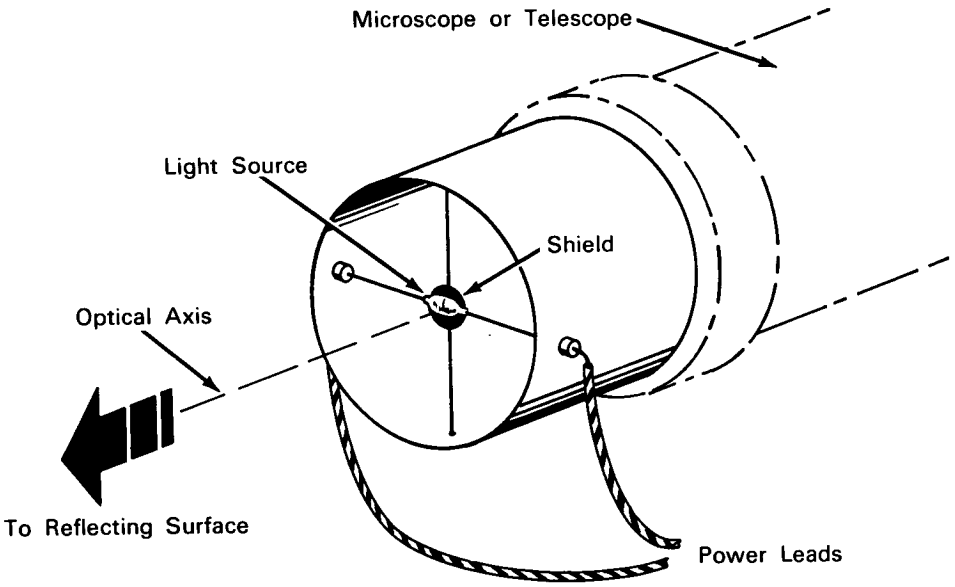
July 1964

Brief 64-10124

NASA TECH BRIEF

This NASA Tech Brief is issued by the Technology Utilization Division to acquaint industry with the technical content of an innovation derived from the space program.

Attachment Converts Microscope to Point Source Autocollimator



The problem: To provide a simple means of autocollimation without the use of expensive optical elements that require extensive calibration and alignment.

The solution: A low-power microscope or telescope fitted with a light source to permit alignment from a reflecting surface normal to the optic axis of the instrument.

How it's done: A very small tungsten-filament lamp is suspended by its wire power leads and centered by two orthogonally mounted wire supports within a rigid cylindrical frame. The frame is mounted on a telescope or microscope so that the lamp is centered, suspended in front of the objective lens on the optic axis. A small shield is suspended by the four wires on the lens side of the lamp to prevent the entry of direct light from the lamp into the optics. The power leads are connected through a switch to an appropriate power source.

The instrument may be used in two modes. In the first mode, the instrument is brought close to the reflecting surface so that it is focused on the reflected image of the light source. In this case the reflected image of the light source will appear as a small spot of light in the eyepiece. Adjusting the work until the small spot of light appears in the eyepiece to be centered in the reticle formed by the support wires aligns the work normal to the optic axis of the instrument. This mode is useful for aligning items that are smaller than the field of view of the instrument.

(continued overleaf)

In the second mode, the instrument is placed farther away from the reflecting surface so that the latter lies near or even beyond the focal plane. In this case the reflected light appears in the eyepiece as an out-of-focus point source, that is, a uniform circle of light. That portion of reflected light blocked by the light source and its supporting wires causes a well defined shadow within the circle of light and the observed image. This shadow is in the reticle configuration. Adjusting the work until the shadow and actual reticle are superimposed in the eyepiece aligns the work normal to the optic axis of the instrument. This second mode, because of its greater resolution, is preferable for aligning items larger than the field of view of the instrument.

Notes:

1. The instrument has been successfully used in the first mode for the alignment of small crystals prior to X-ray diffraction.
2. Experiments in the second mode using a microscope and glass plate demonstrated a precision and reproduction of alignment better than ±1 arc minute.
3. For further information about this innovation inquiries may be directed to:
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