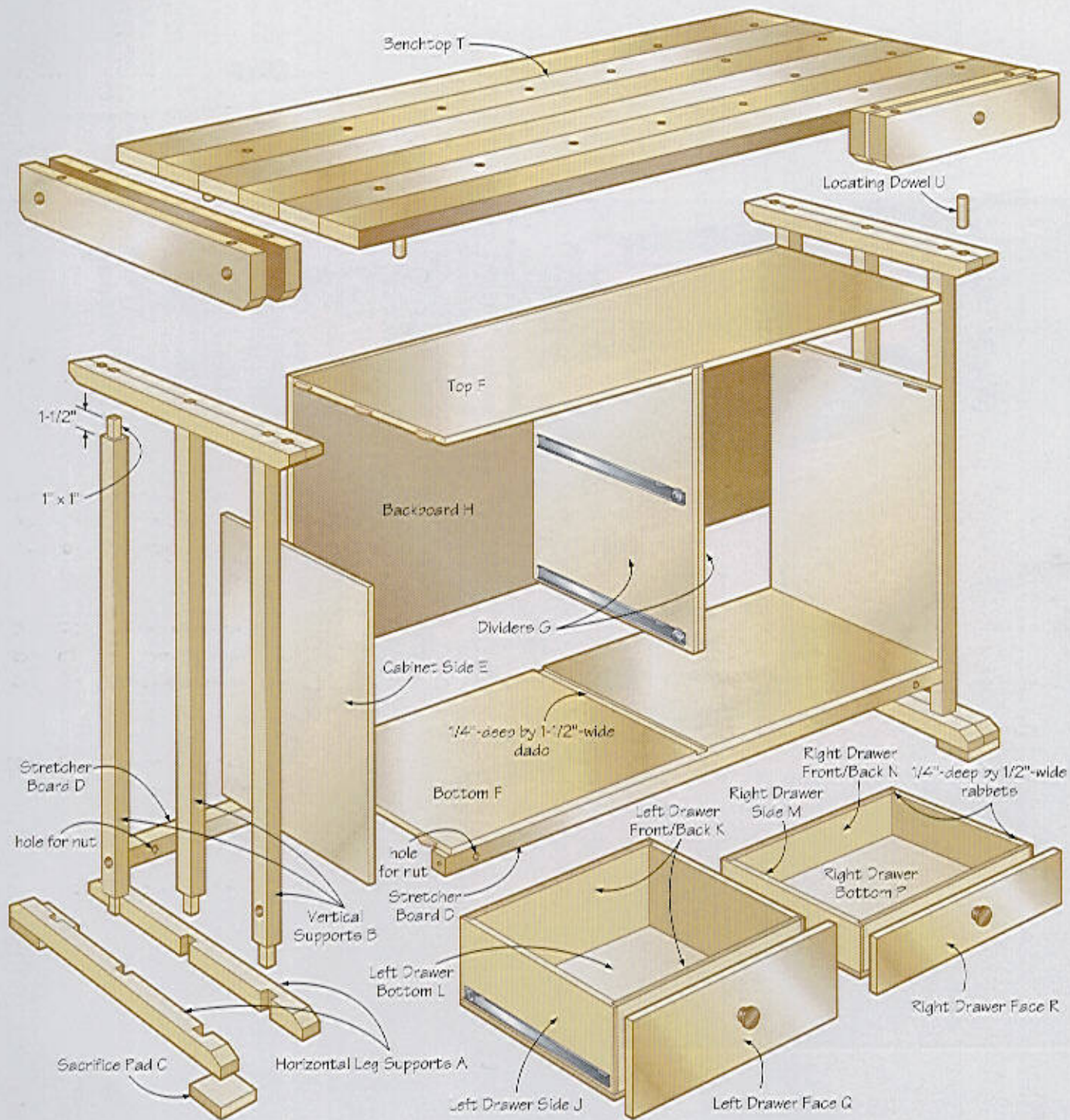
I used ash for my bench and tried to keep the best faces for my top surface. Even though I selected the wood carefully, I did have a few little checks and knots to fill. This wood wasn't a select grade, so I didn't expect perfection. Carefully sort through the lesser grades of lumber and pick the best pieces for your bench. It may not win a beauty contest, but the price will be a lot less than select-grade lumber.

A bench needs one or two good vises and, since a bench has a great deal of space below, a storage cabinet for frequently used tools. This bench has five drawers for tools and a shelf for tucking those tools aside when you are working on a project, keeping them within easy reach.

I installed two Veritas vises on my bench. The twin-screw model is a well-machined and very useful tool. The single-screw model mounted on the right side of the bench is perfect for my work. Both vises are available at Lee Valley Tools. The bench can be mounted on wheels, the vise styles and positions can be changed and the size can be altered for your shop. It's well worth your time and money to build a good workbench because it will be an important part of your shop for many years.







REFERENCE	QUANTITY	PART	STOCK	THICKNESS	WIDTH	LENGTH
A	8	horizontal supports	solid hardwood	1½	1½	24
B	6	vertical supports	solid hardwood	1½	1½	33½
C	4	sacrifice pads	solid hardwood	1	3	3
D	2	stretcher boards	solid hardwood	1½	2½	44
E	2	cabinet sides	veneer plywood	¾	16¾	20
F	2	bottom & top boards	veneer plywood	¾	16¾	42½
G	2	dividers	veneer plywood	¾	16¾	19
H	1	backboard	veneer plywood	¾	20	44

TWO LEFT-SIDE DRAWER BOXES

J	4	sides	birch plywood	½	6¾	16
K	4	fronts & backs	birch plywood	½	6¾	19
L	2	bottoms	birch plywood	½	16	19½

THREE RIGHT-SIDE DRAWER BOXES

M	6	sides	birch plywood	½	3⅝	16
N	6	fronts & backs	birch plywood	½	3⅝	19
P	3	bottoms	birch plywood	½	16	19½

DRAWER FACES

Q	2	faces	veneer plywood	¾	9¾	21½
R	2	faces	veneer plywood	¾	6¾	21½
S	1	faces	veneer plywood	¾	6	21½

BENCHTOP

T	1	benchtop	solid hardwood	1½	30	72
U	4	locating dowels (1" diameter by 2½" long)	solid hardwood			

HARDWARE

5 Sets of 18"-long, ¾"-extension glides (use full-extension glides if desired)
 Drawer handles or knobs
 PB screws
 Bolts, nuts and washers as detailed
 Plate joinery biscuits (#20)
 Glue
 4" x ⅜"-Diameter bolts with washers and nuts
 Wood edge tape
 1½" PB screws
 1" Brad nails
 ½" Screws
 1" Screws

OPTIONAL

1 Front vise (Veritas Tools by Lee Valley Tools #70G08.02)
 1 Twin-screw vise (Veritas Tools by Lee Valley Tools #05G12.22)
 4 Bench dogs (Veritas Tools by Lee Valley Tools #05G04.04)

REFERENCE	QUANTITY	PART	STOCK	THICKNESS	WIDTH	LENGTH
A	8	horizontal supports	solid hardwood	38	38	610
B	6	vertical supports	solid hardwood	38	38	851
C	4	sacrifice pads	solid hardwood	25	76	76
D	2	stretcher boards	solid hardwood	38	64	1118
E	2	cabinet sides	veneer plywood	19	425	508
F	2	bottom & top boards	veneer plywood	19	425	1080
G	2	dividers	veneer plywood	19	425	483
H	1	backboard	veneer plywood	1938	20	44

TWO LEFT-SIDE DRAWER BOXES

J	4	sides	birch plywood	13	171	406
K	4	fronts & backs	birch plywood	13	171	483
L	2	bottoms	birch plywood	13	406	496

THREE RIGHT-SIDE DRAWER BOXES

M	6	sides	birch plywood	13	92	406
N	6	fronts & backs	birch plywood	13	92	483
P	3	bottoms	birch plywood	13	406	496

DRAWER FACES

Q	2	faces	veneer plywood	19	248	546
R	2	faces	veneer plywood	19	171	546
S	1	faces	veneer plywood	19	152	546

BENCHTOP

T	1	benchtop	solid hardwood	38	762	1829
U	4	locating dowels (1" diameter by 2½" long)	solid hardwood			

HARDWARE

5 Sets of 457mm-long, ¾"-extension glides (use full-extension glides if desired)
 Drawer handles or knobs
 PB screws
 Bolts, nuts and washers as detailed
 Plate joinery biscuits (#20)
 Glue
 102mm x 10mm-Diameter bolts with washers and nuts
 Wood edge tape
 38mm PB screws
 25mm Brad nails
 13mm Screws
 25mm Screws

OPTIONAL

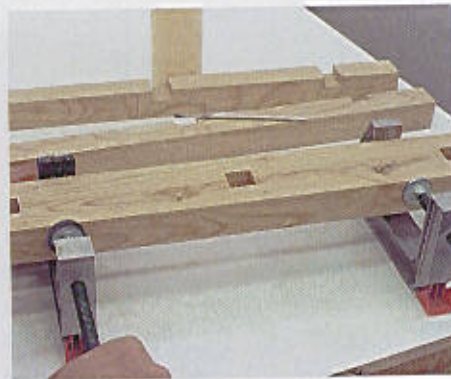
1 Front vise (Veritas Tools by Lee Valley Tools #70G08.02)
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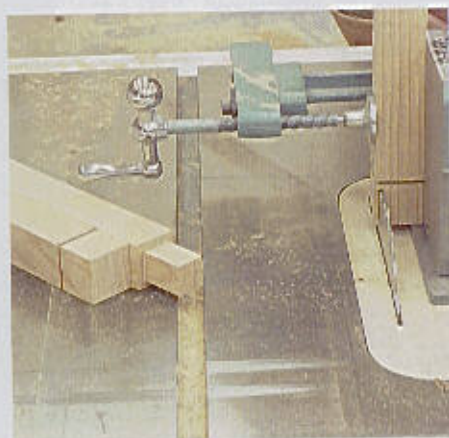
STEP 1 ■ Rip and crosscut the eight horizontal supports A at 1½"-square by 24"-long, and the six vertical supports B at 1½"-square by 33½"-long. A good crosscut blade on a table saw will be required to cut the 1½"-thick material. A sliding table on your table saw, a radial-arm saw or power miter box can be used to crosscut the parts.



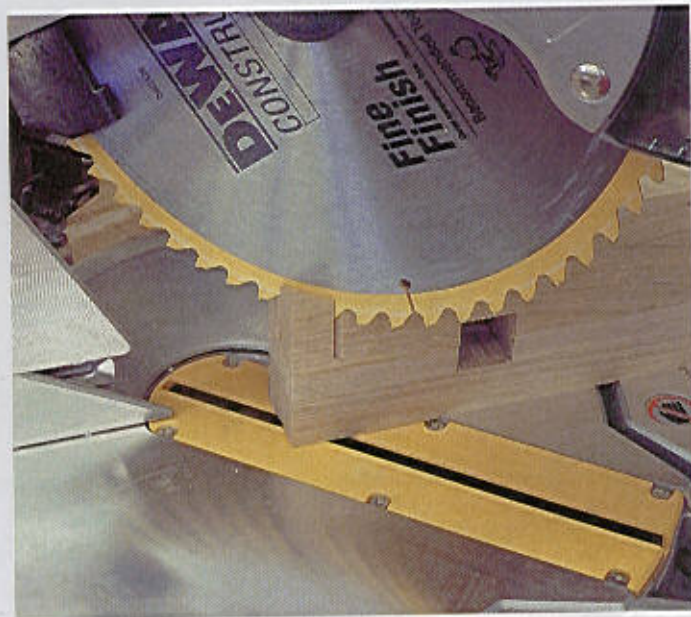
STEP 2 ■ The eight horizontal supports A each require three dados that are 1"-wide by ½"-deep. Two of the dados are located 3" from each end, and the third is located directly in the center. Dados can be cut on a table saw. If possible, gang four pieces together at one time and mark the pairs; this will ensure that sets are matched for joining.



STEP 3 ■ Glue two horizontal supports A together, forming a board with three 1"-square through-mortises. The eight supports will make four horizontal support members. Use dowels, biscuits or simply edge-glue the pieces to each other.



STEP 4 ■ The six vertical supports B require a 1"-square by 1½"-long tenon centered on each end. These tenons can be cut on a table saw with a miter slide or, if you have one, a tenoning jig.



STEP 5 ■ Cut a 45° corner on the end of all four horizontal supports A. Use a ¼" roundover bit in your router to ease all the corners on the vertical supports B, and the top edges of the bottom two horizontal supports A. Don't round over the bottom of the lower horizontal supports that touch the floor or the two top horizontal supports.



STEP 6 ■ Build both leg assemblies using glue and clamps. The tenons should fit snugly into the mortises. Set aside both leg units until the adhesive cures.



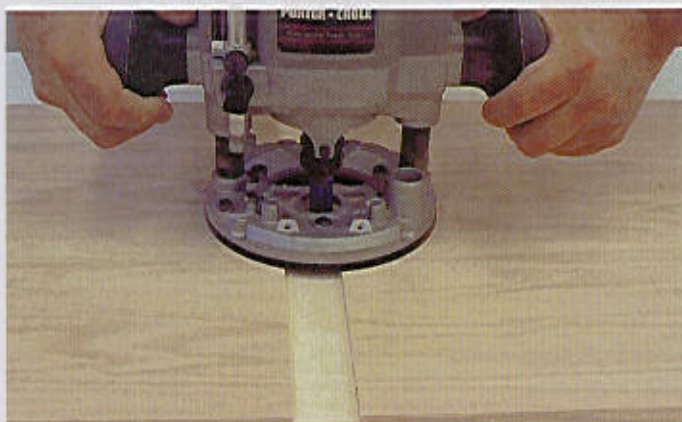
STEP 7 ■ To save wear and tear on the lower horizontal supports, install sacrifice pads. These are 3"-square by 1"-thick and are attached with screws only. When the pads wear because the bench is moved a great deal or become damaged by moisture or liquids on the floor, simply replace the pads.



STEP 8 ■ Cut the two stretcher boards D to the size indicated in the materials list. Drill a 1"-diameter through-hole, centered 4" from each end on both stretchers. Then drill the ends of both boards using a $\frac{3}{8}$ "-diameter bit. The holes are located on the center of each end and are drilled 4" deep to meet the 1"-diameter through-holes.



STEP 9 ■ Drill a $\frac{1}{2}$ "-deep by 1"-diameter hole 4" above the bottom of each vertical support B. Center the hole on the four vertical uprights, making sure your measurements are from the bottom of the vertical supports and not the lower edge of the horizontal supports. Next, drill a $\frac{3}{8}$ "-diameter through-hole in the center of each 1"-diameter hole for the assembly bolts. Attach both leg assemblies together using the two stretchers. Use 4"-long by $\frac{3}{8}$ "-diameter bolts and washers to secure the base. The 1" hole on the outside of each vertical support will allow you to recess the bolt head, and the 1"-diameter through-hole in the stretcher board D will be used to attach the nuts to the bolts.



STEP 10 ■ Cut the drawer carcass parts as detailed in the materials list. I am using $\frac{3}{4}$ "-thick oak veneer plywood to contrast the solid ash.

Apply wood edge tape to all front and top edges of the side boards E. The backboard H requires edge tape on the top and both side edges, as do the front edges of boards F.

Use a router to cut a $\frac{1}{4}$ "-deep by $1\frac{1}{2}$ "-wide dado in the center inside face of both top and bottom boards for the dividers.

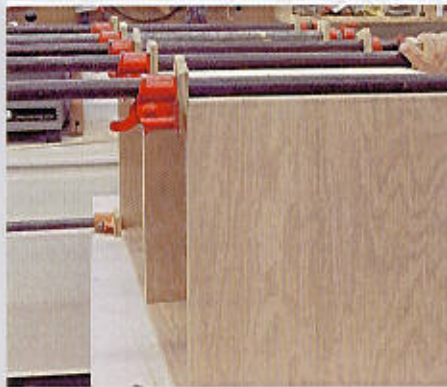


STEP 11 ■ I used three #20 biscuits and glue to attach the carcass sides E to the bottom and top boards F. Dowels or screws and glue can also be used.



STEP 12 ■ Apply glue to both dadoes and place the dividers G into those dadoes. Use a heavy weight on top of the carcass until the adhesive sets and the dividers are fixed solidly in place.

I'm using two dividers for strength because I don't want the dividers to flex, which may interfere with the drawer runners if a lot of weight is added to the top board of the carcass. It's possibly overbuilt at this point, but I'd rather have more support than needed instead of just enough.



STEP 13 ■ The backboard H is attached with #20 biscuits and glue. Clamp it in place until the adhesive sets up.



STEP 14 ■ Put the drawer carcass in the bench frame. Rest the bottom board on both stretchers, aligning the backboard with the outside face of the back stretcher. Use 1½" PB screws to secure the carcass to the bench frame. Do not use glue, so it can be removed if the bench must be moved.



STEP 15 ■ I'm installing drawers on both sides of the carcass. One side will have three drawers and the other side two.

Calculating drawer sizes means subtracting 1" from the interior carcass width for most drawer glides. However, it's well worth purchasing your glides at this point to verify the installation instructions.

In a frameless-style cabinet, such as this one, drawer height is found by following a few simple rules. Each drawer box should have 1" clearance above and below. That required space means there will be a 2" space between drawer boxes. The interior space is 18½" high, meaning on a two-drawer bank we must subtract 4" from that height (1" above and below each drawer box for purposes of calculating drawer height), and divide the result by two. The drawer height for the two-drawer bank will be 18½" minus 4" divided by 2, or 7¼" high.

The same calculations apply to the three-drawer bank. The drawer boxes will be 18½" minus 6" divided by 3, or approximately 4⅞" high, to provide the correct clearance.

Cut all the drawer parts to size as detailed in the materials list. These boxes will be constructed using ½" baltic birch plywood.



STEP 16 ■ Each drawer box side J and M will need a rabbet cut ½" wide by ¼" deep on each inside face at both ends. The back and front boards will fit into these rabbets. Use a router table or table saw to make the cuts.



STEP 17 ■ Join the drawer box sides to the back and front boards using glue and 1" brad nails. The nails will hold the joint until the glue dries. Glue and nail the bottom boards to the drawer box frames.

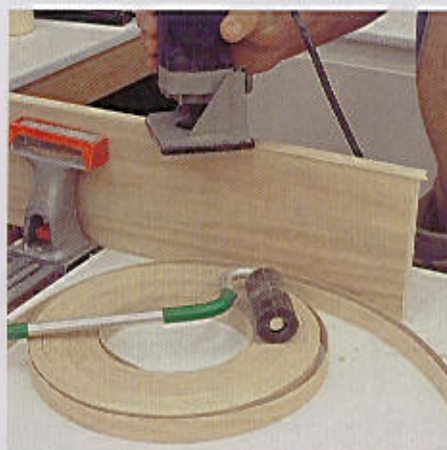


STEP 18 ■ Attach drawer runners to each box. I am using $\frac{3}{4}$ "-extension glides, but full-extension glides (silver in the photo) can also be used if you require full access to the drawer. The full-extension models are two to three times more expensive than the $\frac{3}{4}$ "-extension type, but worth the extra cost if you need to fully access the drawer box.

Attach the runners using $\frac{1}{2}$ " screws and follow the manufacturer's instructions.

STEP 19 ■ Mount the cabinet runners using a level line as a guide, or with a drawer glide-mounting jig.

Install one glide at the bottom of each cabinet section, and one 8" above the bottom board in the two-drawer cabinet. The three-drawer section has one set of runners at the bottom, one at 7" above the bottom board, and the top runner set 14" above the bottom.



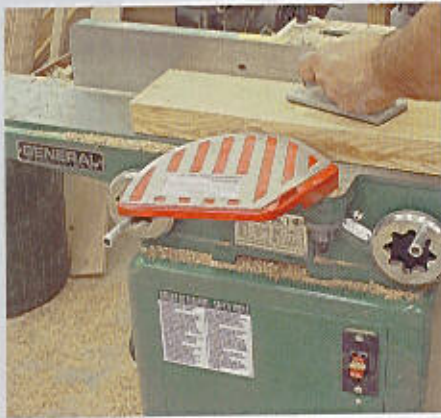
STEP 20 ■ The drawer faces Q, R and S are made using $\frac{3}{4}$ "-thick veneer plywood. All four edges of each drawer face have wood veneer tape applied.



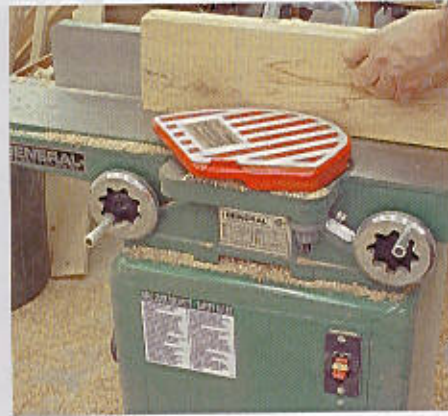
STEP 21 ■ Here's an easy way to accurately locate drawer faces. First, drill the handle hole (or holes) in the drawer face, not through the drawer box at this point. Position the drawer face against the cabinet with the drawer box in place. Once located, drive a wood screw through the handle hole and into the drawer box until the face is secure. Next, open the drawer and drive 1" screws through the back of the drawer box front board, into the drawer face. Finally, remove the screws from the handle holes, drill holes completely through the box and install the handles or knobs.



STEP 22 ■ My benchtop T is constructed using six $5\frac{1}{2}$ "-wide boards that are $1\frac{1}{2}$ " thick. The boards are left longer than 72" and will be trimmed to size once the top is sanded. Thick boards can be joined with a double-biscuit technique that's shown in the photo.



STEP 23 ■ To prepare rough boards for joining, flatten one face on a jointer.



STEP 24 ■ Next, press the flat face against the jointer fence and mill one edge at 90° to the prepared face.



STEP 25 ■ Cut the remaining rough edge parallel to the jointed edge, and at 90° to the prepared face, on a table saw. Hold the jointed edge of the board tight to the saw fence and the prepared face flat on the saw table.



STEP 26 ■ Use a planer to dress the rough face parallel to the prepared face. The board is now ready to be joined to other boards.



STEP 27 ■ Join the boards with clamps on the top and bottom face as shown. This over-and-under technique will help to ensure that your top will set up flat. Tighten the clamps until you see just a little of the glue squeeze out. Clamps set too tight will squeeze out a lot of glue, starving the joint and possibly making it fail.



STEP 28 ■ Complete the top by scraping off the excess glue and sanding smooth. Trim to the required 30"-wide by 72"-long size. Turn the top facedown on the floor. Set the leg and carcass assembly upside down on the bottom face of the top so it's equally spaced side to side and front to back. Drill small pilot holes through the upper horizontal support and into the top. One hole at the end of each support is required.



STEP 29 ■ Drill 1"-diameter holes, 1" deep, in the bottom face of the top using the small drill holes from the previous step as a guide. Cut and install four 2½"-long by 1"-diameter dowels in the holes using glue.

Drill 1"-diameter holes completely through the upper horizontal supports using the pilot holes as a guide. Once the adhesive sets, put the top on the base assembly with the dowels set into the four holes. You may need to widen the diameter of the horizontal support holes with sandpaper to install the top.



STEP 30 ■ My front vise is a single-screw model made by Veritas Tools, available from Lee Valley Tools. I followed the installation instructions and added two 1½"-thick wood jaws.



STEP 31 ■ The end vise I used is also made by Veritas and is a twin-screw model. When using large end vises on this bench, be sure the moving mechanics of the vise clear the bench supports. I used 7/4"-high wood jaws, centering the screws 3" up from the bottom edge of the boards, so both screws would clear the upper horizontal supports.

I drilled ¾"-diameter holes in my benchtop to accommodate round bench dogs. Both vise jaws also had ¾"-diameter holes drilled for the round dogs. These bench dogs can be used with either vise to clamp flat boards that need to be sanded or planed.

The size of this bench, the number of drawers in the storage carcass, the height and the accessory equipment can all be modified to suit your requirements. My bench is 36" high, but that may not be suitable for everyone. If this plan isn't right for you, change the dimensions.

Hardwood is an excellent choice for any workbench. A bench will be around for many years, and may be passed to future generations of woodworkers, so use the best quality hardwood you can afford.

I finished my bench with three coats of oil-based polyurethane that is commonly used on hardwood floors. I gave the top a good coat of hard paste wax to further protect the surface from liquids and adhesive spills.

This is a great project. I hope you'll enjoy your new workbench as much as I enjoy mine.