

Joinery for Light, Sturdy Coffee Table

Wedged through tenons and inlaid butterflies are the keys that hold it together

by Lindsay Suter

I knew a wood supplier in California, a whacky old hippie, whose joy was salvaging trees everyone else overlooked and then turning the wood into spectacular lumber. His lumberyard may have been in complete chaos, but he had a gift for finding the raw material for truly memorable furniture. It was in these wood stacks that I found the curly cherry perfectly suited for a low coffee table I had designed.

The table, as shown in the photo on the facing page, looks quite simple. But its exposed joinery puts craftsmanship as well as the figured wood on display. Through tenons, wedged with butterfly keys, join the legs to the top. Narrow stretchers replace more traditional aprons, keeping the table looking light and airy. The design also is a little daring because the tabletop is fastened directly to the legs.

I wondered as I drew up the plans whether this feature might result in a split top. As it turns out, the frame of this table flexes slightly as the top expands and contracts across its width. This is a result of using relatively thin stretchers, only ½ in. thick, that are set well below the top of the frame. Because the frame isn't absolutely rigid, the top has enough freedom of movement so it won't split. I know because the first one I made went to a client in Massachusetts where summers are hot and humid and indoor winter conditions are bone dry. The table has been there for seven years and shows no signs of a problem. Even so, I would choose a



relatively stable wood for this design. Quarter-sawn white oak, nara or myrtle wood all seem like good choices to me.

Cutting mortises with a dado blade

The top is glued up from four book-matched pieces that give the table a symmetrical quality. The leg tenons penetrate the top at the two outside joint lines. The inlaid butterfly keys let into the tops of the legs not only reinforce the joints between the top boards but also wedge the leg tenons. Cutting mortises into the tabletop where the boards are joined simplifies construction.

I cut the mortises with a dado blade and a crosscut sled on the tablesaw before gluing the top pieces together (see the top photo on p. 70). After testing the setup on

a piece of scrap, I can complete the mortises in a couple of passes.

I used dowels to align and register the edge-glued top joints. I marked the location of the butterfly keys first, so I didn't end up with a dowel in the way later on. To give the top a light, thin appearance without compromising its strength, I tapered the underside of the top at the edge. I used a tall auxiliary fence clamped to the tablesaw's rip fence with the blade fully raised and tilted away from the fence at about 5°. The fence is positioned about ⅝ in. away from the blade, and the top is run through the saw on edge. A featherboard helps hold the top against the fence.

Tenoned, mortised and tapered legs

There are four steps in making the simple, tapered legs: sizing the stock, cutting the tenons, cutting the mortises and tapering the inside faces. Cutting the joints is much easier while the stock is still square. Leave the leg stock slightly long, so there will be an extra $\frac{1}{16}$ in. or so of the tenon protruding through the top. Although the tenon will be sanded or planed flush later, the result is a cleaner finished joint.

To prepare a tenon for a wedge, I drill a hole just above the tenon's shoulder, so the wedge won't split the leg. Then I band-saw a kerf down the tenon to the hole. Remember to orient the leg wedges so that they run perpendicular to the grain of the tabletop, not with it.

Before cutting the mortises for the stretchers, I mark each leg so I know where it belongs on the table and which faces are on the outside. Then I lay out the mortises on all the legs. I cut the mortises on a slot mortiser, but a router, drill press or mallet and chisel will work equally well.

I taper the legs on the tablesaw using a shop-built jig, a rectangular piece of plywood cut to an L-shape. After double-checking that I'm tapering the inside faces of the legs, I run the jig along the fence of the tablesaw with the leg snugly seated in the jig. The offcuts are handy for cutting the stretcher shoulders to the angle of the legs.

I rescued some small scraps of ebony for the feet. The $\frac{1}{4}$ -in.-thick ebony wears like iron and visually punctuates the ends of the tapered legs. I cut and glue the foot to the bottom of the leg and then countersink a screw for good measure.

Lay out stretchers from the legs

I measure and mark the stretchers by dry-fitting the legs into the top and clamping the stretcher in position at the correct height against the back of the legs. I leave a little extra length at both ends, so the tenons will protrude through the legs and can be sanded flush later. I use the tapered, inside edge of the leg as a guide to scribe the shoulder line on the stretcher.

To cut the tenon with an angled shoulder, I use a tenoning jig on the tablesaw. Instead of clamping the stretcher in a vertical position, I back it up with an offcut from tapering the legs. This ensures the angle of the shoulder will match the angle of the tapered leg. As before, I clean up, pare and fit the tenons and then drill and kerf them for wedges.

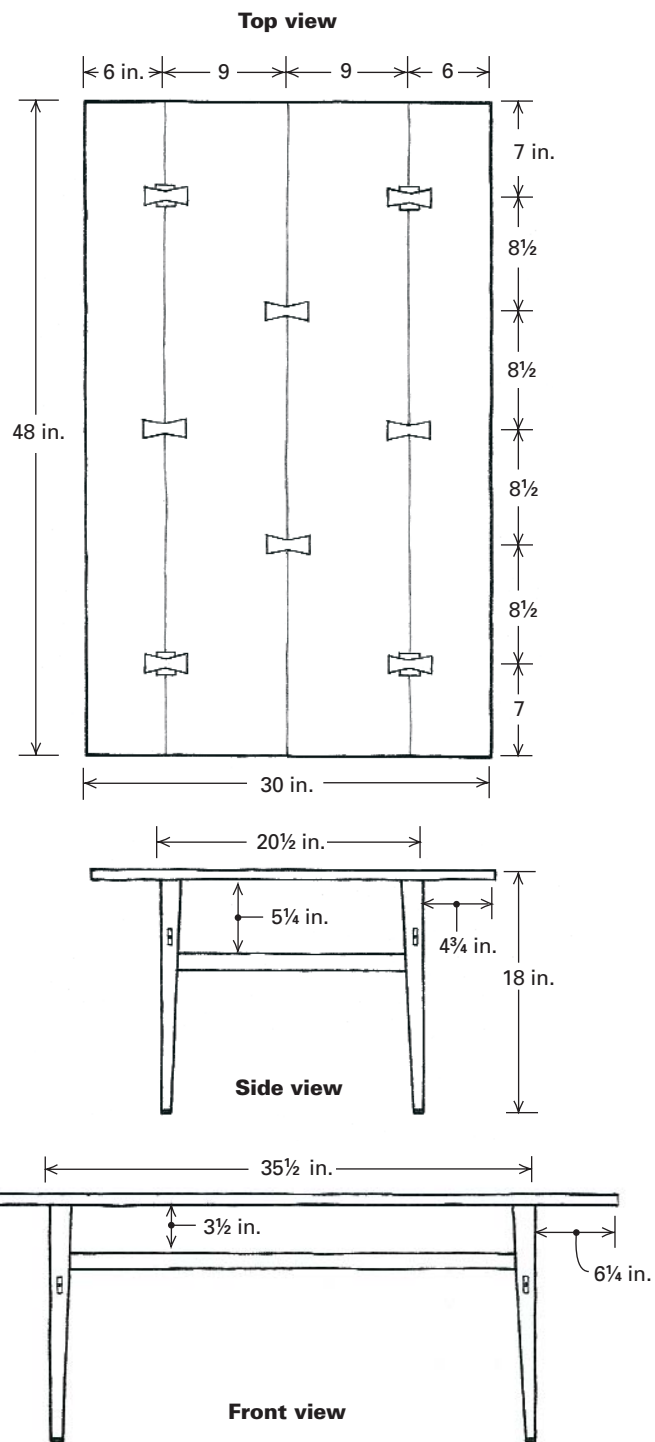
Assemble the frame in two steps

Before assembling the table, I make plenty of wedges from stock that's strong, straight grained and contrasting in color to accent the joint. I also scrape and sand all the parts. Then I glue up two sets of legs to the long stretchers only. After applying glue to the leg-stretcher joints, I fit the joints firmly and set them with a wedge. Then, immediately, I set the assembly into the tabletop (without glue). This holds everything in the correct position.

After the glue has cured, I repeat the procedure with the shorter end stretchers. When these are dry, I glue and wedge the leg/stretcher assembly to the top. I use the top wedges to keep the leg tenons tight in the top until the butterfly keys are finally put into place. When the glue is fully cured, I sand the tenons and wedges flush with the legs and the top.

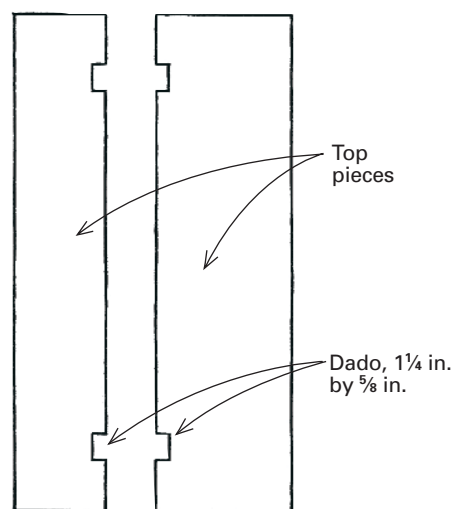
A jig simplifies the butterfly keys

When making multiple, identical butterfly joints, I like to cut all the mortises with a jig first and then fit the butterflies to the mortises (for more on making butterfly keys, see *FWW* #102, pp. 46-47). I make the butterflies with a slight taper on the sides, which helps



A low coffee table makes the most of wildly figured wood. Mortises are cut in the top before glue-up.

TABLETOP MORTISES

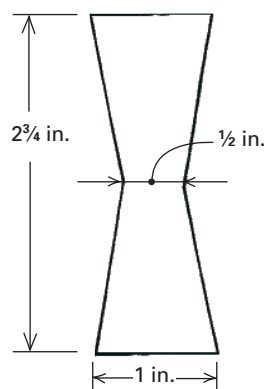


Mortises on the table saw—The tabletop mortises are cut with a dado blade and a cross-cut sled. Mating boards are clamped face to face against the sled's fence.

THE BUTTERFLY KEYS



Butterfly-mortise jig, made of plywood, is cut to shape and glued back together.



Align butterfly-mortising jig with layout lines. The rounded corners left by the router bit in the butterfly mortises are cleaned out with a chisel.

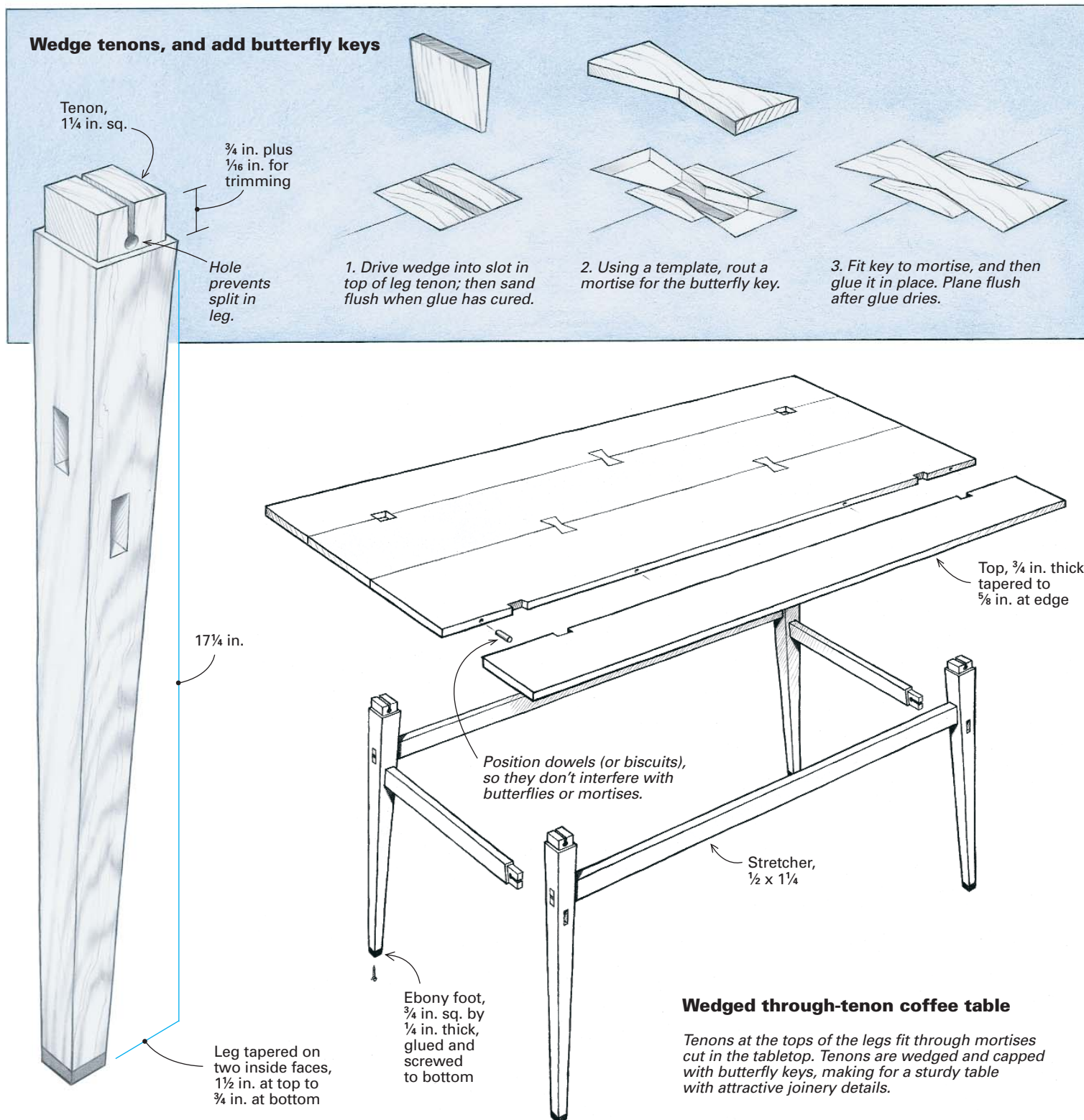
ensure a tight fit and keeps the leg tenons tight in the top.

The butterfly jig is a rectangular piece of $\frac{3}{4}$ -in.-thick plywood cut into three sections. I cut the center section with a chop saw to shape the butterfly (see the photo at left above). The pieces are glued back together, and centerlines are drawn to help with registration.

I lay out the centerlines for all the butterfly locations on the tabletop. Long layout lines make it easier to align the jig on the tabletop (see the bottom right photo). After clamping the jig securely in place, I rout the mortises with a flush-trimming, bearing-guided bit to a depth of about $\frac{7}{16}$ in. To complete the mortises, I clean up the

corners with a chisel. I mill the butterfly stock to $\frac{1}{2}$ in. thick and use the mortising jig to mark out the butterflies. After I bandsaw them to shape, I fit each butterfly, carving a slight taper on the sides. Each butterfly and its corresponding mortise are numbered.

I glue and clamp the butterflies in place, spreading the glue completely, but sparingly, on the taper and on the bottom of the butterfly. I use deep-throated clamps and waxed blocks between joint and clamp. The blocks spread the clamp pressure over the whole butterfly and protect it from damage; the wax keeps the block from being glued to the top. The center butterflies can be tapped



into place with a hammer and a block of wood while supporting the top from below. Or they can be clamped with battens above and below the table with clamps at either side.

When the glue has dried, I use a sharp jack plane to level the protruding butterflies with the tabletop. Then I sand the top starting with 120-grit sandpaper, progressing up to 320-grit.

Finish up with oil and varnish

My favorite finish is a progressive buildup of four or five coats, starting with a straight oil finish, such as Watco. With each succes-

sive coat, I add a little semigloss varnish and mineral spirits in equal parts until the mix consists of approximately one-third of each ingredient.

This finish gives a soft, lustrous surface with better wear resistance than straight oil. After the final coat is dry, I wax and lightly buff the entire piece with #0000 steel wool and then polish with a soft cloth. □

Lindsay Suter has taught at California College of Arts and Crafts in Oakland, Calif., and is now a woodworker in Kingston, R.I.