



THE POST OFFICE MAGAZINE

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Mr. Postman

ONE PENNY

Circuits for Broadcasting

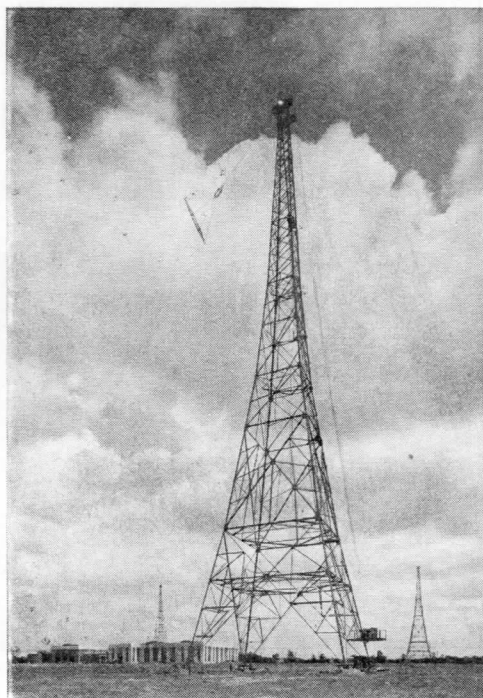
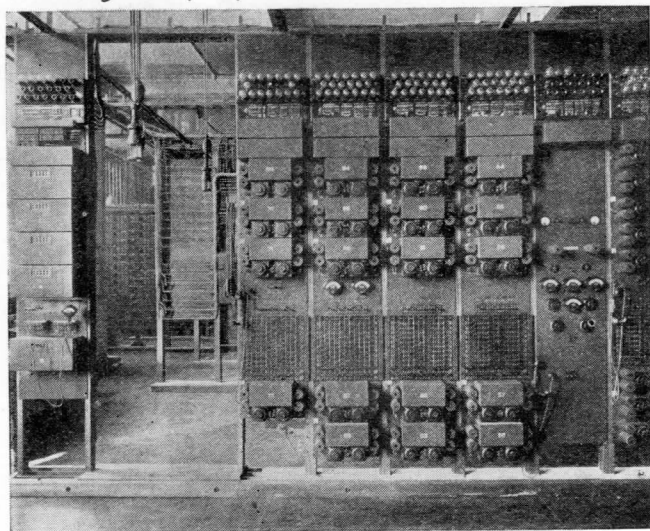
What "Transmission by Land Line" means to the Post Office

MOST readers of this Magazine know from personal experience that the Post Office collects the fees for Wireless licences, and it is also common knowledge that Post Office Engineers do a good deal of work in connection with the elimination of interference on receiving sets. Few of our readers, however, are likely to know of the extensive system of circuits provided by the Post Office for the British Broadcasting Corporation, and a brief description of this network and of the special requirements for circuits to be used for transmission of programmes may be of interest.

Without entering into much technical detail it is first necessary to realize in what respects circuits to be used for programme transmission differ from the normal telephone circuits.

It is probably generally known that most sounds that reach the ear are of a very complex character. They are made up of a large number of different air vibrations, or frequencies, which are present in varying degree, and it is the variation in the number and intensity of the various frequencies present in the sound which gives it a distinctive character. The same word

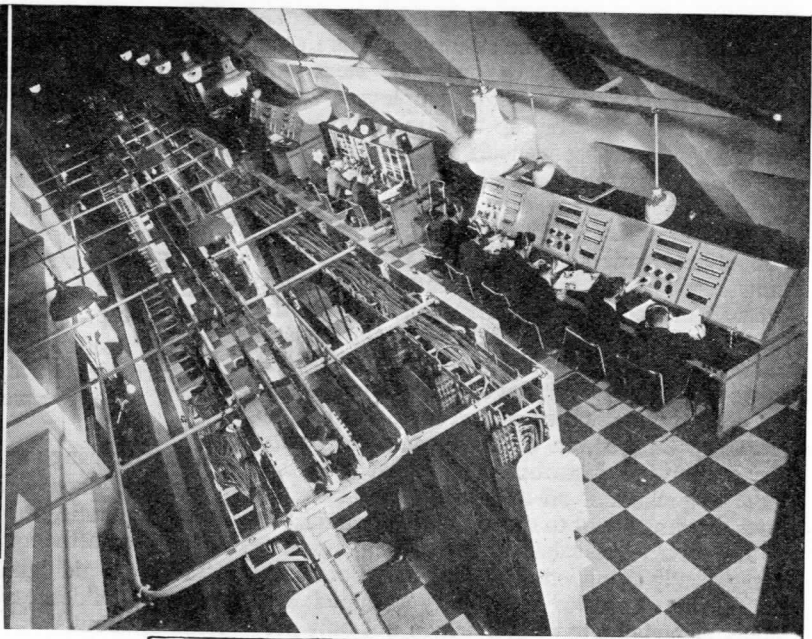
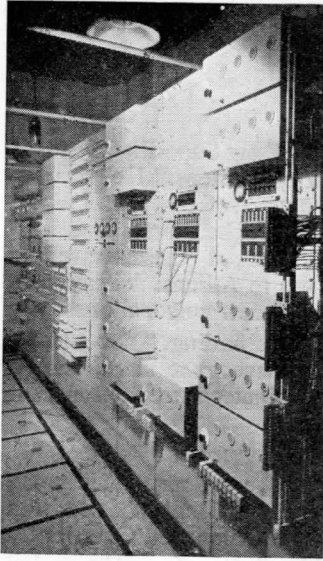
MUSIC REPEATERS: This complicated apparatus maintains the strength and purity of tone on Music circuits



AERIALS AT BROOKMAN'S PARK
(London National and London Regional)

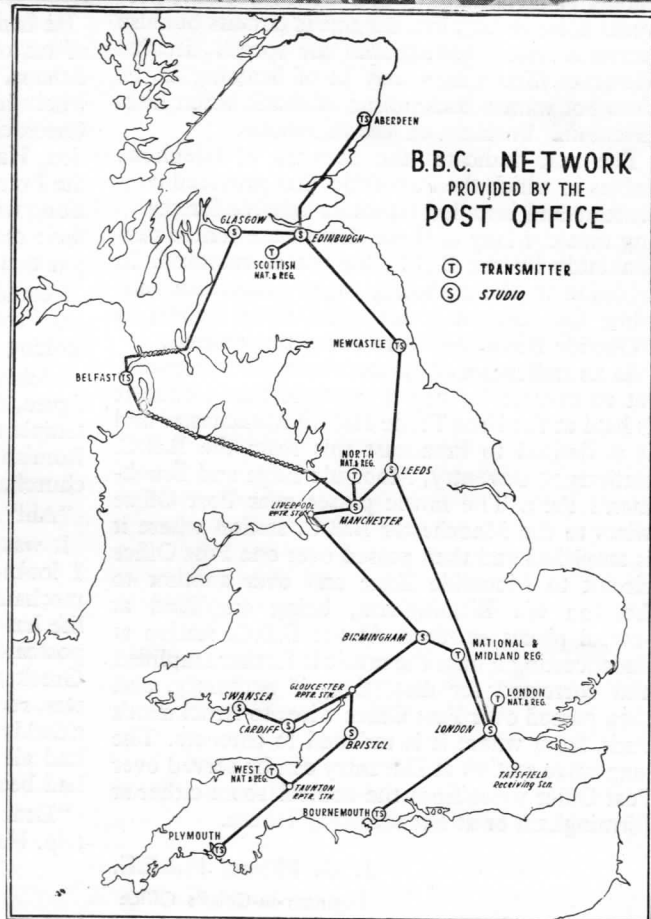
pronounced by different persons does not differ on different instruments owing to the different frequencies which are present. The same music heard in different types of loud speakers connected to the same wireless set varies in quality because some loud speakers are more responsive to certain frequencies than others. Some, in fact, over-emphasize particular frequencies while failing to respond to others. On such instruments music sounds very different from the original. It is the object of the B.B.C. to transmit, over the ether, electrical vibrations which, if received on efficient apparatus, will allow a faithful reproduction of the sounds originally emitted. All the matter spoken or performed in the studios is passed over Post Office wires before it is radiated from the aerials, and it is necessary therefore that no suppression or distortion of the essential

[The illustrations to this article are by courtesy of the British Broadcasting Corporation, except that of Music Repeaters, which is by courtesy of General Electric Company]



TECHNICAL CONTROL of Broadcasting circuits. The control room at Broadcasting House, London (right), and a control panel at Birmingham (left)

frequencies shall occur between the studio or other place where the sounds are made and the radio transmitting station. It is much more difficult to transmit music satisfactorily over wires than it is to transmit speech, because the range of frequencies to be carried is greater and moreover there is greater need for the frequencies to be transmitted in their correct proportions. Experiments have conclusively shown that, if some of the higher frequencies in speech are deliberately cut out, there is no appreciable loss in articulation, and, in fact, there may be a gain, although a friend's voice may sound a little different. The higher frequencies are very difficult to transmit in their correct proportions and, as they are not essential for clear speech, they are in some cases purposely cut out. This cannot be done with music, as the absence of the high frequencies destroys the characteristic sound of certain musical instruments, which thus appear unnatural. It is therefore necessary to design the lines and their associated apparatus so that the frequencies may be effectively transmitted. Here a difficulty is at once encountered. The various frequencies



do not travel equally well along a wire, and the higher frequencies become attenuated more than the lower frequencies. In order to meet this difficulty special devices are employed which apply more amplification to the high frequencies than to the lower frequencies and thus compensate for the loss on the lines. These devices are applied at places in the route of the line known as repeater stations.

On all long underground telephone lines devices known as loading coils are inserted at regular intervals of about 2,000 yards which reduce the attenuation of the transmitted electrical impulses.

There is another important difference between music circuits and ordinary telephone circuits and that is in the method employed to ensure that no extraneous noise gets into the music circuits. Noise is always disturbing, and great pains are taken to prevent it on telephone lines; but it is especially important to do so on music circuits so as to avoid a noisy background when music is being greatly amplified. The music conductors in a cable are therefore completely wrapped in a screen of metallicized paper which not only prevents noise getting into the music circuits but also prevents music getting into the speech circuits. However fond a man may be of listening in, he does not want a background of music when he is discussing business on the telephone.

The map indicates the network of telephone cables in which the Post Office has provided conductors and installed repeaters suitable for carrying music. Many of these circuits are rented permanently by the B.B.C. for use as required. In addition to those shown, many others are supplied for temporary use when items known as "Outside Broadcasts" are being transmitted.

As an indication of the use made of the network, let us assume by way of example that a concert is held at the Free Trade Hall in Manchester and it is desired to broadcast this from the B.B.C. stations at Daventry, Moorside Edge and Brookman's Park. The music passes over Post Office wires to the Manchester B.B.C. station where it is amplified and then passed over one Post Office circuit to Moorside Edge and over another to London *via* Birmingham, being amplified at several places *en route*. At the B.B.C. station at Broadcasting House the music is further amplified and corrected for distortion, if necessary, and then passed over Post Office wires to Brookman's Park, from where it is radiated to listeners. The long wave station at Daventry can be served over Post Office wires from the control room either at Birmingham or at Broadcasting House.

J. G. Hines, M.I.E.E.
Engineer-in-Chief's Office

Ruins

"THIS morning," said my Superintendent, "I had a postcard from Athens." He began to fumble in an inside pocket of his coat. "From my youngest daughter," he went on, still fumbling; "she won one of these travelling scholarships, so she goes to Athens. All expenses paid—except, of course, a few personal ones."

The postcard took a lot of finding. "You and I," he murmured, "would have gone stark, staring mad if, when we were nineteen, we'd been sent to Athens."

"Stark, staring mad," I agreed.

"Athens," he continued, warming to his topic, "the Acropolis, the Pelasgic Wall, the Dipylon Gate, the Parthenon, the Unfinished Gateway."

"Yes," I said humbly, feeling I was being led into the wilderness of things I know little or nothing about.

He had abandoned the inside pocket for a tour of his other pockets. "A man who had been to Athens," he said, "once told me you can trace its whole history in its stones. There is the original Greek city; overlaying that is the Roman occupation, Hadrian's Stoa and so on, then the relics of the Frankish overlordship; then the Turks coming along with their mosques, and the Christians with their churches . . . Now where the devil have I put that card?"

I could not enlighten him. "He said," he went on, "that you could stay in Athens for a year looking at the ruins alone."

I fell to picturing him, a small black and grey figure, flitting like a sombre moth from decaying temple to ruined theatre; from Homeric shrines to Romish Defences, Moslem mosques to Christian churches.

"Ah!" he exclaimed, "here we are at last!"

It was a creditable portrayal of the Parthenon. I looked at it with profound interest, and then mechanically—after all, a very large part of my life has been spent in looking at the other side of postcards—I turned it over and had a look at the Greek stamp and the Athens post-mark. So it was, rudely perhaps, I read the written message of a daddy's pampered daughter, to a progenitor who had all the enthusiasm to see and to learn, but had been denied the opportunity.

"Dear Dad," she had written, "having a lovely trip. Heaps of ruins about. Love, Minnie."

H. Turner
Manchester Post Office