

Router Table

Read This Important Safety Notice

To prevent accidents, keep safety in mind while you work. Use the safety guards installed on power equipment; they are for your protection.

When working on power equipment, keep fingers away from saw blades, wear safety goggles to prevent injuries from flying wood chips and sawdust, wear hearing protection and consider installing a dust vacuum to reduce the amount of airborne sawdust in your woodshop.

Don't wear loose clothing, such as neckties or shirts with loose sleeves, or jewelry, such as rings, necklaces or bracelets, when working on power equipment. Tie back long hair to prevent it from getting caught in your equipment.

People who are sensitive to certain chemicals should check the chemical content of any product before using it.

Due to the variability of local conditions, construction materials, skill levels, etc., neither the author nor Popular Woodworking Books assumes any responsibility for any accidents, injuries, damages or other losses incurred resulting from the material presented in this book.

The authors and editors who compiled this book have tried to make the contents as accurate and correct as possible. Plans, illustrations, photographs and text have been carefully checked. All instructions, plans and projects should be carefully read, studied and understood before beginning construction.

Prices listed for supplies and equipment were current at the time of publication and are subject to change.

Metric Conversion Chart

<i>to convert</i>	<i>to</i>	<i>multiply by</i>
Inches	Centimeters	2.54
Centimeters	Inches	0.4
Feet	Centimeters	30.5
Centimeters	Feet	0.03
Yards	Meters	0.9
Meters	Yards	1.1

router table

THIS ROUTER TABLE DESIGN IS A composite of ideas I've seen and used over the years. What sets this router table apart from the others is the router carriage lift mechanism. It holds the router and controls the up-and-down adjustment without having to stand on your head or lift the whole top, carriage and router to change bits. All I need to do is open the top (it's hinged on the back), grab my wrenches and go to it. I then flip the top

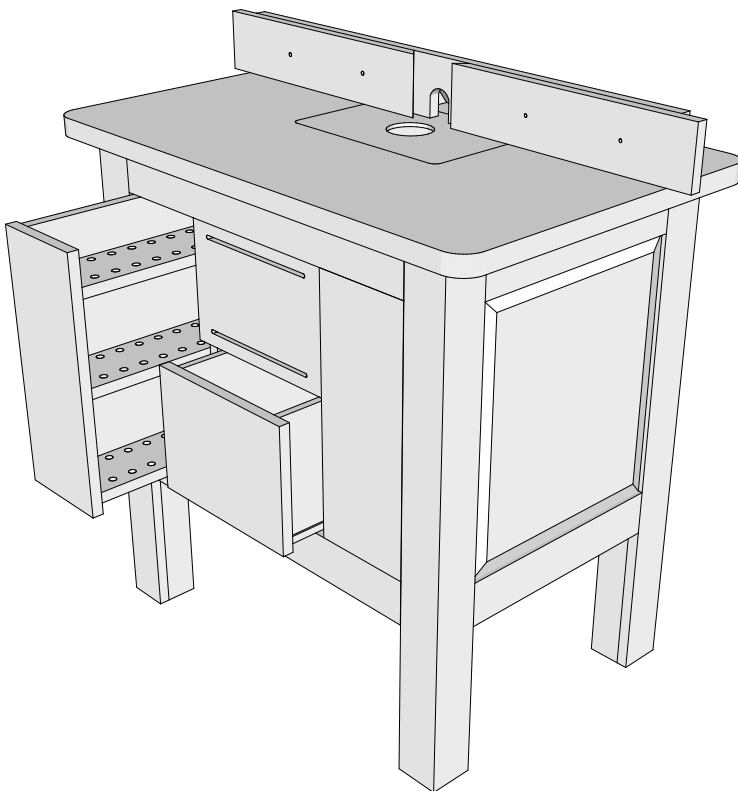
down and I'm ready to go. It has proven its durability as I've used it for the past four years.

I've added detailed plans and instructions showing how to make the router carriage/lift and the table.

A few weeks ago I looked up, in my garage, and saw a bunch of 1×4×8' yellow pine boards just collecting dust. (I recently moved into this house and learned that this wood has been in the garage for about 12 years.) It was my favorite price (free) and it's definitely dry. So, this new router table has a raised-panel back and sides and matches my rolling tool chest (see *Building the Perfect Tool Chest*, project 6) that is made from old pallets. The hardware for this router table is available at any home improvement center or hardware store. The top and insert are available from a manufacturer (I've named the supplier in the parts list), but I've included the materials you'd need to make your own top.

With a router table, I recommend using a 3-hp router. It makes it easier to use large cutters, and the final cuts are smoother and cleaner than using a smaller-horsepower router.

This router table features two dust-collection connections — one at the fence and one in the bottom of the table. This 4"-diameter bottom connection will pull air through the front vent slots, helping to keep the router





The finished router table looks handsome and is a friendly-looking woodshop tool. The castors are the last things to be installed.

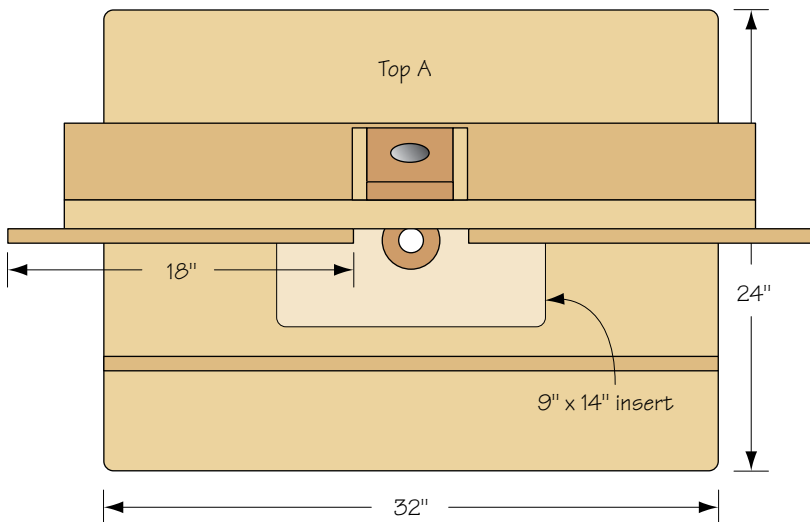
cool and forcing the dust and chips into the dust collector. The collector at the fence picks up all the dust and chips thrown from the cutterhead. (This is how shapers are vented in cabinet shops.) I've found it to be wonderfully effective on this router table.

Things happen fast on a router table. The router is spinning about 20,000 rpm. None of us can think that fast, let alone react that quickly. Whenever I'm making a setup on the router table, I run through my mental checklist. Is the collet nut tight and the router bit secure? Is the fence set correctly and tightened down? Are other attachments securely in place? Then I run through it one more time — check twice before powering up.

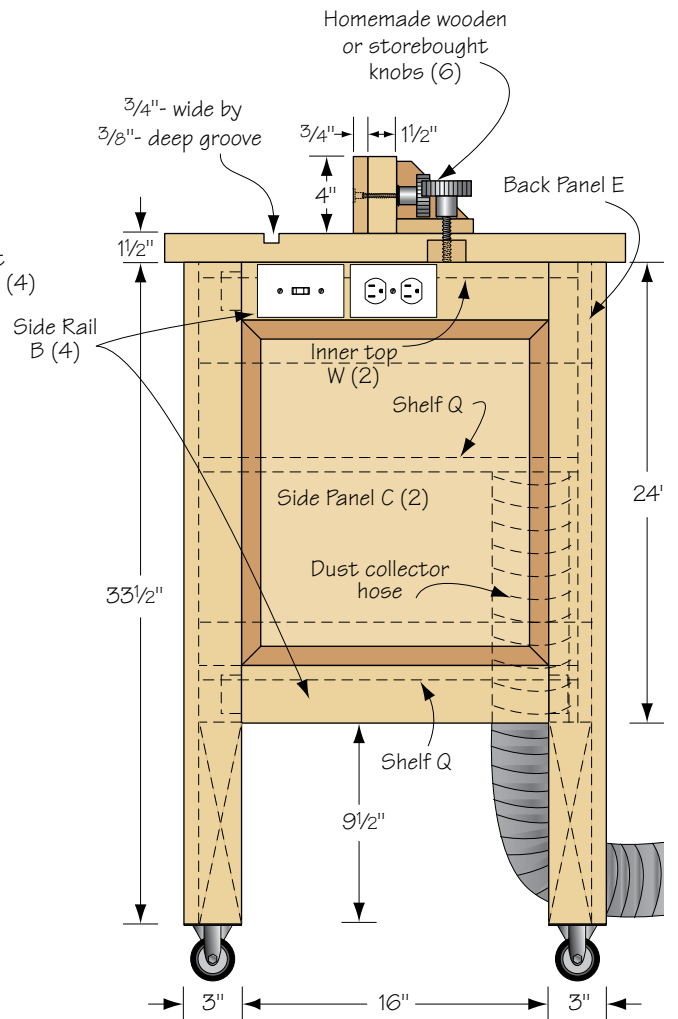
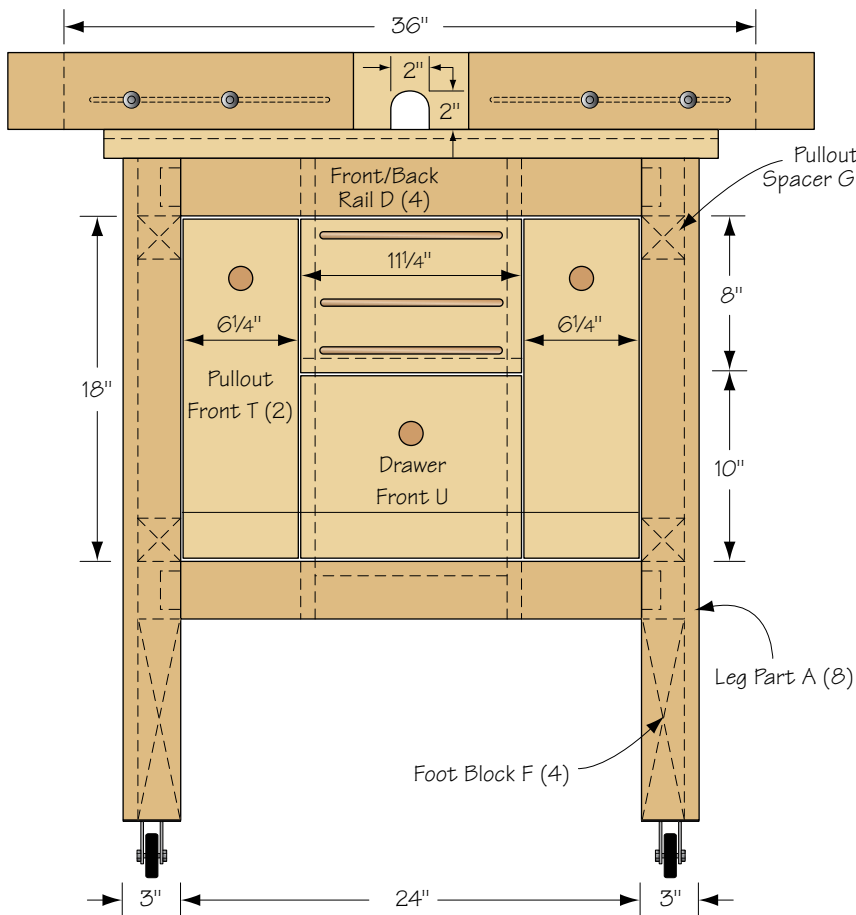
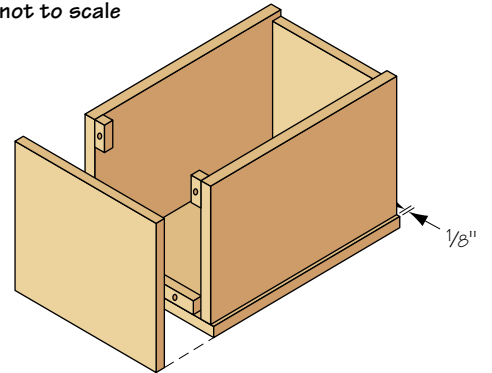
Let's get to building this router table!



I've removed the two inner tops so you can see what the inside should look when the table is completed. The electric is easily routed along the top pullout spacer and behind the pullout. The inner tops will keep dust out of the pullout cavities.



Lower center drawer configuration
not to scale

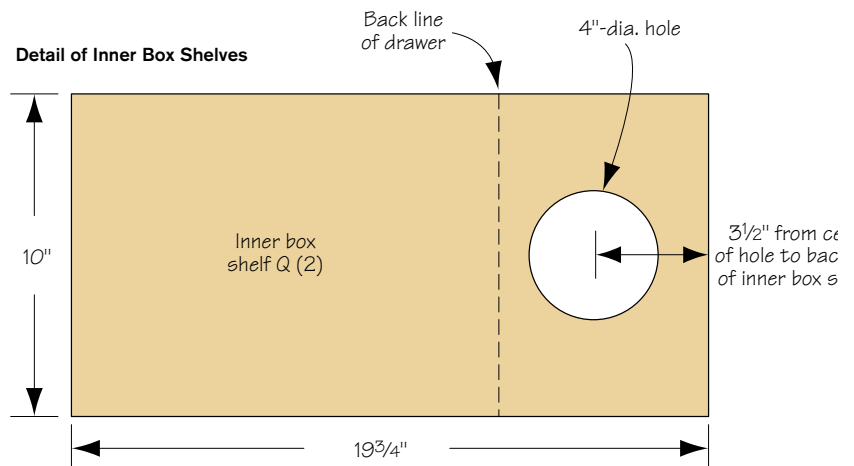


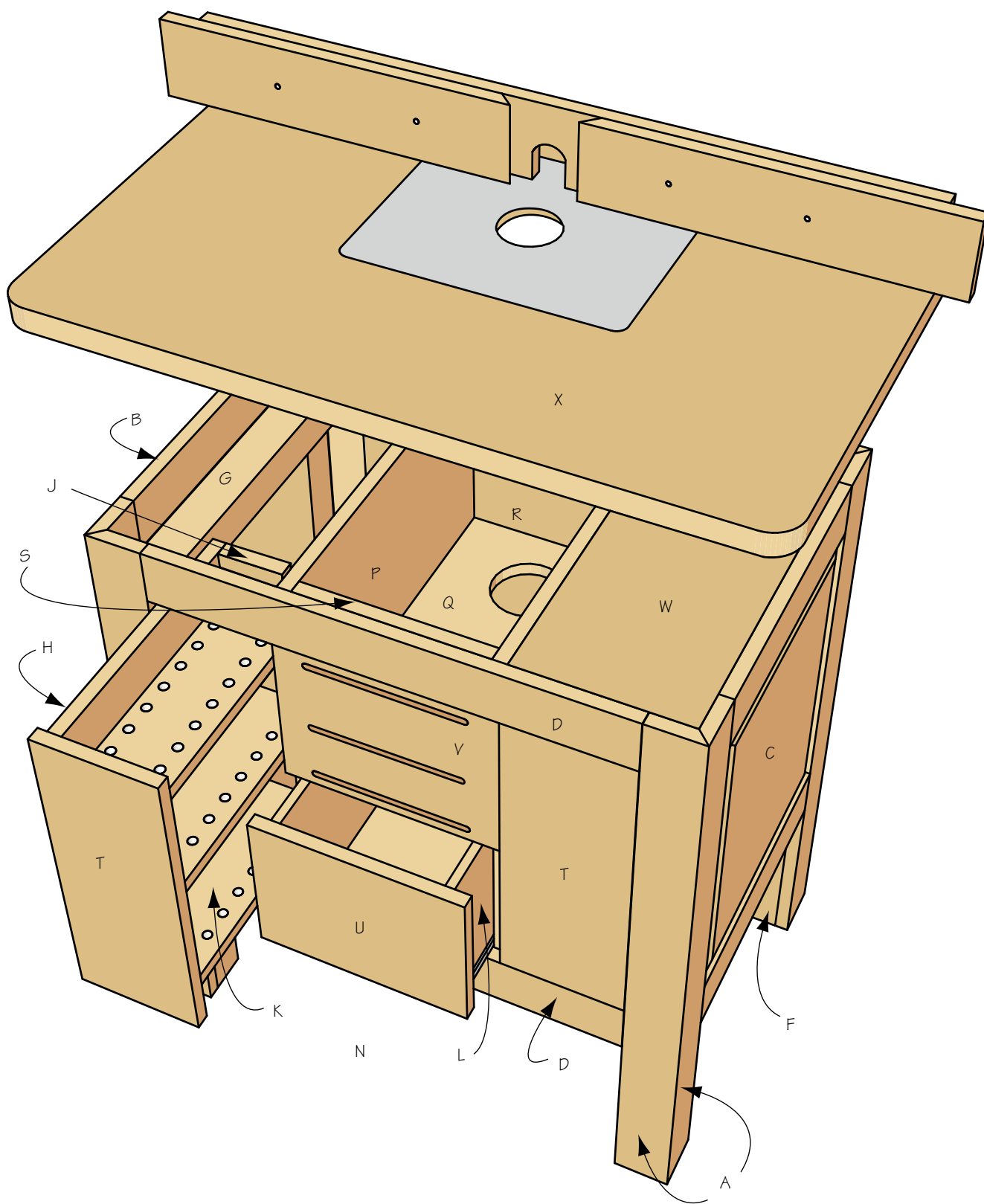
MATERIALS LIST inches (millimeters)

REFERENCE	QUANTITY	PART	STOCK	THICKNESS (mm)	WIDTH (mm)	LENGTH (mm)	COMMENTS
A	8	leg parts	pine	$\frac{3}{4}$ (19)	3 (76)	$33\frac{1}{2}$ (851)	45° miter one long edge, glue 2 parts to make 1 leg
B	4	side rails	pine	$\frac{3}{4}$ (19)	3 (76)	18 (457)	1" tenon both ends
C	2	side panels	pine	$\frac{1}{2}$ (13)	$16\frac{1}{2}$ W (419)	$18\frac{1}{2}$ H (470)	
D	4	front and back rails	pine	$\frac{3}{4}$ (19)	3 (76)	26 (660)	1" tenon both ends
E	1	back panel	pine	$\frac{1}{2}$ (13)	$24\frac{1}{2}$ W (622)	$18\frac{1}{2}$ H (470)	
F	4	foot blocks	pine	$2\frac{1}{4}$ (57)	$2\frac{1}{4}$ (57)	$9\frac{1}{2}$ (241)	
G	4	pullout spacers	scrap wood	$2\frac{1}{4}$ (57)	$2\frac{1}{4}$ (57)	$20\frac{1}{2}$ (521)	
H	2	pullout sides	plywood	$\frac{3}{4}$ (19)	18 D (457)	$17\frac{1}{2}$ H (445)	
J	2	pullout backs	plywood	$\frac{3}{4}$ (19)	$4\frac{1}{4}$ (108)	$17\frac{1}{2}$ H (445)	
K	6	pullout shelves	plywood	$\frac{3}{4}$ (19)	$4\frac{1}{4}$ (108)	$17\frac{1}{4}$ (438)	
L	2	drawer sides	plywood	$\frac{3}{4}$ (19)	$9\frac{1}{4}$ H (235)	14 D (356)	fit height to drawer opening w/part sitting on bottom
M	1	drawer back	plywood	$\frac{3}{4}$ (19)	9 H (229)	$8\frac{1}{4}$ W (210)	
N	1	drawer bottom	plywood	$\frac{3}{4}$ (19)	10 (254)	14 D (356)	fit width to drawer opening
P	2	inner-box sides	plywood	$\frac{3}{4}$ (19)	$20\frac{1}{2}$ (521)	24 (610)	
Q	2	inner-box shelves	plywood	$\frac{3}{4}$ (19)	10 (254)	$19\frac{3}{4}$ (502)	each has one 4"-diameter hole for dust collector hose
R	1	inner-box back	plywood	$\frac{3}{4}$ (19)	10 (254)	24 (610)	
S	2	inner-box rails	plywood	$\frac{3}{4}$ (19)	$2\frac{1}{4}$ (57)	10 (254)	
T	2	pullout fronts	pine	$\frac{3}{4}$ (19)	$6\frac{1}{4}$ (159)	18 (457)	trim to fit
U	1	drawer front	pine	$\frac{3}{4}$ (19)	$11\frac{1}{2}$ W (292)	10 H (254)	trim to fit
V	1	vent panel	pine	$\frac{3}{4}$ (19)	$11\frac{1}{2}$ W (292)	8 H (203)	trim to fit
W	2	inner tops	plywood	$\frac{3}{4}$ (19)	$8\frac{1}{2}$ (216)	$20\frac{1}{2}$ (521)	
X	1	top	MDF	$1\frac{1}{2}$ (38)	24 (610)	36 (914)	2 pieces of $\frac{3}{4}$ MDF sandwiched together
Y	3	cleat blanks	pine	$\frac{3}{4}$ (19)	$\frac{3}{4}$ (19)	24 (610)	cut cleats to length as needed

HARDWARE

- 2 sets 18" (460mm) full-extension drawer slides
- 4 3" swivel casters (two with locks)
- 3 $1\frac{1}{4}$ " (32mm) wooden knobs
- 1 $1\frac{1}{2}$ " (38mm) x 30" continuous hinge
- 2 duplex electrical boxes
- 1 duplex socket
- 1 110V on/off switch
- 1 outlet cover plate
- 1 switch cover plate
- 1 $\frac{3}{8}$ " (10mm) x 9" (229mm) x 14" (356mm) MDF or plywood (for top insert)
- 1 $\frac{1}{4}$ " (6mm) x 12" (305mm) x 12" (305mm) tempered hardboard (for round plates in the top insert)





the cabinet



Cut the lumber to rough lengths for the legs, rails and panels. Then take the lightest pass you can over your jointer to clean up one face of each board. Then run each piece through your planer, again making a cut just deep enough to clean up the boards. The original thickness of the boards was $\frac{3}{4}$ " and the final finished out at $\frac{1}{16}$ "



Joint one edge of each of the panel boards, then cut the other edge on the table saw. Joint this saw-cut edge to clean it up for the glue joint.

3



Glue up the panels first so the glue can be drying while you work on the leg parts and rails.

4



Align the pieces and clamp them together. Be sure to have clamps on opposite sides of the panel for even clamping pressure.

6



Cut the rails to length. Be sure to allow for the 1" tenons. Notice the flipper on my stop. I flip it up and slide the part under the flipper. This makes the cut about $\frac{1}{4}$ " longer than the final length.

5



When I rotate the part end-for-end, the flipper will drop down. I then butt the part against it and make the final-length cut.

7



For the longer-length leg parts, I squared up one end ...



... then I slid this squared along the saw's fence (which has been set to the finished-length cut of the leg part) and made the final cut. This is a safe cut because the sled supports the leg part as it rides along the fence.



Lay all the leg parts against a carpenter's square and clamp them together. Mark the locations of the mortises.



Cut the mortises using a brad-point drill bit. I used a mortising jig that I made for *The Best Jigs & Fixtures for Your Woodshop*, project No. 25, page 86.



By setting my drill press at its highest rotating setting (about 2,500 rpm), I'm able to make a cleanly-cut mortise. Nice!



Yes, I'm using my original router table to cut the grooves for the raised panels. It's simply a matter of connecting the mortises. Lower the leg part so the router bit is in the mortise and cut until you come to the other mortise. Remember, no grooves in the top and bottom front rails and front leg parts.



Then cut the panel grooves in the rails. These run the entire length of the parts.



I used the same bit that I used to cut the grooves to cut the tenon faces ...



... and edges.



Now you can start working on the panels. Cut them to size and level the faces using a hand plane and a random-orbital sander. To "raise" the panels, use your table saw. Set the blade angle so it finishes the bevel about 1/4" from the edge of the panel while leaving the edge about 1/8" thick.



After cutting the panel bevels, cut the 45° bevels on the leg parts. Be sure to make 4 right-handed and 4 left-handed parts!



18a



18b



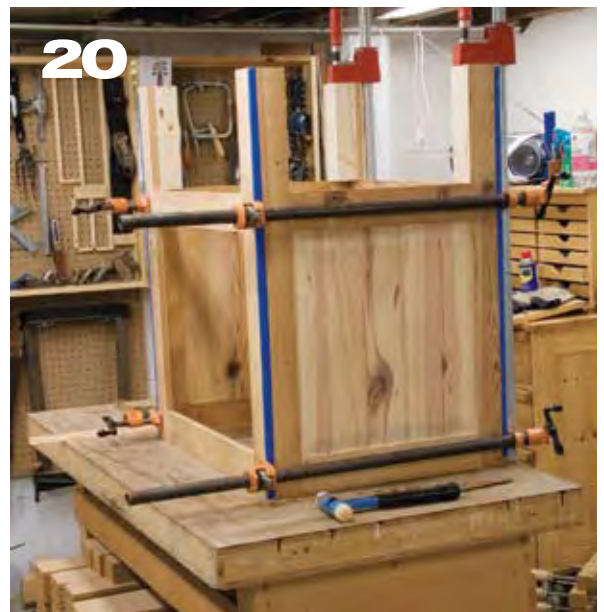
18c

Pair the leg parts and lay them out with the sharp edges of the bevels touching (18a). Run a piece of masking tape along the joint. Flip this assembly over and apply glue to the bevels (18b). Then fold the assembly. Make sure the leg parts form a square and let the glue dry (18c).



19

Glue the foot blocks in place and assemble the front and back sections. Lay out the parts on a flat surface so the assembly will not have a twist. Sight along the tops of the legs and make sure they are parallel with each other. That means the assembly is flat.



20

After the glue is dry, glue the front and back assemblies together. The cabinet is now assembled!

the pullouts and drawer



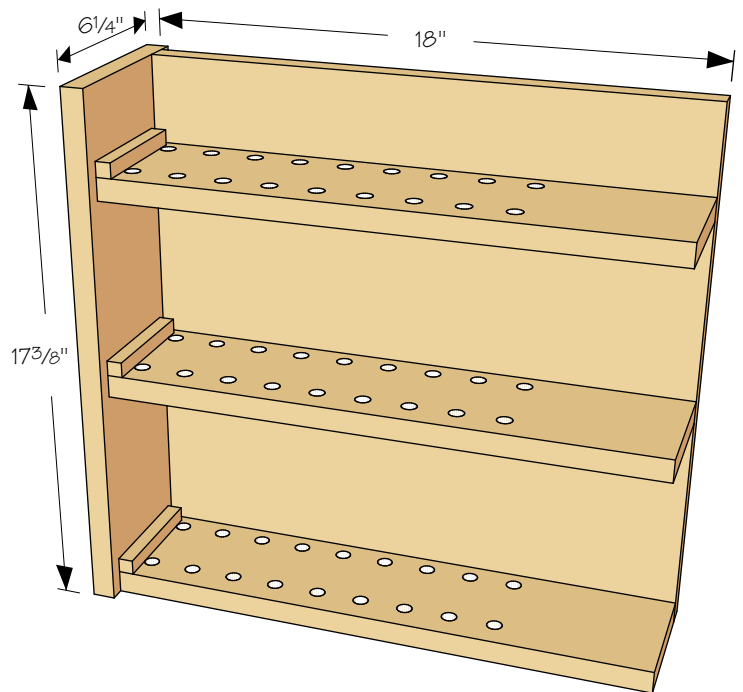
1
Cut out the pullout parts. Arrange your bits on the shelves. These are the largest cutter I have and they all fit on one shelf. I marked the hole locations and drilled them about halfway through the shelf.



2
I drilled the rest of the shelves with two rows of holes spaced fairly evenly, just using my eye to gauge the distance between holes. I drilled three shelves with $\frac{1}{2}$ " holes and the other three with $\frac{1}{4}$ " holes. I ended up with ninety holes total – more than enough for now and the future.



3
Screw the pullout parts together. I made the right-handed pullout for my router bits with $\frac{1}{4}$ " shanks the left-handed pullout for my $\frac{1}{2}$ " bits.



4



Glue up the pullout spacers. Use whatever scraps you have handy. Some of mine are made of plywood and some are made of leftover pine. So far, I've spent no money for materials. All this wood is leftover from other projects.

5



6



After the glue has dried, machine the pullout spaces to their final dimensions and cut them to length. The spacers span the panels and are glued to the legs only. Locate them at the bottoms of the top rails and at the top of the bottom rails. Yeah, that's right. After the glue has dried, draw lines on the spacers perpendicular to the front rails. These are the center lines for the drawer sides. Drill pilot holes and install the screws to attach the slides to the spacers.

7



Measure the distance between center lines on the spacers. Transfer this distance to the pullouts, draw center lines on the pullout sides and attach the drawer slides to the pullouts. I allowed a $\frac{1}{4}$ " clearance between the top rail and the top of the pullout and the same at the bottom. Using two slides on one side of a pullout is a bit unusual, but it works great. However, if the pullout doesn't work perfectly the first time, you can tweak the drawer slides a bit by removing all but the front screws on the spacer slides. Run the pullout into the cabinet about three-quarter. This will allow the spacer slides to align with the slides on the pullout. Replace the screws, drilling new pilot holes if necessary.



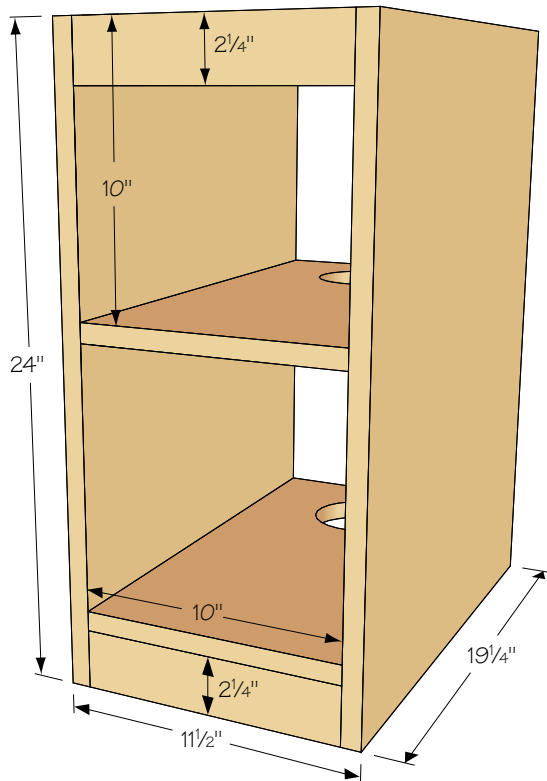
8



9

Center the box inside the cabinet. Attach it to the cabinet rails using screws. This installation will make the cabinet solid.

Now cut out the parts for the inner box. Cut a 4"-diameter hole in the top shelf. This will accept the lower dust collector hose. (Yes, I still need to cut the hole. I forgot to do it before assembly!) I glued and screwed them together for positive holding strength. This box will look like a cabinet when it's done. The back runs the full length top to bottom and the front has top and bottom rails.



10

When locating the inner box inside the cabinet, the top of the bottom shelf of the inner box should be $\frac{1}{16}$ " proud of the top of bottom front rail of the cabinet. The drawer bottom will slide on this shelf without marring the front rail.



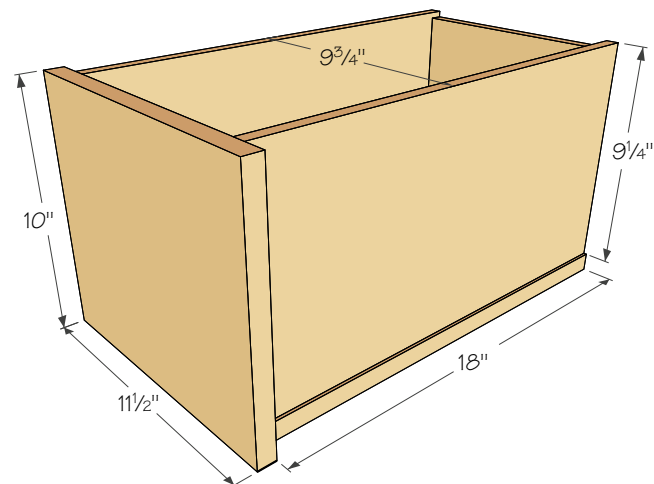
Cut out the drawer parts. First, fit the drawer bottom into the drawer opening in the box. Trim as needed so the bottom slides smoothly in and out.



Now, put the bottom in the opening and fit the sides to the space. Fit each side as there could be slight differences in the drawer opening. Finally, assemble the drawer. Attach the sides to the back, then center this assembly on the bottom. The sides should be about $\frac{1}{8}$ " in from the side edges of the bottom.



Apply some paste wax to the edges of the bottom and to the top edges of the sides. The drawer should slide smoothly in and out with minimal effort. Yes, you could use mechanical slides on this drawer if you like.





14
Glue cleats to the pullout shelves, to the sides of the top space and to the sides of the drawer (I haven't glued these in place yet).



15
Cut out the drawer front, pullout fronts and the vent panel. Fit them to the front of the router table, leaving about $\frac{3}{32}$ " space between all these parts. Then cut the vents in the vent panel. Here, I am using my old router table to plunge-cut the vent slots.



16
Glued the vent panel to the bottom of the top rail. Drill oversized holes in the side cleat and install one screw through each of the cleats. The panel is free to move with the seasons because the screws will move in the oversized holes.



Use double-sided tape, applied to the front edges of the drawer sides and bottom, to hold the drawer front in place. Remove the drawer, glue the front to the front edge of the drawer bottom install screws through over-sized holes in the glue blacks.



Attach the pullout fronts using the same method as you did for the drawer front. Glue the fronts to the front edges of the sides. Install screws through oversized hole in the cleats.

Attach the knobs to the pullouts and the drawer fronts at locations that are convenient for your reach. This completes the assembly of the router table, inner box, pullouts and lower drawer.

the router carriage

I'm not a mechanical genius by any means, but this router carriage is a very efficient method of holding the router solidly and adjusting the height of the cutter. The

best part is the fact that you only need to open the top to change cutters. The router stays put in its collar and you're ready to start routing in a about a minute.



1 Cut out three collars for the router collar assembly. In each collar, cut a hole larger (add $\frac{1}{16}$ " to the diameter) than the diameter of your router's body.



2 If your router has those little tabs on its body like mine does, you'll need to cut out for those so the collar will slip on the router's body smoothly.



3 To hold the three collar pieces in alignment, I used my router as a form. Use enough glue to hold the parts together but keep the glue away from the inner edges of the circle cutout if you can. If a little glue does stick to your router's body, simply pop off the dried glue with a chisel.



4 Cut the collar to shape using your table saw or band saw. Then stand the collar on edge and drill a $\frac{3}{8}$ "-diameter hole for the bolt.

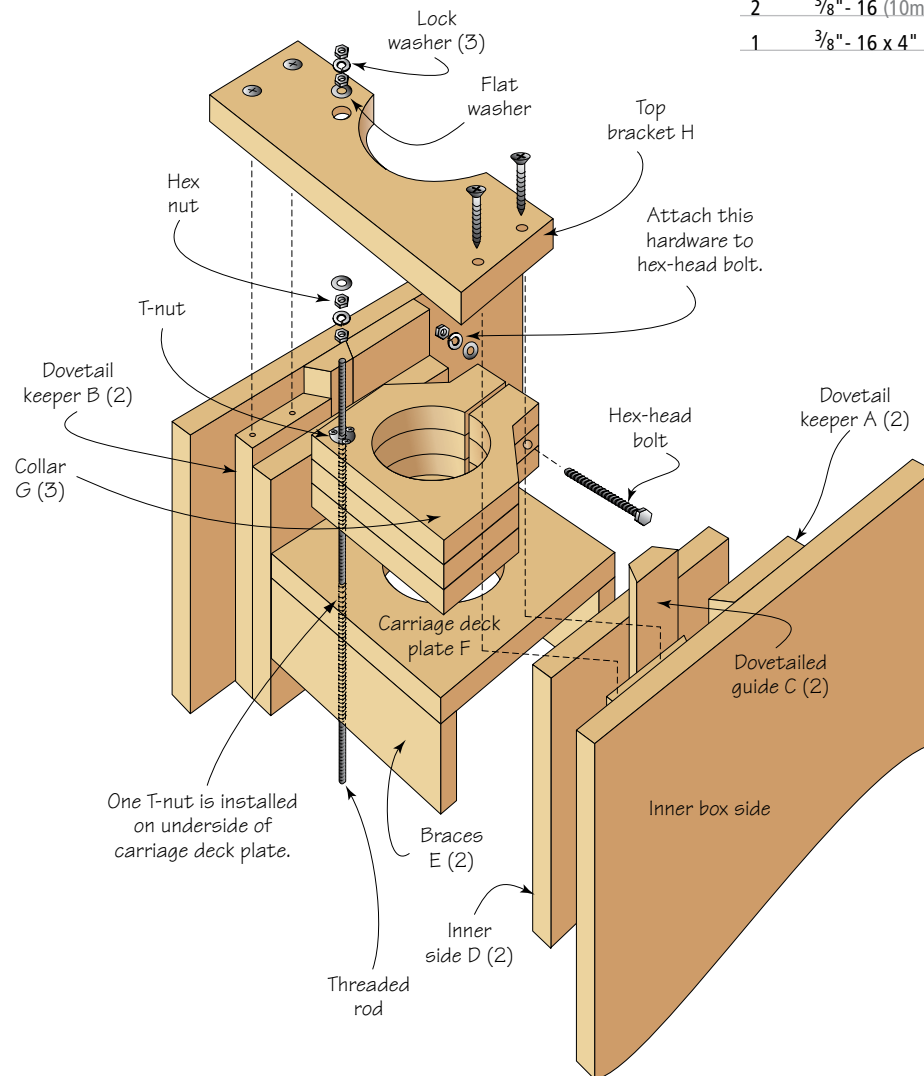
router table carriage

MATERIALS LIST inches (millimeters)

REFERENCE	QUANTITY	PART	STOCK	THICKNESS (mm)	WIDTH (mm)	LENGTH (mm)	COMMENTS
A	2	dovetail keepers	MDF	3/4 (19)	5 (127)	10 (254)	10° bevel one long edge
B	2	dovetail keepers	MDF	3/4 (19)	5 (127)	9 1/4 (235)	10° bevel one long edge
C	2	dovetailed guides	MDF	3/4 (19)	1 1/2 (38)	7 (178)	10° bevel two long edges
D	2	inner sides	MDF	3/4 (19)	7 (178)	11 (279)	
E	2	braces	MDF	3/4 (19)	3 1/2 (89)	7 (178)	
F	1	carriage deck plate	MDF	3/4 (19)	7 (178)	11 (279)	
G	3	collar blanks	MDF	3/4 (19)	6 1/4 (159)	7 1/4 (184)	
H	1	top bracket	MDF	3/4 (19)	5 (127)	10 (254)	

HARDWARE

1	3/8" - 16 x 12" (10mm x 300mm) threaded rod
5	3/8" - 16 (10mm) hex nuts
3	3/8" - 16 (10mm) flat washers
3	3/8" - 16 (10mm) lock washers
2	3/8" - 16 (10mm) T-nuts
1	3/8" - 16 x 4" (10mm x 100mm) hex-head bolt





In the deck plate, center and cut a hole that is $\frac{1}{2}$ " larger in diameter than your router's body. Assemble the box. Then attach the dovetailed guides, centering them on the inner side parts. Make sure they are square to the inner sides.



Attach the collar assembly to the carriage box, centering it over the oversized hole in the deck plate.



Drill a hole that is large enough to accept the body of the T-nuts. This hole runs through the collar and on through the deck plate. This photo shows that the holes need to be aligned perfectly. Then install the T-nuts; one in the bottom of the deck plate and one in the top of the collar assembly. The T-nuts will be subjects to both clockwise and counter-clockwise twisting of the threaded rod, so I drilled three holes in the collars of the T-nuts and secured each nut in place with three, No. 6 \times $\frac{3}{4}$ " sheet metal screws.



Slide the assembled router carriage into the top of the inner cabinet. Hold the tabletop in place and center the hole in the tabletop insert with the hole in the carriage. Mark the underside of the top to locate it on the router table.



Remove the top and install the longer dovetail keepers, attaching them to the sides of the inner box. Install one screw in the keepers, make sure the keepers align with the dovetailed guides and install a second screw.



Now install the shorter dovetail keepers. The top bracket will be installed on the top of these keepers, so they are $\frac{3}{4}$ " shorter than the other two keepers. Push the keepers snugly against the dovetailed guides, then install two screws. Note the spacers on the keeper on the left. The keepers need to be firmly against the body of the carriage, so some adjustments may be necessary.



Remove the carriage and install a screw in the bottom of each keeper.

12



Slide the carriage into the inner box. It should require a little effort to push it into place. When the carriage is adjusted up and down, the threaded rod will have plenty of torque to move it. Again, you want the carriage to be solidly in place, so lots of friction isn't a bad thing in this case.

13



Drop a pencil (be sure it's long enough!) through the T-nuts and make a mark on the shelf of the inner box. Remove the carriage and drill a $\frac{1}{2}$ "-diameter hole at this center-marked location. The threaded rod will protrude through this hole about 1".

14



Loosen the screws holding the collar in place. Start the threaded rod in the T-nut.

15



When the rod reaches the bottom T-nut, it's likely you'll need to finesse it into that bottom nut. The odds of the two nut's threads lining up perfectly are slim. Move the collar up slightly until the rod starts into the bottom nut.



I chucked the rod into my drill. I hand-tightened it. You don't want to mess up the threads at the top of the rod. This will make the rod insertion go quickly. If you want to continue hand-screwing the rod in place, that's fine.

To determine how far to install the rod, remove the carriage (yes, once again!) and install your router in the carriage. (I slid my router in until the plastic housing at the top of my router bottomed out against the bottom of the collar.) Then tighten the collar with the hex bolt hardware. The router should be rock solid in the carriage. Reinstall the carriage.

You'll need to experiment a little here. My "rule" was to raise the carriage until the top of the collet was flush with the tabletop. You can determine this by raising the carriage until the top of the collet is $1\frac{1}{4}$ " or $1\frac{1}{2}$ " above the top edge of the inner box. Put a spacer under the carriage to hold it at this height.

Now turn two nuts onto the rod about 2" down and add a flat washer. Screw the rod in until just before the nuts touch the T-nut.

Tighten the screws that hold the collar in place. Try turning the rod. If it is hard to turn, run it up and down a few times until it turns easier. If the rod won't turn without undo force, loosen the collar screws a little until the rod turns. You may need to add thin spacers between the collar and the deck plate. Use some old playing cards. Be sure to add them all around the bottom of the collar so the router is square to the tabletop. You don't want the rod to turn freely. It needs to have some resistance to turning.

Note that you may need to cut a notch in the top of the drawer to clear the threaded rod that is protruding through the inner box shelf.



Wow, now that that's done, hold the top bracket in place. Mark where the threaded rod will come up through the bracket. Drill a $\frac{1}{2}$ "-diameter hole in the bracket and install the bracket. It should be flush with the top edge of the sides of the inner box, or slightly below as shown in the photo.

Screw the bracket in place through the tops of the dovetail keepers. Then install screws through the sides of the inner box. This bracket is the anchor for the height adjustment, so it needs to be solid.

Remember those two nuts and flat washer on the rod? Run them up until the flat washer just kisses the bottom of the bracket. If your top is $1\frac{1}{4}$ " thick, you should have no more than $1\frac{1}{8}$ " of rod showing. If there is more, run the rod down until it reaches this measurement. Now, tighten the two nuts against each other to lock them in place.

Install a flat washer on the rod and two more nuts. Tighten the nuts until they touch the flat washer, then back them off about a half turn. Tighten them against each other. Here's the test – take a wrench, put it on the top nut and turn. The carriage should start moving up or down. Turn clockwise to raise, counter-clockwise to lower. Because the rod has 16 threads-per-inch, each full turn of the wrench will raise or lower the carriage a $\frac{1}{16}$ ". I use a dedicated ratchet wrench for the height adjustment. I keep in the drawer of the router table.



Back to the top. Cut the hinge to the length of the router table (it should be 30"!). I clamped a straightedge along the mark I made earlier. Center the hinge and push it snug against the straightedge. Install all of the screws.



Put the top on the table and install the screws. A continuous hinge has lots of holding power, so the top will stay in place for years to come.



the electric



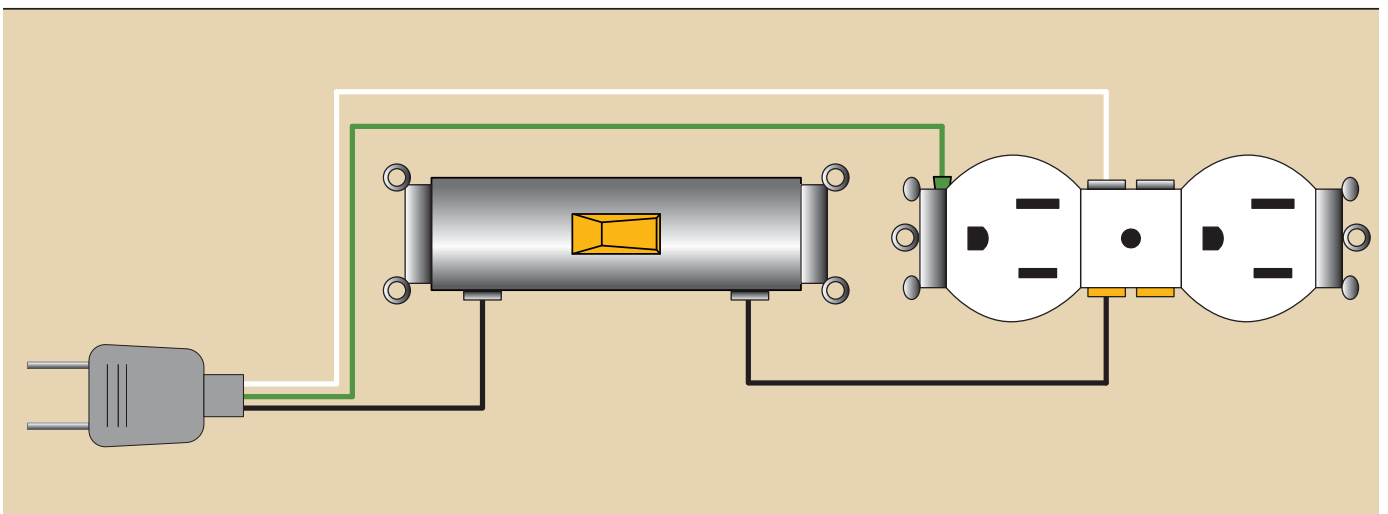
Trace around the electrical boxes. Drill starter holes for your jig saw. Make the cutouts.



The right top photo shows the electrical hardware you'll need. Remove the knockouts at both ends of the left box and one from the right box. Install the clamp connectors in the knockouts. Run one end of the electrical cord through the far left clamp connector. Cut 10" of electrical cord and run it through the other two clamp connectors. Strip back about 4 or 5" of the outer cord insulation from the end of the long cord and the two ends of the short cord, separate the wires, strip insulation from the ends of each wire.

Attach the two black wires in the left box to the switch screw connectors. Wire-nut the two white wires together in the switch box. Attach the two green wires to the green screw on the switch. Attach the black wire to the brass screw connector and the white wire to the steel screw connector on the plug. Attach the green wire to the green screw on the plug. Your connections should look like the lower right photo. Push the stuff into the boxes, screw the switch and outlet in place and attach the covers.

Attach a three-prong plug to the other end of the long cord and you're good to go.



You'll need about 10' of No.12, braided 3-wire cord and a 3-prong, 110V plug. The black wire is hot, the white wire is neutral and the green wire is ground. The switch opens and closes the path of the current passing through the hot black wire, thus controlling the current flow to the outlet.

the fence



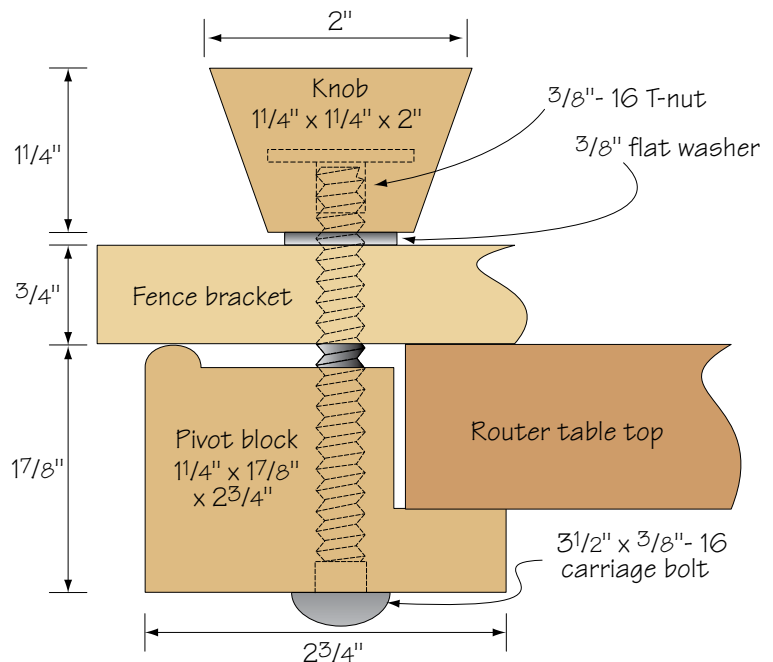
1
Glue two pieces of wood or, in my case, particle board, together to make the fence. Then attach the fence cleat to the fence, making sure the assembly is square.



2
Hey, this is the first job for your new router table! Setup a straightedge and rout two grooves in the fence.



3
Because I'm cheap (or frugal), I make a lot of my fittings. The hold-down clamps are no exception. All you need are two bolts, two flat washer and two T-nuts. To install the T-nuts in the knob, drill a stopped-hole large enough to fit the entire nut. Then drill a through-hole just large enough to clear the nut's body. As the knob is turned, the T-nut pulls tightly against the bottom of the stopped hole.





The dust hood for the fence is made from three pieces of MDF. Cut a hole in the hood to fit your dust collector or shop vacuum hose. The front piece is cut with a 45° bevel on both long edges. Cut a 45° angle to fit the end pieces to the front piece. You are now ready to start routing!

