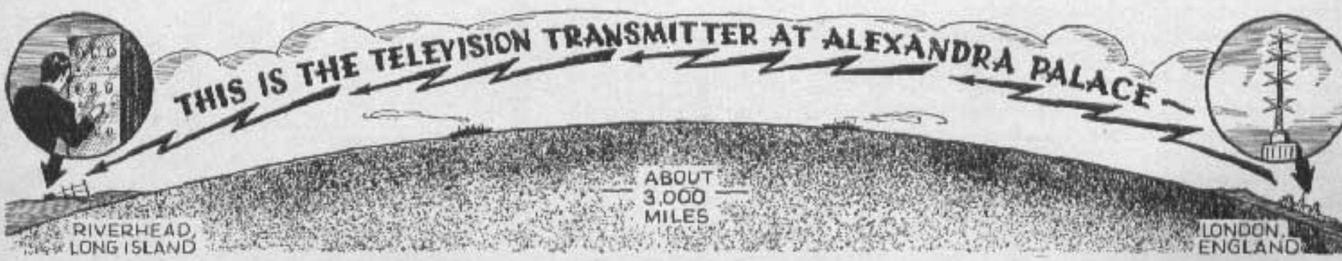

TRANS-ATLANTIC TELEVISION?

Report on English Vision Signals Picked Up Here

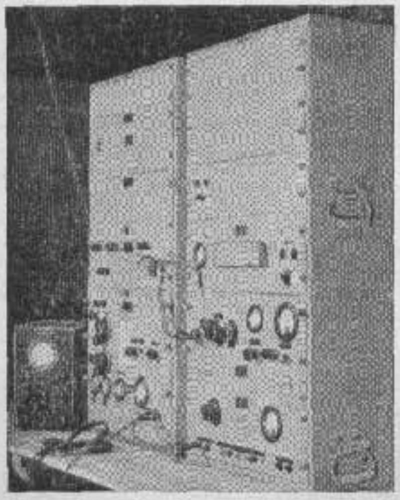

Fig. 1—Receiver used to pick up European television signals at Riverhead, Long Island.

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● ON January 21, 1937 one of our engineers at the Frequency Measuring Laboratory at Riverhead, N.Y., was making his usual routine "Cruise of the ether" in the neighborhood 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, (7.22 meters) the assigned frequency of the voice channel of the Alexandra Palace television transmitter. A few minutes later the transmitter's identity was confirmed as the announcer said: *"this is the television transmitter at Alexandra Palace, London."* Imagine the operator's surprise!

This was the start of a series of observations and measurements on the English and German *television* transmissions. Fig. 1 shows the ultra-high frequency 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 transposed

(*Continued on page 577*)

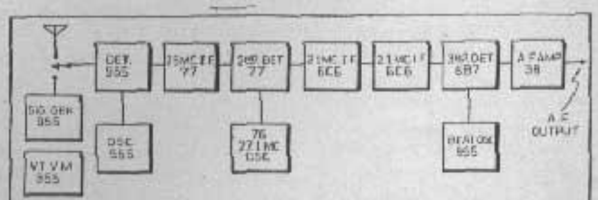

Fig. 2—Block diagram of the U.-H.F. receiver, showing types of tubes used.

Trans-Atlantic Television?

(*Continued from page 536*)

transmission line from the antenna, 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 necessary power supplies and regulators. In order to have the receiver remain perfectly stable and the signal generator hold its frequency setting, it was found desirable to regulate the a-c power supply and also the d-c plate supplies from the rectifiers.

Special Double IF Superhet Used

Fig. 2 shows a block diagram of the receiver. The 955 acorn first detector, which may be tuned from 30 to 200 megacycles, is fed the signal and also the output of the 955 acorn *high frequency* or first oscillator, and produces the *first* intermediate frequency of 25 megacycles, which is fed to the broadly tuned first intermediate frequency amplifier. The second detector receives *this 25* megacycle signal and also the output of the second oscillator which is set at 27.1 megacycles. This detector produces the *second* intermediate frequency of 2.1 megacycles, which is *amplified* by the second *intermediate* frequency amplifier. This amplifier has a flat band width of 100 kilocycles. The *third* detector is fed the 2.1 megacycle signal and provision is also made to supply it with a *2.1* megacycle voltage *from* the *third* oscillator. This third oscillator is used for cw reception and as an aid in tuning the desired signal to the center of the 2.1 mc intermediate frequency amplifier. The third detector drives a single-*stage* audio *amplifier*, the output of which terminates in a pair of jacks at the lower right-hand corner of the receiver. Provision is also made to get at the diode output directly. The receiver input may be switched to either the aerial or a signal generator. A vacuum-tube voltmeter is used to hold this generator's output constant.

To receive the ultra-short wave signals, *a* horizontal rhombic antenna was constructed. This antenna was 134 feet long, 69 feet wide, 45 feet high, and had an effective height of about 8 meters. The direction of London from New York is approximately N 50° E.

From January 1 to April 4, the *voice channel* from London was heard 45 times, whilst the video (image) channel was heard 15 times. Usually the signals were rather weak, but at times *both* the audio (voice) and video (picture) channels became quite strong. The maximum field strength observed was about 70 microvolts per meter on both channels. As the rhombic antenna used had an effective height of about 8 *meters*, the signal strength at the terminals of the receiver was about 500 microvolts.

Signal Strong Enough to Produce Image

Unfortunately, during the period of maximum signal strength, there was no television receiver available on which to observe the video signal optically. When such a receiver was procured the period of strong signals had passed and there was not sufficient signal voltage to permit proper Kinescope synchronization. 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 (voice) signal frequently was of sufficient strength to give *excellent loud-speaker reproduction!* Its fading was prone to be deep and rather fast, but rarely was it of a selective (distortion producing) nature. In fact, when passed through a high fidelity amplifier and loud-speaker system, it produced *exceptionally* fine results as the transmitter's audio system, from microphone to antenna, is reputed to have a flat audio response curve from 40 to 10,000 cycles, something rarely to be found in the American *broadcast* band, due to the close spacing of transmitters and telephone line limitations. Only once was interference noted and that came from the fifth harmonic of a code transmitter on 8.3 megacycles, located on a ship off the coast of Scotland.

The audible response from the video channel consisted of a sharp 50 cycle buzz. This made it difficult to determine whether or not selective fading was *present*. The fading on this channel was quite slow and usually not deep.

German and French Vision Signals Heard

It should be mentioned that the German and French *television* transmitters 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.

Probably the reader now wonders if this is the start of regular trans-oceanic television broadcasting. In the opinion of the author this phase of television is still distant. The trans-oceanic reception of 40 to 45 megacycles may be explained as being due to exceptionally high *ionization 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. This phenomenon should reach its peak the winter of 1938-1939.

How to Listen for BBC Television Signals

Anyone possessing a receiver that is fairly sensitive in the region of 40–45 megacycles could probably hear these English emissions occasionally during the coming winter. A properly designed antenna is almost essential, as the usual broadcast antenna is usually quite poor *on* these ultra-high frequencies. One of the simplest to construct is the common half-wave doublet. It should be 40 to 45 feet above ground (higher or lower will give inferior results), *face England* and have a length of 11¼ feet. The two-wire transmission line *should* be as short as possible.

It should be remembered that winter is the time of year most favorable for long distance *reception of these* signals. Probably from the middle of December to the last of February is the time during which the strongest signals will be heard. At present the London television equipment is in operation daily except Sunday from 10:00 to 11:00 a.m. and 4:00 to 5:00 p.m. Eastern Standard Time. So far we have heard only the morning program.

More on TELEVISION in next issue—Data for building a receiver and other practical information.