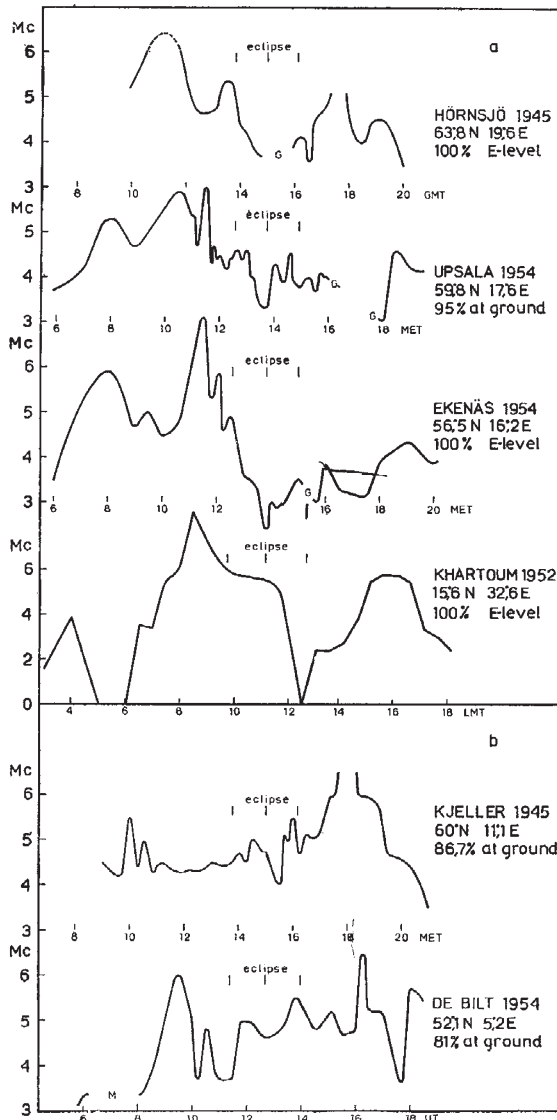


### Variation of $fEs$ during Solar Eclipses

In a recent paper<sup>1</sup> Minnis has discussed the observed values of the  $E_s$  layer during the total solar eclipse at Khartoum in 1952. He is of opinion that there is no obvious reason for attributing the observed decrease in  $fEs$  to an eclipse effect. It is known that a number of observers of other eclipses have not found any typical variations of  $fEs$ .

During the total eclipse on July 9, 1945, a typical variation of  $fEs$  was noticed<sup>2</sup>, consisting of an increase some four hours before, with following decrease and total disappearance during the eclipse. The  $E_s$  was of the special type present only in summer-time.

Particular attention was paid to the variation of  $fEs$  during the total eclipse on June 30, 1954, at Upsala and Ekenäs, both stations operated by the Upsala Ionosphere Observatory. At both places the same typical variation was found. Fig. *a* shows the variation of  $fEs$  together with the observed values from Khartoum, 1952<sup>1</sup>. Fig. *b* shows the variation of  $fEs$  at places where the eclipse was somewhat less than 100 per cent.



The origin of the different types of  $E_s$  is not definitely made clear. A comparison with observations from other stations requires great care because of the limitations in accuracy of the measurements. The median values of  $fEs$  from a great number of ionosphere observatories show, however, that the effect of the radiation from the sun is one of the agents producing  $E_s$ . This is evident from the diurnal and seasonal variations of  $fEs$ . The decrease of  $fEs$  simultaneously with the course of the eclipse thus seems quite reasonable. The decrease of  $fEs$  is only found at places where the eclipse is total or nearly total. It seems that no eclipse variations are found at places with less than about 75 per cent obscuration.

The increase of  $fEs$  some hours before the moon's shadow strikes the earth cannot be due to any direct eclipse effect. Yet it seems that the typical eclipse configuration of sun-moon-earth is responsible in some manner for producing this effect.

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Upsala 10. April 29.

<sup>1</sup> Minnis, C. M., *J. Atmo. Terr. Phys.*, 6, 91 (1955).

<sup>2</sup> Stoffregen, W., *Terr. Mag. Atmo. Elect.*, 51, 495 (1946).

### Dielectric Strength of Organic Liquids

WORK in this laboratory on the conductivity of hexane at high steady fields has shown that measurements can be made at field-strengths far in excess of those previously reported. For gaps of 25 and 150 microns, it was possible to measure the conductivity up to stresses of 1,500 kV./cm. and 1,150 kV./cm. respectively.

This can be achieved by eliminating the pulses occurring at high fields which prevent current measurements. Spectroscopically pure hexane was used, and it was further dried and slowly distilled in a closed system under a reduced pressure to obtain a moisture- and dust-free liquid. The electrodes were polished so that no scratches were visible when they were viewed under an optical microscope, and they were finally cleaned with hexane. Even with this treatment, some current pulses occurred, and it was essential to keep these to a small amplitude because of the ensuing deterioration of the electrodes and the liquid and to reduce the risk of a spurious breakdown.

By keeping the applied voltage only slightly in excess of the onset voltage of the pulses, it was possible to control and eliminate them by a conditioning process. For this purpose a high resistance was connected in series with the test cell and the test voltage was increased only after the pulses had subsided. To facilitate the observation of the pulses, a high-gain pulse amplifier together with a cathode-ray oscillograph was used. A high-speed electronic diverter (operating time  $\approx 0.7 \mu\text{sec.}$ ) safeguarded the electrometer and prevented spurious breakdown damage during conditioning.

As a rule, numerous pulses of appreciable magnitude were observed in a field region of 300–400 kV./cm., but beyond this the pulses were small except near the breakdown field, where very severe isolated pulses were likely to occur. Very pure liquids were relatively easy to condition, and a liquid showing no detectable pulses at high fields could be obtained; but for less pure liquids it was not often possible to reach the higher fields. The immediate breakdown region was indicated by the rapid rise in the steady current and