Abstracts of Technical Articles from Bell System Sources

Shared Channel Broadcasting.[1] C. B. AIKEN. This paper deals with the experimental studies made on the character and causes of interference noticeable in shared channel broadcasting, such as heterodyning, flutter, sideband interference and wobbling. Valuable data are included on the characteristics of square-law and linear detectors anent to interference.

The Determination of Dielectric Properties at Very High Frequencies.[2] J. G. CHAFFEE. A simple method of determining the dielectric constant and power factor of solid dielectrics at frequencies as high as 20 megacycles, with an accuracy which is sufficient for most purposes, is described. The major sources of error are discussed in detail, and several precautions which should be observed are pointed out.

Measurements of the dielectric properties at 18 megacycles of a number of commonly used materials have shown that in general the power factor and dielectric constant are not widely different from those which obtain at frequencies of the order of one megacycle.

In addition, the results of an investigation of the input impedance of vacuum tube voltmeters at high frequencies are described as an illustration of the further application of this method of measurement.

Optical Factors in Caesium-Silver-Oxide Photoelectric Cells.[3] H. E. IVES AND A. R. OLPIN. This paper describes an investigation of the part played by the angle of incidence and state of polarization of the exciting light in producing the enhanced or selective emission of photoelectrons in the red region of the spectrum which is characteristic of photoelectric cells made by treating a silver surface with oxygen and caesium vapor (Fig. 1). This question is one which has been raised in connection with all types of photoelectric cells having composite surfaces and which exhibit spectrally selective emission. It has thus been an open question whether the selective peaks in the spectral response curves exhibited by the alkali hydride cells are to be ascribed to an enhanced effect of the perpendicular vector of obliquely incident

[1] *Radio Engineering*, June, 1934.
[2] *Proc. I. R. E.*, August, 1934.
[3] *Jour. Op. Soc. Am.*, August, 1934.

radiation, or whether the spectral selectivity is in the nature of a locally intrinsic emissive power, such as would be caused by an optical absorption band or an electronic transmission band. In order to answer this question, it is necessary to have emitting surfaces of a specular character. Such surfaces have not been prepared with the alkali hydrides, but it has been found possible to make the caesium-silver-oxide cells on specular plates of silver so that they retain their specular character in the final sensitized surface. Cells of this sort were used in this study, and have made possible a clear separation of the emissive singularities due to optical conditions and the singularities which may be described as intrinsic to the material.

Both from their method of preparation and from their optical behavior, we have felt justified in considering the caesium-silver-oxide photoelectric cells prepared with specular silver surfaces as consisting of silver surfaces overlaid with a thick layer of transparent refracting material, on the top of which is a thin photosensitive layer. The silver plates, after oxidation, exhibit interference colors, the exact color depending upon the amount of oxidation. Viewed at an angle through a nicol prism, these oxidized plates exhibit the well-known properties of thin refractive layers on a metal base. Thus when the plane of polarization is changed from the plane of incidence to the plane perpendicular thereto, no change of hue takes place for small angles of incidence; but at large angles, the color changes to a complementary hue. After the silver oxide surface has been exposed to caesium vapor and given a heat treatment, these optical properties are still usually observable, but degraded. The softening of the interference colors may be due either to a change in thickness of the refracting medium as caesium oxide is formed or to the introduction of a general body color. In a few less common cases the colors faded out completely, the plate at the end of the heat treatment being metallic in appearance yet still exhibiting a pronounced selective response to red and infrared light.

The behavior of a thin photoelectric sheet separated from a specular metal surface by a layer of refracting medium has been treated in an earlier paper where a layer of caesium was deposited on the top of a quartz-coated platinum plate. The data obtained in this earlier paper are immediately applicable to the present problem, granting the similarity of conditions which we have assumed. It has been convenient to pursue this present study on the assumption of such a similarity and to arrive at conclusions from the agreement with, or deviation from, the results obtained from the simpler materials and conditions previously studied.

Phase Angle of Vacuum Tube Transconductance at Very High Frequencies.[4] F. B. LLEWELLYN. Theoretical considerations indicate that the transconductance of a vacuum tube exhibits a phase angle when the transit time of electrons from cathode to anode becomes an appreciable fraction of the high-frequency period. Measurements show that such a phase angle actually occurs and that its behavior is in general agreement with the theoretical predictions.

Application of Sound Measuring Instruments to the Study of Phonetic Problems.[5] JOHN C. STEINBERG. This paper gives the results of a period by period analysis of the vowel sound waves occurring when the sentence "Joe took father's shoe bench out" was spoken. Such an analysis gives an approximate picture of the time variations in r.m.s. amplitude of the wave, frequency of voice fundamental, and frequency regions of overtone reenforcement. Although the study is confined to a few sounds and one speaker's voice, it illustrates a method of approach to studies of speech production and measurement.

[4] *Proc. I. R. E.*, August, 1934.
[5] *Jour. Acous. Soc. Am.*, July, 1934.