

In New York long-distance exchange the arrangements for using the telephone-lines for telegraph circuits that are leased, both telephone and telegraph work proceeding simultaneously, form quite a feature. There are about 250 of these composited lines. All are fitted up as duplex, though most are worked simplex. Storage batteries are used, and voltages, not in excess of 120, that are suitable for the circuit. The lines take 50 milliamperes and more in bad weather. Relays are wound to 200 ohms, repeating-relays 250 ohms and sounders 20 ohms. Sounders are worked off 24-volts 400-amperes hours' storage battery. They take about one-third of an ampere. Lamps are inserted in the local circuit to keep down the current. There is a large number of testing-positions and men for attending to the different requirements. These men are paid more than operators—usually from £20 16s. 8d. to £22 18s. 4d. a month. They work nine hours a day.

There is very little noise on the composited circuits. Conversations to Boston, Chicago, and Washington were listened to, but only on the Chicago circuit was there any flattened Morse noise, and that was faint and not noticeable while talk was going on. Many circuits had to be plugged in on to find one that was giving trace of noise. In New York loops of local circuits are taken from the exchange to the lessee's premises. These loops pass through a coil differentially wound. When there is anything wrong the lessee presses a button, which puts an earth on and cuts out one of the differential windings. A shutter then drops at the testing-room, and attention is at once called and the difficulty remedied. The charge for these leased wires is usually about 20 dollars, or, roughly, £4, a mile. Wires are sometimes leased for certain hours of the day only.

To Philadelphia, ninety miles distant, there are underground lead-covered cables containing 116 pairs. These are run in an earthenware conduit. The pairs are paper-insulated, and are Nos. 13, 14, and 16 B. and S. They are not phantomd. There are also similar cables as far north as New-haven, seventy-five miles.

For long distance up to, say, 600 miles on composited aerial lines the telephone ringing is done in a special manner. The ordinary 16-cycle ringing works a relay at the home office, which brings in a high-frequency ringer by means of a slow-acting relay. This closes a contact at the distant end, which brings in the 16-cycle usual ringing at that end. "Ring off" is got by the operator releasing on the subscriber's signal, and then passing a signal to the far end.

Connections to Philadelphia are given on practically a "no-delay" basis. Thirty-three circuits of an underground cable are used by eight operators in the "busy hour." The load then varies from 180 to 190 calls. The work is done by order-wire. The distance is ninety miles, and the rate is equivalent to 3s. 1½d. The maximum delay is three minutes and a half, and most communications are connected through within a minute.

There are 350 girls engaged on long-distance work. This is the American Telephone and Telegraph staff. Their quarters are comfortable. There are dining-room, sitting-room, kitchen, and matrons. The girls are provided with milk, tea, and coffee free. They bring their own lunch. Eight hours constitutes a day's work. Wages are from 10 to 12 dollars, or about £2 to £2 10s., a week. "Information" is provided for at a special board to accommodate eight persons.

Battery-charging appliances, ringing-appliances, fuse-panels, main and other frames, coil, relay, and meter racks, &c., are all of the usual Western Electric type, and neatly wired, jumpered, and cabled. Great care is taken to keep all clear of dust. Men go over parts with cloths and also "blow out." Wires can be "ordered up," and the usual tone tests, observation of the operators and of the subscribers can all be applied.

The Cortland and Rector exchanges of the New York Telephone Company were visited. These two exchanges are in the same building. This company has its own toll-board apart from the "long-distance" board of the American Telephone and Telegraph Company for operating toll lines of 400 miles or so in its own territory. They record and pass tickets by tube to special positions, where they are, after examination, passed away to other positions by tube, to be distributed by girls to special places.

There is very little delay on toll-work. Everything here is on the "no-waiting" basis. Toll rates are high. New York and American people generally want to talk at once, so that many circuits have to be kept ready to meet the demand quickly at busy times.

The toll-board and local exchange staffs are kept quite separate. Each has its own retiring-rooms. There are day, evening, and night staffs: these are distinct, there being no rotation of day and night staffs. Operators are transferred when necessary from one staff to the other.

The lighting of these exchanges is by tungsten lamps with holophane shades. The reflector methods of lighting up the panels of switchboards is being generally abandoned. The rooms accommodating these exchanges are about 12 ft. high. Artificial ventilating is used to exhaust vitiated air.

Cortland exchange has multiples on the A, but they are not much used. Most of the calls are trunked. In both exchanges keyless ringing is used on the B boards. The cords on all positions are coloured red, white, and green, and the supervisory lamp-opals are of similar colour to correspond with the cords. This is to assist in tracing cords, so that they may be taken down more quickly at the conclusion of a conversation. There are no party lines. Cords are tested at night, but the girls in actual work are considered to be the best testers, as they should detect trouble in conversation and check the cords.

Ancillary answering-jacks are provided in the Rector exchange on the A board to aid team-working. These have been cut in on the cables at the back of the board, and well taped and insulated. On A boards there is different equipment on the key-shelf for the different classes of service, and similar kinds of service are gathered together. There are no "hospital" positions. The coloured buttons are inserted in every section.