Tablesaw

The tablesaw is the central power tool in many woodworking shops. With it, you can rip, cross-cut, miter, bevel, make dado joints, and more, all essential steps in transforming wood into furniture.

The table saw operates by the woodworker pushing a workpiece securely along a fence across the saw table into a high speed spinning circular blade. The cut is smooth and safe as long as the workpiece stays flat on the table and snug against the fence. The workpiece is controlled either by the woodworker’s hands or by using push blocks and feather boards.

Section 1 - Two major dangers.

There are two major dangers in using the tablesaw. The first is particularly important to the blind woodworkers and is the danger of fingers coming directly into contact with the blade or unknowingly straying into contact with the blade. Because of the high speed and sharpness of the blade ANY contact is dangerous and likely to lead to the loss of one or more fingers. That is the leading danger, but at the same time, many blind woodworkers successfully use the table saw everyday by following a few simple rules for safe procedures.

The second danger is kickback— what happens when the blade raises the stock and hurls it back toward you at mind-numbing speed. The tablesaw blade makes a straight cut called a kerf and the wood stays flat on the table so long as the kerf—the cutaway portion of the wood—stays straight and parallel to the blade. If the workpiece angles slightly, the rapidly spinning blade grabs the wood next to the kerf, forcefully raises the workpiece off the table so that the speed of the blade can throw the workpiece back at the woodworker.

The safe solution. Both dangers can be avoided by following proper operating techniques. The most basic rule never to be violated is to keep your hands and fingers well away from the blade—that means keeping them at least six inches away. Do not place your hands directly on the workpiece to push it against the fence and forward into the blade. Use a push block (or push shoe) consisting of a base, something like a 6 or 8 inch length of two-by-four to rest directly on top of the workpiece, with a handle grip sticking above the push block base that will keep your hand well above the top of the blade. The push block needs a small hook-like ledge attached to the trailing end of the push block that will engage the end of the workpiece and push the workpiece forward into the blade or at least a glued-on thin rubber-like pad on the bottom face of the block that will help grip the workpiece, or even a glued-on sheet of 150 or 220 grit sandpaper on the bottom. The push block holds the workpiece down flat on the table as well as snugly against the rip fence. The blade will slightly cut into the bottom of the push block but that is okay. When the push block bottom is so beat up that it won’t lie flat, simply make a new one.

Push sticks are also used but they are a bit more clumsy to use. A push stick is a length of wood or plastic about 8 to 12 inches long with a notch at the bottom to engage the workpiece. Push sticks easily push the wood forward into the blade while keeping the operator’s hand away from the blade but it’s more difficult for the push stick to hold the workpiece flat on the table. In either push block, push shoe or push stick operation, the woodworker uses the right hand to control the block or stick thereby keeping the right hand well away from the blade. The left hand then must be secured away from the blade as well. This is often done by the woodworker lightly gripping the front left-hand edge of the table.

Darrel Vickers, our webmaster in Missouri, says kickback is controlled by being sure that the right-hand edge of the workpiece is held snugly against the rip fence and sufficient pressure is maintained on the top of the workpiece to hold it flat on the table. The push block accomplishes this easily. For additional security, always use a featherboard to put side pressure on the left-hand edge of the workpiece to ensure that the workpiece stays snugly against the rip fence. With pressure on top of the workpiece and against its left edge, the board will stay flat on the table and snugly against the fence so that the cut will be straight and there will be no kickback. Featherboards are wooden or plastic sets of flexible slats, or fingers, that hold the workpiece firmly against the fence (or down to the table).

First practice session. Blind woodworkers safely use the table saw everyday by following these few safe operating procedures. It does take some practice to first overcome fears, and then to develop your own smooth, comfortable technique, but it can be done relatively easily with a bit of practice. For newbie practice, get a wide board no more than a foot or two long. A piece of plywood roughly 12 by 12 works well. Set the rip fence so that you will be cutting off only about a half-inch wide strip from the far edge of the board. Position the board on the table against the rip fence so that the board overhangs the blade by about a half inch. Position the featherboard against the left edge of the board. Position the push block on top of the board and at the back end of the board. Stand slightly to the left of the board. ***Important: Do not turn on the table saw motor.*** Position your hands properly with the left hand lightly holding the front edge of the table closest to your body and the right hand on top of the push block. Using the push block, gently push the board forward until it bumps up against the blade. Notice where your hands are now. Try that pushing motion a few times to develop a bit of rhythm and to keep your hands properly in position. Notice how high your right hand is above the blade and how your left hand is safely removed from the blade.

Next, repeat the same motion but, in addition, apply a little pressure to the right side (as well as to moving forward) so that the workpiece stays snugly against the rip fence and is pushed forward until it bumps against the blade. Notice where your hands are and notice how you have applied pressure both forwards and sideways, with more force going forward and a lesser force going to the side.

Alright—-now’s the moment for your first test cut. Pull back the board, keep your right hand on top of the push block, stand slightly to the left of the board, use your left hand to turn on the motor and then again to lightly hold the front edge of the table. As the table saw blade gets up to speed, using only your right hand, push the push block forward (and slightly to the right) in a smooth motion so that the leading end of the board engages the blade and continue that motion exactly straight forward until the board is completely through the blade and the cut-off falls to the left side. Do not be startled by the moment the blade contacts the wood or the noise that is made as the wood is first cut by the blade. Just keep pushing forward and complete the cut. You will distinctly hear the saw blade cutting and again distinctly hear when the cut is completed.

Once the cut is complete, do not move the board or workpiece any farther forward. Use your left hand to turn off the motor. Wait and listen for the blade to stop completely. Then reaching forward with your left hand and running it along the top of the rip fence, help your right hand retrieve the board. Yes, some woodworkers do it differently once the board is all the way through the blade. They reach up and over the blade with their left hand to help retrieve the board, and then turn off the saw. I strongly prefer the safety of the first alternative because with it you are not blindly reaching over a spinning blade.

Repeat this cut a number of times to develop both confidence and smooth technique. Before each subsequent cut you will need to move the rip fence slightly closer to the blade so that the workpiece will overhang the blade. By the time the board becomes a narrow piece of wood you will have developed the basic skill of safely making rip cuts on the table saw.

The balance of this chapter covers the basic cutting operations, setup procedures, and safety practices. It is aimed toward the beginning woodworker but there is some timely advice for the intermediate woodworker as well. The chapter is organized to individually describe various type of cuts. For this reason much material is repeated. That is essential so that you get a full description how each cut is made. We want you to be able to refer to this manual to look up a particular type of cut and get a complete lesson in how to make that cut.

There are many opinions about how to “correctly” operate a tablesaw and there are some definite do’s and don’ts, but in the end, many things are up to the individual, responsible choice of the operator. What works safely for you? With that in mind, we present information that works well for other blind and sighted woodworkers. You need to judge what will work safely for you. If a procedure does not seem safe to you, don’t do it. Find a different way to do it safely.

Section 2 - Personal Safety Rules

And like any other manual, let’s begin with safe practices. Bob Kennedy, our Southern tool commentator, wryly notes, “Tablesaw kickback, while not yet an Olympic event, does offer everything viewers want in an event. Think of it. With one mistake, there is force, speed and impact. And all before you can get nasty words out.” Don’t be caught flatfooted. Be careful! Be safe! Know how to make cuts properly.

Safety glasses, goggles, and face shields keep the dust and debris out of your eyes. When making your first practice cuts you will have noticed lots of sawdust being thrust up off of the back of blade and directly towards your face. Safety glasses, goggles and face shields will protect you from flying sawdust. If you cut aluminum or plastics, a face shield will keep the hot filings from burning into your face.

The same sawdust thrown up from the blade will find its way to your nose and mouth. You need some kind of breathing protection to stop this harmful sawdust from being breathed in. Unfortunately, wood dust is a recognized carcinogen. Dust masks are extremely helpful in protecting against dust and when cutting wood that may be toxic. It’s the smallest particles—the ones you cannot see—that are most damaging to the throat and lungs. Some exotic woods cause an allergic reaction—anywhere from mild to severe—to some people.

Hearing protection will limit hearing damage from the tablesaws’s average 105 decibel level (db). Foam ear plugs are favored by some, while others prefer the earmuff style. Look for protection that will reduce the noise by at least 25 db. OSHA considers any sustained noise level over 85 decibels to be unsafe. Choose the type of hearing protection that is comfortable for you and that you will actually use.

Gloves are not recommended because they can snag on the saw or the wood, add a false sense of security, and limit your ability to feel.

Keep your hands well away from the blade. Place the push block on top of the workpiece, place your right hand on top of the push block and your left hand lightly on the front edge of the tablesaw.

Stand slightly to the left side of the workpiece to avoid getting hit by kickback. This position is also a comfortable one for feeding the workpiece forward into the blade while keeping the workpiece snugly against the rip fence.

Know where your hands are, and know where the off switch is located so that you can turn off the machine easily and quickly if need be.

Always unplug the saw when changing blades.

Never pull a piece back towards you if it binds. Hold tight and turn the saw off.

Remember that the blade on many saws continues to spin for up to thirty seconds after power is turned off.

If you are uncomfortable with an operation, don’t do it. Find a safer way.

Fortunately, many modern tablesaws have built-in safety features that can help keep you safe. Keep those safety features in place—don’t remove them. And, there are many aftermarket devices that can help.

Section 3 - Tablesaw Parts, Safety Tools and Jigs

Being familiar with all of the basic parts of the tablesaw is quite important both for convenience as well as safety. The table saw tabletop is obvious and is the surface where all tablesaw cutting is done. The edge closest to the woodworker is the front of the top or the saw and the opposite edge that you have to reach over the blade to get to is the back of the saw. The saw blade is roughly centered in the tabletop and will be perpendicular to both the front and back edges of the tabletop. The front rail runs from left to right, is attached to the tabletop and serves as a guide and brace for the rip fence. The power switch typically is located below the tabletop and front rail and to the left, but some older saws may have the power switch nearer the middle or to the right. The tabletop will have one or two miter slots running from the front of the saw to the back and exactly parallel to the blade. These slots usually are three-quarters inch wide and three-eighths inch deep. The miter gauge bar rides in these slots. Some miter slots have solid sides while others will have additional slight grooves on the slot sides near the bottom of the slot to accommodate a T-fitting on the miter gauge bar. The rip fence is a long, adjustable, relatively stable length of thick but hollow metal that runs across the tabletop from the front to the back and exactly parallel to the blade and miter slots. The rip fence attaches to the front rail by moving a handle at the head of the fence containing a cam that locks to the front rail. The rip fence can be loosened to move the rip fence right or left and then tightened to lock in place a specific setting. All measurements are made between an inside tooth of the blade and the inside face of the locked rip fence. Below the front rail and in the front of the cabinet, table stand or table legs is a handwheel used to raise and lower the blade. Usually there is a tightening knob on the handwheel so that the blade height setting can be locked in place. On the right side of the cabinet, table stand or table legs and also below the tabletop is a second hand wheel so that the blade can be tilted from 90-vertical position to any angle setting down from 90-degrees to 45-degrees. Usually there is a tightening knob on the handwheel so that the blade tilt setting can be locked in place. The motor is either within the cabinet or hanging from the back of the table stand or table legs. A drive belt connecting the shaft of the motor to a pulley on the arbor provides the power for the tablesaw. The tablesaw may have additional tables attached on either side of the tabletop to give greater space and working area. A few saws may have an auxiliary outfeed table mounted on the backside of the saw (and even fewer may have an auxiliary table attached to the right front side of the saw) to assist in holding long boards as they are being ripped. All auxiliary tables must be flush to the tablesaw’s tabletop surface. And some saws may be mounted on mobile bases to assist in moving the saw from one location to another, particularly useful when the saw has to be moved to accommodate a particularly large board or sheet goods.

Most table saw have set screws (usually in the face surface of the tabletop near the blade itself) that can be adjusted so that they provide a stop to the blade tilt mechanism stopping it at exactly 45-degrees. There is a second similar set screw that can be adjusted to prohibit the blade from being tilted any more than 90-degrees.

Most modern saws come equipped with safety features and there are a number of aftermarket products and shop-made jigs to help with tablesaw safety. Basically, these devices make it easy to turn off the saw, hold the stock tight to the fence, hold the stock firmly in position, push the stock safely through the sawblade, help prevent binding, help prevent kickback, and help prevent you from contacting the spinning blade.

A Paddle Style Safety Switch is an electrical box usually mounted under the front fence rail containing a recessed button to turn the power on and a paddle covering the off switch. Being recessed, you can't accidentally start the saw. The paddle covers the off switch permitting you to bump the paddle with a hip or thigh to shut off the motor which is very convenient because you don't have to let go of holding the workpiece to shut off the saw. Many saws come with this style of switch as original equipment. After-market models can be purchased for between $15 and $40 through most woodworking supply stores.

Featherboards are wooden or plastic (and sometimes metal) sets of flexible slats, or fingers that hold the workpiece firmly against the fence (or down to the table) assisting in preventing kickback when ripping boards. Featherboards are roughly shaped like a bird’s feather with the slats or feathers going out at an angle from the stem. Featherboards either fit in a miter slot, or are held by magnets to mount the featherboard to the table surface and/or the fence. Position your featherboard slightly before the blade (that is, in front of the blade and closer to you) so that it pushes the workpiece against the fence rather than putting any sideways pressure on the blade. Always use a featherboard when ripping stock.

There are many versions but two popular magnetic featherboards are especially useful:

Magswitch Universal Magnetic Featherboards are devices with one or two rows of feathers or fingers and two twist knobs controlling magnets that can easily be released for repositioning. There are versions that can hold the stock down as well as press it against the fence. These magnetic feather boards are available online and at woodworking stores for about $50 to $70.

Grip-Tite Featherboard is a strong magnet housed in a block of plastic with a handle grip and a cam lever that mounts to a table saw table. A firm plastic flap protrudes from each side. Twisting the cam lever releases the magnet. This magnetic feaherboard is available online and at woodworking stores for about $40

Many saws use an aluminum or granite table where magnets won’t work. For these, select a featherboard that locks into the miter slots of the table by turning a knob to widen a locking bar. These miter slot featherboards are less expensive but fussier to position and turning the twist knob to lock it in place can be tiresome particularly for aging hands. These non-magnetic feather boards are available online and at woodworking stores for about $20.

Blade Guards are viewed as mixed blessings by most woodworkers because the guards are an important safety device but all too often are inconvenient to use. Blade guards are metal or plastic shields that are mounted to the table saw and loosely fit over the table saw blade to guard against fingers touching the blade. The blade guard should be easy to use so you actually ***do***use it. Unfortunately, for some operations the blade guard is in the way. Some guards will stay up for setting the fence, some don’t. This is a problem for many blind woodworkers when setting the fence distance or blade height. It often takes both hands to set the distance to the fence when using a click rule or Roto-matic. Holding the guard up with your chin can be annoying. If your blade guard tends to drop down, use a piece of scrap to block it and hold it up.

Anti kickback pawls are spring loaded serrated toothed pieces of metal that are half, or quarter moon shaped that ride on either side of the blade and usually are attached to the blade guard. The pawls ride on top of the workpiece and help prevent the stock from slipping backwards causing kickback.

The tablesaw insert or throat plate is the removable flat part that surrounds the blade. It’s removable so you can get at the nut on the arbor to change the blade.

A tablesaw splitter is a piece of stiff metal or wood attached to the insert throat plate (and sometimes to the trunnion frame), positioned behind the blade and designed to keep the kerf from closing and therefore binding. Because the splitter often is fixed permanently to the insert throat plate or trunnion frame it is not adjustable and frequently interferes with making rabbet or dado cuts on the tablesaw. Woodworkers usually have an alternate insert without a splitter to use in such cases.

The riving knife is a thin piece of stiff metal mounted to an extension behind the tablesaw arbor (the shaft or axle that holds the blade) and positioned behind the blade to keep the kerf cut open. If the kerf closes it will bind the workpiece possibly causing kickback. When attached to the arbor the riving knife rises and falls in line with the blade depth being increased or decreased so the riving knife can be used while crosscutting as well as when ripping. Riving knives are standard equipment on most new table saws but not at all on older models. Older models have table saw splitters. Whichever style you use, the riving knife or splitter is essential for keeping the kerf open. Some woods will twist inward when cut and either grip the blade tightly making continuing the cut difficult or even causing kickback. Don’t make rip cuts without a splitter in place.

Push Blocks or Shoes are wooden or plastic devices used to push the workpiece through the blade. The general rule of thumb for all sighted woodworkers is to use a pushing device if the distance between the fence and blade is less than six inches. Blind woodworkers should **always** use a pushing device when ripping **any** board. If you, nonetheless, use your fingers to push the stock through, hook your right hand small finger over the fence and use your thumb and index finger to push the stock. This will help keep your fingers away from the blade but it’s still best to use a push stick or push block or shoe.

Push blocks or shoes are the favorite of many woodworkers and were described in detail above in First Practice Session. The design of the block or shoe puts downward and forward pressure on the stock. The push block or shoe is simply a base with a trailing hook or ledger, or a gripping surface on the bottom face of the shoes or block, and a handle or grip mounted perpendicular to the base. Actually, you might think of them as push boots rather than shoes, since your hand rides anywhere between a few inches to more than six inches above the table depending on the style of handle.

A push stick is a length of wood with a notch at the bottom to engage the trailing edge of a workpiece. Push sticks tend to be longer than the handle height on push blocks or shoes and keep the woodworker’s hand farther away from the blade, but they are a bit clumsier to use.

The Microjig GRR-Ripper Push Block is a patented hard plastic sophisticated push block. The device has a base with two fixed legs that ride on the workpiece and an adjustable center leg that can be positioned to form a tunnel that keeps the adjustable leg away from the blade. An adjustable side balance support is used when the workpiece is narrower than the base. The device has a treaded grooved non-slip material on the bottom of the three legs to grip onto the top of the workpiece. Additional accessories are also available.

This very safe and very useful push block is available online and at woodworking stores for about $60 to $80 and there is a range of additional accessories available.

A zero-clearance insert is a piece of wood or plastic fitted snugly around the saw blade. The insert fits into the long oval opening around the saw blade. That opening around the blade is machined to give the woodworker enough clearance to change blades. The better the insert fits, the less tearout will be produced on a cut since the wood edges of the workpiece are supported underneath. Original equipment inserts come with a wide slot in the insert that accommodates blade tilt anywhere from 90-degrees to 45-degrees and various blade thicknesses. But the wide slot allows “feathering” or “whiskers” on the bottom side of the unsupported board. The wide slot also can trap thin offcuts of a board. Woodworkers often make their own zero-clearance inserts and tilt inserts and dado blade inserts to avoid these problems.

Section 4 - Truing or Squaring a Tablesaw

It is critically important that your tablesaw be accurately tuned so that it produces cuts that are precisely square. This means that the blade must be sharp, free of resin buildup, and must cut exactly parallel to the rip fence and to the miter slots. A number of excellent woodworking write-ups and videos are available online from various woodworkers as well as woodworking videos at <https://www.youtube.com>. covering setup and alignment of table saws.

Here’s a method for truing the saw blade to the table slots and fence from Bob Kennedy, a woodworker who never met a tool he didn’t want to own:

“There are different ways to obtain parallel depending on the model you own. How the adjustment is made depends on whether the motor mounts to a trunnion or to the underside of the table. Many contractor saws mount to the underside of the table, while hybrid and cabinet style saws have trunnions. Delta contractor saws have trunnions that hang from the underside of the table.

“Squaring the sawblade to the miter slot. There are many ways recommended to adjust the blade to parallel. The most common and most accurate method requires use of a dial indicator but the use of a dial indicator requires sighted assistance. There are no Braille or talking dial indicators.

“One way a blind person can square the blade is to take a piece of tape, stick it to the left side of the blade on any tooth you choose. The only purpose of the tape is to identify the blade tooth that you are using to measure parallel. Stand at the side of the saw. To help with mental imaging, stand at the front of the saw as if you are ready to cut, then move to the left side. Bring the taped tooth of the blade forward toward the front of the saw until that tooth is about even with the surface of the table.

“Using a combination square, set the short locking part of the square in the miter track closest to you. Note: My Starrett combination square short side is too large to fit into the miter slot. I can place the long side into the miter slot so that the combo blade can be extended to touch the tooth. Extend the blade until it lightly touches the side of the saw blade tooth opposite the tape. It is very important to keep pressure against the side of the miter slot so the square is held truly perpendicular to the saw blade.

“Tighten the locking wheel when the blade of the square and the saw blade make the slightest contact. Gently move the blade back and forth so you can feel a slight drag on the square blade.

“Now rotate the saw blade 180-degrees so the tooth with the tape is now at the surface of the table at the back of the saw. Move the square toward the back end of the miter slot, and check to see if the blade of the square still touches the saw blade.

“With your free hand, rock the saw blade again to feel the tension between the two blades. If it is close to the same as it felt on the front end this is good enough. Any difference will require adjusting under the table no matter the style saw you have.

“I have made a continuity tester tool for adjusting my saw that would work in any saw. I took a piece of miter bar stock and mounted it under a scrap piece of cabinet grade plywood. The wood is approximately four inches wide and its length is an inch short of the distance from the miter slot the the saw blade.

“In the end of the wood closest to the blade, I drilled a hole and mounted a 10-32 nut. Then I took a machine screw with the same threads and ran a jam or locking nut on to it. Finally the screw is threaded into the nut in the wood. I made a continuity tester from available parts at Radio Shack, although its original use wasn’t for squaring a saw.

“When I test for square now, I set the plywood base with miter bar in the miter slot. One lead from the continuity tester clips to the saw blade and the other clips on the screw. I thread the screw out until the buzzer turns on and tighten the jam nut. To make sure the screw isn’t too tight; I put pressure by hand on the side of the saw blade until the buzzer stops. If you feel like the saw is going to move before the buzzer stops, it’s too tight.

“Next, rotate the blade to the back and check to see if the buzzer stays on. I don’t ram the screw against the blade, just until the buzzer sounds, this means I have enough contact to complete the circuit. By putting pressure on the saw blade, I can break contact in the front. If I can do the same at the back end, that is pretty close to square. Unless your arbor has tremendous runout, this method will be really accurate.

“Acceptable runout for the arbor is between one and four thousandths of an inch. The thickness of a US dollar bill is four thousandths. If you have to be more accurate than that, buy a milling machine.”

Squaring the rip fence to the miter slot. Once you determine the saw blade is parallel to the miter slots, make sure the fence is square to the table. You can check this by bringing the fence to the edge of a miter slot and locking it in place. No part of the fence should extend over the edge of the slot. If the near end of the rip fence extends over the edge of the miter slot, then move the fence slightly so that the fence is exactly at the edge of the miter slot and your finger cannot feel even the slightest ridge or difference between the fence the miter slot. Now check the opposite end of the rip fence. If it either overhangs the edge of the miter slot or doesn’t quite come up to the edge, then the fence is not parallel to the miter slot and needs to be adjusted.

Adjusting the fence again depends on your type of saw or if you have an aftermarket application. The gold standard for table saw fences is the Biesemeyer brand. This is a T-style fence, with the top of the T being at the front of the saw where the woodworker stands.

To adjust this fence, there are Allen screws that thread out against the side of the fence clamp. The clamp is pulled against the edge of the table when locked. Depending on which way you thread these screws, the fence will either open or close the distance between the edge of the miter slot and the fence. You do have to take the fence off to make these adjustments, but not very often. A good rule of thumb is to check the tablesaw for proper alignment whenever you begin an important new project.

Other fences may have bolt heads on the top of the fence to control a cam inside the fence to make a similar adjustment. These two types are by no means the only way to adjust the fence. You may need to check your operating manual or go online for instructions on how to adjust your particular type of rip fence. Again it is your responsibility to know how your own saw works.

One rule to remember. Don’t worry about the squareness of the fence until you lock it in place. The locking mechanism tightens the fence and in turn, draws the fence into its final position. This locked position is essential for checking if the fence is parallel to the miter slot. Unlocking the fence can cause it to spring out of line and you do not want to be checking parallel from this unlocked position.

There is a school of thought that says the tail end of the fence (the end farthest away from the woodworker) should be skewed ever so slightly a small fraction of an inch wider than the front to “free” the workpiece as it passes the blade and prevent the wood from dragging against the blade during the final few inches of the cut. This difference should be no more than about one-sixty-fourth of an inch. No harm, however, comes from having the fence exactly square to the table. By no means should it ever be closer to the blade on the tail end than on the front. This will cause the board to become pinched and creates an excellent chance for kickback. Note: Some jigs and push blocks are designed to ride in the miter slot as well as against the fence. It you use a jig like that, you want your fence exactly parallel to the blade.

Once the table saw is setup, tuned and aligned, it’s time to put the table saw to good use.

Section 5 - Rip Cuts on the Tablesaw

Rip cuts and cross cuts are the two fundamental cuts made on the tablesaw and are the most frequent cuts woodworkers make. A rip cut is a cut along the grain of the wood, that is, in line with the wood’s grain, usually along the length of the workpiece. Rip cuts make a wide board narrower. Rip cuts are guided by the rip fence. Once a long edge of the board has been jointed (see the chapter on Four Squaring Wood), that straight edge is taken to the table saw with the straight or jointed edge placed against the rip fence so that the other long side of the wood can be cut exactly parallel to the jointed straight edge. This is an essential step in four squaring wood.

Rip cuts along the grain and length of the workpiece are used to cut a workpiece to exact width. Very often when initially preparing stock to use in a project, the first rip cuts will be made slightly wide to allow the wood to expand or contract across the grain while the wood rests overnight. Once the wood has settled, the workpiece will be ripped again to exact width.

Your first practice steps in Section 1 of this chapter demonstrated the basic technique for ripping thin strips of wood. Now let’s take a larger piece of wood, say 8/4 (eight quarter) thickness, about eight inches wides and roughly about three or four feet in length. Such a piece of wood might be the stock for legs to a table. Or take a standard piece of wood, say 4/4 (four quarter) thickness, about three to four inches wide and also about four feet in length. Such a standard piece of wood might well be the stock for the aprons or rails of a table.

Second practice session. Because this longer length of wood is noticeably different from the short piece used in your first practice steps, let’s do a set of steps in a second practice session. Set the rip fence about an inch wider than than your workpiece. This will let you practice pushing the board all the way through to the outfeed side of the sawtable. **Note: do not turn on the motor. The motor must be off for these practice steps.**

Now position the workpiece on the table and adjust your feather board to hold the workpiece against the fence. Use your left hand to set up the workpiece, featherboard and push block while your right hand reaches back to balance the workpiece. Only about the first 12 inches of the workpiece will fit on the table saw table and the rest will extend out beyond the front of the table. You will need to balance this length of wood and keep it parallel to the saw’s table and the floor. Be sure to keep the front of the workpiece flat on the table and the back of the workpiece parallel to the floor and table. Stand slightly to the left of the workpiece and blade with your left foot forward, your left hip against the front rail, your right foot slightly back and your body slightly facing the leading end of the workpiece. The longer the board the more you will have to position your right foot behind your body and the more your body will have to be turned towards the workpiece.

Once everything seems set up, hold the workpiece in position with your left hand, use your right hand to move the push block towards the back of the board, making sure that the leading end of the board does not contact the blade but remains in front of the blade. **Note: do not turn on the motor. The motor must be off for these practice steps.**

Now keep your left hand on top of the workpiece to hold it flat down on the table, keeping your left hand well back from the blade. Begin to push the board forward with your right hand, with your right arm in line with the board, keeping your left hand in the same fixed position holding the board down while the board slides under your left hand fingers as if actually making the cut. Once the trailing end of the board comes close to the tablesaw, use your right hand to slide the push block back to the end of the board, engage it, and then use the push block to push the board down onto the table and forward as if to complete the cut. Be careful that you do not push down on the push block too soon causing the leading end of the bottom to rise up off of the table. If your push block has a non-skid material on its bottom face you will be able to push the board forward without reaching for the end of the board and without having to engage the hook ledger at the end of the push block. You may even use two such push blocks, one in each hand using a smooth hand over hand motion with each hand pushing the workpiece about twelve inches or so.

The positioning and moving of the hands can be cumbersome to begin with so you need to develop a safe rhythm of keeping the left hand fingers on top of the board while pushing with the right hand and smoothly switching from pushing with your fingers to pushing with the push block. It will take some practice. If you feel uncomfortable with your technique, then go back to the first practice steps exercise and repeat it, using a 12-inch long board to begin with, then gradually using slightly longer boards until you handle boards four or five feet long comfortably.

You cannot expect to be a pro with your first few cuts—you have to gradually work up to excellence. There is nothing wrong with practicing moving from small boards to longer boards because it’s the best way of learning to cut safely and smoothly. Above all, do all practice steps slowly and smoothly. Repeat all practice steps until you develop a smooth, fluid motion. Making quick cuts with jerky motions is a sure way to disaster.

Now you’re ready to make an actual rip cut.

Setting the rip fence for width of cut. First, determine the width of the rip cut you need to make. For table legs, generally you want the stock to be square in cross section so the width will equal the 8/4 (eight quarter) thickness in our example above. Note: 8/4 thickness, of course, is not 2 inches (that’s only the rough measurement at the sawmill). Eight quarter thickness is actually 1 3/4 inches thick (one and three quarters inches). So set the rip fence at 1 3/4 inches. Set the rip fence using a click rule, Roto-matic or other measuring device such as a 1-2-3 block and other set-up bars. Be sure that you are measuring the distance from inside the tooth of the saw blade to the inside face of the fence and not from the body of the blade to the fence. And be sure that you are using the alternating tooth that bevels out sightly toward the fence side of the blade and not the alternating tooth that bevels out slightly to the other side of the blade. There is a small but important difference between these two measurements.

Each blind woodworker with develop a familiar way of measuring and setting the rip fence. Gil Johnson and Jim Nordquist say they measure from the “wrong end” of the click rule, that is, they set the desired measurement deducting a quarter-inch for the thickness of the click rule nut or stop, set the nut against the blade and then set the rip fence against the end of the click rule.

An important caution here. Many woodworkers find that the rip fence moves when they lock it down. To avoid that problem,set the rip fence to the exact measurement you want, then press down and hold the rip fence in place while gradually pushing down the locking handle. Now check the measurement a second time to make sure you haven’t moved the rip fence while locking it. If so, make the necessary adjustment and try again.

Tom Huhn and Louis Scrivani always set the rip fence and first cut a test piece a little wide. They then measure the width and keep adjusting the rip fence ever so slightly closer to the blade until they sneak up on the dimension and get a cut at the perfect width. Then they know the rip fence is set correctly.

Max Robinson gets to the exact dimension by “kissing” with repeated cuts with the blade until it is right on. By “kissing” he means he pushes the edge of the board against the front teeth on the right side of the saw blade causing it to flex a tiny bit and then sets the rip fence against the opposite edge of the board. This, of course, is done with the motor turned off. He then turns on the motor and makes the rip cut taking off a tiny sliver from the board’s edge. He repeatedly measures and “kisses” again until the board is at the exact width he wants. Each pass or kiss probably takes off about one sixty-fourth of an inch, certainly no more than a thirty-second of an inch.

Making repeat rip cuts. If you need to make multiple rip cuts of the same width, make all of the cuts sequentially, one after the other so that each will be made at the same exact fence setting. If you cannot make all of the cuts in a single session, then once you’ve cut as many boards as you first need, cut a reference board at least 12 inches long and at the proper width before changing the rip fence setting, then mark that board for future reference.

Later, when you want to repeat the cut at the same setting, use the reference board to set the rip fence. Position the reference board against the sawblade making sure that the edge of the board touches the blade’s teeth and set the rip fence against the opposite edge of the board. The fence should not be set so that you cannot move the reference board. The setting should be just wide enough to allow the board to slide smoothly between the blade and fence but without side to side play.

Setting blade height. The motor, of course, should always be off when making table saw settings. Once you have the rip fence set correctly, next, set the blade height. Blade height can be set with the click rule or Roto-matic, or can be measured by feeling the top edge of the blade against the top surface of wood or metal set-up blocks positioned right against the side of the blade.

Blade height usually should be set so that a full tooth and gullet protrudes above the top face of the workpiece. Measure this height by setting the board against the blade and use your fingers to feel the height of the blade above the face of the board. This will be a height of about three-eighths inch above the surface of the workpiece. The gullet has to be above the workpiece so that sawdust can be more easily excavated from the cut as the blade spins. And just as importantly, by keeping the blade height at only about three-eighths inch above the face of the workpiece, less of the blade is exposed so there is less danger to straying fingers.

Ripping longer boards. A much more difficult chore is cutting long boards, say anything over four, five or six feet in length. Because of the length of the board, if you hold the trailing end of the board you will be away from the table saw and unable to use your left hand fingers to hold the workpiece flat on the table. Here, a feather board is particularly important in keeping the board snugly against the fence. In this case, reach your left hand forward to be sure the featherboard is holding the workpiece against the fence, then lift up the trailing end slightly so you are sure the leading end stays down on the table, and smoothly move the board forward. As your body gets nearer to the tablesaw you will have the board flat on the table and you can position the push block so that your right hand can grip the push block and complete the cut. This process requires practice to be sure you are making the cut smoothly and safely. Practice it carefully and repeatedly so you are able to make your long rip cuts smoothly and effortlessly.

Problems. If you accidentally skew the workpiece during a cut by slightly moving the trailing end of the board either right or left you will cause the board to press against either the front or the back of the blade likely burning the edge of the workpiece, or worse, causing the blade to grip the workpiece and flip it up and kick it back towards you. The workpiece must be pushed only straight forward. Secondly, if because of your technique or because your blade has a build-up of resin on its teeth, you may get a rough cut. This roughness, called “machine marks”, can be removed with a hand plane set for a very light cut, or can be removed with sandpaper or an edge scraper. Problems can occur when you are cutting thick pieces of wood straining your motor. If the motor bogs down during the cut, slow down your feed rate. If the wood is simply too thick for your saw, reduce the blade height and cut at only slightly more than half the thickness of the workpiece. Then flip the workpiece end over end, keep the same edge against the rip fence and make a second cut through the second half of the thickness.

Section 6 - Cross-Cutting on the Tablesaw

Crosscuts, in addition to the rip cuts just discussed, are a fundamental cut made on the table saw and one of the most frequent cuts a woodworker makes. A crosscut is a cut across the wood’s grain, usually across the width of a board. Crosscutting makes a longer board shorter. Crosscuts are guided by the miter gauge. When the width of a board is relatively narrow it is not possible to keep the end of the board at a 90-degree angle against the rip fence because the opposite end of the board will tilt or skew somewhat. What’s needed is a fence that will carry the board sideways through the sawblade. The usual answer is to position the workpiece against the tablesaw's original equipment miter fence. A better answer is to use a heavy duty aftermarket miter fence, a crosscut sled or a sliding table. These devices provide a fence that is held firmly at a 90-degree angle to the sawblade.

The miter gauge is a table saw accessory with an adjustable protractor-like head and short fence fixed to a metal bar that rides in either of the two miter slots cut into the sawtable face. The adjusting knob on the miter gauge allows you to set it at any angle from Zero-degrees to plus or minus 45-degrees. An aftermarket miter gauge is a heavier duty and larger version that often comes with easier indexing so that it can be finely adjusted to any angle. A crosscut sled is a valuable accessory, usually wood, and frequently shopmade. The crosscut sled has a large sturdy fence mounted to a flat rectangular open base that straddles the sawblade and has two metal or wood runners that run in the two miter slots. The sturdy fence is fixed at exactly 90-degrees to the sawblade and the two runners keep the fence square to the blade. George Newberry especially likes how easily he can measure from the kerf in the sled’s fence to set up a stop block. A sliding table comes either as original equipment or as an accessory that permanently attaches to the left hand side of the sawtable. The sliding table glides on a rigid forward and back guide system with an attached stable fence that smoothly carries a workpiece through the sawblade for very accurate cuts.

Problems with standard miter gauges. Dale Leavens, our Sage of the North, writes:

“There is no law that says a sled will produce squarer cuts than a miter gauge. Miter gauges, however, do suffer a few inherent problems, particularly the usually poor ones provided as original equipment with a table saw.

“The first and most important problem is that the face of the miter gauge is usually relatively short. Four to eight inches is about as long as they get. That isn't a lot of registration surface and it can allow easy slippage. People may stick sand paper to the face of the fence to hold the work tighter and that can help. Similarly people often machine a really straight added length of hardwood and screw it to the face of the fence to lengthen it. This can really help.

“The other problem, more for sighted folk than blind woodworkers, is that the scale for the gauge isn't necessarily accurate or accurately fixed to the gauge or the pointer may not be accurately arranged. The scale is usually well inside the perimeter of the arc so the graduations are really close to each other making adjustment difficult.

“What a cross cut sled does for you is to give you rigidity from using both miter slots for reduced play, and to give you a longer fence for registration. Because the entire platform moves with the work there is less pressure to wobble the piece as it runs through the blade. And the kerf cut through the front fence is a terrific reference point for exactly where the cut will be made. Now a sled is only as good as the alignment of the fence relative to the miter slots and the parallelism of the blade to the miter slots and a kerf cut reference line is only as good as the freshness vs. age of the cut. With repeated use, the kerf cut tends to get wider and therefore less accurate.

“Where a crosscut sled really shines is when cutting a wide board like a cabinet door. Something like that is difficult to keep well aligned to the gauge while simultaneously pushing it through the saw.”

Whether a miter gauge is original equipment, or high quality aftermarket equipment, for crosscutting it is essential that the miter gauge be set exactly at zero-degrees. To do this, and to periodically check that your setting is true, you will need a squared-off reference piece of wood, say about eight inches by eight inches. To know that your reference piece is exactly square, measure both diagonals on the piece. Both diagonals must be exactly the same for the reference piece to be squared off. Now, unlock the miter gauge so that the fence can rotate freely. Place an edge of the reference piece against the blade body (not against a blade tooth), slide up the miter gauge fence snugly against the reference piece, re-lock the miter gauge so that it is now set at zero-degrees.

You also could use a 45-degree plastic drafting triangle available from art, craft and office supply stores. Position the 90-degree side against the blade body or plate, not the teeth, and then align and adjust the miter gauge to fit exactly against the other 90-degree side of the triangle using the same steps outlined above.

Third practice session. Crosscuts using the miter gauge are very different than rip cuts. For this crosscut practice session the rip fence should be moved far to the right of the tabletop so that it does not interfere in any way with your crosscutting exercise, or even removed entirely. **Note: do not turn on the motor. The motor must be off for these practice steps.**

Put the miter gauge in the left hand slot in the sawtable. Check the miter gauge to be sure it is set at Zero degrees. Position a piece of wood about one to two feet in length with a long edge against the miter fence so that its right end will overhang the sawblade by an inch or so. Put your left hand over the workpiece so that your fingers hold the wood firmly against the fence and your left thumb grips the backside of the miter gauge.

**Note: do not turn on the motor.** Using both hands—your left hand on the wood and fence and your right hand gripping the miter gauge handle—slide the miter gauge forward until the wood bumps into the blade. If necessary, now would be the time to adjust the wood right or left to be in the exact position that you want to cut. With your left hand, withdraw the wood and miter gauge away from the blade. Repeat the forward and back motion a few times to be sure you do it smoothly, fluidly and confidently.

Now turn on the motor and repeat the action of gripping the wood and miter gauge with your left hand, using both hands hand to push the miter gauge and wood forward and make the cut. Push the miter gauge forward with slow, even pressure. You will feel the saw blade engage the wood and begin to cut. Continue at the same slow, even pace. Once the cut is complete, do not touch or remove the offcut—just let it lay wherever it falls on the sawtable. Pull back the miter gauge and wood, move the wood a few inches to the right and then repeat the cut. Continue to repeat this action until the remaining wood becomes too small to safely hold against the miter gauge fence. Then turn off the motor and wait and listen for the blade to stop spinning, up to 30 seconds.

Now reach forward with your right hand and collect the offcuts. Notice that the back edge of the offcut, the area that was last cut by the blade, has some feathery whiskers whereas the rest of the cut is crisp and clean. This is blade tearout. Sometimes you might also get that feathery tearout on the top side of the workpiece. Back edge tearout can be avoided by using a backerboard behind the workpiece. The backerboard backs up and supports the workpiece edge preventing tearout while the blade cuts through the workpiece. Any tearout will appear on the backerboard, not on the workpiece. Quarter inch thick plywood or Medium Density Fiberboard (MDF) works well as a backerboard. An alternative would be to wrap the workpiece with blue painter tape in the area where the kerf will be cut.

Problems with crosscutting. If you push the miter gauge too fast or too jerkily you likely will not get a smooth cut on the end of the board. You need a slow, even movement to get a clean cut. If you let the workpiece move slightly to the right or to the left, you will not get an even or accurate cut. The workpiece has to be held exactly in position to get an accurate cut. Lining the miter gauge fence with adhesive sandpaper provides additional grip and helps maintain the wood exactly in position. If you loosen your hand grip on the wood, the force of the blade will jerk the wood out of position, likely take a gouge out of the wood and may even throw the piece of wood. Maintain firm hand pressure on the wood and fence while making the cut.

Many woodworkers want to use the rip fence as a stop block when making crosscuts because it is so easy to set the length of the cut. For sighted woodworkers, this is easy because they can easily see the rip fence setting, but it also is a very dangerous thing to do. When the workpiece is pushed forward and the blade cuts the wood, the offcut, the piece between the blade and the rip fence, is able to move freely and this movement can cause a corner of the offcut to be gripped by the blade and dangerously kicked back to the operator. The rule must be to **NEVER** use the rip fence as the actual stop block when crosscutting.

You can, however, still benefit from using the rip fence as a measuring device **provided** the rip fence does not trap the workpiece during the cut. One way of accomplishing this is to set the rip fence at a measurement of one inch greater than the length you want to cut. Then position a one-inch thick block, such as your 1-2-3 block, against the rip fence and butt the workpiece against that block to position the workpiece on the miter fence. Now remove the block, leave the rip fence in place and make the cut. The one-inch open space at the end of the workpiece is sufficient space to allow the offcut to move away from the blade without being trapped by the rip fence.

Cutting to length. In beginning a project, after a workpiece has been jointed, then cut to rough width, the next step is to cut the piece to exact length. Since wood does not expand with the grain, workpieces can be cut to exact length relatively early in the process. On the other hand, because wood expands and contracts across the grain, hold off on cutting wood to exact width. It’s best to leave workpieces cut only to rough width to give the wood a chance to settle before use.

Cutting to length first involves measuring the exact length. If the workpiece is relatively long, say a five feet long workpiece being cut from an eight feet long board, then it might be cut in two stages. The first cut is made just roughly to length to give the woodworker a more manageable piece to work with and ease the measuring and setup for a second final exact cut. For different techniques on measuring and marking the board, see the Chapter entitled Measuring and Marking. Both steps are equally important. First, you have to measure accurately and then you have to accurately mark that measurement so that you can follow the mark to make the exact cut.

Let’s say you used a click rule to measure a board at 38 1/2 inches for a piece to be used as part of a glue-up for a small tabletop. You marked the 38 1/2 inches with a knifed line and then put a piece of blue painter’s tape exactly along the inner side of the knifed line, that is, the tape is positioned on the workpiece side of the line and not on the waste portion of the board. You also could have taped a small reference or guide block to the board by using double-sided tape on the bottom side of a piece of wood, say a small block about two to three inches square, or a longer piece, so it fits comfortably on top of the workpiece. Position this reference piece exactly along the inner side of the knifed line and press down hard on the wood so that the double-faced tape adheres firmly.

Now position the workpiece on the miter gauge so that your tape marker or your reference strip just touches the left side of one tooth of the sawblade. The saw blade itself will cut a kerf typically one-eight inch wide. A thin-kerf blade will cut a kerf three-thirty-seconds inch wide. Whichever blade you use, you want the cut to be just barely touching your measurement marker. Whenever setting up a cut, be sure that the kerf you plan to cut will be in the waste portion of the board and not within the marked portion. Make sure that you use the edge of the blade tooth as the measuring point, not the body of the sawblade. And use a backerboard behind the workpiece or wrap the board with blue painter tape to help prevent tearout on the back edge of the workpiece when the blade exits the board after the cut.

Now, just as in the practice session, and before turning on the motor, grasp the board and miter gauge fence with your left hand fingers and thumb, use both hands to move the miter gauge forward so that the board touches the blade. Check to make sure that the point of contact is exactly where you want the kerf cut. If necessary move the board slightly either right of left to line up your reference marker so you are exactly on the cut line, hold the board firmly in place, pull back the miter gauge with your left hand and only then turn on the motor using your right hand, all without moving the board. Once again, use both hands to push the miter gauge and board forward and make the cut. You can then use your right hand to turn off the motor and then retract the miter gauge after the blade has stopped spinning. You also could complete the cut, continue to hold the board securely and retract the miter gauge, and then turn off the motor but it’s safer to first turn off the motor. Once the blade has stopped spinning you can reach forward with your right hand and collect the workpiece offcut as well as the backer board offcut and dispose of them.

Measuring the exact length of cuts will always be a challenge and will take time, but you can be confident that exact measurement is a challenge that certainly can be met but it will take a bit of extra time and care. Tom Huhn and Louis Scrivani always set a stop block on the auxiliary miter fence and first cut a test piece slightly long. They then measure the length and keep adjusting the stop block ever so slightly closer to the blade until they get a test cut at the perfect length. Then they know the stop block is set correctly.

Max Robinson gets to the exact dimension by “kissing” with repeated cuts with the blade until it is right on. By “kissing” Max positions the board along the miter fence and pushes the end of the board against the saw blade teeth causing it to flex a tiny bit. This, of course, is done with the motor turned off. He pulls back the miter gauge, then turns on the motor and makes the cross cut taking off a tiny sliver from the board’s end. He keeps repeating the measure and “kisses” again until the board is at the exact length he wants. This kissing technique probably takes off about one-sixty-fourth of an inch each time, certainly no more than one-thirty-second of an inch.

Making repeat crosscuts. In the crosscutting to length example above, the 38 1/2 board was to have been one of a number of boards to be used to glue-up the top of a table, so the woodworker will need to repeat that cut a number of times depending on how wide the tabletop will be and how wide the individual boards are. If you have an aftermarket miter gauge with a telescoping fence you may be able to extend the fence far enough to utilize a 38 1/2 inch stop at the left end of the board. This left end stop will automatically position boards so that their right ends are exactly next to the blade tooth for a repeat cut.

However, most miter gauge fences will not extend quite that far so you need an alternate solution in the form of an auxiliary fence. This is merely a long, straight, four-squared board that can be attached to the miter gauge fence using double-faced tape, or bolts, screws or a special clamp called a fence clamp that will clamp a threaded rod to the backside of the miter gauge fence and grip the top edge of the auxiliary fence to hold it steady. Measure out the necessary distance on the auxiliary fence and use a C-clamp or other convenient clamp to hold a small wood stop block securely in place on the auxiliary fence. Use caution and avoid bumps when positioning the workpiece against the stop block and when making the cut so that you don’t cause the stop block to move and alter the exact measurement. Repeat the process as often as necessary and each cut piece will be exactly the same length. Bill Reynolds says using a miter gauge with an auxiliary fence makes the whole measuring and setup procedure a whole lot easier. Darrel Vickers has added an auxiliary fence to his crosscut sled.

Earlier, we discussed the rule to **NEVER** use the rip fence as a stop when crosscutting. That remains true, but can benefit from using the rip fence as a measuring device provided the rip fence is far enough away from the workpiece that it doesn’t trap the offcut. One way of accomplishing this is to set the rip fence at a measurement of one inch greater than the length you want to cut. Then position a one-inch thick block or spacer against the rip fence and butt the workpiece against that spacer to position the workpiece on the miter fence. Now hold the workpiece firmly against the miter fence, remove the spacer, leave the rip fence in place, and make the cut. The one-inch open space created when the one-inch spacer is removed from the end of the workpiece is sufficient space to allow the offcut to move away from the blade without being trapped by the rip fence. Beware, however, of letting offcuts build up in this area because sooner or later one of them will be pushed into the blade and be clipped and may wind up speeding towards the woodworker.

Cross cutting with the miter gauge on the right side of the sawblade. The usual position of the miter gauge is in the miter slot on the left hand side of the sawblade. But there’s no reason cross cutting cannot also be done on the right side of the blade. Sometimes the floor position of your table saw relative to the length of wood to be cut and walls and other obstacles call for some cross cuts to be made on the right side of the blade.

All procedures would be similar to the more usual set up except for one—and that one is mighty important. Miter gauge features of The protractor head feature on the motor gauge might extend out to the left side of the miter gauge to facilitate positioning in normal usage. However, when the miter gauge is removed to the right side of the blade, most likely you will need to change the fence settings far to the right so that the sawblade does not cut through the miter gauge fence. Obviously, this is critically important. That’s one reason why the practice sessions involve dry runs in which the workpiece is moved up to the blade but the motor is turned off. This practice lets you see where everything will be at the moment the blade starts cutting. The dry run is the time to make corrections in your procedure—before you damage the wood, an accessory or jig, or, God forbid, your fingers!

Aftermarket blind friendly miter gauges are available. Incra Precision Tools makes a Miter Gauge V27 that is an economical cousin to its more expensive Miter Gauge 1000. The Miter 1000 has 41 precision angle stops or easily felt notches on its protractor head in 5-degree increments that are easy to feel and count, a 180-degree angle range, with six miter bar adjustments for zero-side-to-side play to keep the miter gauge neatly positioned in the miter slot and square to the blade, and a telescoped fence expanding from 18-inches to 31-inches. The V27 is more compact with 27 precision stops with 5-degrees between stops that are just as easy to feel and count, a 120-degree angle range, with four miter bar adjustment but the V237 model does not come with a fence. Purchasers need to add their own four-square auxiliary fence. All Incra miter bars come with adjustable nylon washers that eliminate any side to side play in the miter bar. The mounting bracket for the fence also is adjustable so that it can be maintained exactly square to the mitre bar.

No other tool maker that we know manufactures a blind friendly miter jig with such easily felt notches for setting a miter angle, although many miter gauges come with detents for common angles. A detent is a mechanical catch for alerting the woodworker that a specific miter angle has been positioned. Detents, however, are limited to common angle sizes, such as 45-degrees, 22.5-degrees, etc.

The even more expensive Incra Miter 1000HD has stops in 1-degree increments but that’s overkill and the miter gauge is not blind friendly because of the difficulty in counting and keeping track of such small notches when setting an angle.

Here are links to the two blind friendly products.

For the Incra Miter Gauge 1000 priced about $120, go to: <http://www.incra.com/miter_gauges-miter1000se.html>

For the Incra Miter Gauge V27 priced about $75, go to: <http://www.incra.com/miter_gauges-miterv27.html>

Section 7 - Miter Cuts on the Tablesaw

A miter cut is a cut at any angle other than zero or 90-degrees. Perhaps the most common miter cut is 45-degrees for making miter corners in a frame, box or case. Angled cuts at lesser degrees are required for making polygon frames such as a pentagons, hexagons, etc. Turners frequently make 10-, 12- even 20-sided frame polygons as the layers of segmented bowls that will be stacked and glued before being turned smooth. All of these cuts require different miter angle settings on the tablesaw.

There are two very different kinds of miter cuts. In one, the boards are laid flat on their face and cut. This is a flat miter or a frame miter and the cuts are made across the face of the board. These are the cuts made for making picture frames. The following discussion is restricted to flat miter or frame miters. In the second kind of cut, boards are positioned on their edge and cut. These are the edge miter cuts made for boxes and cases. This type of cut will be covered later in the section on bevel cuts on the tablesaw.

Setting Angles on the Miter Gauge. Each miter gauge comes with a slightly different locking mechanism for holding the miter fence at a desired angle. Mostly, the locking mechanism is some form of a knob that is loosened with a counter-clockwise twist movement and retightened with a clockwise movement. The Incra miter gauges come with both a locking knob and a small swinging arm that fits into a notch to more accurately keep the setting.

In general, the process is simple. Choose an angle, loosen the locking knob, turn the miter fence and gauge to the desired angle and retighten the knob. That’s the easy part. The difficult part for blind woodworkers is determining just when the miter gauge is angled to the correct degree. Setting the miter gauge to a precise angle is always a challenge for the blind woodworker.

For common angles such as 45-degrees, 30-degrees and 60-degrees, use a plastic drafting triangle available in art, craft or office supply departments. Loosen the locking mechanism, set the base of the appropriate plastic drafting triangle against the miter gauge fence and swing the protractor head of the miter gauge so that the angled side of the drafting triangle fits flat against the saw blade and the right hand end of the miter fence points towards the blade. Make sure that the edge is just against the blade plate or body and not against a blade tooth. If necessary, adjust or retract the miter gauge fence so that it will not be cut by the sawblade. Now tighten the miter gauge lock to preserve the angle.

For other less common angles, you could use sighted help in cutting individual triangular templates at the proper angle and use the new template as described above for plastic drafting triangles. You also can purchase sets of small brass or aluminum angled setup blocks that are used in the same manner for a much wider variety of angles. There are two problems with the small angled blocks: (1) you may need to combine blocks to get the exact setting you want, and (2) the small size of the angle blocks makes for a clumsier operation so that it may be difficult to fix the precise setting you’re after.

When setting the miter gauge at the proper angle, rotate the right hand leading end of the fence to point towards the sawblade. To do this rotate the miter gauge fence counter-clockwise towards the back of the tablesaw. This is the proper position for producing the most accurate miter cuts.

The reverse setting is not unsafe but with the end of the fence pointing to the front of the table saw and to the operator, the force of the cut might pull the workpiece a bit into the blade possibly causing tearout or possibly even burning the end of the workpiece. If you have a stop block mounted to the fence, the force of the cut may pull your workpiece slightly away from the stop and into the blade, thus ruining your measurement. Better practice calls for setting the miter gauge with the right hand end pointing to the sawblade.

Setting angles on Incra Miter Gauges. You will need sighted help to determine the zero degree setting on the Incra notched protractor scale. There is a screw positioned in the dial above the zero position but you will want to be exactly sure that you’ve located the exact notch marking zero degrees. Once you’ve marked the zero degree position, you can then use either the V27 basic gauge or the 1000 by counting notches from the zero degree mark. Each notch is 5 degrees. So if you want to cut a 15-degree miter, loosen the large clamping handle so the protractor head can swing, loosen the smaller thumbscrew, pivot the indexing tooth away from whatever notch it is in, count three notches from the zero notch, and set the indexing tooth into the third notch, tighten the smaller thumbscrew and then tighten the large handle. To set 22.5-degrees, count five notches from the zero notch—four notches will be for 5-degree increments and then there will be the fifth notch extremely close to the 20-degree notch and that will be the setting for 22.5-degrees. For 30-degrees, you would have to count seven notches, six for the 5-degree increments and the additional special notch for the 22.5-degree setting. And that’s it. If you need 1-degree graduations, then you have to move to the Incra 1000HD and begin counting by ones very carefully. So far as we know, the only blind friendly miter gauges around are the Incra 27V and the Incra 1000.

Fourth practice session. **Note: do not turn on the motor. The motor must be off for these practice steps**. With the miter gauge locked at the desired angle, be sure that the right hand end of the miter fence pointing towards the saw blade is positioned close to, but not touching the saw blade. Now pull the miter gauge back to the front of the table, position the workpiece along the miter fence with the right end pointing to and extending beyond the blade. You will notice that if your workpiece is wide, the miter gauge may be pulled backed beyond the front edge of the table making it difficult to balance the miter gauge level with the flat plane of the table. In such a case, you may want to turn the miter gauge in the reverse direction as noted above. In that case you will have to readjust the position of the miter fence to get it close to the saw blade. Now with the motor turned off, firmly grip the workpiece with the fingers of your left hand against the miter gauge fence, use both hands to push the miter gauge forward to touch the blade and check the position of the workpiece.

Making the first miter cut. Follow the same steps listed just above except this time, once you grip the workpiece with the fingers of your left hand, you will use your right hand to turn on the motor, then use both hands to push forward the miter gauge and workpiece. The cut line will begin near the leading right corner of the workpiece and will finish the cut a few inches down the bottom edge of the workpiece, depending on the width of the workpiece. The cut, of course, will be an angled cut. Once the cut has been completed, continue to grip the workpiece firmly, use your right hand to turn off the motor, and when the blade has stopped spinning, pull back the miter gauge and workpiece. Then reach forward with your right hand to remove the off cut.

If the width of your workpiece required you to turn the miter gauge in the reverse direction, the cut line will be in an entirely different position. The cut line will begin a number of inches to the left of the leading corner of the workpiece, depending on the width of the piece, and will end towards the trailing right hand corner of the piece. If the cut line stops before getting to the trailing edge of the board, that’s okay, simply slide the board a bit to the right and try again.

Setting up the second miter cut. There are two variations for cutting the second miter, that is, the miter to be cut at the opposite end of the board. First, you can choose the make the second cut using the same miter gauge angle setting. In this case, flip the workpiece end over end so that the just cut miter is now at the opposite end of the miter fence and the upper face of the board is now facing down, but the same edge is still against the miter fence.

Alternatively in setting up the second miter cut, you can move the miter gauge to the other miter slot on the other side of the saw blade, reset the miter gauge angle and fence position, and make the cut on the right side of the saw blade. In that case, keep the same face of the board facing up and the same edge along the miter fence. Merely slide the board along the fence and into position for the second cut.

In either case, to determine the proper length for the mitered piece, your measurement will depend on the purpose of the mitered piece and where it must fit or where something else will fit into this piece. If your are making a picture frame, the controlling measurement then will be the size of the item fitting into the frame. This means that the inside edges of the frame must accommodate the picture so the measurement will be made from the interior angle of the miter. If the frame is to be mounted on something else, say a panel on a cabinet, then you need to know the overall measurement of the frame, This means that the outside edges of the frame must fit into the panel so the measurement will be made from the exterior or outside angle of the miter.

For a square frame, of course, all four pieces will be the same length. For other frames, you will need an identical length measurement for the top and bottom frame pieces and an identical length measurement for the two side pieces. For these rectangular frames, there will be a difference in the two measurements.

When making a frame, make the first end cut on all four pieces, regardless of their ultimate lengths. When making multiple frames, make the first end cut in all pieces in the project. Then determine the precise length measurements needed for the second miter cuts. Using a sample trial piece, set a stop block on the miter fence, or auxiliary fence attached to the miter fence, and make repeated trial cuts, resetting the stop block slightly each time, until you get the exact length you need. When making the test cuts, the first mitered end goes against the stop block. For this reason the stop block works better if it has a mitered end so that the two pieces fit nicely together. Make sure that the second miter cut you are about to make is in the proper orientation. The second cut should NOT be parallel to the first cut but must be in the opposite direction so that the two angles point in different directions. If you are cutting for rectangular frames, cut as many pieces as needed for the top and bottom pieces, then reset the stop block and cut as many pieces as needed for all of the side pieces.

This process lets you organize your work so that first you have the freedom to use pieces of varying length to cut just the first angle. Then you can use the same pieces of varying length to set against a fixed stop block so that the second cut will give you not only precise angles but exact lengths for all of the workpieces. The only differences will be in the lengths of the cutoffs.

The test for perfect miters. If your miter angles are all perfectly 45-degree angles, the four sides with fit together without any gaps showing in the mitered corners. That’s your goal.

Section 8 - Bevel Cuts on the Tablesaw

Bevel cuts are another type of miter cut called edge or case miters. In a bevel cut, boards are positioned on their edge and cut so that the cut runs across the end grain. These are the cuts made for boxes and cases.

There are two different types of table saw that must be considered. One is the more common table saw where the blade has a right hand tilt. The following discussion covers right hand tilt blades. The less common type of table saw is one with a left hand blade tilt. The principles of the discussion are the same, but the directions for blade tilt and edge to be bevelled must be reversed for left hand tilt blades.

For narrow wood that is less than three inches wide, bevel cuts can be made in the same manner and with the same miter gauge settings and angles as when making frame miters. The wood is positioned on a long edge with its face against the miter gauge fence, and the cut is made in a similar manner. Table saw blades are limited in their height; generally blade cutting height is no more than 3 inches. Without a backer board, this type of cut may leave tearout or whiskers on the back side of the workpiece, so use a backboard.

The preferred method of making bevel cut is to use the miter gauge set at zero degrees, position the board with its back face down on the table and make a bevelled crosscut. Since this is quite similar to the procedure described above for cross cutting, no additional practice session will be included here for bevelled crosscuts.

Setting blade tilt angle. The key issue is tilting the table saw blade to the exact setting you desire which would be 45-degrees for boxes and cases. It is difficult checking for a perfect 45-degrees setting without sighted help. Even for sighted help the best method is to use a digital angle gauge, zeroed out on the table saw tabletop and then measured against the tilted saw blade body or plate.

An alternative method is to use a plastic drafting triangle or a specially made 45-degree template. Set the triangle on its base and slide it perpendicular to the blade so that the triangle’s diagonal side matches up against the plate or body of the saw blade. A sighted person would look at the line where the diagonal edge meets the saw blade and see if any light is visible between the two. If no light is visible then the saw blade is at a perfect 45-degree angle. Blind woodworkers could use their fingernail to probe for large gaps and can use very thin automotive feeler gauges to test whether there is any gap between the reference drafting triangle and the blade.

Once you have achieved a perfect 45-degree tilt to the saw blade, it’s critically important to keep that angle. Most table saws have set screws (usually recessed on the top face of the tabletop near the blade) that can be adjusted or set so that they provide a stop to the blade tilt mechanism stopping it at exactly 45-degrees. There is a second similar set screw that can be adjusted to prohibit the blade from being tilted any more than 90-degrees. When using a digital angle gauge or the drafting triangle method to set an exact 45-degrees, be sure the tilt set screw is loosened. Once you set the blade exactly at 45-degrees, then tighten the tilt set screw so that in the future you will more easily be able to tilt your saw blade to 45-degrees. Might as well do that also for the 90-degree setting. Sighted help is very useful in making these two settings.

Making the first bevel cut. To cut perfect bevel angles on the ends of boards to be used for a box, be sure the motor is off, the miter gauge is on the left side of the blade, the miter gauge fence is set exactly at zero degrees, and the sawblade is tilted at exactly 45-degrees. Now position one long edge of the board along the miter gauge fence, with the show face of the board facing up, the inside face of the board facing down, and so that the end of the board extends to the right slightly past the saw blade. With your left hand fingers, grip the workpiece against the miter gauge fence, use your right hand to turn on the motor, and with both hands push the miter gauge forward so that the workpiece moves into the blade cutting the 45-degree bevel across the end of the underside of the board. As with all cuts, a backer board will improve the crispness of the cut.

Making the second bevel cut. There are two variations for cutting the second bevel, that is, the bevel to be cut at the opposite end of the board.

First, you can choose to make the second cut using the same blade tilt angle angle setting. In this case, rotate the workpiece 180-degrees in a flat horizontal plane so that the just cut bevel is now at the far left at the opposite end of the miter fence, the show face of the board is still facing up, but the opposite edge is now against the miter fence and position the board using a clamped stop block to set the correct board length. Now push the miter gauge forward making the second bevel cut.

Alternatively in setting up the second bevel cut, you can move the miter gauge to the other miter slot on the other side of the saw blade, keep the same blade tilt angle angle, position the board using a stop block to set the correct board length, and make the cut on the right side of the saw blade. In that case, flip the face of the board so that the show face is now face down and the opposite edge is now along the miter fence.

Bevel cuts at the ends of narrow boards must be made with the miter gauge fence providing a straight surface for controlling the workpiece and the cut.

Bevel cuts in sheet goods. Bevel cuts in wide boards cannot be made with the miter gauge fence because wide boards and sheet goods are too large to fit between the miter gauge fence and the sawblade. Sheet goods include plywood sheets, MDF (medium density fiberboard) sheets, particle boards sheets and the like.

Generally, there is only about 12 inches of space from the front edge of the tablesaw tabletop to the blade. Once the miter gauge is pulled back beyond the front edge of the tabletop, the miter gauge becomes unbalanced and difficult to control so it cannot be used with sheet goods. Secondly, once a board or plywood sheet has about 10 to 12 inches of width to fit against the rip fence, the woodworker will have good control over the workpiece and will be able to avoid skewing the sheet by holding it firmly against the rip fence.

Bear in mind the two different ways the blade tilts on various table saw models. The following directions apply to right hand tilt blades. The less common type of table saw is one with a left hand blade tilt. The principles of the discussion are the same, but the directions for blade tilt and edge to be bevelled must be reversed for left hand tilt blades.

There are two different ways of positioning sheet goods when cutting a bevel edge. The first method is to position the sheet on the right hand side of the saw blade. The right hand edge of the sheet will ride against the rip fence and the left hand edge will get the bevel cut. But this is possible only for sheets up to about 30-inches wide depending on the length of the table saw’s front rail that holds the rip fence and the width of the table saw’s right hand extension table which supports the workpiece. Remember, to make a bevel cut there must be a straight rigid surface for controlling the workpiece and the cut.

If the sheet fits between the secured rip fence and the saw blade, position the workpiece against the rip fence and stand behind the workpiece to balance the portion of the workpiece overhanging the front of the tabletop. Place your left hand along the left edge of the workpiece with your left hand positioned close to your body. The left hand will hold the workpiece firmly against the rip fence and will also help push the workpiece forward. Turn the motor on, then position your right hand as far back as you can comfortably reach on the the right edge. Your right hand will help push the workpiece forward but should not exert any pressure to push the workpiece away from the rip fence. At all times, the right hand edge of the workpiece must be positioned fully against the rip fence.

Now push the workpiece forward being careful to stop pushing with your left hand as soon as that hand reaches the front rail of the saw. Keep your left hand in that position resting lightly against the front rail and providing pressure to the side to keep the workpiece against the rip fence. Use your right hand to continue the forward motion of the workpiece. If the piece is long, you will have to stop pushing the workpiece forward once your right hand is slightly extended in front of your body. Stop moving your right hand forward to avoid contacting the blade. Move your right hand back again as far as you can reach comfortably and repeat the forward cutting motion. For long pieces you will definitely need some form of outfeed support for the workpiece after it has passed the blade. This can be in the form of a long out feed table or support rollers.

When the cut is finished, keep your right hand on top of the workpiece holding it down but not moving it any further. Use your left hand to turn off the motor. Once the blade has entirely stopped spinning you can remove the workpiece.

The second method for making a bevel cut along the edge of sheet goods — and the method that would have to be used for sheet goods that will not fit between the blade and the rip fence — is to position the workpiece on the left hand side of the blade and move the rip fence right up to the blade. The tilted blade will extend slightly past the right hand edge of the sheet and that would mean the saw blade would cut into your rip fence. This requires the use of a sacrificial fence attached to your rip fence.

Attach the face of a length of four-quarter or thicker hardwood or plywood to your rip fence either with double-faced tape or fence clamps. Position the rip fence so that the sacrificial fence just touches the tilted blade. This position will cut off part of the width of the workpiece so it must be slightly oversize to allow the sacrifice.

If your sheets are pre-cut to exact width then you must position the rip fence closer to the blade. Turn the motor off, and lower the blade height. Very carefully slide the rip fence into place at a measurement equal to the thickness of the sacrificial fence plus thickness of the sheet minus one-eighth inch for the thickness of the sawblade. If you are using four-quarter hardwood for the sacrificial fence and plywood for sheet goods, the numbers would be three-quarters inch for the hardwood plus three-quarters inch for the plywood minus one-eighth inch for the blade kerf or a setting one and three-eighths inch. Lock the rip fence in place at that setting. This will permit the blade to come up under the workpiece, cut off a triangular length from the edge of the sheet, and the blade will exit the top face of the sheet just at the outside edge of the sheet.

To set up the cut, turn on the motor and begin raising the blade height until the blade just begins to cut into the sacrificial portion of the fence. Turn the motor off, wait for the blade to stop spinning, then take the sheet you want to bevel and position that edge against the rip fence, turn the motor on again and push the sheet forward to cut the bevel.

Once the first cut is complete, turn off the motor and after the blade stops spinning, check the bevel edge. If the edge comes to a sharp point all along the edge, the settings have been proper and the cut accurate. If the waste portion is still connected to the sheet, then the blade height was too low. Raise it a bit so the blade will cut all the way through the sheet on a repeat cut. If there is a stub flat portion at the tip of the cut, either the blade height was too low or the rip fence was too close to the blade. Raise the blade height slightly and try again. If the stub portion seems to be about the same, then the issue is the rip fence setting. Move the rip fence slightly away from the blade and try again.

When you are satisfied that the first cut is accurate and are ready to proceed with the second cut, horizontally rotate the sheet so that the same face remains facing down and the sheet’s opposite edge is against the rip fence. and proceed with the second cut.

When cutting the four sides of a square box, make the first cut on all four side of the box one after another. Only then choose your method for making the second cut. To make the cut, set a stop block to get the exact length, and then make all of the second cuts one after another. For a rectangular box, make the first cut on all four sides one after another. Then choose your method for making the second cut, set a stop block to cut the exact length of just the front and back pieces and make the second cut for those two pieces. For the two sides of the box, reset the stop block, and make the second cut for those two sides.

Section 9 - Compound Cuts.

A compound cut is a cut in which both the miter gauge fence is set to a miter angle other than zero degrees and the saw blade tilt or bevel angle is set to other than 90-degrees. In this crosscut made with the workpiece against the miter gauge pushing the wood, two different angles are cut at the same time on the workpiece. This is the same type of cut that is required for cove moldings or for splayed legs on a table or stool.

The cut is relatively simple once you know what the required angles are. For a cove molding each piece will have a 45-degree end to form the 90-degree corner and the cove molding will also have a tilt to it, often also 45-degrees, but could also be 30-degrees or 35-degrees. For such a 45-degree-45-degree cut, set the miter gauge at 45-degrees and the blade tilt at 45-degrees and make the cut as you would with any miter cut. For a 45-degree cut on the end of the molding board and a 30-degree tilt of the molding board, set the miter gauge to 45-degrees and the blade tilt to 30-degrees and make the cut.

For a splayed table or stool leg, you might want the leg to splay out at 5-degrees both to the front and to the side. Set the miter gauge at 5-degree and the blade tilt to 5-degrees and make the slight cut off the the bottom end of the leg and from the top end of the leg as well. In positioning the workpiece for the top end of the leg cut, make sure the same face of the board is down and the same face of the board is against the miter fence. In that way the bottom and top ends of the leg will be parallel to each other and the leg will splay in the proper direction.

Section 10 - Dado Cuts. A groove is a shallow open kerf cut in a workpiece made along the grain. A dado cut is a type of groove but cut cross grain across a workpiece resulting in square walls and flat bottoms. Many woodworkers apply the term “dado” to both dadoes and grooves without distinguishing between them. Grooves and dadoes can be any width but the cuts form only a channel and do not penetrate all the way through the workpiece. Dadoes are called housing in the UK or trenches in Europe. Dadoes are often used simply to help align parts in assembly, but dadoes can also provide strength to the joint and help support weight.

Dadoes can be cut on the table saw or with a router. Tablesaw dadoes are always open and visible at the ends while router cut dadoes can be either open or closed (stopped) at the ends where the dado would not be visible.

Dadoes are used, for example, to form a channel or recess in the side of a bookcase so that a shelf can be inserted into the dado. The shelf end should fit snugly into the dado. The dado should be wide enough that the shelf end goes in with just a bit of hand pressure but not so wide that the shelf is loose in the dado. No gap should be visible between the shelf face and the dado edges. Anything less than a snug fit eliminates the joint’s strength.

A different type of dado would be used for boards crossing each other at mid-length position to form a half-lap. Such a dado is cut halfway into the depth of the mating faces of two boards to form a recess in each so the other board can be laid on the first board forming a half-lap joint.

Cutting dadoes with a single blade. The dado can be cut on at the table saw with the regular single saw blade by using the miter gauge and the workpiece slightly for each cut until the dado is fully cut at the proper width. A stop block and spacer are very useful for controlling the width of the dado. The spacer must be smaller than the dado to account for the saw blade kerf. If you are cutting a three-quarter inch wide dado when using a one-eighth inch thick blade, then the spacer must be only five-eighth inch wide. The first cut will be made using the miter gauge with the end of the workpiece against the stop block. This cut will put the right edge of the cut exactly at the spot desired for one edge of the dado. The spacer will then be inserted against the stop block and it will move the workpiece five-eighth inch to the right. The cut will be made beginning five-eighth inch to the left of the first cut plus the one-eighth inch thickness of the blade. This means that the left hand edge of the dado will be exactly three-quarters inch wide. Then repeated cuts are made between the two outer shoulder cuts to clean out the waste between the original cuts. Cuts can be made to whatever depth desired although to maintain strength do not make the cut deeper than half the thickness of the workpiece. You will feel that the uneven cut left by the typical alternating bevel blades may not leave a smooth, presentable bottom to the dado. Smoothing the dado bottom by dragging the flat back of a three-quarter inch wide chisel the length of the dado to smooth the bottom or covering the dado with trim eliminates this issue.

Cutting dadoes with a stacked dado blade set. An easier way is to make the dado cut with a special 6-inch or 8-inch diameter dado blade set, a stack of two full blades and multiple chipper blades plus very slim additional plastic, metal or paper shims positioned next to each other on the table saw arbor to get the exact dado width desired. Each of the full outer blades is one-eighth inch thick with a full complement of teeth. and the inner chipper blades have a center arbor hole with three arms or wide spokes with a single tooth at the end of each arm. Dado chipper blades come with flat tops to the blades and in a variety of thicknesses to enable the woodworker to assemble blades and shims to whatever width is desired. The flat tops leave a nice smooth, very presentable bottom to the dado. It does take time to remove the regular saw blade from the table saw and to assemble and load the dado stack onto the arbor and test the width of the stack for a perfect cut. For that reason, using a stacked dado set for dado cuts usually is done only when multiple dadoes must be cut.

Making the dado cut on the table saw. In a dado cut on the table saw, the ends of the dado will always be visible on the edge of the workpiece. That is only a design consideration.

Whether using a single blade or a stacked dado set for table saw dado cuts, it is essential that the workpiece be held down flat on the saw table near the blade. An overhead feather board is helpful for this or the woodworker can simply hold down the board near the saw blade with a push block or other block of wood. If the board cups up slightly, the dado cut will not penetrate to full depth resulting in a shallow dado. When a crosspiece such as a shelf is inserted into that too shallow dado, the bookcase side will be forced a bit outward to make room for the shelf. So be sure the dado cut is always full depth.

For a bookcase side, the cuts can be made with the bookcase side laid inside face down and positioned perpendicular to the saw blade and with a long edge of the side against the miter gauge fence or the front of a crosscut sled. For repeat accuracy a long auxiliary fence needs to be attached so that a stop block can be used to measure the position of each additional dado cut for multiple shelves. If there are a number of bookcase sides to be cut with dadoes all in similar positions, make the first cut in the same position for each one of the bookcase sides before moving the stop block to a new position for the second cut. All sides should each get the second dado cut in the same position before moving the stop block to a new position, etc. for each shelf position. Cutting dadoes in long bookcase sides requires careful positioning of the workpiece and extra care in making sure the workpiece does not drag but stays flat against the miter gauge fence and square to the sawblade.

When working with a number of similar pieces be sure you maintain each piece in the same orientation, inside face down and the long edges on top of each other. It’s essential to keep the boards properly oriented to prevent a cut being made in the wrong place. It may be useful to use a piece of tape to mark the topside face of the board that will not be cut and the edge of the board that will not be placed against the miter gauge fence or the crosscut sled fence. That way each piece of tape can be felt to help in properly positioning the board for a cut.

To actually make the dado cut, properly position the workpiece along the miter gauge fence or the fence of a crosscut sled. Be sure the face where you went the dado cut is facing down and make sure the long reference edge is against the fence. Be sure the workpiece is properly positioned right to left so that the dado is actually cut within the desired space for the dado. With your left hand fingers be sure the workpiece is held snug against the fence, use your right hand to turn on the motor, use the left hand to maintain the board in place and both hands to push the fence and workpiece forward into the sawblade. When you have completed the cut, leave the motor running, be sure the workpiece does not move either right or left, and pull back the fence and workpiece to the original starting position. Now turn off the motor and wait for the blade to stop spinning.

Note: The next chapter on using the router will cover making dado cuts with a handheld router.

Section 11 - Cutting Rabbets.

A rabbet is simply a rectangular recess along the end of a board or along the long edge of a board. Rabbets are used to fit two sides together of a box or case, are used along the inside of a half overlay door to make for a closer fit, are used to make the recess inside of a picture frame designed to hold the picture itself, are the recesses found at the ends of boards being fitted into a half-lap joint, or found along the long edges of boards being ship-lapped.

Like the dado cut, rabbets can be cut with either the table saw or a router, either handheld or on a router table. The next chapter on using the router will cover making rabbets with a router.

Cutting rabbets using a single blade. The rabbet can be cut on the table saw with the regular single saw blade either as a rip cut along the edge of a board or as a crosscut at the end of a board. As with a dado, the rabbet can be cut with multiple passes over the blade moving the workpiece a slight amount left or right for each cut to get to the final size desired. Alternatively, depending on the size of the rabbet and the length of the workpiece, the workpiece can be held vertically against the rip fence and the rabbet shaped with just two cuts using different fence settings and blade heights.

Cutting rabbets on the inside of frame stock using a single blade. A rabbet on the inside of a picture frame is designed to provide a recess for holding the picture inside of the frame. The rabbet can be any size width and depth but frequently is one-quarter inch by one-quarter inch or three-eighths by three-eighths inch. The rabbet cut can be made very simply. Set the blade height to the desired depth, say one-quarter inch and set the rip fence to one-eighth inch, that is, one-quarter inch width for rabbet minus one-eighth inch kerf cut from the blade. Position the inside long edge of the frame piece against the rip fence with the back face of the frame down on the tabletop, set a feather board in place to hold the frame piece snugly against the rip fence and use a push block or push stick to push the workpiece through the blade. Then reset the rip fence just shy of the blade, reposition the feather board, ready your push stick and repeat the cut.

Alternatively, once the first cut has been made, turn off the motor, wait for the blade to stop spinning, flip the workpiece end over end keeping the same edge against the rip fence so that the kerf faces up. Now, lift up the left edge of the workpiece and flip it over so that the kerf face is now against the rip fence. Make a second cut with the board in that position and the rabbet will be complete.

Cutting rabbets on the edges of casework using a single blade. When making casework out of plywood, woodworkers often cut a rabbet on the long edge of a case side and case bottom so that the two pieces can be easily positioned against each other forming a corner of the cabinet. This is also frequently done for case sides and case backs and bookcase sides and back. The long rabbet cut is made in the same manner as the rabbet cut for a recess in the back of a frame. The large size of case requires that the rabbet be cut along the rip fence rather than as crosscut with the workpiece positioned against a miter gauge. Note: The casework sheets must be precut to final length and width before cutting the alignment rabbet.

The easier and safer method for cutting a rabbet along the edge of such large workpieces is to lay the three-quarter inch thick plywood workpiece flat on the table saw tabletop to make the first shoulder cut, then reset the rip fence closer to the blade for the second cut, and set the rip fence closer yet to the blade for the final cut so that the rabbet is the almost three-eighths inch needed. If you have multiple pieces to cut, make the first cut in all of the pieces, then reset the rip fence and make the second cut in all of the pieces, then reset the rip fence for making the final cut in all of the pieces. This eliminates the need for constantly resetting the rip fence with the unwelcome chance of making an error resetting the fence and winding up with uneven rabbet widths.

Caution must be used here since three-quarter inch plywood is rarely actually three-quarter inch thick, usually it’s a thirty-second or even a sixteenth inch shy of that thickness. MDF (medium density fiberboard), on the other hand, almost always is reliably an exact three-quarter inch thick.

Similar rabbets are also cut on the ends of shelves to be fitted into a dado on the bookcase sides. Follow the same procedure just described.

Cutting rabbets using a stacked dado blade set. Just as with dado cuts, large rabbets can be cut more easily with a stacked dado set. Stacked dado sets work whether making rip cuts along the rip fence or when making crosscuts using a miter gauge. But it takes time to set up the stacked dado set for the cut so this method is more efficient when a number of rabbets have to be cut and when handling bulky sheet goods such as plywood, particle board and MDF. Both the single blade method and the stacked dado set method produce workable rabbets but rabbets cut with a stacked dado set often produce a smoother surface, assuming the dado blades are evenly ground to produce that flat surface.

As described earlier, a stacked dado set is a special 6-inch or 8-inch diameter blade set consisting of a stack of two full blades and multiple chipper blades plus very slim additional plastic, metal or paper shims positioned next to each other on the table saw arbor to get the exact dado width desired. Each of the full outer blades is one-eighth inch thick with a full complement of teeth. The inner chipper blades have a center hole with three arms or wide spokes with a single tooth at the end of each arm. Dado chipper blades come with flat tops to the blades and in a variety of thicknesses from one-sixteenth inch to one-eighth inch to enable the woodworker to assemble blades and shims to whatever width is desired.

For measuring purposes treat the stacked dado set as a super thick blade leaving a super thick kerf. This is critical in setting the rip fence for a cut. If you are using a partial stack set to measure an exact three-eighth inch width to cut a rabbet, you must set the rip fence as close to the blade as possible without the blade scratching the rip fence. The rabbet cut will begin at the right edge of the workpiece and extend three-eighth inch into the workpiece giving you a three-eighth inch wide rabbet.

To avoid the danger of setting the rip fence too close to the blade or getting an inaccurate length measurement for your rabbet cut, it’s much safer to use a sacrificial fence attached to your rip fence. Attach a length of thick hardwood (four-quarter, six-quarter or eight-quarter hardwood) or doubled-up MDF or plywood to your rip fence either with double-faced tape or fence clamps. Position the rip fence so that the sacrificial fence just slightly covers the dado blade.

If you want to use this procedure to cover the blade, be sure the motor is off and lower the blade below the tabletop. Slide the rip fence into place slightly over the dado blade. Lock the rip fence in place at that setting. Turn on the motor and gradually raise the blade height as the blade cuts into the sacrificial fence and reaches your desired blade height for proper depth of cut.

Now you will need to measure the remaining exposed width or thickness of the dado blade. To do this, set blade height at about one-quarter inch, use a scrap piece of wood, position it along the rip fence, position a feather board to hold the wood against the rip fence, and use your push block or push stick to cut a rabbet in the scrap wood. Now measure the width of the rabbet and compare it to the width you desire for your rabbet cuts. Adjust the rip fence closer or farther as needed and make test cuts as necessary to get the exact setting you need, say eleven-thirty-seconds inch to be exactly one-half the thickness of the undersized plywood nominally called three-quarter inch thick plywood.

This sacrificial fence method can be used for any of the rabbet cuts. The key is setting the fence so that just enough of the dado blade is exposed to give you the exact width you want for the rabbet. The cutting technique using a stacked dado set and sacrificial fence is generally similar to each of the examples described for cutting various rabbets using just a single sawblade.

Cutting rabbets on the inside of frame stock using a dado blade. To cut a rabbet along the long inner edge of frame stock, carefully set the blade height and set the rip fence using test cuts to get the exact width of cut you want for the rabbet. Position the frame stock against the sacrificial fence with the back face of the frame stock laying flat on the tabletop and the inside edge of the frame stock against the rip fence. Position a feather board to hold the workpiece against the fence and have your push block or push stick at the ready. Turn on the motor, hold the stock down with your left hand and use you right hand to push the stock forward. As the end of the stock comes near the front of the saw table, grab your push block to continue pushing the workpiece through the blade.

Once again, long frame stock, particularly when cutting the rabbet before molding the face of the frame and before cutting the miter corners, will require some outfeed support once the workpiece is pushed past the back of the tabletop. Note: if you are using particularly thin stock, that stock may bend down below the tabletop height once it gets only a few inches beyond the tabletop. Be sure to position the outfeed support near enough to the tabletop to catch the workpiece before it bends, or set the support lower so that the bending workpiece will not be hung up as it first meets the outfeed support roller or surface.

Cutting rabbets on the edge of casework using a dado blade. Use the stacked dado blade and sacrificial fence method to cut a rabbet along the bottom or back edges of casework sides, bottoms and backs. The casework sheets must be precut to final length and width before cutting the alignment rabbet. Lay the precut casework sheet flat on the tabletop with the edge that will be the side’s bottom edge against the sacrificial face of the rip fence, hold the sheet in place with your right hand, use your left hand to turn on the motor, position your left hand against the left edge of the sheet guiding the sheet against the fence, your right hand now against the trailing edge of the sheet guiding the sheet forward, and push the sheet forward making the rabbet cut. It’s important that the sheet lay flat during the entire process so that there will be an even depth of cut for a flat rabbet and that the edge being rabbeted always be fully against the sacrificial fence.

With sheet goods, you will always need some form of outfeed table or support rollers to hold the sheet as its balance point passes over the back of the tabletop. **Caution:** If, for some reason, the sheet begins to tilt down at its leading edge and you cannot maintain downward pressure or control, quickly lift up your hands and quickly step back, allowing the sheet to fall forward. With luck the sheet will fall all the way forward onto the floor. Without luck it will hit something, arrest its fall to the floor and fall back onto the tabletop with part of the sheet falling on top of the spinning dado blade and taking out a large gouge. This is a better outcome than your hands failing to quickly correct things and being injured in the process.

Section 12 - Cutting Half-laps on the Tablesaw

A half-lap at the end of a board is a rabbet cut, simply a larger rabbet. A half-lap removes half the outer face of a board. A similar cut is made in the end of a second board and the two half-laps are fitted together to form a corner joint.

Cutting half-laps horizontally using a single blade. To cut a rabbet for a half-lap using just the regular table saw blade, lay the workpiece flat on the tablesaw, position a long edge of the workpiece against the miter gauge fence with the end to be rabbeted extending to the right beyond the blade. This will be a crosscutting procedure **except** (and that is a very important “except”) the cut will not be a complete, through cut. Rather, the cut will be only of the underside of the board and no loose off cut will be produced, just sawdust. For that reason, the rip fence can be set as a stop to measure the length of the cut. There is no off cutoff to worry about being kicked back. Remember that the rip fence setting measures the distance from the right side of the blade’s tooth to the rip fence and that the actual kerf cut will be an additional one-eighth inch wide to the left of that tooth edge. Note: if you are using a thin-kerf blade then the kerf cut will be only three-thirty-seconds inch. That requires you to set the rip fence at one-eighth inch less (or three thirty-seconds inch less) than the desired length of the half-lap.

So, if your stock is a retail dimensioned piece of one by three to be used to make a frame with half-lap corners, the actual width of the board will be only two and a half inches. That is the dimension needed for the half-lap to allow the second board to fit perfectly across the first board. Set the rip fence at two and three-eighths inches, that is, two and a half inches board width minus the one-eighth inch blade thickness.

Set the blade height to one-half the thickness of the workpiece. In our example the retail dimensioned one by three is known as a four-quarter board but it is actually only three-quarter inch thick. For such a board, the blade height must be set at one-half the thickness or at three-eighths inch. Use a click rule, Roto-matic, combination square, or some type of set-up block to measure the actual height of the blade. But be careful, many times the actual setting will be lowered as you tighten the blade height knob. Partially tighten the knob, then recheck the actual height. Adjust as necessary, rechecking each time. Gradually fully tighten the knob and make a final blade height check. Many woodworkers will set the blade height to slightly less than one-half the board thickness to avoid taking a deeper cut than intended. They will then cut the rabbet and finish up using a hand plane to gradually remove any excess thickness to sneak up on a perfect half-lap fit.

With the workpiece positioned against the miter gauge fence, the blade height properly set, the rip fence properly set as a stop, slide the workpiece to the right to fit snugly against the rip fence. Use the fingers of your left hand to grasp the workpiece against the miter gauge fence making sure the workpiece remains against the rip fence, use your right hand to turn on the motor, and use both hands to push the assembly forward making the first cut. This first cut will be the actual shoulder cut and will be quite visible when the frame is completed so the cut must be smooth and true.

After the cut is finished, maintain a firm grip on the workpiece so it doesn’t move either right or left, and use both hands to pull back the assembly. Now slide the workpiece just slightly to the left one-eighth inch or less, and repeat the cut. Continue the forward and back process, each time moving the workpiece a bit further to the left. Eventually the entire half-lap face will be cut. Pull back the assembly and turn off the motor. Lift up the workpiece and run your finger over the cut surface and feel the ridged surface left behind by the cuts. To produce a tighter fit, this surface can be smoothed with a few strokes of a hand plane. The surface could also be smoothed using the table saw. Reposition the workpiece along the miter gauge fence with the right end against the rip fence. Turn on the motor and push the assembly forward until just the leading edge of the workpiece is over the blade. Now, using your left hand, slide the workpiece to the left causing the cut area to be moved over the top of the blade removing some of the ridges. Pull back the assembly, reposition the workpiece end against the rip fence, push it slightly more forward than the first time and repeat the sliding motion to the left to trim off more of the ridges. Repeat this motion a few times and check the flatness of the half-lap surface. When smooth you will be sure to get a tight fit with the mating board.

Cutting half-laps vertically using a single blade. Half-laps can also be formed with simply two cuts on the table saw when the workpiece is held vertically, that is, perpendicular to the tabletop with one face against the rip fence provided the desired length of the half-lap is less than your tablesaw’s maximum blade height. The process is a bit complicated but once set up, is quick and efficient.

Boards with half-laps generally are narrow and it is impossible to hold such boards exactly in a vertical position while moving the workpiece along the rip fence and through the saw blade. However, a relatively simple jig can be constructed to keep the workpiece vertical. Make a pusher board approximately 12 inches by 12 inches and of an identical thickness as the workpiece. Glue or screw a four inch wide by six or eight inch long cover board along the leading edge of the pusher board with one end of the cover board positioned flush against the top of the pusher board and its long edge overlapping the leading edge of the pusher board by about two inches. With the jig against the rip fence the overlap forms a bit of a pouch into which you can insert the workpiece. When the pusher board is positioned behind the workpiece, the cover board will hold the workpiece vertical side to side and against the rip fence while the pusher board maintains the workpiece vertical front to back as it is pushed through the saw blade.

Additional side or outrigger support is needed to keep the pusher board always vertical against the rip fence. This problem can be handled by mounting a six inch wide by eight inch long balance board in an L-shape against the trailing edge of the pusher board. By extending the balance board out to the left of and perpendicular to the pusher board, the balance board will maintain the pusher board vertical to the rip fence. After cutting the half-lap the sawblade also will cut a kerf through the balance board but there is sufficient width to the balance board to maintain vertical rigidity. If you are concerned about the outrigger balance board not being maintained art a 90-degree angle to the pusher board, then nail or screw a diagonal support piece running from the upper leading corner of the pusher board to the upper outside corner of the balance board. The diagonal provides plenty of rigidity to the jig.

Alternatively, if you have a Biesemeyer-style rip fence on your tablesaw, that is, a rectangular long rip fence with parallel sides that are perpendicular to the tabletop, you can design a jig to ride on your rip fence. The jig will consist of an upright pusher board about six to eight inches long on its base and ten to twelve inches high plus a fence or stop about two inches wide but not quite as high as the pusher board. Attached the fence to the pusher board so that their long edges are flush at the trailing edge, the top ends flush leaving an open space at the bottom of the fence so that the fence does not get hung up on the tabletop when in use. Rest a rider board along the top of your rip fence exactly the same width as your fence assembly and as long as the six to eight inches width of the pusher board. Attach the pusher board to the rider board with two screws. Position a support board on the right side of your rip fence the same length as the rider board and attach that support leg to the rider board with two screws. If desired, you could attach a toggle clamp, also known as a De-Sta-Co-type clamp, to the jig’s back fence to help with securing the workpiece against both the pusher board and the fence.

Because the thickness of the pusher board moves the workpiece farther away from the rip fence you will need to add that thickness to your measurement when setting the rip fence to make the half-lap cut.

To cut the half-lap with two cuts, first determine blade height which will be identical to the actual width of the mating workpiece and set the blade at that height. If you are using retail dimensioned lumber, say a one by three, the width of the wood will be two and a half inches but check the actual width to be sure. Next determine thickness of the workpiece and set the rip fence to exactly one-half that actual thickness. If you are using dimensioned four-quarter lumber, that thickness will be three-quarter inch and half the thickness will be three-eighth inch, but, again, check the actual measurement to be exact.

Mount the workpiece vertically against the jig pusher board with the workpiece’s uncut face against the rip fence. With your right hand reach up to the top of the pusher board, position your fingers on the right side of the pusher board and your thumb on the left side roughly parallel to the tabletop and gripping the workpiece and pusher board. Turn on the motor with your left hand and then move your left hand to rest on the tabletop where your fingers will push against the pusher board to keep it snug against the rip fence. Your right hand will provide the forward motion. The saw blade will make a vertical kerf cut just off the centerline of the workpiece. Because the blade height is so high and there’s a lot of sawdust waste to remove, take it easy with the cut. Do not rush the cut and risk tipping or skewing the workpiece.

If you have a number of same size boards with ends to be half-lapped, now is the time to cut those as well. And follow then with half-lapping the other end of the boards if necessary. When all the half-laps have been cut, it’s now time to set up for a second or final cut, a shallow crosscut to remove the half-lap waste.

Set the blade height to just less than half the thickness of the workpiece. Set the rip fence to the length of the desired half-lap minus the thickness of the blade. If you are using retail dimensioned lumber, say a one by three, the rip fence setting will be two and three-eighths inches, that is, two and a half inches half-lap length because of the two and a half inch board width minus one-eighth inch saw blade thickness (or three-thirty-seconds inch if you are using a thin kerf blade).

To remove the waste, with the motor off, lay the workpiece flat on the tabletop with the face to be half-lapped face down and a long edge against the miter gauge fence. Set the rip fence at the length of the half-lap (the same as the width of the mating piece to the half-lap), minus the thickness of the blade. Slide the board to the right to butt up against the rip fence. Use your left hand fingers to grip the workpiece against the miter gauge fence and your right hand to turn on the motor. Use both hands to push the assembly through the sawblade. The thin waste portion in the half-lap area will fall away. Pull the assembly back, turn off the motor and wait for the blade to stop spinning. Reach up and remove the thin waste piece and prepare to cut the next board.

The resulting half-lap will have a very smooth face.

Cutting half-laps using a dado blade. Just as with dado cuts, half-laps can be cut more easily with a stacked dado set. A half-lap removes half the outer face of a board. A similar cut is made in the end of a second board and the two half-laps are fitted together to form a smooth corner joint. Do not use a sacrificial fence for cutting half-laps with a dado blade. To cut a rabbet for a half-lap with a dado blade, first install the dado blade probably using the maximum number of blades to produce the widest cut.

Set the blade height to one-half the thickness of the workpiece. If you are using a retail dimensioned “one-by” board known as a four-quarter board, be aware that it is actually only three-quarters inch thick. For such a board, the blade height must be set at one-half the thickness or three-eighths inch. In any case measure the exact thickness of any board you are using, then determine the one-half measurement. Use a click rule, Roto-matic, combination square, or some type of set-up block to measure the actual height of the blade. Be careful, many times your carefully measured setting will be lowered as you tighten the blade height knob. To remedy this, only partially tighten the knob, then recheck the actual height. Adjust as necessary, rechecking each time. Gradually, fully tighten the knob and make a final blade height check. Many woodworkers will set the blade height to slightly less than one-half the board thickness to avoid taking a deeper cut than intended. They will then cut the rabbet and finish up using a hand plane to gradually remove any excess thickness to sneak up on a perfect half-lap fit.

Making a half-lap cut is a crosscutting procedure **except** (and that is a very important “except”) the cut will not be a complete, through cut. Rather, the cut will be only of the underside of the board and no loose offcut will be produced. For that reason, the rip fence can be set as a stop to measure the length of the cut. There is no offcut to worry about being kicked back. Use a trial and error approach to setting the rip fence to produce the exact length of half-lap you need.

Say you are using a retail dimensioned piece of one by three to be used to make a frame with half-lap corners. The actual width of the board will be only two and a half inches. That is the dimension needed for the half-lap to allow the second board to fit perfectly across the first board. If you are using a full dado stack of three-quarter inch width, set the rip fence about one and three-quarters inch. Grab a scrap piece about a foot long, position it against the rip fence with the right end of the board extending to the rip fence.

With the workpiece positioned against the miter gauge fence and the blade height properly set, use the fingers of your left hand to grasp the workpiece against the miter gauge fence making sure the workpiece remains against the rip fence, use your right hand to turn on the motor, and use both hands to push the assembly forward making the first cut. Pull back the assembly, slide the test piece to the left and repeat the cut. Do not change the rip fence setting. Repeat the cuts as necessary to fully remove the half-lap waste from the underside of the workpiece.

Now measure the length of the fully cut-away portion. If it’s more than two and a half inches, the half-lap is too large. Move the rip fence to the left, closer to the sawblade, whatever distance is necessary and repeat the test cuts. If the measurement if less than two and a half inches, carefully more the fence slightly to the right away from the sawblade, lock it in place, position the test piece against the miter gauge fence, slide it to the right until it touches the rip fence, grip the workpiece with your left hand fingers to hold the piece against the miter fence, use your right hand to turn on the motor, use both hands to push the assembly forward and recut the inner portion of the half-lap. Turn off the motor. Recheck the measurement and repeat the cuts and measurements as often as necessary to get an exact two and a half inch length or whatever desired length you need for your half-lap.

Lift up the workpiece and run your finger over the cut surface and feel the ridged surface left behind by the cuts. To produce a tighter fit, this surface can be smoothed with a few strokes of a hand plane. The surface could also be smoothed using the tablesaw. Reposition the workpiece along the miter gauge fence with the right end against the rip fence. Turn on the motor and push the assembly forward until just the leading edge of the workpiece is over the blade. Now, using your left hand, slide the workpiece to the left causing the cut area to be moved over the top of the blade removing some of the ridges. Pull back the assembly, reposition the workpiece end against the rip fence, push it slightly more forward than the first time and repeat the sliding motion to the left to trim off more of the ridges. Repeat this motion a few times and check the flatness of the half-lap surface. When finally smooth, you will be sure to get a tight fit with the mating board.

Section 13 - Cutting Tenons on the Tablesaw

Cutting tenons horizontally using a single blade. Similarly, cut a tenon on the end of a board by rabbeting both faces at the same end of the board. A tenon is the shaped tongue-like protrusion at the end of a board that will house into a mortise to form a strong joint. The process is similar except that a tenon requires a rabbet on both faces of the workpiece rather than just one face as with the half-lap. In the half-lap, one half the thickness is removed as waste. In tenons, typically (but certainly not always) one-third the thickness is removed as waste from each face leaving a center tongue that is one-third the thickness of the original workpiece.

The thinner the tenon (or tongue) the less strength the tenon retains. Often, woodworkers will remove only a small amount of wood from each face of the tenon resulting in a thicker, stronger tenon. Note: correspondingly, this thickness often will be limited by the resulting thinness of the mating mortise whenever there is insufficient overall thickness to the mating piece, such as in a thin leg of a table. A careful balance has to be struck between the thickness of the tenon and the thickness of the walls of its mortise.

To cut a tenon on the end of a board with a single blade in the table saw, follow the same procedure as for cutting a half-lap. The thickness of the tenon will be determined by the width of the mortise which most often is cut in the mating piece before the tenon is cut. It is easier to cut or plane or sand the tenon to exact thickness and parallel flatness when fitting it than to try to slightly widen the mortise to fit the tenon. Determine if the tenon is to be centered on the end of the workpiece or offset to one side. This is often a design consideration but also could be affected by the shape or thickness of the mating piece. If the tenon is to be centered, then an equal amount of thickness will be removed from each face of the board, say one-quarter inch from each face. If the tenon is to be only slightly recessed on the outer face of the workpiece, say one-eighth inch, then different depth of cut settings will be required for the sawblade—say, one-eighth inch for the outside face and perhaps five-eighths for the inside face.

Use your click rule, Roto-matic, combination square, or set-up block to set the blade height as determined above. Again, some woodworkers will set the blade height slightly low to avoid cutting the tenon too thin, and during the fitting process, will plane or sand the tenon to exact fit. Set the rip fence for the desired tenon length. Remember to allow for blade thickness, so if you want a tenon length of three-quarters inch then the fence will be set at five-eighths inch, that is, the desired three-quarters inch tenon length minus one-eighth inch blade thickness. Set the miter gauge at zero degrees to produce a 90-degree cut at the blade. Position the long edge of the workpiece along the miter gauge fence. If the tenon cut will be centered in the end of the board, you will need to cut off an equal amount of waste from each face. Accordingly, either face can be down to begin with. If the tenon cut will not be centered, then make sure you position the down face to correspond to the depth of cut for that side or face of the workpiece.

Slide the workpiece so that its fits snugly against the rip fence. Use your left hand fingers to grasp the workpiece against the miter gauge fence, being sure that the right end of the board remains right against the rip fence. Use your right hand to turn on the motor, then use both hands to push the assembly forward to make the cut. You have now made the face shoulder cut for the tenon. This first cut is important because the straightness and squareness of the cut determine the tightness of the fit when positioned into the mortise. Pull back the assembly, slide the workpiece one-eighth inch or less to the left, reposition your left hand to hold the workpiece firmly against the miter gauge fence (note the right end of the workpiece properly will no longer be against the rip fence), use both hands to push the assembly through the saw blade and again retract the assembly. Continue with repeat cuts until the full length of the tenon has been cut. Now flip the workpiece edge over edge but keep the same end against the rip fence, and repeat the full rabbet-cutting process to cut the second face of the tenon.

If the tenon was designed to be off-center, once the first face has been fully cut, reset the blade height to correspond to the greater or lesser depth of cut needed for the second face. Flip the workpiece edge over edge but keep the same end against the rip fence, and repeat the full rabbet-cutting process to cut the second face of the tenon at a different depth.

You will now need to cut the edge shoulders because the tenon width is not as wide as the board. The tenon width will be slightly less than the mortise length. Subtract the desired width of tenon from the actual width of the board and then divide by two. This is the amount to be taken off from each long edge of the tenon. Set the blade height to just under that number. Leave the rip fence exactly in the same position. Position the workpiece on its long edge against the miter gauge fence. Slide the workpiece to the right to butt against the rip fence. Use your left hand to grip the workpiece against the miter gauge fence, use your right hand to turn on the motor, use both hands to push the assembly through the blade, then pull the assembly back, move the workpiece slightly to the left and repeat the cuts until all waste is removed. Now flip the workpiece edge over edge, and repeat the process to cut the opposite edge shoulder. When later fitting the tenon to the mortise, use a file or chisel to reduce the width if necessary to get a perfect fit.

Cutting tenons vertically with a single blade. Tenons can also be cut on the tablesaw when the workpiece is held vertically, that is, perpendicular to the tabletop with one face against the rip fence provided the length of the tenon length is less than your tablesaw’s maximum blade height. This cut is similar to cutting a half-lap vertically except tenons require a cut removing waste on each face of the board to make a tenon with side shoulders. The process is a bit complicated but once set up, makes for neat faces or cheeks on the tenon.

Boards with tenons generally are narrow and it is impossible to hold such boards exactly in a vertical position while moving the workpiece along the rip fence and through the saw blade. However, a relatively simple jig can be constructed to keep the workpiece vertical. Make a pusher board approximately 12 inches by 12 inches and of an identical thickness as the workpiece. Glue or screw a cover board to the face of the pusher board. The cover board should be about four inches wide by eight inches long and should be mounted on the pusher board face along the leading edge of the pusher board with one end of the cover board positioned flush against the top of the pusher board and its long edge overlapping the leading edge of the pusher board by about two inches. With the jig against the rip fence the overlap forms a bit of a pouch into which you can insert the workpiece. When the pusher board is positioned behind the workpiece the cover board will hold the workpiece vertical both side to side and against the rip fence while the pusher board maintains the workpiece vertical front to back as it is pushed through the saw blade.

Additional side or outrigger support is needed to keep the pusher board always vertical against the rip fence. This problem can be handled by mounting a balance board at least six inches wide by eight inches up to the same twelve by twelve dimensions of the pusher board. Mount the balance board in an L-shape against the trailing edge of the pusher board. By extending the balance board out to the left of and perpendicular to the pusher board, the balance board will maintain the pusher board vertical to the rip fence. After cutting the half-lap the sawblade also will cut a kerf through the balance board but there is sufficient width to the balance board to maintain vertical rigidity. If you are concerned about the outrigger balance board not being maintained at a 90-degree angle to the pusher board, then nail or screw a diagonal support piece running from the upper leading corner of the pusher board to the upper outside corner of the balance board. The diagonal provides plenty of rigidity to the jig.

Alternatively, if you have a Biesemeyer-style rip fence on your table saw, that is, a rectangular long rip fence with parallel sides that are perpendicular to the tabletop, you can design a jig to ride on your rip fence. The jig will consist of an upright pusher board at leas six to eight inches long on its base and ten to twelve inches high plus a fence or stop about two inches wide but not quite as high as the pusher board. Attach the fence to the pusher board face so that their long edges are flush at the trailing edge, the top ends also flush thereby leaving an open space at the bottom of the fence so that the fence does not get hung up on the tabletop when in use. Rest a rider board along the top of your rip fence exactly the same width as your rip fence and as long as the six to eight inches width of the pusher board. Attach the pusher board to the rider board with two screws through the face of the pusher board and into the edge of the rider board. Position a support board on the right side of your rip fence the same length as the rider board and attach that support leg to the rider board with two screws through the face of the support board and into the opposite edge of the rider board. If desired, you could attach a toggle clamp, also known as a De-Sta-Co-type clamp, to the jig’s back fence to help with securing the workpiece against both the pusher board and the fence. Or you could install a T-track parallel to the rip fence and about halfway up the face of the pusher board. A toggle clamp can be mounted to a block that would ride in the T-track and give you the ability to adjust the toggle clamp position to accommodate a range of widths of boards to be tenoned.

Because the thickness of the pusher board moves the workpiece farther away from the rip fence you will need to add that thickness to your measurement when setting the rip fence to make the tenon cut.

To cut the first tenon face, set the tablesaw blade height to equal the tenon length you want. Next determine thickness of the workpiece and the desired tenon thickness. Set the rip fence to the thickness of the pusher board plus the thickness of workpiece minus amount to be removed from each face of the tenon plus the thickness of the table saw blade. If you are using a workpiece of dimensioned four-quarter lumber, that thickness will be three-quarter inch, but, again, check the measurement to be exact. That three-quarter inch workpiece thickness plus the three-quarter inch thickness of a MDF pusher board, minus the one-quarter inch to be removed for an evenly centered one-quarter inch thick tenon plus the one-eighth inch blade thickness means you need to set the rip fence at one and one-eighth inches. There’s a lot of factors in that formula but just re-read it carefully and think through why each figure is there. Some woodworkers would set the fence at just over one and one-sixteenth inch in this case resulting in a slightly thick tenon that would be planed to exact thickness during the process of fitting the tenon to the mortise.

Mount the workpiece with its face against the jig pusher board. With your right hand reach up to the top of the pusher board, position your fingers on the right side of the pusher board and your thumb on the left side roughly parallel to the tabletop and gripping the workpiece and pusher board. Turn on the motor with your left hand and then move your left hand to rest on the tabletop where your fingers will push against the pusher board to keep it snug against the rip fence. Your right hand will provide the forward motion. The saw blade will make a vertical kerf cut just off the outside face of the tenon. Because the blade height is so high and there’s a lot of sawdust waste to remove, take it easy with the cut. Do not rush the cut and risk tipping or skewing the workpiece.

If you have a number of same size boards with ends to be tenoned, now is the time to cut those as well. And follow then with tenoning the other end of the boards as well. When all the first faces of the tenons have been cut, it’s now time to set up for the second face cut.

Turn the motor off, pull back the jig assembly, turn the board around so that the opposite face now faces the pusher board and rip fence. Turn on the motor with your left hand and then move your left hand to rest on the tabletop where your fingers will push against the pusher board to keep it snug against the rip fence. Your right hand will provide the forward motion. Repeat the cut. As before, there’s a lot of sawdust to remove, so take it easy with the cut. Do not rush the cut and risk tipping or skewing the workpiece.

With the kerf for the cheeks cut, here’s the set-up to remove the cheeks. Set the blade height to the measurement of the amount of waste to be removed. Set the rip fence to the tenon length minus sawblade thickness. Now position the workpiece with its long edge against the miter gauge fence, slide the workpiece to the right up against the rip fence, use your left hand to grasp the workpiece against the miter gauge fence, use your right hand to turn on the motor, use both hands to push the assembly through the blade, The blade will make a single cut that will detach he waste portion from the tenon. Pull back the assembly, roll the board forward edge over edge so that the just cut portion is now facing up, reposition your hands and make the second cut to detach the waste from the other face of the tenon. The resulting tenon will have very smooth cheeks.

You will now need to cut the edge shoulders because the tenon width is not as wide as the board. Subtract the desired width of tenon from the actual width of the board and then divide by two. This is the amount to be taken off from each long edge of the tenon. Set the blade height to just under that number. Leave the rip fence exactly in the same position. Position the workpiece on its long edge against the miter gauge fence. Slide the workpiece to the right to butt against the rip fence. Use your right hand to grip the workpiece against the miter gauge fence, use your left hand to turn on the motor, use both hands to push the assembly through the blade, then pull the assembly back, move the workpiece slightly to the left and repeat the cuts until all waste is removed. Now roll the workpiece edge over edge, and repeat the process to cut the opposite edge shoulder. When fitting the tenon to the mortise, use a file or chisel to reduce the width if necessary.

Cutting tenons with a dado blade. Similarly, you can use a stacked dado blade set to cut tenons on the end of boards by rabbeting both faces at the end of the board. As you know, a tenon is the shaped tongue-like protrusion at the end of a board that will house into a mortise to form a strong joint. The tenon requires a rabbet on both faces of the workpiece rather than just one face as with the half-lap. In the half-lap, one half the thickness is removed as waste. In tenons, typically (but certainly not always) one-third the thickness is removed as waste from each face leaving a center tongue that is one-third the thickness of the original workpiece. The thinner the tenon (or tongue) the less strength the tenon retains.

To get a thicker, stronger tenon woodworkers often will remove only a small amount of wood from each face of the board. However, this thickness often will be limited by the resulting thinness of the walls that comes from cutting a wider mortise. This usually happens whenever there is insufficient overall thickness to the mating piece, such as a thin leg of a table. You need to strike a balance between a sufficiently thick tenon as well as sufficiently thick mortise walls.

To cut a tenon on the end of a board with a dado blade in the tablesaw, follow the same procedure as for cutting a half-lap. The thickness of the tenon will be determined by the width of the mortise which most often is cut in the mating piece before the tenon is cut. When fitting a tenon to a mortise, it is much easier to cut or plane or sand the tenon to exact thickness and parallel flatness than it is to try to slightly widen a mortise to fit the tenon.

Determine if the tenon is to be centered on the end of the workpiece or offset to one side. This could either be a design consideration or could be affected by the shape or thickness of the mating piece. If the tenon is to be centered, then an equal amount of thickness will be removed from each face of the board, say one-quarter inch from each face. If the tenon is to be only slightly recessed on the outer face of the workpiece, say one-eighth inch, then a different depth of cut setting will be required for the dado blade—say, one-eighth inch for the outside face and perhaps five-eighths for the inside face.

Use your click rule, Roto-matic, combination square, or set-up block to set the blade height as determined above. Again, some woodworkers will set the blade height slightly low to avoid cutting the tenon too thin, and during the fitting process, will then plane or sand the tenon to exact fit.

Setting the rip fence for the desired tenon length is cumbersome particularly if it’s too difficult to measure the precise thickness of the stack of dado blades. But you will have a close approximation of the thickness of the dado blade based on the number of blades and chippers you used in the stack. So if you want a tenon length of one inch and you are using a full dado stack of about three-quarters inch, set the rip fence at less than one-quarter inch, that is, one inch desired length minus the thickness of dado stack. Make a test cut, measure tenon length, then reset the rip fence and sneak up on the exact tenon length following the procedure below, making as many test cuts as needed to get to the exact desired length.

As before, set the miter gauge at zero degrees to produce a 90-degree cut at the blade. Position the long edge of the workpiece along the miter gauge fence. If the tenon cut will be centered in the end of the board, you will need to cut off an equal amount of waste from each face. Accordingly, either face can be down to begin with. If the tenon cut will not be centered, then make sure you position the down face to correspond to the depth of cut you set for that side or face of the workpiece.

Slide the workpiece to the right so that it fits snugly against the rip fence. Use your left hand fingers to grasp the workpiece against the miter gauge fence, being sure that the right end of the board remains right against the rip fence. Use your right hand to turn on the motor, then use both hands to push the assembly forward to make the cut. You have now made the face shoulder cut for the tenon. Pull back the assembly, slide the workpiece to the left a little less than the dado blade thickness, reposition your left hand to hold the workpiece firmly against the miter gauge fence. Note: the right end of the workpiece properly will no longer be against the rip fence. Use both hands to push the assembly through the saw blade for a second cut and again retract the assembly.

If the tenon was designed to be off-center, once the first face has been fully cut, reset the blade height to correspond to the greater or lesser depth of cut needed for the second face. Flip the workpiece over edge for edge but keep the same end against the rip fence, and repeat the full rabbet-cutting process to cut the second face of the tenon at a different depth.

Once again, you will notice that the tenon faces will be marked with slight ridge lines. To produce a tighter fit, this surface can be smoothed with a few strokes of a hand plane. The surface could also be smoothed using the dado blade. Reposition the workpiece along the miter gauge fence with the right end against the rip fence. Turn on the motor and push the assembly forward until just the leading edge of the workpiece is over the blade. Now, using your left hand, slide the workpiece to the left causing the cut area to be moved over the top of the blade removing some of the ridges. Pull back the assembly, reposition the workpiece end against the rip fence, push it slightly more forward than the first time and repeat the sliding motion to the left to trim off more of the ridges. Repeat this motion a few times and check the flatness of the half-lap surface. When finally smooth, you will be sure to get a tight smooth fit in the mortise.

Section 14 - Resaw Cuts on the Table Saw

A resaw cut is a cut along and parallel to the wider face of a board. Boards are resawn to make thinner pieces of wood with the same width as the original plank. Thick slabs of lumber are resawn at the mills to provide usable thicknesses of boards to sell at retail. Each additional thinness of wood, comes at a higher per board foot rate to more than cover the time and skill needed for the cut and to cover the additional waste from sawdust as more kerfs are cut.

Woodworkers resaw boards in their shops to provide less expensive, thinner planks of wood and to get the most surface coverage from particularly expensive exotic woods and to book match attractive boards. The thinner wood is cut, the more difficult the job of cutting exactly parallel sheets of equally thick dimensions.

Most resawing is done on larger bandsaws but that process is not blind friendly. Resawing requires a finely tuned bandsaw, well adjusted for drift, a tall fence exactly parallel to the blade and a keen eye to be sure the cut line is being followed.

Woodworkers argue that resawing on a bandsaw wastes less wood although that is not a clearcut case. When resawing on a bandsaw, some thickness is lost as sawdust due to the kerf thickness of the bandsaw blade. Secondly, the cut face will have numerous small ridges left as saw marks. The stock must be jointed flat after each cut. Both steps result in wasted sawdust. Resawing on a table saw may create slightly more waste, but that number probably is important only when sawing very thin sheets of veneer, but not when simply making thinner planks.

Blind woodworkers can resaw on a table saw efficiently, economically and with excellent results. The process is essentially rip cuts with the board face against the rip fence. It is important to have a splitter behind the blade to keep the kerf open all though the cut. Narrow boards up to almost three inches in width can be resawn with a single rip cut. Boards wider than three inches, up to about six inches wide, can be cut in a two-step process. With the face of the board against the rip fence and the saw blade raised to a height of slightly more than half the width of the board, a first cut is made. The board is then rotated end over end keeping the same face against the rip fence. A second rip cut is then made, freeing the two thinner pieces from each other. Using a featherboard, push stick and tall auxiliary fence substantially improve the outcome by ensuring that the face of the workpiece is kept flat against the fence at all times. This two-step full cutting height works better with less dense woods such as pine, cedar and poplar.

When resawing denser woods, It’s better to make a series of cuts, gradually raising the blade for a greater depth of cut after each cut. For instance, start with the blade set at one inch high, make a first cut, raise the blade to two inches high, make a second cut and finally raise the blade to maximum height and make a third cut. This produces less strain on the table saw and makes for smoother cuts. To cut into the remaining portion of the board, rotate a wide board end over end to resaw the remaining half of the width, keeping the same face against the rip fence. Before making the new cuts, first lower the blade to one inch and then repeat the process gradually raising the sawblade for each cut.

Sometimes a small ridge line is left along the centerline of the board. This can easily be removed by running the board through the thickness planer, or with a hand plane or even by sanding true face of the board.

Section 13 - Types of Tablesaw Sawblades

Varieties of sawblades. Modern engineering has produced terrific saw blades and there are a variety of tablesaw blades available to the woodworker. For the beginning woodworker, the choice is simple. A sharp combination blade with 40 to 60 teeth works quite well for both rip cuts and crosscuts, for solid wood and for sheet goods. There’s no significant reason for getting a different blade until you develop special needs because your type of woodworking requires a specialty blade. Tablesaws come with a variety of original equipment combination blades and most of these are quite satisfactory for beginning woodworking. Specialty combination blades includes the Woodworker II blade from Forrest Manufacturing and the Freud P410 which are excellent blades for both ripping and cross cutting but, of course, are more expensive.

Most experienced woodworkers keep a combination blade on their tablesaws most of the time, changing it only for special needs. The most common need would be a change to a dado blade stack. Dado blades are expensive because more blades are needed to make up the stack. Freud SD508 along with Infinity Dadonator and Forrest Dado King are excellent choices.

If, for instance, you are doing a major project or a lot of remodeling and you need to rip or resaw lots of wood, then purchasing a specialty ripping blade makes sense. A ripping blade has fewer teeth and larger gullets making the cuts easier and cooler so burn marks won’t be left on the wood. If you are making lots of panels by edge gluing lots of planks, a special Glue-Line rip blade might be worth a purchase because it produces a very smooth finish even with an aggressive feed rate.

If you are building plywood cabinets, or working with MDF or lots of laminates, a special high tooth count, triple chip tooth grind plywood and laminate blade will eliminate much of the splintering and chipping that you get with those products. And there are special melamine blades to give smooth finishes.

If you cut lots of non-ferrous metals including aluminum, brass and copper, you might consider a non-ferrous sawblade. Ferrous materials, steel studs, sheets, pipes and rebar call for a steel sawblade.

Care of sawblades. Obviously, the teeth on sawblades are very sharp and that requires that they be handled with care. Many woodworkers use a cloth or gloves when gripping a loose sawblade to avoid fingers being cut. The teeth, particularly the carbide tips, are also brittle and easily damaged when dropped or clanged against the table saw top or other tools. Particular care is required when changing saw blades so that the teeth are not banged against the edge of the tabletop opening when either positioning the sawblade on the arbor or removing the blade. Re,move and store blades in a protective cover when not in use.

After significant use you eventually will notice that the blade is not cutting as well and you will gradually feel more and more resistance when making cuts. This results both from the teeth losing their sharpness and actually become dull and also from the blade simply being dirty. Woods have gum or sap, the fast spinning blade produces heat from friction, and that heat causes the gum and sap to melt slightly and become deposited on the sides of the sawblade.

Once a blade loses its sharpness it must be sent out to a professional for resharpening. Many companies such as Forrest and Freud have mail-in services for re-sharpening blades. Retail woodworking stores and some hardware stores often have a local source for sharpening blades. Unless you are doing a tremendous amount of woodworking, your tablesaw blade likely can go a couple of years before it needs resharpening. But if you work with lots of tropical woods, for instance jatoba, ipe and wenge, the general hardness and silica content of many of those woods will dull blades prematurely.

On the other hand, the saw blade will need cleaning much more frequently, say every six months or so, depending on the type of wood you have been cutting. Pine and fir are real culprits in leaving behind pitch, gum and sap. Commercial products are available through woodworking stores and online for cleaning sawblades. Soaking blades overnight in oven cleaner or ammonia also works well, and many woodworkers have success with products such as Simple Green, Zep Degreaser and 409. The blade should be removed in order to have easy access to clean all parts of the blade. Some woodworkers merely soak overnight, then wipe off the crud with a cloth or paper towel, others use a brass brush to remove pitch followed by a careful wiping of the blade.

Note: The next chapter on using the router will cover making rabbet cuts with a handheld router or on the router table.

Section 7: Mitering

Spline Jig by Larry Martin

Take a piece of plywood about 12 by 12 or so. Mount two 45-degree plywood or hardwood fences next to each other making a 90-degree cradle for holding the frames, The V-point of the 90-degree angle should be positioned about at the midpoint on the bottom edge of the 12 by 12 base. That's all there is to the jig.

The tablesaw rip fence should be set so that the blade will cut a kerf about in the middle of the thickness of the frame. Where to set the fence depends on the thickness of the sliding jig and the thickness of the frame. Determine how high to set the blade. It must be set high enough to cut a kerf through the two fences that form the cradle to hold the frame and also high enough to cut into the frame itself. Be careful not to set the blade too high or it will cut all the way through the frame corner and into the area reserved for the glass front and back of the frame.

To use the jig, set a corner of the frame into the fence cradle, line up the back side of the jig against the rip fence and push the jig forward into the blade. The blade will cut into the fence cradle first and then into the frame itself leaving a nice one-eighth inch wide kerf.

Make a bunch of splines by cutting one-eight inch thick material into right angle triangles. You want the splines thick enough so that they do not fall out of the kerf but not so thick that it is difficult to seat the spline all the way to the bottom of the kerf. If the spline is not seated all the way, you will be able to see a small gap under the spline which is unsightly and un-workman like. So you want the splines to be able to be seated firmly and fully with just finger pressure. If one is a bit tight, just tap it with a mallet to seat it fully. I apply a small bit of glue to the inside of the kerf before pushing in the spline. Too much glue, of course, will give you squeeze out problems.

The splines can be cut from the same material as the frames if you want to hide the splines. If you want a decorative detail, then cut the splines from a dark material if the frames are light colored or from light colored stock if the frames are of dark material.

Sections to be added in future —

Section 8: Beveling

Section 9: Compound Cuts  
Section 10: Dado Cuts

Section 11: Rabbet Cuts

Section 12: Resawing Cuts Section 13: Types of Blades and How to Change Them   
Section 14: Shopping for a Tablesaw (includes Types of Saws)

When shopping for a tablesaw it is useful to look at the parts and features.

Tables

The table can be made of stamped steel, aluminum, cast iron, or granite. Sizes vary by the type of saw described in the next section. There are pros and cons of each material. For example, an aluminum table is lightweight and easy to move around. Yet, since it is so light, you often need to clamp the saw to something stationary. And, some magnetic safety tools, like a magnetic feather board won’t work.

Arbor Length

The arbor is the threaded rod that holds the blade. The capacity of the arbor varies in some less expensive saws. If you intend to use a stacked blade dado set, look for an arbor that can hold blade stacks of at least three-quarter of an inch. Some inexpensive saws only allow for using a single blade, and some allow for a one half inch blade thickness.

Blade Diameter

A ten inch blade is the norm for most table saws. Beveling and resawing thick stock over an inch and a half may be an issue with smaller diameter blades. Check the specifications of the saw to see if it fits your needs.

Blade Guards/Riving Knives/Anti Kickback Pawls

The blade guard should be easy to use so you do use it. Some guards will not stay up. This is a problem for many blind woodworkers when setting the fence or blade height. It usually takes both hands to set the distance to the fence when using a click rule or rotomatic. Holding the guard up with your chin can be annoying.

The riving knife is a thin piece of metal behind the blade that keeps the cut from closing and therefore binding. Some saws have the knife attached to the blade guard, while others have the knife attached to the motor. How the riving knife is attached is a personal preference. However, the knife is useful.

Anti kickback pawls are spring loaded serrated tooth pieces of metal that are half, or quarter moon shaped that ride on either side of the blade and usually attached to the blade guard. The pawls help prevent the stock from going backwards.

On/Off Switch

Many modern on and off switches have a recessed on switch with a paddle style off switch. The paddle off switch can be operated with a knee, which can improve safety. The size of the off switch is blind friendly.

Dust Collection

If dust is a concern, you might consider a tablesaw that has an option to easily hook up a shop vacuum.

Table Slots

There are two “T” shaped slots that run parallel to the blade a few inches to the right and left. The slots can hold a miter gauge, feather board, cross-cut sled, and other jigs. The slots can be different sizes depending on the manufacturer. There are two main widths of these slots. Craftsman uses one and nearly everyone else uses the other. However, some inexpensive saws have their own standard. If you intend to use third market tablesaw accessories, you should check to see if they fit the saw you intend to purchase.

Flesh Sensing Tablesaw

As of early 2014 there is only one company, SawStop, which offers tablesaws that will stop the blade before cutting a finger. The technology senses moisture then instantly stops and lowers the blade before most injuries could occur. The SawStop is relatively expensive but that expense provides you with a top of the line tablesaw as well as phenomenal safety.

Right or left Tilt Blades

The direction of the blade tilt for cutting bevels might be consideration for right and left handed operators. On a left tilting saw, the fence is usually to the right of the blade. This is a natural position for right-handed users. On the right tilting saw, the fence is usually to the left of the blade. This is a natural position for left-handed users. Again, it is a personal preference. As a right-handed operator I have used both types of saws.

The next thing to consider is your budget, space, and intended uses of a tablesaw.

Types of Tablesaws

Like other tools, there are many types and prices of tablesaws. Choosing the right saw is an individual choice based on budget, the size of the shop, and the intended use.

There are four basic tablesaw designs.

Bench Top

The smallest is the Bench top or portable table saw. These saws are also known as jobsite saws and is often confused with the contractor type. They are fairly lightweight. They usually have a fairly small footprint and a small table area around the blade. As the name implies, bench top saws offer the choice of setting the saw on a bench for use. Many of these models come with an optional stand which you assemble. Many have a rolling base to move around the shop or worksite. Some have dust collection ports. Prices vary from $120 to more than $1,000 U.S.

Contractor Tablesaw

These saws are sometimes found on a job site and often in the home workshop. They can weigh up to 200 pounds or more. These saws are larger than the bench top type. The standard table of the saw is twenty-seven inches from front to back and after attaching the optional wings, as wide as thirty-six inches.

Contrator saws have an open base stand that distiquishes them from the cabinet saw. Contractor saws can range in price from approximately $400.00 up to approximately $1900.00.

Dust collection is a problem because the stand is open and there isn't a good way to direct the dust after the blade has cut the wood. Various boxes and bags have shown up lately to help with dust collection, but really amount to an attempt at dust containment.

The final step in tablesaws used to be the cabinet saw. However, recently there has been the addition of the hybrid models. More like a full blown cabinet saw than a contractor model, the hybrid is most often cast iron, with some of the most recent models having granite table tops.

The motor, while less powerful than the cabinet saw, is usually more powerful than the contractor. The standard for hybrids is 1.75 HP, a couple claim 2 HP. Motors come with your choice of 110 or 220 volts.

Prices range depending on the amount of extras included. Saws at the low end start around $800 and can go up to the $1400 range. Most seem to be near the $1100 mark unless you catch a sale.

Finally there are the cabinet models. These Cadillac’s of table saws are large, heavy and powerful and they are the work horses of the shop. They can range in price from just under $2000 to well over $4000 on the top of the line units.

No matter the saw, a few things remain the same to operate one. Safety must be the thought everyone lives by. I have been blessed to use table saws and while having come in contact a couple times with a spinning blade, I never required medical attention, and I still have all of my fingers and both thumbs. Others I know aren't as fortunate.

Currently, only the SawStop brand utilizes “flesh sensing” technology to force the blade to an immediate stop when it contacts flesh. SawStop saws are available in both contractor and cabinet saw models.

With there being so many different styles and models of saws available, it is beyond the scope of this chapter to include detailed instructions on setting up each type of saw. It is the responsibility of the owner to make sure he understands how his particular saw works and is adjusted.

References and Appendices: Links, History, SawStop Flesh Sensing Saw

Bob- while paragraphs like this fail to comply with the sacrosanct standards of the Harvard Guide to Academic Writing I think we should include it.

At different times, I have launched shorter pieces of plywood that have destroyed my shop radio, cleared off a bench, busted a window, and made dents in the plywood walls. I've been fortunate, all things considered, because the worst that has happened to me was pealing back a thumb nail.

Basics of Safety:

Appendix 1

History

Samuel Miller of England is credited with the invention of the first circular saw blade in 1777. He created a metal disk with teeth around the edge and found it worked very well for cutting wood when spun at a fast rate. This was not electrical however. This was thought to be the beginning of the saw mill. Most early saw mills depended on water current to provide energy to spin very large saw blades.

The idea of the table saw took around one hundred more years to come about. One of the first companies to experiment with the idea of a table saw and then market the saw was W.R. & John Barnes in Rockford, Illinois. Their treadle powered saw started selling in 1878. Still not powered by electricity, this early model was powered much like an old sewing machine.

In 1922, Raymond Dewalt invented the radial arm saw. This saw was powered by electricity and worked so well, that in 1924 he decided to open his own company, Dewalt Tools.

Just five years later, Art Emmons of Porter Cable invented an electric motor with a helical or worm gear attached that could also turn a smaller saw blade and that was the beginning of the circular saw.

Appendix 2 Currently, only the SawStop brand utilizes “flesh sensing” technology to force the blade to an immediate stop when it contacts flesh. SawStop saws are available in both contractor and cabinet saw models.

Recently, a landmark law suit was settled which focused more on whether a table saw should have “flesh sensing” technology, rather than requiring the user to exercise common sense and safe practices.

On April 19, 2005, Carlos Osorio of Columbia, was working for a hardwood flooring installation company in Boston, Mass. On that day his left hand came in contact with the blade and his little and ring fingers were completely severed. The other two fingers sustained damage to the nerves, tendons and blood vessels.

Osorio was using a Ryobi BTS 15, which was purchased at Home Depot on Jan. 10, 2005, for $159. According to court records, at the time of the accident, he was trying to make a rip cut on a 1 by 3 piece of oak flooring. The actual size of the board was two foot long, by two and a half inches wide by three quarters of an inch thick.

Several safety factors were ignored and safety features were not in place. According to court records, he was attempting to cut the board “freehand” without the rip fence. Osorio intended to make a cut in a straight line all the way through the board. He had cut only a small portion of the work piece when it got stuck at the blade. According to the same court documents, Osorio immediately experienced chattering and felt vibration in the work piece. He stopped cutting and cleaned the tabletop. Then he tried to make the same cut again but the chattering continued, and he decided to push the board harder. His left hand then slipped into the spinning saw blade.

During his deposition, the attorney for One World Technologies, parent company of Ryobi, asked Osorio, “…Before you started this cut, did you take the rip fence off?” To which Osorio replied through an interpreter, "Yes, I took that piece off, because we didn’t use that piece only, I only use it when I have to make a straight cut.”

according to a motion filed by Osorio's lawyers, the saw blade height was set to approximately 3 inches above the table, which is near the maximum elevation, and the blade guard was not installed on the saw during the operation. Even worse, the table saw was on the floor, Osorio was kneeling on one leg in front of the table saw, and his body was just to the left of the saw blade,.

The \*\*\*judgment which is sure to be appealed gave Osorio 1.5 million dollars because the saw didn’t have the “flesh sensing technology” currently only found on the SawStop brand.

\*\*\* portions of the description was taken from the Fine Woodworking website.