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Continuation Sheet No.....

THE CAMBRIDGE SCIENTIFIC INSTRUMENT COMPANY, LIMITED.

CAMBRIDGE. ENGLAND.

NOTES ON CALLENDARS BOLO-METRIC SUNSHINE RECEIVER.

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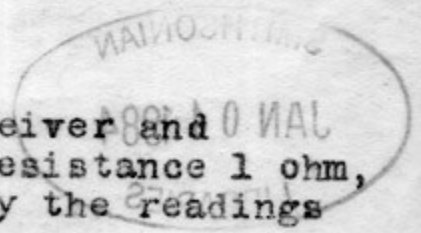
For the reduction of results Professor Callendar has hitherto recommended that they should be expressed in mean hours of sunshine, to conform with the prevailing method as closely as possible. It must be remembered, however, that a mean sunshine hour on one of Professor Callendar's recorders corresponds to a definite quantity of heat received by the Earth's surface, and is not a vague and indefinite entity like the hour of clear sunshine recorded by the usual burning glass or photographic methods. For instance, the burning glass gives the same record for an hour of clear sunshine in Winter and Summer, whereas the Winter sun in England is about four times less intense than the Summer sun.

For practical application in Meteorology it is most important that the instruments should be reduced to the same standard by direct comparison with each other. There is no other instrument in existence capable of recording the vertical component of the total radiation, or the total quantity of heat received by the earth's surface, so that the comparison with other instruments must involve some additional elements of uncertainty which it is desirable to eliminate from the comparisons. Instruments for recording or indicating the normal component of the solar radiation are of no use for meteorology because they are profoundly affected by atmospheric absorption, whereas Professor Callendar's instrument is not, and because while they include an unknown and indeterminate error due to radiation from the sky, they neglect the greater part of this factor.

REDUCTION TO ABSOLUTE MEASURE:- There are many difficulties in the absolute reduction of results, which could only be appreciated by those who have made special study of this difficult question, and the absolute reduction factor must remain for the present subject to considerably greater uncertainty than the relative or comparative values. The following factor represents however, a degree of accuracy which is probably sufficient for any purpose to which it could be applied; and is of a much higher order than current estimates of the value of the "Solar Constants".

10 scale divisions on the record sheet (40 mm.) on Prof. Callendar's standard is his "mean sunshine" using bridge wire No.1 (equivalent resistance 1 ohm per 20 cms.) and corresponds to a vertical intensity of 0.405 calories per sq. cm. per minute.

To reduce values obtained with a given sunshine receiver and Callendar Recorder using bridge wire No.1 (equivalent resistance 1 ohm, actual resistance $\frac{1}{2}$ ohm) it is only necessary to multiply the readings



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in scale divisions by the factor given on Professor Callendar's certificate, to reduce the calories per sq. cm. per minute. To obtain the total number of calories in any given time multiply the average reading (as determined by the planimeter or by counting squares), by the number of minutes in the time interval considered. The method of adjusting the planimeter is fully explained in a separate pamphlet. The reduced plainimeter reading gives 1.25 revolutions of the wheel for 25 hours or 0.01 revolution in 12 minutes at an intensity of 10 divisions on the record sheet. Thus the planimeter reads one revolution for $100 \times \text{Factor} \times 12$ calories, and the total number of calories received in any given time will be $100 p \times f \times 12$ where p is the planimeter reading in revolutions of the wheel and f the factor given in Professor Callendar's certificate. For instance, in the case of Professor Callendar's standard (with which 10 scale divisions on the record sheet corresponds to 0.405 calories per sq. cm. per minute) one hundredth of a revolution of the planimeter corresponds to $100 \times 0.01 \times 0.405 \times 12 = 4.86$ calories per sq. cm.

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