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(d) Antennas for Radio Propagation Measurements (5.1)
(H.V. Cottony, H.F. Cones, J. J. Hitchman)

1. Antenna Impedance Meters

Work continued in the development of automatic impedance measuring equipment. The original makeshift equipment was replaced by improved solidly-constructed gear. A beat frequency oscillator-amplifier was constructed in the same principles as before, but covering the frequency range from 1 to 25 Mc/s. It has been tested and is giving promising results. Work is now being carried on to perfect the stabilization circuit. A paper was delivered before the convention of the Institute of Radio Engineers describing the impedance meter and its applications in relation to antenna design.

(e) Radio Noise
(H.V. Cottony, J.R. Johler, F.F. Viezbicke, J.B. Bryant)

1. Atmospheric Radio Noise (5.6)

A report CRPL 5-1 "Interim Report on the Measurement of Atmospheric Noise Level" by Dr. H. A. Thomas and Mr. H.V. Cottony was issued on January 24. This report describes the Thomas atmospheric noise measuring equipment in general and the recent improvements which have been made to increase its sensitivity. It is expected that with the improvements incorporated in the apparatus it will be possible to measure atmospheric noise intensities down to 0.05 microvolts per meter (assuming a receiver bandwidth of 16 Kc/s over the frequency range of 2 to 20 Mc/s. The Wilmotte Manufacturing Company of Washington, D.C. received an order for 15 modification kits from the British Commonwealth Scientific Office. Their first production model was submitted to this laboratory for approval tests and, after a few minor changes, was found to perform substantially as well as the laboratory model.

2. Cosmic Radio Noise (5.11)

The chief problem in the recording of cosmic noise because of the low intensity of the field to be recorded has been to secure a highly stable recording system. The system which has been adopted consists of special low-noise figure preamplifiers feeding into commercial receivers which serve as intermediate-frequency amplifiers. Of the available commercial receivers the Hammerlund Super-Pro model SP-400X was found to be acceptable from the standpoint of stability of gain with changes in temperature. Four receivers of this type have been ordered and are expected to be delivered shortly. A power supplying type RA-57A has been secured from surplus and is being modified to serve as a source of highly-regulated d-c voltage for preamplifier convertors, Super-Pro receivers used as i.f. amplifiers, d-c voltmeters, and calibrating diodes. Construction of four preamplifier-converters has been started. Of these, two, designed for 80 and 60 Mc/s reception respectively, have been completed although not tested. The third, for 40 Mc/s is partly completed.

Construction of the fourth to operate at 110 Mc/s has begun.

Recording of cosmic noise on a preliminary basis has begun on a frequency of 110 Mc/s using the original 110 Mc/s preamplifier- converter A 132 cm. horizontal dipole, approximately one quarter wave length above ground is being used as a collector. The antenna, which has a measured resistive component of impedance of 120 ohms, is connected to the receiver by a 160 ohm two-conductor open transmission line. The antenna is matched to the transmission line by means of tuning stubs. After matching the standing wave ratio was found to be 1.1/1 which is the limit of accuracy available with the present probe.

It has been found that the present test location of the system is unsuitable for continuous recording because of man-made noise interference and it is planned to move the equipment to a more suitable location.

On January 20 and 25 an attempt was made to measure solar noise intensities. This was done by the use of available cosmic noise receiving apparatus, and using the SCR-270 radar antenna as a collector. No means for calibrating the antenna were available; however, a measure of solar noise was obtained by observing the difference in noise output, with the antenna pointed toward the sun and away from the sun. On January 20, the output was approximately 17% higher in power when the antenna was beamed on the sun. On January 25, the receiving system was improved by a better match of the antenna to the transmission line and to the receiver. On this date, an increase in noise power output of 8 times was observed when the antenna was beamed on the sun. It was later learned that this day coincided with a period of high solar activity. No measurements of solar radiation are being made at present.

Respectfully submitted,

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