1930.

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA.

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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

BRUNSWICK, VICTORIA.

By Authority:
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MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

(Seventh Committee.)

ANDREW WILLIAM LACEY, ESQUIRE, M.P., CHAIRMAN.

Senate.	*House of Representatives.*
Senator John Braidwood Dooley	Malcolm Duncan Cameron, Esq., M.P.
Senator Matthew Reid	John Curtin, Esq., M.P.
Senator Burford Sampson.	Hon. Henry Gregory, M.P.
	Edward James Holloway, Esq., M.P.
	William John Long, Esq., M.P.

INDEX.

EXTRACT FROM THE VOTES AND PROCEEDINGS OF THE HOUSE OF REPRESENTATIVES, No. 4, DATED 26TH NOVEMBER, 1929.

9. PUBLIC WORKS COMMITTEE—REFERENCE OF WORK—BRUNSWICK, VICTORIA—AUTOMATIC TELEPHONE EXCHANGE—Mr. Lyons (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:—Brunswick, Victoria—Establishment of Automatic Telephone Exchange.

Mr. Lyons having laid on the Table plans, &c., in connexion with the proposed work—

Question—put and passed.

LIST OF WITNESSES.

AUTOMATIC TELEPHONE EXCHANGE, BRUNSWICK, VICTORIA.

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 Brunswick, Victoria, has the honour to report as follows:—

INTRODUCTORY.

1. The telephone subscribers in the Brunswick area have been served by a manual magneto system which reached the limit of its capacity in 1926. To provide for further development in the area a temporary automatic exchange was established as an adjunct to the manual exchange, but, owing to building limitations, it is stated that provision for growth by this means can be met in the existing building only until October, 1931. It is urged, therefore, that a complete modern plant should be installed in a new building, to permit of efficient service being given to existing and prospective subscribers in the area.

PRESENT PROPOSAL.

2. The proposal is to erect a building on the rear portion of the existing post office and telephone exchange site in Sydney-road, Brunswick, and install therein an automatic telephone switching system, having an initial equipment for 3,600 subscribers' lines, and an ultimate capacity of, approximately, 7,000 subscribers' lines. It is proposed that the initial equipment shall be capable of extension to the ultimate capacity named, and thus enable requirements to be met in the proposed automatic exchange area for 20 years after the proposed date of opening.

ESTIMATED COST.

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

	£
Site (proportionate cost)	915
Building	7,600
Air-conditioning plant, &c.	2,230
Exchange equipment, including that necessary at other exchanges	56,088
Sub-station equipment	12,744
Line plant (diversion)	3,025
Sundries	818
Total	84,320

COMMITTEE'S INVESTIGATIONS.

4. The Committee visited the existing telephone exchange at Brunswick, inspected the site of the proposed automatic telephone exchange, carefully scrutinized the plans submitted for the building, and took evidence from a representative of the Brunswick City Council, and from the telephone and works officials in regard to the proposal.

SITE.

5. The site proposed for the new exchange forms portion of the existing post office area which extends from Sydney-road to Frith-street, having a frontage of, approximately 56 feet to Sydney-road and 63 feet to Frith-street, the depth being, approximately 352 feet. It has not been necessary to purchase any land for this new exchange, as it forms portion of the post office site, but an amount proportionate to the value of the area has been charged against this proposal. The proposed building will occupy the Frith-street frontage. The soil is of a volcanic nature, and the site is flat and suitable as a building site for the proposed structure.

Building.

6. The building is to be of brick—the front portion being of two stories, with a single-storied switch room at the rear.

The front portion will contain, on the ground floor, a power room 18 ft. 6 in. by 28 ft. 4½ in., and an air-conditioning room 21 ft. 3 in. by 22 ft. 7½ in., with fuel and power rooms, and on the first floor a battery room 18 ft. 10½ in. by 28 ft. 4½ in., a staff room 21 ft. 7½ in. by 15 ft. 9 in., with locker room, store, and the necessary lavatory accommodation. The switch room is to be 70 ft. long by a width of 49 ft. 6 in.

The switch room, as designed, is to have a concrete floor, steel ceiling, steel roof trusses, and a corrugated iron roof. The roof of the front portion is proposed to be of timber trusses supporting terra cotta tiles. The whole building is to have steel-framed windows with wired glass.

7. Consideration was given to the question of having the roof of the building of two different materials, but, in view of the fact that the exchange will front a narrow street, where most of the structures in the vicinity are roofed with galvanized iron, it was decided that there was no necessity in this instance to incur the extra expenditure of £50 involved in roofing the front portion of the exchange with tiles.

The decision arrived at by the Committee in connexion with this matter is shown by the following extract from its minutes of proceedings, namely :—

"Mr. Gregory moved that the whole of the roofing be of galvanized iron. Seconded by Senator Sampson.

Mr. Holloway moved as an amendment that the roof of the portion comprising the air-conditioning and power rooms be of tiles, and that the switch room be roofed with galvanized iron as provided in the plan. Seconded by Senator Dooley.

The Committee divided on the amendment :—

Ayes, 3.	Noes, 6.
Senator Dooley	Senator Reid
Mr. Holloway	Senator Sampson
Mr. Long	Mr. Cameron
	Mr. Curtin
	Mr. Gregory
	Mr. Lacey

and so it passed in the negative.

The Committee then divided on the original motion—

Ayes, 6.	Noes, 3.
Senator Reid	Senator Dooley
Senator Sampson	Mr. Holloway
Mr. Cameron	Mr. Long
Mr. Curtin	
Mr. Gregory	
Mr. Lacey	

and so it was resolved in the affirmative."

8. The question was raised as to the advisability of having parapet walls to the switch room to guard against the risk of fire from adjoining buildings. In view of the fact, however, that provision is made for a right-of-way on each side of the building; that a good water service exists in Frith-street, and chemical fire extinguishers will be provided in the building, the majority of the Committee considered that this precaution was unnecessary.

The decision arrived at by the Committee in connexion with this matter is shown by the following extract from its minutes of proceedings, namely :—

"Mr. Gregory moved that, to minimise the risk of fire from adjoining buildings, the switch room, comprising the rear portion of the building, be constructed with brick parapet walls. Seconded by Senator Reid (*pro forma*).

The Committee divided on the motion.

Aye, 1.	Noes, 8.
Mr. Gregory	Senator Dooley
	Senator Reid
	Senator Sampson
	Mr. Cameron
	Mr. Curtin
	Mr. Holloway
	Mr. Lacey
	Mr. Long

and so it passed in the negative."

Air-Conditioning Plant.

9. It was stated in evidence that Brunswick, being one of those districts where, with the improved moisture resisting qualities of modern type automatic telephone equipment, the Postal Department's engineers advise that it is not necessary to provide for any reduction in the moisture contents of the air, the refrigerating plant, which forms an expensive part of the air-conditioning installation is not provided for.

The plant suggested is of the filtration type, capable of cleaning and heating the air only and distributing it into the exchange, and the estimated cost is :—

	£
Ventilating plant, including heater and dust filters	1,625
Vacuum cleaning service	375
Compressed air service	230
	2,230

After hearing the evidence of the engineers in regard to this matter, the Committee is satisfied that this plant will enable an effective telephone service to be maintained, and recommends its installation accordingly. It was ascertained, however, that space is being provided in the building for the installation of a full air-conditioning plant, if experience shows that such plant is necessary at any future time, and with this action the Committee concurs. Information was obtained, however, that the compressed air service, designed to remove dust from the intricate telephone equipment has not proved effective in the past, and the Committee consequently recommends that this item be omitted.

This will result in a saving on the proposal of £230.

Financial Aspect.

10. It was stated in evidence that the total annual charges for the proposed automatic telephone exchange, as at date of opening, will amount to £30,180
and five years later to 38,120
The estimated annual revenue as at date of opening is set down at 39,310
and five years later at 53,260
The assets recoverable or thrown spare if the automatic telephone exchange is established in October, 1931, are estimated to have a recoverable value of £25,220.

An amount of £12,320 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.

Committee's Recommendation.

11. Under these circumstances, the Committee has no hesitation in recommending that the automatic telephone exchange at Brunswick be established as early as possible.

Savings Effected.

12. The recommendations of the Committee will result in a saving on this proposal of—

	£
Alteration in roofing	50
Elimination of compressed air service	230
	280

A. W. LACEY,
Chairman.

Office of the Parliamentary Standing Committee on Public Works,
Parliament House, Canberra.

8th January, 1930.

MINUTES OF EVIDENCE.

(Taken at Canberra.)

THURSDAY, 28TH NOVEMBER, 1929.

Present;

Mr. LACEY, Chairman;

Senator Dooley	Mr. Curtin
Senator Reid	Mr. Gregory
Senator Sampson	Mr. Holloway
Mr. M. Cameron	Mr. Long.

Thomas Hill, Director-General of Commonwealth Works, sworn and examined.

1. *To the Chairman.*—In connexion with the proposal to provide an automatic telephone exchange at Brunswick, I am responsible for the design of the building, and for all the services other than the actual telephone equipment. With your consent I propose to devote myself this morning to an explanation of a very important part of the mechanical services, so as to familiarize the new members of the committee with it. For that purpose I have brought along different exhibits, diagrams, and data, relating to air treatment. Experience has shown that when the relative humidity in the atmosphere reaches a point above 70 per cent. it particularly affects the working of automatic telephone equipment, and that a loss of efficiency in the service to the public immediately results. That is especially noticeable on the east side of the Great Dividing Range, particularly in New South Wales and Queensland. The very delicate mechanism in automatic exchanges requires not only that the air shall be dehumidified, but also that it shall be pure in the sense that it is free from dust. Therefore, in addition to dehumidifying plants, dust extraction plants are being, and have been for some years installed in many exchanges. The propositions that the committee will have placed them for the establishment of automatic exchanges in Victoria and South Australia, will be similar to the present proposition, in which there is to be dust elimination but not dehumidification. To-morrow, however, you will be considering a proposal to establish an automatic exchange at Hurstville, near Sydney, the plant for which will embrace not only that for dust extraction, but also that for dehumidification. The cost of dehumidification is rather high on account of the fact that the only method so far discovered for extracting moisture from the atmosphere is to install a refrigerating plant to cool it.

2. *To Mr. Curtin.*—Despite the additional cost thus incurred, the operating expenses are lower than in the case of a manual exchange. Automatic exchanges are now the accepted thing, and we have to render them so efficient that even on a very humid day contact between the subscribers will still be maintained.

3. *To the Chairman.*—No engineering difficulties are apprehended in connexion with the water and sewerage services for this exchange. It is not proposed to install a full air conditioning plant with dehumidifiers, but it is proposed to have a full dust extraction plant. The estimated costs of the mechanical services are as follows:—

1. Ventilating plant including heater and dust filters, £1,625.
2. Vacuum cleaning service, £375.
3. Compressed air service, £230.

The ventilating plant (Item 1) proposed for this exchange is of the oil filtration type only. Brunswick being one of those districts where, with the improved moisture resisting qualities of modern type automatic telephone equipment, the Postal Department's engineers advise that it is not necessary to provide for any reduction in the moisture contents of the air. The refrigerating plant, which forms an expensive part of an air conditioning installation is, therefore, not provided for. The plant proposed will consequently be of the filtration type, capable of cleaning and heating the air only, and distributing it into the exchange. The cleaning is readily effected by means of viscous type oil filters, several kinds of which are already on the market, and installations of this kind have recently been made in several telephone exchanges in Victoria and New South Wales, in accordance with the evidence submitted and approved by previous works committees. Before these plants were installed severe tests were carried out by the department, in collaboration with the Commonwealth analyst, on several different types of filters, and these tests established the fact that satisfactory filters can be obtained. Greased cards showing clearly the effectiveness of the filters tested are submitted for your inspection. The filters are coated with a thin film of special oil, and the air entering the switch room will be passed through a battery of these filters, the dust adhering to the oily surface and the cleaned air passing through. The installation thus consists of a centrifugal multivane fan delivering clean air into the switch room in sufficient quantity to change completely the air in the room eight times in an hour; a battery of dust filters; a heater battery; a cast iron hot water boiler with circulating water pump, and the necessary ductwork and registers to distribute the air effectively throughout the switch-room. The air supply will pass firstly through the dust filters, then through the heater battery, which will be in operation only when it is necessary to heat the air, through the fan, and then by means of suitable ducts and registers, into the switch room. Outlet ducts and registers are provided in suitable positions in the switch room to allow the foul air to escape into the roof space, thus maintaining a circulation of wholesome air in the room. Provision is also included for cleaning the filters when they become too dirty for efficient operation, and recharging them with fresh oil. The approximate annual charges for the ventilating plant are as follows:—

	£	s.	d.
Interest and depreciation 10 per cent. on £1,625	162	10	0
Power for fan, 5 B.H.P. motor	114	0	0
Power for hot water pump, 1 B.H.P. motor ..	10	0	0
Oil for filters	25	0	0
Fuel for boiler	42	0	0
Total	353	10	0

To enable dust to be removed from the intricate telephone equipment, it is proposed to install a compressed air service, similar to that already installed in other automatic telephone exchanges, at an estimated cost of £230. It is also proposed to install a vacuum cleaning system at an estimated cost of £375, which will enable dust from the floor and fittings to be picked up with suitable tools and hoses. Tools and hoses may be connected through piping to a vacuum producer in the machine room. You will notice that the diagrams show a telephone exchange with the roof off, the equipment installed, and the ducts, which admit and discharge

air from it. Cure is taken to catch the air where it will be as fresh and as free from dust as possible. If we have a clear passage or right of way near the property, we admit the air into the *power room through* louvres, but if there is only a narrow passage we take it into the exchange from a point above the roof.

4. *To. Mr. Gregory.*—It would not be wise to have the inlet pipe at all times at least as high as the height of the building. That is not necessary in places where we have complete possession of the property. In most cases the air is taken through the wall. It passes through an oil filter, and is led into the exchange by *means of ducts and discharged* at different points along the ceiling. From there it passes through the switch room and escapes into the *roof space and helps to keep* the roof cool.

5. *To the Chairman.*—We endeavour to keep the air in the exchange at a temperature of between 62 and 64 degrees Fahr. We have a simple *method of heating it in* cool weather. We aim at making from six to eight changes of air per hour. As a rule, no air other than that which is thus admitted gets in. The windows are so made that they can be sealed, and any air which *enters the exchange* must pass through the filter. There are several types of filter on the market, but so far we have found the Reed filter *to be the most effective*. It is made in United States of America. So far, we have not been able to manufacture it in Australia, but every endeavour is being made to either come to an arrangement with patentees or manufacture ourselves. This *is the only portion of the plant that is not manufactured* in Australia, and we want the whole of it to be *Australian made. We are now experimenting with a* British made filter, and our experience leads us to believe that it will prove successful. It could easily be made here. All kinds of factories will ultimately go in for air cleaning. I produce a sample of the oil which we use. It is a rather thick oil, thinned down with paraffin. We have experimented with glucose and a *number of other things.* In the case of castor oil we found that as soon as the temperature rose and the air began to pass into the building, *it carried with it a* certain quantity of the oil, and the odour was most objectionable. The cost of the oil we use is not great. It is necessary for us to have an oil that is not odoriferous. After the screen has been dipped it is drained *of all surplus oil* to prevent any from getting into the exchange. The screen then has merely the adhesion of a thin film of oil. *It is not inflammable.* I produce two bottles of dust that was collected in an experiment covering a period of fourteen hours. The cleaning of the filters is quite a simple operation. They are dipped in a hot bath of caustic soda, drained, and then redipped in an oil bath.

6. *To. Mr. Curtin.*—There is no need for *any special* supervision, because that work is undertaken by the fitters.

7. *To the Chairman.*—This system is now being installed in five exchanges, one being at Caulfield East. Previously, we relied on the dehumidifying plant to clean the air, but in view of the heavy expense involved in the operation of a cooling device we had to explore other means for obtaining clean air. This *method appeals to us very greatly.* Very exhaustive experiments have been carried out, and they all lead us strongly to the belief that *we are on the right track.* Under the present system the mechanism functions to its maximum efficiency. I suggest to members of the committee that they read the evidence which I gave on 18th April last, in connexion with the proposal to *establish an automatic* telephone exchange at Caulfield East. They will find that I then dealt with points upon which I have not *touched this morning.*

8. *To Senator Reid.*—By the use of this device we have reduced the amount of plant which we require for air conditioning. Previously we had to adopt the *dehumidification* process where it was not otherwise needed. Air picks up a certain amount of moisture, and unless you *remove that moisture before* the admission of the air into the main switch room the room becomes filled with it. There are only two *methods by* which it can be removed. One is to heat the air; but if it is already warm, any further heating of it will make the conditions intolerable for the staff. The other method is to cool it; but a cooling device is expensive. *In order to avoid that* expense where we do not need a cooling device we have developed this method of oil filtration. It can be worked up to a *temperature of* 90 degrees or even 100 degrees and still keep the dust out. We found, however, in the case of certain oils, that when the temperature was much over 70 degrees they began to be carried forward into the room, and to *throw off* an objectionable odour. They have no effect on the plant inside. We have carried out experiments at all *temperatures and the oil we are now using is suit*able for the removal of dust under all conditions. We know from practical experience extending over a period of years that the efficiency of the exchange becomes less after the humidity exceeds 70 per cent.

9. *To Mr. Curtin.*—In certain cities during different months of the year, you can be sure of a greater *humidity than 70* per cent. In Sydney and Melbourne it reaches to as high as 80 per cent. or 90 per cent. The temperature of the *water in the mains is frequently* over 70 degrees, and if you attempted to wash air with it without cooling it, you would increase the humidity in the exchange. This system is not operating in the Perth exchange. It can be installed fairly easily *in exchanges* where it is not now operating.

10. *To Senator Reid.*—From my own observations I know that *it is necessary to prevent the humidity from* becoming greater than 70 per cent.

11. *To Mr. Holloway.*—*It is not correct to say that* in our endeavour to obtain the best results from the plant we make the conditions more difficult *for mem*bers of the staff. Their conditions are improved. If you had a dehumidifying plant without a cooling de*vice*, you would get bad conditions; but I cannot imagine such a thing happening. Power for this plant will be supplied *at the rate charged by the Brunswick council.*

12. *To Mr. Long.*—The accumulation of dust would not be minimized if the air inlet was *placed at a higher* level. We have tried various levels. Certainly, the higher you get the less dust you find in the atmosphere. If the conditions are not good at the ordinary level we run a duct up and take the air in above the roof. *By doing so*, we have less dust and better conditions. I am quite satisfied that the added efficiency is a sufficient recompense for the *difference in cost between oil* and water. Water is a dangerous thing to use unless you have a cooling device; it is so easily *picked up by* the air and carried into the switch room. If the air is at all warm, you can very easily make the conditions *bad in the switch room.* We are on the right track when we use oil where the temperatures are low and moisture *extraction is not necessary.*

13. *To Senator Sampson.*—In our buildings we use either brick or concrete walls. *Unless there is danger* of fire from adjacent buildings, we adopt steel principals for the roof. Where there is danger from fire from higher buildings alongside us, we adopt a flat roof. We are avoiding the flat roof *as much as possible*, because of the difficulty of keeping it water-proof under all conditions. Our present type provides *simplicity without extravagance.* We are aiming at standardizing the type elevations so that Commonwealth buildings will be *immediately recognized.*

14. *To Mr. M. Cameron.*—The ventilation of this exchange will not be similar to that of the Collingwood exchange. *The latter has a dehumidifying plant.* If we were establishing the Collingwood exchange tomorrow, we should install this type of plant, not because its present plant is inefficient, but on account of the fact that our experience has shown that a dehumidifying plant is not absolutely necessary in Victoria. Also, there has been an improvement in regard to the *resistance to moisture of the equipment supplied by the* companies. We must, of course, install such a plant in certain temperatures; but we *are now able to say* that certain portions of Australia that we formerly thought required it can get on quite well with only the dust extract plant. The oil filter with which we were experimenting at the time of the establishment of the automatic exchange at Caulfield East was of British make, and the agents were proposing to manufacture it in Australia. *It was a stream line filter, but it has not* been exactly a success. Too much dust passed through it. The officers of my department are afforded time and opportunity to devote to experimental work. Our experiments with the corrugated type of filter, a sample of which I have here with me, are very promising. In all branches we are continually detailing officers for *experimental work.*

15. *To Mr. Gregory.*—It is very strongly recognized that when the humidity exceeds 70 per cent., it is dangerous to the working of automatic telephone plant. *In the month of February the humidity in Melbourne* sometimes exceeds 80 per cent., but apparently that humidity does not continue sufficiently long *to have any* deleterious effect. It is intensive humidity for day after day, and week after week that causes the trouble. If at any time after an automatic exchange has been established without a dehumidifying plant, it is found *necessary to install such a plant, it can quite easily be* put in. Where there is any doubt, we make provision for it in the building plan. *Our layout permits us to* extend without difficulty. We could easily erect an additional building outside the main building if sufficient room were not available inside. In one of the big exchanges in Sydney, where we have found it necessary to increase the plant, we have managed to find room for it. The cost of the equipment in this case will *be approximately £70,000.*

16. *To Mr. Curtin.*—It is preferable, but not essential, to have the plant on the ground floor. It could be placed on the roof.

17. *To Mr. Gregory.*—There would not be a likelihood of more dust collecting if it were so placed. The *cool air would be taken by means of a duct from the* roof. In connexion with one or two of the Sydney exchanges, we have considered the advisability of putting the plant on the roof, but other difficulties have prevented our doing so. The plant is all electrically driven. We use very little coke or coal; generally oil. This plant will not cool the atmosphere. I do not think *that the windows should be opened in any circum*stances. Fresh air from outside is taken into the building eight times in the course of the hour, *and the other* air escapes through vents. Better conditions are thus provided than would be obtained from opening the windows. I recommend that the windows should be sealed. The faults at Malvern have been corrected since the visit of the committee. The charge for power in connexion with this proposal will be so much a *kilowatt an hour as an annual charge, plus a certain* rate for each unit of consumption. I accept responsibility in connexion with the drawings for the building. They show that there are to be overhanging eaves. In this particular location it is quite safe to have that type of roof. We have plenty of room. It is at the rear of the existing post office. We called in as fire consultant, Mr. Lee, late chief of the Victorian Fire Brigade. When we are considering any important building we seek his advice in regard to fire resistance. There will not be a great danger of fire from adjacent buildings *with this particular kind of roof.* There is very little wood in it. It has steel principals and the ceiling is of corrugated iron. Even *if a fire did start, only the light* wooden battens carrying the tiles would ignite. The rafters are of steel. Even if they were of wood, they would not be a menace on account of the small quantity used, and the fact that the ceiling is of corrugated iron. *The architecture* would be altered if we made provision for parapet walls all round. That type of architecture has been objected to. *We are trying to keep up appear*ances where we think that can be done safely.

18. *To Senator Dooley.*—*The oil filtration system is* being used largely in factories in the United States of America. I was over there two *years ago. It is also* used in some of the exchanges; for example, Chicago. In confectionary and other factories in Great Britain, oil screens of different kinds are used largely to prevent the admission of dust. In fact, it is very rare now *for a building of any quality* to be erected in the United States of America without this system or other oil-type filters being used. The oil *that we use does no* have any effect on the atmosphere inside the building, so long as the temperature does not exceed 90 degrees. *None* of it is carried into the building, and there is no danger from fire. The cost of insurance is not increased by *its use.*

19. *To Senator Reid.*—The weight of the plant would *not be greater than* 7 or 8 cwt. With a dehumidifying plant, we need a water cooling device. That is a big wooden louvre *affair which drips* water. That is what has caused us to refrain from installing the plant on the roof.

(Taken at Melbourne.)

MONDAY, 2ND DECEMBER, 1929.

Present:

Mr. LACEY, Chairman;

Senator Reid	Mr. Gregory
Senator Sampson	Mr. Holloway
Mr. M. Cameron	Mr. Long.
Mr. Curtin	

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

20. *To the Chairman.*—I am aware of the proposal to establish an automatic telephone exchange at Brunswick, and am responsible for it. The following statement sets out the details of the scheme:—

PROPOSAL FOR ESTABLISHMENT.

The proposal is to erect a building on the rear portion of the existing post Office and exchange site in Sydney-road, *Brunswick*, and install therein an automatic telephone switching system having an initial equipment for 3,000 subscribers' lines and an ultimate capacity of approximately 7,000 subscribers' lines. It is proposed that the initial equipment shall be capable of extension to the ultimate capacity named, and thus enable requirements to be met in the proposed automatic exchange area for twenty years after the proposed date of opening.

REASONS FOR THE PROPOSAL.

The existing manual magneto telephone exchange reached the limit of its capacity in 1926. *To provide for further* development in the area, a temporary automatic exchange was installed as an adjunct to the manual exchange, but owing to *building limitations, provision for growth by this* means can only be made in the existing building until October, 1931. It is proposed therefore to install a complete *modern plant in a new building in* order to give efficient service to the existing and prospective subscribers in the area.

ESTIMATED COST.

The estimated immediate cost of the work is:—

	£
Site (proportionate cost)	915
Building	7,000
Air Conditioning Plant, &c.	2,230
Exchange Equipment including that necessary at other exchanges ..	56,938
Substation Equipment ..	12,744
Line Plant (Diversion)	3,025
Sundries	818
	84,320

The actual revenue for the year ended 31/12/28 and the annual revenue it is estimated will be obtained on the date of opening and five years thereafter is shown hereunder:—

Average number of subscribers' lines connected during the year ended 31st December, 1928.	Actual total revenue received for the year ended 31st December, 1928.	Estimated number of subscribers' lines October, 1931 (date of opening).	Estimated annual revenue October, 1931	Estimated number of subscribers' lines October, 1936 (five-year date).	Estimated annual revenue October, 1936.
2,431	£ 30,828	3,100	£ 39,310	4,200	£ 53,200

The following statement supplied by the accountant verifies those figures:—

POSTMASTER-GENERAL'S DEPARTMENT - VICTORIA.

REVENUE - PROPOSED AUTOMATIC TELEPHONE EXCHANGE - BRUNSWICK.

(a) Actual total revenue received from the subscribers and public telephones in the existing Brunswick Telephone Exchange area for the twelve months ended 31/12/28:-

	£ s. d.
Rents	15,992 7 8
Calls	£13,134 10 4
Miscellaneous Charges	397 15 2
Trunk Line Calls	1,003 10 4
Total	30,828 9 6

Average number of lines connected during the above-mentioned twelve months, 2,431.

Average revenue per line, £12/13/7.

(b) Estimated annual revenue for the proposed Brunswick Automatic Telephone Exchange area as at the proposed date of cut over i.e. October, 1931 and five years later.—

	No. of Lines.	Rents.	Calls.	Miscellaneous Charges.	Trunk Line Calls.	Total.
		£	£	£	£	£
As at cutover	3,100	10,749	29,011	607	2,945	39,312
Five years later	4,200	22,893	27,112	637	2,770	53,292

I hereby certify that the above figures have been computed from the books and records of this office, and the figures with respect to the revenue are to the best of my knowledge and belief, correct.

E. G. TERRILL,
Accountant,
Postmaster-General's Department,
Melbourne.

Dated 28th March, 1929.

SITE.

It is proposed to erect the building for the proposed Brunswick automatic exchange on the rear portion of the existing post office and exchange site. This site extends from Sydney-road to Frith street and has a frontage of approximately 56 feet to Sydney road and approximately 63 feet to Frith-street, the depth being approximately 352 feet. The proposed building will occupy the Frith-street frontage.

BUILDING.

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 3,600 subscribers' lines, but the building will be designed to accommodate equipment having a capacity of approximately 7,000 subscribers' lines.

FINANCIAL ASPECT.

	As at October, 1931. £	As at October, 1936. £
1. Capital Cost—New	84,320	93,260
2. Capital Cost—New and *in situ* ..	243,720	311,400
3. Annual Working Expenses of proposed Automatic Exchange ..	9,000	12,270
4. Total Annual Charges for proposed Automatic Exchange	30,180	38,120
5. Annual revenue—		
Actual for the year ended 31/12/28—£30,828		
Estimated as at October, 1931	39,310	
Estimated as at October, 1936		53,200
6. Assets recoverable or thrown spare if an automatic exchange is established in October, 1931—		
(i) Book Value	37,540	
(ii) Recoverable Value ..	23,220	
(iii) Cost of Recovery ..	730	

Regarding item 6 of the foregoing statement, the difference between sub-items (i) and (ii), namely £12,320, 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 substation equipment) which is irrecoverable and includes depreciation due to wear and tear, and labor in installation.

The humidity of the air at Brunswick has been taken into consideration. The air conditioning plant that is to be installed in the building is not what we would term a full air-conditioning plant. It is a somewhat modified one. From the information that we have obtained from the Meteorological Department, and from our own experience, we have come to the conclusion that the air-conditioning plant, as proposed, will suffice for the protection of the apparatus. We do not say that in other centres such as Brisbane and Sydney we would be justified in installing a similar plant. We are satisfied from our investigations that the plant will provide an efficient service. The difference in the space necessary for a full air-conditioning plant, and that for a modified plant is small, and, of course, it might be found necessary at a later date to install a full plant. It would be better to have the accommodation for a full plant, because a reduction in the space would save little or no expenditure. It may later be found necessary to put in a refrigerating plant and, therefore, it would be unwise to reduce the space. It will be noticed that a good deal of the automatic plant operating at the present exchange will be usable in other exchanges. It cannot be used in the proposed building because that must be in readiness for use before we disconnect the existing exchange. But as soon as we recover that plant the automatic equipment will be used in other exchanges. Automatic apparatus is being subjected to continual improvement. There is no finality. The proposed equipment will be of a much later design than that of the equipment in operation at Geelong, Newtown, Balmain, or Glebe. Of course, the existing automatic equipment would not be obsolete. The cost of the recovery of this equipment will be £730, and the value of the equipment that we shall recover is set down as £25,000. The cost of reinstallation will perhaps mean the expenditure of an additional £950. It therefore pays us to recover any apparatus that may be usable at other exchanges. Then again, much of the magneto equipment is usable. We re-condition magneto equipment for use as sub-station apparatus. We shall use practically all of the subscribers' magneto plant after reconditioning it.

21. *To Mr. Curtin.*—The cost of the reconditioning of the manual apparatus is not included in our estimate, but the value of much of it is recoverable. Before we reissue the plant we recondition it, and when we re-issue it it has a recoverable value equal to that shown, plus the cost of reconditioning.

22. *To the Chairman.*—The cost of line plant diversion is estimated at £3,025. At present the lines run into the existing building, and those lines have to be teed into the new building. That work entails a fair amount of re-routing and shortening of cables. I have details showing how the estimated costs are made up. This is not guess work. We take the actual cost of previous work. We know, for instance, what it costs to tee in cables. We calculate these costs in units, and we know the latest prices of the equipment. Occasionally the prices vary, but the trend is slightly downward, so that the figures that I have given are likely to be conservative. The difference between the actual total revenue received for the year ended 31st December, 1928, and the estimated annual revenue at October, 1931, is about £9,000. That takes into account the ordinary increase in three years, which is 30 per cent. In addition to that, there is always a slight impetus given to exchange development when a more efficient service is provided. All these estimates are based upon what we call our telephone survey, which is carefully prepared. The probable increase in every portion of the area for periods of five years, eight years, and twenty years is carefully estimated. Of course, when we deal with a period of 20 years we are dealing largely in prophecy, but in this instance we are guided by past experience with the best material available at hand, and the estimates that I have given are survey figures for those periods.

23. *To Mr. Long.*—The present equipment has a capacity of 3,600 subscribers' lines, but the new building is designed to accommodate equipment having a capacity of 7,000 subscribers' lines. We have based that estimate on the survey that we check from time to time. We have been making surveys for the last fifteen or twenty years, so I think that we are in a safe position in making these estimates. The data is prepared by an officer who goes round the district noting any likely changes. He consults estate agents, municipal authorities and business people, in fact, any one who is likely to give him useful information. All the information is carefully noted in our survey plans. By means of calculation we find out what the total development is likely to be in five, eight, and twenty years, and then we discover the copper centre, which is the point at which the least amount of copper is required to serve the whole of the subscribers in the area. We then endeavour to establish the exchange at that copper centre. In this particular case there is little difference in respect of the position of the copper centre for each of those periods, and it would be an expensive matter to obtain a site at the actual copper centre, which is about 120 yards from the present centre. It is preferable to erect the new exchange on the present site. I am perfectly satisfied that we are within the margin of safety in erecting the building on the present site. There are many applications for telephones, and under present conditions we shall be able to accommodate them only to October, 1931; after that we shall not be able to accommodate intending subscribers. The present building will then be working at full capacity, and there will be no room for more equipment. After that date we could not give efficient service in the present Brunswick exchange. The item of sundries, £818, covers small items, which are not worth itemising. That estimate is based upon wide experience. The estimate of £7,000 for the building was supplied to us by the Works Department. We simply give that department the space requirements, and they submit to us for approval a building at an estimated cost. Of the equipment estimated to cost £84,000, probably about 12½ per cent. of it would be made in Australia. Of course, the labour would be a local item. The rest of the equipment would be imported because it is not manufactured here. The operators at the existing exchange will not be required on the automatic exchange, but we shall require additional mechanics. Probably none of the girls will be dismissed. They are usually absorbed

elsewhere, and no new girls are taken on until the others have been placed. The actual staff will be fewer on the new exchange. There will be few discharges, because we generally manage to avoid that. There will be some saving in the wages bill, but the wages will be paid to mechanics and not to operators. Of course, it is the displacement of the operators that allows us to provide for a plant costing £84,000. At present there are 54 intending subscribers awaiting connexion, not because we cannot connect them, but because there is probably some cable shortage. On the 31st December, 1921, there were 1,180 lines, and on the 30th September last 2,618. If we add to that the 54 intending subscribers we get an increase in eight years of 1,492. The ratio has gone up steadily. The average increase has been rather more than 10 per cent. In one year it was 20 per cent., but 10 per cent. would be a fair average to take. Actually, it looks like 11 per cent. or 12 per cent. I am satisfied that the automatic telephone exchange is justified.

24. *To Mr. Cameron.*—From the date that we get authority to proceed with this work it will take practically twelve months to complete the building and to obtain the equipment provided that there is no delay in its arrival. We propose to carry on the present exchange until 1931. This is the position. It takes us usually about three months before the work is submitted to and approved by the Public Works Committee. When it is approved, we have to call tenders. Assuming that by that time the specification is ready, we give the tenderers four months to submit tenders. Then we have one month to consider them. Then we have to allow for the completion of the building and we generally allow about another nine months for the delivery of the equipment, provided that there is no delay. That is about two years altogether. It would take three years to install a big exchange like that at Brisbane central in which there is from 8,000 to 9,000 lines. Brunswick is an industrial centre, in fact, an average suburban district. It is more a working class area than a professional class area. The telephone requirements of such areas are much about the same. No one can say when the Brunswick district will reach saturation point, but we look forward to the time when every one will have a telephone. The expense to a working man and his family of attending picture theatres would be far greater than the expense of a telephone. At first, telephones were confined to big businesses, such as banks and insurance offices, then the ordinary commercial people installed them. The wealthier residents and business men then considered it desirable to have telephones at their own homes. The demand spread to the social strata below, the professional men, to whom £5 a year was a comparatively small matter. Nowadays, small shopkeepers realize that they must have a telephone in the interests of their business. The farmers are using the telephone, and the time is rapidly approaching when the working man will of necessity have a telephone in his home.

25. *To Mr. Curtin.*—Wharf labourers would certainly find it convenient to have a telephone.

26. *To Mr. Cameron.*—There is not much fluctuation in the price of material. It is slightly on the down grade. About 85 per cent. of the material for the automatic exchange would have to be imported. The new tariff would have no effect upon that, because there is no proposal to manufacture automatic equipment in Australia.

27. *To Mr. Curtin.*—England supplies us with most of our material. At one time we were getting seven times as much equipment from America as we were from England, but to-day the position is reversed.

28. *To Senator Reid.* There are about five companies competing for the supply of our equipment. Prices have been on the downward grade for four or five years. We are to-day paying distinctly less for material than we were five years ago and we are getting equipment that is as efficient as any in the world. Improvements suggested by our own post office people have been incorporated in some of the latest designs of apparatus. Generally we find that an efficient thing is a cheap thing. We are really getting more efficient plant per unit for less money. I should think that the postal department would have use for the present Brunswick exchange building because Brunswick is a growing centre. We do not anticipate that the recent adjustment of rates will affect telephone development. The new rates will of course mean an increased revenue. We have based our estimates of revenue on the old rates and therefore they will be on the conservative side. I cannot say what will be the extra revenue because of the new rates, *because they have not yet come into force.* There is a possibility that as the charge is 10s. a year more in the Brunswick area the people may be more economical in their calls to that extent. Our estimate of revenue is based on the ground rental plus calls. If the ground rental were 10s. more and calls 10s. less there would be no alteration. But we think that there will be an increase of revenue and we are budgeting for it. Our old telephone rates were practically the lowest in the world. The new rates will make little alteration to that position. There are many factors to be taken into consideration, particularly in respect of the Scandinavian rates, and I should not like to say whether our rates are higher or lower than those. The new rates will not affect the country people more than the city people. The demand for the extension of telephones is being maintained, and the new rates are having little or no effect. I do not think that the new rates should place the telephone beyond the reach of the wharf labourer. We have carried out many experiments in connexion with the humidity of the air and installation of air conditioning plant. We have made progress inasmuch as in this case we are *installing a modified plant.* We have ascertained that in certain places a modified plant will give an efficient service.

29. *To Mr. Holloway.*—If this building is approved it will probably take over a year before it can be completed. By that time we shall be just about ready to install the equipment in it. All we can do to speed up the building operations, is to make representations to the Works Department. We are just as anxious as any one else to assist in providing work for the unemployed, but the erection of this building is under the control of the Works Department. I realize that we are likely to get a much better deal from the contractors while there is a surplus of labour, and I fancy that the Works Department would be alive to that aspect. We do not get our equipment from one company only. We have at least five competitors and we accept, of course, the lowest tender. We receive tenders only from America and England. Our orders are fairly evenly divided among the companies. For instance one company has supplied equipment for Brisbane, another for Adelaide, and another for Melbourne.

30. *To Mr. Curtin.*—We let contracts for the whole of the equipment. We cannot mix the equipment.

31. *To Mr. Holloway.* We have plenty of competition. We actually have two separate companies installing equipment at Sydney. The British General Electric Company has a branch in Australia. As a matter of fact two companies in Australia have amalgamated or come to some arrangement in respect of the manufacture of small parts. Four companies in Great Britain usually tender for our equipment, and they are distinct competitors. I have no reason to believe that there is an agreement among them.

32. *To Senator Reid.*—It was cheaper and better to install a partial automatic telephone system at Brunswick rather than to extend the manual exchange, particularly as the partial automatic plant has a high recoverable value. We have made no credit entry for the use of the old building by the Post Office people.

The witness withdrew.

Horace John Mackennal, Commonwealth Works Director, Victoria, sworn and examined.

33. *To the Chairman.*—I am aware of the proposal to establish an automatic telephone exchange at Brunswick. I think that I shall be responsible for the preparation of the working drawings. Sketches have already been prepared by the central office in respect of this proposition. Generally speaking, the proposed building will be of brick. The front portion facing Frith-street, will consist of an air-conditioning room and a power room on the ground floor. The battery room, the staff retiring room, and conveniences will be on the first floor. That portion of the building is to be roofed with terra cotta tiles. The actual telephone exchange portion of the building, consisting of the main switch room, will also be in brick, with a concrete floor, steel ceiling, roof trusses of galvanised iron, and a corrugated iron roof. The whole building is to have steel-framed windows. The roof of the front portion of the *building will be of timber trusses supporting terra cotta* tiles, whereas the back roof will be of steel trusses with galvanised iron. The equipment will be housed under the galvanised iron roof. Generally speaking, the building is of simple construction with a little ornament at the front entrance in the shape of cement facings. The date of the completion of the building will depend upon whether it is to be carried out by contract or departmental labour. If by contract labour quantities will have to be prepared. That will take about a fortnight. The preparation of the drawings would take about three weeks, and advertising and preparation of quantities for contractors about another three weeks. If the work were to be carried out by departmental labour it could be started in about the fourth week. It would take about five or six months to complete the building. The site is flat, the nature of the ground being volcanic. It has a dark clay bed with bluestone underlying it. I have not had actual holes sunk on the site, so I have to rely on my memory to carry me back to the time when the post office was erected there. I do not specifically remember the excavations, but from my knowledge of the district I believe that it is volcanic ground. *The fire risk in this* instance would be no greater than it is in any other settled place. There is a foundry alongside the building, but I do not think that it offers any grave fire risk. There will be a right of way on either side of the building, and there is a good water service from Frith-street. Chemical extinguishers, of course, will be used inside the building to obviate ordinary fire risks. I do not think that the provision of a parapet wall instead of eaves would provide a greater protection against fire. I should favour a parapet wall when buildings are semi-detached, because in that case the wall would form a fire break. But when there is a right of way between buildings a parapet wall would be a danger, because flying sparks and falling debris from an adjacent building that is on fire would collect behind it. I do not think that the neighbourhood of Brunswick justifies the building being roofed with tiles. In any case, there is not much difference in cost. If we substituted galvanized iron for the tiles it would mean a saving of about £50. There is space provided

in the building sufficient for the installation of a full air-conditioning plant We merely advise the Postal Department of the estimated cost and how the plant should be planned, and that department requests the building according to what it considers are the requirements. I do not know exactly what amount of space a dust eliminating filter would take up in the air-conditioning room, but if that apparatus were all that was necessary, less space could be provided. In any case, I do not think that that would make much difference, as the symmetry of the building would have to be preserved. I do not think that there would be any saving of expense if space only sufficient for a dust eliminating filter were provided in the air-conditioning room.

34. *To Mr. Long.*—To cover the back portion of the building with tiles would cost about £75 extra. There is not a great deal of accommodation for office staff in such a building. The office is actually in the switch room. The superintendent of the exchange would have a table, and his controls and warning lights would be *in front of him.* I do not think that there is any accommodation for office work other than in the switch room. The general experience is that the heat of the switch room would be increased by 10 per cent. if a galvanised iron roof were substituted for a tile roof. The building would take from five to six months to complete if tackled in the ordinary way, and the work done by contract. The difference in the expedition of day labour as against contract would depend entirely upon the number of men engaged on the job. The building could be erected in, say, six months under either system of labour. I consider that the site is suitable, and that the foundations are good. I have had experience of that locality and similar localities. The building has a frontage of 63 feet to Frith-street. The total frontage in Frith-street is 72 ft. 10 in. A 10 ft. right of way is preserved on our own land on the south. There is a right of way from 12 ft. 3 in. to 12 ft. 10 in. wide on the other side of the building. The fire risk from the foundry is no greater than the ordinary fire risk. I am not conversant with the actual title to this property, but I have an idea that we have the right to insist that the right of way between the foundry and our *property shall not be built upon. Mainly B.H.P. roof* principles will be used in the building. There would be no difficulty in getting local supplies. It is the general practice of the department to give preference to local industries. That has always been an instruction from the Ministry.

35. *To Mr. Gregory.*—We have never been able to get a definite decision from the Ministry whether preference shall be given regardless of cost. The Minister in charge for the time being generally decides what preference shall be given. We have instructions that we must give preference to Australian goods. Not only is that an instruction to us in the case of departmental work, but it forms a printed condition of our contract. We have not yet prepared a schedule of cost in respect of this building. It was designed in my own branch in consultation with the postal officials. They put the scheme before their head office, and it was altered to meet their requirements. The head of the Postal Department called in the head of the Works Department, who subsequently prepared this design. His estimate for the work was about £7,600. I have had particulars prepared to this design. Although I agree with it materially, my estimate is only £7,000. There is really no justification for constructing the building immediately, seeing that the automatic telephone apparatus could not arrive here until eighteen months' hence. The work, as far as the manufacture of machines for air-conditioning is concerned, is done by contract, but the installation, including piping, tubing and flume work, is generally carried out by departmental labour. If the building were commenced now, it would, after completion, have to remain idle for some months until the apparatus arrived. I do not consider it necessary to have a parapet wall round the roof for the prevention of fire. There is really no menace of fire from the adjoining building because there is a right of way in between. A parapet wall would, in case of fire on an adjoining building, provide lodgment for flying sparks and falling debris. The risk would be greater in that case than with an overhanging roof. With respect to the windows, I should be inclined to make them of wired glass, mainly to prevent the ingress of flames from an adjoining property that is on fire. Of course, the glass would melt just as quickly as plain glass, but the advantage of reinforcement is that the glass does not fall when cracked, and, therefore, to some extent, prevents the ingress of flames. I am not aware that the old foundry building next to the telephone exchange is now used as a garage. The last time that I was in the foundry tram wheels and that class of material were being manufactured. If the foundry is now a garage, that would add to the fire risk, because where oil is in use there is always a danger of fire. The difference between the cost of wired glass and that of plain glass would not be very much, in any case, not more than £30 for the whole structure. With regard to the switch room, windows will be as shown on the sketch, but it will depend upon the Postal Department whether they are to be closed altogether. At one exchange in Melbourne it was decided, after consultation, that open windows should be built, but that locks should be provided, and the keys placed in charge of a responsible officer. The entrance to the building will have swing doors with check springs. There will be little difficulty in respect of entry and leaving the switch room, because the number of officers in that room will be small, and they will not pass with any frequency in and out of the room except at lunch time, or to enter the battery room. We have made no definite experiment in respect to the use of the new process of extracting dust from the air by means of oil. We did install something of the sort seven years ago for the photography branch in Swanston-street. It was a small plant. There will be ample space to install, if *it is found* necessary, a plant to prevent dust from entering the switch room.

36. *To Mr. Holloway.*—The roofs on this class of building vary. Some are of galvanized iron, and some are of terra cotta tiles. The great trouble with our work is lack of continuity, both on the practical and economic side. Propositions are put up which are never adopted. Other propositions are put up, and after having reached a certain stage are withdrawn because of a change of Government or something else that intervenes. For instance, the other day we were asked to let a contract for a hospital for the Aviation Department. Tenders were in, worth about £9,000, when suddenly we received word to stop work. The time of my staff and that of the contractor's staff was wasted. It is impossible to overcome those difficulties and, therefore, we would find it difficult to so arrange our various works as to provide continuity of employment. If we were given instructions to go on with certain work it would be put in hand immediately.

37. *To Mr. Cameron.*—There is no necessity to have a roof of terra cotta tiles on the proposed building. From the point of view of utility, an iron roof would be preferable. I do not know who is responsible for the provision of a tiled roof for this building. It may be the Postal Department, or the architect, at the central office. Architecturally, I prefer this building to the building at Caulfield East, although the Caulfield building has a better setting. If the roof were converted from tiles to galvanized iron, it would mean a saving

of about £45 or £50. The ornament on the front of the building would not increase the cost by more than £25.

38. *To Senator Reid.*—Working drawings are not proceeded with until it is decided that the work is to be carried out. The windows are to be steel framed. It is hard to say which of the two roofs, tiles and galvanized iron, has the longer life. I have seen bad installations of both. A galvanized iron roof in the vicinity of coal-burning apparatus is not a long-lived proposition. A foundry, for instance, has elements that cause deterioration in iron. The sulphur fumes settle on the iron and perforate it quickly. That happens at copper mining centres such as Mount Lyell, where it is impossible to keep an iron roof intact. I should say that in Brunswick an iron roof would last longer than a tile roof, especially if it were properly treated. There is no reason why tiles should be used for the roof. The building would be more in conformity by having a roof wholly of galvanized iron. The sketch provides for a corrugated iron ceiling, but in the estimates prepared by myself I proposed to use fibrous cement, with sealed joints for the ceiling. The object of the small corrugated iron ceiling is to prevent the ingress of dust, and for this purpose the sheets are to be riveted together with the top sides soldered. That is a difficult proposition from a practical point of view. I have built some dozens of places at the arsenal factories where dust must not be allowed to enter, and most of the ceiling work has been of fibrous cement, taped in linen at the joints and painted. I should prefer a fibrous cement ceiling, although it is a trifle dearer than a corrugated iron ceiling. I should think that where corrugated iron meets the wall it would allow the ingress of dust.

39. *To Mr. Holloway.*—If a corrugated ceiling were provided in lieu of one of fibrous cement, it would effect a saving of £15. The trouble is the top soldering of joints, which is not a good proposition.

40. *To Senator Reid.*—The fibrous cement ceiling is not very thick, so that its retarding effect in respect of the heat from the sun's rays, as compared with that of corrugated iron, is little or nothing. Iron, of course, holds the heat much less than does other material, and, of course, it responds more quickly to the heat. I do not think that the provision of a fibrous cement ceiling would make much difference in the temperature of the switch room. Not all of the departmental work is being done by contract. I have done a considerable amount of work by departmental labour, more particularly works of a small nature, such as fortification work. Ordinary work is mainly done by contract.

The witness withdrew.

Matthew Balfe, Councillor, City of Brunswick, sworn and examined.

41. *To the Chairman.*—I was aware only a few days ago of the proposal to establish an automatic telephone exchange at Brunswick. I understand that similar exchanges are to be established throughout the metropolis. I have been connected with the Brunswick exchange for a great many years. There are 2,600 subscribers to the exchange, and the district is a progressive one. It is an industrial municipality, and a large number of works, such as brickworks, pipeworks, hosiery factories, and steel foundries, are established there. We have our full share of factories. A large number of men and women are employed at Brunswick, but I do not think that we have any exact data showing the number of factories and work people engaged in them. The people of Brunswick are asking to be protected from the further encroachment of factories into the district, but despite the efforts of the council to assist them by establishing residential zones, the factories are extending. I know the area in which the post office is situated. It is proposed to establish the telephone exchange at the back of the post office. It is solid land, providing a good foundation for a building. The site is central. The building adjoining the post office is Martin's steel foundry. I am not certain whether the foundry is now being used as a garage; but the last time I was there oxy-welding was being done. I do not know positively whether the foundry is being used as a garage. The foundry is a galvanized iron structure, and I do not think that there would be any great risk of fire from it. It is seldom that there are fires in foundries. There is a poor class of building in Frith-street. It is an old-settled portion of Brunswick, and the cottage property in the vicinity is of a poor type. The foundry takes up a large portion of that area, being on the east and west of Frith-street. It would be much preferable to have the whole of the roof of the proposed building tiled instead of being part tiled and part galvanized iron. That would give an added advantage from the point of view of appearance and utility. The fumes from a foundry have a deteriorating effect upon galvanized iron. My own home is alongside a foundry, and all the iron roofs in the vicinity, including my own, have rusted considerably because of the fumes. In fact, the foundry itself has just had to be re-roofed.

42. *To Mr. Gregory.*—There are many complaints about the operation of the existing manual exchange, and the installation of an automatic exchange would save a lot of argument with the operators. I understand that in Brunswick over 500 people are connected with the automatic, and over 2,000 with the manual exchange. I am connected with the manual exchange, and I have little or no trouble in obtaining connexions. I prefer an overhanging roof to a parapet wall. I do not know that the apparatus in the switchroom would be given more protection from fire by a parapet wall than it would by an overhanging roof.

43. *To Mr. Cameron.*—From time to time the people of Brunswick have complained about the encroachment of factories upon the residential areas. They do not object to working in the factories, but they like to have their homes situated at some distance from the factory area. While they are quite prepared to earn their living in factories, they do not want to sleep near them. These complaints reached Parliament, and a law was passed enabling municipalities to proclaim residential areas, to be used for residential purposes only. It was also provided that factories already in existence should be allowed to extend to the full limits of their property. My municipality took advantage of that legislation, and proclaimed certain areas of Brunswick residential. In spite of that, factories are growing up and encroaching upon the residential areas. The factories are expanding, and require more land, so from time to time we have excised portions of the residential areas to enable the factories to extend, provided, of course, that the operations of the factory are clean, and in no way offensive. This certainly militates against any increase in population. The area of Brunswick is 2,722 acres and one-fifth of that area is outside the residential portion. Another one-fifth is occupied by streets and rights of way, and another one-fifth by factories that were in existence before the by-law came into force. Therefore, three-fifths of the area of Brunswick is taken up by streets, lanes and factories. On that portion set aside for residential purposes, including lands, representing 1,200 acres, 60,000 people are living. The residential area is still being encroached upon, despite the fact that we have set aside certain areas for factories.

44. *To Senator Reid.*—There is vacant land in the district, and there is still room for the extension of the residential and factory areas. The time is not far

distant when we shall have many more factories in Brunswick, because manufacturers are very anxious to occupy the districts of Brunswick, Fitzroy, Collingwood and Richmond. Those four municipalities are very much sought after for factory purposes, and I think ultimately they will become factory areas. I am looking forward to the time when our people will be able to live away from the factory area and from the municipality. The increase of factories, and the consequent decrease in the population, would, I think, cause a greater demand for telephones. The council has passed a by-law providing for a minimum allotment of 4,950 square feet—45 ft. x 110 ft.—but a great many of our tenements are situated on properties of a less area than that. When every working man wants a telephone in his house, he will not live in Brunswick. He will go to Croydon, Warrandyte, or some other similar place. Every working man, as soon as he gets a family, is anxious to live in the open spaces. The foundry adjacent to my place is manufacturing steel by blowing air through molten iron, and dense fumes are emitted from the factory. Mr. Martin's foundry, which is situated next to the post office, has been carrying on the same class of business. There is a tremendous quantity of sheet iron in and around the foundry, and it is all rusty. The roof of Mr. Dawson's foundry has had to be renewed twice. There are no dwelling houses with tiled roofs in Frith-street. The proposed building, if roofed with tiles, would be an outstanding feature of the district. A tiled roof is certainly preferable to an iron roof from the point of view of appearance. I do not think there would be any danger of fire from the foundry. If the roof of the back portion of the building were of galvanized iron, it would not constitute an aid to fire, because the whole of the material to be used in the roof would be non-inflammable.

45. *To Mr. Long.*—There is no local ordinance in operation that would in any way affect the construction of the proposed building. I think that the right-of-way, which is over 12 feet wide, would be a sufficient fire break. The erection of the proposed building would be a distinct advantage to the municipality, because every one wants an automatic telephone exchange. The total population of the district is 57,000 people. There is a growing demand for increased telephone facilities. I favour a tiled roof from the point of view of appearance and utility. If I were constructing a similar building I should have no hesitation in going to a small additional expense in order to have a tiled roof. The life of such a roof would be considerably longer than that of an iron roof, because there would be little chemical action brought about by the fumes from the foundry. The residential area of Brunswick is gradually being absorbed by factories, but it would be absorbed much more rapidly if the council were to rescind its by-law. We do not object to industries being established in our district, but we have to consider the present residents and manufacturers. One hosiery factory is extending rapidly. It is a clean industry, with little noise attached to it. A lot of young girls are employed by the management, and we are loath to refuse it permission to extend its operations. I am inclined to think that the greater the industrial development, the greater will be the demand for telephones. Our by-law, unlike the law of the Medes and Persians, is not unalterable. When we passed that by-law, it was carried unanimously. But if it were re-submitted to the council to-day I doubt whether it would be carried. I am satisfied that there will be an increased demand for telephones. One of my own sons said to me to-day that he was losing business by having only one 'phone, and that it would be necessary to install another. That would be applicable to other industries. Brunswick is a fine business centre, and we attract business from other suburbs, such as Northcote, Coburg, Preston and Essendon. Brunswick is densely populated, and our business people sell their goods cheaply. The present telephone system is rapidly becoming inadequate, and we want an automatic system.

46. *To Mr. Holloway.*—Even if the number of subscribers did not increase, the present subscribers are fully entitled to claim modern facilities. The advantages attaching to an automatic telephone exchange are so evident and desirable that I am surprised that the committee is taking evidence at all.

The witness withdrew.

Reginald Nyren Partington, Superintending Engineer, Postmaster-General's Department, Victoria, sworn and examined.

47. *To the Chairman.*—I am aware of the proposal to establish an automatic telephone exchange at Brunswick, and I have been concerned with the preparation of data in connexion with the proposal. I understand that the committee has paid a visit to the present post office. It has reached the limit of its capacity, and we shall only be able to carry on for two years. It is, therefore, necessary to construct a building and to install new equipment in it in readiness to change over at the end of that period. This building is urgently needed, and it will take us all of two years to get ready for the new exchange. I have examined the figures showing an increase in the number of telephone subscribers at Brunswick. Last December there were 2,431 subscribers, but since then the number has increased to 2,628. The outlook is healthy at the present moment. There would be a corresponding increase in the revenue. The rate of development is likely to be maintained. We expect to have 3,100 subscribers in 1931, and 4,200 subscribers in 1936. That increase of 1,100 is based upon a survey of the whole of the Brunswick area that has been made by expert officers in consultation with local estate agents and the Town Planning Commission. Only in one case have our estimates been out to any extent, and that was at Caulfield, which is really East Malvern, where we estimated on the low side. Actually we had an abnormal increase. Otherwise our estimates are accurate. We check up every five years. In regard to the air-conditioning plant, it is not proposed to put in a full plant at Brunswick. I am quite satisfied that the modified plant will be effective. It was in Sydney in 1916 that we began to experience disaster as a result of the humidity in the air causing electrolytic erosion inside the wiring. With the automatic exchange, the residents of Brunswick will get a more reliable and quicker service. We cannot give a more speedy service at Brunswick than is being given to-day because the equipment is of the earliest type. About 2,000 subscribers are connected with the old magneto switchboards which spreads across the room. It is manually operated, and it is difficult for operators to operate the board speedily. Operators, as good as they are, have their limits, and at Brunswick they are doing their best to attend to the requirements of the subscribers. The work at the automatic exchange is really machine work, depending upon the operation of the dial by the subscriber. As soon as the conversation is finished, the connexion is released, and a call may be put through again. The human element is almost eliminated, and, therefore, greater accuracy is obtained.

48. *To Senator Reid.*—We have never over-estimated the development of an exchange. We are guarded, and the public are guarded, by our checkings. We take the requirements for twenty years, and we expect the equipment in a building to carry on the service for two years after the date of opening of the exchange. Then we check up from time to time the development

for five years. It is becoming a vocation. Those safeguards prevent us from over-estimating growth. Usually our estimates are conservative. That is due probably to the fact that the telephone habit has grown a little quicker than we anticipated. Even to-day, I think that there is a wonderful field for the development of the telephone habit. Not so many years ago there were few pianos per hundred of families, but to-day there is a piano and gramophone in nearly every home. I think that the ordinary person will not wait very long before installing a telephone. Our estimates *have always been conservative; in no case have they* been too liberal. The site of the proposed building is naturally satisfactory from our point of view, because the theoretical centre is almost adjacent to the post office. In eight years it will be only a few yards away, and in twenty years about a quarter of a mile away.

49. *To Mr. Gregory.*—In some instances it would be necessary to provide full air-conditioning plants in any automatic exchanges established in and around Melbourne. For instance, we have a full plant at Brighton. The exchange is close to the sea coast and we are feeling the effects of humidity there. I consider that a modified plant would be quite satisfactory at Brunswick. In any case, there would be no difficulty in extending the plant if that were found necessary. The annual charges would include interest and depreciation. We allow 4 per cent. for depreciation on the exchange equipment. That allows for a life of 25 years. At one time we allowed for a life of fifteen years, and subsequently twenty years. It is now deemed advisable, in view of improvements, to allow for a life of 25 years.

50. *To Senator Reid.*—I was concerned in an experiment *at Collingwood to try to eliminate dust from a* room. The Works and Railways engineers were present and we placed a sheet of white foolscap paper on top of one of the cabinets. We kept the plant going for three months under close observation, and corrected it according to the humidity. At the end of that period one could hardly see any dust on that paper despite the fact that Collingwood is a very dusty district. The plant is successful. Certain exchanges may not warrant the installation of a full plant, but one was certainly warranted at Collingwood. When I first went to Sydney in 1916 we were just beginning to feel the disastrous effect of the humidity, and we were in a very bad way. Our efforts to combat that trouble led to the adoption of air-conditioning plants generally throughout the States. Humidity is more prevalent at Brighton than at places further from the coast. Our open lines in proximity to the sea are affected by the humidity and stickiness of the atmosphere. When there are dust storms followed by a light rain, we feel the effect of the stickiness and humidity of the atmosphere on our lines and telegraph instruments. If, instead of a light rain we had a decent downpour, the insulators would be cleaned. *It sometimes happens that our tele-*graph lines lose current. We know that the plant is in good order and that our men are capable. They are trained in their work and they do their best to find the fault. We are compelled to attribute it to atmospheric conditions outside. At present only the insulators are affected and it is not a heavy expenditure to keep them in order, but it would be disastrous if this atmospheric condition were to get inside the exchanges in which are installed equipment valued at £50,000 and more.

51. *To Mr. Long.*—Brunswick is some distance from the sea coast and is therefore not so subject to humidity as is Brighton. The air at Brunswick would certainly be dust laden. The old exchange is very dusty at the end of the day. I consider that the proposed air-conditioning plant will successfully cope with the dust nuisance.

52. *To the Chairman.*—If additional telephone facilities are not provided at Brunswick we shall have to close down the present exchange in a few years' time. The present equipment is obsolete and insufficient for the area it serves and the business done. We cannot make any further connexions in the existing building after October, 1931. I was rather expecting to be asked why it is not intended to make use of the present exchange building for the installation of the automatic system. I am not an architect, but I did think that the old building could be adapted for that purpose, and Mr. Mackennal went to considerable trouble to get plans and estimates of cost. The cost was about the same as that of the proposed building, but we could not get an efficient lay-out for the plant and offices. Moreover, the position of the mail room in the existing post office would be worse than it is at present, especially in respect of lighting facilities. There was no difference in cost and as we would get more efficient lay-out by a separate building, we recommended that one be erected at the back of the existing post office. There is every possibility of the postal business increasing *and more room being required. The two main objec*tions to the use of the old exchange building was that the mail-room would be darkened seriously and a suitable lay-out for offices, retiring room and battery room was not afforded.

53. *To Mr. Long.*—We consider it far better to erect a new building, because it will allow room for improvement. That was not the case in respect of the other building. The equipment in the present exchange has provision for 3,600 subscribers' lines, and the new building will have a capacity of 7,000 subscribers' lines. Another proposal, which we considered, is whether it would be more economical to have two exchanges, one at Brunswick and one at Coburg. But that was set aside in favour of a separate building at the back of the present exchange. The radius of the present exchange is five miles north and south, and two miles *east and west.*

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