TRAMMING THE MILL TURN

Your mill turn was trammed at the factory, but after a long voyage here, handling by various forklift and truck drivers, it is possible that it has lost some of its original position. Tramming is not difficult.

1. Get your machine moved into its final location and fully levelled. We recommend you add "earthquake" straps to a wall behind the machine if possible. On the upper rear corner of your machine on each end you will see a hole in the sheet metal cover and a 10 MM X 1.5 tapped hole in the support frame. You can run a bar or angle iron from this point to the wall behind to attach the machine to the wall. It would prevent the machine from tipping over in an earthquake, but it also adds a lot of stability to the mill head and machine.

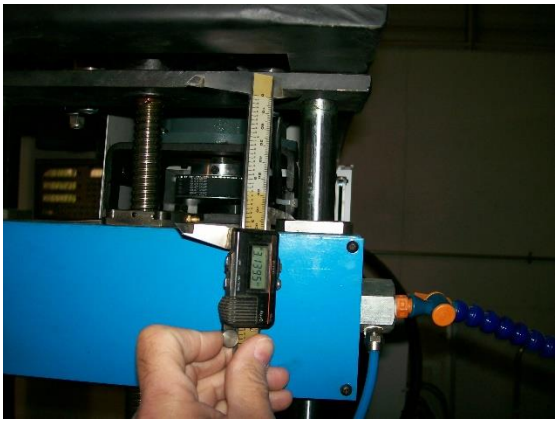
2. Once your machine is in position as above, do a "self- align" of the 6 linear rail posts by-

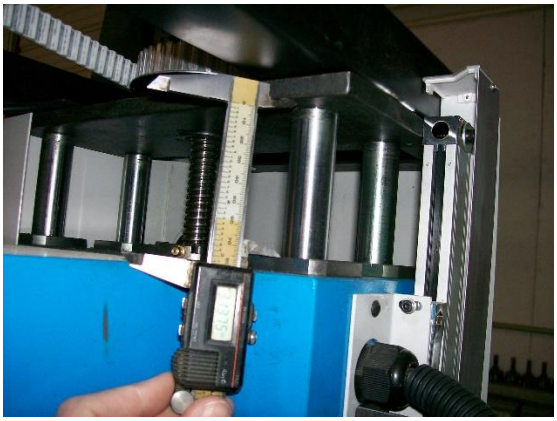
A. Using your manual handle, drop the mill head down to its lowest position- the mill head should come to rest on the casting that holds the lathe spindle, and also on the 2 clamps around the linear rail columns on the tailstock end. You can adjust the clamp locks to get both ends resting at exactly the same point. Now loosen all 6 bolts holding the linear rail columns at their bottom point, then re-tighten them. This will allow them to shift a bit in the mounting holes and self- align to the mill head.

B. Now manually raise the mill head to its highest position and loosen the 6 top bolts of the linear rail columns and re-tighten them. That will also self -align them at the high position. Run the column down to the lowest position again

and back up until it is about 4" from the top just to check that the motion is smooth and no binding.

3. Now measure the distance from the top of the linear rail to the top framework on each end- these distances should be the same. If they are off by any significant amount 0.050" or more, you will need to adjust the drive pulley synchronization.



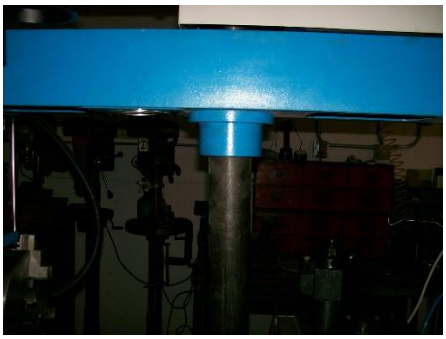


4. Remove the top cover to expose the pulley and belt drive system. Do a general look over to see all the mechanisms and how they work. The ball screws are metric, but essentially a 5 threads per inch pitch, meaning that 1 turn of the screw will give you 0.1969" motion. The pulley is a 72 tooth pulley, so each tooth increment would give you 0.1969" divided by 72 = 0.00273" or in round number 3 thousandths. So, for example, if you needed to raise or lower one end of the mill head by 20 thousandths, you would need to move the belt by about 7 teeth.

NOTE: If the tram is out by a large amount, such as 0.100", a faster way to adjust it is to loosen the bolts holding the ball nut to the casting and simply rotate the ball nut to another position on the mounting holes. 1 full turn of the nut would be 0.1969, while ½ turn would be 0.09854".

5. Moving the belt is fairly easy, but you have to remember that once the belt is taken off the pulleys, the weight of the mill head will simply thread the ball screws down until they hit the bottom, so you need to put a support piece under the mill head. You can uses a pipe or a block of wood under the spindle.

NOTE: This only applies to early machines that do not have the gas strut supports- those with struts need no support.



Once the head is supported, you can loosen the idler pulley located in the center of the framework and release the belt tension enough to move the belt around the pulley as much as you need. Use a sharpie to mark the belt and pulley on each end and also to mark the point you want to move to. After you have moved the belt, re-tension the idler so that you have about a ¼" deflection in the space between the motor and idler pulleys. Too much tension drags the motor down and reduces your speeds- too little tension can result in jumping teeth .

6. Once your belt is back in place, remove your support piece and run the mill head down a bit then back up and measure the distance again to see if you got it right. That covers the main adjustment.

7. Now it's time to check the actual tram of the mill spindle to the table. Move the carriage under the mill spindle and put your dial indicator holder in the collet so that the dial indicator will sweep the full with of the table. Crossing your dial probe across the T slots is tedious, so if you have a good piece of flat material to put on the table that will help- a piece of plate glass will work.

8. Sweep your indicator around in a circle and use a sharpie to mark the variations at every 45 degrees.

9. You will see that the mill spindle cartridge is held in place by 6 bolts at the bottom and a large clamp collar at the top. The hole through the mill head casting is made slightly oversize to allow shimming of the cartridge. Loosen the large clamp lock on top, then loosen the 6 lower bolts and place shims between the casting and cartridge in places where you need to adjust the tram. Tighten the 6 lower bolts and sweep your indicator again and re-mark your variations. Continue this process until you are satisfied with the result. Then fully tighten everything. If you don't have shim stock, a cheap feeler gauge set from an auto parts store will work, as the thickness is written on each gauge and the thin ones can be cut with scissors.