FESTOOL

Kapex® KS 120 Miter Saw

Sliding Dual Compound Miter Saw
Supplemental User's Manual

WARNING *To reduce the risk of serious or fatal injury, read and understand all safety precautions and instructions in this manual before using this tool.*

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About This Manual

Save These Instructions

It is important for you to read and understand this manual. The information it contains relates to protecting YOUR SAFETY and PREVENTING PROBLEMS. The symbols below are used to help you recognize this information.

	**WARNING!**	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	**CAUTION!**	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.
	**Laser Radiation**	This symbol is used on the machine and in this manual to signify the possibility of laser radiation.
	**NOTICE**:	Indicates a potential situation which, if not avoided, can result in property damage or damage to the tool.
	**Note:**	Indicates information, notes, or tips for improving your success using the tool.

Tool Symbols

V	Volts
W	Watts
Hz	Hertz
~	Alternating Current (AC)
n_o	No-load Speed
Ø	Diameter
	Class II Double Insulated

Designated Danger Zone. Avoid positioning hands, fingers, or arms in the area designated by this symbol.

Intended Use

The Kapex miter saw is intended to cut wood, plastic, aluminum, and similar materials. All applications beyond this are regarded as improper use. The tool should not be altered or used for any other purpose other than as specified in these operating instructions. Using the tool in contravention to this manual may lead to injury and will void your warranty. The user shall be responsible and liable for accidents, injuries, and property damage resulting from misuse or abuse of this tool.

Functional Description

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Item	Name or Description	Ref. Page(s)
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I	Trigger Lock	9, 10, 11
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N	Miter Stop Release Lever	12, 15, 18, 20
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Item	Name or Description	Ref. Page(s)
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Setting Up a New Miter Saw

Congratulations on your purchase of a new Kapex Sliding Dual Compound Miter Saw. Before using your new miter saw, make sure you fully read and understand all of the instructions, precautions, and safety information presented in this manual.

WARNING! To avoid tipping the miter saw during use, the miter saw must be placed on a stable surface.

Note: There is a 2.5 mm hex key needed for making adjustments located in the Styrofoam packing material. Take care not to lose it.

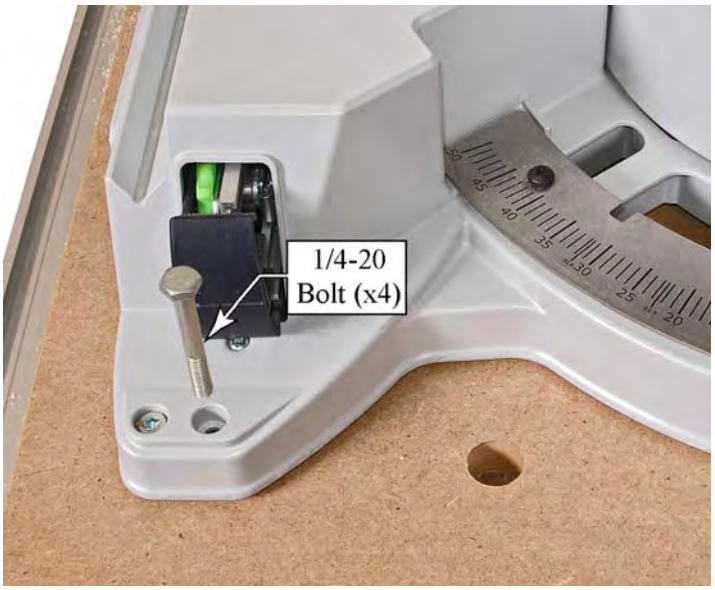
Note: You may want to save the original box and packing material in case you ever need to send in the saw for service.

The KS120 miter saw is ready to use right out of the box, but there are several placement options available, depending on the intended use. These options include:

- For truly portable use, the KS120 may be used directly on a jobsite floor. The height of the cutting bed was specifically designed to coincide with the height of a Festool #1 Systainer, which can be used as an outfeed support.

- The KS120 can also be used on a level and stable jobsite work table. The saw must be securely clamped to the table to help prevent it from tipping or falling off.

- For a more permanent installation, the Kapex saw is equipped with 4 bolt holes, to be used with ¼-20 (M6) bolts to securely bolt the saw to a work table.



- The Kapex saw was specifically designed to be compatible for operation on a Festool Multi-Function Table (MFT). The four feet under the saw coincide with the hole spacing of an MFT tabletop to keep the saw firmly in position, and the optional bolt kit permits quick mounting.

Note: When clamping or bolting the Kapex to a work table, take care not to over tighten the clamps or bolts, as this may distort the saw base.

Changing Sawblades

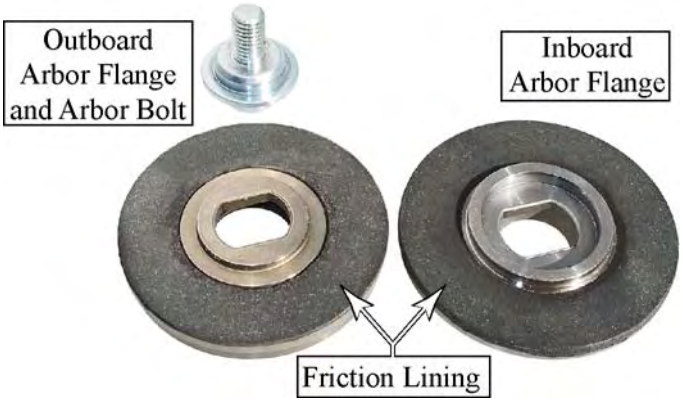
WARNING! To reduce the risk of injury from contact with a moving part, always unplug the saw before changing blades.

1. Push in and rotate the FastFix® arbor lock clockwise. This prevents the arbor from turning and also disables the motor.
2. Loosen the clamping screw on the arbor bolt guard, and rotate the guard away from the arbor bolt. (The combination hex key is stored on the back of the saw by the power cord.)

3. Unscrew the arbor bolt by turning it clockwise. The arbor bolt is a **left-hand thread** and turns the opposite of a standard screw.

4. Without pushing down on the trigger lock, pull up on the trigger to release the blade guard.
5. Raise the blade guard out of the way and remove the outboard arbor flange and sawblade from the arbor.
6. Inspect the friction lining on the two arbor flanges. If the lining is damaged, replace the flanges, as this can cause the sawblade to wobble.

Note: The friction lining on the arbor flanges grips the blade, but also permits the blade to slip slightly, in the event of a binding condition.



WARNING! When installing a new blade, make sure the arbor bolt is properly tightened and the rotation direction of the sawblade matches the rotation direction indicated on the saw (see image below).

7. Make sure the blade is oriented correctly and install the blade onto the inboard arbor flange.
8. Replace the outboard arbor flange, tighten the arbor bolt, and then unlock the FastFix arbor lock.

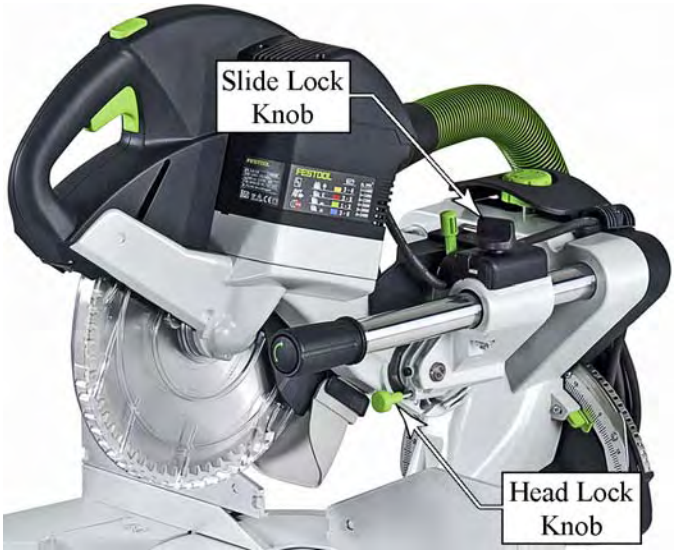
Transporting the Saw

When The Kapex miter saw is collapsed for transport, it is very well balanced and easily carried using the integrated carrying handles.

1. Unplug the saw and coil the power cord on the reel at the rear of the saw.

WARNING! To reduce the risk of unexpectedly starting the saw, make sure the saw is unplugged.

2. Pull the power trigger (without depressing the trigger lock) and lower the motor head down. When the head is in the down position, push in on the Head Lock Knob (see the picture to the upper right).
3. Push the motor head all the way to the rear of the saw and tighten the Slide Lock Knob.

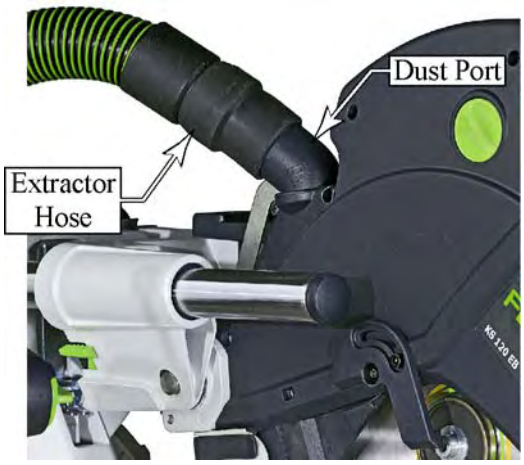


4. Set the miter angle to 60° and push down on the miter lock lever.
5. Pick up the saw from the rear by grasping the two handle points as shown below.

Dust Extraction

The Kapex saw can be connected to a dust extractor to substantially reduce dust during operation. The dust port swivels to either side, and accepts either a 27 or 36 mm Festool hose. The 27 mm hose fits inside the dust port, or the 36 mm hose fits over the outside of the dust port.

Note: For optimal dust extraction performance, Festool recommends using a 36 mm hose.



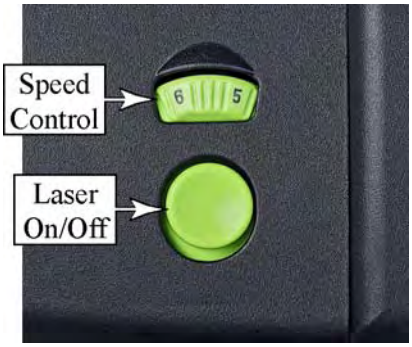
Basic Operation

Setting the Motor Speed

The Kapex saw has electronic speed control with soft-start circuitry. The electronic controller will maintain the motor speed even as the load changes. The speed control is infinitely variable from 1400 to 3400 RPM. The optimal speed of the saw is predominately determined by the type of material being cut.

Material	Speed
Soft wood products and veneer plywoods	6
Hardwood products	3-6
Plastic laminate countertops	6
Hard plastics	3-5
Soft plastics	1-4
Aluminum	4-6

Turn the speed control dial to the number shown in the table to the left. The speeds listed in the table are just rough guidelines, and actual results may vary.



Using the Laser Guides

CAUTION! Laser Radiation. Do not look directly into the laser beam.

The Kapex saw contains a low-power solidstate laser system that scans across the path of the sawblade to indicate to the user where the blade will cut the workpiece. (The laser does not cut the workpiece.)

The two laser beams shine down on the workpiece on either side of the sawblade. The sawblade will cut the workpiece between the two laser lines.

To turn on the laser, press the On/Off button on the rear of the motor near the speed control dial. Pressing the button a second time will turn the laser off. The laser will also automatically shut off if left on for more than approximately 30 minutes.

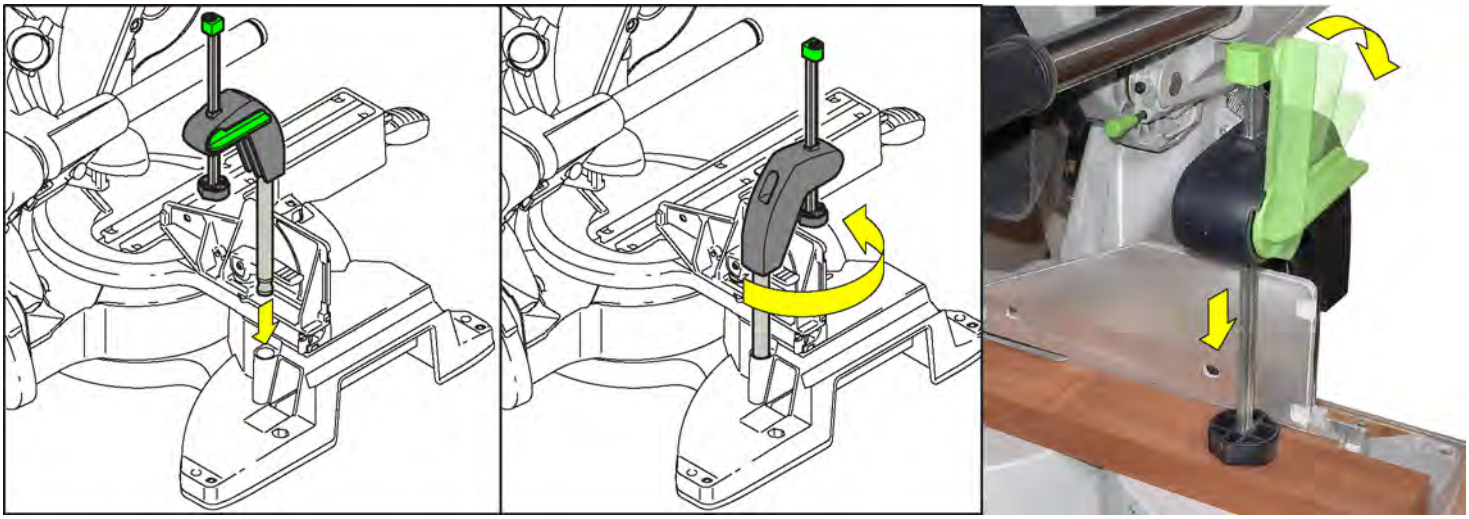
Power Trigger and Plunge Release

The power trigger turns on the saw but also releases the motor head to plunge downward. To help prevent accidental starting of the saw, the trigger lock must be pushed to release the trigger to power the saw.

- To start the saw (activate the sawblade), press the trigger lock and squeeze the trigger. The saw head can then be plunged downward.
- To plunge the saw head down without starting the saw, squeeze the power trigger, but do not press the trigger lock.

Using the Hold Down Clamp

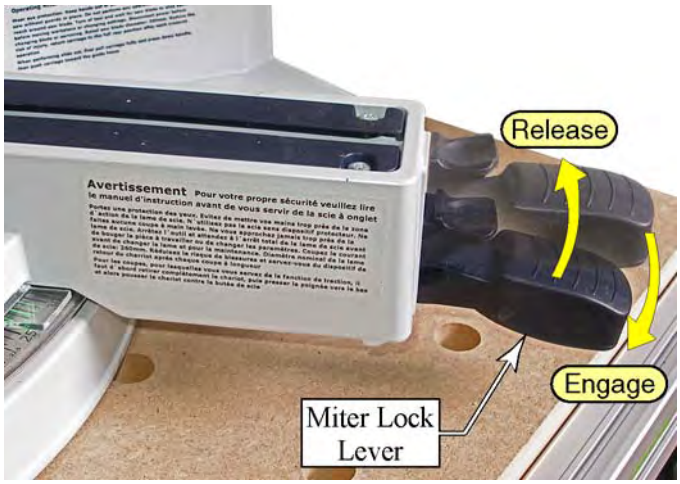
The hold down clamp fits in a socket on either the left or right sides of the saw. To insert or remove the clamp, rotate it to the rear to unlock it from the socket, as shown in the first image below. To lock the clamp in its socket, rotate it to the forward position, as shown in the center image below. To secure the workpiece, press down on the green knob and rotate the locking handle down, as shown in the image on the right, below. To release the clamp, rotate the locking lever up.

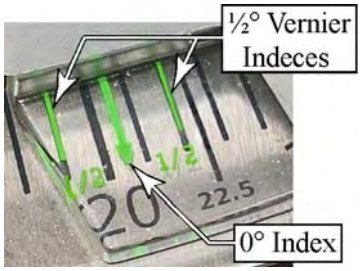


Setting the Miter Angle

A mitered cut is where the saw head is rotated side-to-side. The Kapex saw is capable of mitering 50° to the left and 60° to the right. Positive stops are located at 0, 22½, 30, and 45 degrees. The miter gauge pointer also includes ½ degree vernier indices for accurately setting the miter angle to half-degree values. Also refer to "Using the MiterFast Tool" described on page 15.

1. Release the miter lock by lifting up on the handle.





2. Press down on the miter stop release lever, and rotate the miter to the desired angle.

- To stop at one of the preset positive lock miter positions, release the miter stop lever just before reaching the angle, and the miter stop will click as it locks into position.
- To set the miter angle to ½ degree between the primary angles, line up the ½° vernier indices with the adjacent angle index marks. (The example shown to the left represents 20½°.)

3. When the desired miter angle is set, engage the miter lock by pressing down on the miter lock lever.

Note: When setting a miter angle very close to one of the miter stops (for example, at 45½°), keep holding down the miter stop release lever until you fully engage the miter lock lever, to prevent the miter angle from jumping to the nearby miter stop position.

Setting the Bevel Angle

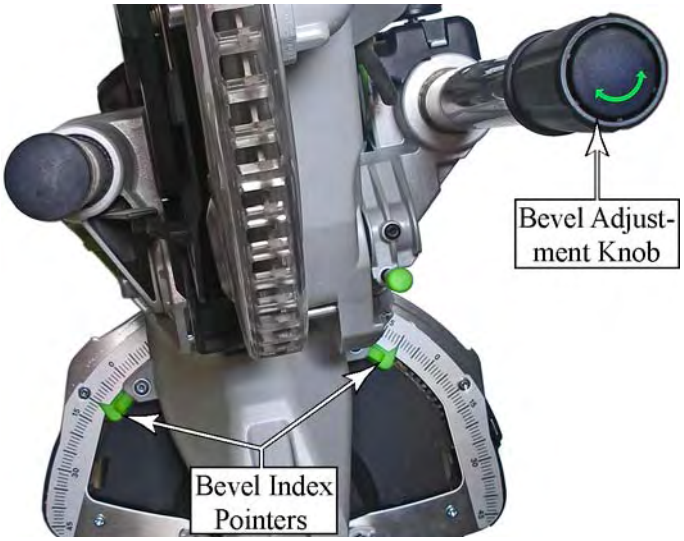
A beveled cut is where the saw head is tilted to the left or right from vertical. The Kapex saw is capable of beveling up to 47° to the left and right.

The bevel range selector engages a series of angle stops. The selector has three settings. The first setting, (0-45°) limits the bevel travel between 0 degrees and 45 degrees to the left. The second setting (±45°) limits the bevel travel between 45 degrees to the left and 45 degrees to the right. The last setting (±47°) limits the bevel travel to the full extent of the saw, which is 47 degrees to the left and to the right.

NOTICE: These settings are not hard-limits, and turning the bevel adjustment knob into one of the limit settings will cause the spring loaded limit to be bypassed. However, it should be noted that doing so can cause premature wear to the bevel limits.

1. Release the bevel lock by lifting the lever.
2. As necessary, turn the bevel range selector to the desired range.

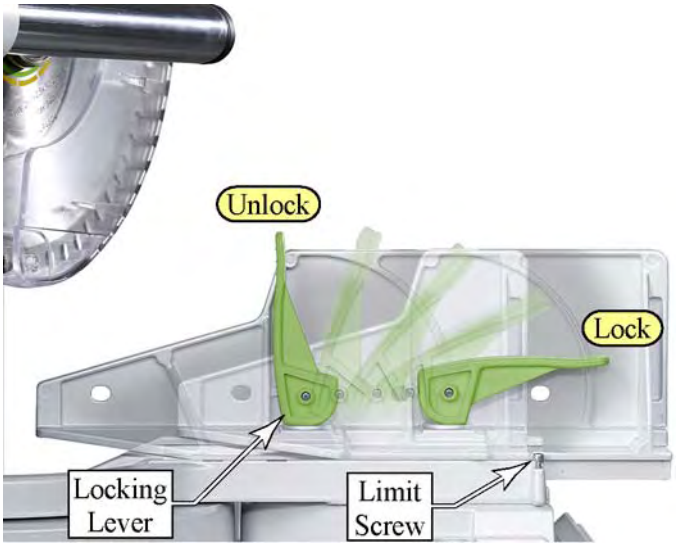
3. Rotate the bevel adjustment knob until the bevel index pointer is pointing to the desired angle. (There is a duplicate pointer on either side of the saw.)
4. Lower the bevel lock lever.



Using the Auxiliary Fence

The auxiliary fence provides support for taller workpieces. The two halves of the fence can be slid toward or away from the blade, or removed completely. Performing beveled cuts requires the auxiliary fence to be moved away from the blade area.

- **To move** the auxiliary fence, lift the locking lever, slide the fence, then lower the locking lever.
- **To remove** the auxiliary fence, lower the limit screw by turning it clockwise, then slide the fence out of the retaining slot.

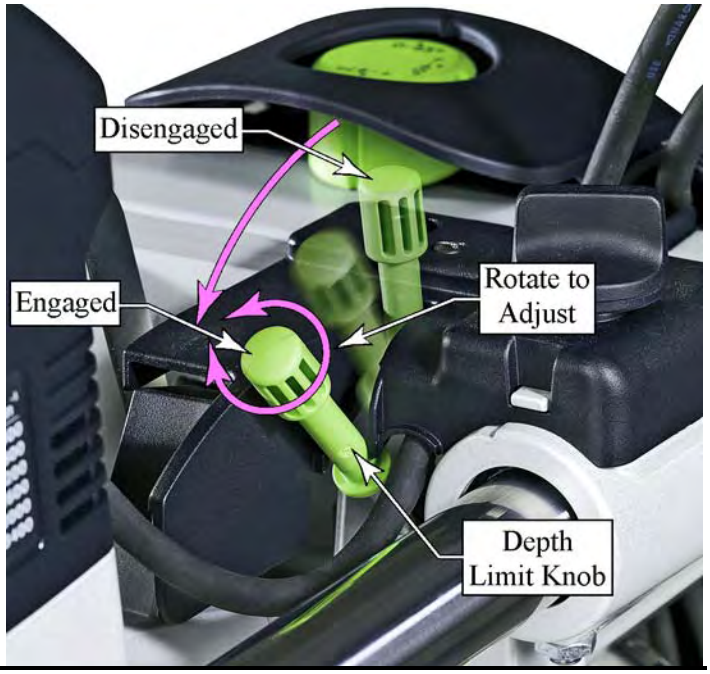


Setting the Depth Limit

The depth limit is used for making partial cuts that do not cut all the way through the workpiece, such as making dados. When the depth limit is engaged, the sawblade's vertical travel is limited from going below the preset height.

The height is easily adjustable by turning the depth limit knob. Turning the knob clockwise ¼-turn raises the sawblade by approximately 1 mm (0.040"), and turning it counterclockwise lowers the sawblade.

To engage the depth limit, pull the knob forward. To disengage the depth limit, push the knob back.



Using the Tall Miter Latch

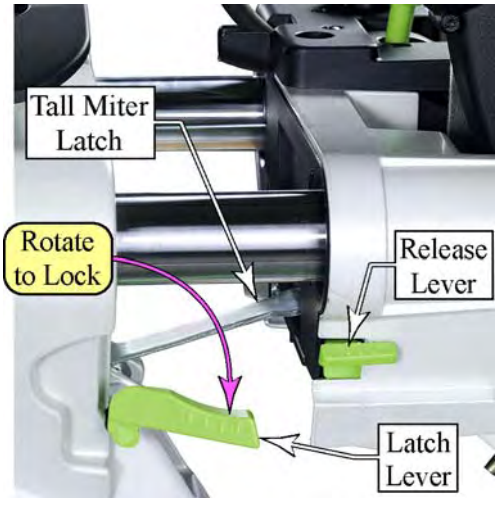
The tall miter latch is used for cutting boards in the vertical position, such as mitering baseboard material. In this cutting position, the height of the cut is maximized. The miter latch holds the saw head slightly forward from its normal position, and also increases the maximum depth that the saw can plunge downward.

WARNING! To reduce the risk of injury from loss of control, never cut tall boards without the auxiliary fence installed. The workpiece can tip if not properly supported.

Note: The bevel position must be at zero degrees before you can engage the tall miter latch. The latch will not engage if the saw head is tilted.

Engaging the Tall Miter Latch

1. Pull the saw head away from the fence.
2. While holding the latch lever down, push the saw head back toward the fence until the tall miter latch locks into the back of the saw head.



Releasing the Tall Miter Latch

While pressing down on the release lever (see previous image), pull the saw head away from the fence. The tall miter latch will spring to the vertical position when it releases.

Cutting the Workpiece

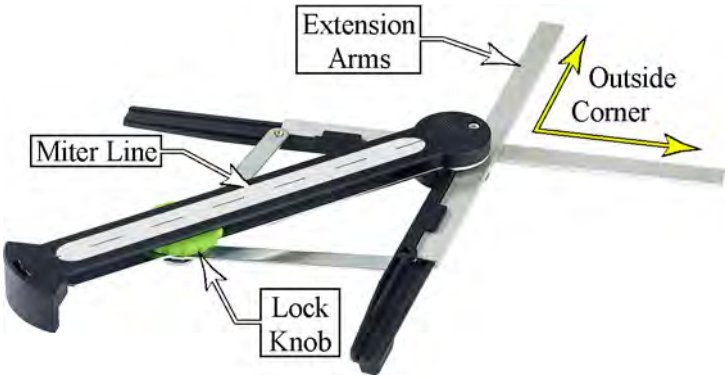
Stand the workpiece up against the fence and plunge the saw head down into the cut.

Using the MiterFast Tool

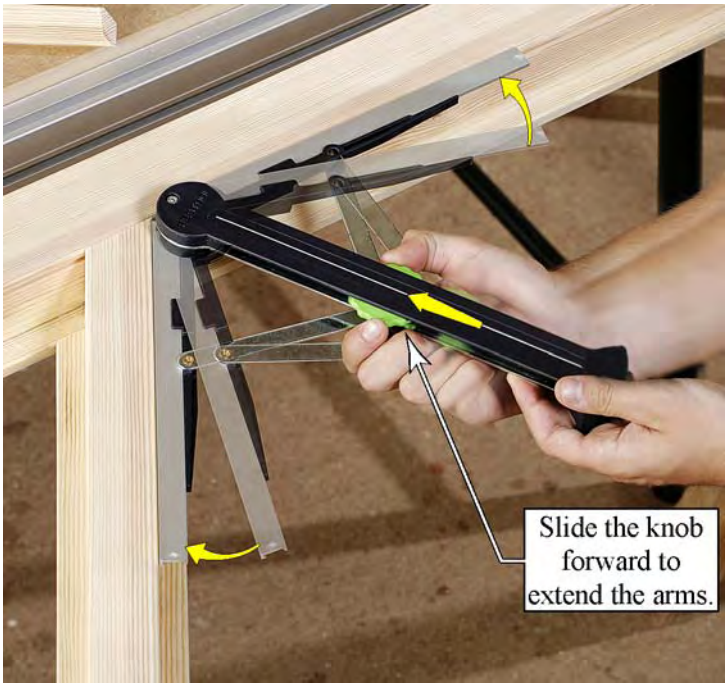
The MiterFast™ angle transfer tool converts a corner angle measurement into a miter setting. The miter line in the center of the tool is always at the midpoint of the two angle arms, and when lined up with the saw's laser, provides the proper miter angle for the measured corner.

Measure the Corner

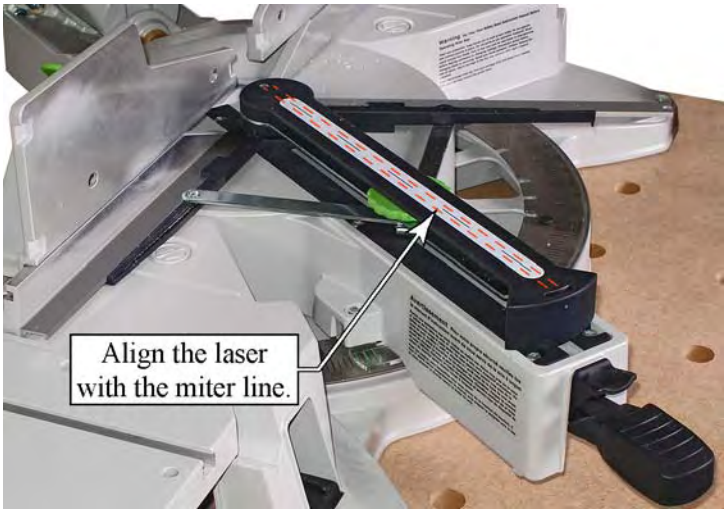
- For measuring an outside corner, extend the extension arms as shown in the image below.
- For measuring an inside corner, retract the extension arms as shown in the second image below.



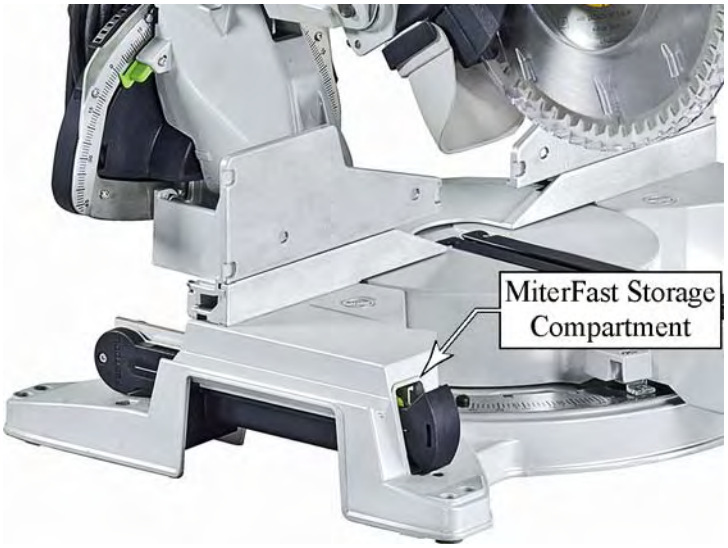
1. Loosen the lock knob on the MiterFast tool.
2. Place the MiterFast tool in (or on) the corner and slide the lock knob forward to expand the arms.
3. When the arms are lined up with the corner walls, retighten the lock knob.



4. Place the MiterFast tool on the saw with one of the arms up against the fence.
5. Turn on the laser for the saw. (Refer to Using the Laser Guides on page 11.)
6. Adjust the miter angle of the saw (refer to Setting the Miter Angle on page 12) until either of the laser beams line up with the miter line on the MiterFast tool.
7. Lock the miter setting on the saw.



8. Fold up the MiterFast tool and return it to its storage position in the base of the saw.



Cutting Techniques

There are three basic cutting techniques for sliding miter saws, but only two are proper and authorized. These are Chop-Cut, Push-Cut, and the improper method is a Pull-Cut.

Chop-Cut

A chop-cut is used for cutting narrow or tall stock, where the front edge of the workpiece is behind the center of the sawblade. For this type of cut, the saw head is brought straight down into the cut.

Push-Cut

A push-cut is used for cutting wider boards, but is also usable in most situations where a chop-cut could be used. For this type of cut, the saw head is pulled out toward the operator, plunged downward, and the primary cutting of the workpiece occurs as the saw head is being pushed back toward the rear of the saw (as shown in the picture below).

Pull-Cut (Improper Method)

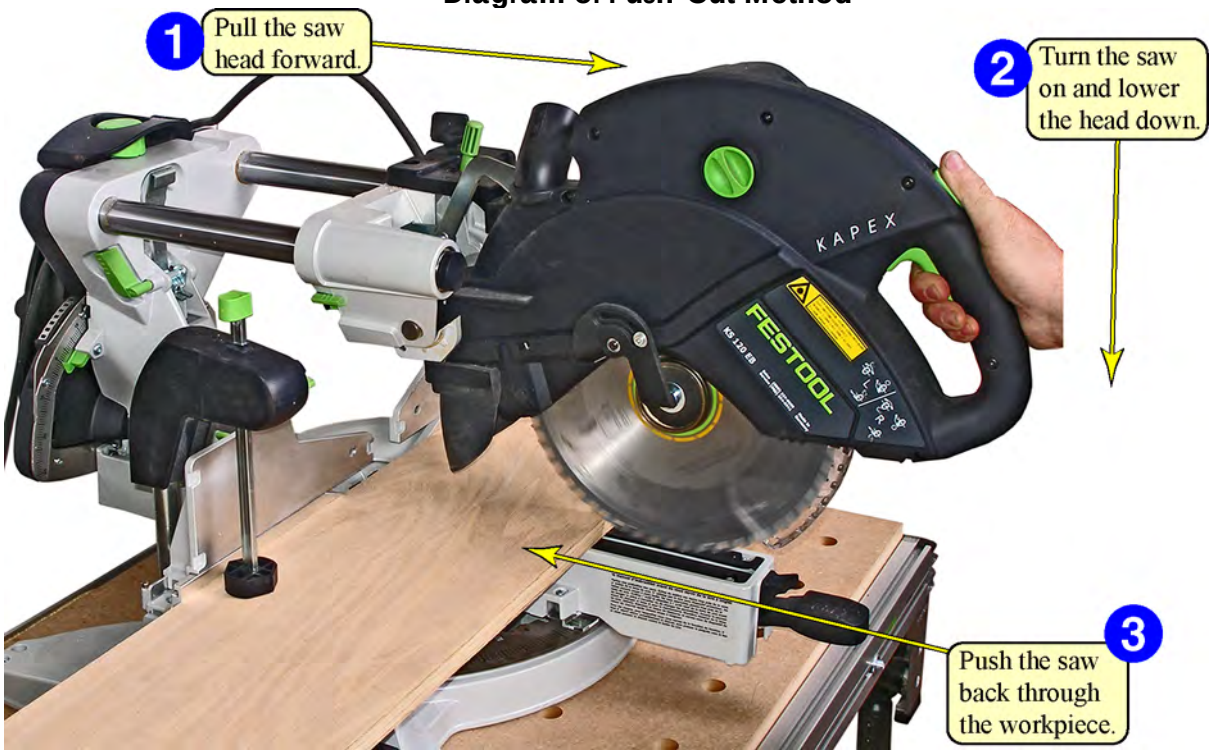
WARNING! To reduce the risk of injury from loss of control, never use the pull-cut technique.

The third type of cut, called a pull-cut, or climb-cut, should be avoided for both safety reasons and for cutting performance reasons. This type of cut is made by plunging the saw head down, and then pulling it forward. The danger of this type of cut is that the sawblade wants to self-feed into the cut (called climb-cutting), and this can cause the saw head to jump forward unexpectedly. The reason this type of cut results in a poor quality cut is because it is using two different actions for the same cut. It starts out with a plunge-cut, and then finishes with a climb-cut. This means that the sawblade is cutting the wood in two different manners, and there will frequently be a rough edge at the transition from one type of cut to the other.

Tips for Successful Cutting

- For more accurate cuts, mark your cutting length with a thin pencil line. A thick line will result in a less accurate cut length.
- When fitting one piece to another, it may be helpful to make the initial cut slightly long, and then trimming the cut to final length after test-fitting the piece.
- When cutting a new board, cut off the original factory end to ensure a square, fresh end, before measuring for your final length.
- When cutting small trim, use a zero clearance fence and/or insert to prevent small offcuts from being thrown behind the fence by the windage from the spinning blade (see page 23).
- When cutting multiple pieces of varying lengths from a limited supply of stock, always cut the longest pieces first, and cut the remaining pieces from the leftovers.
- Do not force the blade through the cut. A cleaner edge will be achieved with a steady, moderate feed rate.
- A chop-type of cut yields the lowest tearout on the front and top edges of the cut, but the most tearout on the rear side of the cut.
- A push-type cut yields moderate tearout on the top surface, but the best cut edge.

Diagram of Push-Cut Method



Miter Cuts

Miter cuts are used when a board needs to be cut at an angle across its width. The most common application for a miter cut is for joining two boards to form a corner without endgrain showing. The miter angle is one-half of the corner angle. So for a 90° corner, for example, the miter angle is 45°.

Miter Angles for Polygons		
Number of sides	**Corner Angle**	**Miter Angle**
3 – Triangle	120	60
4 – Square	90	45
5 – Pentagon	72	36
6 – Hexagon	60	30
7 – Heptagon	51.4	25.7
8 – Octagon	45	22.5

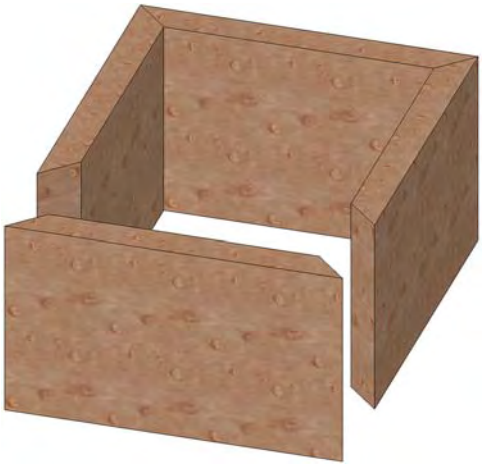
For even the most experienced woodworkers, cutting accurate and tight fitting miters can be problematic. The following are some tips for making accurate miters.

- Clamp the workpiece down. Because the sawblade is cutting at an angle with the workpiece edge and fence, it will tend to move the workpiece sideways, in the direction of the cut, as the cut progresses. This can result in a cut that is not straight, or the angle of the cut may be off.
- Cut slowly. Cutting too rapidly can cause the sawblade to deflect as it encounters varying densities in the woodgrain.
- Use a chop-cut only for narrow miters. When in doubt, use a push-cut.
- When marking the length of the workpiece, use a sharp pencil to draw a thin line. The thicker the line, the more difficult it will be to cut accurately on the line.
- When marking a workpiece length to match a wall or other structure, use a utility knife to mark the cut with a small nick. This is more accurate than a pencil line.

- If a utility knife is used to mark the cut, you can use a method called “Sneaking up on the cut.” This is where you make an initial cut longer than needed, and continually make very small re-cuts until the cut line splits through the center of the nick you made with the utility knife.

Bevel Cuts

Bevel cuts are used when a board needs to be cut at an angle across its thickness. The most common application for a bevel cut is for constructing a box or similar structure.



The following are tips for making accurate bevel cuts:

- Clamp the workpiece down. If the workpiece is not held firmly, the blade will tend to pull the workpiece into the cut and up the blade.
- For best results, use only a push-cut.
- Take care not to deflect the saw head sideways. Because the saw head is tilted to the side, it can be easy to inadvertently push the saw head down or pull it up as you feed the saw into the cut. This will result in a crooked cut.
- Place the workpiece on the saw with the best-side down. Because of the angle of the blade teeth exiting the workpiece on the top side of the cut, there will be slightly more tearout on the top, especially on the sharper edge.

Depth Limited (Dado / Half-Lap) Cuts

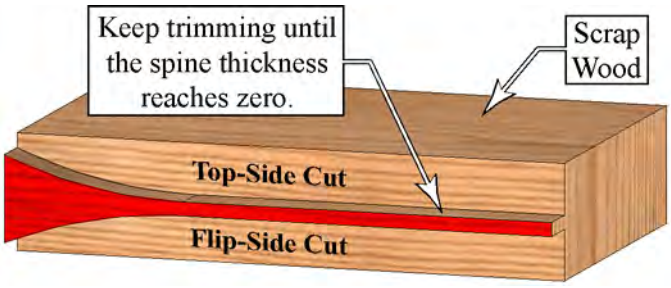
WARNING! Never attempt to install or use a dado blade in the Kapex saw. Using either a stacked-dado or wobble-dado blade will exceed the capacity of the arbor, and the blade may impact the saw's guards, resulting in personal injury and damage to the saw.

A dado is a special type of cut where the depth of the cut does not go all the way through the workpiece. One common example of this type of cut is for making half-lapped joints, which is shown to the right and described below. In a half-lap joint, material is removed from the intersection of both workpieces comprising the joint. When the joint is assembled, the pieces overlap, creating a strong joint, but unlike a full-lap joint, the thickness of the joint is equal to just the thickness of the workpieces.

Depth Setting

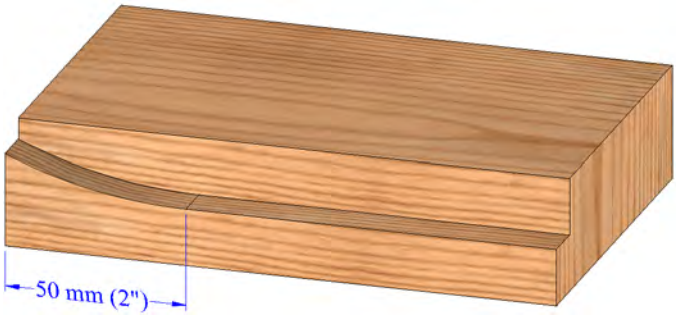
For making a half-lap joint, it is necessary to set the saw's cutting depth to be exactly in the center of the workpiece thickness. The most accurate way of finding the center of a board is to trim from both sides until the two cuts meet.

Use a piece of scrap wood that is the same thickness as the actual workpiece. Starting with a depth setting that you know to be less than half the workpiece thickness, make a cut from the top side, and then flip the piece over and make a second cut, as shown below by the Red color. Gradually lower the depth of cut and repeat these two cuts until the two cuts meet, and the spine reaches a zero-thickness. This is exactly the center of the workpiece.

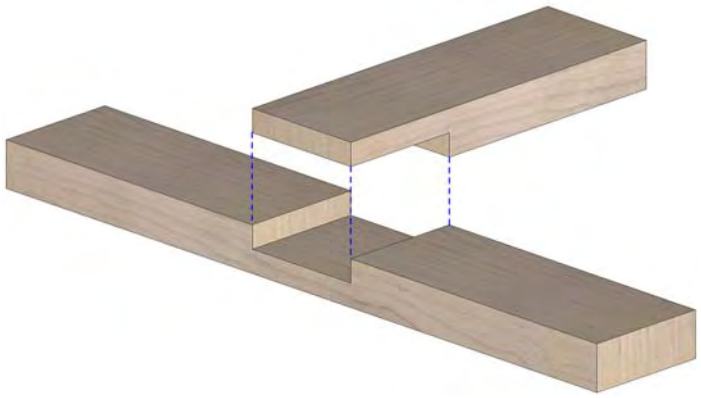


Fence Spacer

The center of the sawblade is 50 mm (2") forward of the saw's fence, which results in the curved ramp at the rear of the cut shown in the image below. To account for this and remove the radius at the end of the cut, add a 50mm (2") spacer in front of the fence, and clamp it in place with the Kapex hold down clamp as shown to the right.

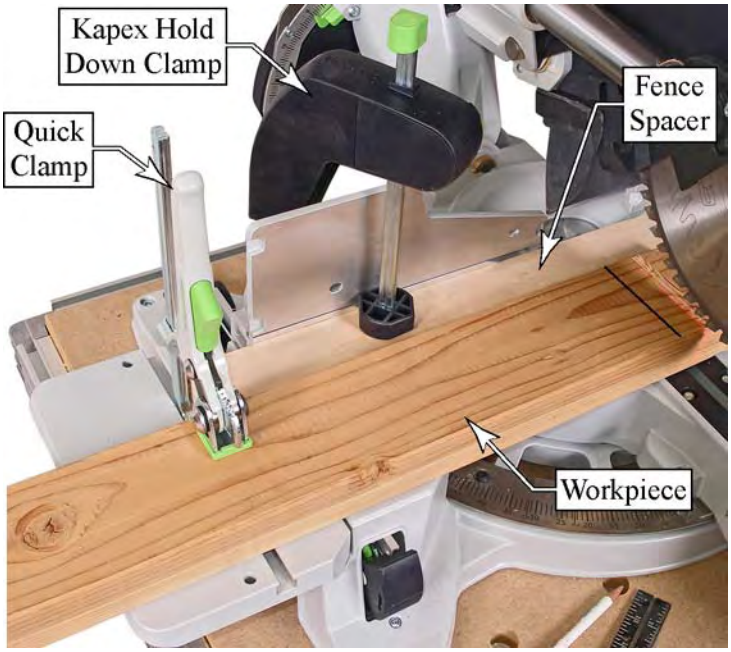


Half-Lap Joint



Clamping

It is important that both the fence spacer and workpiece are securely clamped to the saw for cutting. Use the Kapex Hold Down Clamp (see page 12) to clamp the fence spacer, and use an auxiliary clamp, such as a Festool Quick Clamp or Screw clamp (see page 16) to secure the workpiece.

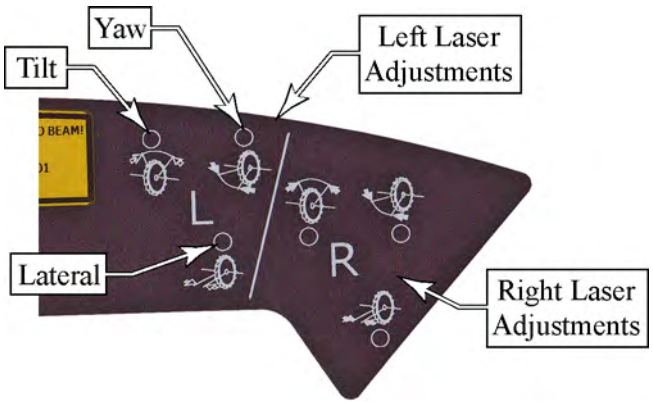


Cutting the Dado

Before cutting the dado, mark the right and left sides of the cut to indicate how wide the dado needs to be. Then make successive kerf-cuts between the lines until all the material between the lines is removed. The closer together each of these successive cuts are, the smoother the bottom of the dado will be. For best results, clean the bottom of the dado with a sharp chisel.

Calibrating the Lasers

In order to calibrate the lasers, you will need to puncture the decal on the side of the saw. The 2.5mm adjustment screw openings are identified by the small circles on the decal.

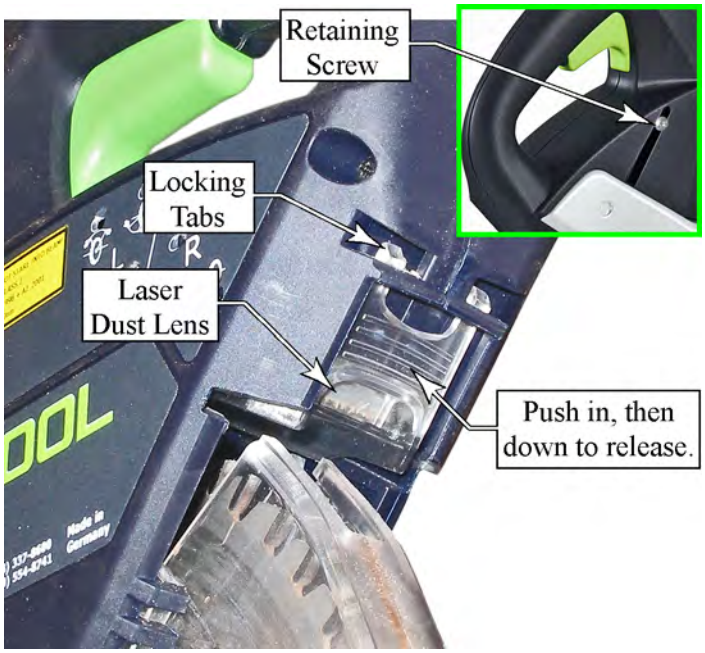


The 2.5 mm hex key is shipped with the saw and is located in the Styrofoam packing material.

- The Tilt adjustment is used to ensure the lasers are pointing parallel to the sawblade, so they trace out the same line regardless whether the saw is raised or lowered.
- The Yaw adjustment rotates the laser (as viewed from above the saw) so it remains parallel with the path of the saw cut (front-to-rear).
- The lateral adjustment moves the laser toward or away from the saw cut (sawblade).

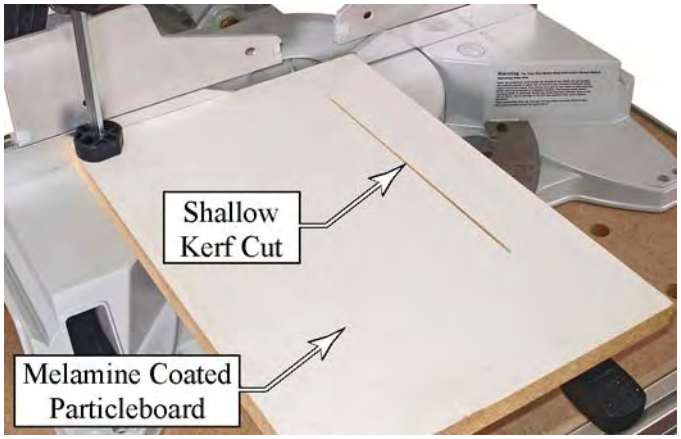
Setup

1. Before beginning, remove the laser dust lens and clean it. To remove the lens, loosen the retaining screw, push in and down on the ribbed surface to release the locking tabs, and then slide the lens out of the saw.



2. Wipe off any dust and debris from the lens with a soft cotton cloth, or rinse it with water and mild soap.
3. Reinstall the lens before making adjustments to the lasers.

4. Clamp a smooth piece of scrap wood to the saw and using the depth limit (see page 14), make a shallow kerf cut across the board.
   - This kerf cut will help you aim the lasers where the saw actually cuts.
   - You can use any wood that has a relatively smooth surface. The white melamine board shown below provides a good contrast between the board surface and the kerf cut.



5. Turn on the laser.
6. Begin by adjusting the yaw settings so both lasers are parallel with the saw cut.

Make sure to remove the hex key from the screw before gauging your progress. The pressure of the hex key is enough to deflect the laser.

7. Next, lower the sawblade down into the kerf (touching the wood) and temporarily adjust the lateral setting until the laser is against the edge of the kerf.
8. Raise the saw back to the top, and adjust the tilt setting so the laser remains against the edge of the kerf (at the same position as the previous step).
9. Verify the tilt adjustment by raising and lowering the saw and check that the laser remains the same distance away from the kerf.
10. Finally, adjust the lateral position to line up with the edge of the saw cut.

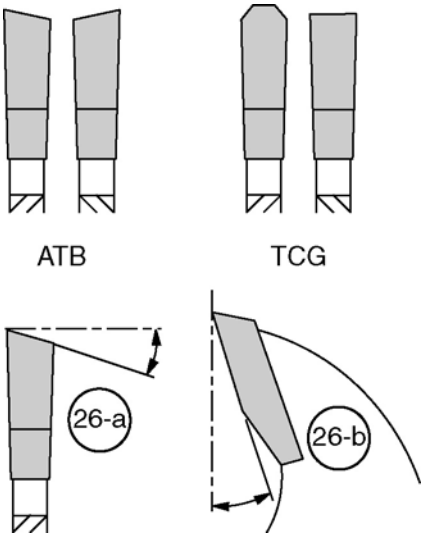
It is a matter of your own personal preference as to whether the laser lines split the edge of the kerf, or if they remain just outside of the kerf. Adjust the lateral position that you prefer.

Optional Accessories

Sawblades

Combination Blade		
Tooth Type	ATB, 60 teeth	
Hook Angle	-5°	
Item Number	494 604	
Description	This is the standard blade that comes with the saw. With a moderate tooth count and ATB tooth grind, this blade provides good results when a single blade is needed for general purpose cutting. The blade incorporates asymmetrical tooth spacing to reduce harmonic vibration.	
Fine Crosscut Blade		
Tooth Type	ATB, 80 teeth	
Hook Angle	-5°	
Item Number	494 605	
Description	With a high tooth count and ATB tooth grind, this blade provides excellent, chip-free crosscutting of lumber and fine (cabinet-grade) plywood. The blade incorporates asymmetrical tooth spacing to reduce harmonic vibration.	
Fine Laminate Blade		
Tooth Type	Flat-tipped ATB, 64 teeth	
Hook Angle	-5°	
Item Number	494 606	
Description	The ultra-hard, flat-tipped (FT) ATB teeth on this blade reduces chipping of laminates and solid surface materials without dulling. The FT- ATB grind results in the performance of an ATB grind, with the longevity of a TCG grind.	
Aluminum and Plastic Blade		
Tooth Type	TCG, 68 teeth	
Hook Angle	-5°	
Item Number	494 607	
Description	The high tooth count, TCG grind of this blade provides long lasting sharpness and good control for cutting aluminum and hard plastic.	

Notes



ATB: Alternate Top Bevel. The ATB type blade slices through wood fibers, first on one side and then on the other for clean cuts in natural and manmade materials.

TCG: Triple Chip Grind. The TCG type blade is designed to cut through hard materials. The trapezoidal tooth cuts the center of the kerf and the flat raker tooth cuts the edges. This type of blade design is more resistant to dulling.

26-a Bevel Angle: All of the ATB-type blades shown above have a bevel angle of 15°. This moderate bevel angle helps provide good chip-free cutting without rapidly dulling.

26-b Hook Angle: The higher the hook angle, the more the tooth grabs the material and pulls it into the cut. Ripping blades have a very high hook angle to cut aggressively. Lower hook angles are used for harder materials where greater control is needed.

Tooth Count: The more teeth a blade has, the smoother it will cut. Conversely, blades with fewer teeth cut more aggressively.