

Abstracts of Technical Articles by Bell System Authors

*Electronics in Telephony.*¹ FRANK A. COWAN. The historical development of the use of electronic devices by the telephone system is reviewed, showing how long distance telephony has grown with the increased use of, and improvements in, electronics. The number of telephone repeaters has grown from 16 in 1908 to 123,000 in 1942 and carrier circuit mileage has grown from 2,000 in 1920 to 2,300,000 in 1942, while copper usage per circuit mile has decreased from 400 pounds in 1910 to less than 70 in 1942.

A transcontinental telephone connection has grown from an open-wire circuit with a total loss, less repeaters, of less than 75 db (1915) to a present day cable circuit operating at carrier frequencies, which may have a total loss of over 10,000 db. The problem of matching enormous amplifications to compensate for huge losses with a precision of one or two db was a difficult one, which was solved by electronic techniques. The amplification necessary to compensate for the high losses on the cable layout may entail some 200 repeaters utilizing a total of more than 600 vacuum tubes in tandem. The automatic regulation and control of the amplification is accomplished by electronic devices, giving to the present day circuits a stability unequalled in the days before the vacuum tube.

There is available, except for the War, radiotelephone service to 83 foreign countries and overseas areas, and ocean liners at sea, and to boats in coastal and inland waters.

Such widespread dependence on vacuum tubes has stimulated research and design to achieve long life and a high degree of uniformity, stability and reliability. Among interesting future possibilities are transoceanic cables, the use of higher frequencies providing broader bands and larger numbers of circuits over a given path, and further application of remote and unattended stations.

*Deionization Considerations in a Harmonic Generator Employing a Gas-Tube Switch.*² WILLIAM G. SHEPHERD. A description is given of an experimental investigation of the properties of a thyratron operating as a high-frequency switch in a circuit which permitted the generation of a wide band of harmonics. The experiments indicate that there is an operating frequency below which no difficulties in deionization occur and above

¹ *Electronics*, March 1943.

² *Proc. I.R.E.*, February 1943.

which stable operation requires that the grid potential fulfill certain conditions dependent upon the frequency, wave form of the grid voltage, and circuit constants. It has been found possible to operate certain standard thyratrons at switching frequencies as high as several hundred kilocycles per second. For these higher frequencies the deionization of the tubes is incomplete but normal switching behavior is obtained.