RULES FOR USING THE TOOLS

"The pioneers cleared the forests from Jamestown to the Mississippi with fewer tools than are stored in the modern garage."

— unknown, attributed to Dwayne Laws

I'm not an emotional guy. I don't get nostalgic about high school, my first car or my first dog, Scampy. I don't much hug family members at holiday gatherings. But I do have the deepest respect and affection for my tools. The care you give tools will gush readily into the things you build with them. None of the tools in the following kit are disposable; if you take good care of them, they will be around for many years of service.

STOP RUST

Here are some basic tips for caring for all tools. Don't you dare let them rust. Rust spreads like a cancer in ferrous materials (iron and steel) and can make your measuring and cutting tools difficult to use. There are a lot of products out there to prevent and remove rust, but the best thing going cannot be found on the shelf: a small can of vigilance.

When you are done with a tool, wipe down the metal surfaces – especially the cutting surface – with a rag that has been soaked with WD-40. Always keep the rag nearby (mine is seven years old) and renew it with a squirt of WD-40 when it gets dry. Wiping your tool down does two things: First, it removes dust from the tool. Dust can carry salt. Salt attracts water. The combination of salt and moisture will start breaking down your iron and steel tools.

Second, the WD-40 helps prevent rust by forming a thin protective barrier, albeit one that must be constantly renewed to be effective. Other people will disparage WD-40 (I once did). Ignore them. We tested all the rust preventative products on the market one spring weekend. We applied the products to a cast-iron plate and left the plate outside in the dewy grass for a couple of days. The area treated with WD-40 came out of the test looking the best. WD-40 is cheap. It's readily available. It won't stain your work. Spray some on a piece of wood and watch what happens. Once it dries, there's nothing to see.

LEARN TO SEE

All of your tools require tweaking and maintenance. They might work perfectly right out of the box; they might not. It all depends on who made the tool and what sort of day they were having when your tool came down the assembly line — whether the assembler was a robot or a person.

You need to learn to set up your tools so they do what they were intended to do – cut square, bore straight holes, measure accurately. Once you set them up, you need to check on them every once in a while. Trust, but verify. It's a fact: Tools lose their settings after regular use.

In fact, one of the biggest challenges in woodworking is training your eye to see the right things. You need to learn to see if the cut is square. You need to see if your square is square. Have you ever heard the old expression "tried and true?" It is an expression that applies to your tools as well as your work. When you make a cut you should test it to make sure it's the cut you wanted – this is called *trying* your work. If the cut is correct it is said to be *true*. Likewise with your tools, you must try them to ensure they are cutting true. We're going to show you how to test all of your tools (and joints) so they are true. It's not hard, and it pays off big-time.

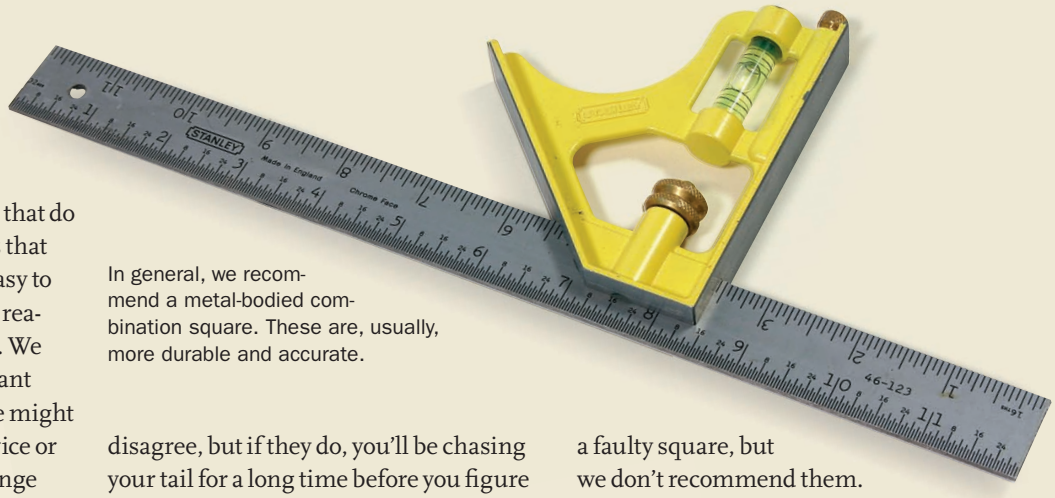
BUYING QUALITY

You can spend a ridiculous sum on any tool – ridiculously huge and ridiculously small. Jigsaws can cost $35 to $500. Awls can cost $2 to $180. I wouldn't recommend you buy the tool on either extreme of the spectrum. It would be easy for us to say simply: "Buy the best you can afford." But that's a cop-out. If money is tight, you shouldn't buy the $35 jigsaw. You should wait and save a bit more cash. If you're a

wealthy heiress, you shouldn't buy the $180 scratch awl just because you can afford it (save your money for some real jewelry).

What's important is to buy tools that do what they are supposed to do. Tools that hold their settings. Tools that are easy to maintain and adjust. Tools that are reasonably durable. Tools that are safe. We are going to explain what is important about each tool, and what is not. We might not be able to offer brand-name advice or model numbers because those change from month to month and from city to city (no lie; ask me about that fact over a beer sometime). But we can help you narrow your choices considerably.

All of the tools on our list can be purchased from a home center or a hardware store. There is no specialty stuff on the list to search the world for.



In general, we recommend a metal-bodied combination square. These are, usually, more durable and accurate.

MEASURING TOOLS

You want to buy both of your measuring tools – a 12" combination square and a 16' tape measure – at the same time so you can check the scale on one to make sure it matches the other. They are unlikely to disagree, but if they do, you'll be chasing your tail for a long time before you figure out what the problem is. To buy these tools, take with you to the store a mechanical pencil and a scrap of wood that is at least 6" square and has one straight edge.

12" COMBINATION SQUARE

This is the tool that will lay out your joints and cuts, and check all your work to ensure your cuts are accurate. The home center should have a few different brands available with some variation in price. Here's what's important:

First, the square must be square. The ruler and head must meet at 90° or the tool is worthless. There are ways to tweak a faulty square, but we don't recommend them. It's not something you should have to do. This is why you brought the wood and the pencil along with you – they will help you sort through the pile of combination squares to find the most accurate one in the bunch. Don't be embarrassed to do this in the store; they should be embarrassed that you have to do this.

First, take the ruler and press one edge against the straight edge of your board to confirm that the edge is straight. Generally you don't want to see any light peeking out between the ruler and the wood. If your wood is out of whack, wander over to the lumber section to look for an offcut to borrow. Usually there's a barrel by the panel saw or radial arm saw where they cut down big stock into small stock for customers.

The ruler from your combination square can confirm if the edge of the board is straight. Off-the-rack lumber will usually have at least one decent edge.

Accuracy is important here. Keep the square registered securely against the wood as you scribe the line. If anything feels like it shifted during scribing, make another line. Use a mechanical pencil to ensure your line is consistent in width.

Now flip the square over and show the ruler to the line. If your square is true and your line consistent, then the line and the ruler should be perfectly parallel. If the line and the ruler don't match up, try the operation again before you reject the square – it's easy to trip yourself up when checking your square.

With the square reassembled, press the head of the combination square against the straight edge of the board and use your fingers to hold the ruler down and steady against the face of the board. With a pencil, scribe a thin line along the edge of the ruler. Make it as thin and consistent as possible. If the square moves or the line changes thickness, simply move the square and try again.

Now flip the square over so the other face of the ruler is flat against the face of your board and hold the head of the square against the edge. Push the square up to your perfect line; this is called "showing the line to the square." If the edge of the ruler is perfectly parallel to your pencil line, you have found a square that is indeed square. Congratulations. If the line is slightly off, try the test again. If it's off in the same way, put the square back for another sucker, er – shopper.

Now look at the ruler itself. It must be readable. Look for fine dimension marks. Better-quality squares will have them engraved in the metal rather than printed on. Ideally, you want the ruler to have different scales on each edge. The best combination squares will have one scale in 8ths of an inch, another in 16ths, 32nds and 64ths. You can get away without the 64ths. The 32nds are helpful in most cases. The 16ths are non-negotiable and necessary.

Remove the square from its head by loosening the nut below the ruler. The ruler should be easy to remove and replace. You'll be doing this quite a bit. Now tighten up the nut and make sure the ruler locks firmly in place. It should stay put when you tug on it.

Check out the rest of the square. Is there a bubble level in the head? Yes? No? It doesn't much matter; it's mostly worthless in such a small tool. Is there a removable scribe/scratch awl in the head? Again, pretty worthless in my book. I seem to lose mine right away, but never miss it. It's too small to use anyway.

Treat your combination square like it is a holy relic. If it gets knocked to the floor, curse yourself and then test it immediately. If it's out of true, get in your car and head back to the hardware store. Throw away the old head but keep the ruler – it's still useful. Never slide the ruler needlessly through the head (I've seen some people who do this like it's a nervous tic). This activity wears the area where the head meets the ruler. I've had squares that went out of true after only a couple hundred full-length motions through the head. If that happens to you, buy a better brand of square next time.

16' TAPE MEASURE

First, why not buy a 50' tape measure like all the contractors have on *This Old House*? My dad always mocks my 16' tape measure. "That," he says, "is for girls." Let me tell you, the big tape measures are a pain for furniture work. They curl up more and are hard to lay flat on the work. They weigh a lot. They are bulky. They rarely have the right scales on them.

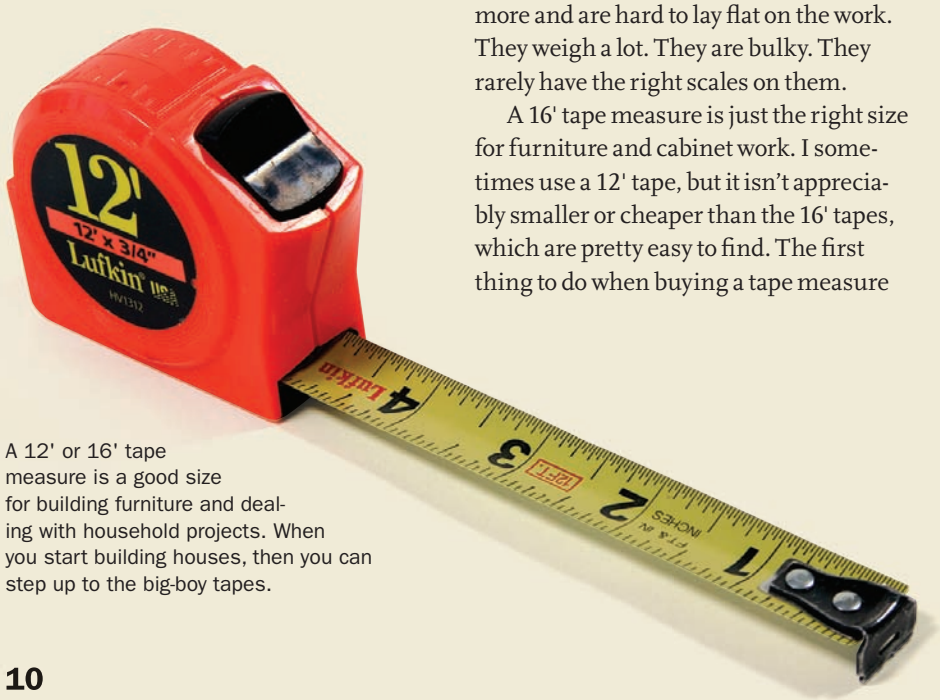
A 16' tape measure is just the right size for furniture and cabinet work. I sometimes use a 12' tape, but it isn't appreciably smaller or cheaper than the 16' tapes, which are pretty easy to find. The first thing to do when buying a tape measure is to pull the tape out and look at the scale. It's nice to have 16ths on the entire length and 32nds along the first 12" or so.

Now compare the scale on your combination square with the scale on the tape measure. They should match up. Line them up on the 1" mark and check the dimension lines between 1" and 2". The tape itself is important. You want the lines to be as fine as possible and you want the tape to lay as flat as possible on the work (this makes it easy to mark and measure accurately).

There also is a thing called *standout* with tape measures, this is how far out the tape will extend before it bends and droops. For building furniture, this is not a big deal – a mere 36" to 48" of standout is

The hook should move in and out. The distance it moves should be equal to the thickness of the hook itself. Tweak the hook with pliers until the tape consistently measures inside and outside measurements.

After comparing about 15 brands, I like the Lufkin scales. They have fine graduations and avoid the ridiculous gimmickry on some scales (some measure in 10ths of an inch!). Note the 32nds at the bottom and the 16ths at the top.



A 12' or 16' tape measure is a good size for building furniture and dealing with household projects. When you start building houses, then you can step up to the big-boy tapes.

Always check your tape measure against your combination square to ensure that the graduations are similarly fine and actually line up. Manufacturers of tape measures and combination squares swear that inaccurate scales cannot occur. I, however, have found occasional discrepancies.

no problem in the shop. (Know, however, that you can never visit a home-building site with this sissy tool.)

Now check the tab, sometimes called the hook, on the end of the tape measure. It should move a little bit. How much? Exactly as much as the thickness of the tip of the hook. If the hook is 1/32" thick, the hook should slide forward and back 1/32". Some people foolishly glue (or weld) the hook so it doesn't move. This prevents you from taking accurate measurements on either the inside or outside of your work. When you measure the inside of a box, the hook is pushed in so the outside face of the hook is zero. When you measure the outside of a piece, the hook is pushed out so that the inside face of the hook is zero.

You can tweak the hook a bit with pliers back at home in order to make the tape measure accurate for inside and outside measurements. For now, find one wheather the hook looks like it moves enough to be accurate.

There are other features on a tape measure that are personal. A clip for the belt is necessary. The locking mechanism should be easy to activate and release – but not too easy. I've always fumbled with the tape measures that release by pressing a plate on the underside of the tool. I constantly retract the tape by mistake. Also – and this might sound funny – I like to have a brightly colored tape measure. The color makes it easy to find when you set it down.

STYLES OF SAWS

We had some long discussions about which kind of portable saws should be in this tool kit. The circular saw seemed a natural part of the tool kit, but it has some limitations when dealing with smaller work, and it won't cut miters that are good enough for picture frames (I'm sure someone can do it; but we can't). Plus, it can be difficult to find saw blades that have enough teeth to make a furniture-grade cut. Circular saws are best suited for the job site.

In the end, we settled on a jigsaw for rip cuts and curves, and a 10" miter saw for crosscuts and miters. The jigsaw has the disadvantage that you need to clean up your rip cuts with a block plane. But its advantages far outweigh that disadvantage. (Plus, learning to use a block plane is an essential furniture-building skill; more on that later). The jigsaw cuts curves beautifully and it is safe, powerful and inexpensive. Plus, with a little practice, you'll find that you need very little clean-up of your sawn edges. We'll show you how to achieve this (the trick is the blade you buy and your left thumb).

The miter saw is a great crosscutting tool for fine and rough work when it is properly tweaked. It will make airtight crosscuts, perfect miters and even break down stock into manageable lengths for you to work with your other tools. A simple 10" miter saw may be limited in capacity to cut only a 1 × 8, but when you're dealing with off-the-rack lumber from the home center, 1 × 8 is likely the largest lumber with which you'll be dealing. Let's look at these tools in detail.

This is a barrel-grip jigsaw – chic and European and hard to find in North America. Too bad; some of us really like the lower center of gravity. If you can find a jigsaw like this one at your home center, we recommend it. If you can't – don't worry about it.

JIGSAW

This tool seems so simple, yet it is a subtle thing, capable of immense finesse in skilled hands. There are lots of features on this tool that are rarely discussed from a furniture-making perspective, but that's exactly what we're going to do here.

First, there's the body style of the saw. There are two kinds of bodies: the common top-handle grip and the more European *barrel-grip* style. I absolutely hate to do this to you, but I encourage you to look for the barrel-grip saw. It bewilders me that the top-handle saw is the dominant style in this country. These tools are more tippy and harder to steer than the barrel-grip tools. This tippiness is not a big deal when you're just trying to notch some 2×4s on the job site, but it makes an appreciable difference in the shop. Keeping both your hands and the tool lower to the work improves your control. This maxim is not just for beginners; this applies to everyone.

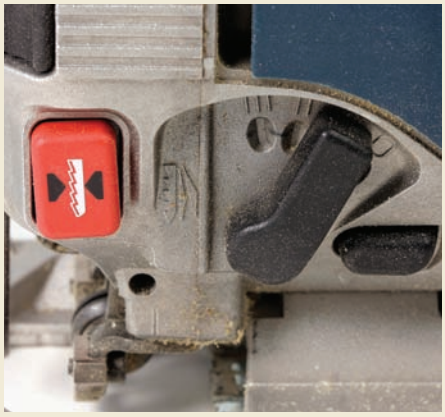
The next most important thing is the blade-release mechanism. This is something you're going to be using quite a bit, so it should be simple. The best blade-release mechanisms are almost effortless: Pull a lever and the blade drops out or pops out. Lots of saws have sticky mechanisms – you don't want to have to grab the blade and wiggle it or tug it to remove it from the body. Eventually you will cut yourself.

Older saws need special screwdrivers or require you to twist a knob a good deal to remove the blade. Avoid these if you can because there are less frustrating ways to work. Speaking of blade-holding mechanisms, there are two dominant styles of blade-holding mechanisms on the market: a T-style and a Universal style or U-style. The T-style blade has a (surprise) T-shaped shank on top. The Universal-style blade has a hole bored in the blade. I've used both. I don't really have a preference. In fact, my preference is to buy a jigsaw that can hold either style blade. The jigsaw gurus tell me that this compromise results in a blade-holding mechanism that is weak. But I have never had a jigsaw blade come out of the tool while I was working.

Jigsaws have different *strokes,* which is the amount that the blade travels up and down in the tool. A 1" stroke is typical and fine. Shorter-stroke saws are generally at the very low end of the price spectrum and should be avoided anyway. You'll also see a lot of hype about the amperage of a tool. By and large, this is not important for furniture work. I'd give up a couple of amps of alleged power in exchange for a 12' power cord any day. And do check the length of the cord. A short cord will get hung up your work where the plug meets the extension cord.

Another feature that gets played up is the orbital setting. The orbital setting is the amount that the blade will travel back and forth in the cut. Usually, most saws have four settings: zero, one, two and three. Zero means no forward movement,

Here you can see what we're talking about. On the standard top-handle jigsaw, (behind the Festool) your hands will be much higher – 3" to 4" higher. That said, I wouldn't reject either of these jigsaws – both cost more than my monthly truck payment.



Shown is a properly set jigsaw with the orbital on 1. When you work in thicker material (or need to saw really fast), switch to 2 or 3.

Most people don't check the blade to ensure it's square to the baseplate, but it's a good idea. Even the best saws (such as this Bosch) will go out of alignment. If you don't check this occasionally, you'll be in for a rude shock when you try to do some precision work.

It's also good to test your results occasionally. If your blade is square to the baseplate but your work isn't square, there could be a couple of problems. You could be cutting too fast, causing your blade to deflect. Or your blade might be slightly bent. Either problem requires a remedy.

With a little practice you'll be able to cut very close to the line with your jigsaw. If you can leave just 1/32" of waste, then it's simple work to rasp (or sand) down to your line. If you cross the line while cutting, you'll have no line to rasp to. Make a relief cut into the corner before cutting the curve.

The jigsaw is a two-handed tool. A thumb on the baseplate will help steady the tool and will allow you great finesse as you round curves and track a line. We've removed the plastic guard on this saw for clearer pictures. With the guard in place, it's quite a feat to cut yourself.

which results in a slow cut but a clean one (generally). Three is when you need to cut plywood to cover your windows for an oncoming hurricane. It's fast and rough. Set your saw to one and you'll be fine until you move into the thick stuff.

How about a blower, do you need one? A blower puffs away dust from your cut line to make it easier to follow. I like a blower, otherwise I find myself doing all the puffing and turning blue. How about a worklight? It's not a must-have, but if your saw has one, you'll use it and like it. It can get dark down there by the blade.

Other features aren't so important. How you bevel the base of the saw is pretty irrelevant – some manufacturers play up the fact that the saw requires no tools. I rarely find the need to bevel the base. Once a year maybe. So no big deal. Do make sure that your blade is cutting straight down. You can check this first with your combination square, but keep the ruler away from the teeth of the blade. The teeth can be bent, or set, to either side of the blade on some blades. Register the ruler against the steel behind the teeth.

Then make a careful and straight cut off the end of a board. No curves (these tend to deflect the blade). Now check the finished cut with your combination square. If the cut is square, you're good. If it's not, then tweak the base of the tool until the resulting cut is square. Now cut a curve at a comfortable pace and check the work. The edge should be square to the face. If the blade deflects, then slow down your cutting pace.

You do need variable speed at the trigger – the more you press, the faster the blade goes. This is common on all but the cheapest tools.

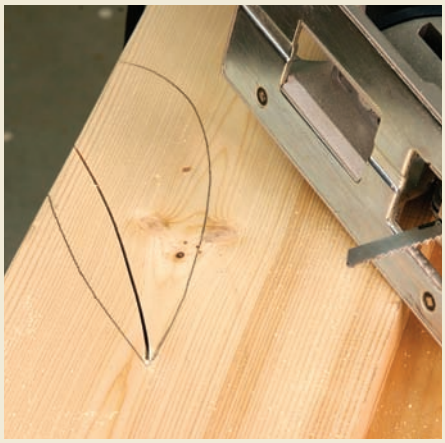
Jigsaw Use

Like any portable saw (hand or power) you want to have a pencil line that shows you where to cut. Always cut to one side of the line – the waste side. Cut as close as your skills allow. The less wood you leave, the less clean-up work will ensue, but the more disastrous the mistakes will become. I shoot for 1/32" of waste left or less.

The jigsaw is a two-handed tool. One-handed use is for hot dogs. One hand should grasp the tool's body and trigger. Use the thumb on the other hand to press the base against the work. I use both hands to steer the tool. My trigger hand supplies the forward motion and does the heavy steering. My other hand provides the small adjustments that are critical to tracking my line. The thumb also keeps the saw from jumping up and down in the cut. If you keep the saw's plastic guards in place, this is quite safe.

You also need to know about relief cuts. These are the difference between success and disaster at times. Simply put, relief cuts are cuts you make into the waste that allow you to remove the waste one chunk at a time. They're sort of like waypoints for your tool. When your waste comes out in small chunks, it's less likely to droop and split and splinter, which can ruin your work. It also allows you to turn curves that are a bit tighter by freeing up space behind the blade, allowing it to turn.

I usually make a couple of relief cuts where my cutline is heading into a turn or coming out of a heavy turn. Also, I'll make a relief cut when I see that the waste



Learning where to make a relief cut takes some practice. If you have a sharp corner, such as this, that's always a good place to put a relief cut. You'll also want a few relief cuts in a long cut to prevent your waste from sagging and possibly breaking off.

is going to be 6" long or so. This really depends on how big your waste piece is going to be and how droopy it will become during the cut.

We need to say a word about blades. Cheap blades will burn or leave a splintery mess in their wake. Buy nice blades and take care of them – wipe them clean with your WD-40 rag at the end of your shop time. After years of trying out different blades, we generally have two kinds of blades in our shop. I like the Bosch T234X Progressor blades, with 11 teeth per inch (*tpi* in shop lingo). Senior Editor Bob Lang likes the Progressor for straight cuts, but prefers the T101BR for curves where the Progessor is too bitey and rough.

MITER SAWS

These saws were once the province of the high-end finish carpenter. Then the rough carpenters started using them (where they're called chop saws) as did the furniture makers. Each profession leans on a different feature of the tool to do their work. Finish carpenters like the combination of portability and accuracy. Carpenters like the speed and power. Furnituremakers like the accuracy and safety compared to a radial-arm saw (sometimes called the "radical-harm saw").

These tools are rarely perfect out of the box. They require tweaking for furniture work, plus they require a different way of working that we'll discuss later. But by and large they are incredible tools once you understand a few things.

Styles of Saws

There are three major saws in the miter saw family:

Straight Miter Saw: This saw makes miters at any angle, usually between 47° left and 47° right at minimum. The cut this saw makes will always be 90° to the face of the work.

Compound Miter Saw: This saw does everything a straight miter saw does, plus the head can tip right (or both right and left) to make compound cuts. Compound cuts are angled in two directions, across the face of the board and across its thickness. This feature is used by trim carpenters for installing crown moulding.

Sliding Compound Miter Saw: This saw does everything the above saws do, but it also runs on a sliding carriage, which allows you to cut wide boards – most of these saws will cut a 12"-wide board; some go as far up as 16". These saws are as expensive as a good entry-level table saw and most of the features are little-used by a furniture maker.

So which saw do you need? Really? Probably just a straight miter saw. These are getting harder to find these days, so you might have to step up to a compound miter saw. And even these are getting cheap. Thanks to overseas manufacturing, I've seen good 10" compound miter saws for about $100 or a little more. What about the blade size? The 12" saws are notably more expensive, though it's nice for the occasional cut where you really need the extra width. However, we honestly think you can get by just fine with a 10" saw.

Important Features

These saws can be loaded with extras, so let's cut through the clutter here. Two things are really important with this tool. First, it has to have a decent carbide-tooth blade that is capable of making clean finish cuts. Look for a blade with at least 40 teeth (and as many as 80). The more teeth you have, the smoother the cut, but having more teeth slows the cut and increases the chance you'll burn the work. And if you fall for a cheap saw that comes with a high-speed steel blade, you'll be upgrading it immediately and probably spending a good deal more money than you have to.

Second, you need a saw that is easy to adjust so the blade is 90° to the fence. Note that I'm not talking about the little handle up front that allows you to swing the head left and right. I'm talking about adjusting the tool so that when the head is locked at 90° it makes a perfect 90° cut. Sometimes you have to adjust the fence behind the blade, sometimes you adjust the points where the head locks down. We prefer this second method of adjusting the saw because it is faster and it doesn't ever result in you bending the fence. I've bent a couple, even while being careful. And when the fence is bent, you'll never get a square cut on both sides of the blade.

Both of these are T-style jigsaw blades, the most common style on the market. The T101BR (top) is Bob's favorite and the Bosch T234X (bottom) is my favorite. Note that mine is bigger.

Your basic 10" miter saw is accurate enough and durable enough for a lifetime of woodworking. Beware of low-priced saws, even from national brands. One of the ways they lower the price is by equipping the saw with a poor-quality blade. You'll have to replace that blade immediately, and that almost always negates the price savings.

A carbide blade on top of a steel blade. Luckily, the steel blades are becoming more difficult to find, even on the cheaper saws. If you see a steel blade, don't buy it unless you need something to chew up your work in an unacceptable manner.

Follow the manufacturer's directions for squaring up the tool, and then make a sample cut and check it with your combination square. This brings us to another critical aspect of miter saws: How you make the cut. I've found that the number one cause of errors in this tool is not that the fence is off, it's that the work has shifted slightly during the cut, spoiling your accuracy.

The problem is these tools have fences and tables that are make of machined aluminum, which is slippery. So it's quite difficult to hold your work perfectly still during the cut. It's possible, of course, just difficult. Some manufacturers supply a hold-down clamp to secure the work against the table. These can be slow and can get in the way. The best solution I've found is to apply a layer of #120-grit peel-and-stick sandpaper to both sides of the fence. This works wonders.

The other way to spoil your accuracy is by taking too light of a cut and taking it too fast. For example, let's say you want to trim 1/32" off the end of a board. You line up the board as best you can and make your cut. It's not a lot of material so you make the cut quickly. Sometimes, not always, the blade can deflect out when you do this. This results in a cut that is not 90° to the face of the board. If you need to make a cut like this, take it a bit slower in order to keep the blade true.

The bottom line with this tool is that it's always best to check your work, especially if you don't have some sort of stop to constrain it from slipping around. So cut each joint and try each joint. You'll be fine.

Other features of miter saws are less important. We haven't become fans of lasers on these saws yet. That may change, however, once they get them

Here's a common operation with a miter saw – trying to remove just a bit to sneak up on a cut line. If you make this cut too fast (especially in hardwoods or thick stock), the blade can deflect. Though it seems like you're making a light cut, slow down and check the cut across the thickness to ensure everything's OK.

The fences on these saws can be bent during assembly. When you get your saw out of the box, check the fence with your square to ensure it's straight. If it's not, take the saw back and exchange it. A bent fence is almost impossible to fix and will cause a lifetime of headaches.

A less-common problem is that the fence isn't square to the table. Check this along several points on the fence. A twisted fence will wreak havoc with your accuracy.

Personally, I don't understand why they make the table and fence so smooth and slippery. Their job is to support and grip the work. Even after using these tools for thirteen years, I still struggle with keeping the work immobilized as I cut it. If it shifts even a tiny bit during the cut, your cut won't be square. Adding a bit of self-stick sandpaper to the fence works wonders.

working just right. The raw amperage of these saws is mostly a non-issue. Almost all of them list their power as 15 amps, which is the maximum for a typical 120-volt household circuit and plug. All of the saws we've tested, even the cheapies, have enough power to cut standard material thicknesses with no complaint. The dust collection on all of them is quite poor – learn to live with it.

A few saws allow you to do stop cuts to make grooves or trenches across your work. You'll probably never use this feature. There are also high fences (best for crown moulding) and gizmos that allow you to micro-adjust your miter settings. These are not deal-breakers (or deal-makers).

CIRCULAR SAW

When we decided on the list of power tools for our tool kit, we selected the jigsaw over the circular saw. But there are many instances where the circular saw would be the best choice; straight-line rips and cutting plywood are the most relevant. So we decided that the circular saw would have to be the first power tool added to that original list.

There is much to consider when selecting a circular saw, the first of which is the saw's size. The size of the saw is described in terms of blade diameter. You'll find saws that are from $4\frac{3}{8}$" to $10\frac{1}{4}$" with a number of entries between.

So, how do you choose? To begin, take a look at the depth of cut that can be made with the saw set at 90° and at 45°. As you begin building projects from this series you'll find that your materials will be mostly $\frac{3}{4}$" or $1\frac{1}{2}$" thick. So, the need to cut these materials should inform your purchase.

A $4\frac{3}{8}$" circular saw will cut only $1\frac{1}{4}$" in thickness set at 90°, and $\frac{3}{4}$" when angled at 45°. So, it's obvious this saw is not the one for your shop. You'll find that a $6\frac{1}{2}$" saw just clears a $1\frac{1}{2}$" cut at 90° but because the size is a bit odd, you may have trouble locating blades.

The most popular size of circular saw is the $7\frac{1}{4}$". Any store that carries circular saws will have a complete line of $7\frac{1}{4}$" saws from which to choose, as well as a

Large knobs can makes adjustments quick and easy when adjusting the depth or angle of cut.

number of different blades designs (we'll discuss those in moment). The depth of cut with the 7¼" saw at both 90° and 45° is more than required. This saw meets or exceeds the requirements of most woodworking so there is no need to look into bigger models that are heavier, higher in cost and unwieldy as well.

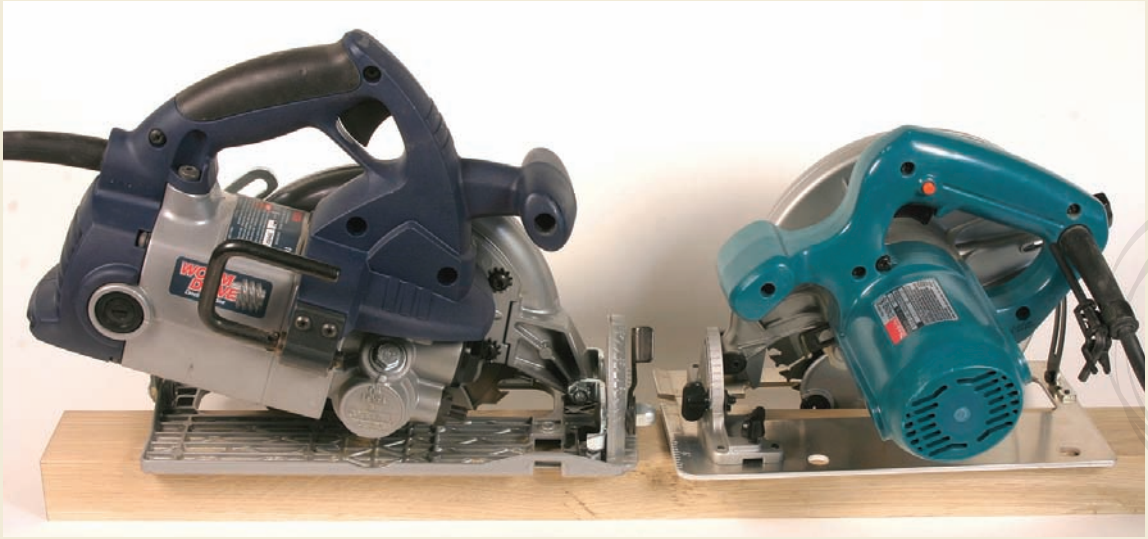
Saw Designs

Circular saws are divided into two general categories – worm drives and in-line saws, also known as sidewinders. Worm drives are easily recognizable due to their design. The motor sits behind the blade, which is driven by a worm gear (the gear looks like a curled worm.) These saws provide a good line of sight while cutting and will extend your reach across sheet goods, but they are more expensive than sidewinders. And, because wormdrive saws are much heavier saws – 14 to 16 pounds – they can be awkward to use because they tend to be front heavy.

Sidewinders, so named because the motor sits beside the blade, are the most common configuration. A sidewinder provides a better balance in your hand because the handle is directly above the motor. Bottom line: We recommend a 7¼" in-line saw.

What to Look for in a Saw

So where do you go from here? What about the power? Most saws boast of amps. The 7¼" saws generally have a 13- to 15-amp motor. Amps relate only the amount of electricity that the tools use, not the power sent to the blade. Is that good, or is horsepower better? Horsepower is generally measured when the saw is not in a real-world cutting situation. This too, is not an informative basis for comparison. The better way to select a saw is by price. A good sidewinder for woodworking will set you back around $100 to $150. Sure, there are saws that cost less, but they aren't going to last a lifetime nor be able to withstand the rigors of the woodworking shop. They would be great for the homeowner looking to use a saw occasionally.



Not only can you see the difference between the worm drive saw (left) and the sidewinder (right), it is obvious that the sidewinder will be a lighter, more easily controlled saw.

Comparison Shopping

In side-by-side comparisons of saws, begin with an inspection of the saw's shoe – the bottom plate of the saw. You can find shoes that are aluminum or magnesium as well as plastic and other material. Our recommendation is to stay away from the plastic shoes and look for a metal base; cast metal would be best. A shoe with ribs will have added reinforcement in case (or when) you drop the saw on the floor – but that added strength adds weight to the tool.

The overall weight of the saw will affect comfort, and that is an issue in choosing your saw. Also, check the handle positioning and the balance of the saw. Making sure that the saw fits your hands and feels comfortable while in use is key in the selection process.

Next you need to look at the adjustments of the saw. The two adjustments are depth of cut and angle. You'll find knobs, levers and wing nuts used to allow these adjustments. Large knobs and smartly placed levers will make adjustments both quick, and accurate. Small, out-of-the-way levers and wing nuts are less handy.

The last issue to consider is how easy it is to change the blade. We've seen saws that require you to insert a nail through a hole in the blade to lock the blade. Or worse yet, to hold the blade as you try to release the arbor nut. These are not the best scenarios. A shaft-lock mechanism is the best option. This feature locks the shaft so it doesn't rotate, allowing easy use of a wrench to remove the arbor nut.

A Word About Blades

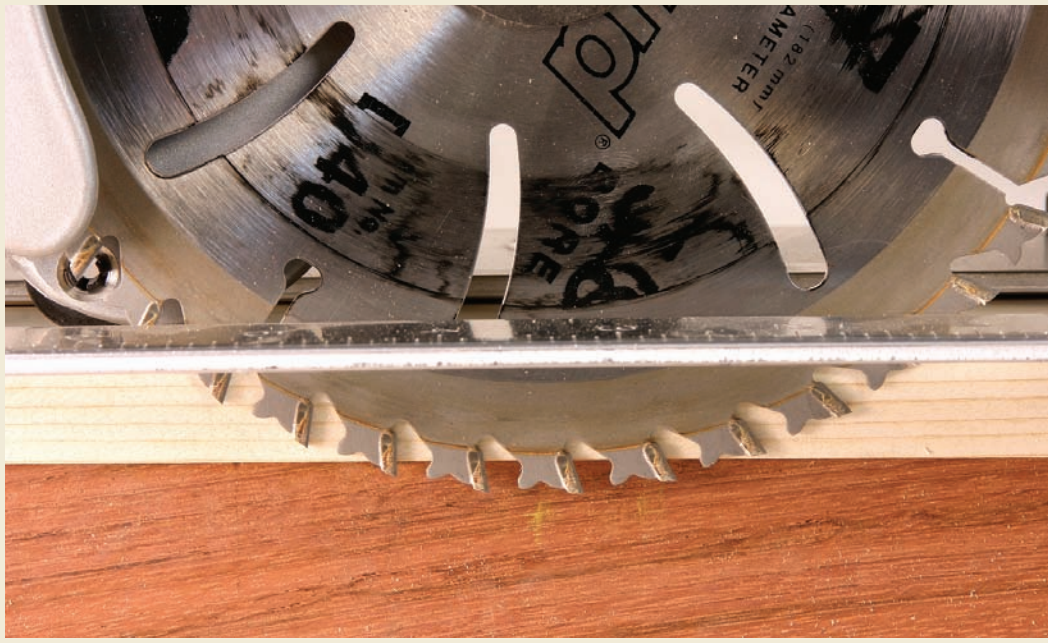
A sharp blade is very important when using a circular saw. Dull blades are one of the causes of kickback, which is when the blade catches the wood but instead of cutting the piece, the saw is propelled back toward the operator. This is dangerous.

There are many choices when selecting a blade for your circular saw. First, you should always use a blade that is sized for your saw – if you have a 7¼" saw, use a 7¼" blade. Installing a smaller-diameter blade will not allow the saw to develop the rim speed needed for the machine to work at its full potential.

Second, base your blade decision on the type of work the blade will perform. If you're roughcutting lumber, a 24-tooth carbide blade would be right. But using that blade to cut veneer-faced plywood would result in a massive amount of tear-out.

There are blades that have 16, 18, 24, 40 or 60 teeth (and some in between, I'm sure). There are blades for plywood as well as masonry. You have to decide how the saw will be used in order to select the correct blade. Our tool kit would have a 24-tooth carbide blade (carbide tips on the teeth will stay sharp longer) for roughcutting stock and a 40-tooth carbide blade for the finish cuts.

Large knobs can makes adjustments quick and easy when changing the depth or angle of cut. The cut made with a circular saw should not be considered the last step in the milling process. A hand plane should be used to ne-tune most of the edges for better-quality results.



Properly setting the depth of cut will help extend the life of the blade and lessen the possibility of kickback.

Using the Circular Saw

There are a few basic guidelines for using a circular saw. Adjust the depth of cut prior to cutting any material. Loosen the knob or lever and raise or lower the shoe until the blade is between ⅛" – ¼" beyond the lower edge of the material to be cut. Remember to tighten the depth knob before beginning the cut. Setting the depth of cut too deep could lead to binding and kickback.

Because the circular saw cuts with the blade coming up through the material, it is best to cut with the face side, or best side, down. Any tear-out would then be on the back side of the material and away from sight.

Always start the saw with the front of the shoe resting on the workpiece; don't let the blade make contact with the wood until the blade has reached full speed. Move through the cut with the motor/ base resting on the good side of the workpiece, not the waste material side and do not remove the tool from the workpiece before the blade has come to a complete stop.

Another good rule of thumb is to have your workpiece properly supported. This does not mean laying the workpiece across two sawhorses while cutting the

Aligning the blade with the cut line and using a speed square provides a temporary fence for a square or straight cut.

middle of the board. This tool is designed to cut through material causing one piece – the waste – to fall away.

To cut the end off of a board, make sure to have the waste material extended past any supporting surface. As the cut is finished the waste will fall away. In cutting sheet goods you may not want the waste to fall. In this case, support the work from below using several long lengths of scrap so the work is fully supported. Some people cut sheet goods on top of 4' × 8' foam insulation board. Either way, set your cutting depth so you don't cut through the support below your work.

Clamping an auxiliary fence to the workpiece is an excellent way to achieve a straight cut, so long as the fence is also a straightedge. Note the gun shot notch.

Making the Cuts Freehand

Many of the cuts made with the circular saw will be freehand cuts. This is where the saw is guided by hand and eye, not with guides or jigs. There are two methods for completing this type of cut while staying on your line and making straight cuts. The first is to use your eye to watch the relationship of the blade to the cut line.

With your safety glasses in place, tilt your head and watch the cut. The dynamics of the circular saw will enable to you to make straight cuts more accurately than you can with a jigsaw. The circular saw, because the cutting area of the blade is wider than a jigsaw blade, will help to guide you on a straight path. It is possible, however, to veer from the cut line so keep your attention focused.

The second method of cutting by hand and having the resulting cut straight is to use the gun shot to help guide the tool. The gun shot is a notch in the saw's shoe that aligns with the edge of the blade. Maneuvering the saw while keeping the notch at the line will provide a straight cut – as long as you started the cut at the line to begin with.

Cutting with Fences and Guides

Another much-used method of making straight cuts with the circular saw is to use a fence or other type of guide. As long as the fence is straight, the saw will follow that fence and the result will be a straight cut.

One type of guide is a speed square or an aluminum carpenter's square. To use this setup, position the saw so the blade touches your cut line, then move the speed square tight to the saw's shoe on the opposite side from the blade. At the same time, hold the square tight to the edge of the board to allow the shoe to ride against the square. This technique is best suited for cuts across the grain (called crosscuts) no wider than the square itself.

Making wide crosscuts requires a different fence or guide. The best fence is plywood; the factory edge works great.

But, any scrap piece that has a straightedge will serve. Use the fence just as you would a speed square, but clamp this guide to the workpiece.

This arrangement is one of the best ways to accurately make cuts with the grain (called rip cuts), too. Place the plywood in relation to the cut line as before and repeat the process of running the saw shoe along the cut, ripping a straight line. Be sure to have the work supported correctly.

A Specialized Guide

If you plan to use your saw extensively, we suggest making a fitted guide that is designed to work with your saw for crosscuts or rip cuts.

Why make a fitted guide? Without a fitted guide, you have to do more measuring to position your auxiliary fence on your work. You're always having to add in the width of the saw's shoe when positioning your fence. A fitted guide allows you to position the fence perfectly on the cut line each time.

You'll need a piece of plywood and a straight piece of scrap stock (plywood will work here too) to build this fitted guide. The plywood needs to be about 5" wider than the shoe of the saw and the scrap

The jig has a wide fence to make clamping easy. Because this jig was created using the circular saw, whenever we clamp the jig exactly at the cut line, the result will be straight and on the layout line.

should be about 4" in width, with a factory straight edge.

Attach the scrap to the left-hand side of the plywood keeping the straight edge to the right. Clamp the assembly to a bench or worktable making sure that the single-thickness edge is hanging off of the bench.

Next, adjust the saw for the thickness of the plywood and cut through the plywood as the shoe rides tight against the scrap. This is just like making a rip cut with a fence, but this time the fence is attached. The freshly cut edge is now in line with the saw blade. Each time you make a cut, all you need to do is locate the jig exactly at the cut line and clamp it in place. Each time you run the saw against that scrap, while the saw is resting on the plywood, the cut will be correct to your layout. One thing to remember is that you need to set the depth of cut to the material you are cutting and the thickness of the plywood. This will shorten the thickness of cut of the saw but you get accurate results each and every time. If you need the additional depth, resort to the hand-held cut methods described earlier in "Making the Cuts Freehand." The jig has a wide fence to make clamping easy. Because this jig was created using the circular saw, whenever we clamp the jig exactly at the cut line, the result will be straight and on the layout line.

DRILLS

I'm going to guess that you already have some kind of drill. Maybe it's a corded drill; maybe it's a cordless drill. If I had to own only one drill it would probably be a cordless drill because these tend to have clutches and different speed ranges that make them ideal for driving screws in addition to drilling holes. However, nothing beats the raw and unlimited power of a corded drill. A handful of the corded drills have clutches and speed settings, and I don't know why there aren't more around. Probably because we love cordless drills – they must be the hottest-selling tool on the market.

There are a lot of factors to consider when buying a drill because they are used for so many different things. I'm going to tell you what's important for building furniture. First, you need a drill that is lightweight, balanced and will hold all the bits you need, from the tiniest wire bits up to 3/8"- or sometimes 1/2"-shanked bits. If you are buying a cordless drill, you probably should buy a 9.6-volt or 12-volt model. These drills generally satisfy all the requirements above – except they typically hold bits only up to 3/8" in diameter, which is OK. Heavy drills (such as 18-volt drills) are hard to wield with any finesse. And you are so rarely far away from your charger while you're in the shop that the run-time issue is moot.

You need variable speed. This is found on all but the cheapest tools. Variable

I got by for years and years with a corded drill alone. Once I finally bought a cordless drill, I was glad I'd made the upgrade. Not only do you lose the cord, but you gain some features, such as control over your top speed and a clutch that prevents you from over-torquing your screws.

When you're in the store, close the chuck of the drill that you're considering and take a look at how closely the jaws close. The best chucks will close down to nothing. The lamest ones will allow you to get a toothpick in there. The tight jaws will let you grab the smaller bits that are occasionally important for woodworking.

Maybe the big drill doesn't look so big to you here. Just wait until you have to heft this thing up above your head for the hundredth time. Then you'll want the wimpy 9.6-volt drill. If you work far away from your battery charger (like on an oil derrick) then get the big drill; otherwise, smaller is generally better (and cheaper!).

speed is where the more you pull the trigger, the more rpm you get. You want your drill to ramp up smoothly, though no drill is perfect in this department.

A keyless chuck is a desirable feature. Though the keyless chuck might not hold as tightly as a keyed one, this is almost never an issue. The keyless chucks hold plenty tight enough and are so much faster and easier to use than their keyed cousins. While you're examining the chuck, take a look at the three jaws that grab the bit. Close the chuck on itself and take a look at where the three jaws meet. The best chucks will have a seamless fit. When the jaws come together they will look like one piece of solid metal. Lesser chucks will have a gap at the center. This gap will prevent the chuck from closing on small bits. Most of the time, this is not important, but when you need a tiny hole...

Let's talk a minute about clutch setting and speed ranges. These are important fine-tuning settings that you'll become more sensitive to the more you use your drill. Most drills (with a couple of notable exceptions) have two speed settings, low and high. In general, the low setting is for driving screws and the high setting is for boring holes. That's simple enough. Then you have the clutch of the drill to consider. The clutch has more settings than any reasonable person needs. Perhaps manufacturers see it as a way to get the upper hand on competitors. I just wish I didn't have to do so much fiddling and clicking to get the right clutch setting.

What does the clutch setting do? It's for driving screws. When you reach a certain amount of torque, the clutch disengages the motor from the chuck to stop the spinning action. This disengagement can prevent you from making some critical mistakes, such as snapping or stripping a screw's head. Or driving it too deeply in softwoods – perhaps to the point where the screw won't hold.

How do you use the clutch? Here's how I do it: When I'm driving a bunch of screws into a cabinet back or the like, I'll set the clutch setting really low. When I drive the first screw I'm unlikely to fully seat it. So I click the clutch over a couple of notches and try again. When the screw seats where I want it, I'll drive all the screws for that project.

One last detail on the clutch: I don't much use it in the high-speed range. Most drills have a setting on the clutch designed specifically for drilling bits. So I recommend you set your speed range to high, set your clutch to the drilling setting then go for it.

The list of things you don't need on a drill is quite long. Wrist strap? No. Bubble level? Nope. Work light? Not likely. Laser? Please! Focus on the attributes that are important and you won't go wrong when picking a drill.

Setting the clutch as shown will disengage the clutch, allowing you to drill at full power and speed. This is in the drill's instruction booklet that you threw away.