

1929.

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA.

MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS  
(Select Committee)  
MALCOLM DECKMAN, Chairman, M.P.  
House of Representatives  
Senator JOHN BARNES  
Senator HERBERT JAMES HICKSON, M.P.  
Senator HERBERT FRANCIS PASQUIN, M.P.  
PARLIAMENTARY STANDING COMMITTEE  
ON PUBLIC WORKS.

REPORT

TOGETHER WITH

MINUTES OF EVIDENCE

RELATING TO THE PROPOSED ESTABLISHMENT OF AN

EXTRACT FROM THE VOTES AND PROCEEDINGS OF THE HOUSE OF REPRESENTATIVES  
PUBLIC WORKS COMMITTEE—REFERENCE ON WORK—ROESCHER, NEW SOUTH WALES—AUTOMATIC  
TELEPHONE EXCHANGE—Mr. GIBSON (Minister for Works and Railways) moved, pursuant to notice,  
That in accordance with the provisions of the Commonwealth Public Works Committee Act 1913-1914  
the following proposed work be referred to the Parliamentary Standing Committee on Public  
Works for investigation and report, viz.:—*Edgcliff, New South Wales—Establishment of Automatic  
Telephone Exchange.*  
AUTOMATIC TELEPHONE EXCHANGE

AT

EDGECLIFF, NEW SOUTH WALES.

*Presented by Command; ordered to be printed, 30th August, 1929.*

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MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

(Sixth Committee.)

MALCOLM DUNCAN CAMERON, Esquire, M.P., Chairman.

Senate.

Senator John Barnes,  
 Senator Herbert James Mockford Payne.  
 Senator Mathew Reid.

House of Representatives.

Percy Edmund Coleman, Esquire, M.P.  
 Josiah Francis, Esquire, M.P.  
 The Honorable Henry Gregory, M.P.  
 David Sydney Jackson, Esquire, M.P.  
 David Charles McGrath, Esquire, M.P.

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EXTRACT FROM THE VOTES AND PROCEEDINGS OF THE HOUSE OF REPRESENTATIVES,  
 No. 9.

Dated 22nd February, 1929.

4. PUBLIC WORKS COMMITTEE—REFERENCE OF WORK—EDGECLIFF, NEW SOUTH WALES—AUTOMATIC TELEPHONE EXCHANGE.—Mr. Gibson (Minister for Works and Railways) moved, pursuant to notice, That, in accordance with the provisions of the *Commonwealth Public Works Committee Act 1913-1921*, the following proposed work be referred to the Parliamentary Standing Committee on Public Works for investigation and report, viz. :—Edgecliff, New South Wales—Establishment of Automatic Telephone Exchange.

Mr. Gibson having laid on the Table a plan, &c., in connexion with the proposed work—  
 Question—put and passed.

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# AUTOMATIC TELEPHONE EXCHANGE, EDGECLIFF, NEW SOUTH WALES.

## REPORT

THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS, to which the House of Representatives referred for investigation and report the question of the establishment of an automatic telephone exchange at Edgecliff, New South Wales, has the honour to report as follows:—

### INTRODUCTORY.

1. The existing Edgecliff Telephone Exchange, located at the corner of New South Head-road and Edgecliff-road, was established about eighteen years ago, and serves the suburbs of Edgecliff, Woollahra, Bellevue Hill, Rose Bay, Darling Point and Point Piper. The exchange has a manual switchboard of the multiple magneto type with a line capacity of 3,400. The number of lines connected to the exchange at 28th February, 1929, was 3,261, leaving only 139 spare numbers to meet developments.

2. It is represented that the existing building will not permit of much greater expansion of the manual equipment; that, owing to the increase in the number of subscribers' lines in the eastern portion of the area, the present exchange is not now at the telephone centre; and that, in view of the conversion of the Sydney network to automatic working, it is essential for early action to be taken to replace the existing manual exchange by a modern automatic switching plant.

### PRESENT PROPOSAL.

3. The proposal now submitted aims at the erection of a building on a site, which is Commonwealth property, at the corner of Kiaora-lane and Anderson-street, Edgecliff, and the installation therein of an automatic telephone switching system having an initial equipment for 4,500 subscribers' lines and an ultimate capacity of approximately 6,500 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.

### ESTIMATED COST.

4. The estimated immediate cost of the work is set down at:—

	£
Site (already acquired) . . . . .	1,448
Building . . . . .	7,000
Air-conditioning plant, &c. . . . .	3,750
Exchange equipment, including that necessary at other exchanges . . . . .	87,657
Sub-station equipment . . . . .	16,541
Line plant . . . . .	2,583
Sundries . . . . .	1,537
Total . . . . .	120,516

### COMMITTEE'S INVESTIGATIONS.

5. The Committee visited the existing exchange, inspected the site for the proposed new building, and traversed portion of the area which would be served by the new automatic telephone exchange. A careful scrutiny was made of the plans of the suggested building, and evidence obtained from the postal engineers and works officers in regard to the proposal.

## SITE.

6. The site, which is Commonwealth property, is situated at the corner of Anderson-street and Kiaora-lane, in the municipality of Woollahra. It is rhomboidal in shape, with an average frontage of 112 feet to Anderson-street, and 100 feet to Kiaora-lane, and of this area a strip 3 feet wide, along Kiaora-lane has been handed over to the Woollahra Municipal Council to provide a drainage easement. The Commonwealth has also purchased for the sum of £20 an easement over a strip of land about 4 feet wide which will enable the Department to run cables from Old South Head-road to the site.

7. The land is flat and low-lying, and excavations made show that it consists mainly of 3 feet of surface soil over a natural sandy silt, and that water exists at a depth of about 4 feet below the surface. Representatives of the Postmaster-General's Department, however, said that the area is suitable from their point of view, as it is as near as practicable to the telephonic centre of the proposed automatic area; while inquiries made by the Committee indicate that by raising the floor level of the building 3 ft. 6 in. above the ground, no disadvantages from dampness need be anticipated. The works officials also report that it is good building land, and the Committee is satisfied that the area will be suitable for the purpose for which it is intended.

## BUILDING.

8. The building proposed is of simple construction with brick walls, concrete floors and ceilings. Over the concrete ceiling of the switchroom there is to be a covering of light iron to keep the roof cool. The building will consist of a switchroom 63 feet by 54 feet; an air-conditioning room 31 ft. 6 in. by 17 feet, with provision for boiler and fuel; a power room 31 ft. 6 in. by 16 ft. 6 in.; a battery room 31 ft. 6 in. by 20 feet; and a mechanics' room 14 feet by an average of 18 feet. Steel window frames will be provided and the usual lavatory accommodation. The height of the ceiling in the switchroom will be 13 feet, in the cable room 14 feet, and in the boiler room 15 feet.

It was ascertained in evidence that the plans of the building have been prepared by the Commonwealth Works Department after due consultation with the officials of the Postmaster-General's Department, and that those officials are satisfied it will meet all their requirements.

## AIR-CONDITIONING PLANT.

9. The Committee was informed by the postal engineers that the manufacturers of automatic telephone equipment do not guarantee efficiency, unless the atmosphere of the switch room is kept free from dust, and the relative humidity below 70 per cent. To provide for these conditions the Works Department intends to install:

a full air-conditioning and dehumidifying plant, at an estimated cost of ..	£3,130
a compressed air service at an estimated cost of .. .. .	220
a vacuum cleaning service at an estimated cost of .. .. .	400
Total .. .. .	£3,750

The full air-conditioning plant is strongly recommended by the postal engineers for a coastal district, such as Edgecliff, where automatic equipment is likely to be subjected to a humidity of 70 per cent., occurring at frequent intervals during the summer months.

The plant will be similar to that already installed in other automatic exchanges. It will consist of a centrifugal multivane fan delivering 6,000 cubic feet of air per minute; an air washer and heater; a refrigerating plant of 6 tons capacity for cooling the spray-water; a cast iron hot-water boiler; and galvanized iron ducts and registers to distribute the air in the most effective manner throughout the switch-room.

The air supply will be drawn through a duct from above the roof of the building. It will then pass through the washer spray chamber, the water being cooled when necessary, thence through a battery of bent baffle plates, eliminating water which might otherwise be carried through from the washer in suspension, then over a battery of heaters, through the fan and then by means of suitable ducts into the Exchange.

Ducts and registers are also provided to allow foul air to escape into the roof space, which has the effect of reducing the temperature of the roof and ceiling.

It is proposed to mechanically ventilate the switch-room only, and the plant proposed will give eight changes of air per hour.

The power required for the refrigerator will be about 17 horse-power, and for the fan about 5 horse-power.

The windows in the switch-room are hermetically sealed, and therefore practically the only dust which could enter the Exchange is that which is carried in on boots and clothes, or that which enters when the doors are opened to allow ingress or egress.

#### ANNUAL CHARGES OF AIR-CONDITIONING PLANT.

The annual charges of the air-conditioning plant are set down at :—

Interest and depreciation, 10 per cent. on £3,130	..	..	£313
Power for refrigerator, 17 b.h.p. motor	..	..	52
Power for fan, 5 b.h.p. motor	..	..	114
Power for water-circulating pump, 5 b.h.p. motor	..	..	114
Power for hot-water pump, 1 b.h.p. motor	..	..	10
Coke for heating Boiler	..	..	25
			<hr/>
			£628
			<hr/>

To enable the dust to be cleaned from the intricate automatic telephone equipment, it is proposed to install a compressed air system at an estimated cost of £220. Hoses fitted with suitable nozzles may be plugged into sockets at convenient points in the Exchange, and these will be supplied, through piping, with air at a pressure of about 40 lbs. per square inch. By this means the air is directed into the equipment and instruments, and harmlessly blows dust away from parts which would otherwise be very difficult of access.

It is also proposed to install a vacuum cleaning system at an estimated cost of £400.

The running costs of the vacuum and compressed air systems are small, probably about £15 per annum, as they are only in use for a few hours each day.

The equipment which has been described is said to have proved most effective in dealing with the department's problems, particularly in districts where humidity is likely to prove detrimental to the telephone equipment.

It is claimed to be up to date in all respects, and in accordance with latest practice, and, under these circumstances, the Committee recommends that it be installed as suggested.

#### FINANCIAL ASPECT.

10. It was stated in evidence that the total annual charges for the proposed automatic telephone system, as at the proposed date of cut-over, namely, April, 1931, were estimated at	..	..	..	..	..	..	..	..	..	£38,040
and five years later at	..	..	..	..	..	..	..	..	..	46,360
The actual revenue for the year ended 30th June, 1928, was	..	..	..	..	..	..	..	..	..	36,958
The estimated revenue as at April, 1931, is	..	..	..	..	..	..	..	..	..	50,400
and the estimated revenue five years later	..	..	..	..	..	..	..	..	..	64,270
The assets thrown spare if the automatic system is installed in April, 1931, are estimated to have a recoverable value of	..	..	..	..	..	..	..	..	..	33,554

#### COMMITTEE'S RECOMMENDATION.

11. Under these circumstances the Committee recommends that the proposed installation, as suggested by the Department, be put in hand as early as possible.

M. D. CAMERON,  
Chairman.

Office of the Parliamentary Standing Committee on Public Works,  
Parliament House, Canberra,  
4th June, 1929.

# MINUTES OF EVIDENCE.

(Taken at Sydney.)

SATURDAY, 9TH MARCH, 1929.

Present:

MR. M. CAMERON, Chairman;

Senator Barnes  
Senator Payne  
Senator Reid  
Mr. McGrath

Mr. Coleman  
Mr. J. Francis  
Mr. Jackson.

Robert Lawson, Superintending Engineer, Postmaster-General's Department, New South Wales, sworn and examined.

1. The details of the proposal for the installation of an automatic telephone exchange at Edgecliff were prepared by the officers of my department. The proposal is to erect a building on a site which is Commonwealth property at the corner of Kiaora-lane and Anderson-street, Edgecliff, and install therein an automatic telephone switching system having an initial equipment for 3,700 subscribers' lines and an ultimate capacity of approximately 6,000 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. Owing to the growth of subscribers' lines in the eastern portion of the area, the present manual magneto telephone exchange is not now at the telephonic centre, and it will not be economical to extend the external line plant to the existing site after about December, 1929. The existing building will not permit of much greater expansion of the manual exchange equipment after that date. It is necessary also to provide additional accommodation for postal activities at Edgecliff, and, in conjunction with these requirements, investigations indicated that the establishment of a modern exchange on the proposed site would be an efficient and economical arrangement. The estimated immediate cost of the work is:—

	£
Site (already acquired) .. ..	1,448
Building .. ..	7,020
Air-Conditioning Plant, &c., .. ..	3,750
Exchange Equipment, including that necessary at other exchanges .. ..	72,212
Sub-station Equipment .. ..	13,035
Line Plant .. ..	2,128
Sundries .. ..	1,537
<b>Total .. ..</b>	<b>101,130</b>

The actual revenue for the year ended 30th June, 1928, and the annual revenue it is estimated will be obtained at the date of opening and five years thereafter is shown hereunder:—

Average number of subscribers' lines connected during the year ended 30th June, 1928.	Actual total revenue received for year ended 30th June, 1928.	Estimated number of subscribers' lines 30th June, 1929 (date of opening).	Estimated annual revenue 30th June, 1929.	Estimated number of subscribers' lines as at 1934 (five year date).	Estimated annual revenue 30th June, 1934.
2,933	£36,958	3,160	£39,816	4,200	£52,910

The proposed site is situated at the corner of Kiaora-lane and Anderson-street, Edgecliff, and is Commonwealth property. It has a frontage of approximately 112 feet to Anderson-street, and a depth of 100 feet along Kiaora-lane, and is located as near as practicable to the telephonic 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 3,700 subscribers' lines, but the building will be designed to accommodate equipment having a capacity of approximately 6,000 subscribers' lines.

The financial aspect of the proposal is given by the following figures:—

	As at 30th June, 1929.	As at 30th June, 1934.
Estimated Capital Cost—New	101,130	112,886
Estimated Capital Cost—New and <i>in situ</i> .. ..	252,036	321,002
Estimated Annual Working expenses of proposed automatic exchange .. ..	9,750	12,473
Estimated total annual charges for proposed automatic exchange .. ..	30,578	38,414
Annual Revenue—		
Actual for year ended 30/6/28— £36,958. Estimated as at 30/6/29 and 30/6/34 ..	39,816	52,910
Assets recoverable or thrown spare if an automatic exchange is established on 30/6/29—		
(i) Book value .. ..	44,068	
(ii) Recoverable value .. ..	29,321	
(iii) Cost of Recovery .. ..	1,333	

Regarding item 6 of the foregoing statement, the difference between sub-items (i) and (ii), namely, £14,747, 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 (chiefly magneto exchange and sub-station equipment) which is irrecoverable and includes depreciation due to wear and tear and labour in installation. It is undesirable to retain the existing manual exchange, for more than one reason. One of the first objections is that it is inadequate in regard to size. It is absolutely full of manual equipment and no additional plant can be installed in the building. This proposal has been delayed for reasons beyond our control. It was hoped that the automatic equipment could have been installed and put into service this year. Because it cannot, we shall need to install immediately in the manual exchange 500 lines of automatic equipment. There is no accommodation for manual equipment and, therefore, on the ground floor, which at present accommodates the cable terminals, we shall make a temporary installation of automatic equipment drawn from City North. The present exchange is well removed from the telephonic centre and the tendency of the area is to develop on the eastern side to a greater extent than has been the case in the past. On the eastern side of the new exchange site flat development is taking place very rapidly indeed. Therefore, cable necessities would have driven us eastward even if lack of accommodation in the building had not done so.

The matter is one of great urgency. When we put forward proposals for the erection of new exchanges we always endeavour to get as near as possible to the telephonic centre. The present exchange is between 22 and 25 chains away from that centre. I submit a plan of the Edgecliff area. The main artery is New South Head-road. The present exchange is located at the corner of New South Head-road and Edgecliff-road. Most of the hills are very steep. The land is high, and more or less inaccessible except at selected points. The theoretical centre at the moment is in a block of land on New South Head-road between Bay-street and Cross-street. The developmental tendency is to pull the exchange further eastward; therefore, the telephonic centre will be somewhere by New South Head-road and Kiaora-road.

2. *To Mr. Jackson.*—The ground is low-lying, but that does not affect the position. From the nature of the case we are almost driven to low land. On the Bellevue Hill side the approaches are very steep and there is only one east and west artery for cable distribution. The result is that we are driven somewhere near New South Head-road and one of the main north and south run-offs. Manning-road is one possibility and Kiaora-road is another. Both of these were examined and it was found that Manning-road presented difficulties that we wished to avoid.

3. *To the Chairman.*—We paid for this land the sum of £1,428 and also £20 for an easement from Anderson-street to New South Head-road. The area is 110 feet by 100 feet. It was suggested that the site was undesirable on the ground that any building erected on it would suffer from dampness. To test this I had two holes dug on the 22nd August, 1927. At 11.15 a.m. we struck water 3 ft. 11 $\frac{3}{4}$  in. from the surface. At 4.30 p.m. on the same day, at high tide, the depth was 3 ft. 11 $\frac{1}{2}$  in. Therefore the tide had practically no effect; that quarter of an inch may have been an error of measurement.

4. *To Mr. Jackson.*—The land is above sea level. An open storm water drain runs out to Double Bay. At high tide there is water in it, but at low tide there is none. Tidal water does not back on to the land.

5. *To Mr. McGrath.*—Within the last twelve months flats have been erected in the vicinity of the site. That is an indication that others do not regard land in this vicinity as a bad building proposition.

6. *To the Chairman.*—We have taken every precaution to ensure that we shall be perfectly safe. The other buildings in the vicinity have their floors one foot above ground level. We propose to build ours 2 ft. 6 in. above ground level, so that no surface water will be able to enter it. The additional cost will be £90, the respective figures being £6,230 and £6,320. After very heavy rain there is surface water on New South Head-road, at occasional spots from Manning-road to Rose Bay. We do not want to get that in the building. The present exchange was opened between seventeen and eighteen years ago. The number of subscribers' lines on the 28th February last was 3,261. During the last three years the average annual rate of increase has been about 260, but there has been serious restriction on the Edgecliff side. At the present time we have 37 subscribers held up because we are short of cable; so you may say that 3,300 lines should be connected to-day. The increase per annum during the next three or four years will be 300. The area is restricted; therefore its ultimate capacity cannot be very much larger than our estimate. It is

bounded by the Vacluse, Waverley and City East exchanges and cannot grow indefinitely. The existing equipment has reached the end of its economic life. Some parts may be used; but its recoverable value has been placed at a low figure. The quality of the apparatus is definitely lower than that which we can buy now, and the cabling does not give satisfactory service, especially in Sydney, which is exceptionally humid. During the month of February last year the service given by the Edgecliff exchange was atrocious for about a week. The humidity will not have a more detrimental effect because of the low-lying nature of the ground. The present building suffers from dampness although it is situated on high ground. Edgecliff-road rises steeply behind the building. There is a regular face of rock, which weeps after rain, and the water cannot get away. The building is on a sandstone rock bottom, with a sandstone rock cliff behind it. I imagine that dampness will not hang as much in the vicinity of the new structure. Humidity is a function of the upper air, not of the soil. There will be no weeping. The operating costs for the year ended the 30th June, 1928, amounted to £7,138. Reckoning the average rate of pay at something like £120 or £130, there would be roughly 50 operators over all the hours. We carry quite a large number of temporary operators. There is a considerable wastage, due to marriage. We have never had difficulty in absorbing all the girls who are released upon the establishment of an automatic exchange. The position at Edgecliff is much less difficult from the point of view of absorbing the staff than it would be in the case of the closing down of a large central exchange. It is likely that for the next eight or nine years the existing average rate of increase in the number of subscribers will be maintained. It will continue at that rate until the area becomes saturated. It is a very desirable area, being convenient to the city. Its amenities are considerable. The council is an extremely good one and gives splendid service. The director of buildings and building services was responsible for the estimate for the air-conditioning plant. I am perfectly satisfied that it is highly desirable to have such a plant. The service given by exchanges in which an air-conditioning plant is not installed is appreciably lower. At Edgecliff we suffer from both humidity and dirt. One of the arguments in favour of having the exchange in an off street is that dust troubles are considerably obviated. We must have high insulation and must govern the humidity to secure our cable and eliminate dust to care for our contacts. An air-conditioning plant is a satisfactory agency for the removal of dust troubles. The type of air-conditioning plant that it is proposed to install is similar to that at City East and will be the most up-to-date procurable. The development of air-conditioning plants throughout the world has followed very closely the type that we use. A similar type of plant is used in moving picture theatres. From the point of view of the health of the individual it has been found to be the most suitable and the most economical. Whatever movement has taken place has been in the direction of making it cheaper. I am satisfied that the proposed site is the most suitable in every respect.

7. *To Mr. Jackson.*—We are basing our revenue on the estimated development under automatic conditions and according to our most recent figures. The air-conditioning plant will offset any tendency towards dampness. At the present time we have thirteen manual exchanges in the metropolitan area. They are at Drummoyne, Edgecliff, Epping, Hunter's Hill, Kogarah, Kurnell, Liverpool, Mascot, North Sydney, Petersham, Redfern, Ryde and

Wahroonga. We are working on the conversion of Drummoyne, Mascot, North Sydney, Petersham, and Wahroonga. The completion of the programme will depend upon the necessary money being made available. In the metropolitan area the total number of lines working full automatic on the 28th February last was 60,189, and the total number of lines working on manual exchanges 22,237. Edgecliff is already working the whole of its inward calls on automatic equipment, and so is Kogarah. We had to increase the capacity of Edgecliff and we did it by installing apparatus which made all the inward calls automatic. About 90 per cent. of our traffic is now handled automatically. Hunter's Hill is badly placed. It lies on a spit of land, and would be too expensive to shift. When we have the other exchanges going it will not take long to do Hunter's Hill. It would have to be a sub-exchange to Chatswood. There are only 586 lines there.

8. *To Mr. Coleman.*—We anticipate that the whole of the metropolitan service will be automatic in five years time.

9. *To Mr. Jackson.*—At the commencement the cost per line in an automatic exchange is between £16 and £17. The cost is governed by the amount of traffic and the relationship of local and transferred traffic. Another factor is whether it is a main or a sub-exchange. Edgecliff will be a sub-exchange to City East; therefore, its cost will be lower per line than that of City East. Some of the switches that conduct an Edgecliff call are located at City East; therefore, it would be proper to take the cost into account when estimating the cost per line at Edgecliff. You have to discriminate between a main and a sub-exchange. After that it is a question of traffic. A suburban exchange like Edgecliff would be much less costly per line than one like City North, because the calling rate would be in the order of four to six per day, while that of City North would be from ten to fifteen. The cost rises as the volume of business increases; but, on the other hand, we obtain more revenue. Prices are now stable; if anything they are falling. After the war they rose remarkably. We got the Geelong exchange cost down to between £8 and £12 a line. Costs were high up to about three years ago. We now have the most complete competition. Four reputable companies are tendering, and the equipment of each will interchange with that of the others.

10. *To Mr. Francis.*—This is a very urgent work. When we made this proposal the best part of three years ago we banked on getting the new exchange. Many properties that we did not dream would be opened up have been subdivided, and there has been considerable building activity. The flats are letting for £16 a week. Those who are prepared to pay that sum must have a telephone, and are not concerned about what rental they pay for it. We restricted our cable provision at the bottle neck of the area because we expected to get out of that bottle neck. That is one reason why there is a shortage of cable. Another reason is that there has been exceptional flat development in the area approaching Rose Bay. I do not know whether Mr. Brown has made a report in writing to the Postmaster-General, as the result of his observations of telephones abroad, but it is practically certain that he has. I do not think that this proposal should be delayed with the idea of taking advantage of the experience that he gained overseas. If there had been any movement of sufficient importance to cause him to alter the plans he would have done so. We keep very closely in touch with the British Post Office and the American Telegraph and Telephone Company, and are kept *au fait* with any changes in design. This proposal embodies all the latest developments.

11. *To Senator Payne.*—This building will provide immediately for 3,700 subscribers' lines. The annual rate of increase will be 300 lines. The total capacity as at present designed will be 6,000 lines, but the disposition of the building on the site will permit of its being extended should the necessity arise to a capacity of between 8,000 and 9,000 lines. The area itself cannot increase, because it is bounded on all sides by other exchanges. If there should be some remarkable development, such as the erection of flats fifteen stories high, it might be necessary to open an additional exchange in the area. I should say that that is hardly likely. Our experience has taught us that, in the case of a suburban exchange, 9,000 lines is the limit of profitable expansion. It then becomes necessary to make other exchange provision, because your cable costs are too high.

12. *To Mr. Coleman.*—There is no limit to the capacity of an automatic exchange. It is contemplated that ultimately City North and City South will house 30,000 lines in the one building. I do not mean that it will be one exchange. It would be difficult to give inter-connection facilities with 30,000 lines in one group, but if it became necessary and justifiable we could have 30,000 lines in one building.

13. *To Senator Payne.*—The estimated value of the existing telephone exchange site is £1,500, and of the building, £2,200; but actually the value is considerably greater than that. As a sale proposition, and for the purpose of the estimates under consideration, the total value is shown as £3,700, but a judicious sale would realize possibly £6,000.

14. *To Senator Reid.*—We have not conducted tests, as such, to ascertain the value of air-conditioning plants. In City South exchange, which is air-conditioned, we, on one occasion, experienced a shortage of water in the condenser on the top of the building and the consequence was that the maintenance of the exchange dropped appreciably. We are proposing to install a pump and a big cistern on the top of the building to store our requirements of water. A comparison of the service given by exchanges that are air-conditioned with those that are not proves that in the latter the troubles due to low insulation, and dust are much greater. We cannot afford to make too many experiments, because they affect the quality of the service. All the collateral evidence is in favour of the plant, and we do not wish to degrade the service in an endeavour to prove it. This exchange, I think, will meet the requirements of the district. It will not have the effect of relieving any other exchange. We do not propose to alter the area at all. It will be a sub-exchange to City East. Other exchanges in the vicinity are Vaucluse and Waverley. Vaucluse meets it at O'Sullivan-road, Waverley on the top of Bellevue Hill, and City East at Rushcutter's Bay. We took into consideration the increase in population when we estimated that the rate of increase would be 300 lines per year. The soil upon which the building will be erected is black loam on top of sand. At one time the White City tennis courts were situated there, before they were removed to Rushcutter's Bay. For three blocks up Kiaora-road the land is substantially flat. There is no evidence that the land is affected by the tides, and the test I made satisfied me that it is not. You can get tidal water into a manhole, but not out of it. If you had a north-east wind and a high tide the surface water would lie on the land. A storm water channel about 12 feet wide has been provided to carry off the surface water. Our land would be affected only in the case of an overflow. The distance from the back of the existing exchange building to the cliff would



not be more than 9 feet. There is a gutter to carry off the water. The sandstone rock is constantly wet and the air is kept damp by the seepage. It does not make the building itself wet, but it makes for dampness within the exchange. The existing cable is more affected by humidity than that which is installed in other exchanges, because it is poor in quality. It was installed at a time when the care devoted to exchange plant was not so great as that which is devoted to it now. It is also subjected to greater stresses than was the case in the earlier period of its life. It is subjected to what are really automatic conditions, and it was designed for magneto conditions.

15. *To Mr. McGrath.*—We expect to recover £17,631, of which £8,347 represents the value of some automatic equipment which was recently installed. It will not be used in the new exchange, but will go back to City North, where we have the same type of plant. The plant installed in subscribers' premises has a book value of £13,158, and its recoverable value has been set down at £7,877. It consists of ordinary magneto telephones which after renovation will be suitable for many other places in New South Wales. The line plant is negligible; it has a book value of £186 and a recoverable value of £113. It consists merely of cables that lead into the office. Outside the office there will be no wastage of line plant. The building is not air conditioned and we could not install such a plant there. I understand that the Town Clerk of Woollahra Council wrote to Mr. Marks, M.P., expressing the hope that there would be no danger from dampness because they did not want the service to be interfered with when it was established in the new exchange.

16. *To Mr. Coleman.*—Only a small percentage of the equipment is Australian made. We make the framework, the ironwork, the runways and some cabinet-work in connection with test positions. The building has been so designed as to allow for expansion. We estimate the life of automatic equipment at twenty years, but it is extremely probable that it will give satisfactory service for 25 or 30 years. An automatic service is in every way more efficient than a manual service. The exchange maintenance cost as at 30th June, 1929, has been estimated at £3,019. The actual cost of the existing manual exchange is £2,280. We could not maintain automatic equipment more cheaply than manual equipment in an exchange of this size. In the case of an exchange of 20,000 lines the maintenance on the mechanical side would be cheaper with an automatic exchange than with a manual exchange. In addition, there is a considerable saving in operating costs.

*The witness withdrew.*

Percy William Ferris, Assistant Superintendent, Telephone Department, New South Wales, sworn and examined.

17. *To the Chairman.*—I am satisfied that it is necessary to establish an automatic telephone exchange at Edgecliff. We conferred with the State engineer regarding the life of the present switchboard, and its capacity for expansion. The proposal is to install an automatic telephone switching plant at the corner of Kiaora-lane and Anderson-street, Edgecliff, to replace the existing manual magneto exchange, to meet future development. The automatic system it is proposed to install will have an ultimate capacity of 6,000 lines

and is estimated to meet development for the next twenty years. The Edgecliff telephone area is at present served by a manual switchboard of the multiple magneto type. The present equipment has been installed for approximately twenty years and is unsuitable for the requirements of a large and important exchange. In view of the conversion of the Sydney network to automatic working, it is essential for early action to be taken to replace the existing manual exchange with modern automatic switching plant. The present switchboard is housed in a room 44 feet x 81 feet, which is equal to 1,364 square feet, and the operating space is fully occupied with equipment. It was recently necessary to house certain keyboard sender positions in the middle of the floor, thus occupying space which is usually set apart for supervisory purposes. There are 23 officers rostered for duty concurrently. No space is available for further switchboard equipment. The line capacity of the existing exchange is 3,400 lines. The number of lines connected at 28th February, 1929, was 3,261, leaving only 139 spare numbers to meet development. The average net increase per month during the past five years has been twenty lines, and for the past six months the growth has been at the rate of 30 per month. At this rate the existing spares will be absorbed in from four to six months. It has been decided to meet development temporarily, until the cut over of the new automatic exchange, by installing automatic equipment on the ground floor of the present building. This, however, can only be regarded as a temporary expedient, and has certain unsatisfactory features.

The Edgecliff exchange area serves the following suburbs:—Edgecliff, Woollahra, Bellevue Hill, Rose Bay, Darling Point, Point Piper. In this class of suburb the ratio of telephones to the population is high and will continue so, and, in view of the probability of the erection of flats, there is no doubt that the estimated development to 6,000 lines will be realized in twenty years. As the area is wholly within the two-mile radius of the exchange, no variation in rental will be involved. The average calling rate of the existing exchange is 4.81 calls per day per subscriber. I should say that that rate will be maintained or slightly increased. Approximately 40 per cent. of the calls are local at Edgecliff and the balance consists of transferred traffic or calls to other exchanges. This exchange is one of the series which will complete the network of automatic exchanges in the metropolitan area. I say definitely that it would not be possible to give an efficient service by a re-arrangement of the present equipment. The number of operators in the exchange is 36. When the automatic system is established in this area there will be no necessity to retain any traffic staff. They will be absorbed by other exchanges when vacancies occur. No permanent employee will be dismissed. We have a system whereby we employ temporary labour and we balance the staff by taking into consideration the likely conversion of exchanges to automatic working at various dates. We have not augmented our permanent staff in the metropolitan network for seven or eight years. We did not wish to have an overplus of permanent hands when automatic exchanges were installed. Those who are the last to enter the service are the first to be put off. The telephone branch does not concern itself with the development figure, except to satisfy itself in a general way that the total number of subscribers at a given date will be in accordance with the estimate of the engineer. I should say

that saturation point in this area will be reached in twenty years. The exchange should then have 6,000 subscribers' lines.

18. *To Senator Payne.*—During the last five years the average rate of increase per month has been twenty lines; but during the last six months it increased to thirty per month. The rate is not likely to be maintained. There is a good class of house in the area and the number of telephones compared with the population is higher than in other districts.

19. *To Senator Reid.*—The existing manual exchange plant would not last for more than six months. Generally speaking, seventeen years is regarded as the life of this class of equipment; but it has been in use for twenty years. The service is only fair and we have had many complaints regarding it. The average number of verbal complaints per thousand subscribers is 286.1 per month. Out of 867 complaints, 854 were on account of maintenance, eight were due to traffic causes, and five to the subscriber. Whether the automatic exchange was established or not, we should have to dispense with the existing plant. The number of verbal complaints at Ryde, which also is a manual exchange, is at the rate of 140 per thousand; at Lakemba, the rate of written complaints is three per thousand; at Ashfield, 3.7 per thousand; and at Balmain, 3.8 per thousand. They are automatic. We make intensive observations in the case of automatic equipment to ascertain the reason for any complaints that are made. We make them in such a way as to determine whether the trouble is due to the local or a distant exchange, whether the subscriber is to blame,

or whether it is caused by an operator in a manual exchange. I submit the following table, which gives the figures for the whole of the exchanges:—

#### ANALYSIS OF COMPLAINTS.

##### EDGECLIFF EXCHANGE.

1928.	Written Complaints due to—			Total.	Complaints for 1,000 Subscribers.
	Traffic.	Main-tenance.	Mis-cellaneous.		
January ..	4	8	7	19	6.4
February ..	9	16	2	27	9.2
March ..	7	7	4	18	6.0
April ..	2	8	2	12	4.0
May ..	6	5	6	17	5.6
June ..	5	1	5	11	3.6
July ..	8	3	..	11	3.6
August ..	3	2	4	9	2.9
September ..	7	4	2	13	4.1
October ..	5	8	1	14	4.4
November ..	5	8	7	20	6.3
December ..	7	3	3	13	4.0

Analysis of written complaints covering two months at all automatic exchanges:—

Total number of subscribers' lines ..	55,499
Total number of subscribers' stations ..	79,849
Total number of complaints for two months ..	386
Less complaints due to subscriber ..	356
Average complaints per month ..	178
Complaints per month per 1,000 lines ..	3.21
Complaints per month per 1,000 stations ..	2.23
Complaints per month per 1,000 stations due to apparatus faults ..	0.87
Complaints per month per 1,000 stations due to line faults ..	1.25

#### ANALYSIS OF VERBAL COMPLAINTS AT MANUAL EXCHANGES FOR MONTH OF DECEMBER, 1928. (INCLUDES FAULTS REPORTED BY SUBSCRIBERS, AND ALSO THOSE LOCATED BY TRAFFIC STAFF.)

Exchange.	Complaints.		Faults Reported by Subscriber.				Faults Reported by Traffic Staff.				Total Com-plaints.	Total Faults reported.	Total Com-plaints and Faults reported.	Com-plaints and Faults per 1,000 Subscribers.
	Traffic.	Sub-scriber.	Lines.	Appa-ratus.	Tested, O.K.	Total.	Lines.	Appa-ratus.	Tested O.K.	Total.				
Drummoyne ..	6	2	19	16	24	59	16	38	25	79	8	138	146	139.2
Edgecliff ..	8	5	56	129	124	309	93	320	132	545	13	854	867	268.1
Epping ..	5	10	13	11	5	29	87	97	54	238	15	267	282	209.3
Hunter's Hill ..	7	5	9	12	10	31	18	16	13	47	12	78	90	154.4
Kogarah ..	4	17	39	120	63	222	67	181	109	357	21	579	600	202.0
Manly (automatic, 8th December, 1928) ..	..	2	7	43	14	64	11	31	7	49	2	113	115	49.2
Liverpool ..	1	1	14	14	2	30	21	22	8	51	2	81	83	226.8
Mascot ..	..	..	1	9	3	13	32	99	36	167	..	180	180	241.9
North Sydney ..	8	10	37	162	164	363	88	150	306	544	18	907	925	207.8
Petersham ..	3	4	16	129	49	194	229	613	510	1,352	7	1,546	1,553	408.9
Redfern ..	3	7	39	77	19	135	84	257	35	376	10	511	521	420.8
Ryde ..	..	1	18	19	8	45	29	21	25	75	1	120	121	140.1
Wahroonga ..	11	12	93	11	51	155	98	29	67	194	23	349	372	260.8

(Taken at Melbourne.)

THURSDAY, 18TH APRIL, 1929.

Present:

Mr. M. CAMERON, Chairman;

Senator Barnes

Mr. Coleman

Mr. J. Francis

Mr. Gregory

Mr. McGrath.

Thomas Hill, Chief Engineer, Department of Works, sworn and examined.

20. *To the Chairman.*—The estimated costs of the mechanical engineering services for the Edgecliff Automatic Telephone Exchange are as follow:—

(1) Full air-conditioning and dehumidifying plant	£3,130
(2) Compressed air service ..	220
(3) Vacuum cleaning service ..	400

Total .. .. £3,750

The full air-conditioning plant is strongly recommended if the postal engineers consider it harmful for the automatic equipment to be subjected to a humidity of 70 per cent. occurring at frequent intervals during the summer months. The plant will be similar to that already installed in other automatic exchanges. It will consist of a centrifugal multivane fan delivering 6,000 cubic feet of air per minute, an air washer and heater, a refrigerating plant of 6 tons capacity for cooling the spray-water, a cast-iron hot-water boiler, and galvanized-iron ducts and registers to distribute the air in the most effective manner throughout the switch room. The air supply will be drawn through a duct from above the roof of the building. It will then pass through the washer spray chamber, the water being cooled when necessary, thence through a battery of bent baffle plates

eliminating water which might otherwise be carried through from the washer in suspension, then over a battery of heaters, through the fan, and then by means of suitable ducts into the exchange. Ducts and registers are also provided to allow foul air to escape into the roof space, which has the effect of reducing the temperature of the roof and ceiling. It is proposed to mechanically ventilate the switch room only, and the plant proposed will give eight changes of air per hour. The refrigerator will take about 17 h.p., and the fan about 5 h.p., to drive. The windows in the switch room are hermetically sealed, and therefore practically the only dust which could enter the exchange is that which is carried in on boots and clothes, or that which enters when the doors are opened to allow ingress or egress.

ANNUAL CHARGES OF AIR-CONDITIONING PLANT.

Interest and depreciation, 10 per cent. on £3,130 ..	£313
Power for refrigerator, 17 B.H.P. motor ..	52
Power for fan, 5 B.H.P. motor ..	114
Power for water circulating pump, 5 B.H.P. motor ..	114
Power for hot-water pump, 1 B.H.P. motor ..	10
Coke for heating boiler ..	25
Total .. .. .	£628

To enable the dust to be cleaned from the intricate automatic telephone equipment, it is proposed to install a compressed-air system at an estimated cost of £220. Hoses fitted with suitable nozzles may be plugged into sockets at convenient points in the exchange, and these will be supplied, through piping, with air at a pressure of about 40 lb. per square inch. By this means the air is directed into the equipment and instruments, and harmlessly blows dust away from parts which would otherwise be very difficult of access. It is also proposed to install a vacuum-cleaning system at an estimated cost of £400. The dust from the floor and fittings will be picked up by means of suitable tools attached to hoses which may be plugged into sockets located by the side of the compressed-air points, and the dust will be conveyed through pipes to the machine room, where it can be effectively dealt with. The running costs of the vacuum and compressed-air systems are small, probably about £15 per annum, as they are only in use for a few hours each day. The equipment which has been described has proved most effective in dealing with our problems, particularly in districts where humidity is likely to prove detrimental to the telephone equipment. It is up to date in all respects, and in accordance with latest practice. Air-conditioning plants of this nature are now regarded as a necessity in most American hotels, public buildings, and in factories where foodstuffs and confectionery are manufactured. We are recommending a full air-conditioning and dehumidifying plant because of the long period of summer weather in Sydney as compared with Melbourne. Complete meteorological records show that humidity of 70 per cent. occurs frequently during the summer months at all places east of the Dividing Range. These records have been taken over a period of about ten years, and constitute data upon which we can rely with the utmost confidence. I am convinced, from what I saw in my visit recently to the United States of America and Europe, that we are quite up to date in our methods for air-conditioning and dehumidifying the atmosphere in our automatic exchanges.

(Taken at Melbourne.)

MONDAY, 22ND APRIL, 1929.

Present:

Mr. M. CAMERON, Chairman;

Senator Barnes	Mr. Gregory
Senator Payne	Mr. Jackson
Mr. Coleman	Mr. McGrath.
Mr. J. Francis	

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

21. *To the Chairman.*—I am responsible for the proposal to erect an automatic telephone exchange at Edgecliff.

The proposal is to erect a building on a site which is Commonwealth property at the corner of Kiaora-lane and Anderson-street, Edgecliff, and install therein an automatic telephone switching system having an initial equipment for 4,500 subscribers' lines and an ultimate capacity of approximately 6,500 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.

Owing to the growth of subscribers' lines in the eastern portion of the area, the present manual magneto telephone exchange is not now at the telephonic centre, and it will not be economical to extend the external line plant to the existing site after about December, 1929. The existing building will not permit of much greater expansion of the manual exchange equipment after that date.

The estimated immediate cost of the work is:—

Site (already acquired) .. .. .	£1,448
Building .. .. .	7,000
Air conditioning plant, &c. .. .. .	3,750
Exchange equipment, including that necessary at other exchanges .. .. .	87,657
Substation equipment .. .. .	16,541
Line plant .. .. .	2,583
Sundries .. .. .	1,537
Total .. .. .	£120,516

The actual revenue for the year ended 30th June, 1928, and the annual revenue it is estimated will be obtained at the date of opening and five years thereafter, is shown hereunder—

Average number of subscribers' lines connected during the year ended 30th June, 1928.	Actual total revenue received for year ended 30th June, 1928.	Estimated number of subscribers' lines April, 1931 (date of opening).	Estimated annual revenue April, 1931.	Estimated number of subscribers' lines as at April, 1936 (five-year date).	Estimated annual revenue. April, 1936.
2,933	£ 36,958	4,000	£ 50,400	5,100	£ 64,270

The proposed site is Commonwealth property. It has a frontage of approximately 112 feet to Anderson-street, and a depth of 100 feet along Kiaora-lane, and is located as near as practicable to the telephonic 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 4,500 subscribers' lines, but the building will be designed to accommodate equipment having a capacity of approximately 6,500 subscribers' lines.

## FINANCIAL ASPECT.

Item.	As at April, 1931.	As at April, 1936.
1. Estimated capital cost—new	£120,520	£134,030
2. Estimated capital cost—new and in situ .. ..	311,500	386,410
3. Estimated annual working expenses of proposed auto- matic exchange ..	12,290	15,110
4. Estimated total annual charges for proposed auto- matic exchange ..	38,040	46,360
5. Annual revenue— Actual for year ended 30th June, 1928—£36,958. Estimated as at April, 1931, and April, 1936	50,400	64,270
6. Assets recoverable or thrown spare if an auto- matic exchange is estab- lished in April, 1931—		
(i) Book value ..	50,435	
(ii) Recoverable value	33,554	
(iii) Cost of recovery	1,333	

Regarding item 6 of the foregoing statement, the difference between sub-items (i) and (ii), namely, £16,881, 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 (chiefly magnetic exchange and substation equipment) which is irrecoverable and includes depreciation due to wear and tear and labour in installation.

I submit the certificate of the accountant of the Postmaster-General's Department, Sydney, dated 12th April, 1929, as follows:—

(a) Actual total revenue received from the subscribers and public telephones in the existing Edgecliff telephone exchange area for the twelve months ended 30th June, 1928—

Subscribers .. ..	£18,563
Public telephones .. ..	310
Total .. ..	£18,873
Subscribers .. ..	£2,883
Public telephones .. ..	7
Total .. ..	£2,890
Rents .. ..	£13,997
Calls .. ..	18,873
Miscellaneous charges .. ..	1,198
Trunk-line calls .. ..	2,890
Total .. ..	£36,958

Average number of lines connected during the above-mentioned twelve months, 2,933.

Average revenue per line, £12 12s. 0.18d.

(b) Estimated annual revenue for the proposed Edgecliff automatic telephone exchange area as at the proposed date of cut-over, i.e., April, 1931, and five years later—

	No. of Lines.	Rents.	Calls.	Mis- cellaneous Charges.	Trunk Line Calls.	Total.
As at cutover..	4,000	£ 19,090	£ 25,740	£ 1,630	£ 3,940	£ 50,400
Five years later	5,100	24,340	32,820	2,080	5,030	64,270

The comparatively small losses shown in the recoverable assets is accounted for by the fact that for the last year or two we have been installing a considerable quantity of automatic apparatus in view of the anticipated early change over from a manual to an automatic exchange. The proposed site is as close as we can get to the actual telephonic centre. The present exchange is fully a half a mile away from the telephonic centre. The site selected will be close to the telephonic centre five years after the cut-over. We do not anticipate any trouble as regards flooding of the area, but to make sure we are raising the exchange

another foot or two. We consider it essential to install a full air-conditioning plant. This equipment is essential for the efficient working of Sydney and all northern coastal exchanges. It is necessary to bring the humidity of the atmosphere down to below 70 per cent., and, to do this, we must install full air-conditioning plants in all exchanges where the humidity is high in the summer months. In other parts of the Commonwealth, such as Melbourne and Adelaide, we believe that we can run our exchanges efficiently with what are known as partial air-conditioning plants, by means of which the air is warmed and dried. I am satisfied that the Mid-west system is the most satisfactory for the use in exchanges where there is no marked humidity in the atmosphere. During the period of great humidity in Sydney about fifteen months ago, we had no trouble whatever in exchanges that were equipped with full air-conditioning plants. For three or four days during the period I mention, the humidity ranged from 90 per cent. to 100 per cent. It was as severe a test as we are ever likely to have, and the air-conditioning plants were entirely satisfactory. Without them, it is probable that the exchanges could not have been operated efficiently during that time. Investigations as regards air-conditioning plants are conducted by the Works Department, but the officers in our department are in close touch with all that is being done. On one occasion we had an unfortunate experience, owing to the escape of ammonia fumes at the Carlton exchange. A faulty valve allowed of the escape of free ammonia into the room, and a mechanic who did what he thought was necessary, was in difficulties. He was able to escape from the room, which was heavily impregnated with ammonia fumes, but was overcome just as he got outside. We have had slight trouble on one or two other occasions, and we have taken the necessary steps to guard against any danger in future. We have provided gas helmets for the use of attendants in the event of an escape of free ammonia, and we have indicated what must be done to a number of taps which have to be operated in a certain order to minimize the possibilities of trouble. These taps are painted red, and there are complete directions as to how they should be operated. The statement which I present to-day differs somewhat from that which was submitted to Parliament last year, and upon which the proposal was referred to the Public Works Committee for inquiry and report; but the figures do not in any way affect the economics of the scheme. What we have done is to bring the figures up to date. The estimated cost of the work was shown to be £101,130 in September last, and the latest figures are £120,516. This is explained by the rapid development which has taken place in that area, due in some measure to the popularity of flats, a position that was not anticipated during the original survey of the area. An increase in the number of flats means, of course, an increase in the number of telephone subscribers. Our original survey was made four or five years ago. Our experience is that development takes place by what may be regarded as a series of jumps. In certain places, and Edgecliff is one of them, a survey of the position shows that suddenly there is a rapid increase in the number of subscribers, then the curve flattens out, and this again is followed by a steep rise in the figures. The principal increase is in the exchange equipment, which is now estimated to cost £87,657 as against an estimate in September last of £72,212. It is possible that, as Sydney expands, there will be a greater tendency for people to live in flats in the Edgecliff area. This movement has already started in certain portions of that district. We have made provision for this contingency, having allowed in our estimate for two years' requirements for switches, and five years' requirements for services.

22. *To Mr. McGrath.*—When we prepared our previous estimate, we had in mind the probable increase in the number of subscribers, but it has come more suddenly than we then anticipated. Our survey was made, as I have said, some years ago. We do not get these figures annually, so when this proposal came up for review, I thought it was advisable to bring the figures up to date in view of the time that has elapsed since the last survey was made. As far as could then be seen, our figures were accurate, but there have been unforeseen developments since then. There is no truth in the rumour that the department is importing automatic switches which, previously, were manufactured in Australia. As a matter of fact, we have never manufactured automatic switches in this country. If you have been advised that we have, I think your informant must have been confusing automatic switches with branch switchboards, which have been manufactured in the Commonwealth. These branch switchboards are installed in private business houses or in private residences. You will remember that when members of the committee inspected the City-South (Sydney) exchange, I showed you a number of power boards which have been made in Australia. I deny that we have imported Belgium automatic switchboards in the belief that they were of British manufacture. We have not the necessary machinery for the manufacture, on an economic basis, of automatic switchboards in the Commonwealth. We have investigated the position and we are satisfied that the work could not be done economically in this country. I should regard as unworthy any statement that cadet mechanics were put on to the work of manufacturing automatic switchboards which, afterwards, were condemned. We have not even attempted to manufacture automatic switches in Australia. There is only one firm in Belgium manufacturing this class of equipment. It has a branch in Great Britain. We get tenders for automatic switchboards from five manufacturing concerns, only one of which has any connexion with Belgium, and from that firm we have obtained equipment for only three exchanges, two in South Australia and one in New South Wales. If any portion of the equipment is made outside Great Britain that fact must be clearly stated in the form of tender, which must set out the proportion manufactured in Great Britain and the proportion manufactured in foreign countries. Then we load the tender with the stipulated percentage of preference to be given to British tenderers. The department has not been idle with regard to the City-West automatic exchange, which was approved by the Public Works Committee on the 19th September last. The specifications have nearly been completed, and we shall shortly be obtaining quotations. There is a tremendous amount of work to be done after approval has been given to a work of this nature, before it can be actually started. That work is regarded as urgent, and we are pushing on with it as quickly as possible.

23. *To the Chairman.*—We estimated that it would be three years before we could arrange for the cut-over, and we anticipate being ready in that time.

24. *To Mr. McGrath.*—Several proposals for the installation of automatic exchanges have been put in hand in recent years. Hobart central exchange was approved by the committee in July, 1926, and we expect to have it open for business in a few months time. The exchanges at Oakleigh, Box Hill and Cottesloe were approved by the committee on 23rd March, 1928. Tenders for these works have been accepted. Some time was occupied in considering the tenders and bringing them all to a proper unit basis.

25. *To Mr. Gregory.*—Separate specifications have to be prepared for every exchange, because the conditions differ materially. For instance, the specification for the Oakleigh exchange could not be used for

the Box Hill exchange, owing to the difference of the lay-out, the difference in the cable dimensions, the junction requirements, and so on.

26. *To Mr. McGrath.*—If you include England in the list of foreign countries, we are entirely dependent upon the foreign market for the supply of equipment for automatic exchanges. To manufacture this equipment highly specialized and complicated machinery is necessary. For the amount of work in the Australian market it would not pay us to install this special machinery and engage trained mechanics. Compared with the prices which we have to pay for the English or American equipment, it would not be an economical proposal to carry out the work in Australia. We have made an estimate of the probable cost and we know that we could not even look at it. If there is an impression that, since the visit of Mr. H. P. Brown to Great Britain, we are importing material to the detriment of Australian manufacturers, I can only say that it is entirely erroneous. Actually, the proportion of orders placed in England compared with America since Mr. Brown's return to Australia has risen considerably. There was a time when we got practically all our material from America. Now we get nearly the whole of it from England. It would be uneconomic to set up the machinery in this country for the manufacture of this equipment locally. The developments are so rapid that, in view of the limited market in Australia, we could not install fresh machinery to keep abreast of the improvements in equipment. There have been revolutionary changes since the installation of the early Strowger switchboards of the Master Switch type. The Australian market would not be able to keep an Australian manufacturing concern in operation for more than two or three months in each year. I cannot say what will be done with the land upon which the present manual exchange is built. It is next to the post office, and I understand there was a proposal to utilize some portion of it for post office extensions, but I do not know if a decision has been reached yet.

27. *To Mr. Jackson.*—Our estimates of cost and anticipated revenue of previous installations have been fairly close to actual results. Our estimate of the cost per line for the Glenelg automatic exchange was £20, and the actual cost was £17 15s. 7d. For City-East (Sydney) exchange the estimated cost per line was £20, and the actual cost was £24 15s. 8d. In all cases we use the latest figures for our estimate. Sometimes it happens that they are prepared during a period when costs are rising, and on other occasions they are compiled when costs are falling. This would account for a discrepancy between the actual cost and the actual figures. If the increase in subscribers is greater than is estimated, the cost of the undertaking will be increased to the extent that, instead of the sum provided being sufficient for the full period of five years, it might not last more than three or four years, and we might have to order fresh apparatus earlier than we anticipated. Prices for materials are not stable. A good deal depends on whether the manufacturers are busy or slack. If they have a rush of work in hand, naturally their prices for equipment are higher. Our estimates of revenue are on a conservative basis, and are quite safe. Revenue has a certain definite relationship to the average cost of installation. The actual revenue from automatic exchanges more than pays for the cost of installation. The calling rate in automatic exchanges is higher than in exchanges operated manually. The total estimated annual charges for the Edgecliff exchange at April, 1931, is £38,040; and the total revenue at the same date £50,400, shows a profit of, roughly, £12,000.

28. *To Mr. Francis.*—We anticipate that if this proposal is approved by the Public Works Committee, the new exchange will be in operation in two years time.

It must be understood, however, that much depends upon the delivery of automatic equipment. We do not anticipate any undue delay in this respect. The humidity in coastal exchanges is high, but we are making ample provision by the installation of a full air-conditioning plant.

29. *To Mr. Gregory.*—As far as practicable the specifications for automatic equipment provide that the various parts shall be interchangeable. This provides a wider field of competition. If by any chance there is a new tenderer in the field, he has an opportunity to submit a tender for an alternative type of switchboard, and we have to consider whether it is interchangeable with the existing equipment. We endeavour to prevent the original contractor for a small equipment, such as for this exchange, from having an undue advantage over competitors for future extension work; but I admit that he has a certain advantage over other manufacturers. In Brisbane, for instance, we have a type of apparatus supplied by one manufacturer, and in Sydney and Melbourne we have equipment supplied by another manufacturer. There are degrees of interchangeability. One type of apparatus to be interchangeable with another may require another extra relay or two. This means added cost to the manufacturer, and it does not give him the same chance as the manufacturer whose equipment, to be interchangeable, does not require such extra relay. As a factor, interchangeability is taken into account even in the matter of spares. I doubt that any good would come from a comparison of costs between New Zealand and Australia. For one reason there is a flat rate in New Zealand as against the measured rate in Australia. In the purchase of exchange equipment the provisions as regards junction accommodation depends entirely upon the amount of traffic to be handled, and traffic in its turn depends upon tariff. If you have a higher calling rate you must have more junctions and the other necessary equipment. Before any useful comparison could be made between costs in New Zealand and Australia, we should have to make a complete study of all these factors, including the efficiency factor. I assume, of course, that the system in New Zealand is efficient. The department there has developed what we call the rotary type of switch, whereas in Australia we have adopted the step-by-step system. We do not know why they have stuck to the rotary type. That is best known to themselves. We have tried both and we prefer the step-by-step system, which is universally adopted in the British Post Office, and is favoured in America. We have taken out the two exchanges that were on the rotary principle and converted them to the step-by-step system. The estimated cost (£311,500) includes all external plant. We anticipate that the end of the five-year period we shall need certain additional plant to handle the traffic. I should not like to estimate what would be the cost if the automatic equipment had to be manufactured in Australia.

30. *To Mr. McGrath.*—We have not made an estimate of the probable cost of an Australian automatic equipment, but preliminary inquiries have shown that it would be impracticable to carry out such manufacturing work in Australia.

31. *To Mr. Coleman.*—I am unable to supply the figures, but we only have to consider that we have to pay from 60 per cent. to 70 per cent. more for labour in this country to realize that the proposal is uneconomic.

31A. *To Mr. J. Francis.*—The technical difficulties would also be an obstacle; but assuming that we could overcome them, we have not the necessary manufacturing organization and experience or the machinery to carry out that class of work.

32. *To Mr. Gregory.*—If the automatic equipment were made in Australia, the higher cost would mean an increased rental for subscribers. A considerable proportion of the total cost is represented in line plant. Copper wire costs from £110 to £120 per ton. Prices for copper, lead and tin have been rising lately. We are providing an automatic switchboard having an initial equipment of 4,500 subscribers, and we estimate that the number of subscribers' lines at the date of cut-over will be 4,600. The margin between that number and the capacity of the switchboard may seem to be narrow. That is due to the fact that we have already added a considerable number of automatic subscribers to the Edgecliff manual exchange, because we knew that, before long, it would be converted into an automatic exchange. We did not wish to extend the manual switchboard there, so after having conducted certain experiments, we considered it was possible to connect additional subscribers on the automatic system. In this way, we look to save a certain amount of expenditure when the change over is made. This also accounts for the high recoverable value of the assets. But for this policy the recoverable value might be down to £15,000 or £16,000 instead of £33,000. Very little of this manual equipment will be utilizable in country exchanges. The Edgecliff manual exchange is now uneconomical, and a considerable proportion of the material will be scrapped. We are putting in a special type of automatic exchange for country rural districts.

33. *To Senator Payne.*—In the original estimate the value of the recoverable assets was fixed as for April, 1929, whereas in the revised statement the figure is given as for April, 1931. The original proposal was prepared some time before it was submitted to Parliament, and I thought it advisable, for the purpose of accuracy, to revise it and bring the figures up to date. The book value of recoverable assets in April, 1929, was given at £44,068, whereas in the amended statement the amount is £50,435. This is explained by the addition of a considerable amount of apparatus since the original estimate was prepared. We estimate on a life of twenty years for the equipment, so at the end of five years we have to write off 25 per cent. for depreciation.

34. *To Mr. Coleman.*—If you peruse the original statement of estimated costs and compare it with the revised figure, you will find that there is a deduction of £20 in the cost of the building, an increase of £455 on lines. Originally we estimated for an initial equipment of 3,700 subscribers. Now we are providing for 4,500. As far as possible, all automatic exchange equipment is standardized. I am not aware of any friction between the Postmaster-General's Department and certain Australian manufacturers as the result of the policy of placing orders for equipment abroad. I am aware that the representatives of Stromberg Carlson, Sydney, have made several applications for the imposition of a tariff on automatic telephone equipment, but that firm has never supplied automatic switchboards to the department.

35. *To Mr. McGrath.*—The firm in question has had every opportunity to tender.

36. *To Mr. Jackson.*—It is the policy of the department to give definite preference to Australian and British tenderers over foreign competitors.

37. *To Mr. McGrath.*—Stromberg Carlson have never tendered for automatic switchboards. We consider tenders chiefly from the economic stand-point, but we endeavour to get Australian manufacturers in the market as competitors for the supply of our equipment, and to this end we give a definite preference.

38. *To Mr. Coleman.*—Invariably we load all foreign tenders with the preference indicated by the Government. This is our absolute rule.

39. *To the Chairman.*—It is our invariable practice to push on with works as soon as they have been approved by the committee. In this case, we expect the cut-over to take place in April, 1931, and that will be our objective. Unforeseen difficulties may cause delay. If, for example, the contractor for the supply of apparatus for the City-West (Melbourne) exchange is behind with his supplies, the cut-over to that extent will be delayed.

40. *To Mr. McGrath.*—All the firms that supply automatic equipment have their representatives in Australia. They stipulate the time within which they can supply the equipment. If they are behind in their deliveries, we have to consider the imposition of a penalty; but it may be shown that the delay is due to a strike. If so, we have to take that into account in fixing penalties. English contractors have been inconvenienced in this way, and have been late in deliveries.

41. *To the Chairman.*—There is fair competition for the supply of equipment from five firms—four British and one American. The British manufacturers are holding their own. Our view is that the importation of necessary machinery, coupled with the limited market, would make it impracticable to manufacture equipment in Australia. The telephone services showed a deficit of £120,000 last year. The losses were principally in connexion with country lines. We cannot give a country service at anything like the cost of city services; but the rural automatic exchanges will, I hope, reduce costs, and, I have no doubt, will lead to a substantial increase in revenue.

(Taken at Melbourne.)

WEDNESDAY, 24TH APRIL, 1929.

Present:

Mr. M. CAMERON, Chairman;

Senator Payne	Mr. Gregory
Mr. Coleman	Mr. Jackson
Mr. J. Francis	Mr. McGrath.

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

42. *To the Chairman.*—I am aware of the proposal to erect a building for an automatic telephone exchange at Edgecliff. The plan before the committee was prepared in the Sydney office after consultation with officials of the Postmaster-General's Department, and subsequently reviewed by and accepted by the Postmaster-General's Department. I assume that members of the committee are acquainted with the site which was acquired by the department after a considerable amount of investigation. It is at the corner of Anderson-street and Kiaora-lane, in the municipality of Woollahra. It is rhomboidal in shape, with an average depth to Anderson-street of 112 feet and 100 feet to Kiaora-lane. The location was not chosen lightly, because it presented certain difficulties from the stand-point of building, and from the stand-point also of the technical work of the post office. A certain amount of correspondence took place before a decision was reached. All the defects of the position were carefully considered, and we are satisfied that it is the best site that was available. It is very close to the telephone centre. The building itself has received careful consideration. The plan now before the committee is the

fourth scheme that has been prepared in connexion with this proposal. It will be seen, therefore, that the scheme has been thoroughly thrashed out by the officials of the respective departments. Two schemes were prepared for a building of one story. Then it was thought that a building of two stories would be more economical, but we came back to the consideration of a scheme for a building of one story only. We found that if we erected a two-storied building the switch room would have to be on the upper floor, and the power room, battery room, and accommodation necessary for employees on the ground floor would not have been large enough for the space required by the switch room upstairs. For this reason we abandoned the idea of having an exchange with two stories, and came back to the original plan for a one-storied building. To obviate the danger of water getting into the cable trenches we decided to raise the floor level of the building 3 ft. 6 in. above the level of the site. At first we thought that an extra 2 ft. 6 in. would be sufficient, but after consultation with officials of the Postal Department we decided to raise the floor level by 3 ft. 6 in. This has increased slightly the estimated cost, which is now put down at £7,000. This figure is not unduly high. The building is of a simple character, with brick walls, concrete floors and ceilings. Over the concrete ceiling of the switch room there is to be a covering of light iron to keep the roof cool. The form of construction recommended is one with which the committee is conversant, and it has been employed in respect of practically all telephone exchanges erected by the department in recent years. I believe that if we could use steel trusses, and asbestos plaster ceilings, we should be able to save a certain amount in cost. There is still an element of uncertainty as to the cost of air-conditioning plants. I understand that the committee has been advised of certain experiments that have been made to see if adequate provision can be made to ventilate automatic exchanges without incurring expenditure on plant for the washing and cooling of the atmosphere. If these experiments prove satisfactory we should be able to reduce construction costs. The proposal embraces no extravagances. The usual steel windows will be adopted. The building itself will contain a switch room 63 feet x 54 feet; an air-conditioning room 31 ft. 6 in. x 17 feet, with provision for a boiler and fuel; a power room 31 ft. 6 in. x 16 ft. 6 in.; a battery room 31 ft. 6 in. x 20 feet; and a mechanics' room 14 feet by an average of 18 feet. This room will measure 19 ft. 3 in. at one end and 16 ft. 6 in. at the other. There will also be the usual lavatory accommodation. I omitted to mention that the actual area of the site will be reduced by a strip 3 feet wide along Kiaora-lane. This portion of the land has been handed over to the Woollahra Municipal Council to provide a drainage easement. There is another easement from Kiaora-lane to the old South Head-road, for which we paid £20. This is 4 ft. 0 $\frac{3}{4}$  in. wide, and will enable cables to be brought from the new South Head-road to the site of the building. The height of the ceiling in the switch room will be 13 feet, in the cable room over the frames it will be 14 feet, and in the boiler room 15 feet. The slight increase in estimated cost over previous estimates is due to a decision to raise the floor level 3 ft. 6 in. instead of only 2 ft. 6 in. As a rule our estimates of cost are about the mean of all tenders received. I have inspected the site, and I do not anticipate there will be any trouble with regard to the foundations. Three trial holes put down passed through 3 feet of surface soil and entered the natural sandy silt, which I estimate will carry a load of one ton per foot. The water appears to be pretty constant, though it fluctuates somewhat in volume. It is fresh water, and is not in any way connected with the rise and fall of the tide.

I made inquiries of people who have been living in the locality for years, and have been informed that they have never seen water lying on the surface of the land for any length of time. They have told me that it gets away quickly, and never goes over the road.

43. *To Mr. McGrath.*—After a heavy rain-storm the water does, I believe, remain on the site for a short time. The photograph of the area shows that rushes are growing on it; but I have been advised that water does not remain on the surface for any length of time. As buildings are erected in the locality this condition would disappear altogether. I am perfectly satisfied with the site. For the purpose of an automatic telephone exchange it presents no unusual difficulty. It may interest the committee to know that when the General Post Office in Perth was erected the water level was only 1 ft. 9 in. below floor level. When considering the proposal to erect a bank on land adjoining the post office, investigations were made as to what had happened since the post office had been built, and it was

discovered that the water level had risen 18 inches, so it is now only 3 inches below the floor level, but our foundations were put down to a stratum that is absolutely safe. I made a careful examination of the building, and found that it had not suffered in any respect.

44. *To the Chairman.*—If the water level there rises any more it will get into the storm-water channels, but we do not anticipate any trouble.

45. *To Mr. Jackson.*—We intend to raise the floor level of the proposed new exchange so as to keep all cable channels dry.

46. *To Senator Payne.*—We have used a great variety of timbers for flooring in telephone exchanges, and we have discovered that cement plastered floors are the most satisfactory. Between the frames we lay linoleum in bitumen direct to the cement floors. This minimizes dust in the switch room, and is more comfortable for the operators.

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(Taken at Melbourne.)

WEDNESDAY, 24th APRIL, 1920.

Present:

- Mr. M. G. G. (Chairman)
- Mr. G. G. G.
- Mr. J. J. J.
- Mr. K. K. K.
- Mr. L. L. L.
- Mr. M. M. M.
- Mr. N. N. N.
- Mr. O. O. O.
- Mr. P. P. P.
- Mr. Q. Q. Q.
- Mr. R. R. R.
- Mr. S. S. S.
- Mr. T. T. T.
- Mr. U. U. U.
- Mr. V. V. V.
- Mr. W. W. W.
- Mr. X. X. X.
- Mr. Y. Y. Y.
- Mr. Z. Z. Z.

John Smith, Minister, Director-General of Works, and Chief Architect, Department of Works, were and examined.

47. *To the Chairman.*—I am aware of the proposal to erect a building for an automatic telephone exchange at Edgely. The plan before the committee was prepared in the Survey Office after consultation with officials of the Postmaster-General's Department and subsequently reviewed by and accepted by the Postmaster-General's Department. I assume that members of the committee are acquainted with the which was accepted by the department after a considerable amount of investigation. It is at the corner of Anderson-street and Kinnear-street in the municipality of Woolloomooloo. It is a rhomboidal in shape with an average depth to Anderson-street of 112 feet and 100 feet to Kinnear-street. The location was not chosen lightly because it presented certain difficulties from the stand-point of building and from the stand-point also of the technical work of the post office. A certain amount of correspondence took place before a decision was reached. All the details of the position were carefully considered, and we are satisfied that it is the best site that was available. It is very close to the telephone exchange now before the committee.