TELEVISION SIGNALS ACROSS THE ATLANTIC

By H. O. PETERSON and D. R. GODDARD
(Research Engineers R.C.A. Communications, Inc.)

An exclusive account of some R.C.A. experiments in picking up the B.B.C. Signals in New York.

ON January 21, 1937, one of the engineers at the Frequency Measuring Laboratory of the Radio Corporation of America at Riverhead, N.Y., was making his usual routine "cruise of the ether" in the neighbourhood of 40 megacycles when to his surprise he heard a carrier modulated with a voice having a distinct English accent. A hurried check of the frequency showed the carrier to have a frequency of 41.5 megacycles per second, the assigned frequency of the voice channel of the Alexandra Palace television transmitter.

This was the start of a series of observations and measurements on the English and German television transmissions. Fig. 1 shows the ultra-short wave receiver used. The lower panel of the further rack is the receiver proper while just above it is a low capacity antenna switch used to connect the receiver to either the incoming transmission line or to a calibrated ultra high-frequency signal generator contained in the rack in the foreground. The bottom panel of this rack is a peak voltmeter useful in comparing peak signal values and determining signal-to-noise ratios. The upper panels of the two racks contain the rectifying equipment and voltage regulators necessary to obtain stable receiver operation at these frequencies.

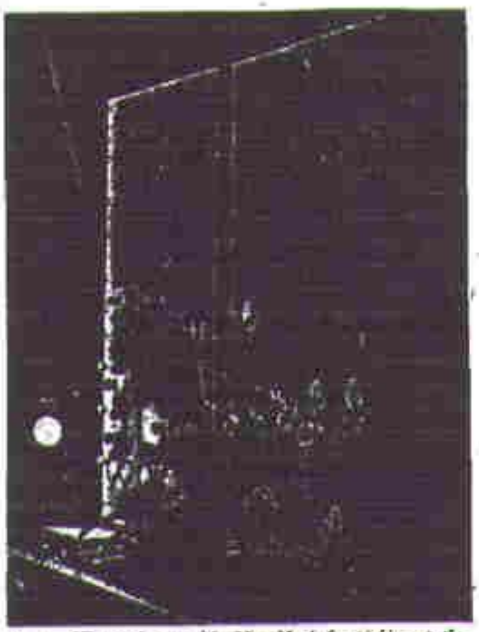

Fig. 1.—The receiver used in New York for picking up the Alexandra Palace signals.

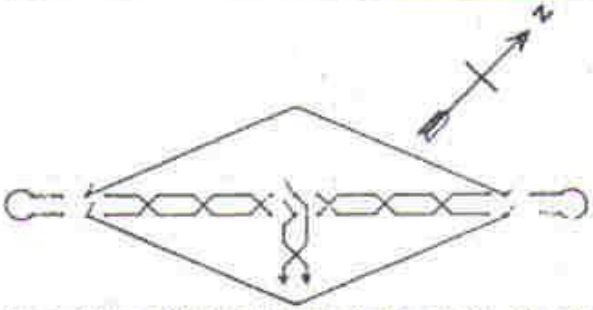

Fig. 2.—Diagram of horizontal rhombic antenna for receiving Alexandra Palace on 41.5 mc.

Fig. 2 shows the horizontal rhombic antenna designed to receive London on 41.5 mc. At the two extremities of the antenna special low-capacity remotely controlled double-pole double-throw switches were installed and connected as shown through transposed transmission lines to a third similar switch located near the centre of the antenna. From this third switch a transmission line was run to the receiver, shown in Fig. 1. The object of this array of switches was to provide means whereby the receiver could be connected to either end of the antenna and a damping network connected to the other end. This provided a directive antenna directed towards London or, at the snap of a switch located at the receiver, a directive antenna aimed 180° away from London.

From January 21 to April 4, the voice channel from London was heard 45 times whilst the video channel was heard 15 times. Usually the signals were rather weak, but at times both the audio and video channels became quite strong. The maximum field strength observed was about 70 microvolts per metre for both channels. As the rhombic antenna used had an effective height of about seven metres, the signal strength at the terminals of the receiver approached 500 microvolts.

German Transmissions

The German and French television transmissions were heard on several occasions but in general these signals were not as strong as the English transmissions and were heard less consistently. There was also reason to believe that the Italian television voice channel was received although positive identification was not established.

The English signals were picked up a few times at the R.C.A. receiving station near Chicago. The signal strength at this point was considerably weaker than at Riverhead (near New York City). Also the

Continued on page 18

signal often was not audible at Chicago when Riverhead would have a good signal.

Unfortunately, during the period of maximum signal strengths, there was no television receiver available on which to observe the video signal capacity. When such a receiver was procured the period of strong signals had passed and there was not sufficient signal voltage to permit proper kinescope synchronisation. However, judging from the fact that at times the received video signal reached a value of well over 400 microvolts, it would be reasonable to assume that a useful picture could have been obtained. The audio signal frequently was of sufficient strength to give excellent loud-speaker reproduction.

These two channels were, of course, subject to fading. This fading was of quite a different nature on each. The 41.5 megacycle signal usually experienced rather rapid deep dips in intensity, in fact, it seldom maintained a fixed value for more than a few seconds at a time, while the 45 megacycle channel changed its level slowly, frequently remaining almost constant for a minute or more. Rarely was the fading of a selective nature on the audio channel. The audible response of the video channel was of such a nature as to make it difficult to state whether or not selective fading was present.

One case of interference from another station was noted. This signal came from a ship off the coast of Scotland working the shore with their standard ship telegraph transmitter operating on 8.3 megacycles. It was the fifth harmonic of the transmitter that caused the interference.

Is Transatlantic Television Possible?

The reader now probably wonders if this is the start of regular trans-oceanic television. In the opinion of the authors this phase of television is still distant. The trans-oceanic reception of frequencies of 40 to 45 megacycles may be explained as being due to exceptionally high ionisation of the F_2 region of the Kennelly-Heaviside layer. This in turn is in phase with the great increase in sunspot activity as the maximum of the eleven-year sunspot cycle is approached. With this in mind it is reasonable to assume that for the next few years, there will be sporadic reception of ultra-high-frequencies over great distances.

Television and Short Wave World, September 1937