AN OVERVIEW OF THE ROLE OF MICROWAVE NOISE IN SYSTEMS

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A brief description of the effect of noise on microwave systems will be presented. A summary of figures of merit for systems such as radar, communications, radiometry, etc., and how the different sources of noise enter into the development of these figures of merit will be given. This talk will be aimed at presenting an overview of the role of the different noise generating mechanisms and their characterization, on microwave systems.

MEASUREMENT OF NOISE PERFORMANCE FACTORS

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During the past three decades since the introduction of the concept of noise factor, many techniques have been used to measure the noise performance of amplifiers and other electronic transducers. Recently, a project at the National Bureau of Standards provided the opportunity to review many of these techniques and to make a critical comparison of their merits. The results of this review and comparison will be available soon as a "metrology guide" for noise performance factors. They are briefly described during this Panel Discussion.

Seven essentially different techniques were selected for review. These include those commonly used as well as some that are less well known but which are practicable for certain applications. They are (1) Y-Factor, (2) 3-dB, (3) Automatic, (4) Gain Control, (5) CW, (6) Tangential, and (7) Comparison techniques. Each technique has been analyzed to obtain analytical equations for the measured quantity (noise factor and/or effective input noise temperature) and its measurement error. The latter have permitted a direct comparison of measurement accuracy for a given set of conditions in the measurement system. Some techniques are typically more accurate than others in a given situation, primarily because of the sophisticated instrumentation that has been developed for that situation. The error equations are of great benefit in helping the metrologist identify where his efforts should be placed to improve his system.

In addition to the analysis for comparative accuracy, each technique has been reviewed from other standpoints; viz., (a) frequency range for best measurement results, (b) instrumentation requirements, (c) speed and convenience, (d) operator skill required, and (e) special problems unique to a given technique. The results of these reviews serve as a helpful guide in selecting the best measurement technique for any of a wide range of operational requirements.