SHORT COMMUNICATIONS

A FURTHER NOTE ON IONOSPHERIC RECORDERS AND SPORADIC *E**

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As a supplement to work reported earlier (Thomas, Svenson, and Brown 1956), in which the receiver gain of a *P'f* recording equipment was systematically changed from record to record, a similar experiment has been devised in which the power radiated by the transmitting aerial is systematically changed, thus altering the " signal-to-noise " ratio at the receiver. This should and does give results differing from those formerly obtained.

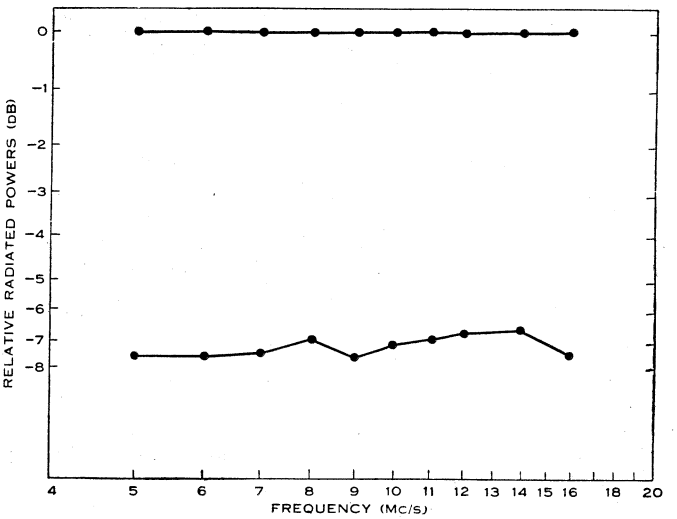

Fig. 1

Two extreme values of transmitter power were used in the experiment the actual alteration being achieved by switching the input tapping to the H.T. transformer at 2-min intervals, so that consecutive *P'f* records were made with alternately high and low transmitter powers.

Measurements of relative radiated powers were achieved (at a number of frequencies) by comparing the field strengths (for the two positions of the switch)

* Manuscript received December 27, 1956.

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at a distance of several wavelengths from the transmitting aerial. The difference in radiated power at any one frequency* with change in H.T. voltage was found to be nearly constant at 7 dB (Fig. 1). Zero decibels correspond to about 1 kW peak power.

The receiver uses automatic volume-control (A.V.C.) with a time constant of about 0·02 sec, which corresponds to the time between successive transmitted pulses. This means that the receiver gain is effectively noise controlled at all frequencies—the transmitter ground pulse and echoes contribute very little toward the biasing. Thus the advantages of A.V.C. can be retained in making these measurements, since the amount of interference at any particular frequency does not vary rapidly and the receiver gain at any frequency will be the same from one record to the next. Portions of records affected by interference from sources at known frequencies are ignored in the analysis.

Studies of the records show that:

(1) $f_{\min.}$ (i.e. the minimum recorded frequency) decreases with higher transmitter power.

(2) The extraordinary-ray reflection from the normal E region is sometimes recorded on high power but never on low power.

(3) Range spreading (Thomas 1956) is greater at high power.

(4) f_0E_s and f_bE_s for the two major types of E_s present at Brisbane (Thomas 1956) are almost independent of transmitter power. Occasionally, however, a very weak sporadic reflection is seen only on the high-power record—this may correspond to Naismith's "meteoric E" (Naismith 1954).

The first three facts are in agreement with expectations for the higher S/N ratio. The fact that f_0E_s and f_bE_s does not change markedly with transmitter power provides further evidence that the two major types of E_s ionization found at Brisbane give true penetration frequencies which are independent of the power employed.

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 Department of the Interior, and is published by permission of these bodies.

References

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* The power radiated upwards will change considerably with frequency due to changes in the radiation pattern of the delta aerial. We are here concerned only with the relative change occurring at any one frequency.