

SQ2™ User Instructions

SQ2 Overview:

The stationary circular saws including table, radial and chop saws are arguably the most important tools in the shop. They may also be the most difficult to reliably set up because of the poor angular indicating scales with which almost all are equipped. Because of this there have been a lot of products brought to the market to help woodworkers set up their saws. None have worked as easily or with the accuracy that is obtainable with the **SQ2**.

Every woodworker faces two issues with circular saw setup on a regular basis. The first is daily verification of simple blade tilt angles relative to the supportive reference surface that supports the wood while it is being cut. This is often frustrating because I have spent a lot of time trying to verify that I have returned the table saw blade to exactly 90° after I tilted the blade for an angle cut. This is bad enough on table saws and often nearly impossible on radial saw and chop saws.

In day to day use, the SQ2 provides you with a simple way to:

- set blade to table angles on stationary circular saws including table, radial and chop saws
- check rip fence alignment to miter slot on table saws
- square the head on your table saw miter gauge
- square the blade to back stop on radial and chop saws
- square jointer fence to jointer bed

On a less frequent but very important basis, use the SQ2 to tune your table saw arbor to miter slot alignment for perfect cutting. Following this, index the SQ2 off of the miter slot to set the rip fence parallel to the miter slot. Saw tuning with the SQ2 this is much easier and much more accurate than any single gauge tool on the market. Additionally it is also useful for checking the fence to bed angle on jointers..

The SQ2 was designed to simply eliminate the guesswork in stationary circular saw setup.

Included in the SQ2 kit you should find the following.

Item:	Quantity
SQ2 Aluminum Casting	1
SHAN 512-166-N Dial Indicators	3
5/16" x 1 1/2 " -1/4-28 Set up legs	3
5/16" x .300" -1/4-28 thread Miter Slot Pins	2
5/16" x 7/8" -14-28 thread Black Pointed Stationary Pin	1
4-48" thread Black Knurled Pointed Anvil	1
4-48 thread 2" Stainless Steel Dial Indicator Extension	1
3/32" long arm Allen wrench	1
Instructions	1

Note: Each Dial indicator is individually packaged and marked with a position number that includes the accessories to be used with the dial indicator at it's assigned position. When you unpack and assemble your SQ2 install each indicator into it's assigned location.

Unpacking and setup:

The SQ2 is a unique tool in that it is the only product on the market that uses multiple dial indicators mounted in a precision machined fixture to not only measure simple angles, but to also measure the plane of one surface vs. the other. The SQ2 is intended to be used with any high quality circular saw blade with a diameter of 10" or greater made with a "FLAT PLATE". If you are not sure about your saw blade contact your saw blade manufacturer. Most high performance carbide blades today use flat plates. Some of the very thin kerf blades are an exception. Optionally you can also use a tooling plate mounted circular saw blade.

Circular Saws are dangerous. Unplug or lock out your tools before using the SQ2 or any other setup tool. Photos in these instructions are taken with safety guards removed to provide visual clarity only. Always operate your tools with the safety guards in place.

The SQ Features:

To set up the SQ2 it is important that we identify the parts of the product. The SQ2 (Fig 1) is a precision machined aluminum casting that has two large machined surfaces or faces. These faces are called the Reference Face and The Gauge Face. They are machined at 90 ° to each other. The edges to these faces are reference edges and they are also machined square to the two major faces. In each face of the SQ2 holes are machined to accept dial indicators and reference screws.

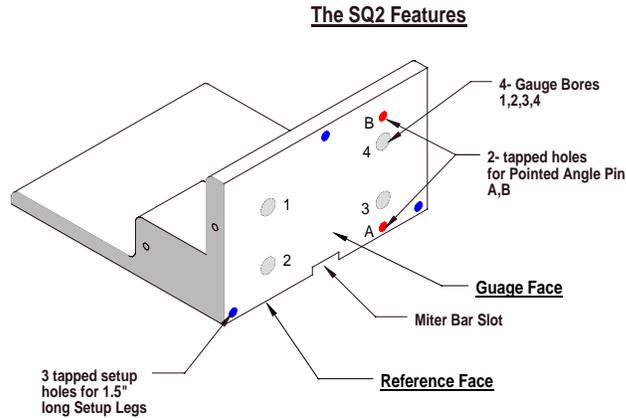


Fig 1

The Gauge Face:

The Gauge face is shown in Fig2. It includes 4 machined bores for the **SHAN** dial indicators included in the kit. Each Gauge Bore Position is unique and the dial indicator for each position has specific accessories. There are three sets of holes machined into the Gauge Face of the SQ2. The Gauge Bores, the Setup Pin Holes and the Stationary Pin Reference Holes.

The Gauge Bores(1-4)

There are 4 Gauge Bore holes in the Gauge Face of the SQ2. Each is reamed to accept the barrel of the dial indicators, For each Gauge Bore hole there is a hole drilled and tapped on the edge of the SQ2 that holds a set screw which is used to lock the dial indicator position on the SQ2.

- Gauge Bore Position 1 requires a dial indicator with a ball tip anvil
- Gauge Bore Position 2 requires a dial indicator with a 2" extension and a ball tip anvil
- Gauge Bore Position 3 is used when setting up table saws requires a dial indicator with the Black Knurled Pointed Anvil.
- Gauge Bore Position 4 is used on Radial saws and uses the dial indicator setup for Position 3

The Gauge Face of the SQ2

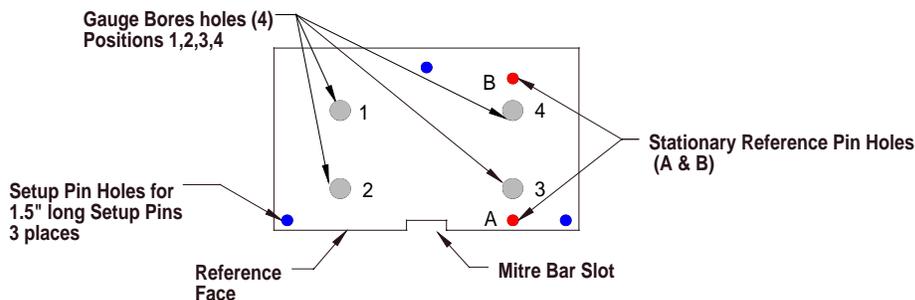


Fig 2

Setup Pin Holes

The Gauge Face also has three tapped Setup Pin Holes, highlighted in Blue, of Fig 2. These holes accept the setup legs that are used when setting up the SQ2.

Stationary Reference Pin Holes (A&B)

There are two Stationary Reference Pin holes, highlighted in Red of Fig. 2. These are used to hold the 5/16" x 7/8" Black Pointed Stationary Pin. The Stationary Reference Pin is used with the Gauge in the #3 & 4 Position to set blade tilt angles.

Setup:

Install the Setup Pins

Remove the 3, 5/16" x 1.5" long threaded Setup Pins from the plastic bag and screw them into the tapped Setup Pin Holes on the Gauge Face of the SQ2. Make sure that the Setup Pins are screwed all the way in so that they are snug against the Gauge Face of the SQ2. Stand the SQ2 on the Setup Pins on a clean flat surface like a table saw top.

Install Dial Indicator into Gauge Bore 1

Remove the position 1 dial Indicator from its box. This is the dial indicator with a Ball tip anvil installed. Insert the Position 1 Dial Indicator in the #1 Gauge Bore and lower the dial indicator until the Gauge reads close to .100" displacement. The large hand on the dial indicator should be near the "12 o'clock Position" and the little hand should be pointing to the 1 on the small dial. Tighten the setscrew to fix the dial indicator at this position. Loosen thumbscrew on side of dial indicator and turn bezel until 0 is exactly aligned with the dial indicator needle. Tighten thumbscrew.

Install Dial Indicator into Gauge Bore 2

Remove the Position 2 dial Indicator from its box. You will also find in that box a 2" gage extension with a ball tipped anvil on it. Carefully thread the extension into the shaft of the dial indicator being careful not to over tighten the extension. Insert the Position 2 Dial Indicator in the #2 Gauge Bore and lower the dial indicator until the Gauge reads close to .100" displacement. The large hand on the dial indicator should be near the "12 o'clock Position" and the little hand should be pointing to the 1 on the small dial. Tighten the setscrew to fix the dial indicator at this position. Loosen thumbscrew on side of dial indicator and turn bezel until 0 is exactly aligned with the dial indicator needle. Tighten thumbscrew.

Install Dial Indicator into Gauge Bore 3

Remove the Position 3 dial Indicator from its box. It will have a Black Knurled Pointed Anvil installed on the shaft. As with the other dial indicators, insert the Position 3 Dial Indicator in the #3 Gauge Bore and lower the dial indicator until the Gauge reads close to .100" displacement. The large hand on the dial indicator should be near the "12 o'clock Position" and the little hand should be pointing to the 1 on the small dial. Tighten the setscrew to fix the dial indicator at this position. Loosen thumbscrew on side of dial indicator and turn bezel until 0 is exactly aligned with the dial indicator needle. Re-Tighten the thumbscrew.

Your setup should now look like the picture to the right. All of the dial indicators are now synchronized, and perpendicular to the table saw top surface and reading precisely zero.

WHEN HANDLING THE SQ2 ASSEMBLY, ALWAYS PICK IT UP BY THE FRAME AND NEVER BY GRABING THE GAUGE STEMS.

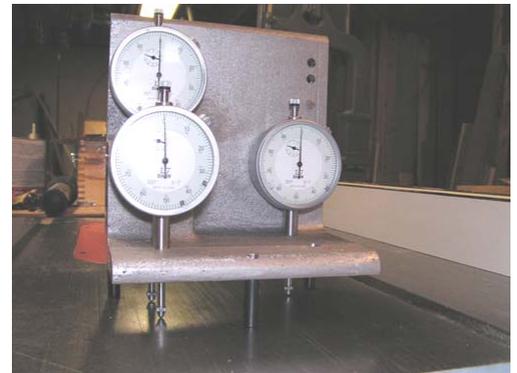
Let us now look at the Reference Face.

The Reference Face

The Reference Face shown in Fig 3 below, includes 3 pairs of holes that accept the Miter Slot Reference Pins, and the Miter Bar Slot. The 4 epoxied sites on the reference face hold rare earth magnets that are used to keep the reference face against iron surfaces. These small magnets are fairly strong so be careful when setting the SQ2 on its Reference Face.

The Miter Slot Reference Pin Holes

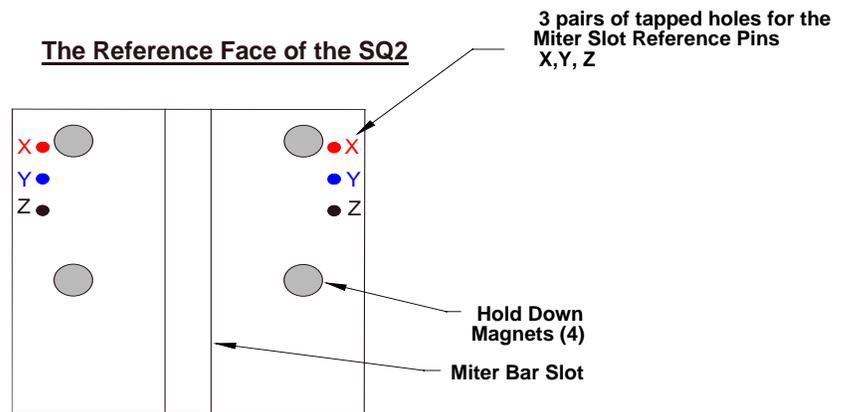
The Miter Slot Reference Pin holes are used in lateral pairs, to hold the Miter Slot Reference Pins. The Miter Slot Reference Pins provide a way to index the SQ2 relative to your table saw miter slot. Installed in the Reference Face of the SQ2 they extend into the recess of the table saw miter slot, they allow you to make the face of the SQ2 parallel to the miter slot. In this condition if the gages in position 2 and position 3 have the same reading then you know that the Table saw blade is parallel to the miter slot. There are 3 pairs of holes that allow the SQ2 to work on a variety of table saws with different miter slot to blade spacing.



The Miter Bar Slot

The Miter Bar Slot is a groove that is perpendicular to the Gauge Face and it will accept the miter gage bar of your table saw.

Fig 3



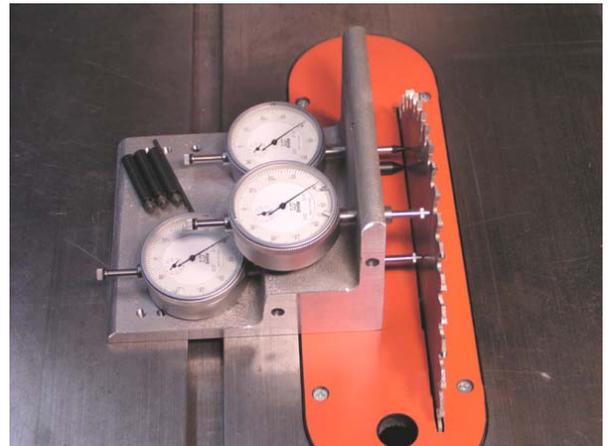
Accuracy: The SQ2 is a very precise instrument. If you are $\pm .001$ - $.002$ “ in any of your measurements then you are probably close enough to your target setting.

Arbor Runout: If you are careful, you can also rotate your blade by hand to observe arbor runout on your saw. Excessive runout generally requires service by a professional repair shop.

Using the SQ2 with the Table Saw

Setting the Table Saw Blade to 90° to the table saw top

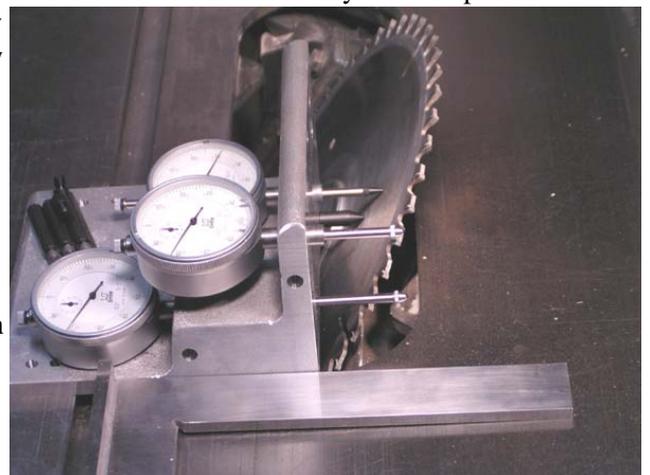
The dial indicators in positions 1 & 2 are used to set the table saw blade to 90°. Raise your table saw blade to full height. Make sure that the saw blade and the table saw top is clean. Wipe off the Reference Face of the SQ2 and carefully place it on the table saw top to one side of the blade. Slide the SQ2 on the Table saw top so that the anvils of the dial indicators contact the side of the blade. The blade will be square when both dial indicators, 1 & 2, read exactly the same. Note that the Gauge Face of the SQ2 does not need to be perfectly parallel to the table saw blade for this operation.



Picture 1

Setting the Table Saw Blade Tilt Angle

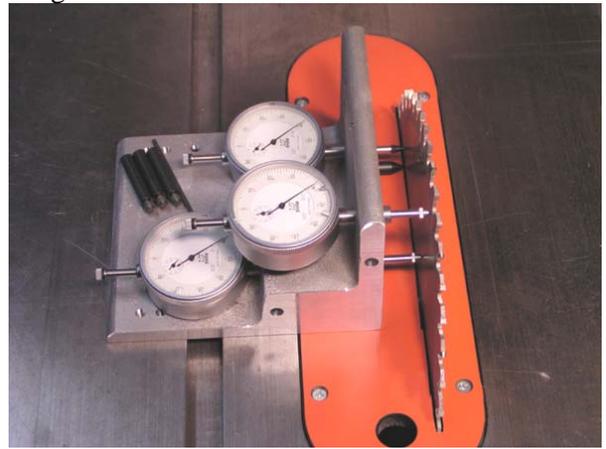
The dial indicator in position 3 is used, along with the 5/16” diameter x 7/8” long -1/4”-28 thread Black Pointed Stationary Pin mounted in the A position, to set blade tilt angles on the table saw. Install the Black Pointed Stationary Pin into position A below the dial indicator in position 3, making sure to screw it all the way into the SQ2. Raise the blade to full height and use the scale on your saw to get the saw tilt close to the angle you want. Wipe the Reference Face of the SQ2, the table saw top, and the side of the table saw blade clean. Carefully set the SQ2 onto the table saw top, so that it is on the open side of the tilted table saw blade as shown in Picture 2. Use a machine square to set the SQ2 so the Gauge Face is roughly parallel to the table saw blade. Slide the SQ2 toward the saw blade until the Black Pointed Stationary Pin just makes contact with the blade. Determine the blade angle by comparing the indicator reading on the dial indicator in position 3 with the SQ2 Dial Indicator Reading column of the SQ2 Angle Chart. Adjust the tilt of the blade and reposition the SQ2 until you reach the angle you want. Lock your tilt mechanism and recheck your blade angle because on some saws the blade angle changes a little when the angle is locked down.



Picture 2

Tuning your Table Saw - Setting the Blade Parallel to the Miter Slot

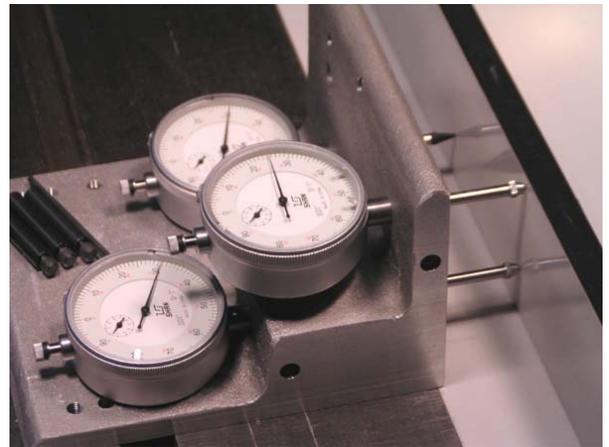
To set the saw blade parallel to the miter slot, first raise the blade to full height and set it to 90°. Next install the Miter Slot Reference Pins into the Reference Face of the SQ2. Choose a pair of holes that will allow the anvils of dial indicators in position **2 & 3** to contact the face of the saw blade. Wipe the all dust from the Reference Face of the SQ2, the table saw top and the side of the saw blade. Carefully place the SQ2 onto the surface of the table saw with the Miter Slot Reference Pins extending into the miter slot of your table saw, and so that the gauge anvils contact the table saw blade. Push the SQ2 to or from the face of the blade so that Miter Saw Reference Pins firmly contact one edge of the miter slot of your table saw. Refer to your table saw manufacturer instruction allows adjusting the parallelism of the table saw blade to miter slot. This typically involves adjustment to the trunion mounting bolts that hold the table saw tilt mechanism to the underside of the table saw. The gages in position should both read the same when the blade is perfectly parallel.



Picture 3

Tuning your Table Saw – Setting the Rip Fence Parallel to the Miter Slot.

Once you have set the table saw blade parallel to the table saw blade adjust the rip fence to be parallel to the miter slot. Using the same setup, lower your blade and bring the fence to contact the gauge anvils of the SQ2. Using the dial indicators in position **2 & 3**, follow your table saw or rip fence manufacturer's procedure for adjusting the rip fence parallelism to the miter slot. Check the rip fence in both miter slots.

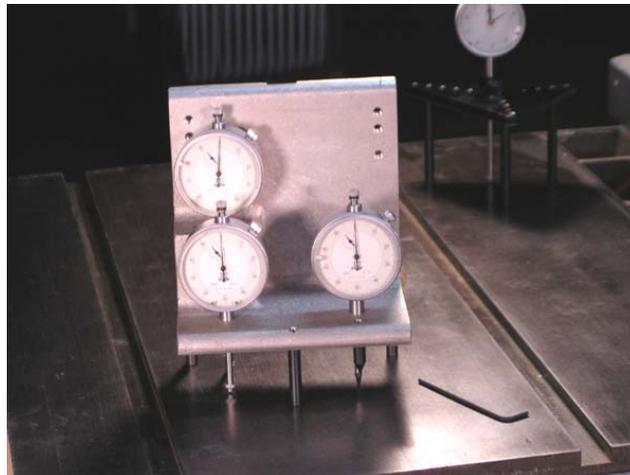


Picture 4

Using the SQ2 with the Radial Saw

Setting Up the SQ2 for the Radial Saw

The dial indicators in positions 1 & 4 are used when setting up a radial saw. This requires mounting the dial indicator with the Black Knurled Pointed Anvil in position 4 on the SQ2. And the mounting of the Black Stationary Reference point in Position B. **Picture 6** shows the Dial indicator with the Black Knurled Pointed Anvil moved to position 4 on the SQ2 and preset to .100”.



Picture 5

Setting the Radial Saw Blade to 90° to the radial saw top

The dial indicators in positions 1 & 2 are used to set the radial saw blade to 90°. Lower your radial saw blade to the support table. Make sure that the saw blade and the radial support top is clean. Wipe off the Reference Face of the SQ2 and carefully place it on the radial saw top to the open side of the blade. Slide the SQ2 on the Radial saw top so that all of the anvils of the dial indicators contact the side of the blade. Adjust the tilt mechanism so that the dial indicators in position 1 & 2 read exactly the same. This will square the blade to the radial saw table.

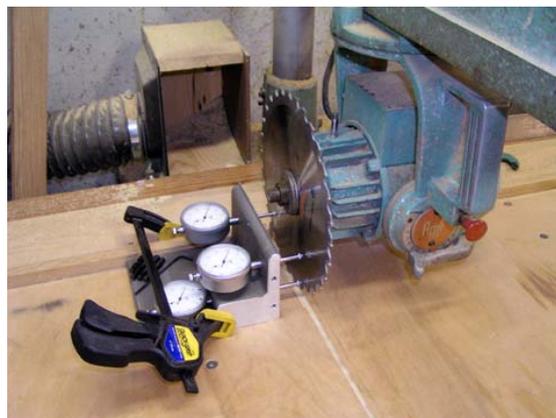


Picture 6

Setting the Radial Saw Blade Perpendicular to the Backstop

The dial indicators positions 1 & 4 are used to set the radial saw blade to 90° to the support backstop. You need to setup the SQ2 with the dial indicator equipped with the Black Knurled Pointed Anvil in position 4.

Put the Setup Pins in the Gauge Face of the SQ2. Set that assembly on a known flat surface and move the dial indicator with the Black Knurled Pointed Anvil to Position 4. Set the dial indicator to read .100”. Remove the Setup Pins and place the SQ2 on its Reference Face on the radial saw support table, with the dial indicators pointed toward the radial saw blade. Holding the SQ2 against the backstop, slide the SQ2 toward the radial saw blade until the dial indicators in positions 1 & 4 contact the blade. Both dial indicators should read the same if the blade is perpendicular to the backstop. If they are not make adjustments according to the manufactures instructions to bring the blade perpendicular to the backstop.



Picture 7

Setting the Radial Saw Blade Tilt Angle

The dial indicator in position **4** is used with the 5/16" diameter x 7/8" long -1/4"-28 thread Black Pointed Stationary Pin mounted in the **B** position to set blade tilt angles on the radial saw. Install the Black Pointed Stationary Pin into position **B** above the dial indicator in position **4**, making sure to screw it all the way into the SQ2. Raise the blade to full height and use the scale on your saw to get the saw tilt close to the angle you want. Wipe the Reference Face of the SQ2, the radial saw top, and the side of the radial saw blade clean. Carefully set the SQ2 onto the radial saw table, so that it is on the closed side of the tilted table saw blade as shown in Picture 8. Use a machine square to set the SQ2 so the Gauge Face is roughly parallel to the table saw blade. Slide the SQ2 toward the saw blade until the Black Pointed Stationary Pin just makes contact. Determine the blade angle by comparing the indicator reading on the dial indicator in position **4** with Gauge Reading column of the Blade Angle Chart. Adjust the tilt of the blade and reposition the SQ2 until you reach the angle you want. Lock your tilt mechanism and recheck your blade angle because on some saws the blade angle changes a little when the angle is locked down.



Picture 8

Using the SQ2 with the Compound Miter Saw

Setting the Compound Miter Saw Blade to 90° to the table saw top

The dial indicators in positions **1, 2, & 3** are used to square the Compound Miter saw. Lock the unit in the down position so that the blade guard retracting mechanism has exposed the blade. Make sure that the saw blade and the saw top are clean. Wipe off the Reference Face of the SQ2 and carefully place it on the table saw top the open side of the saw. Slide the SQ2 on the toward the saw blade, while holding the SQ2 against the backstop fence, putting about .100" of preload on them. Make adjustment to the tilt mechanism and the backstop fence so that all the dial indicators read the same.



Picture 9

Other uses for the SQ2

Using the SQ2 with the Jointer

Here we use the SQ2 to check the jointer fence to make sure that it is square. Rare earth magnets in the “Reference Face” of the SQ2 hold it in place on the bed of the jointer.



Picture 10

Using the SQ2 to Square the head of your miter gauge

Put the setup legs in the SQ2. Loosen the lockdown knob of your table saw miter gauge and place the SQ2 on the guide bar with the legs pointed toward the miter gage head. Hold the setup legs of the SQ2 against the miter gage head to square it to the guide bar and then lock the miter gage head.



Picture 11

SQ2 Angle Chart

SQ2 Dial Indicator Reading	Blade Tilt Angle to Table	SQ2 Dial Indicator Reading	Blade Tilt Angle to Table	SQ2 Dial Indicator Reading	Blade Tilt Angle to Table
(inches)	Degrees	(inches)	Degrees	(inches)	Degrees
0.7250	0	0.5575	15	0.3495	31
0.7141	1	0.5458	16	0.3345	32
0.7032	2	0.5339	17	0.3191	33
0.6922	3	0.5219	18	0.3034	34
0.6813	4	0.5098	19	0.2874	35
0.6703	5	0.4975	20	0.2709	36
0.6593	6	0.4851	21	0.2540	37
0.6483	7	0.4725	22	0.2367	38
0.6372	8	0.4597	23	0.2189	39
0.6260	9	0.4467	24	0.2006	40
0.6148	10	0.4336	25	0.1817	41
0.6035	11	0.4202	26	0.1622	42
0.5922	12	0.4065	27	0.1422	43
0.5807	13	0.3927	28	0.1214	44
0.5692	14	0.3786	29	0.1000	45