Section 5 Atmospheric Radio Noise

The type of informations studied to clarify the detailed structure of atmospheric noise includes the four statistical parameters, the amplitude probability distrbiution, the crossing rate distribution, the probability distribution of duration of pulses and that of the interval between pulses. The study of interfering effect of the noise no a radio communication system involves not only the amplitude characteristics but also the time sequence of the variation of the intensity.

It is well known that a remarkable progress has been made in the study of the structure of atmospheric noise in VLF through SF bands, by introducing the statistical method. Accordingly, we are convinced that some contribution can be expected by this method in the research field of atmospherics other than the study of them as a radio noise.

Lately we have started a work of investigating the statistical nature of atmospheric noise radiating from near origin. The atmospheric noise envelope has been measured with narrow band receivers at 10 KHz and at ELF, and recorded on a magnetic tape so that it could be statistically analyzed in terms of amplitude probabilisy, crossing rate, pulse duration and interval between pulses. For distant thunderstorms, the amplitude probability distributions have been preliminarily measured by a new method of measurement at 10 KHz and at ELF with narrow band receivers, at Tottori field station.

This new method of measuring the amplitude probaility distributions has been developed by introducing an apparatus which is the combination of PHA (pulse height analyzer) and ADA (amplitude distribution analyzer) and the method has been adopted for the noise analysis in place of the Sullivan distribution meter. The new method and apparatus have been proved to be very useful for the purpose of measuring the amplitude probability distributions. Using this apparatus, reliable distributions have been obtained at 50 KHz with a receiver of 1 KHz 3-db-bandwidth. These experimental distributions have been compared with the theoretical ones derived in the case of the expected noise descried elsewhere and the remarkable agreements between them have been obtained for a wider range of the probability. Moreover, the study of the time function of atmospheric radio noise has been carried out, where the comparisons have also been made between the theoretical and experimental distributions of durations of pulses and of intervals between them. The details of it is to be reported in this volume,

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