

Shopsmith Free Grandfather Clock Plans A Clockmaker's Diary



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A Clockmaker's Diary FIRST INSTALLMENT -- The Hood Assembly

Jim McCann is Shopsmith's Quality & Facilities Manager . . . as well as the designer and builder of this regal, cherry Grandfather's Clock. We think it's a stunning example of what the Shopsmith Woodworking System can do in the hands of a patient, diligent woodworker.

Building this clock gave Jim an excellent opportunity to express one of his favorite beliefs: "It's really not all that hard to build one of these," he said in response to our congratulations. "Sure, when you think of trying to build it all at once, it seems pretty intimidating. But, if you build it as if it were a bunch of smaller, less complicated projects, then put it all together like a big jigsaw puzzle, it's not intimidating at all."

Jim's been working with wood for about 30 years. He took instruction in advanced woodworking and drafting at Eastern Kentucky University, worked in a production shop for a while (building Gerstner Tool Boxes), then served as a woodworking craftsman, where he built hundreds of projects from simple to complex in support of our original "Hands-On!" Magazine and virtually all of the more than 50 books authored by Nick Engler, America's Best-Selling Woodworking Author.

But Jim will be quick to remind you that when he built this clock (1n 1982), he was not a man with 30 years' experience....but rather, a woodworker who understood that even the most complex projects can be tackled without fear...by breaking them down into smaller components and completing each one in turn.

Construction of this clock took place at intervals over the course of several months. When he started, he decided to take some time at the end of each week's work to reflect on the challenges (and joys) of tackling a major project such as this.

Since building a tall case clock is a long-term project made up of many smaller projects, we can't devote all the space needed to tell the story in a single issue. Instead, we'll spread the information out over three installments. This is the first of those installments. Once the remaining articles and plans appear, you'll have all the information you need to make an exact duplicate of this clock.

But, even if you're not interested in building a duplicate of our clock, you'll soon discover that just reading about the methods Jim used to design, organize, machine and join the components of the clock will prove invaluable to you on any future projects you may build.

WEEK ENDING JULY 10:

Mind power! That's what this week's been all about. I need to get a good, clear image of this clock so it will all come together. Spent a lot of time looking at photos of clocks, deciding what I like and don't like about certain ones. Found a number of suppliers of clock kits. They'll sell me as much clock as I want — everything from basic clockworks to the whole kit. I chose an 8-inch dial face with a moving moon dial on top.

It's important to note that the size of the dial face is a key piece of information. For example, the overall size and radius of the dial face determines the size and shape of the dial face frame, the door, the scroll board and the size of the clock housing. In fact, it determines the size of the entire hood assembly and therefore, the proportions of the entire clock! Knowing this information, I can get started on the scale drawings.

I've decided that I want to keep the overall height of the clock at just slightly taller than the height of a typical door (about 6-feet, 8-inches). That way, it'll be a little shorter than a classic 7-foot clock, but will

still look good in a typical American home with 8 foot ceilings.

I figure I'll need about 30 board feet of lumber to build the clock, but I've decided to buy about 30% more than what I'll actually need to cover for bad wood, extra pieces for making set-ups and, of course, mistakes. I've pretty much decided to build the clock out of cherry, but checked on the price of walnut, just out of curiosity. WOW! Sure glad I chose cherry!

WEEK ENDING AUGUST 14:

All the big design problems are now at least solved on paper. Picked up the wood. Received my clockworks and mounted it to a piece of plywood to check out my critical dimensions. It's neat to finally see the actual clockface with the pendulum and chime rods hanging below — I can almost visualize what the finished clock will look like — and I LIKE what I see! After getting the dimensions I wanted, I repacked the clockworks and stored them away for safekeeping in a dustproof area. Took the time to draw full-size profile details on all the turnings and moldings. I'm sure these will change slightly as I do the actual milling and turning, but at least I know what I'm aiming at. I've thought about this project for so long that I guess I'm a little apprehensive about getting started. I'm wondering if I've thought about everything and really know for sure where I'm going.

Okay, the three basic units for the clock: the Hood, the Waist and the Base. Starting with the Hood, I first made the sides and the dial face frame, which was a little challenging. Grain direction will make this arched piece fragile, so I won't cut the arch, yet. Cut joinery, dry assembled frame and set it in grooves between the two sides to get the width for the scroll board and the size of the hood base.

I cut the spindle stock. Doweled all the pieces together dry: the scroll board and sides to the spindle stock to make the scroll board assembly. No gluing yet. No turning yet. The spindles and finials will come from the same size stock, so I cut them at the same time. Used a carbide-tipped blade for my sizing cuts. Reserved my hollow-ground blade for the joinery that will come later.

WEEK ENDING AUGUST 14:

The scroll board and base are done with the unturned spindle and finial stock blocked in between them for position. Now, I can figure some rough lengths: dimensions of the lower hood moldings. This is definitely a challenging project! All the interrelated skills I've learned are coming into play. A lot of final fitting. Some really tight tolerances. Used my rabbeting plane today to fit and clean up the rabbets on the door. What a great little tool!

Cut the sound ports on the hood sides with a scroll saw piercing cut. Then used a hand-held router to form the edge and hand-carved the inside corners to make them look as if they were mitered. I'm really getting rolling on this — hate to stop work for anything else.

Started the lathe work. Worked from the end of the spindle toward the middle — large diameters first, then small ones — less chatter and “whipping” that way. Marked and turned a piece of scrap first — that gave me a full-size model and a three-dimensional, mental image of what I was wanting on the cherry stock. By the time I was done turning the four spindles, I had the pattern memorized.

Sanding on all four spindles came after I was done turning the fourth one. If I made a small mistake on the last spindle, I could go back, adjust the others, then sand them all at once. Like I've heard it said, “A true craftsman isn't necessarily the one who always does it right the first time . . . but rather, the one who knows how to cover for his mistakes the best.”

Didn't drill the ends for the joinery of the spindles to the finials, yet. That would make it real hard to get them back on the lathe for the final sanding and finishing to come later.

Really got into milling the moldings. Started from the bottom of the hood and worked my way up. From the simplest to the more difficult. From the “cream” of the stock I reserved at the very beginning for the thinner, more delicate moldings, I started to mill the moldings I wanted. Avoided trying to use “curly”, figured stock. It looks great, but anything less than straight-grained wood can be very difficult to work on the molder or shaper.

In all the milling, I tried to use reasonably large pieces of stock (“blanks”) so that forming an edge on it would be as safe as possible. The more “gripper” you have the better. After running the blanks through the molder or shaper, I cut the molding away from the edges of the blanks.

The door frame molding is real delicate. Cut the contour of the door frame in a wide board, then used a shaper with rub collars and a starter pin in my table insert — no fence. The board was extra long so I could cut all the molding I’d need. After shaping, I resawed the board and belt-sanded the back side. Then I cut the molding off with my bandsaw and smoothed the topside of the arched molding on my disc sander at a slow speed, using a fine grit paper.

For the gooseneck molding and its matching sides, I started with the sides. That way, I could machine the 1-5/8-inch x 1-5/8-inch stock with molding knives . . . cut the cove on the table saw (see “coving” in “Power Tool Woodworking For Everyone”) . . . then hand-carve the cove in the gooseneck portion to match.

The gooseneck molding on the top of the hood turned out to be a very big challenge. I ended-up gluing up my stock like stairsteps, then hand carving the curved cove with my 1-inch lathe gouge (see Figure 1). I shaped the outer edges on the shaper first, glued the pieces together, then dove in on the handwork.

WEEK ENDING AUGUST 28:

After milling all the molding, I set it aside. I final sanded and finished the spindles and finials. To protect the areas that would need to take glue, I applied masking tape. Then, I drilled the holes in the ends of them.

I glued together the scroll board, spindles, sides and also the base. It looks like a miniature “temple” standing on the end of my workbench. After sanding, I can get the measurements for the moldings. Used an enlarged, shop-made miter gauge extension to cut the miters on the arched door molding (see Figure 2 below).

The same miter gauge extension with a nail placed strategically in it helped to hold the gooseneck molding while I cut the miters in it. Then I used the disc sander to achieve the final fit on all the miters. Here again, my rabbeting plane came in handy to final form the corners after gluing the miters. Even though it’s part of a classic technique to use brads or small nails to attach the moldings, I used glue alone. Attaching these moldings felt like applying the final decorations to my benchtop “temple”!

Got the knife hinge, pull and catch for the door. Hung the door so it swings hinged from the right (called a left-hand door). Don’t know why, but that’s the way the doors on almost all tall case clocks swing.

WEEK ENDING SEPTEMBER 12:

Reviewed and re-worked my drawings for the Waist Assembly. The way the Hood turned-out changes a few of the dimensions on this part. Boy! Do I enjoy looking at the Hood sitting up there on the benchtop! But, I’m also very glad the Waist Assembly doesn’t have the same suspended gooseneck

moldings and fancy multiple turnings!

This section is basically going to be a long box with a door and molding on the top and bottom. Sort of like a “curio cabinet”, sitting between the Hood and the Base Assemblies.

First task: Choose some of the best, most attractive wild cherry stock for the sides of the Waist. Don't want to do any gluing-up on these pieces.

The major challenge of the Waist is going to be the upper and lower moldings. These pieces form important transition points in the flow of the clock's overall lines. They're not there just to “fancy it up”. Tried to balance the design of this one-piece upper Waist molding with the Hood moldings. I'm not looking for a mirror image — just a complimentary balance.

No problem drawing this out on paper. Now, all I have to do is get the wood to look like the drawings! Shouldn't be too difficult. First, all of the moldings must look balanced: starting with a bead on the lower Hood molding and ending with another bead on the lower Waist molding. In-between, the coves will form an attractive, sweeping transition. Each cove must start at a certain point and end at a certain point...it'll take some pretty precise table saw coving on each of them. Once I've figured out the technique for the upper molding, the lower molding should be a breeze.

Chose the stock I wanted to use for the molding blanks. No burls or other figuring on them. As straight-grained as possible. Sized these down...then made some test blanks of poplar...the exact same size. I'll practice the table saw cove cuts on these first. After that, I'll run them over the molder.

WEEK ENDING SEPTEMBER 26:

Reviewed the section on making cove cuts with the table saw in my copy of Power Tool Woodworking For Everyone, the great “how-to” textbook that's comes with every Shopsmith MARKSV. Actually, the cove profile I want is not a quarter of a circle — but rather, a quarter of an ellipse. So, I'll have to tilt my MARKSV's worktable to get that profile (5-degrees for the upper molding; 13-degrees for the lower molding).

It took a lot of trial-and-error to find the correct settings for the angle of the fence, table tilt and saw blade height. Used an ordinary, all-steel 10-inch all-purpose blade for this operation. When coving, the teeth of the blade don't really cut as much as they scrape the wood. Figured the sideways pressure probably wouldn't be too good for my carbide-tipped blade.

Took the better part of a whole working day just to get the setup right for the first cove cut. Who would have guessed? Now, it's on to the lower molding. It should go faster (I sure hope so!). Those who've never done this kind of cut on a table saw would be amazed at the ease of the actual sawing operation. With a sharp blade, it goes very smoothly -- no kickbacks.

For safety, I positioned the fence so that the blade pulled the stock into the fence rather than away from it. I also added a safety guide block on the saw table. It's job is to keep the blank from slipping away from the fence and down into the blade (see Figure 1). Used push blocks throughout the whole cutting operation. Was extra careful because I had to remove the upper saw guard for this operation.

WEEK ENDING OCTOBER 10:

Finished the upper molding. Had to do a good bit of careful sanding to remove the saw and molder knife cut marks. Don't want to lose the hard edges of the transition points at the beginning and end of the cove — these steps help define the lines of the clock. Used a wood cylinder padded with tissue paper under coarse Garnet sandpaper. No sense getting them sanded extremely smooth — before I

get to the final sanding of the whole clock, the wood grain on all the separate pieces will have to be raised again due to temperature and humidity changes.

Cut the miters and made sure they all looked good. Didn't glue them up, yet. The overall dimensions of the carcass they fit onto won't be known until I actually do the final sanding.

WEEK ENDING OCTOBER 24:

The lower molding is a three-piece affair. If it were only one piece, the upper bead would get in the way of making the cove. The contours of this lower molding will hide the glue joints. When I got around to gluing-up the miters on the moldings, I discovered that I didn't need to clamp them. I just held them by hand for about a minute to make sure the aliphatic resin glue made a good bond between the two pieces of wood. Then, I simply set them aside to let them dry completely. There was plenty of "set" between the pieces to keep the joint tight.

Next, I made the upper and lower rails for the Waist. Since the construction of the doors for the Waist and the Base will be about the same, I'll hold off on making the Waist door for right now and make them both together when I make the door for the Base.

WEEK ENDING November 6 :

I started by selecting clear, clean wood for the sides of the Base carcass, just as I did for the sides of the Hood and the Waist. Got the width from the lower base molding, less the split column. Looking ahead to the panel I'll fit in the Base door, I set aside some "interesting" wood -- a piece I can resaw down to expose a beautiful book-matched grain pattern, and some sap pockets. This should add a lot of "character" to the panel.

The front of the frame for the Base carcass is mortised and tenoned together. I could have done it with dowels, but I wanted to use a more classic technique. Beneath the lower rail is what looks like a piece of Ogee molding. In reality, it's a frame that supports the whole clock, distributing its weight evenly onto the feet, underneath.

This also allowed me to make a hidden compartment by installing a false bottom in the base. Made this molded frame with a blind spline (see Figure 1) to reinforce the corners. Put it all together and glued it up, then I molded the edge.

From Hood to Base, the doors on the Clock use the same, simple lap joints at the corners. I used miters to join the thumbnail molding at the corners. The vertical line of the doors continues from the top to the bottom of the clock, so the overall length of the door rails is set for me by the width of the Hood door.

For the Waist and Base doors, the bottom rail is wider than the top rail, lending a balanced look to the door. The Base door stiles are 1/4-inch wider than the Waist door stiles. This adds a little "bulk" to the base. The width of the vertical front frame stiles will be dictated by the size of the split turnings I used for decorating the Base . . . and by the width of the door opening. That's why I needed to design these turnings before I got very far into building the Base. I want them to look something like the columns on the Hood -- not exact duplicates, though. That would make them too "busy".

When I got around to doing the doors, I did a mini-production run on them. It saved set-up time. I cut the elliptical contours of the top and bottom rails, then drum-sanded the sawn edges first. Next, I cut the thumbnail on the inside edge of the door frame. Had to use the Shaper because of the curved half-ellipse (see Figure 2).

WEEK ENDING NOVEMBER 20:

The bracket feet look pretty fancy -- and take some time -- but really aren't difficult to make. Don't make them as four separate pieces, but as a box that's cove-cut around the perimeter. After this, the box is cut apart and the Bandsaw is used to do the scroll work. The left, front and right sides of the box are made of 1-3/4-inch thick stock . . . the back of 3/4-inch stock. The two front corners are spline-mitered (see Figure 3), but once they're coved and contoured, they look like there's no joint at all.

Used a wooden template to maintain the pattern on the matching feet. The tight curves caused me to have to use relief cuts on the Bandsaw to ease them to completion. Used a rabbeting plane to help smooth the outside curves on the feet. Some Drum Sanders are small enough to fit a number of the tight curves of the bracket design, but few are long enough for the really thick stock. So, I used small files and sandpaper wrapped around small dowel rods for these.

WEEK ENDING DECEMBER 4:

I want two quarter columns to ease the front corners of the Base. These split turnings are made from a single 2-3/4-inch turning blank. Glued it up so the glue line wouldn't show once the piece was cut apart on the Bandsaw. Used woodworker's glue and allowed plenty of time for setup/drying. While it was drying, I practiced turning my previously drawn design on a piece of 4 X 4 pine.

The oversized blank leaves me enough margin to split the single turning on the Bandsaw, then remove the saw marks by using the Jointer. Used the Jointer as well to backcut the quarter-columns so that I got good contact all along the front edges.

These split turnings were the last cuts for the clock construction -- except for the back piece.

Last of the construction . . . the back. It's to be 3/4-inch veneered plywood. It'll not only support the entire weight of the clockworks, but also act as a sounding board for the chimes that will be attached to it.

Finally, I put the entire case together -- from top to bottom -- to check for final fit. And though it seems like I'm almost done with the clock, the final sanding and finishing is yet to come.

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like I'm almost done with the clock, the final sanding and finishing is yet to come.

WEEK ENDING DECEMBER 18:

Sanding the moldings is a real challenge. Have to take careful care to keep the corners sharp and clean, with well-defined lines. Started sanding with 80-grit Garnet paper, then moved on to 100-grit . . . ending up with 150-grit.

Worked in stages, sanding and finishing the Hood first, then the Waist and Base. When I got to the final sanding, I applied a coat of oil finish, then worked it in with 220-grit, silicon carbide, wet/dry sandpaper. As I rubbed out the finish, the oil and sawdust mixed to make a paste that filled the wood grain nicely.

Finished the inside of the Clock as well as the outside. Used the same number of coats of finish to help prevent warpage that could result from finishing only one side. I'll finish up with a high quality paste wax for a really hard finish. Rubbed the wax in with #0000 steel wool, then buffed it out with a soft cloth. Three coats did the trick.

After completing the clock, I stood and looked at it for a long time. It's become a lot like a close "friend" who speaks to me every quarter-hour . . . and starts a conversation every hour.

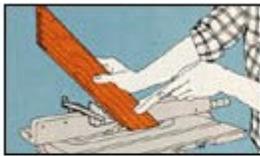


Fig 1. Cutting blind spline in lower base molding. Note use of the push stick and 45-degree angle stop block.

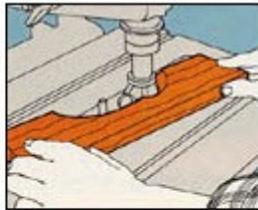


Fig 2. Forming the thumbnail molding on a door rail. Elliptical shape requires use of the Shaper with starter pin and rub collars for this operation.

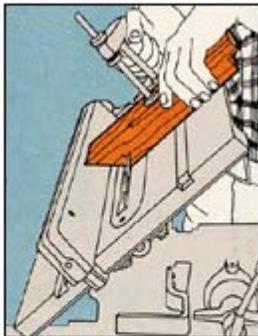
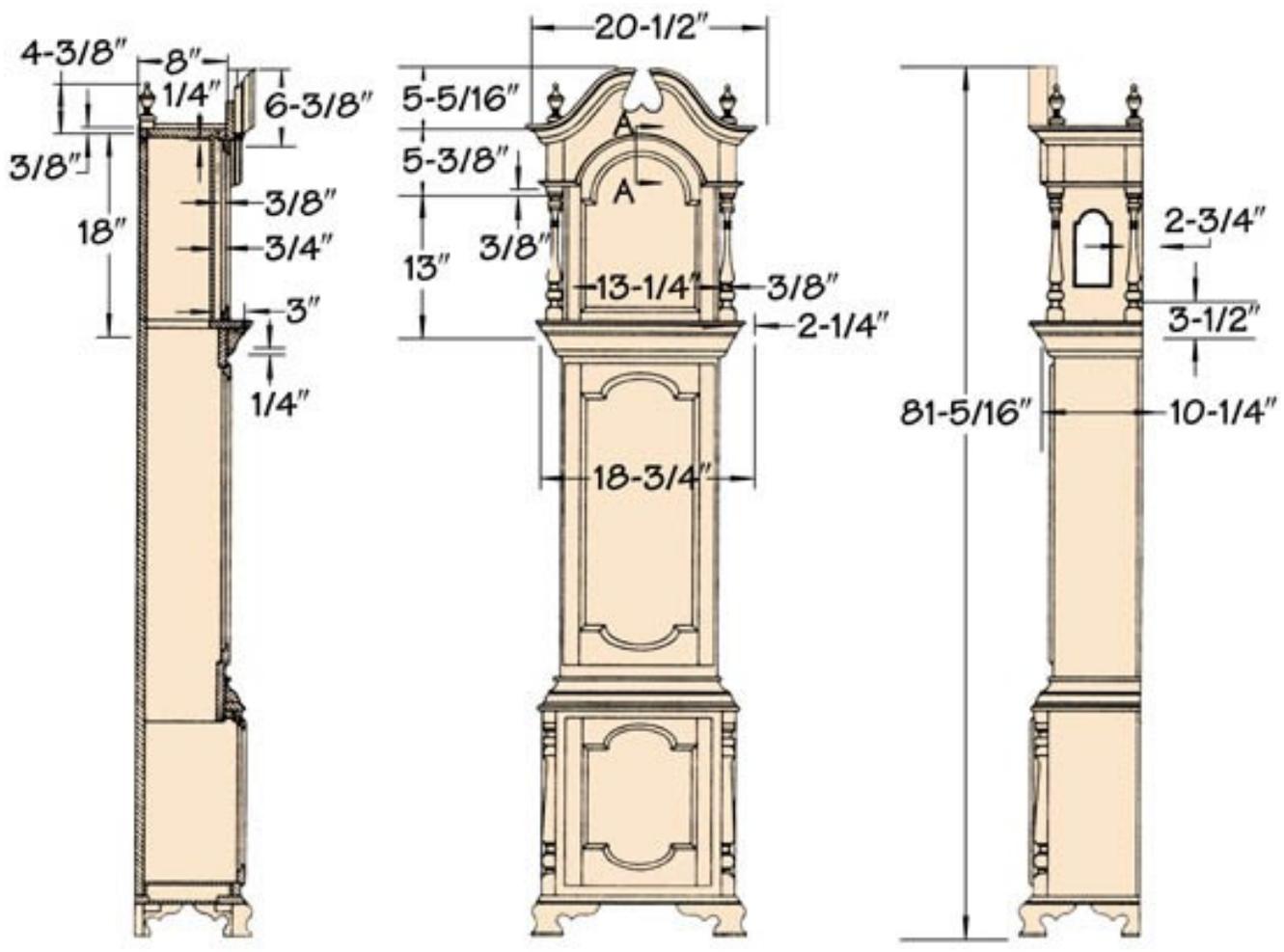
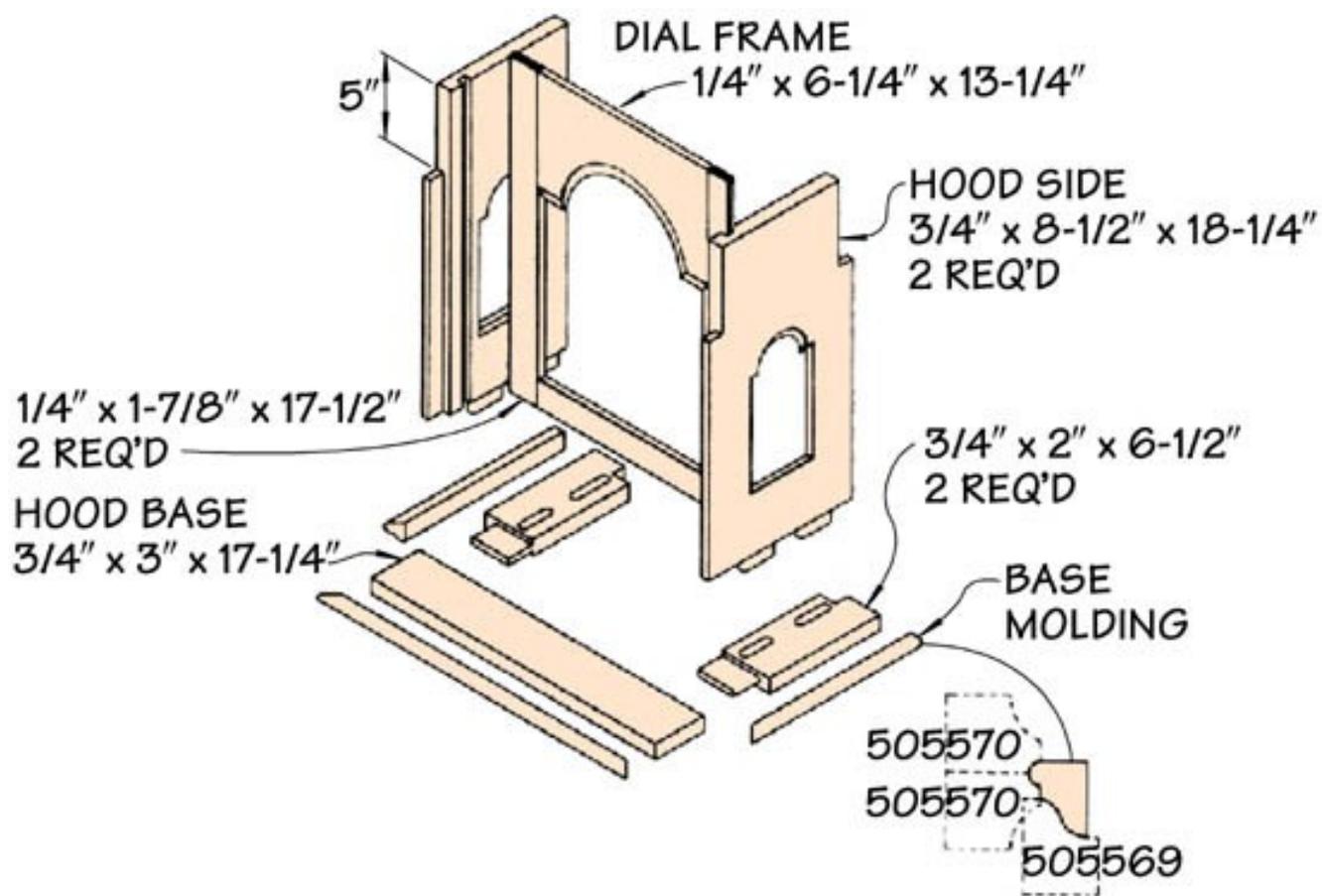
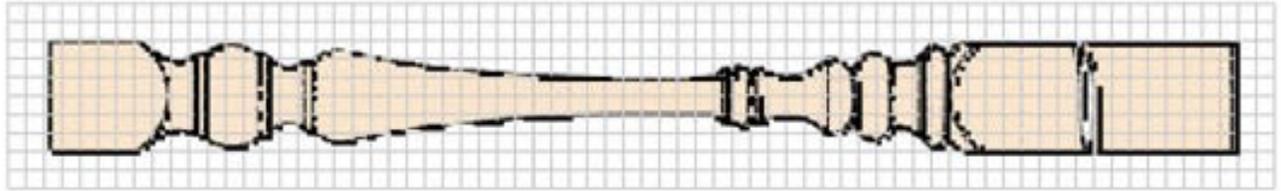
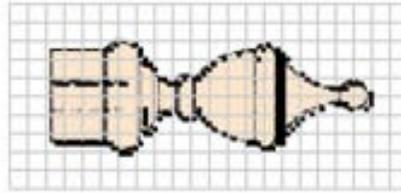


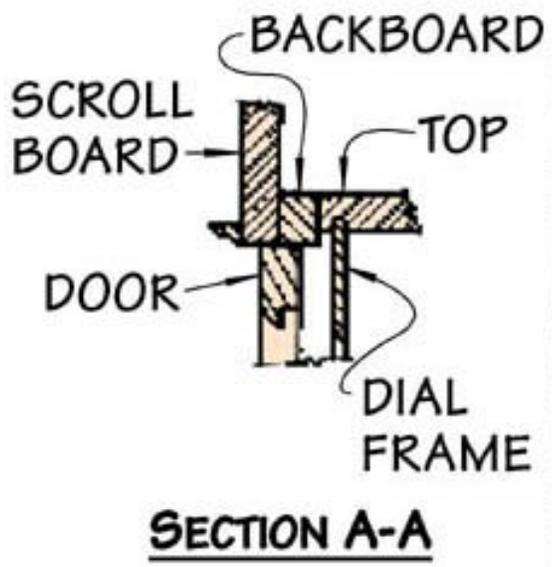
Fig 3. Table saw used to cut splined miters on the inside of the front bracket feet.



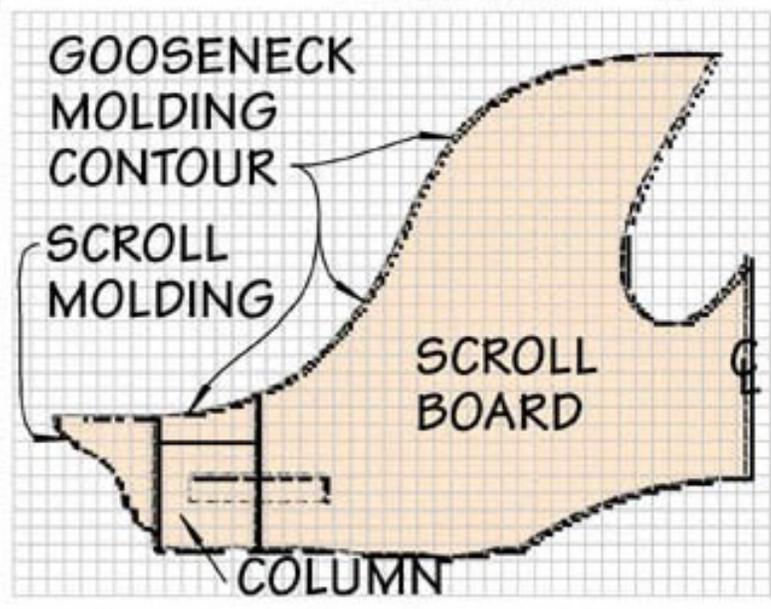


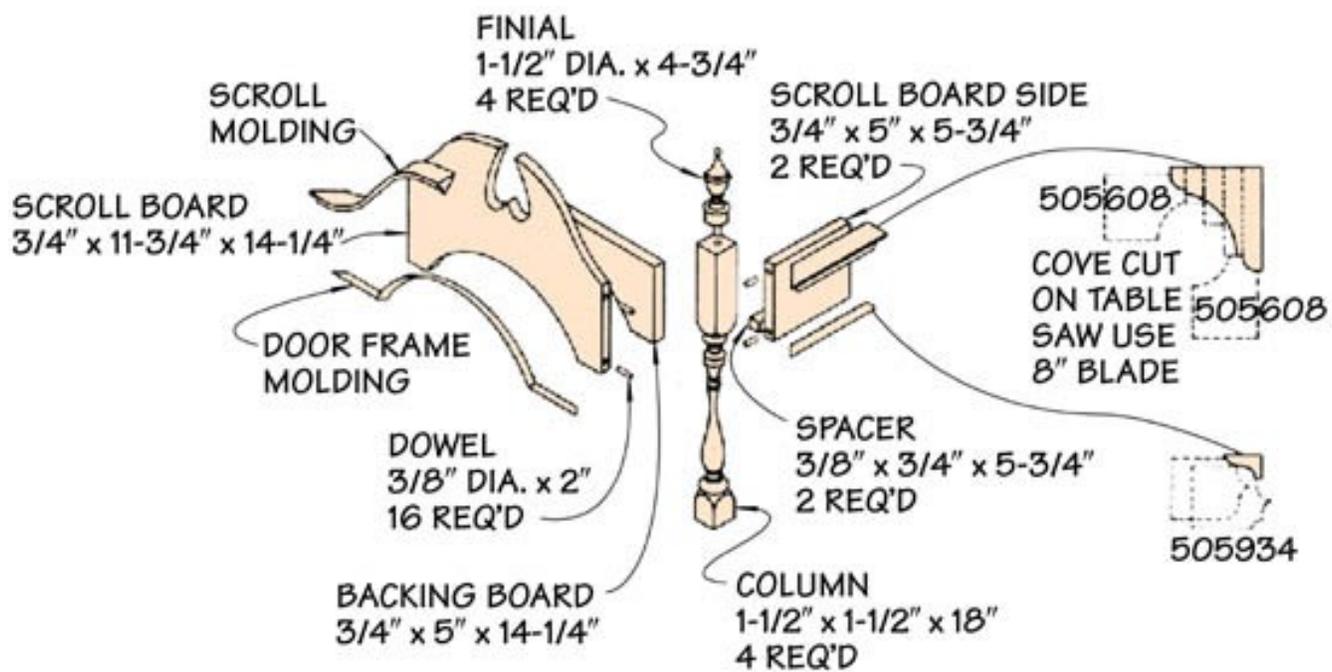
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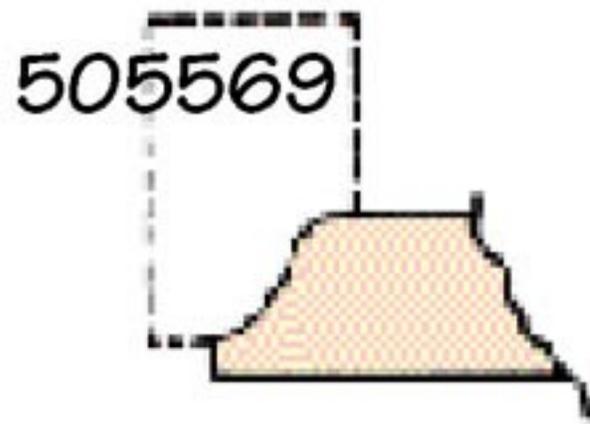




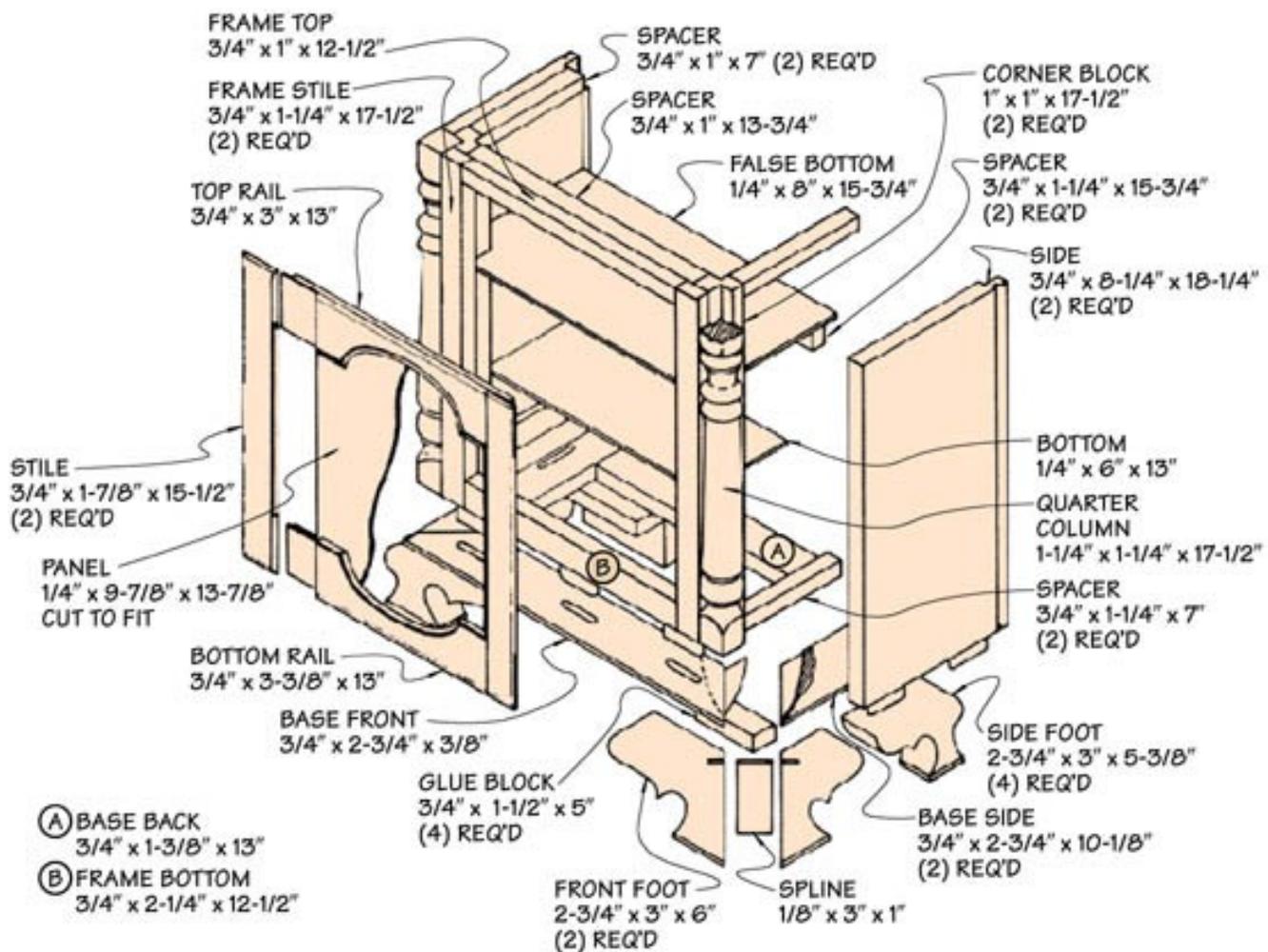
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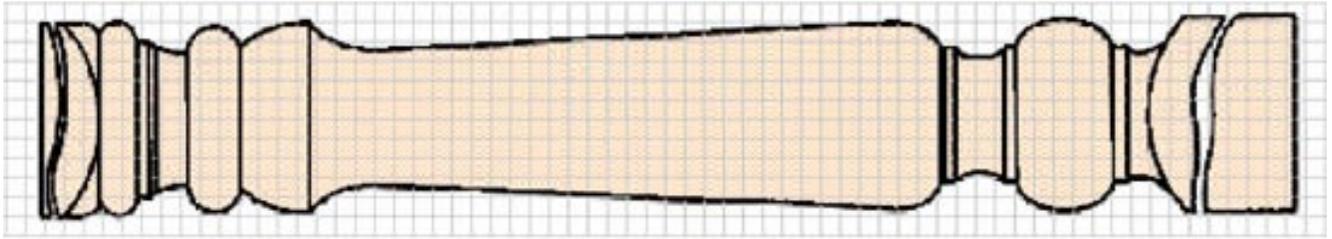




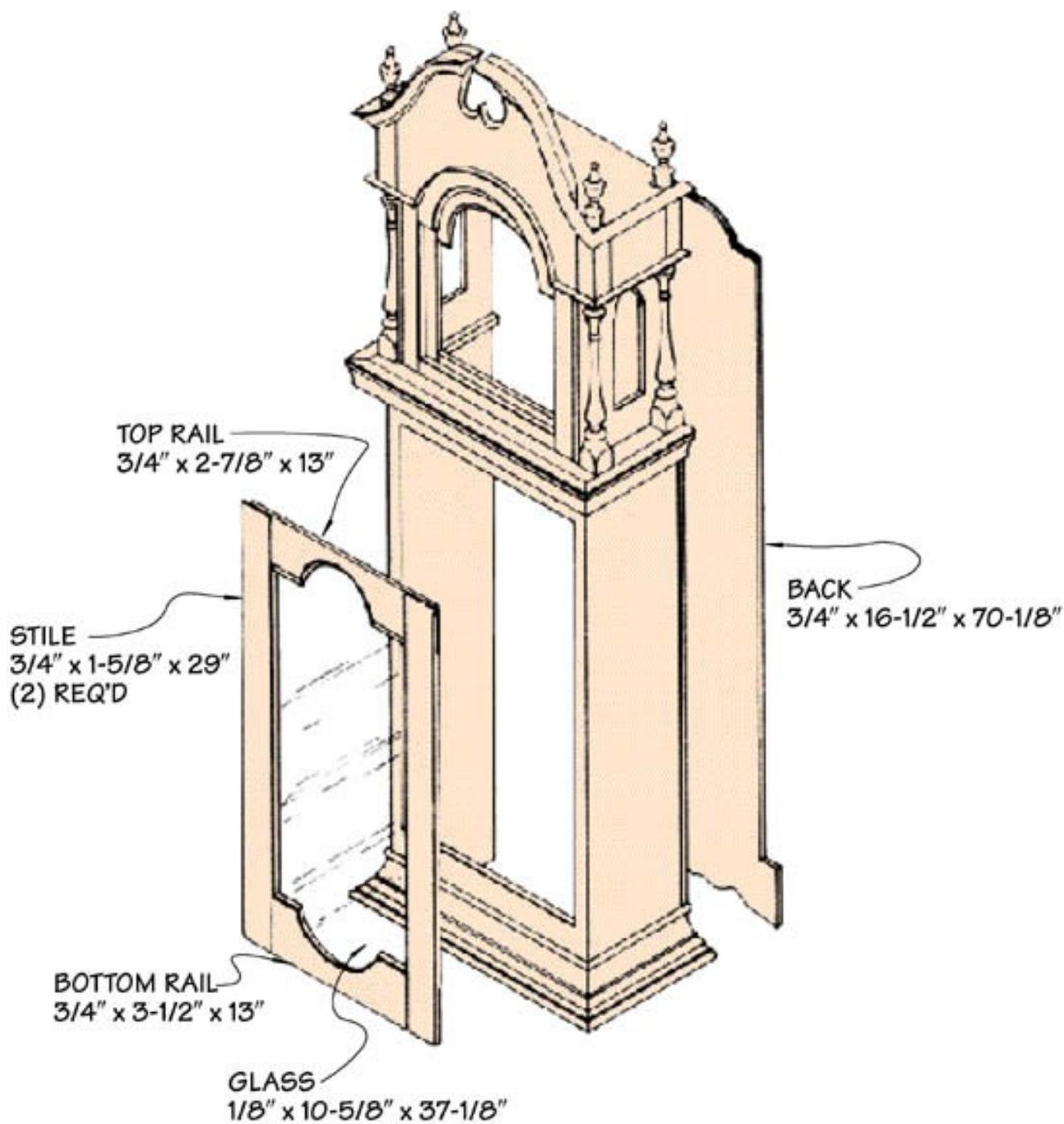


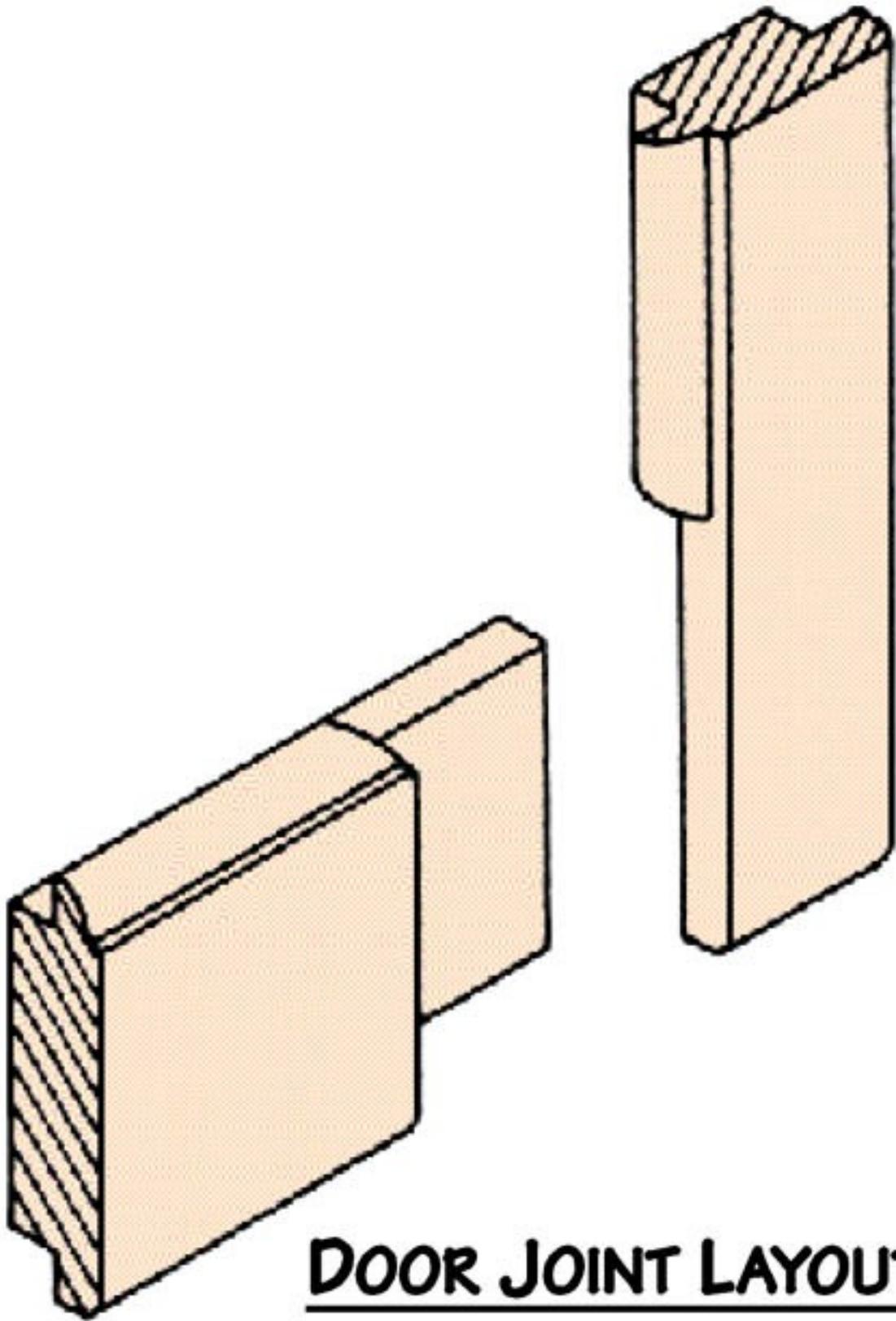
BASE MOLDING



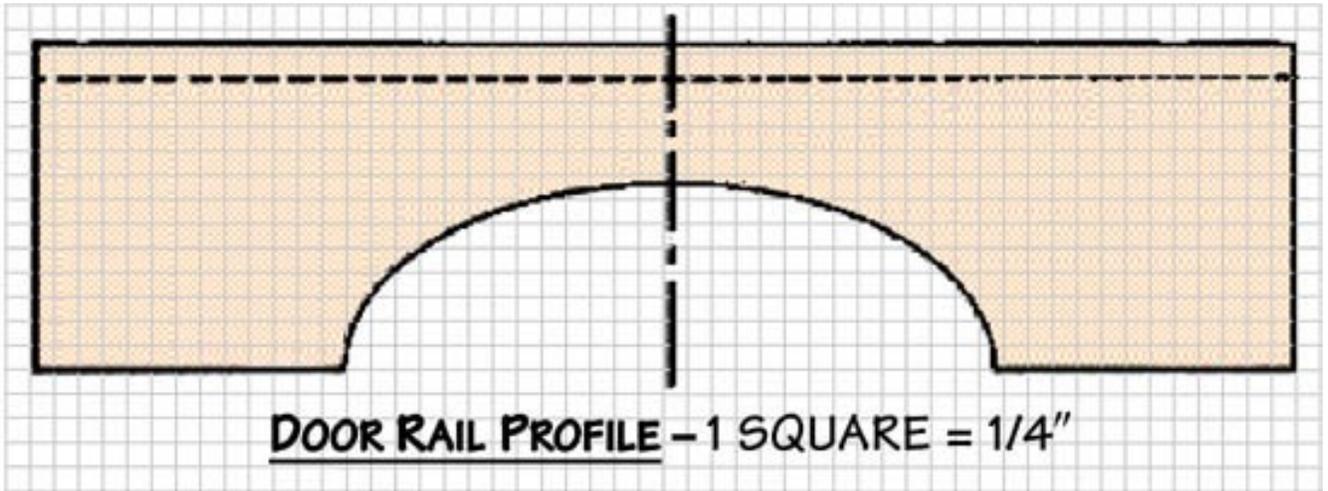


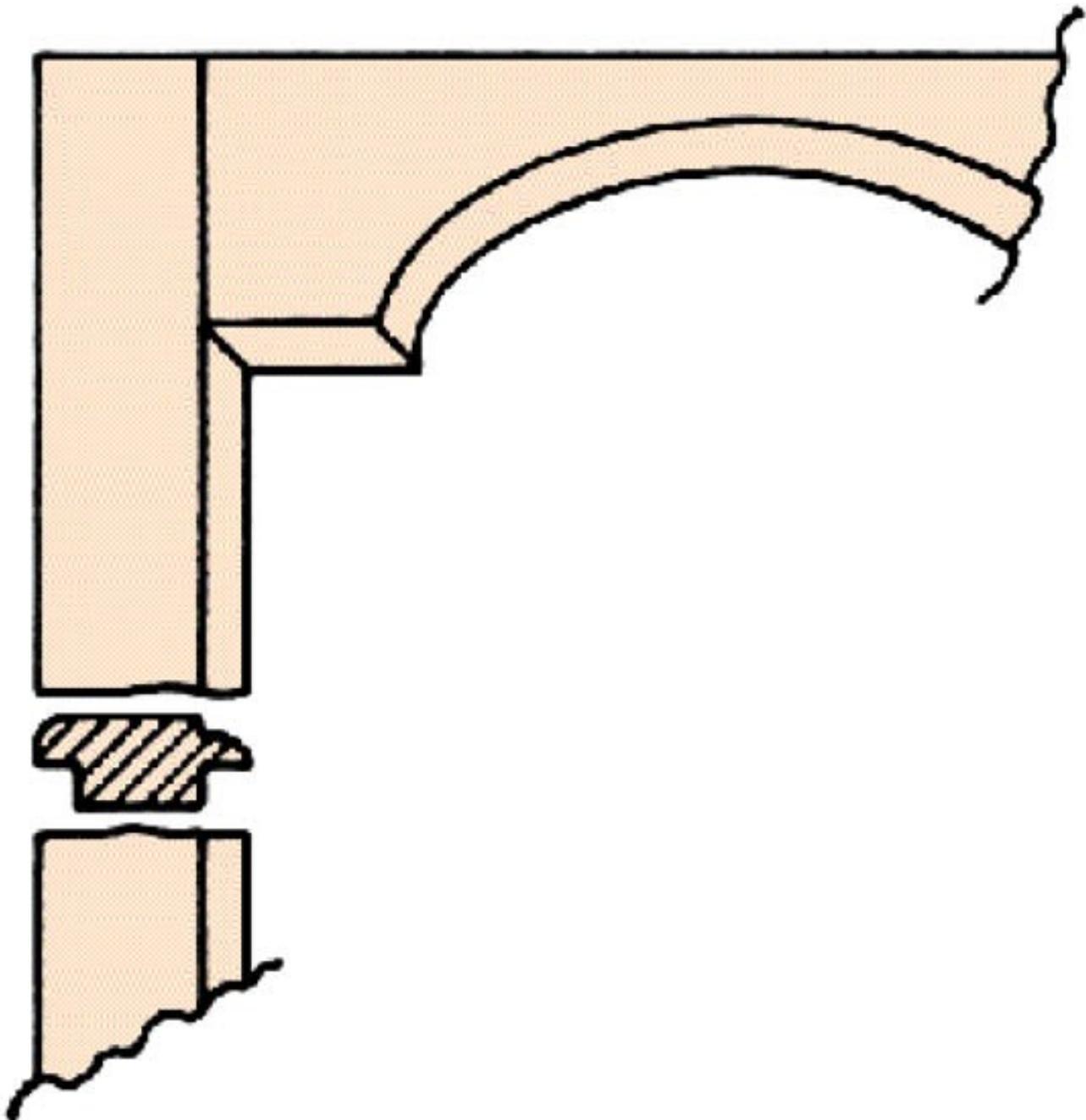
QUARTER COLUMN PROFILE - 1 SQUARE = 1/4"



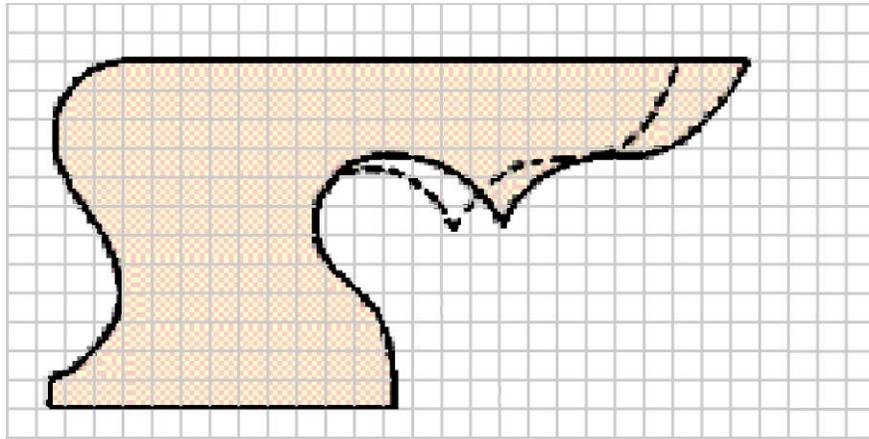


DOOR JOINT LAYOUT





DOOR STILE PROFILE



FOOT PROFILE - 1 SQUARE = 1/4"

