to calibrate the probe detector at frequencies of the order of one or two hundred megacycles per second.

It is important that the perturbation produced in the strip-line by the device being calibrated should be small. This should not often present any serious difficulty, however, since the monitoring devices being developed will normally have a small measuring probe remote from the main indicating equipment.

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¹ "Safety Precautions Relating to Intense Radio-Frequency Radiation" (H.M.S.O., London, 1960).

² El-Kharadly, M. M. Z., *Proc. Inst. Elect. Eng.*, B, **102**, 17 (1955).

The 'Ballas' Form of Diamond

THE rare 'ballas' form of natural diamond is referred to occasionally in the literature. Ballas diamonds have been described by various authors as follows: (1) "Dense, globular aggregates of small, radially disposed diamond crystals"¹; (2) "... a very hard, tough, globular mass of diamond crystals radiating from a common center"²; (3) "... a rare form of natural diamond with radial symmetry composed of apparently spherically grown layers ..."³; (4) "Radial stalk-like formation of diamond crystals, or irregular growths of multiple crystals"⁴.

These descriptions allude to the idea that a ballas has some type of radial structure in its crystal arrangement. Recently, I examined a polished section of a ballas with the view of determining its structure, since I could not find a photograph of such a section or imagine precisely what sort of structure would fit the published descriptions. The section was made about 0.5 mm. from the centre of a 0.70-carat stone. After a polishing operation, the stone was etched in molten potassium nitrate for 1 hr. at 700°C. A photomicrograph of the polished surface at 30 × is shown in Fig. 1. Residual scratches from the sectioning step are still visible. The centre of the sphere lies about 0.5 mm. below the × marked on the photograph.

Fig. 1. Polished and etched section of a ballas diamond. (× 30)

Surprisingly, the many crystals making up the ballas do not appear to have any radial geometry. Such geometry should be revealed on a chordal plane so close to the centre of the sphere. This information indicates that previous descriptions are not precise or that the ballas at hand is an unusual variation. Part of description (4) above seems applicable to the findings. The irregularity of the crystal boundaries is an unusual feature of the structure. I should be glad to have any further information on this subject.

Williams, in his classic "Genesis of the Diamond", has shown sections of 'hailstone' bort which seems to fit description (3) above. It seems that 'hailstone' bort and ballas should not be confused as the same types.

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¹ "Industrial Minerals and Rocks", A.I.M.E., third ed., 398 (1960).

² "Industrial Minerals and Rocks", A.I.M.E., third ed., 6 (1960).

³ Bovenkerk, H. P., "Some Observations on the Morphology and Physical Characteristics of Synthetic Diamond", advance papers, Conference on Very High Pressure, Sagamore Hotel, New York, June 1960, p. 6-5.

⁴ Grod/inski, Paul, "Diamond and Gem Stone Industrial Production", 234 (N.A.G. Press, Ltd., London, 1943).

Frictional Oscillations

It is generally considered^{1,2} that vibrations excited by friction are due to a variation of friction with velocity, μ decreasing with increasing velocity, and in some cases (unpublished work) this is so. Vibrations in sliding systems can, however, be excited by other mechanisms. Consider a rigid strut $O'P$ held in an elastic pivot O' which in turn is attached to another strut $O'O''$, the pivot O'' being stiffer than O' (Fig. 1).

Fig. 1

The surface AB is moving past P in the direction shown and the coefficient of friction of the tip P is μ . The force F at P is given by $F = \mu L / (1 - \mu \tan \theta)$; so if $\mu = \cot \theta$, F is very large and 'spragging' occurs, that is, there is no slip between P and the moving surface AB . P is therefore displaced elastically in the direction of motion and θ increased slightly. As AB continues to move the elastic moment at the pivot O' opposing further deflexion of $O'P$ eventually becomes so large that $PO'O''$ becomes equivalent to a rigid strut $O'P$, O'' becomes the pivot point and θ is reduced to θ' . F falls accordingly so that the elastic energy stored in O' takes over and tends to swing P off the surface and slip occurs. The strut $O'P$ is therefore set vibrating and the surface AB is subjected to a periodically varying tangential force, and if AB is of suitable dimensions and elastic properties it can be set oscillating. Provided they are suitably mounted, solid bodies can be made to vibrate by a similar mechanism to the system of struts.