

## A NOTE ON DIAGRAMS FROM SEISMOGRAPHS RECORDING VERTICAL MOTION.

BY F. OMORI.

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Horizontal Pendulum Seismographs have been subjected to most severe tests, and are well known to be perfectly trustworthy. Test diagrams for such instruments are given in Memoirs of the Science Department, University, Tokyo, No. 9, where it is proved that the so-called "steady point" of such a seismograph remains practically steady during ordinary earthquakes; and also in the Journal, Science College, Imperial University, Vol. I., where earthquake diagrams simultaneously obtained at the same station by two horizontal pendulums involving the same principle but somewhat different in details of construction are compared. Seismographs recording vertical motion have now also been in use for several years, but, as far as I am aware, they have not been tested severely, at least there is no such published record. The following test, though not strictly rigorous is, I think, sufficient for the testing purpose.

The vertical motion seismograph used in the testing was exactly of the form described by Prof. J. A. Ewing, in Memoirs of the Science Department University Tokio; No. 9. A stout board about 1 foot broad and 7 feet long was hinged at one end to the ground, and supported at the other end by a flat bent spring, the board being horizontal. At the supported end a vertical post was fixed to the board, and to this post the vertical motion seismograph was attached in the same way as for actual earthquake observation. Close to this and at the same height there was a lever similar to the multiplying pointer of the

Seismograph, whose point of support remained strictly at the same height. One end of this independent lever was attached to the post to which was fixed the seismograph, while the other end wrote, side by side with the pointer of the seismograph, on a revolving glass plate placed on the board. The vertical motion was communicated by slightly tapping the end of the board supported by the spring. In this way we can compare the diagrams given by the Seismograph with those given by the independent lever, the latter representing the actual motion. Specimens of the comparison diagrams are given in the accompanying plate. The tracings marked A were given by the Seismograph, and those marked B were given by the independent lever, the motion being in each case magnified about eight times. Some of the corresponding displacements are marked with the same letters. It should be noticed that the pointer and the lever, were placed side by side in such a way that their direction of motion, being parallel to one another, made equal angles on opposite sides of the radii drawn to them. This fact must be kept in mind in comparing the two sets of diagrams, which will then be seen to agree as close as we could expect.

The "steady point" of the machine would therefore probably be practically steady during ordinary earthquakes, and, perhaps, we may say that Vertical Motion Seismographs record motion with an accuracy equal to that of Horizontal Pendulums, giving thus trustworthy means for completely recording earthquake motion.

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*Test Diagrams for the Vertical Motion Seismograph.*

