COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS

RECORDS:

1965/71

AN EARTHQUAKE ALARM

by

N.O. Myers

AN EARTHQUAKE ALARM

by

N.O. Myers

Records 1965/71

AN EARTHQUAKE ALARM

by

N.O. Myers*

Records 1965/71

INTRODUCTION

A self contained earthquake alarm providing audible indications of local seismic events of relatively high amplitude motion has been developed at the Vulcanological Observatory, Rabaul. It has proved a useful accessory to Observatory equipment because:

(a) Warning will alert an observer who can then watch the arrival of the seismic waves on visual recorders.

(b) Warning occurring when photographic records are being changed will alert attendant staff who can then postpone operations until activity has ceased.

DESCRIPTION OF EQUIPMENT

The unit consists of:-

(a) Light source
(b) Torsion seismometer
(c) Photo-electric transducer
(d) Switching unit
(e) Bell
(f) Monitors

The seismometer constants are:-

Period, To = 1.0 seconds

Static magnification of the light lever path, V = 40

Damping ratio, e = 10:1

A standard 6V 3W automobile lamp is used for the light source and two miniature germanium junction diodes serve as the transducer. The photo-diodes are moderately sensitive to the direction of light entering the cell. Therefore they may be used under normal artificial lighting conditions without interference. A diagram of this arrangement is shown in Figure 1. Magnetic damping of the seismometer is not shown.

---

* Technical Officer, Administration of Papua - New Guinea Vulcanological Observatory, Rabaul.

OPERATION

In the quiescent state, a light beam reflected from a mirror on the seismometer mass is brought into focus midway between the photo-diodes. When the seismometer mass is displaced by seismic waves, the light beam scans the diode apertures alternately for short periods, making them conduct, thus triggering the single stage switching circuit which operates the warning bell, and monitor pilot lamp. The lamp glows until relay B is restored manually. The monitor is a simple means of indicating operation of the alarm. A circuit diagram is shown on figure 2.

CONCLUSIONS

In practice, it has been found that the alarm is triggered by:-

(a) All felt earthquakes

(b) Many near earthquakes too small to be felt

(c) By high energy teleseisms

Because of the low magnification used there is no premature operation of the alarm caused by diurnal seismometer drift.

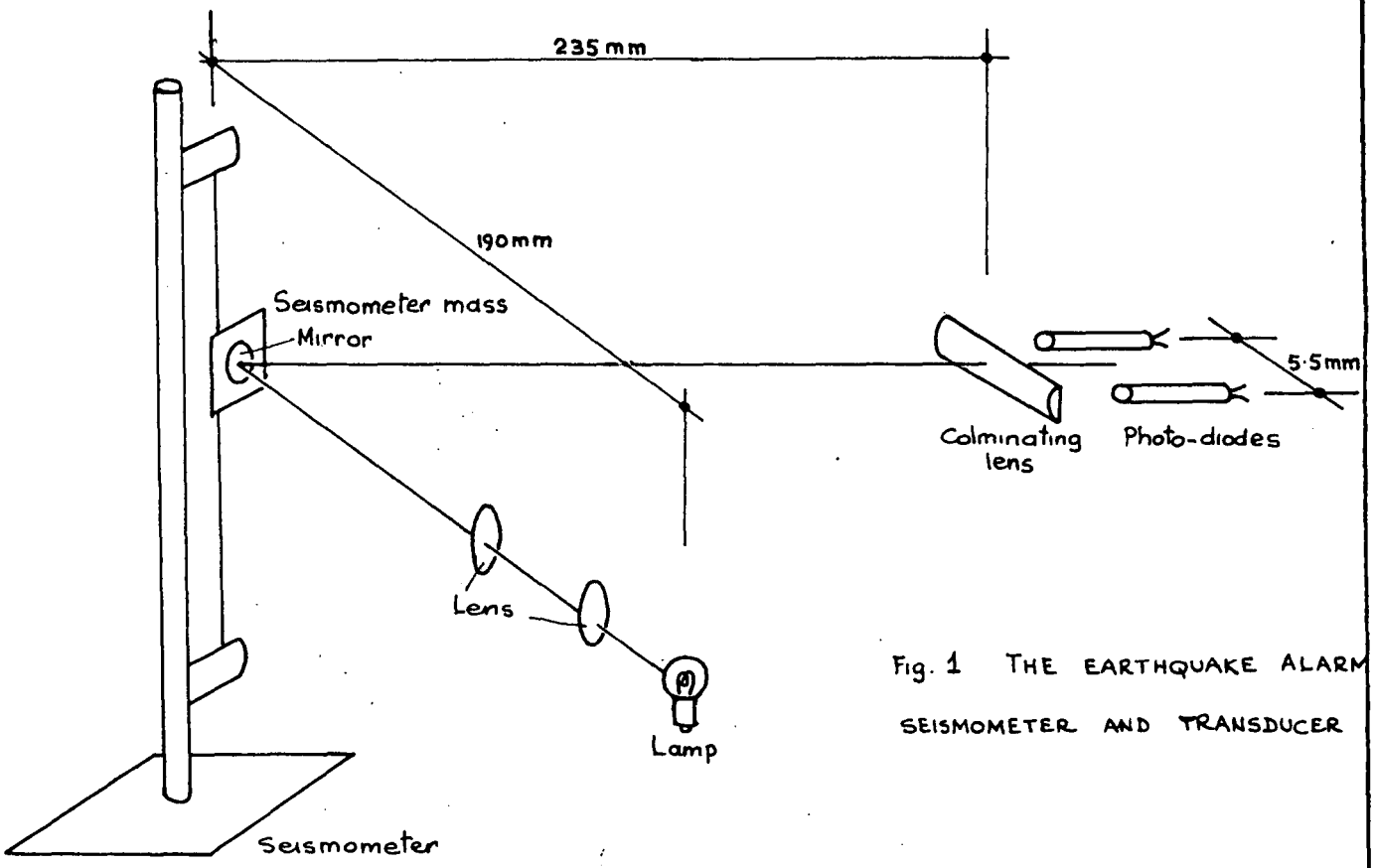

Fig. 1 THE EARTHQUAKE ALARM SEISMOMETER AND TRANSDUCER

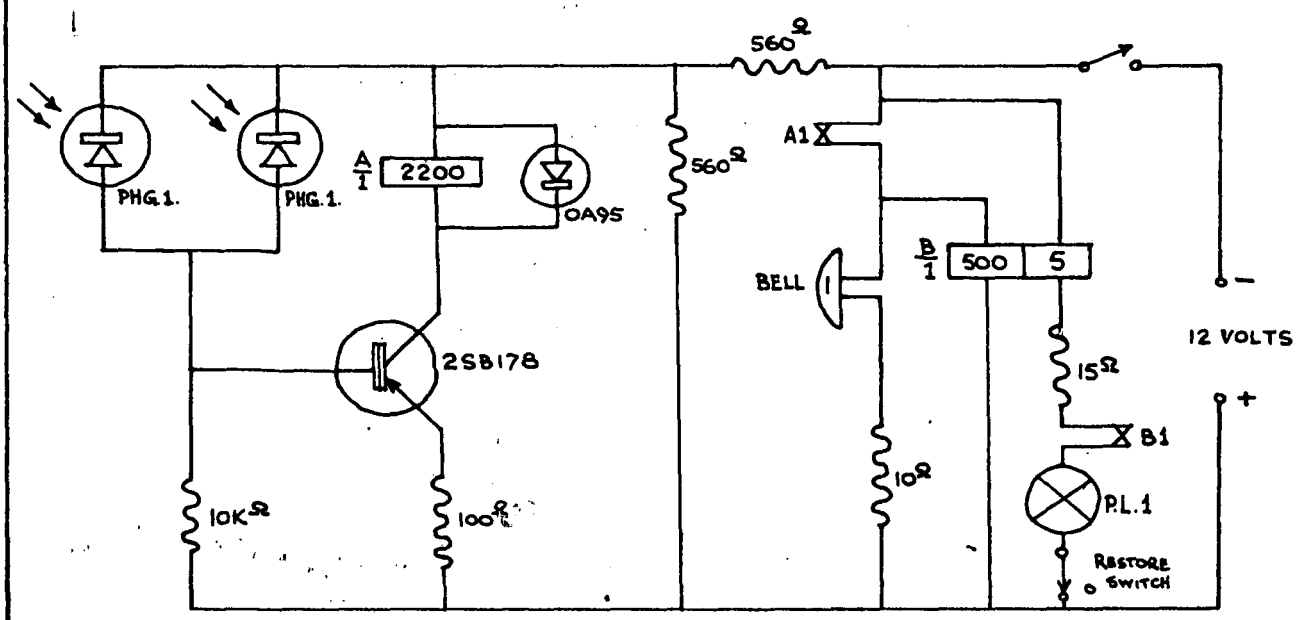

Fig. 2 EARTHQUAKE ALARM SWITCHING AND MONITORING CIRCUIT

C.D.B.

Bureau of Mineral Resources, Geology and Geophysics

To accompany Record 1965/71

B56/A2/36