

Presented by Popular Woodworking

# Outdoor Furniture

## 8 Backyard Builds



**Handplane  
Birdhouse**



**Folding  
Plant Stand**



**Seedling Shelter**



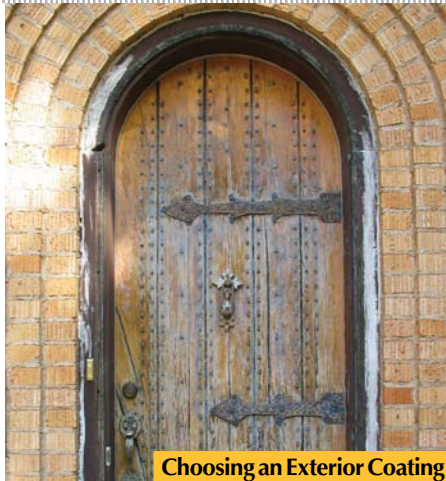
**All-weather  
Morris Chair**



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Garden Storage Bench



Choosing an Exterior Coating



Garden Swing

## All-weather Morris Chair

Paint and pine make this Craftsman classic a comfortable addition to your outdoor life – and it can be made in a day.

BY DAVID THIEL

## Folding Plant Stand

Less than one sheet of plywood and a few hours' work are all you need to create this functional folding plant stand.

BY JIM STUARD

## Garden Storage Bench

Pegged mortise-and-tenon joinery hold this Arts & Crafts beauty together, and it in turn holds your hoses and garden tools.

BY CHRISTOPHER SCHWARZ

## Seedling Shelter

Give your plants a jump on spring with this cold frame to protect seedlings. This mini-greenhouse also features a heat-activated window opener to save you work.

BY JIM STUARD

## A Picnic of a Build

This simple classic picnic table can be built in an afternoon and is at home in the dining room as it is outdoors.

BY LAURA ANN ARNOLD

## Old Plane Birdhouse

This easy-to-build birdhouse is just plane perfect for woodworkers. Based on a 14" Marples jack plane, it's been up-sized to look right over a door or on a fence.

BY CHRISTOPHER SCHWARZ

## Choosing an Exterior Coating

Five different types of protection exist. Here's a guide to choosing the best one for your outdoor project.

BY BOB FLEXNER

## Garden Swing

When lunch is served at the garden swing, simply pop up the center section of the seat to turn it into a handy built-in table.

BY DAVID THIEL

## Japanese Garden Bench

Combine five 2x4s, a handful of screws and a long afternoon to build a handsome and sturdy sitting spot for your deck or garden.

BY CHRISTOPHER SCHWARZ  
& KARA GEBHART

## A Picnic of a Build











# all-weather MORRIS CHAIR

A Morris chair is a great place to settle in and do lots of things, including reading a book, enjoying a drink, chatting with friends and watching a good rain storm. During at least half of the year in the Midwest these things are nice to do outside, as well as inside, but dragging a white oak mortise-and-tenoned Morris chair onto your deck isn't the easiest thing. Not one to be put out of a comfortable position, I decided painted pine could work for a Morris chair as well, and so I headed for the home center store.

The chair is made entirely from 1 x 4 and 1 x 6 pine, about \$40 worth. The hardest joint on this chair is a butt joint, and if you've got a jigsaw, drill and a hammer you can knock one out in a day. With the help of a couple extra tools, my personal best time is under four hours. Your hardest work will be picking through the lumber racks to find the straightest and most knot-free lumber from the store.

The chair is designed to have a cushion, but you don't have to add one. If you don't use a cushion, the chair may feel a little deep when you sit in it. Because of this, I'd suggest taking 2" off the lengths for the side rails, arms, seat slats and side cleats. Readjust the spacing of the side slats to fit the shorter seat. My cushions came from a home center store and were modified with a little sewing. You also can check out [www.summerlivingdirect.com](http://www.summerlivingdirect.com) or other online retailers.

Start your building by cutting out the pieces to form the front and rear legs. Traditional Morris chairs typically have very stout legs, and I didn't want to lose that look or stability, so I edge-glued and nailed two pieces together to form a "T." Face-on or from the side, the sturdy leg is still visible. With the legs formed, the rear (shorter) legs need to have the top end cut at a 5° angle from front to back. Remember that the back on these

Morris chairs  
are pretty darn  
comfortable,  
but they aren't  
the type of  
furniture you  
drag out onto  
the porch —  
until now.

by David Thiel

Questions or comments? You can contact David at 513-531-2690 ext.11255  
or at [david.thiel@fwcommunity.com](mailto:david.thiel@fwcommunity.com).

Photo by Al Parrish.



With the legs assembled, attach both lower side stretchers. Then place an upper stretcher in position and draw a line from the top of the angle on the back leg to the front leg. Cut the stretcher on the mark, then attach the upper stretchers, completing the two side frames.

legs is the top of the "T." A miter box made quick work of this step.

The next step is to get your box of 1 1/4" deck screws out and attach the lower stretchers to the inside of the legs with the top edge 8" off the floor. With those attached, slip the top stretchers into place, flush with the front leg, and mark and cut the bevel on the rail to allow the arms of the chair to slope back. Then screw these stretchers in place, also on the inside of the legs and then screw the front and rear stretchers in place, above the lower side stretchers. With the side frames complete, cut the pieces for the side slats using the sides themselves to determine the angle to cut on the top of the slats. I spaced them evenly and used a pneumatic brad nailer to attach the slats as they're more decorative than structural.

The two arms are cut from 37"-long pieces. Measure 4 1/2" in from the front edge of each, then cross-cut the pieces at this point at a 2 1/2° angle. By flipping over the shorter piece, a 5° angle is formed, and the arms can be attached to the legs and top rails. Cut the

taper shown in the diagrams on the back of the arms to add a little more grace to the piece, then center the arms on the front legs and attach. I used screws here, because I knew in my heart that I'd be dragging the chairs around by the arms. I was right. The extra strength is a good move.

The seat of the chair is formed by simply adding nailing cleats to the inside of the chair frame. Screw the rear cleat in place with the bottom edge flush to the bottom of the rear seat stretcher. Then lay a straightedge on the

The side slats are mounted flush to the bottom of the lower side rail and cut to match the angle of the top rail. Simply hold the piece in place, make a mark, and choose your toothed tool of choice to make the cut.

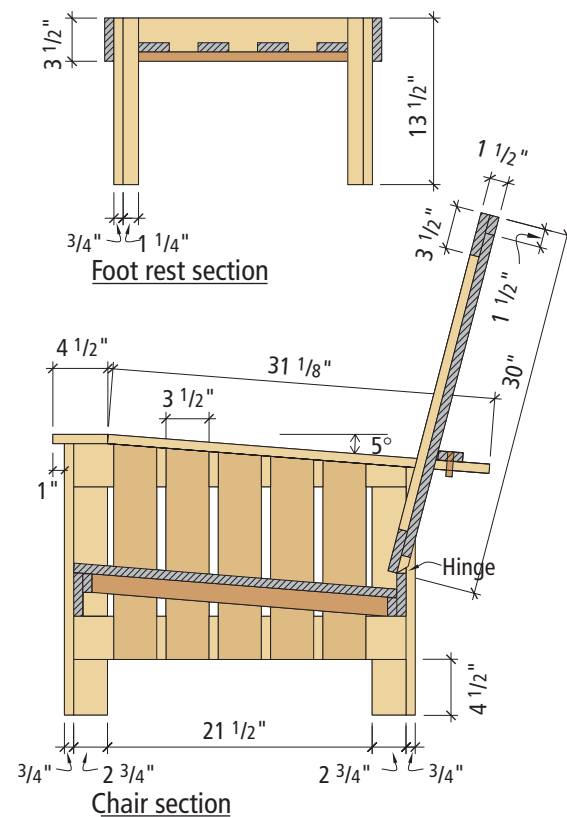
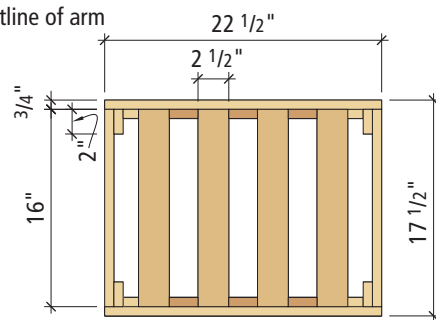
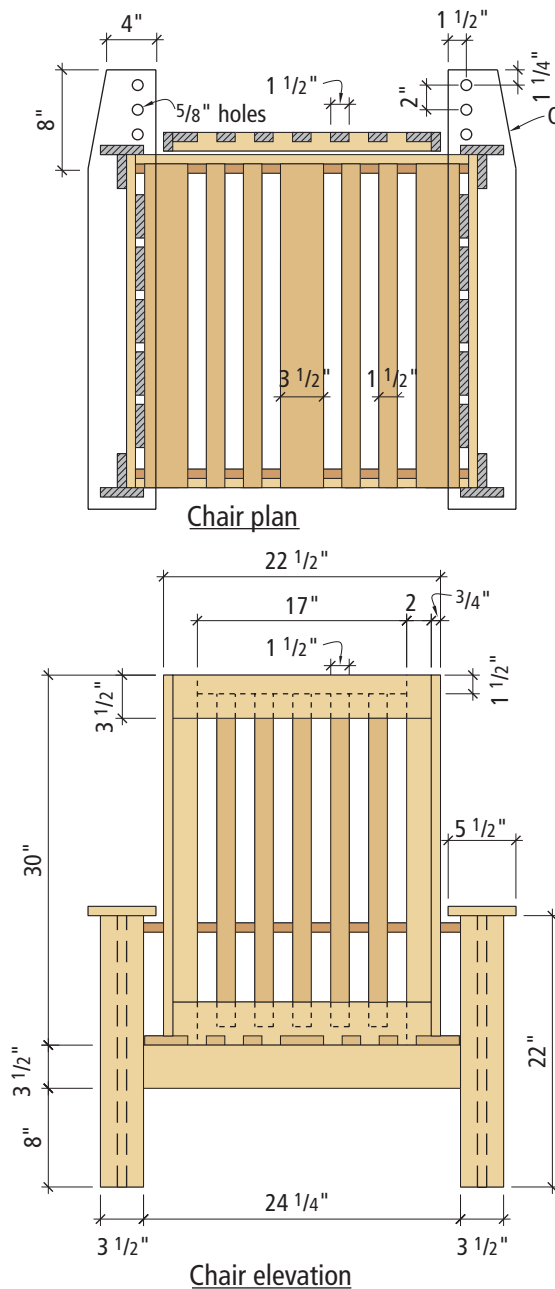


Simply screw the front and rear stretcher between the side frames and it starts to look like a chair.

rear cleat, stretching across the front stretcher of the chair. This is the angle the seat will take. Mount the front cleat to the front stretcher so that it fits under the straightedge. The two side cleats are mounted following the angle of the straightedge. Mounting the seat slats is simple from here. Cut the slats and use a router to round over at least the front edges of the boards. If you like, go ahead and round over the long edges as well. Then simply lay the two outside slats tight against the sides and back and nail them in place. Put

the center slat in place next, then fill in with the four thinner slats, spacing them evenly.

The back is constructed by forming L-shaped sides, screwing a top and bottom rail between them, then nailing the slats evenly spaced across the back. To allow the back to fold both forward and back, the continuous hinge needs to be mounted to the inside of the back chair rail and to the outside of the lower back rail. Mounted this way, the two back stiles will keep the back from reclining. To solve this I cut



## ALL-WEATHER MORRIS CHAIR

| NO. | ITEM         | DIMENSIONS (INCHES) | NOTES          |
|-----|--------------|---------------------|----------------|
| T   | W            | L                   |                |
| 2   | Legs (front) | 3/4 3 1/2 22"       |                |
| 2   | Legs (front) | 3/4 2 3/4 22"       |                |
| 2   | Legs (rear)  | 3/4 3 1/2 20 1/8"   | bevel to fit   |
| 2   | Legs (rear)  | 3/4 2 3/4 20 1/8"   | bevel to fit   |
| 6   | Stretchers   | 3/4 3 1/2 27"       | bevel 2 to fit |
| 2   | Arms         | 3/4 5 1/2 37"       | trim to length |
| 10  | Side slats   | 3/4 3 1/2 17 1/2"   | bevel to fit   |
| 2   | Back stiles  | 3/4 1 1/2 30"       |                |
| 2   | Back stiles  | 3/4 2 30"           |                |
| 2   | Back rails   | 3/4 3 1/2 21"       |                |
| 1   | Back rail    | 3/4 1 1/2 17"       |                |
| 5   | Back slats   | 3/4 1 1/2 27"       |                |
| 1   | Back support | 3/4 2 28"           | bevel to fit   |

| NO. | ITEM        | DIMENSIONS (INCHES) | NOTES          |
|-----|-------------|---------------------|----------------|
| T   | W           | L                   |                |
| 4   | Seat cleats | 3/4 1 1/2 27"       | bevel 2 to fit |
| 3   | Seat slats  | 3/4 3 1/2 26 1/2"   | trim to fit    |
| 4   | Seat slats  | 3/4 1 1/2 26 1/2"   | trim to fit    |
| 2   | Dowels      | 1/2 dia. 2"         |                |
| 1   | Hinge       | 1 1/2 20"           |                |

### Foot rest

|   |        |                   |
|---|--------|-------------------|
| 4 | Legs   | 3/4 1 1/4 13 1/2" |
| 4 | Legs   | 3/4 2 13 1/2"     |
| 2 | Sides  | 3/4 3 1/2 22 1/2" |
| 2 | Sides  | 3/4 3 1/2 16"     |
| 4 | Slats  | 3/4 2 1/2 16"     |
| 2 | Cleats | 3/4 3/4 17"       |

Outdoor screws are available at McFeely's 800-443-7937 or [www.mcfeelys.com](http://www.mcfeelys.com)





The arms are cut to the front and rear lengths at a  $2\frac{1}{2}^\circ$  angle and then the front piece is flipped upside down. This gives you a  $5^\circ$  angle at the joint. While the inner part of the arm is well supported by the legs and stretchers, the outer part of the arm needs some extra support. With a little variation on the Arts & Crafts exposed joinery theme, I used an exposed biscuit, cutting the biscuit slot at the mating point of the arm, then inserting the biscuit and later cutting and sanding it flush.



As you can see on the end, the back stiles are glued together to form "L"-shaped sides, then the back rails are screwed in place between the two sides. The  $1\frac{1}{2}$ " rail is attached to the upper rail to make a more solid looking and feeling back.

a bevel on the back stiles using a hand saw. Mount the back and fold it forward for now.

Next, mark the  $\frac{5}{8}$ " hole locations on the arms and drill the holes using a spade bit. To avoid tear-out, drill through the top of the arm until the tip of the bit pokes through the bottom of the arm, then drill the rest of the hole from the underside of the arm.

To make the chair an adjust-

able recliner, cut a back support bar as shown in the cutting list and cut a chamfer along one edge. Then mark the bar to match the holes in the arms and drill two  $\frac{1}{2}$ " holes through the piece. Put a little glue on the two 2"-long sections of dowel and insert them into the holes until they are flush with the top edge of the piece. The glue should hold, but to add a little extra strength I shot a brad

nail through the back of the piece into each dowel.

It's not a decent Morris chair unless it has a foot rest. This one is fairly simple, with the four legs again using the strength formed by an L-shaped glue-up.

Four stretchers screwed between give the footstool its shape, and cleats and some evenly spaced slats finish the job.

Again, this is designed for a cushion, so if you aren't using a cushion, adjust your dimensions and mount the slats to the top of the stretchers.

You're ready to finish. Do a little sanding to knock off the sharp edges and make a nice sur-

face on the arms. The best outdoor finish is one that blocks light and seals the wood. Around my neighborhood that's paint. I picked a nice kelly green and used about seven cans of spray paint.

You may have noticed the reference to my "best time" at the beginning of this story. Since building the first of these chairs I've built a second for myself, and there have been orders pouring in from family and neighbors. So why don't some of you take these plans and start up a side business. Please, take some pressure off me! **PW**



With the back slats in place, the ends of the back stiles need to be beveled to allow the back to recline to a comfortable position. I'm beveling the pieces here with a pull saw at more of an angle than necessary, but it won't hurt anything.



The completed back is screwed in place against the back seat rail with a continuous hinge. You can also see the three holes in each arm that the back support (shown on the right-hand arm) drops into.









Photo by Al Parrish

Less than one sheet  
of plywood and a long  
afternoon are all you need to  
build a functional and foldable  
floral display.

# *f o l d i n g* *plant* *stand*

*w*hen you have a lot of plants to display, you are always looking for ways to show them off to their best advantage. Or maybe you just want to cover that hole where a gopher dug under the house. Either way this plant stand is a great way to make a few potted plants look like a huge display. And here's a bonus feature: the whole thing folds up flat so you can hang it on a garage wall in the off-season. You can make it using about three-quarters of a sheet of  $\frac{3}{4}$ " CDX plywood, which is essential for outdoor use. The term CDX refers to the quality of the two face veneers and the glue between the plys. So CDX has a "C" and a "D" side ("A" being the best grade) with the "X" referring to the exterior-grade glue. The plys themselves are the same as in any other pine plywood. The shelves are designed to hold 6" pots, but with care, larger pots are also okay.

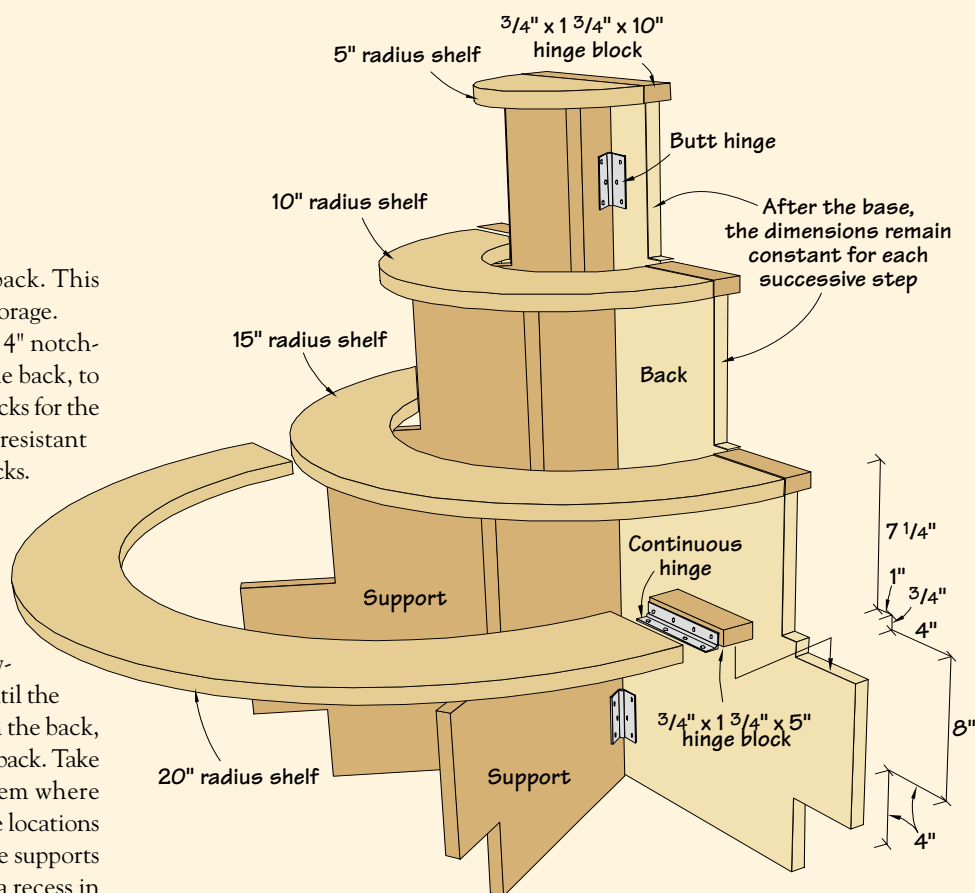
Start with two four-foot square sheets of plywood, and begin construction by cutting out the back and supports from one sheet and the shelves from the other. Use the diagrams to lay out your cuts. To cut the shelves and supports from the ply, use a drill with a  $\frac{3}{16}$ " bit to drill two overlapping holes for the jigsaw blade. Drill clearance holes at the outside corners of the back and supports to start the saw blade. If you clamp the parts to a table, you can cut the shapes in short order. Once you get the back and supports cut, you'll notice that the steps on the sup-

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by Jim Stuard

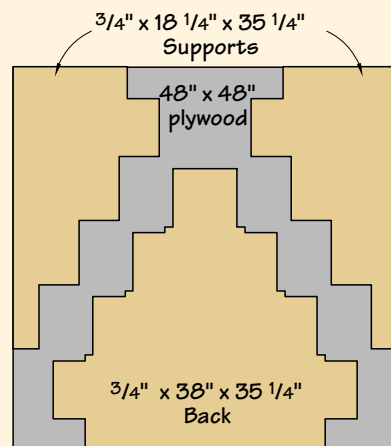
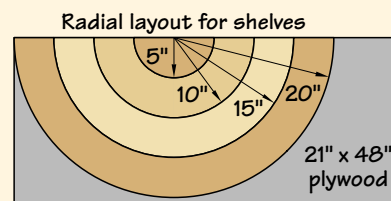
port are  $\frac{3}{4}$ " shorter than the back. This helps everything fold flat for storage.

The next step is to cut  $\frac{3}{4}$ " x 4" notches in the tops of the steps, at the back, to receive the hinge mounting blocks for the shelves. Use screws and water resistant glue to attach the mounting blocks. When installed, the blocks stick out 1" from the edge of the back and  $\frac{3}{4}$ " from the surface. These locations line up with the shelves and give an offset to clear the supports when everything is folded. Adjust the fit until the supports fit into the notches on the back, then mount the supports to the back. Take four butt hinges and place them where they will be mounted. Mark the locations with a pencil and then take the supports off the back. You need to rout a recess in the support and the back for the hinge. Otherwise, there won't be enough clearance for the shelves to come down. Mount



the hinges and check the fit of the supports to make sure they clear the mounting blocks. At this time, go ahead and paint the back/support assembly. This is easier now than when everything is assembled. Also fill any voids and knots with a waterproof filler. I used a two-part auto body filler. It sets up quickly and sands easily.

The last thing to do is cut and mount the shelves. Begin the layout with a set of trammel points, with a pencil on one end. From the center of the other plywood panel, lay out concentric semi-circles at 5", 10", 15" and 20". Now rip the panel at about 21" to keep it manageable. Cut the shelves out using a jigsaw, taking it slow and stay on the line. When you're done, you'll have four concentric shelves ready for mounting. After filling the voids and knots, paint the shelves. Lay out and rout a recess on the bottom of the shelf ends to accept the hinge leaf, flush to the shelf. This also helps for the close tolerances when folding everything together. Go ahead and mount the shelves to the back. When you're all done, lay the unit on its back and fold the shelves so they're sticking straight



up. Fold up the supports and tip the entire unit upright. Touch up any paint problems and you're ready to lush up this display with the local flora. **PW**



To set up the plant stand, lay it flat on its back and raise the shelves. Then fold the supports up.







Built to hold  
hoses, store  
garden tools  
and to last  
for years.



# *garden* Storage Bench

**O**utdoor Arts & Crafts furniture was almost always made from wicker or hickory sticks, so when it came to designing a garden bench in that style I had almost no examples to turn to. However, after collecting and building this type of furniture for almost a decade, I knew one thing had to be true: it would have to be built to last.

Fact is, I could have glued and screwed this whole thing together in a few hours. But because this bench was built for my sister-in-law as a gift for her new home (and because I don't want to be haunted by the ghost of Gustav Stickley), I decided to take the most traditional approach I could. That meant pegged mortise-and-tenon joints.

## **All Tenons, All the Time**

Begin by cutting all your parts to size and laying out the  $\frac{1}{2}$ "-thick x 2"-wide x 1"-long mortises on the four legs. Each  $7\frac{1}{4}$ "-wide slat in the lower case gets four tenons — that's two on each end. If I'd put only one wide tenon on each end, I would have had to remove too much material in the legs for the mortises. The detail drawing on the next page shows you how the mortises and tenons are spaced. Now cut your mor-

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by Christopher Schwarz



tises. You'll notice that the mortises on the two adjacent sides meet in the middle of the leg. This means you'll have to miter your tenons on down the road.

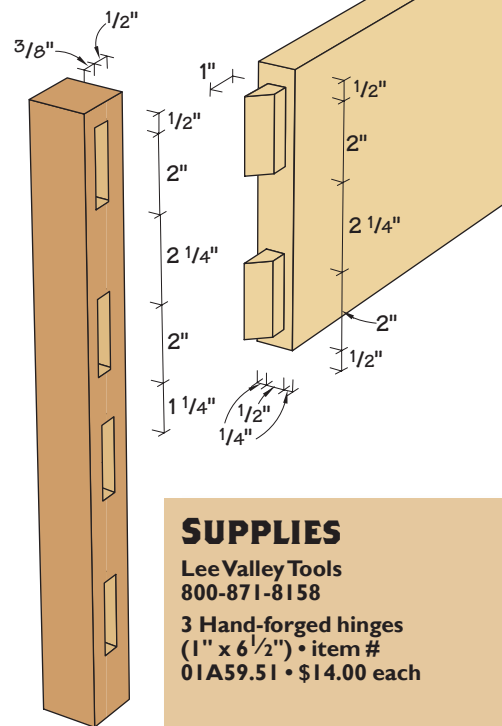
Now lay out and cut the through-mortises on the back legs. The through-mortises for the top rail measure  $\frac{1}{2}$ "-thick x  $5\frac{1}{4}$ "-wide. The through-mortises for the bottom rail measure  $\frac{1}{2}$ "-thick x 2"-wide. Now cut your tenons and miter the ones for the lower case. To clean out the area between the two tenons on the lower case

pieces, use a backsaw and a coping saw.

Cut the 2" arches on the front, sides and back pieces using a band saw. Clean up your work with sandpaper. Now locate where the center seat support will go and cut biscuit slots to hold it in place. Sand everything to 150 grit.

## Assembly

After first dry-assembling your bench, glue up the bench in stages. First glue up the front pieces between the front legs and the back pieces between the back legs. I recommend polyurethane glue here for two reasons. One, it's quite weather-resistant; and two, it has a long open time, which helps with this glue-up. Put glue in the mortises only, and be stingy. You don't want a lot of foamy squeeze-out. After the glue has cured, glue the side pieces and center seat support between the front



## SUPPLIES

**Lee Valley Tools**  
800-871-8158

**3 Hand-forged hinges**  
(1" x  $6\frac{1}{2}$ ") • item #  
01A59.51 • \$14.00 each

and back leg assemblies.

Screw the two slat support pieces to the inside of the frame (one on the front, one on the back). Then screw the eight slats to the supports with about  $2\frac{1}{2}$ " between each slat. Once that's done, peg all the mortises. I used  $\frac{1}{4}$ " x  $\frac{1}{4}$ " x  $1\frac{1}{4}$ " strips of walnut. First drill a  $\frac{1}{4}$ " hole that's  $1\frac{1}{8}$ " deep. Carve the walnut strips round on one end, then hammer them home. Cut the waste flush.

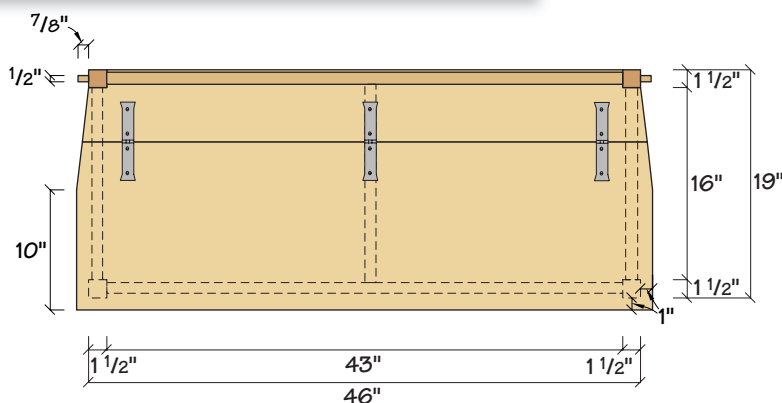
Now work on the seat. Notch the rear seat piece around the legs. Attach it to the frame using cleats and screws. Then attach the front seat piece to the rear seat piece using the hand-forged hinges from Lee Valley. These are rustic, inexpensive but of excellent quality. You'll need to scare up some equally rustic screws to attach the hinges. I used some old #7 x 1" flathead screws. **PW**

## SCHEDULE OF MATERIALS: GARDEN STORAGE BENCH

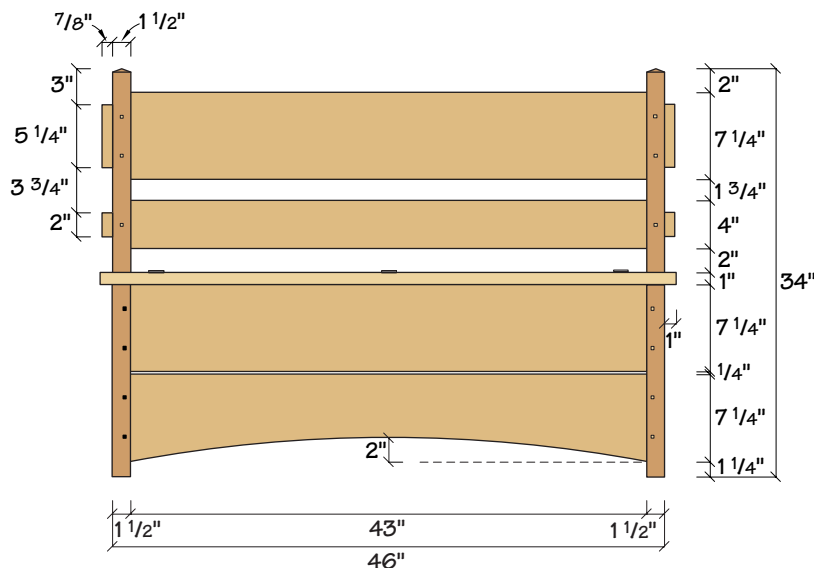
| No. | Item               | Dimensions T W L                          | Material |
|-----|--------------------|-------------------------------------------|----------|
| 2   | Front legs         | $1\frac{1}{2}$ " x $1\frac{1}{2}$ " x 16" | Redwood  |
| 2   | Back legs          | $1\frac{1}{2}$ " x $1\frac{1}{2}$ " x 34" | Redwood  |
| 2   | Front/back pieces* | 1" x $7\frac{1}{4}$ " x 45"               | Redwood  |
| 4   | Side pieces*       | 1" x $7\frac{1}{4}$ " x 18"               | Redwood  |
| 1   | Top rail**         | 1" x $7\frac{1}{4}$ " x $47\frac{3}{4}$ " | Redwood  |
| 1   | Bot. rail**        | 1" x 4" x $47\frac{3}{4}$ "               | Redwood  |
| 1   | Rear seat piece    | 1" x 6" x 48"                             | Redwood  |
| 1   | Front seat piece   | 1" x 14" x 48"                            | Redwood  |
| 1   | Seat support       | 1" x 3" x $16\frac{3}{4}$ "               | Redwood  |
| 2   | Slat supports      | $1\frac{1}{2}$ " x $1\frac{1}{2}$ " x 42" | Cedar    |
| 8   | Slats              | $\frac{3}{4}$ " x 3" x $16\frac{3}{4}$ "  | Cedar    |

\* 1" mitered tenon on both ends, included in measurement

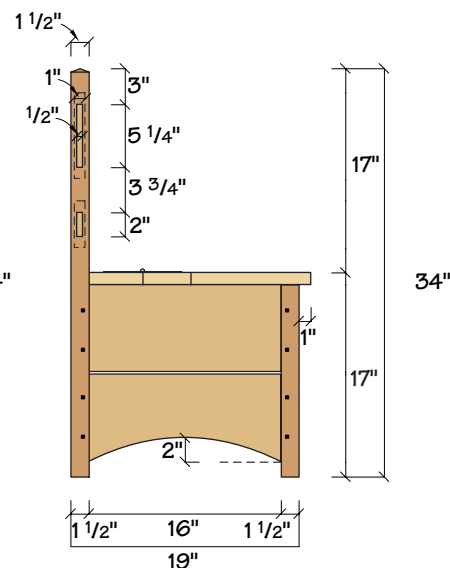
\*\*  $2\frac{3}{8}$ " through-tenon on both ends, included in measurement



Plan



Elevation



Profile





# seedling shelter



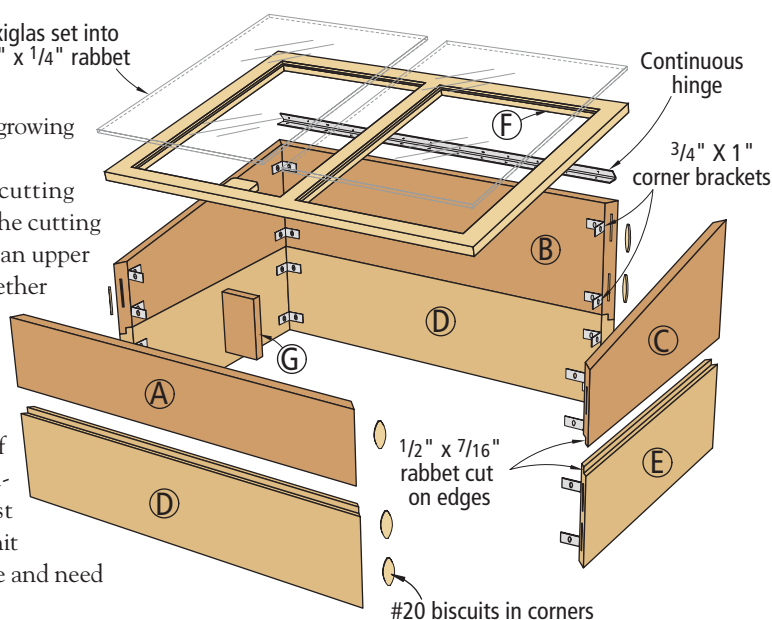
When it's freezing out and you want to get a jump on spring, nothing beats this cold frame.

Not being much of a gardener myself, when my wife decided to get into gardening I had a learning curve to overcome. I wasn't aware that the growing season starts late in the winter months rather than the spring. Around here (Ohio) it's too cold to get the vegetables started without the aid of a cold frame. What's a cold frame? Simply a mini-greenhouse. The interiors should be painted with light colors to reflect as much light and heat as possible. The top is mostly glass (or Plexiglas) to generate solar heat, and the lid needs to be adjusted at least twice daily to prevent mold from growing because of the condensation that forms in this cozy little plant-friendly environment.

As designed, this cold frame will keep three flats of seedlings safe from the elements. I didn't feel like adjusting a lid all the time, and Lee Valley Tools came to the rescue with a heat-activated window opener that opens and closes as the ambient temperature changes, eliminating the daily lid adjustment. This project takes only a couple of afternoons to complete, so you'll have your seedlings growing in no time.

Begin construction by cutting out the parts according to the cutting list. The box is made up of an upper and lower box that nest together in rabbets. Cut the box parts to size and mill the  $\frac{1}{2}$ " x  $\frac{7}{16}$ " rabbets in what will be the top edge of the lower box and the bottom edge of the top box. This rabbet allows the two boxes to nest together and make a taller unit when your seedlings mature and need the room.

After cutting the box parts to length, cut 45° angles on the ends and cut two biscuit joints in each corner. Clamp two halves of a joint together to form a square corner, making it easier to use a biscuit joiner. Dry-clamp the top box together and lay out the angle for cutting the pitch of the box to better catch the sun's rays. Use a jigsaw to cut the angle on the sides, then use a table saw with the blade angled



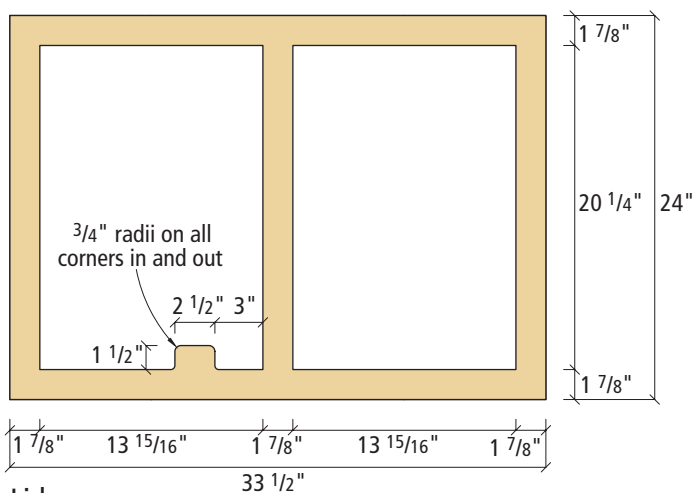
by Jim Stuard

*Jim is a former associate editor and now divides his time on the projects he is most proud of: his children, his writing and teaching woodworking.*

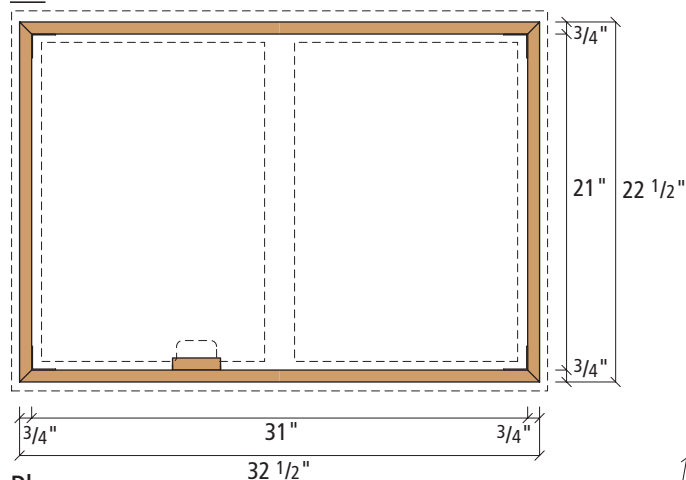
Photo by Al Parrish.

## SEEDLING SHELTER

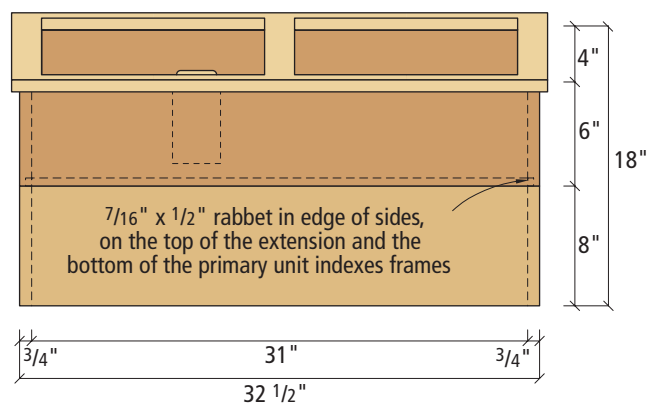
| NO. | LET. | ITEM                 | DIMENSIONS (INCHES) |       |        | MATERIAL |
|-----|------|----------------------|---------------------|-------|--------|----------|
|     |      |                      | T                   | W     | L      |          |
| 1   | A    | Top box front        | 3/4                 | 6     | 32 1/2 | CDX Ply  |
| 1   | B    | Top box back         | 3/4                 | 10    | 32 1/2 | CDX Ply  |
| 2   | C    | Top box sides        | 3/4                 | 10    | 22 1/2 | CDX Ply  |
| 2   | D    | Bot box frnt and bk. | 3/4                 | 8 1/2 | 32 1/2 | CDX Ply  |
| 2   | E    | Bot box sides        | 3/4                 | 8 1/2 | 22 1/2 | CDX Ply  |
| 1   | F    | Lid                  | 3/4                 | 24    | 33 1/2 | CDX Ply  |
| 1   | G    | Hinge mounting tab   | 3/4                 | 3     | 5      | CDX Ply  |



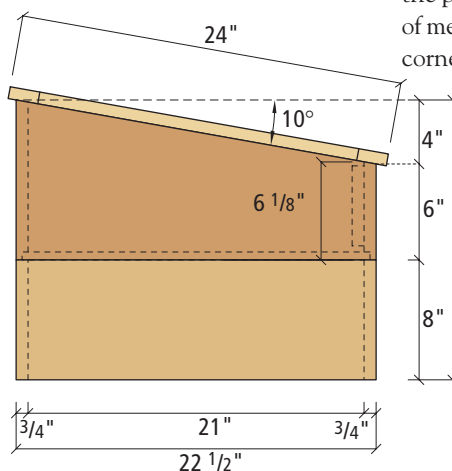
Lid



Plan



Elevation



Profile



When your seedlings start to kick into high gear, you can add the second box to the seedling shelter to give them more room to grow.

to bevel-cut the top edges on the front and back pieces. You'll be cutting away one of your biscuit joints, but you'll be adding corner braces later to reinforce the frames. Use polyurethane glue in each joint to make the boxes water-resistant. When the glue is dry, plane all the edges flush and then check the fit between the top and bottom boxes.

Now make and attach the lid. Cut it out of one piece of plywood, then make the cutouts according to the diagram. Take a router with a rabbeting bit and cut a 1/4" x 1/4"-wide rabbet on the top edge of the cutouts to accommodate the thickness of the Plexiglas. The adhesive used to hold the Plexiglas in place later will leave it a little proud of the lid surface and will help the lid

shed water. The mounting tab for the window opener (Lee Valley Tools, 800-871-8158, item #AM401, \$47.00) is located between two seedling flats when they're in place. You'll have to plane the top of the tab so it's flush with the rest of the rabbet. Attach the lid with a piece of continuous hinge. Attach the window opener so it doesn't go beneath the bottom edge of the top box when it's on the ground. This takes a little finagling but it can be done. The openings for the Plexiglas pieces are the same size. Cut two "panes" to size and set them aside for later.

Go ahead and paint the entire cold frame with a durable outdoor paint. Use white or at least a light color for good reflectivity. Apply two coats to every surface. When the paint is dry, install a couple of metal corner brackets to each corner for extra support. Attach the lid; glue in the Plexiglas with epoxy and seal the rabbets in the lid with white caulk. Attach the window opener and apply weatherstripping to the joint between the lid and the frame.

Now get to the potting shed for some serious seedling duty. **PW**



BY LAURA ANN ARNOLD

# A Picnic Of a Build

This simple table is at home in the dining room – or outdoors.

This table is a picnic to build with dimensional lumber, screws and bolts.

I'm usually not intimidated by undertaking projects. We need some artwork for the new apartment? I can paint some vivid, abstract oil paintings. Hair is not the way I wanted it? I'll trim it. Not the right color? I'll dye it. Shirt too loose? Hand-stitch it. We need a dining room table? Well ... I'll drive us to Ikea.

The odd thing was, I shouldn't have been intimidated about making something. I'm not a fan of measurements, but I can use them



**Ends are the beginning.** Make the two end assemblies first. Then attach the top and diagonal braces.



**Urban chic.** This pine table is destined for the dining room – but throw on a coat of spar varnish or exterior paint (or use pressure-treated lumber), and it will serve well on the deck, too.

when necessary. Making a picnic table is a large project, true, but it wasn't the size – or the numbers – that was intimidating.

It was the saws. And the splinters. What if I cut off a finger? What if I drilled through my palm like some sort of nightmarish woodshop stigmata scene? After telling my irrational and oddly descriptive fears to step aside, my husband, David, and I stepped into the *Popular Woodworking Magazine* shop. We went over some safety tips, reviewed the design for the table and got to work.



**Spaced out.** Use shims to space out your top boards. When the top looks good, screw it down.

The miter saw was the hardest thing for me to get over. Sure it looks innocent, but the idea of pulling the sharp, quickly rotating blade down and toward myself seemed foolish, if not downright dangerous. I discovered that the key was to go slow. Not only did this make it easier and give me more control, it also made for a much cleaner cut.

## Making the Cuts

This picnic table is going to be our dining room table. After painting it black, I covered the tabletop with my favorite food and beer memorabilia I've collected as a food blogger, mostly six-pack covers. Then, to protect the stuff, we covered the tabletop with some thin Plexiglas. It looks great.

However, you might have different plans for your picnic table. Say, a picnic perhaps? In that case you'll want to purchase pressure-treated pine or a rot-resistant species, such as redwood (pricey!) or white oak (still pricey). We used white pine, which was cheap. You can use white pine as well, as long as you paint the table and maintain the paint job. Our table is going to live a long, cushy table life indoors.

The table requires about a dozen 2x6x8s, some 2½" screws and some hex-head bolts,

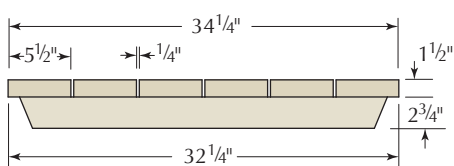
washers and matching nuts. Oh, and you'll need a long afternoon or a few friends. I brought the beer – for after the work was done. Don't drink and drill.

### Odd Angle; Easy Cuts

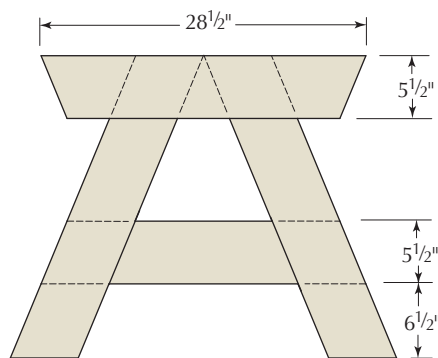
To begin, pick out the six best 2x6s for the top and set them aside. Pick out the stock for your legs and set your miter saw's table to cut a 22.5° angle. Lock it there. Cut your legs to length (use a stop-block to make sure they're all the same size).

Design-wise, the table is better too short than too tall, especially if one of the members of your family is petite, like me. David is 6' plus and I'm 5'2" on a good day. It is easier for him to adjust to a shorter table than for me to constantly strain upward. Now cut the bottom braces and top braces to length – they are identical and each end is cut at 22.5°.

After that, arrange each end assembly on your bench or garage floor. Place the legs so they touch at the top. Position the lower brace



TOP PROFILE



BASE PROFILE

so the ends are flush to the legs and the legs touch at the top. Bolt the lower brace to the legs for each end assembly. Following that, place the top brace in place. Center it on legs and bolt it as well.

To make the narrower top cleats and diagonal braces, you'll need to rip one of your 2x6s. Once you rip it to width, cut the ends to 22.5° on the miter saw. Glue and screw one narrow cleat to the top of each leg assembly. You'll have two narrow cleats left.

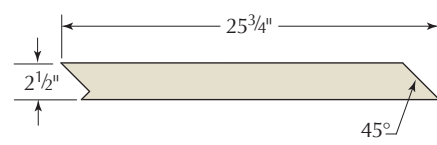
### Attach the Top

To attach the top pieces, balance your end assemblies on the floor and space them 63" apart. Put clamps on the feet to stabilize them. Space the top pieces out on top of the legs. When they look good, screw them down. Flip (easy now) the whole assembled thing over so the feet are sticking in the air like road kill.

Now cut your diagonal braces. These have a 45° angle on each end. Set your miter saw to 45° and cut them to length. Then fit them between the end assemblies and top. When they fit, screw the two narrower top cleats (remember those?) to the underside of the top. Then screw each diagonal brace to each narrow top cleat.

### Two Bolts for Strength

To ensure your picnic table lasts, you should bolt the diagonal brace to the end assembly. We used 1/2" x 4" hex-head bolts with washers and nuts. Drill a 1/2" clearance hole through each lower brace and through the diagonal brace (have a friend hold the diagonal brace while you drill the hole).



DIAGONAL BRACE

Now you need to cut a square notch in the diagonal brace so the washer and bolt have a flat area to sit on. Cut the notch with a handsaw and tighten the bolts.

### Dessert

Almost done! The last few steps are just sanding and finishing. Be sure to break all the sharp edges using #120-grit sandpaper. If you are painting the picnic table, you can sand the entire project up to #120-grit and call it a day. If you are going to add some sort of clear finish (such as a deck stain), go up to #150 grit.

Though it was a big project, our rewards were great. I should not have been afraid of detaching any digits. In fact, the only injury I sustained throughout the entire project was a paper cut – from the wrapping on my chicken fingers when we broke for lunch.

Now we need some bookshelves for the apartment. I can do that! Let's get started. I'll man the miter saw. **PWM**

*Laura (along with her husband, David) are the Cincinnati Nomerati – one of our favorite blogs in Cincinnati that covers food, beer and all other things tasty. Check it out at [cincinnatiomerati.blogspot.com](http://cincinnatiomerati.blogspot.com).*

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### About This Column

Our "I Can Do That" column features projects that can be completed by any woodworker with a modest (but decent) kit of tools in less than two days of shop time, and using raw materials that are available at any home center. We offer a free online manual in PDF format that explains all the tools and



shows you how to perform the basic operations in a step-by-step format. Visit [ICanDoThatExtras.com](http://ICanDoThatExtras.com) to download the free manual.

### Supplies

- 2 ■ bolts, 1/2" x 4"
- 12 ■ bolts, 1/2" x 3"
- 14 ■ nuts, 1/2"
- 28 ■ washers, 1/2"
- 200 ■ screws, 2 1/2"

### Picnic Table

| NO. | ITEM                | DIMENSIONS (INCHES) |       |          | COMMENTS  |
|-----|---------------------|---------------------|-------|----------|-----------|
|     |                     | T                   | W     | L        |           |
| 6   | Top pieces          | 1 1/2               | 5 1/2 | 8        |           |
| 4   | Legs                | 1 1/2               | 5 1/2 | 28 11/16 | 22.5° ABE |
| 2   | Upper braces        | 1 1/2               | 5 1/2 | 28 1/2   | 22.5° ABE |
| 4   | Narrow upper cleats | 1 1/2               | 2 3/4 | 32 1/4   | 22.5° ABE |
| 4   | Lower braces        | 1 1/2               | 5 1/2 | 28 1/2   | 22.5° ABE |
| 2   | Diagonal braces     | 1 1/2               | 2 1/2 | 25 3/4   | 45° ABE   |

\* ABE: Angle Both Ends



# Old Plane Birdhouse

BY CHRISTOPHER SCHWARZ

Every woodworker should spruce up the yard (or the shop) with this simple birdhouse.

I've never been a fan of birdhouses. Why welcome something to your yard that really wants to poo on your head?

Yet, inspiration works in weird ways. While visiting Maine in February I saw an enormous birdhouse that looked like a jointer plane hanging outside Liberty Tool, an ironmonger. I just had to have one to hang above my shop door.

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*"A boat is not a boat unless it's in the water."*

— John Gardner (1905 - 1995)  
founder of Mystic Seaport's boatbuilding program

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## Simple, Quick & Fun

This birdhouse is based on a Marples 14" razee jack plane I own. I scaled it up to 35" long so it would look good above a standard door. If you'd like to make yours bigger, you can scale our model by downloading the free SketchUp file through our web site.

You'll need about 10 to 12 board feet of a weather-resistant wood. I used cypress. And don't forget the waterproof glue and stainless (or galvanized) fasteners.

The whole project takes about three hours, so it also was great therapy for me after coming off of an intense three-month-long project.

Begin by gluing up the wood for the thick wedge and the tote. These pieces



**For birds both plane and fancy.** This birdhouse would look great in your yard, above the door to your shop or even in your shop.

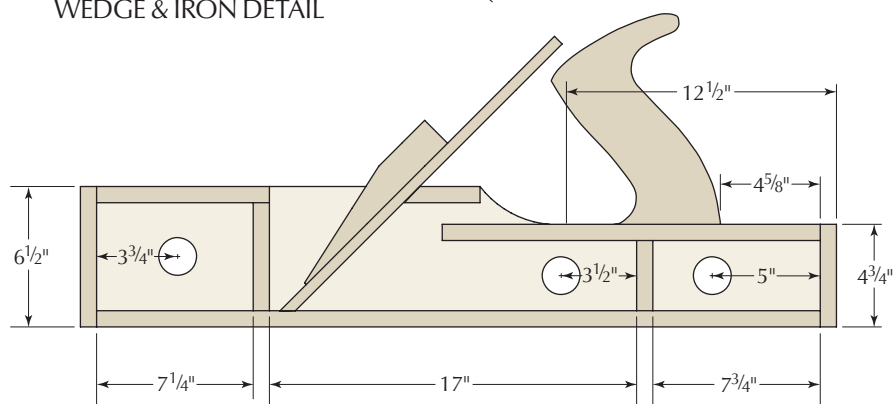
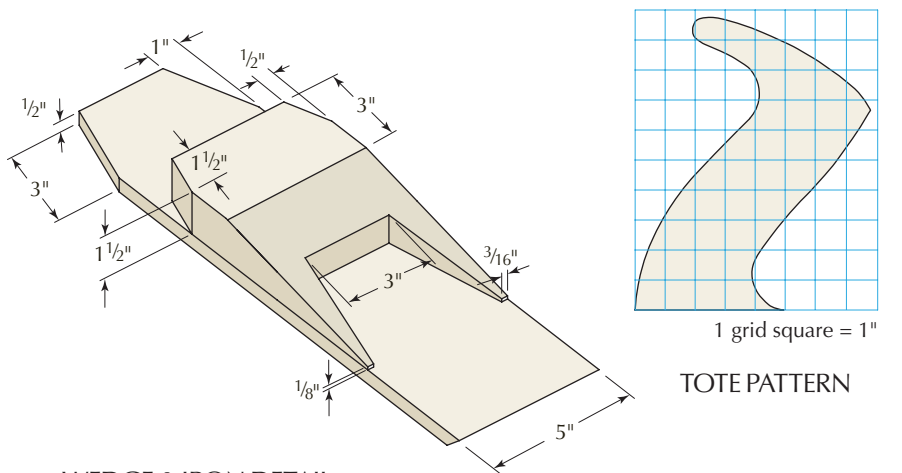
are made by gluing two pieces of stock face-to-face. Clamp them up and set them aside for the glue to dry.

## Next Up: The Sidewalls

After ripping all your parts to width, begin by shaping the two sidewalls. Lay out the razee shape on one sidewall using the

drawing as a guide. Cut the shape on the band saw and clean it up with a spindle sander. Then use the first sidewall to lay out the pattern for the second.

Cut that one close, then tape the two sidewalls together and shape them simultaneously so they are identical. I used the spindle sander here as well.



ELEVATION



**This plane is hollow.** Glue and nail all the interior pieces as shown before you screw the second sidewall in place.

### Assembly. What, Already?

Cut the interior parts to size: the toe, heel, top, front of the mouth, frog, divider and sole. Sand or plane them smooth, then get your nails out.

Glue and nail these seven pieces to the sidewall that will eventually have the entrances for the birds (you'll bore those holes later).

Now shape the tote. Remove the thick piece that you glued up earlier from the clamps and cut it to size using the patterns and drawings provided above. Dress it smooth and then screw the tote to the plate for the tote. Glue and nail the finished assembly to the sidewall.

Shape the iron and the wedge using the drawings to guide you. Glue and nail them in place to the sidewall and the frog.

### Be Bird-friendly

Drill some ventilation and drainage holes in the sole and in the top of the plane using a 1/4" bit. Then decide what sort of birds you want to attract and drill entrance holes that are based on the species (a quick search on

## Old Plane Birdhouse

| NO. | ITEM           | DIMENSIONS (INCHES) |       |        |
|-----|----------------|---------------------|-------|--------|
|     |                | T                   | W     | L      |
| 2   | Sidewalls      | 3/4                 | 6 1/2 | 35     |
| 1   | Toe            | 3/4                 | 5     | 6 1/2  |
| 1   | Top            | 3/4                 | 5     | 8      |
| 1   | Front of mouth | 3/4                 | 5     | 5      |
| 1   | Frog           | 3/4                 | 5     | 3 1/2  |
| 1   | Plate for tote | 3/4                 | 5     | 17 1/2 |
| 1   | Divider        | 3/4                 | 5     | 3 1/4  |
| 1   | Heel           | 3/4                 | 5     | 4 3/4  |
| 1   | Sole           | 3/4                 | 5     | 33 1/2 |
| 1   | Tote           | 1 1/2               | 7 1/2 | 10     |
| 1   | Wedge          | 1 1/2               | 5     | 9 1/4  |
| 1   | Iron           | 1/2                 | 5     | 18     |

the Internet will call up the hole sizes for a variety of birds). I want to attract Purple Martins, so I drilled my holes at 1 7/8" in diameter.

So that the birdhouse is easy to clean, attach the second sidewall to your birdhouse using No. 8 x 1 1/4" stainless screws.

To hang the birdhouse, I made a French cleat. One half gets screwed to the sidewall. Its mate gets screwed to the house, right above my shop door.

And what about having the birdhouse hanging over my shop door? That seems stupid. Maybe. But perhaps the threat of some loose-boweled birds will prevent my neighbors from pestering me when I'm working in the shop. **PWM**

*Christopher is editor of Lost Art Press and husband to a cat lady, who just might like the idea of a birdhouse that attracts food (I mean birds) to the yard.*

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# Choosing an Exterior Coating

Five different types of protection exist. Here's a guide to choosing the best one for your project.

The need to protect wood outdoors is much greater than the need to protect it indoors because of exposure to sunlight and rain. These cause wood to gray, split, warp and rot; and moist conditions make the growth of mildew possible.

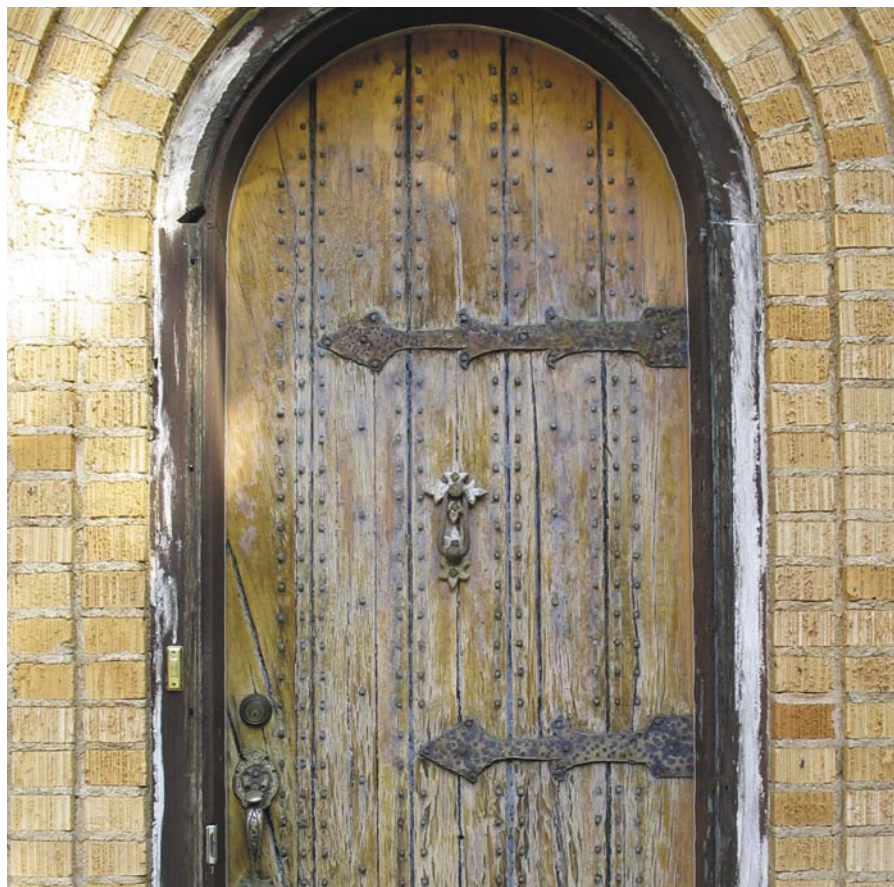
You can use paint, stain, clear finish, water repellent and preservative to prevent or retard damage to exterior wood. But first, it's helpful to understand the causes of the damage.

## Exterior Damage

Sunlight contains strong ultraviolet light, which is very destructive to wood over time. UV light destroys the lignin that glues the cellulose wood cells together, and rain then washes the lignin away. Because the lignin contains the extractives that give wood its distinctive coloring, the wood turns silvery gray on the surface when the lignin is gone.

Sunlight also heats the surface of the wood and draws out moisture, causing shrinkage. This leads to splitting and warping, and these are made worse by rain when it comes in contact with only one side of the wood—as on decks, tabletops and exterior doors. The water makes the surface cells swell, but the thickness of the wood prevents the surface from expanding. The cells are then forced to compress to oval shapes, and they hold these shapes even when dry.

This phenomenon is called “compression shrinkage” or “compression set,” and I described it in the context of finishing both sides of wood in the October 2004 issue. (Back issues are available online at [popwood.com](http://popwood.com).) Compression shrinkage causes wood to warp and split as the exposed side continues to



Photos by the author

This front door faces west with no trees or other obstructions to block afternoon sunlight. You can see that the door is in good shape at the top where the deep recess in the framing protects it. But the condition worsens progressively from there down because of contact with both sunlight and rain. An overhang would offer the best protection, but this would change the design and the architect's intent. To preserve the design, the best solution is to coat the door with a marine varnish high in UV-absorber content, and sand back and recoat whenever the varnish begins to dull.

shrink a little more each time it goes through the wetting and drying cycle.

Rain is partially responsible for rotting and the growth of mildew, because both require moisture to occur. Rain is also indirectly responsible for a visually similar damage—insect infestation—because insects require moisture to thrive.

The heartwood of redwood, cedar and

some hardwoods is naturally resistant to rotting. Some softwoods are pressure treated with chemicals to make them resistant to rotting. These woods have the familiar dull green or dull brown coloring. Sapwood and non-pressure-treated pine and fir are not resistant to rotting.

There are five different types of coatings you can use to protect against the problems caused by sunlight and rain: paint, stain, clear finish, water repellent and preservative. You can buy any of the first four types of coatings with a preservative included to retard mildew, or you can sometimes buy a

by Bob Flexner

*Bob is the author of "Understanding Wood Finishing" and a contributing editor to Popular Woodworking.*

concentrated preservative separately and then add it yourself.

## Paint

Paint is the most effective coating for protecting wood. The thick film blocks water penetration and the pigment blocks UV light. You can find wood siding that is in perfect shape after 200 years because it has been protected continuously with well-maintained coats of paint.

There are two large categories of paint: oil-based and water-based (latex). Because oil-based paint wears better than latex paint, it is best for objects that see a lot of abuse such as chairs and picnic tables.

Oil-based primers are also best when you are painting wood that has been exposed to the weather for a month or longer, especially if the wood has grayed. Oil-based primers penetrate deeper than latex primers, so they are better able to penetrate the degraded wood caused by the destruction of the surface lignin and bond to good wood underneath. If the wood is freshly milled or sanded, acrylic-latex primers perform well.

Latex paint is best for wood siding because it is better than oil paint at allowing moisture vapor created inside a building to pass through. If the moisture vapor can't get through the paint layer, it builds up behind

the paint and causes it to peel. (A primer coat of oil-based paint applied under latex paint is not thick enough to stop moisture penetration.)

Paint is great for siding and house trim because they can be caulked to keep water from getting into the wood and causing the paint to peel. Paint is also great for furniture and exterior doors if they don't get a lot of exposure to moisture.

But paint is a poor choice for decks and often for fences because it's rarely possible to seal off all the end grain effectively. The paint peels and requires too much work to effectively keep up.

## Pigmented Stain

Pigmented stain is the next most effective coating for exterior wood. Just as with paint, it resists both moisture and UV-light damage because it contains both binder and pigment. But because there is much less of each and little or no film build, pigmented stains are not as resistant as paint.

On the other hand, the lack of film build makes maintenance easier. Usually, all that is required is a fresh application of the stain every year or two, depending on the climate and amount of exposure. There's seldom a reason to scrape, strip or sand.

There are three types of binder and two

concentrations of pigment to choose from. The binders are oil-based, water-based and alkyd-based. The pigment concentrations are semi-transparent and solid color.

Oil-based stains are the most popular and easiest to use. You can brush, spray or roll on a coat and enough of it will either soak into the wood or evaporate so that you end up with very little or no film build. With no film build, there is nothing to peel, so recoating is easy. Simply clean the wood of dirt and mildew, and apply another coat.

Water-based acrylic stains are popular because of their lack of odor, ability to be cleaned up easily and reduced amount of polluting solvents. But water-based stains leave a build that somewhat obscures the wood and may peel if water gets underneath. Water-based stains also show traffic patterns more easily than oil-based stains because of the thin build wearing through.

Alkyd-based stains make use of a soft varnish to attach the pigment to the wood. These stains are meant to build on the wood, but they resist peeling because they attach so well to the wood, and they are so flexible. Often, manufacturers recommend as many as three coats and instruct you to clean the surface and apply an additional coat every year or two.

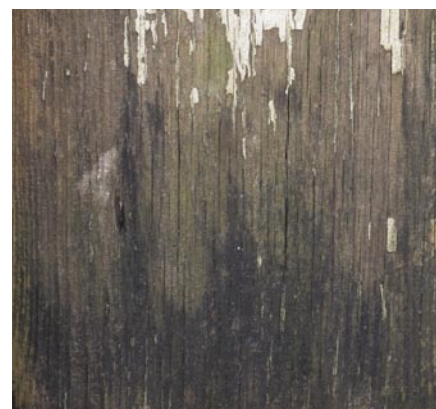
The disadvantages of these stains are that they will peel anyway if the wood isn't nearly



The combination of sunlight and rain causes wood to turn silvery gray. If you like the gray color, and you aren't having other problems, you can leave the wood unprotected. The grayed surface is very effective at blocking further degradation below. UV light erodes wood at only about 1/4" per century.



Quartersawn wood (right) is much more resistant to splitting than plainsawn wood (left). If you have a choice, always use quartersawn wood in exterior exposures. The two boards shown here are from a cedar tabletop left outside and unfinished for about eight years.



The mildew on the lower part of this board is a dark fungus that develops in moist conditions, especially in sheltered areas away from sunlight. You can prevent mildew by applying a wood preservative or a coating that contains a preservative. You can remove mildew by power washing or applying household bleach diluted with two to four parts water. Mildew causes little harm to the wood, but it looks bad.



perfectly clean during initial application or recoating, and visible wear is common in high traffic areas. It's very difficult to blend these areas back in.

The primary difference between semi-transparent and solid-color stains is the amount of pigment included. Solid-color stains contain more pigment (and also more binder), so they are better at blocking UV light. But the higher pigment concentration causes greater obscuring of the wood.

Stain is usually the best choice for decks and fences, and a good choice for cedar-shingle siding, and cedar shingles and shakes. Stain can also be used on furniture and doors. Alkyd, solid-color and water-based stains tend to build on the wood, which makes them vulnerable to lap marks and peeling. Semi-transparent stain is less resistant to UV light and water, but there is no peeling so recoating is easier.

### Clear Finish

Clear film-building finishes, including water base and all types of varnish, resist water penetration well, but not UV light. Destructive UV light penetrates the film and causes the wood to degrade. The lignin that glues the cellulose cells together loses its strength, and the surface fibers separate from the rest of the wood. When this happens, the finish, which is bonded to these surface fibers, peels.

The trick to getting a clear finish to survive in UV light is to add UV absorbers, and many manufacturers supply finishes with these added. There is, however, a great deal of difference in effectiveness of various products. "Marine" finishes sold at home centers and paint stores contain much less UV absorber than marine varnishes sold at marinas.

Clear finishes sold for exterior use can be divided into three categories: marine varnish, spar varnish and oil. Water-based exterior finishes are also available, but they have not found much acceptance thus far. Marine varnish is a soft, flexible varnish with UV absorbers added. Spar varnish is a soft, flexible varnish without UV absorbers added. Oil may or may not have UV absorbers added, but it is too thin on the surface to provide much resistance to sunlight even with them.

Linseed oil, whether raw or boiled, is also susceptible to mildew growth. In fact, mildew feeds on the fatty acids in linseed oil, so

mildew develops faster than if no linseed oil had been applied. Only in very dry climates should linseed oil be considered as a finish for exterior wood.

Marine varnishes from marinas are the best clear finishes to use outdoors. They are always very glossy (for better light reflection), relatively soft (for better flexibility), and require eight or nine coats to reach maximum UV resistance. In addition, because the UV absorbers in these finishes don't prevent the finish itself from deteriorating, you will need to sand off surface deterioration (dullness, chalking and crazing) and apply a couple of additional coats whenever the surface begins to deteriorate. This might be as often as once or twice a year if the finish is exposed to bright sunlight in Southern exposures.

Use marine varnish on objects where you want maximum UV resistance with a clear finish and are willing to deal with peeling if water gets underneath the film. Use spar varnish if UV resistance isn't critical. Use oil only if you are willing to reapply it often and don't expect much UV or water resistance.

### Water Repellent

Water repellents are usually mineral spirits with low-surface-tension wax or silicone added to repel water. Sometimes, they are simply thinned water-based finish.

Water repellents are fairly effective at reducing water penetration for a short time. If UV absorbers are included, water repellents block UV light for a short time. Both types of resistance wear away within months, so unless

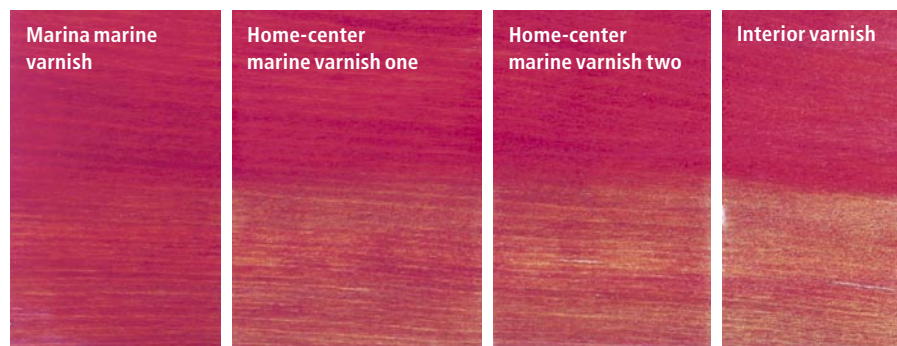


Rot is very destructive to wood, as is obvious in this photo. Pressure-treated wood and the heartwood of redwood, cedar and a number of exotic woods including teak, mahogany and ipe resist rot. A wood preservative that is not pressure-injected is fairly ineffective at preventing rot on non-rot-resistant woods.

you are willing to devote a lot of attention to upkeep, the wood will gray and split almost as fast as if no coating were applied.

Water repellents provide the least protection of any exterior wood coating, but they are easy to apply because they don't leave lap marks, and they don't peel.

Use water repellent on decks if you don't mind the wood graying or splitting. Use water repellent with a preservative included to fight mildew if you live in a humid climate. **PW**



Many exterior finishes claim UV resistance, but there is a big difference in effectiveness. I applied a red dye to this panel, followed by five coats of a marine varnish bought at a marina (left), five coats of two common marine varnishes bought at a home center (center) and five coats of an interior varnish (right). Then I exposed the panel to sunlight for six months with the top half protected by newspaper. The fading of the dye shows that the home-center marine varnishes provided little more resistance to UV light than the interior varnish with no UV absorber.

When lunch is served at the garden swing, simply pop up the center section of the seat to turn it into a handy built-in table.

# garden • swing



Nothing says summer like a glass of lemonade, relaxing in the shade and hoping to catch a breeze – or creating your own by giving your swing a kick. Of course, I always get so comfortable I'm looking for a place to put my drink down and close my eyes. Now I've got a swing designed to help. Integrated into the seat is a simple pop-up table that sits level to the ground while the swing keeps your back at a comfortable angle.

The swing is simple to build. Joinery consists of some simple tongue-and-groove construction, biscuits and screws. Most of the pieces are dimensional lumber sizes you can buy right off the rack. You will, however, need a planer to run the slats down to their proper thickness.

Start the project by heading to the lumber yard. The six-foot swing as shown required one 2x8, one 2x6, five 2x4s, and 10 1x4s all in eight-foot lengths. I chose western red cedar because it's a durable, lightweight, outdoor wood and is less expensive than redwood. At Midwest prices, the lumber cost about \$120.

## Seat Frame

Once back in the shop, start construction by cutting the seat rails and stringers from the 2x4s. As you probably know, dimensional lumber comes with rounded edges. You'll need to get rid of them. Cut the pieces for the rails and stringers to their 3" thickness by first running one edge over the jointer until they have a square edge, then rip them to 3" wide. To give the seat a comfortable back angle, set your saw blade to an 7-degree bevel and run the back rail on edge to give a 7-degree angle to the back.

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by David Thiel

Photo by Al Parrish

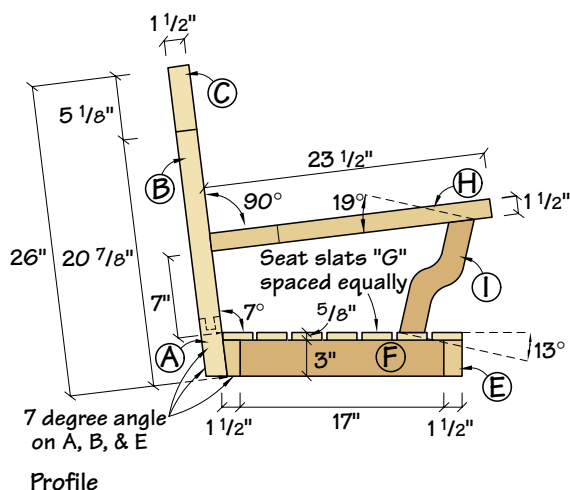








With the seat frame assembled, nailing the slats in place was a cinch with a pneumatic finish nailer and stainless steel nails. Note the 7-degree bevel on the rear of the back seat rail.



Now cut the pieces to length and screw the stringers between the rails, spacing them as shown. The center section spacing is critical because the pop-up table needs to be square so it can be lifted out and turned in place and the legs lowered. Use 2" galvanized deck screws when screwing the seat frame together.

Mill all the slats at the same time because they are essentially the same size. Cut the 1x4s into 24" lengths, and plane

the boards to  $\frac{5}{8}$ " thickness. Then rip them to their  $2\frac{1}{2}$ " width and crosscut the seat slats to 20". To give the swing a finished look, cut an  $\frac{1}{8}$ " roundover on all four top edges of each seat slat using a bit mounted in a router table.

Attach the slats for the permanent seats, running the slats from side to side. They should flush up in length to the outside edges of the stringers, and the front slat should be flush to the front rail. Use about  $\frac{3}{8}$ " spacing between the slats.

I decided to attach the slats to the frame using finish nails and an air nailer. This left a much smaller hole than screws, and it was very quick.

To finish the seat I decided to build the top surface of the

table at this point. The spacing works the same as on the side seats, but run the slats from front to back. The slats are attached to two table battens ( $\frac{3}{4}$ " x  $1\frac{1}{2}$ " x  $19\frac{7}{8}$ ") that are held  $\frac{1}{16}$ " or so away from the inside face of the front and rear rails. This gap should allow the table to lift out without binding, but some slight fitting may be necessary. Don't worry about the legs yet, we'll do that later.

### Build the Back

Next, turn to the back of the swing. Mill the bottom back rail and two stiles to size as described earlier to leave crisp edges. Run the bottom edge of the bottom back rail and both stiles through the saw at an 83-degree angle to match the bevel on the seat. Then take the 2x8 top rail and lay

out the top arch of the swing by marking the center of the rail, then mark  $2\frac{1}{2}$ " down from the top at the center. Tap a small brad nail into the board at this spot, then put two more brad nails into the board at the bottom corner of the board at either end. Then take an eight-foot strip of  $\frac{1}{4}$ "-thick wood and bend it across the top nail, attaching the strip to the two lower nails with spring clamps. The arch formed by the strip can then be marked with a pencil, and then a second line ( $2\frac{1}{2}$ " above the first line), marked. Jigsaw the piece to the outside of these



Holding the arched top rail steady was the most difficult part of routing the top groove for the slats. Remember to make the cut in two passes on each side. In this photo you can see that the rail hasn't been cut for length yet, allowing extra support for the router at the beginning and end of the cut (at left).

With the miters cut on the top rail and back stiles, space the slats and use the top rail to mark the angle and length of each slat, (adding 1") (above).



lines, then sand the piece smooth.

To determine the length of the top rail, lay the bottom rail and side stiles flat with the bottom rail between the stiles. Clamp these pieces in place, then lay the top rail across the tops of the stiles, flush to the top outside corner of each stile. With the top rail in place, mark the point where the inside curve of the rail intersects the inside edge of the stiles. Connect the two points and this is the angle to cut on the top edges of the stiles and on the ends of the top rail, to form mitered joints. The back frame will be held together with a double helping of biscuits, but first you need to cut the groove in the top and bottom rails to hold the slats.

Running the groove in the bottom rail is fairly simple. Set up a router with a straight bit (or an up-spiral bit) of either  $\frac{3}{8}$ " or  $\frac{1}{2}$ " diameter. Next set up a fence on the router  $\frac{7}{16}$ " from the bit, and set the bit for a  $\frac{1}{2}$ " depth. (The final depth is 1", but take it in two passes.) By running the router on both long edges of the rail, the groove will be centered on the piece. Check the fit of the back slats in the rail (or better, a test piece), then make the groove.

To cut the same groove in the arched top rail, see the photo at left. You will need to adjust the depth of the final cut a bit to compensate for the curve of the arch.

Miter the top rail to length, then check the fit of your slats in the grooves. The spacing between the slats should be about  $2\frac{1}{4}$ ", but double-check your dimensions.

After cutting the double biscuits at the joints, place the slats in the bottom groove and locate the top rail in position on the slats. Mark the height and curve on each



The back of the arm is simply screwed in place through the back stile, while the support is attached to the arm and seat with dowels and polyurethane glue. Notice the foamy squeeze-out of the glue at the joints.



With the notches cut in the support cleats, the two pieces can be glued in place in the seat frame.

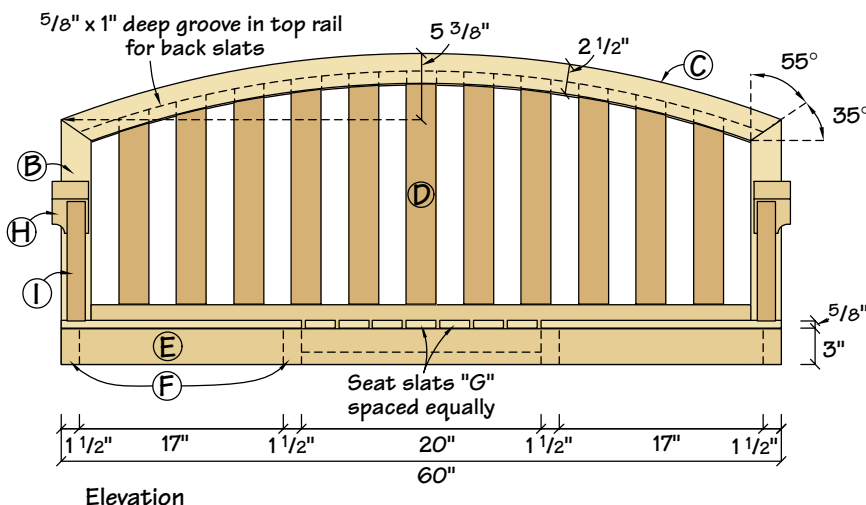
slat. Remove the slats, numbering them as you do. Now add 1" in length to the marks on the slats and cut them to their finished length using the band saw. You're now ready to glue up. I used polyurethane glue for all my glued joints. The polyurethane adhesive provides a strong water-resistant bond in even long-grain to short-grain

joints. Don't glue the slats in place, however. Place them in the grooves in their approximate positions, then after the frame has dried, use a brad nailer to tack the slats in place with a single brad at top and bottom, from the back. To protect the lower

#### SCHEDULE OF MATERIALS: GARDEN SWING

| No. | Ltr. | Item                 | Dimensions T W L                                         | Material |
|-----|------|----------------------|----------------------------------------------------------|----------|
| 1   | A    | Bottom back rail     | $1\frac{1}{2}$ " x 5" x 55"                              | Cedar    |
| 2   | B    | Back stiles          | $1\frac{1}{2}$ " x $2\frac{1}{2}$ " x $20\frac{7}{8}$ "  | Cedar    |
| 1   | C    | Top back rail        | $1\frac{1}{2}$ " x 8" x 60"                              | Cedar    |
| 11  | D    | Back slats           | $\frac{5}{8}$ " x $2\frac{1}{2}$ " x $20\frac{1}{2}$ "** | Cedar    |
| 2   | E    | Seat rails           | $1\frac{1}{2}$ " x 3" x 60"                              | Cedar    |
| 4   | F    | Seat stringers       | $1\frac{1}{2}$ " x 3" x 17"                              | Cedar    |
| 21  | G    | Seat slats           | $\frac{5}{8}$ " x $2\frac{1}{2}$ " x 20"                 | Cedar    |
| 2   | H    | Arms                 | $1\frac{1}{4}$ " x 3" x $23\frac{1}{2}$ "                | Cedar    |
| 2   | I    | Arm supports         | $1\frac{1}{2}$ " x 4" x $12\frac{3}{4}$ "**              | Cedar    |
| 2   | J    | Table battens        | $\frac{3}{4}$ " x $1\frac{1}{2}$ " x $19\frac{7}{8}$ "   | Cedar    |
| 2   | K    | Table legs           | 1" x $1\frac{1}{4}$ " x $6\frac{1}{2}$ "                 | Cedar    |
| 2   | L    | Table legs           | 1" x $1\frac{1}{4}$ " x $8\frac{3}{4}$ "                 | Cedar    |
| 2   | M    | Table leg braces     | $\frac{5}{8}$ " x $1\frac{1}{4}$ " x $13\frac{3}{4}$ "** | Cedar    |
| 2   | N    | Table support cleats | 1" x 2" x 20"                                            | Cedar    |

\*Longest slat, cut to fit. \*\*Length oversize to allow fitting.



rail from rot from standing water in the groove, cut blocks (called fillets) the size of the spaces and glue them in place.

You're now ready to glue and bolt the back to the seat. I used four  $\frac{1}{4}$ " threaded bolts with washers to bolt the bottom rail of the back to the back rail of the seat. Hold the bottom edges of each flush, and again use polyurethane glue on this joint.

Next cut the two arms and arm supports from 2x4 material and cut them to shape using the scaled drawings on the next page. You may want to cut the angle on the bottom of the support and on the back end of the arms, then fit them in place and confirm the location and angle of the top end of the supports. Attach the arms to the back with a long deck screw through the back stile. Glue the support to the arm and to the seat with  $\frac{1}{2}$ " dowels between.

The last step is to put the legs on the table, and to notch and fit the support

## NO PORCH? NO PROBLEM

While most of us enjoy a porch swing, not all of us have a porch. So we designed this swing for the porch-challenged reader by including an A-frame structure that can be placed anywhere in your yard.

Rather than spend a lot of valuable swinging time notching the timbers, we went to the local home center store and picked up some playset hardware from Swing-N-Slide and some treated dimensional lumber.

The wood and hardware cost a little more than \$150, making it more expensive than the swing. So you may want to consider that in your planning. The pre-made brackets make assembly very easy. Screw two 96"-long 4 x 4 posts to the leg braces using 2" deck screws. By following the angle of the brackets, the 25-degree angle of the posts is simple to determine. Next cut a 96"-long 2 x 6 into two 48"-long pieces with 25-degree miters on each end. Screw these supports to the legs, measuring from the bottom of the legs to keep the supports parallel to the ground.

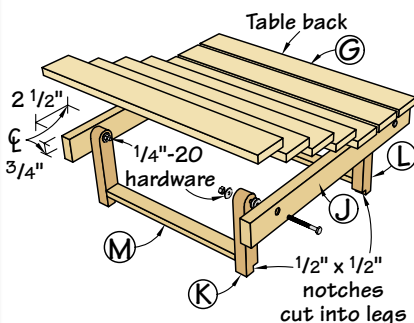
The top rail is the last piece, and the frame brackets will fit 6" between them, so I screwed a 2x4 to each side of a 4x4 post, finishing out at 6". The rest is simply laying the top rail on the leg assemblies, centering and squaring the legs to the rail and screwing and bolting the braces in place.

Last, but not least, drill  $\frac{1}{4}$ " holes, 6" from the inside of each leg assembly, through the top 4 x 4 and insert the 6" eye bolts. Use washers and nuts to secure the eye bolts, then hang the chains with the "S" connectors.

Some swings will use one chain suspended from the top rail which divides into a "Y" close to the swing. However, the swing is much more stable by using individual chains for each attachment point on the swing.



*Last, but not least, bolt the table legs in place to the table battens. Note the notches on the ends of the legs which drop into the previously cut notches to stabilize the table.*



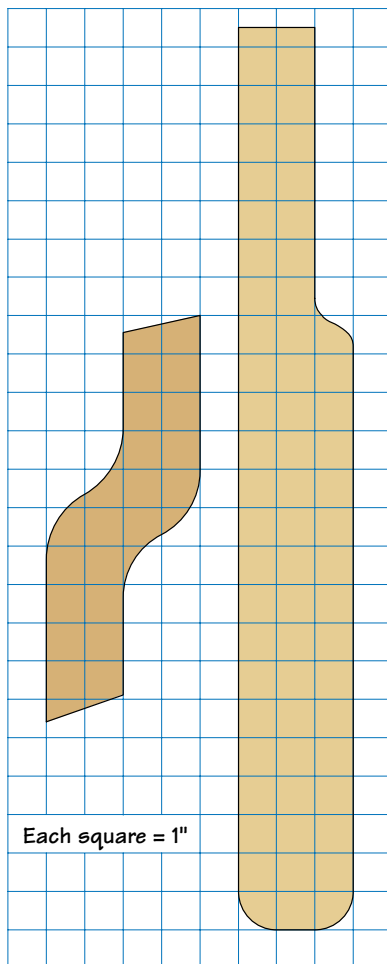
cleats. Start by cutting the leg pieces to the sizes given in the Schedule of Materials. They are two different lengths to allow the table to sit parallel to the ground, even though the swing itself is angled back. Round over the top end of each leg to allow it to swivel without catching, then drill  $\frac{1}{4}$ " clearance holes,  $\frac{1}{2}$ " down and centered on the legs. Drill clearance holes in the table battens  $\frac{1}{2}$ " up from the bottom edge, and 1" in from the inside corners. Attach the legs using  $\frac{1}{4}$ " x  $2\frac{1}{2}$ " bolts with two washers on either side of the leg and a nylon-lined nut to hold the legs tight, but not immobile.

Check the spacing between the legs (near the bolts) then cut the leg braces to fit, and screw them in place between the legs.

Now head back to the saw and cut the two table support cleats to fit between the inside stringers. Clamp these in place, center the table in place left to right and mark the location of the legs.

Remove the cleats and cut  $\frac{7}{8}$ " x 1" notches on the leg locations. Then use a handsaw to trim the ends of the legs to form tongues to fit into the mortises you've just created in the cleats. Glue the cleats in place, and once dry, the table will drop into place in the cleats, holding the table steady.

After adding  $\frac{3}{8}$ " x 4" eye bolts to the front and rear of the swing seat, the swing is ready to hang. If you've got a porch, find a sturdy joist and get the lemonade. If you happen to be missing a porch, use the information at left to build a simple A-frame structure to let you swing in style anywhere in your yard. **PW**



### SCHEDULE OF MATERIALS: SWING A-FRAME

| No. | Item                           | Dim.TW L    | Material |
|-----|--------------------------------|-------------|----------|
| 4   | Frame legs                     | 4 x 4 x 96" | PTP      |
| 1   | Top center rail                | 4 x 4 x 96" | PTP      |
| 2   | Top outer rails                | 2 x 4 x 96" | PTP      |
| 2   | Leg supports                   | 2 x 6 x 48" | PTP      |
| 4   | Swing-N-Slide EZ Frame Braces  |             |          |
| 4   | Swing-N-Slide Leg top braces   |             |          |
| 2   | $\frac{3}{8}$ " x 6" eye bolts |             |          |
| 4   | $\frac{3}{8}$ " flat washers   |             |          |
| 4   | $\frac{3}{8}$ " nuts           |             |          |
| 8   | S- connectors                  |             |          |
| 4   | 6-foot lengths of chain        |             |          |

PTP = pressure treated pine







# Japanese Garden Bench

Combine five 2x4s, a handful of screws and a long afternoon to build a handsome and sturdy sitting spot for your deck or garden.

**M**y father always has had a knack for doing more with less. He built the first house on our farm using a Skil saw, a drill and a hammer.

Sometime during my childhood he built a pair of these Japanese-looking benches using leftover 2x4s and framing nails. While visiting him one recent summer, I was struck by the fact that they have survived more than a dozen winters and still look good.

This project is really great for the beginning woodworker who doesn't have a lot of tools, skills or confidence. But the end result will make you look like you've got all three, in spades.

## Trip to the Lumberyard

This bench is designed to be built using just five 10'-long 2x4s. You can build it from sugar pine, paint

it and spend less than \$10. I always liked redwood for my outdoor projects (and that's what the originals were made from) so I spent the extra cash – about \$200.

No matter what species you choose, select the straightest, most knot-free 2x4s you can find. While you're at the lumberyard, pick up a pound of stainless-steel screws. Associate Editor Kara Gebhart (who helped me build this project) and I used #8 x 2" screws. Another excellent choice would be Miller Dowels (847-853-1000 or millerdowel.com).

## Back in the Shop

You don't need a jointer, planer or table saw to build this bench.



We used a miter saw to cut our pieces to length. Here you can see that we clamped all the top boards together and “gang cut” them to length simultaneously.

You don't even need a shop. A drill, a saw, some sandpaper and a couple of sawhorses will get the job done right on your driveway.

Start by laying out your crosscuts on the 2x4s using chalk. Pick the best-looking boards for the five top pieces. Boards with too many knots or dings can be used as legs, which are mostly covered up by the top pieces.

Then cut all your pieces to

length as shown in the cutting list on page 82. What's important to remember here is that it's not critical if you cut your legs a bit long or cut the top boards a bit short. What is important is that you cut all the legs the same length, whatever that turns out to be. For that reason, I recommend “gang cutting” your parts.

“Gang cutting” is when you clamp together all the parts that are the same length and trim them to size simultaneously, as shown above. This works no matter what tool you use for crosscutting.

by Christopher Schwarz & Kara Gebhart





square corners of the wood cut the round hole into a square one. Once your plugs are glued in place, cut or sand them flush.

### Final Assembly

Stand the legs upright on your work surface and put the stretchers in place between the two cross braces. Glue and screw the stretchers into place and plug the holes left by the countersink.

Then arrange the five top boards on the base. Because the pith side of flat-grained wood is more prone to raised grain, make sure you place all your boards bark-side up. (Look at the growth rings.)

To ensure everything was spaced evenly, we first attached the top pieces at the front and back of the bench using glue and screws. Then we centered the middle board between those.

Finally, we put the remaining two boards in place and figured out what gap should be between each board. We then glued and screwed these two boards in place. Finally, we plugged the holes.

Check out Bob Flexner's advice on protecting exterior wood below. We chose to leave the wood in its natural state and allow it to turn a silvery-gray, which will happen when left outside. **PW**

## SUPPLIES

**McFeelys**

800-443-7937 or [mcfeelys.com](http://mcfeelys.com)

#8 x 2" • Stainless steel screws,  
\$6.40 for 100

*Prices as of publication date.*

## PROTECTING EXTERIOR WOOD

There is probably more misunderstanding about how to protect wood outdoors than about any other aspect of wood finishing.

The need for a quality coating to protect exterior wood is great because when sunlight or water come into frequent contact with wood, the wood can lose its color, split, warp and often rot.

The best way to protect exposed wood is to apply a paint or finish that blocks sunlight and moisture, and holds up to these elements.

- Light is the principal enemy of paints and finishes. Over time, ultraviolet rays, which are strongest from direct sunlight, break down paints. If you catch it before the paint is damaged all the way through, you can rub off the dull, chalky result with abrasives (contained in many car polishes, for example) and expose paint that looks shiny and new.

UV rays also break down clear finishes, but most of the damage here will come when they peel. The finish peels because the UV rays penetrate the film and destroy the lignin that holds the cellulose cells of wood fiber together. The surface cells separate and the finish bonded to these cells peels.

The best sun-blocking agents are pigments (contained in paints and stains). But pigments hide the wood, and many people would rather have it visible. Other good sun-blocking agents are UV absorbers, which are similar to sunscreen

agents used in suntan lotions. They convert UV light energy to heat energy, which dissipates. UV absorbers don't hide wood, and they are effective at preventing deterioration, but they are expensive, and a significant amount (1 percent to 3 percent by weight) has to be in the finish to be effective.

- Moisture also causes paints and finishes to peel when it gets between the coating and the wood. Paints resist moisture penetration well, but most clear finishes don't. Water repellents, which contain a low-surface-tension waxy substance, cause water to bead but water repellents don't totally keep moisture out of the wood.

The best moisture-resistant clear finishes are varnishes called spar or marine varnish that are made to be very flexible so they can keep up with extreme wood movement. Varnishes made with phenolic resin and tung oil are best because they don't crack as quickly as those made with polyurethane resin.

The best way to protect wood outdoors is to paint it. Paint repels water and blocks UV rays effectively. There are two major categories of paint: oil-based and water-based (also called latex).

**Oil-based paints** are best for objects such as chairs and picnic tables because latex paints don't wear as well. Oil-based primer also is best on wood that has been exposed to the weather for a month or more because it penetrates

deeper than latex primers. If the wood is freshly milled or sanded, acrylic-latex primers perform well.

**Water-based or latex paints** offer the best protection for wood siding because they allow moisture vapor to pass through better than oil-based paints. If the water vapor can't get through the paint and to the outside environment, it will build up behind the paint and cause it to peel. A primer coat of oil-based

paint is not thick enough to stop the penetration of moisture.

No clear finishes work as well as paint if they are exposed to bright light, but expensive marine varnishes come closest. Keep in mind, however, that these finishes are very glossy and relatively soft (for flexibility), and you need to apply eight or nine coats to reach maximum UV resistance.

— Bob Flexner, contributing editor



Left unfinished, white oak and other weather-resistant woods will turn a silvery-gray. This Adirondack chair has survived 10 seasons outside with little deterioration.