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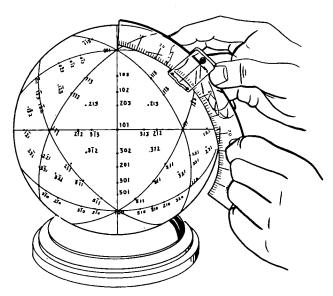
Brief 65-10065

## NASA TECH BRIEF



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Spherical Model Provides Visual Aid for Cubic Crystal Study



SPHERICAL PROJECTION OF A CUBIC LATTICE

**The problem**: Visualizing the crystallographic planes of crystals in the cubic system and interpreting the Laue X-ray diffraction patterns of single cubic crystals. A simple three-dimensional model that would serve as a visual aid for these purposes was desired.

**The solution:** An eight-inch transparent sphere of polymethylmethacrylate with all major zones and poles of a cubic crystal inscribed on its surface. A vernier protractor is used for making angular measurements.

**How it's done**: The sphere is machined from a laminated block of polymethylmethacrylate. Colored inks or paints are used to inscribe the major zones and spot all the poles usually associated with standard projections of the Laue patterns on the surface of the

sphere. The corresponding Miller index is marked alongside each spot representing a pole. The sphere is mounted on a felt-lined hardwood base which allows easy rotation to any desired orientation. Angular distances between any two pole positions are measured by means of a vernier protractor made to conform to the surface of the sphere.

The zone lines represent the geometric relations of the various crystallographic planes of the cubic system and aid in determining the orientation of all surfaces of a single crystal that is to be cut to a given shape when the orientation of one surface is known. The array of spots provides three-dimensional representations of the X-ray diffraction patterns that would be obtained if a single cubic crystal were irradiated while at the center of a spherical film.

(continued overleaf)

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## Notes:

- 1. This model should find application as an aid to students of crystallography and in the initial interpretation of fixed single-crystal X-ray diffraction patterns.
- 2. Other transparent plastics could be used for making the models. Large quantities could be inexpensively made by molding the plastic in the form of a hollow sphere.
- 3. Inquiries concerning this invention may be directed to:

Technology Utilization Officer Lewis Research Center 21000 Brookpark Road Cleveland, Ohio, 44135 Reference: B65-10065

**Patent status:** NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

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