## READING THE CENTER OF GRADUATIONS WHEN USING A MICROSCOPE

The microscope furnished with the length bench has a reticle on which each graduation represents 0.002 inch. The difference in length between two tapes is measured from the center of the graduations of interest. The tape should be placed on the length bench such that the reading edge of the tape partially covers the graduations marked on the length bench. Place the microscope so that both the edges of the tape and the edge of the bench graduations are in the field-of-vision of the microscope and within reading range of the graduated reticle. Position the microscope so that part of the graduations on the reticle overlap the bottom portion of the graduation on the tape and part overlaps the graduation on the length bench. This setting is illustrated below. Do not move the microscope once the comparison between X and S has begun.
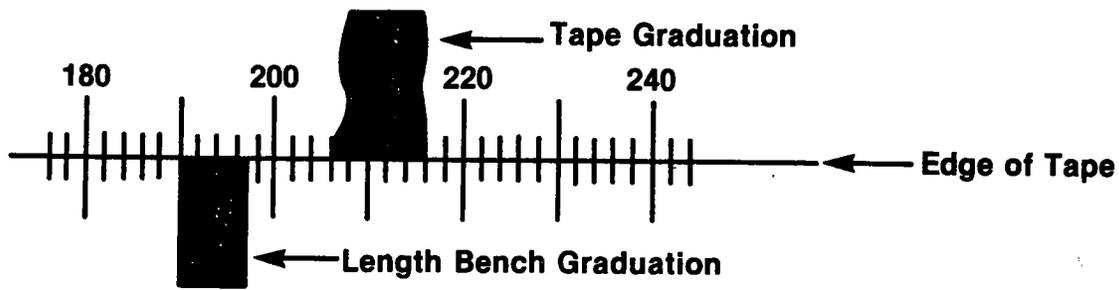
Determine the center of a graduation by first determining the width of the graduation, dividing the width by two and adding this value to the reticle reading for the left edge of the graduation. In the illustration above, let the length bench be the standard, S, and the tape be the unknown, X. The left edge of the tape graduation is at 206 (0.206 inch); the right edge is at 216 (0.216 inch). The width of the graduation is 0.010 inch. Adding half this value to 206 gives the center of the graduation at 211. Following the same procedure for the length bench graduation shows the left edge of the graduation at 190 and the right edge at 197. The center of the graduation is 193.5. The difference between the two tapes is 211 - 193.5 which is 0.0175 inch. Since X is longer than S, d is positive. Using the equation X - S = d,

$$X - S = 0.0175 \text{ inch.}$$
$$\text{or}$$
$$X = S + 0.0175 \text{ inch.}$$

If it is necessary to calibrate a rigid rule to the ends of the rule, the edge of ends of the rule are reference points for the measurement. In these cases, there will be only a single value read from the microscope reticle for each end of the rule since the center of the graduation is assumed to be the end of the rules.