Building a Roll-Top Desk

Interlocking slats form an all-wood tambour

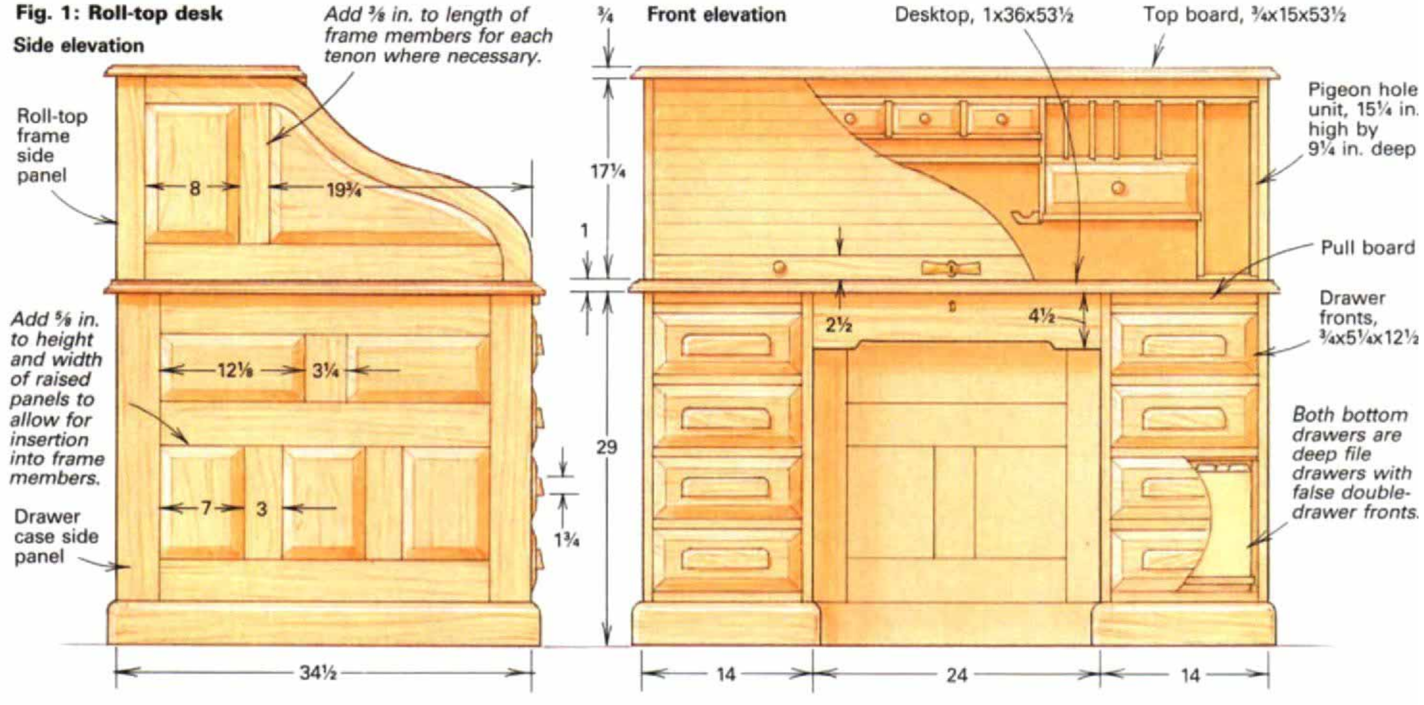
by Kenneth Baumert

I can recall my first encounter with a roll-top desk. My parents and I were visiting my uncle's home and were impressed with all the compartments and little drawers in his desk. Many years have passed since that visit, and I now realize that the greatest asset of a roll-top desk is not all the storage areas provided by the drawers and pigeon holes, but the tambour curtain that can be drawn over the working area to transform a cluttered utility desk into an elegant piece of furniture.

Before building my roll-top desk, I did a little research to determine what would be a typical design. The roots of the roll-top stretch back more than two centuries to the "bureau à cylindre" or cylinder desk, which was built in France in the 1700s. The curved solid cover, called a cylinder fall, "disappeared" as it was rotated into a large housing chamber within the desk. Another French cousin of the roll-top was the "secrétaire à abattant," which had a hinged, solid wood cover. This desk contained the small drawers and pigeon holes now found in the roll-top. Finally, a third relative of the roll-top, the tambour desk, came into prominence in England and America during the Hepplewhite and Sheraton periods of the late 1700s. It featured horizontal tambour doors that generally did not cover the writing surface. It wasn't until 1850 that Abner Cutler, owner of the Cutler Desk Co. in Buffalo, N.Y., combined elements from these desks and patented a desk with all the features we associate with roll-tops today: A curving tambour curtain that pulls down from above to completely enclose the pigeon holes and writing surface.

Although there have been many variations on the basic roll-top desk through the years, the most common method for constructing the tambour has always been to glue the slats to a canvas backing. This somewhat awkward process requires a special clamping board large enough to hold all the slats tightly together while the cloth backing is glued onto them. I used this method on my first roll-top, simply butting the slats together edge to edge. This may work on smaller tambours, but on my 4-ft.-wide roll-top, the slats at the convex part of the S-curve gradually separated from each other. Even though I could solve this problem by alternately rab-

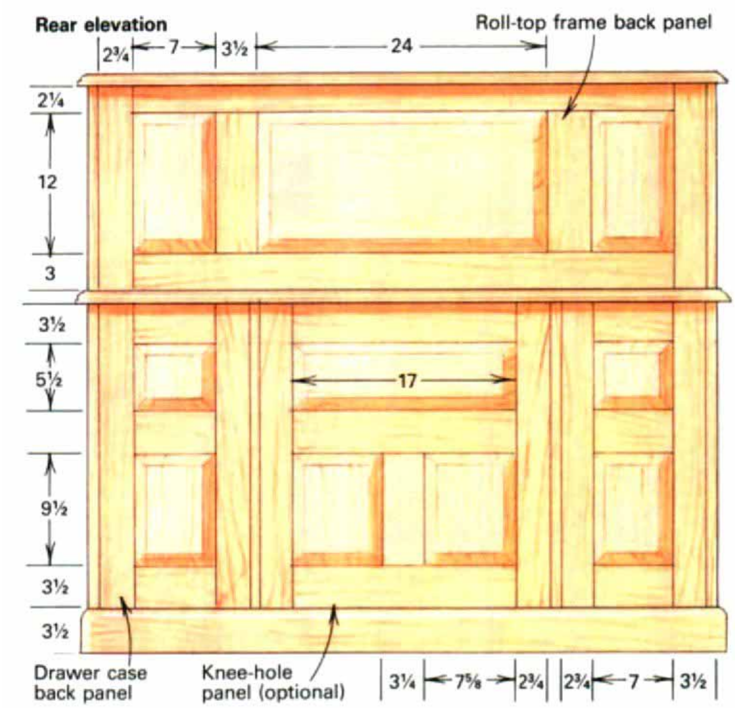
Fig. 1: Roll-top desk



beting the edges of the slats like shiplap boards, so they would overlap and strengthen the cloth-back curtain, I wanted to eliminate the cloth backing completely. So, I sat down at the drawing board and designed an interlocking joint for the edges of the slats—kind of an elongated ball-and-socket joint—that holds the slats together without any backing at all. The mating parts of this joint are cut with a dado blade and standard router and shaper cutters. The interlocking tambour design, along with a mechanism for locking the six lower-case drawers by closing the tambour, help make this roll-top both a challenging project and a unique piece of furniture worthy of its long heritage.

Understanding the basic construction—The desktop in the photo at right is 36 in. deep and 53½ in. wide. The desk requires approximately 170 bd. ft. of hardwood lumber and about 25 bd. ft. of a secondary wood, such as poplar or pine, for drawer sides and slides. Drawer bottoms require two sheets of ¼-in. plywood or the equivalent amount of solid wood. I use 5/4 stock for the writing surface so I can end up with a 1-in.-thick top after straightening and planing it. All the other parts are milled to their appropriate thickness from 4/4 stock. The top board, drawer fronts, tambour stock and frame members of the frames and panels all are ¾ in. thick after milling. The raised panels and drawer sides are ½ in. thick and the pigeon holes are made from both ½-in.- and ¼-in.-thick stock.

One of the challenges presented by a complex piece of furniture like this is that it must be designed to be easily disassembled into its component parts for transport. Figure 2 on the following page shows how the parts go together. The two identical frame-and-panel drawer cases are glued up as individual units and form the foundation of the desk. Next, I attach the roll-top frame to the desktop with screws running from the underside of the top through elongated holes to allow the wide, solid top to expand or contract. Then, I attach the desktop and roll-top assembly to the drawer cases with figure 8-shape desktop fasteners, available from The Woodworkers' Store, 2.1801 Industrial Blvd., Rogers, Minn. 55374-9514, and various other mail-order companies. The circular shape of the figure 8s lets them rotate slightly to allow expansion and contraction, making them ideal for attaching solid tops. Four




A roll-top desk combines the best features of a utilitarian workspace with the elegance of a piece of fine furniture. The tambour on the author's oak desk, above, is made with interlocking slats, instead of being the more common cloth-back tambour.

figure 8s are screwed to the top edge of each case, as shown in figure 2. The desktop is then placed on top of the cases and the locations of the figure 8s are marked on it Then, the top is removed and shallow mortises are drilled with a brad-point bit at the marks on its underside. The figure 8s fit into the mortises so the top will pull down tight to the frames when the screws are driven home. Be sure to angle the screws that go through the figure 8s and into the top so you can drive them in without hitting your knuckles on the side of the drawer case. To complete the base assembly, the center drawer is slid into place on guides screwed to the sides of the drawer cases.

The interlocking slats of the tambour are now fed into the access grooves at the top of each of the curved side panels. The top board is attached with figure 8s screwed to the roll-top frame in the same way the desktop is fixed to the drawer cases. Finally, with the tambour open, the pigeon hole unit is slid into place. It's made to just fit between the side panels and below the fully opened curtain. Felt glued to its bottom lets it slide easily without marring the surface of the desk. A narrow strip tacked along the back of the desktop acts as a stop to make sure the pigeon holes aren't slid so far back that they interfere with the opening of the curtain.

An optional knee-hole panel can be installed with knock-down hardware between the drawer cases. I prefer the heavy, solid look that this knee-hole panel gives the desk, especially when the desk is used in the center of a room instead of up against a wall. I originally used four regular 90° metal angle brackets to join the knee-hole panel to the drawer cases, but I've since found a somewhat more elegant solution, identified simply as "joining devices" in The Woodworkers' Store catalog. These three-part knock-down brackets, shown in the detail of figure 2 on the next page, provide a tight connection and disassemble and reassemble without having to remove and replace screws. The two brown plastic mating portions of the device screw to the parts to be joined and a metal joining plate slides over them to make the connection.

Making the frames and panels—As you can see in figure 1 at left, the basic building blocks of the desk are all frame-and-panel assemblies, except for the desktop and top board, which can be glued up and cut to size at this time. You'll need a left, right and back panel

Drawings: Kathleen Rushton

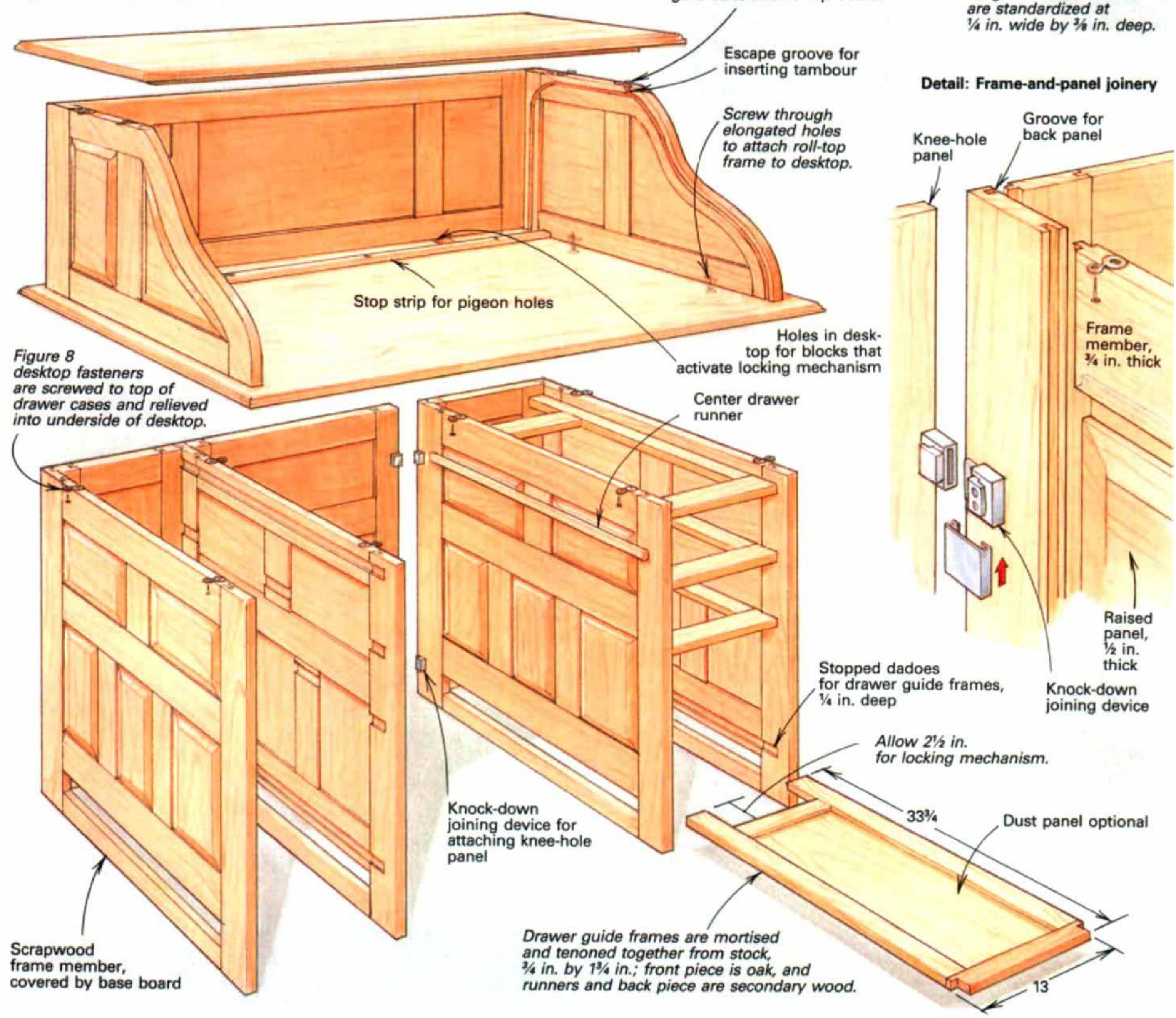
assembly for each of the drawer cases and, if you choose, a knee-hole panel assembly to go between them. The roll-top frame requires a back panel assembly and the two curved side panel assemblies. To begin, determine the overall dimensions of the desk you're building based on the size of the desktop, and prepare a parts list. Then, cut out, groove, tenon and bevel all the frame-and-panel parts for the base of the desk and the roll-top frame at one time.

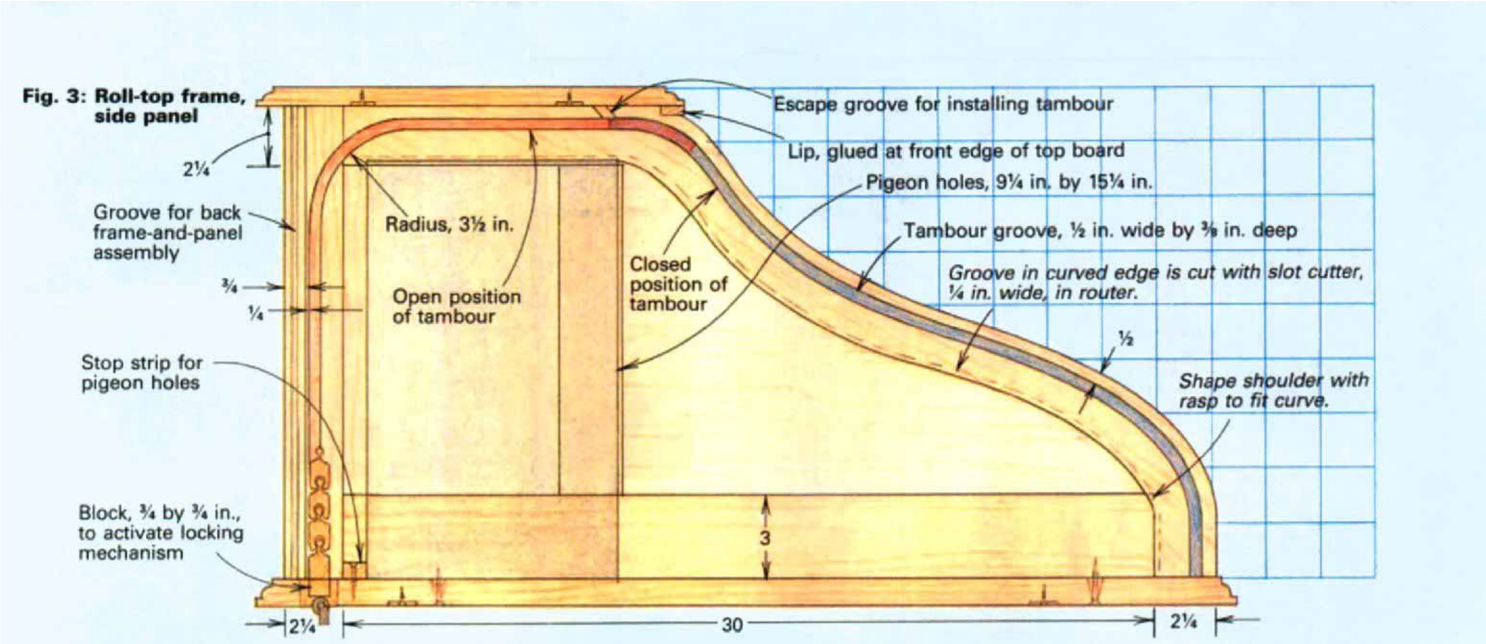
I cut the grooves in the frame members with a dado blade on the tablesaw. These grooves accept the tenons from adjoining frame members and also provide the space to house the floating, raised panels. To simplify machining I've standardized the groove for all the pieces at ¼ in. wide by ⅜ in. deep. Where the back panels of the drawer cases and the roll-top frame join their respective side panels, a ¼-in. by ⅜-in. tongue, machined the full length of the frame member, is glued into a groove in the inside surface of the vertical frame members of the appropriate side panels. While you're cutting grooves and tenons, don't forget the parts for the drawer guide frames (see figure 2 below), as they also use the same size groove and tenon.

I originally cut the rectangular raised panels with a dado head on the tablesaw, but this was very time-consuming because of all the sanding needed to clean up the bevels. When I tried to make the cut in one pass with a panel-raising cutter on the shaper, I had to reject a significant number of panels because of chipping. Even when I made multiple passes, there was some chipping across the grain. To eliminate this chip out, I switched to a two-tool operation on the tablesaw and shaper. First, I make a 1/64-in.-deep scoring cut on the tablesaw at the inner edge of the bevel. Next, with the sawblade set to the same angle as the shaper's panel cutter, I saw off most of the waste. Finally, the shaper is set up to make the finish cut.

By slightly changing the settings on the tablesaw and shaper, you can bevel the ¾-in.-thick drawer fronts right after the panels are made. Experience has taught me to belt sand the outer surfaces of the drawer fronts and panels before cutting the bevels to avoid rounding the crisp edges of the raised panels. To sand the cross-grain bevels, I clamp the panels to the workbench and begin sanding with 80-grit paper on an electric block sander. Oak panels usually don't need to be sanded finer than 120-grit;

Fig. 2: Basic construction





walnut and birch are usually sanded to 220-grit.

Work out the design for the curved frame-and-panel sides for the roll-top frame full scale on paper, When the tambour is open, only the handle slats should show and when the tambour is closed, there should be only one or two slats hidden behind the lip on the front edge of the top board (see figure 3 above). To test this relationship, lay a string along the path of the tambour groove on your drawing, and mark the length of the string when it's lying in the closed tambour position. Now, move the string to the open tambour position and compare the distances. Because the depth of the desktop is already established, you must vary the height of the side panel assembly and the slope of the curve until the two distances are equal.

Once you've established the profile of the roll-top frame, you can bandsaw the curved frame members and sand them smooth with a drum sander chucked in the drill press. Then, rout the groove in the inside edge with a bearing-guided ¼-in.-wide slotting bit. With rasps and files, I fit the shoulders of the tenons to the curve where the bottom frame piece of the side panels join the curved frame. After the frame pieces are complete, use them to lay out a pattern for the curved panels. Bandsaw the panels to shape and bevel them with a horizontal panel-raising shaper cutter in conjunction with a guide bearing. If you don't have one, you can use a bearing-guided router bit with a profile that will remove most of the waste, and then finish up with chisels and sandpaper to match the bevel on the other panels.

After all the frame-and-panel parts are grooved and tenoned, assemble them into the modules that will make up the desk. Take care when gluing the joints to avoid locking the panels to the frames; the panels must float freely so they can expand or contract with changes in humidity, In addition, be sure you have a flat area to lay out your clamps or you might end up with twisted case sides. After the cases are glued up, I run a baseboard around them, mitering it at the corners and screwing it to the case from inside the bottom rail. Since the first 3½ in. of the bottom rail gets covered by the baseboard, I save oak by leaving a gap and using scrapwood or secondary wood at the very bottom (see figure 2 on the facing page).

After removing the clamps from the frame-and-panel assemblies, sand the frame pieces with a small electric pad sander to about 100-grit. Keep the sander on the frame members and be careful not to round over the crisp corners of the raised panels. I go over the cases again with 100-grit after they are glued up and then usually finish-sand them to 120-grit.

Before gluing up the drawer cases, you need to lay out and cut the dadoes on the inside of the case sides to receive the drawer guide frames. I cut these stopped dadoes on the tablesaw, and then use a router to clean them out to within about 1 in. of the front, and right up to the groove for the back panel assembly at the rear of the case sides. Then, notch the front corners of the guide frames to fit the stopped dadoes (see figure 2). I use the tablesaw to ensure square and accurate notches. When the guide frames are all notched to fit, glue up the drawer cases. Make sure the cases go together square or you'll spend hours fitting the drawers to out-of-square openings.

With the base of the desk in clamps, you can turn your attention to the roll-top frame. Before gluing the curved side panels to the upper back panel, you'll need to rout the tambour groove, as shown in figure 3 above. The easiest way to do this is with a ½-in.-dia. pattern cutting bit and a Masonite template. Pattern cutting bits come with interchangeable bearings that fit on the ¼-in. shaft *above* the cutting portion of the bit, and they are available from Trendlines, 375 Beacham St., Chelsea, Mass. 02150. The top bearing makes it possible to use a Masonite template bandsawn to fit right up to the inside edge of the desired groove. Clamp the template and side panel to the top of your bench and rout the ⅜-in.-deep groove. The next step is to mark the location of the escape grooves for inserting the tambour slats and rout them freehand. Now you can glue the side panels to the upper back panel and attach the roll-top frame to the desktop. The top board can't be screwed in place until the tambour is installed, but this is a good time to mount the figure 8s to the side panels and mark and drill to recess them in the underside of the top. As shown in the photo on p. 49, a thin strip is glued below the front edge of the top. The purpose of this small lip is to fill the gap created by the curve of the tambour as it goes under the top. However, this piece should be made and glued in place only after the tambour is installed to be sure it doesn't interfere with the tambour's motion.

Drawers and locks—Each of the drawer cases that comprise the base of the desk contain three drawers and a pull board, as shown in figure 1 on p. 48. Both bottom drawers are deep file cases that can hold either manila folders or Pendaflex hanging files. The fronts of the file drawers incorporate a visual ploy common to this style of roll-top: a false double-drawer front. The narrow, center drawer runs on wooden guides screwed to the side cases (see figure 2 on the facing page). Additional drawers, as many or few as you prefer, can be made to fit the pigeon holes.

My desk drawers have dovetails on all four corners and are flush

Fig. 4: Locking mechanism

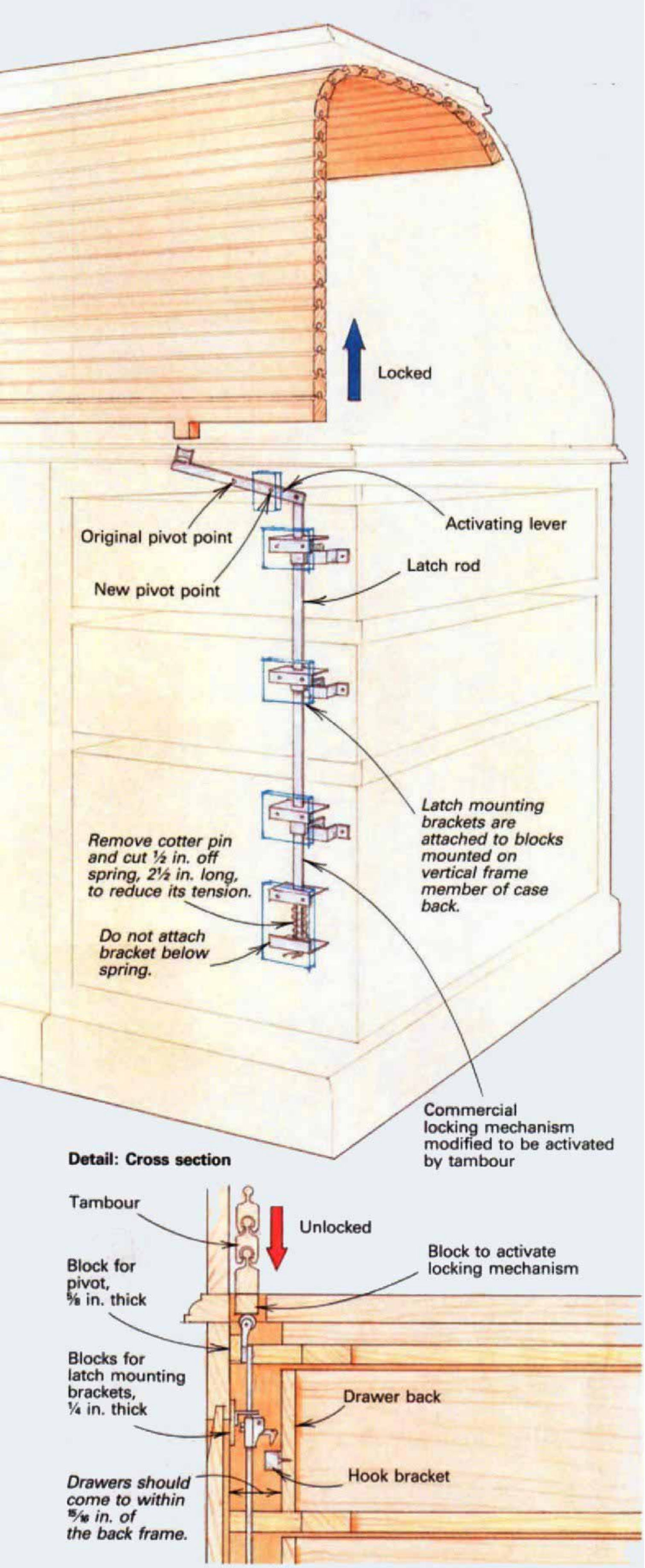
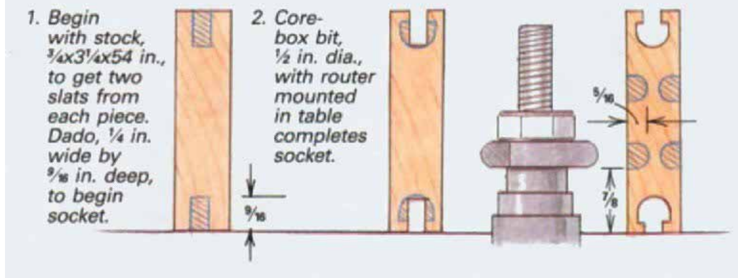


Fig. 5: Shaping the interlocking slats

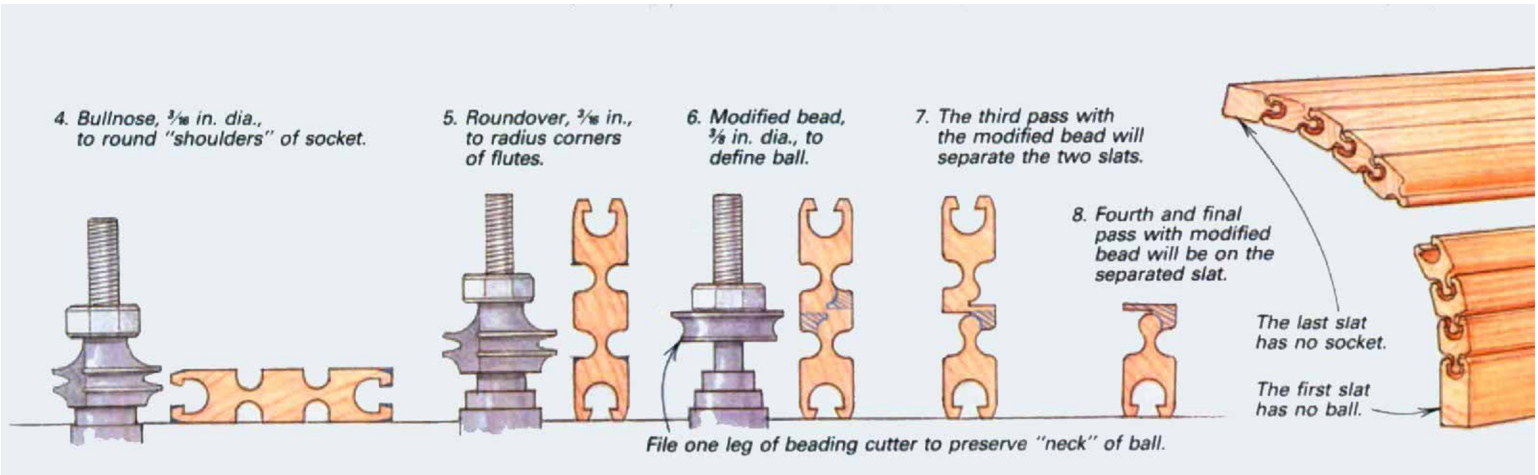


mounted, meaning they fit within the case frame so their front edges are flush with the case. Flush drawers make it imperative that both the cases and the drawers be built perfectly square; the fit around the drawer front is right there for all to see. The wooden drawer pulls are easily made if you begin with a long piece of stock. Clamp this long board in a vise and lay out for several pulls, marking both the length of the pull and the location of the finger notch for each. Then, with the long piece still in the vise, rout all the notches with either a 45° bevel or a core-box bit. Bevel the front face of the pull stock on the tablesaw, and sand this beveled face. Now, crosscut each handle from the long stock and round the corners.

There are only two key holes on the desk, as shown in the photo on p. 49: one on the bottom slat of the tambour to secure it to the desktop and one for locking the center drawer. The side drawers lock automatically and simultaneously when the curtain is closed, and conversely unlock when the curtain is open.

I couldn't find a locking system designed to be activated by the tambour of a roll-top desk. But Selby Furniture Hardware Co. (321 Rider Ave., Bronx, N.Y. 10451) has a mechanism (part #L-7CTRDSK U) that locks all the side drawers when the center drawer is closed. With a few modifications, I made the mechanism work off the weight of the tambour. Metal rods with spring-loaded latches are screwed to the inside back of each of the drawer cases, and activating levers are connected to the top of each of these latch rods. To work off the center drawer, as the mechanism is designed to function, the latch rods are placed so the activating levers extend over to each side of the center drawer. Each lever is screwed to the back frame of the drawer cases so it will pivot when its free end is forced up by triangular metal brackets screwed at the back of each side of the center drawer. So, when the center drawer is closed, the brackets push up on the lever and the lever's pivoting action forces the latch rod down, engaging the latches with hook brackets on the back of each drawer and locking all the side drawers simultaneously. When the center drawer is open, a spring at the base of each latch rod pushes the rod back up, disengaging the latches and unlocking the drawers. However, this system is cumbersome because the center drawer has to be left partially open for the side drawers to be unlocked. By modifying the mechanism, as shown in figure 4 at left, I made it work off the weight of the tambour.

I reversed the position of the activating levers so that instead of the brackets on the center drawer pushing up on the levers to lock the drawers, the tambour will be pushing down on them. This means that the springs at the bottom of the latch rods, instead of pushing down on the bottom mounting bracket, will be pushing up against the first mounting bracket from the bottom. Since the bottom mounting bracket moves with the latch rod, it must not be screwed to the frame of the desk. Although the springs were easily squeezed by the force of the brackets on the center drawer, the



weight of the tambour was not sufficient to compress them. To remedy this I cut ½ in. off the 2½-in.-long springs and moved the fulcrum point of the activating levers closer to the lifting point to increase the levers' mechanical advantage.

Now that I've installed a few of these mechanisms, I find it's easier to mount the lock on the desk back before gluing the drawer case together. The lock is mounted with the curtain contact point 1 in. above the drawer case, A 1½-in. square is cut in the desktop and blocks glued to the last slat of the tambour activate the lock through these openings. The final step is to mount the hook brackets on the back of each drawer for the spring-loaded hooks to grab.

Shaping the tambour slats—One of the keys to shaping the interlocking joint on the edges of the slats is beginning with 3¼-in.-wide boards. This width allows you to get two slats out of each piece, which speeds up the process, and gives you a substantial piece of wood to work with, which keeps your hands away from the cutter. The 3¼-in.-wide boards should be milled ¾ in. thick and crosscut a little longer than the finished length of the slats. I prefer to sand the surfaces of the stock before machining the slats so the only clean up I have later is on the rounded-over corners.

Figure 5 above shows the progression of cuts I use to make the joint. The socket for the elongated ball-and-socket joint is begun with a ¼-in.-wide dado cut on the tablesaw and completed on the router table using a ½-in.-dia. core-box bit. You need to set the router table fence so the core-box bit will center on the dado groove to begin cutting. Once you're in the groove, the ¼-in.-dia. shaft of the core-box bit will guide itself along the dado.

The ball portion of the joint is formed on the shaper. First, I make four cuts with a ⅜-in. flute cutter to define the ⅛-in.-thick "neck" of the ball. Then, I change to a multiple profile cutter, as shown in step #4 of figure 5 above, which has the next two shapes I need: a 3/16-in. bullnose to contour the "shoulders" of the socket and a 3/16-in. roundover for what will be the outer edges of the slats (step #5 of figure 5). The bullnose cut is made with the stock flat on the table; all the other passes are made by running the stock on edge. I readjust the fence and the height of the cutter in between the bullnose and roundover operations. The final ball shape is formed with a ⅜-in. beading cutter that I modified by grinding back one of the protruding cutting wings so it would leave the neck of the ball. To avoid weakening the piece prematurely, make the first two cuts on opposite sides from opposite edges. The third pass will separate the two slats (see step #7 of figure 5) and the fourth and final cut will be done on an individual slat.

The whole operation results in a significant amount of chips and sawdust because the process removes approximately 40% of the blank. It may be desirable to hog out as much of the waste as possible with a dado head on the tablesaw; some woods are less forgiving than others and won't tolerate heavy shaper cuts without splintering. Depending upon the quality of the wood, you should machine 5 or 10 extra slats to ensure that you end up with the 25 to 30 good slats needed for a desk. Don't forget to make a wide slat with only a socket for the handle slat, and make another with only a ball for the last slat. Also, the small blocks that fit through the holes in the desktop and disengage the locking mechanism when the tambour is open are glued to the last slat.

I don't crosscut the slats to final length until after I've screwed the roll-top frame to the desktop so I'm sure to get an accurate measurement. The slats should be about ⅛ in. shorter than the distance between the curtain grooves. Then, I cut a rabbet on the back side of both ends of each slat to leave a 7/16-in.-thick tenon. Calculate the length of the tenon to leave the back of the slats 1/16 in. shorter than the distance between the roll-top side panels, The tenons for the handle slat have to be somewhat thinner and rounded so this wider piece will negotiate the curves.

Building the pigeon holes—I build the pigeon hole unit after the rest of the desk is complete so it can be dimensioned to fit between the side panels with very little to spare. When laying out the pigeon holes, consider how the desk will be used and design the compartments to suit that particular purpose.

All pigeon hole pieces are cut to size and sanded. Make the top and end pieces a little wider than the shelves and dividers so they can be rabbeted for a back piece. The grooves for joining the parts are all dadoed on the tablesaw. To ensure that the compartments all come out square, it's important to lay out and cut all the grooves from the same end of the horizontal shelves. This can be tricky, so take your time and check your spacing before you glue up the unit. Don't be surprised if you have to trim some of the pieces to length to account for the depths of the dadoes. Gluing up the pigeon holes is a delicate process because some grooves are only ¼ in. wide by ⅛ in. deep.

After all the component parts have been built and fitted together, the desk should be disassembled and the parts finished separately. I apply up to seven coats of polyurethane to the writing surface to completely close the pores. The other portions of the desk get three or four coats of polyurethane, and I sand between coats. The tambour slats are finished individually with a liberal amount brushed into the interlocking sockets. Once the finish is completely set, all wearing surfaces, such as the tambour's ball joints and the tambour grooves in the curved panels, as well as the drawer guides, are coated with a hard carnauba wax to ensure free and easy movement. □

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