TIP 66 — A Vernier Scale for the Rotary Table/Matthew Springer

Matthew Springer was looking for a way to divide more accurately on the rotary table, so he used an old method developed in 1631 by French mathematician Pierre Vernier. A Vernier scale is a sliding secondary scale that is used to indicate where the measurement lies when it is in between two of the marks on the main scale. In this case, ten marks on the Vernier scale make up the same total distance as 9 marks on the handwheel. Whichever mark on the Vernier scale aligns most closely with a line on the handwheel represents the number in the additional decimal place. Here is his explanation of how it works:

"Print either the JPG or PDF file in the links below at 1 to1 scale. Cut out and install the scale with the handwheel shaft through the .250" hole in the middle of the scale. Line up the "10" mark with the "0" witness mark on the rotary table worm housing. The entire Vernier scale will be to the left of the witness mark. Tape the scale in place so it won't turn with the handwheel, with tape off the right and left side of the scale beside the handwheel shaft the tape will wrap around the sides of the worm housing. Place the small washer that goes between the handwheel and bearing over the scale. Slide the handwheel back on and reinstall 5-40 screw in middle of the handwheel. Tighten the screw, but the handwheel must be able to turn but not scrape against the scale. Tighten the set screw to lock the handwheel to the shaft.

Download the scale art: **rt_vernier.pdf** or **rt_vernier.jpg**

To use the scale

Each turn of the handwheel rotates the table 5 degrees. Each major mark numbered "10,"" 20," etc. represents 1 degree. Each major mark is divided into 10 minor division marks. Each of these represents .1 degree, so you can directly dial 1/10th of a degree.

Example using the Vernier scale to obtain a reading to 1/100th of a degree:

If you want to dial 6.42 degrees:

- Rotate the handwheel one full turn = 5 deg
- Then turn to "10" on handwheel = 6 deg
- Then turn 4 more minor marks = 6.4 deg
- The minor mark will be lined up with the 10 mark on the Vernier scale.
- Keep turning until one of the handwheel marks lines up with the 2 mark on the Vernier scale. = 6.42 deg

For a more detailed description of how a Vernier scale works, see

 http://en.wikipedia.org/wiki/Vernier_scale.

—Matthew Springer

Here is the printed Vernier scale cut out, installed behind the handwheel and taped to the worm housing. The "10" mark on the scale lines up with the witness mark on the worm housing.

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