

case. A building has to be provided; it need not be large. The satellite Wiltshire, which is a sub of West Branch exchange, Los Angeles, is a brick building 20 ft. by 20 ft. It provides for 500 subscribers, and has room for about 700 more. The building must be maintained, must provide for circulation of air, provision must be made for heating and lighting, and for supervising from the main exchange. The apparatus must be kept in order by a visiting switchboard-man, and when anything is wrong it must be specially visited. If the satellite is not installed, a corresponding quantity of apparatus has to be maintained at the central office. The problem thus becomes one of balancing the annual cost of the satellite against the annual cost of the extra outside plant that would be required if it were not used. It is found that operating companies with experience of satellites are increasing them.

It may be of advantage at this stage to consider purely operating-costs for the three systems, magneto, common battery, and automatic. The questions of depreciation and interest will not be touched on, as the way these affect the annual charges has already been indicated.

In considering the magneto system the operating-charges for the Wellington Telephone Exchange will be set out. The operating-charges for common battery and full automatic must be estimated.

Wellington has about 3,800 lines and 1,200 extension telephones. The calling-rate is about 8 per day a line. The operating-expenses inside are, per annum :—

	£
1 manager .. .. .	290
2 switchboard-men (inside) .. .. .	346
2 test clerks .. .. .	350
1 main-frame man .. .. .	160
1 man repairing cords .. .. .	140
66 operators (females) at £61 average .. .. .	4,025
Night operators (men), 17 working half-time on S board .. .. .	1,155
5 supervisors and monitors .. .. .	720
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	£7,186

For common battery manual with 3,800 lines and 1,200 extensions, calling-rate 8 a line a day, the operating-expenses per annum would be :—

	£
1 manager .. .. .	290
2 switchboard-men (inside) .. .. .	346
2 test clerks .. .. .	350
1 main-frame man .. .. .	160
1 man repairing cords .. .. .	140
48 operators* at £70 for day and night work .. .. .	3,360
5 supervisors and monitors .. .. .	720
Observation clerk .. .. .	100
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	£5,466

\* It is found that £70 is the average annual salary for operating the Wellington exchange, although the average salary of the cadettes is only £61. Toll operators are *not* included.

For automatics with the same number of lines and rate of calling we get, per annum :—

	£
1 manager .. .. .	290
1 switchboard foreman .. .. .	250
1 wire-chief .. .. .	220
1 assistant wire-chief .. .. .	160
1 main-frame man .. .. .	170
6 switch or inside-trouble men at £170 .. .. .	1,020
4 information and complaint clerks at £80 .. .. .	320
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	£2,430

The difference between magneto and common-battery operating-costs for the same work amounts under magneto conditions to £7,186 — £5,466 = £1,720 per annum in favour of common battery.

The capital cost of equipment for common battery, if both were being put in new, would be less than for such a magneto-board as is in use at Wellington, as considerably fewer sections would be required.

The automatic switchboard-operating or inside maintenance costs are much lower than the inside costs of the other two systems. The comparison between automatic and those systems cannot, however, be made on that basis alone, as the first cost of plant and the increased cost of telephones due to the dials have to be considered. Automatic has already been shown to possess an advantage in annual charges over common battery of about £1,500 per annum for 6,000 lines, or, say, £1,000 for 4,000 lines. Taking, therefore, £1,720 and £1,000, it would appear that full automatic equipment would possess an advantage for Wellington over *present* costs of operating of £2,720 per annum. As some of the factors to reach this conclusion have had to be estimated, and so that automatic advantages may not be unduly pressed, if the gain be taken at, say, £2,000 per annum that amount represents a very substantial consideration.

The toll work in Wellington is now performed by eleven operators, drawing £965 per annum. That has been left out of consideration in the preceding remarks, and would remain unaffected, as toll work must continue to be done manually.