

## Drop-leaf rule joints and wood-hinged leaf supports are fussy but fun


small side tables, but they were built in all sizes. I once measured an antique Pembroke table with a 48 -in.-long top.

## Two-piece jig is used to taper legs on the tablesaw

I can't claim ever to have had an original thought, and I certainly can't claim to have invented anything as far as woodworking is concerned. The tapering jig I used for the table's legs is no exception. I borrowed the idea from Charles Grivas of West Cornwall, Conn. I'm not sure he invented it, either, but it sure works well. (For a look at Grivas' work, see $F W W \# 131 \mathrm{pp} .40-44$. )
The tapered legs are cut from $1 \% / 6-$-in. square billets, $29^{3} / 4 \mathrm{in}$. long (see the photos at right). The taper starts 6 in. down from the top of each leg. The legs taper on all sides to $7 / 8$ in. at the floor. It's a good idea to cut the mortises in the legs before you start tapering.
Set your tablesaw fence for about 5 in. and rip two 35 -in.-long medium-density fiberboard (MDF) or plywood scraps. After ripping, don't touch that tablesaw. You're going to taper the billets by setting them proud of the edge of the ripped strips and sending them through the tablesaw at the same fence setting, once for each tapered leg side, for a total of four cuts.
Lay out a $7 / 8$-in. square centered on the bottom end of one of the billets and square around the billet 6 in. down from the top. Set the billet atop one of the MDF strips with the $6-\mathrm{in}$. square line and the outside edge of the $7 / 8$-in. square flush with the edge of the MDF.
Trace the billet onto the MDF and then, using a bandsaw or jigsaw, remove the outline of the billet. After you've made the cut in the MDF, pressure-fit the billet into the cutout and then send the MDF through the tablesaw.
Hold the one-taper billet to the edge of the second MDF strip, just as you did before. One edge of the $7 / 8$-in. leg-bottom square will have been removed by the first cut. Line up the 6 -in. square line again and the edge of the $7 / 8$-in. square opposite the side that was removed with the first cut. Trace the one-taper leg onto the second strip of MDF and remove the leg outline as you did before. To distinguish the two MDF strips, and thus to avoid cutting the wrong tapers on the wrong sides-I've been know to make mistakes in my life-I made a red mark on the first-taper strip and a green mark on the other. Then I marked the end of the billets: red for the first cuts and green for the second cuts.
When you have made the cutouts on both MDF strips, you're ready to taper. Fit a billet into the firsttaper strip and taper the first side. Then turn the billet and taper a side perpendicular to the first. Fit the billet into the second MDF strip and taper the two remaining perpendicular sides.

## Swinging leaf support pivots on a wood hinge

The table's short leaves are supported by flipperlike arms that swing out of the side aprons on wood hinges and fold flush into the aprons when the leaves are down. The five-knuckle wood hinge is pinned at the centerline of the side apron with a length of $1 / 8$-in.-
dia. steel rod. Cut two lengths of $41 / 2$-in.-wide stock 6 in. longer than the finished length of the aprons. You'll need the extra length to account for the tenons and the wood you waste when making the hinge.
Mark five knuckles of the same size across the apron's width. Crosscut the apron stock through the five knuckle lines and then make a mark $5 / 8$ in. from each end of the cut. In $3 / 4$-in. stock, a $5 / 8$-in.long knuckle works well. Anything longer and the hinge will bind when it's glued to the secondary-wood subapron. The swinging leaf support has two knuckles, and the stationary apron piece has

## TAPERED LEGS

Leg taperingjig is made from two strips of MDF ripped to the same width. The edge ofa $7 / 8$-in. square marked on the bottom of a leg billet hangs over the edge of the MDF strip. The billet, held to the outside edge of the smaller square, is traced on the MDF and cut away to make a pattern for the first two cuts on the four-taper legs. Leg billets are pressure-fit into the cutouts in the MDF and ripped on the tablesaw.

Rip the first two tapers on one jig. The part of the billet that sits proud of the MDFstrip is ripped away when the MDF strip is sent through the saw at the same setting at which the strips were ripped.

Color coding can counter confusion. The author marked two perpendicular sides of each billet end with a red pen for the first cuts and a green pen for the second cuts. Thejigs are coded the same way. (The first cuts in the billet in the photo have already been sawn away.)


The drop-leafsupports swing on a wood hinge. Hinge knuck-les-two on the support and three on the stationary pieceare $5 / 8 \mathrm{in}$. long. The width of each knuckle is determined by the width of the apron stock divided into five parts. A cyma curve on the end of each support adds a decorative touch.


Knuckle relief. The back of the wood hinge knuckles are cut away at an angle so that the hinge can swing freely. If the knuckles were left square, their front sides would pinch one another as they swung.


Fit to be drilled. Once the wood hinges have been pared to fit, clamp the pieces together against a backer board and drill a 1/s-in.-dia. hole through the hinge. A ${ }^{1 / 8}$-in.-dia. steel rod is used as a hinge pin.


Fingerhold is cut with a gouge. The swinging leafsupport, cut on the end with a gentle cyma curve, nests against the apron end, which gets cut with a slightly more exaggerated curve. The back of the support is relieved with a gouge to provide a fingerhold for opening the support.
three knuckles. Butt the two marked pieces end to end and mark waste lines on each piece (see the left photo above).
Cutting the wood hinges is exacting. To look good, the knuckles must fit tightly but should not be so tight that the hinge won't swing. Prepare to do a lot of test fitting. The back side of the hinges must be relieved at about a $45^{\circ}$ angle so that the knuckles on one piece can swing past the knuckles on the other (see the photo, second from left, above).
Once the knuckles fit together, clamp the two pieces to a backer board and drill a $1 / 8$-in.-dia. hole through the center of all of the knuckles (see the photo, second from right, above). Push a long piece of $1 / 8$-in.dia. steel rod through the hinge and test the action. Unless you're a real ace, you'll have to pare away at the knuckles to get the hinge to swing smoothly. Using a piece of long rod for the test fitting makes it easy to pull out the pin when you have to adjust the knuckles.
Each swinging leaf support has a gentle cyma curve cut into the end, and it folds flat against another, slightly more exaggerated curve cut into the apron end. Use a gouge to relieve part of the back of the leaf support to provide a fingerhold (see the right photo above).
When you are convinced that the leaf support works smoothly and you're pleased with the fairness of the curves cut on the supports and apron ends, glue the stationary part of the hinge and the apron end to a $41 / 2$-in.-wide subapron made of a

secondary wood (poplar in this table). Because the primary apron is broken by the swinging leaf support, the subapron gives strength to the assembly. Gluing the apron pieces together makes it easy to cut the tenons (see the photo below).

## Rule joints add decorative touch

The hinged leaves on some unadorned drop-leaf tables simply butt to the tops when folded up. Rule joints-a combination of two moldings, cove and roundover-add a decorative and a structural element to a drop-leaf table. When a table leaf is folded down and hangs vertically from the tabletop, you see a decorative, molded roundover along the edge of the top. And when the leaf is folded up, the cove in the leaf rests on and is supported by the roundover, giving strength to the joint when the table is loaded.
For the first Pembroke table I made, I borrowed rule-joint planes from Mike Dunbar, and in fact, the inspiration for this table came from his Taunton Press book, Federal Furniture (1986). Cutting

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Traditionally, Pembroke tables have a wide top and shallow leaves. With the leaves open, this table's top appears almost circular with spurs making four corners. When the leaves are folded down, the spurs line up with the outside edges of the tapered legs. The leaves are held open with swinging leaf supports.


Metal pin, wood hinge. The top of the pin is peened to prevent it from slipping out. In operation, the swinging leaf support folds flat against the apron when the table leaves are down.
the joint with molding planes wasn't easy; using a router table with $\mathrm{a}^{1 / 2}$-in. cove bit and a $1 / 2-\mathrm{in}$. roundover bit was a piece of cake.
I don't think it matters whether you first cut the cove in the leaves or the roundover in the top. What's important is that you have a perfectly jointed edge between leaves and top before you cut the moldings. It's also important that the fillets-the flat, vertical section of each molding-above the roundover and the cove be the same dimension. If they aren't, the top and the leaves won't sit flush in the opened position. I used $3 / 16$-in. fillets on my table.
Trust me on this: It's a good idea to run extra lengths of scrap with the cove and roundovers run into the edges. Table-leaf hinges are a different breed of (swinging) cat, and it's a good idea to mount a pair to some scraps before you attack the real top. And later, the scraps can come in handy for tuning up the rule joints.

## Hinge installation is exacting

A table-leaf hinge is unusual for several reasons: one leaf is longer than the other; the leaves are countersunk opposite the barrel; and in operation, the hinge folds away from the barrel rather than around it as it does on a regular butt hinge. The longer side of the hinge gets screwed to the table leaf.

Rule-jointed table leaves pivot not from the tabletop's widest point but rather from a point in line with the fillet on the roundover (see the drawing below). The exacting part of setting a tabletop hinge comes in setting the hinge barrel (and thus the pivot point) in line with the fillet. If you set the pivot point a little too far forward or too far back, the rule joint will bind as it swings or the leaf will hang too low, revealing the hinge mortise. Neither case is the end of the world, and both can be remedied with a little fiddling.
Mounting a table hinge requires that the hinge barrel get mortised deep into the tabletop and the hinge body get mortised flush with both the tabletop and the leaves. Transcribe the fillet line$1 / 2 \mathrm{in}$, back from the edge of the roundover-to the underside of the top. Use a ${ }^{1 / 4}$-in. chisel to knock out a rough mortise for the barrel, centering the hinge pin on the line you've transcribed. Neatness doesn't count here because the hinge body will cover the barrel mortise. Once the barrel has been mortised and the hinge body rests flush with the underside of the top and leaf, you can mark around the hinge and then cut the mortise for the hinge body into the top and the leaves. Drill holes for one screw in each of the hinge leaves and attach the leaves to the top.

Set the top and leaves on the edge of your

## RULE JOINT AND TABLE-LEAF HINGE




Hinge pivots at the
roundover fillet line. Tran-
scribe a line on the underside of the tabletop equal to the setback of the vertical fillet on the rulejoint.


Mortise the barrel first. Then scribe around the hinge leaves and mortise them flush with the tabletop.


Looks like a butt hinge, but it ain't. A table-leaf hinge has leaves of different lengths, and the screw holes are countersunk on the sides opposite the barrel.
bench so that one of the leaves hangs over the side and test the action of the hinges and the rule joint. It's likely that you'll have to fuss with the joints to get them just right. If the leaf hangs too low on either side or both, such that you see the hinge mortise on the underside of the tabletop, you'll have to deepen the hinge-barrel mortise on the tabletop. Don't deepen the end of the mortise on the edge of the roundover, just the barrel mortise and that area of the hinge leaf toward the center of the tabletop; you're trying to sink the hinge deeper into the tabletop and thus raise the height of the attached leaf.
If the leafbinds as it swings open-you'll hear an annoying squeaking, scraping noise-the easiest thing to do is get out the sandpaper. I used spray adhesive to attach a strip of sandpaper to one of the test scraps I made when cutting the rule joint. Use the scrap with the cove cut into it to sand the roundover and vice versa. When both leaves swing well, drill and drive in the rest of the screws.

## Trammels lay out the top

When viewed from above, the top of table looks like a circle with squared-off spurs at each corner. In fact, the edges of the table ends and the leaves are sections of a circumference each with a different center point. To my eye, one of the cool things about the table is the way the spurs on the leaves hang even with the outside edges of the legs.
With the hinges mounted and the rule joints tuned, flip the top over on your bench and find the center of the top. Mark two long axis lines through the center point, one line perpendicu-
lar to the rule joint and one parallel to it. Temporarily set the table base upside down on the top, clamp the leaves against the legs and mark lines on the underside of the tabletop along the outside of the four legs (see the drawing at right). It's a good idea to make witness lines so that you can align the table base and the top the same way in the future.
On each table-leg line, mark a point 7 in. from the rule joint. This point will become the end of the spur. Traditionally, Pembroke tables have short leaves, and although the 7 -in. point is arbitrary, it's a good size for the leaves.
From that 7 -in. point, mark a $1^{1 / 2}$-in.-long line perpendicular to the table-leg line, and then mark a point $1 \frac{1}{2}$ in. back toward the rule joint on the table-leg line. These $1^{1 / 2}-\mathrm{in}$. squared corners will become the four spurs. Now you'll draw sections of circles between the spurs.
I made a trammel out of a pencil and a strip of wood with a drywall screw through one end (see the photo at right). The radii you mark on the top will vary based on the size of the table base you've made and the rough width and length of your tabletop and leaves. To lay out the curve on the table ends, use the parallel-to-the-rule-joint axis line you made through the top's center point. To lay out the curves for the leaves, use the perpendicular line.
First the table ends: Moving the drywall screw point along the parallel line adjusts the radius of the circle you swing from the tips of the spurs. Setting the screw point closer to the center of the table will make a tighter circle, and if you move it farther away, you will make a wider circle.
Hold the trammel so that the drywall screw sticks in the parallel line and the other end rests on one of the spurs. Swing the pencil end of the trammel in an arc to the spur on the opposite side of the table. Move the screw up and down the parallel line and swing arcs with different radii until you find one that's pleasing to your eye. When you find a radius you like, mark the nonscrew end of the trammel and drill a hole in the stick so that you can pressure-fit a pencil through it. With the pencil through the stick, draw the circumference from the tip of one spur to the tip of the spur on the opposite side of the tabletop. To swing the same arc on the other end of the table, set the screw point the same distance from the tabletop center point in the other direction.
For both table leaves, you are going to swing an arc using the perpendicular-to-the-rule-joint axis line you drew through the center of the tabletop. And this time, instead of swinging an arc from the tips of one of the spurs, you'll swing the arc from the end of the $1 \frac{1}{2}-$-in. line that's perpendicular to the table-leg line.
The last thing to do in laying out the tabletop is to relieve the corners of the table-end arcs. Relieving the corners adds to the illusion that the top is a true circle. Using a compass, swing a pleasing arc from a point on the table-end arc 1 in . past the line where the

## LAYING OUT THE TABLETOP



Two trammels swing different arcs. By using different center points, trammels of different lengths and a compass, it's possible to lay out a gracefully curving tabletop of any dimension. The curves break at each corner spur, and the spurs are aligned with the table's legs.

leaf meets the top to the point you've marked 1 1/2 in. down the table-leg line.
After cutting out the tabletop with a jigsaw, I planed, scraped and sanded it until I was blue in the face. I used 340 -grit sandpaper to knock the sharp edges off the tabletop and base, wanting to maintain the crisp corners. To accommodate the drop-leaf-hinge barrels and to make the tabletop lie flat on the base, I knocked out a small mortise on the base under each barrel. To attach the top to the base, I used small, L-shaped wood buttons that screw to the underside of the top and fit into chiseled slots in the base.
I was going to use an oil-and-shellac finish on the table, but after the first coat of oil, I didn't like the way it looked on the mahogany, so I'll probably scrape it off and go for a straight shellac finish. Hey, we all make mistakes; we all change our minds. Look what happened to my marriage. I just hope that my ex-father-in-law hasn't changed his mind about Pembroke tables.

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[^0]:    Table aprons are double thick. After the swinging leafsupport has been cut, fit and drilled and the end of the apron is cut with a cyma curve, the primary apron pieces are glued to subaprons. Cutting tenons on the doubled-up aprons is straightforward. In the photo, the swinging support has been removed from the apron.

