

PUBLIC CALL OFFICES (COIN-IN-THE-SLOT TELEPHONES).

The public call office telephone (familiarly known as the "slot telephone") continues to prove remunerative in business and densely populated residential areas.

During the year 66 additional public call offices were provided, bringing the total number in use up to 612.

CARRIER-CURRENT TELEPHONE SYSTEMS.

One of the most interesting developments of modern telephone practice is that known as the "carrier-current" system by which existing channels of communication can be multiplied without increasing the wire plant. The method consists in the application of high-frequency currents to existing telephone-lines, thereby increasing the number of telephone speech channels without increasing the number of wires carried upon the pole-lines. This advance in the telephone art has been made possible largely by the invention and development of two devices now indispensable to the communication engineer—the thermionic valve and the electrical filter.

In an ordinary telephone circuit, each frequency component in the voice of the speaker is transmitted by an electric current of the same frequency, but generally the electrical equipment is not called upon to transmit frequencies above 3,000 cycles per second. In carrier-current operation the voice-frequency currents are caused to modulate a high-frequency current, which thus serves as a carrier for the message. In this way an additional telephone channel is obtained using frequencies entirely above those transmitted along the ordinary voice-frequency channel. By using other high-frequency carriers several additional conversations can take place simultaneously over the one pair of wires. Each channel occupies a certain range of frequencies included in a band extending approximately from 4,000 to 30,000 cycles per second. The words of one speaker may, for example, be conveyed by a channel employing frequencies of from, say, 23,500 to 26,000 cycles per second. At the receiving end the various incoming groups of high-frequency currents are separated by electrical filters. Then by demodulation the original voice-frequency currents are reproduced and transmitted over voice-frequency circuits, such as subscribers' lines, the speech transmitted over each channel thus reaching the proper listener.

This is one of the subjects that received attention by the Chief Telegraph Engineer during his trip abroad in 1927. In 1928 it was decided that the carrier-current system should be adopted by the Department for the purpose of improving its long-distance telephone system and for increasing the number of telephone channels between centres where the use of the system would prove economical. Accordingly, in July of that year a contract was let for the supply of five carrier-current telephone systems, to be installed in various parts of the Dominion, as under:—

- (1) Three short-distance single-channel systems for use between Auckland and Hamilton.
- (2) One long-distance single-channel system (the terminal equipment of which will be installed at Christchurch and Seddon respectively), for supplementing the South Island land-line section of the Wellington-Christchurch telephone circuit, and for improving the quality of speech between Wellington and the principal centres south and west of Christchurch.
- (3) One three-channel system (the terminal equipment of which will be installed at Hamilton and Palmerston North respectively) for providing a single channel between Hamilton and Palmerston North and two channels between Wellington and Auckland.

Auckland-Hamilton Systems.—The three single-channel systems for use on the Auckland-Hamilton section are to be operated over three of the existing metallic circuits between those places. The installation of these three systems will obviate the erection of four additional wires over this section of line. The cost of the three carrier circuits will be considerably less than the estimated cost of erecting the additional lines that would have been required to provide the same facilities; and the carrier circuits will be more efficient than any of the existing physical circuits. Two of these systems have been in operation since November, 1928, and the third is now being installed.

Auckland-Wellington Three-channel System.—In this system three additional speech circuits will be obtained by the transmission of six groups of high-frequency currents over the existing metallic circuit. The system has necessitated the installation of equipment at Hamilton, Ohakune, and Palmerston North. It was found necessary to erect a new building at Ohakune for the accommodation of the carrier "repeating" or "amplifying" equipment. The terminal apparatus at Hamilton and Palmerston North is now being installed; but in consequence of delay in completion of the building at Ohakune it is unlikely that the complete system will be brought into commission before September, 1929, although a modified system may be made available when the terminal equipment is completed.

This system will enable the Department to provide two high-grade direct telephone circuits between Wellington and Auckland, and one direct circuit between Palmerston North and Hamilton. These new circuits will show an improvement of over 300 per cent. in efficiency (loudness or volume of speech) as compared with the existing circuits. The Department is confident that these improved facilities will bring about a rapid increase in the traffic handled over this section of line. Besides creating additional and more efficient circuits between the centres named above, this three-channel carrier system will form the first link in a high-grade long-distance telephone network in the North Island.

Christchurch-Seddon Long-distance Single-channel System.—The bulk of the equipment for this system has been delivered, and the remainder is due for delivery in April, 1929. It is expected that the system will be in operation about the end of June, 1929. At present there is only one direct circuit between Christchurch and Seddon (Marlborough). The additional circuit to be provided by the installation of the carrier system will minimize the delay that is at present incurred on Christchurch-