FILAR MICROMETER EYEPIECES

CATALOG NUMBERS
424B AND 424C (ENGLISH)
426B AND 426C (METRIC)

REFERENCE MANUAL

AMERICAN OPTICAL
CORPORATION
SCIENTIFIC INSTRUMENT DIVISION • BUFFALO, N.Y. 14215

INTRODUCTION

No. 424 and No. 426 10X Filar Micrometer Eyepieces (figure 1) are measuring instruments that permit accurate specimen linear measurements when used in conjunction with a microscope. The No. 424 incorporates an English scale and the No. 426 a Metric scale.

Accuracy of the Micrometer Eyepiece greatly exceeds that of a simple micrometer scale because of the inclusion of a graduated micrometer drum (figure 1) which moves a fiducial line precisely one reticle scale division for each revolution. The uppermost knurled thumbscrew of the Micrometer Eyepiece (figure 1) provides the added convenience of a reticle scale zero setting control for speed of measurements. The lower knurled thumbscrew is used to affix the eyepiece to the microscope. Focusing onto the reticle scale is provided by a focusable eyelens with a spiral collar.

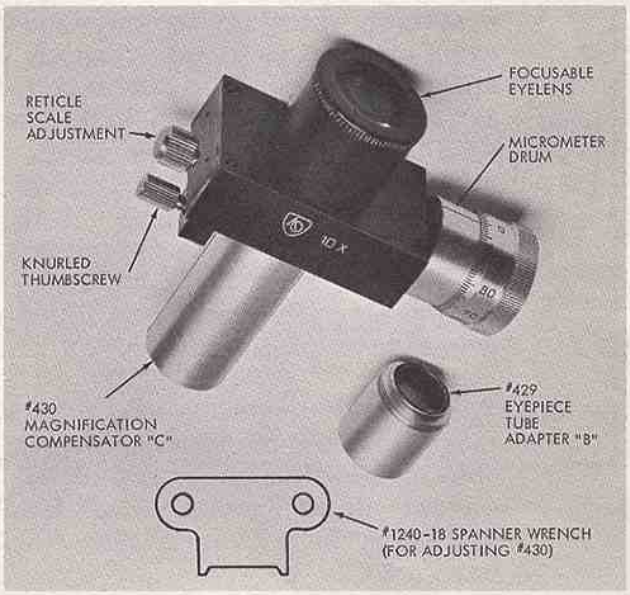

Fig. 1

Both Micrometer Eyepieces are available with a No. 430 Magnification Compensator "C" or No. 429 Eyepiece Tube Adapter "B". The No. 430 Magnification Compensator is designed for use on the AO Series 10 Microstar Microscope and permits calibrating microscope objective magnification at even values to simplify direct measurements. The No. 429 plain Eyepiece Tube Adapter provides for conventional use of the Micrometer Eyepiece on any microscope.

USE

Basically, the method for reading the scale of either the English or Metric Micrometer Eyepiece is the same. Each graduation of the reticle scale represents one revolution of the graduated drum and constitutes the first digit of the measurement. The remaining two digits are read from the graduated drum and represent the position of the fiducial line between two graduations of the reticle scale. Following is a general procedure for taking readings and is applicable to either micrometer eyepiece.

1. Remove the conventional eyepiece from the microscope.

2. Insert the micrometer eyepiece

assembly into the fixed eyetube of the microscope and tighten the knurled thumbscrew (figure 1).

3. Adjust the focusable eyelens to focus the eyepiece sharply onto its reticle scale.

4. Position the reticle scale by means of the reticle scale adjustment so that "0", or any convenient graduation, of the reticle is lined up with the left side of the image of the specimen to be measured. See figure 2.

5. Turn micrometer drum until the fiducial line coincides with the right side of the specimen.

6. Take the specimen reading as follows:

   a. Record the number of full reticle spaces the specimen covers. For example, 2 spaces as shown in figure 2.

   b. Record the drum reading composed of two digits between 00 and 99. For example, 32 as shown in figure 2. Add this suffix to the reticle graduation recorded above to complete the reading which is 232 as shown in figure 2.

7. This reading is used to compute the actual specimen size as explained below.

CALIBRATION WITH NO. 430 MAGNIFICATION COMPENSATOR

The No. 430 magnification compensator can be adjusted so as to take direct measurements for most objective magnifications used on the Series 10 microscope.

1. Install the micrometer eyepiece assembly with the No. 430 magnification compensator on the microscope as explained previously and focus on a stage micrometer.

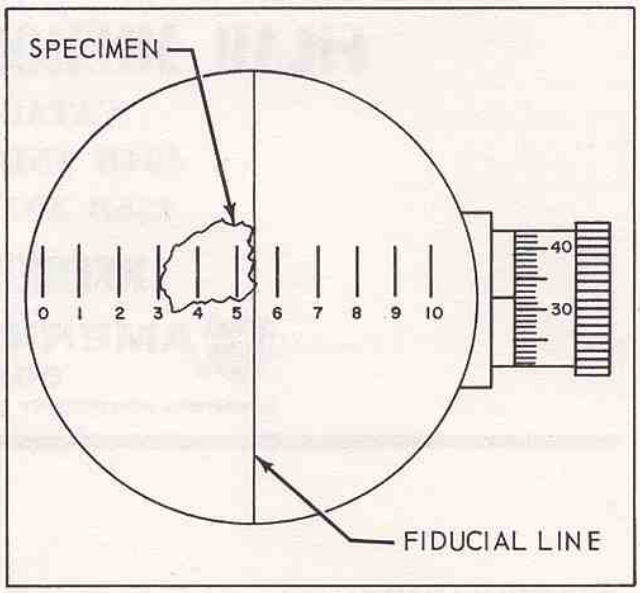

Fig. 2

2. Move the stage micrometer until one of the even graduations corresponds with one of the divisions of the micrometer reticle (figure 3). This is determined by the magnification used. For example: A 10X objective should magnify the stage micrometer so that the one millimeter graduation corresponds to the ten millimeter graduation on the micrometer eyepiece reticle. If they do not correspond exactly, compensation of magnification should be made.

3. Adjust the magnification of the optical system by removing the micrometer eyepiece, and using the supplied spanner wrench, turn the magnification compensator adjustable lens until the determined stage micrometer and micrometer reticle graduations correspond exactly. If the stage micrometer is shorter than the micrometer reticle scale, increase magnification. If it is longer, decrease magnification.

4. To increase magnification, turn the magnification compensator adjustable lens counterclockwise (ccw). Conversely to decrease magnification, turn the adjustable lens clockwise (cw).

5. Continue the adjustments of step 4 until the two scales are exactly coincident.

You are now calibrated to take direct measurements. When other objectives are used calibration must be repeated. When calibrating an English scale micrometer eyepiece with a metric stage micrometer, conversion to the same measuring system is necessary.

No. 424 Micrometer Eyepiece - English Scale

The reticle scale on the No. 424 Micrometer Eyepiece is 0.4 inch long and is subdivided into eight equal increments of .05 inch each. Since the graduated micrometer drum has 100 increments, each of these increments is equal to .0005 inch each. If the No. 430 Magnification Compensator is used and adjusted to precisely a 5X magnification objective, each reticle scale division is equal to .01 inch and each micrometer drum division to .0001 inch. With a 50X magnification objective, the comparable values are .001 inch and .00001 inch.

No. 426 Micrometer Eyepiece - Metric Scale

The reticle scale on the No. 426 Micrometer Eyepiece is 10 mm long and is divided into 10 equal parts of 1 mm each. The micrometer drum (figure 1) moves the fiducial line 1 scale division for each complete revolution. Since the drum is subdivided into 100 divisions, each drum division equals .01 mm or 10 u (microns). If the No. 430 Magnification Compensator is used and adjusted to precisely a 10X magnification objective, each reticle scale division is equal to 0.1 mm and each drum increment .001 mm or 1.0 u. Accordingly, with a 100X objective, the comparable values would be 0.01 mm and 0.1 u.

CALIBRATION WITH NO. 429 EYEPIECE TUBE ADAPTER

The values of the Micrometer Eyepiece measurements vary with the optical combination used, and consequently should be pre-calibrated before accurate measurements can be made.

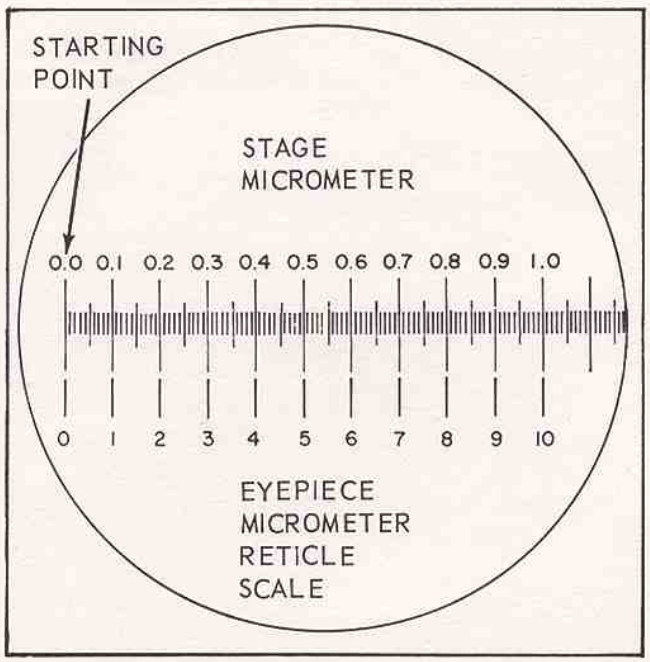

Fig. 3

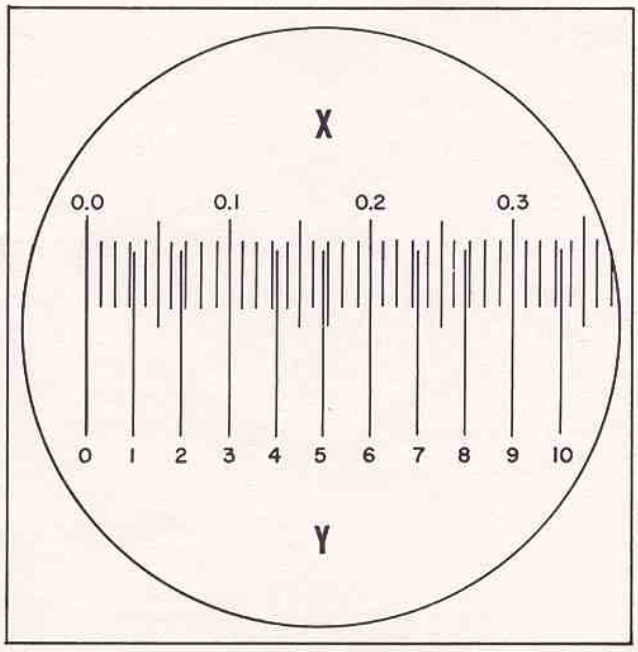

Fig. 4

1. Install the Micrometer Eyepiece with the No. 429 tube adapter on the microscope and focus on a stage micrometer.

2. Move the stage micrometer until one of the graduations corresponds exactly with one of the divisions of the micrometer reticle (figure 4).

3. Divide the true distance (X) seen on the stage micrometer by the number of divisions (Y) measured on the micrometer eyepiece (C = X/Y).

4. When taking measurements the number of divisions covered by the specimen multiplied by the calibration constant (C) gives the length of the specimen.

CLEANING

1. Clean all surfaces with a soft, lint-free cloth moistened with an approved solvent.

2. Use a soft, lint-free cloth or lens tissue moistened with xylene or alcohol to clean the eyepiece lenses.

3. Clean the inner lens on the compensating tube adapter with a toothpick covered with cotton at the tip, or a small Q-tip, moistened with xylene or alcohol.