J.W 1-15-00

Report of the visit of G.A.Ediss and Dr. J.Hesler (UVA) to Prof. H. Fetterman (UCLA)

12-14 January 2000

The purpose of the visit was to evaluate the Specac FTS of Prof. H. Fetterman with the possibility of purchasing one for the ALMA project (in collaboration with UVA).

The system consists of a polarizing Michelson interferometer with 7 cm apertures, phase modulation, a mercury arc lamp and a 4K bolometer with a NEP of 1.3 * 10^-13. The original Specac software had been replaced with their own written in Labview. The whole interferometer in evacuable, and a sample chamber for transmission/reflection measurements, with an external switch is available, but was not used for the test measurements. The sample has to be inserted and removed by hand. All mirrors and the modulator are on a three point mounts which can be aligned , but the system is usually quite stable.

A long-wavelength cutoff filter, cut off 200 microns (30 cm-1) was used in the dewar (infrared labs). The moving mirror had a maximum scan of 5 cm, and the minimum step size is 5 microns. The zero path length is at the center of the scan. This can be changed with spacers. For this reason double sided scans were made.

Using 4.4 cm of travel and 25 micron steps, to obtain a resolution of 0.125 cm-1, a scan takes 1 hour 45 mins.

Several background scans were made with 1 cm travel and 25 micron steps, to obtain 100% lines (figures 1 and 2). These clearly show almost no power below 6 cm-1 and unrepeatable results below about 10 cm-1. Due to the long scan times the accuracy above 10 cm-1 is +/- 2% and this is probably set by the lamp stability over these long scans. Above 28 cm-1 the cutoff of the filter is clearly seen. Several attempts were made to measure a 5 cm-1 filter (Hesler) but no repeatable measurements could be made in this range (leakage of approximately 5% at 15 cm-1 was seen). Measurements of 20 mil thick Goretex is shown in figure 3, and 235 mil thick Goretex in figure 4.

Attempts to push the response to longer wavelengths were made (hot absorber source and pumping on the bolometer) but no improvement was seen (the pre-amp stopped operating as its operating temperature became to low).

How this all relates to a new Specac machine with 4 inch apertures and to a 2K bolometer with NEP of 10^-15 is not clear.

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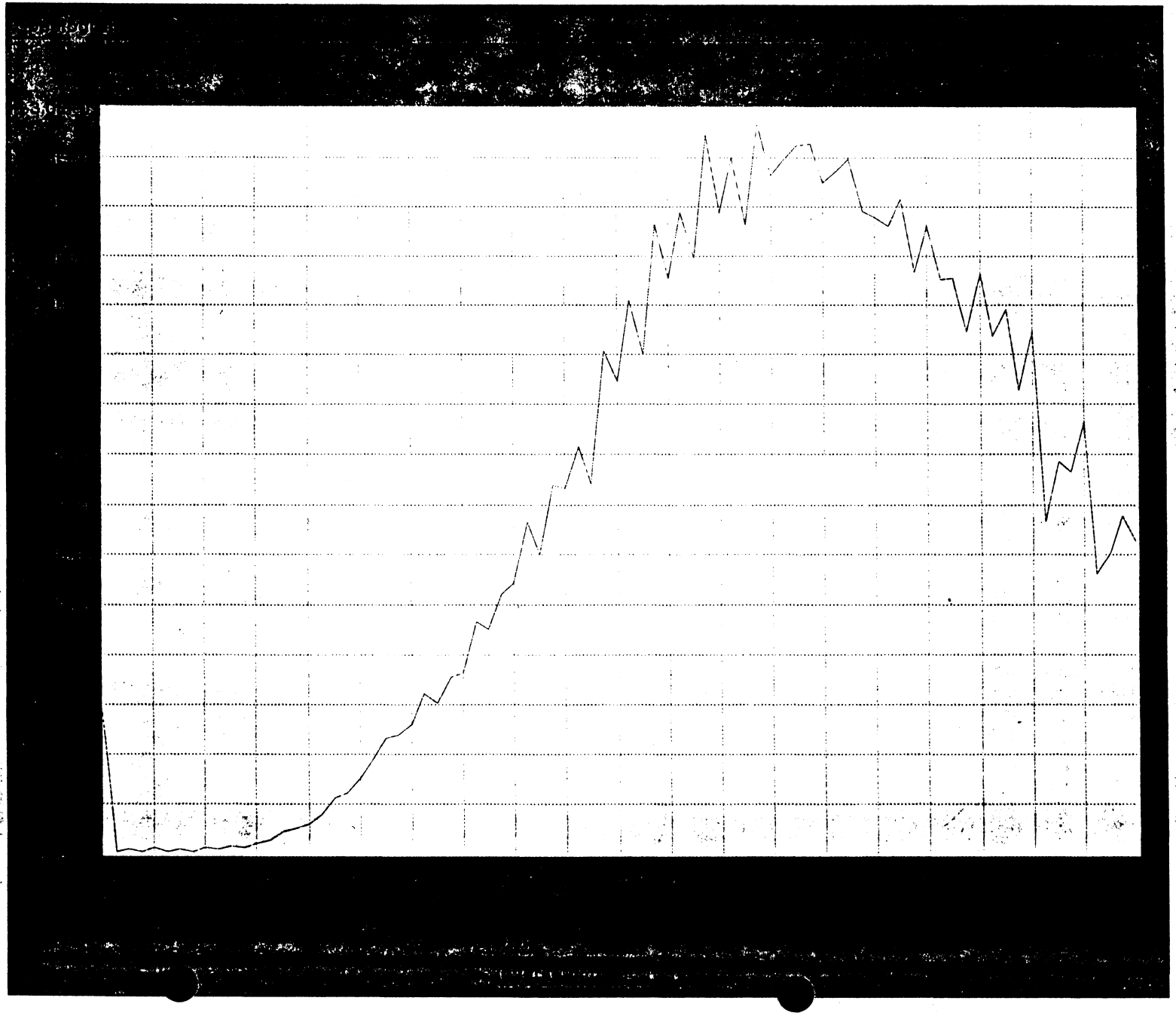

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Figure 1

Background

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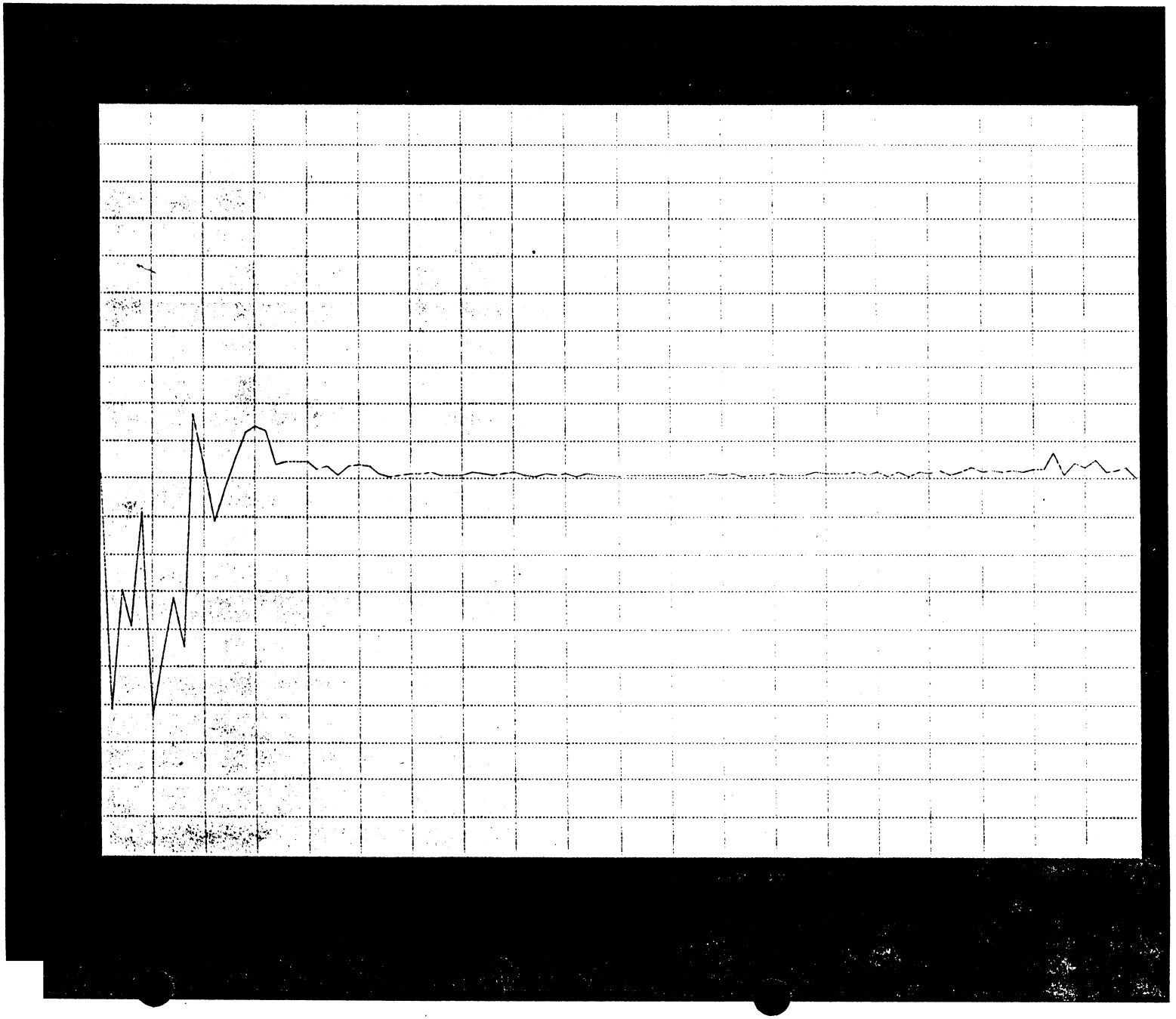

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Figure 2
100% line

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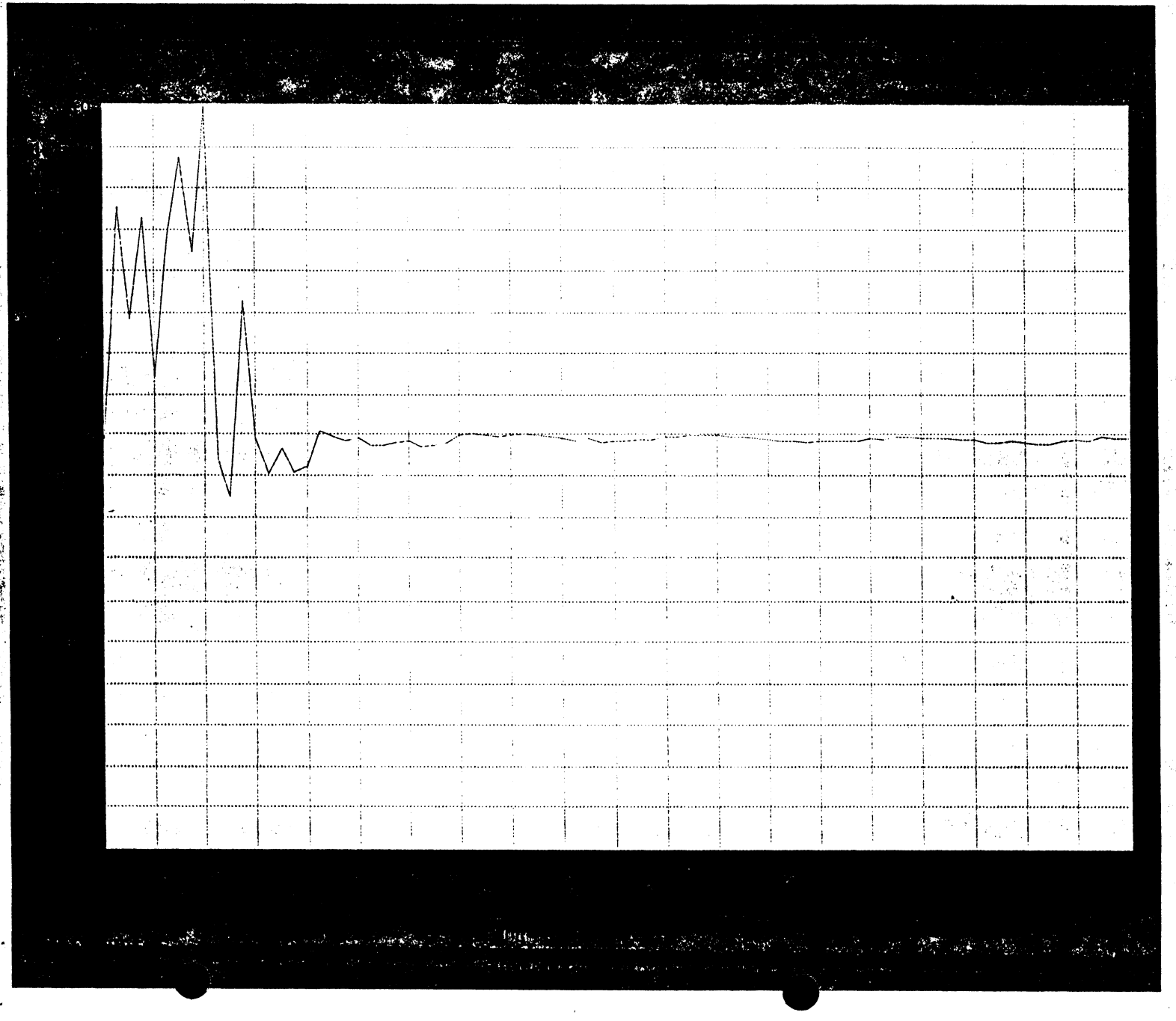

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Figure 3
25mil Gortex

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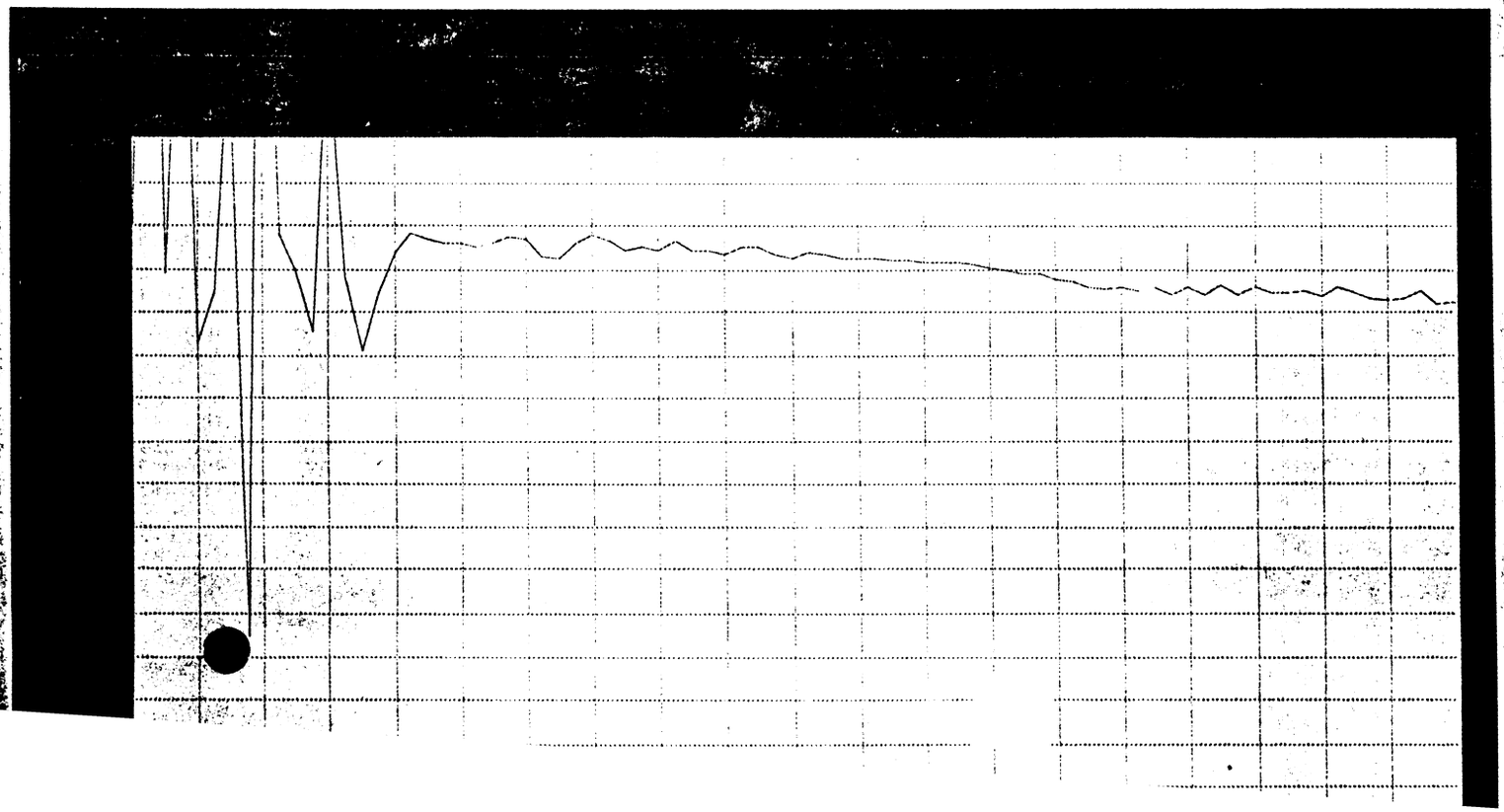

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