

introduction of machine switching in telephony is justifiable because—(a) Little or no improvement which will result in a better or more economical service can be visualized in connection with manual exchange plant. (b.) Difficulties in obtaining, training, and retaining efficient operators are so formidable in large cities that the future outlook is one of insecurity and increasing anxiety. (c.) The public and Press are demanding a better service. Owing to the increased cost of operating, and labour conditions generally, this demand cannot be satisfied in large cities under manual conditions unless an undesirable increase in the tariff is imposed. Even then, with the unstable operating conditions, the attainment of improved service will be problematical. Moreover, its permanency could not be guaranteed, whereas with a machine system a good service, once attained, would be free from violent disturbing influences. (d.) It would facilitate the introduction of increased rates in future if the Department could allay public criticism by promising a grade of service superior to that hitherto given, and not inferior to that which will shortly be available in the United States. We have no hesitation, therefore, in recommending the adoption of full automatic working as the only reliable method for notably improving the telephone service.”

Until recently the policy of the American Telephone and Telegraph Company and the associated Bell companies in regard to providing for future expansions to their systems, and particularly their views on machine switching, had not been clearly understood. I venture to say—having in view the fact that the Bell companies and the American Telephone and Telegraph Company have the manufacturing organization of the Western Electric Company to supply their needs—that the announcement of this policy was delayed until the Western Electric Company was in a position to manufacture apparatus on a scale large enough to show reasonably rapid progress after the first installations were commenced.

The American Telephone and Telegraph Company has decided to install what is known as the Western Electric Company’s “panel system” in all large multi-office areas in the United States. In fact, it is claimed that this system is the only one yet produced that can efficiently handle such services. Arrangements have been made by the Western Electric Company to manufacture this equipment on a large scale in its factory at Hawthorne, Chicago, and the American Telephone and Telegraph Company has prepared a programme of installation in various areas throughout the United States. Owing, however, to the increased troubles with the operating staff, particularly the difficulty in training and retaining them, as well as the greatly increased wages, it has been compelled to enlarge considerably its automatic programme. The output of the Hawthorne Factory is expected to be—in 1921, 230,000 lines; in 1922, 300,000 lines. The quantity of equipment required to carry out the enlarged programme is, however, greater than the anticipated output of the Hawthorne Factory, and arrangements have therefore been made with the Automatic Electric Company of Chicago for the supply of Strowger type apparatus to equip at least 75,000 lines per annum during the next five years: the Strowger equipment to be confined to areas with an ultimate of about 10,000 lines.

I found that the Automatic Electric Company had added a large extension to its factory, and was organized to manufacture Strowger type equipment at the rate of 75,000 lines per annum for the associated Bell companies, in addition to an output to meet the demands for independent companies and foreign business. I learnt from American engineers that it was not anticipated that any further large manual exchanges would be installed, but there would still, of course, be requirements for manual equipment for extensions of existing plant, but its cost will be relatively high on account of manufacturers having to maintain expensive machine tools for a relatively small output.

In America some States agreed to increase rates when an automatic system was promised, and others agreed to increase rates on condition that this system would be installed. For the large multi-office areas in the United States and for the five largest cities in Great Britain the Western Electric panel system has been adopted. The system being installed in our four chief centres and several provincial towns is the Western Electric rotary, and it is already giving service in several European cities and one or two towns in England. The panel and rotary are both “impulse-storing” systems—*i.e.*, the impulses are received and stored in “registers.” The panel, because of its being manufactured in 500-line units, is considered more suitable for large areas; some authorities go so far as to say that no other existing system is capable of handling telephone traffic in such large multi-office areas as London and New York.

From what I have seen of the Western Electric Company’s panel and rotary machine-switching telephone exchanges, I am of an opinion that in some respects the rotary has advantages over the panel, especially for conditions existing in New Zealand. Rotary is cheaper to install, and costs less to maintain. Before the war the rotary was being manufactured at Antwerp. Just prior to the Germans entering that city the Western Electric Company hurried the tools necessary for the production of this apparatus to its factory at Woolwich, London. The tools and machinery were no sooner set up than that portion of the factory was taken for the manufacture of munitions. The tools and machinery were again dismantled, packed, and shipped to the company’s Hawthorne Factory at Chicago. On the declaration of peace arrangements were made to retransfer this tool equipment to Belgium. The transfer was practically completed when I visited Antwerp. For the future, all the rotary apparatus necessary for completing the contract the Government has with the Western Electric Company, and for future extensions to this system at the various places where it is installed, will be supplied from Antwerp. It will be noticed that all our equipment for automatic telephone exchanges is of foreign manufacture.

There are two concerns making tried automatic-telephone apparatus in England—*i.e.*, the Automatic Manufacturing Company, Liverpool, and Siemens Bros., London—both turning out apparatus on what is known as the Strowger principles. The former company, owing to an agreement with the parent American company, is unable to do business with Australasia. Siemens