



# Old-Fashioned Carriage Doors

**M**y wife and I recently spent a year looking for our new home in the Pioneer Valley area of central Massachusetts. One of the items on our wish list was a garage for my new woodshop. Driving to house-hunting appointments, we noticed that a few of the older garages still had their original swing-out carriage doors, and we thought they looked far better than modern overhead doors. We knew that if we found a house with a suitable garage, we would replace the ubiquitous roll-up doors with traditional swing-outs. We found just such a place, and when we moved into our new home, I got started planning the transformation of the two-car garage into my woodshop. Once I had decided

the tool, electrical, and dust-collection layouts, I turned my attention to the design of the front facade and the new doors.

The building had an entry door on the right and a 16-ft.-wide overhead garage door on the left. I decided to divide the long doorway in half with a pillar, creating openings for two pairs of carriage doors. I only really needed one set, and I could have closed in half of the opening with a wall, but I wanted the building to look like a garage from the street.

### **The doors are a sandwich**

I wanted to maximize natural light in the shop, so I designed the doors with large windows. I found six-light basement sash that were stock items and would provide plenty of light.

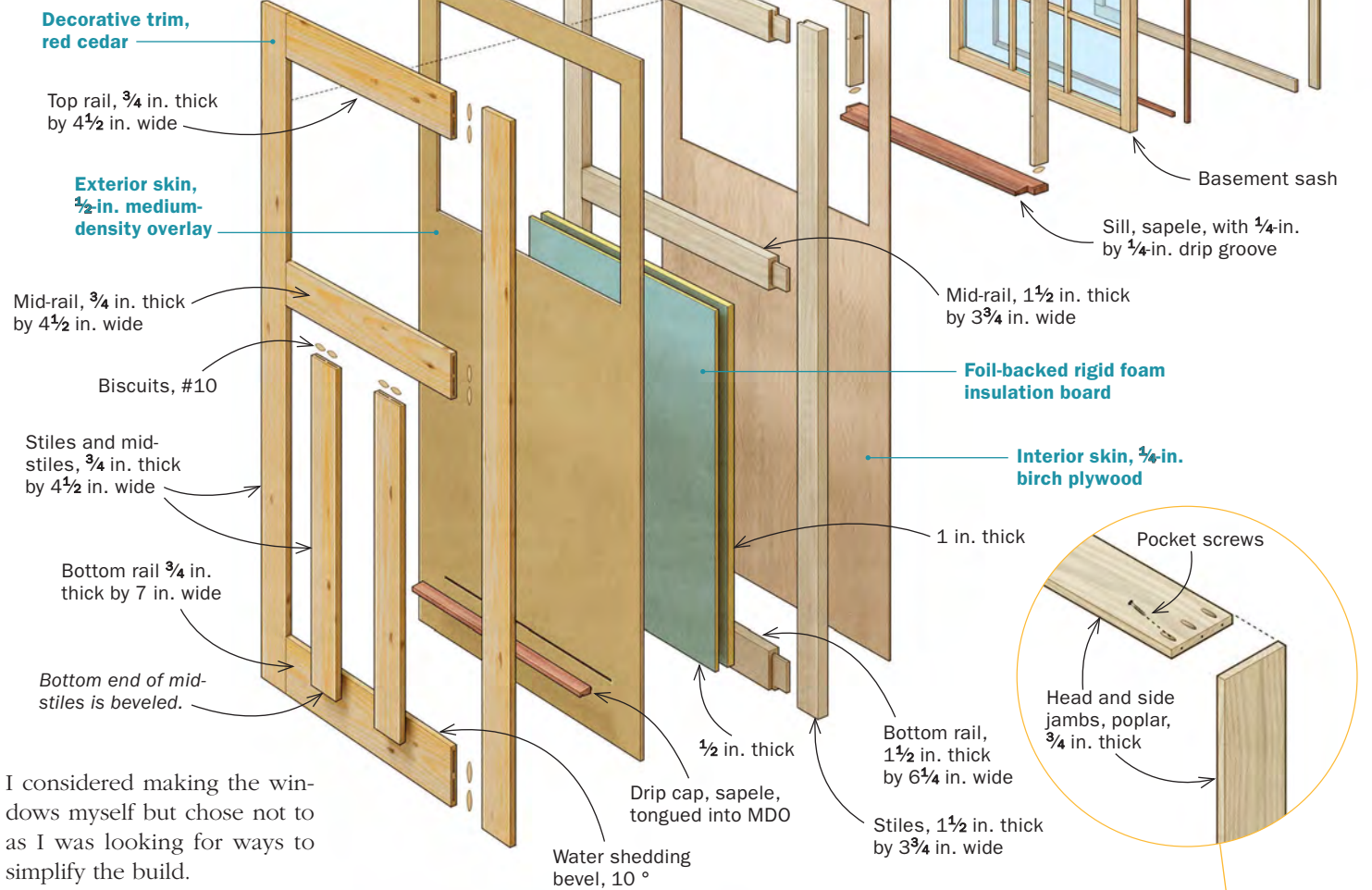
Add character and convenience to your garage woodshop

**BY JOHN HARTMAN**



# HEAVY-DUTY LAMINATED DOOR

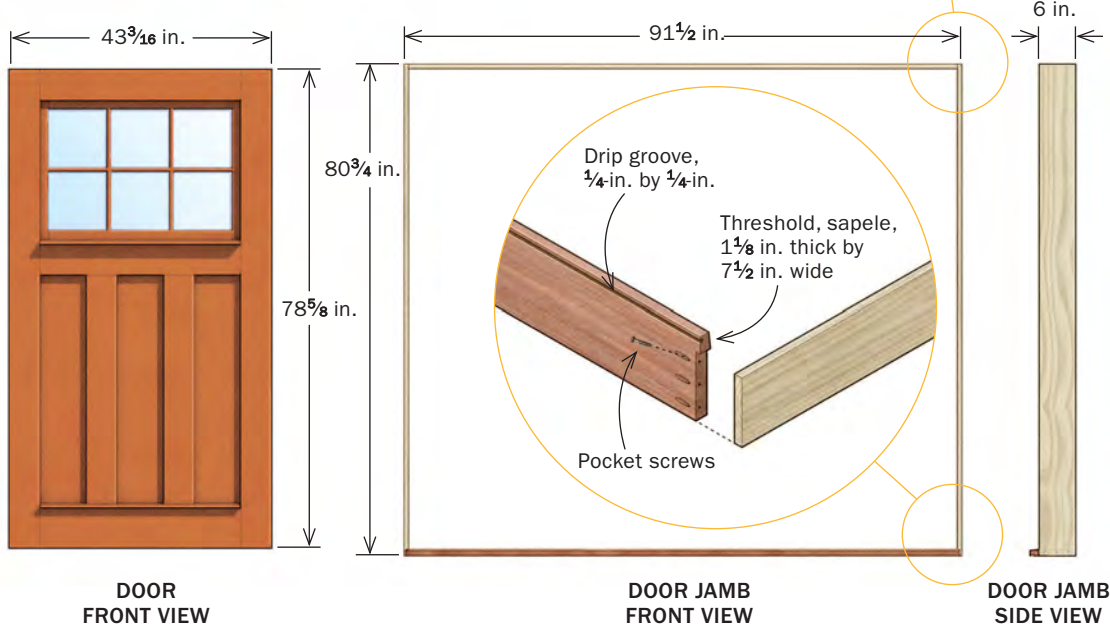
Stable, strong, and weatherproof, the door has a stout, mortise-and-tenoned, solid-wood frame at its core. Sheet goods are glued to both faces of the frame with construction adhesive and galvanized finish nails. A framework of decorative trim glued and pinned to the exterior skin imitates frame-and-panel construction.



I considered making the windows myself but chose not to as I was looking for ways to simplify the build.

To make the doors as strong, stable, and weatherproof as possible, I built them with a hybrid structure: a stout, mortise-and-tenoned solid-wood frame skinned with plywood. I skinned the outer face of the frame with ½-in. medium density overlay (MDO), which has an exterior-rated plywood core covered on both sides with a thin veneer of smooth, resin-impregnated paper. MDO, which is used for concrete forms and outdoor signs, is rated highly for exterior use and holds paint extremely well.

To attach the MDO sheet to the poplar frame, I used



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# Door structure



**Inside story.** For rigidity and durability, Hartman built his carriage doors as a sandwich, with a mortise-and-tenoned poplar frame skinned on both faces with sheet goods.

**Trim for the window.** Hartman cut through the MDO to create the window opening, first rough-cutting with a jigsaw, then flush-trimming with a router.



**Outside face.** Hartman applies  $\frac{1}{2}$ -in. medium density overlay (MDO), an exterior-rated and paint-friendly plywood, to the exterior side of the poplar frame with polyurethane construction adhesive and galvanized finish nails.



**Keeping it warm.** With the door flipped so the exterior side is down, Hartman inserts two tight-fitting sheets of insulation board in the frame's lower opening. Next, he'll skin the inside face of the door with  $\frac{3}{4}$ -in. birch plywood, glued with Titebond III.

polyurethane construction adhesive and galvanized finish nails. I roughed out the opening for the window with a handheld jigsaw and trimmed it flush to the frame with a router. I cut foam insulation board to fit snugly in the lower section of the frame, making sure to orient the foil side toward the interior face of the door.

Wanting to minimize the overall thickness and weight of the doors, I skinned the inside face with  $\frac{1}{4}$ -in. birch plywood, gluing it on with Titebond III.

## Sprucing up the door slab

I added a framework of trim to the outside of my modern door to give the plain slab the appearance of a traditional

frame-and-panel door. I made the trim of cedar for its lightness and rot resistance. To cut costs, I used cedar decking from a big box store and milled it down. Western red cedar, even of this poor grade, is stable and holds paint well.

Before attaching the trim to the outer face of the door, I installed the lower drip cap, gluing its tongue into a groove in the MDO. I glued up the trim stiles and rails on a flat surface using Titebond III and #10 biscuits, waited for the glue to cure, and then attached them to the door, again using polyurethane construction adhesive and galvanized finish nails. I finished the trim by fitting and attaching the mid-stiles.

# Door trim



**Frame-and-panel trim.** A framework of cedar trim pieces creates the appearance of a frame-and-panel door. Hartman begins by gluing up the outer frame pieces on a flat surface. Then he glues in the drip cap (above), which helps locate the trim, and glues and nails the frame to the door slab (right).



**Installing the mid-stiles.** With the outer framework of trim glued in place, Hartman bevels the bottom end of the mid-stiles (above), which butt against the angled drip cap. He biscuits the top end of the mid-stiles and the bottom edge of the mid-rail (below). Then he glues and nails the mid-stiles with Titebond III and galvanized finish nails (right).

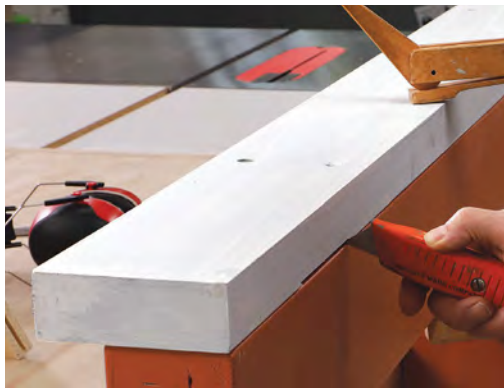


# Hinges

**Begin with the bucks.** Hartman cuts the hinge mortises using a shopmade router template clamped to the buck. He'll square up the corners of the mortises with a chisel.



**Mortise transfer.** Having routed the buck mortises, Hartman clamps the buck to the door and transfers the mortise locations with a knife (right). Hartman then uses his routing template to cut the hinge mortises in the door (below).



**Centering the screws.** Hartman uses a self-centering Vix bit to drill perfectly placed pilot holes for the hinge screws.



**A lot easier than hinging in place.** After installing the hinges in the door, Hartman screws them into the door, tests their action. Then the hinge pins are removed and the bucks are screwed into the doorway.

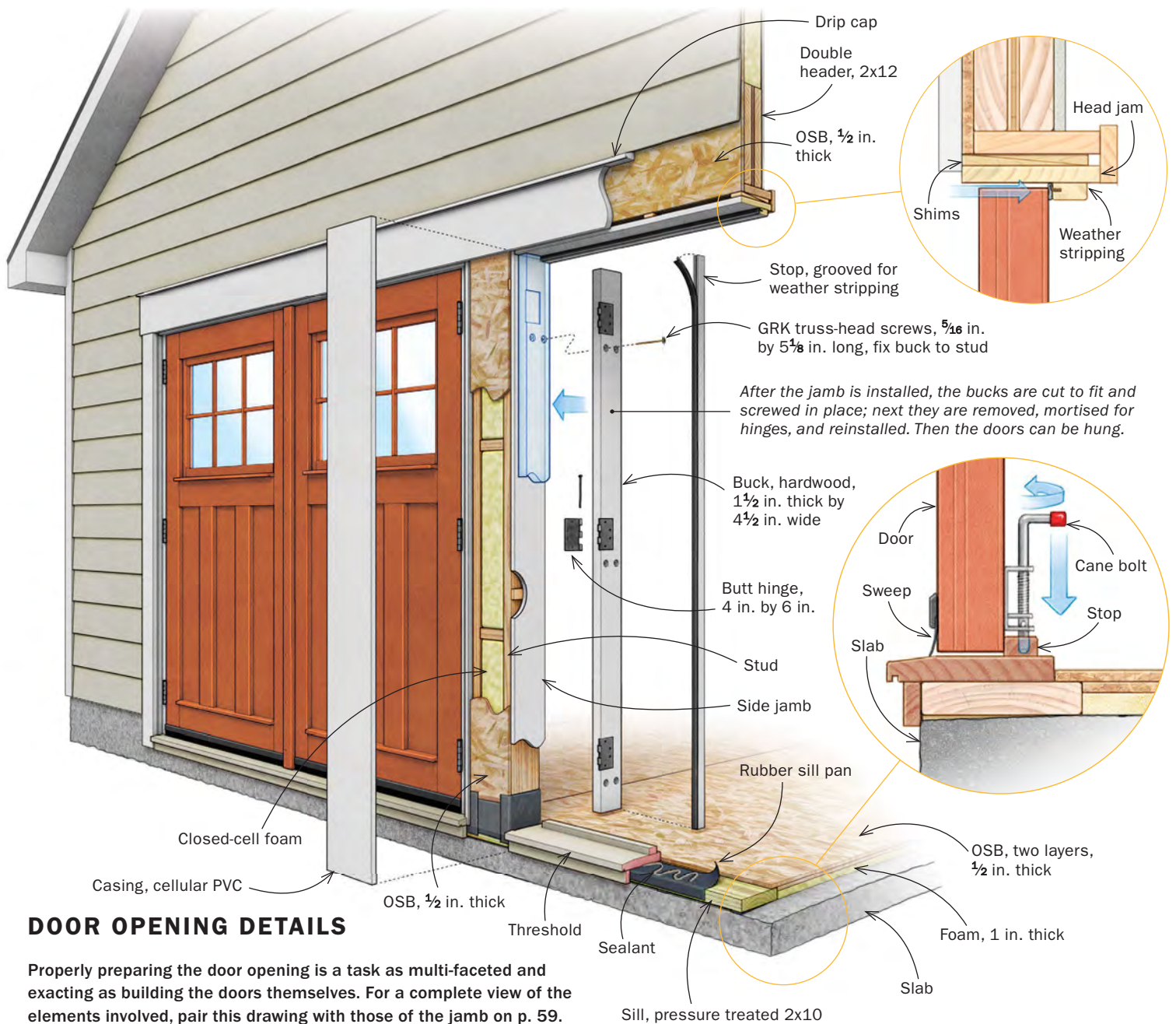
Next I made the frame that the basement window fits into. I joined the frame with #0 biscuits and drilled holes for the pocket screws that would attach the frame to the door.

Painting came next. I filled all the nail holes, painted any knots with Zinsser BIN stain sealer, and applied paintable caulk to all the inside corners. I used an oil-based primer on all surfaces. When the primer dried, I attached the window frames with pocket screws. I

top-coated the exterior surfaces and edges of the doors with a high-quality exterior latex paint, leaving the interior of the door to be top-coated after installation.

## Build and install the jambs

I started work on the door openings by attaching a pressure-treated 2x8 sub sill to the front edge of the floor slab with Tapcon screws. The slab had a slight bevel at the edge, so I used shims to level the



## DOOR OPENING DETAILS

Properly preparing the door opening is a task as multi-faceted and exacting as building the doors themselves. For a complete view of the elements involved, pair this drawing with those of the jamb on p. 59.

sill. I built the center column with 2x6 studs faced with 1/2-in. OSB. I used ZIP flashing tape to form the sill pans, taping the top of the sub sill, over its front edge, and partway up the studs. I pressed the tape down firmly with a J-roller.

I made both jambs the same size, measuring both rough openings and using the smaller dimensions. I subtracted 1/2 in. from the rough opening width and 3/8 in. from the height to determine the outside dimen-

sion of the jambs. My rough openings were not too badly out of square; if yours are, you may need to make the jambs a little smaller.

For strength and durability, I made the thresholds from sapele. The front edge is beveled to shed water and there is a drip groove machined in the underside. The other jamb parts are made from poplar. I notched the threshold at the ends to form horns that overlap the rough opening; they

get cut back when the exterior trim is installed. After joining the jambs with pocket screws, I applied an oil-based primer.

When the jambs were ready to install, I squared them up and screwed on sticks made from scrapwood. Attached diagonally and extending a few inches past the jamb parts, the sticks keep the jambs square during installation. Once the jambs are in place, check them for level and plumb, and shim

the threshold as needed. Remove the jamb and attach any shims with pin nails.

Apply a generous amount of OSI Quad 425 Window, Door & Siding Sealant on top of the subsill. Tilt the jambs into place and temporarily screw the diagonal braces to the exterior sheathing. Screw the threshold to the subsill. Shim and screw the sides and head of the jamb to the rough opening, making them straight. Foam the gaps between the jambs and

# Install the jambs



**Square and set the jambs.** After assembling the jambs in the shop, Hartman screwed on diagonal sticks to keep the jambs square and also to act as depth stops against the sheathing.



**Level the threshold.** With the jambs in place, level the threshold, adding shims where necessary.



**Plumb the jamb.** Once the threshold is level, check that the side jambs are plumb and straight. Add shims where needed.



**Foam the seams.** Hartman applies foam sealant around the perimeter of the jambs. He'll add more to these spaces from inside.

the rough opening from the outside about 2 in. deep. The remainder of the gap will be sealed later from the inside.

## Hinge and hang those doors

To make hanging the doors simpler and more secure, each door gets hinged to a heavy, solid-wood piece called a buck rather than directly to the jamb, in a process that happens right at the workbench. First the bucks must be trimmed to fit snugly into the jamb and secured there. Each pair of bucks should be adjusted coplanar by performing

a cross-leg test. Attach strings from each corner of the pair of bucks, forming an X. The two bucks will be coplanar when the strings just barely touch at the middle.

I opted to use extrawide 4-in. by 6-in. butt hinges to be sure the screws would go into the solid-wood frame at the heart of the door. After unscrewing the bucks from the jambs, I used a shopmade template and routed shallow mortises in each buck for the hinges. I transferred the mortise locations from the buck to the mating door with a knife, then



**Casing the joint.** Before hanging the doors, Hartman installs the casings around the opening. He used cellular PVC for its weather resistance.

# Hang the doors



**Buck first.** After installing all the hinges and removing the hinge pins, re-drive the long screws that fix the buck in the door opening.

routed mortises in the door. Then I unpinned the hinges and screwed the leaves to the door and the buck. After replacing the pins and testing the action of the hinges, I pulled them again and re-installed the bucks in their jambs. Then I lifted each door into place and secured the hinge pins one more time.

## Last bits

To air-seal the doors I made stops grooved to hold weather stripping, and mounted them to the sides and tops of the doors. At the bottom I screwed on a rubber sweep. I secured the doors with spring-loaded cane bolts top and bottom.

I installed the windows after hanging the doors. Having primed and painted the sash, I just placed them into the window frames and secured them with wood stops screwed to the frames. Weather stripping attached to the stops provides the air seal. Then all that was left was to remove the old overhead door—which went surprisingly easily—and button up the interior trim. □

*FWW* illustrator John Hartman draws (and builds) furniture in West Springfield, Mass.



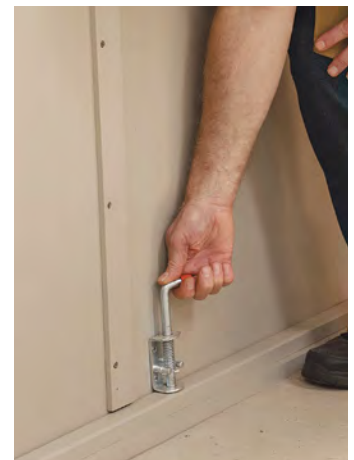
**Door meets buck.** Set the door in place, using shims and a pry bar to align the knuckles of the hinges, then drive the hinge pins.



**Where the doors meet.** Once both doors are hung and the door stop is installed on the threshold, Hartman screws the meeting rail in place.



**In with the windows.** After the sash are primed and painted, they are placed into their openings and secured with wooden stops faced with weather stripping.



**The bolt goes home.** Spring-loaded cane bolts drop into the door stop and secure the doors from inside.