

SECTION 3

THE ESTIMATION OF THE HYDRAULIC CONDUCTIVITY OF PEAT AT

DUN MOSS

SECTION 3.1

The Auger Hole Method

3.1 (i) Procedure

The pressure bulb recording units adjacent to open wells provided an opportunity to investigate the auger hole method. The positions of these recorders are detailed on fig. (2.3.1.) and their operation is explained in section 2.3 (iv).

Three series of experiments were carried out in October 1968, December 1968 and April 1969. Each series consisted of one drawdown only at each of the ten positions. The subsequent recovery of the water levels was recorded on the disc charts, figs. (3.1 1, 2 and 3). The water was pumped out of the wells, using a double acting hand operated pump, and conducted to a point approximately eighty feet away from the well through a one inch dia. hose pipe.

3.1 (ii) The recovery record

The pattern of the recovery time relationship varied for the three experiments at each position, and it was clear that this was largely the result of the different initial depths of water in each well. Figs. (3.1.1)2 and 3) which were obtained from one position on two different dates support this conclusion.

A record of the recovery levels at appropriate times was abstracted from the charts, and these readings, marked as dashes on the charts shown, are presented in the tables in Appendix 5.

3.1 (iii) The analysis of the record

An equation developed by van Bavel and Kirkham (1948) was used in the analysis of the records, namely:-

$$K = -2.303 \frac{\pi a^2}{A} \tan \theta \quad 1.4.16$$

where a is the radius of the well, $\tan \theta$ is the slope of $\log_{10} h$ plotted against time (h being the difference of potential head between the water in the well and that in the surrounding soil) and A , the shape factor, is determined from the curves in their paper.

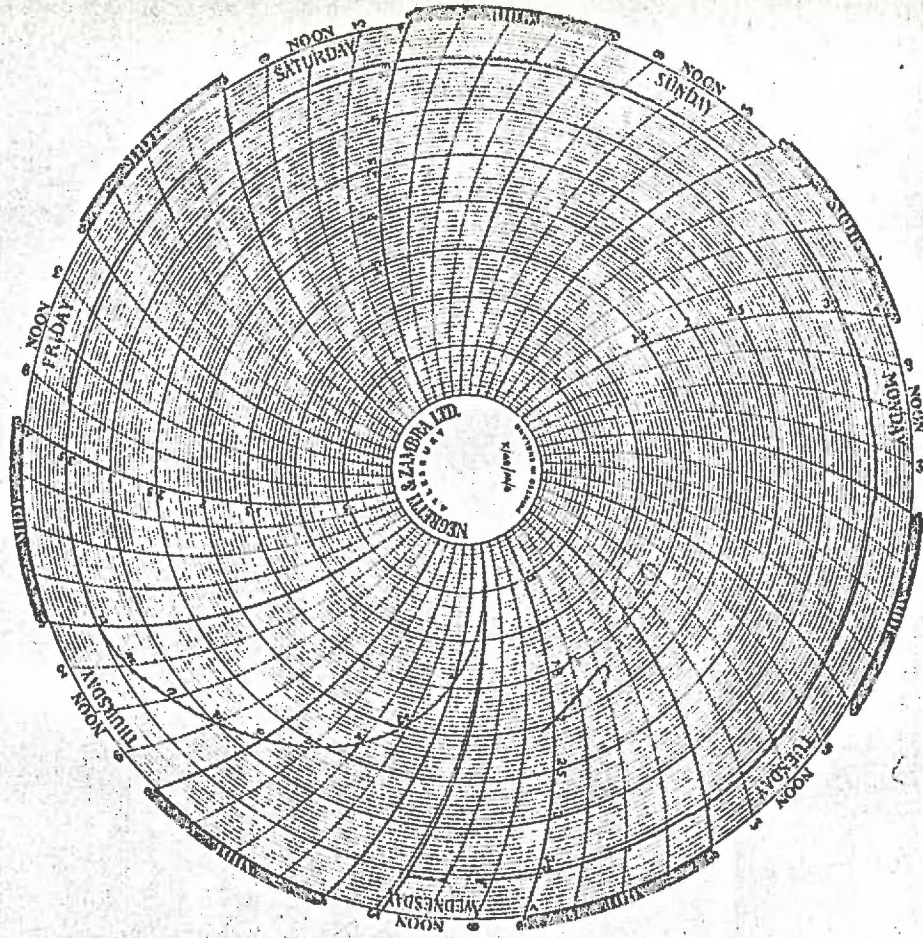


Fig. (3.1.1)

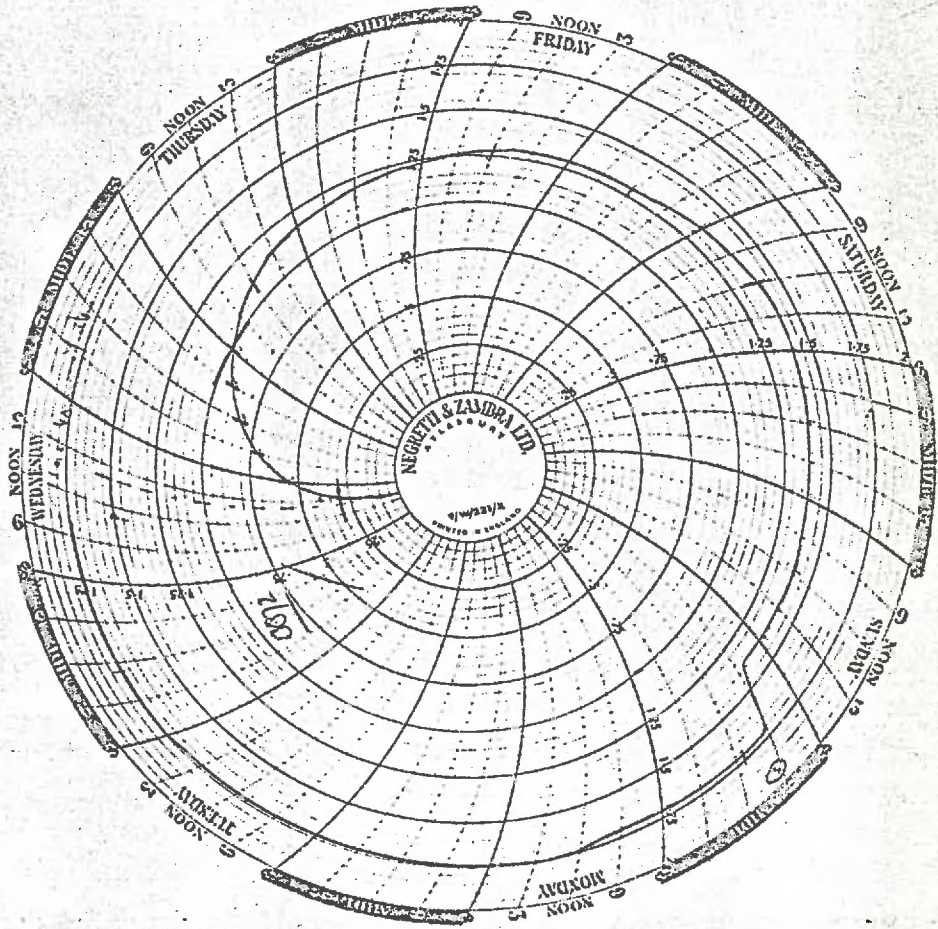


Fig. (3.1.2)

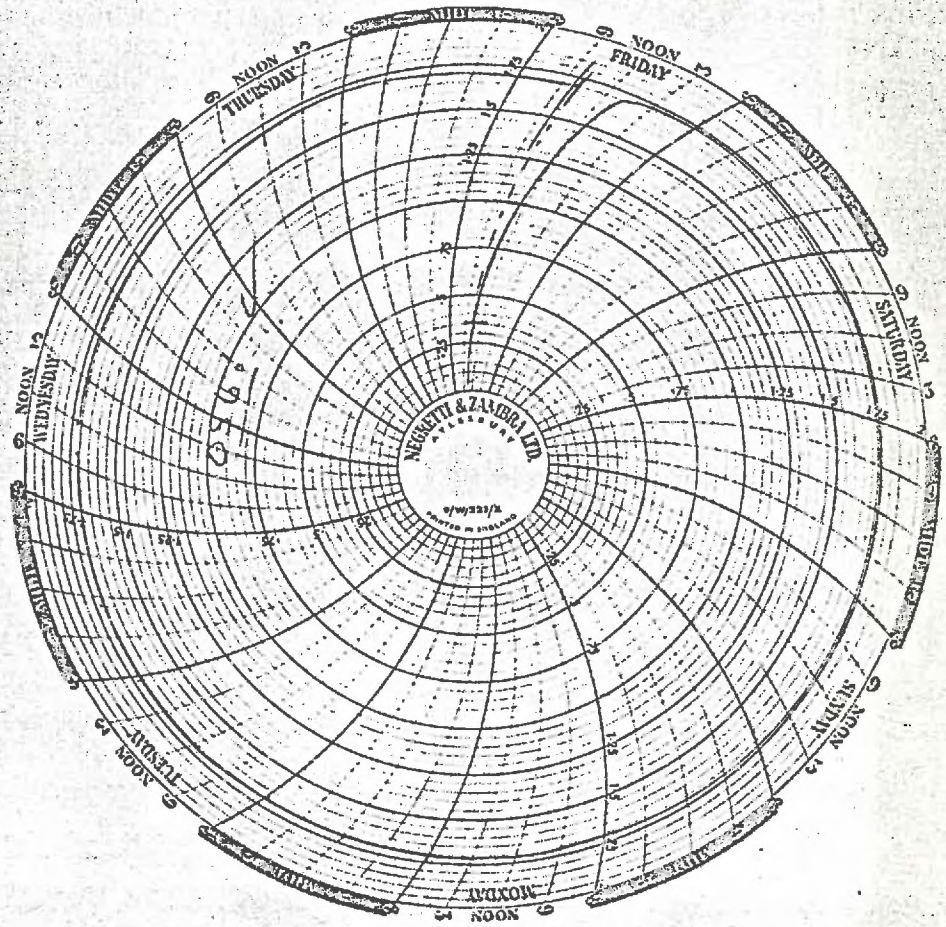


Fig. (3.1.3)

The error due to the variability of A (section 1.4 iii) is minimised as recommended by these authors, by restricting the analysis to the period during which

$$0.2d < d-h < 0.6d$$

where d is the depth of water standing in the well before drawdown.

Figs. (3.1.4 - 3.1.6) are typical curves of $\log_{10} h$ against time.

Fig. (3.1.4) relates to the chart shown on fig.(3.1.2) whilst the remaining two graphs relate to three experiments at one position.

It was observed that the plot did not produce one straight line, but rather a curve where the gradient diminished with time; therefore it followed that values of hydraulic conductivity computed from equation (3.4.16) also diminished with time. Values of apparent conductivity were computed from the equation in the absence of evidence to account for the variations. The difference in values computed between the first two points a and b on the curves and the last two points c and d are an index of the overall change of conductivity or other associated parameters. Table (3.1.1) is a record of the first apparent value K and the final value K' for the experiments. The recovery was, in a number of experiments, so abrupt that only one value of apparent conductivity was determinable and this is set out midway between the columns for K and K'

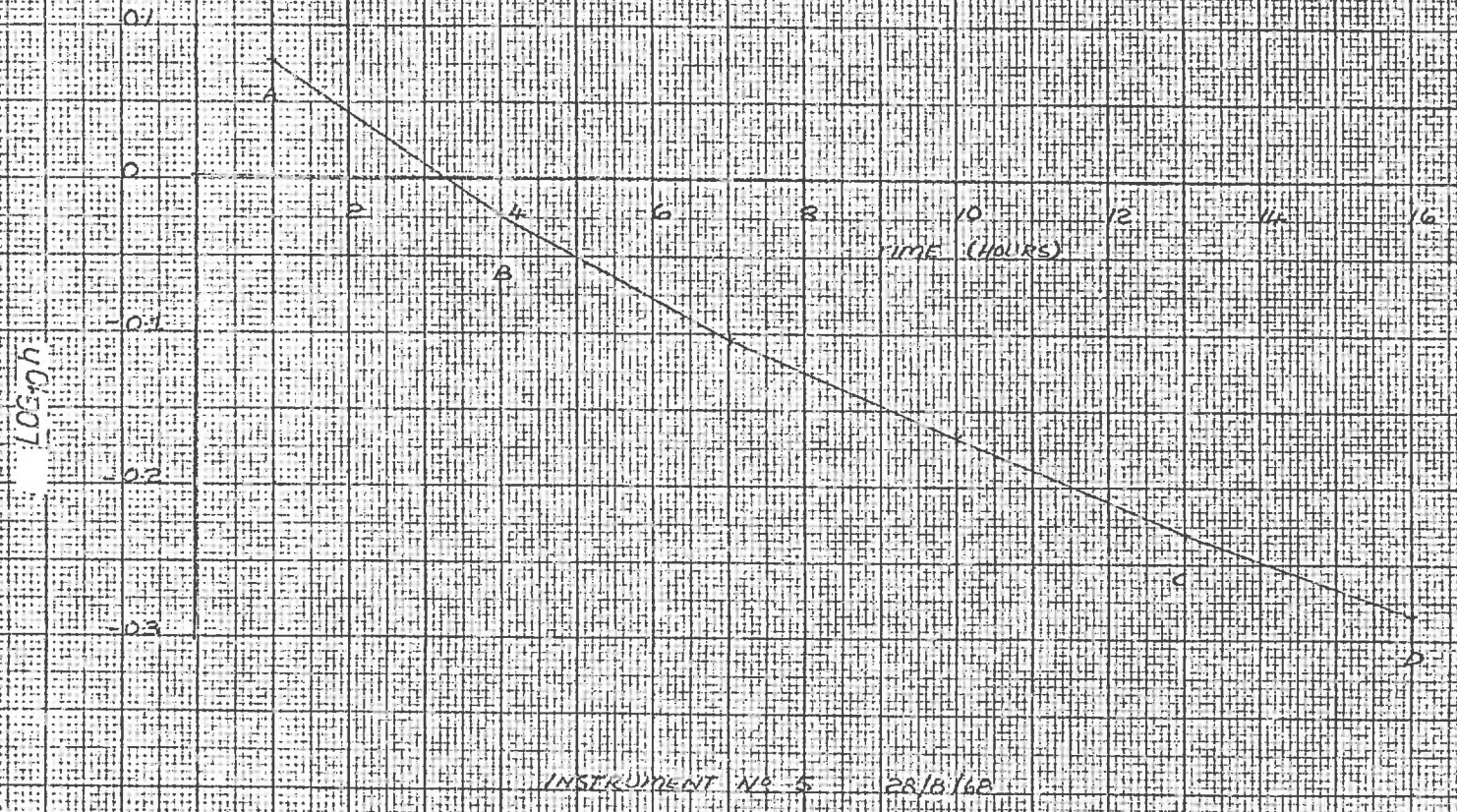
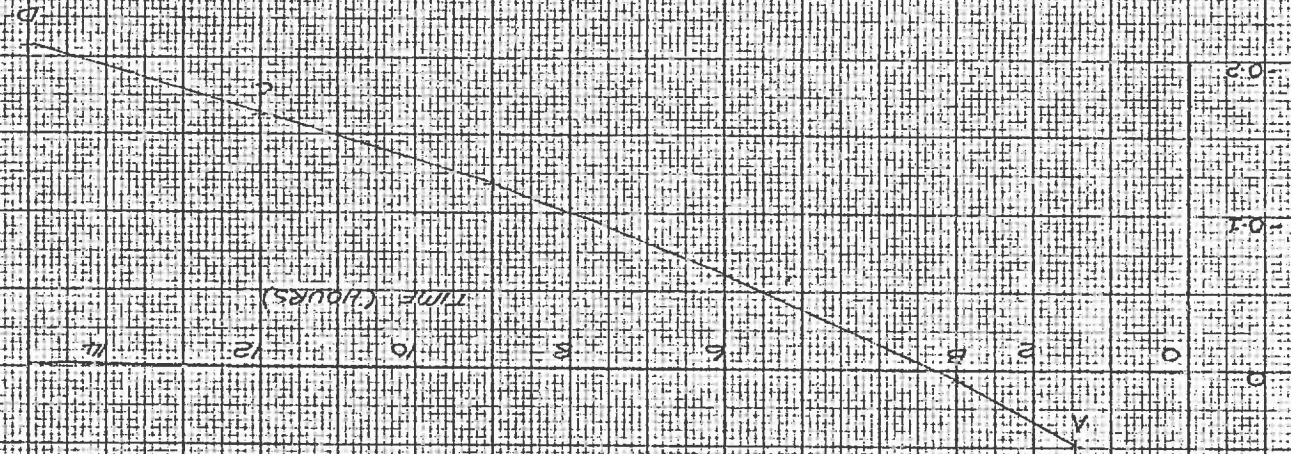


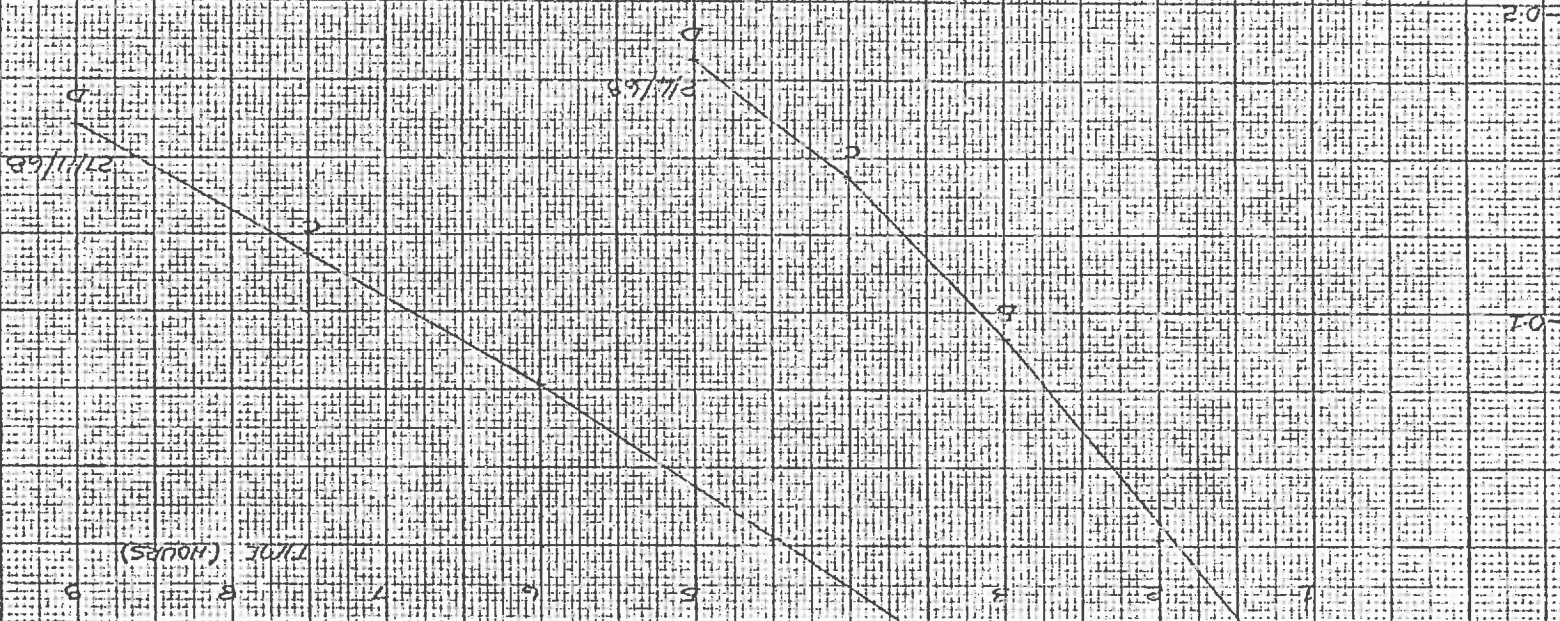
Fig. 3.1.4

MR. 3.1.5

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