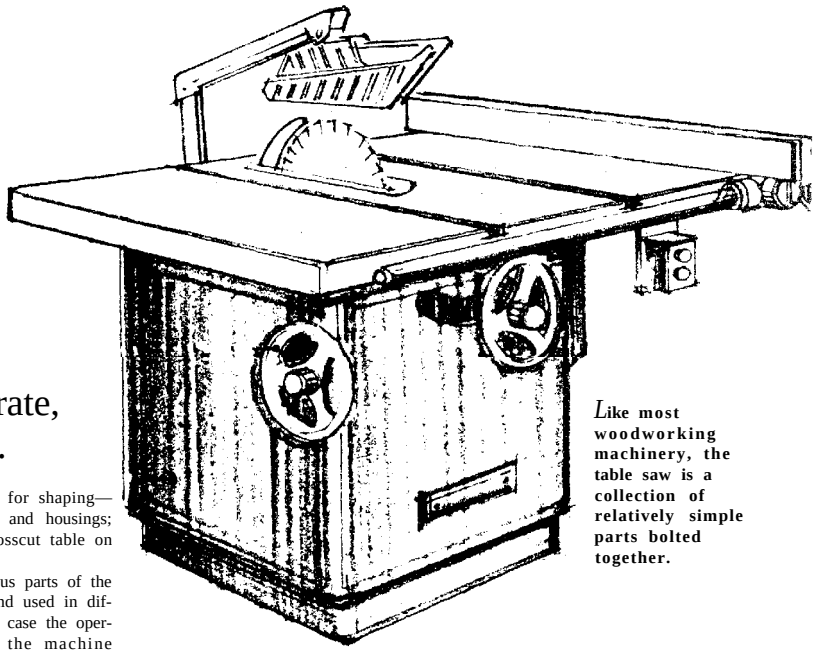
By Ian J. Kirby

TABLE SAW *TACTICS*



Like most woodworking machinery, the table saw is a collection of relatively simple parts bolted together.

If you want the saw to cooperate, set it up correctly for the job.

Early table saws consisted of massive metal castings and large diameter blades. They were designed and built for one purpose: to rip large pieces of solid wood into smaller pieces of solid wood. Today we expect the table saw to perform a variety of tasks: to rip solid wood; to crosscut solid wood; to break down manufactured sheet materials; and to make a range of joints and molded shapes with speed and accuracy. This increase in its capacity has come about as a result of improvements to the machine, developments in blade technology, and the design of shop-made jigs.

Not surprisingly, this degree of change in a machine requires equivalent changes in operator procedures and machine setups. We can isolate four sets of working situations for the table saw. Two of them are directed by the materials being cut; the other two are directed by the operation being performed.

The four working situations are:

- The conversion or ripping of solid wood;
- The conversion of manufactured sheet materials;
- Using the table saw for shaping—making grooves, rabbets and housings;
- Using the sliding crosscut table on the table saw.

In each case the various parts of the table saw are adjusted and used in different ways, and in each case the operator is positioned at the machine differently (Figure 1).

It is particularly critical that the fence be set up correctly. How the fence is shaped, and where it is positioned relative to the blade, varies with the material being cut and the type of cut being performed. If the rip fence on your saw extends the full length of the table, you will have to make three auxiliary fences in order to safely and accurately rip solid wood, break down manufactured sheet material and cut grooves and rabbets.

Fence for Solid Wood

The fence was originally designed for ripping solid wood, and fences on good quality older machines varied little, regardless of the manufacturer. When ripping solid wood, the fence must support the wood no further than an inch beyond the bottom of the gullets (Figure 2). This allows the wood to behave as it sometimes does when cut through—it is allowed to distort. The distortion is caused by the release of internal stress as the board is cut through.

The front bottom edge of the fence on many saws was profiled into a concave quadrant that duplicated the periphery of the saw blade. The entire fence—between 6 to 9 inches high and 18 to 30 inches long—could be moved backward and forward so that as the saw blade was raised or lowered, the fence was in just the right relationship to the blade so that it was no longer in contact with the workpiece beyond the sawcut (Figure 3).

Let us assume that the board comes off the sawcut bending hard and away from the blade toward the fence. Because the fence supports and guides the workpiece no further than an inch beyond the gullet, the sawn board can distort freely as the cut continues. If the fence runs full-length across the table, however, the workpiece places the operator and the workpiece at risk because the distorting board is trapped between the fence and the blade, setting the stage for a nasty happening called kickback (Figure 4).

The least injurious effect is damage to the saw blade by overheating. The distorting workpiece pushes itself off the full-length fence and into the blade, causing friction which in turns produces localized overheating of the blade with accompanying expansion and buckling. Enough heat may be generated to cause the blade to lose its

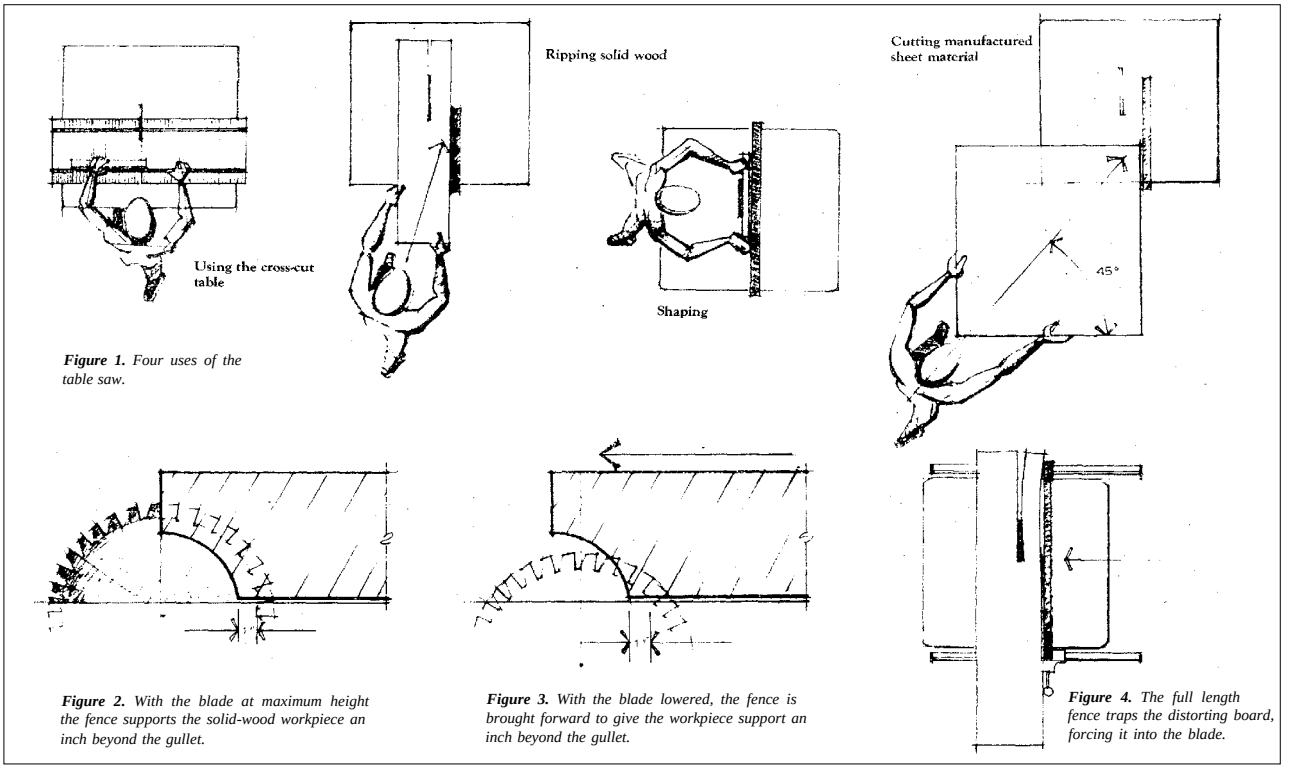


Figure 1. *Four uses of the table saw.*

Figure 2. *With the blade at maximum height the fence supports the solid-wood workpiece an inch beyond the gullet.*

Figure 3. *With the blade lowered, the fence is brought forward to give the workpiece support an inch beyond the gullet.*

Figure 4. *The full length fence traps the distorting board, forcing it into the blade.*

tension and become useless until repaired. While the blade revolves in its buckled condition, it is well able to trap the workpiece tightly against the fence. The upward thrust of the back edge of the blade will overcome the feed pressure by the operator, and the billet is kicked back suddenly with great force. Its trajectory from the machine is impossible to predict.

To prevent such problems, every time you saw solid wood you should set up the fence correctly. Since it is now common for table saws to have a full-length fence, you have no alternative but to make an auxiliary fence.

The auxiliary fence should be made of a hard-wearing material. Maple or cherry is a good solid wood choice, but particleboard or fiberboard faced with plastic laminate will serve just as well. The thickness of the fence should be at least 1/2-inch but not more than 1-inch because whatever you add means that the maximum opening between saw and fence is now reduced by the same amount.

The size and shape of the fence is related to the size of the blade. Put the largest diameter blade on the machine, set it to maximum height and make the new fence 1/2-inch higher than the blade. The front end of the fence extends to the front edge of the table, and the opposite end, profiled as a quadrant of a circle, extends an inch beyond the bottom of the gullets. This fence setup, being stationary, obliges you to saw solid wood with the blade set at maximum height. This is not necessarily bad practice, but if you want a more sophisticated setup, the fence attachment points can be slots instead of holes, thus allowing it to move forward and backward in conjunction with varying blade heights (Figure 5).

All fences should have a rabbet at the bottom of the working face to accommodate sawdust and chips on the tabletop which would otherwise become trapped between the workpiece and the fence, causing an incorrect cut. A chip clearance rabbet 1/8 x 1/8-inch is sufficient for this purpose.

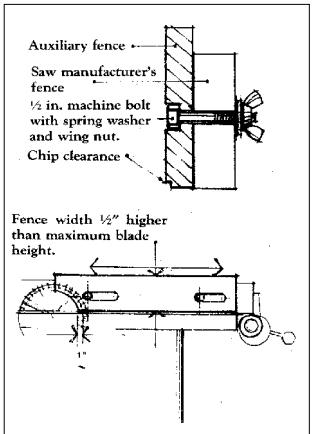


Figure 5. *Fence for solid wood. To allow forward and backward movement of the fence, use slots at the attachment points.*

Fence for Manufactured Sheet Material

If you have a full-length fence, you must make an auxiliary fence specifically for cutting manufactured sheet material. It differs from the fence designed for ripping solid wood because sheet stock differs from solid wood; its surface dimensions are larger; its thickness range is very small; and it reacts predictably when cut. Sheet stock is wider than solid wood to begin with, and many finish cuts are in the 18 x 24-inch range. We rarely cut sheet stock thicker than 1-inch and most cuts are in the 1/4 to 5/8-inch range. When cut, the distortion, if any, is negligible.

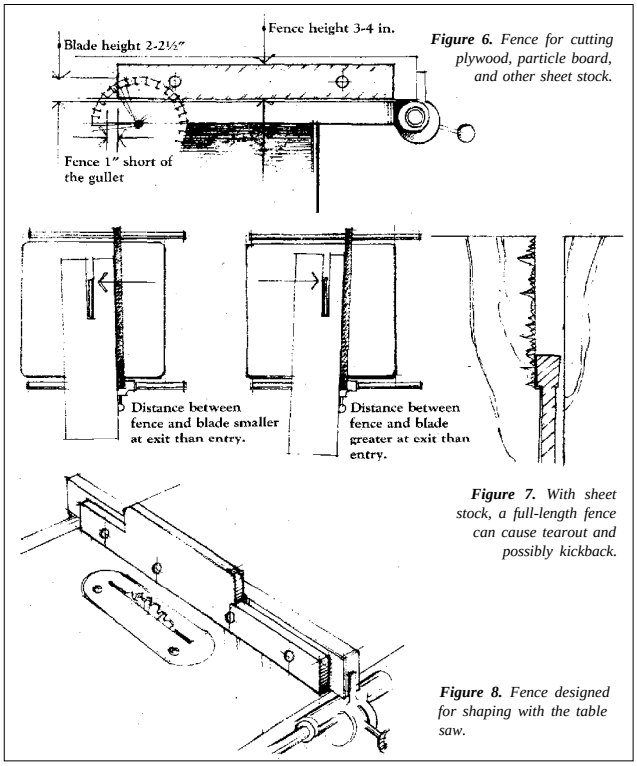


Figure 6. *Fence for cutting plywood, particle board, and other sheet stock.*

Figure 7. *With sheet stock, a full-length fence can cause tearout and possibly kickback.*

Figure 8. *Fence designed for shaping with the table saw.*

Set the blade so that it projects 2 to 2-1/2 inches. This setup presents less blade surface to trap the workpiece between blade and fence, and since the saw teeth are traveling more horizontally than vertically through the workpiece, there is less tearout along the sawcut on the underside of the panel. The fence need only be 3 to 4 inches high. If higher, it neither hinders nor helps. The length should go from the front edge of the table to a point which is an inch short of the gullet on the output side of the blade (Figure 6).

Let's consider what happens if you decide to continue using a full-length fence. If the distance between blade and fence is smaller at the exit point than it is at the entry point, the workpiece is squeezed against the back edge of the blade. The result is tearout of the edge of the workpiece at best, and kickback at worst. If the distance between blade and fence is smaller at the entry point than the exit point, and you keep the workpiece tight to the full-length fence, the falling board is likely to rub onto the back edge of the blade, and again tearout occurs. There is no danger of kickback in this case, but the absence of danger still doesn't justify incorrect setup. In both cases the panel passes over the blade in a skewed fashion (Figure 7).

The accuracy of the cut is controlled by using the fence before the sawcut; you cannot control the operation by using the fence beyond the sawcut. If you have trouble controlling the panel near the end of the sawcut, you are feeding it incorrectly. Supporting the panel with table extensions allows attention to be better focused on the contact between workpiece and fence.

Fence for Rabbets and Grooves

When the table saw is used to make simple shapes, such as rabbets and grooves, the operation differs considerably from ripping solid wood or breaking down sheet material. The design of the fence is also quite different. When shaping on a table saw, the fence should support the workpiece across the full length of the table (Figure 8).

The fence design for grooving and rabbeting is more concerned with the workpiece than the blade, and the workpiece can vary considerably. What fence, for example, a would be suitable for making both a 1/4 x 1/4-inch groove located 1/2-inch from the edge of a 1/2-inch thick board *and* a 1/2 x 1/2-inch rabbet in the edge of a 3/4 x 9-inch board? To accommodate the latter operation and not hinder the former, I suggest a fence 5 to 6 inches high; the 5 to 6 inches need be only the center 18-inch portion, with the remainder at each end being 2 to 3 inches high. The only other requirement is that the fence be straight end-to-end.

This fence should preferably be made with sheet material rather than solid wood, and faced both sides with plastic laminate. The thickness may be 1 to 2 inches since we are not concerned with how much we have reduced the maximum opening between fence and blade. Like the other auxiliary fences, it may be attached to the manufacturer's fence with machine bolts and wing nuts. ■

The material in this article is adapted from Woodworking Book 2: Down to a Line, by *Ian Kirby, who has 30 years experience designing and building* furniture and *teaching.* Woodworking *is a series of 12 books that Kirby is writing to create a self-training curriculum in "high-quality and low-volume" woodworking. Each book will* be accompanied *by an audio tape.* Woodworking Book 2 *and tape are available* for *$19.95 from Lignum Press, Ltd. P.O. Box* 900217, *Atlanta, GA 30329.*

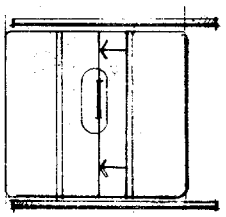


Figure A. *Lower the blade and scribe parallel to the miter gauge slots a line which passes through the center of the slot in the insert.*

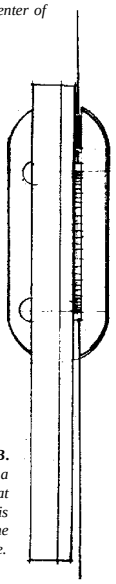


Figure B. *Check with a straightedge that the blade is parallel to the scribed line.*

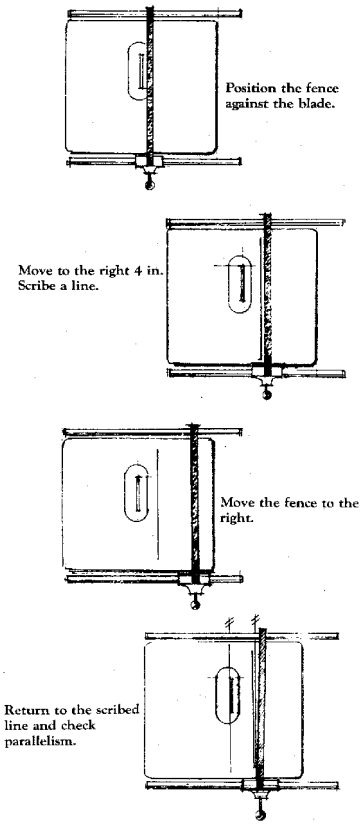


Figure C. *Four steps to line up the fence.*

ALIGNING the FENCE

Ideally, we would prefer everything—slots, blade and fence—to be aligned accurately. If this is impossible, then the important factor is to make the fence parallel to the blade.

Begin with the blade lowered and scribe a line, parallel to the miter gauge slots, which passes through the center of the slot in the table saw insert (Figure A). Once the line is plotted, raise the blade to its full height and place a straightedge against it to check that it is parallel to the scribed line. The straightedge must lay firmly against the blade disk and not be deflected by one of the tungsten carbide tips. Make the check a number of times by revolving the blade 1/8 turn at a time (Figure B). If the blade and slots are misaligned, parallelism is usually achieved in one of two ways: the blade is moved relative to the table—or the tabletop is moved relative to the blade.

It is common on smaller machines to find that the motor and blade assembly is mounted to the under-side of the table. This enables the blade to be adjusted to the slots. On larger machines the motor and blade assembly is attached to the base which means the table top can be adjusted at its mounting points on the base.

Making the fence parallel to the slots may be complicated by the fact that the fence does not lock at a constant angle after it has been moved. To check the fence, begin by positioning it against the blade. Move it to the right 4 inches and lock it. Scribe the line of the fence across the table. Now move the fence 8 inches from the blade and then return it to the 4-inch position. Lock it and scribe a second line. The second line will coincide with the first line on the front edge of the table. If there is a gap between the lines it will be at the back edge. Over a 24-inch table there should be less than 1/32-inch difference in the two lines (Figure C). If you cannot meet this standard by adjusting the fence, you should consider buying one of the fences on the market which meet or exceed this accuracy.

The alternative is to constantly remember to set the fence so that the gap at the back edge of the blade is wider than the gap at the front edge. This is accomplished by always moving the fence toward the blade when making the final setting. Once the fence is adjusted to always lock up at the angle, it must then be adjusted to lock up parallel to the slots and blade. The attachment of a tapered auxiliary fence may be necessary to achieve parallelism.