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ISSUE 225 MAY 2014

Better Homes and Gardens®

# WOOD®

The World's Leading Woodworking Resource

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- Blade size: 92½"–93½" L (⅛"–¾" W)
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- Table tilt: 45° R, 10° L
- Cutting capacity/throat: 16¼"
- Max. cutting height: 12⅛"
- Blade size: 131½" L (⅛"–1" W)
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- Motor: 1½ HP, 110V/220V, single-phase
- Precision-ground cast iron table with wings
- Table size: 25¼" x 40" • Arbor: ⅝"
- Arbor speed: 4000 RPM
- Capacity: 3⅛" @ 90°, 2¼" @ 45°
- Rip capacity: 30" R, 12" L
- Approx. shipping weight: 208 lbs.

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### 10" HYBRID TABLE SAW

- Motor: 2 HP, 110V/220V, single-phase
- Precision-ground cast iron table with wings measures: 27" x 40"
- Arbor: ⅝" • Arbor speed: 3850 RPM
- Capacity: 3⅛" @ 90°, 2⅜" @ 45° • Rip capacity: 30" R, 12" L
- Quick change riving knife • Cast iron trunnions
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- Motor: 3HP, 240V, single-phase, 3450 RPM, 12A
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- Static pressure: 16.7"
- 7" inlet has removable "Y" fitting with three 4" openings
- Impeller: 12¾" cast aluminum
- Bag capacity: 11.4 cubic feet
- Standard bag filtration: 2.5 micron
- Portable base size: 21½" x 49½"
- Bag size (dia. x depth): 19½" x 33" (2)
- Lower bags: Plastic
- Powder coated paint
- Height with bags inflated: 78"
- Approximate shipping weight: 170 lbs.

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### 12" BABY DRUM SANDER

- Sanding motor: 1½ HP, 115V, single-phase
- Conveyor motor: ⅛ HP, 115V, single-phase, variable speed 5-55 RPM
- Drum surface speed: 2127 FPM
- Maximum stock dimensions: 12" wide x 3½" thick
- Minimum stock length: 8"
- Sanding drum size: 4"
- Sanding belt size: 3" x 70" hook & loop
- Dust collection port: 2½"
- Feed rate: 2.5-17.3 FPM
- Approx. shipping weight: 166 lbs.

CSA C US 177335

$79 shipping

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### 8" JOINTERS

- Motor: 3 HP, 220V, single-phase, TEFC
- Precision-ground cast iron table size: 9" x 72½"
- Max. depth of cut: ⅛" • Max. rabbeting depth: ½"
- Cutterhead dia.: 3" • Cutterhead speed: 4800 RPM
- Cuts per minute: 20,000 (G0656P), 21,400 (G0656PX)
- Approx. shipping weight: 500 lbs.

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BUILT-IN MOBILE BASE

4 KNIFE CUTTERHEAD
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SPIRAL CUTTERHEAD
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$150 shipping

### 15" PLANERS

- Motor: 3 HP, 220V, single-phase
- Precision-ground cast iron table size: 15" x 20"
- Min. stock thickness: 3/16"
- Min. stock length: 8"
- Max. cutting depth: ⅛"
- Feed rate: 16 & 30 FPM
- Cutterhead speed: 4800 RPM
- Approx. shipping weight: 666 lbs.

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May 2014 Issue 225

# In this issue

## PLANS



## TECHNIQUES



## TOOLS & MATERIALS



## DEPARTMENTS









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The *WOOD*® magazine difference: We build every project, verify every fact, and test every reviewed tool in our workshop to guarantee your success and complete satisfaction.

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woodmagazine.com

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## START WITH THESE GREAT PLANS

Adirondack chair with footrest (*left*) woodmagazine.com/addyfoot
Beanbag game boards woodmagazine.com/bagsgame
Pergola (shown *above*) woodmagazine.com/pergola
Raised planter box woodmagazine.com/rplanter
Tudor birdhouse woodmagazine.com/tudorbird
Picnic table woodmagazine.com/picnictable
Footbridge woodmagazine.com/footbridge
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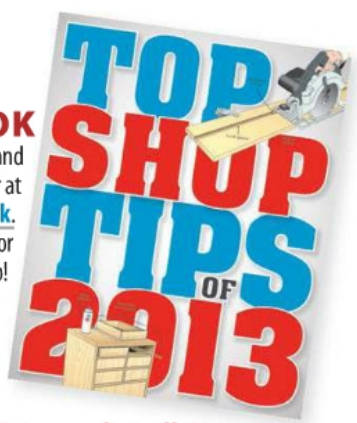


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# Editor's Angle

# Take a load off

Long before the world had luxurious decks, three-season porches, and "outdoor rooms" hidden behind our houses, we had the good old front porch. Out on the farm, my grandpa and grandma had these old painted steel chairs on the porch that were nice to look at, perfectly functional, and about as comfortable as tight shoes.

When it comes to seating, "pretty" doesn't cut it for long. So, when designing the Garden Bench on *page 50*, *WOOD*® design editor John Olson made sure it would appeal to both your head and (ahem) tail. After you build it, tell me if it isn't one of the most comfortable benches you've ever parked yourself on.

To achieve that sometimes-delicate balance between beauty and bottom-friendliness, John prototyped the bench and experimented with different back angles and back-rail locations. Real-world testing like that should play a role in your builds, too, whether you're working with one of our plans or one of your own. We'll show you the benefits and give you some tips starting on *page 40*.

## Take a load off your mind, too

Ready to upgrade your tablesaw but not blow your budget? Check out Bob Hunter's review of six models on *page 44*. And if you're looking for buying advice on other tools, find more reviews from our editors and woodworkers just like yourself at toolreviews.wooodmagazine.com.

See you in the shop!

Dave Campbell
dave.campbell@meredith.com

# Sounding Board

Our bulletin board for letters, comments, and timely updates

## Arbor helps Boy Scout achieve Eagle rank

I want to thank you for the Easy Swingin' Arbor plan in issue 212 (July 2012). I built the arbor, *below*, for my Eagle Scout service project. If not for your easy-to-understand instructions, I doubt I could have accomplished a project of this scale.

After working to purchase the materials, I gathered a work crew and set about constructing the arbor. My role was a strictly supervisory one per Scout tradition, making sure everything was done safely and to my beneficiary's specifications. I even tried my hand at modifying the plans to incorporate a mortise-and-tenon joint to replace the screws. The arbor turned out beautifully; it's been a big hit in its new memorial-garden home.

*—Parker Blackwell, Milton, Ga.*

*To purchase plans for the Easy Swingin' Arbor, visit woodmagazine.com/easyarbor.*

*—WOOD® Editors*

## Start 'em early

In case you were wondering who is reading your magazine, I thought I'd snap a quick photo of my one-year-old daughter, Mia, as she gave it a read. She enjoys my issue almost as much as I do!

*—David Reed, Massapequa, N.Y.*


## More surprises in toy box?

I really enjoyed building the Sit 'n' Store Toy Box and Bench from issue 222 (November 2013). But knowing how kids tend to behave, and fearing that a small child might climb into the box and not be able to lift the lid to get out, I drilled a few air holes in the back panel, just in case.

*—Don Hopler, Carlisle, Pa.*

I worry that the Toy Box and Bench project overlooks the possibility of children's fingers being pinched. The lid has a few points where it could be a real hazard to small children.

*—Maurice Peterson, Janesville, Wis.*

*Pinching hazards can never be completely prevented in a toy box with a hinged lid, even with slow-closing hinges and lid supports. If you find the risk unacceptable, you could build the toy box without the lid (D), which would eliminate both the suffocation and pinch dangers.*

*—WOOD Editors*

## Article Updates

### ▶Adirondack chair

In issue 219 (July 2013), in order for the frontmost seat slat (C) to overhang the rear legs (A) by ¾" as suggested, make it 3¼" wide.

### ▶Neoclassical clock

In issue 223 (December/January 2013/2014), step 3 under "Machine the parts" should include the final step of planing the top (D) to ⅜" thick.

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## TRACK SAW

- Motor: 120V, 9A, 1100 watt, 5500 RPM
- Blade diameter: 160mm (6¼")
- Cutting capacity:
  With track: 1 31/32" @ 90°, 1 7/16" @ 45°
  Without track: 2 5/32" @ 90°, 1 5/8" @ 45°

New

**W1832** Track Saw Master Pack
*Includes: Saw, Guide Rail, and Accessory Pack*

**W1835** Track Saw only
**D4363** Accessory Pack **D4362** Guide Rails

## 14" BANDSAW

- 1 HP, 110V/220V
- Precision ground cast iron table measures 14" x 14" x 1½"
- Blade size: 93½" (⅛" to ¾" wide)
- Cutting capacity 13½" (throat)
- Cast iron frame and wheels
- Ball bearing blade guides
- Includes fence and miter gauge

*Feature packed, and an incredible value*

**W1706** 14" Bandsaw

## PLANER MOULDER with Stand

- Motor: 2 HP, 240V, single-phase, 10.8A, 3450 RPM
- Precision ground cast iron table measures 14⅛" x 10" x 7/16"
- Max planing width: 7"
- Max planing height: 7½"
- Cuts per minute: 14,000
- 2 HSS knives

PATENT OWNED BY WOODSTOCK INTERNATIONAL INC.

**W1812** Planer Moulder with Stand

## 10" TABLE SAWS with Riving Knife

- 3 HP, 220V, single-phase motor
- Cast iron table size:
  27" x 40¼" (W1819) 53⅝" w/extension
  (W1820) 74" w/extension)
- Max. rip capacity: (W1819) 29½",
  (W1820) 50"
- Camlock fence with HDPE face

*Free 10" Carbide-Tipped Blade*

**W1819** 10" Table Saw
**W1820** 10" Table Saw w/ Long Ext. Table

## POCKET HOLE MACHINE

- ½"-1½" material thickness range
- Go from making face frames, casework, drawers etc. without stopping between operations.
- Two or more workers can share the same machine without interruption.
- Approx. weight: 56 lbs.

New

*U.S. Patent No. 7,140,813*

**W1833** Pocket Hole Machine

## 6" x 12" HEAVY-DUTY COMBINATION SANDER

- 1½ HP, 120V, 10.5A, single-phase, 1725 RPM
- Precision-ground cast iron tables (2)
- Sanding belt size: 6" x 48"
- Belt Speed: 1066 FPM
- Disc size: 12"
- Disc speed: 1725 RPM

*Made in an ISO 9001 factory*

**W1712** Oscillating Benchtop Spindle Sander

# OUTSTANDING SHOP FOX® DUST COLLECTORS

## 3 HP CYCLONE DUST COLLECTOR

- Motor: 3 HP, 220V, single-phase, TEFC Class F
- CFM: 1489
- Filter: 0.2-2 microns, Spun bond polyester
- 55 gal. steel collection drum with casters
- Intake: 8"
- Maximum static pressure: 10.2"
- Includes remote control
- Approx. weight: 396 lbs.

**W1816** 3HP Cyclone Dust Collector

## WALL DUST COLLECTOR

- Motor: 1 HP, 110V/220V, single-phase
- Air suction capacity: 537 CFM
- Bag capacity: 2 cubic feet
- Standard bag filtration: 2.5 micron
- Static pressure: 7.2"

New

**W1826** Wall Dust Collector

## 3-SPEED HANGING AIR FILTER

- Motor: ⅛ HP, 120V, 60Hz, 1A single-phase
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- Inner filter: 1.0 micron

New

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**W1830** Hanging Air Filter

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**Great Ideas**
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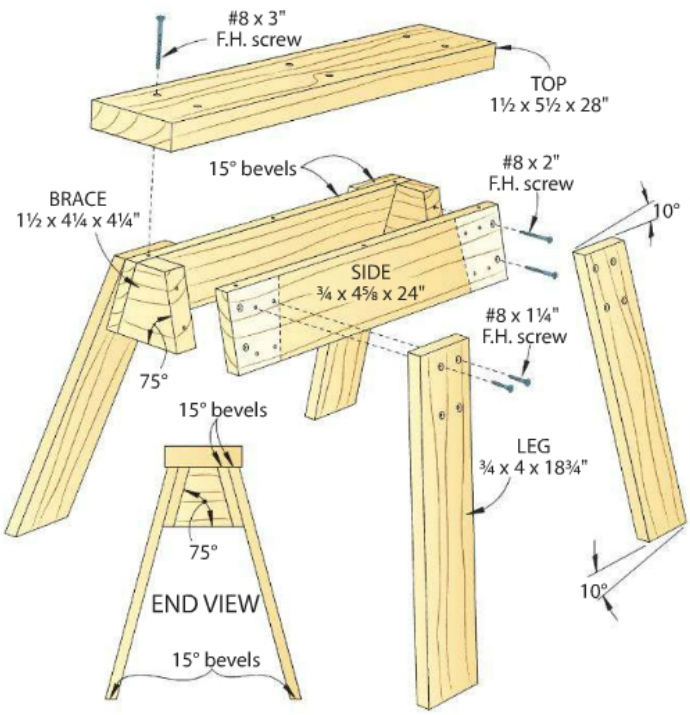
# Simple, stackable Assembly Stands

When you assemble or finish a project too large to fit on your workbench, kneeling down while the project rests on the shop floor can be awkward. And lifting it onto typical sawhorses may make parts of it too high to reach. But a set of these assembly stands puts your project at a comfortable height. Plus, they stack, so they take up little room when stored. A pair of stands will support most projects; lay a sheet of plywood across four stands to make a temporary table.

To build an assembly stand, begin by cutting two sides from ¾"-thick stock. Rip parallel 15° bevels in the long edges. Then, cut two braces and miter two sides of each at 15°. Screw the sides to the braces where shown.

Cut the legs to size, mitering both ends of each leg at 10° so the legs angle in toward the center of the stand. Then, cut a 15° bevel on each end of the legs. Fasten the legs to the sides, where shown. Screw on the top.




# Drill Without Damage

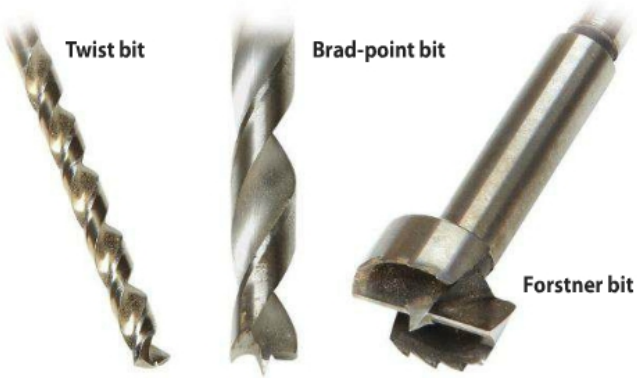
**If holes you drill look more like exit wounds in a crime-scene investigation drama, follow these easy steps to prevent future drillin' villainy.**

## 1 Start with the right bit

Do-it-all twist bits are inexpensive and designed to punch through wood, metal, and plastics. To achieve this versatility, manufacturers typically grind their cutting tips to 118°. This shallow angle can allow the bit to wander on entry and blow out wood fibers on exit, so reserve twist bits for plastic, metal, and holes smaller than ⅛" in wood where the small size minimizes those tendencies.

For holes sized from ⅛" to ½", instead select a brad-point bit. The center point of a brad-point bit prevents wandering on entry, while the sharp outer spurs shear the wood for far less tear-out.

When you need to drill holes larger than ½", move up to a Forstner bit. Like brad-point bits, Forstners feature a center guiding point and cut very clean holes. Multispur Forstner bits, like the one shown *below*, add sawlike teeth to the rims, which cut more aggressively without sacrificing cut quality. When using this type of Forstner, slow the feed rate, and secure the workpiece with clamps.




You'll need all three bit styles—twist, brad-point, and Forstner—to drill tear-out-free holes in a range of sizes.

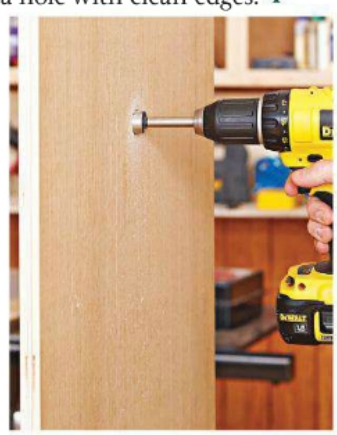
## 2 Back up your cut

Regardless of bit choice, any time you punch metal through wood, unsupported wood fibers on the back of the workpiece can tear out. So get in the practice of backing up your workpiece with scrap wood. The backing board traps the wood fibers around the exit point, preventing the bit from pushing out the last splinters. At the drill press, simply slip a scrap beneath the workpiece; for handheld drilling, clamp the backer in place, as shown *above*. If your bits lift fibers around the entry points, apply masking tape to the face of the workpiece before marking your layout lines and drilling.

## 3 Drill from both directions

If the location of a hole makes it difficult to clamp a backer board in place (such as when drilling cord-access holes in the back of an entertainment center), instead drill from both directions, as shown *below*, for a hole with clean edges.

After drilling a 1/16" pilot hole through the workpiece, use the hole to guide the point of a Forstner or brad-point bit about halfway through.



Repeat on the opposite side of the part, again using the pilot hole to guide the point of the bit until the two larger holes meet.

# Upgrade For Free!

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*Overarm Dust Collection requires a DC Blade Guard, which is included with the 3.0HP Professional Cabinet Saw but must be purchased for the 1.75HP model.

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sawstop.com/upgrade

# Permission granted!


Photo courtesy of shuttersam.com

**Stalled in your woodworking skills? Step them up by giving the man in the mirror permission to succeed.**

Early in my woodworking hobby, I realized that my skills weren't advancing as quickly as I would have liked. After some self-examination, I realized that I was over-thinking and second-guessing nearly every purchase, technique, and project I attempted. This "paralysis by analysis" was like a mental jailer prohibiting my improvement. How did I break free? I simply granted myself permission in three key areas.

## Permission to splurge

You've heard that "he who dies with the most tools, wins." I was on my way to winning that race...with some of the worst tools a woodworker could own.

Beginner's enthusiasm combined with frugality can be a crippling combination. I remember buying clamps that couldn't hold two pieces of paper together! But it was awesome because I got 10 for only $1!


Quality tools, properly tuned and cared for, make work easier, guarantee improved results, and provide a lifetime of pleasurable service.

A friend's gift of a set of quality chisels served as an intervention. Sharp out of the box, they retained their edge longer and felt better in my hand. And suddenly a light bulb came on when I discovered how much more potential I could realize with quality tools.

Step out of the bargain basement and spend a little more on tools you can count on every time you pick them up. You'll be surprised by your improvements.

## Permission to disagree

After that, I gave myself permission to stray from the plans. It's often difficult to "challenge" the authority of the experts who create woodworking plans. Even making the smallest design or dimensional change can make you question all your instincts.

The truth is, published plans should be treated more like as-the-crow-flies directions than a designated route. When I first saw how changing a single dimension dramatically altered the look of a project and made it better suit my needs, it felt like I was taking my first steps in the world of project design.

By granting yourself permission to disagree, you won't just detour around a skills roadblock, you'll drive right through it and never look back.

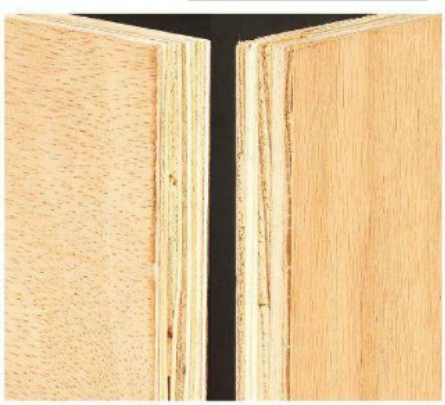
## Permission to fail

The most liberating license by far was giving myself permission to fail. At everything! Fear of failure stopped me before I even attempted many wood-working tasks and techniques. For example, I wouldn't go near a piece of expensive lumber for fear I'd ruin it and have to spend EVEN MORE to make up for my rookie mistakes.

With permission to fail, I branched out into better materials. And guess what? I spent less time compensating for the shortcomings of lesser-quality wood and instead, enjoyed the results I was getting from the "good stuff." Not to mention I was starting to build pieces that looked amazing!

And while I didn't necessarily make fewer mistakes, I didn't make any more than usual, as I had feared. And every mistake was followed by better results the next time I tried. Forget your fear of failure. The risk and the resulting improvements will propel your wood-working to new heights.

*Matt Vanderlist was one of the world's first woodworking podcasters. With more than 500 free episodes of* Matt's Basement Workshop *produced, he remains one of the most prolific as well, earning the peer-bestowed title, "Podfather." Find him at mattsbasementworkshop.com.*


Though it costs 50 percent more, the plywood on the *right* eliminates uneven core veneers, voids, and a distinct curl that could impact your success.

# Every Bit Counts

The work and materials matter, and so do the bits. New Xtra-Clean router bits with shear angle carbide deliver improved cut quality, speed and life. Available for mortising, edge forming and now, laminate trim jobs. **Better Accessories. Better Results.**
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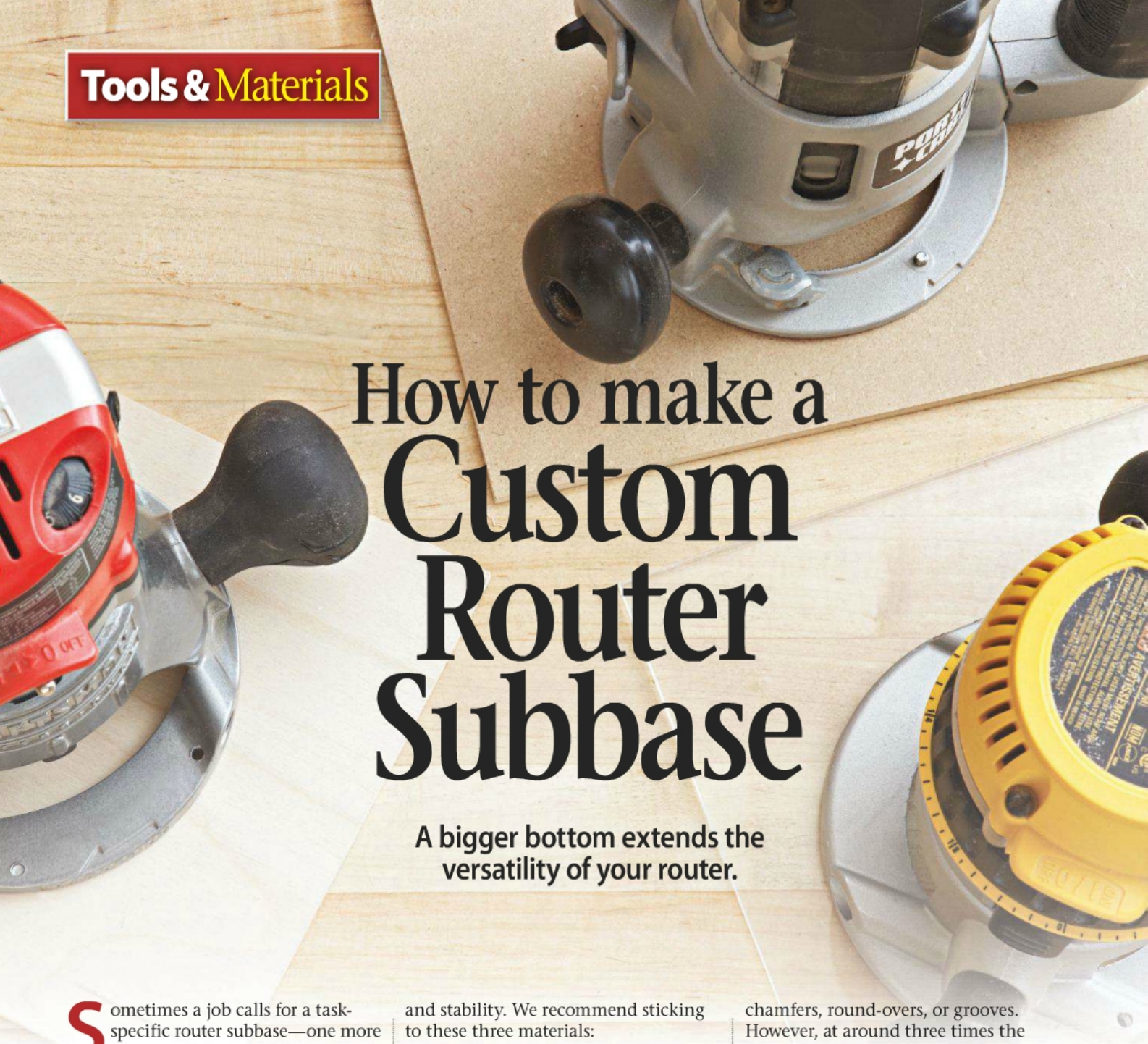

# How to make a Custom Router Subbase

**A bigger bottom extends the versatility of your router.**

Sometimes a job calls for a task-specific router subbase—one more affordable to build than buy, like a circle-cutting trammel. Or maybe you need the added stability of a wider subbase with handles, or a square-sided one that rides along a guide to route flawless flutes. Whatever the application, here's how to make and mount a router subbase successfully.

## Choose subbase material based on your needs

Although your first thought may be to use any scrapwood on hand, the material you choose for your router base can dramatically affect accuracy and stability. We recommend sticking to these three materials:

**Hardboard:** So affordable (around $.65 per sq. ft.), a subbase made of hardboard can be considered disposable. It also resists humidity changes that lead to warpage.

**Baltic-birch plywood:** With thin, voidless plies, Baltic-birch plywood makes a sturdy and affordable subbase. (It costs around $2 per sq. ft.) Other ¼"-thick plywood warps easily—a big problem when building large subbases.

**Acrylic:** A transparent acrylic subbase improves bit visibility—especially important when routing stopped chamfers, round-overs, or grooves. However, at around three times the price of Baltic-birch plywood, and 10 times hardboard, you may find acrylic cost-prohibitive.

For best results when cutting acrylic on a tablesaw, use a thin-kerf blade with a high tooth count for less chipping; but reduce the tooth count if melting occurs. (More teeth also means more friction and heat.) When drilling or boring holes in acrylic, be sure to use a backer board, a sharp bit (twist or brad-point bits work well), and a slow bit speed to avoid melting and chipping. As bit size increases, bit speed should decrease.

*continued on page 15*

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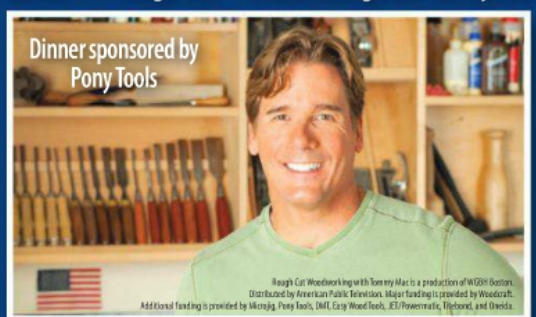


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*continued from page 12*

## Now make it and mount it

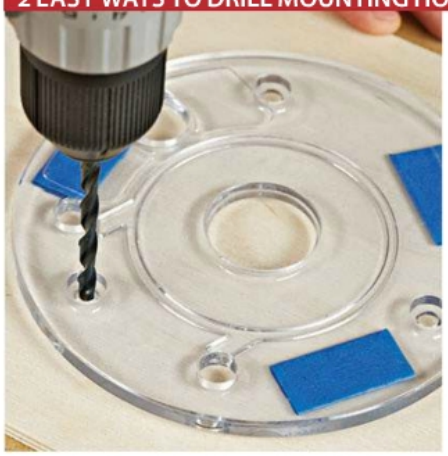
After selecting a subbase material, remove the factory-supplied subbase from the router. Transfer the subbase's mounting-hole pattern and bit opening to the new subbase material using one of the techniques shown *below*.

Next, drill the holes for the mounting screws and bore the bit opening.

***Quick Tip!*** ***For another way to locate and bore out the exact center of the bit hole, insert a straight bit into the router collet, mount your new subbase to the router, and plunge the bit through the subbase.***

Finally, countersink or counterbore the new subbase's screw holes, as shown *below*. If necessary, replace the factory-supplied mounting screws with screws long enough to account for any additional thickness your replacement subbase adds.

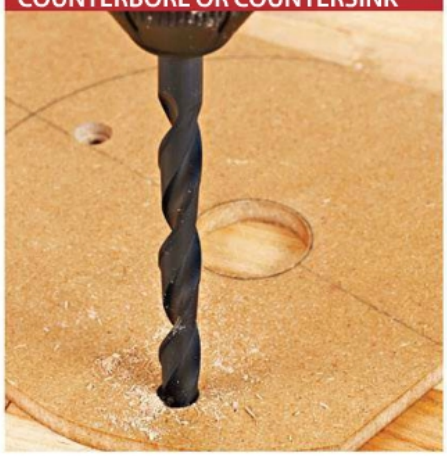
### 2 EASY WAYS TO DRILL MOUNTING HOLES



After removing the factory-supplied subbase, drill matching mounting holes in the new subbase. One simple method: Tape the factory subbase to the new one and use it as a drilling template.

To make several subbases, photocopy the factory-supplied subbase and drill the mounting-hole locations through the photocopied template after taping it to your blank.

### COUNTERBORE OR COUNTERSINK



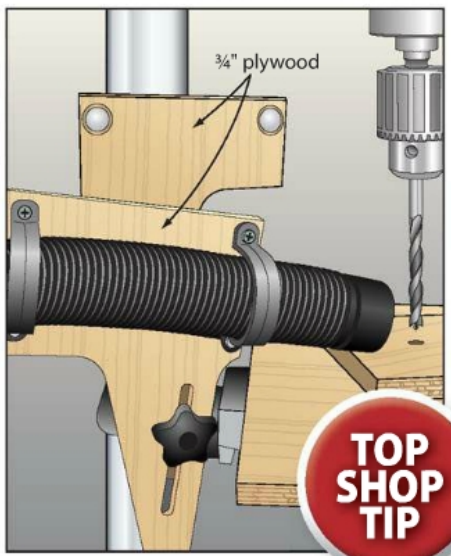
Match the depth of the factory-supplied subbase's counterbore or countersink in the mounting holes of your new subbase to keep the screw heads flush with or below the surface.

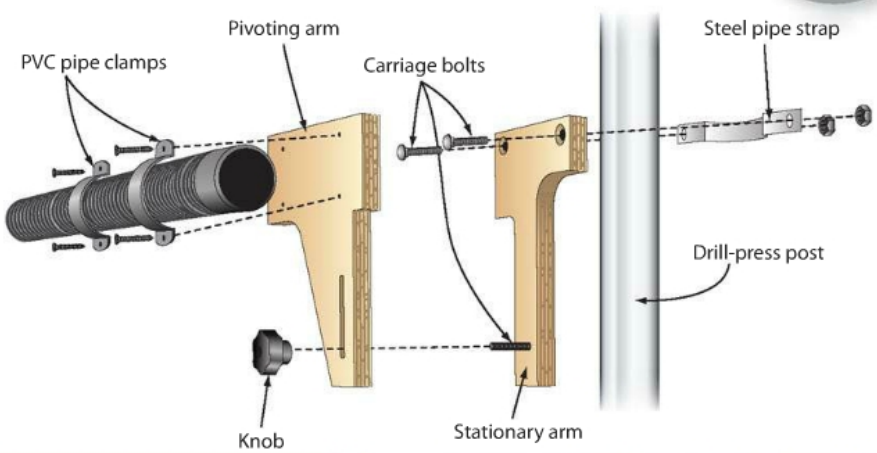
## Drill-press mount controls unruly dust-collection hoses

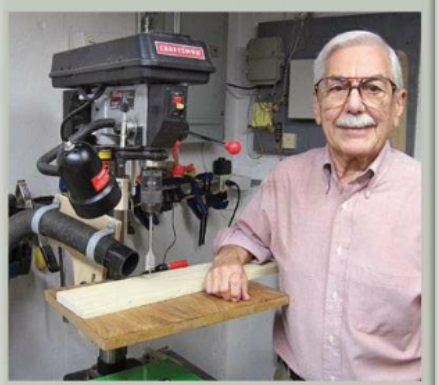
I struggled to find a good way to hold a shop-vacuum hose to capture debris generated by my drill press. The hose has a mind of its own, and no amount of tape or coat-hanger wire could keep it pointed where I wanted. So I built this swiveling hose mount, and it does the trick perfectly.

To make one, cut and drill the pivoting and stationary arms to shape from ¾" plywood, as shown. Fasten the pivoting arm to the stationary arm with a carriage bolt and knob, and then fasten the assembly to your drill-press post with countersunk carriage bolts and a steel pipe strap. Attach the vacuum hose using PVC pipe clamps, and you're set.

*—John Cusimano, Lansdale, Pa.*



*For sending this issue's Top Shop Tip, John receives a Jet AFS-1000B Air Filtration System worth $370.*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 *continued on page 18*

# INTRODUCING THE NEW PM1000 TABLE SAW


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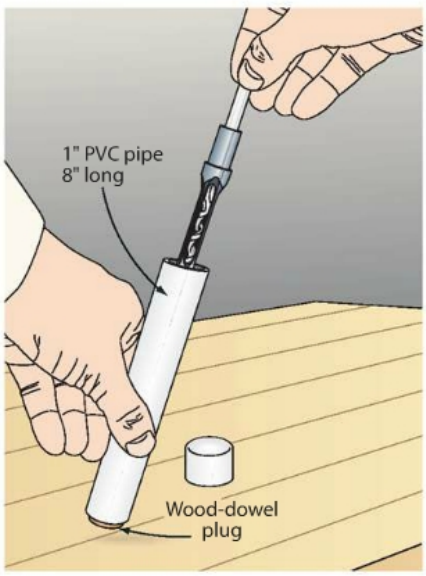
# Shop Tips

## Cover mortiser chisels with protective PVC

Instead of letting my mortiser's hollow chisels roll around freely inside a drawer where they could get damaged, I made a few simple PVC sheaths. Just plug one end with a scrap of wood dowel, drop in a chisel, and top the pipe with a PVC cap.

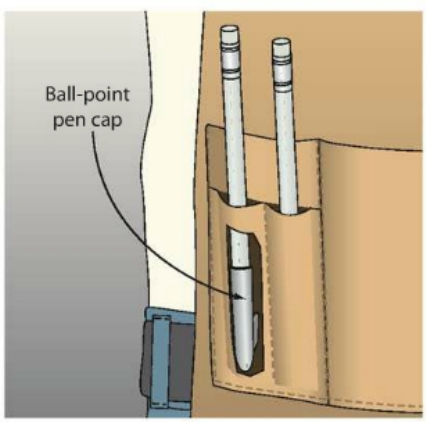
*—Bill McNeil, Bandon, Ore.*




## Protect pencil points in your pocket

It's frustrating to hear the "snap" of a pencil's graphite tip breaking as you return it to your shop apron. Rather than constantly resharpen broken ends, protect them with the cap from a spent ballpoint pen. Trim off the clip and slip the cap into the bottom of your apron's pencil pocket. Then, write off broken pencil tips for good!

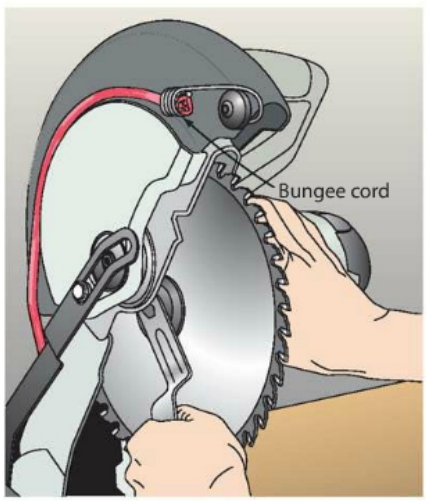
*—Serge Duclos, Delson, Que.*



## Bungee cord keeps mitersaw from dropping its guard

My mitersaw's blade guard works well—so well, in fact, it's difficult to keep it out of the way when I change blades. To overcome this, after unplugging the saw, I hook a short bungee cord between the front of the blade guard and the miter handle at the rear of the saw. This keeps the guard up and out of the way.

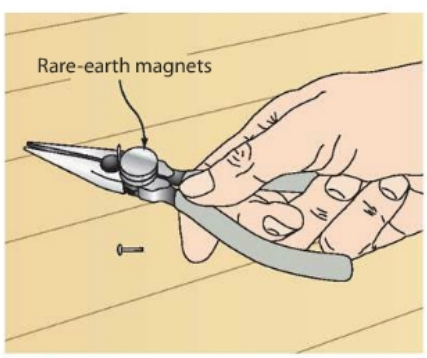
*—Father Chrysanthos, Etna, Calif.*




## Snip-don't-sling nail-trimming trick

Have you ever trimmed off a nailhead (to make a pivot for a circle-cutting jig, for instance) using a pliers' side cutter only to have the tip fly willy-nilly into some distant corner of your shop? Spare yourself the frustrating search for it and protect your eyes by placing rare-earth magnets on the side of your clippers or pliers, against the nail. The magnets prevent the trimmed end from ejecting.

*—Charles Mak, Calgary, Alta.*




*continued on page 20*

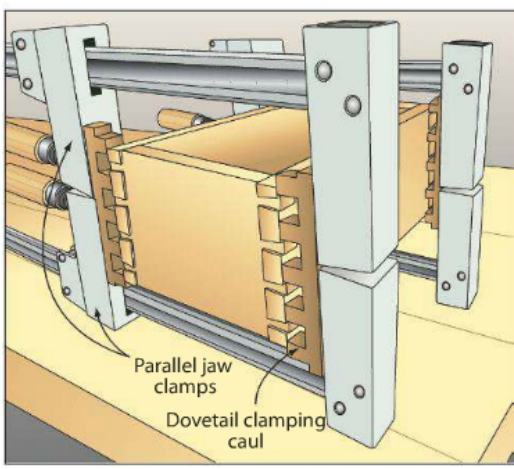
# Shop Tips

## Clamp 'tails tight with comblike cauls

If you've cut the pins and tails of a dovetailed joint correctly, they should stand slightly proud when joined. But clamping directly over the dovetailed joint doesn't hold things tight because the clamp only touches the tips of the pins, not the sides of the tails. And if you try to skirt this by placing the clamps just behind the joint, you run the risk of overtightening and bowing the project sides.

So, I've cut a few sets of custom clamping cauls that apply pressure only to the sides of the tails. You can use a box-joint jig or dovetail jig to make them if the spacing works. Finish the cauls with a couple of coats of polyurethane to keep glue from sticking them to the project.

*—Bob Hunter, WOOD® Magazine Tools Editor*



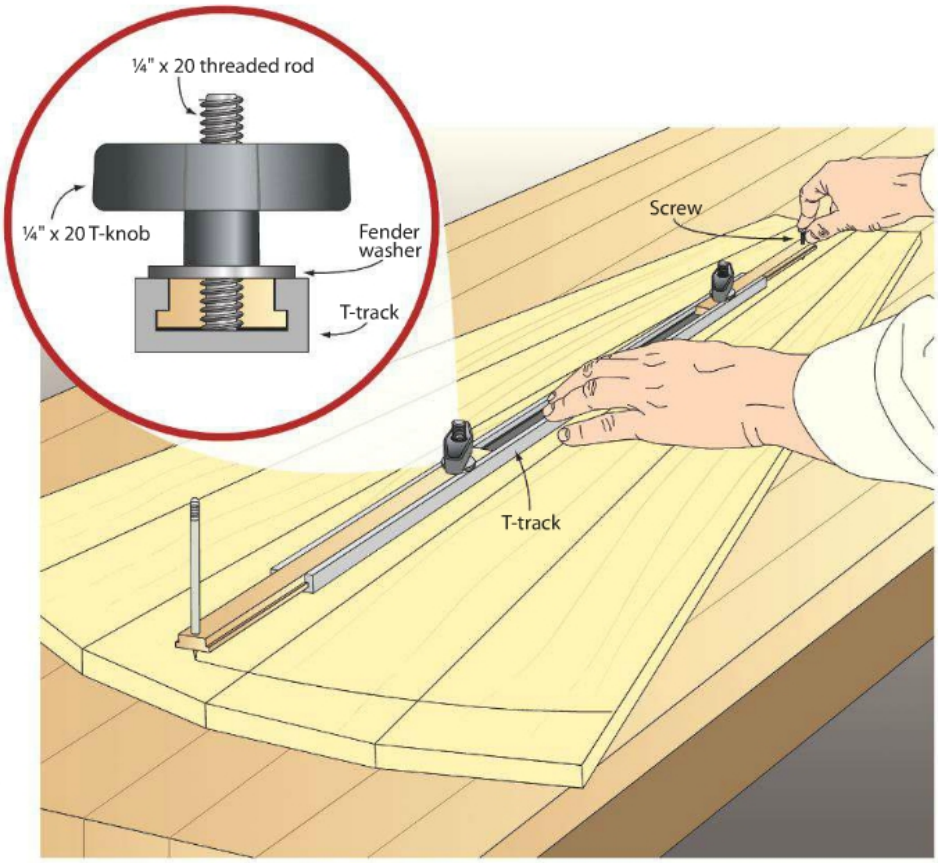
## Adjustable compass swings wide for big arcs

When laying out the semicircle on the backrest of an Adirondack chair, I found I needed a compass. A big one.

Here's how to build an adjustable beam compass that fits the bill: First, cut and rabbet two pieces of scrap hardwood to fit inside a length of aluminum T-track. Drill a 3/16" hole in each piece and twist in a length of ¼"×20 threaded rod. On the opposite end of one piece, drill a hole to snugly fit a pencil. In the other piece, drive a screw to serve as a trammel point. Slide the scraps into the T-track and tighten them with a fender washer and T-knob.

After setting the distance between the pencil and screw to the needed radius, I scribed a perfect sweeping top on my project.

*—Gary Dean, Prince George, B.C.*






*continued on page 22*

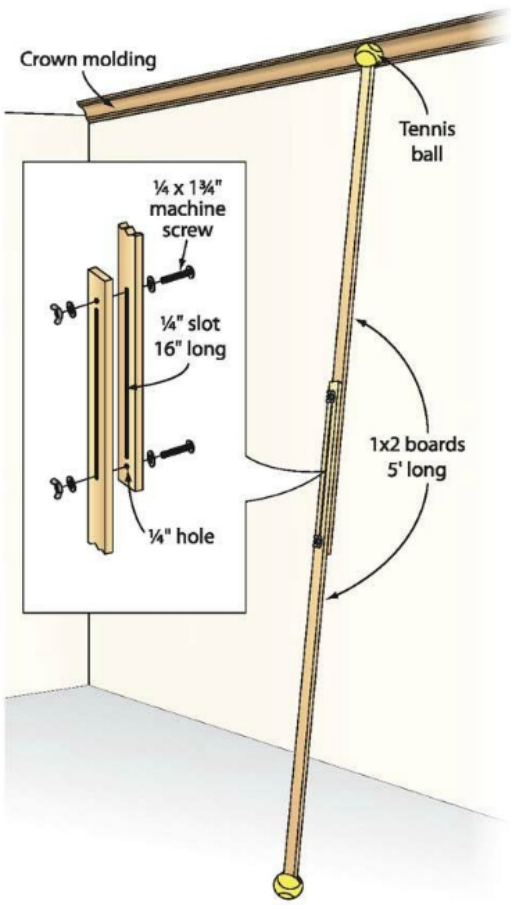
# Shop Tips

## Crown-molding support acts as an extra set of hands

Holding up crown molding by yourself while nailing it in place can be a real balancing act. A quick trip to the home center produced all the parts I needed to build a support for the task: a 10'-long 1×2, a pair of flathead machine screws, washers, and corresponding wing nuts. I had a couple tennis balls already, but you may need to purchase a tube of those.

Saw the 1×2 into 5' lengths and cut a 16"-long, ¼"-wide slot in one end of both halves. Drill a ¼" hole above both slots for the machine screws and assemble as shown. A tennis ball skewered on each end of the support prevents it from marring the molding or slipping off when in use.

*—Oneil Long, Mound City, Mo.*

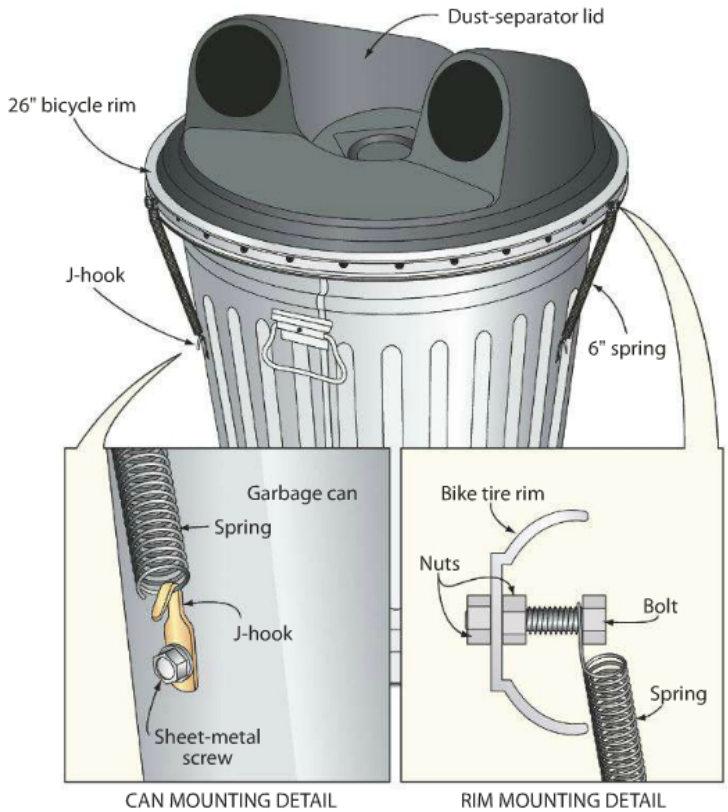


## Bike rim gets new life as dust separator hold-down

I bought one of those inexpensive plastic dust-separator lids for a 30-gallon trash can, but it fit so loosely, the lid lifted any time one of the collector's 4" hoses moved.

Here's a solution I found hanging in my garage: an old 26" bicycle wheel without its spokes. Mount the bike rim to the lid by passing bolts through 6" springs and the rim's spoke holes, as shown. Slip the other ends of the springs over J-hooks attached to the can, as shown. The springs provide holding power, but release quickly for easy emptying.

*—Lee Nye, Naperville, Ill.*




CAN MOUNTING DETAIL RIM MOUNTING DETAIL

# Tile-top Accent Table

With only five different parts and an 18" tile, you can build this distinctive piece quickly.

Dimensions: 24"W × 24"D × 24"H
Approximate materials cost: $80

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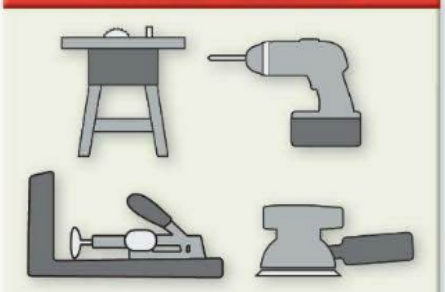


## Build the base

**1** From ¾" stock, cut the legs (A) and stretchers (B) to size [**Materials List, Drawing 1**]. Mark the locations of the half-lap notches on the stretchers [**Drawing 1a**]. With an auxiliary face attached to your tablesaw's miter gauge, and the blade set 1¼" high, cut the notches [**Photo A**].

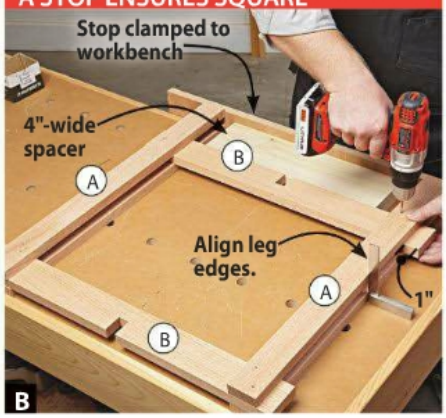
***Quick Tip!*** *Work your way up to a perfect fit by cutting the half-lap notches slightly narrow initially and dry-fitting them to their mating piece. Then, trim the half-laps wider if necessary. You'll avoid loose joints due to slight variations in workpiece thickness.*

**2** Lay out the hole locations on four of the legs (A) [**Drawing 1b**]. Using two marked and two unmarked legs, stack, align, and square one leg assembly (A/B) [**Photo B**]. Orient the stretchers as shown and allow them to overhang the legs by 1". Drill 7/64" pilot holes on the marks [**Drawing 1**]. (The 5/16" holes will be drilled later.) Join the legs and stretchers with glue and temporary #8×2" wood screws.

**CUT PRECISE HALF-LAPS**


Position a stopblock to cut one side of the notch in each of the stretchers (B). Rotate the board to make the opposite cut and nibble away the center.

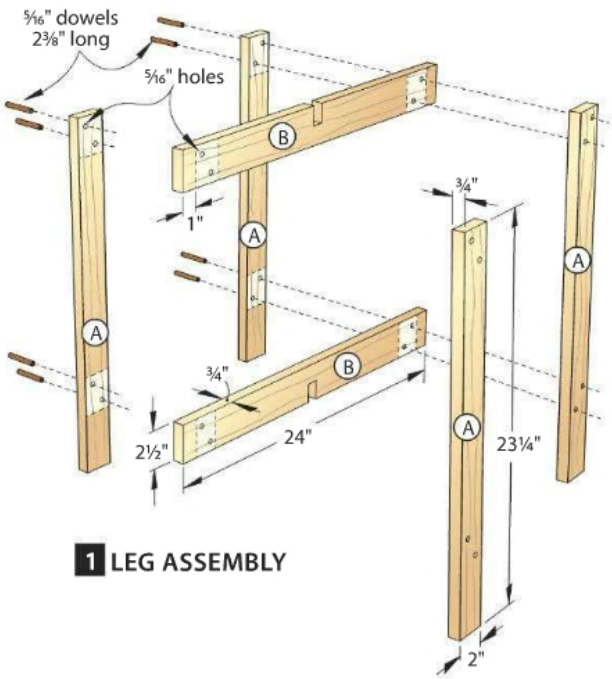
**A STOP ENSURES SQUARE**



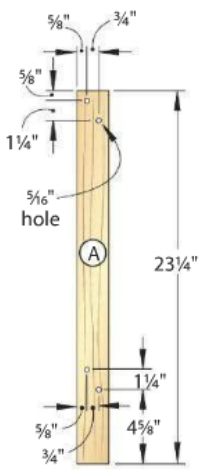

Use a square and a stop clamped against the edge of your workbench to align the legs (A). A scrap board spaces the bottom stretcher (B) for drilling.

**POUND THAT PEG**

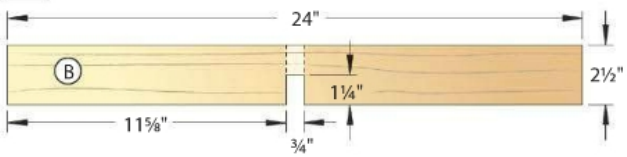

Hammer the dowel through the leg joint and into the hole in the backer to leave it proud on both sides while also preventing grain tear-out.




**1 LEG ASSEMBLY**




**1b LEG**




**1a STRETCHER**

Lay out the second leg assembly, being careful to orient the notch in the bottom stretcher so it faces up to mate with the first leg assembly bottom stretcher. Drill the second leg assembly, then assemble it, leaving the top stretcher (B) out for now. Allow the glue to dry.

**3** Cut 16 lengths of 5/16" dowel 2⅜" long. Remove a screw and, at its hole, drill a 5/16" hole through the joint, backing the hole with a piece of scrapwood to prevent tear-out. Without moving the assembly, add glue to the hole and pound in a dowel [**Photo C**].

***Quick Tip!** Use a twist bit to enlarge the holes for dowels. The conical tip self-centers and follows the straight path of the screw holes.*

**4** Apply glue to the half-lap notches on the bottom stretchers (B) of the leg assemblies (A/B) and assemble the two, clamping them at the joint. Retrieve the remaining stretcher, apply glue where it meets the legs, and to the half-lap where the stretchers meet, and carefully slide

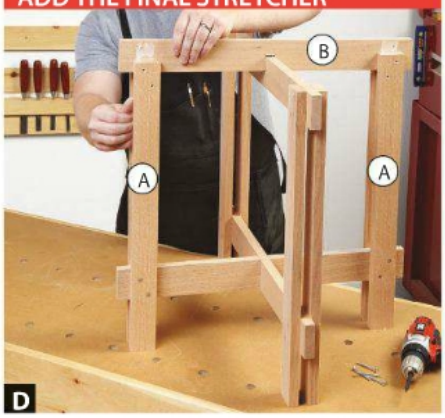
## Make mine mahogany

Add a Greene & Greene flair by trading oak for mahogany and making a few other subtle changes. Here's how:

First, make the stretchers (B) 24½" long so they extend just beyond the top, calling to mind the look of through-tenons common in the Arts & Crafts style.

To add a hint of the pillowed ebony plugs typical of the Greene & Greene style, cut 32 lengths of 5/16" dowel, 1¼" long. After rounding one end of each with sandpaper, use ebony dye (Lockwood #327, wdlockwood.com) to blacken the ends. After the dye dries, top it with a clear coat to keep it from bleeding onto the surrounding wood. Allow it to dry. Add glue to the peg holes. Then, protecting the ends with cloth or leather, pound in two dowels per hole, one from each side of the leg, leaving the rounded end proud.

ADD THE FINAL STRETCHER

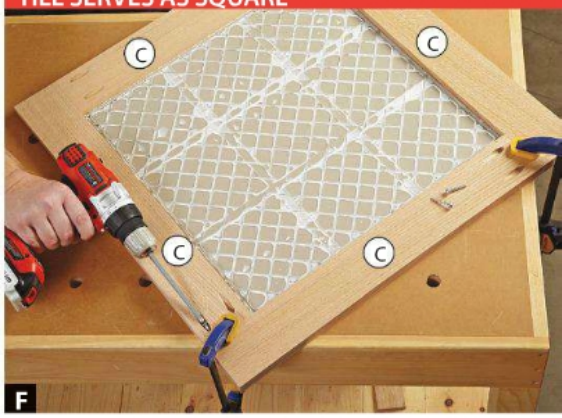



Spread the legs (A) apart slightly while lowering the stretcher (B) into place to avoid smearing glue on visible surfaces.

MARK FOR PRECISE LENGTH


Because tile dimensions can vary, arrange the top trim pieces (C) in an overlapping pattern around the 18" tile to mark each board's actual length.

TILE SERVES AS SQUARE




Assemble the top trim pieces (C) with the tile set in place to reduce movement and maintain square while driving the screws.

the stretcher in place between the legs [**Photo D**]. Screw the legs to the top stretcher and allow the glue to dry.

**5** Remove the screws. Drill and peg the remaining holes with dowels and allow the glue to dry. Trim the dowels flush with a flush-trim saw (see **Supplies on Demand**) and sand away saw marks.

***Quick Tip!*** ***Surround the protruding dowels with masking tape to protect the wood from saw-tooth marks.***

## Top the table

**1** From ¾" stock, cut the top trim pieces (C) to width and 1" longer than the finished length [**Materials List, Drawing 2**]. Use the 18" tile to help determine the final length of each trim piece [**Photo E**]. Then, crosscut the trim pieces on the marks.

**2** Drill pocket holes through one end of each top trim piece (C) on the bottom face. ***Note:*** *Drill the pocket holes parallel to the edges [**Drawing 2**]. That ensures that the screw threads grip tightly in the cross grain of the mating piece.* Then, join the trim pieces together with pocket screws [**Photo F**].

**3** Clamp the top assembly (C) in position centered on the leg assembly (A/B). Drill and screw the top assembly in place using #8×2" screws [**Photo G**]. Set the tile in place and measure the lip formed by the top assembly (C) [**Photo H**]. From scrap ¾" stock, rip two short shims (D) and one long shim (E) to that thickness [**Photo I**].

**4** Glue the shims (D, E) to the top stretchers (B) [**Drawing 2**], allow the glue to dry, and apply a clear finish. (We used a shop-made wiping varnish. See **Easy clear-coat recipe is in the can**, *next page*.) When the finish has cured, add a bead of silicone caulk to the shims and press the tile in place.

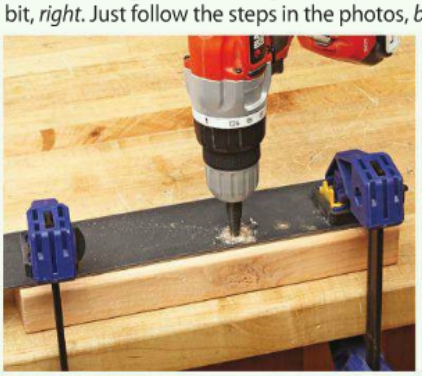
# SHOP TIP

## Perfect-fit dowels with a handmade plate

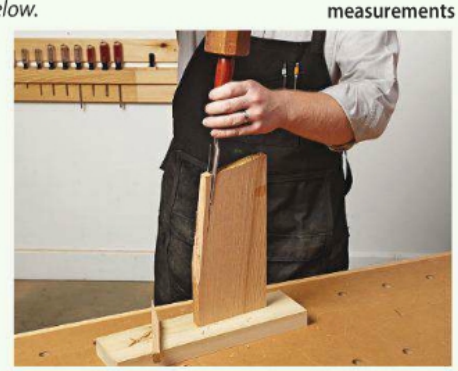
Even if your home center carries oak dowels, the shape might not match your drilled hole. That's because dowels often ship in a less-than-dry condition. As it dries, wood shrinks at different rates depending on the grain direction. So you're often purchasing oval-shaped sticks.

The solution: a dowel plate that helps you make your own dowels from project stock. You can find commercial dowel plates, or quickly make your own low-dough version using a small plate of mild steel and a stepped drill bit, *right*. Just follow the steps in the photos, *below*.

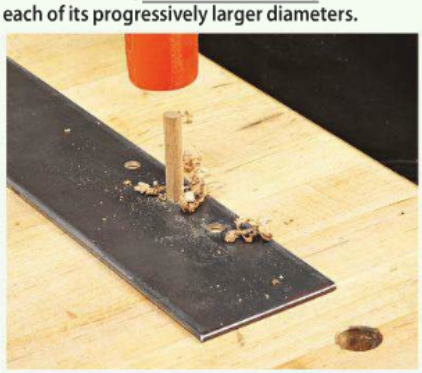
To easily choose the correct diameter, this stepped drill bit (Milwaukee Tools, no. 48-89-9100, milwaukeetool.com) has etched measurements at each of its progressively larger diameters.



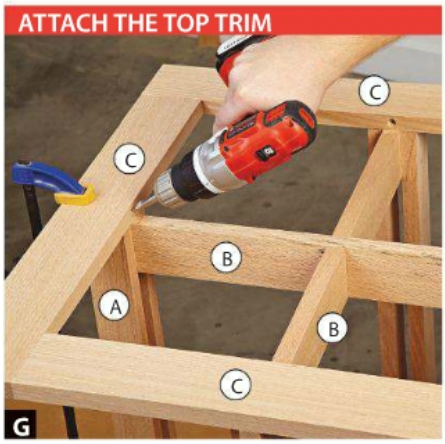
With the steel plate and a backer board clamped to your worksurface, drill ⅜", 11/32", and 5/16" holes through the steel plate.



Chop lengths of your project stock from a piece of scrap, splitting the wood along the grain. Plane, file, or sand the dowel blanks to roughly ⅜" diameter.



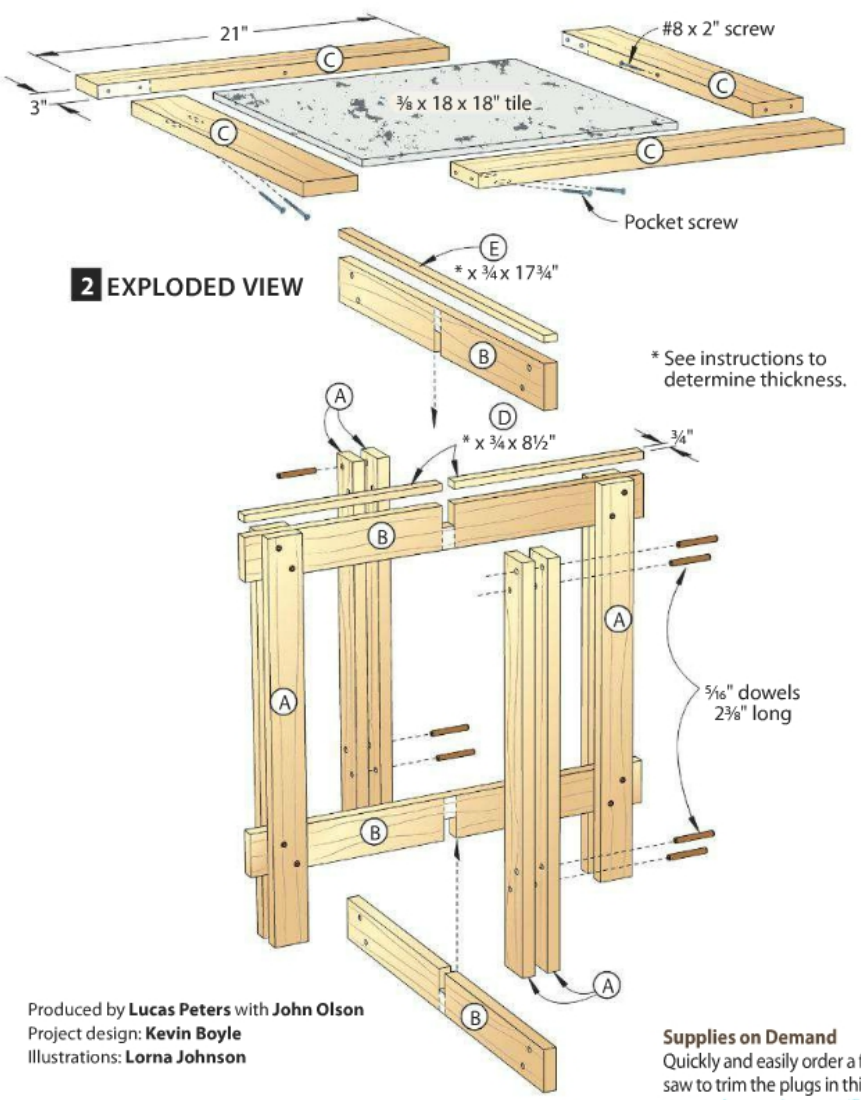
With the dowel-plate hole aligned over a dog hole, pound the blank first through the ⅜" hole, then the 11/32" and 5/16" holes.




Drill and countersink 7/64" holes at an angle through the edges of the top assembly (C) into the stretchers (B) before driving the screws.


Measure the difference in height between the tile and the top of the top trim (C) by resting a combination square on the top trim.


Use a long, heeled pushblock to cut the shims (D, E) without kickback. The block's height keeps your fingers a safe distance from the blade.




Produced by **Lucas Peters** with **John Olson**
Project design: **Kevin Boyle**
Illustrations: **Lorna Johnson**

## Easy clear-coat recipe is in the can

Because of the pounding this project takes during assembly, it would be inadvisable to prefinish the parts. But that leaves difficult nooks and crannies for post-assembly finishing. So we turned to one of our (and soon to be one of your) favorite finishes: wiping varnish.

To make some, thoroughly stir a can of oil-based polyurethane. Then, mix equal parts of the poly with mineral spirits in a separate, sealable container.

Dip a folded shop towel in the mixture, squeeze out the excess, and simply wipe down the project, ending by wiping in the direction of the grain to avoid streaks. Don't try to build a finish in a single coat; simply wet the wood.

Wiping varnish spreads and dries fast so it settles flat and defect-free before drying. Allow two hours drying time between each of three coats. The next day, sand with 320-grit sandpaper before repeating the process with two more sets of three coats. As always with an oil-based finish, lay rags out flat to dry before disposing of them.


## Materials List

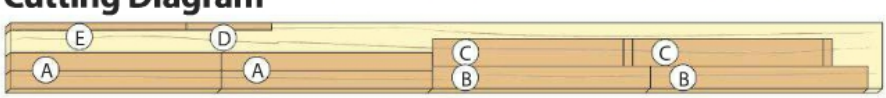
| Part | | FINISHED SIZE T | W | L | Matl. | Qty. |
|---|---|---|---|---|---|---|
| A | legs | ¾" | 2" | 23¼" | O | 8 |
| B | stretchers | ¾" | 2½" | 24" | O | 4 |
| C* | top trim | ¾" | 3" | 21" | O | 4 |
| D | short shims | † | ¾" | 8½" | O | 2 |
| E | long shim | † | ¾" | 17¾" | O | 1 |

*Parts initially cut oversize. See the instructions.
† See instructions to determine thickness.

**Materials key:** O–oak
**Supplies:** #8×2" wood screws (16), #8×1¼" fine-thread pocket-hole screws (8), 5/16" dowel, 18" tile, silicone caulk.
**Bits:** 7/64" and 5/16" drill bits.

**Supplies on Demand**
Quickly and easily order a flush-trim saw to trim the plugs in this project at woodmagazine.com/flushtrim.

## Cutting Diagram




¾ x 7¼ x 96" Oak (5.3 bd. ft.) (2 needed)

# Arch-handle Serving Tray

Overall dimensions:
18⅝" W × 12" D × 4" H

**Build this elegant and functional carrier in a weekend. A figured wood, such as curly maple, really makes it pop.**

## Handle the handles first

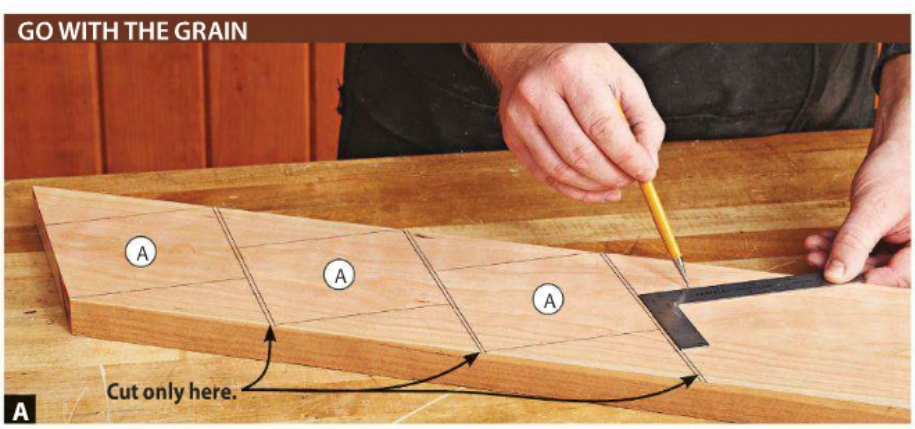
**1** From 1"-thick cherry, lay out and crosscut four half-handle blanks (A) to length [**Drawing 1, Photo A**]. (See the **Shop Tip** about grain orientation for these parts on the *next page*.) Leave the half-handle blanks as parallelograms to make **Step 2** easier.

**2** Install a ⅜" stacked dado set in your tablesaw and cut a centered dado in the jointline ends of each half-handle blank (A) [**Drawing 1, Photo B**]. (Add an auxiliary fence to your tablesaw's rip fence if you need additional vertical support to prevent wobbling.) When done, rip the blanks to 4½" square.

**3** From contrasting stock—we used curly maple—plane to thickness a 4½×12" blank for the handle splines (B), two 2×19" blanks for the tray sides (C), and two 2×13" blanks for the tray ends (D). These blanks should fit snugly in the dadoes cut earlier [**Drawings 1** and **2**]. Set the tray blanks aside, and cut the handle splines to size [**Materials List**]. Create a 9"-wide handle assembly by gluing a spline into each pair of mating half-handle blanks (A).

**4** After the glue dries, clean up and flatten the bottom edge of each handle assembly (A/B), and then cut a ⅜×2" groove—again in four passes—in each [**Drawing 1a**]. Rip away ½" from what will be the inside "leg" of each handle assembly [**Photo C**].

**5** Use a compass to lay out the top and bottom arcs for the handle assembly (A/B) [**Drawing 1**]. Mark the locations for the screw holes on the outer face of each assembly, and drill the counterbores and shank holes in the outer legs only. Bandsaw and sand the handles to shape, and rout ¼" round-overs along the edges. Sand to 220 grit.

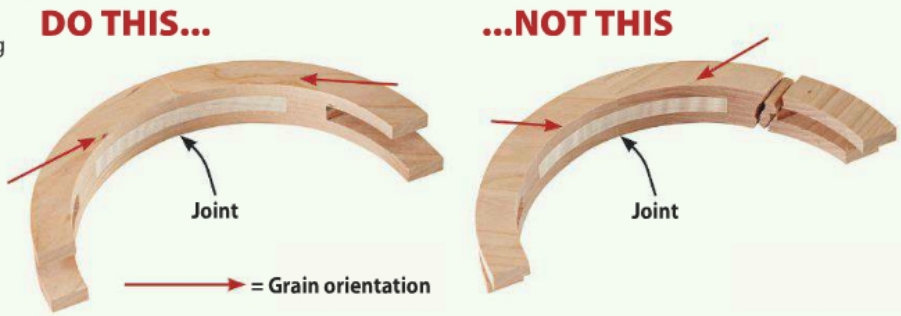


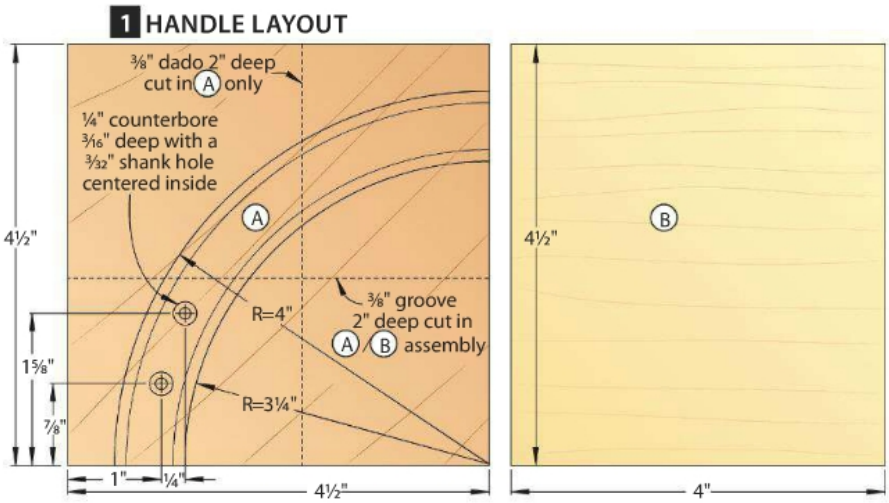

Lay out the handle blanks as shown, so the grain runs from point to point. We oriented ours at 30°, but that might vary, depending on your board's grain.

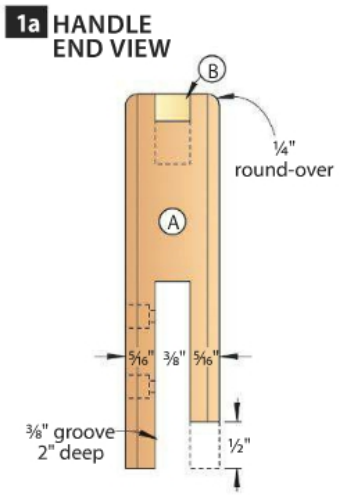
## SHOP TIP

### Arched-up grain makes for stronger handles

Position the half-handle blanks (A) in pairs end to end to determine the most appealing matches. Orient the grain in each blank so it angles up, forming a cathedral "arch" at the joint, as shown *right*. Mark each pair across the jointline to match them up again later. The handle at *far right* was glued up with the grain of each blank angling downward at the joint, creating lots of short grain that could break, as shown, during assembly or later during use.




## Now build the tray

**1** Retrieve the blanks for the tray sides (C) and ends (D). Arrange the parts as you want them for the tray [**Drawing 2**] and mark them for easy reference during machining and assembly. Rip a groove along the bottom inside face of each blank to match your tray bottom's (F) thickness [**Drawing 2**].

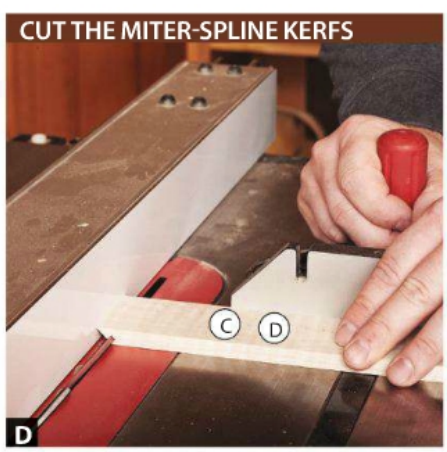
**2** Tilt the tablesaw blade to 45° and miter-cut the tray sides (C) and ends (D) to length [**Drawing 2**].

**3** With the blade still tilted to 45°, cut 3/16"-deep kerfs in the miters of each tray side (C) and end (D) for splines [**Drawing 2, Photo D**].

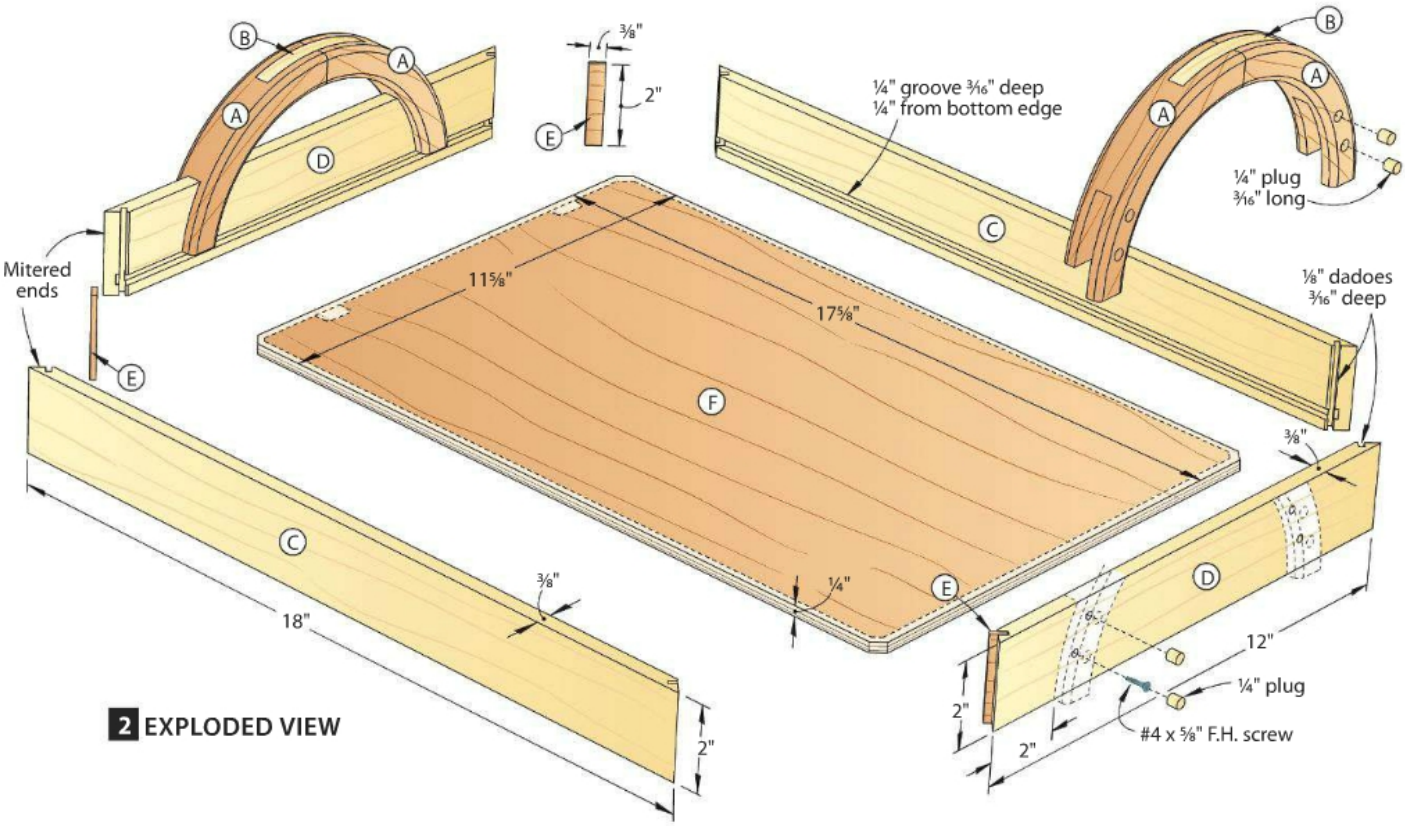
***Quick Tip!*** *Use a 50-tooth combination blade to cut these narrow dadoes. In addition to left- and right-beveled teeth, it includes flat-topped raker teeth for cutting a flat-bottom channel perfect for splines.*


Because cutting end grain can be tricky, cut the 2"-deep dado in four ½" increments. Hold the blank securely against the rip fence with a pushblock.


Raise the blade so it cuts through the inside leg (resting on the tabletop) without cutting into the other leg.




To cut the corner-spline kerfs, hold a workpiece against the miter gauge and use the rip fence as a stop, a safe cut since it's not a through-cut.




**2** EXPLODED VIEW

**5** Mill a ⅛×2×12" tray spline (E) blank from cherry. Check its fit in the dadoes; cut a thinner or thicker blank if needed. Crosscut the splines to length to fit snugly in the mated kerfs [**Drawing 2**].

**6** Cut the tray bottom (F) to size, miter-cutting the corners to allow for the tray splines (E) [**Drawing 3**]. Dry-assemble the tray (C–F) to check the fit of all joints. Finish-sand the inside faces for the tray sides (C) and ends (D) and both faces of the bottom (F) to 220 grit.

**7** Assemble the tray (C–F), applying glue in the spline kerfs, on the miters, and in the bottom groove. When dry, sand the tray's edges and outer faces to 220 grit.

## Bring it all together

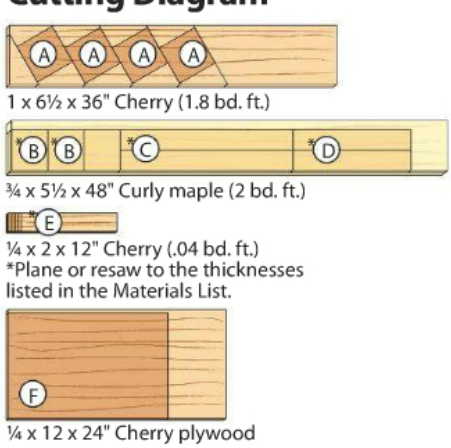
**1** Apply a light coat of glue to the inside legs of one handle assembly (A/B) and slide it onto a tray end (D), centering it side-to-side. Add a tape flag to a 1/16" drill bit 13/16" from the tip and drill pilot holes for the mounting screws. Then, secure the handle with screws [**Drawing 2**]. Wipe away any excess glue with a damp rag. Repeat for the other handle.

**2** Use a ¼" plug cutter to make maple plugs. Glue the plugs into the screw counterbores. Trim and sand smooth when dry.

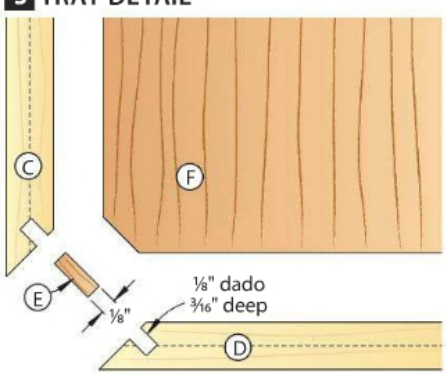
**3** Apply a finish. We used natural Watco Danish Oil finish to bring out the highlights in the figured maple. Then, we applied three coats of Old Masters water-based satin polyurethane to provide resistance against spills or condensation from cold drinks.


Produced by **Bob Hunter** with **John Olson**
Project design: **Kevin Boyle**
Illustrations: **Lorna Johnson**


## Cutting Diagram




**3** TRAY DETAIL




## Materials List

| Part | | FINISHED SIZE T | W | L | Matl. | Qty. |
|---|---|---|---|---|---|---|
| A* | half-handles | 1" | 4" | 4" | C | 4 |
| B** | handle splines | ⅜" | 4½" | 4" | CM | 2 |
| C* | tray sides | ⅜" | 2" | 18" | CM | 2 |
| D* | tray ends | ⅜" | 2" | 12" | CM | 2 |
| E* | tray splines | ⅛" | 2" | ⅜" | C | 4 |
| F | tray bottom | ¼" | 11⅝" | 17⅝" | CP | 1 |

*Parts initially cut oversize. See the instructions.
**Size of blank before cutting to shape.

**Materials key:** C–cherry, CM–curly maple, CP–cherry plywood.
**Supplies:** #4×⅝" F.H. screws (8).
**Blade and bits:** Stacked dado set, ¼" round-over router bit, ¼" plug cutter, and ¼", 3/32", and 1/16" drill bits.

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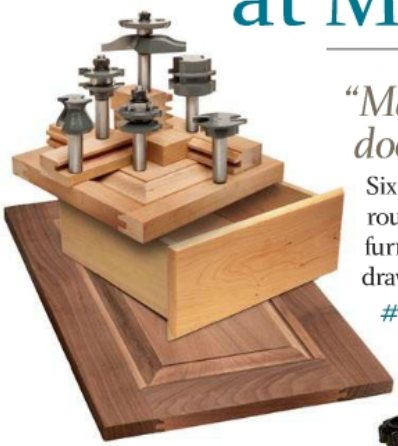

## *"Make cabinet doors & drawers"*

Six 1/2" shank carbide tipped router bits make kitchen and fine furniture raised panel doors and drawers. Undercutter set shown.

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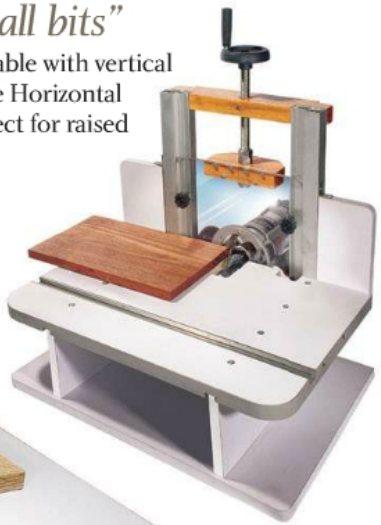

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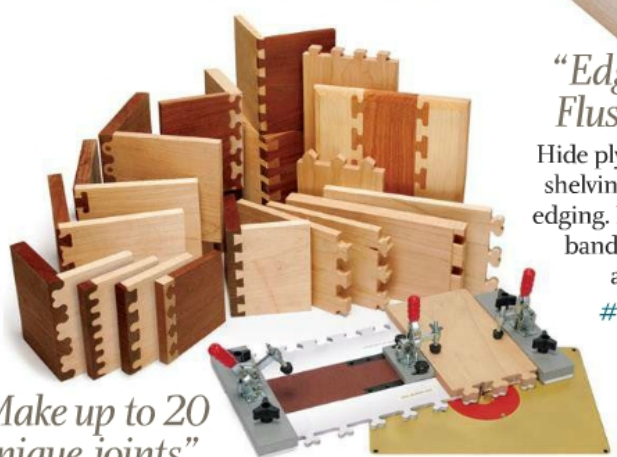

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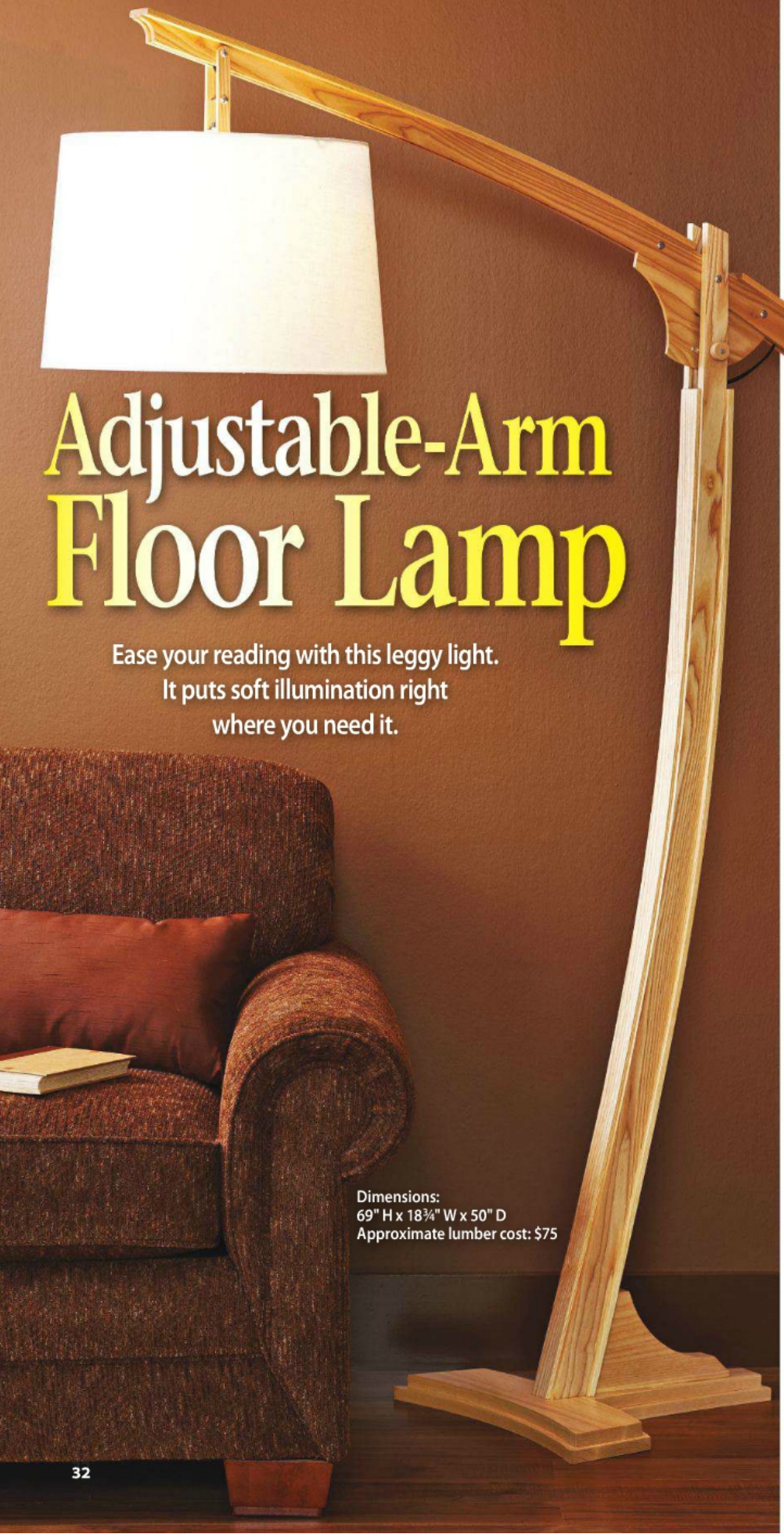
# Adjustable-Arm Floor Lamp

**Ease your reading with this leggy light. It puts soft illumination right where you need it.**



Dimensions:
69" H x 18¾" W x 50" D
Approximate lumber cost: $75

Sitting beside or behind your favorite chair, this lamp extends light right over your lap to illuminate your book, magazine, or whatever you're working on. The arm pivots and locks at three different heights so even if you move the lamp to a different location, simply adjust it to put light at just the right position.

To make the electric portion of the project easier for you, we've assembled a kit with all the required lamp hardware [**Source**, *page 38*]. All you need to do is buy lumber (we used ash) and choose a lampshade to match your decor. And if you decide to do the wiring yourself, a free online video walks you through that process [**More Resources**, *page 38*].

## Build with grace under pressure

**1** Cut blanks for the tower sides (A) to size [**Drawing 1**]. Then, cut the tower back (B) and tower front (C) 1" longer than listed [**Drawing 4**; **Materials List**, *page 38*]. Cut blanks for the arm sides (D) to size [**Drawing 2**], and arm cap (E) 1" longer than listed. (Later, you'll cut the arm cap into short and long sections.)

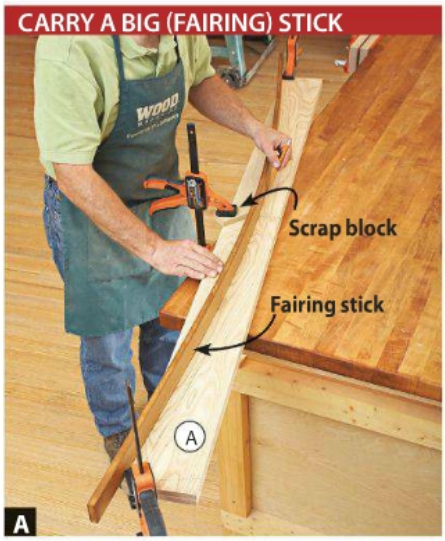
***Quick Tip!*** ***Use double-faced tape to stack the blanks for the tower sides and arm sides so you can lay out their shape and cut them to identical size at the same time.***

**2** On each stacked set of blanks, lay out the ends and peaks of the long curves [**Drawings 1** and **2**]. Cut a ½×2×72" MDF fairing stick. (See **More Resources** for information about fairing sticks.) Bend and clamp the fairing stick to follow your marks and trace arcs on both blank stacks [**Photo A**]. Then, lay out the end angles on both stacks, the tower back (B) length on the tower side blanks, and the radii at the ends of the arm side (D) blanks. Drill the ¼" holes in the blanks where shown.

**3** Miter-cut the ends of the tower sides (A) and arm sides (D). Then, bandsaw the curves, staying to the waste side of the layout lines, and sand to the lines. (See the **Shop Tip** on the *next page*.) Separate the tower sides and arm sides.

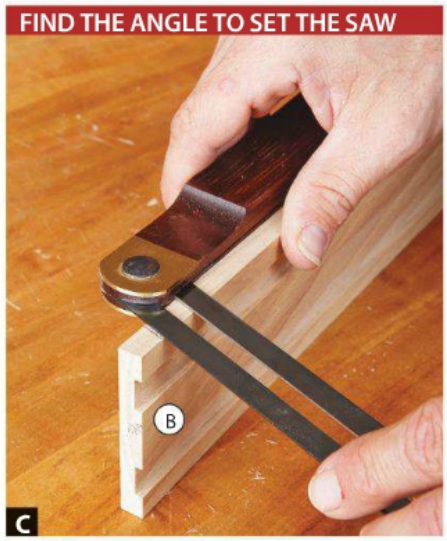
**4** Cut the grooves on the tower back (B) and the rabbets on the tower front (C) to accept the tower sides (A) [**Drawing 3**]. Set aside the tower front.

**5** Place the tower sides (A) on your bench with the crowns up and their ends flush. Clamp the tower back (B) to the sides and mark the bottom bevel

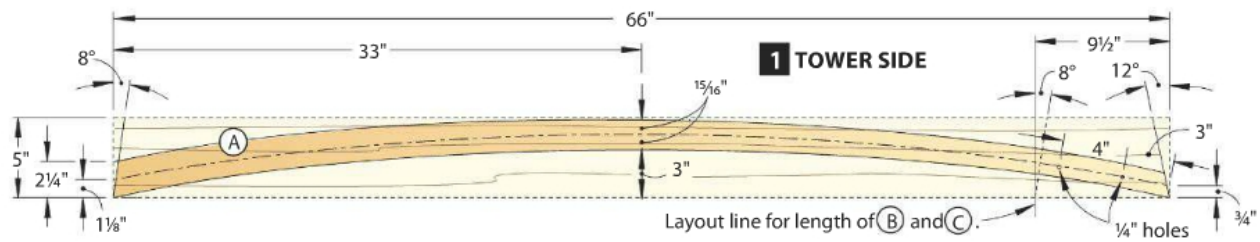


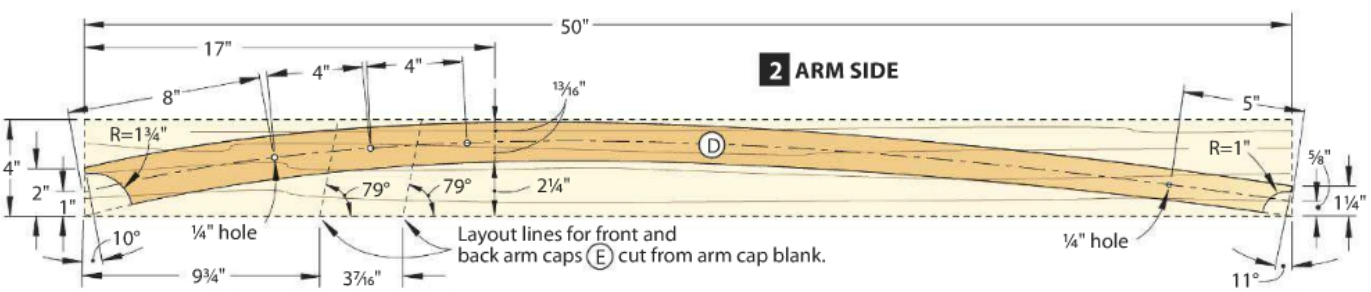

To draw an even curve on the tower side (A) and arm side (D) blanks, bend an MDF fairing stick and hold it in place with clamps and a piece of scrap.


Use a straightedge against the angled ends of the tower sides (A) to mark the angle of the tower back (B) end.

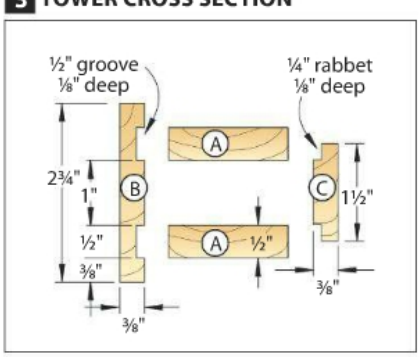



Match the bevel-gauge angle to the tower back (B) mark. Rest the bevel gauge on your mitersaw table and tilt the blade to match.



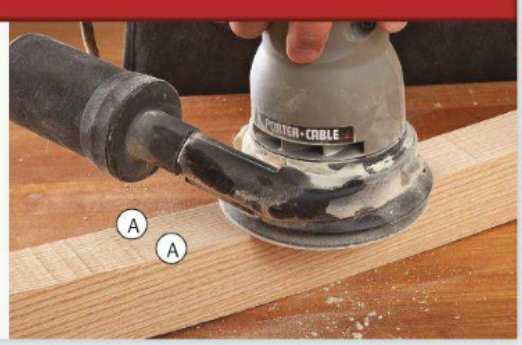

**3 TOWER CROSS SECTION**




## SHOP TIP

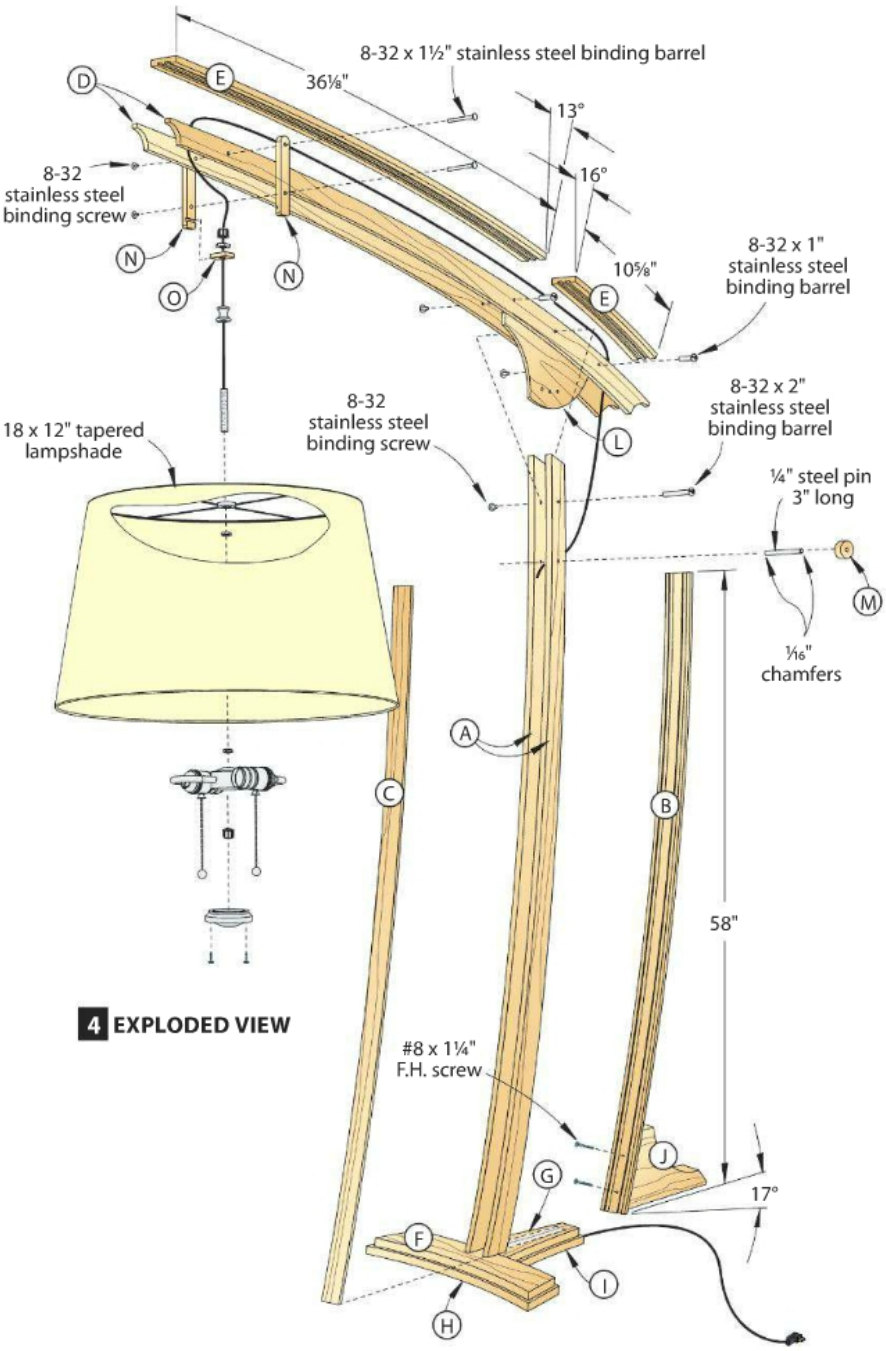
### Sand bandsawn curves smooth—the easy way

Your random-orbit sander's flat pad can handle gentle curves, like those on the tower sides (A) and arm sides (D), if you take long, sweeping strokes and keep the sander moving continuously to avoid creating scallops and flat spots.



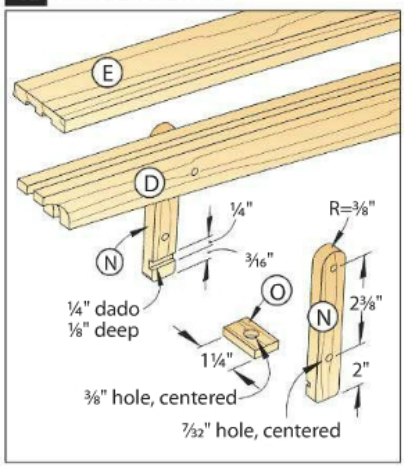

[**Photo B**]. Set a bevel gauge to align with the mark [**Photo C**] and use it to set the blade tilt on your mitersaw. Then, bevel-cut the bottom of the tower back.

**6** Cut three 1"-wide spacers from scrap and use them to separate the tower sides (A) as you lay them on your bench with the outside curves up. Clamp the tower back (B) to the sides and transfer the tower back length [**Drawing 1**] from the sides to the back. Unclamp the assembly and cut the back to length.

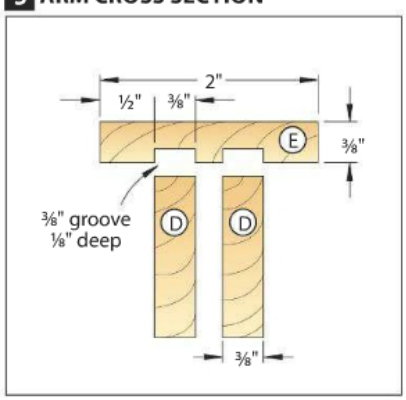



**4** EXPLODED VIEW

**4a** HANGER DETAIL




**5** ARM CROSS SECTION




**7** Apply glue in the grooves in the tower back (B) and clamp the tower back to the tower sides (A) with the bottom ends flush [**Drawing 4**].

***Quick Tip!*** ***Temporarily insert bolts in the holes to align the sides. Work your way up from bottom to top, clamping the tower back to the sides [Photo D].***

**8** Cut ⅜" grooves in the arm cap blank (E) [**Drawing 5**]. Tilt your mitersaw blade to 13° and bevel-cut the long arm cap to length [**Drawing 4**]. Reset the tilt to 16° and bevel-cut the short arm cap to length. Glue the caps to the arm sides (D) as in **Step 7** with the ends flush.

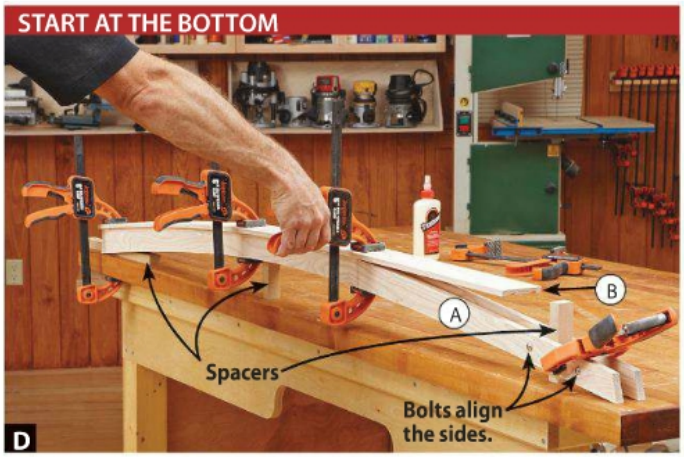
## Add a stable base and brace

**1** From ¾"-thick stock, cut blanks to size for the base upper front (F) and upper back (G) [**Drawing 7**]. Cut blanks for the base lower front (H) ⅛" wider and ¼" longer than listed, and for the lower back (I) ⅛" wider. Drill pocket holes 1" from each edge of the upper back blank and glue and screw it centered to the upper front blank [**Drawing 7**].

**2** Center a ⅜" groove ⅜" deep in the bottom face of the base lower back (I) to accept the electrical cord [**Drawing 6a**]. Then, center a ¾" groove ⅛" deep over the first groove. Drill pocket holes 1" from each edge of the lower back blank [**Drawing 6**]; then, glue and screw it to the lower front blank (H).

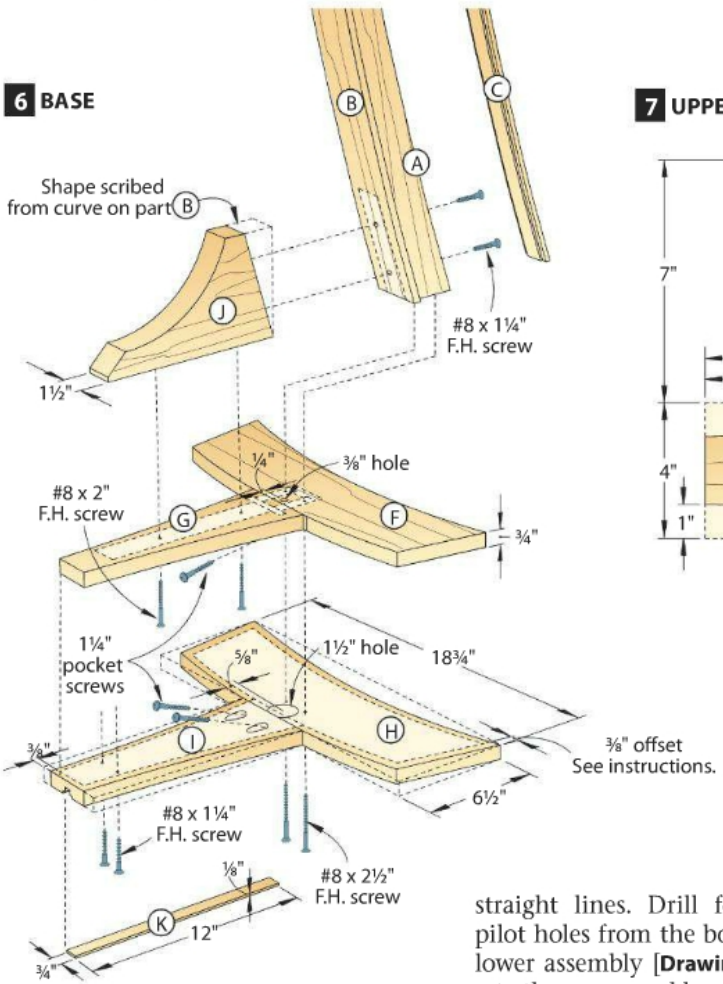
**3** Lay out the shape of the upper base assembly (F/G) [**Drawing 7**]. Bandsaw and sand to the lines. Using double-faced tape to join them, center the upper base assembly on the lower base assembly (H/I) with the end of the upper back (G) inset ⅜" from the end of the lower back (I) [**Drawing 6**].

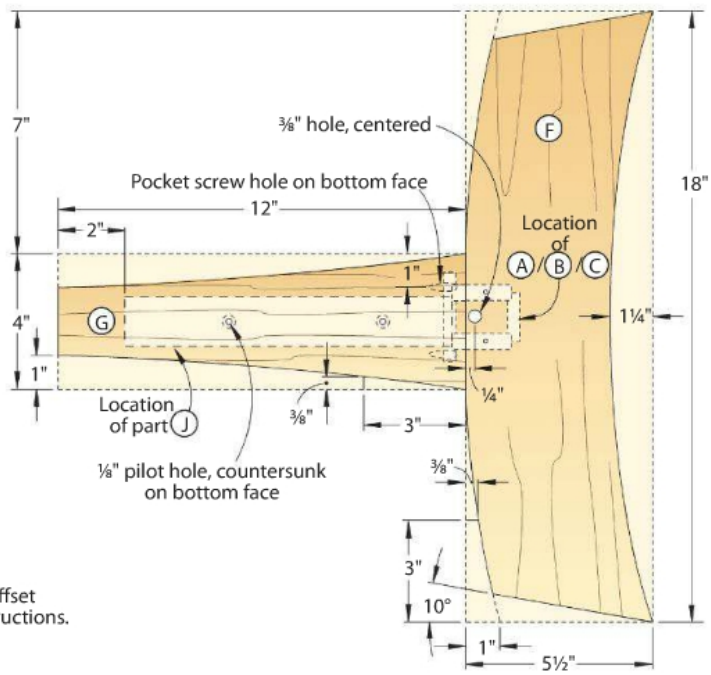
**4** On the lower base assembly (H/I), trace an offset ⅜" from the edges of the upper base assembly (F/G) [**Photo E**]. Mark over the rounded corners with

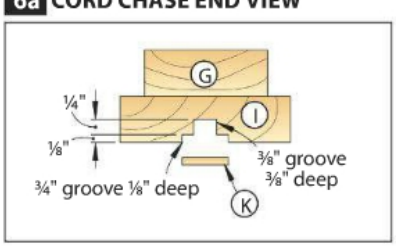



Insert 1" spacers to separate the tower sides (A). Glue the tower back (B) to the sides using clamps spaced about 1' apart.


With your pencil tip inside a ⅛x⅞" fender washer, trace around the upper base (F/G) to mark the lower base (H/I).



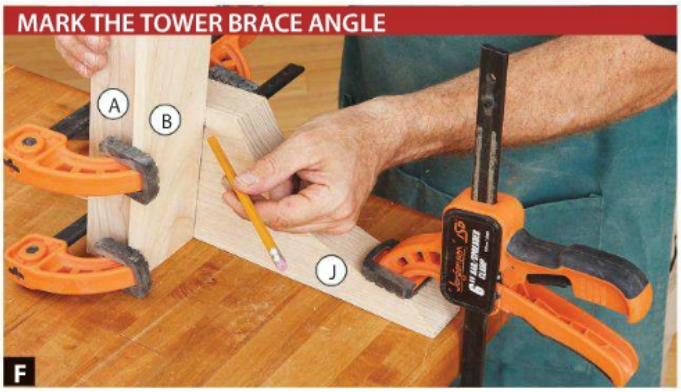

straight lines. Drill four countersunk pilot holes from the bottom of the base lower assembly [**Drawing 6**]; then, separate the upper and lower assemblies.

**5** Drill a ⅜" hole in the base upper front (F) and lower front (H) and a 1½" hole in the lower front centered end to end [**Drawing 6**]. Bandsaw and sand the base lower assembly (H/I) to the layout lines.

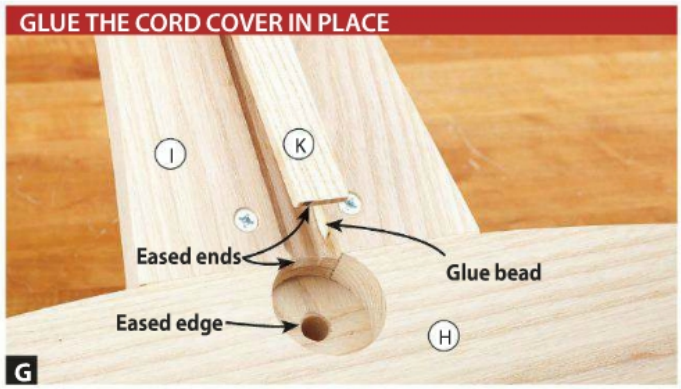
**6** Cut the tower brace (J) to shape except for the angled long end [**Drawing 8**]. Leave that square for now. Clamp the brace to your bench and the tower subassembly (A/B) to the brace, with the tower bottom flat on the bench [**Photo F**]. Trace the curve of the tower back (B) onto the brace. Bandsaw and sand to the line, and ease all the tower brace's upper edges.

**7** Glue and screw the tower brace (J) to the upper base assembly (F/G) [**Drawings 6** and **7**]. Then, glue and screw the upper base assembly to the lower base assembly (H/I).

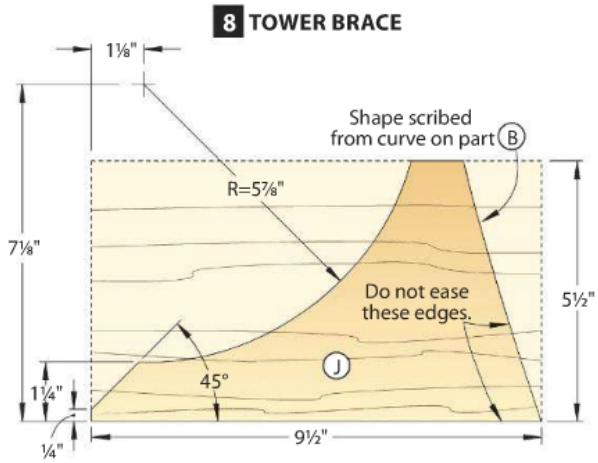
**8** Rip the cord cover (K) to fit the ¾"-wide groove in the base lower back (I) [**Drawing 6**] and sand the cover

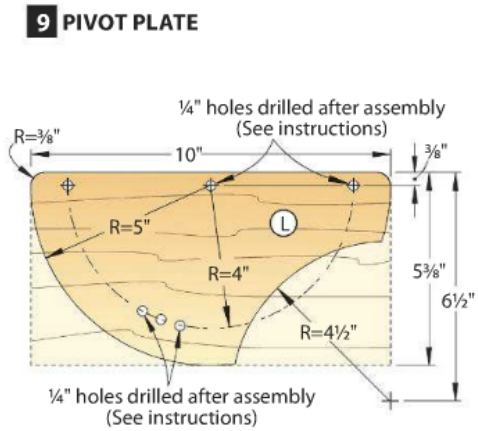



On a flat surface, clamp the tower assembly (A/B) against the side of the brace (J). Trace the slight curve of the back onto the brace.




Avoid glue squeeze-out in the cord chase by using thin glue beads in the groove corners. Eased edges reduce cord damage.




smooth. Ease the edge around the ⅜" hole and the ends (not the edges) of the cord cover. Then, glue the cord cover to the lower back [**Photo G**] and sand flush.

## Join the tower to the base

**1** Clamp the tower assembly (A/B) to the tower brace (J) [**Drawing 6**]. Then, drill and screw (but don't glue) through the tower back (B) and into the brace.

**2** Trace the tower assembly (A/B) on the base upper front (F) [**Photo H**]. Remove the tower assembly and drill pilot holes through the base assembly (F–K) [**Photo I**]. Countersink the holes on the underside.

**3** Glue and screw the tower assembly (A/B) to the tower brace (J). Using the pilot holes in the base assembly (F–K) as a guide, extend the pilot holes into the tower sides (A). Screw the tower assembly to the base assembly.

**4** Retrieve the tower front (C). Clamp it in place with the tower sides (A) seated in the rabbets. Transfer the angle of the tower to the bottom end of the tower front [**Photo J**], unclamp the tower front, and bevel-cut the end along the mark. Reclamp it to the tower sides with the end against the base upper front (F), mark the finished length using the mark on the tower side, and cut the tower front to length. Glue and clamp the tower front to the sides.

***Quick Tip!*** ***As you glue the tower front to the sides, apply glue only on the inside edge of the tower sides. The tower sides will hide any squeeze-out.***

## Raise your arm

**1** Lay out the pivot plate (L) shape and the center hole location [**Drawing 9**]. Cut and sand the part to shape, but do not drill the holes yet.

**2** Place the arm assembly (D/E) upside down on your bench and drop a ¼×¼" spacer between the arm sides (D) [**Photo K**]. Rest the pivot plate (L) on the spacer, aligning the hole-location mark with the center hole in the arm sides. Clamp a backer scrap to the far arm side. Drill through the holes in the near arm side and through the pivot plate. Remove the pivot plate, finish-sand it, and mount it between the arm sides with two 1" binding barrels and screws [**Drawing 4**].

**3** Insert the arm assembly (D/E/L) between the tower sides (A) and hold it in place with a 2" binding barrel and screw. Hold the end of the arm level while you support it with a 6'-long scrap [**Photo L**]. Clamp ¼"-thick scraps on both sides of the pivot plate (L) and drill the first hole.

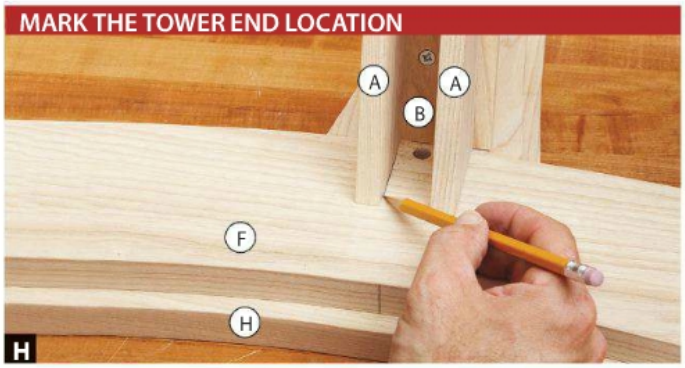
**4** Raise the long end of the arm assembly (D/E/L) 5" and drill a second hole through the pivot plate (L). Raise the arm another 5" and drill the third hole.

**5** To make the knob (M), draw a 1"-diameter circle in ½"-thick scrap and drill a ¼" hole at the center of the circle. Cut out the knob and sand it to 220 grit.

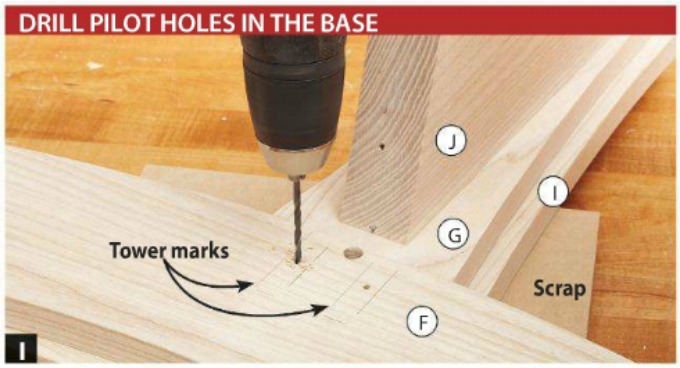
**6** Cut a ¼" steel pin 3" long. Sand or file the ends smooth and ease the edges. Apply epoxy to the pin end and insert it into the knob with the tip ¼" proud of the knob. After the epoxy cures, place the pin through the tower sides (A) and pivot plate (L).

## Hang the lampshade

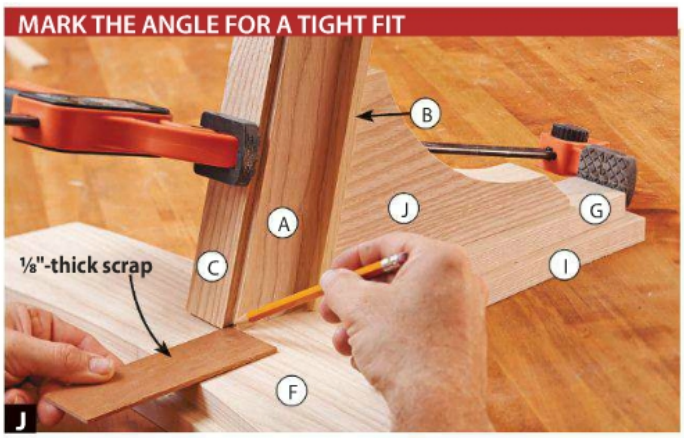
**1** From ¾" stock, rip a ¼×12" blank to make the hanger sides (N) and plate



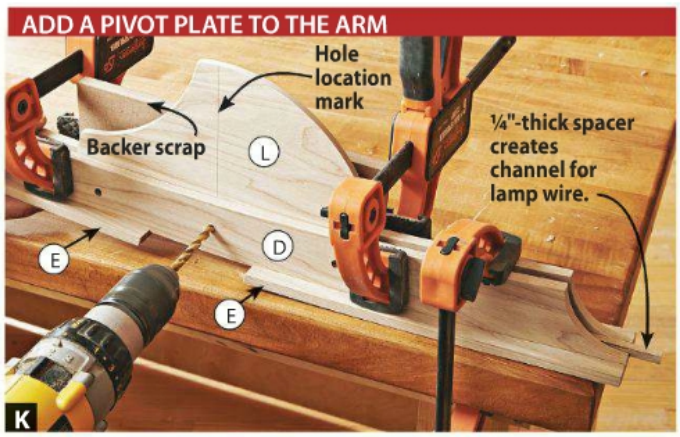

With the tower assembly (A/B) screwed to the brace (J), trace around the ends of the tower sides (A) to determine pilot hole locations.




Center your bit between the marks for the tower sides and drill through the base upper front (F) and lower front (H).




Use a scrap to transfer the angle between the base upper front (F) and tower sides (A) to the end of the tower front (C).




Lightly clamp the arm sides (D) against the pivot plate (L) while you drill mounting holes in the arms.

(O). Cut ¼" dadoes 3/16" from both ends of the blank. Cut a hanger side from each end of the blank. Stack the hanger sides together with double-faced tape. Then, drill 7/32" holes and round the edges [**Drawing 4a**] before separating them.

**2** On the remaining blank, drill a ⅜" hole ⅝" from one end and centered on the blank's width. Cut the drilled end to 1¼" long to make the hanger plate (O) [**Drawing 4a**]. Glue and clamp the hanger plate to the hanger sides (N).

**3** Remove all the hardware, and finish-sand all parts to 220 grit. Then, apply a finish. (We applied boiled linseed oil followed by two coats of aerosol satin lacquer after the oil dried.)

## Join the tower to the base

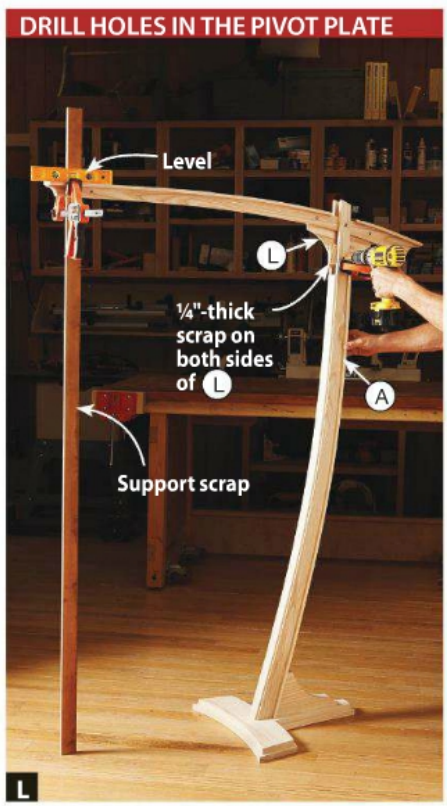
**1** Reassemble the lamp except for the hanger assembly (N/O). Feed the lamp cord up through the base (F–K) and tower (A–C) assemblies. (See **Source** on *page 38* for a kit containing all the necessary wiring hardware.) Draw the cord around and over the pivot plate (L) and through the arm assembly (D/E) above the binding barrels [**Drawing 4**], leaving about 3' hanging from the end of the arm.

**2** Slide onto the wire a female bushing, a hexhead nut, the hanger assembly (N/O), the turned neck, and the 2½" nipple. Then, secure the hardware to the nipple and hanger plate (O) [**Drawing 10**]. (See **More Resources** for a video on how to wire a lamp.)

**3** Push the cord through the lampshade center hole followed by two hexhead nuts. Tighten the first nut to secure the shade but leave the second nut slightly loose. Route the cord through the light fixture and screw the fixture to the nipple. Then, add a bushing to the end of the nipple.

**4** Tie an Underwriter's knot in the wires [**Shop Tip,** *page 38*] and connect the ends to the light fixture using wire nuts. Pull the excess wire back out of the fixture and attach the cover to the fixture bottom.

**5** Using 1½" binding barrels and screws, mount the hanger assembly (N/O) to the arm sides (D) with the wire over the upper barrel and behind the lower one. Then, draw the excess wire



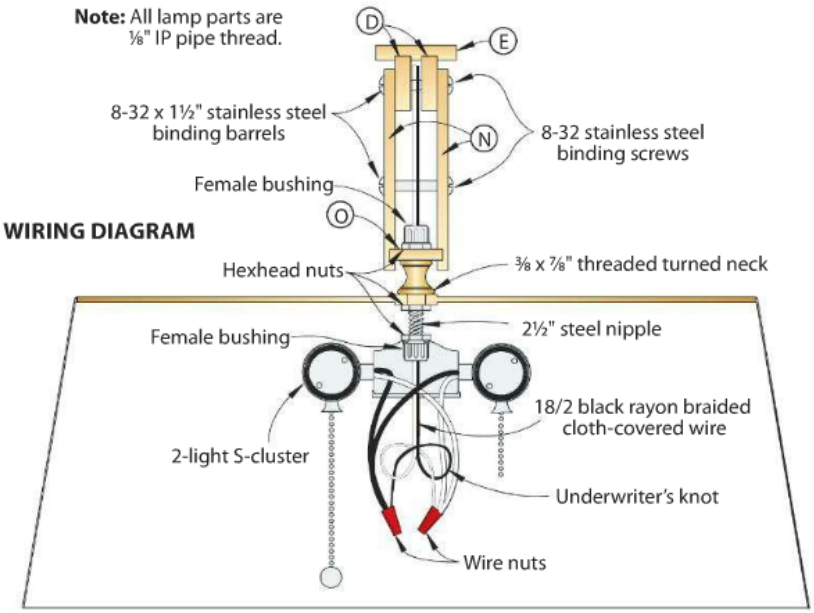

Clamp the arm to a support with the end of the arm level. Then, drill the first hole through the tower sides (A) and the pivot plate (L).

back through the lamp and install a plug on the end, following the manufacturer's directions.

**6** Add two lightbulbs, and plug in the completed lamp next to your favorite chair. Then, open your copy of *WOOD*® magazine to read about which project you'll build next.

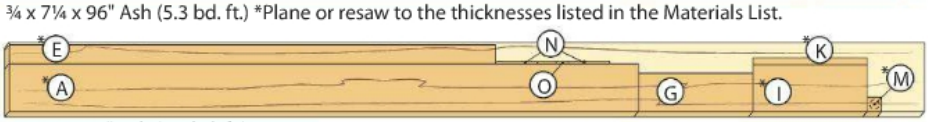
Written by **Bob Wilson** with **Jeff Mertz**
Project design: **Jeff Mertz**
Illustrations: **Roxanne LeMoine; Lorna Johnson**

**10 WIRING DIAGRAM**

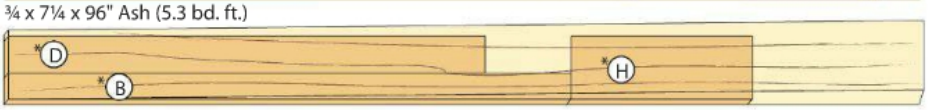



## Cutting Diagram


¾ x 7¼ x 96" Ash (5.3 bd. ft.) *Plane or resaw to the thicknesses listed in the Materials List.

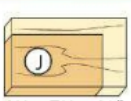



¾ x 7¼ x 96" Ash (5.3 bd. ft.)




¾ x 7¼ x 96" Ash (5.3 bd. ft.)


¾ x 5½ x 96" Ash (4 bd. ft.)




1½ x 7¼ x 12" Ash (1.3 bd. ft.)

## More Resources

**FREE ARTICLE**

- How to Make and Use a Fairing Stick woodmagazine.com/fairing.

**FREE VIDEOS**

- How to Cut Perfect-Fitting Dadoes woodmagazine.com/deadondado.
- Bandsaw Tips, Tutorials, and Jig Plans woodmagazine.com/bandsaw.
- How to Wire a Lamp woodmagazine.com/lampwiring.

## SHOP TIP

### This simple knot keeps cords from pulling loose

An Underwriter's knot prevents accidentally pulling the wires out of their connections in a light fixture. To tie one, split the the cord 3–4" back from the end and curl the ends around to look like a letter P, with one wire in front of and one behind the cord. Then, feed the ends of the wires through the loops and lightly pull on the ends to tighten the knot.

## Materials List

| Part | | FINISHED SIZE T | W | L | Matl. | Qty. |
|---|---|---|---|---|---|---|
| **Tower and arm** | | | | | | |
| A* | tower sides | ½" | 4⅞" | 66" | A | 2 |
| B* | tower back | ⅜" | 2¾" | 58" | A | 1 |
| C* | tower front | ⅜" | 1½" | 58" | A | 1 |
| D* | arm sides | ⅜" | 3⅞" | 50" | A | 2 |
| E* | arm cap blank | ⅜" | 2" | 50" | A | 1 |
| **Base** | | | | | | |
| F | upper front | ¾" | 5½" | 18" | A | 1 |
| G | upper back | ¾" | 4" | 12" | A | 1 |
| H* | lower front | ¾" | 6½" | 18¾" | A | 1 |
| I* | lower back | ¾" | 4¾" | 12" | A | 1 |
| J | tower brace | 1½" | 5½" | 9½" | A | 1 |
| K | cord cover | ⅛" | ¾" | 12" | A | 1 |
| **Hanger assembly** | | | | | | |
| L | pivot plate | ¼" | 5⅜" | 10" | A | 1 |
| M | knob | ½" | 1" diam. | | A | 1 |
| N* | hanger sides | ¼" | ¾" | 4¾" | A | 2 |
| O* | hanger plate | ¼" | ¾" | 1⅛" | A | 1 |

*Parts initially cut oversize. See the instructions.

**Material key:** A–ash.
**Supplies:** Double-faced tape; #8×1¼", #8×2", and #8×2½" flathead wood screws; 1¼" fine-thread pocket screws; 8-32×2" (1), 8-32×1½" (2), and 8-32×1" (2) stainless steel binding barrels and screws; ¼×3" steel pin.
**Blade and bits:** Dado set; ⅛", 7/32", ¼", ⅜", 1½" drill bits.

## Source

**Lamp kit:** Each kit contains the hardware, cord, and plug (no shade or lumber) to build one lamp. Order kit no. RS-LMP-202, $76.50 plus shipping, 888-636-4478, woodmagazine.com/lampkit.

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# Prototyping Makes Perfect

## To err is human; to refine before building, divine.

Whether you're a hobbyist trying to get a better sense of a project's "feel" or a professional craftsman pitching to a client, prototyping can help you test a design's structural integrity, functionality, and comfort. Building a prototype also helps you become familiar with a new or complex technique with no risk of mistake on expensive stock. You may not need all these techniques for every project, so select and use only the most appropriate method for each job.

Finished chair

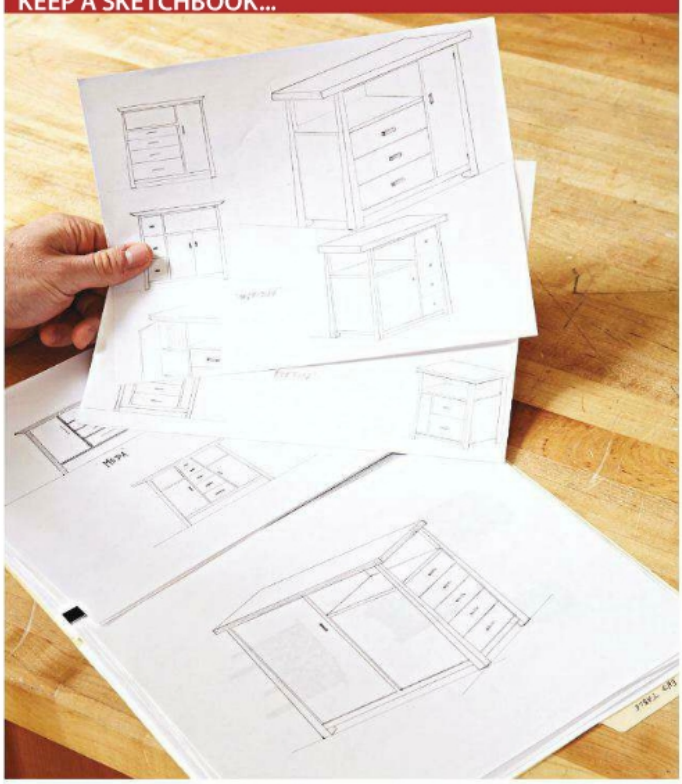
Full-size prototype built from construction lumber

1/3 scale design concept

## 1. Start with a sketch

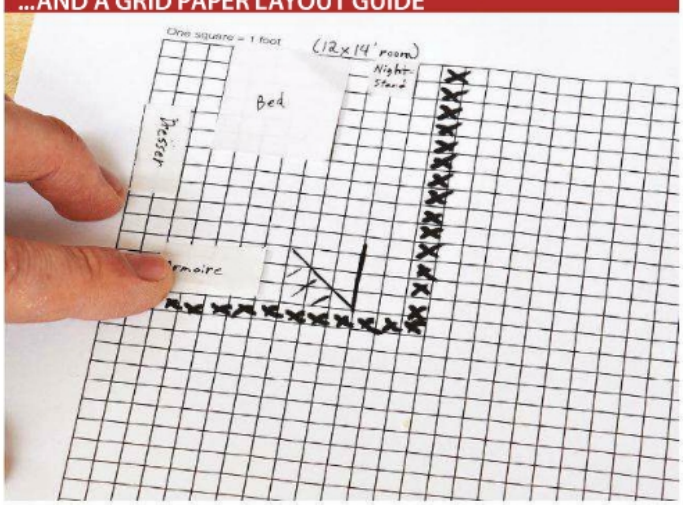
To help you visualize a project and determine which lines and proportions appear most pleasing, make a series of sketches from different perspectives and with various dimensions (*below*). Keep grid paper handy to determine how a new piece of furniture will fit amid doors, windows, and existing pieces in a room (*bottom*). If your sketching skills are, well, sketchy, use 3D modeling software, such as SketchUp, to generate scale drawings of your designs [**More Resources**]. Once you've modeled, you can rotate the drawings on-screen to view the design from any angle or distance.

**KEEP A SKETCHBOOK...**



Doodle project ideas in a sketchbook. Even if you decide on a different design, review it again later when you need inspiration or fresh ideas.

**...AND A GRID PAPER LAYOUT GUIDE**




If you have any doubts about how a project will fit in a room, or the project's best size, lay out the room virtually using a grid with scale cutouts of furniture.

## 5 must-know design principles

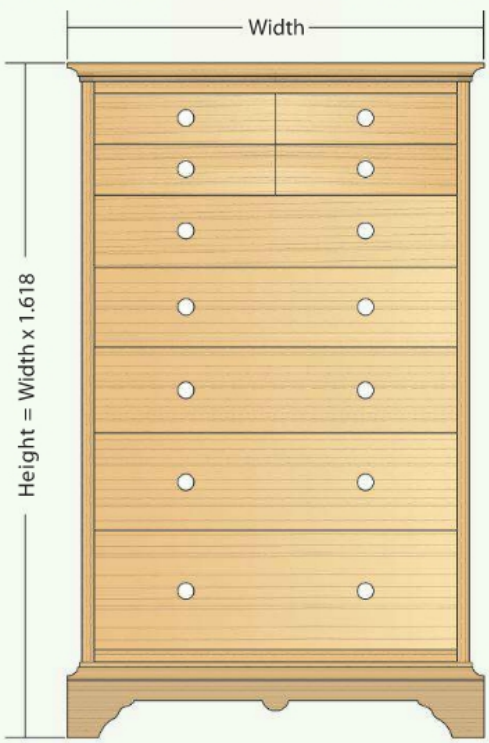
**1.** When developing design concepts, start with the Golden Ratio, an ages-old method for determining pleasing proportions. It calls for a 1:1.618 ratio between adjoining dimensions; such as height and width, width and depth, height and drawer or shelf placement; or the most visually appealing location of hardware such as hinges or pulls. For example: Break down the dimensions of a nicely proportioned 5"-deep, 8"-wide, 3"-high jewelry box, and you'll find that multiplying the height by 1.618 yields 4.85" (which can be rounded up to the 5" depth), and 4.85" multiplied by 1.618 yields 7.85" (rounded up to the 8" width). A Fibonacci gauge (*above*, **More Resources**) will help you maintain that ratio when drawing plans.

**2.** After determining the overall dimensions, look for ways to add dominant (prominent, figured, or thick parts that catch the eye first) and subordinate forms (subtle, plain, or thin parts) to your design. A chair with slats, seat, legs, and back all the same thickness has no dominant or subordinate form. Vary part thicknesses and widths for more visual appeal.

**3.** View a completed prototype from all angles. Looking at it in three dimensions may reveal design shortcomings. For instance, though a chair may have an impressive profile, looking straight at it may reveal a surprisingly bland or blocky appearance.

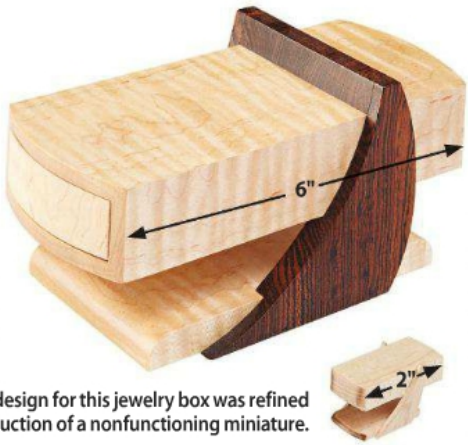
**4.** Once you've developed your design, add or subtract an element. If adding a decorative curve in a dresser's bottom trim or removing a mirror from atop it makes the piece less attractive, the design is probably complete.

**5.** Finally, don't feel bound to design principles. Designer, craftsman, and *WOOD*® contributor Todd Clippinger says, "I'm not tied to numbers; I design by feel and trust my instinct."



## 2. Make a miniature

Even if it lacks the functionality of the real thing, a miniature helps convey your design concept to a spouse or client. A miniature also helps you fine-tune design elements, identify methods for—and the order of—assembly, and gives you your first real-world look at the project's shape and proportions. For supplies to make a low-cost miniature mock-up, look no further than your scrap bin (*right*), or desk drawers (*below*).




The general shape and design for this jewelry box was refined through the quick construction of a nonfunctioning miniature.

Design Editor John Olson used only a manila folder, tape, and paper clips to prototype—hinged wings included—the Quick-Convert Tablesaw/Router Station featured in issue 213 (Sept. 2012).

## 3. Tape up an outline

Once you've established a general design concept and an approximate idea of the project's size, lay out the project's footprint with painter's tape (*below*) to quickly convey its dimensions and presence to a spouse or client. If they or you still can't quite picture the finished piece, try the next strategy.

**TAPE OUTLINE SIGNIFIES SIZE**

Mimicking the dimensions of your proposed project with painter's tape gives a sense of the space the project will fill.

## 4. For larger scale, prototype with packing material

Cardboard, foamcore, polystyrene foam (Styrofoam®), and rigid insulation are inexpensive, easy-to-work materials for quickly mocking up a full-size prototype such as the one seen at *right*. You can cut pieces to size with a utility knife or your regular woodworking tools, sand them to shape with rasps and abrasives, and join them with hot-melt glue or painter's tape.

Additional layers of material to mimic doors or frame-and-panel assemblies further refine the design. Or simply draw them on with a marker.

***Quick Tip!*** ***As with your sketchbooks, don't throw out rejected prototypes. Even if the design isn't quite right, you may find the visual aid helpful in selecting elements you want to keep for the final project.***

**CONSTRUCT WITH CARDBOARD**

Designer, craftsman, and *WOOD*® contributor Todd Clippinger mocks up a full-scale fireplace surround from cardboard to help his client visualize the design.

## 5. Build a facsimile from secondary woods

Though foam and cardboard work well for constructing mock-ups, they don't help you determine a piece's strength and functionality, and making them gives you no insight into building techniques. For assistance in those areas, build a full-size prototype from an inexpensive wood such as poplar, birch, pine, or Douglas fir. For sheet goods, choose MDF, or plywood if structure and strength need testing. Don't worry about detailed appearance—you can disregard fine sanding—as much as practicing construction techniques and testing the functionality of the piece (*below*).

***Quick Tip!*** ***When clamping your prototype, snap a quick photo with your phone. Review the photo before doing the same step on the actual project to help recall the best clamp configuration.***


A poplar prototype of this hand plane reveals more about the most comfortable and ergonomic shape than a nonwood material would.

**PARTIAL PROTOTYPES HELP**


Though the *WOOD* designers approved the look of the Z Rocker in issue 208 (November 2011), they wanted to test the strength of the tenons joining the legs. Constructing a prototype of the leg assembly proved the chair would support more than enough body weight to work.

## 6. Wait to fasten parts on the final project

With a prototype built, the design confirmed, and techniques practiced, you might think you're done. But even with the final parts cut out, you can still make final adjustments to tweak a project for the best look, fit, or feel (*right*).

Perhaps the best part of having constructed a series of prototypes isn't just the resulting polished final project, but having everything you need to replicate the piece time and again.

**CHECK FOR COMFORT**

With this bench's back slats only clamped on, Design Editor John Olson invited fellow staff members of varying heights to take a seat as he adjusted the slats' locations for maximum comfort.

### More Resources

- Prototype on the computer with SketchUp. Learn the basics: **woodmagazine.com/sketchupsimplified**.
- Download a free copy of SketchUp here: **sketchup.com/download**.
- Learn about the Golden Ratio and how to use a Fibonacci gauge here: **woodmagazine.com/fibonacci**.

SHOP TESTED

# 10" Tablesaws

**If you're ready to invest in a quality tablesaw, but can't justify spending nearly $2,000 or more for a high-end model, here's where you start.**

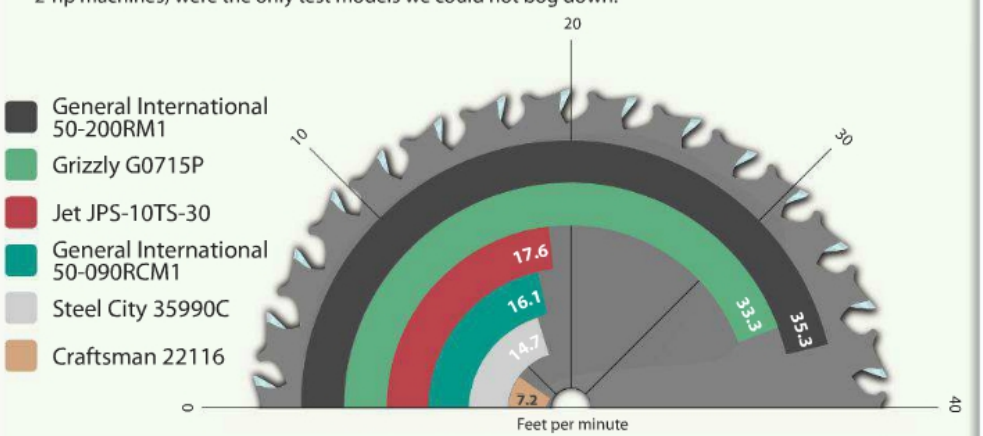
## Pick your power

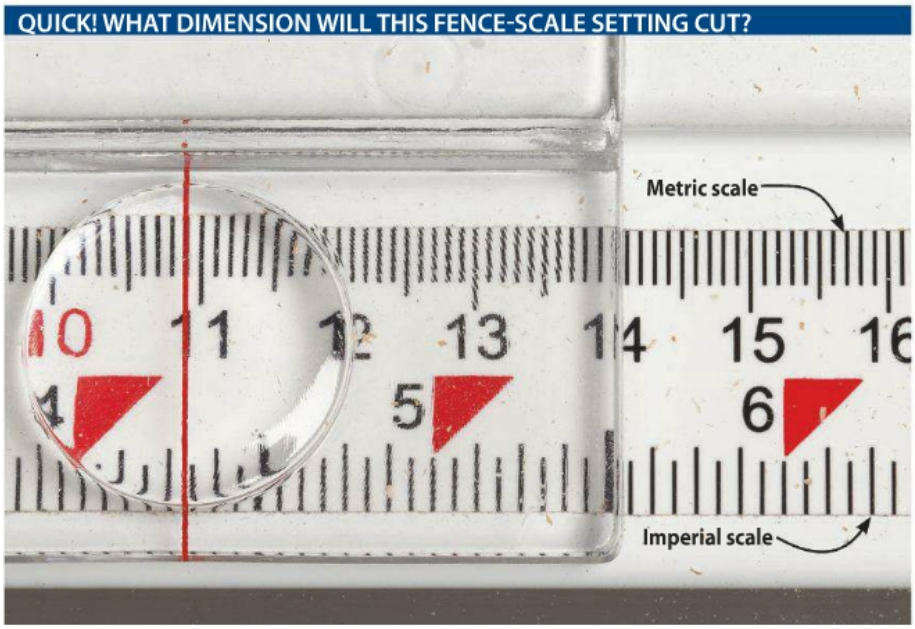
The saws in this group come with motors rated from 1½ to 2 hp, a 'tweener range where induction motors can often be wired for either 110 or 220 volts. We tested them as they came wired: four for 110 volts and two for 220. Contrary to popular belief, rewiring a 110-volt motor to run on 220 will not save on energy consumption, make the motor run appreciably cooler, or give it more power output. It will, however, cut the machine's amperage draw in half, reducing the likelihood of the motor being starved for juice and overloading a circuit.

After setting up and fine-tuning each saw, we installed a new Freud 30-tooth thin-kerf rip blade and ripped 8/4 oak as fast as each saw could handle. Not surprisingly, the Grizzly G0715P and General International 50-200RM1, both outfitted with 2-hp-rated motors (wired for 220 volts), dominated, cutting twice as fast as the third-quickest saw. (See the chart *below*.) Most of the 110-wired saws (with 1½- to 1¾-hp motors) made those same cuts without stalling when we slowed our feed rate. However, the Craftsman 22116 bogged down so easily, requiring a feed rate so slow, that we can't consider it a serious contender in this group.

### BEEFY 2-HP MOTORS CUT FASTEST

We ripped 8/4 red oak boards as fast as possible to determine the relative power of each tested tablesaw. The Grizzly and General International 50-200RM1 saws (both 220-volt, 2-hp machines) were the only test models we could not bog down.






The imperial scale on the General International 50-200RM1's rip fence proved confusing to read because increment markings are of similar lengths, a problem worsened by the circular magnifying bubble that distorted the markings rather than making them easier to read.


Jet's miter gauge can be adjusted to fit more tightly or loosely in the slot by changing the slotted bar's width via three setscrews.

## Insist on a reliable rip fence and miter gauge

Virtually every cut you make on a tablesaw requires using the rip fence or miter gauge, so both need to be reliably accurate. Each of the tested saws comes with a T-square-style rip fence with either aluminum or UHMW-plastic sideboards. They all lock securely on the front rails, adjust easily to align parallel with the blade, and did not deflect significantly during cuts. The only problem we encountered: The rip fence on the General International 50-090RCM1 tended to catch when sliding over the joint in the two-piece front rail.

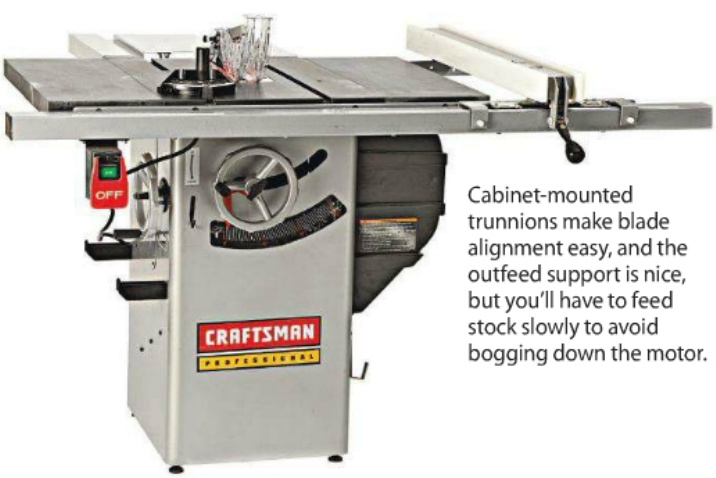
General International's 50-090RCM1 has 36" rip capacity to the right of the blade, the rest only about 30". And only the Steel City 35990C gives you more than 12" of left-rip capacity (20½"). The fence scales on the 50-090RCM1 and Grizzly proved inaccurate by 1/64" for every foot. Grizzly sent a replacement scale that proved accurate. And General International's Norm Frampton said his company would replace a faulty scale with a new one under warranty.

As for the miter gauges, each saw comes with a basic model with adjustable stops for 90° and 45° left and right, and markings up to 60° each side of center. When dialed in, all enabled accurate crosscuts. The miter bar on the Jet JPS-10TS-30's gauge is the only one that adjusts to fit in the miter slots (shown *above*). And Grizzly's gauge, with two sets of scales—one on the head marked in 5° increments and another on the toe of the bar marked in 1° increments—proved difficult to use.

All six saws have ⅜×¾" miter T-slots, convenient for using aftermarket jigs, miter gauges, or sleds [**More Resources**, *page 49*]. And the Steel City gives you the greatest crosscut capacity (a little more than 12") without pulling the miter-gauge head off the tabletop.

### Craftsman 22116, $1,100

800-549-4505, craftsman.com




Cabinet-mounted trunnions make blade alignment easy, and the outfeed support is nice, but you'll have to feed stock slowly to avoid bogging down the motor.

### General International 50-090RCM1, $1,000

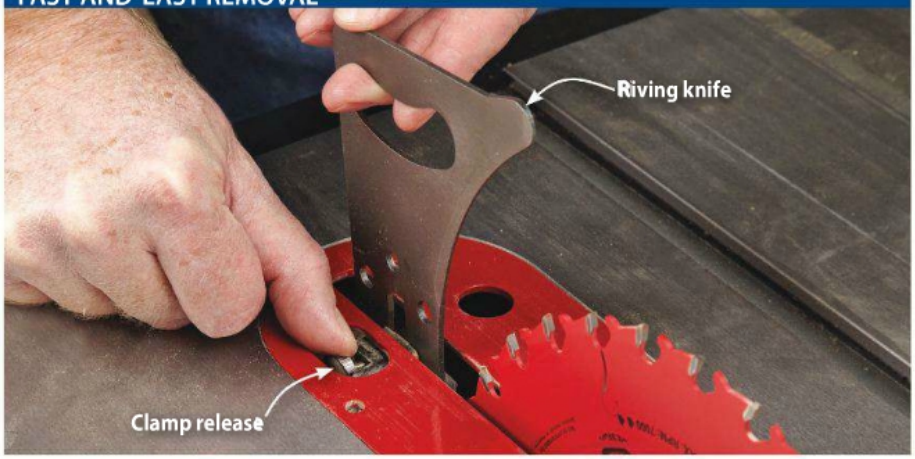
888-949-1161, general.ca


With 36" right-rip capacity, this contractor-style saw handles wider stock than all the other test models. Despite its smaller base, dust collection was not as effective as on the other machines.

## Deal-breakers? Possibly...

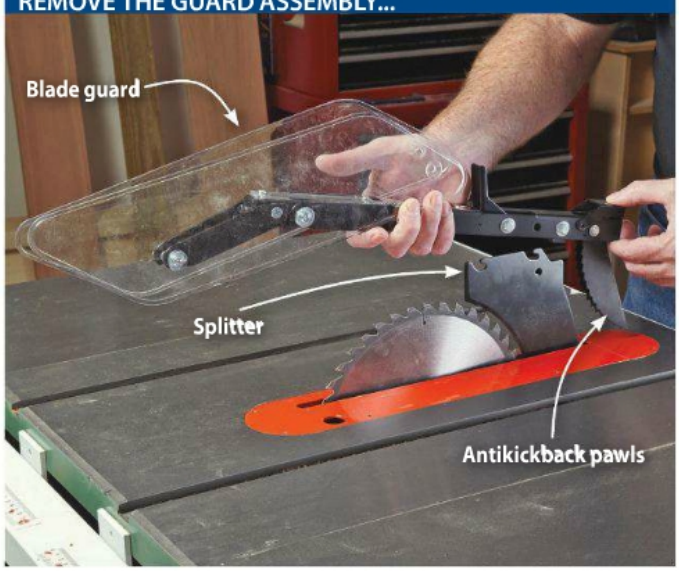
▶ **Blade guard/riving knife.** All six saws have blade-guard assemblies that mount behind the blade arbor, move up and down with it, and slide into bayonet-type brackets that you can align with the blade. To release the bracket and remove the guard assembly, you must first remove the throat insert on all saws but the Grizzly, which has a shortcut we appreciate (shown at *right*). And each saw except the Steel City includes a separate low-profile riving knife that mounts slightly lower than the blade's peak, *below right*. With the Steel City, you simply adjust the splitter to a lower position after removing the guard and pawls.

**FAST-AND-EASY REMOVAL**



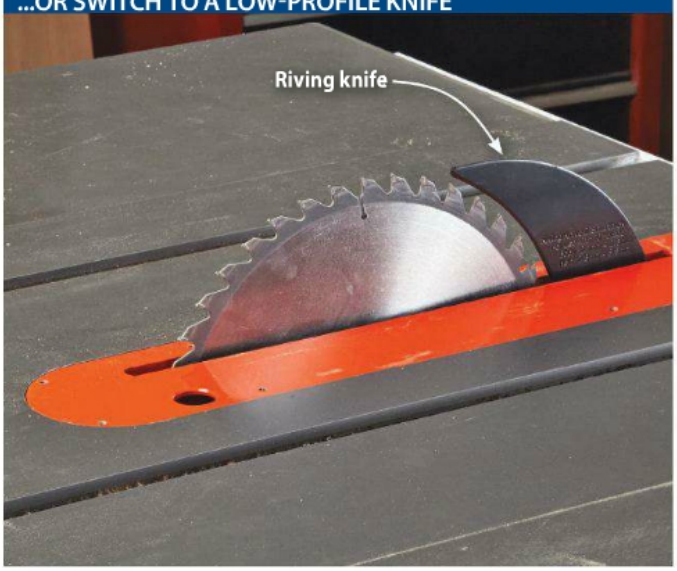

To remove the entire blade-guard assembly or the riving knife from the Grizzly G0715P, you free it using a top-side clamp release—no need to lift the insert.

**REMOVE THE GUARD ASSEMBLY...**




You can easily remove the guard and antikickback pawls from the splitter without tools on each saw except the Grizzly G0715P.

**...OR SWITCH TO A LOW-PROFILE KNIFE**




A shark-fin-style riving knife keeps workpieces from pinching on the back of the blade when making non-through cuts, such as rabbets or dadoes.

## General International 50-200RM1, $1,250

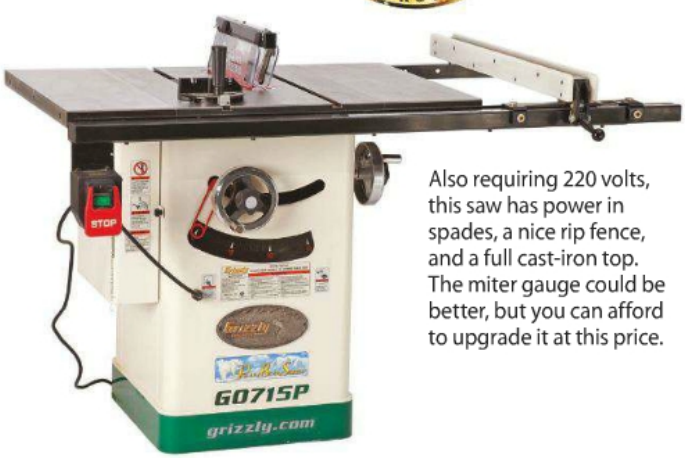
888-949-1161, general.ca


The most powerful saw in the test, it also has the best blade-guard system and a full cast-iron top. You'll need a 220-volt circuit to power it.

## Grizzly G0715P, $795

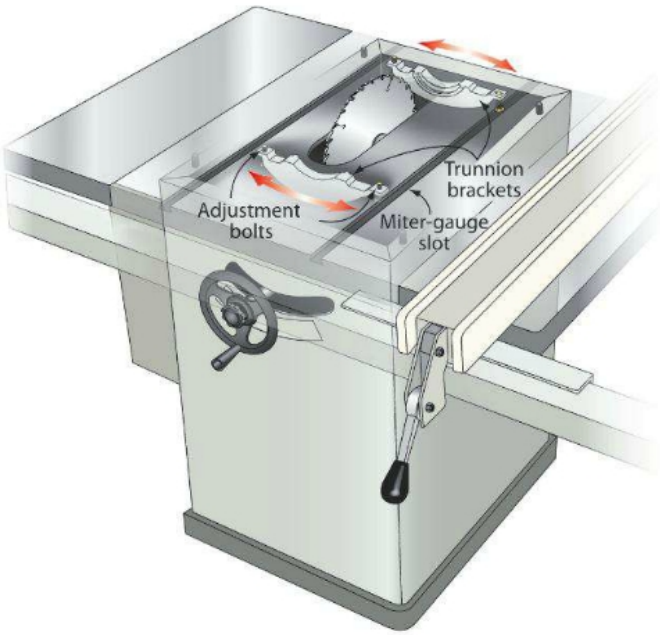
800-523-4777, grizzly.com

WOOD MAGAZINE TOP TOOL APPROVED

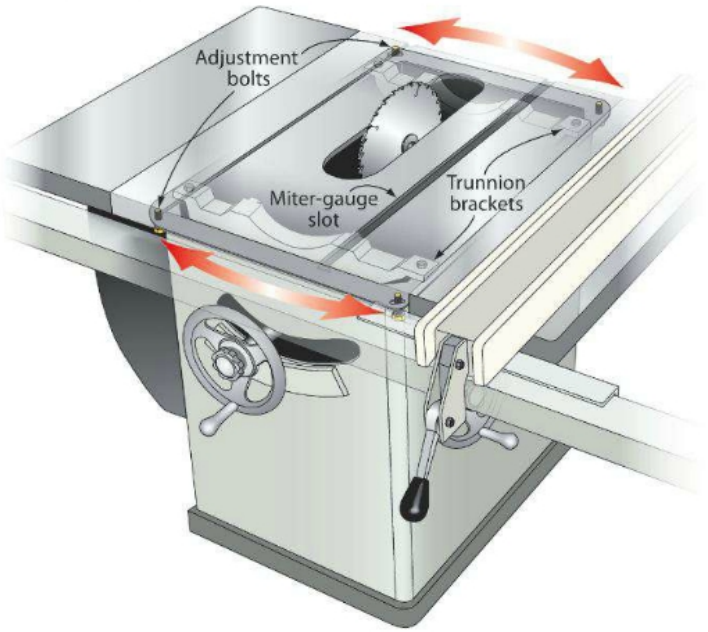



Also requiring 220 volts, this saw has power in spades, a nice rip fence, and a full cast-iron top. The miter gauge could be better, but you can afford to upgrade it at this price.

**TOP-MOUNTED TRUNNIONS:**
Harder to adjust inside the cabinet or base




**CABINET-MOUNTED TRUNNIONS:**
Easy to adjust without reaching inside the cabinet




▶ **Cut quality.** None of the blades supplied with the saws proved capable of making cuts free of scoring marks and tear-out, even after we fine-tuned each saw. But when we installed new Freud blades on each machine, the cut quality greatly improved. (See the performance grades on *page 48*.)

▶ **Blade alignment.** With any tablesaw, your first job after assembly is to parallel the miter slots with the blade to guarantee clean and accurate cuts. To do this, you adjust either the trunnions (the brackets that hold the arbor assembly in place) or the tabletop. As shown in the illustrations *above*, with trunnions mounted to the underside of the top, you must loosen the trunnion bolts inside the base or cabinet and tediously tap on the arbor assembly inside the cabinet until the blade aligns with the miter slots. Saws with trunnions mounted to the cabinet, rather than the top, adjust more easily because you loosen only three of four easily accessible tabletop mounting bolts and then pivot the top slightly to align the miter slots to the blade. And we've found that cabinet-mounted trunnions hold their alignment longer than top-mounted ones. The Craftsman, General International 50-200RM1, and Steel City saws have the preferred cabinet-mounted trunnions.

▶ **Bevel cutting.** All six saws have left-tilting blade arbors, with adjustable stops at 90° and 45°. The Craftsman, General International 50-090RCM1, and Jet use setscrews embedded in their tops for adjusting these stops easily. With the other saws, you must reach inside the cabinets to adjust stopnuts.

Each of the bevel handwheels turned easily and locked solidly. We liked the General International 50-200RM1 that tilts the blade from 90° to 45° in fewer than 30 turns. The others required from 38 to 45 turns, a tedious job.

## Jet JPS-10TS-30, $1,200

800-274-6848, jettools.com


A good rip fence and miter gauge, easy blade changes, and excellent dust collection give this saw an edge over the other 110-volt machines. (You can buy this saw with cast-iron wings for $1,350, model JPS-10TS-CW-30.)

## Steel City 35990C, $800

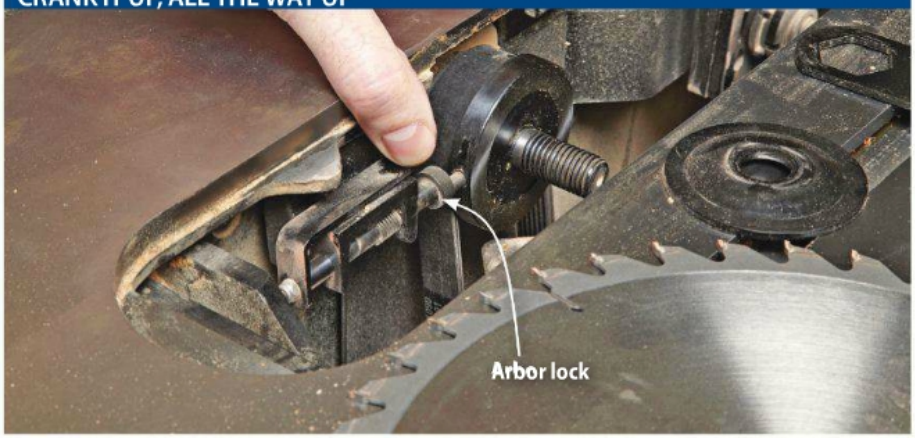
877-724-8665, steelcitytoolworks.com


The only saw with a built-in mobile base, it also has cabinet-mounted trunnions and excellent dust collection. Its blade-guard system could be more user-friendly. (Save $100 and get this saw with stamped-steel wings, model 35990CS.)

**▶ Tabletops.** Five of the six saws have cast-iron tabletops. Craftsman's saw features a polished granite top and wings, and this heft (at 432 lbs, it's heaviest in our test) resulted in a smooth, vibration-free performance. The General International 50-200RM1, Grizzly, and Steel City have cast-iron wings for added stability. The General International 50-090RCM1 and Jet have stamped-steel wings; as a result, these machines vibrated more in our testing.

**▶ Blade changes/throat openings.** We found it easiest to change blades on the Jet, thanks to its 4⅛"-wide throat opening and arbor lock embedded in the top, so you insert only one hand into the opening. Not all arbor locks proved so easy to use. (See photo, *right*.) You can install at least a ¾" dado stack on each saw, although none includes a dado throat insert. (All offer one as an optional accessory.) And all the saws have rabbeted throat edges at least ¼" deep, so you can make your own zero-clearance inserts for cleaner cuts.

**CRANK IT UP, ALL THE WAY UP**




**To change blades on the General International 50-200RM1, you must raise the arbor to full height to engage the stationary arbor lock.**

## STEP-UP TABLESAWS AFFORD GOOD OPTIONS

| | | PERFORMANCE RATINGS (1) | | | | | | | | | | | | | MOTOR | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PRIMARY | | | | | SECONDARY | | | | | | | | | |
| BRAND | MODEL | OBSERVED POWER | ABSENCE OF RIP FENCE DEFLECTION | QUALITY OF MITER GAUGE | CUT QUALITY WITH PREMIUM BLADE | EASE OF USING BLADE GUARD/RIVING KNIFE | ABSENCE OF VIBRATION | EASE OF CHANGING BLADES | EASE OF USING ON/OFF SWITCH | EASE OF ALIGNING BLADE WITH MITER SLOTS | EASE OF ADJUSTING BEVEL STOPS | EASE OF SETTING BEVEL ANGLE | DUST COLLECTION | EASE OF USING HANDWHEELS | RATED HORSEPOWER | VOLTAGE (PREWIRED IN **BOLD**) |
| CRAFTSMAN | 22116 | C | A- | B- | B | B | A | B | B | A | A | C | A- | B+ | 1¾ | **110**/220 |
| GENERAL INTERNATIONAL | 50-090RCM1 | B | A- | B- | B | B | C | B- | B- | B | A | B | B | B+ | 2 | **110**/220 |
| | 50-200RM1 | A | A- | B | A- | A | A | B- | B- | A | C | B | A- | A | 2 | **220** |
| GRIZZLY | G0715P | A | A | C | A- | B | A | B | B | B | C | C | A- | A- | 2 | **220** |
| JET | JPS-10TS-30 | B | A | B+ | A- | B | B | A | B | B | A | C | A | A- | 1¾ | **110**/220 |
| STEEL CITY | 35990C | B | A- | B- | A- | C | A | B | B | A | C | B | A | B+ | 1½ | **110**/220 |

1. A Excellent, B Good, C Fair
2. Measured with blade at full height.
3. (B) 10" 40-tooth blade, (D) Dado insert, (M) Mobile base, (P) Pushstick
4. (C) China, (T) Taiwan
5. Prices current at time of article production and do not include shipping, where applicable.

▶ **Mobility.** Only the Steel City machine comes with a built-in mobile base for easy maneuvering around the shop.

▶ **Power switches.** Each saw has a mechanical on/off switch with a large paddle for easy shutdowns. Both of the General International machines have paddles that latch in the off position, preventing accidental startups but requiring you to pull them free before turning on the motor: safe but annoying. You can position the switch for the General International 50-090RCM1 anywhere along its front rail; with the others you have to select from a few predrilled spots or drill your own.

▶ **Dust collection.** Because each saw has an enclosed base or cabinet, your dust collector has a leg up on sucking away the debris. Blade shrouds on the General International models funnel dust directly into a 2½" hose at the bottom, which then connects directly to the dust port. But with only a 2½" port, the 50-090RCM1 left more dust in the cabinet.

Produced by **Bob Hunter** with **Bob Baker**
Illustrations: **Micah Matthias** and **Tim Cahill**

## More Resources

▶ Read reviews of other tablesaws, miter gauges, and other accessories from *WOOD*® editors and other woodworkers at toolreviews.woodmagazine.com.

WOOD MAGAZINE'S REVIEW-A-TOOL

## 2-hp saws topped our test

The General International 50-200RM1 and Grizzly G0715P deliver plenty of cutting muscle, full cast-iron tops, enclosed cabinets, quality rip fences, and easy-to-use blade-guard systems, so it's a virtual dead heat performance-wise. But the Grizzly costs $450 less, making it our Top Tool. Invest some of that savings in a quality aftermarket miter gauge and blades, and you'll have a tablesaw ready for decades of woodworking.

If you don't have the 220-volt hookup, the Jet JPS-10TS-30 demonstrated the most power among the 110-volt saws, and comes with a five-year warranty.

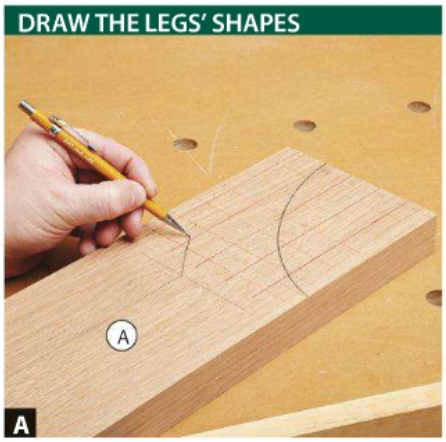
| DIMENSIONS, INCHES | | CAPACITIES, INCHES | | | | | | | | | ACCESSORIES (3) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OVERALL, W × D × H | TABLETOP, W × D | FRONT OF TABLE TO BLADE (2) | MAX. RIP, LEFT OF BLADE | MAX. RIP, RIGHT OF BLADE | MAX. CUTTING HEIGHT AT 90° | MAX. CUTTING HEIGHT AT 45° BEVEL | MAX. DADO WIDTH WITH ARBOR WASHER | MAX. DADO WIDTH WITHOUT ARBOR WASHER | BLADE CHANGES: 1 OR 2 WRENCHES | DUST PORT DIAMETER, INCHES | STANDARD | OPTIONAL | WEIGHT, LBS | WARRANTY, YEARS | COUNTRY OF ASSEMBLY (4) | SELLING PRICE (5) |
| 59×64×34 | 40¼×27 | 12 | 12 | 30 | 3 5/16 | 2¼ | 13/16 | 29/32 | 2 | 4 | B | D | 432 | 1 | C | $1,100 |
| 38×66½×42½ | 40×25¼ | 9 | 8 | 36 | 3¼ | 2 5/16 | ¾ | 29/32 | 2 | 2½ | B | D,M,P | 217 | 2 | T | 1,000 |
| 44×61×36 | 44×27 | 10¼ | 8 | 30 | 3 | 2¼ | 13/16 | 29/32 | 1 | 4 | B | D,M,P | 321 | 2 | T | 1,250 |
| 44×60×34 | 40×27 | 11½ | 12 | 30 | 3⅛ | 2 3/16 | 13/16 | 29/32 | 1 | 4 | B | D,M,P | 393 | 1 | C | 795 |
| 40×60×41 | 44×27 | 10⅝ | 8 | 30 | 3⅛ | 2⅛ | 13/16 | 29/32 | 1 | 4 | B | D,M | 252 | 5 | T | 1,200 |
| 38×68×35½ | 40×27 | 12½ | 20½ | 30¼ | 3⅛ | 2¼ | ¾ | 13/16 | 2 | 4 | B,M,P | D | 328 | 2 | C | 800 |

# Garden Bench

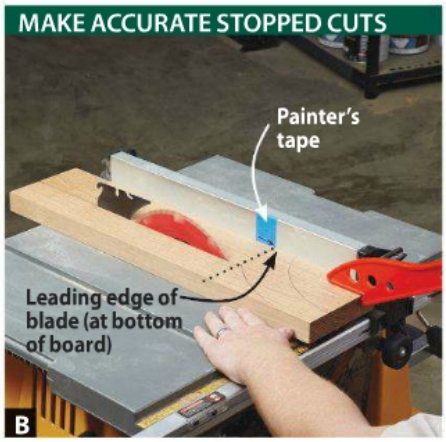
**Classic design adds beauty to any outdoor setting.**

Dimensions: 56" W × 26½" D × 40" H
Materials cost: $160

For ease of construction, this project goes together almost entirely with glue and tight-gripping screws—you can't see them, but they'll keep the bench rock-solid season after season. All the screwheads hide in plugged counterbores or out-of-sight pocket holes. If you haven't tried pocket-hole joinery before, check out the **Shop Tip** on *page 52* and **More Resources** on *page 55* for pocket-hole pointers.




Lay out a 1"-square grid on the leg blanks and use the lines as guides to help you transfer the curves and angled cuts from the patterns to the blanks.




Fully raise the blade and mark the fence with painter's tape to indicate the blade's leading edge so you'll know where to stop the straight cuts.


When smoothing the legs, the top bearing of the flush-trim bit rides along the straightedge; the bottom bearing falls below the workpiece.

## Feet first, then frame 'er up

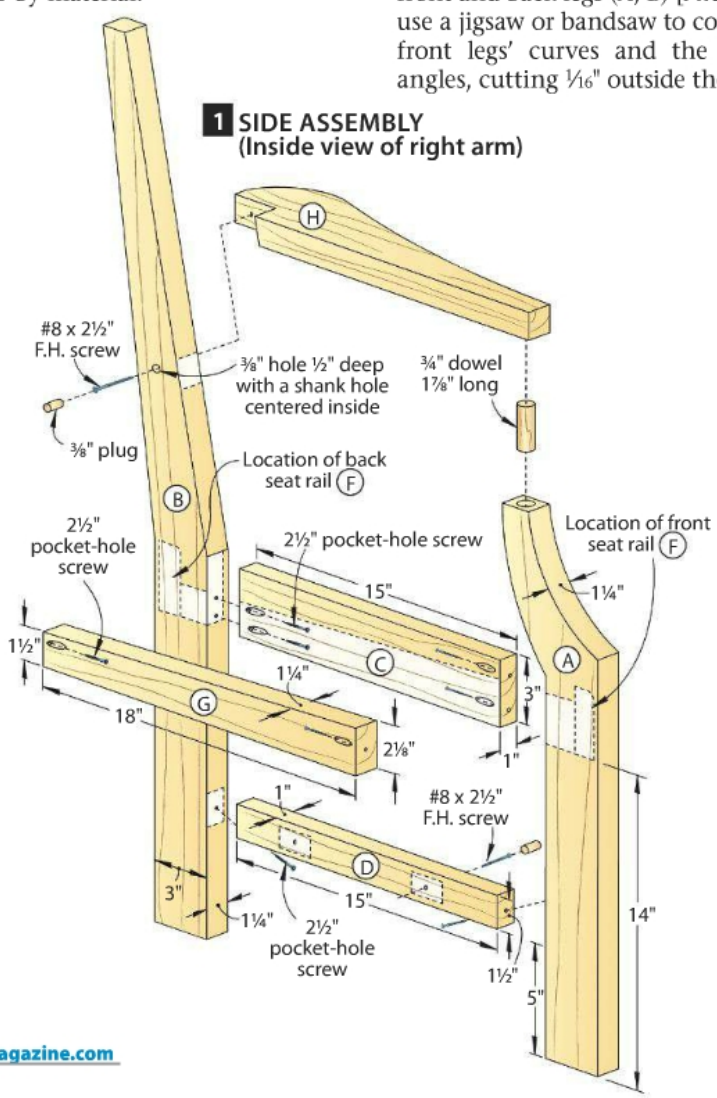
We started with 6/4 (1½"-thick) white oak for many of the parts in this project, but milled it to 1¼", a thickness that allows you to remove twists and cups should you instead choose to use dimensional lumber such as pressure-treated or cedar 2-by material.

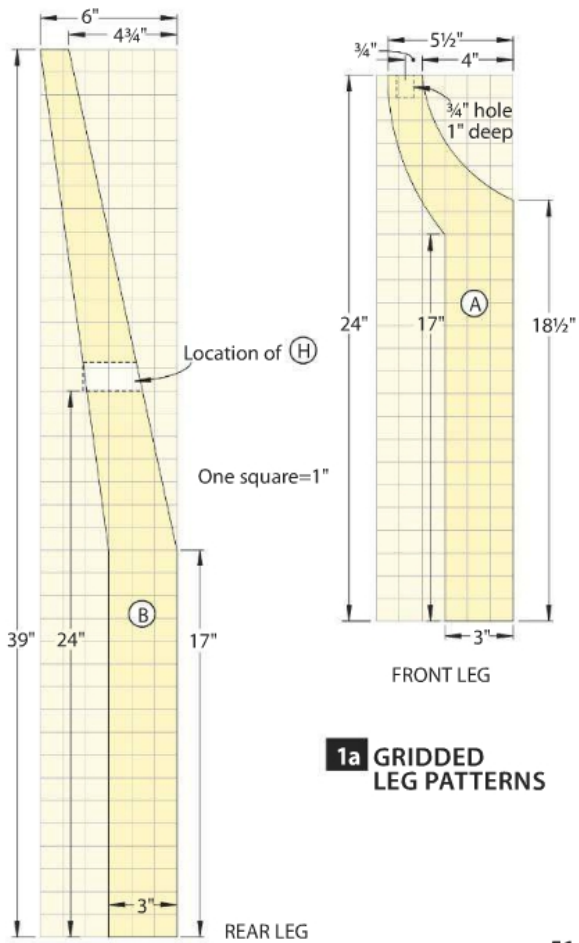
**1** Cut blanks for the front legs (A) and back legs (B) to size [**Materials List**]. Transfer the gridded patterns [**Drawing 1a**] to the blanks [**Photo A**]. Mark the location of the arm (H) on the back legs.

**2** Use your tablesaw to rip stopped cuts on the straight, lower portions of the front and back legs (A, B) [**Photo B**]; then use a jigsaw or bandsaw to complete the front legs' curves and the back legs' angles, cutting 1/16" outside the lines.

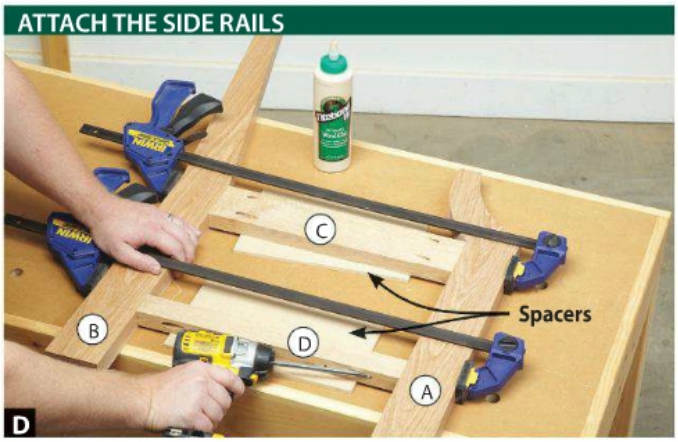
**3** Sand the curves on the front legs (A) to the line. Use a straightedge and a router outfitted with a top/bottom bearing flush-trim bit to smooth the angled faces on the back legs (B) [**Photo C**]. ***Note:*** *You'll only use the top bearing in this operation; the bottom bearing will come into play in a later trimming operation.*

**4** From 1" stock, cut the side seat rails (C), the side stretchers (D), and the stretchers (E) to size [**Drawings 1** and **2,**

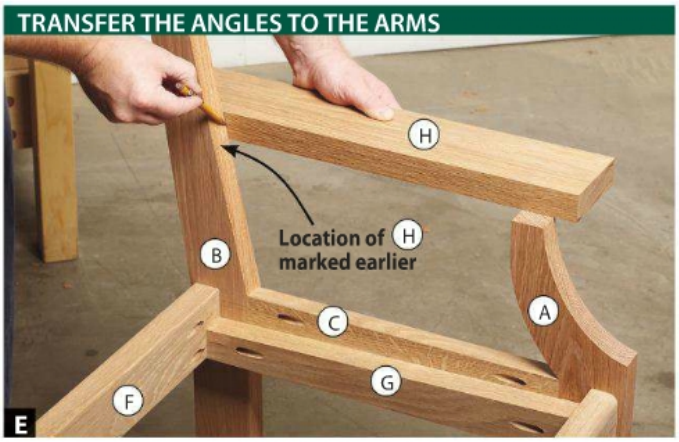



**1a** GRIDDED LEG PATTERNS




Rest the side seat rails (C) and side foot rails (D) on ¼" spacers to align them flush with the inside faces of the legs (A, B).




When marking the angle of the back leg (B) on the arm blank (H), make sure the blank is tight against the legs and flush with the rear of the back leg.

**Materials List**]. Set the stretchers aside for now. Drill pocket holes in the ends of the side seat rails and the side stretchers.

**5** Use 2½" stainless steel panhead fine-thread pocket-hole screws and glue to fasten together the right- and left-side leg assemblies (A/B/C/D), with the pocket holes in the side seat rails (C) and side stretchers (D) positioned on the inside or bottom where they will be hidden from view [**Photo D, Drawing 1**]. ***Note:*** *Use a weather-resistant type 2 or 3 wood glue for this project.*

**6** Cut to size the front/back seat rails (F) [**Materials List, Drawing 2**]. Rout a ½" round-over on the top front edge of the front seat rail and a ⅛" round-over on the top front edge of the back seat rail. Drill pocket holes in the ends of the inside faces of the rails. Glue and screw them to the side leg assemblies (A/B/C/D) with the edges flush with the side seat rails (C) and ¼" back from the outside edges of the legs (A, B).

**7** Cut the seat cleats (G) to fit between the seat rails (F) and tapered as shown [**Materials List, Drawing 1**]. Then, drill one pocket hole in each end of the seat cleats. Spread glue on the seat cleats where they meet the side assemblies and the front/back seat rails and screw them in place.

**8** Drill ⅜" counterbores with 7⁄64" pilot holes to attach the stretchers (E) to the side stretchers (D) [**Drawing 2**]. Glue and screw; then, fill the counterbores with ⅜" plugs.

***Quick Tip!*** ***To avoid the noticeable end grain of dowels, use a plug cutter to make plugs from the face grain of matching wood.***

## Fashion the arms; add a seat

**1** Cut two arms (H) to width but 2–3" longer than listed [**Materials List**]. Hold each arm in position against its corresponding back leg (B) and scribe the back leg's angle onto the inside edge of each arm [**Photo E**]. Then, use a handsaw to make the angled cut and a jigsaw or bandsaw to complete the notches [**Drawing 2a**].

**2** Fit the arms (H) in place and mark their final length at the front edge of the front legs (A). Then, lay out the profile of the arms as you did for the legs and cut them to shape [**Drawing 2a**]. Check each arm for fit, make any adjustments, and sand smooth.

**3** Drill ¾" holes 1" deep into the underside of each arm (H) [**Drawing 2a**] and centered on the top of the front legs (A) [**Drawing 1**]. Drill ⅜" counterbores with 7⁄64" pilot holes through the back legs (B) for the rear mounting points of the arms [**Drawing 1**].

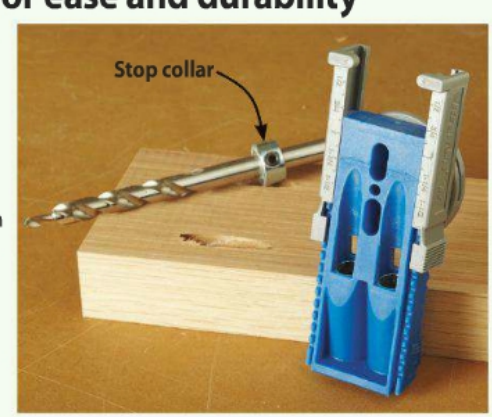
**4** Cut two 1⅞" lengths of ¾" dowel and glue them into the holes in the tops of the front legs (A) [**Drawing 1**]. Attach the arms (H) [**Photo F**]; then, fill the counterbores with ⅜" plugs.

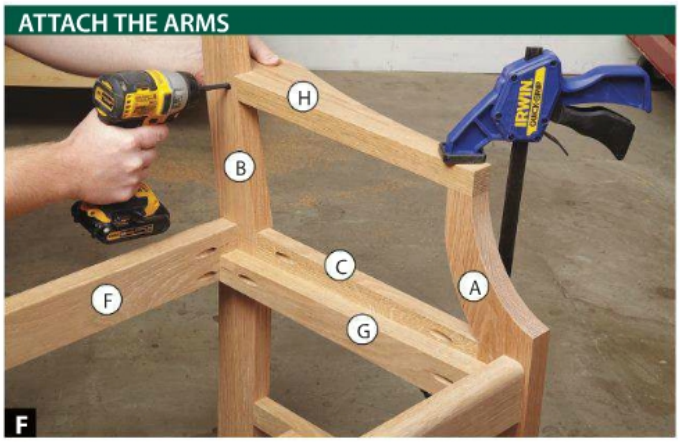
**5** After the glue dries, ease the edges of the arms (H), front legs (A), and back legs (B) with sandpaper or a spokeshave.

## SHOP TIP

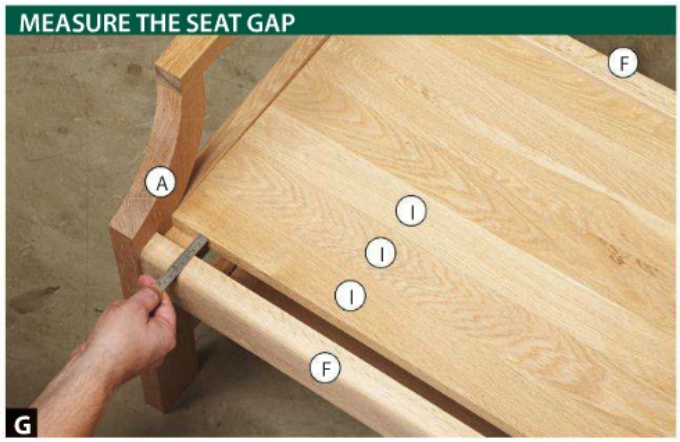
### Use pocket-hole joinery for ease and durability

Beginners and pros alike prefer pocket-hole joinery in applications where the pocket hole can be hidden, and for good reason: Screws hold tenaciously, and making the joints requires a minimum of skill and time. Before you dive into pocket-hole joinery, make sure you purchase an adjustable jig (some aren't) capable of handling stock from ¾" to 1½" thick. Practice with the jig and test how far the 2½" screws required for this project will stick out of the ends of the boards as shown *right*. Varying stock thicknesses require that you adjust the stop collar on the jig's specialized drill bit to achieve the correct boring depth.




Glue and clamp the arms (H) in position on the dowels; then, drive screws through the back legs (B) and into the arms to secure the arms.

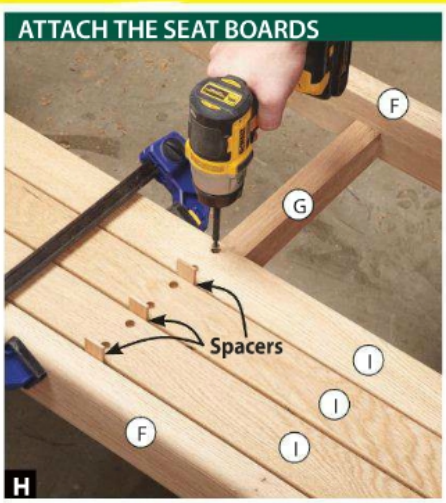



With the seat boards (I) ganged against the back seat rail (F), measure the gap between the frontmost seat board and the front seat rail (F).

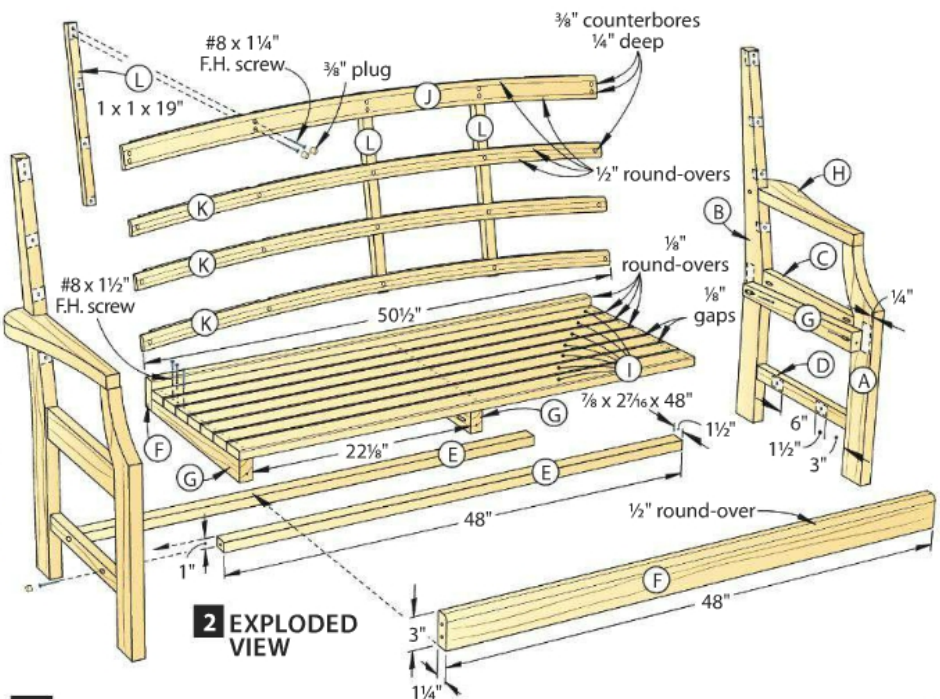
**6** Cut the seat boards (I) to fit between the side seat rails (C) [**Materials List**]. Place them on the seat to measure the gap [**Photo G**]. Divide that measurement by eight (the number of spaces between the seat boards, plus the spaces at the front and back rails), and make spacers from scrapwood thicknessed to that result. For example, a 1" gap between the front seat board and the front seat rail results in ⅛"-thick spacers.

***Quick Tip!*** ***Are you coming up with an oddball measurement for the spacers? Try centimeters to make division easier. Or rip one or two seat boards down a bit to get a more easily divisible gap.***

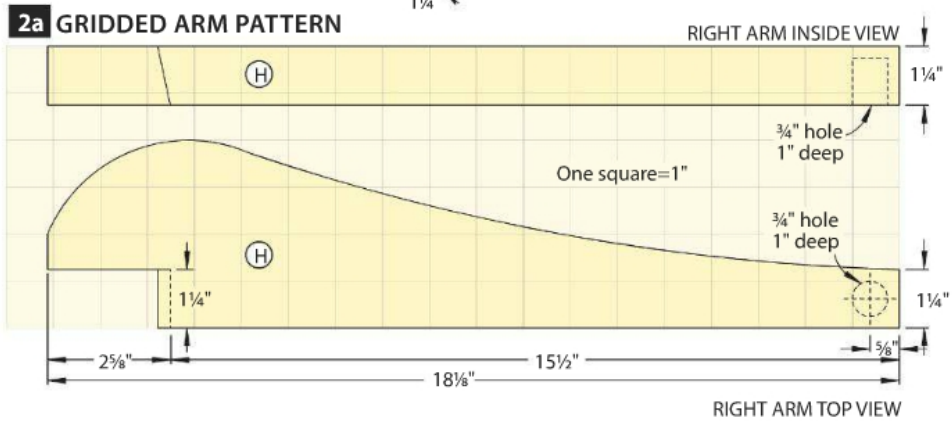
**7** Drill ⅜" counterbores with 7/64" pilot holes in the seat boards (I) at the points where they will be screwed to the seat cleats (G) [**Drawing 2**]. Rout ⅛" round-overs on the top edges of the seat boards and sand them to 220 grit. ***Note:*** *To reduce finish frustrations in places where the wood will be inaccessible later, finish the interior of the seat frame and the edges and bottom faces of the seat boards now. We applied three coats of Old Masters water-based spar urethane, sanding between coats. When the finish is completely cured, lightly sand the adjoining edges to feather any finish contamination that might show through during final finishing.* Attach the seat boards to the seat cleats [**Photo H**] and plug the counterbores.




Insert spacers between the seat boards (I); then, attach the boards to the seat cleats (G) with #8×1½" flathead screws.




**2** EXPLODED VIEW



SCRIBE THE CURVES


A thin scrap of wood (fairing stick) tensioned to intersect the curve's top and ends, makes a perfect arch for laying out the curves of the back rails (J, K).

FLUSH-TRIM THE CURVES


Set the depth of the pattern/flush-trim bit so that the bit avoids the dadoes as it rides against the top back rail (J) to smooth the middle back rails (K).

## Build the back

**1** From 1¼" stock, cut two 50½" blanks, one 5" wide, the other 6", for the top back rail (J) and middle back rails (K) [**Materials List, Drawing 3**]. From 1" stock, cut the back stiles (L) to size.

**2** Mark the locations and use the technique shown in "**Two perfect-width dado techniques with one jig,**" *next page,* to rout the ½"-deep dadoes and rabbets on the rail blanks (J, K) [**Drawing 3**].

**3** On the 6"-wide blank, use a fairing stick to mark out the bottom and top arches for the top back rail (J) and one middle back rail (K) [**Photo I, Drawing 3, More Resources**]. Cut the top and bottom arches but do not yet cut the blank into individual parts. Sand the curves smooth.

**4** Use the J/K blank as a pattern and transfer its arches to the 5"-wide blank from which you'll make two more middle back rails (K) [**Drawing 3**]. Cut the arches slightly proud, and then double-faced tape the J/K blank beneath the K/K blank to flush-trim the arches [**Photo J**]. Cut the blanks into their separate parts and flush-trim in the same fashion.

**5** Set the bit depth to ensure that the bearing misses the dadoes and rout ½" round-overs on the front faces of the top and middle back rails (J, K). Then, drill ⅜" counterbores ¼" deep with 7/64" pilot holes centered inside at each dado and rabbet location [**Drawing 2**].

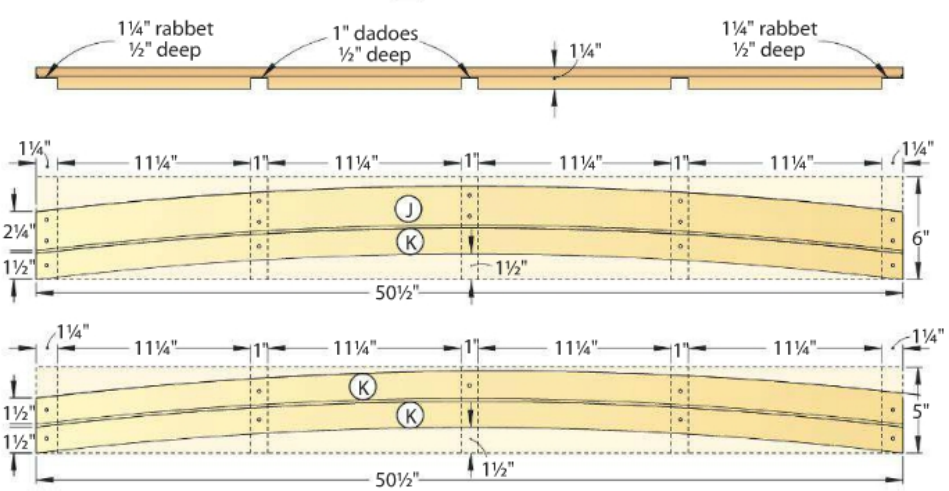
**6** Glue and screw the top back rail (J) in place. Trim the top of the back leg (B) to match the curve [**Photo K**].

**7** Clamp the middle rails (K) in place, test for comfort, and adjust the spacing as preferred. ***Note:*** *We found that even spacing of the middle rails produced a bench that was comfortable for people in the 5'8" to 6'1" height range.*

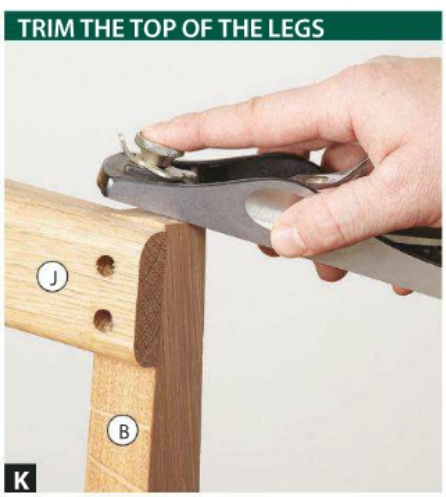
**8** Glue and screw the middle rails (K) to the bench assembly. Then, glue and screw the back stiles (L) to the back rails (J, K) [**Drawing 2**]. Fill any remaining counterbores with plugs. Finally, trim the ends of the back stiles to match the curves of the top rail and bottom middle rail.

**9** Sand any unfinished portions of the bench to 220 grit and apply finish. When the finish is dry, place the bench on firm, level ground. Then, have a seat, and take a well-earned break.

**3 BACK RAILS**




TRIM THE TOP OF THE LEGS




Use a low-angle block plane to shave the tops of the back legs (B) until they are flush with the curve of the top back rail (J).

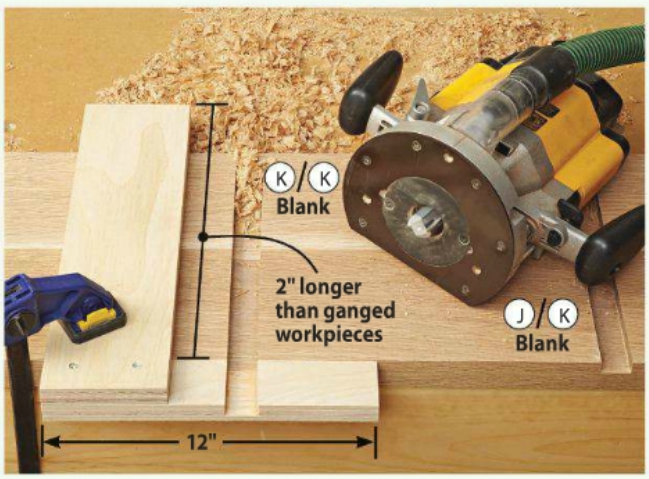
## SHOP TIP

# Two perfect-width dado techniques with one jig

If you cut all the dadoes for the back rails (J, K) individually, you run the risk of cuts that won't line up during assembly. To ensure perfectly aligned dadoes across all the rails, gang the rail blanks together and use a dado jig, *below*. Consisting of two short lengths of ¾" plywood or hardwood joined together at a right angle, the jig guides your router for perfect dado cuts. There are two methods for using it.

**Method one:** Use the jig as a guide for a full-size router outfitted with a 1" straight bit. First clamp the jig to a scrap piece to cut a test dado, running your router against the jig's fence. Plow all the way across the jig's leg. Then, cut the dadoes as shown *below left*. The rabbets on the ends of the back rails will take two passes to complete. Simply move the jig to cut the 1¼" rabbets.

**Method two:** For better control with a compact router, use a pair of the same jigs along with a ½" dado cleanout bit. Clamp one jig fence along your layout line. Reverse a second jig and clamp it in place using a back stile (L) as a spacer. Remove the back stile and rout as shown *below*.

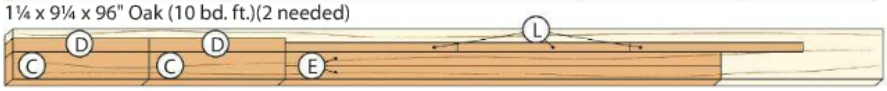



After an initial test cut, the resulting groove in the leg becomes a perfect alignment guide. Align it with your layout lines for perfect dado placement.


Make multiple shallow passes to complete the dado, running the bearing first along one fence and then back along the other.

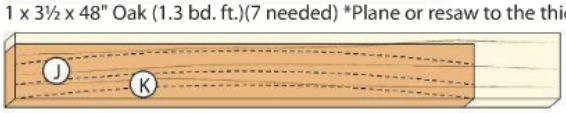
## Cutting Diagram


1¼ x 9¼ x 96" Oak (10 bd. ft.)(2 needed)

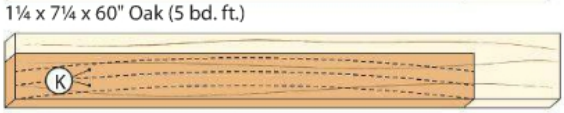



1 x 5½ x 96" Oak (4 bd. ft.)


1 x 3½ x 48" Oak (1.3 bd. ft.)(7 needed) *Plane or resaw to the thickness listed in the Materials List.




1¼ x 7¼ x 60" Oak (5 bd. ft.)




1¼ x 7¼ x 60" Oak (5 bd. ft.)

## Materials List

| Part | | FINISHED SIZE T | W | L | Matl. | Qty. |
|---|---|---|---|---|---|---|
| A | front legs | 1¼" | 5½" | 24" | WO | 2 |
| B | back legs | 1¼" | 6" | 39" | WO | 2 |
| C | side seat rails | 1" | 3" | 15" | WO | 2 |
| D | side stretchers | 1" | 1½" | 15" | WO | 2 |
| E | stretchers | 1" | 1½" | 48" | WO | 2 |
| F | front/back seat rails | 1¼" | 3" | 48" | WO | 2 |
| G | seat cleats | 1¼" | 2⅛" | 18" | WO | 3 |
| H* | arms | 1¼" | 4" | 18⅛" | WO | 2 |
| I | seat boards | ⅞" | 2 7/16" | 48" | WO | 7 |
| J* | top back rail | 1¼" | 3¾" | 50½" | WO | 1 |
| K* | middle back rails | 1¼" | 3" | 50½" | WO | 3 |
| L | back stiles | 1" | 1" | 19" | WO | 3 |

*Parts initially cut oversize. See the instructions.

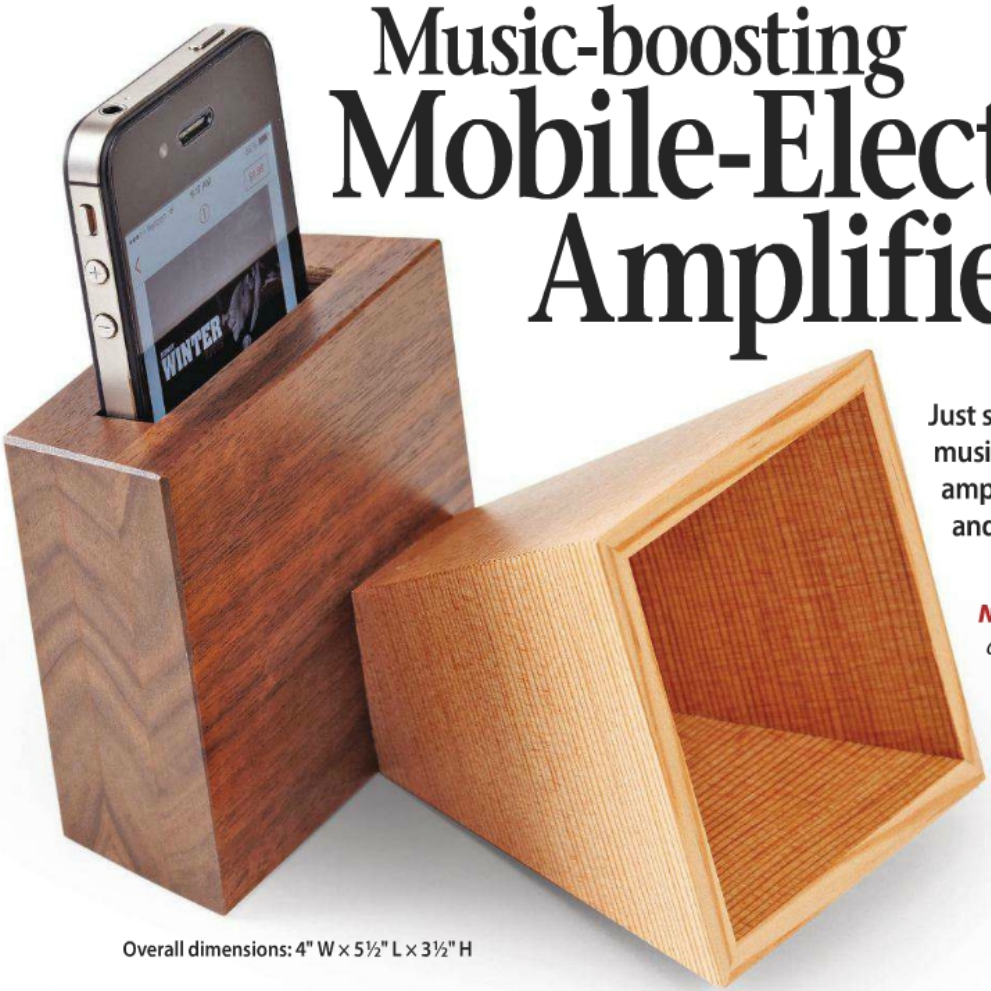
**Materials key:** WO–white oak.
**Supplies:** ¾" dowel, #8x2½" F.H. screws (6); #8x1½" F.H. screws (42); #8x1¼" F.H. screws (25); 2½" stainless-steel panhead fine-thread pocket-hole screws (26).
**Blade and bits:** ¾", ⅜", and 7/64" drill bits; ½" round-over, ⅛" round-over, 1" straight, ½" dado cleanout, and 1¼" top/bottom bearing flush-trim router bits; ⅜" plug cutter.

## More Resources

- Learn how to make and use a fairing stick at: woodmagazine.com/fairing.
- Find reviews of pocket-hole jigs at: woodmagazine.com/2013issues.
- Read 10 pocket-hole pointers at: woodmagazine.com/phpointers.

Written by **Mike Berger**
Produced by **Lucas Peters** with **John Olson**
Project design: **John Olson**
Illustrations: **Lorna Johnson**

# Music-boosting Mobile-Electronics Amplifier



**Just slip your smartphone or mobile music player (speaker down) into the amplifier's base for noticeably louder and clearer sound.**

***Note:*** *We designed this amplifier to fit an iPhone5 without a case. Before cutting any parts, measure your device's thickness and width, adding ⅛" to the width and thickness for wiggle room. Adjust the thickness and cutout in the center base layer (B) to fit your phone and the location of its built-in speaker.*

Overall dimensions: 4" W × 5½" L × 3½" H

*One of the running jokes around the WOOD® offices is that I'm the youngest guy on staff, and the most technologically behind the curve. I'm still a proud user of my old flip-open cell phone, and anything but a gadget guy. That said, this passive amplifier is such a fun project and conversation piece, I'm beginning to rethink my position as staff Luddite. It gives those weak built-in speakers on smartphones and portable music players an acoustic boost just by dropping the device inside. The design pays homage to gramophones of old, but looks so sleek and modern, even the trendiest of smartphone owners will want one.*

Nate

Nate Granzow
General-Interest Editor

## Layer the base

**1** From ½" walnut, cut three 3½×4" blanks for the base layers (A, B, C) [**Drawing 1**]. On the center base layer (B), mark the cutout to match the speaker location on your device [**Drawing 2**]. Bandsaw the cutout.

**2** Apply glue to the center base layer (B) and clamp the three base layers together with the edges and ends flush. After the glue dries, sand the base edges.

**3** Mark the location of the ¾" horn hole in the base (A/B/C) with an awl. Drill through to the center cavity. Cut 10° bevels on the sides and bottom of the base [**Drawing 2**]. Finish-sand the base to 220 grit.

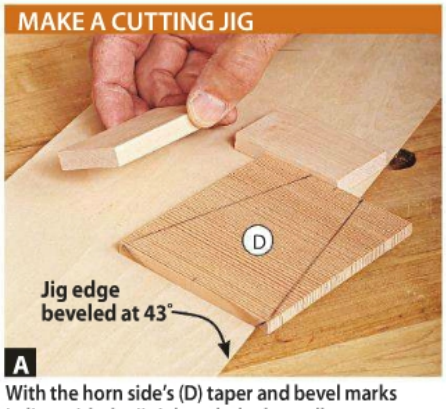
## Jig up for the horn

**1** Prepare a ¼×4×15" Douglas fir blank for the horn sides (D). Cut four 3½" pieces from the blank. Draw tapers on both faces, and bevels on both ends, of one of these pieces [**Drawing 3**].

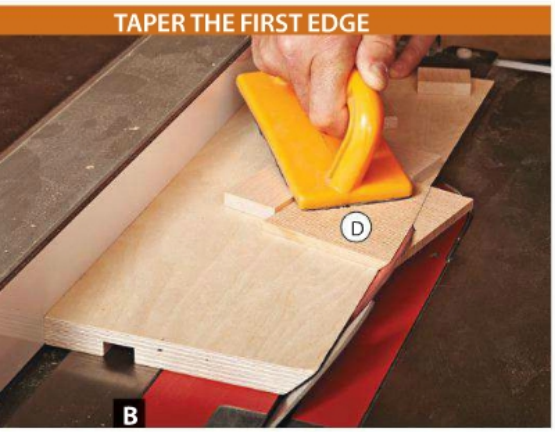
**2** To build a jig for making tapered bevel-cuts on the horn sides (D), cut an 8×18" piece of plywood and bevel one edge at 43°. Cut four 1×2" scrap blocks and apply a piece of double-faced tape to a face of each. Adhere two of them to the jig's face [**Photo A**], oriented to support the first tapered bevel-cut.

**3** Make the first 43° bevel-cut in the horn side (D) [**Photo B**]. Then, adhere the next set of scrap blocks to the jig, oriented to support the second cut [**Photo C**]. Repeat the cuts for all four horn sides.

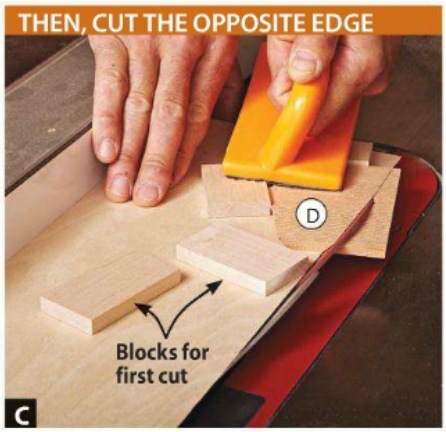
MAKE A CUTTING JIG



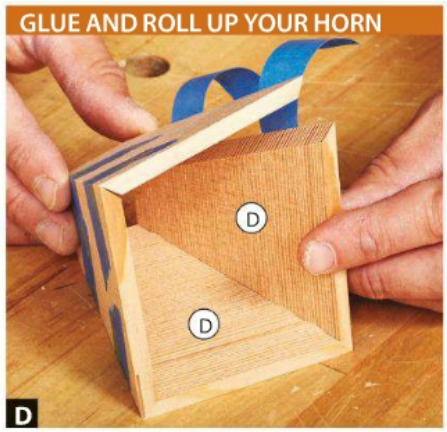

With the horn side's (D) taper and bevel marks in line with the jig's beveled edge, adhere scrap blocks to capture the workpiece.




Use a push pad to hold the horn side (D) down and tight to the jig's scrap blocks when making the first beveled taper cut.




Without changing the blade angle or moving the fence, rotate the horn side (D) 180° to the next set of scrap blocks and taper its opposite edge.



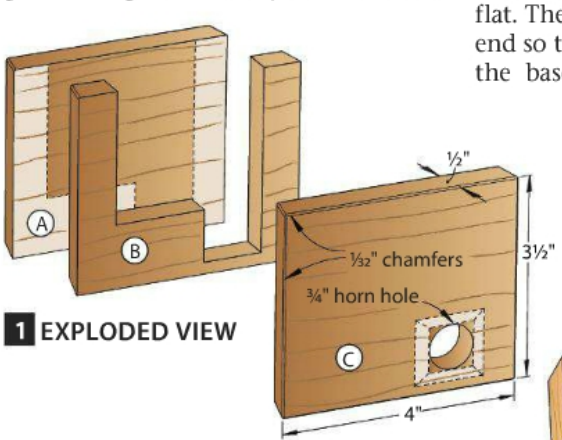

With the horn's (D) joints taped, test their fit before putting on glue. If you're happy with the fit, apply glue to the joints and fold the assembly up.

## Assemble the amp

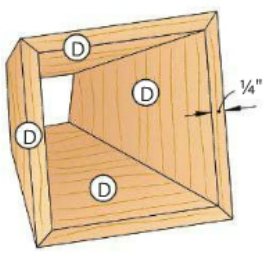
**1** Place the four horn sides (D) narrow face down on your workbench with the edges tight to one another. Apply painter's tape across the joints, and then flip the sides over. Glue and tape the assembly together [**Photo D**].

**2** Use a power sander or a strip of PSA sandpaper applied to your tablesaw table to sand the wide end of the horn flat. Then, sand an angle on the narrow end so that, after mounting the horn to the base (A/B/C), the wide end rests above the tabletop. Chamfer the amplifier base's edges where shown in **Drawing 1** and **2**. Finish-sand the entire amplifier to 220 grit.

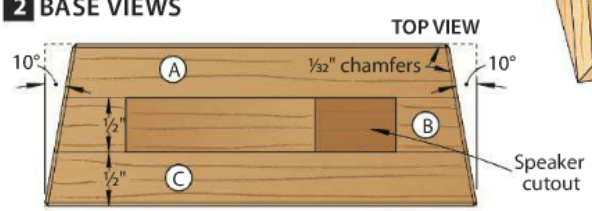
**3** Carefully glue the horn (D) to the base. Tape it in place with the narrow end over the horn hole. Finish the amplifier with three coats of wipe-on polyurethane. Then, drop in a music device and relax to your favorite track.

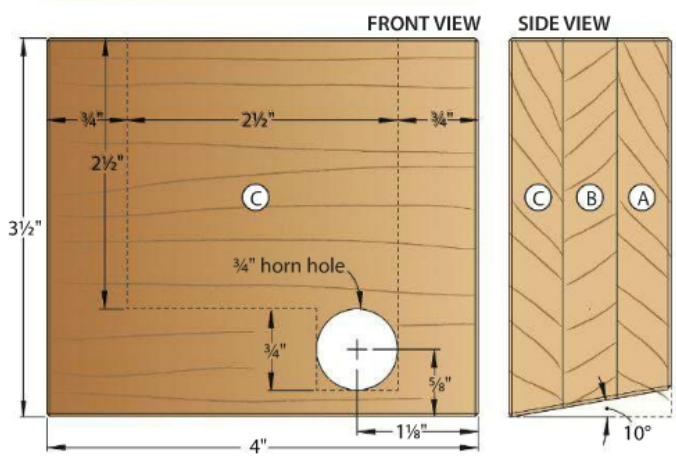



**1** EXPLODED VIEW

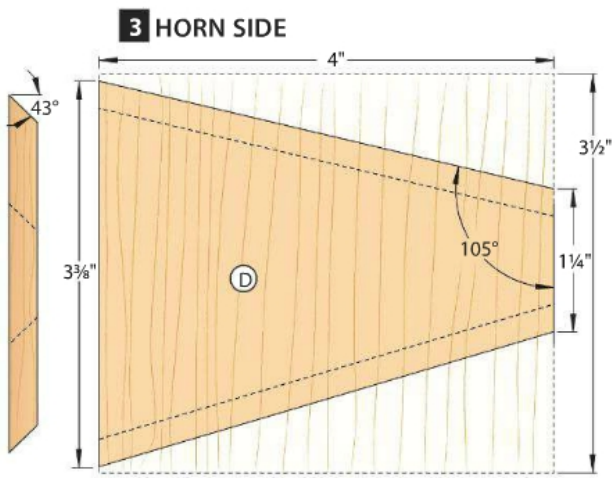



**2** BASE VIEWS




**3** HORN SIDE




## Materials List

| Part | | FINISHED SIZE T | W | L | Matl. | Qty. |
|---|---|---|---|---|---|---|
| A | back base layer | ½" | 3½" | 4" | W | 1 |
| B | center base layer | ½" | 3½" | 4" | W | 1 |
| C | front base layer | ½" | 3½" | 4" | W | 1 |
| D* | horn sides | ¼" | 4" | 3⅜" | DF | 4 |

*Parts initially cut oversize. See the instructions.
**Materials key:** W–walnut, DF–Douglas fir.
**Bit:** ¾" Forstner drill bit.

## More Resources

- Purchase an iPad case plan at woodmagazine.com/ipadcase or a tablet stand plan at woodmagazine.com/tabletstand.

Produced by **Nate Granzow** with **Kevin Boyle**
Project design: **Kevin Boyle**
Illustrations: **Lorna Johnson**

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REG. PRICE $149.99

37012285

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

## SUPER COUPON!

### 2.5 HP, 21 GALLON, 125 PSI VERTICAL AIR COMPRESSOR

CENTRAL PNEUMATIC

"The Perfect Compressor with Powerful, Quiet and Consistent Airflow... Plus we Love the Low Price" – Street Trucks Magazine

Item 67847 shown

SAVE $70

$149.99 REG. PRICE $219.99

LOT NO. 67847/61693/61454

92431028

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

## SUPER COUPON!

### HIGH VOLUME, LOW PRESSURE SPRAY GUN KIT

CHICAGO ELECTRIC POWER TOOLS

LOT NO. 44677

SAVE $30

$99.99

REG. PRICE $129.99

81514150

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

## SUPER COUPON!

### 1/4" TRIM ROUTER

drillmaster

SAVE 42%

LOT NO. 44914/61626

$19.99 REG. PRICE $34.99

Item 44914 shown

38607401

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

## SUPER COUPON!

### 12" x 33-3/8" WOOD LATHE WITH REVERSIBLE HEAD

CENTRAL MACHINERY

LOT NO. 34706

$199.99

$269.99 REG. PRICE $349.99

SAVE $150

32212592

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

## SUPER COUPON!

### 8", 5 SPEED BENCH MOUNT DRILL PRESS

SAVE $45

LOT NO. 38119/44506/60238

Item 60238 shown

CENTRAL MACHINERY

$54.99 $69.99 REG. PRICE $99.99

58101179

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

## SUPER COUPON!

LOT NO. 93888/60497/61899

### MOVER'S DOLLY

HaulMaster

- 1000 lb. Capacity

Item 93888 shown

SAVE 46%

$7.99

REG. PRICE $14.99

49868657

LIMIT 8 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

## SUPER COUPON!

### UNIVERSAL TOOL STAND

CENTRAL MACHINERY

- 500 lb. Capacity

SAVE 37%

LOT NO. 46075/69805

Item 46075 shown

$24.99

REG. PRICE $39.99

18350233

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

## SUPER COUPON!

PITTSBURGH

### RAPID PUMP® 3 TON LOW PROFILE HEAVY DUTY STEEL FLOOR JACK

- Weighs 77 lbs.

SAVE $100

LOW PROFILE 2-3/4" High

28" Long

20"

LOT NO. 68049/60688/61253/61282

$69.99 REG. PRICE $169.99

Item 61253 shown

72802996

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

## SUPER COUPON!

### 90 AMP FLUX WIRE WELDER

LOT NO. 68887/61207/61849

- No Gas Required!

SAVE $50

Item 68887 shown

CHICAGO ELECTRIC WELDING

$99.99 REG. PRICE $149.99

29740019

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

## SUPER COUPON!

### 2 HP FIXED BASE ROUTER

drillmaster

SAVE 35%

★WINNER★ Best Buy Award The Family Handyman

LOT NO. 68341

$44.99

REG. PRICE $69.99

53152874

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

SUPER COUPON

## 6.5 HP (212 CC) OHV HORIZONTAL SHAFT GAS ENGINES

LOT NO. 68120/ 60363/69730

SAVE $80

LOT NO. 69727 CALIFORNIA ONLY

PREDATOR ENGINES

Item 68120 shown

$99.99

REG. PRICE $179.99

75824678

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

SUPER COUPON

SAVE 41%

## ALUMINUM OXIDE SANDING SPONGES - PACK OF 10

Lifetime CARBIDE

YOUR CHOICE!

$3.49

REG. PRICE $5.99

COARSE LOT NO. 46751

MEDIUM LOT NO. 46752

FINE LOT NO. 46753

Item 46752 shown

31705284

LIMIT 7 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

SUPER COUPON

WINDSOR DESIGN

## 60" WORKBENCH WITH FOUR DRAWERS

LOT NO. 93454/69054

SAVE $110

Item 93454 shown

$139.99

REG. PRICE $249.99

85746162

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

SUPER COUPON

CENTRALPNEUMATIC

## 28° ANGLE FRAMING NAILER

SAVE $50

LOT NO. 68068/69928

Item 69928 shown

$69.99 REG. PRICE $119.99

31688961

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

SUPER COUPON

CENTRAL MACHINERY

SAVE $100

## 2 HP INDUSTRIAL 5 MICRON DUST COLLECTOR

LOT NO. 97869/61790

Item 97869 shown

$149.99 $199.99

REG. PRICE $249.99

28327556

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

SUPER COUPON

CENTRAL MACHINERY

## 16" VARIABLE SPEED SCROLL SAW

LOT NO. 93012

SAVE 25%

$59.99

REG. PRICE $79.99

48108891

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

SUPER COUPON

## ELECTRIC CHAIN SAW SHARPENER

CHICAGO ELECTRIC POWER TOOLS

SAVE 44%

4-1/4" grinding wheel included.

Item 68221 shown

$27.99 REG. PRICE $49.99

LOT NO. 68221/ 61613/93213

83142790

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SUPER COUPON

Requires three AAA batteries (included).

## 27 LED PORTABLE WORKLIGHT/FLASHLIGHT

LOT NO. 67227/ 69567/ 60566

SAVE 55%

HFT

Item 67227 shown

$2.69 REG. PRICE $5.99

30326833

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SUPER COUPON

CHICAGO ELECTRIC WELDING

## MIG-FLUX WELDING CART

LOT NO. 69340/ 60790/90305/61316

SAVE 50%

Item 69340 shown

Welder and accessories sold separately.

$29.99 $49.99

REG. PRICE $99.99

16207944

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SUPER COUPON

## 4" PLATE JOINER

CHICAGO ELECTRIC POWER TOOLS

LOT NO. 68987/38437

SAVE 33%

Item 68987 shown

$39.99

REG. PRICE $59.99

59715009

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SUPER COUPON

## TRIPLE BALL TRAILER HITCH

LOT NO. 94141/ 69874/61320/61913/61914

Haul Master

Item 94141 shown

SAVE 66%

$19.99

REG. PRICE $59.99

68717246

LIMIT 6 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

SUPER COUPON

drillmaster

## ORBITAL PALM SANDER

LOT NO. 40070/ 61311/61509

• 12,000 OPM

SAVE 59%

Item 40070 shown

$8.99 REG. PRICE $21.99

60373209

LIMIT 9 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

SUPER COUPON

CENTRAL PNEUMATIC

## RETRACTABLE AIR/WATER HOSE REEL WITH 3/8" x 50 FT. HOSE

SAVE $70

"Impressed with the Quality, Covers your Entire Garage at an unbelievable Low Price" – Street Trucks Magazine

LOT NO. 93897/ 69265

Item 93897 shown

$59.99 $89.99

REG. PRICE $129.99

79278085

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

SUPER COUPON

## 11 PIECE WOOD CARVING SET

Item 4855 shown

LOT NO. 4855/60655

SAVE 50%

$2.99

REG. PRICE $5.99

86766345

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SUPER COUPON

## 10 FT. x 10 FT. POPUP CANOPY

LOT NO. 68216/69456

SAVE $42

HFT

Item 68216 shown

$57.99

REG. PRICE $99.99

99255877

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SUPER COUPON

## 14" FOUR SPEED WOODWORKING BAND SAW

LOT NO. 60564/ 67595/68835

Item 60564 shown

CENTRAL MACHINERY

SAVE $130

$329.99 REG. PRICE $459.99

81465071

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

SUPER COUPON

CENTRALPNEUMATIC

## HIGH SPEED METAL SAW

LOT NO. 91753/60568

SAVE 70%

Item 91753 shown

$9.99

REG. PRICE $33.99

40689821

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SUPER COUPON

BADLAND

NEW!

## 2500 LB. ELECTRIC WINCH WITH REMOTE CONTROL AND AUTOMATIC BRAKE

SAVE $70

Item 61258 shown

$49.99

REG. PRICE $119.99

LOT NO. 68146/ 61258/61297/61840

66628078

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**We FedEx Most Orders in 24 Hours for $6.99**

**500 Stores Nationwide**

# HARBOR FREIGHT TOOLS

**Quality Tools at Ridiculously Low Prices**

**LIFETIME WARRANTY** ON ALL HAND TOOLS!

---

SUPER COUPON!

CENTRAL MACHINERY

## 4" x 36" BELT/ 6" DISC SANDER

SAVE $42

Item 97181 shown

LOT NO. 97181/93981

$57.99

REG. PRICE $99.99

56704574

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SUPER COUPON!

PITTSBURGH

## 24" CLAMP AND CUT EDGE GUIDE

LOT NO. 66126

SAVE 46%

$6.99

REG. PRICE $12.99

93805330

LIMIT 9 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

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SUPER COUPON!

PREDATOR GENERATORS

SUPER QUIET!

## 4000 PEAK/ 3200 RUNNING WATTS 6.5 HP (212 CC) GAS GENERATORS

- 70 dB Noise Level

LOT NO. 68528/69676/69729

LOT NO. 69675/69728 CALIFORNIA ONLY

Item 68528 shown

SAVE $200

$299.99

REG. PRICE $499.99

53991769

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SUPER COUPON!

PITTSBURGH

## 3 TON HEAVY DUTY JACK STANDS

LOT NO. 38846/ 69597/61196

SAVE 62%

Item 38846 shown

$16.99

REG. PRICE $44.99

14365155

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SUPER COUPON!

PACIFIC HYDROSTAR

## 1500 PSI PRESSURE WASHER

SAVE $50

LOT NO. 68333/69488

Item 68333 shown

$79.99

REG. PRICE $129.99

60394292

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SUPER COUPON!

## 1/2" PROFESSIONAL VARIABLE SPEED REVERSIBLE HAMMER DRILL

CHICAGO ELECTRIC POWER TOOLS

Item 68169 shown

LOT NO. 68169/ 67616/60495

SAVE 50%

$24.99

REG. PRICE $49.99

46198127

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SUPER COUPON!

## 1195 LB. CAPACITY 4 FT. x 8 FT. HEAVY DUTY FOLDABLE UTILITY TRAILER

- DOT certified

SAVE $150

Haul Master

$249.99

REG. PRICE $399.99

LOT NO. 90154

19560915

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

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SUPER COUPON!

## 12" COMBINATION SQUARE SET

PITTSBURGH

LOT NO. 92471

SAVE 50%

$4.99

REG. PRICE $9.99

54491082

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SUPER COUPON!

CEN-TECH

## 12 VOLT, 10/2/50 AMP BATTERY CHARGER/ ENGINE STARTER

Item 60653 shown

LOT NO. 66783/ 60581/60653

SAVE 62%

$29.99

REG. PRICE $79.99

79919650

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SUPER COUPON!

THUNDERBOLT SOLAR

## 45 WATT SOLAR PANEL KIT

LOT NO. 68751/90599

SAVE $115

Item 68751 shown

$144.99

REG. PRICE $259.99

21587974

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SUPER COUPON!

## COLOR SECURITY SYSTEM WITH TWO CAMERAS AND FLAT PANEL MONITOR

LOT NO. 60565

SAVE $35

NEW!

Bunker Hill Security

$64.99

REG. PRICE $99.99

68824881

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

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SUPER COUPON!

## DOVETAIL MACHINE

CENTRAL MACHINERY

LOT NO. 34102

SAVE 28%

$24.99

REG. PRICE $34.99

79302330

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

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SUPER COUPON!

## 3" HIGH SPEED ELECTRIC CUT-OFF TOOL

SAVE 42%

CHICAGO ELECTRIC POWER TOOLS

LOT NO. 68523/60415

Item 68523 shown

$19.99

REG. PRICE $34.99

216354458

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SUPER COUPON!

## MECHANIC'S SHOP TOWELS PACK OF 50

LOT NO. 46163/ 68442/69649/ 61837/61878

Item 46163 shown

SAVE 50%

$9.99

REG. PRICE $19.99

73604954

LIMIT 7 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

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SUPER COUPON!

## POWDER-FREE NITRILE GLOVES PACK OF 100

- 5 mil. Thickness

Item 68498 shown

YOUR CHOICE!

SAVE 42%

$6.29

REG. PRICE $10.99

MEDIUM LOT NO. 68496/61363

LARGE LOT NO. 68497/61360

X-LARGE LOT NO. 68498/ 37052/61359

45356053

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SUPER COUPON!

PITTSBURGH

## 105 PIECE TOOL KIT

- 4 Drawer Tool Chest Included!

SAVE 60%

LOT NO. 4030/ 69323/69380/61591

Item 4030 shown

$35.99

REG. PRICE $89.99

31806878

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

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SUPER COUPON!

## 10", 13 AMP INDUSTRIAL BENCH TABLE SAW

CENTRAL MACHINERY INDUSTRIAL

LOT NO. 68827/ 97896/69480

SAVE $60

Item 68827 shown

$119.99

REG. PRICE $179.99

97499795

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

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SUPER COUPON!

## 500 LB. CAPACITY ALUMINUM CARGO CARRIER

SAVE $60

Haul Master

Item 92655 shown

LOT NO. 92655/ 69688/60771

$69.99

REG. PRICE $129.99

38553324

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

SUPER COUPON

## 2.5 HP 12" PLANER

CENTRAL MACHINERY

LOT NO. 95082

$219.99

$269.99 REG. PRICE $299.99

SAVE $80

24514736

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

SUPER COUPON

## NO. 33 BENCH PLANE

LOT NO. 97544

SAVE 20%

WINDSOR DESIGN

$7.99 REG. PRICE $9.99

71778376

LIMIT 8 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 7/11/14. Limit one coupon per customer per day.

SUPER COUPON

Blade included.

## 12" SLIDING COMPOUND DOUBLE-BEVEL MITER SAW WITH LASER GUIDE

SAVE $170

NEW!

★WINNER★ Best Value Award The Family Handyman

CHICAGO ELECTRIC POWER TOOLS

LOT NO. 69684/98194/61776

Item 69684 shown

$129.99 $189.99 REG. PRICE $299.99

27236436

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SUPER COUPON

## 7 FT. 4" x 9 FT. 6" ALL PURPOSE WEATHER RESISTANT TARP

LOT NO. 877/69137/ 69249/69129/69121

SAVE 66%

$2.99 REG. PRICE $8.99

Item 877 shown

45564655

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SUPER COUPON

• 1000 lb. Capacity

## 9" x 6 FT. 2 PIECE STEEL LOADING RAMPS

Haul Master

Item 44649 shown

LOT NO. 44649/ 69591/69646

$39.99 $59.99 REG. PRICE $79.99

SAVE 50%

21485081

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SUPER COUPON

## AUTO-DARKENING WELDING HELMET WITH BLUE FLAME DESIGN

CHICAGO ELECTRIC WELDING

LOT NO. 91214/61610

Item 91214 shown

SAVE 53%

$41.99 REG. PRICE $89.99

84564855

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SUPER COUPON

## 17 FT. TYPE 1A MULTI-TASK LADDER

LOT NO. 67646

• 300 lb. Capacity

• 23 Configurations

SAVE $82

$117.99 REG. PRICE $199.99

35680979

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SUPER COUPON

## 29 PIECE TITANIUM NITRIDE COATED DRILL BIT SET

Item 5889 shown

drill master

LOT NO. 5889/61637

SAVE 60%

$9.99 REG. PRICE $24.99

47530288

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SUPER COUPON

## PNEUMATIC ADJUSTABLE ROLLER SEAT

Item 46319 shown

PITTSBURGH

LOT NO. 46319/61160/61896

• 300 lb. Capacity

SAVE 42%

$19.99 REG. PRICE $34.99

77728407

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SUPER COUPON

CENTRAL MACHINERY

## 8" x 12" BENCH TOP WOOD LATHE

LOT NO. 95607

SAVE $50

$99.99 REG. PRICE $149.99

73950029

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SUPER COUPON

## EIGHT DRAWER WOOD TOOL CHEST

LOT NO. 94538

WINDSOR DESIGN

$59.99 $79.99 REG. PRICE $99.99

SAVE $40

21443170

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SUPER COUPON

## 1500 WATT DUAL TEMPERATURE HEAT GUN (572°/1112°)

drill master

LOT NO. 96289

SAVE 69%

$7.99 REG. PRICE $25.99

64109635

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SUPER COUPON

CHICAGO ELECTRIC POWER TOOLS

"The Price is Irresistible" – The Family Handyman Magazine

## MULTIFUNCTION POWER TOOL

8 Functions: Sanding, Remove Grout, Cut Metal, Cut Flooring, Cut Plastic, Plunge Cut, Scrape Concrete, Scrape Flooring

Item 68861 shown

LOT NO. 68861/68303/60428

SAVE 70%

$14.99 REG. PRICE $49.99

51361882

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SUPER COUPON

## P95 MAINTENANCE-FREE DUAL CARTRIDGE RESPIRATORS

SAVE 30%

MEDIUM LOT NO. 66554

LARGE LOT NO. 67727

YOUR CHOICE!

$13.99 REG. PRICE $19.99

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SUPER COUPON

## 2 PIECE VEHICLE WHEEL DOLLIES

Haul Master

LOT NO. 67338/60343

• 1500 lb. Capacity

Item 67338 shown

SAVE 50%

$39.99 REG. PRICE $79.99

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SUPER COUPON

## 16" x 30" STEEL SERVICE CART

US★GENERAL

LOT NO. 5107/60390

• 220 lb. Capacity

Item 5107 shown

SAVE 37%

$27.99 REG. PRICE $44.99

29867239

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SUPER COUPON

## HEAVY DUTY HAND TRUCK

HaulMaster

LOT NO. 95061

• 600 lb. Capacity

SAVE 40%

$29.99 REG. PRICE $49.99

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SUPER COUPON

Bunker Hill Security

## 36 LED SOLAR SECURITY LIGHT

LOT NO. 69644/ 98085/69890/60498

Includes 3.2V, 600 mAh Li-ion battery pack.

SAVE 33%

Item 69644 shown

$19.99 REG. PRICE $29.99

46145115

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# Shop-Proven Products

These woodworking wares passed our shop trials.

**About our product tests**

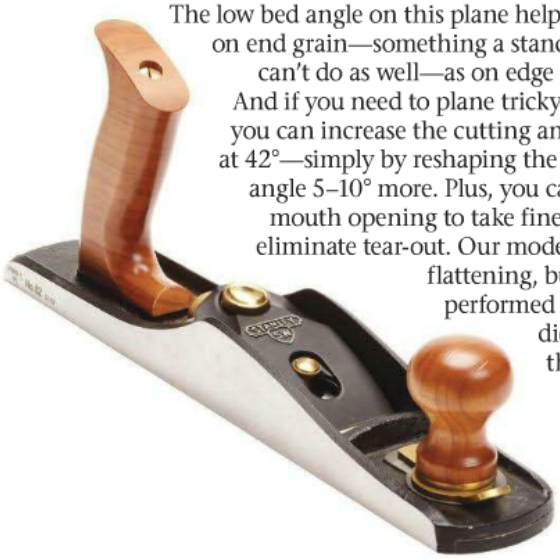
We test hundreds of tools and accessories, but only those that earn at least three stars for performance make the final cut and appear in this section. The products shown here, and those that don't make the cut, are also reviewed at toolreviews.woodmagazine.com. Prices shown are current at the time of article production and do not include shipping, where applicable.

## WISE BUYS: Jack planes

Named for its "jack-of-all-trades" versatility, a jack plane works great for both flattening and smoothing the faces and edges of a workpiece. And its momentum-making mass means you can hog away material without wearing out your arms. *WOOD*® project builders Kevin Boyle and John Olson tested eight jack planes over several months, and they recommend these four models.

### Best for end grain

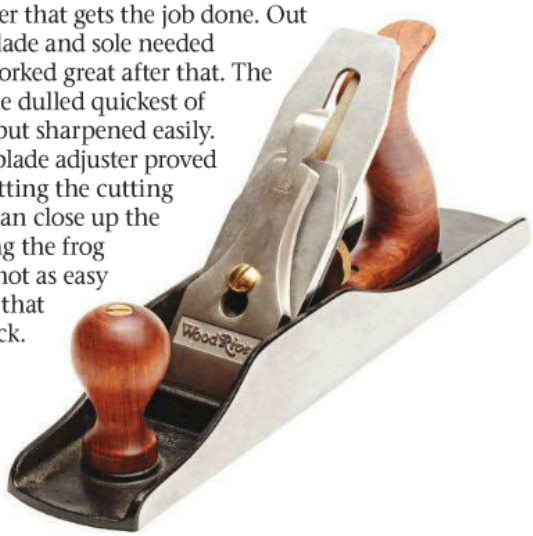
**Stanley Sweetheart no. 62 low-angle, $135**
**800-262-2161, stanleytools.com**



The low bed angle on this plane helps it cut as great on end grain—something a standard-angle jack can't do as well—as on edge and face grain. And if you need to plane tricky figured wood, you can increase the cutting angle—normally at 42°—simply by reshaping the bevel-up blade angle 5–10° more. Plus, you can close up the mouth opening to take finer shavings and eliminate tear-out. Our model's sole needed flattening, but once done it performed nicely. And we didn't care for its thick, wide tote; we'd prefer a classic Stanley design.

### Best bang for the buck

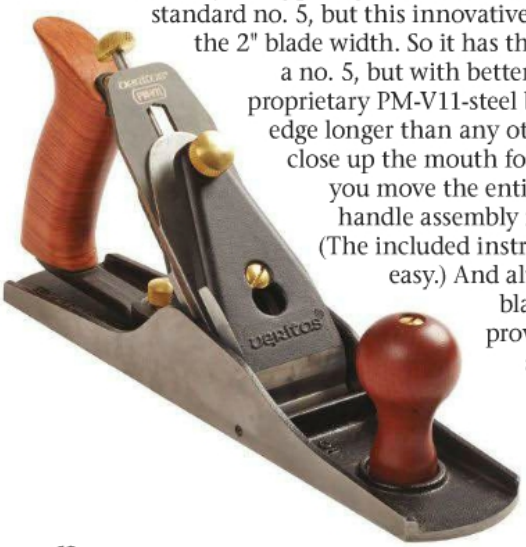
**WoodRiver no. 5 (150875), $170**
**800-225-1153, woodcraft.com**



This is the Chevy pickup truck of jack planes: a midpriced, no-frills performer that gets the job done. Out of the box, the blade and sole needed flattening, but worked great after that. The carbon-steel blade dulled quickest of those we tested, but sharpened easily. The Bailey-type blade adjuster proved easy to use for setting the cutting depth, and you can close up the mouth by moving the frog forward, but it's not as easy as a movable toe that slides front to back. The bubinga handles are a nice touch.

### Best if you dread sharpening

**Veritas no. 5¼ (05P24.71), $242**
**800-871-8158, leevalley.com**



No. 5¼ jacks typically are shorter and narrower than a standard no. 5, but this innovative model maintains the 2" blade width. So it has the mass and feel of a no. 5, but with better balance. And the proprietary PM-V11-steel blade held a sharp edge longer than any other in our test. To close up the mouth for tighter shavings, you move the entire blade-frog-and-handle assembly forward and back. (The included instructions make this easy.) And although the Norris blade-depth adjuster proved fussy at times, setscrews near the mouth restrict side-to-side blade movement.

### Most likely to hold its value

**Lie-Nielsen no. 5, $325**
**800-327-2520, lie-nielsen.com**

Based on the classic Stanley designs from a century ago and built in Maine, this jack feels comfortable in your hands and proves easy to use right out of the box. The A2-steel blade takes longer to sharpen than others, but holds an edge longer than carbon-steel blades. You can buy extra frogs ($75–80 each) for this plane to quickly change the cutting angle using the same blade; the blade and frogs are also interchangeable with Lie-Nielsen's no. 4 smoothing plane. Plus, these tools have proved to hold their resale value should you later choose to sell yours.

*continued on page 64*

# Shop-Proven Products

## Get big-saw features in a 110-volt machine


**10" Tablesaw (PM1000)**

| | | |
|---|---|---|
| Performance | ★★★★★ | |
| Price | w/30" rip capacity | $2,000 |
| | w/52" rip capacity | $2,100 |

Powermatic
800-274-6848; powermatic.com

Powermatic's PM1000 tablesaw truly qualifies as a "hybrid" machine, one that merges the best features of a beefy 220-volt cabinet saw with the ability to plug into a 110-volt outlet. It performs (and costs) like a cabinet saw with a smaller motor.

In my testing, the 1¾-hp motor plowed a thin-kerf blade through 8/4 red oak like a champ. The cast-iron base around the cabinet and a heavy-duty arbor-and-trunnion assembly eliminate vibration. And because the trunnions mount to the cabinet rather than the top, I found it easy to align the miter slots to the blade.

I like the PM1000's miter gauge better than most factory-supplied ones because it pivots 60° left and right, has five adjustable angle stops (0°, and 30° and 45° to each side), and a sliding fence with T-slots. The rip fence locked solidly and never deflected more than .002" during testing. And such touches as large, smooth-turning handwheels, easy-to-read rip-fence and blade-bevel scales, and a large pull/push power switch make this saw stand out from other 110-volt machines.

*—Tested by Bob Baker*

## Add more GRR-Rip for other shop machines

I've used Micro Jig's GRR-Ripper pushblock for years—I never make a tablesaw ripcut without it. And I'm just as keen on these similar pushblocks for use on other machines, such as a jointer, bandsaw, or router table. The GRR-Rip Blocks have the same heavy plastic handle and base, plus a rubbery grip pad pocked with round nodules for a sure grab on any workpiece. I like the drop-down catches at each heel, providing a way to also hook the end of a workpiece. These catches also lock in the "up" position when not needed.

*—Tested by Bob Hunter, Tools Editor*


**GRR-Rip Block (GB-1)**

| | |
|---|---|
| Performance | ★★★★★ |
| Price | $30 |

Micro Jig
855-747-7233; microjig.com

*continued on page 66*

# Shop Proven Products

## Make a "hole" lot of game boards easily

The older I get, the more I appreciate the bigger things in life, such as oversized print and large knobs on jigs. Rockler's XL Cribbage Board Templates make an 8×28" game board big enough to play without my "cheater" glasses when scoring, and the easy-to-grip optional metal pegs (no. 49537, $16) add a nice touch. Plus, the templates make it easy to crank out lots of game boards to give as gifts.

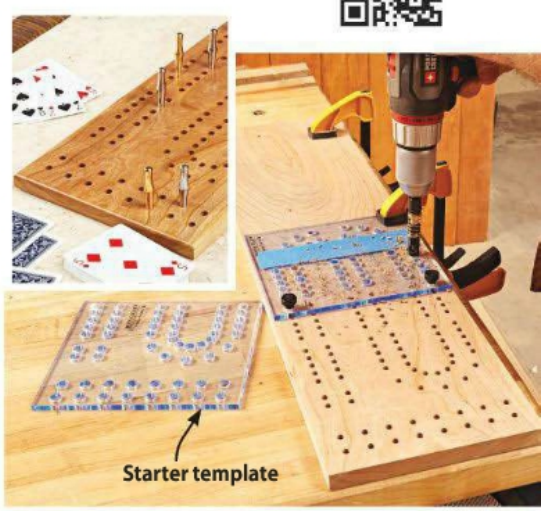
The kit comes with two templates, a special spring-loaded ¼" drill bit, and two registration pins. You drill the first group of holes with one template; then use the other five times in a step-and-repeat process drilling only the straight-row holes, and then a sixth time drilling all the holes on that template. The registration pins align the template each time with holes you just drilled, and even though they hold the template pretty well, I still clamped it to avoid any miscues.

*—Tested by Dave Campbell, Editorial Content Chief*

**XL Cribbage board template set (46368)**

| | |
|---|---|
| Performance | ★★★★★ |
| Price | $49 |

Rockler Woodworking & Hardware
800-279-4441; rockler.com




To prevent accidentally drilling beyond the required guide holes while repeating steps with the same template, tape over the holes used only in the last step.

*continued on page 68*

# SAVE When You Grow A Zoysia Lawn From Plugs!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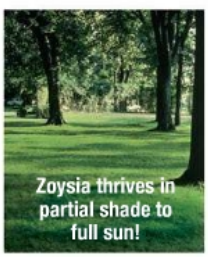


Stop wasting money, time and work sowing new grass seed each spring, only to see birds eat the seed – or rain wash it away – before it can root. Plant a genuine Amazoy™ Zoysia lawn from our living Plugs only once... and never plant a new lawn again!

### Zoysia Grows Where Other Grass Doesn't!

Zoysia is the perfect choice for hard-to-cover spots, areas that are play-worn or have partial shade, and for stopping erosion on slopes. North, South, East, West – Zoysia will grow in *any* soil, no ifs, ands or buts!

**Each Zoysia Plug You Plant In Your Soil Is GUARANTEED TO GROW Within 45 Days Or We'll Replace It FREE!**

To ensure best results, we ship you living sheets of genuine Amazoy™ Zoysia Grass, harvested direct from our farms. Plugs are not cut all the way through. Before planting, simply finish the separation by cutting 1"-sq. Plugs with shears or knife. Then follow the included easy instructions to plant Plugs into small plug holes about a foot apart. Our guarantee and planting method are your assurance of lawn success backed by more than 6 decades of specialized lawn experience.



### Eliminates Endless Weeds And Weeding!

No more pulling out weeds by hand or weeds sprouting up all over your lawn. Zoysia Plugs spread into a dense, plush, deep-rooted, established lawn that drives out unwanted growth and stops crabgrass and summer weeds from germinating.

### Environmentally Friendly, No Chemicals Needed!

No weeding means no chemicals. You'll never have to spray poisonous pesticides and weed killers again! Zoysia lawns are safer for the environment, as well as for family and pets!

### Cuts Watering & Mowing By As Much As 2/3!

Many established Zoysia lawns only need to be mowed once or twice a season. Watering is rarely, if ever, needed – even in summer!


Meyer Zoysia Grass was perfected by the U.S. Gov't, released in cooperation with the U.S. Golf Association as a superior grass.

www.ZoysiaFarms.com/mag

### Stays Green In Summer Through Heat & Drought!

When ordinary lawns brown up in summer heat and drought, your Zoysia lawn stays green and beautiful. The hotter it gets, the better it grows. *Zoysia thrives in blistering heat (120°)*, yet it won't winter-kill to 30° below zero. It only goes off its green color after killing frosts, but color returns with consistent spring warmth. Zoysia is the perfect choice for water restrictions and drought areas!

### Our Customers Love Their Zoysia Lawns!

One of our typical customers, Mrs. M.R. Mitter of PA, wrote how "I've never watered it, only when I put the Plugs in... Last summer we had it mowed 2 times... When everybody's lawns here are brown from drought, ours just stays as green as ever!"

### Order Now And Save!

The more Amazoy™ Zoysia Plugs you order, the more you SAVE! And remember, once your Zoysia lawn is established, you'll have an endless supply of new Plugs for planting wherever you need them. Order now!

**FREE! PLANTING TOOL** With Order of 500 Plugs or More!
Saves time, work and effort when making holes for Plugs!

## *Order Now and Save Over 50% – Harvested Daily From Our Farms And Shipped To You Direct!*

## SAVE Even More With FREE Shipping!

## PLUS Get Up To 900 Plugs-FREE!

Please send me guaranteed Amazoy plug packs as marked:

| QTY | # PLUGS | + FREE Plugs | +FREE Planting Tool | Retail Value | Your Price | + Shipping | Save |
|---|---|---|---|---|---|---|---|
| | 150 | — | — | $14.95 | $ 14.95 | $ 5.00 | |
| | 500 | + 100 | + Free Step-on Plugger | $84.00 | $45.60 | $ 7.00 | 38% |
| | 750 | + 150 | + Free Step-on Plugger | $128.00 | $74.50 | ~~$10.00~~ FREE | 42% |
| | 1100 | + 400 | + Free Amazoy Power Auger | $220.00 | $99.10 | ~~$15.00~~ FREE | 52% |
| | 1500 | + 900 | + Free Amazoy Power Auger AND Step-on Plugger | $355.00 | $147.50 | ~~$25.00~~ FREE | 59% |

❑ Extra Step-on Plugger **$8.95** + $3 Shipping | ❑ Extra Amazoy Power Auger™ for 3/8" Drill **$24.95** + $5 Shipping

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# Shop Proven Products

## New and Untested

### Porter-Cable beefs up its 20-volt lineup

Following the successful launch of its 20-volt lithium-ion drill and impact driver, Porter-Cable has rounded out that platform with these additional cordless tools:

- 6½" circular saw
- jigsaw
- reciprocating saw
- pivoting flashlight
- oscillating multi-tool
- grinder/cutoff tool

Porter-Cable also added a new 4-amp-hour battery pack for its 20-volt tools, for increased runtime compared to its original 1.5- and 3-amp-hour packs. Go to portercable.com for more details.

### "Glide" mitersaw now available in 10" model

Bosch's compact and innovative 12" dual-bevel Glide mitersaw (GCM12SD) has a 10" sibling in the CM10GD. According to Bosch, this saw boasts a 12" crosscut capacity and 5½" vertical capacity. It sells for $699. For more information, go to boschtools.com.




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# Stop the slamming with soft-closing solutions

**Q** My neighbor just got new kitchen cabinets with doors that don't slam shut. I want the same. Can I retrofit my existing cabinets with this type of hardware?

*—Ethan Hamilton, Buffalo, N.Y.*

**A** You can, Ethan. Here are two methods to do it.

**OPTION 1: Replace the hinges.** If you already have European-style concealed hinges on your cabinets, you can probably replace them with soft-close models. Blum's Blumotion, Salice's Silentia, and Grass's TEC may do the trick. Soft-close pistons built into the hinge cup or onto the arm ensure a slam-free closure.

**Pros:**

- Some models have on/off switches, letting you disengage the soft-close feature if you wish.
- Depending on the door size, you might need to replace only half or two-thirds of its hinges with soft-close versions. Experiment to find out.


**Cons:**

- Soft-close hinges cost more ($4–$10 each, depending on brand) than standard hinges.
- Some models might not fit precisely in the existing mounting holes. For best results, stay with the same manufacturer as your original hinges.
- If you have a less-common hinge style, such as for inset doors, you might not find a replacement version.

**OPTION 2: Add a plunger.** If you can't find the right hinges, or don't want to swap out the ones you have now, you can always install plunger-style pistons, like the one shown *above*. Selling for about $10–$15 apiece, these screw onto the face frame or side panel, or into a hole bored into the cabinet, to slow the door as it closes the last inch or so. They work on just about any door with a snap-close hinge.

## How to calculate speeds for a replacement pulley

**Q** I need a new pulley for my 1940s-era drill press, but the manufacturer has gone out of business. At the hardware store, I found a four-step pulley of similar size to the original, but slightly different in diameter for each step. How can I calculate the drill-bit speed for each setting?

*—James Allen, Dallas*

**A** To calculate spindle speeds, James, you need to know the diameter of the two pulleys the belt runs on, plus the motor speed. The equation looks like this:

**d1 × s1 = d2 × s2**

- d1 = diameter of the motor pulley
- s1 = motor speed (found on the motor plate)
- d2 = diameter of the spindle pulley
- s2 = spindle speed

Example: The motor pulley measures 1⅛", or 1.125", and the motor runs at 1,725 rpm. The spindle pulley measures 4". So to find the spindle speed:

**1.125 × 1,725 = 4 × s2**
**1940 ÷ 4 = s2**
**s2 = 485 rpm**

Use the same formula to calculate all the other pulley combinations, and keep them on a chart at your drill press.

To find the proper speed for different types and sizes of drilling accessories, download our free speed chart at woodmagazine.com/drillpresschart.

*continued on page 72*

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# Ask WOOD

## A tulip by any other name...

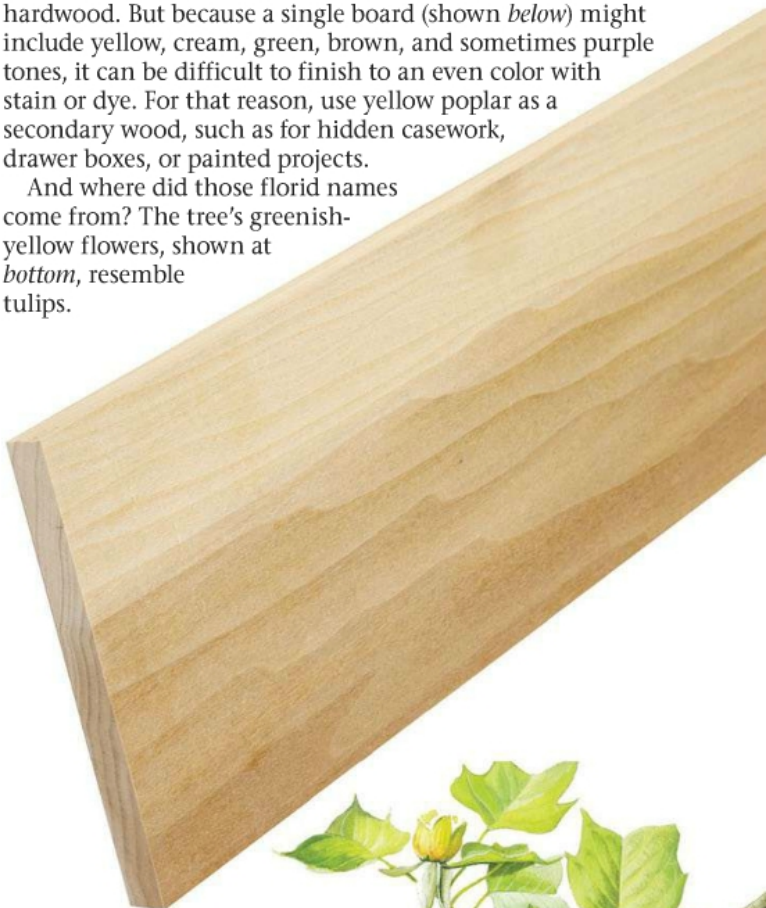
**Q** In my part of the country, yellow poplar is readily available. I hear people from other parts of the country talk about tulip poplar. What's the difference?

—*Wes McMurtry, Columbus, Ohio*

**A** There is no difference, Wes. The wood (and tree) is the same, only the names differ. In fact, the name list goes on: poplar, tulipwood, whitewood, canoewood. The tree's formal name is *Liriodendron tulipifera*, and it's native to the eastern third of North America.

Yellow poplar grows fast, producing fine-grained, stable hardwood. But because a single board (shown *below*) might include yellow, cream, green, brown, and sometimes purple tones, it can be difficult to finish to an even color with stain or dye. For that reason, use yellow poplar as a secondary wood, such as for hidden casework, drawer boxes, or painted projects.

And where did those florid names come from? The tree's greenish-yellow flowers, shown at *bottom*, resemble tulips.



*continued on page 74*

# Ask WOOD

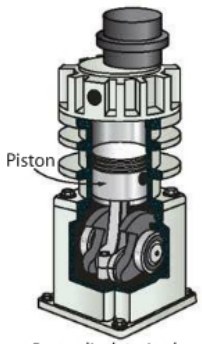
## What's a two-stage air compressor?

While shopping for a home-shop compressor, I saw an online listing for a "two-stage" machine. Would it be appropriate for running nailers and a gravity-cup sprayer? What's the difference between a two-stage and a regular compressor that, I guess, is single-stage?

*—Jeff Burgess, Corvallis, Ore.*

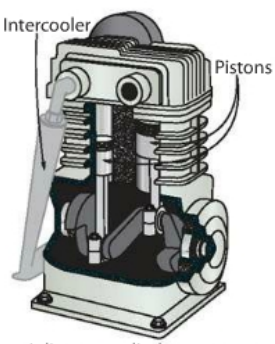
A Unless you plan to do large-scale spray painting (homes, cars), pneumatic sanding, or remove wheel lug nuts on a vehicle, Jeff, you should not need a two-stage compressor. Here's why.

A single-stage model *(right)* draws air into its pump and then compresses it directly into the tank. This type of compressor runs on 110-volt current, ranges in tank size from 1 to 60 gallons, and produces up to about 11 cubic feet per minute (cfm) of airflow. Furniture-scale spray guns require 7–12 cfm, depending on model.



One cylinder, single-stage

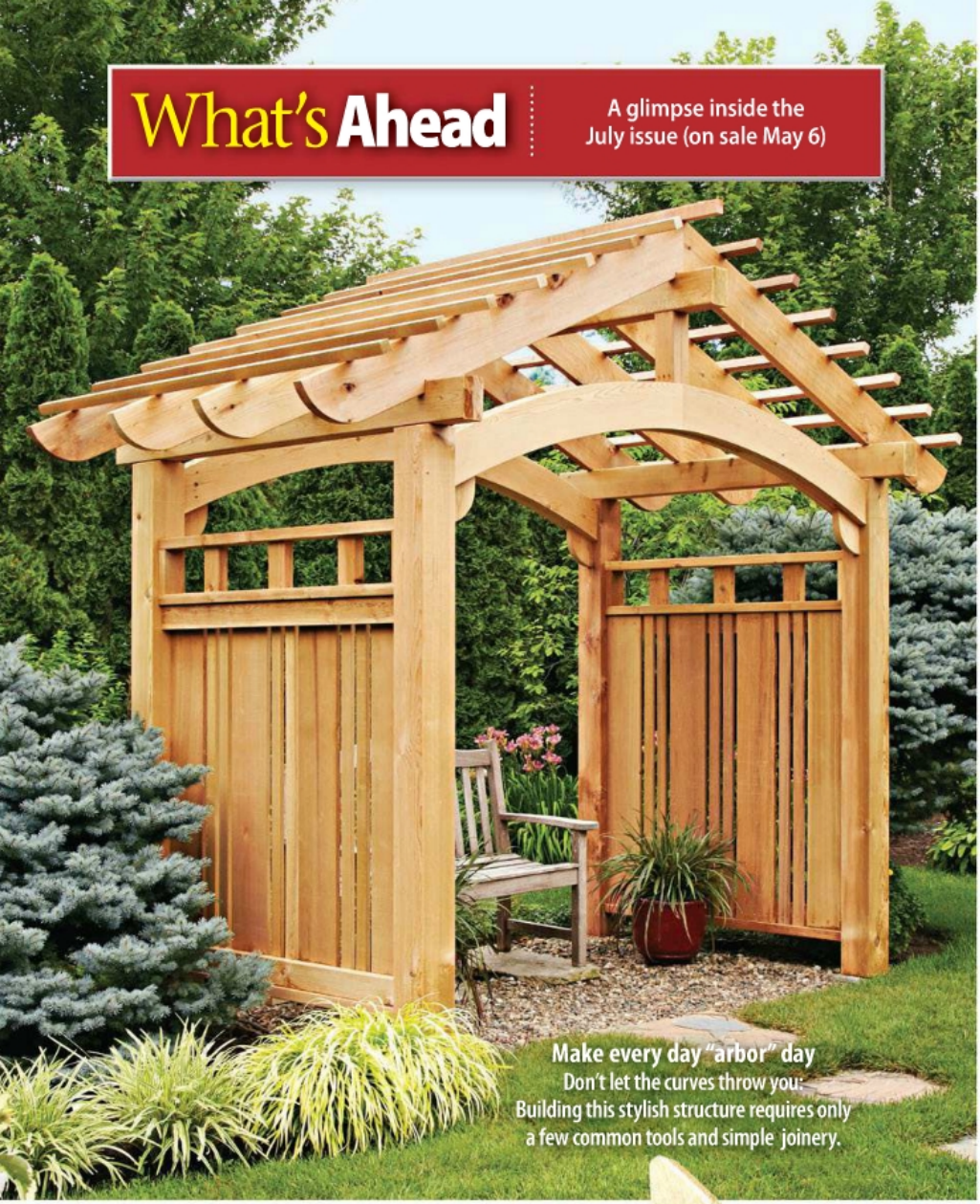
For most home woodworking shops, a two-stage unit, which requires 220 volts, is overkill. This type, *below*, has two pistons, housed in a cast-iron pump, to divide the workload. The first piston compresses air to about half the desired pressure level, then sends it through an intercooler (removing built-up heat) to the second cylinder, where the air gets further compressed and then sealed inside the tank. These compressors usually have 80-gallon or larger tanks and create about twice the airflow of single-stage units. This allows you to use high-demand tools, such as large sprayers, impact wrenches, and dual-action sanders, without running low on air pressure.



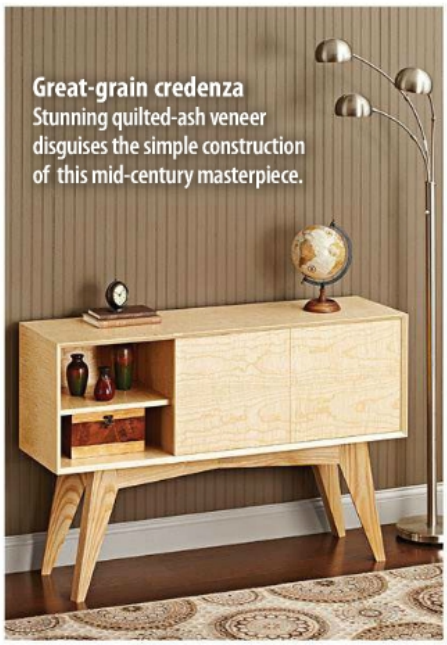
Inline two cylinder, two-stage

# What's Ahead

A glimpse inside the July issue (on sale May 6)



**Make every day "arbor" day**
Don't let the curves throw you: Building this stylish structure requires only a few common tools and simple joinery.



**Great-grain credenza**
Stunning quilted-ash veneer disguises the simple construction of this mid-century masterpiece.

**Clamp with—literally—a ton of pressure**
Learn how a vacuum bag and pump help you successfully apply veneer at the simple flip of a switch.

**Hideaway kitchen appliance garage**
A faux-drawer facade and classic milk-paint finish makes this simple-to-build hidey-hole as striking as it is handy.

**Dig this!**
A backhoe serves as the Swiss army knife of the job site. Our popular Construction-grade series grows to 13 models with this sharp-looking toy.

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