

## Abstracts of Technical Articles from Bell System Sources

*Stability of Two-Meter Waves.*<sup>1</sup> CHARLES R. BURROWS, A. DECINO and LOYD E. HUNT. The continuous records of the field strength received over a 60-kilometer path on a frequency of 150 megacycles for the year 1936 are analyzed. Preliminary comparison with other paths of the same length indicate that the magnitude of the recorded variations of the signals may be typical of paths of this length.

A reduction in the path length by a factor of two reduced the fading range in decibels by a factor of five.

The results are found to be in agreement with an earlier formula. Fading reduced the field 7 decibels below the average value 1 per cent of the time.

*Loudness, Masking and Their Relation to the Hearing Process and the Problem of Noise Measurement.*<sup>2</sup> HARVEY FLETCHER. It is shown in this paper how to define loudness and loudness level in a quantitative way. Definite procedures are given for determining experimentally the loudness level of any sound heard by any person. For a typical observer a true loudness scale is developed. The relation of the scale to the loudness level scale is determined experimentally. The scale has been found to be very useful for calculating loudness from the noise spectrogram, the noise audiogram, or the overtone structure of the sound.

The relation between the masking and the loudness produced by a sound has been quantitatively determined and a formula deduced from this relation which has proved useful for calculating the loudness. This formula may be applied with equal success to a normal ear and also to a deafened ear. Evidence has been given that the masking expressed in decibels produced upon any pure tone is equal directly to the agitation of 1.1 per cent of the total nerve endings expressed in decibels above the threshold value for such a patch and at the position where such a tone would be sensed. These loudness relations throw light upon some of the important processes involved in hearing. In particular the data from the masking effects of thermal noise were used to calculate the relation between the position of

<sup>1</sup> *Proc. I. R. E.*, May 1938.

<sup>2</sup> *Jour. Acous. Soc. Amer.*, April 1938.

maximum stimulation on the basilar membrane and the frequency of the tone producing the stimulation.

*Pick-up for Sound Motion Pictures (Including Stereophonic).*<sup>3</sup> J. P. MAXFIELD, A. W. COLLEDGE and R. T. FRIEBUS. Although the basic principles underlying sound pick-up for motion pictures have been understood for some time, the ability to carry them out completely in the presence of the requirements of artistry, photography, lighting, etc., has constituted a difficult problem. The paper discusses some of these problems, particularly with respect to the acoustics of production sets and scoring stages. The problems of stereophonic reproduction are also discussed in some detail.

*Practical Application of Telephone Repeaters and Carrier Telephone Systems.*<sup>4</sup> J. A. PARROTT. The paper discusses engineering problems in the application of telephone repeaters and carrier systems with which railroad communication engineers recently have been particularly concerned. The first part of the paper deals with crosstalk, noise, balance and overloading considerations in the design of repeated circuits, particularly from the standpoint of selecting the locations of repeaters to obtain the most satisfactory results on existing lines. The importance of securing test data on the wire facilities to aid in this design work as well as to serve as a guide in improving circuit conditions is emphasized.

The second part of the paper briefly discusses the application of the H1 carrier telephone system and provides transmission data for the preliminary design of the layout of such systems. The Type D and K10 carrier transpositions are described and features of particular interest in their possible use on railroad facilities are discussed.

*Sorption of Water by Rubber.*<sup>5</sup> R. L. TAYLOR and A. R. KEMP. The effect of several variables on the rate of sorption of water by rubber is discussed. Expressions based on short-time immersion tests are derived which permit calculation of the water content after an extended period of immersion under fixed conditions of temperature and vapor pressure. A sorption coefficient by which one material may be compared with another is suggested, and its application to practical problems is considered.

<sup>3</sup> *Jour. S. M. P. E.*, June 1938.

<sup>4</sup> *Proc. Assoc. of Amer. Railroads, Telegraph and Telephone Sec.*, October 1937.

<sup>5</sup> *Indus. & Engg. Chemistry*, April 1938.

*Chemical Studies of Wood Preservation—The Wood-Block Method of Toxicity Assay.*<sup>6</sup> ROBERT E. WATERMAN, JOHN LEUTRITZ and CALEB M. HILL. Actual decay resistance of treated wood is used as the basis for a simple laboratory technic in the assay of materials advocated for the protection of wood. In its present stage of development the test is a valuable tool in wood preservation studies.

<sup>6</sup> *Indus. & Engg. Chem., Anal. Ed.*, June 15, 1938.