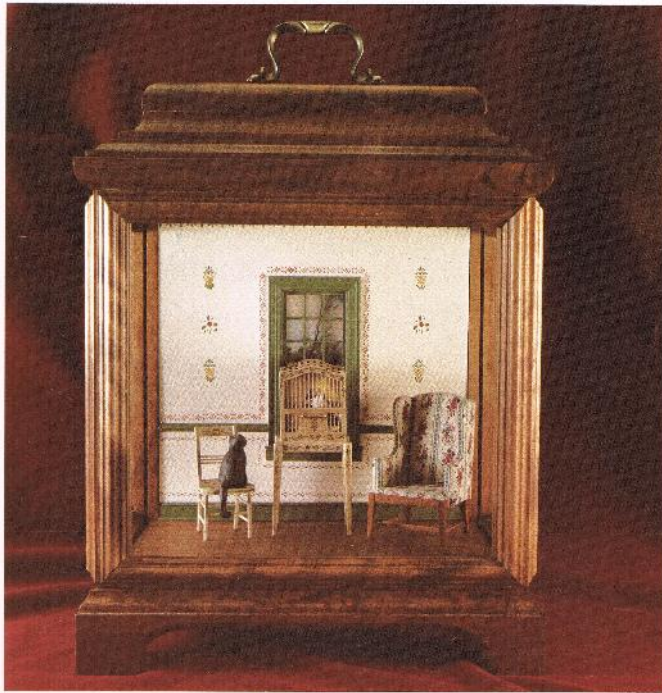


The Scale Cabinetmaker

THE MODELER'S REFERENCE JOURNAL

Sept./Oct. 1984
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◻ ANTIQUE BIRD CAGE ◻ PARLOR STEREOSCOPE ◻ HAND CUT FURNITURE JOINTS ◻ MITER JIG
FOR FRAME CUTTING ◻ PROPORTIONAL DIVIDER ◻ SHAKER COMMODO CHAIR ◻ WOOD TUB ◻

"Basic Furniture Joinery With Hand Tools" (Part 1)

A Free Sample Article From the Pages of *The Scale Cabinetmaker* (Volume 8:5)

Sometimes it is easier to show rather than try to explain *The Scale Cabinetmaker* (TSC). In an age when advertising rules and content is a bit short, TSC rarely had more than a four or five pages of ads shoved at the end of the issue. Each issue averaged 52 pages of content, four pages of advertising at the back of the journal, and the cover. Over the course of 20 years, TSC published a wide range of materials, from beginner's articles and projects designed to teach new modelers the basic techniques to advanced projects that were designed for the master craftsmen and everything inbetween.

There is no "one" beginner's issue. Each issue was designed to help miniaturists advance in their hobby, regardless of where they started. "Basic Furniture Joinery with Hand Tools" is part one of a three part series published in TSC 8:5, TSC 8:6, and TSC 9:1 and is representative of the "Beginner's Workbench" series of articles published over 19 of the 20 years of TSC. While we had beginner's articles in the first volume of TSC, we did not start the Beginner's Workbench series until the second year. For a full list of Beginner's Workbench articles, download a free copy of the TSC Cumulative Index.

Each issue includes a minimum of 10 projects or articles, covering a wide range of subjects. In TSC 8:5, for example, you can learn basic furniture joinery with hand tools (Jim Dorsett) and learn to make and use proportional dividers to create scale drawings from a photograph (Jim Jedlicka); build John Grey's shop-built belt grinder-sander and Don Dube's sliding miger jig for thde Dremel table saw; create an antique bird cate and stand (Donna Hendricks), a Turn-of-the-Century parlor sterioscope (Ruth Armstrong), a Colonial wood wash tub and water bucket (Marie Heuer), and a Shaker Commode Chair (Bill Postman).

The Scale Cabinetmaker is available in two formats: by the issue as pdf downloads (available from www.dpllconline.com) and by the volume (4 issues) as cd-roms (also in pdf format, available from www.dorsettpublications.com).

The Beginner's Workbench

Basic Furniture Joinery With Hand Tools (Part 1)

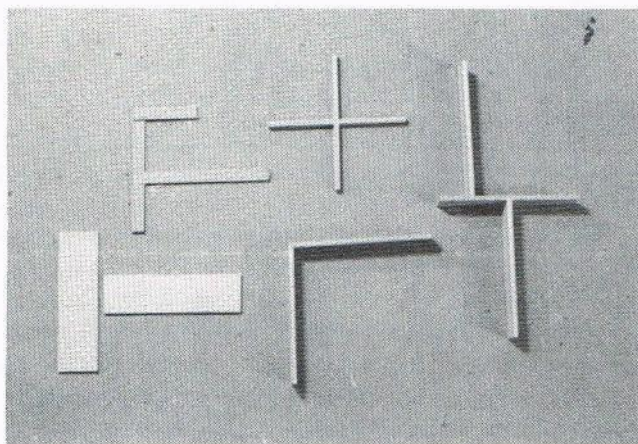


FIGURE 1. The obvious features that meet the eye when you look at a piece of furniture, whether miniature or full scale, are not its most important characteristic. That characteristic is hidden from the eye i.e., the system of joints that holds the piece together. The marks of a good joint are its invisible character and its strength. Regardless of the color and grain of the wood, the surface embellishment and carving or the care in upholstery and finish, a poorly cut joint will impose its own measure of the completed piece. So miniature cabinetwork is basically the practice of joinery.

All of the joints appearing in this and the following *Workbench* are commonly used in miniature furniture. In this issue they are (from lower left, clockwise): butt (edge), center and end half lap, cross lap, dado and blind dado and rabbeted.



FIGURE 2. All of these joints can be cut with hand tools. Even though power tools will often speed up the work, a hand-cut joint can produce a comparable, excellent

result. The basic tools required are laid out on the workbench. They begin with accurate measuring tools: steel scale rules (center) with or without cork backing and (lower left) a machinist's depth gauge. The depth gauge is useful for several purposes. It is used to transfer measurements from the scale to the wood, to mark the position and dimensions of the joint and to check for squareness.

Other tools include (upper left) a pin vise and miniature drill assortment (from 1/16" down), a fine-tooth razor saw and miter box (upper right), hobby knives and chisels (lower right) and an assortment of needle files (lower center) and sandpaper. Two X-Acto blades are especially useful: the common #11 and the less common #17 flat chisel blade. An assortment of small (1/16" wide and smaller) flat chisels are also need. These are available from such miniature tool suppliers as Micromark or (as is the case with the two chisels shown to the left of the knives) from your family dentist. Old and broken dental chisels, reground and sharpened, are perfect tools for miniature joinery.

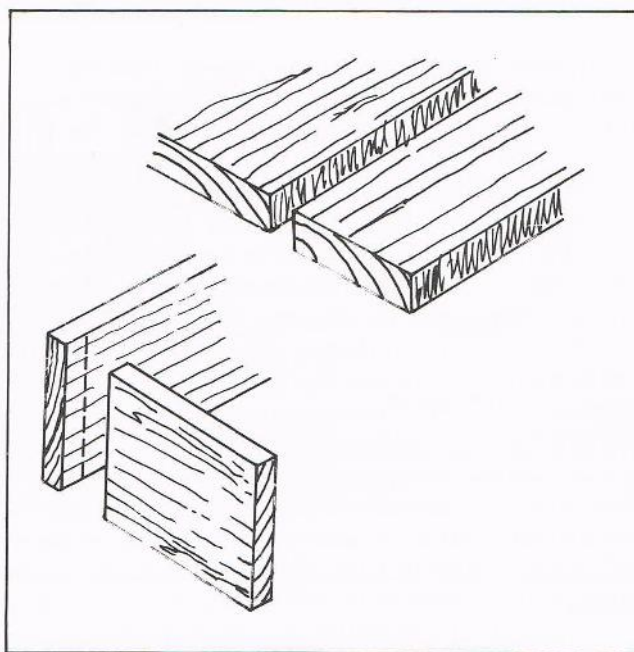


FIGURE 3. The EDGE and END BUTT JOINTS are the most common joints in miniatures and most often used by beginners. The butt joins one flat surface (usually cut at 90° to the mating surface, but not necessarily so) to another. It is the easiest and weakest of the furniture

joints, used to join the edges or ends of flat boards for table tops, case sides, etc. It requires that the mating surfaces be perfectly square and true.

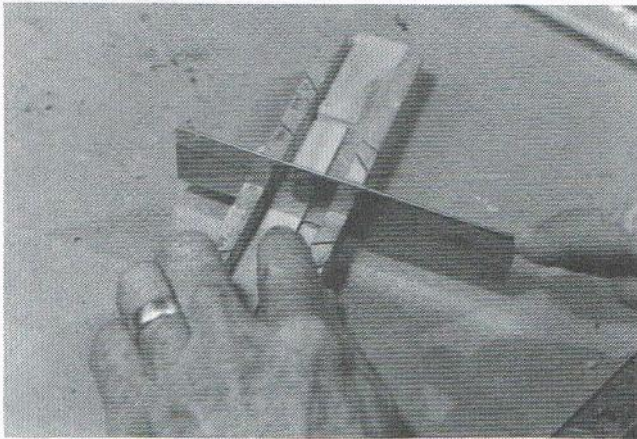


FIGURE 4. The length of board is measured and marked with the depth gauge. Then it can be cut off in the miter box. Carefully position the board so that the edge of the saw blade lines up exactly with the outside edge of your mark. In cases where several pieces are to be cut to the same length a stop block is used in the miter box. This is a hardwood block cut square on the ends and just wide enough to provide a tight, sliding fit between the fences of the miter box (top, center). Once set at the required distance from the 90° position in the box (with a marked piece of wood and the saw in place) additional pieces of identical length can be easily cut. But always blow the sawdust out of the box between cuts. In miniature the smallest amount of sawdust, scooped up by the end of the board as you slide it into place against the stop block, can throw your measurements off.

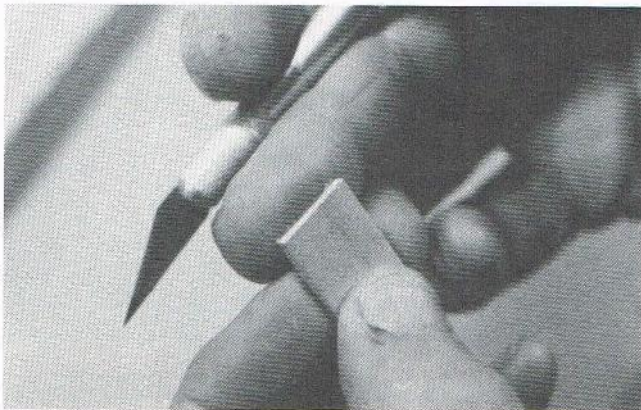


FIGURE 5. The miter saw cut will tend to leave a ragged fringe of wood fibers at the ends and bottom of the cut surface. This is especially true of basswood and other softer hardwoods. This should be cut off rather than broken off if you want to avoid a splintered edge along your joint line. Straighten out the fibers by brushing them with a finger tip. Then lay the end of the piece on a smooth hardwood cutting block and part off the fibers with the tip of a hobby knife.

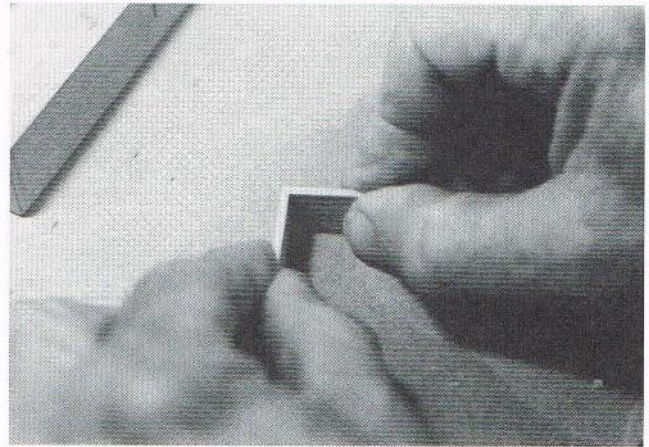


FIGURE 6. Always check the surfaces of a butt joint for squareness with a depth gauge or try square. The joint surface must be square to the edge and top of the board if the joint is to be clean, strong and free of gaps.

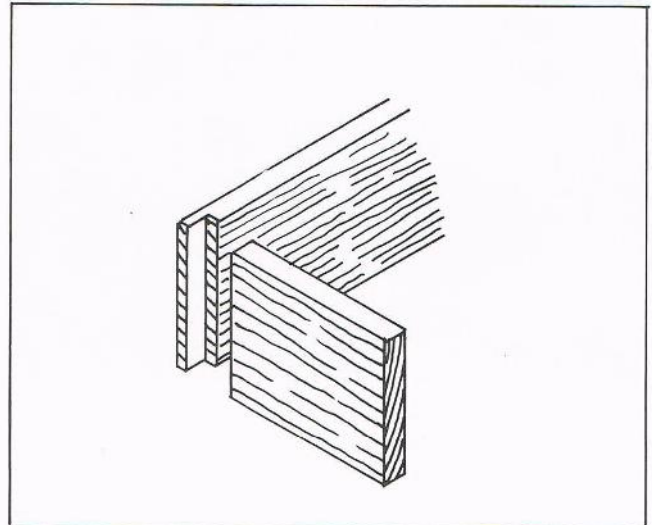


FIGURE 7. The weakness of a butt joint results from the fact that only two surfaces (one on each board) are being joined. To strengthen any joint you must increase the number of joining surfaces by altering the faces of the edges to be glued. The easiest of these is the RABBET. This is a corner joint that is often used to join the back of a case to the sides or drawer sides to a drawer front. One of the joined pieces is cut as for a butt joint. The other surface is notched along its length, always to the thickness of the other board and usually to a depth of half the thickness of the rabbeted board. (If you wish to hide all but a small amount of the end grain of both boards, cut the rabbet deeper, leaving only a sliver of wood at the bottom of the joint.) The resulting joint provides four joining surfaces, rather than the two in the butt joint. The squareness of the butting board and the width and squareness of the rabbet are critical to the appearance of the finished joint.

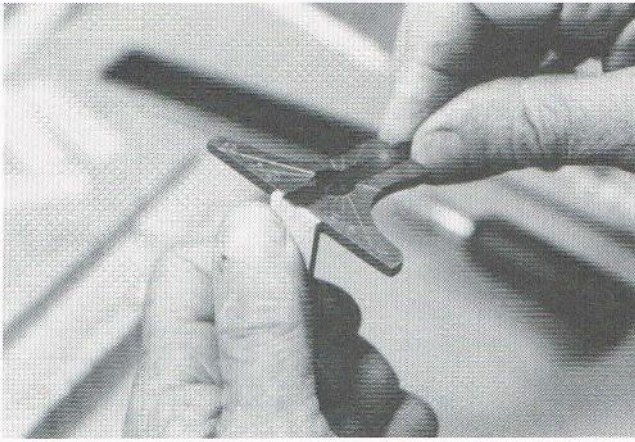


FIGURE 8. First, set the depth gauge to the exact thickness of the butting board. (Don't assume that a board is $1/16$ " thick for example. Wood sizes do vary and every board should be measured.) This measurement establishes the *width* of the rabbet to be cut.

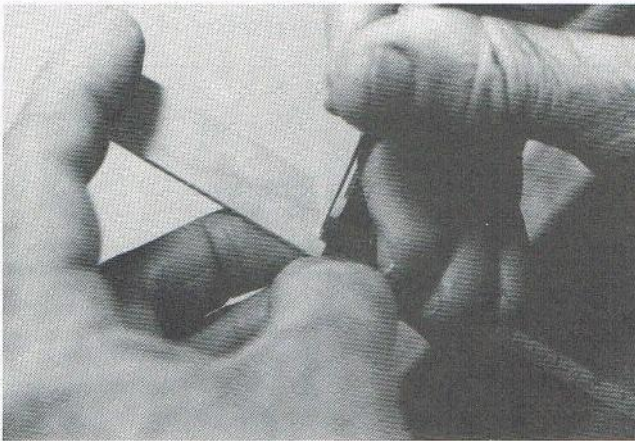


FIGURE 9. Cut the end of the board to be rabbeted in the miter box and check it for squareness. Then, transfer the width measurement to the board. Place the cross-piece or fence of the gauge against the edge of the board with the rule extending over the surface of the board. Using a knife tip, make two marks on the surface, near the two sides. Then use a square to mark the joint line across the face of the piece. If the end of the board is square this line will pass through both marks.

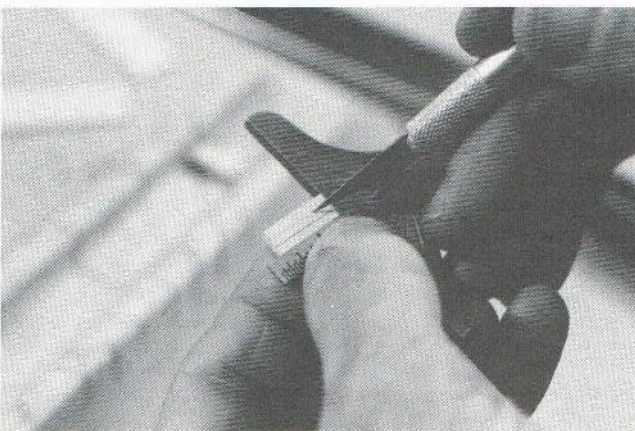


FIGURE 10. *Always* use the tip of a knife to mark the joint lines in the wood. Two lines have been marked on the ends of this board. The line marked by the knife tip is clean, narrow and sharp. The second line, drawn with a pencil, is more visible but is undesirably wide. Even the sharpest pencil tip will produce a line that is a scale $1/4$ " or more in width. And that is too great a variation for sharp joinery. In addition the knife tip will break the surface wood fibers, resulting in a sharper joint line.

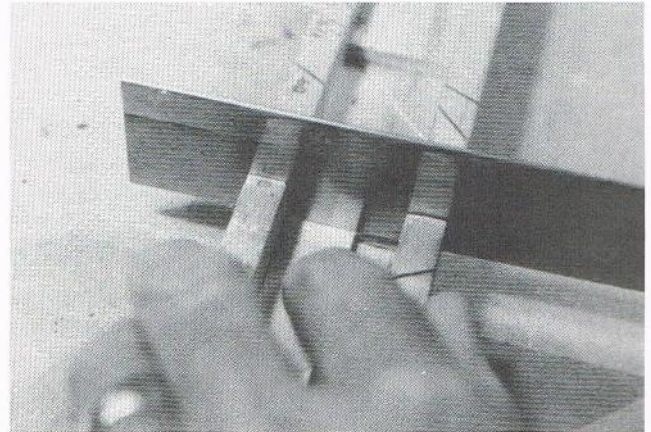


FIGURE 11. Position the piece in the miter box so that the near edge of the saw blade lays on the *side* of the line nearest the end of the board. (In other words don't center the blade over the line, but cut "inside the line".) Then, keeping the blade parallel to the surface of the board, make the cut to the required depth with light pressure and even strokes. Don't rock the blade back and forth.

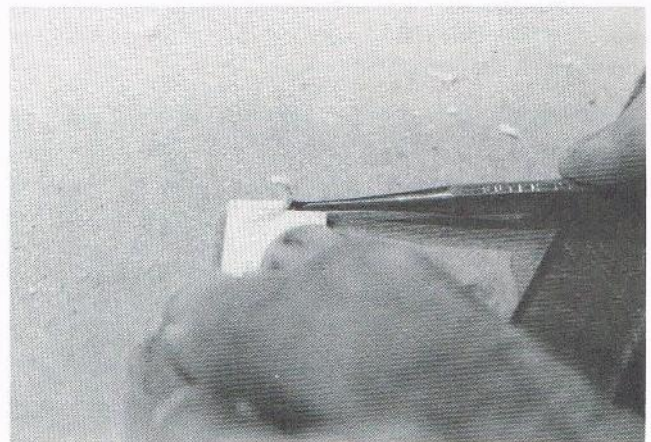


FIGURE 12. Lay the board on a flat surface near the edge of the table (to allow for hand movement). When cutting any joint, always secure the workpiece on a firm surface or in a clamp. Hand-holding the workpiece and the tool may be OK if you are an orchestral conductor waving a baton, but it produces uneven results in cabinetry and keeps open the exciting possibility that the cut may be made in your finger rather than the wood.

The rabbet may be cut with either the tip of a #11 blade or the edge of a #17 chisel blade. However, a dental chisel that has been ground to a width of $1/16$ " ($3/4$ " in one

twelfth scale) produces a smooth, straight cut as the wood curls up from the joint.

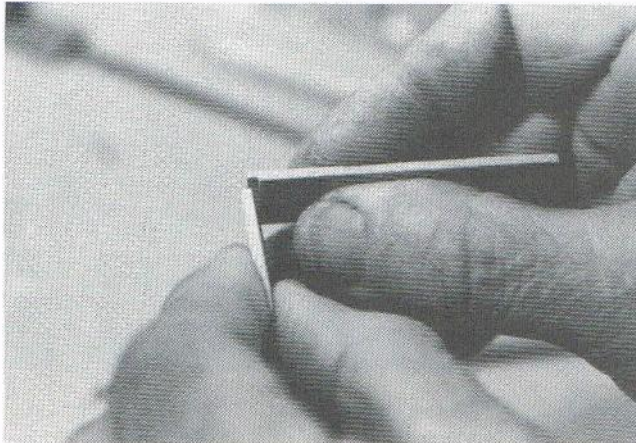


FIGURE 13. Test the joint, fitting the two pieces together. If necessary, smooth up the surfaces of the rabbet with a square needle file until a correct fit results. (Again, secure the workpiece! And work slowly, taking off a little bit of wood at a time to avoid overcutting the joint.)

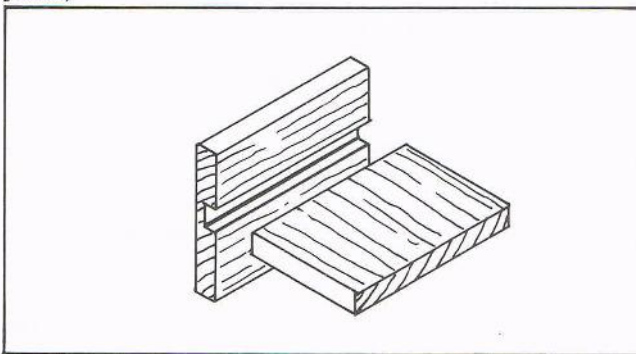


FIGURE 14. The DADO JOINT is used inside a carcase, often joining shelves into the sides of the case. It is also commonly used to join a drawer bottom to the sides and front of the drawer. In a "fully housed" dado (as shown) unless the wood is perfectly flat and the joint carefully cut there will be visible gaps along the joint line. As with the rabbet only one board is altered but it increases the number of joining surfaces to six.

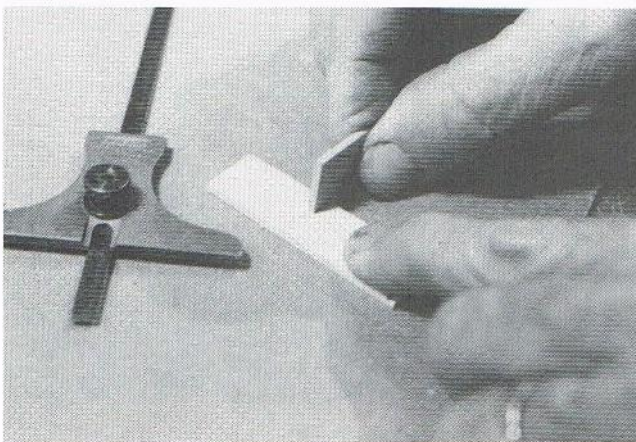


FIGURE 15. First mark the two joint lines across the surface of the board, using the depth gauge to measure in of the two joining boards. Each is as wide as the joining joint can be made by laying the joining board between the lines.

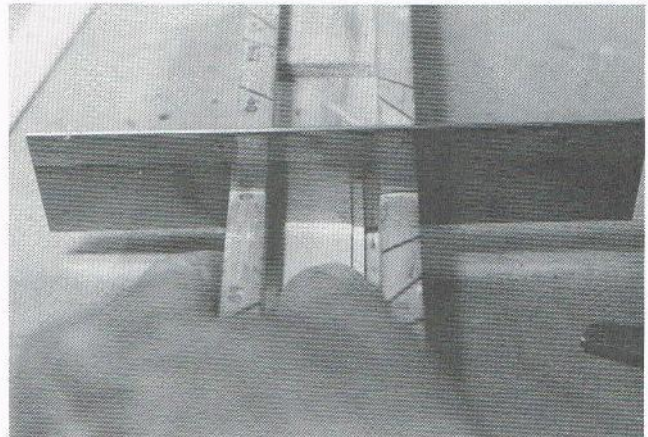


FIGURE 16. The parallel cuts are made in the miter saw in the same manner as in the rabbet. Make both cuts "inside" the lines rather than over them. A close check of the miter box will reveal that something new has been added since we cut the rabbet (on which we more or less guessed at the depth of the cut); we've laid two hardwood gauge strips in the miter box, one in front of the workpiece and one behind it. The workpiece is $1/16"$ thick and we wish to cut the dado to half the thickness of the board. Therefore, the gauge strips are $1/32"$ thick. When the saw has entered the workpiece to a depth where the teeth just scuff the top of the gauges at front and back you know that the depth is exactly right.

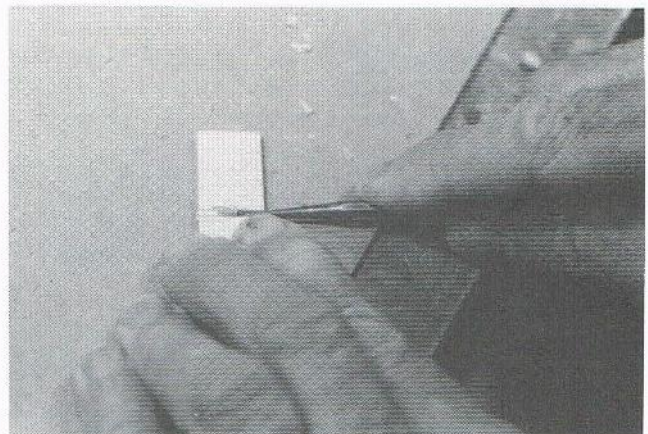


FIGURE 17. Secure the work on the bench and chisel out the waste wood between the cuts. If you are using a knife blade, slip the tip into the two ends of the joint to assure a clean joint line at the ends. Then chip out the wood between. Finally, clean up and smooth the joint with a square needle file.

A flat dental chisel produces a more even result. Work from both ends toward the middle of the joint. This

will result in a cleaner cut at the ends of the joint where appearance may be more critical.

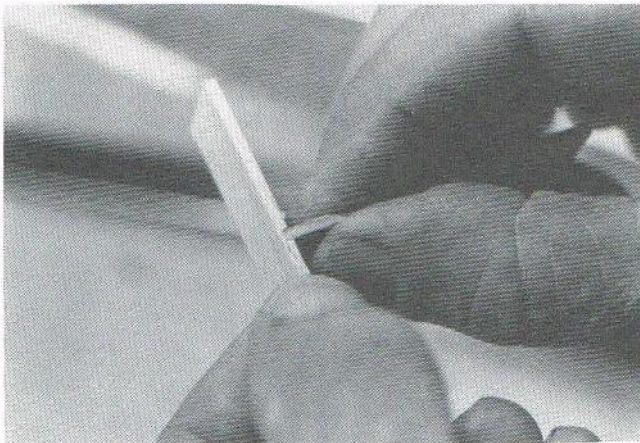


FIGURE 18. The resulting joint is strong and, if the width of the joint was correctly cut, will show no unsightly gaps. However, when the end of the joint will not be covered or "faced" by another board (as on a bookcase, for example) a series of full-housed dados will still produce more visible joint lines than you may wish. In that case an alternative dado can be used.

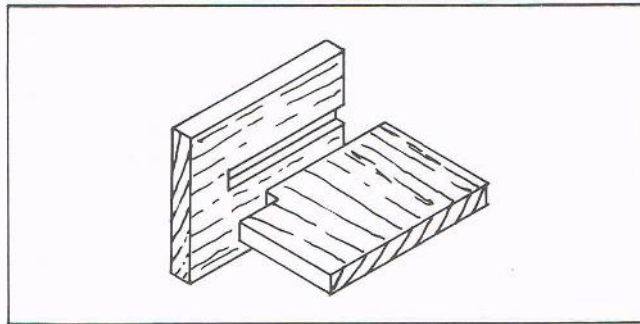


FIGURE 19. The BLIND DADO is so called because it is not carried to the entire width of the board, thus leaving a single joint line on the edge of the material. This is often used in open shelving where the front joints will show.

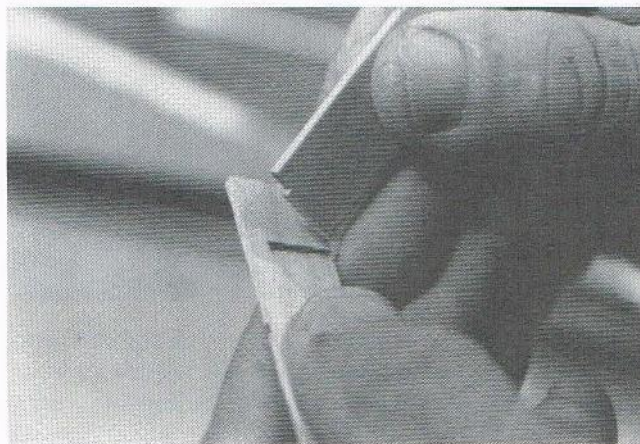


FIGURE 20. Instead of cutting the joint with a razor saw you will have to cut the lines to the proper depth with a knife tip. The front edge of the joining board is notched to the depth of the dado.

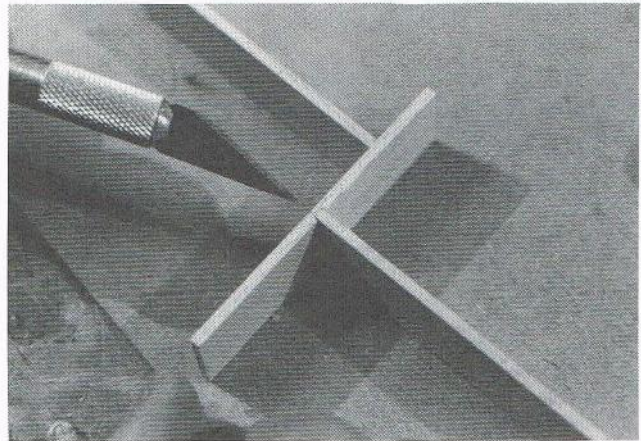


FIGURE 21. On the edge surface the blind dado has the clean appearance of a simple butt joint and avoids the multiple lines of the fully-housed joint while providing equal strength.

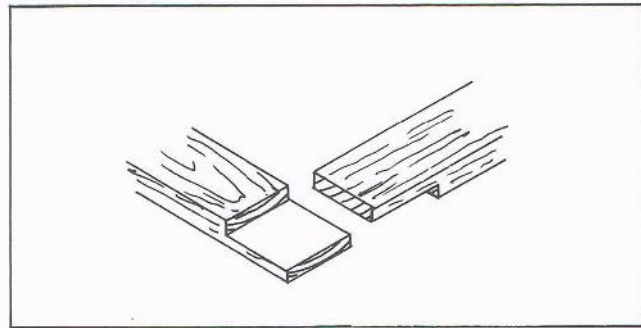


FIGURE 22. A common problem in cabinetmaking is the construction of strong, square frames for mirrors, cabinet doors and in rail and stile (framed panel) carcass construction. Of course in miniature there is not the strain on such assemblies as in full scale and butt joints could be used all around. But such frames are inherently weak and prone to be out of square. One alternative is the END LAP joint. Where the joining boards are of identical dimensions, identical cuts are made in the ends of the two joining boards. Each is as wide as the joining board and half the depth. If one board is thicker than the other, the depth of the joint is equal to half the depth of the thinner piece.

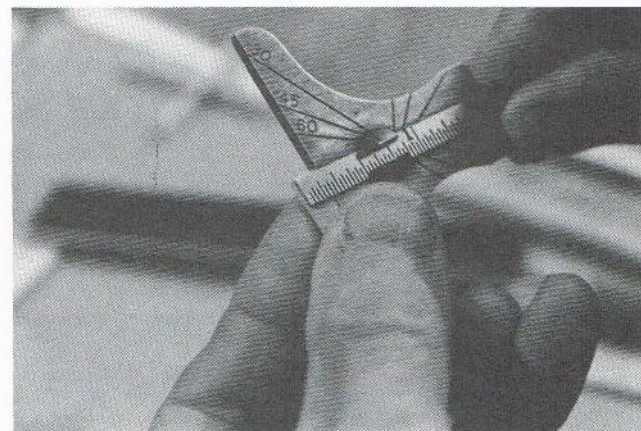


FIGURE 23. First set the depth gauge to the width of the

material. In use a screw and nut clamps the sliding rule of the gauge to the fence. With the workpiece held tightly against the fence, the nut is loosened and the rule slid out until the end is flush with the edge of the board. Then the nut is tightened.

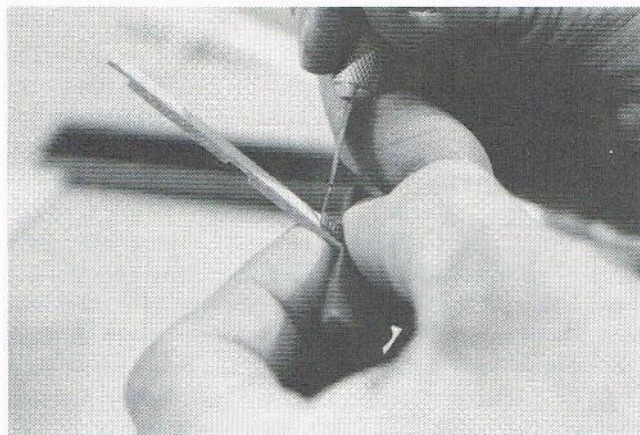


FIGURE 24. Transfer the measurement to both workpieces, laying the end of the board against the fence and marking the joint line across the board with a knife tip.

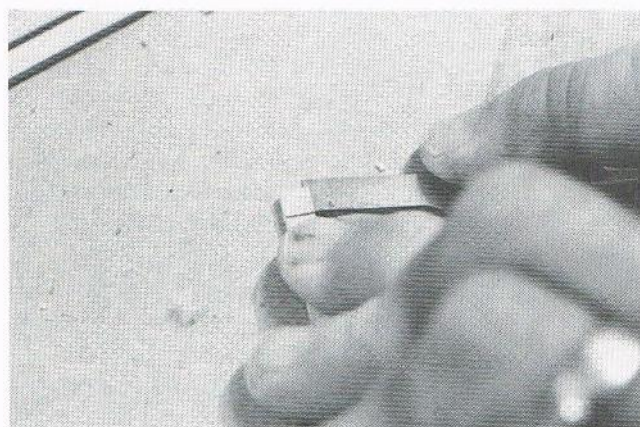


FIGURE 25. Cut both pieces to the desired depth, using a knife tip or a miter saw. Then, working carefully and taking thin slices from the joint, cut the material away with a knife blade or chisel. Here a #17 X-Acto chisel blade is being used. Smooth up the joints with square and flat needle files, testing the pieces frequently for a correct, tight fit.

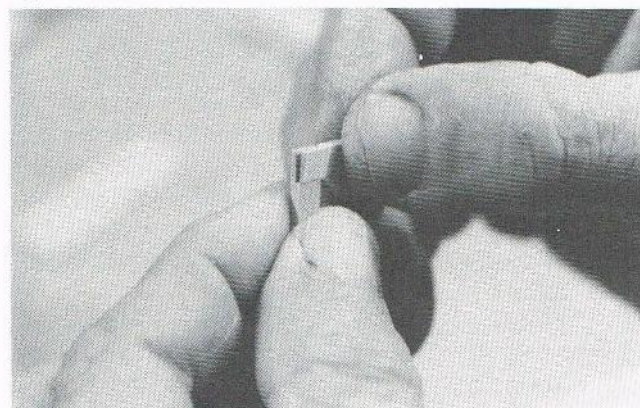


FIGURE 26. When well done, the front and back surfaces of the boards will be flush, the joint lines clean and the corner square.

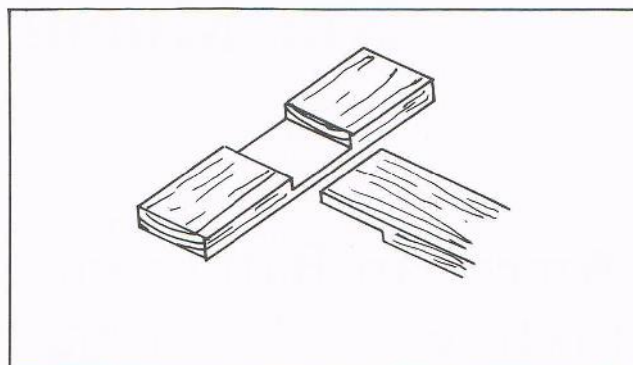


FIGURE 27. The CENTER LAP JOINT (also called a "lapped dado") is found in joining fascia boards on the front of case pieces and in table construction (where the top of a gate leg nests into the table rail).

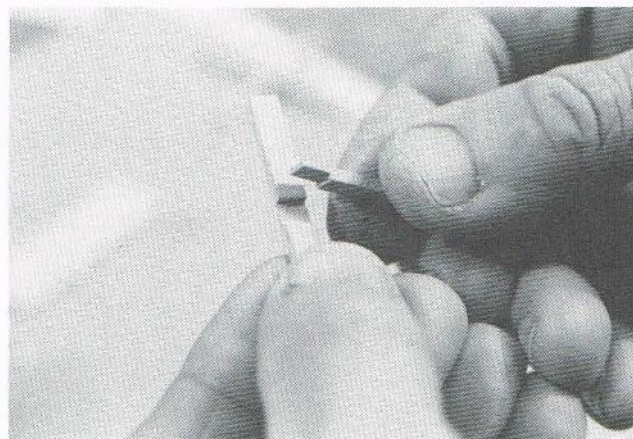


FIGURE 28. The center lap is identical to the end lap in every respect, except that one of the two joining surfaces is cut in the center (rather than the end) of the board.

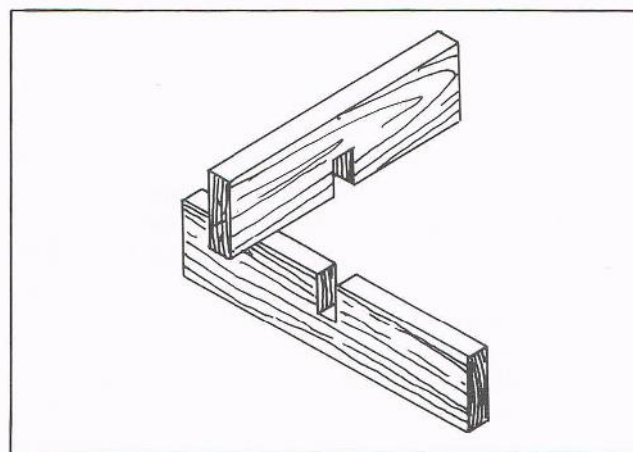


FIGURE 29. A variation of the lap joint is the CROSS LAP, used to provide a strong, neat cross joint on a flat plane. This is most often found on cross-based tables and

(Continued on p. 54)

WORKBENCH (Cont. from p. 21)

stands and therefore should be in the repertoire of every miniatures craftsperson.

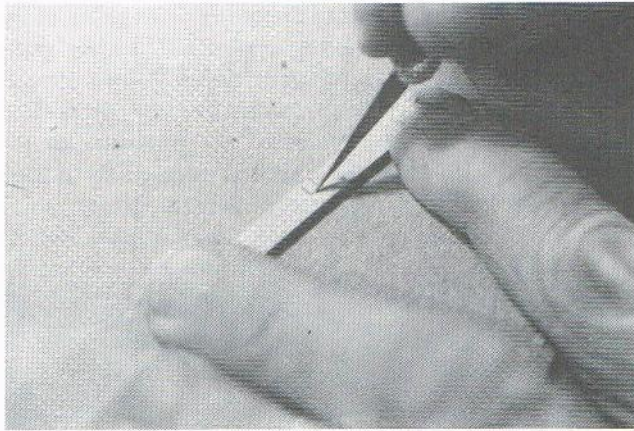


FIGURE 30. Mark the joint lines (width and depth) on the face and edge of both workpieces. The cuts are identical on both pieces. The width of the joint is the thickness of the material and the depth of the joint is half the width of the material. (For a tight joint make certain that both pieces of material are of identical dimensions!) Place each piece in the miter box and make parallel cuts within the lines to the depth of the joint. Then chip out the waste material with a knife tip or chisel.

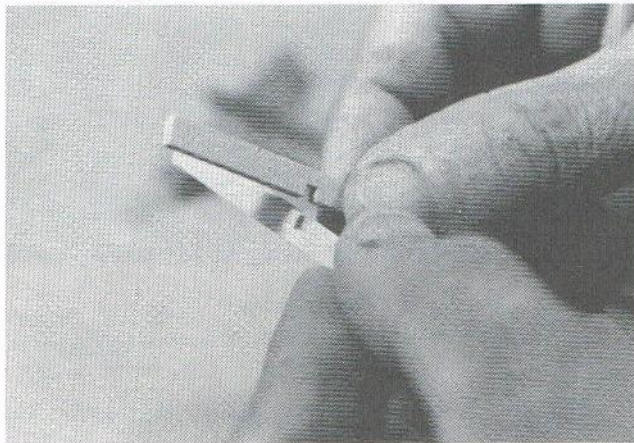


FIGURE 31. Because the depth of your two cuts may vary a bit and the grain of the wood may not run true,



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don't try to take out all the material in one piece. Rather, chip it out in several pieces, leaving a bit of material above the marked joint line with the second cut. Then clamp the piece in a vise and file the bottom of the joint down to the line with a square or tapered flat needle file. Test fit the joint several times in the process to assure a smooth, tight joint.

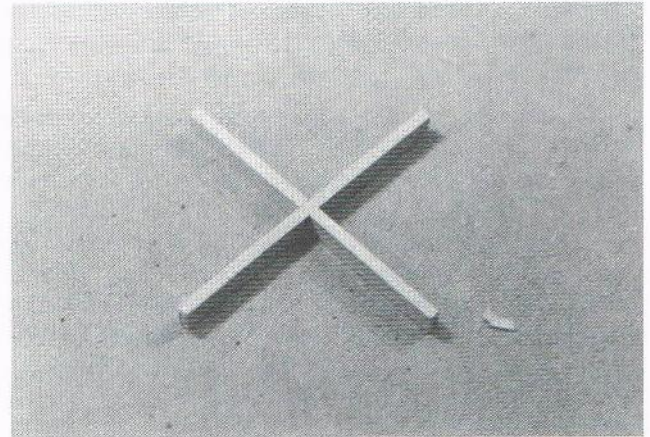
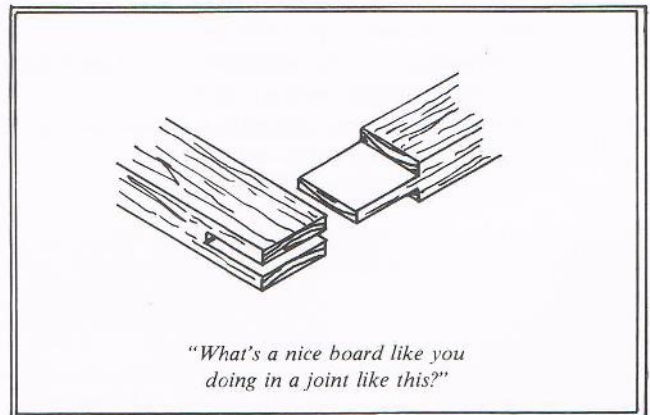


FIGURE 32. The finished cross lap will provide a firm base for a stand or table.

In TSC 8:6 (Nov.-Dec., 1984) *Beginner's Workbench* will broaden the range of joints that can be cut with hand tools, adding to the list a variety of doweled joints, mitered joints and mortise and tenon joints.



BEGINNERS

For a free listing of all past TSC articles written especially with your needs in mind, send a large SASE to: THE SCALE CABINETMAKER, Beginners, P.O. Box 506, Christiansburg, VA 24073.

(continued from the inside cover)

Its rewards and its milestones are ultimately determined by no one else. Even though the final outcome of the project may fall short of the image of perfection you might have had in mind during the dreaming stage, you can still look back with satisfaction to problems you've learned to solve, techniques you've come closer to mastering, achievements that a year before you never thought were in you. On more occasions than I can number I've turned out some absolutely wretched results on the workbench, yet found satisfaction in them....because they were better than the previous disasters! Every person who has written a letter to the editor reflecting on what is now known and can now be accomplished compared with some time in the past knows that feeling. There's immense satisfaction in that.

Finally the project is done. From that point on satisfaction continues to flow not only from the shared pleasure that comes from sharing the result with others (as a character played by Walter Brennen in a long defunct TV series used to say: "No brag; just fact!") but as

well from the memories you have of the process that resulted in this. As a row of fine spindles gleam in their orderly array you remember the night when all you could do was break them...but there they are, unblemished in the finished piece....a triumph! You recall the day when you finally figured out how to make a new tool work for you...a triumph. You look at a new type of joint you tried (and it only required a bit of filler and a decent finish to look as good as it does)...a triumph.

Then, weary from the concentrated effort, you determine to let the tools on the workbench rest for a while as you do something else. But, there in the back pages of "Antiques" is a huntboard that would certainly look neat with that piece of cherry with the twisted grain in the scrap box....and some boxwood banding....I've never tried purfling a miniature before...I wonder how you'd do it? And then you reach for the back of an envelope and a pencil stub and the cycle begins again. How do you spell scale modeling? I spell it "s-a-t-i-s-f-a-c-t-i-o-n".

Jim Dorsett

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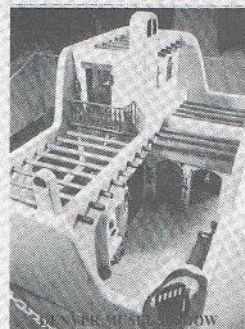
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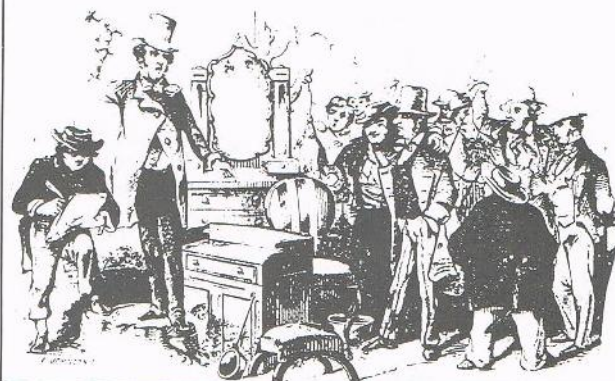
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