

The main telegraph circuits in New Zealand are worked on the manual Morse quadruplex system: this is four telegrams passing over a wire simultaneously, two being received at the same time as two are being sent. Machine printing will enable eight telegrams to pass over a single wire—i.e., four going and four coming at the same time, and each telegram being despatched at double the speed possible with manual Morse signalling. In other words, the carrying-capacity of the lines will, with machine-printing apparatus, be increased by 300 per cent., and an operator's capacity for getting off work will be increased 100 per cent., with, as I have already mentioned, less mental and physical strain.

The Wanganui-Nelson cable, of 107 nautical miles, which has been out of action only about twice in forty years, is now worked only duplex—i.e., one telegram sent and received simultaneously—and will with machine-printing apparatus be capable of carrying eight times the traffic it is now doing.

With a view to quickly increasing the carrying-capacity of some of our most-congested routes I sought to obtain sufficient Boudot tape-printers to bring this about. With the assistance of the British Post Office Engineering Department I managed to secure twenty tape-printers, which should arrive in New Zealand shortly. Some time must elapse before this apparatus is brought into practical use. Staff must be trained to work it, and different methods from those now in vogue for handling traffic must be organized.

In America Morse is now worked on local circuits only, the long-distance and the more important circuits being entirely equipped with machine-printing apparatus of the Western Electric Company's and the Morkrum types. Both these types are really identical with Baudot-Murray.

The Western Union Company is using page-printers only; but one of their prominent New York engineers informed me that the American public were used to typed telegrams—handwritten messages do not appear under any conditions, the reception of Morse at the Morse circuits being effected throughout by typewriters, of which only one pattern, the Underwood, is used. So the company started off with page-printers when it inaugurated machine telegraphy; but if it were going in for such a system to-day for the first time, and knew as much about it as it does now, it would not start with page-printers. He had data showing that a page-printer in comparison with a tape-printer wastes 13 per cent. of line time. Costs are higher for maintenance; a higher-class mechanic is required for adjusting them; and mistakes are more easily corrected on tape. He went on to say that an operator can just as readily gum tape and check telegrams as one watching signals being received on a page-printer. He also said that the company was considering a printer to do sixty words per minute, which can easily be got from a tape-printer; it could then work multiplex three channels at sixty words a minute instead of four channels at forty words a minute, thus saving line time, with fewer operators.

Line difficulties such as momentary contacts and varying insulation produce a larger reduction in output on the more complex systems than on simpler ones—that is to say, a page-printing multiplex will suffer more from these effects than a similar set using tape-printers. I saw a Baudot tape-printer at London which I was informed had been in use for thirty years.

We shall be in a position to try out both types of printers when the Murray page-printers come to hand.

There is a simpler type than the multiplex of machine telegraph apparatus used in America, which is known as the "start-stop" or the "Teletype." It will send signals for printing messages in both directions over a wire. It uses the same keyboard and signals as the Baudot, and can be used on a lot of our circuits with a considerable saving in man-power. I have secured a set for trial.

It should be noted that various instruments which go to make up machine telegraphy are interchangeable. For instance, on a London-Manchester circuit I saw working on one of the multiplex channels a Murray keyboard, a Western Electric transmitter, and a Baudot tape-printer. At the corresponding end at Manchester they had a Baudot five-lever key worked manually, and a Western Electric page-printer.

Start-stop or Teletype apparatus will work into a multiplex set. Duplex quadruple could be used over a wire from Wellington to Christchurch, and by means of simple repeaters at Christchurch channels for Greymouth, Oamaru, and Timaru provided, leaving the fourth channel for Christchurch-Wellington traffic. So Greymouth, Oamaru, Timaru, and Christchurch would be simultaneously sending and receiving a telegram to and from Wellington, so that in effect eight telegrams would be passing to and from over a single wire between Wellington and Christchurch. When such apparatus is installed throughout our country it does not require much imagination to see that working will be possible to all centres—i.e., all centres will be in intercommunication, thus saving greatly in transmitting or relaying staffs, with a corresponding reduction in number of hands through which telegrams will have to pass, and a corresponding reduction in the chances of error. The apparatus at Timaru, Oamaru, and Greymouth would have no machinery moving when there is no traffic to be despatched or received.

In Great Britain accumulators are used at all the larger telegraph centres for providing the electric currents for working telegraph apparatus, and in America machines are universally used for this purpose. The Western Union Company used to have several machines working on one shaft, but found this arrangement caused too frequent and unduly long general stoppages when anything failed in power plant. The company now uses individual machines for its various voltages, and finds that four voltages satisfactorily meet all its requirements. The voltages are 110, 160, 240, and 320, the last for the "B" sides of Morse quadruplexes; but as quadruplexes are fast disappearing—I saw only two sets in America—there is not much demand for this high voltage. The company used to have 26 and 52 volts for local circuits, but nothing less than 110 volts is now used. The machines are various sizes, depending on the size of the office; they range in size from 100 to 2,000 watts, in jumps of 100. The company has just recently adopted double commutator generators,