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AN IMPROVEMENT TO A RADIOMETER FOR FIELD USE

by

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SUMMARY

The radiometer for field use described by McGuire and Wraight (1960) is liable to error owing to reflections from the bevelled edge of the aperture admitting the radiation, on to the mica window and from there on to the receiving element. The present note indicates how this error can be eliminated by blackening the bevel.

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A radiometer for field use was described in detail by McGuire and Wraight⁽¹⁾. Essentially it consisted of two gold discs enclosed in a cavity in a large chromium-plated brass block (Fig. 1). One disc (the receiver) was exposed behind a mica window to the radiation to be measured and the other disc was shielded from the radiation. The resulting temperature difference between the gold discs produced an e.m.f. in a chromel-constantan thermocouple. To reduce obscuration of the disc, the edge of the circular hole in the brass plate separating the window and exposed disc was bevelled. The outer cover plate and the bevel were originally chromium plated in order to reduce heating by radiation. The angle of the bevel was such that radiation was reflected from it on to the gold disc when the incident radiation made an angle of more than 36 degrees with the normal to the window (Fig. 1) and this has restricted the use of the radiometer.

It has now been found that radiation may be reflected from the polished bevel on to the mica window and back on to the receiver (Fig. 1). This can occur with radiation making an angle of up to 40 degrees with the normal to the window, but the increase in the radiation falling on the receiver is greatest when the angle with the normal is small. The sensitivity can vary by as much as 25 per cent depending on the position of the radiometer relative to the source.

The reflection can be eliminated by coating the bevel of the radiometer first with black lacquer and then with a layer of candle black. This reduces the sensitivity which however is then nearly independent of the position of the radiometer with respect to the source of radiation. The modified instrument may be used to measure radiation making an angle of up to 60 degrees with the normal to the receiver. At larger angles the receiver is partly obscured by the edge of the outer cover.

Reference

- (1) McGUIRE, J. H. and WRAIGHT, H. 1960. J.Sci. Instrum., 37 128.

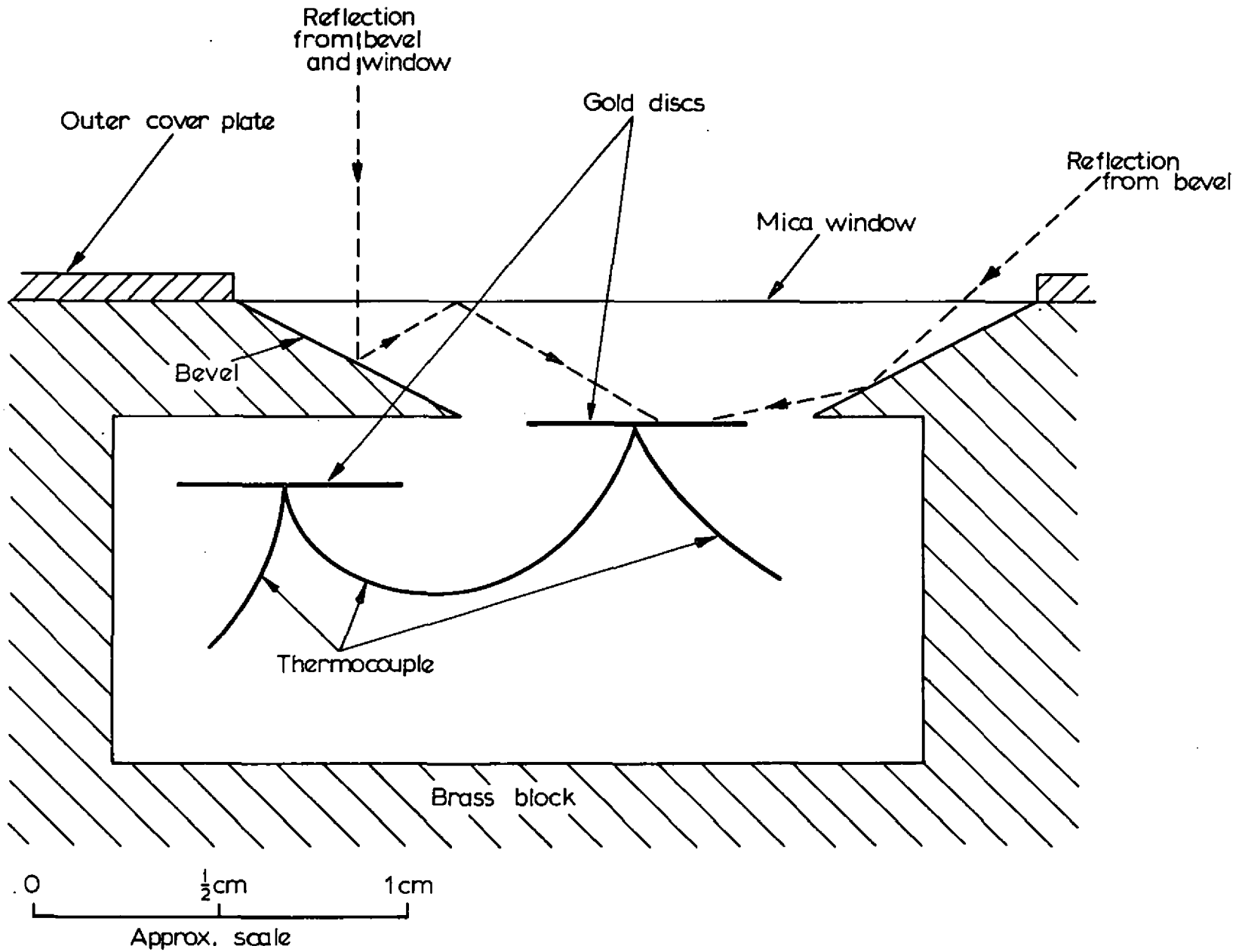


FIG.1. SECTION THROUGH CAVITY IN RADIOMETER