Attaching Tabletops

Six methods to control and direct wood movement

BY MARIO RODRIGUEZ

Attaching a top to its base is a critical aspect of table design and construction. Regardless of the method you choose, it should meet the following criteria: The top must be firmly attached to the base; the top must remain flat; a solid-wood top must be allowed to move seasonally; the attachment method shouldn't compromise the design of the table or complicate its construction. I'll describe six ways of attaching a tabletop that meet these requirements, along with the reasoning behind each method.

The most important factor to consider when deciding how to attach a tabletop is wood movement. We all know that solid wood

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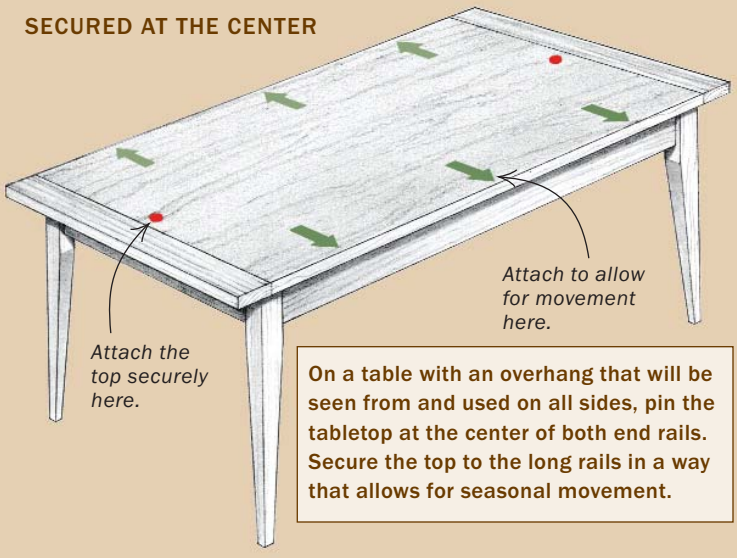
Controlling wood movement

While you cannot prevent a solid-wood tabletop from moving seasonally, you can direct this movement so that it doesn't disrupt the looks or the use of the table. Below are examples of how to secure the tabletop to the frame to control expansion and contraction.

SECURED AT THE CENTER



On a table with an overhang that will be seen from and used on all sides, pin the tabletop at the center of both end rails. Secure the top to the long rails in a way that allows for seasonal movement.

SECURED AT THE BACK

Because a demilune table often is placed against a wall or locked to a larger section of a table, the top should be secured at the rear so the wood expands toward the front.

Drawings: Michael Gellatly

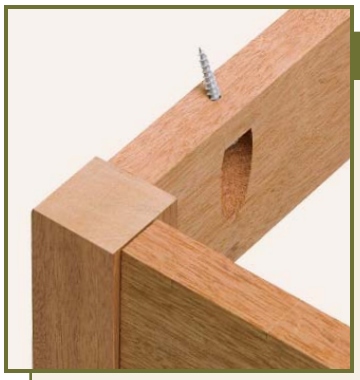
moves seasonally across the grain. It's a fact; you can't do anything to stop it. In the summer, a board will expand across its width because of an increase in humidity. During cold months, the same board will shrink and become narrower. If no allowance is made to control or direct this seasonal movement, a tabletop might buckle, or worse, crack and split.

When calculating how much a board will move, I usually allow from ⅛ in. to 3⁄16 in. for every 12 in. of width. Therefore, I would anticipate that a 42-in.-wide tabletop might move about ½ in. overall. This is only a general guide, and certain factors must be taken into account. For instance, in parts of the country with low humidity, wood movement might be minimal.

Another factor is the type of wood you're using: Cherry moves less than white oak but more than mahogany, while flatsawn wood moves more than quartersawn. For more on this subject, read *Understanding Wood* by R. Bruce Hoadley (The Taunton Press, 2000).

Once you accept that the tabletop will move, you can control or direct this movement so that it doesn't disrupt how the table works or looks (see the drawings below). For a freestanding table with a uniform overhang, I anchor the top to the base at the center of the end rails. That way, any cross-grain movement will occur evenly along each long-grain side. On a demilune (half-round) table, I pin the back edge of the top, which typically is placed against a wall. Conversely, on a writing table I might fix the top along the front of the table so that movement occurs toward the rear.

For this article, I have illustrated six methods of securing a tabletop (right and pp. 68-71). The methods are listed by ease of installation, starting with the simplest. The hardware for two of the methods can be purchased relatively cheaply from hardware catalogs, while the rest can be made from shop scrap. This is a low-budget process.



POCKET HOLES

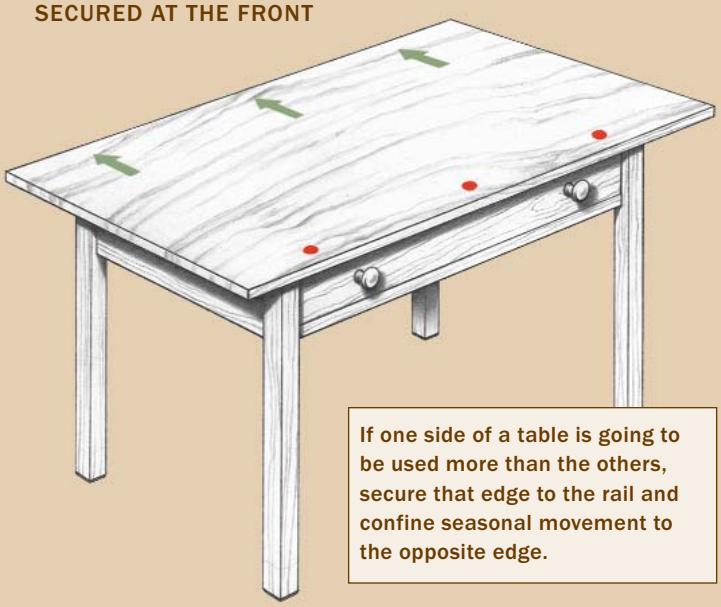
This method is probably the oldest way of attaching a tabletop. It involves drilling into the rail a ½-in. flat-bottomed pocket hole at a 10° angle. Then a smaller pilot hole (to accommodate the shank of a #8 wood screw) is drilled into the center of the pocket hole.

Common on antique furniture, pocket holes make no allowance for wood movement, which may explain the number of cracked and split tabletops. On small solid-wood tops (up to 9 in.) or veneered plywood tops, pocket holes can be the only attachment method. On larger pieces, they should be limited to areas needing movement restricted.

Pocket-hole jig. *Construct a small jig to hold the rail at approximately 10° while drilling pocket holes with a Forstner bit.*

A hole in the pocket. *Drill a smaller-diameter pilot hole for the screw that will be driven into the tabletop.*

SECURED AT THE FRONT



If one side of a table is going to be used more than the others, secure that edge to the rail and confine seasonal movement to the opposite edge.

METAL TABLE CLIPS

These clips, also known as S-shaped clips or simply as tabletop fasteners, are probably the easiest and quickest method for attaching tabletops. They fit into a groove or slot cut on the inside face of a rail.

The easiest method is to cut the grooves in the rails on the tablesaw. The grooves must be cut before the base is assembled.

The clips are installed after the base has been assembled. Place one end of the clip into the groove and screw the other end into the underside of the tabletop. Because the groove runs the length of the rail, any number of clips can be used. This method nicely accommodates any cross-grain wood movement whether the clips are parallel or perpendicular to the tabletop's grain: The clips on the end rails move along the groove as the wood moves, while the clips on the front and back rails move in and out of the groove.

An alternate way to install the clips is to cut slots in the rails using a biscuit joiner. This method removes less wood from the rails, and it has the added advantage of being doable after the base of the table has been glued up.

Grooves or slots. *The clips are installed in grooves cut on the tablesaw or in slots cut with a biscuit joiner.*

Secure but free to move. *Driving the screws too tight will prevent the wood from moving and defeat the purpose of using the clips.*

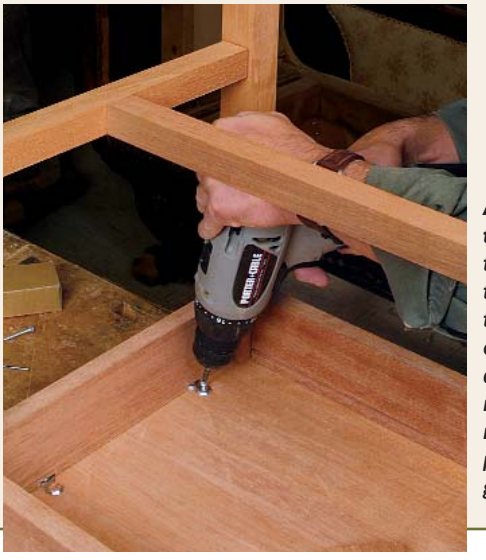
FLAT TWIN-CIRCLE CLIPS

Also known as a desktop or figure-eight clip, this unobtrusive fastener requires only a shallow flat-bottomed recess in the top edge of the rail. The diameter of the recess should accommodate that of the clip, but the recess should be drilled to place the center of the clip past the edge of the rail. This location will let the clip pivot slightly, allowing for cross-grain wood movement.

For large tabletops, you can increase the clip's ability to move side to side by chiseling away a little of the rail on both sides of the clip. However, because the clips do not handle wood movement perpendicular to the rail very well, they are best confined to end rails. Like the metal table clips (above), these fasteners should be relegated to casual, day-to-day furniture pieces.

Precision drilling. *The recess for twin-circle, or figure-eight, clips, should be close to the inside edge of the rail to allow for movement.*

Attached to the rail. *The twin-circle clips can be screwed to the rail either before or after the base has been assembled. Check that the clips are free to move.*



Attached to the tabletop. *These fasteners are best fitted to either small tables or to the ends of large tables. They do not allow for much wood movement when fitted perpendicular to the grain of the tabletop.*

Photos, except where noted: Mark Schofield; this page (top left, middle left): Kelly J. Dunton

SIMPLE WOODEN BLOCKS

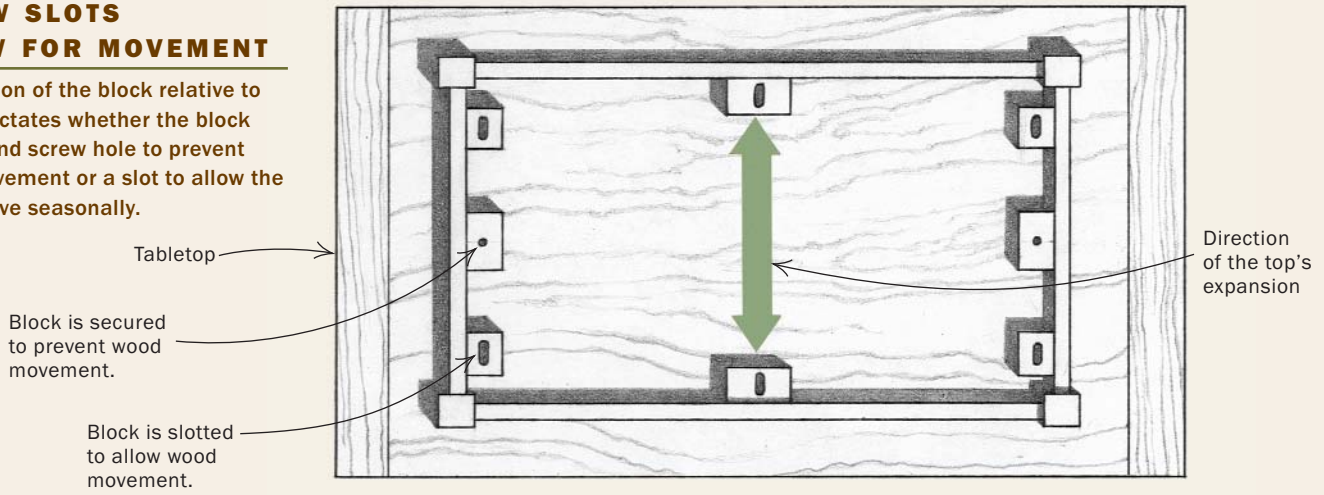
These wooden blocks are either glued or screwed to the inside of the rail and screwed to the tabletop. This type of fastener offers the advantage of using shop scrap that matches the piece.

The blocks need to be tailored to each location around the rails: Blocks at the center of each end rail can have just a single screw hole because there is no wood movement here, and they can keep the top centered on the rail. Blocks at the extremity of each end rail will require a slot that runs parallel to the rail, while those attached to the front and rear rails will have slots perpendicular to these rails. In all cases, ensure that the blocks are designed so that the long grain—not the end grain—is glued to the rails.

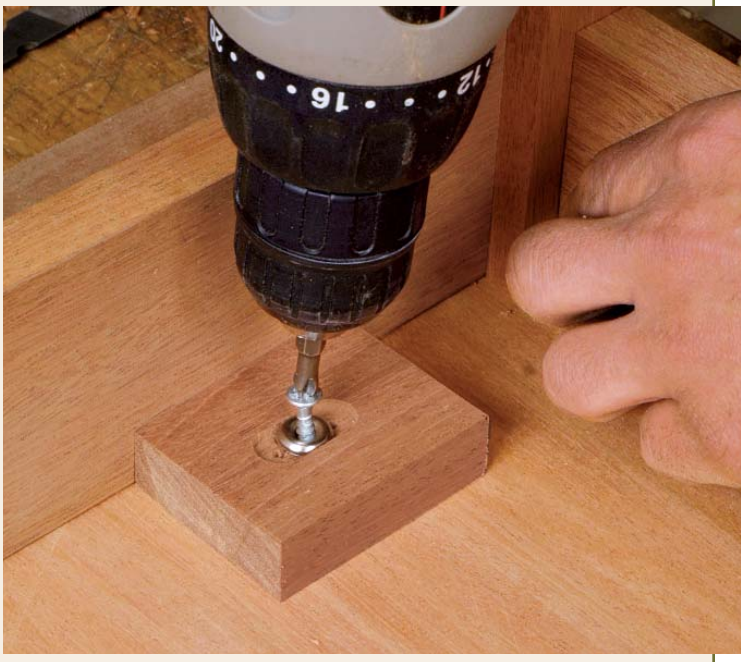
Two methods work well when gluing the blocks to the rails: With the table base the right way up, glue and clamp the blocks using a straightedge to ensure that the block tops are level. The other method is to lay the base upside down on a flat surface covered with wax paper and then rub the glued blocks onto the apron until they stick tight. When the glue has dried, tear off any paper that has stuck to the wood.

SCREW SLOTS ALLOW FOR MOVEMENT

The position of the block relative to the rail dictates whether the block has a round screw hole to prevent wood movement or a slot to allow the top to move seasonally.



Attaching the block. *With the rail sitting on a flat surface covered with wax paper, rub the glued block on the rail until it adheres. When the glue has dried, remove any paper that has stuck to the wood.*



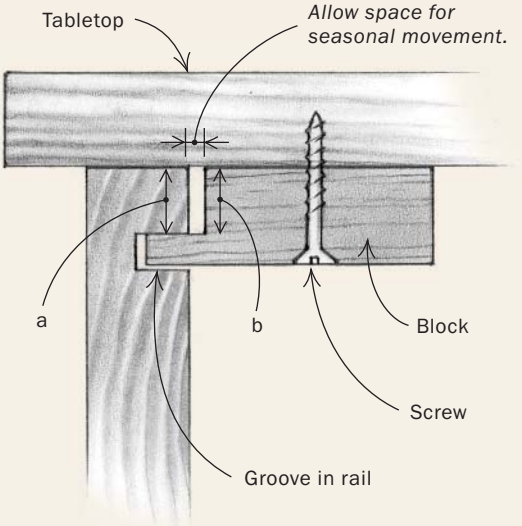
Room at the corner. *Near the corner of the end rail, the block needs to have a slotted hole parallel to the rail. Make sure that the long grain, not the end grain, of the block is glued to the rail.*

Photo, this page (top left): Kelly J. Dunton

TONGUE-AND-GROOVE BLOCKS

This type of fastener is made from project leftovers. These blocks are attached to the tabletop with screws and have projecting tongues that engage corresponding grooves cut into the rails. The rail grooves are slightly larger than the width of the blocks, allowing for movement and preventing the tabletop from splitting.

By carefully laying out the placement of the blocks and milling properly sized grooves, a more tailored and carefully crafted appearance is achieved. The best way to cut the grooves is with a router guided by a fence bearing on the rail. Properly spaced, tongue-and-groove blocks work very well for all sizes of tabletops.



Make sure that the distance (a) is fractionally greater than (b) to ensure that the tabletop is tightly attached to the frame but still free to move.

Two blocks in three cuts. *Make a cut about ⅜ in. deep in each end of a piece of wood. Next, cut perpendicular to the first cut to remove a small block of waste. The push block prevents the waste block from being thrown back when it is cut from the workpiece. Last, cut the piece of wood in half to produce two tongue-and-groove blocks.*

Cut the groove. *Select a straight bit slightly wider than the tongue of the block and, using a guide fence, rout a series of grooves in the rails.*

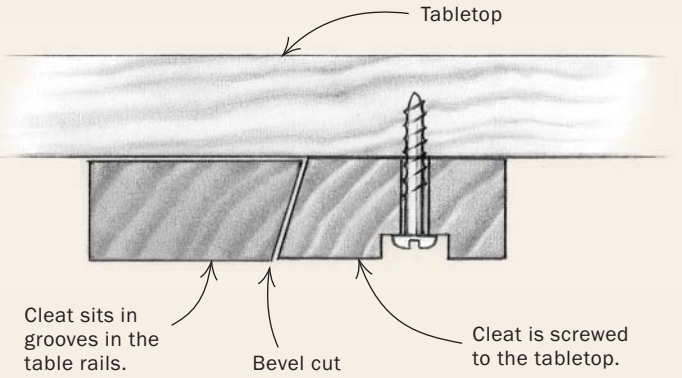
Attach the blocks. *The tongues of the blocks engage with the grooves in the rails. Then the blocks are screwed to the tabletop.*

Photo, this page (top left): Kelly J. Dunton

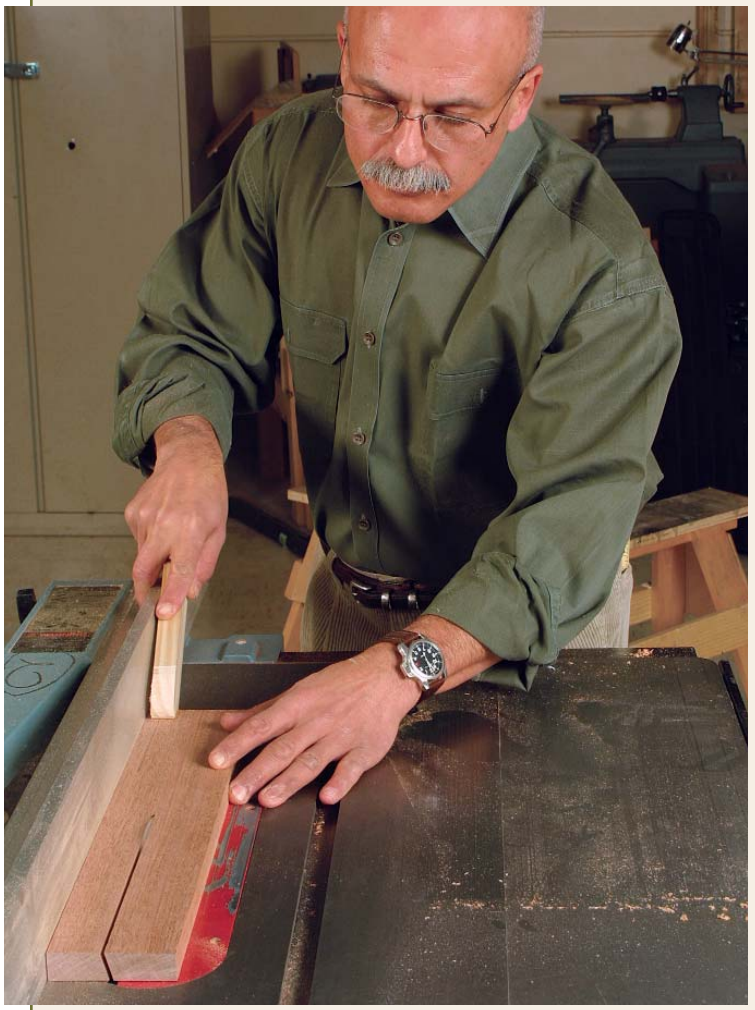
BEVELED CLEATS

This attachment method provides a clean appearance. First, rip a 3-in.-wide hardwood strip with the tablesaw blade tilted to a 15° angle. Then cut tenons on both ends of one piece and rout matching grooves in the side rails.

When the table base has been assembled, the tenoned cleat is inserted but not glued into both rails. Make sure that the wider side of the angled cut is placed against the tabletop. With the base positioned on the upside-down tabletop, take the other section of wood that was ripped, crosscut it slightly shorter than the distance between the rails, and place it next to the other cleat. Screw it to the tabletop using a single hole in the middle and slots near the ends of the cleat to allow for wood movement. On small tables, the top is attached at each end, but for tables more than 48 in. long, a third center support is necessary.



The tenoned half is attached to the rails, and the second half is screwed to the top. The bevel creates resistance to the top being lifted.



One cut makes two cleats. *Select a piece of wood 3 in. wide and a little longer than the end rails of the table. With the blade at a 15° angle, rip the board in half.*

Tenons slide into the grooves. *One cleat sits in grooves in the side rails. The wide side of the board should be against the tabletop.*

Meeting on the bevel. *Slide the second cleat against the first one and screw it to the tabletop. The center screw can be fixed, but screws closer to the edges should be in slotted holes to allow for wood movement.*

Watch it on the web

For a video on making beveled cleats, go to www.finewoodworking.com.

Photo, this page (top left): Kelly J. Dunton