

INTERFERENCE MICROSCOPE OBJECTIVE

CAT. NO. 33-16-02

REFERENCE MANUAL



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The Interference Microscope Objective is a precision built accessory for determining the surface quality of polished materials by the formation of an interference pattern between the test surface and a test glass set close to the surface. Basically, it is a 16mm microscope objective with the addition of a small glass test plate, used with a vertical illuminator and a special filter. The test plate, when brought into contact with the specimen to be tested, forms an interference pattern which is seen in the microscope superimposed on the image of the specimen. This pattern is virtually a contour map of the surface of the specimen. Proper interpretation of the pattern provides both a qualitative and a quantitative evaluation of the surface contour.

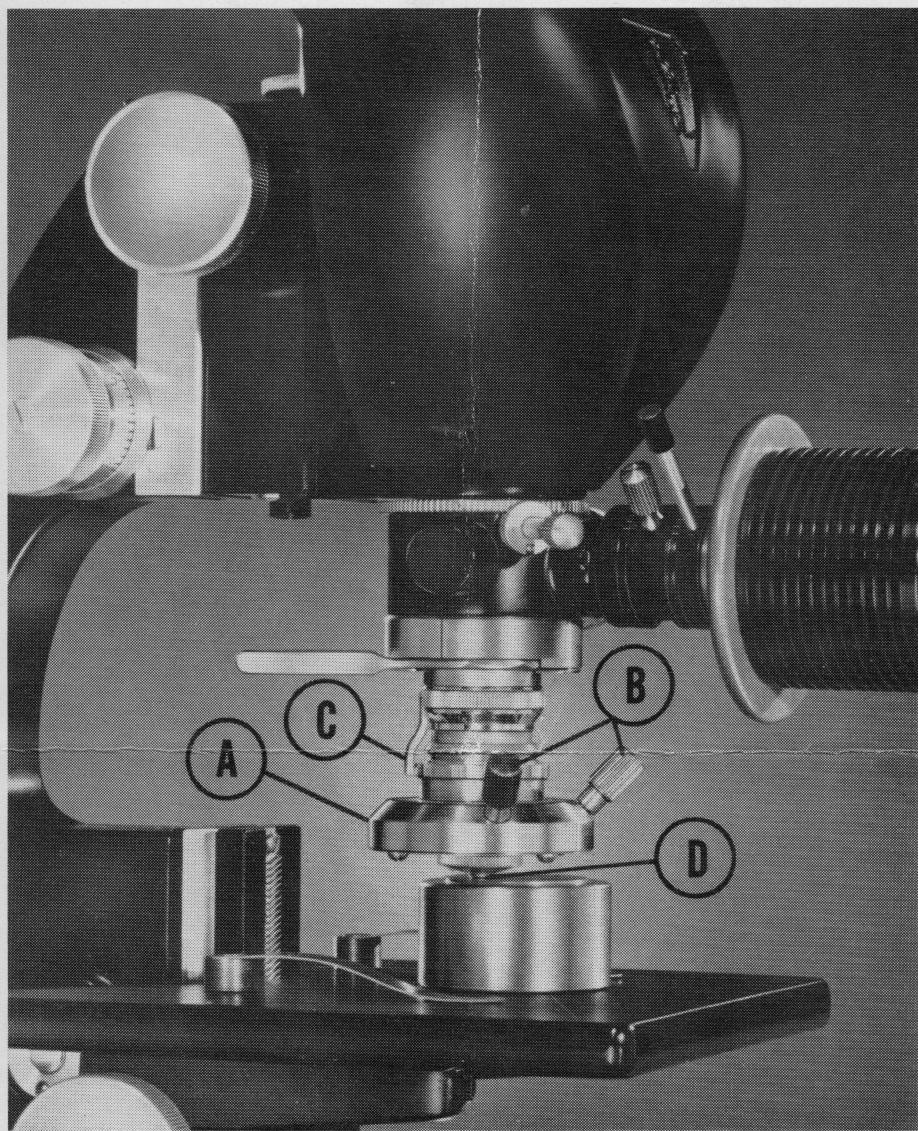
Two test plates are provided; one is coated with 20% reflecting inconel and one with 10% reflecting inconel to provide for best fringes with specimens of different reflectivities. For highly reflecting surfaces, the 20% test plate should be used.

Setting up the Instrument

Thread the Interference Microscope Objective into the vertical illuminator nosepiece or objective handle in the same manner as an ordinary objective and place on the microscope in the usual manner. Place the special interference filter in the filter mount of the

vertical illuminator. Figure 1 shows the Interference Microscope Objective on a CM microscope. Holding the sliding sleeve (A) in its uppermost position, rotate it until the thumbscrews (B) are in a convenient operating position. Allow the sleeve to move downward slightly until it is supported by engagement of the guide arm (C) with one of the raised bands of the sleeve. Place a specimen on the stage of the microscope. The specimen and the test plate (D) must be clean and free of small particles of dust for proper results. The test plate should be cleaned only with a piece of lens tissue, or other soft material to avoid scratching its coated surface. Position the specimen so that its surface is parallel to the surface of the microscope stage. By means of the thumbscrews, adjust the test plate so its surface is also approximately parallel to the surface of the stage.

With the sleeve in its "up" position, focus the microscope on the specimen in the usual way. Locate the portion of the specimen that is to be tested. Then close down the aperture diaphragm of the vertical illuminator to a very small aperture. Rotate the sleeve slightly until the guide arm is free to pass through one of the slots and then lower the sleeve gently until contact is made between the test plate and the specimen surface. If the test plate and the surface of the specimen are ap-



B&L INTERFERENCE MICROSCOPE OBJECTIVE

- A—SLIDING SLEEVE
- B—THUMBSCREWS
- C—GUIDE ARM
- D—TEST PLATE

($\frac{1}{2}\text{w}$ 2780)

proximately parallel, fringes will appear in the field of view of the microscope. The size and orientation of the fringes can be adjusted by suitable rotation of the two thumbscrews. Avoid excessive downward pressure on the thumbscrews to prevent damage to the test plate.

If fringes do not appear in the field of view, it is probably because the surface of the test plate is not approximately parallel to the surface of the specimen or because there is some foreign matter between the two surfaces preventing them from coming close enough to each other to form the fringes.

Adjust the thumbscrews until there are from five to ten fringes in the field. If there is a definite direction to the surface scratches of the specimen, the fringes should be perpendicular to that direction.

If the fringes lack contrast, using the other test plate might improve them. To change a test plate, move the sleeve to its up position, raise the body tube by means of the coarse adjustment, unscrew the test plate mount and replace it with the other test plate.

Interpretation of the Fringe Pattern

If a perfectly flat and smooth specimen is used, the fringes will be regular and straight. Any gentle deviation from flatness will be shown as a curving of the fringes. Any abrupt deviation from smoothness such as a scratch will be shown as a sharp departure from the smooth straight fringe.

To measure the depth of a scratch, turn the fringes so they are perpendicular to the scratch. The fringe will seem to break at the scratch and run along the length of the scratch for some distance. The number of fringes this extends is a measure of the depth of the scratch. Going from one dark fringe to another is equivalent to a depth of 0.000011". *or, 27 μ*

The Interference Microscope Objective can be used for qualitative testing by setting up a standard of smoothness, taking an interference photograph of it, and then comparing other surfaces with that photograph.

Suggestions

All the necessary adjustments of the Interference Microscope Objective should be gentle, not only in order to preserve the surface of the test plate, but also to best control the fringes.

The test plate should not be brought into contact with rough metal surfaces. It is possible to obtain interference pattern only with surfaces that have some degree of polish.

The sleeve should be in its "up" position whenever the specimen is moved to prevent damaging the surface of the test plate.

Replacement of Test Plates

In use, the surface of the test plates will eventually become too scratched for good results. Replacement test plates can be ordered by the catalogue numbers listed.

$$\begin{aligned} (.000011" &= .27 \mu) \\ &= 10.6 \text{ μ} = \text{in} \\ &= 270 \text{ mμ} \\ &= 2700 \text{ Å} \end{aligned}$$