Installation of 200 kw. Telephony Transmitter at Rugby Wireless Station.

4. After the preliminary data from these measurements became available it was possible to decide upon the size and type of transmitter and the receiving arrangements which would be necessary in order to attempt a commercial telephone service between England and America, and the committee recommended the Postmaster-General to install a 200-kilowatt telephony transmitter at the Rugby Wireless Station for this purpose, and in order to see what further difficulties would be encountered. It was hoped that this transmitter would, if successful in the experimental stage, be suitable for commercial working later.

The telephony transmitter apparatus was ordered by the Post Office from the Western Electric Co. (now Standard Telephones and Cables, Ltd.), who installed it at Rugby. A separate antenna and earth system and the necessary oscillating circuits for the telephony installation were also erected by the Post Office.

It was thus possible to obtain the advantages of conducting the initial experiments at the Rugby Station, where the high masts and the necessary power and certain plant were already available without additional expense.

The telephony transmitter installed at Rugby comprised modulation equipment and power-amplifiers. The modulation equipment converts the speech currents arriving over the cable system from London into weak wireless signals, using the "single-side-band suppressed-carrier system" already mentioned. After the wireless signals are produced in the modulation equipment they are amplified in three stages for transmission from the antenna. The power-amplifier consists of thirty water-cooled metal-glass valves, each of 10 kilowatts rating. This transmitter was designed on somewhat similar lines to that which was already in use by the American Telephone and Telegraph Co. at the Rocky Point Station, full advantage being taken of the experience gained in the working of that installation. The British installation was ready for trial early in 1926, and, after preliminary tests had been made, two-way conversation between England and America was first attained on the 7th February, 1926.

Installation of Receiving Arrangements at Wroughton and in the United States.

5. Improvements had also been made in the receiving arrangements. In this country a double receiving-antenna had been erected at Wroughton, near Swindon, in order to be near the main underground telephone system from London to the West of England.

Measurements and tests carried out in Scotland in 1925 and 1926 indicated that a considerable improvement would be obtained by reception in the north, and another receiving-antenna is being built at Cupar, which it is expected will be ready shortly.

In America also experiments had been made, using a receiving-antenna at different locations. As a result it was found that the more northerly the location the greater was the freedom from atmospherics, and the American Telephone and Telegraph Co. built a receiving-antenna system at Houlton, Maine, near the Canadian border. Improvements on this antenna, and the receiving arrangements have been continued, and further developments which have been suggested will be put into effect.

Decision to operate both Transmitters on the same Wave-length.

6. The preliminary two-way conversations were made on two separate wave-lengths, and had to be confined to week-ends, so as not to interfere with other wireless services. The early measurement work on signals and atmospherics had indicated that the optimum wave-length for this transatlantic communication would be between 5,000 and 6,000 metres. In this band there were over forty wireless-telegraph services already working, and the difficulties of finding room in this crowded range of communication were such that it was decided to attempt to operate both American and British transmitters on the same wave-length. This introduced a difficult problem, which was solved independently on both sides of the Atlantic by the development of switching-devices actuated by the voice. These devices switch the transmitting and receiving circuits at each end on or off, according to the direction in which the speech is proceeding.

Clearing the Wave-band of Existing Wireless-telegraph Services.

7. Having obtained satisfactory two-way telephony on one wave-length, it was decided to ask the authorities responsible for certain wireless-telegraph services whether they would be willing to alter their wave-length, and we have pleasure in recording the friendly spirit of co-operation shown by the Government Administrations in Germany, Italy, and Russia, and by the Air Ministry and Marconi Co. in this country, in making these changes in order to make room for the transatlantic wireless telephone service. On the American side also there were a number of wireless stations in the wave-band desired, under the control of the United States Navy, and they also kindly altered the distribution of wave-lengths used by their stations.

Opening of a Commercial Service.

8. In October, 1926, the experiments had progressed so far as to show that reasonable commercial working with America should be possible over a considerable portion of twenty-four hours each day, and the committee recommended the Postmaster-General to establish a commercial service on an experimental basis, in order to ascertain those defects and possible improvements which can only be eliminated and secured respectively by operating under actual service conditions. After consultation between the Post Office and representatives of the American Telephone and Telegraph Co., the service was opened for public use on the 7th January, 1927. The operating-hours were limited to the afternoon in this country, the portion of the day in which the business hours overlap those of New York; but with the expansion of the service it would be possible to extend considerably the hours of operation.