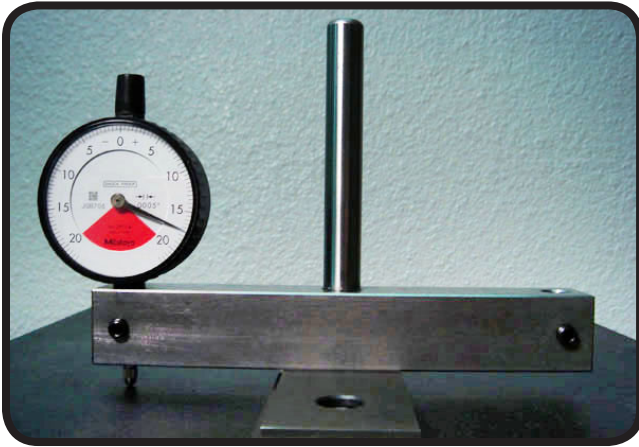


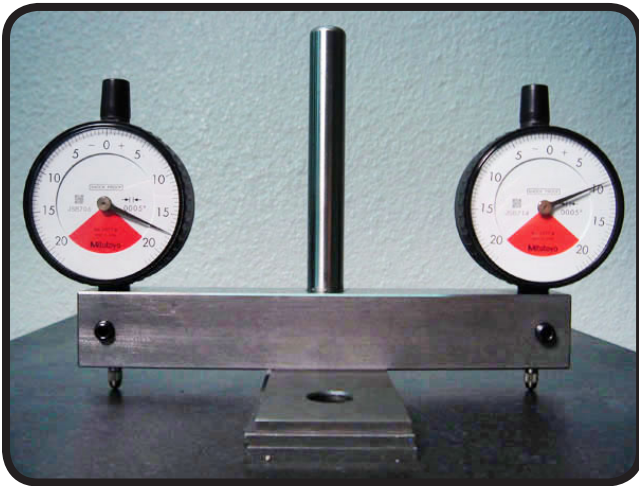
SPINDLE TRAM GAGE INSTRUCTIONS

COARSE SET UP & INDICATOR INSTALLATION



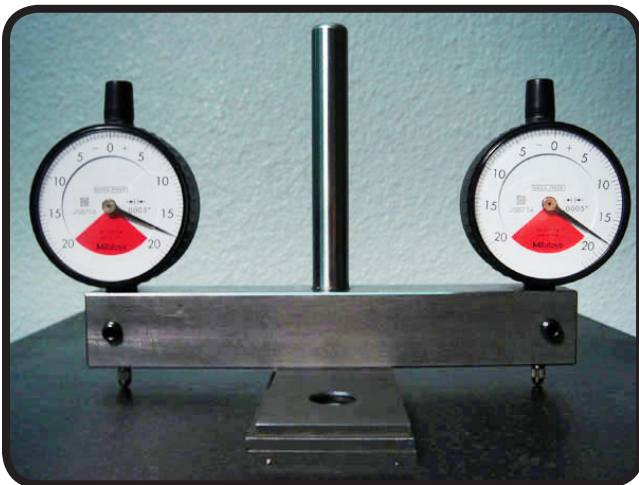
STEP 1

- Leave set-screw loose
- Install one indicator (.375" shank)
- Allow indicator to drop to full depth
- Snug set screw but do not fully tighten
- This indicator will not need further adjustment
- **NOTE:** Tightening the set screw deforms the nylon tip. If you fully tighten, remove, and then attempt to reinstall, the set screw will not hold well.



STEP 2

- Stack three parallels under the gage
- Note reading of first indicator
- Install second indicator (do not tighten set screw)
- Slide indicator up or down to roughly match the first indicator reading before snugging set screw
- **NOTE:** Depending on the indicators you use, the stack height may need to be different. The purpose is to depress the plunger anywhere in the indicator's operating range. It does not need to read "zero" at this time. (See photo)

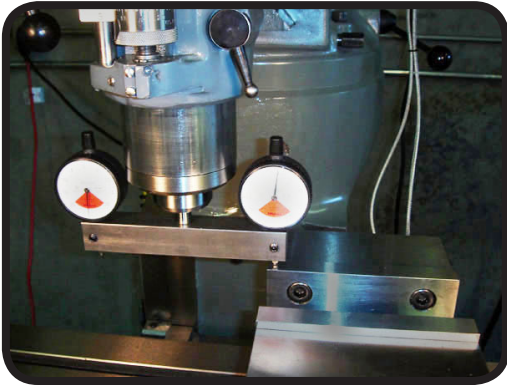


STEP 3

- Confirm that both indicators read approximately the same
- Fully tighten set screws
- **NOTE:** The purpose of coarse setting is to make sure the "zero" point on both indicators is close to the 12 o'clock position when in use. This does not affect the accuracy, but makes the indicators easier to read.

SPINDLE TRAM GAGE INSTRUCTIONS

CALIBRATING THE SPINDLE TRAM GAGE



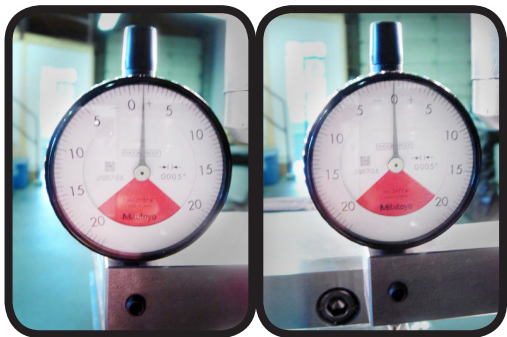
STEP 1

- Secure gage in .5" collet
- Lower quill to reference point until indicator reads "zero."
- You can orient the gage along either (X or Y) axis
- **NOTE:** In this case, the reference point is the top of the fixed jaw on the vise. You may use almost anything as a reference object. If you are working without a vise, clamp a 1-2-3 block, v-block, or parallel to the table.



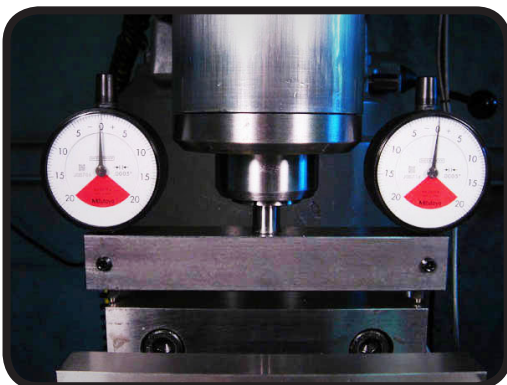
STEP 2

- Be sure the reference object can not move.
- Rotate the gage 180 degrees
- **NOTE:** Try to pick up the same spot as the first indicator. If you are indicating from a vise, v-block, parallel or other precision ground object the exact position is less critical.



STEP 3

- Look at the indicator from the other side
- Rotate the indicator to read "zero"
- At this point the gage is calibrated
- **NOTE:** For maximum accuracy you should recalibrate the gage every time you use it. This method is extremely sensitive and will read and magnify clamping error in the collet.



STEP 4

- Rotate the gage back to the front
- Traverse table so both points rest on the top of the fixed jaw
- Tram as needed
- **NOTE:** Trimming the Y axis with a vise --> Sometimes the height of the moveable jaw will be slightly off from the fixed jaw. To compensate for height error: calibrate the gage, zero out the gage on the fixed jaw X axis (see photo), traverse the X axis until only one indicator is touching, traverse the Y axis until that indicator is on top of the moveable jaw. If this jaw is not at "zero" adjust the gage face to read zero. Rotate 90 degrees so the indicator you just "corrected" remains on the moveable jaw and you are ready to tram.