

The trunk exchange was visited, and was found to be very interesting. The room is large, being about 45 ft. wide by 120 ft. long, and extending further in a right-angled turn. The equipment consists of 118 working positions, 4 spare positions, 448 trunk lines, 547 junction lines, and 149 record lines. Each section consists of three panels. The centre panel contains rows of twenty three-point jacks. These junction lines are worked with call wires, and part go to common battery and part to magneto exchanges. There are two other rows of five jacks, and lamps which go to A transfer sections and to "local subscribers' sections." Some local subscribers make special arrangements to have telephones at their premises for trunk-working only. The other panels are called "trunk panels." Each is fitted high up on the panel with five name-plates and five "outward" concentration jacks, so as to pass the trunk lines to another part of the board at night. Just beneath these are ten "inward" concentration jacks. The two lower rows of jacks on the panel correspond to these, and when the top sets are plugged the bottom are not, and *vice versa*. In the centre of each panel there are rows of twenty jacks for the signalling-junctions. Each has a button associated with it, which upon being depressed lights a red lamp common to all if that junction is engaged. The junctions are multiplied over several sections. Lower in the trunk panel are strips of twenty jacks and lamps for the B transfers.

For transfer work there are two switching positions. Any operator getting a demand from one toll line for another plugs into an A transfer. This calls the transfer operator, who gets the order and plugs into a B transfer-jack in the verticals before her. This lights a lamp at her position and another at the position required. On the call being taken up both lamps go out, and when the conversation is completed they light again, upon which the transfer switching-operator takes down the cord. This action passes a lamp signal to the A transfer originating-operator, who also takes down the cord.

There are forty-eight record positions. Subscribers' demands reach these positions through record switching-operators. These operators have plugs before them, the tip and ring of which lead to the record operator's lamp and key. On any demand they merely take up a plug, insert it in a jack, and at once the subscriber can give particulars to the record operator, who prepares a ticket and despatches it by air-valve to the distributing-centre, where it is examined and then sent by air carrier to the proper trunk position. The record operator on receiving a call pulls her speaking-key and the lamp darkens. On restoring that key a signal is given for disconnection at the switching section. When a conversation is completed the ticket is retained at the section for some time, so that inquiries concerning the call may be facilitated if any are made.

A $3\frac{1}{2}$ -horse-power motor is installed for the ticket-distribution. Vacuum is used to the distributing centre, and pressure thence to the trunk sections.

There are eight telegraph call-wire circuits. This class of circuit is going out of use; fewer are employed now than formerly. There are two telephone call-wires, and about sixty other ordinary order-wire circuits. The originated calls are about eight thousand to ten thousand a day.

The French outgoing calls are 180; incoming, 230. Belgian, about sixty each way. The speech on the two foreign sections was listened to, and was found to be good. It was better, however, on the loaded than on the unloaded circuits. Several of the circuits to the provinces were listened on and found to be quiet. Operators are not given more than five circuits to attend to.

There is a large blackboard at one end of the record-table on which is written the delay that is occurring on circuits during the different hours of the day, so that operators may be able to advise the public as demands are made. This delay is often twenty to thirty minutes, and runs up to forty-five minutes and over at times. There is not the liberal supply of trunk wires here that there is in America.

The writer has frequently heard a business man speaking from London to another at Manchester, and found there was considerable difficulty in their understanding each other.

The following gives an idea of the class of circuit provided, expressed in terms of standard cable: There are ten circuits to Manchester, each equivalent to about fifteen miles of standard cable, so talking should be easy. The circuits to Liverpool are better, there being sixteen, and four under erection. These represent twelve miles and a half to thirteen miles and a half of standard cable. London has four circuits to Glasgow as good as those to Manchester.

All trunk lines are twisted. Some discussion arose in America about the relative merits of twisting and crossing wires. They prefer the crossing methods in the States. There is, however, much to be said for twisting, which is also done on the Continent.

It should be mentioned that in this trunk exchange there is a system of informing subscribers speaking on the trunk wires when the three-minutes period has elapsed. These time-checks were also seen in operation at Manchester and at Liverpool trunk exchanges. They are well spoken of. A master clock works a relay which controls several electro-magnets. A shaft on which are mounted ten wheels is moved by the electro-magnet, and revolves in twenty-four minutes. There is a friction-clutch which, when current is applied, causes a part to be set in motion, and which at the end of three minutes has moved so far as to close a contact, which lights the line-lamp. The operator then advises the speakers of the time. At the beginning of the conversation the operator pulls out a little button near the line-lamp, which closes a circuit through a coil in the clutch. Pushing back the button breaks the circuit, releases the clutch, and allows the movable piece to drop to normal.

Liverpool and Manchester trunk exchanges have almost as many positions as London. Liverpool has eighty-four. Tickets, made out here by record operators who sit at a table in the centre of the room, are placed on a travelling band and conveyed thereby to a distributing-position at the end of the record-table, and delivered thence by hand to the trunk sections. There are about four hundred and twenty trunk circuits. Between Manchester and Liverpool there are sixty-eight trunks, many of them underground and loaded. The distance is about forty miles. There is an 80-pair underground cable made up of 40 lb. copper loaded,