1927.

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

by Senator Reid

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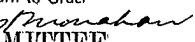

Senate.

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PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

REPORT

TOGETHER WITH

MINUTES OF EVIDENCE

RELATING TO THE PROPOSED ESTABLISHMENT OF AN

AUTOMATIC TELEPHONE EXCHANGE

AT

OAKLEIGH, VICTORIA.

By Authority:
H. J. GREEN, GOVERNMENT PRINTER, CANBERRA.

F.793.

MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

(Fifth Committee.)

GEORGE HUGH MACKAY, ESQ., M.P., Chairman.

Senate.	*House of Representatives.*
Senator John Barnes.	Malcolm Duncan Cameron, Esq., M.P.§
Senator Patrick Joseph Lynch.*	Robert Cook, Esq., M.P.‖
Senator Herbert James Mockford Payne.†	The Honorable Henry Gregory, M.P.‡
Senator Matthew Reid.	Andrew William Lacey, Esq., M.P.
	David Charles McGrath, Esq., M.P.
	Alfred Charles Seabrook, Esq., M.P.

* Resigned 30th June, 1926. † Appointed 1st July, 1926. ‡ Resigned 2nd March, 1927. § Appointed 24th March, 1927.

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EXTRACT FROM THE MINUTES OF THE EXECUTIVE COUNCIL—No. 51, DATED 7TH MAY, 1927.

Postmaster-General's Department,
7th May, 1927.

Departmental No. 51.

Executive Council

No. 24.

MINUTE PAPER FOR THE EXECUTIVE COUNCIL.

Subject:

PROPOSAL FOR THE ESTABLISHMENT OF AN AUTOMATIC TELEPHONE EXCHANGE AT OAKLEIGH, VICTORIA.

Approved in Council.

(Sgd.) W. G. GIBSON,
for Governor-General.

18th May, 1927.
Filed in the Records of the Council
(Sgd.) J. H. STARLING,
Secretary to the Executive Council.
19th May, 1927.

I recommend for the approval of the Governor-General in Council that in accordance with the *Commonwealth Public Works Committee Act* 1913-1921 the undermentioned work be referred to the Parliamentary Standing Committee on Public Works for investigation and report thereon to the House of Representatives, viz.:—

Oakleigh, Victoria; establishment of an automatic telephone exchange.

(Signed) W. G. GIBSON,
Postmaster-General.

LIST OF WITNESSES.

OAKLEIGH AUTOMATIC TELEPHONE EXCHANGE.

REPORT.

THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS to which His Excellency the Governor-General in Council referred, for investigation and report to the House of Representatives, the question of the proposed establishment of an automatic telephone exchange at Oakleigh, Victoria, has the honour to report as follows:—

PROPOSAL.

1. The proposal submitted is to erect a telephone exchange building on a site which has already been acquired in Neerim-road, Oakleigh, and to install therein an automatic telephone switching system having an initial equipment for 1,300 subscribers' lines, and an ultimate capacity of approximately 4,300 subscribers' lines. It is proposed that the initial equipment shall be capable of extension to the ultimate capacity named, thereby affording sufficient accommodation for the anticipated development in the Oakleigh area for a period of 20 years after the proposed date of opening.

REASONS FOR THE PROPOSAL.

2. It is stated that the present manual magneto telephone exchange at Oakleigh will reach the limit of its capacity by about 1928, and that, owing to building limitations, no adequate extension of it can be made in the existing structure. It is represented that it would not be economical to utilize the site of the present manual exchange for the automatic installation owing to its distance from the telephone centre of the area. It is proposed, therefore, to install modern automatic plant in a new building on another site; by which course it is claimed it will be possible to render a more efficient service to the existing and prospective subscribers in the area.

ESTIMATED COST.

3. The estimated immediate cost of the proposal as submitted to the Committee, is set down at:—

	£
Site (already acquired)	744
Building	5,800
Air conditioning plant, &c.	2,650
Exchange equipment (including that necessary at other exchanges) ..	24,722
Substation equipment	4,800
Line plant (diversion)	1,009
Sundries	455
	40,180

COMMITTEE'S INVESTIGATIONS.

4. The Committee visited Oakleigh and inspected the existing manual telephone exchange and the site suggested for the new automatic installation, and traversed portion of the district which would be served by the new exchange. Careful attention was given to the plans submitted, and evidence was taken from the telephone and works officials concerned with the proposal.

SITE.

5. The site, acquired in June, 1926, for the sum of £744, is situated at a distance of 140 feet from the corner of Neerim and Poath roads, Oakleigh, and has a frontage of about 106 ft. 3 in. to Neerim-road, by a depth of about 200 feet. The area is level in character, good building land, and as its location practically coincides with the theoretical telephone centre of the proposed automatic exchange district, it is represented as being eminently suited for the purpose for which it is intended.

BUILDING.

6. The building suggested has been planned to suit the site, and conforms with the requirements of the Postmaster-General's Department. The design is for a fire-resisting structure which will comprise a switch room 64 feet by 39 feet by 14 feet high. The accommodation accessory to the switch room will be a power room 23 feet by 20 feet 3 in.; a battery room 20 feet 3 in. by 18 feet; an air conditioning room 26 feet by 16 feet; a staff room 15 feet 6 in. by 10 feet; a linesmen's room 25 feet by 9 feet 10 in.; a store room 16 feet by 6 feet as well as the usual lavatory accommodation.

7. The construction will be of brick with a concrete ceiling over which there will be a low iron roof concealed behind a parapet, which serves also as an additional safeguard against fire. All walls will be of brick and the floor of concrete 6 inches thick; window frames will be of steel with wired fire-resisting glass. A chimney is provided in connexion with the air-conditioning plant, and a brick flue will ventilate the battery room.

8. It is proposed that the building shall be erected 11 feet 6¾ in. from each side of the boundary, and a similar distance back from Neerim-road. The total frontage of the building will be 83 feet, and the depth 64 feet, so that at the rear there will be a clear space of 120 feet. This will provide any storage room required for linesmen and be available for any building extension that may be required in the future.

9. After carefully examining the plans and hearing the explanation of the Director-General of Works and Chief Architect, the Committee is satisfied that the building has been designed with due regard to economy, and will be quite suitable for its purpose.

FINANCIAL ASPECT.

10. It was stated in evidence that the total annual charges, including interest and depreciation, for the proposed automatic system as at the date of establishment, viz., 30th June, 1928, are estimated at £10,237, and five years later at £12,154. The estimated revenue at 30th June, 1928, is set down at £10,244, and five years later at £16,394. The assets thrown spare if the automatic system is installed on 30th June, 1928, are estimated to have a recoverable value of £7,450.

COMMITTEE'S RECOMMENDATION.

11. After due consideration the Committee unanimously agreed to recommend that the proposal for the installation of an automatic telephone exchange at Oakleigh, Victoria, as submitted, be proceeded with.

G. H. Mackay

G. H. MACKAY,
Chairman.

Office of the Parliamentary Standing Committee on Public Works,
Parliament House, Canberra,
5th October, 1927.

MINUTES OF EVIDENCE.

(Taken at Melbourne.)

WEDNESDAY, 31ST AUGUST, 1927.

Present:

Mr. MACKAY, Chairman,

Senator Barnes	Mr. Cook
Senator Reid	Mr. McGrath.
Mr. M. Cameron	Mr. Lacey

John Murray Crawford, Chief Engineer, Postmaster-General's Department, Melbourne, sworn and examined.

1. *To the Chairman.*—I am aware that the Committee is considering the construction of an automatic telephone exchange at Oakleigh. The proposal is to erect a building on a site already acquired in Neerim-road, Oakleigh, and install therein an automatic telephone switching system having an initial equipment for 1,300 subscribers' lines, and an ultimate capacity of approximately 4,300 subscribers' lines. It is proposed that the initial equipment shall be capable of extension to the ultimate capacity named, and thus enable requirements in the proposed automatic exchange area to be met for twenty years after the proposed date of opening. The existing manual magneto telephone exchange will reach the limit of its capacity by about 1928, and owing to building limitations cannot be extended in the existing building. It will not be economical to utilize the existing site owing to its distance from the telephone centre of the area. It is proposed, therefore, to install modern plant in a new building on a new site, in order to give efficient service to the existing and prospective subscribers in the area The estimated immediate cost of the work is—

Site (already acquired)	£744
Building	5,500
Air-conditioning plant, &c.	2,500
Exchange equipment, including that necessary at other exchanges	24,722
Sub-station equipment	1,800
Line plant (diversion)	1,009
Sundries	455
	£39,730

The actual revenue for the year ended 31st December, 1926, and the annual revenue, it is estimated, will be obtained on the date of opening, about June, 1928, and five years thereafter, is shown hereunder.—

Average Number of Subscribers' Lines connected during the Year ended 31.12.26.	Actual Total Revenue received for Year ended 31.12.26.	Estimated Number of Subscribers' Lines 30.6.28 (date of opening.)	Estimated Annual Revenue 30 6 28	Estimated Number of Subscribers' Lines 30.6.33 (five-year date).	Estimated Annual Revenue 30 6 33
792	£8,116	1,000	£10,244	1,500	£16,349

The proposed site, which was acquired in June, 1926, is situated in Neerim-road, near Poath-road, Oakleigh. It has a frontage of 106 feet by a depth of 200 feet; and its location practically coincides with the theoretical telephone centre of the proposed automatic exchange area. It is proposed that the building shall be of simple design, and built on the latest fire-resisting principles. The immediate installation in the exchange is for an equipment of 1,300 subscribers' lines; but the building will be designed to accommodate equipment having a capacity of approximately 4,300 subscribers' lines. The financial aspect of the project is as under—

Item.	As at 30.6.28.	As at 30.6.33.
	£	£
1. Capital cost—new	39,730	50,043
2. Capital cost—new and *in situ* ..	77,306	87,619
3. Annual working expenses of proposed automatic exchanges	3,603	4,411
4. Total annual charges for proposed automatic exchange	10,195	12,113
5. Annual revenue—		
Actual for year ended 31.12.26, £8,116		
Estimated as at 30.6.28	10,244	..
Estimated as at 30.6.33	..	16,394
6. Assets recoverable or thrown spare if an automatic exchange is established on new site on 30.6.28—		
(i) Book value	12,174	..
(ii) Recoverable value	7,456	..
(iii) Cost of recovery	330	..

The difference between sub-items (i) and (ii) of item (6), namely, £4,718, is an amount which will have to be written off in the departmental accounts as representing the proportion of the capital outlay on the original assets which is irrecoverable, and includes depreciation due to wear and tear, and labour in installation. The population of Oakleigh at the date of the last census, 4th April, 1921, was 6,076 persons. The area proposed to be served by the scheme now under consideration is from 20 to 25 square miles. In this proposal, we are aiming at covering the whole of that area with an automatic exchange, which is at present served by a manual exchange. You will note by a reference to the plan, which I submit, that in the north-eastern portion of the area, there is at present practically no settlement, but in the event of, say, a railway being constructed in that direction, it would rapidly increase. The effective area of an automatic telephone exchange system in this locality is 1½ miles from the centre in one direction, and about 2 miles in the other. The estimated population in that area at the 31st December last was 9,000 persons, so that during the six years since the last census was taken, there has been an increase of, approximately, 66 per cent. There are 30 persons awaiting connexion in the Oakleigh district at present. The present manual exchange was established on the 6th September, 1900; the land on which the exchange is now situated was purchased by the Government for £500, and the book value of the building is set down at £1,867. The present exchange had, on the 30th June last, 864 lines, or 963 stations. It will be noted from the figures previously given that the average number of subscribers' lines connected during the year ended 31st December, 1926, was 792, which does not mean that the number of the subscribers was increased to that extent. At the beginning of that year there may have been 725 subscribers, and at the end of the year, say, 830, but the average of the year was 792. The limit of the present exchange would be about 950, or possibly 1,000 subscribers' lines. Connexions are now being established more rapidly than was the case twelve months ago. The actual increase works out at about 13 per cent or 14 per cent. in that area. According to the figures for the metropolitan area for last year,

the increase was 13 per cent., but in a locality such as Oakleigh the increase would be greater, because more development is taking place in the outer suburbs than in those more closely settled. It is considered that it will be more economical to cater for the telephonic requirements of the district by establishing a new exchange. A reference to the map will show that the present exchange is a considerable distance from the theoretical telephonic centre. This has been recognized for some time. We have estimated that the site on which the proposed building is to be erected will be the centre for the next 20 years, although possibly our estimate may not be quite accurate. If extensive development should occur in the north-eastern portion of the area to be served, it would be easier to provide a satellite exchange than bring the lines right into Oakleigh. We do not, however, contemplate that that will be necessary during the next 20 years. The post office is situated fully three-quarters of a mile from the site of the proposed exchange. It does not necessarily follow that the telephonic centre is the postal centre. We have to take into account the location of subscribers' lines and the central point in the general development of the area. The business centre in a given area may, of course, be quite different, and at times may move from one point to another. After having made a careful survey of an area, we have a fairly good idea of the approximate telephonic centre. We have to consider the point from which the smallest quantity of copper will be necessary to serve the whole of the subscribers in an area. We endeavour to ascertain as carefully as possible the portions that are likely to be settled. In making a survey we consult those who can speak with some authority concerning the development of the district, and are also guided by our own experience in other localities. I regard the proposed site as suitable for the purpose for which it has been obtained. The provision for twenty years in only in respect of the building, but in regard to the switches, we provide accommodation for only two years ahead. "Shelves" and "racks" to meet requirements for five years ahead are, however, provided, as we find it economical to do so. The subscribers who will be connected with the proposed exchange are not at present attached to any other exchange, and the area is co-extensive with the present area. As it has been considered unlikely that the present building can be utilized to accommodate any other governmental activity, it is proposed to sell it. There is a good dwelling attached, and there should be no difficulty in disposing of it. There is no likelihood of the present building being required for use as a branch exchange in the near future, and it is not worth while holding it for possible future departmental use. Although we have included the estimated cost of an air-conditioning plant, we do not propose to install the plant at the outset, and, therefore, the £2,500 as shown in the estimated cost will not be spent at the outset. We are really waiting to see whether we can dispense with air-conditioning plants in Victoria, Tasmania, and in certain portions of South Australia. We know that they are absolutely essential in semi-tropical places such as Sydney and Brisbane. The present practice leads us to think that we may be able to dispense with these plants in Victoria, but it will be two or three years before we will be justified in coming to a definite decision. The additional cost involved in this instance is comparatively small, as it involves the provision of a room 16 feet by 14 feet. The air-conditioning plant is still in operation at the Collingwood Automatic Exchange, and we have found that the conditions there are better with the plant than without it. We are studying the effect of the atmosphere upon the cables and equipment. When a circuit is broken there is a high or flash, voltage, and when the humidity is high the insulation is affected. We have had a great deal of trouble in connexion with insulation, but when the air is conditioned that is dispensed with. In Melbourne when the humidity is high, the temperature is fairly low, but in Sydney and Brisbane, and further north, high humidity often occurs when the temperature is high. Experiments are still being made to ascertain whether the cost of air-conditioning plants is justified. Our department is in close touch with the Department of Works and Railways in connexion with the proposed building, and plans for this and similar structures are always prepared by the Department of Works and Railways in collaboration with the officers of the Postmaster-General's Department. The proposed building is one which we consider will meet our requirements. The cost of providing public telephones, apart from the telephone cabinet varies considerably according to circumstances; but as far as the actual fitting of the telephone and making the necessary provision is concerned, it is more costly than an ordinary telephone. For instance, a coin box, consisting of complicated mechanism, has to be provided, and the system of operation is more costly, because the telephonist has first to get in touch with the subscriber called from a public telephone. In some instances there is a delay of two or three minutes before the connexion is actually made. I could not state definitely whether £23 is a reasonable amount for providing a public telephone in a suburb of Brisbane, as a good deal depends on the work to be done in leading in the telephone. If a drop wire were easily available, a public telephone could be installed at about the figure mentioned; but if a length of piping had to be installed, and a considerable length of aerial line erected, the cost would be considerably greater. So far as I know, the department has not become more conservative in the matter of providing public telephones; in fact, I think it has acted very liberally. We are now providing a large number of additional silence cabinets in all parts of the Commonwealth, and are catering for public requirements in that respect.

2. *To Senator Reid.*—Private subscribers predominate in the area proposed to be served at Oakleigh. The figure I have given as to the probable increase is based on the increase which has taken place up to the present, and modified by the possible development of the future. Even if the old building allowed for greater extensions, it would not pay the department to increase the manual system in that district. Oakleigh is surrounded by Malvern, Box Hill, Sandringham, and, still further away, Frankston. The development of the Oakleigh district is fairly regular. The old building could not be used as a branch post office within a reasonable time. The cost of automatic equipment has not increased, and any variation has been in the direction of a reduction. The cost is now about £13 10s. per line; but it varies according to whether the equipment is for a residential or city exchange. In the latter, provision has to be made for more trunking and switches, and consequently the cost is greater. At present there are five or six firms competing for the supply of automatic telephone equipment, the price of which is influenced by certain patent rights, which have to be observed by all tenderers. The difference in the prices quoted would be governed by the methods of manufacture and efficiency in management. The prices do not vary much. We use a distinct type of equipment, and are standardizing as much as possible. We leave the tenderers to meet our requirements in any way they wish; but the competing companies are gradually reaching one particular type of equipment. American manufacturers have now been largely ousted by British manufacturers, and most of our material now comes from Great Britain. It would be difficult for me to say if public telephones are a paying proposition, because that information is collected by another branch. I believe the rates charged just about cover expenses. It is the policy of the Department to make the revenue meet the expenditure. A 2d charge for a public telephone call is made to meet the extra service which has to be rendered. The Telephone Department showed a deficit last year for the first time, which gave us a little concern. We are, however, doing our best by introducing labour-saving devices, and economical methods to make our revenue meet our expenditure. It is impossible to make our country telephonic system pay at the present rate. Country telephone systems have been extended very greatly during the past few years and the department is feeling the effects. The department has been providing telephonic facilities for the country at rates which are unremunerative.

3. *To Mr. McGrath.*—The cost of all such work as that now under consideration is met out of loan money. The annual working expenses of the proposed automatic exchange as at 30th June, 1928, is set down as £3,603, and the total annual charges at £10,195. There are items in the latter amount which are not included in the annual working expenses, that includes interest and depreciation. The recoverable value of the assets is given as £7,456, which amount includes the value of material that will be used after a certain amount of expenditure has been incurred. Most of the other stuff will be scrapped. We have not had very much trouble in getting cable and telephones, although in some instances we have been compelled to reject consignments of material. We have had some difficulty at times in getting cable of the exact size we require. We do not anticipate any trouble in obtaining supplies of the equipment required at the proposed exchange. The department took the precaution of acquiring a suitable site at Oakleigh two years ago, and has acted similarly in other directions. For instance, for the Melbourne East Exchange, which will not be open for some years, the necessary land has been acquired.

4. *To Mr. Cook.*—The site on which the proposed building will be erected was acquired at the beginning of 1926, and although its value has not appreciated, it will in the course of time.

5. *To Mr. Lacey.*—In the figures I have submitted, it will be seen that the estimated number of subscribers' lines on the 30th June, 1928, has been set down at 1,000, whereas the estimated number of subscribers' lines on 30th June, 1933, is given as 1,600 But provision has been made to meet requirements for the next twenty years. In five years' time we shall have to buy more switches, "banks" and more cable, but it would not pay us to buy it now. Provision for an estimated increase of 600 subscribers' lines is considered ample, based upon our survey figures. The present exchange building and equipment would serve the district for two or three years, when structural alterations would have to be made in order to put in transfer boards and other equipment to enable the exchange to effectively operate. It is more economical to establish a new exchange.

6. *To Mr. Cameron.*—Although 30 persons are waiting to be connected with the present Oakleigh exchange, there is no congestion. The present post office at Oakleigh was opened only last year, and the new exchange will be as far removed from the post office as is the old exchange. The post office, however, is not in the theoretical telephonic centre. For instance, a branch post office may be opened at Clayton in the future, and other suburbs may develop where branch post offices will have to be established. The item of £24,722 for exchange equipment, including that necessary at other exchanges, is to cover the automatic switching equipment required at Oakleigh, together with certain automatic switching equipment which will be necessary at other exchanges such as at Central, Sandringham, and Windsor, in consequence of the establishment of an automatic exchange at Oakleigh. If the exchange at Oakleigh were to be conducted as a manual exchange, additional automatic equipment at the exchanges mentioned would not be needed. It is more economical to erect and equip a new building than to continue a manual exchange.

7. *To the Chairman.*—Approximately 30 per cent of the telephone exchanges in the Melbourne metropolitan area are conducted on the automatic system, in Sydney the percentage is higher. It is the policy of the Department to install automatic equipment, which gives a greater service than the manual system, wherever it can economically do so. Automatic exchanges are being established where the telephonic work is becoming congested. We have always to make our arrangements eighteen months in advance, and after that time it would cost a good deal to continue the manual system at Oakleigh. It is, therefore, considered desirable to establish a new automatic exchange at Oakleigh, and have it ready for operation by the time the present manual exchange has reached its full effective capacity. I consider that the Oakleigh proposition is one requiring urgent attention. All new exchanges are being installed on the automatic system, which is considered more economical.

The witness withdrew.

Ernest George Quarry, Sectional Engineer, Postal Department, sworn and examined.

8. *To the Chairman.*—I am aware of the proposal to establish an automatic telephone exchange at Oakleigh. I am the engineer for the designing of the plant. My duties consist of designing automatic telephone exchanges to meet the requirements of the Melbourne metropolitan network, the computation of switch quantities, the installation of the exchanges, and the cut-over into service. I regard the installation of an automatic exchange at Oakleigh as an urgent necessity, one of the main reasons for that opinion being that the existing manual magneto equipment will reach the limit of its capacity about 1928. Because of building limitations, the new exchange could not be satisfactorily installed in the existing building. Moreover, the site of the present exchange is not sufficiently central to meet the needs of the district. The grade of service rendered by automatic exchanges is far above that given by manual exchanges. Were the whole of the metropolitan network converted to the automatic system, the service rendered would be much more effective than it is now. The first automatic exchange in Victoria was installed at Geelong, where for some time careful observations were made to ascertain the effect of the change. Because of the success of that installation it was decided gradually to convert the whole of the metropolitan network to the automatic system. Where the automatic system is in operation the time occupied in obtaining connexion with other subscribers is the time occupied in dialling, whereas the manual system depends upon the speed and accuracy of the exchange telephonist. With an automatic installation it would take no longer for a Malvern subscriber to call a subscriber connected with the Brighton Exchange than it would to get into touch with another Malvern subscriber. The full benefit of the automatic system will not be realized until the whole of the metropolitan network has been converted to that system. The exchange at Oakleigh will belong to the "U" group, of which the main exchange is at Malvern. The experience of the department is that subscribers soon become accustomed to the automatic system, although when the change-over is made there is usually some trouble. The present intention is that, eventually, the metropolitan area will be divided into nine main exchange groups. Where an area is served partly by automatic and partly by manual exchanges it is necessary to employ a number of telephonists whose services could be dispensed with under the complete automatic system. When the whole of the metropolitan area has been served with automatic telephones, it will not be necessary to dial more than two prefixes

and four digits to obtain any other subscriber connected with the system. The total estimated annual working expenses of the existing manual exchange immediately prior to the cut-over namely, 30th June, 1928, is £4,388, made up as follows:—

Operating		£1,907
Maintenance—		
Building	£15	
Exchange equipment	455	
Sub-station equipment	536	
Line plant	1,425	
		2,481
		£4,388

It will be observed that the working expenses for automatic equipment are greater than for manual equipment. That is due to the necessity for constructing a building capable of meeting the requirements of the system twenty years in advance, and also because generators and batteries must be provided on the same scale. The batteries themselves may not from the inception be sufficient for the full estimated requirements at the end of the period, but the containers must be made large enough for that purpose. The proposed automatic exchange at Oakleigh will be a sound business proposition from the point of view of the Commonwealth, and, in addition, the grade of service which it will render to subscribers will be higher than it is now. A comparison of three manual exchanges—Central, Windsor, and Box Hill—with three automatic exchanges, viz., Malvern, Collingwood, and Sandringham, has been made. For every 1,000 lines connected with those exchanges, the average faults over a period of twelve months represented 1.81 in the case of the manual exchanges and 0.18 in the case of the automatic exchanges. Faults on the subscribers' instruments showed 1.99 per 1,000 subscribers connected with those three manual exchanges, and 1.37 in the case of the automatic exchanges mentioned. It will, therefore, be seen that the automatic system gives less trouble than does the manual system. Where the automatic system is installed, faults are anticipated and not allowed to mature; but where telephonists are employed the human factor must be taken into consideration. The department proposes to convert to the automatic system the whole of the manual exchanges in the metropolitan area as early as possible. The Oakleigh Exchange is a matter of urgency. At that exchange we not only have switchboards to accommodate subscribers' lines, but we also have switchboards for incoming junctions. There is accommodation for only about another 200 lines. It must be remembered that as additional subscribers are connected, more incoming and outgoing junction equipment is necessary. Moreover, the greater the number of lines connected with the manual exchange, the greater will be the cost of conversion to the automatic system. Although it might be possible to effect structural alterations to the existing building, in order to accommodate more plant, the economies which would be effected by the new exchange would be greater. Whenever it is proposed to establish a new telephone exchange a survey of the district is made by the department's officers, who estimate its immediate requirements as well as its requirements at various periods for several years ahead. That information is set out in a map of the district. The map prepared in connexion with the proposed automatic exchange at Oakleigh shows the existing manual exchange at the corner of Dandenong-road and Atkinson-street. The bulk of the subscribers connected with that exchange live in the area adjoining Murrumbeena and Hughesdale. The area proposed to be served by the exchange is divided into squares of equal size, on each of which is recorded the department's estimate of the number of subscribers in that square in five, fifteen, and twenty years. Those numbers are then totalled horizontally and vertically. By that means the theoretical centre of the district is ascertained. Action is then taken to acquire a site for an exchange as near as possible to that theoretical centre. That has been done in connexion with the Oakleigh Exchange. In estimating the numbers of subscribers to an exchange, the department's officers take into consideration the nature of the district, the class of dwelling, and make full inquiries as to the prospective development in the district. Generally, it is considered that a house valued at £2,000 or over will contain a telephone subscriber. The Oakleigh district is chiefly residential, although there is a tendency for manufacturing and engineering firms to establish businesses in the eastern portion of the district. When the existing Oakleigh Exchange was opened in December, 1900, there were 21 subscribers connected with it. In December, 1926, the number of subscribers had increased to 842, the development per cent. each year being as follows:—

1921	7.3
1922	4.14
1923	13.35
1924	38.01
1925	10.47
1926	14.09

The scarcity of equipment at times might have affected some of those percentages. The department considers that anything above 10 per cent. development is very favorable. Although I am not responsible for the installation of air-conditioning plant in connexion with automatic telephone exchanges, I know that the elimination of dust and humidity gives a higher grade of service than would be possible otherwise. In Sydney and Brisbane the humidity is much greater than it is in Melbourne, and consequently air-conditioning plants and refrigerators are essential there. In Victoria, where the humidity is not so great, I should like to see an exchange constructed without the expensive ammonia refrigerator, although I consider that the building should be designed so that one could be installed if found necessary. In any case, I consider that the air-conditioning plant should be installed, although without the refrigerator, and that the building should be designed as now, with sealed windows and doors which close by air pressure in order to prevent, as far as possible, the entrance of dust. I also advocate the washing of the air. Officers in the central office of the department decide whether air-conditioning plants shall be installed. They have not consulted me in the matter. Although Melbourne is not subject to humidity to any great extent it must be remembered that a continuation of dry, fine weather may result in the temperature of the spray being equal to that of the external air. That would give 100 per cent. humidity, and would make necessary the chilling of the water. In wet weather it might not be necessary to wash the air, but otherwise I advocate that the air be washed. I am satisfied with the estimate of the probable increase in the district. Should the estimate of the number of subscribers be found to be too low, no serious difficulty would be caused. One advantage of the automatic system is that a portion of the equipment can be installed in another building, thus reducing the length of line required. For instance, should the northern portion of the area proposed to be served by the Oakleigh Exchange develop beyond the department's expectations, equipment could be installed in a building there, and then be linked with the sub-office and the branch office, and ultimately with the Malvern exchange which is the main exchange in the "U" group. That would obviate considerable expenditure for cable. The position then would be similar to that existing at Sunshine, where there is an existing manual exchange Ultimately, Sunshine will be a sub-office to Footscray. All originating calls at Sunshine under the new system will pass through Footscray and go through to Central. Some of the equipment will

be housed in a separate building, and linked up with the main office. We always endeavour to keep the length of line down to the minimum.

9. *To Mr. Cameron.*—The installation of an automatic telephone exchange at Oakleigh would make possible the discharge of a number of telephonists now employed. The mechanical staff would be about the same as it is now. There would be no telephonists at the Oakleigh Exchange, but that exchange would be debited with a portion of the cost of the telephonist at Malvern.

10. *To Senator Reid.*—I am not aware that the department has conducted any test as to the effect of humidity on the plants already installed in the Melbourne metropolitan area. We always strive to maintain in the building a relative humidity of 70 per cent. At Collingwood elaborate tests were made when the plant there was installed. The data then obtained has been the basis of subsequent computations. I am not aware of the saving in the cost of cable which the construction of the new exchange on the proposed site would effect. I think that the Public Works Department's report only gives the estimated cost of the diversion; but the fact that the site chosen is practically at the telephonic centre of the district should make it the most economical point at which to establish the exchange.

11. *To the Chairman.*—The items comprising the estimated annual charges at the time of the cut-over on the 30th June, 1928, are as under:—

	£	£
Interest on capital at 5 per cent.		3,865
Maintenance—		
Building, at ·83 per cent.	46	
Air conditioning plant, at 3·5 per cent.	88	
Exchange equipment and sub-station equipment	1,997	
Line plant	1,425	
		3,556
Depreciation—		
Building, at 1·155 per cent.	64	
Air conditioning plant, at 6·5 per cent.	163	
Exchange equipment, at 4 per cent.	989	
Conduits, at 2·5 per cent.	174	
		1,390
Administration—		
Telephone manager's branch	538	
Equipment, 29 per cent.	494	
Lines, 16 per cent.	305	
		1,337
Working expenses—operating		47
		£10,195

Those charges do not cover the expenses of the Works and Railways Department. They are only the administration charges in connexion with the engineering work involved. The cost of the air-conditioning plant proposed to be installed is estimated at £2,500.

(Taken at Melbourne.)

THURSDAY, 1st SEPTEMBER, 1927.

Present:

Mr. McMackay, Chairman;

Senator Reid	Mr. Lacey
Mr. M. Cameron	Mr. McGrath.
Mr. Cook	

John Smith Murdoch, Chief Architect and Director General of Works, sworn and examined.

12. *To the Chairman.*—I am responsible for the plans for the proposed automatic telephone exchange at Oakleigh, on a site with a frontage of 106 ft. 3 in. to Neerim road by a depth of 200 feet. 140 feet from the corner of Neerim and Poath roads The land was acquired in June, 1926, at a cost of £743 15s. The building has been planned for the site, and conforms with the requirements of the Postmaster-General's Department. The Department of Works and Railways has been in close touch with the Department of the Postmaster General in regard to details of the building. The design is for a fire-resisting structure, which will comprise a switch room 64 feet by 39 feet by 14 feet high. The accommodation accessory to the switch room will be a power room 73 feet by 20 ft. 3 in., a battery room 20 ft. 3 in. by 18 feet; an air-conditioning room 26 feet by 16 feet; a store room 15 ft. 6in. by 10 feet; a linesmen's room 25 feet by 16 ft 10 in. and a storeroom 16 feet by 6 feet as well as the usual lavatory accommodation. The building will be erected 11 ft. 6½ ins. from each side of the boundary, and a similar distance back from Neerim-road At the rear there will be a clear space of 100 feet the total frontage of the building being 83 feet and the depth 64 feet. The construction will be in brick with a concrete ceiling over which there will be a low iron roof concealed behind a parapet. It has been considered wise to have a parapet instead of projecting wooden eaves, because of possible fire risk from the adjoining buildings. A chimney is provided in connexion with the air-conditioning plant, and a brick flue will ventilate the battery room. All walls will be of brick, and the floor of concrete 6 inches in depth. No reinforcement will be necessary. The window frames will be of steel, with wired fire-resisting glass. It is not anticipated that an additional story will be required. All exchanges are planned to provide for extensions at the rear if necessary. In about 20 years' time some slight extensions may be desirable but I do not anticipate that any additions to the accessory rooms will ever be called for. The space at the rear of the building will be useful to the linesmen, who have plant for which storage room has to be found. There is very little yard room at the present exchange building. Long experience in connexion with buildings for the Postmaster-General's Department has convinced me that yard room such as will be provided will be fully utilized eventually, because the department —especially the telephone section of it—is always growing. The estimated cost of the building, in accordance with the plan A.1848 now before the Committee, will be £5,800. This estimate is for building complete, gates, fencing, and tar paving, the details being:—

Cost of main building	£5,677
Fencing and tar paving	123
	£5,800

Separate estimates for engineering services are:—

Vacuum cleaning plant only	400
Compressed air service plant only	220
	£6,420

Should a complete air-conditioning plant be required at some later date, its probable cost, including direct radiator heating with oil-fired boiler, would be about £2,650. I understand that the policy of the department is to give the exchange a trial with the reduced engineering services indicated with the object of ascertaining if it is possible to do without the complete air-conditioning plant. The figures which I have given as to the estimated cost of the building and a complete air conditioning plant differ somewhat from the estimate furnished to the committee yesterday by Mr. Crawford. He stated the probable cost of the building at £5,500 and of the air-conditioning plant at £2,500, a difference of £450. I must accept blame for the

discrepancy, but I should like to explain that the figures which Mr. Crawford used were furnished to him several months ago from incomplete data. Since then the scheme has been prepared in detail, and it is now possible to estimate the cost with greater accuracy. My figures are the result of computations from the finished drawings. Mr. Crawford did not anticipate that we should find it necessary to amend the estimate, and inadvertently I overlooked the fact that there was a discrepancy between the figures which were furnished to him some time ago and the latest estimate. Accordingly, I did not supply the corrected estimate to Mr. Crawford before he gave his evidence yesterday. There is always some slight variation between preliminary and later figures relating to the cost of buildings. I should have handed the latest estimate to Mr. Crawford yesterday. I am glad to know that the department is carrying out experiments with regard to air-conditioning plants for automatic telephone exchanges, because I have always felt that some means would be devised to lessen such equipment. The work will be done by contract, and I estimate it will take from nine to ten months. Local building regulations allow buildings on adjoining land to be erected within 4 feet of the boundary, and as the proposed exchange building will be 11 ft. 6 in. from each boundary the distance between it and any other building will be at least 15 feet. This will reduce any fire risk considerably. I regard the site as excellent for the purpose. I cannot say to what use the site of the present exchange will be put. It is one of the transferred properties. I presume the department will ask the State Government if it requires the building; and, if it is not wanted, that it will be placed on the market for sale.

13. *To Mr. Cook.*—I do not think there has been any alteration in building costs during the past twelve months; but, as regards automatic telephone exchanges, some saving may be effected in the cost of air-conditioning plants. If it is possible to adopt reduced plants, as is contemplated at Oakleigh, it should be possible to reduce considerably the cost of such buildings. I believe that the provision made is ample, but only time will tell. Usually our estimates approximate closely the actual cost of buildings. Frequently there is a difference of 50 per cent. between the highest and lowest tenders. If in our opinion a tender price is too high, we sometimes carry out construction by day work, but get our materials on contract

14. *To Mr. Cameron.*—I cannot say offhand how many rods of brickwork there will be in the building; but, if necessary, will furnish the figures to the committee. The cost, based on the actual cost per rod of other buildings in the locality, will work out at about £37 a rod. There is little difference between the cost of Government and private buildings. Probably our inspection is a little more stringent than is the case on some private contracts. I favour a cyclone fence with a hedge, as against the ordinary type of fence.

15. *To Senator Reid.*—There will be cement lintels over the doorways and window openings, and the window frames will be of steel. I think the building will be about the best we have done so far. I have not noticed any tendency for the price of building material to go down during the past twelve months, and do not think there is likely to be reduction unless wages come down. In regard to air-conditioning plant, I am hopeful that it will be possible eventually to save considerably. Vacuum cleaning is essential for all automatic exchanges. We may reasonably expect, some day, to dispense with a full air-conditioning plant in Melbourne, but not at a place like Cairns. It seems an anomaly that for a building costing £5,000 to £6,000 it should be necessary to install an air conditioning plant costing £3,000.

16. *To the Chairman.*—The front elevation of the building will be 83 ft. 1½ in. and the height of the parapet over the switch room will be 19 feet, whilst the height of the accessory room parapet will be 14 feet. The building will have an ordinary red brick front, with a cement base, up to the level of the windows, so that it will be quite presentable.

17. *To Mr. Cameron.*—There will be seven rooms in the building, namely, switch room, power room, battery room, air-conditioning room, staff room, linesmen's room and storeroom.

(Taken at Melbourne.)

THURSDAY, 15TH SEPTEMBER, 1927.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Cook
Senator Reid	Mr. McGrath.
Mr. M. D. Cameron	

John Murray Crawford, Chief Engineer, Postmaster-General's Department, recalled and further examined.

18. *To the Chairman.*—I can explain the difference between figures furnished to the committee by Mr. Murdoch, of the Works and Railways Department, and those furnished by me. When we prepared the proposal we received from the Works and Railways Department an estimate of £5,500 as the cost of the building. At a later date we received a revised estimate of £5,800. The first estimate for the air-conditioning plant was £2,500, and later we received an estimate for the air-conditioning plant of £2,650. Those revised estimates had not been supplied before I gave evidence, so that I had to work on the earlier estimates received from the department. Those two items are the only items of cost supplied by another department. When that department revised its costs we had to revise ours. The alteration made a total cost £40,180, instead of £39,730, the difference being made up of an extra £300 for the building and £150 for the air-conditioning plant. Similar discrepancies may be avoided in the future by ascertaining the latest estimate from the department before giving evidence. This is the first time that the Works Department has altered its estimate, so it never occurred to us to query the estimate before giving evidence. I will undertake to obtain the latest figures available in future before giving evidence.

The witness withdrew.

The committee adjourned.

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