satisfactory to the user, who did not appear to have any desire to quit and go over to the manual company, nor had the automatic operating company any fears that service rendered in that way was going to be prejudicial to the retention of their subscribers.

It should be explained that in moderate-sized and large cities where telephone service is given manually there are usually several exchanges, and the subscribers to these require to intercommunicate. This necessitates two classes of switchboard in each office called the A and the B board. The A board receives the subscribers local to each exchange. The B board receives the *incoming* calls from any A exchange, and the B operator has to complete such calls to the subscribers local to the exchange called into. This the B operator does through the multiple. There are usually half as many B as A positions, so that half as many B as A operators are required. Of course, where there are not many exchanges in an area, and whatever are are small, this relation of numbers does not hold, but for the present purpose let it be considered so.

The use of semi-automatic dispenses with all those B operators, with all the apparatus at B positions, and saves the floor-space they have been taking up. It does more, because it has been found that a large proportion of the errors that take place on manual switchboards occur between the A and the B operators, and these cannot now happen. The A positions working semi-automatic do not require the multiple of the subscribers, and the high cost of that is effaced. That saving, however, is only possible in cases where the multiple has been on the A board, and in large places where trunking of calls is in excess of 75 per cent. the multiple is placed only on the B boards and all calls are trunked. The A operators, semi-automatic, have only one cord, and it has been found that while on the manual the number of straight-line calls that can be properly taken care of is about 230 per hour, the capacity of an operator is increased to about 350 calls, so that the number of A operators can also be largely reduced, say about 35 per cent. Some switchboard is still necessary, but it is much reduced and simplified. In the place of the more complex manual board, automatic machinery has been introduced. The A operator can be still further reduced by dispensing with the upright boards with cords and supervisory features, and in their place substituting flat boards, comparatively inexpensive and taking up but little space. Automatic mechanism is then introduced to distribute calls to any operator who may chance to be idle at the moment. This more evenly divides the work, and it is found that an operator can take care of 450 to 500 calls per hour by these means.

From the preceding considerations it can be seen how telephone authorities in large areas with multi-offices may figure that it is economical to install semi-automatic, and thereby retain certain features of control and of the operator keeping in touch with the subscriber that under certain conditions are considered by some operating companies as indispensable. It is worth while noticing how far such considerations would be applicable to our New Zealand conditions. So far we have only single-office exchanges, therefore no B boards. If we were to adhere to manual switchboards the time has probably arrived when it will be imperative to have another or other exchanges in each of our four large centres. This would, of course, bring along B boards at all such exchanges. They would not, however, be very extensive for some time to come, but whatever may be their size it is desirable to avoid them if at all practicable. There being no B boards, semi-automatic would not effect there any reduction of operators, apparatus, or floor-space, except the prospective reduction referred to in the preceding sentence. It is only on the A boards that reduction of operators, apparatus, and floor-space could be looked for. Dealing, therefore, with the semi-automatic method that distributes to the idle operator, which method requires fewer operators and less apparatus and floor-space than the other method using cords and supervisory control, the situation works out about as follows :—

Assume a single-office exchange of 6,000 subscribers and a calling-rate per day per subscriber of 8, the number of calls in the " busy " hour one-eighth of the total daily number, there are then 6,000 calls coming in the busy hour. In common-battery exchanges operators are expected to be able to make 230 *straight-line* connections per hour on the basis of being only thirty minutes occupied in the hour. Some companies place this at 250, and it came under my notice in two or three places that 275 were required; 230 seems reasonable. Various considerations operate to increase the value of each call, so that having regard to the future it is probably fair to recokon 190 actual calls as equivalent to these 230 straight-line calls. This would require about 32 or 33 positions. Taking 1·75 as the multiplier per position to arrive at the number of operators required for the twenty-four hours, and to provide for relief and sickness, there would be needed, say, 56 operators, 4 monitors, and 2 supervisors, at a cost of about £4,520, plus 2 information and complaint clerks, and 1 observation clerk—say, 3 at a total of £260 = £4,780 per annum. Toll-board operators are not being considered, and distinction has been made between the cost of men at night as compared with women. By the semi-automatic method of distributing to the idle operator, as each operator can handle 450 calls, to take care of 6,000 calls 13 operators would be required in the busy hour, say another 6 to provide for relief, sickness, and hours not covered by those of the 13 operators, and 3 for night-work. (It is to be noted that night-work can be more easily cared for by this method than by manual, as the operator does not need to move about: she remains seated, and the calls seek the position.) Total, 22 operators, 2 monitors, and 1 supervisor; cost, £1,920, plus £160 for 2 information and complaint clerks = £2,080. Operators are taken at an average of £70 per annum, monitors £110, and supervisors £160. The other semi-automatic method, with the cord and supervisory features, would work out higher for operators, and would require more apparatus and floor-space besides.

Semi-automatic and full-automatic systems, so far as the automatic mechanism is concerned, are practically the same. The operator is provided with a keyboard in the first case to enable her to start automatic appliances that in the other case the subscriber starts by means of a dial, or set of levers, or as may be otherwise suitably arranged.

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