

IONOSPHERIC RECORDERS AND SPORADIC E^*

By J. A. THOMAS,† A. C. SVENSON,† and H. E. BROWN‡

It has been many times stated (Rawer 1949 ; Booker 1950 ; Booker and Gordon 1950 ; McNicol and Gipps 1951) that the frequency characteristics of the sporadic E region are rapidly varying functions of the overall sensitivity of the recording $P'f$ equipment. A very simple test of this statement has been made, and it has been found to be incorrect at Brisbane.

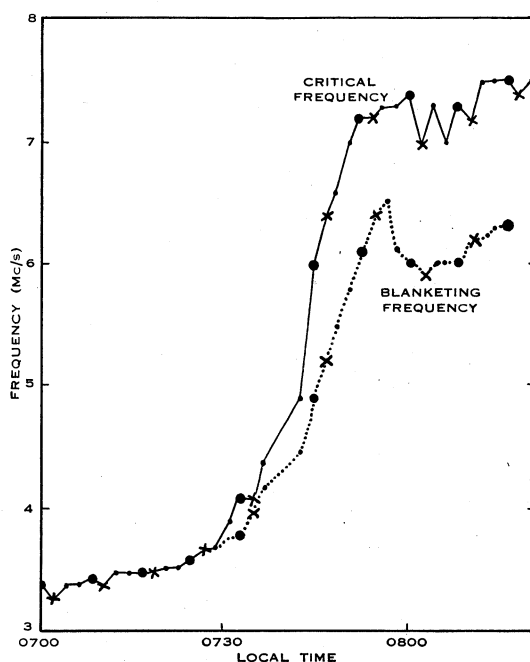


Fig. 1.—Variation of fE_s and f_bE_s for sequential type E_s for different recorder sensitivities (November 16, 1955).

● 0 dB × -24 dB · -12 dB

The tests were made by taking repetitive sequences of records (on an auxiliary display) with different receiver gains. Each two minutes the receiver gain was automatically changed by a known factor ; any resultant changes in fE_s or f_bE_s should thus show clearly when the scaled values are plotted over a period of time. Two different sensitivity sequences have been used : (a) -12 dB,

* Manuscript received December 15, 1955.

† Physics Department, University of Queensland, Brisbane.

‡ Ionospheric Prediction Service, c/o Physics Department, University of Queensland, Brisbane.

0 dB, -24 dB, -12 dB; and (b) -12 dB, +6 dB, -24 dB, -6 dB. (A reflection coefficient of about 0.003 is necessary to produce a record at the 0 dB level.) A typical sequence is shown in Plate 1; the camera speed is one-third of its normal value.

The scaled values of fE_s and f_bE_s for typical cases of the two types of E_s which occur at Brisbane are shown plotted in Figures 1 and 2. In neither case is there any evidence of dependence of fE_s on the receiver sensitivity (and hence on overall equipment sensitivity). This result is to be expected for the sequential type of E_s (McNicol and Gipps 1951), but is now established for the

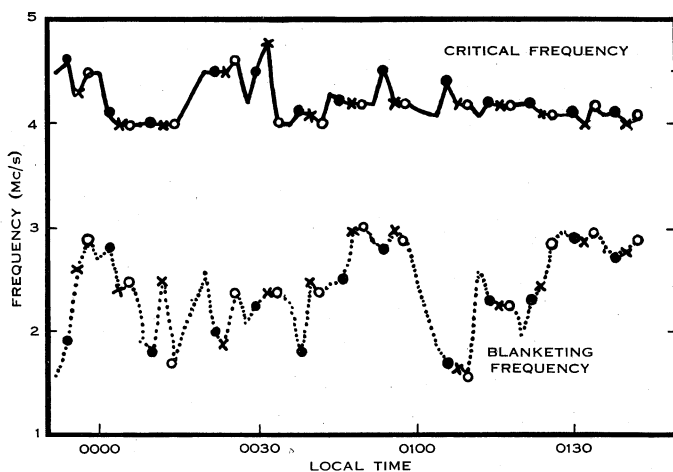


Fig. 2.—Variation of fE_s and f_bE_s for constant height type E_s for different recorder sensitivities (November 16, 1955).

● +6 dB ○ -6 dB · -12 dB × -24 dB

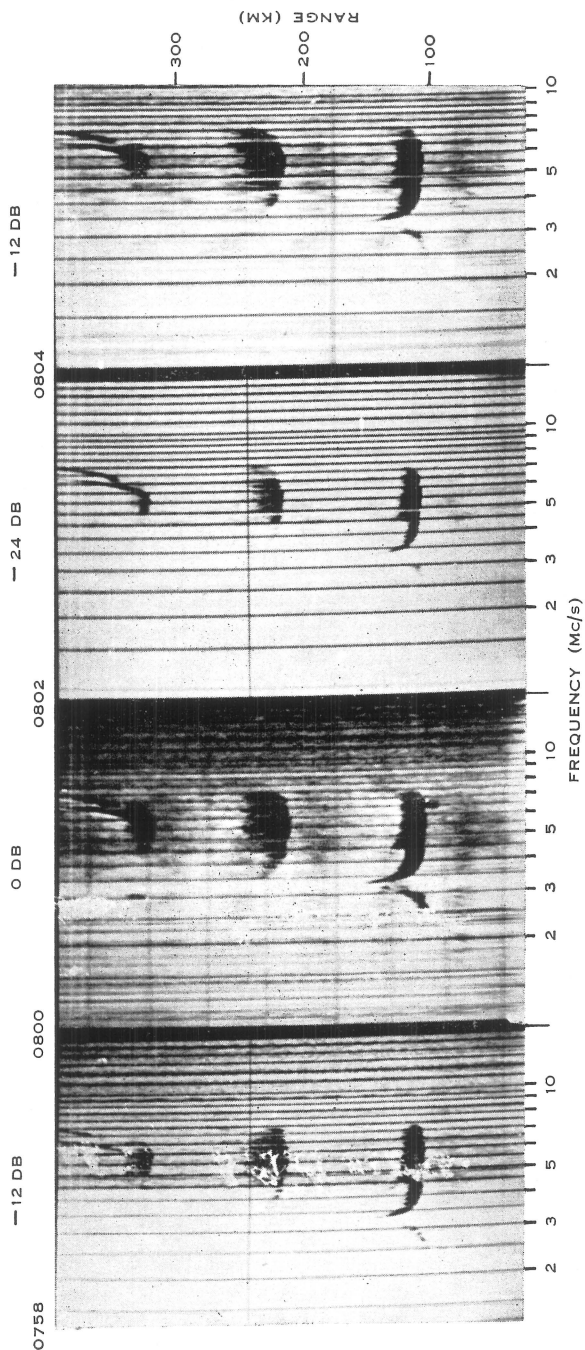
constant-height type of E_s as it occurs at Brisbane. Provided E_s is recorded at all it will be recorded with a critical frequency which is independent of overall sensitivity up to at least 6 dB above the normal recording sensitivity. Blanketing frequency is also independent of sensitivity—such variations as do occur on change of sensitivity are no larger than the random changes constantly occurring on fixed sensitivity.

These results may mean that more reliance can be placed on the fE_s and f_bE_s values for stations in mid latitudes than has been thought possible in the past; the marked variations between stations may be due to the varying nature of the sporadic E itself rather than to variations in overall recording sensitivity between the stations.

The authors wish to thank Mr. G. Cairns for his assistance in taking the measurements.

This work forms part of the research programme of the Radio Research Board of C.S.I.R.O. and of the Ionospheric Prediction Service of the Commonwealth Observatory, and is published by permission of these bodies.

IONOSPHERIC RECORDERS AND SPORADIC E



A typical sequence of auxiliary $P'f$ records with varying sensitivity (November 16, 1955).

References

- BOOKER, H. G. (1950).—Proc. Pennsylvania Conf. Ionospheric Physics *A*, p. 171.
BOOKER, H. G., and GORDON, W. E. (1950).—*Proc. Inst. Radio Engrs., N.Y.* **38** : 401.
McNICOL, R. W. E., and GIPPS, G. DE V. (1951).—*J. Geophys. Res.* **56** : 17.
RAWER, K. (1949).—*Nature* **163** : 528.