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The Seismological Station of Helsinki University

By

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The seismological station of Helsinki University has been operating since 1924 (RENQVIST, 1926). The station is located in the basement of the Physics Department and is connected economically and administratively with it. All credits for the establishment of the station we must give to Prof. Henrik Renqvist who was in chaege of the station until 1937. His assistant was Prof. Risto Jurva, who later succeeded him as head of the station through 1945.

The university got the instruments for the station as a gift from Sohlberg's foundation (RENQVIST, 1926). At first the station had only two Mainka horizontal seismographs, but after a couple of years a Mainka vertical seismograph was set up. The instruments have mechanical recording systems with electromagnetic damping. The instrumental constants have been approximately:

TABLE 1

Instrument	M	To	V	v	Drum speed
N	730 kg	12 sec	140	3.5	20 mm/min
E	730 »	12 »	140	3.5	20 »
Z	300 »	3.5 »	70	2.0	17 »

The station operated regularly until the second world war. But, was stopped for some years, because the building of Physics Department suffered some damages by air bombardements. As the building and the station

after the war were under repair, it was thought to be a correct time to modernize the station itself.

The old masterclock which had been working rather poorly for years before the war was replaced with a new pendulum masterclock of Riefler type (Fig. 1) constructed in Finland by Lauri Helske. The clock has the

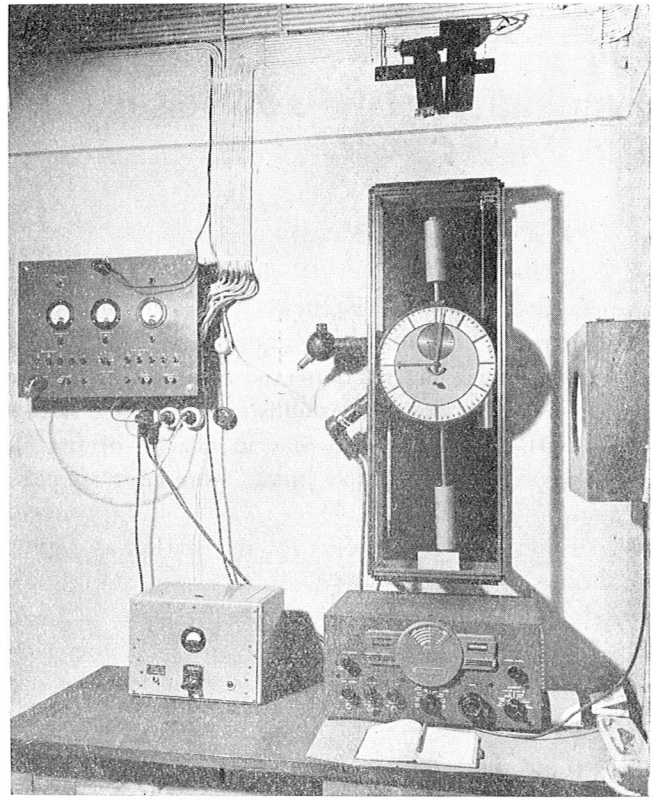

Fig. 1.

pendulum made by silver steel and is therefore, of course, more sensitive to temperature variations than an invar pendulum. However, it has been working very satisfactorily with maximum variations of only 0.2 sec. per day.

Some special arrangements are made for keeping the time correction always smaller than plus-minus 1 sec. so that very seldom it is necessary to take the correction into consideration. The clock has a pendulum of

special type, so-called minimum pendulum and it makes it possible to regulate the clock without stopping it. Such a pendulum is namely very sensitive to mass change of the upper part of pendulum and if a few milligram weights are put in the hollow existing on the upper pendulum mass the clock begins to slow up and if some weights are taken off it then begins increase its speed. Therefore, when necessary, it is very easy to keep the clock under micro regulation daily and in correct time.

This masterclock furnishes time marks of records of the seismographs. A light beam is the only connection between the clock and the time marking apparatus. On the left side of the clock case is a light source (Fig. 1). From here the light beam goes to the small balanced mirror on the axle of the second hand where it reflects every full minute to the photocell, existing immediately below the light source. This photocell works as the operator for an amplifying relay (left side on the desk, Fig. 1).

This time marking apparatus has been working since 1945 without any kind of trouble. Not even the photocell or the tubes of the amplifyer have been changed. The apparatus has been working very reliably giving impulses for the time mark relays exactly on the same point of the minute without any irregularity between the real time marks and the clock's running.

This modernized time marking system makes it possible for the Helsinki station to give more reliable seismological data than before.

An another photocell system is also connected with the masterclock of the station. A small mirror is mounted on top of the pendulum, and the light beam and photocell above the clock case (Fig. 1), with an amplifier, give second impulses for some special clocks in the Physics Department. It also gives impulses, if necessary, for some special laboratory work in the physics laboratories.

The old Mainka horizontal seismographs are still working. The recording system is changed only insofar that synchronous motors are moving the recording drums at present.

It was discovered that the sensitivity of the vertical seismograph was so low, thinking of present-days requirements, that it was necessary to supply the station with a new vertical instrument. A vertical seismograph of Galitzin type was planned, and it was constructed in the workshop of the Áhysics department. The new instrument was ready in January of 1950.

The new seismograph has some special constructive details, for instance, the hinge system (Fig. 2). Also the spring system and the magnets are

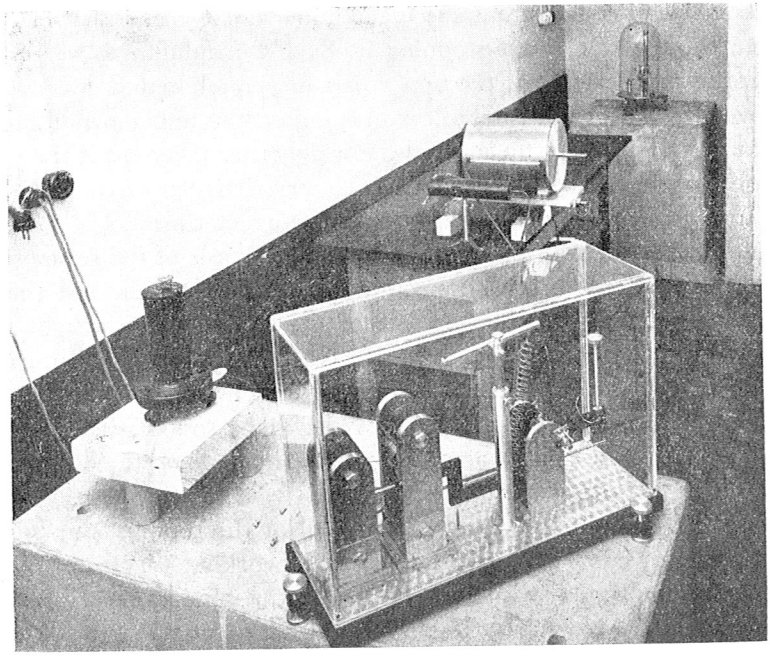

Fig. 2.

easily adjustable. The instrument has a period of 2.9 sec. and a static magnification about 4 000. It is used with a standard Leed & Northrup galvanometer.

The seismograph has been shown to be satisfactorily sensitive especially in picking up the first impulses. During the first experimental operation period the seismograph recorded very satisfactorily, among others, the following earthquakes (the P impulses in Fig. 3):

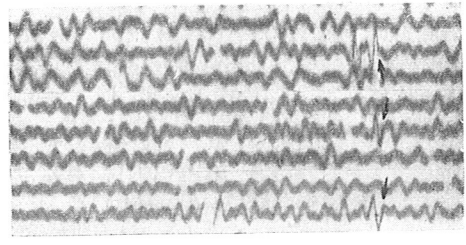

Fig. 3.

TABLE 2

Feb. 25	iP 05—55—23.5	B.C.I.S.	45 ½° N, 99° E,	H: 05—47—06
Mar. 02	iPKP 18—59—52.7	B.C.I.S.	59 ½° S, 34° W,	H: 18—39—47
Mar. 03	iPKP 11—03—21.9	B.C.I.S.	25° S. 177½° W,	H: 10—43—07

The recorder also has its special construction. It was made especially for the vertical instrument and is rather small in size. The recording drum is inside a cylinder and the construction of the recorder is illustrated in Fig. 4.

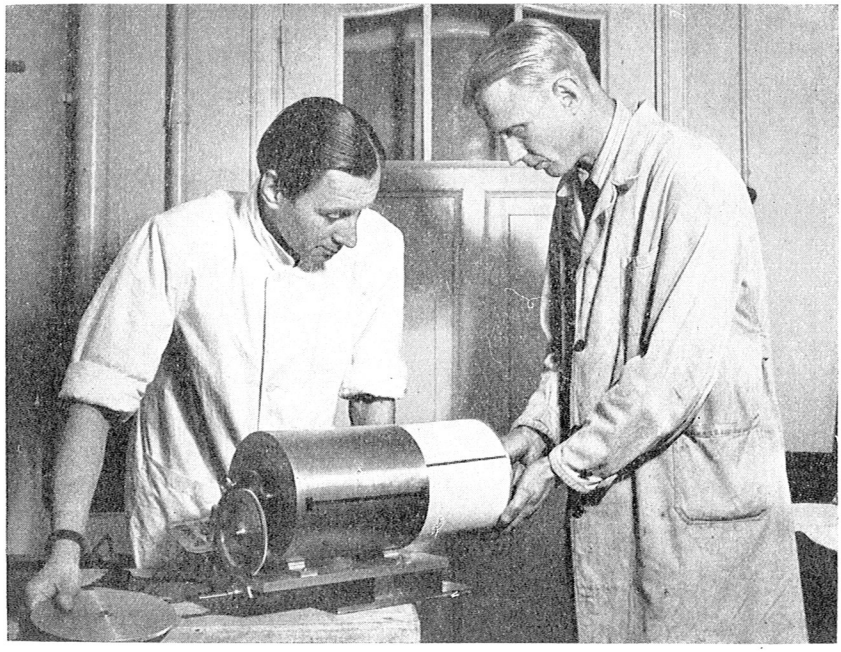

Fig. 4.

In the future the station also needs a couple of mote sensitive horizontal seismographs. One small torsion seismograph has already been constructed (in Fig. 2 the instrument is on the pillar at the back) and it has been operated satisfactorily. The seismograph is not working at present because the

recorder for the instrument is not yet ready. The instrument has some constructive specialities and will be completely explained later.

The first part of the modernizing program of the Helsinki station is completed. The reliability, of the station answers the present-days demands. This is of especial value, because the location of the station in regards to the most active earthquake zones is most advantageous.

REFERENCES

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