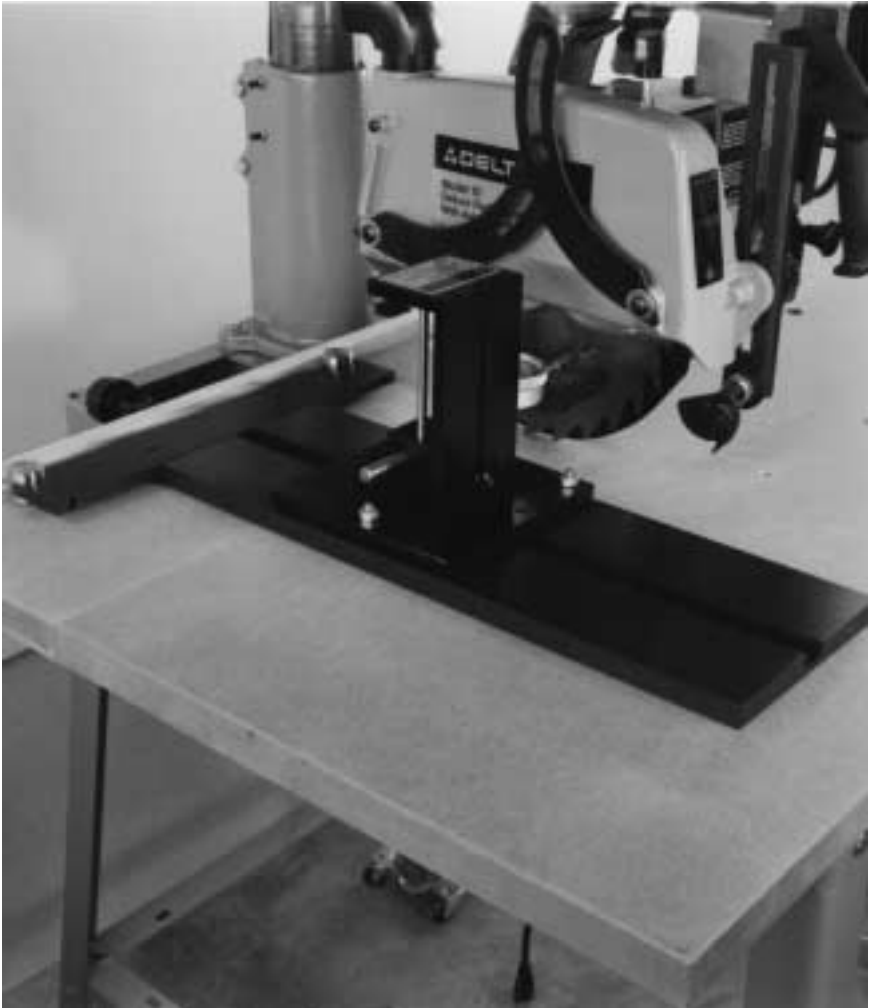


RS-ALIGNER



An accessory for TS-Aligner

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Introduction

Thanks for purchasing RS-Aligner. With it you will be able to your TS-Aligner to align your radial arm saw like never before. As always, I'm concerned that you get everything out of your purchase that we put into it. Therefore, if you have any questions or problems, please don't hesitate to give us a call.

Safety

RS-Aligner is pretty safe all by itself. The worst thing you could probably do is drop it on your foot or hit somebody with it. So, don't do that! That radial arm saw, on the other hand, isn't such a safe tool. Be sure that you understand and obey all the safety rules that are included with your radial arm saw. There's no reason to have the saw connected to power when you're using RS-Aligner. Therefore...

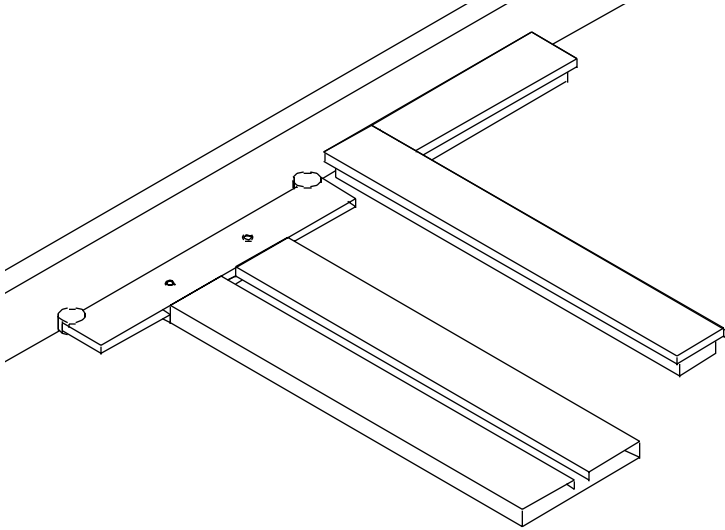
Disconnect all power from your saw before using RS-Aligner.

You risk having a severe and potentially fatal accident if you ignore this one safety rule.

Calibration

RS-Aligner comes from the factory fully calibrated. However, there are some rare instances that you might need to re-calibrate it. We'll be happy to perform this task for you at the modest fee of \$10.00. Doing it yourself is not all that difficult and only takes a few minutes. What you need is a very accurate square that is long enough to perform the task (14" to 18") such as the squares we offer as accessories.

Place RS-Aligner against the fence of your radial arm saw. Place the square next to RS-Aligner as shown in the drawing below. Elevate the square with some blocks so that when you put your TS-Aligner on the RS-Aligner, the stylus will be in contact with the edge of the square.



With the square and RS-Aligner firmly against the fence, move TS-Aligner down the slot so that you measure along the edge of the square. If there is any significant change in reading (greater than ± 0.002) then you should adjust RS-Aligner. This is done by loosening one of the screws that holds the cross piece (the one with the elongated hole) and carefully changing the angle of the slot until it is correct. Re-tighten the screws when you are done. Be aware, the accuracy of your alignment depends on how straight your fence is. This can be checked by flipping the square to the other side of RS-Aligner and checking the results.

Aligning your radial arm saw

Throughout these procedures we'll be using terms that are explained in detail in the TS-Aligner user's guide. If you have an older copy of this manual that doesn't explain these terms, please give us a call and we will send you a new manual.

These instructions apply to most general purpose radial arm saws but we can't begin to cover all the unique features of all saws available. Therefore, have your owner's manual handy so that you can be sure how the adjustments are made on your saw.

Aligning a radial arm saw requires several steps that depend upon each other for accurate results. If each step isn't done accurately, or if you take these setups out of order you will probably not obtain very accurate results. So, be careful to do it right and do it in the order laid out in this manual.

Removing play in the arm and carriage

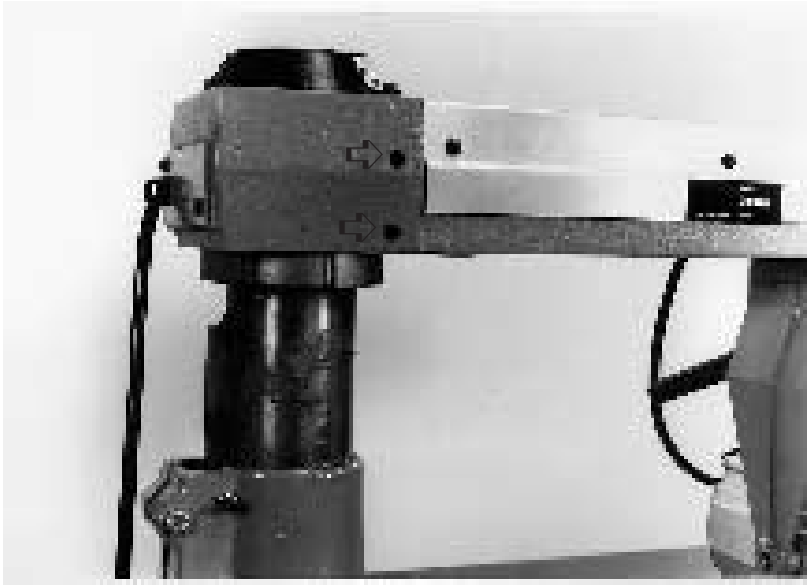
Before you get started aligning your saw you should try to remove excess play in both the carriage bearings and the arm angle lock. Aligning your saw will be much easier if you take time to remove excess play. Your owner's manual should detail how this can be done.

For the saw that we will be using in this manual, the carriage bearings are found underneath the arm cover. They are adjusted by loosening locking nuts and turning an eccentric. The following photo shows the carriage bearings.



Be careful not to over-tighten the bearings. This will reduce the ease of motion of the carriage and also promote accelerated wear on the bearings.

Removing play in the arm angle locking mechanism is done by adjusting two set screws in the side of the arm (on this particular saw).

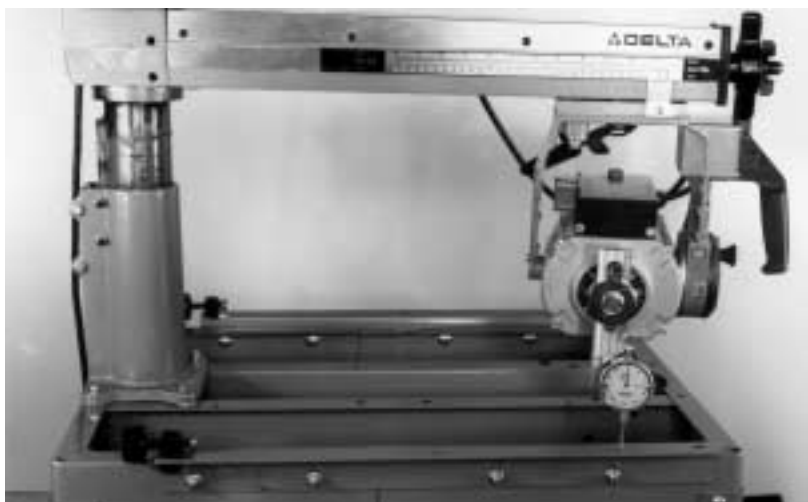


Setting the table support brackets

Remove the table top to reveal the table mounting brackets. Attach your dial indicator to the mounting bracket supplied with RS-Aligner using a 1/4" x 20 screw. Then mount the bracket on the arbor of your radial arm saw. Point the stylus of the dial indicator downward so that you can take measurements from the surface of the table support brackets. Move the arm and slide the carriage so that the dial indicator is pointing at the rear of the bracket. Refer to the photo below for proper setup.



Next, you want to change the height adjustment on the saw to zero the dial indicator. This is your reference point. Completely loosen all the bracket bolts except the one in rear that is just under the dial indicator. The one in the rear should be slightly loosened so that it is still snug. In the photo above, the mounting brackets have four bolts. Therefore, we would loosen the one in the front and the two middle ones and leave the one in the rear snug. Now, by moving both the arm and the carriage, take a reading at the front of the bracket just above front mounting bolt as shown in the photo below:



Move the front part of the bracket so that the dial indicator reads the same as it did at the rear. Return the dial indicator to the rear part of the bracket and reestablish your reference point (since the whole bracket moves when you move the front, you'll need to reestablish your reference). Repeat these steps until both the front and the rear of the mounting bracket give you the same reading. When the front and rear of the bracket are at the same height, tighten the front and rear bracket bolts. Now take readings at points above the intermediate bracket bolts. If the bracket isn't completely flat over its entire length, you can flex it and tighten the bolts to make it flat. Check over each bolt, flexing and tightening as necessary. When you are done, you should be able to take a reading at any point along the bracket and get the same measurement (to within a couple of thousandths of an inch).

The next step is to adjust the bracket on the other side of the saw so that it is at the same level as bracket we just adjusted. In order for this step to be accurate, you must not change the height setting on the saw. Completely loosen all of the bolts on the bracket. Then, with the dial indicator measuring the rear end of the bracket, adjust the bracket so that the dial indicator reads the same as it did on the other side of the saw. When it does, snug the bolt and check the reading at the front. Adjust the bracket at the front until the dial indicator reads the same as it did on the other side. Repeat your checking and adjust the front and rear of the bracket until they both read the same as the bracket on the other side of the saw. Then tighten the front and rear bolts. Adjust the middle bolts by flexing and tightening until the entire bracket surface reads the same on the dial indicator as the first bracket.

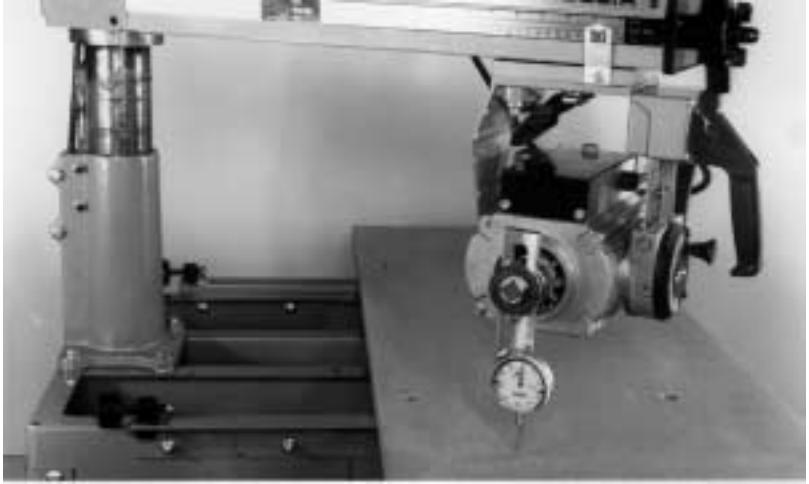
At this point both brackets should be aligned. The readings on the dial indicator should be the same no matter where you are measuring on either bracket surface. All of the bracket bolts should be tight and secure. Replace the table top. You're now ready to level the table top.

Leveling the table top

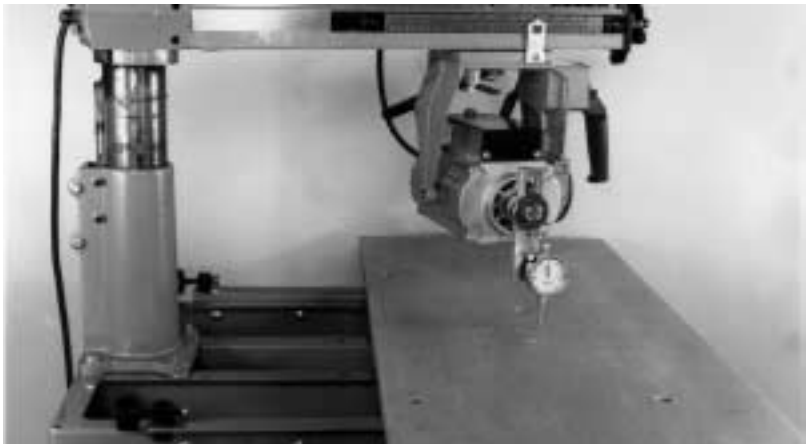
Even though the table brackets are aligned, the table top may not be perfectly flat and so your cuts won't be accurate. Therefore, most manufacturers have adjustments for leveling the table top as well. Typically, adjusting screws are supplied to push up or pull down on the center of the table.

Note: As you move the dial indicator across the surface of the table, the needle on the dial indicator will probably jump around quite a bit. It is registering the smoothness of the table surface and also the smoothness of the bearings in the carriage.

With the dial indicator mounted in the arbor of the saw, point the stylus toward the table surface and adjust the height mechanism on the saw to obtain a reference point. The photo below demonstrates this.



It's best to check the flatness of the table across as much of the surface as possible. Realize however that you may not be able to make it completely flat. A good compromise is to make sure that the table reads roughly the same in the center as it does on the edges. On this saw, the center is adjustable. So a reference reading is taken on one side of the table and compared to the center of the table.



The center is adjusted so that it reads the same as the edge. Then, a reading is taken on the other edge of the table.



It's not completely unreasonable for the table to be out by as much as 0.010" - 0.020" across its entire surface. If the table is much worse than this, you should consider replacing the table. Don't give in to the temptation to adjust the table brackets to compensate for a warped table surface. For more demanding applications you might consider replacing a wooden table with one made from more stable solid surface material.

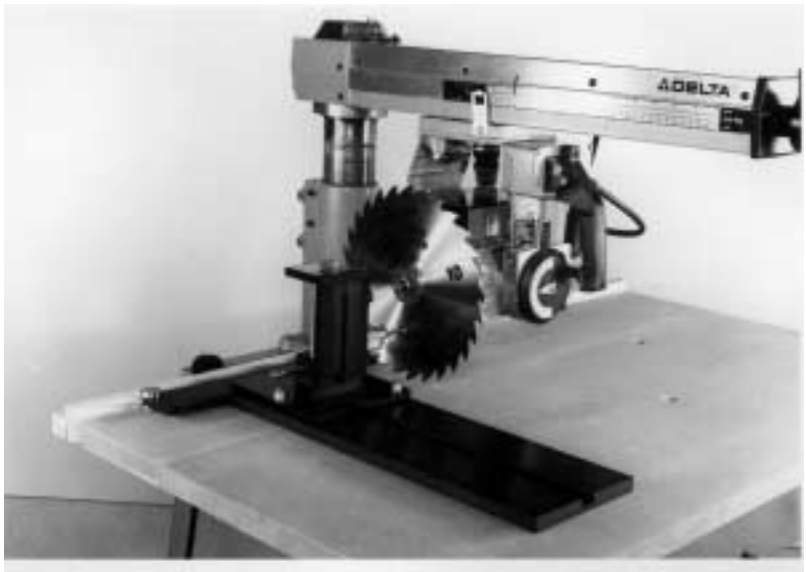
Setting the zero point of the arm

Most radial arm saws have a detent when the arm is supposed to be at 90 degrees to the fence. For general work, this detent comes in quite handy. Most saws allow you to adjust the angle of the arm relative to the position of the detent. Your owner's manual can give you details on how to make the adjustment. RS-Aligner, together with TS-Aligner will give you the information you need to make the adjustment accurately. A common mistake that many people make is to align the blade before setting the zero point on the arm. Be careful to make sure that the arm is aligned before you proceed to align the blade.

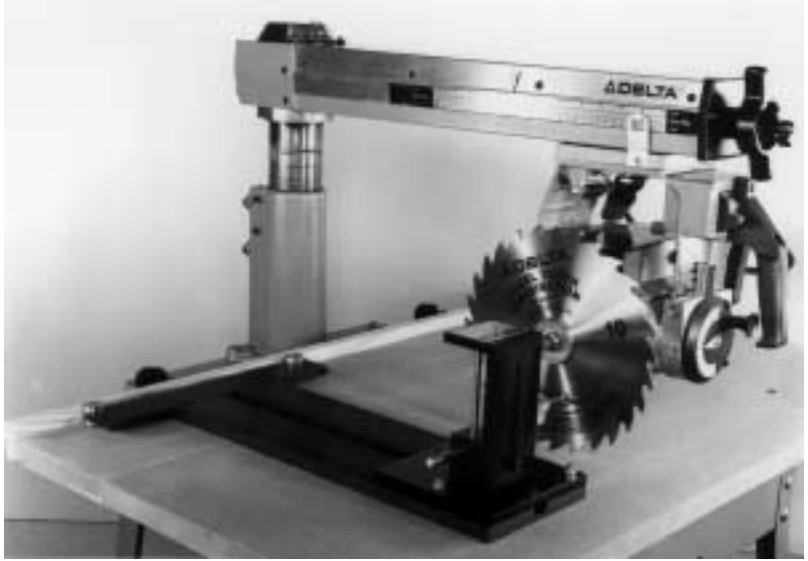
Place RS-Aligner on the table surface with TS-Aligner on top of it as shown in the following photo. Adjust the arm on the saw so that it is locked in place at the 90 degree detent. Adjust the dial indicator on

TS-Aligner so that it is against the blade body. You won't need to use the stylus offset to make this measurement. In fact, having it in place will make this process a bit more difficult so you should remove it and place the stylus tip into the end of the plunger on the dial indicator. Make sure that RS-Aligner remains firmly against the fence.

Establish a reference point with the carriage in the rear position as shown in the following photo. You'll want to mark a spot on the blade at your reference point. Since the blade is not yet aligned, different points along the surface of the blade may give significantly different readings.



Next, move both the carriage and TS-Aligner together and observe any changes in reading on the dial indicator. These changes will indicate how far out of square the arm is.



Referring to your manual, make the adjustment that will bring the dial indicator back to your reference measurement. On this saw, there are screws in the column assembly that adjust the angle of the arm as shown in the following photo.



These screws also affect the stiffness of the blade elevation mechanism so they must be carefully adjusted. If they are too tight the blade elevation mechanism will be difficult to operate and there will be excessive wear. If they are too loose, then there will be play allowing the arm to move side to side.

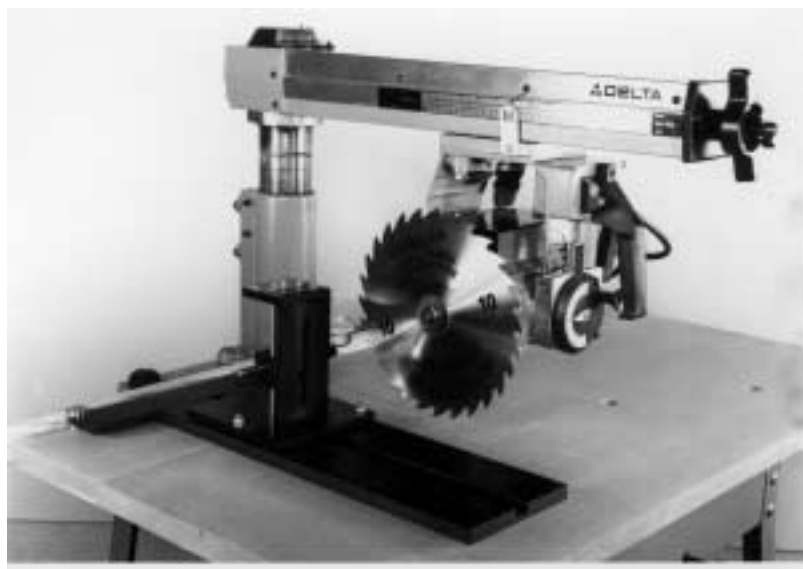
Return both the carriage and TS-Aligner back to the rear position to check your reference point. Repeat the entire procedure until you receive the same reading along the full travel of the carriage. When you're done, you can also adjust the pointer on the angle scale so that it points to zero.

Aligning the blade

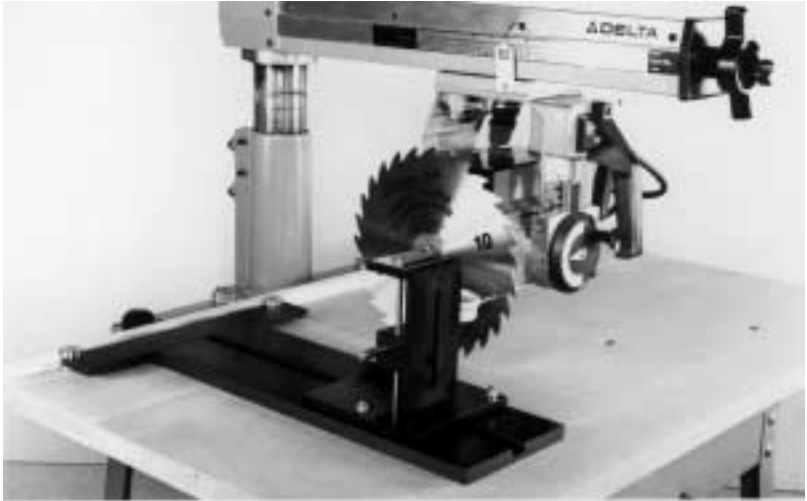
Before you begin this procedure, you must make sure that the arm is perfectly square with the fence. If it isn't, your blade alignment won't be accurate.

The whole carriage assembly is usually designed to rotate for rip cuts. Typically there's a detent at both the crosscut and rip positions and there's an adjustment to make sure that the detent positions provide adequate blade alignment.

Start the alignment procedure by locking the carriage somewhere near the middle of it's travel. Place RS-Aligner on the table and TS-Aligner on top of it as shown in the following photo.



Establish a reference point at the rear of the blade. Again, the stylus offset is just going to get in your way so you should remove it.



Now move TS-Aligner to the front of the blade and observe the reading on the dial indicator. You may wish to mark the blade at your reference point and rotate the blade as well so that your readings at the rear and front of the blade are made at the same location. This will eliminate any error from a warped blade.

Aligning the blade is often referred to as adjusting the heel of the blade. You will need to look in your saw's owner's manual to see exactly how it's done. On this saw, the yolk locking lever and two bolts are loosened (see photo below). The carriage assembly can then be rotated until the blade is in full alignment.



Squaring the blade

As with most of the adjustments on a radial arm saw, there's a detent at the 90 degree setting for the blade tilt. There's usually a way to adjust the position of this detent so that the blade is adequately squared up when it's locked in place.

Start with RS-Aligner on the table top and TS-Aligner on top of RS-Aligner. Slide the carriage assembly to about mid travel and lock it in place. The setup is shown in the following photo.



As you raise and lower the dial indicator, you'll be able to see just how far out of square the blade is. On this saw, the adjustment is made by locking the blade tilt lever and removing the cover that has the angle scale on it. Underneath the cover are the four adjustment bolts. Loosen three of these bolts completely. Leave the fourth bolt snug enough to hold the motor in place but loose enough so that it can be adjusted.



Start by establishing your reference in the center of the blade (with the dial indicator raised). Then lower the dial indicator to see how much adjustment is needed. Rotate the entire motor assembly to return the dial indicator back to the reference reading. Then raise the dial indicator to check the reference point. You may need to repeat this procedure several times before the blade is perfectly square. When done, carefully tighten all four bolts, watching the dial indicator to make sure that nothing shifts.

Setting arm and blade angles

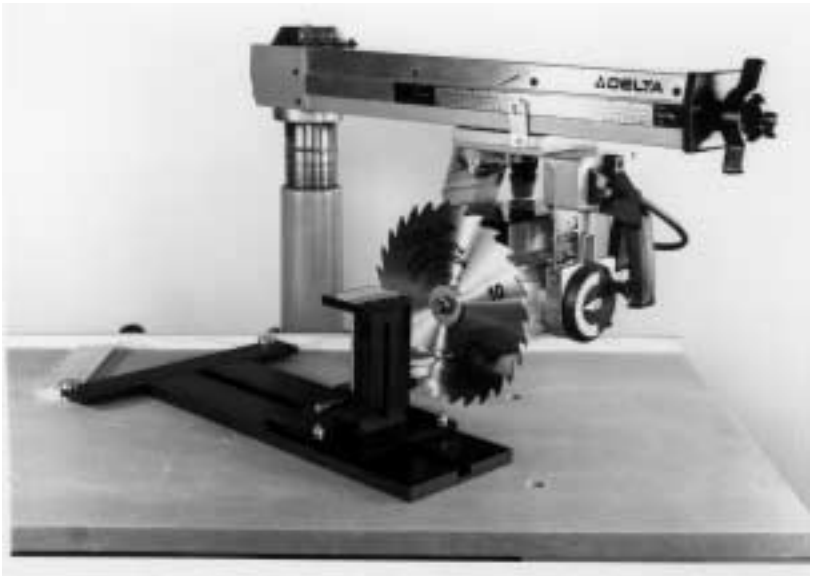
Now that your saw is completely aligned, you can set blade and arm angles with complete confidence.

Blade angles are set on the radial arm saw just as easily as they are on the table saw. Angle blocks or the poor man's angle set can be used.

Setting the arm angle is a little different. Gage blocks are used behind one of the cylinders on RS-Aligner to set the angle of the slot. The same mechanism is used by machinists when setting the angle of a sine bar. RS-Aligner works like a 12" sine bar. The length of the gage block can be calculated using the formula:

$$\text{length} = 12 * \sin(\text{angle})$$

The photo below demonstrates the use of a gage block in setting the arm to 45 degrees.



The table on the back cover shows gage block sizes for angles from zero to 45 degrees. If you have an accurate way to measure and cut gage blocks from a stable material you can make your own. We also offer gage blocks as accessories.

Table of gage block lengths

0.5	0.105	15.5	3.207	30.5	6.090
1.0	0.209	16.0	3.308	31.0	6.180
1.5	0.314	16.5	3.408	31.5	6.270
2.0	0.419	17.0	3.508	32.0	6.359
2.5	0.523	17.5	3.608	32.5	6.448
3.0	0.628	18.0	3.708	33.0	6.536
3.5	0.733	18.5	3.808	33.5	6.623
4.0	0.837	19.0	3.907	34.0	6.710
4.5	0.942	19.5	4.006	34.5	6.797
5.0	1.046	20.0	4.104	35.0	6.883
5.5	1.150	20.5	4.202	35.5	6.968
6.0	1.254	21.0	4.300	36.0	7.053
6.5	1.358	21.5	4.398	36.5	7.138
7.0	1.462	22.0	4.495	37.0	7.222
7.5	1.566	22.5	4.592	37.5	7.305
8.0	1.670	23.0	4.689	38.0	7.388
8.5	1.774	23.5	4.785	38.5	7.470
9.0	1.877	24.0	4.881	39.0	7.552
9.5	1.981	24.5	4.976	39.5	7.633
10.0	2.084	25.0	5.071	40.0	7.713
10.5	2.187	25.5	5.166	40.5	7.793
11.0	2.290	26.0	5.260	41.0	7.873
11.5	2.392	26.5	5.354	41.5	7.951
12.0	2.495	27.0	5.448	42.0	8.030
12.5	2.597	27.5	5.541	42.5	8.107
13.0	2.699	28.0	5.634	43.0	8.184
13.5	2.801	28.5	5.726	43.5	8.260
14.0	2.903	29.0	5.818	44.0	8.336
14.5	3.005	29.5	5.909	44.5	8.411
15.0	3.106	30.0	6.000	45.0	8.485