CHAPTER V

NOISE FROM THE OTHER SOURCES

Interferences to radio signals may occur by the sources of r-f energy other than transmitting stations. There are natural static (atmospherics); artificial static (man-made); noise generated in tubes (shot-effect noise); in circuits (thermal-agitation, etc.) and other disturbances. If the desired signal is strong enough, the effect of the interferences from the other sources, except the atmospheric noise, can be neglected.

Interference due to Atmospheric Noise

Atmospheric noise arises from the electrical discharges associated with thunderstorms. Some of the essential features of a thunderstorm vary with the stage of its activity, the type of thunderstorm, its geographical location, etc. The electrical discharges accompanying a lightning flash give rise to the radiation of electromagnetic waves in the form of impulses. These radiations travel through space in exactly the same manner as other radio waves and, when received in a receiver, give rise to noise. This noise is the principle source of interference to signalling systems in the frequency range 1 - 20 Mc.

A thunderstorm is essentially a localized thermodynamical process in the atmosphere accompanied by electrical discharges. When the intensity of the electric field at some points in the cloud exceeds the disruptive strength of the dielectric, a discharge occurs and this leads to the initiation of a lightning flash. Theoretically, such a flash can occur (i) within the cloud, (ii) from a cloud to the upper atmosphere and (iii) from a cloud to the earth.

For a complete scheme of noise estimation, we require the following additional information: (1) types of typical tropical thunderstorms, (2) their growth and decay characteristics, (3) type of noise radiated during the growth, peak activity and decay stages of each type of thunderstorm, (4) the probable hour of maximum activity of each type, (5) definition of peak activity and duration of peak activity of each type of thunderstorm, and (6) the frequency of occurrence of the different types of thunderstorms during the different seasons. The information was obtained by following individual thunderstorms by noise measurements.

It is found that the number of such impulses received per minute, their magnitude and duration show statistical variations. This is particularly true when noise arises from a large number of thunderstorms and holds to a considerable extent even when noise arises from a single thunderstorm. This fact suggests the application of statistical criteria for the collection and assessment of data on atmospheric noise.

When impulses are being received, experiments indicate that a minimum of ten impulses per minute are necessary to cause annoyance to the average listener of broadcast programmes. Therefore, the arithmetical average of the ten highest impulses per minute. is taken as a measure of noise. When the number of impulses received per minute is less than five, impulsive noise is ignored as it has no annoyance value. But, when the number of impulses received per minute is between five and ten per minute, the impulsive noise value is computed by taking the average of all the impulses received.

The method classifies atmospheric noise on the basis of listening and/or recording experiments. This noise can often be heard or recorded through a superheterodyne receiver in the form of impulses.