

troubles; yet another 100, 98 troubles; and 300 telephones had 175 troubles. At an unattended exchange of 276 subscribers the actual faults per 100 subscribers, in five months were 94, 119, and 107.

In the main exchange there is only *one* man in attendance from 11.30 p.m. until 7 a.m., and two information operators at night. There are only two other of the exchanges that have permanent attendants in the daytime. There is one attendant at each by day and none at night. The main exchange is the only one that has a switchman on duty at night.

East branch office has 700 lines equipped and a capacity for 1,200. It is in the dining-room of a residence, and is cared for by a man who lives in the building with his family and who looks after another exchange of 260 lines. Repairs are effected at a small bench in the switch-room.

Franklin Park is another attended exchange. It is three miles from the main office. The building is of brick, with a concrete interior. There are 680 lines in use and space for a few hundred more. The engineer stated that before this building was erected it was figured it would cost 48,000 dollars (£10,000) to supply the district from the main office, while the actual cost by a branch exchange was 28,000 dollars, or £5,933. The other offices range in size from about 300 to 60 lines. Several of them are in special-type buildings which cost from 1,500 to 2,000 dollars, or about £312 to £416. It has been found such elaborate buildings are not necessary. Control of these exchanges is got automatically from the main exchange. It is proposed to have four more sub-exchanges of 800, 300, 200, and 100 lines. A sub-exchange of 100 lines is found to be cheaper than four-party service.

Before introducing automatic, Columbus had, from 1900 to 1905, a manual common-battery board which was working well. Extensions were required, and it was figured that it would pay to install automatics, which was done. They have been unable to sell the manual plant. Automatic has been in operation at Columbus for six years. The officers express themselves as well pleased with the plant and its operation. Some years ago Columbus (in Georgia) had an automatic equipment. The exchange came under the control of the Bell interests, and the automatic was put out. The apparatus was then purchased for extensions by the Columbus (Ohio) Company and is in operation to-day. There were 1,000 lines. Wear is here, as in other automatic exchanges, not a matter of any consequence.

For a considerable period Columbus and Dayton, seventy miles distant, and both automatic, operated their toll lines between those places automatically. A subscriber at Dayton would call the toll operator there, who would make the charges and then call direct to the subscriber at Columbus, and *vice versa*. This very largely increased the number of calls that could be made over the toll lines, as many as 175 calls a day being made on one circuit, mostly in the day hours. The direct working has, however, been abandoned, as the authorities having control of the toll lines did not keep them in sufficiently good order for this class of work. Similar methods prevail between automatic exchanges in the Montana region, and Columbus is working tolls in that way with Newark and Lancaster, twenty-five to forty miles distant, to the great advantage of the work.

A number of people were called on by me, and inquiry made whether manual or automatic service was preferred. The replies were about 80 per cent. in favour of automatic.

The rates are—

						Per Annum.		
Within city limits—						£	s.	d.
Business	..	..	..	..	..	8	6	8
Residence	..	..	..	..	..	5	0	0
Outside city limits (extra each half-mile beyond city limits)—								
Business	..	..	..	..	..	1	5	0
Residence	..	..	..	..	..	0	16	8
Two-party lines (within city limits)—								
Business	..	..	..	..	..	7	1	8
Residence	..	..	..	..	..	3	15	0

Dayton (population 120,000) has about 7,600 automatic telephones. The apparatus here is old-type, local batteries at subscribers' telephones and the like. They are changing gradually to the two-wire system and introducing common battery. About 1,000 telephones have been altered. The switch-room staff consists of 8 men. There are 7 clerks for information and trouble, 1 man who attends to private branch exchanges, and 3 men in the workshop. Wages are the same as at Columbus. Cost of material for maintenance is low. They contemplate nine sub-exchanges, and would like them, but no money is available, as the Ohio Independent Companies have been bought by J. P. Morgan, and there is no money forthcoming for any purposes. It was noticed that there was a girl at a position whose only duty was to give baseball results to the public as they called up. She was quite busy, too. This class of service sometimes requires two operators, and is done free. Some other companies also give that information to the public. The rates are, for individual lines—Business, £8 6s. 8d. per annum; residence, £5 per annum: throughout the area.

Richmond (population 22,000) has an automatic system. The main exchange has 2,077 telephones. There are three unattended sub-exchanges, each about a mile distant from the main exchange, having about 290, 220, and 100 telephones. There are 170 telephones on party lines, and about 300 on farmers' lines—total telephones about 3,200. The staff consists of 4 men and 2 apprentices, drawing 375 dollars, or £77 1s. 4d., a month: 2 girls, 35 and 30 dollars, or £13 10s. 10d., a month: these are inside. Outside are two trouble-men drawing £22 18s. 2d. a month. In this exchange the working-expenses per telephone are £1 12s. This includes every expense up to interest on bonds and dividends. They pay 5 per cent. to 6 per cent. The rates are, for individual lines: Business, £7 10s. per annum; residence, £3 15s. per annum: anywhere in the area. Toll lines are worked automatically between this exchange and the automatic exchange at Dayton, forty-two miles distant. This increases the carrying-capacity of the toll lines. They have also worked with Columbus, 112 miles away, in the same manner.

Champaign and Urbana (population about 20,000) have 2,800 telephones, mostly automatic. Urbana is about two miles from Champaign and is the site of the State university. The university