

Brought up by
Senator Keating,
C. R. Roydall
Clerk of the Senate
5-11-15



PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

P A P E R S

to be laid on the Table of the
S E N A T E.

R E P O R T

together with Minutes of Evidence
relating to the questions of

Provision of AUTOMATIC TELEPHONE EXCHANGE, SYDNEY,
Provision of AUTOMATIC TELEPHONE EXCHANGE, MALVERN, VICTORIA,
Provision of AUTOMATIC TELEPHONE EXCHANGE, COLLINGWOOD, VICTORIA.

1915.
COMMONWEALTH OF AUSTRALIA.

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ON PUBLIC WORKS.

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RELATING TO THE QUESTIONS OF

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PROVISION OF AUTOMATIC TELEPHONE EXCHANGE, MALVERN,
VICTORIA.

PROVISION OF AUTOMATIC TELEPHONE EXCHANGE, COLLINGWOOD,
VICTORIA.

MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

First Committee.

EDWARD RILEY, ESQUIRE, M.P., Chairman.

Senate.

Senator the Honorable John Henry Keating.
 Senator Patrick Joseph Lynch, Vice-Chairman.
 Senator William Harrison Story.

House of Representatives.

James Edward Fenton, Esquire, M.P.
 William Eyle Finlayson, Esquire, M.P.
 The Honorable Henry Gregory, M.P.
 Sydney Sampson, Esquire, M.P.
 William Henry Laird Smith, Esquire, M.P.

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AUTOMATIC TELEPHONE EXCHANGES—SYDNEY, MALVERN,
AND COLLINGWOOD.

REPORT.

EXTRACT FROM THE VOTES AND PROCEEDINGS OF THE
HOUSE OF REPRESENTATIVES.

No. 89 of 9th and 10th September, 1915.

11. PUBLIC WORKS COMMITTEE—REFERENCE OF WORKS—(AUTOMATIC TELEPHONE EXCHANGES).—The Order of the Day having been read for the resumption of the debate on the following motion of Mr. Spence—That, in accordance with the provisions of the *Commonwealth Public Works Committee Act 1913-1914*, the following works be referred to the Parliamentary Standing Committee on Public Works, for their report:—

1. Provision of Automatic Telephone Exchange, Sydney.
2. Provision of Automatic Telephone Exchange, Malvern, Victoria.
3. Provision of Automatic Telephone Exchange, Collingwood, Victoria.

Debate resumed.

Mr. Spence having laid on the Table plans, &c., in connexion with the proposed works—
Question put and passed.

The Parliamentary Standing Committee on Public Works, to which the House of Representatives referred for consideration and report the questions of—

- (a) Provision of Automatic Telephone Exchange, Sydney,
- (b) Provision of Automatic Telephone Exchange, Malvern, Victoria,
- (c) Provision of Automatic Telephone Exchange, Collingwood, Victoria; has the honour to report as follows:—

1. At the outset of the inquiry the Committee sought to inform itself in a general way on the principles of automatic telephones and the essential differences between the automatic telephone switching equipment and the manually operated switchboard, and subsequently occupied itself with a consideration of some of the more important advantages claimed for the automatic system.

2. Visits of inspection were made to the telephone exchanges at Sydney, New South Wales, and Malvern, Victoria, where manually operated boards are in existence; and to the exchanges at Newtown, New South Wales, and Geelong, Victoria, where automatic telephones are in operation.

3. At each place the Committee had the opportunity of seeing the exchange under actual working conditions, and were given detailed explanations of the various systems by the Electrical Engineers of the Postmaster-General's Department, who were present.

ADVANTAGES CLAIMED FOR AUTOMATIC.

4. Some of the advantages claimed for the automatic system as against the manual system are—

(a) *Speed of Operation.*—The traffic is handled expeditiously with an automatic switchboard; that is it does not matter within certain limits how many subscribers call at once on any particular group of subscribers, for the switches operate immediately and make the connexion desired. In a manual plant the subscriber has to wait his turn to be answered by the operator. In the case of a subscriber making a series of calls this element of speed is a manifest advantage, as no time is lost in obtaining connexion with the subscriber called up, and on completion of conversation no time is lost awaiting disconnexion.

(b) *Secrecy of Service.*—The operation of the subscriber gets him immediately the number he wants, and replacing the receiver on the hook at once restores the line to normal. No one can cut in on him and no one can cut him off—in fact, each subscriber is complete master of his own line. If the line should be "in trouble," there is an automatic "trouble finder" at each exchange which instantly gives notice of the trouble to the mechanic in charge and where it is located, thus insuring promptness in the restoration of the service.

- (c) *Saving in Telephonists' Salaries.*—An automatic exchanges need no operators a considerable saving is effected in telephonists' salaries. On the other hand, an increased number of mechanics is required, but not of course to anything like the extent of the telephonists dispensed with. It was stated, for example, that the net saving on salaries at the seven automatic exchanges near Sydney, aggregating 7,125 subscribers, amounts to £14,903 per annum.
- (d) *Capacity for Extension.*—It is claimed that the automatic lends itself to an easy extension of the telephone system by the addition of small exchanges and to the saving of line construction and staff, or in other words, the establishment of satellite exchanges.
- (e) *Saving in Building Space.*—Less floor space is required for automatic exchanges, and the space for telephonists' retiring rooms, &c., is also saved, as well as the cost of lighting, fuel, &c.
- (f) *Longer Life.*—The Western Electric Company estimates the life of its common battery switchboards at approximately fourteen years, whilst the Automatic Company estimates the life of an automatic switchboard at 25 years. The former estimate is reasonable from Australian experience, but the automatic has not been in existence long enough in Australia to be able to judge whether the latter statement is borne out by actual Australian experience. Engineers in Australia, however, state that if the life of the automatic be only fourteen years they would still recommend its adoption.
- (g) *Greater Efficiency.*—From the experience gained in the Sydney network the engineers claim that the efficiency of the automatic is greater than that of the common battery in so far as the number of faults per 1,000 calls is lower, consequently a better service is given to subscribers. This is also borne out by the fact that complaints from subscribers since the automatic has been introduced have fallen in a very marked degree, and in quite a number of cases subscribers have personally expressed appreciation of the great improvement in the service both as regards promptness and reliability. The automatic system eliminates the human element in switching and performs this important operation mechanically—thus removing operating errors and tending to greater efficiency.

5. In the course of its investigations the Committee learned that the use of automatic systems is rapidly increasing, particularly in America, where 77 automatic plants have recently replaced manual equipments. The only case brought under the Committee's notice of the replacement of an automatic system by a manually operated system was one in San Francisco, which appeared to be a business arrangement, where a large manually operated system bought out a small automatic system and dismantled the automatic plant.

6. The Committee is satisfied from personal observation, from the evidence of the expert engineers of the Postmaster-General's Department, and from the testimony of commercial men who use the automatic telephones to a considerable extent, that the system is highly efficient and a distinct improvement on the manually operated system. It has, therefore, no hesitation in recommending that the automatic system be adopted in cases where the establishment of a new exchange of a sufficient size is in contemplation, or where manually operated boards of a sufficient size have outlived their period of usefulness and have to be replaced.

PROPOSALS BEFORE THE COMMITTEE.

(a) SYDNEY.

7. The proposal is to erect a five-story building on a site off Castlereagh-street, which has been acquired by the Commonwealth, and to install therein an automatic telephone switching equipment having an immediate capacity of 5,000 lines. This equipment will be capable of extension by suitable steps to 20,000 lines, thereby affording sufficient accommodation for the anticipated development in the congested city area between Martin-place and Circular Quay, Sydney.

REASONS FOR THE PROPOSAL.

8. The switchboard accommodation in the existing City Exchange in the General Post Office is approaching exhaustion, and it will be impossible to continue to provide efficient telephone service in the heart of Sydney unless now accommodation be afforded. With the ordinary rate of increase in subscribers' lines the capacity for the City Exchange would have been exhausted in November last, and it would then have been necessary to refuse connexions to new subscribers. The urgency of the case was however postponed by war conditions which retarded normal development, but the necessity will again become imperative within a very few months. As it takes from 18 months to two years to obtain an exchange plant of the size required, counting from the time it is necessary to ask for the expenditure until the date the plant can be provided ready for use, it will be seen that action should be taken in sufficient time to provide for carrying on the service.

ESTIMATED COST.

9. The immediate cost of the work involved is set down at £93,008, while the estimated capital cost for installations of 5,000 and 20,000 lines respectively is as under:—

	5,000 Lines.	20,000 Lines.
	£	£
Site	15,500	15,500
Building	25,300	25,300
Exchange equipment (including equipment at other exchanges) ..	45,544	182,176
Subscribers' equipment	14,137	56,548
Line plant (conduits, cables, and open lines)	16,320	60,375
	<u>£110,801</u>	<u>£339,899</u>

The Committee could not go fully into the question of profit and loss as the automatic system has not been installed sufficiently long in Australia to enable adequate investigations and comparisons to be made, but the estimates submitted by the Chief Electrical Engineer, and the savings shown to have been effected where the automatic system has been installed, tend to show that, although the cost of installation is much higher in the case of the automatic than in that of the manually operated system, this is more than compensated for by the saving in the working expenses of the automatic system. It was stated in evidence that under the full automatic system the working cost per line would be reduced approximately £1 per line per annum. This estimate was arrived at after making full allowance for interest and depreciation.

ESTIMATED REVENUE.

10. The annual revenue which it is expected will be derived from the subscribers to the new exchange at periods during its life is as follows:—

	£
At time of transfer	5,180
With 5,000 subscribers connected	40,250
With 20,000 subscribers connected	185,000

BUILDING.

11. It is proposed that the building shall be a concrete and steel structure five stories high and built on the latest fire-resisting principles. The immediate installation in the exchange is for a capacity of 5,000 lines, but the building has been designed sufficiently large to accommodate an equipment of a capacity of 20,000 lines—the accommodation not immediately required for exchange purposes to be used by portion of the staff of the Postmaster-General's Department.

12. The plans of the building were explained to the Committee by the Works Director, New South Wales, who stated that the structure had been designed after consultation with the officers of the Postmaster-General's Department, so that it entirely meets with their requirements. Careful attention appears to have been paid to lighting, ventilation, &c., of those rooms which will be occupied by employees, and the Committee is satisfied that the proposed building is suitable for the purpose for which it is intended.

SITE.

13. The building space in the General Post Office, Sydney, being already congested, it was not possible to install adequate additional exchange equipment there. It therefore became necessary to obtain a suitable site elsewhere. In the case of a large exchange it is desirable to locate it as nearly as possible in the centre of the largest number of subscribers so as to shorten the length of the subscribers' lines and effect economy in outside construction, and this fact was borne in mind in selecting the site.

14. A conference as to the location of the exchange took place, at which were present the Postmaster-General, the Secretary to the Postmaster-General's Department, the Director-General of Works, the Director of Commonwealth Lands and Surveys, the Deputy Postmaster-General, Sydney, and the Chief Electrical Engineer. Subsequently certain sites were inspected by the Director-General of Works, the Director of Commonwealth Lands and Surveys, and the Chief Electrical Engineer, and ultimately, the Postmaster-General, after inspecting the sites, approved of the acquisition of an area known as the Belmont garage site off Castlereagh-street.

15. The Committee inspected the site which has been acquired and found that it is an area about 50 feet by 120 feet, completely surrounded by buildings varying from two stories to six stories in height. The only approach to the area is by means of a right-of-way 10 feet wide and 150 feet long, leading from Castlereagh-street, and this right-of-way is built over for about half its length.

16. The Committee was very unfavorably impressed with the site from the point of view of fire risk, bearing in mind that there will be a staff of about 164 in occupation of the building during the day-time and about three at night. Evidence on the subject was obtained from the Chief Officer, New South Wales Fire Brigade, which supported the Committee's view that in the event of an outbreak of fire there would be great difficulty in the way of employees effecting an escape from the building through the right-of-way, which is the only outlet. At the same time the approach of fire fighting appliances through the same right-of-way would be extremely difficult.

17. The Committee recognises that it is not essential that a telephone exchange should be in a main thoroughfare, and would not be averse to this site if an additional outlet existed, either to Castlereagh-street or elsewhere. It is understood that a block of land between the Commonwealth property and Castlereagh-street has been placed under offer, and the Committee is of opinion that the purchase of such area, if it can be obtained at a reasonable price, should be carefully considered. The possession of this land would materially add to the value of the telephone exchange site—firstly, by giving additional means of access thereto, and secondly, by providing the Commonwealth with a convenient site on which might be erected offices for some of those departments for the accommodation of which large rentals are now being paid in various parts of Sydney.

DECISION.

18. The decision arrived at by the Committee is shown in the following extract from its Minutes of Proceedings, viz. :—

"Mr. Laird Smith moved—That the Committee, while favorable to the provision of an automatic telephone exchange in Sydney, is unable to recommend the erection of the building on the site proposed until ample and secure additional means of ingress and egress between the site and an adjoining thoroughfare be provided.

Seconded by Mr. Gregory. Carried unanimously."

(b) MALVERN.

19. The proposal is to provide a new telephone exchange building in Llancastr-street, near Glenferrie-road, Malvern, and to install therein automatic telephone switching equipment having a present capacity of 3,600 lines and capable of extension to 7,500 lines.

REASONS FOR THE PROPOSAL.

20. The switchboard accommodation provided in the present exchange at Malvern is almost wholly appropriated, and it is impossible to continue to give service in the existing exchange with the ordinary rate of increase in subscribers lines. It would have been necessary to refuse connexion to subscribers some months ago, but the urgency of the case was slightly postponed by war conditions which retarded normal development. Under existing conditions it is stated the necessity for refusing service will become imperative almost at once. If the public is to continue to obtain telephone service therefore it is necessary to proceed with the equipment of a new exchange at once.

21. It is also stated that the present building is unsuitable, is incapable of extension, and cannot be made to accommodate the new switchboard. It is further stated that the type of board in use in the existing exchange is obsolete for exchanges of the size to which that at Malvern has now grown, and so long as it remains in use a satisfactory service cannot be given.

ESTIMATED COST.

22. The immediate cost of the work involved is estimated at £16,933, while the capital value of the plant in the area, after the exchange has been installed and including plant already *in situ* and borne on capital account, is estimated as follows :—

Site	£	550
Building .. .. .	..	5,000
Exchange equipment (including equipment at other exchanges) .. .. .	..	28,620
Subscribers' equipment .. .. .	..	10,365
Line plant (conduits, cables, and open lines) .. .. .	..	127,538
		<hr/>
		£172,073

ESTIMATED REVENUE.

23. The annual revenue which it is expected will be derived from the subscribers to the new exchange at two periods during its life is as follows :—

At the time of transfer	£	17,462
With 3,600 subscribers connected .. .. .	..	23,940

SITE.

24. The Committee visited the site acquired by the Commonwealth for the purposes of this exchange. It has a frontage of about 80 feet to Llancastr-street, by a depth of about 166 feet, and is situated a little distance from its junction with Glenferrie-road, and quite close to the present Malvern Exchange. The area acquired is ample for exchange requirements and for providing a convenient yard for storing material, and is, in the opinion of the Committee, eminently suitable.

BUILDING.

25. The Committee inspected the plans of the building, which it is proposed to erect. The structure is to be a two-storied building in brick, of plain design, with corrugated iron roof, steel principals, concrete floors, and steel casements, and appears to be in every way satisfactory. It is suggested, however, that in erecting the building, consideration might be given to the advisability of keeping it back somewhat from the building line.

DECISION.

26. The decision arrived at by the Committee is shown in the following extract from its Minutes of Proceedings, viz. :—

"Senator Story moved—That the proposals laid before the Committee in regard to the provision of an automatic telephone exchange at Malvern be approved.

Seconded by Senator Keating. Carried unanimously."

(c) COLLINGWOOD.

27. The proposal is to provide a new telephone exchange in Wellington-street, Collingwood, and therein to install automatic telephone switching equipment having a present capacity of 3,400 lines and an ultimate capacity of 9,000 lines.

REASONS FOR THE PROPOSAL.

28. The telephone service in the Collingwood area is at present performed from the Exchanges at Lonsdale-street (Central), Windsor, and Hawthorn. This is an uneconomical arrangement owing to the considerable lengths of wire involved, each subscriber's service requiring the provision of approximately $1\frac{1}{2}$ miles of double wire in excess of that necessary if and when the new exchange is opened.

29. Apart from the question of the congestion of line or cable routes the provision of the proposed exchange will relieve pressure on the switchboards at Central, Windsor, and Hawthorn Exchanges, thus deferring the time when their extension will be necessary.

ESTIMATED COST.

30. The immediate cost of the work involved is estimated at £49,752, while the capital value of the plant in the area, after the exchange shall have been installed and including the plant already *in situ* and borne on capital account, is estimated as follows:—

	£
Site	1,150
Building	6,000
Exchange equipment (including equipment at other exchanges)	27,392
Subscribers' equipment	9,455
Lins plant (conduits, cables, and open lines)	108,704
	<hr/>
	£152,701

ESTIMATED REVENUE.

31. The annual revenue which it is expected will be derived from the subscribers to the new exchange at periods during its life is as follows:—

	£
At the time of transfer	11,890
With 3,400 subscribers connected	22,610

SITE.

32. The Committee visited the site acquired by the Commonwealth. It is conveniently situated with a frontage of about 110 feet to Wellington-street, by a depth along Glasgow-street on the north of about 157 feet, and along Northumberland-street on the south of about 100 feet. This land is ample for existing requirements, will provide a convenient yard for storing material, and contains a sufficient area to admit of any extension of the building necessary for many years. It might be added that a somewhat larger area than was absolutely necessary was acquired to minimise risk of fire from some small weatherboard buildings which were adjoining. The Committee considers this a wise precaution, and is of opinion that the site as it stands is quite suitable.

BUILDING.

33. The Committee inspected the plans of the building which it is proposed to erect. The structure is to be a two-storied building in brick, of plain design, with corrugated iron roof, steel principals, concrete floors, and steel casements, and appears to be in every way satisfactory.

DECISION.

34. The decision arrived at by the Committee is shown in the following extract from its Minutes of Proceedings, viz:—

"Mr. Finlayson moved—That the proposals laid before the Committee in regard to the provision of an automatic telephone exchange at Collingwood be approved.

Seconded by Mr. Gregory. Carried unanimously."

Edward Riley

Chairman.

Office of the
Parliamentary Standing Committee on Public Works,
120 King-street,
Melbourne, 25th October, 1915.

MINUTES OF EVIDENCE.

(Taken at Sydney.)

SATURDAY, 18TH SEPTEMBER, 1915.

Present:

Mr. RILEY, Chairman;	
Senator Keating	Mr. Finlayson
Senator Lynch	Mr. Gregory
Senator Story	Mr. Sampson.
Mr. Fenton	

George John Oakeshott, F.I.A., Works Director for New South Wales, Department of Home Affairs, sworn and examined.

1. *To the Chairman.*—I have prepared plans for a new automatic telephone exchange at Castlereagh-street, comprising a basement and five stories, constructed of steel stanchions, and girders for the frame work, reinforced concrete floors, the filling in of the outside walls being of brick and cement. There is to be no ornamentation about it, because it is not in full view of the public, and therefore there is no necessity for architectural effect. The estimated cost is £25,000, which works out at 1s. 6½d. per foot cube for the whole building. I expect, unless unforeseen hindrances occur, to construct the building in about twelve months. I am ready to go on with the work if Parliament adopts the report, except that the contract drawings are not completed yet. I do not think we shall call for tenders, as the work will probably be done by day labour. The Minister has not yet given his final decision on that point. The site chosen is off Castlereagh-street, approached by a right-of-way 10 feet wide. It has a frontage of 120 ft. 2 in. towards the east, and 121 ft. 10 in. towards the west, 51 ft. 8 in. towards the north, and 47 ft. 9½ in. towards the south. It has no frontage to any street. Light is obtained by a light area 14 feet wide running the full width of the eastern front. That is not deemed sufficient by the Director-General, so we have taken over three more feet of light area from our own property to give better light for the lower floors, and make the basement a real working proposition. We shall have pavement and upright lights, which will throw the light to the very back of the basement. To give still better lighting for the clerical division accommodation, a set-back of 15 feet has been made above the second floor, towards the southern end, thus giving an additional row of windows facing the south. It has been found by trial holes that the solid rock is not reached until 8 feet below the existing floor level, and it has, therefore, been decided to excavate the whole of this, and make a basement

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down to the rock level. The ground floor will be 3 feet above the actual ground level, and therefore the ceiling of the basement will be about 2 feet above the ground level, giving excellent head room. The basement will be used for the entry of the cables through the right-of-way from Castlereagh-street, and the distribution of the cables to the racks and frames room above. That will take up some space. The remaining basement space will be used for power, battery rooms, store rooms, and similar purposes. The ground floor will be used entirely for the racks and frames, and the wires distributed there for connecting up. Here there will be great weight on the floor, and the first floor will be used entirely for the switchboards, and the second floor will be used for switchboard extension, experience having shown that we must make ample provision for expansion. The floor space, 5,687 feet, as I understand, ample for the present provision of the switchboard; but an additional 5,687 feet is provided on the second floor. The third, fourth, and fifth floors will be used for the clerical staff and any purposes which the Postal Department wishes. The top floor is covered with a flat roof for the recreation of the employees. This will be asphalted, and at the end will be a ladies' retiring-room and lavatories, and men's retiring-room and lavatories. We have sufficient space for a luncheon-room, but the rooms have not yet been allotted. There will be an electric passenger lift 7 ft. 6 in. square from the basement to the top floor, surrounded by a fire-proof staircase, which will also be taken from the basement to the top. The flat roof promenade is 70 feet by 45 feet. The greatest care has been taken to make the building thoroughly fire-resisting. It will be heated in winter, and cooled in summer, and a system of ventilating will be carried throughout. It will be lighted by electricity. The total floor space provided is as follows:—

	Sq. Feet.
Basement	5,687
Ground floor	5,687
First floor	5,687
Second floor	4,841
Third floor	4,841
Fourth floor	4,841
Fifth floor (flat roof)	3,196
Fifth floor (retiring rooms)	1,645
Caretaker's quarters	018
Total	37,343

Three separate estimates of cost have been made. In the first there was no basement, and no fourth and fifth floors, and another included the fourth

and fifth floors. The third estimate included the basement and fourth and fifth floors, when it was found that excavations could easily be made to a depth of 8 feet. The height of the building from the basement floor to the top of the parapet of the caretaker's quarters is 108 feet. The only provision for fire escape, other than the external iron fire-escape ladders, is the fire-proof staircase. We have reduced the possibility of fire to such a minimum that there is no possibility of anything but a local fire. There will be no risk to life.

2. To Mr. Finlayson.—I do not think we shall be in much danger of fire from the surrounding buildings. We have not provided iron shutters for the windows, but they will have metal sashes, and wired glass. We always try to comply with the Sydney building regulations, but we are not bound by them.

3. To Mr. Sampson.—My Department has had frequent consultations with the Deputy Postmaster-General, Mr. Young, the Electrical Engineer, Mr. Nelson, the Chief Electrical Engineer, Mr. Hesketh, and the Secretary, Mr. Oxenham, and a great deal of the plan has been arranged in Melbourne. I regard this as a suitable building for the work. I think it is to be erected in the most economical way consistent with a permanent structure, and it is certainly fireproof, which should be the main characteristic. That is an essential for a city telephone system. There will be ample strength for one more floor if required, and perhaps even for two, if used only for clerical work. It would not be strong enough to carry any heavy load higher up, like racks and frames.

4. To Senator Lynch.—I suppose this will be the Central Exchange for Sydney; but some part of the telephone system is still to be continued at the General Post Office. I understand the site is admirable for the purpose. We have had a little trouble about the entry of the cables down the right-of-way. For about 36 feet there is, in connexion with a boxing saloon leased to Mr. R. L. Baker, a small dressing room annex under the right-of-way. That will rather complicate the entry of cables. There is no difficulty between the Departments over it; but we are considering how to get over the difficulty. The best way would be to acquire the space from Mr. Baker; but I do not know that we can do it. The owner of the land, Mr. Charley, guaranteed Mr. Baker the right to build the room. I believe there is a right of easement for the cables. Mr. Goodwin has that matter in hand. The Lands and Survey Branch of the Home Affairs Department bought the site. I do not know if any other sites have been considered. I did not come on the scene until the site was accepted, and I am sure from our conferences that the building will satisfy all the requirements of the Postal Department. Even if we cannot acquire the boxing saloon annex, we have the right to take our cables underneath Mr. Baker's floor. The site cost £15,000, which is not high, considering the area. Although it only fronts a right-of-way, it must be remembered that it is right in the centre of the city. I was simply given the site to build upon. Our Department, in consultation with the Postal Department, selected it. The actual transfer of property is done through our Department.

(Taken at Sydney.)

WEDNESDAY, 29th SEPTEMBER, 1916.

Present:

Mr. RILEY, Chairman;
 Senator Keating | Mr. Finlayson
 Senator Lynch | Mr. Gregory
 Senator Glory | Mr. Sampson
 Mr. Fonton | Mr. Laird Smith.

John Yeates Nelson, Electrical Engineer, Postmaster-General's Department, New South Wales, sworn and examined.

5. To the Chairman.—I have been close on forty-nine years in the Service, and have always been in the Postal Department. I was in the Telegraph Branch before telephones were invented. After the introduction of the telephone into this State, I was associated with it, but more particularly within the last sixteen years with telephone engineering. The telephone system has grown considerably in this State, and is still growing. I produce a 1600 telephone list comprising 98 pages, and one of the present day covering 763 pages. I have prepared the following statement regarding the necessity for installing a new city exchange:—

Present City Exchange Plant.

The City Exchange, which provides for handling the whole of the city telephone subscribers' lines, is situated in two rooms in the General Post Office, having a total floor space of 7,080 square feet, and containing a common battery switchboard having twenty-four sections, of three positions each, an operator being placed on each position, who attends to a specified number of subscribers connected to each position.

The number of subscribers so allocated to each operator depends on the number of calls which an attendant can handle properly at the busiest hour of the day. Counts of subscribers' calls are made for each hour of one day per month, to ascertain the volume of the traffic. By means of these statistics, the total number of calls made hourly on each position during the day of twenty-four hours supply information for various purposes, one of which is to ascertain whether any particular operator is overloaded or underloaded. The average load of each operator is periodically adjusted by transferring some of the busy lines on busy positions to those not so heavily loaded. From a study of the various classes of service, and the capacity of the operators, it has been found that each operator's position on the present City Exchange switchboard can accommodate 128 subscribers' lines, at an average rate of calling of ten calls per subscriber per day.

There are at present 3,480 subscribers connected to the city switchboard, with accommodation for 726 further subscribers' lines, or a total accommodation for 9,216 lines.

The normal annual rate of growth on the City Exchange is between 7 per cent. and 8 per cent., and had this rate of increase continued since the war, the present board would only have lasted a little over twelve months. The lower rate of increase since the crisis will, however, enable us to carry on till the new equipment can be made available, though it is problematical what the growth may be in the future.

As it takes from eighteen months to two years to obtain an exchange plant of the size required, counting from the time it is necessary to ask for the expenditure till the time the plant can be provided ready for use, it will be seen that action has to be taken in sufficient time to provide for carrying on the service.

From present information, it does not appear likely that a further reduction in the lower number of prospective subscribers may be anticipated.

New City Exchange.

It being recognised that further accommodation is required, it is necessary to decide where, and the kind of equipment which should be provided.

Brief.

The building space in the General Post Office is already congested, and adequate additional exchange equipment cannot be installed there.

The present main exchange common battery switchboard occupies the whole of the exchange rooms, in addition to which are the teleboards, public telephone line boards, junction line switchboards, and automatic apparatus to work with the branch automatic exchanges already in operation, and further exchanges to be shortly installed, have been placed in additional rooms. These equipments have absorbed every possible foot of space of the building accommodation.

It, therefore, becomes necessary to look elsewhere to provide building space to meet the future development and to provide for the further exchange equipment required. The location of such a site is governed by the questions of economy and suitability for the purpose to be served.

A telephone survey was made of the positions of the whole of the existing and prospective subscribers in the City Exchange area in 1912, and from this survey it is practicable to arrive at a decision as to where the exchange would best be located.

In the case of a large exchange, it is desirable to locate it as nearly as possible in the centre of the largest number of subscribers, so as to shorten the length of the subscribers' lines, and effect economy in outside construction.

For purely exchange purposes, it is not necessary for an expensive site to be secured in a main street, and so long as it is within the congested telephone area, a less costly site in an off street, or with a less expensive frontage will meet the requirements.

The telephone survey shows that the General Post Office is the centre for the whole of the present and prospective city subscribers, and in laying out an exchange building, provision should be made for at least fifteen years ahead.

It was estimated that in fifteen years at least 30,000 subscribers, on a conservative estimate, would have to be provided for, and such a number of subscribers could not be accommodated in the General Post Office building. Either additional land would have had to be resumed adjoining the General Post Office, or the subscribers will have to be divided into districts with exchange centres for different districts.

The latter course was adopted. The late Postmaster-General, and the Secretary, conferred with the Director-General of Works, the Director of Commonwealth Lands and Surveys, the Deputy Postmaster-General, and the Chief Electrical Engineer with regard to accommodation for telephone exchange purposes in the Sydney City area. After certain sites had been inspected by the Director-General of Works, the Director of Commonwealth Lands and Surveys, the Deputy Postmaster-General, and the Chief Electrical Engineer, the Postmaster-General visited the site and approval of action being taken to acquire the land which has now been purchased, as it was considered the most suitable for the proposed new exchange for the northern portion of the city. This site meets the requirements, being as near as possible to the centre of the telephone area.

Automatic Equipment for City North Exchange.

The automatic system is already in operation on the Sydney telephone network at the following branch exchanges:—

Exchange.	No. of Subscribers, 1st Sept. 1916.
Newtown	1,085
Balmain	613
Glebe	800
Manly	1,070
Ashfield	1,318
Burwood	940
Homebush	530
	7,125

The following further exchanges are almost completed, and will be cut over within a month or so:—

Exchange.	No. of Subscribers.
Parramatta	608
Lidcombe	233
Vaucluse	270
Cherrywood	1,405
	2,606

The total number of subscribers for these eleven exchanges is, therefore, 9,731.

The experience so far gained in Sydney has been favorable to the automatic system on the question of efficiency and on financial grounds.

As bearing on the financial aspect, a statement is attached showing the comparative costs and maintenance of an exchange for 2,000 lines, with 1,000 lines connected on an automatic, and on a common battery switchboard. These figures are based on the actual costs for the Newtown automatic board and the North Sydney common battery board.

Building accommodation has been omitted in each case, although economy is in favour of the automatic, as shown later on.

The statement shows that whilst the capital cost of the equipment for automatic is £10,208, for common battery it is £9,842, but the annual charges, including sinking fund and interest on cost of plant, are—for automatic, £3,613; and for common battery, £3,121; and this difference in annual cost is accentuated the larger the exchange grows.

This is mainly due to the increasing operating charges on the common battery switchboard, and also to the increasing cost of connecting subscribers, owing to the enormous amount of cabling and the number of multiple jacks required to connect every subscriber to each section of the board.

Advantages Claimed for Automatic.

Some of the advantages claimed for the automatic system as against the manual system are the following:—

Speed of operation and secrecy of service.
 Considerable saving in telephonists' salaries.

The traffic is handled expeditiously with an automatic switchboard that is, it does not matter, within certain limits, how many subscribers call at once on any particular unit, for the switches operate immediately, and make the connexion desired in a manual plant, the subscriber has to wait his turn to be answered by the operator.

Suitability for adding small exchanges, and a saving in line construction and staff; or, in other words, the establishment of satellite exchanges.

Saving in building space—less floor space is required for automatic exchanges, and the space for telephonists' retiring rooms, &c., is also saved, resulting in a saving in lighting and fuel.

For instance, the floor space occupied by the city common battery equipment is:—

Switchboard Rooms (2) ...	7,080 sq. foot.
Test Room, Power Plant, &c. ...	3,999 "
	11,040 "
	for, say, 10,000 subscribers.
Female Retiring Room ...	2,215 "
	14,255 "

Proposed New City Exchange Building.—Automatic Equipment.

1 floor 118 feet x 43 feet	Switchboard ...	5,074 sq. feet
1 floor 101 feet x 43 feet	switchboard ...	4,343 "
1 floor 118 feet x 43 feet	Power Plant, &c. ...	5,074 "
		14,491 "
		for 20,000 subscribers

(This omits the cable room for street cables, which would be common to both systems.)

The report of the Royal Commission appointed by the State Government to inquire into the Maitland telephone system refers to the following opinions respecting the advantages claimed for the automatic system, and which in the Commission's opinion were borne out:—

"One great advantage claimed (and, of course, it is a fact) for the automatic is the elimination of the operators, in itself a very considerable item in the traffic cost. Another advantage is the question of service—you get your subscriber in a few seconds, and instantly on restoring the phone to the lug, the line is brought back to normal. If you get a wrong number it is your fault. If you call a number

which has been abandoned, you automatically get "information" and get the new number. No one can cut in on you, and no one can cut you off. In fact, each subscriber is complete master of his own line, and should your line be "in trouble" there is an automatic "trouble find" under the name of your switchboard, which instantly gives notice of the trouble to the mechanic in charge, and where it is located, thus insuring promptness in the restoration of the service. The cost of having the exchanges is measurably lower than in the case of manual exchanges. A large saving in cost of operation is claimed for the automatic.

From inquiries made as to the feelings of local subscribers respecting the automatic system, it has been distinctly favorable to the new system, and so far as the system has been in operation, the advantages mentioned above have been borne out in our case.

Comparative Life of Automatic and Common Battery Switchboards.

There has not been sufficient experience in this State to ascertain the lives of common battery and automatic equipments. The Western Electric Company, however, estimate the life of their common battery switchboards at approximately fourteen years, whilst the Automatic Company estimate the life of an automatic switchboard as twenty-five years. The former estimate is, I think, reasonable from our own experience of the city board and its condition—the first portion of it having been erected in 1908—seven years ago. The estimated life of an automatic board at twenty-five years is, in my opinion, open to question; but if its life were only fourteen years, it would still warrant its adoption.

Wear and Tear.

From our experience so far, and judging by the behaviour of the apparatus, the wear and tear on automatic is not, I think, as heavy as on the manual apparatus. Most of the wear on a manual plant takes place on the multiple and local jacks and the cords and plugs, whereas in automatic equipment there is no apparatus similar to this installed. The automatic wearing parts are not such as to entail excessive wear, whilst the replacements of such parts are not costly.

Efficiency.

From the experience gained in the Sydney network, the efficiency is in favour of the automatic, as compared with the common battery, in so far as the number of faults per 1,000 stations is concerned. This is shown on the return attached, and consequently a better service is given to the subscribers. This is also borne out by the fact that complaints from subscribers since the automatic has been introduced have fallen in a very marked degree, and at quite a number of cases subscribers have personally expressed appreciation of the marked improvement in the service, both as regards promptness and reliability.

The automatic system eliminates the human element in switching, and performs this important operation mechanically, thus removing operating errors, and tending to greater efficiency.

Automatic in Other Countries.

I attach lists of towns in other countries where the automatic system has been introduced. These lists are not complete nor up to date, but give the figures as far as I have been able to gather them.

The Automatic Company's list includes 128 towns with 442,434 telephones, principally in America, and of these seventy-seven automatic plants have replaced manual equipments. Los Angeles, California, is one of the largest automatic installations, and has 60,000 automatic telephones in operation which replaced a manual plant.

The total number of lines included in the lists is 593,610.

The only case I have heard of where the automatic system has been displaced is in San Francisco, where some 22,000 automatic telephones were introduced, and, from what I understand, it was a matter of arrangement between the American T. and T. (Bell) Company and the Automatic Company, whereby the Bell Company bought out the latter, and dismantled the automatic plant.

As indicating also that the Western Electric Company, of United States of America, who are the largest manufacturers of common battery plants in the world, and are associated with the A. T. and T. Company, have accepted the question of automatic, and have decided to put an automatic system, as recognizing that the automatic system has come to stay. This company also paid £125,000 for the Lorimer automatic patents.

The Telephone Manager, Mr. V. Butler, has supplied me with the following important information:—

The following table shows the approximate saving in operating (traffic) expenses by the conversion of five (5) exchanges from manual to automatic:—

Exchange.	Staff—Old Listing.			Amount.
	Supervisors.	Monitors.	Telephone-Men.	
Avonfield ..	1	2	23	£ 3,438
Balmaln ..	..	..	19	2,244
Globe ..	..	3	33	3,862
Manman ..	..	..	22	3,428
Newtown ..	..	3	31	4,018
Total ..	2	13	139	£10,810

The increase in the operating in the City Exchange consequent upon the conversion is approximately as follows:—

POSITION HOURS DAILY.				
Prior to Cut-over.	After Cut-over.			Totals.
	A Positions.	Auto. A. B.	Manboard Switch. C. D.		B. and C.
Hrs. Mins. 84 25	Hrs. Mins. 103 50	Hrs. Mins. 110 30	Hrs. Mins. 214 20	
Difference per day = 129 hrs. 52 mins.				

This represents £2,984 17s. 0d., exclusive of supervision, which can roughly be set down at four monitors at £132 per annum equals £528 per annum, making a total of £2,012 17s. 0d.

The estimated saving is, therefore, £14,168.

Exchange.	Supervisors.	Monitors.	Telephone-Men.	Amount.
Burwood ..	..	2	18	2,248
Hornebush ..	..	2	14	1,622
Totals ..	..	4	32	3,870
Previous to Saturday cut-over ..	2	13	139	10,810
Grand Total ..	2	17	171	£20,680

No details re increase at city regarding Burwood and Hornebush—

Previous estimate for other exchanges ..	£2,012
Estimated excess ..	£18,668

The automatic system requires an increase in the staff of mechanics, but not to anything approaching the saving on the operators. Newtown has required only one extra mechanic, and

similarly on the other exchanges, so that is a very small item. The following statement shows the comparative costs and maintenance of

Automatic.	Common Battery.
Cost of Exchange Equipment, as per Contract ..	15,000
Cost of Installing, Labour, and Material from Accountant's Authority ..	1,418
Cost of Subscribers' Equipment—00 per cent. Wall Telephones, at £2 14s. 6d. each; 10 per cent. Table Telephones, at £3 each ..	2,484
Cost of Installing, and Material, at 6s. 11d. per Line ..	290
£10,268	£10,812
Sinking Fund and Interest on Cost of Exchange and Substation Plant—0 per cent. of £10,268 ..	1,734
Maintenance (exclusive of Administration and Lines Staffs)—	
Mechanical Staff Salaries—	
1 Foreman Mechanic, £228 per annum	
3 Mechanics, at £174 per annum ..	1,311
3 Junior Mechanics, at £141 per annum ..	
1 Assistant, at £102 per annum ..	
Sunday Pay and Travelling—	
1 Mechanic, 52 Sundays, at 10s. 6d. per Sunday, and 3 Junior Mechanics, Travelling, at 10s. per Month ..	70
Material and Running Cost (from Particulars supplied by Foreman Mechanic) ..	420
Operating—Complaint and Information—	
1 Operator, at £50 per annum ..	50
£3,043	£4,164

Automatic figures taken from Newtown. Common battery figures taken from North Sydney.

I have also prepared the following comparison of faults per 1,000 stations per day between automatic and common battery manual ex-

Months.	Common Battery Exchanges (City and North Sydney).			Automatic Exchanges (Newtown, Globe, and Manman).		
	Average Number of Faults.			Average Number of Faults.		
	Exchange Faults.	Substation Faults.	Total.	Exchange Faults.	Substation Faults.	Total.
January ..	2.80	2.10	4.90	1.37	2.43	4.80
February ..	3.10	1.80	4.90	2.10	2.65	4.75
March ..	3.80	3.21	7.07	2.22	3.02	5.24
April ..	2.91	2.24	5.15	0.73	2.80	3.53
May ..	2.07	2.10	4.17	1.03	2.01	4.52
June ..	2.07	2.28	4.35	1.01	2.01	4.52
July ..	2.00	3.70	5.70	0.70	4.40	5.10
August ..	1.95	3.05	5.00	0.84	3.43	4.27
Total Daily Average ..	2.78	2.68	5.46	1.40	3.25	4.65

I have here also a list of cities and towns in which the Automatic Electric Company, United States of America, has installed automatic equipment, and those which have replaced manual equipment. They comprise 128 towns, with a total of 442,434 lines provided for. Ten of these are in Australia. Accompanying it is a list of machine-switching exchanges completed or on order from the Western Electric Company of United States of America. These include Unley and Norwood, in South Australia. There is also a list of the automatic and semi-automatic telephone exchanges supplied by Siemens as at November, 1913. In this list appears Port Adelaide, with 1,000 lines. The three standard automatic systems in the world which have proved out absolutely are the Automatic, Western Electric, and Siemens. Each of those tied to any, and it will be a matter to be decided by tender as to which will be installed in the new Central Exchange.

an exchange for 2,000 lines, with 1,000 lines connected on automatic and on common battery switchboards:—

Automatic.	Common Battery.
Based on £3 6s. 10d. per line ..	£ 6,283
Based on 7s. 11d. per line ..	1,353
10 per cent. Wall Telephones, at £1 10s. 6d. each; 10 per cent. Table Telephones, at £1 15s. 6d. each ..	£1,008
Cost of installing and material ..	290
£9,934	£9,942
Sinking Fund and Interest—0 per cent. of £9,934, as for Automatic ..	886
Maintenance, as for Auto. ..	1,314
Sunday Pay and Travelling, as for Automatic ..	70
Material and Running Cost ..	303
Operating—	
1 Traffic Officer, £168 per annum ..	
2 Monitors, £132 per annum ..	
10 Telephonists, £60 per annum ..	
1 Telephonist, for Complaint and Information ..	
£90 per annum ..	1,321
£4,164	

G. To Mr. Penton.—Siemens Brothers are, I believe, connected with a German firm. I would not recommend any special system, but we have in the Automatic Company's plant at present in use in this network. That company's system was selected when the tenders were being considered for the Balmaln, Globe, and Newtown Exchanges, the only two tenders being the Western Electric and the Automatic. Siemens, for some reason, could not tender. The Automatic is a Chicago company. The British Insulated Company manufacture the Strouger system, which is now in operation in England. They are the agents for the manufacture in England of the Automatic Company's system. It is possible that they manufacture their materials there. I understand that they had an arrangement with the Chicago company to manufacture under royalty conditions for the United Kingdom. I believe that the agreement of the Automatic Company here with the parent company in Chicago is such that it does not matter

where they manufacture, the Chicago company must get their royalties. There is no question about the British company being able to make as good material in England as is made in America. I do not think it would pay to lay down a factory to manufacture here, because special plant would be required, and there would not be sufficient demand to warrant the expense. The machinery would be very exact. I can express no opinion as to who is likely to get the contract, and it is quite immaterial. The only strike possible on an automatic system is among the mechanics. We are independent of the electric light. When the gas strike occurred at North Sydney, we were running our plant at Mooman from gas. I put a carburetor on, and we ran the engine from petrol. There was a little trouble in cutting the Mooman Exchange over to the automatic, as there has been on each exchange when it was first cut over. Naturally, the machinery is new and stiff, and certain small faults develop in the line construction, and also in connexion with the subscribers, but I think everything is working fairly satisfactory now. The outside construction, whether for automatic or for common battery, must be of an equally high standard. If that standard is sufficient to work the common battery, it will be ample for the automatic. That has been our experience, and there is no reason why it should not continue. I was not a party to the selection of the proposed site off Castlereagh-street. I produce maps showing how it was arrived at, and the data on which it was selected. It is advisable to place the new exchange in the area of greatest congestion. That lies between Hunter and Bridge streets, and between Castlereagh-street and George-street, beyond Martin-place, and the selected site is in that area. To the north of that we shall have about 20,000 telephones in fifteen years, and about 10,000 in the southern portion of the city.

7. To Mr. Laird Smith.—We shall experience no engineering difficulty in getting the cables into the proposed exchange. We have a tunnel up Moore-street to Castlereagh-street, and all the new undergrounding necessary is about 600 to 600 feet.

8. To Mr. Fenton.—We have a right to the right-of-way. If there is any difficulty about Mr. Baker's promises we can go underneath them without any trouble, except for the extra tunnelling.

9. To Mr. Laird Smith.—We do not intend to continue the tunnel there at the same size. It is intended to install with 61 ducts in conduits eight blocks of eight each. We use *stonevare* conduits, with cement joints. If there is any engineering difficulty with regard to the right-of-way, it is quite possible to obtain the right to come direct from Pitt-street tunnel.

10. To the Chairman.—It is not contemplated to do that, and I would not recommend it, because it would be more expensive. The proper system is to come along Castlereagh-street and under the right-of-way. All existing subscribers' lines will be utilized, and any that are to be diverted from the present switchboard at the General Post Office to the new exchange would be diverted by cables. We have a system of main tunnels throughout the city area.

11. To Mr. Fenton.—I did not make an inspection of other sites. That was done by the officers mentioned in my previous statement, but, so far as I know, this is the most suitable.

12. To Mr. Laird Smith.—I do not think there would be any grave danger from fire. The building will be fire-proof, like all the exchanges we are now erecting. It is for the Home Affairs Department to see that provision is made against fire risks from the adjoining buildings. There will not be many employees in the building, and those that are there should be able to get out if a fire occurred in the Castlereagh-street building flanking the right-of-way. That is the natural outlet, but I am dealing with the building on an engineering point of view. Once the exchange is erected there is no need to use the right-of-way for carts. If a cart were standing in the right-of-way it would certainly block the exit. The Commonwealth has no exclusive rights over that passage.

13. To Senator Lynch.—Since this site was accepted I reported on a site in Castlereagh-street offered by Messrs. Batt, Rodd, and Purves, somewhat larger than the site we have; but the present is ample for our purposes, and the cost was considerably more. This was my report, dated 30th August.—

I inspected the ground offered by Batt, Rodd, and Purves, in company with Mr. Oakeshott, Director of Works, but it offers no advantages for our purposes over the ground already purchased by the Commonwealth. (2) The ground offered is naturally dearer than the ground already purchased, owing to it having a frontage to Castlereagh-street, but this is no advantage from our point of view, as it is not necessary to have a main street frontage for telephone exchange purposes. The ground is slightly larger, but this also need not be considered, as sufficient space will be provided for in the ground already secured.

(3) So far as the question of an entrance to Pitt-street is concerned, if such an entrance is desired, it will be cheaper to provide it from the site already secured than from the land now offered, seeing the former is the nearer to Pitt-street. It would, in any case, be a very expensive matter to provide such an entrance, whilst it is not absolutely necessary.

(4) There does not, therefore, appear to be any reason why the offer of the proposed site should be favorably considered.

The present site has been accepted and resumed, the building standing on it is being demolished, and the place made ready for the new work.

14. To Mr. Laird Smith.—The route from the site to the existing tunnel has been surveyed, and the country found quite suitable for tunnelling. The question of Mr. Baker's room under the subway has arisen since.

15. To the Chairman.—There is no virtue in having a site surrounded by buildings, but you could not get a suitable open space anywhere in Sydney.

16. To Mr. Sampson.—There must be some danger from fire anywhere in a congested area in Sydney, but I do not think the danger on this site is greater than in any other part where we could get similar facilities; nor do I think we could get any suitable site free from fire risk. There is greater danger in a site surrounded by buildings than in a site fronting a street, but the latter is much more expensive.

17. To Mr. Laird Smith.—I do not see why the building should not be absolutely fireproof. That would not interfere with the insulation of our machinery. If it is made fireproof, I will be perfectly satisfied to place the equipment there. The whole of the apparatus is insulated irrespective of the floor. This is done mostly with ebontite or hard rubber. Even if the building is wholly of reinforced concrete, or even steel, I would not anticipate any electrical leakage.

18. To Mr. Fenton.—If a fire occurred in surrounding buildings, and damaged the plant, it would only throw out that network to the extent to which the damage occurred. So far as I could see on looking round the buildings, no dangerous trade was being carried on in the immediate vicinity. It appeared to me to be general warehouse business.

19. To Senator Storry.—The cost of the equipment, apart from the building and site, is £70,000 for 5,000 subscribers' lines. Our development prior to the war was at the rate of about 500 new subscribers per annum. We might reasonably expect that rate of development to increase with the increased population. Our normal rate of increase has been between 7 per cent. and 8 per cent. per annum, and it is calculated that in fifteen years we shall have 20,000 subscribers on that exchange. The equipment is being provided in anticipation of that number. We calculate the development increases at compound interest. When 20,000 subscribers are reached, the question will arise as to whether it is advisable to increase that number located in that building. We anticipate, from our statistics, that this area to the north of the city will have 20,000 subscribers. If there is likely to be further extension we shall have to decide what portion of the area will be subdivided, and where to put another exchange to relieve this one. The southern portion has already been provided for by a site at Wilmot-street, which runs between George and Pitt streets, and between Liverpool and Park streets, not far from the Town Hall. We propose to have another exchange there for the southern portion of the city.

20. To the Chairman.—I propose to utilize the ground floor and first floor to provide for 10,000 subscribers. I propose to occupy the other three floors with my own staff and the staff of the Construction Branch, who are at present located in temporary quarters in Kent-street, for which we pay a rental of £330 per annum. That amount will be saved on the erection of this building. The rental value of my space in the General Post Office will also be saved. I am being very urgently pressed to give that up to provide accommodation for the accountants. The whole of the new building can be occupied right away. My staff will occupy the second floor, and the third floor will be occupied by the equipment section, which is also located in the General Post Office. The remainder of the second and third floors will be occupied by the Construction Branch. We will get more space and better accommodation in the new building than we have now.

21. To Mr. Laird Smith.—I do not think it will be necessary to construct tunnels similar to those now existing in making the new installations. The outside construction in Sydney is high owing to the hard nature of the country we had to go through in making the tunnels. The larger portion of Sydney consists of rock formation. Our outside construction is also more expensive than in Melbourne, owing to the configuration of the layout of the streets in the city and suburbs. We can easily erect distributing poles in the back streets, and are doing it now. In connection with undergrounding, I have started from the Circular Quay what is known as block distribution. We take the underground work into the centre of each block and distribute from there. No overhead wiring will come into this exchange. The main tunnels run from the General Post Office out to Newtown. We have had trouble in the tunnels

from storm water, but not serious. The existing tunnels are the backbones of our system, and from the tunnels conduits are laid. As the undergrounding is extended it will not be necessary to tunnel, but simply to conduit. As our service increases, the overhead cost and maintenance charges will come down. That is the object of undergrounding. We called for tenders for the automatic service. We have not always stipulated that the company shall install it, handing the machinery over as a going concern. Lately tenders have been called for the supply of the apparatus delivered into the exchange required, with a supervising engineer to supervise the installation, we providing the installers. Our own men install under the direction of an engineer of the company. We have done all the installing in all the local exchanges. Our men have experienced no difficulty in mastering the new system. We must provide a new exchange in this part of North Sydney for new subscribers, because we are within measurable distance of the completion of the common battery switchboard. It is not intended to scrap any part of our existing system, seeing that we have only in the last few years installed the last portions of that board. When that board has served its life the subscribers can then be transferred to the north and south, but that need not be done until then. We have had no difficulty in making the automatic interchangeable with the common battery, but there are certain difficulties inseparable from a dual system in the one network. There is no undue delay in making the connection. Any delay is due to the manual operators passing from the automatic to the manual, or vice versa. The cost per subscriber in the case of the common battery depends on the size of the plant. We had two sections of the common battery equipment added to the city exchange, and that for about 950 lines cost about £2 1s. per line. We had to make a further extension of it, and it cost us £7 odd per line for that number of subscribers on the additional equipment. If we had to put a further extension on it, the cost per line would amount to a much smaller rate owing to the full multiple having now been provided. On the other hand, the cost of the automatic per line is virtually constant. It is simply a matter of adding certain apparatus and so much cabling. In the case of the common battery, for every new subscriber it has to be multiplied round the whole exchange, and every subscriber has to be brought on to every individual operator working on the board. That is where the enormous cost and size comes in with common battery work, and that is why a common battery switchboard has a capacity of about 10,000 subscribers. When a common battery switchboard has more than 10,000 subscribers, the multiple rises to such an extent that the operators cannot reach it. We, therefore, cannot reasonably and practically put more than 10,000 subscribers on a common battery switchboard. With the automatic it is quite different. The mechanical supervision necessary in the common battery exchange is almost as great as that in the automatic exchange. There is very little difference in the maintenance in that respect. If there is any it is heavier in the common battery. There is no greater difficulty in protecting the automatic from high potential currents than the common battery. The protective apparatus for each is identical. I have not heard of any damages due to power currents at Newtown. Although our outside network is considerable, and we are subject to the light and power currents all over the city and suburbs, the contacts between the two

systems have been remarkably small. When contacts occur all that happens is that the fuse at the subscriber's end of the line blows and cuts his instrument off, and the fuse at the exchange blows and cuts our apparatus off, leaving the line disconnected. I do not think there is much difference between the number of contact points in the common battery and automatic. I think the larger portion of the faults with the common battery is caused by switches, boards, and plugs, and so on. There are relays and contacts in the automatic which may give trouble if not looked after, but faults of that kind show up readily, and are easily got at. The interruptions in the automatic are not frequent or serious. We have had absolutely no difficulty in tracing the faults. We have had no difficulty in getting the business people to work the new system. The public have responded remarkably well to the wishes of the Department to introduce the new system. They have given us every facility, and I am advised that they have responded well.

22. *To Mr. Gregory.*—I have heard of no complaints of ineffective calls on the automatic. I can hardly say what the proportion of ineffective calls was last year on the automatic, because the matter rests with the subscriber himself. I have no data showing the number of effective and ineffective calls on the new system. I know there was some difficulty with the automatic at Fremantle in the first instance, but that was due to want of sufficient trunk accommodation to pass the calls across. Mr. Heskeith can give the Committee information on that point. An effective call is shown by the meter. An ineffective call is not recorded on the meter on which the charges are made. With 5,000 lines installed, the site, building, and equipment is estimated to cost £114,401. I understand that there has been a large loss on the New South Wales telephone system, but that loss covers the whole of the State, and does not apply to the metropolitan area only. There is a loss in Sydney, but it is largely in connection with the operating charges, which are exceedingly heavy. The accountant can give the Committee a statement of the financial results of the working of the telephones within the metropolitan area. If you find it prohibitive to get a telephone for a back-country place in Western Australia, the difficulty would be due to the cost of installation and the cost of maintenance. The Home Affairs Department can give a better opinion about the question of fire protection in the new building than I can. It is purely a matter of building construction. All we want them to do is to provide an absolutely fireproof building. From an electrical engineering point of view, the site is most suitable. It will be free from dust and noise, although the latter is immaterial in an automatic exchange.

23. *To Senator Lynch.*—The proposal is that the subscribers already connected with the General Post Office shall remain there. The new exchange is to provide for new subscribers, who cannot be handled there. We propose to centralize only the northern portion of the lines in the new building. Our experience of the automatic in Sydney has been very satisfactory. I recommended its substitution for the manual system. I think my superior officers endorse that view. The Chief Electrical Engineer was specially sent to America and Europe to go into the whole question, and, on his advice, the automatic system was adopted for Balmain, Glebe, and Newtown. I have not heard

from the subscribers of any difficulty as new subscribers are added to the automatic system. We have experienced no greater trouble in handling a greater than a small number. There is no reasonable limit to the number of automatic subscribers' lines that may be put into the one building, but it will then be a question of economy in outside construction, whether it would be advisable to have a larger number in one exchange or divide them into two exchanges. I claim an advantage on economical grounds for the automatic. Even on a small plant the manual system is more expensive to maintain. We have no experience yet as to the length of life of the automatic. No experience is available anywhere of an automatic that has been in existence for 25 years. The company make their estimate on the wear and tear of the plant, but it is quite reasonable to expect that its life would be at least equal to that of the common battery system. I put the two systems on the same footing from the point of view of effective service. In the figures I have given, for the cost of maintenance of the two systems, I am working on what it actually costs, allowing 0 per cent. for sinking fund and interest. The saving of £511 shown in the annual charges in favour of the automatic is only for 1,000 lines. The saving for fourteen years will not continue at that low rate, in view of the increase in subscribers that will take place every year. That will be largely to the disadvantage of the common battery every year. It becomes more expensive each year as subscribers are added to it, whereas with the automatic, with the increase of subscribers, the cost remains virtually the same per line. The difference in the annual charges in fourteen years' time of the two systems is simply a matter of estimating, all depending on the growth. We have a common battery switchboard with 8,000 odd subscribers. I can give the Committee the actual cost for that plant, and compare it with the automatic for the same number of subscribers, but the figures in the latter case will have to be purely an estimate. If the life of the automatic is to be only the same as that of the common battery, I can take out the figures on that basis, but that is a conservative estimate. The automatic equipment will certainly last more than fourteen years. Even if it lasted only fourteen, it would still be a better financial proposition than the common battery.

24. *To Mr. Fenton.*—I produce curves showing the increase of subscribers. From 1899 to December, 1900, they increased at a rate which, if it had continued, would have given us a total of only 6,600 subscribers at the present day. When the measured rate system came into force, in 1907, there was an immediate jump from 4,969 to 5,335, and the increase each year from that time right up to 1915 has been at the higher rate, giving us a present total of 8,437 subscribers, that we may reasonably expect 10,000 in 1917. There has been a very noticeable diminution in the rate of increase since the war began. The increase up to 1913 was 500 odd every year. In 1914, when the war began, we had an increase of only 388. Our previous percentage of increase was between 7 per cent. and 8 per cent. In 1914 it was only 3 per cent. I do not anticipate a very great slump owing to the proposed new charges, but they will have some effect. The introduction of the automatic system means doing away with the telephonists, but every one of the 171 hands so far displaced has been absorbed in other Departments. The whole of our system could not be

turned into an automatic in fourteen years, because we would not wipe out the present city exchange in that time. It would not pay us to scrap that plant. I do not think the automatic calls for any special training on the part of the mechanics. I do not think it would pay any firm in Australia, or even the Government, at present to lay down a plant and factory to meet Australian requirements in such special apparatus as the automatic system requires. It would all have to be special machinery. I do not think I have the total capital cost in connection with the automatic instalments so far made in Sydney, as the Burwood and Homebush exchanges were opened only last Saturday. I can supply later the total capital cost of installing our seven automatic exchanges.

25. *To Senator Keating.*—The system has been in use in Sydney a little over a year. Newtown was the first exchange cut over. The complaints have markedly fallen off. The subscribers had a little trouble at first in manipulating the system, but within a week things were running very smoothly. The subscribers have expressed their thorough appreciation of the improvement in the service. The automatic system can attend to almost any number of calls upon it at the one time. It is undoubtedly a more secret system. The only delay occurs in connecting subscribers on different systems. It will take from eighteen months to two years from the inception of the work of the new City Exchange equipment to its completion. Two or three hundred of the present subscribers on the General Post Office switchboard may be cut over on to this new exchange, but that is all. There would be no difficulty in cutting 500 over.

26. *To Senator Lynch.*—The last tenders for automatic exchange equipment we called for were for seven exchanges in one group. The previous one was for three exchanges in one group. In the case of Newtown, we had only two competing firms. In the last case there were, I think, three.

27. *To the Chairman.*—Mr. Heskeith's estimate of the capital cost of the undertaking is as follows:—

Site	5,000	20,000
Building	116,500	215,500
Exchange equipment (including equipment on other exchanges)	22,000	22,000
Subscribers' equipment	45,544	182,170
Line plant	14,137	50,519
Totals	211,401	437,459

His estimate of the immediate cost is:—Site, £16,500; building, £22,000; exchange equipment, £15,544; subscribers' equipment (including conductors, cables, and open lines), £5,070. Total, £20,068.

(Taken at Sydney.)

FRIDAY, 1st OCTOBER, 1915.

Present:

MR. RILEY, Chairman;

Senator Keating, Mr. Finlayson,
Senator Lynch, Mr. Gregory,
Senator Storey, Mr. Sampson,
Mr. Fenton, Mr. Laird Smith.

Nicholas George Sparks, Chief Officer, New South Wales Fire Brigades, sworn and examined.

28. *To the Chairman.*—I have to inspect proposed sites and plans of buildings which come under the Height of Buildings Act. The plans for the proposed automatic exchange building, off Castlereagh-street, have not been submitted to me. If the building is 100 feet high, it will come under the Height of Buildings Act, and, therefore, under our notice. The principle objection I see to the site is on the question of accessibility. It is reached only by right-of-way, and if a fire occurred the question is whether the employees would be able to get out. It is not easily accessible to those going to extinguish a fire. I think that the internal risk of fire would be in the cable room or the testing room, where the cables are separated and insulated by wax. A fire occurred a little while ago in the General Post Office, at the place where the cables entered the building, and considerable damage was done. Currents of high tension come in, and a stray current may be picked up. We have not been able to ascertain the cause of this fire. Some years ago the proposed site was a very risky place from a fire point of view. Four years ago a building occupied by cardboard and paper-book manufacturers adjacent caught fire, and it took thirteen steam fire engines and two motor fire engines to extinguish it. Appreciable damage was done to the surrounding property. Since then the risk has improved, in so far as the building concerned has been reconstructed. It is on the north side of the site, but it has now three reinforced concrete floors and a sprinkler installation throughout. It is occupied by account-book manufacturers at present, and, although it contains a lot of machinery, the fire prevention methods adopted have improved the risk. This region at one time a dangerous fire zone from an external point of view. Adjoining the building mentioned are the premises of William Brooks and Company, printers. They are now reconstructing the building entirely, to make an office building of it, having erected large works at Waterloo, where all the machinery will be placed. On the east side there is an unoccupied building of about three floors. The outside risk for the site will be from the opposing windows. There are fifteen unprotected windows on the east, and thirteen on the south. That is always a source of danger. If the water supply is cut off, and the sprinklers fail in the adjoining building, there is every chance of getting a big fire, and unprotected windows are always a source of danger. In the north-east corner there is practically no risk, and there is not very much on the south-east. It is a nice piece of ground, but the objection of inaccessibility remains. If a fire broke out in the new building the fire brigade would take full charge of the right-of-way. This would mean a lot of confusion with people coming out and going in. To have only one means of entry would render operations rather difficult. I would much prefer a frontage to Castlereagh-street if it could be got. If the building is 100 feet high, and comes under the Height of Buildings Act, it will be necessary to have two staircases, one of fire-escape design, entirely enclosed and cut off with automatic doors, so that it would be possible, if the whole building was alight, to go up and down that staircase without danger. I do not consider that this is a suitable site to put up a public building of this nature, with the number of employees that there will be in it. A building of that description should shut on to a public thoroughfare. I now understand from Mr. Oakshott that the building is only 80 feet in height from the ground. In

that case, the plans will not be submitted to me or to the Government Architect, but Mr. Oakshott tells me that a fire escape will be put on the outside of the building. We have had experience of a fire going across a 60 feet road. As the building is to be only 80 feet high, I have no jurisdiction to insist on another staircase, but we estimate, as a safe margin, that no person should have to travel more than 60 feet to reach a staircase. I should strongly recommend another staircase at the opposite end. Under the Factories and Shops Act an alternative means of escape on the outside of the building is insisted on if work is going on in the building. It is not everybody that cares to go down an outside staircase.

29. *To Mr. Laird Smith.*—The leakage of a high potential current from outside was, in my opinion, the cause of the fire at the Post Office.

30. *To Senator Story.*—The greatest risk in this case would be from outside from the one building I have mentioned, but it would be all right if the water supply was intact. I prefer wire glass and metal frames for protecting windows. This will stand 2,000 degrees of heat, and one advantage it has over fireproof shutters is that it does not conceal a fire, and is easily broken to give access, although it will stand an enormous temperature before collapsing. I have had no experience of wire gauze shutters, although I believe they are used in Melbourne. If wire glass was supplied for the windows it would be safe to erect a building on the site. I recommend the use of wire glass. It is much used in Sydney.

31. *To Senator Lynch.*—A rising main and hydrant should certainly be installed on each floor, and chemical extinguishers should be put in. Under the Height of Buildings Act a rising main and hydrant has to be on the outside of the building, with connections on each floor, and connections on the pavement level to connect the pump to. I certainly recommend the installation of a hose and hydrant in the most economical way, so long as it is in the building. I know of no other public building in the city of the same height, character, and situation. It stands alone, but there are many private buildings of four and five floors which are difficult of access. There is a bigger margin of risk in this proposition than in any other public building that I know of in the city.

32. *To Mr. Sampson.*—If a fire occurred in the building facing Castlereagh-street, the employees in the new building would probably be able to escape, given two staircases, but there would be a danger of the right-of-way being so congested that they could not get out. I do not think there would be a great risk of the right-of-way collapsing, nor do I think there is any reasonable danger of the walls on each side of the right-of-way falling and blocking up the passage, because I do not think any large fire would occur on that side. The biggest risk is on Penfold's side, to the south. The right-of-way might easily become congested in case of fire, although the police regulate the traffic, but seven or eight lines of hose would make the access more difficult. I would not recommend this site as a public building, because of its inaccessibility and the risk on the south side. To make the place at all safe another approach ought to be obtained, either from Merchant-court or elsewhere; but, in any case, the site seems a rather difficult proposition. If 100 employees are engaged there, you should have two means of egress. Another, 12 or 14 feet wide, would be sufficient.

That would make it a reasonably safe building. That exit could possibly be taken through one of Vickery's warehouses into Merchant-court.

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

33. *To the Chairman.*—Wire gauze blinds and wire-woven glass will be put in all our city buildings.

(Taken at Sydney.)

TUESDAY, 5TH OCTOBER, 1915.

Present:

Mr. RILEY, Chairman;	Mr. Finlayson,
Senator Keating,	Mr. Gregory,
Senator Lynch,	Mr. Laird Smith.
Senator Story,	
Mr. Fenton,	

Edwin James Young, Deputy Postmaster-General, New South Wales, sworn and examined.

34. *To the Chairman.*—We have at present adequate accommodation for our telephone subscribers, but we are looking forward to the extension of the system by establishing a new exchange of Castlereagh-street. A new exchange is necessary, quite apart from the accommodation we have now. It is not intended to do away with the existing exchange in the General Post Office. My experience is that the automatic is the most up-to-date system of telephony. I have every reason to think it will prove a greater boon to the public than the common battery or magnet systems. At Newtown, Glebe, and Balmain, where the automatic has been established for some time, the complaints from the public have decreased materially. When the system is first installed we expect some trouble, because it takes a little while to get people accustomed to it. I think the automatic will prove cheaper to run. It dispenses with the need of telephonists, and requires only a small number of mechanics. That is where the saving will come in. Two floors of the new building will be required for exchange purposes. The others will be used for the clerical staff of the Electrical Engineer, and the clerical staff of the Construction Branch. We are paying now £350 a year for premises rented for the Construction Branch staff. That amount will be saved. A dining-room will be made on the top floor. One hundred and sixty-four employees will be engaged in the building to begin with, comprising eight mechanics and 156 clerical. These include very few women. That will be the day-time staff. Only three mechanics will be there at night. It is not intended to put the repair section of the mechanical staff there. When the building is erected, they will go into a new building to be put up adjoining our present stores, at Darling Harbour. I was not consulted regarding the Castlereagh-street site. The opportunity to secure land at the back of the General Post Office for a new exchange is gone. A vacant space there might have been acquired eighteen months or two years ago.

35. *To Mr. Finlayson.*—I have had no experience of automatic telephony. I base my opinion on the reports I receive from my officers and on

my own observations. We have about 7,000 subscribers on the automatic exchanges within the metropolitan telephone network. Our oldest automatic exchange has been working for only nine or ten months. Before the new site was selected, I was consulted regarding accommodation, which was urgently needed. We cannot extend the present exchange in the General Post Office any further, and a site had to be obtained so that a new building could be erected in about two years' time. I have been consulted by the officers of the Home Affairs Department about the plans of the proposed building, and am waiting to see the final plan. I consider the building will be suitable for the requirements. I know the site, and should say it was suitable. There will be very little other traffic than the staff when the building is completed. I would have preferred land at the back of the General Post Office, but can see no objection to the proposed site for a telephone exchange. It is not necessary to have an exchange in the main thoroughfare. It would have been a great advantage to be able to concentrate the work of the Postal Department by securing a site near the General Post Office, but centralization can be overdone. So can decentralization. With a growing city like Sydney, it would not do to have only one central exchange. It would be too costly to bring all the wires into that centre. The present telegraph operating room is congested, and when the Electrical Engineer and his staff go to Castlereagh-street I shall be able to give them all the space they want for some years. Only yesterday we completed removing a section of the Mail Branch to the railway station. We propose to turn the space thus saved into a public vestibule, to give people much better facilities than we can give them under present conditions. It would not be advisable to put the Stores Branch and the exchange together, as the exchange should be kept as free as possible from the danger of fire. It would be far too costly to put the new exchange at Rodford, as that would mean taking the wires that extra distance. Eventually there will have to be another exchange near the railway station. The connexion between one exchange and another is by junction lines. The new exchange is to serve what might be called the northern end of the General Post Office, and is required to meet expansion in that area. It will be of no use to meet the development of the city in any other direction. These will have to be met by new exchanges. The area of this exchange will take opinion, but some did not favour it. Subsequently, even those said they did not want to go back to the old system. Before any automatic system was installed in Sydney for the public, we put in a system for our own use in the General Post Office to demonstrate its suitability and accuracy. We have about 24,000 subscribers still on the common battery and other systems from whom there are a fair number of complaints. I cannot say that these are out of proportion to the working of the system. Of course, it is possible that many people are dissatisfied that we hear nothing from. If the Sydney Exchange is regarded as worse than any other in Australia, it must be remembered that, in the first place, we have many more exchanges than any other city. That in itself creates a difficulty. Victoria has about the same number of subscribers on its exchanges, but it has fewer exchanges. My impression is that there have been too many suburban exchanges, and that if they had been reduced in number the service might have been more efficient. I could not say what were the prin-

into about £14,000 per annum. The gross saving would be about £18,000, but some amount must be deducted to allow for the increased mechanical staff. We have been losing a large sum on the Sydney telephone system, but the installation of the automatic will make a big annual saving. I anticipate that the saving through the decrease in the staff will give a better financial result, even after charging interest on the greater capital expenditure.

37. *To Senator Lynch.*—The automatic system is giving very reasonable satisfaction. We cannot expect perfection. Possibly I do not hear all the complaints. A good deal of the faulty working of the system, in the first place, was due to want of knowledge on the part of the subscribers of how to manipulate the telephone. Some line difficulties also occurred, but as the difficulties are straightened out, I find that big improvement takes place in the exchange. We cannot put down all the difficulties to the public. We must have a good class of mechanic, so that we may know that the apparatus is kept in reasonably good order. There are slight faults inseparable from the introduction of any new system. I have not heard anything about the displacement of the automatic system in America, beyond what I saw in the press the other day about the use of the wireless system, with which a distance of 2,600 miles had been spoken over. I should not like to say that that is about to supersede the automatic. I certainly favour the automatic in preference to the common battery system, from what I have seen of it. We shall probably have three exchanges in the city area, one at the General Post Office, one to the north, and one to the south. It will not be possible to dispense with the common battery system when the new exchange is installed, although gradually a number on the present exchange will be transferred to the new one. Experience seems to show that the decentralization of exchanges tends to economy. The greatest expense is in bringing the wires over long distances. Although you increase the expense in providing a new exchange, you make a saving in material and labour by the shorter distance travelled. Our telephone charges, generally speaking, have been lower than those of other cities in the world.

38. *To Senator Keating.*—When we installed the Newtown, Glebe, and Balmain automatics, we heard from subscribers generally favorable opinions, but some did not favour it. Subsequently, even those said they did not want to go back to the old system. Before any automatic system was installed in Sydney for the public, we put in a system for our own use in the General Post Office to demonstrate its suitability and accuracy. We have about 24,000 subscribers still on the common battery and other systems from whom there are a fair number of complaints. I cannot say that these are out of proportion to the working of the system. Of course, it is possible that many people are dissatisfied that we hear nothing from. If the Sydney Exchange is regarded as worse than any other in Australia, it must be remembered that, in the first place, we have many more exchanges than any other city. That in itself creates a difficulty. Victoria has about the same number of subscribers on its exchanges, but it has fewer exchanges. My impression is that there have been too many suburban exchanges, and that if they had been reduced in number the service might have been more efficient. I could not say what were the prin-

considerably once the automatic boards are installed and the undergrounding of wires is done. The tunnels and conduits can be used for years, and the overhead charges will diminish.

49. *To Mr. Fenton.*—Local conditions make Sydney more difficult to work the telephone system than in any other capital. The way the city is broken up by the water adds to the cost; the general maintenance is more expensive, and we have more exchanges within the network. We have 26, as against 19 in Melbourne. We have increased the expenditure without correspondingly increasing the revenue. We have about 60,000 subscribers in New South Wales, as against about 35,000 in Victoria. The Sydney metropolitan subscribers total 32,000, and Melbourne, 24,000. The actual cause of the different results in the two cities is the matter into which the special committee inquired. I do not know what their conclusions were. I can supply your Committee with a statement showing the total expenditure on telephones within the last four or five years, the cost of installing the automatic system, the cost of new equipment, and of undergrounding. I expect to see the revenue gradually increase and the expenditure show a big drop.

60. *To Senator Lynch.*—The system of accountability in all the States is the same. We are now able to show clearly the accounts for the three divisions—postal, telegraph, and telephone. The only difficulty is in apportioning the time of certain employees in country offices. The present system lends itself to the accurate keeping of telephone accounts. The telephone department is, generally speaking, the greatest loser of the three. We have two systems of recording calls. In the one case a girl operating the switch enters on the docket the number of the subscriber who calls, but the only system that can apply to the automatic is the meter. We have complaints of over-charges, but the meters are under constant supervision. If they are registering erratically the matter should be noted at once, and the meter tested. If a meter shows undue progress it is tested. I would not regard the complaints of over-registration as frequent. I have had people admit that the telephone might have been used by others than themselves. It is our system to allow about 3 per cent. for obsolescence of telephone plant.

61. *To the Chairman.*—My branch pays the accounts for all the material bought in this State. The Controller of Stores, if there is no contract, obtains quotations, and we pay the accounts. The State Tender Board has a list of contractors who are engaged to supply at schedule rates with 2½ per cent. discount for payment within one month, and we as a Commonwealth Department get the benefit of that arrangement. If we have not a contractor of our own, we can always call on a State contractor to supply us, and we frequently get discounts. I have never had the impression that there is any combination amongst suppliers of goods for our Department to put the price up. I have never had reason to believe otherwise than that the competition is free and above board.

George John Oakshott, Works Director for New South Wales, Department of Home Affairs, recalled and further examined.

62. *To the Chairman.*—We are providing for a rising main and hydrant on each floor. Iron sashes and wired glass for the windows have been

included in the estimate. The information asked for by the Committee in my previous examination has just arrived from Melbourne. I am prepared to supply a digest later. The question of the site was gone into chiefly by Mr. Scrivener, Mr. Goodwin, and Mr. Hesketh, and the matter was carefully considered in relation to what is called the copper centre. No definite arrangement has been come to about taking the cables through the right-of-way, but I anticipate no trouble. If we cannot go through Baker's annex it only means the extra expense of going under the floor. It would be an excellent idea, if it could only be managed, to make another right-of-way through Vickery's warehouses into Merchant-court, but it would mean purchasing one of the warehouses. A double approach from Castlereagh-street could be obtained only by purchasing extra property.

63. *To Mr. Laird Smith.*—We could purchase land facing Castlereagh-street, put a decent building on it, and let the front for shops or offices. I do not know whether the Commonwealth would care to speculate in that way, but if it did a very payable proposition could be made of it.

64. *To Senator Story.*—It would be a very costly proposition to tunnel into the building on either side. The tunnel would have to go through the solid rock. I would much rather buy one of the warehouses right out. There are other Commonwealth Departments that could be conveniently housed in the new building. We are leasing premises for the Land and Income Tax Departments now. There are also the Public Services Inspector, the Poisons Department, and the Home Affairs Department will require a place when the Customs Department wants the rooms we are now using. A new building fronting Castlereagh-street alongside the right-of-way leading to the proposed exchange would be convenient and suitable for all those Departments. I can see no objection to acquiring land, and building there, except the expense.

65. *To Mr. Fenton.*—We were offered property by Batt, Rodd, and Purves, either as a lease or to purchase outright. Mr. Goodwin is our land and property officer, and I could not act regarding the acquisition of property to make another right-of-way except at his request. A telephone exchange would be very suitable at the back of the Post Office, but the difficulty is to acquire the property.

66. *To Mr. Gregory.*—I have thought of another means of exit than that already provided in the plan since hearing Mr. Spark's evidence. I thought of the most southern warehouse being purchased and putting another staircase in the south-west corner. I propose to put two external fire-escapes in at the opposite end to the original staircase. I dare say it could be arranged to have fire-escapes on to the roofs of other buildings from our own flat roof. We can make the building so fire-resisting as to be practically fireproof. The fact that the site is surrounded by buildings which are not fireproof constitutes an element of danger, but I do not think there is grave risk to life. The site was selected by Mr. Scrivener, the Director of Commonwealth Lands and Surveys, in April, 1914, and secured on 30th June, 1914. Complete plans and specifications for the work will be prepared. Just as elaborate plans will be required for day labour as for contract. If tenders were called this job would offer a fair test.

(Taken at Melbourne.)

MONDAY, 11th OCTOBER, 1916.

Present:

Mr. Ruxx, Chairman;

Senator Keating,	Mr. Gregory,
Senator Story,	Mr. Sampson,
Mr. Fenton,	Mr. Laird Smith.
Mr. Helyarson,	

John Hesketh, Chief Electrical Engineer, Postmaster-General's Department, sworn and examined.

67. *To the Chairman.*—I have recommended that the Commonwealth shall install all new exchanges with automatic telephones in Sydney. In 1904 I went round the world, and saw the then existing automatic exchanges, particularly in America. At that time I reported that the automatic exchange system had not developed, and did not meet the conditions as well as did the latest manual apparatus. In 1912, I again went round the world, and saw the latest apparatus, not only in America, but in England, Belgium, Germany, and Austria, and observed the advances that had been made up to date. As a result of that particular investigation, I reported to the Postmaster-General on my return, and the report is embodied in pages 35-38 of the Third Annual Report of the Postmaster-General. In America and in Europe I had seen examples of the three most important full automatic systems—the Strowger system; the Siemens system, which is a modification of Strowger; and the Western Electric Company's system. I also saw the Lorimer system, and the North semi-automatic system, as contrasted with the full automatic system. In a confidential report, dated about November, 1912, I briefly compared the principal automatic systems, and the conclusion was that any of the three systems—the Strowger system as made by the Automatic Electric Company, Chicago, the Siemens system, or the Western Electric Company's system—would perform all the functions required of a modern system. I then detailed the advantages of one as against the others. For Sydney I recommended the Strowger system, as made by the Chicago Company. There are British companies—the Automatic Electric Company, which was previously the British Insulated and Helsby's Cable Company—but they are making according to the Strowger system under a licence from the Chicago Company. The Western Electric Company is a British branch of the American Company, and they are making a system of their own independently of the Chicago Company, and the instruments are also made in England. For the new exchange in Sydney no tender has yet been accepted; we have not even invited offers.

68. *To Mr. Sampson.*—Price is the controlling matter. I would not like the Committee, or any one else, to get the idea that I have such a preference for any particular make that I would recommend it as against others irrespective of considerations as to price. That is why I was so careful to report that either of the three systems would meet requirements. I tried to protect the Department. Since that report was made things have undoubtedly changed. Siemens apparatus is being made at Woolwich, in England, with British capital and material, and by British workmen. This, however, touches

a controversial matter of policy, and I prefer not to deal with it. There is, however, the fact that the Siemens system is being made at Woolwich by the same firm which is now making war material for the British Army. In the report to which I have referred I compared the systems in the following terms:—

SUMMARIZED.

Either of these three systems, the Strowger, as made by the Automatic Electric Company, Chicago; Siemens or Helmsky's, as modification of the Strowger; or the Western Electric Company's system; will perform all the functions requisite for a modern telephone system. The advantages and disadvantages of the three systems may be stated as follows, apart altogether from cost, on which point no general statement can be made, and as to which each case must be considered on its merits.

Strowger System.—
For—Extended and successful use in many places over about twelve years.
Against—Somehow rougher finish of parts; lower efficiency of step-by-step mechanisms and of trunking groups.

Siemens System.—
For—Use in several exchanges in Europe for a few years. Improved mechanical design and construction of details of apparatus.
Against—Suggested patent complications. Lower efficiency of step-by-step mechanisms and of trunking groups.

Western Electric Company's System.—
For—Greater efficiency in construction and design mechanically and electrically.
Against—Use up to the present restricted to a company associated with the manufacturer.

These are, briefly, the arguments for and against the three principal systems.

69. *To the Chairman.*—It is not quite correct to say that in the installation of automatic in Melbourne and elsewhere we have adhered to one particular firm. In the installations so far completed we have adhered to one particular firm in each network; but at Port Adelaide we are installing Siemens, while at Unley and Norwood we are installing the Western Electric Company's system in the same network, but separated by eight or nine miles. There is no technical difficulty in getting two different systems to work one with the other, although there is a little added complication. I do not think there is any combination between the three companies of which I have spoken, in regard to prices and conditions. There is, I think, a combination between the Chicago Company and its subordinate companies in Australia and Great Britain, but that is only natural. I am emphatically of opinion that in the end the automatic will supersede the old system in large networks. The automatic system is not economical in exchanges which are isolated, and which are below a certain size; an automatic exchange does not, as the Americans say, "prove in" economically until about 1,000 lines are installed. Below that number it does not pay as against the manual system; and I wish the Committee to remember that fact when they are considering the Geelong figures. The Geelong exchange is one of the worst from this point of view, and only just about warrants the adoption of the automatic. For this there are two reasons—first, that the exchange is so small, and, secondly, that it is isolated. In an exchange which is isolated there are only what are called subscribers' operators, and the cost of operating is confined exclusively to them. On the other hand, in each of the twenty-eight separate exchanges in Sydney there are operators who answer subscribers, and other operators who attend to junction lines. That is to say, the operating costs in Sydney are greater because of the num-

ber of exchanges in the network, and that is so in every large network. In Melbourne we have a large number of exchanges, and at each of them there are two groups of operators and the operators of junction lines, whereas at Geelong there were only subscribers' operators, and that is why we there can only make a saving of the subscribers' operators' salary. In Sydney we shall save the salaries of both subscribers' operators and junction operators. The cost will be reduced by the introduction of the automatic system. When I recommended the first group of exchanges in Sydney I estimated that under the full automatic system the working cost per line would be reduced approximately £1 per annum. I have seen no reason to change that opinion, though the figures may be altered owing to a variety of conditions. That brings me to one important suggestion I venture to submit. I propose to place before the Committee a copy of a statement based on the Geelong figures, and also estimates on two exchanges—hypothetical cases—one with 6,000 lines and another with 10,000 lines. I shall compare the 6,000-line automatic exchange with a manual exchange, and a 10,000-line automatic with the manual exchange, under conditions which are approximately those of Sydney and Melbourne. I could not get the estimates finished by to-day, and, therefore, I must produce them later. I do not say that I stake my reputation as head engineer that, by the installation of the automatic, the telephones will become a paying concern, but I say the costs will be reduced. Whether the rates are adequate, which, I take it, is not at present under discussion. You may take it from me, however, that if you install the automatic in Sydney and Melbourne, you will reduce the costs by £1 per line per annum, and bring the system that much nearer to paying. That estimate is made after making full allowance for interest and depreciation. I am only desirous to give the fullest details, and, therefore, I ask the Committee to consider the estimates to which I have referred, and go through them step by step, from one end to the other, in order to see whether they do not justify the recommendations made. The Committee may be disappointed with the facts, but my evidence is in accordance with facts. Geelong is a particularly disadvantageous case, and still it "proves in" the use of automatics. What I mean is that Geelong is the least favorable example of the use of automatics, and yet, even there, the system can be justified. Geelong was the first installation in Australia, and it has been in operation there for about three years. I have here a statement which I prepared on the actual experience at Geelong, and presented in July of this year. In order that it might be compared with the existing manual experiences, we took Bendigo and Dallarat exchanges, and compared their actual costs. We reduced these to a common figure, because the same number of lines are not connected at each exchange. The effect is that the annual cost per thousand lines for equipment, leaving out the lines because they are the same in each case, would be at Geelong, with automatic, £4,043; at Bendigo, manual, £4,636; and Dallarat, manual, £4,324. Therefore you see that even in circumstances less favorable to automatic, there is a distinct saving in annual costs; but, as I said before, that saving will be increased when you introduce the automatic into a large network like that of Sydney or Melbourne. As a profit and loss

account the comparison is of no value. The old system at Geelong was practically obsolete when it was abolished; but, in any case, at Bendigo and Dallarat we had to do the same thing. We had to take out the old board in each case, as there had to be new boards, just as at Geelong. In the comparison I refer to building, exchange equipment, subscribers' equipment, repairs and renewals, and operating and administration. There, I think, we were a little unduly handicapped at Geelong, because we included over a portion of the postmaster's salary, and he has very little to do in an automatic exchange. I did not anticipate a question as to the rates here compared with the rates in other parts of the world, and, therefore, I have no figures with me, but I shall prepare them and bring them on my next visit. As to the choice of a site for an exchange, I am the officer who recommends the area within which a site shall be obtained, but, after that, the Home Affairs Department does all the work in connection with the selection. At the time the Castlereagh-street site was selected, I did not know of any objection to it. So far as the location is concerned, I cannot see that it is a bad site. Everything depends on what we know as the telephone centre, and this site is approximately in the telephone centre of that portion of the city. There is no reason whatever why it should have a street frontage. The only difficulty I can see in connection with it is that there will be trouble in getting adequate drainage; but that is a matter for the Home Affairs Department, and not for us. The site would be valueless unless we are allowed to put wires down the alleyway; but in regard to this, you rely absolutely on the Home Affairs Department, which purchases the land, and should, therefore, see that there is proper access. It was known exactly what we wanted the land for—that we wanted access with the conduits. There will be about 100 employees in the building during the day. The fire risks are certainly greater than in a building on a street frontage, but I do not think they are unduly great. They are not nearly so great as those in the present exchange at the General Post Office. There have been two fires there to my knowledge.

60. *To Mr. Fenton.*—There is no direct access from the street to the proposed telephone exchange, though there is indirect access. In the Melbourne Exchange there are four or five times as many people.

61. *To the Chairman.*—The block at the back of the Post Office in Sydney was decided to be impracticable, not only by the Department of Home Affairs, but by the Postmaster-General's Department. On this point a report dated 3rd April, 1914, was as follows:—

Secretary.
On 2nd April, the Postmaster-General and the Secretary conferred with Colonel Owen, Director-General of Works; Mr. Scrivenor, of the Lands and Property Department of the Home Affairs; the Deputy Postmaster-General, Sydney; and the Chief Electrical Engineer, with regard to accommodation for Telephone Exchanges in the Sydney city area.

(2) The Chief Electrical Engineer explained that at the present rate of development there would be 30,000 lines connected within the city area in thirteen (13) years from this date. These 30,000 lines could be accommodated in a variety of ways, either by building additional switchboards in the existing General Post Office building, or in convenient sites elsewhere.

(3) The Director-General of Works explained that space could not be made available in the present General Post Office building for an additional exchange. He fur-

ther explained that land for the extension of the present General Post Office could not be obtained within the block bounded by Martin-place, King-street, George and Pitt-streets, excepting at excessive cost. He pointed out that during the last year or so the eastern portion of the block, which had previously been occupied by cheap build-ings, was now being built over by substantial six or seven story buildings—the only section not so built over being the western portion at the back of Messrs. John Bardsley and Company's premises. The dimensions of this piece of land are approximately 35 feet by 70 feet, and this would not provide sufficient accommodations for the immediate and prospective requirements, while the cost would be very high. This was confirmed by Mr. Scrivenor.

(4) It is further not essential that the consolidated Telephone Exchanges should be in the present General Post Office building. In fact, the present building is objectionable from several points of view—the chief among them being, first, that it is not a sufficiently fire-resistant building, and, secondly, the equipment, as designed to fit the existing building, instead of the building being designed to accommodate the equipment, as is essential for efficiency and economy. At the present time the telephone equipment is distributed over several disconnected rooms in a manner which does not tend to efficiency or economy.

(5) In view of the impracticability of obtaining within the General Post Office site, or within a block of buildings referred to, sufficient space for the accommodation of the ultimate telephone requirements without unduly encroaching on the Post Office requirements, consideration was next given to alternative locations for the telephone exchanges.

(6) Certain sites had been inspected by the Director-General of Works, Mr. Scrivenor, and the Chief Electrical Engineer, and these were mentioned in detail, and ultimately the matter after inspecting the sites, approved of detailed action being taken with a view to acquiring the site of Castlereagh-street.

This site will accommodate automatic exchanges up to an ultimate capacity of at least 20,000 lines, the intention being to proceed at once with a building to accommodate 10,000 lines—the building to be designed ultimately to accommodate 20,000 lines, when the time comes to transfer the lines already connected to the General Post Office to the exchange on site "A." This line will be on the expiration of the term of the existing switchboard in the General Post Office, about 1925 to 1926.

(7) The second step in the development will be to build an exchange on one of the sites marked "B" or "C" to accommodate the lines in the southern portion of the city. Details of these two sites were to be obtained by the officers of the Department of Home Affairs, the intention being to acquire one of them at once and to hold it in readiness so that on the exchange on site "A" being sufficiently filled, another exchange on site "B" or "C" could be erected to take the subscribers in the lower portion of the city.

(8) The steps in the development of the telephone exchange would, therefore, be as follows:—

First, at the earliest practicable moment, to erect a building on site "A," and install therein automatic equipment with a capacity of at least 10,000 lines, to meet immediate requirements. This equipment should be ready at the earliest possible moment, so that no more delay be incurred, and the sooner we begin to establish the subscribers need be connected to the present City Exchange, the sooner we shall get definite relief on the City Exchange. At the least, this exchange should be in operation for operation within eighteen (18) months.

(9) The next step which it is anticipated will be necessary in the course of the next six or eight years, depending upon developments in the meantime, will be to establish a similar exchange on site "B" or "C"—the principle being that this exchange should be established as soon as it found that there are sufficient subscribers to the south of the General Post Office to justify its establishment.

(10) The third step in this present scheme, and the last so far as the present proposal is concerned, will be when the life of the present equipment in the city and central area has expired, to transfer all the lines to equivalent accommodation to be erected on site "A." This work will be one of considerable magnitude, and, therefore, it will be necessary to provide for it well in advance by running branch cables from the tunnel through to the new switchboards of this work, however, can be left until a later period.

10 After seeing the sites, the Minister yesterday approved that full details should be obtained of sites "A," "B," "C," and "D," and a decision given as to the acquisition of two or three of these sites at the earliest possible moment, so that consequent action might be taken. It was understood that the officers of the Department of Home Affairs would take the necessary action immediately.

(11) Recommended to: continuation of the foregoing, (12) sending copy to Department of Home Affairs, asking them to expedite action accordingly.

(Signed) JOHN HENNING,
Chief Electrical Engineer.

2nd April, 1914.

The Wilmot-street site was the site eventually decided on as the second site. I have seen the site and buildings around the Castle-street and Castlereagh-street sites. Some of the buildings are pretty flimsy, but I do not think the risk is excessive. If a fire did take place, and the passage were blocked up, there would be more trouble than with a street frontage. As I understand, the land between the acquired site and stand, the land between the acquired site and Castlereagh-street is not necessary for post-office purposes, but that, of course, is out of my province, and I would not like what I say to be taken as such.

62. *To Mr. Laird Smith.*—I did not become Chief Electrical Engineer until five or six years after the Commonwealth took over the telephone systems, and, up to then, there was no technical control from the central office. As to whether, when I became Chief Electrical Engineer, I found the system throughout most obsolete, I know that you do not wish me to say anything which would be a reflection on my brother officers at that time. I should like to say, however, that the telephone industries were in a state of flux the whole time, and we were only doing what every one has done in the past. It is true that the States would not grant the engineers money to bring their systems up to a proper pitch, and the engineers were not to blame in the least. We introduced what are known as "development studies," and they show that in no case had we anything like sufficient accommodation to meet the existing rate of development. Up to the time the Commonwealth took over the telephones we had certainly been starved, but for several years after they were taken over we were starved even worse than before. We were starved as regards funds to meet the growth, and that growth was accentuated, first of all, by reducing the rates, and, secondly, by extending the mileage of lines provided at the fixed rate. At one time they get only a mile of line for the ground rent, and then it was increased to 2 miles. Then, it will be remembered, there was introduced the 25 rate, with 2,000 free calls, which brought in a great many additional subscribers.

What with shortage of money and increase of work I really do not know how we got through the difficulty. The installation of the common battery system, and subsequently of the automatic system, was not for the purpose of experiment, but simply to bring the service up to date. We did not scrap any valuable up-to-date boards in doing that, every board that was replaced was an obsolete one, which ought to have been replaced long before. I would not propose, either in Melbourne or Sydney, to replace city exchanges which have common battery switchboards. I would not replace a simple manual common battery board with the automatic system at the present time.

In my report I say that the common battery switchboard has to run its life before it is replaced. The boards I propose to replace are either worn out or obsolete—are inefficient and uneconomical. Malvern shows the conditions

under which we work with absolute apparatus, and there we have no capacity for more than an additional 60 lines. You may take it from me that in New York they have replaced the entire system three times in sixteen years in order to meet the growth and development of the telephone art. In 1912, in New York and San Francisco, I saw boards which had been reconstructed in the preceding eight years, and which in 1904 were new boards. I saw other boards being reconstructed which had been put in in the interim, although not one was more than eight years old. We have not gone so far in Australia in this regard as private companies would go, because a private company would scrap all the old exchanges in Sydney. It is approximately correct to say that in Chicago the telephone companies charge £15 for what we pay £6 here. When the Commonwealth took charge there was not in Sydney, for example, one metallic circuit. In this regard, according to the Fourth Annual Report of the Postmaster-General, not only have we approximately quadrupled the lines connected, but in the metropolitan area, by the end of 1914, 99 per cent. of them were on the metallic circuit. In Victoria the proportion was 44 per cent., because the reconstruction was only partly carried out; in Queensland it was 100 per cent.; in South Australia, 97 per cent.; in Western Australia, 93 per cent.; and in Tasmania, 99 per cent. That work was charged against revenue, and it is a fact that we so charge all new works, and hence the mutual expenditure appears higher than it should.

We design all our circuits for at least twelve years ahead. Where there are under 1,000 subscribers I would not recommend the introduction of an automatic switchboard unless in an area like Melbourne or Sydney, where it might be justifiable to introduce a small exchange as part of a large network. Undoubtedly it is economical to have more than one exchange in a large city, and the decision to introduce more is based on the "development studies" to which I have referred. May I just throw a little sidelight on the opening of new exchanges? I have here a map of Melbourne showing the result of the latest telephone survey, which, I may say, is neither more nor less than organized guess-work. A man is sent round every block of buildings in the whole of the area shown, and he is told to ascertain the rental of every building in the block. He knows that in the case of buildings with rentals ranging from 25s. to 30s. a week, over so many of the residents in the area have telephones, and he must assume that, as time goes on, everybody else living in a house at 30s. a week will have a telephone. It is a very fair assumption, and on this, checked by the rate of growth of population, the increase in the number of houses, and the actual growth of telephone lines, we make an estimate of the number of telephones required from year to year. For instance, in the city area with at present 4,797 telephones, we estimate that in five years there will be 13,000, and in fifteen years some 25,000. Collingwood, North Melbourne, and South Melbourne are at present served from the central, and if we are to continue to serve them we must be prepared to serve 41,000 lines in one building, and to lay long and expensive cables to those areas. If we put an automatic, or a semi-automatic, exchange in Collingwood, we shall serve all the lines coming into the central, and so with other suburbs. In all other areas we have made similar estimates. Malvern was esti-

mated in fifteen years to be to 8,216 lines. All that was done before the war, and the war is the thing which has saved us as regards telephone development. We could not have carried on if the rate of progress had continued as it was before the war. In the Melbourne area we were growing at the rate of 16 per cent. per annum, whereas now we are growing at the rate of 5 or 6 per cent. per annum. In some exchanges we have actually stood still, and in Perth have gone back one or two lines. In Sydney the rate of growth has dropped from 10 per cent. to about 5 or 6 per cent. The way to relieve the central is to open branches in North Melbourne, South Melbourne, and Collingwood, with automatic equipment. With an automatic exchange it is in some cases cheaper to have a few small exchanges rather than one large one. As to the number of junction wires, everything depends on the traffic between the exchanges. I have here the actual traffic records of Sydney and Melbourne for 24th August, a Tuesday. The Malvern Exchange at that time had 2,342 lines connected, each of which made 4.29 calls a day. Of these calls 95 per cent. could not be completed locally by the girl who answered them, and had to be transferred to some other place, owing to the fact that at Malvern there is an obsolete board. At Hawthorn there is a multiple board with 2,060 lines, with 4.88 calls, 63 per cent. of which had to go to Canterbury, Malvern, Central, or Windsor. Hawthorn can work direct to Malvern, Windsor, Central, or Canterbury, and, I think, some other places, but the main traffic will go to those named. The great cost in the manual system is owing to junction lines between exchanges. This is where I very much fear you may possibly be tempted to form erroneous conclusions from the figures laid before Parliament with regard to the Sydney and other exchanges now before you. The estimates were not intended to be the basis of a profit and loss account, and did not include junction lines and other things which, in such an account, would be included. I cannot see, however, how we can include them.

63. To Mr. Sampson.—As to the proportion of junction lines to the total number of subscribers, we used to work on a rough-and-ready method, taking it that there must be 10 per cent. at least. Now, however, we reckon the traffic to be passed over junction lines in the busy hours at one-eighth of the traffic of the whole day. This varies with exchanges, some having their busy hour between 11 o'clock and 12, or between 10 and 11, while at some residential exchanges it is between 8 and 7 at night. The great complexity of this matter makes me venture to say that we have a mass of information on the subject, and I scarcely know how to present it to you. We are only too anxious, however, to let you know the whole situation. It is the first time any of our estimates have been under review, and we wish the fullest information to be given.

64. To Mr. Laird Smith.—In protecting the automatic system from high potential current outside, we experience no more difficulty than with an ordinary battery apparatus. We had one case where a private branch exchange gave us trouble, but that was exceptional. This might do less damage, on an automatic than on a common battery, because there would be no question of life involved. It would do no more harm to the apparatus than in the case of a manual board. The pressure of 40 volts is for the purpose of

working the magnets in connexion with the automatic, but also to give a more economical speech transmission. I may say that the same voltage is used at Hawthorn on a common battery manual exchange. It is not more costly to provide current for the automatic than for the common battery—to provide the power plant—but the consumption per line per annum may be more, though not worth mentioning in the total savings. It is perfectly possible with the automatic system for one subscriber to tie up the line of another, but we could easily introduce devices to tell us when such a thing is being done. The automatic system may be releasable by the calling subscriber or by the called subscriber, whatever we may decide upon. The usual practice is that the line is held until the caller hangs up, and the reason is that a man who is called has frequently to go for information, and forgetting that he is using an automatic, hangs the receiver on the hook. The consensus of opinion and experience is that it would not be wise to change the present method, because we can check any such abuse as that referred to. It might happen once, but we could check it. The same sort of thing was done with the manual system, though the operator noted that at once. I find that our mechanics readily grasp the working of the automatic system. From a mechanical point of view, the cost of maintenance and supervision is slightly more in the case of the automatic, and I shall show the expense in the estimates I shall present later on. We could do as good work here as is done anywhere else in the world if we were allowed to, but we have difficulties which are not experienced elsewhere. Sydney is a difficult place to telephone, and we have to do much of the work there and in Melbourne in a temporary way. We shall eventually have to scrap it, and thus increase our costs. But the Australian engineer and the workmen are quite equal to the demands of any telephone system. I should not like it to be said that the system in Melbourne is as bad as some of the systems I saw in London, but the London systems have been wonderfully improved. A fire in an exchange would be the greatest calamity that could happen. If the land in Castlereagh-street, in front of the site of the proposed exchange, could be acquired, without charging it to our Department, it would undoubtedly be a vast improvement on the present position. It would minimize the danger of fire. I should not like to be asked what we would do in order to supply machinery if a fire were to destroy that in an exchange—I should not like to be asked such a question until the thing happened. We have no reserve plant, whereas the American companies keep an emergency plant at a place from which it can be moved to any part of the country. Our exchanges are not insured, but that is according to the policy of the Government. It is decidedly not so in the case of the manual board, that the bigger the system installed the cheaper it is to install; but with the automatic system, within certain limits, it is cheaper. It depends on whether you have all the subscribers connected with one exchange, with long feeding cables, or whether you have them in a variety of exchanges, and so reduce your cable costs. In a properly-designed system you can, with the automatic plant, grow without perceptibly increasing the cost per line; but with a manual system you cannot. The physical dimensions of an operator largely control the design of a manually-operated board, but that does not apply to the automatic board. We can get an automatic installation into a smaller space than a common battery. That, however, is not

because of the operators' rental, but because of the fact that the apparatus necessary to complete the calls by the automatic system, occupies less space than the corresponding apparatus on a manual board. I shall, however, give further information on that point when I submit the estimates. There was a report made by Mr. G. Howson on the Geelong automatic service. The Minister had been told that there was some dissatisfaction amongst some of the subscribers in Geelong, and being rather anxious, we sent Mr. Howson to investigate. I also visited Geelong, and confirmed all that Mr. Howson said. The report states that out of twenty-six business men who were interviewed, only two had made any complaint—that the majority would not revert to the other system under any circumstances—and I am satisfied from that report, and as the result of my own observations in Geelong, that the system there is working well.

65. To Senator Keating.—The development in telephone work has been remarkably rapid in recent years, and this is one of our difficulties, inasmuch as it necessitates a larger expenditure. I do not think that the present design of the automatic apparatus will be the last word in telephone construction, but my view is that automatic telephony may last some time. Even in my short experience of automatic telephony I have seen four or five different developments of the system—there is constant development. I have had a limited experience of wireless telephony, inasmuch as I have met the leading inventors and discussed the problems with them, and have seen their work up to a certain date; and, of course, I have kept myself in touch with the subject by reading. I may say at once that I am conversant of no system by which 40,000 people within the Melbourne area could be supplied with a wireless plant to intercommunicate as efficiently or as economically as with wires. I can, however, conceive of trans-marine wireless telephony, as, for instance, between Victoria and Tasmania. The idea of utilizing wireless telephony between subscribers in the metropolitan areas of Melbourne and Sydney has only to be mentioned to be dismissed as impracticable at present; and, so far as we can see—although, of course, every scientific man tries to keep an open mind—for many generations. The use of it is suggested for long-distance telephones, especially over distances where it is impracticable to have posts or wires, such as over water. I may say that the longest telephone line in the world has been opened from New York to San Francisco, and is working successfully with repeaters, which until recently were unknown; and the very company that operates that distance by wires owns the patents by which wireless telephony can be carried on over long water distances. It is only reasonable to suppose that that company would have used wireless if they could have done so, and so saved expense. We have no repeaters in Australia, but we have long trunk lines—Melbourne to Sydney, and Sydney to Adelaide; and, if there be one taken from Sydney to Brisbane, as is now proposed, it is possible that Brisbane may wish to speak to Adelaide, and we must be prepared for repeaters. The expenditure that has been necessitated by the extraordinary development in telephony has been habituated to the years in which it is incurred; and the expenditure is extraordinary, because it is occasioned by extraordinary circumstances. Wherever we put down conduits it is for twelve years, and our

cables are down for five years; and, therefore, when we have once laid the conduits and cables in any area, the expense of connecting the subscriber is reduced to a minimum. My view is that it is not fair under the circumstances to compare the revenue of the year with the expenditure of that particular year on such works, but that is a matter of policy. So long as parliamentary votes are paid out of revenue instead of loans, it is inevitable that the comparison shall be made. I do not think it is quite the case that the telephone system is judged from that point of view since a system of profit and loss accounts has been introduced. If you look at the Chief Accountant's figures you will see that he makes all allowance for this expenditure as capital expenditure, and not maintenance. It is not directly debited against revenue in his statement, however it may appear in the parliamentary figures, which, in this respect, are misleading. If a profit and loss account capital expenditure is kept distinctly separate, but, even so, there is a danger that a large expenditure on reconstruction may appear in one year. The profit and loss account to which I have referred may be found in the Postmaster-General's Annual Report. It first appeared in his Third Annual Report, and it also appeared in the fourth, giving figures to the 30th June, 1914. It shows the whole of the capital expenditure and working costs compared with the revenue of each of the States. The fifth Annual Report of the Postmaster-General is now in hand. The debiting to a single year what is really capital cost has contributed to a good deal of misunderstanding. The public has taken hold of the bald fact that the revenue does not equal the expenditure in any particular year, omitting to take into account the fact that the expenditure includes exceptional expenditure, and, further, that the revenue is on a system of charges that is indefensible. This I know is a debatable matter, but I have expressed my opinion. There is no doubt, however, as to the first ground. When I speak of the Geelong exchange as an "isolated" one, I mean that all the subscribers are connected with the one exchange. The metropolitan exchange gets calls from Geelong, but they are trunk line calls, and have to pass through the trunk line operators. A Geelong subscriber, for instance, can call up the trunk line operator and get connexion with Melbourne; and I think that such calls should be encouraged, as they are. The Geelong subscribers are not shown in the Metropolitan telephone book, but a number is really not required, for it is the duty of the trunk line operator to give it to the person calling. The reason for this is a very practical one, namely, that the Government Printer could not staple a book big enough. The previous issue of the metropolitan telephone book contained Geelong and Ballarat, but it was then that the Government Printer pointed out this difficulty. On 1st January, 1914, there were 1,025 subscribers on the Geelong exchange, and now, I suppose, there are 1,100 or 1,200. This exchange, as I have said, is under conditions not financially favorable to the automatic system.

60. *To Mr. Finlayson.*—The new exchange in Sydney was estimated to provide for 30,000 subscribers but that is not the utmost capacity, because, with another floor, it could carry another 10,000. I estimate that each of the areas in Sydney—north, central, and south—has to provide for approximately 10,000. All the subscribers in this area are at present accommodated at the General Post Office

There are at present 8,587 lines connected, and I estimate that in fifteen years these will number 30,000. Our experience is that we must multiply by four, at least, for fifteen years' growth. We do not propose to transfer the subscribers in Sydney to the automatic system until the exchange in present use has lived its life. I do not propose to take any of the subscribers off the present board, but to let the new exchanges simply meet the growth, leaving the other exchanges until they are worn out. Then we may have to transfer 11,000 subscribers in a batch. In the meantime we have enough to do to meet the growth. I take it that the complete transfer will take place about 1927. It may be necessary to take a few subscribers from one exchange and connect them with another, but there is no intention to transfer the subscribers *homo hominibus*. With the manual system the cost increases with the number of exchanges, but that does not apply to the automatic system, or, at any rate, not nearly to so great an extent. In the latter case the increase is very slight, and in some cases there may even be a reduction. Generally speaking, the cost per line beyond a certain number is fairly constant, and that, undoubtedly, is one of the advantages of the automatic system. I anticipate that the proposed new telephone exchange will be sufficient for all requirements for the northern portion of the city area in fifteen years, and there may be included other exchanges in other parts of the city to meet the altered demands of the traffic. We have acquired a site for this purpose in Wilmot-street, in the southern portion of the city. There is no special technical advantage in the Castlereagh-street site beyond the fact that it is within the telephone area which economic conditions require. Anywhere in that block would have done for us—I mean the block bounded by Castlereagh-street, Pitt-street, Moore-street, and Hunter-street. If we move anywhere from that centre we have to proportionately lengthen every subscriber's line. The only disadvantage of a more open site, perhaps at a slightly increased distance, would be the cost of lengthening the subscriber's lines. I understand that the officers of the Department of Home Affairs inspected several sites, and I inspected five within the area, and know no site in the area which would be more suitable. It must be remembered, however, that the question of site is not one that we have primarily to deal with. If a site will meet our requirements, then the Department of Home Affairs looks after all the rest of the business. The danger of an external fire in the case of an exchange is considerably less than the danger of an internal fire, though, of course, there is a risk. An internal fire is caused electrically; the cables and apparatus are attacked by an electric current, and that causes and contributes to the fire. In the case of an external fire, the outside of the building may be scorched, but the apparatus is not touched; and we had such a case in Adelaide, where our building was next door to a timber yard which took fire. Although that building in Adelaide had a street frontage the risk from fire was four times that of the Castlereagh-street site. If the Superintendent of the Fire Brigade, Sydney, says that the Castlereagh-street site is objectionable on account of its inaccessibility, and of the fire risks, I naturally take an expert's view before my own. I have, however, been a member of a Fire Board for some time, and have had to consider the general question of risks to Commonwealth buildings. The fire risk does not govern everything; you can buy immunity from fire at too big a cost. We must

take ordinary commercial risks. The risks to life in the case of the Castlereagh-street site are not so great as the risks to life in other exchanges. Look, for instance, at the case of the Perth exchange. I do not say that two wrongs ever made a right, but we must take ordinary commercial risks. In nine out of every ten exchanges in the Commonwealth, the fire risks are, at least, equal to those of the suggested site in Castlereagh-street. I do not know that this proves that we have been careless in selecting sites, because we have only done what ordinary commercial practice and experience have proved to be justifiable. We are all prepared to take the risk of a brick falling on our head every time we walk down the street. How many buildings in the city area have been set on fire from the outside?

61. *To the Chairman.*—I know there have been big fires of the kind in Sydney, as at Moore-street, but the class of building has very much altered generally since then. I know that the buildings at the back of the proposed site are somewhat of a rabbit warren, but reconstruction is going on.

62. *To Mr. Finlayson.*—The only means of access at present is a right-of-way, 30 feet wide and about 150 feet long, and that would not be satisfactory as a means of exit in the case of a manually operated exchange. That is no reason, however, why it should not be quite safe for an automatic exchange, in view of the difference in the number of operators. There will be, I understand, 164 persons employed in the building, and they will be in offices and workshops. It would certainly be an advantage to have an alternative exit, but I do not see that the present conditions bar the site from consideration. I do not say that the site is ideal, but if I were engineer to a company I should advise the board of directors to take it.

(Taken at Melbourne.)

TUESDAY, 12th OCTOBER, 1915.

Present:

Mr. RITLEY, Chairman;

Senator Keating,	Mr. Gregory,
Senator Story,	Mr. Sampson,
Mr. Feuton,	Mr. Laird Smith,
Mr. Finlayson,	

John Heskeith, Chief Electrical Engineer, Postmaster-General's Department, re-called, and further examined.

63. *To Senator Story.*—We have additional technical equipment for two different systems on order for South Australia, but not yet working. This may lead to some complication, but it will be very slight. The reason for adopting two different systems in respect of the one State is mainly one of cost, but efficiency has also had a considerable bearing on the point. We invite public tenders in the manner prescribed by the Audit Act on a specification of our traffic requirements, and we allow the manufacturers to state how their apparatus will best meet our needs. We cannot specify details of apparatus, but we can specify requirements. In the South Australian case, tenders were called on two different specifications, and manufacturers had an opportunity of tendering in both cases on an equal footing. The desire to have under observation at least one example of each of the principal systems was another con-

sideration slightly governing our action in ordering the two different systems for South Australia. There is no reason why we should tie ourselves up to an individual system or manufacturer. It would mean as you suggest, a difference in cost if we were able to invite tenders for three installations instead of for one in any one State. That is what we have done in New South Wales. The first set of installations in respect of which tenders were invited were those for Glebe, Balmain, and Newtown. The next set was for seven installations, and the third group, which has been deferred, was, I think, speaking from memory, one of seven or eight installations. The chief reason for ordering the two different systems for South Australia was not that we should have an opportunity to have the two under observation but rather the advantage in cost and in efficiency. There is also the incidental advantage of our not being tied to one system. The difference in cost, I think, was sufficient to justify our action. There is a considerable difference in the number of subscribers to be served in the two districts to which these orders relate, but we do not compare the two tenders on the basis of two different districts; both relate to the same job, and are based on the same conditions. We notified our requirements to the companies, and they all tendered. My recollection is that three tenders were received for the installation at Enfield and Norwood, and three for Port Adelaide. It is the practice of the Department to invite public tenders, and to consider them all on the same basis. We have found this a considerable advantage. For instance, in the case of common-battery switchboards, until a certain date a certain company was quoting figures which we considered to be too high. We, therefore, invited fresh tenders, and, as the result of the competition, prices were reduced very considerably. Our figures relating to the increase of subscribers show an approximate increase of 15 per cent. per annum. I see no reason why that rate of increase should not have continued during the next fifteen years if the war had not intervened. In America, for instance, the annual rate of increase in some cases has been as high as 20 per cent. We are working on the basis of a 15 per cent. increase, which has been our experience for over three years. In America a telephone district is not supposed to be properly served unless at least one-tenth of the population of that district is connected with the telephone exchange. Melbourne, with a population of 600,000, on that basis, should have 60,000 telephones. That is the lowest limit in America. In Victoria, for 1913, the percentage of instruments to population was under three. On the 30th June, 1914, there were 30,000 telephones in the metropolitan area of Melbourne. That would not represent 5 per cent. of the population, so that the proportion is much lower than in America. The charges here for telephones are much less than in the larger cities of the United States, but there are cases where the charges in America are low. I purpose submitting a return showing the latest figures that I have obtained regarding the use of the telephones in America, and making a comparison with Australian conditions.

64. *To Mr. Feuton.*—In every case where it is proposed to erect a telephone exchange we contrast the price of a site at or near the telephone centre of the area to be served with the price of a site outside of, or a little removed from, the centre of the area. We take into account the price per foot by which we should have to increase each subscriber's line if the

be taken on both sides; we should decrease the cost by the introduction of automatic and by every other possible economy, and increase the revenue by some adjustment of rates. I have not at hand the figures relating to the number of ineffective calls, but we have kept very careful records. We have a common-battery board at Fremantle, and we kept a careful record of the number of calls between Fremantle and Perth which were effective on the first try, the second try, and the third try, as well as the number that were ineffective. The number of effective calls is certainly not lower than that of any good manual practice. There were great many complaints, and justifiable complaints, in Perth on the introduction of the automatic system there. I was in Perth in September last, and a more distressing cut-over I have never seen. It showed at once that in certain directions additional apparatus must be provided, and certain other work had to be done. That work was completed about March last. I went over again to see the new apparatus put into use, and was very pleased to note the improved results. The improvement was so marked that the Chamber of Commerce, at its next meeting, practically congratulated the Department upon it, while even the *Sunday Times* asked, "Where are the growers?" The condition at the outset was certainly lamentable, and I am glad that the newspapers can see that we have done something to bring about an improvement. In Geelong we had practically no complaints. We had one or two at the inception of the new system in Sydney, but by far the majority of subscribers are in favour of it. Being a new system, complaints relating to it are inevitable. It is possible for a caller to tie up a connexion, and so to prevent the called subscriber from using his telephone, but where it is once done we can check and correct it. It is true that we employ "listeners." We cannot avoid it if we are going to maintain the system. I should like to give you one illustration of the necessity for employing listeners. A certain subscriber said that our charges for his calls were wrong; that he had kept a careful record of every time he had used his telephone, and that our record was altogether erroneous. He agreed with us that he would keep a record for a fortnight, and that we should do the same. We did not tell the operators of this, but we kept some one listening on that line. Every time it was used the person using it called up not only the girl at the switchboard, but a man at an observation desk. As the result of this fortnight's observation, we found that several people were making unauthorized use of the telephone. We justified our charges, and proved that the subscriber's contention was wrong. We must have these methods of checking. The Department did not strongly oppose a proposal to install at the subscriber's end a self-registering meter which was invented here. We did not oppose the principle, although we may have said that the means by which it was proposed to be carried out were not suitable. That is not a distinction without a difference. The Department has recently approved of conditions for the installation of automatic registration at Ballarat. It has also ordered machines which require the registration of calls by subscribers before they can call the exchange. The sole point at issue is merely one as to the means by which these things are to be done. I remember our invention which was submitted to the Department, and a certain very ineffective piece of mechanism I have seldom

seen. Even the basis of the principle was bad. I have no objection to the introduction of self-registering meters at the subscriber's end of the wires; in fact, I have recommended the purchase of such meters. We must employ listeners, not merely to deal with cases of the kind I referred to a few minutes ago, but to make observations with the object of finding out the class of errors to which subscribers are most prone. That can be ascertained only by an observation service. This observation service is practical all over the world. It is fundamental to, and lies at the root of, the success of the system. If you remove it you will remove one of the most powerful agents for checking and improving our system. Coming to the report which I furnished on the 14th August last with regard to the proposed Sydney metropolitan exchange, I should like to clear the ground at once by saying that it cannot be taken as a basis for a profit and loss account. In preparing it we endeavoured, as nearly as possible, to give the information required by the Act. We give nothing that would justify us in putting before you a hypothetical profit and loss account, even if one could be manufactured. This is the first occasion that we have appeared before the Committee with any of our estimates, and in preparing this report we did not know exactly the kind of information you desired to obtain. If the Committee required a profit and loss account, we should have to take into consideration a great deal more than is included in that report. The figures given in it, for instance, do not include administrative charges. I have not taken into account any proportion of the cost of the existing system which is chargeable to the exchange, nor have I taken into account any of the cost of the accountants' staff in Sydney, which it would be necessary to show in a profit and loss account. Neither have I given any figures in regard to the stores administration, or interest and depreciation on stores buildings. I have not taken into account the cost of general engineering supervision; there is no provision for junction lines or spare lines, and no provision for spare cables. The figures furnished in the report, therefore, could not possibly form the basis of a profit and loss estimate. If such an estimate is required, I shall be glad to submit one. If we had thought for one moment that the figures in that report would be considered by the Committee without the officers of our Department having an opportunity to explain them to you, they would not have been presented in the form given. They constitute merely a statement of answers to the questions put, as far as we can interpret them, under the Act. I do not know that the inevitable conclusion to be drawn from the figures given in the report is that if the automatic system were introduced throughout the service a profit would be assured. On the 24th August last we had 26,286 subscribers' lines connected with the manually-operated exchanges of Sydney, or, including those connected with the automatic system, some 30,000. On the 30th June, 1914, the total working expenses for the New South Wales metropolitan area, not including administration charges or provision for depreciation or interest, were £248,552, and the revenue £247,452, showing a deficit of £1,101 on the year, so that the service is practically only paying working expenses without allowing for administrative charges. In my report relating to the Sydney metropolitan exchange, I show that the estimated capital cost for the installation of an automatic system in respect of an exchange of

20,000 lines is £337,490. The Committee must remember the circumstances under which my report in regard to the Sydney metropolitan exchange was prepared. It was asked for under an Act of Parliament, which gives no opportunity to present a profit and loss account, even if such a statement were possible. We did not attempt to prepare such a statement, because we know that we were to appear before the Committee. I repeat that you cannot take that report as a basis for a profit and loss account. I agree with you that the manual system would not give anything like so good a showing as the automatic system in respect of the margin of profit. I propose presenting the Committee with a return showing the difference between the automatic and the manual systems in respect of exchanges of 5,000 and 10,000 subscribers. My report was intended to be merely a bare compliance with the requirements of the Act, and I do not think it could possibly mislead the Committee. Mr. Nelson's report, giving the comparative costs and maintenance for the Sydney city common-battery switchboard and a similar-sized switchboard of automatic equipment, shows an estimated saving of £16,000 in salaries and ordinary administrative and other charges, but it allows nothing for administration generally. All these figures tend to the impression that with these automatic installations there will be a big reduction in cost. I said yesterday that they would probably mean a reduction at the rate of £1 per annum per line. That would be a very big reduction. Some subscribers have three lines, and we therefore speak of this reduction as so much per line.

73. *To the Chairman.*—That would be a saving to the Department and not to the subscriber. There can be no question, I think, as to the ultimate economy of the automatic system to at least that extent. The basis of my recommendation in respect of the Sydney exchange was that we should save at the rate of £1 per line per annum by the time that we had 40,000 lines working on the automatic system. That would mean a saving of £40,000 a year.

74. *To Mr. Gregory.*—That estimated reduction includes provision for interest, depreciation, and every other charge. I do not think the Committee should be at all dubious as to the wisdom of this large expenditure. Indeed, I do not think it will be after I have supplied it with my report; but it would not be fair to enter upon a lengthy discussion of this phase of the subject on the report. I have already furnished regarding the Sydney metropolitan exchange, and taking that report as being equal to a statement of profit and loss.

75. *To the Chairman.*—I am aware of a case in the United States in which automatic boards were discarded and manual boards used in their place. This occurred in San Francisco while I was there, and it is the only case of which I know. San Francisco had in operation two systems on both sides of the harbor. The larger system was that of the Bell Company, working by common battery. I forgot the exact number of lines connected with it, but I think that there were 200,000 or 200,000. I can supply you with the exact figures. Side by side with that company's system there were working a comparatively small set of automatic exchanges feeding the same area in competition with the Bell Company. The Bell Company bought out the automatic company, at what I have heard was a fairly well suggested figure, and it had then to decide which of the two

systems it should continue to operate. If it had continued to operate the automatic system it would have had to scrap an immense amount of capital—an amount far in excess of what they eventually dealt with by scrapping the automatic. Farther than that, the Western Electric Company have already developed their own automatic system, and, therefore, if they are going eventually to install any automatic in San Francisco, I take it that they will put in their own system. The Bell interests cover America, and the Western Electric Company, working in conjunction with the Bell Company—is the manufacturing company for the whole of the Bell interests—has developed a first-class automatic system. They prefer to use it as a semi-automatic system. The other side of the picture is that, while they are taking out the automatic system in San Francisco, they are putting in the Western Electric Company's automatic system in New York. This is being done by the same group of companies.

76. *To Mr. Finlayson.*—It was a mere matter of financial policy with them.

77. *To the Chairman.*—I have some recent figures from New York, and shall present the Committee with a return comparing the American charges with those made in Australia.

Gilbert Grange Haldane, Chief Accountant of the Postmaster-General's Department, sworn and examined.

78. *To the Chairman.*—In some respects it is impossible to completely separate the accounts of the telephone service from all other branches of the Department. We have, for instance, in some cases telephone and telegraphic traffic carried over the same lines, and it is impossible to determine what portion of the repairs to such a line is chargeable to the telephone and what proportion is chargeable to the telegraph service. We have, therefore, to arrive at a method of division. Sydney is a network containing 29 different exchanges. It has been found impracticable to clearly separate the cost of working individual switchboards in that network. Under a new system of accounts, which has been in operation for two years, we have dealt with each network as a whole. The Sydney network is, therefore, treated as one unit. There are many difficulties in the way of separating the cost of working each different exchange in a network comprising a number of exchanges. In our published statement of accounts we show separate accounts for the Geelong exchange, where the automatic system has been installed, and the returns for that exchange can be compared with those for Ballarat and Bendigo. The figures are slightly in favour of Geelong when you bring them down to a common basis. I cannot give you a comparison of the working of the automatic and manual switchboard exchanges in Sydney, because the automatic system has only been running there for about twelve months. We find that the early costs in connexion with an automatic exchange are very much higher than when the new system has settled down into proper working order, so that you would be misled if you attempted to base any decision on the results of the working of automatic exchanges for the first few months. For the year ending 30th June, 1913, the Geelong exchange showed operating expenses £206, and repairs and renewals to equipment £5,267. In the following year it showed operating expenses £401, while repairs and re-

news for equipment amounted to only £3,583. Thus, if you had taken the figures for the first twelve months of the new installation there, you would have been entirely misled as to its merits. The same remark will apply to all the exchanges where the new installation has been made. A special investigation would be necessary to arrive at a result as to the Newtown, Mosman, and other Sydney suburban exchanges where the automatic system has been introduced. The costs are over and over again exaggerated. There are overhead charges, but those I have enumerated are the main ones. We have a system of accounts which we apply to our Department throughout the Commonwealth. When we desire to get at the wages cost of any work, we have to rely upon the workmen themselves. It would not be practicable to have an overseer to insure that every workman looked the time occupied by him on each job. We have, therefore, to trust to the workmen to properly allocate to the different jobs or work orders the time occupied by them. There is some risk attached to this, and if you were to make a special investigation by expert officers, you would be more likely to obtain results upon which you could depend. Mr. Hesketh's time results will probably give you a more accurate knowledge of the actual position than you could obtain from the workmen's analysis day by day and month by month. The workmen are provided with time-sheets. In dealing with a specific matter like that now before you, I should prefer to base my opinions on a special investigation, such as Mr. Hesketh proposes, than on figures taken out in the ordinary routine way. The Accountancy Branch desired the engineers in Sydney nearly twelve months ago to supply statements showing what each board cost; but there were so many difficulties in the way that that could not be done. It is essential, however, that these costs should be ascertained, and instructions to that effect have been drafted in my branch. The officers are directed to try to give us these figures.

79. To Mr. Gregory.—We have taken out the figures for the metropolitan network in what we call a working account, which includes all expenditure, exclusive of administrative charges, interest, and depreciation, and it shows that in respect of the actual direct expenditures in Sydney 30th June, 1914 To ascertain the actual deficit, however, it would be necessary to add to our figures those in respect of administration charges, interest, and depreciation. I could provide such figures, but so far Parliament has not asked for them. In preparing our profits and loss account we have clearly separated working expenses and capital expenditure. As I have said, there was a loss of £1,101, exclusive of administrative charges, interest, and depreciation, in the Sydney metropolitan area, whereas Melbourne for the same period showed a surplus of £51,000, Brisbane a surplus of £14,555, Adelaide £30,380, Perth £10,691, and Hobart £5,150, excluding administrative charges, interest, and depreciation in each case, or an aggregate surplus of £111,000 in respect of these metropolitan networks.

80. To Mr. Fenton.—The deficit in respect of the Sydney metropolitan network is due to various causes, amongst which are the geographical position of the city, the fact that the area is a sea-level one, and that heavy winds are experienced. There was also an element of mismanagement. During the period to which these figures refer,

matters were not being handled very satisfactorily in Sydney. I shall not say that even now they are altogether satisfactory, but in the operating branch during the period in question they were particularly bad. Mr. Hesketh, Mr. Woodrow, and I were appointed as a special committee to look into the telephone work up there, and we found that the operating branch was in a chaotic condition. The position was so bad that the then telephone manager had to go out. He is now postmaster at Albany. Mr. Duthor, who has succeeded him, told me last week, when I was in Sydney, that since our inspection was made a reduction of 350 had been made in the number of telephone hands there.

81. To the Chairman.—The introduction of the automatic system would account for a proportion of the reduction. It accounts, as a matter of fact, for 173. That still leaves a big balance. The telephone branch was under the control of the Deputy Postmaster-General, but he knew nothing about it.

82. To Senator Keating.—All the Sydney suburban exchanges are under the control of the Deputy Postmaster-General. We found that telephonists were appointed to exchanges when there were no positions which they could fill. It seemed to be thought that the one solution of all the difficulties of the service there was to appoint additional hands. We found that the telephonists were so numerous that they were only getting in each other's way and talking to each other. I do not know why the Deputy Postmaster-General could not make this discovery.

83. To Mr. Laird Smith.—The engineering difficulties in Sydney are much greater than in other metropolitan areas. The calling rate is very much higher in the city portion of the Sydney network, and more revenue is earned there than in the other portions of the network, while that a shorter length of line is required, because a larger number of people live within a given area. The city portion of the network would probably show a better result than does the network as a whole. It is in connexion with outside exchanges, such as Chatswood, Waverley, Mosman, Manly, and Liverpool, that the cost runs up.

84. To Mr. Gregory.—I think that the cost of working the automatic system will be lower than that of the manual system. I base that opinion on our experience of the working of the Exchange and the special figures which the Department have prepared. Our branch of the Department will follow up this phase of the question. Mr. Hesketh is just as anxious as I am to ascertain the true position, but there are engineering difficulties to be overcome before we can get at it. We have directed that the cost of each switch-board shall be recorded. The engineers state that there will be great difficulty in doing this, but we hope to obtain the figures. It is of great importance that we should ascertain what is the financial effect of the introduction of the automatic system before it is launched as a big general policy. The evidence before us is that the automatic system is undoubtedly cheaper than the manual board system, after making provision for interest and depreciation, and also that it is efficient. The accounts for the first year's working of the Perth automatic system would have been very valuable, because of the large amount of work that was necessary to overcome certain troubles that arose there at the outset.

85. To Mr. Sampson.—In the report of the Postal Department particulars are given of the revenue and expenditure of every post-office. In our last report we have practically done the same in respect of telephone exchanges, except that we have not taken out a separate profit and loss account in respect of each individual exchange. We have grouped the different exchanges. We have not included a statement of interest and depreciation in respect of every exchange, because to obtain such information would have seriously delayed the issue of the report.

John Thomas Hill Goodwin, Acting Director of Commonwealth Lands and Surveys, sworn and examined.

86. To the Chairman.—I have occupied my present position since the 18th January of this year. Prior to that date the site in Castlereagh-street for the telephone exchange had been selected by Mr. Scrivener, also the Wilmot-street site. In regard to the Castlereagh-street site, Mr. Scrivener, accompanied by the Postmaster-General, Mr. Hesketh, and, I think, a works officer, inspected four sites, which are known in the papers as A, B, C, and D. Site A was in a back street between Pitt and George streets and contained 6,677 square feet. It was offered for £15,000, or £3 6s. per square foot, but in addition there were several leases only a lane frontage; the nearest street to it was George-street. That site was rejected. Site B, which was purchased, is approached by a 10-foot lane, which is really no more than a right-of-way. It contains an area of 5,980 square feet, and was purchased for £14,500, or £2 5s. 7d. per square foot. Site C has a frontage of 744 feet to George-street, and contains 6,780 square feet. It was placed under offer at £15,000, or £2 13s. per square foot. Site D contains 3,691 square feet, with a frontage to Castlereagh-street, and was placed under offer for £22,500, or £3 6s. per square foot. Subsequent to the acquisition of site B a block of land adjoining it, and with a frontage of about 554 feet to Castlereagh-street, was offered to the Government for £30,000. It contains an area of 7,552 square feet. The price at which it was quoted represents about 24 per square foot. That block was placed under offer on the 30th July, but, of course, had the Government desired to acquire the block, they could have done so under the compulsory acquisition clauses of the Land Act. So far as I know, the Department had not given any consideration to the acquisition of that block prior to it being offered. There are no inquiries from other Departments for land for building purposes in Sydney, but proposals are under consideration for a rearrangement of the housing of the various Departments. It is proposed to transfer to the Commonwealth Bank building the Audit Department, Land Tax Department, Crown Solicitor, Public Service Inspector, and Federal members and Ministers. There is also a proposal to enlarge the Customs House. It is proposed to leave the Accounts Department and to also accommodate there the Electoral Department and the Lighthouses, Quarantine, and Navigation Administrations. These Departments are already in the Customs House, but they require larger premises. We shall then have to provide accommodation for the Pensions Office and the Money Order Office. We are paying rent at the rate of £500 a year, or 2s. 3d. per square foot, for the Pensions Office at the present time. The Public Service Inspector is accommodated in the New South Wales Banking Chambers, Pitt-street, near, or 6s. 3d. per square foot. Those are very good offices. The Audit Department is accommodated in the same building, and we pay for its Pensions Office is situated in High-street, and that costs us £200 a year, or 5s. 2d. per square foot, and that 2s. 3d. per square foot. For the offices of the Crown Solicitor, in University Chambers, Phillip-street, we pay £475 per annum, or 5s. 2d. per square foot. We pay £52 a year for an office for the Attorney-General in the same building. The Income Tax Department is accommodated in Warwick Chambers, in a lane at the back of the A.M.P. buildings, off Pitt-street. There we rent 16,000 square feet for £1,050 per annum. That price works out at 2s. 7d. per square foot; that is one of the cheapest properties we have. Those promises have been leased by us quite recently for a term of three years, and there is plenty of accommodation to allow of the extension of the Department. The Quarantine Department is accommodated at Circular Quay, at a cost of £175 per annum. Then there are telephone workshops in Manning-square, and in the electrical engineer's shops are in the buildings near the Customs House, and we pay for them £108 per annum. For the Money Order Office, in Ocean House, we pay £575 per annum. All those Departments, with the exception of the Money Order Office, will, under the proposed rearrangement, be accommodated in either the Customs House or the Commonwealth Bank building. I think the Government is to pay for the accommodation in the bank buildings on a basis of 5 per cent. on the capital cost to the bank. The Departments will be tenants of the bank. They are under no obligation to take accommodation removed there under instruction from the Prime Minister. The Works Department, the Accounts Department, and the Electoral Department, which are already housed at the Customs House, will continue there and have increased accommodation. I have already stated that the Lighthouses, Quarantine, and Navigation Department will be in the same building. We have now to provide for only the Postal Department, the Money Order Office, and whole of the available space in the Commonwealth Bank buildings is already absorbed.

87. To Mr. Finlayson.—Major Charley was the vendor of site B, and is also the owner of the adjoining site, which was placed under offer for £30,000. If the latter were acquired there would be plenty of room to provide accommodation for the workshops, and I think the location would be more landily situated than the sites of the present workshops. The matter of purchasing this property was referred to the Postmaster-General's Department, and the answer we received was that there was no present justification for such a step. The great objection to site B is that it has only one exit, and that is by a right-of-way, over which we have compulsorily acquired an easement for carriage-way and drainage. I believe that the site of £500 a year, or 2s. 3d. per square foot, for the Pensions Office at the present time. The easement was granted on the 20th June, 1914.

That easement does not give the right to construct a tunnel for telephonic purposes, but the Department is able to do that under its own Act. The building above the right-of-way has an underground room, in which Reginald Baker conducts athletic classes. We found that we should have to sink a shaft, then tunnel under Baker's rooms, and rise again, and that would prove very expensive. A proposal was made that we should acquire right through a sufficient area to enable the requisite tunnelling to be done. We have to consider which of the two proposals would be the cheaper. Baker had no lease of the rooms, and we asked Major Charley whether he would sell to the Commonwealth an easement through his property for the purpose of tunnelling. It was in response to that letter that the property fronting Castlereagh-street was placed under offer. If we acquired that we should have the right to tunnel where and how we liked. At present we have only the right of carriage-way and drainage over Baker's rooms. Failing the purchase of that property, I cannot suggest at this moment any means by which site B would be provided with an exit in addition to the right-of-way. I do not know how the land at the rear of the site is subdivided, or whether it would be possible to provide access from the rear. The Postal Department would like to get access from Pitt-street, but I have not sufficient knowledge on the subject at present to express an opinion as to what is possible.

88. To the Chairman.—I have not looked at the property in Castlereagh-street from a purchase point of view, but the chances are that we should be able to acquire it at a price less than that asked by Major Charley. The buildings on the site are of no value; the whole property is only returning about 12 per cent, and all we should pay for would be the unimproved value of the land.

89. To Mr. Sampson.—The site facing George-street is suitable so far as situation is concerned, but no reasons appear in the paper as to why it was rejected. The Director reported that the choice lay between sites A and B. The owner of site A fixed a price, but did not desire to sell, and had we acquired the block it would have cost us a lot of money.

(Taken at Geelong.)

THURSDAY, 14TH OCTOBER, 1915.

Present:

Mr. RITZEL, Chairman;

Senator Keating,	Mr. Gregory,
Senator Storey,	Mr. Sampson,
Mr. Fenton,	Mr. Laird Smith,
Mr. Finlayson,	

Howard Hitchcocks, of the firm of Bright and Hitchcocks, drapers, Geelong, sworn and examined.

90. To the Chairman.—We have three direct lines to the exchange and seventeen lines on a business exchange in our premises. We were doing business before the automatic system was installed. The good points of the automatic system are that it is very much quicker, the hearing is very much better, and there is no interference on the part of operators. Taking it all round, it is a vastly superior system. The bad points are too many wrong numbers being called

by subscribers (leading to waste of time through having to answer them, and causing great annoyance when a person is rung up at night only to find that some one has given the wrong number), loss to subscribers through those wrong numbers (because every time the receiver is taken off a call has to be paid for), and cross conversations. I do not think the last trouble would apply to persons who have only one line, but in our case, where we have three lines to the exchange, it is a great objection. Sometimes we go to No. 1 line and find a conversation going on. If we go to No. 2 line we hear another conversation. If we go to No. 3 line we also hear a conversation. There are three distinct conversations going on, and we must wait until they are finished before we can speak. Another bad point is getting the wrong number. A person may make a mistake himself owing to similarity in numbers, such, for instance, as 1207 and 1207; but we have given the correct number and tried two or three times to get it, with the same result. We could see that the mechanism was absolutely wrong. When we would ring up No. 9 and complain, the excuse would be advanced that the dial was not working correctly, or that there was something wrong in connexion with it. When they find that the dial is wrong they are supposed to credit us with the call, but we do not know that this is always done, especially when the person who is talking to No. 9 is called up directly afterwards to answer another call. It is questionable whether the circuit is put down carefully. However, we have not the slightest hesitation in saying that the automatic system is a great improvement on the old system, and that we would not go back to the old. The Department cannot be blamed when subscribers actually call up wrong numbers, but our trouble is in having to waste time in answering the calls. This trouble would not be so evident under any other system, because the person actually calling the right number gets connected with the subscriber he wants, whereas under the automatic system he fails to get the number he actually calls, and is connected with a different number. Under the old system, when the correct number is given and the caller is connected with a wrong number, the fault lies with the operator in the exchange; under the automatic system the caller himself calls the number by turning the dial round. Of course, under the old system it was quite possible to give the operator a wrong call, but under the automatic system it is easier to give a wrong ring on the dial than to give a wrong number to the operator under the old system. I think that there could be a great improvement in the numbering in the books. Sometimes it is difficult to distinguish between 5 and 8. However, the supplementary book recently issued is an improvement in that respect. The Department are to be congratulated on giving plain figures. I do not suppose many business people would trouble to keep a check on the calls, but they are such a small item, and even if they did I doubt whether their record would be accepted by the Department. We have to pay whether we like it or not. I have used the telephone in other countries. I like the automatic system a long way better than the system used in Great Britain. In America the automatic is used mostly. I do not say that the Australian system is equal to anything I have seen in other countries. I prefer the English system to the old Australian, but the automatic is considerably better than anything I have come into contact with elsewhere. I had no

hesitation in advising the Committee to adopt it. It is much quicker; I emphasize that point. For instance, if it were necessary to call up twelve people under the old system it would take a considerable time. Under the automatic system it can be done in a quarter of the time. This is a very important feature from a business standpoint. I am afraid that no provision could be made by which a subscriber could switch off so as to avoid night calls. The occurrences to which I have referred are not very frequent, and where one has a circle of friends he feels that he must answer the telephone late at night. It might be a very important message in regard to a fire, or something of that sort.

91. To Senator Keating.—I do not understand the mechanism sufficiently to explain the cause of the cross conversations to which I have referred. It was not the case of hearing a conversation between two other parties; it was the case of a conversation proceeding on our own lines. No one had rung up any of our lines. They were free when we rang up, only to find some other person's conversation upon them, and we could not get the number we called, but this might be the fault of our own exchange. Of course, the same occurred to a greater extent under the old system. It is not a distinctive feature of the automatic, but I mention it as one of the faults, otherwise it might be inferred that it was perfect. We use the trunk lines considerably. They are mostly used between Melbourne and Geelong from 9.30 a.m. to 11 a.m., just after the mail has been opened. On Saturday mornings also they are busy, and a caller has sometimes to wait for three-quarters of an hour. The average wait throughout the week is from a quarter to half an hour. The delay is regulated by the number of junction lines between here and Melbourne. I believe that if the automatic system were in force in Melbourne we would be able to get connexion very much more quickly. When we wish to communicate with Melbourne we ring up No. 9 (distance) on the automatic exchange and ask for the number of the Melbourne subscriber, just as we did under the old system. The list of subscribers issued in Geelong does not contain the names of all the subscribers throughout Victoria. The Department issues a separate supplement for Geelong. I understand that in future, if we require distance calls, we must apply for the large publication containing the names of all the subscribers in Victoria, for which I suppose we shall have to pay. Hitherto all the names of Victorian subscribers have been issued in one book. Now, if we were doing business frequently with Ballarat, we would have to get the Ballarat supplement or the large book containing the names of all the Victorian subscribers. We do not communicate with Bendigo regularly, but we may require to do so at any time. We have not yet been told that it will be necessary to secure separate books for all the districts. There is a great advantage in making a series of calls on the automatic system. We would rather use the automatic if we wish to communicate some information to a dozen people. It is about four times faster than the old system in that regard. Frequently a person had to wait some time before being connected, and then when he rang off one subscriber and gave a quick ring to get the next number, the operator, thinking it was only a second ring for the first subscriber, would not give attention to the call. There is no doubt that the beauty of the automatic system is the comparative speed with which a subscriber

can make a series of calls. I do not know much about the mechanism, but I have had a conversation with our exchange operator, and asked her if she had any suggestions to add to the points which I brought before the Committee. She said that what I had noted was a fair explanation of the good and bad points of the automatic system. I have not studied the question of whether it is more sensitive to weather conditions. We used to have a very bad trunk line. I understand that it was an underground line. It was called the "buzzer." Now, with overhead wires, conversation on the trunk lines is more distinct than in Geelong itself.

92. To Mr. Sampson.—We can hear better over the trunk lines, because there are more overhead lines between Geelong and Melbourne now. Frequently we have long-distance calls from the country, and are connected through five or six exchanges. I do not think that I can express any preference as to whether the calls are plain under the automatic system than under the previous system, but I have spoken to Geelong from Marysville on several occasions, and it was just as if the person spoken to was in the next room. The automatic mechanism does not come into play in connexion with trunk lines after leaving Geelong. The person to whom you are talking can hear you better under the present system. When the numbers are similar you are liable to make more mistakes in working the dial than in calling up the exchange under the old system. There would not be so many mistakes if the numbers were smaller, but that does not occur, though having to start in the thousands. However, it is just carelessness on the part of the caller. There is no real reason why he should make a mistake, though occasionally the dial is not brought quite up to the metal. Mistakes are possible in that way. Similarity of numbers is also confusing. I cannot say that the number of wrong calls is decreasing, though it should be, because the subscribers are charged every time they make a mistake in this way. When a person who is rung up takes off the receiver, the call is registered. The person who makes the mistake has to pay for it.

93. To Mr. Gregory.—As a rule, if I do not get the person to whom I wish to speak, I make a second attempt, and then if I fail I ring up No. 9 and tell them not to debit me with the call. There should not be a large proportion of ineffective calls. The largest proportion of failures to get the persons called is due to carelessness in moving the dial. It would be a fair thing if the customer were provided with a self-registering meter at his instrument, in order to check the number of calls. If it would not be too expensive, my firm would be prepared to pay if a meter was provided at each of our instruments. At present we must accept the departmental figures without any check. It would be a great advantage to have some sort of check.

94. To Mr. Finlayson.—On one occasion we made an attempt to check the calls from our instruments with the account rendered by the Department. The two did not agree, but it was not to a very big extent. The Department claimed that we had a greater number of calls than our check indicated. I have not visited the exchange in order to see the system of registering calls, and I cannot say whether it is reliable or not. Under the automatic system we are sometimes disconnected half way through a conversation. I do not know how it is done. It would seem to be

almost impossible, but it does happen, and occasionally the subscriber gets a small shock at the same time. We have had no explanation from the officers as to why we are disconnected while the conversation is in progress. I cannot say that in this regard our experience is worse under the automatic system than under the old.

95. *To Mr. Laird Smith.*—We have had the experience of having our circuit left so that we cannot work it, possibly through some other subscriber blocking our connexion with the exchange. I cannot express an opinion upon the point as to whether the circuit should be controlled by the man ringing up or by the person who is rung up. We have experienced the cross conversation or induction on our three lines one after another. We experienced great difficulty in working the "buzzer." I may be mistaken in thinking it was an underground wire, but it was certainly a failure.

96. *To Mr. Fenton.*—When I say that the automatic system is more expensive, I mean that under the old system, when a mistake is made through carelessness, the subscriber has to pay for one call only, whereas under the automatic system, owing to carelessness or the fault of the mechanism, the subscriber may sometimes have to pay two or three calls instead of one. It is not a very big matter.

97. *To Senator Keating.*—I think this trouble should decrease in time, but as the automatic telephones cost more to use, I do not think the Government should increase the rates to subscribers on automatic exchanges.

98. *To Mr. Fenton.*—There is a considerable saving of time, and, on the whole, taking this into consideration, the automatic system is less expensive.

99. *To Senator Story.*—I do not think that there has been any improvement in regard to the bad features that I have mentioned. They are just as bad to-day as they were when the exchange first opened. In fact, they must be worse, because subscribers do not make mistakes willingly, seeing that they realize that they have to pay for mistakes, and yet mistakes are just as frequent as when the exchange was first opened. So far as the Department is concerned, the system was just as successful when first introduced as it is after two years' operating. The mistakes at first were on the part of the subscribers.

Herbert Buchanan Gibb, manager for Hawkes Bros., wholesale and hardware merchants, Geelong, sworn and examined.

100. *To the Chairman.*—We have four direct lines to the exchange. I have heard the evidence given by Mr. Mitchell, and, on the whole, I agree with what he has said. Our telephone had complaints about being cut off in the middle of conversations. This frequently occurs. I do not know how it happens, but it is a great nuisance to some of my staff. I should say that it would be more liable to happen under the old system. I speak from what I have been told by my employees. I have not experienced the trouble myself, though I use the telephones a great deal. We frequently get wrong numbers, and it is not the fault of the person who is moving the dial. On my private telephone I tried to communicate with a bank, but a lady answered. Finding that I was connected with the wrong number I hung up the receiver. After waiting three minutes I tried

again, but the same lady answered. This occurred three times. I did not report the matter. We hear other conversations, but not very often. I have no desire to go back to the old system. The automatic is the better system. We do a good deal of telephoning to Melbourne. Hearing is all right, but sometimes we are delayed from a quarter to half an hour, and sometimes longer. I think that it is a hardship to the Geelong business people that the list of subscribers issued here does not contain the names of Melbourne and Ballarat subscribers. We do a good deal of business with Ballarat, and are obliged to fall back on the old list of the telephone book in order to get Ballarat numbers. Later on the books containing the names of all the subscribers in Victoria will be hard to obtain. It would be very much better, from our point of view, if the Department would continue the old method of issuing the full book. I would not like to go back to the old manual system. The automatic is a great improvement. I have not gone into the matter of the extra cost to the subscriber.

101. *To Senator Keating.*—I cannot say that the delays on the trunk line are longer than they were under the old system. I believe that there has been a slight improvement. We have more lines between Geelong and Melbourne. It would be more convenient for people using the trunk line frequently to have all the telephone subscribers in one book. We call Melbourne half-a-dozen times a day. I cannot say that it is a frequent occurrence to get the wrong number through the automatic exchange. I am frequently rung up on my private line and asked if I am a certain person. That might be due to a similarity of names. In the case to which I referred when I tried to ring up the bank, I was very careful in hearing the correct number. On the third occasion I heard the lady telling some one else that she was being rung up and asked if she were a bank, and saying that she wished she were.

102. *To Mr. Laird Smith.*—I was seen in reference to a report on the working of the exchange, dated the 10th November, 1913, and prepared by the Assistant Engineer for Telephones Equipment.

103. *To Mr. Gregory.*—In making a call another person is able to come in and interrupt. My accountant tells me that his experience in this respect has been very bad. He says that he has had numerous instances within the last two or three days. It occurs about once a day. Some one rings him up, and during the course of conversation is cut off, and when the connexion is again made, the person calling has said "We were cut off." There is no doubt that they do cut in very often. Even when there is perfect silence on the line there is a cut-off.

104. *To Mr. Fenton.*—The Geelong telephone list covers the whole of the Western District and part of South Australia. I do not think that it would be fair to ask the Department to print the full book for the 1,000 subscribers in Geelong, when only 20 people may be frequent users of the trunk lines, but the people who are in the habit of using the trunk lines should be supplied with the full list of Victorian subscribers. If any one wishes to communicate with Melbourne, he can ring up the long-distance and say that he wishes to speak to a certain person in Melbourne, and he can get connexion. It is quite a simple process. The Chamber of Commerce considers that, from an expense point of view, it was quite right to cut

down the telephone book to some extent, but people who are frequent users of trunk lines should be provided with the full list without having to pay for them.

William Henry Atkin, of the firm of Deonys, Lascelles Ltd., woolbrokers, Geelong, sworn and examined.

105. *To the Chairman.*—I agree with what the previous witnesses have said. The advantages of the automatic system greatly outweigh the disadvantages. Our experience of the automatic system has been satisfactory, with the exception of occasionally getting on to wrong numbers. This, however, does not occur more frequently than can be expected. With machinery we must be prepared to have mistakes, and our experience is that the percentage is small. I do not claim that each subscriber should have the full telephone book, but, at the same time, it should be available to users of the trunk lines to any extent. The Department has a record of the large users of trunk lines, and a list to whom the full book should be supplied could easily be compiled.

106. *To Mr. Fenton.*—After the first day or two a youth or a girl easily gets into the automatic system. It is not difficult to understand. I do not know that adults are more careful. Our telephone is always attended to by the junior in the establishment. We have had no difficulty with juniors, although, as a matter of fact, a youngster may be a little more careless than an adult.

107. *To Mr. Gregory.*—I do not know of any case of another person cutting in to a conversation. Cross conversations are very infrequent. The percentage of ineffective calls is not very great. I agree that there should be a self-registering meter at each instrument, providing the expense is not too great.

108. *To Mr. Finlayson.*—We have no complaint to make as regards overcharges for calls, because we keep no tally. I do not think that the number of calls charged against us has been increased since the automatic system has been installed. I think our calls are about the usual number, as compared with the old system. I have not visited the exchange.

109. *To Senator Keating.*—The automatic system has marked advantages over the old system.

George Spencer Faulkner, managing director of Liberty, Dunn, and Company Proprietary Limited, millers, grain and forge merchants, Geelong, sworn and examined.

110. *To the Chairman.*—We are building new premises. Formerly we had a switchboard with five local lines. I would not like to go back to the old system after having experienced the advantages of the automatic. I have heard the remarks of the other witnesses. No doubt the advantages of the automatic is the rapidity with which you can call up a subscriber, but there are some bad points. Very often, if I call up a subscriber, and that person requires some information from me, I leave the instrument to get it for him, and when I come back I cannot get him, though the receiver has not been hung up. In such a case you do not like to hang up your receiver, but after again, because it might disconnect you, but after a considerable time the other person may get tired and hang up his receiver. Then you are able to get him again and speak to him, and he tells you

that he has been waiting all the time. Something should be done to find out what the defect is. It is very rarely that you obtain wrong numbers. It has happened to us, possibly, two or three times during the last three weeks. To make sure whether I have made a mistake myself I immediately call again, and when I still get the same number I ring up No. 9, and the matter is put right. Evidently there is some little defect in the mechanism. I believe that the officers can ascertain if anything goes wrong. If you ring up the exchange the mechanic goes along and puts the matter right immediately. I have made mistakes and called up wrong numbers. The trunk lines are perfectly satisfactory, except for the delays. The other day I gave three separate long-distance calls one after another, and I got the first call first. The first call was an important one, but there was a delay of two hours before I was connected. It was not my fault. The human element comes between the subscriber and the automatic in the case of the trunk-line calls. I suppose that the full Victorian telephone book is not issued on the score of expense. It is a bulky book, and the only people who would need it would be those using trunk lines extensively. One does not wish to be bothered with having to ring up the exchange every time to ask whether he can get So-and-So, and there is always a possibility of mistake in doing so. Extensive users of the trunk line should have the full books given to them. Persons who do not use the trunk lines very often would experience no difficulty in calling the exchange and saying, "I want to speak to Mr. Jones, of Ballarat." I prefer the automatic to the old system, and all those in our establishment prefer it.

111. *To Mr. Sampson.*—Sufficient time has elapsed to allow us to judge as to the efficiency and working of the system.

112. *To Mr. Laird Smith.*—Until we assume possession of our new premises we have three direct lines to the exchange. In our new building I shall have a switchboard. I hope it will be something up to date. The switchboard we had was satisfactory, except for the noise of the buzzer when the attendant was not at the board. However, that was unavoidable.

113. *To Senator Story.*—I do not think that the subscribers would object to paying the cost price of a telephone book comprising the names of subscribers outside their own particular district. No one wishes the Government to run a business at a loss. On the other hand, I do not think they should make a profit out of it. These books are an absolute necessity to business people. I understand that books for each district can be obtained at cost price. That is no hardship.

114. *To Mr. Sampson.*—If a charge is to be made it should be for the complete list of subscribers covering the whole State. Such a book would be more convenient.

115. *To Senator Keating.*—We have a deposit at the exchange against trunk calls. The Department can ascertain from the amounts of deposits made by the principal users of trunk lines, and furnish those who use them up to a certain minimum with free books containing the names of all Victorian subscribers. The absence of these books very probably lead to loss of revenue. It is a disadvantage to have separate books. For instance, the Melbourne subscribers are not in the Geelong book. It would be possible for wrong numbers

to be called, as described by the Assistant Engineer for Telephone Equipment in his report on the working of the Geelong Exchange, dated 10th October, 1913, in which he says:—

I am of opinion that the calling device is capable of improvement in the way of providing for a greater margin between the stop and the point where the impulses start after the line is released in order that some latitude may be allowed when operating the device. If the stop is raised a little it will be seen that it is very easy to make the device to miss one impulse if the finger is not placed in the hole in the correct manner and pulled hard against the stop. If the finger is held at an angle it is possible for it to come against the stop before the dial has been pulled to the correct position.

Calling needs to be done very carefully. It is the fault of the subscriber if what the engineer desires does happen. In ringing No. 0 the dial comes round with a click, but in ringing the other numbers you feel the finger touch the terminal. To make a mistake the moving would have to be very carefully done. The danger is in not bringing the finger right home. This is due to carelessness.

115. *To Mr. Fenton.* We often ring up Mr. Gaudier. We even speak to Sydney. It is very satisfactory. The wonder is that you can hear so well over such long distances; but during the drought I had to speak to Jung, about 180 miles away, and I did not find that line satisfactory. However, the Western District lines have improved wonderfully. I think that the difficulty is at the other end, especially on some of the small lines. On the whole, speaking on the telephone is much more satisfactory at Geelong than it used to be. Connections and the public generally are much better catered for. If the Department found that a considerable saving of money could be effected by the non issue of the full list of subscribers, we would not wish to see unnecessary expense incurred by issuing that full list to every subscriber in Victoria. Economy should be practised in every way possible. The person who wishes to speak to Melbourne about once a year can ask the attendant at the exchange to give him the number he desires. There may be a little less delay in turning up the book yourself and ascertaining the number. As the printing of lists must cost hundreds of pounds a year, and as all these things increase the cost of telephones generally, I may say that it would not be a fair thing to ask the Department to distribute these lists *ad lib.*

The witness withdrew.

Alexander Alfred Direks, Electrical Engineer for the State of Victoria in the Department of the Postmaster-General, sworn and examined.

116. *To the Chairman.*—The automatic system was installed in Geelong in July, 1912. It replaced the non-multiple manual system, concerning which there were a considerable number of complaints, and which had practically outgrown its usefulness. We have been practically free from complaints since the installation of the automatic. I have heard the complaints mentioned by witnesses this morning. The complaint as to over-hearing between one line and another arises from defects in the apparatus. There is bound to be a certain amount of trouble with moving machinery of any description. Simultaneous connections are possible. When people call up at exactly the same moment they may be connected with the same line. Owing to dust on the con-

nects causing defects in the apparatus, it is possible for an engaged line to be picked up on the second occasion by some other caller, as dust on the apparatus may prevent the engaged test from operating. However, the percentage of such troubles is comparatively low. We keep a very careful record of all faults that are reported and are discovered, irrespective of the complaints by the public, and the percentage is very low. The complaints ventilated here this morning are not very serious as compared with those under the old system. The great majority of them would be caused by the mechanical parts of the apparatus. I have no hesitation in recommending an extension of the automatic system. It is desirable to extend it in Collingwood and Malvern. Collingwood has not yet had an exchange. It is portion of the metropolitan area, and the business in the metropolitan area has increased. Business has increased very largely at Malvern. In the latter case I recommend the establishment of a new building on a fresh site, because the present building is altogether inadequate for an automatic exchange. I have seen the plans, and they meet our requirements. They should prove satisfactory to the automatic system. The Collingwood plans are also satisfactory. In both cases the plans were submitted for our criticism, and to see whether they met our requirements. As a matter of fact, in the first place we gave the approximate floor space necessary, and the Iloimo Affairs Department prepared the plans on that basis.

117. *To Senator Keating.*—If two subscribers take up their receivers at exactly the same moment they may be connected on to the one line in the exchange. The chance is that the two would be in communication with one another, and both would miss getting their calls. Two subscribers could simultaneously be connected with a third, should the engaged test be faulty. If a call is established between two persons, and the engaged test is faulty, a third party calling for the same number might possibly be connected to the two already in communication. In such a case the fault would be discovered. On a complaint being made to No. 0, it would be remedied very easily. The majority of these faults are occasioned by dust. Most of the mechanism is enclosed in glass. We have tried vacuum cleaners on the switchboard to remove dust, but so far we have not discovered anything that will extract all the dust. The vacuum cleaner is liable to draw dust on to other parts and points. The use of it is not a continuous operation. I have heard that some factories employ means by which dust is automatically and constantly drawn off, but I have not seen it. The ideal system is to seal the exchange room in order to prevent any dust arising or entering, and keep the air pure by forcing in fresh and pumping out the bad. There would be a maximum number of seven persons in the room at Geelong, but even that small number creates dust. The mechanism is fairly delicate in parts, but the trouble is not the delicacy of the mechanism so much as the accumulation of dust on the points. Dust is a very important factor in regard to the proper working of the very sensitive mechanism that is employed. When I speak of points I refer chiefly to the platinum points of the relays. I cannot give any theoretical reason as to the cause of the cutting off referred to by witnesses. It might be traced in some of the cases, but after a connexion is once established I see no reason why it should break down because a person leaves his instrument for a few minutes.

Witnesses have referred to two classes of cutting off—during a conversation and during absence from the instrument. In both of these cases the cause would be identical. I cannot imagine what will occasion disconnection after it is once established, but these things do occur. Mr. Faulkner referred to getting a wrong number. I have had a similar experience. The trouble lies in a defect in the moving apparatus, possibly caused by dust. If dust accumulates on one of the selectors it might be possible for that selector to be continually taking the wrong number, because in setting up the spindle of the selector to nine impulses only eight would be effective, and, instead of the subscriber getting 9,000, the selector would only reach the 8,000 level every time. That might have been Mr. Faulkner's experience. The success of the system depends largely on its being kept free from dust. At least, that is a very considerable factor in it. We have advocated the sealing of the rooms and the artificial ventilation of them as one means of reducing the dust. I understand that this matter has been taken up by the Department of Iloimo Affairs in order to ascertain whether it can be applied to the telephone exchanges. A further device, which I saw in Sydney, has been introduced by the Automatic Telephone Company. They have introduced an individual cover for each piece of apparatus, in addition to the glass case in which the whole is assembled, and it should be a further protection against dust, and tend towards greater efficiency.

118. *To Mr. Laird Smith.*—I cannot say that the dust trouble can be got over easily by proper supervision. The endeavours we have made to extract the dust by means of vacuum cleaners have not been altogether successful. Chemical action does set up between the contacts. It is true that dust carbonizes and spoils the contacts, but we keep that trouble down by a constant system of cleaning the points, and we could further improve matters by reducing, as far as possible, the dust that may accumulate in the exchange. A speck of dust may happen to lodge on a contact point, with the result that when the point is brought into operation there is a slight spark, which will probably carbonize that particle of dust, and cause it to firmly attach itself to the point, and occasion constant trouble until it is removed. Induction is responsible for cross conversations. A single circuit outside causes induction, but there are very few lines in connexion with the Geelong Exchange that are not metallic throughout. There are no connexions which would bring about leakage, providing everything is in proper condition. When one side of a metallic circuit makes contact with the earth there is leakage, and the whole circuit will be liable to inductive disturbances. This is likely to occur whenever the metallic circuits are not perfect. Induction would be caused by working on a trunk line on which there may be a leakage. One witness referred to an underground wire as the "buzzer" system. It really referred to a telephone working through condensers on a telegraph line. It is practically impossible to get successful work by switching the automatic system on to a telegraph line used for telephone purposes. We must have a complete metallic circuit in order to work the automatic telephone, so that the impulses may be sent so as to affect the mechanism to the distant end. I do not think it is advisable to use a telegraph line for telephone purposes for important services, because to do so reduces the efficiency of both. We have installed private branch exchange switchboards in

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several places in Geelong. We maintain them. They form part of our installation. We do not think it wise to allow private installation in any case where it can have communication with the main exchange.

119. *To Mr. Finlayson.*—By careful attention and supervision of the working parts, such as systematic cleaning of the points and so forth, the number of faults experienced on the Geelong Exchange has been reduced since it has been established. I have not heard of any improvements that will overcome the troubles referred to this morning. They are inherent to any mechanical switchboard. The latter has reduced the faults experienced in connexion with other switchboards. I can hardly say that the elimination of the telephone exchange operators has proved to be an un-mixed advantage. Certainly, the elimination of the human element has quickened the service, but there are advantages not possessed by the automatic system which lie with the employment of the human element. The automatic system is the best that has been devised for giving service to the public. I cannot say that it is absolutely perfect, but it more nearly approaches perfection than any other system. There is a standing invitation to the subscribing public to visit exchanges and see how they are worked. I am satisfied that the system of registering calls works satisfactorily. Complaints as to overcharges would not come under my notice. I have known of many cases where parties objecting have been invited to visit exchanges and see exactly how the registration of calls is done. It is done automatically in an automatic exchange on the called subscriber taking off his receiver. I do not think that the attaching of a meter to each subscriber's telephone would obviate errors, though it might be a satisfaction to the subscriber to see the number of calls he has originated. These meters would need to be operated automatically, in the same way as the one in the automatic exchange is operated. There is no serious obstacle to the meter at the instrument and the meter at the exchange both operating. I do not think it would be very expensive, but it would add a complication to the system, without which any system is better. It would not otherwise interfere with the working of the system.

120. *To Mr. Laird Smith.*—The register in the exchange is in a shunted circuit, which has to be operated over the main circuit. It is only in the circuit when the apparatus is in operation, and not when a person is speaking.

121. *To Mr. Gregory.*—I can supply figures in regard to the capital value of the system, the annual cost of maintenance in comparison with Bendigo and Ballarat, and other details, to show the comparison between the old system and the new. The cutting in is caused by some defect in the apparatus. If the Department is notified the trouble might be remedied immediately, and possibly future trouble avoided to people using the same apparatus later on. The Department encourages subscribers to report any troubles. It aids the Department to get reports. There would be no difficulty in installing registers at each instrument. So far we have only installed devices of that character on party lines, so that each subscriber to a party line may have a register of the number of calls he makes. We have at the exchange an automatic register for each individual register at each instrument.

would be. However, it would not be a large amount. It would possibly cost more than 10s. for each subscriber, because, in addition to the register, there would be an auxiliary device to operate the meter at the proper time and without coming into the working circuit. It is hard to estimate the value of the apparatus that would be required; but, from an engineering stand-point, there is nothing in the way of each customer having a check on the Department, though in the case of the automatic system the subscriber is absolutely protected. I believe that there have been complaints as to overcharging for calls, but these complaints should cease when the automatic system, with the automatic registration of calls, is installed.

122. *To Mr. Sampson.*—The Geelong Exchange was opened in July, 1912. On that date it was actually cut over from the manual to the automatic system. The greater number of faults lies in the apparatus, either in the subscribers' houses or at the exchange. There is very little trouble with the lines in Geelong. Trouble is experienced through defects in the calling device, and in the moving parts of the mechanism in the exchange, but the percentage is very low compared with the number of calls made. The chief difficulties occur in the moving parts of the relays and connectors in the exchange. We have not had any serious trouble through the wearing of the parts. Our experience is that the mechanism is durable. We make regular inspections of the instruments in subscribers' houses.

123. *To Mr. Fenton.*—The Department encourages its mechanics to make improvements. Two improvements to one portion of the apparatus have been introduced by our own mechanics, and in both cases bonuses were given as a reward.

124. *To Mr. Laird Smith.*—I have seen three distinct makes of automatic telephones, but I have not had experience with any other than the one installed here. In Great Britain they are installing different types of apparatus in order to determine by experience the efficiency of each, and how far they will meet requirements. That is the only practical way to determine the relative merits of the different systems. The Geelong system was established really on that basis, in order that the Department might determine whether the system was a success. It is doing all that was expected of it. We are well satisfied with it.

(Taken at Melbourne.)

FRIDAY, 15th OCTOBER, 1915.

Present:

Mr. RILEY, Chairman;

Senator Keating, Mr. Anderson,
Senator Storey, Mr. Sanderson,
Mr. Panton, Mr. Laird Smith.

John Heston, Chief Electrical Engineer, Postmaster-General's Department, recalled and further examined.

125. *To the Chairman.*—At an earlier meeting of the Committee I promised to submit a compar-

ison between the costs of automatic and manual telephone equipment. I beg to submit that comparison now. It shows the difference in the cost of the two systems at exchanges of 5,000 and 10,000 lines, together with the estimated capital cost, and the estimated annual charges on certain assumptions. In preparing any estimate, certain figures have to be assumed, and in this case I have assumed the calls per line to be ten. On the 21st August, 1915, the calls per line for the City Exchange, Sydney, were 10.7, and for the whole network, 9.5; and in estimating for a 5,000-line exchange, I have assumed that the calling rate will be that of the city—not the suburban—exchange, namely, ten. I have also assumed that the calls during the busy hour of each day are one-eighth of the daily number of calls. So as to give every possible advantage to the manual system I have assumed that the maximum load per operator is 225 calls per busy hour for "A" or subscribers' operators, and 400 calls per busy hour for "B" operators. The ratio between the busy hour and the total day force, for instance, in Sydney and Melbourne at the present time, is about 1 to 1.5. That is to say, if 50 operators are employed in the busy hour, a total force of 80 would be necessary. No line construction costs are included in this estimate for the reason that these costs are the same in both manual and automatic systems. Neither have administration charges been included, my intention being to show only the saving brought about by the use of the automatic equipment. Interest and sinking fund, and depreciation charges have been included. I may add that the figures have been arrived at as the result of actual experience.

The capital cost for a 5,000-line exchange is as follows:—

	Automatic.	Manual.
	£	£
Building	4,800	6,700
Exchange equipment	45,000	21,250
Subscribers' equipment	21,250	15,750
Total	71,050	41,700

The larger cost of building for the manual system is due to the fact that considerably more floor space is required for the accommodation of the operators, luncheon rooms, locker rooms, &c. The item for exchange equipment includes cost of erection in both cases, and the figures are based on what has actually been done in Australia. Contractors' costs have been taken from existing contracts, and the estimate is also based upon figures which contractors have stated that they are prepared to guarantee not to exceed in this class of work. All along I have not endeavoured to make the difference between the two costs greater than I could demonstrate if it were necessary. Any advantage has been given to the manual system in this respect. The figures for a 10,000-line exchange are as follow:—

	Automatic.	Manual.
	£	£
Building	9,600	12,000
Exchange equipment	90,000	47,500
Subscribers' equipment	42,500	27,500
Total	142,000	87,000

The only comment I have to make on these figures is that the cost per line on the manual board increases as the size of board increases. Maintenance charges are as follow:—

[5,000 LINE EXCHANGE.]		Automatic.	Manual.
		£	£
Exchange Equipment Maintenance ..	4,600	4,600	4,600
Subscribers' Equipment Maintenance ..	2,400	2,400	2,400
Operating	330	10,000	10,000
Building Maintenance (0.83 per cent. of 14,0703, and 4.14/10337) ..	40	60	60
Depreciation and Interest—			
Exchange Equipment, at 0.103 per cent. ..	4,137	1,053	1,053
Subscribers' Equipment, at 14.3 per cent. ..	3,039	1,067	1,067
Building, at 4.655 per cent. ..	224	312	312
	14,200	21,038	21,038
Approximate, per Line ..	2.84	4.21	4.21
Difference in favour of Automatic, £1.37 per line per annum.			

[10,000 LINE EXCHANGE.]		Automatic.	Manual.
		£	£
Exchange Equipment Maintenance ..	8,600	8,600	8,600
Subscribers' Equipment Maintenance ..	4,800	4,500	4,500
Operating	624	10,700	10,700
Building Maintenance (0.83 per cent.) ..	80	100	100
Depreciation and Interest—			
Exchange Equipment, at 0.103 per cent. ..	8,274	4,200	4,200
Subscribers' Equipment, at 14.3 per cent. ..	6,978	3,981	3,981
Building, at 4.655 per cent. ..	443	650	650
	28,203	42,222	42,222
Approximate, per Line ..	2.83	4.22	4.22
Difference in favour of Automatic, £1.39 per line per annum.			

The cost of maintaining subscribers' equipment would be identical in each system, excepting for the fact that in the automatic system there is a dial connected. In every other respect the two instruments are identical, and, therefore, the only basis for calculating any difference is on the increased cost of maintaining that dial, regarding which we have fairly accurate figures. Regarding building maintenance I have taken figures supplied by the Department of Home Affairs. In both these comparisons I have given conservative figures, and I think the differences are the minimum that may be expected. Certain of the automatic companies claim that their building costs will be reduced by 50 per cent. I have not accepted those figures. I have taken our own calculations based on Australian experience, and I assume the difference to be one of about 25 per cent. on floor space.

126. *To Mr. Sampson.*—I have assumed the lives of the two systems to be the same. That assumption favours the manual system, because I think the automatic system will have the longer life. In this respect I may refer to a publication issued by the Automatic Electric Company, of Chicago, which states that the automatic telephone will have a considerably longer life than the manual telephone, though I do not think my claim is made there that the difference will be one of ten years, as some makers may claim. In view of the fact that we have not had any actual experience on the point, the fairest course is for us to assume that the lives of the two systems will be equal. In 1911 a body of English engineers went to America in order to report on the cost of installing the automatic as compared with the manual telephone. The result of their investigations showed the figures on a 500-line exchange

to be:—Automatic £651, manual £701, 5,000 lines—automatic £6,090, manual £8,987 10 000 lines—automatic £12,180, manual £19,666. These figures, the Committee will observe, are considerably more in favour of the automatic system than the figures I have quoted, but that fact does not make me alter my estimate. Associated with that particular question is the subject raised, I think, by Senator Keating, as to the costs of operation in Australia as compared with other countries. Upon this aspect of the question I was asked to prepare a statement, and I will submit to the Committee an extract from a memorandum addressed to the Secretary of the Postmaster-General's Department, by the Committee of Investigation, Telephone Profit and Loss Accounts, dated 15th December, 1914. This extract is as follows:—

27. The costs of giving telephone service in Australia must necessarily be higher than in most other English speaking countries, for the following reasons:—

28. The capital cost is higher owing to increased cost of all material—(due to the distance from the place of manufacture) and increased cost of labour installing the same. This is entirely apart from the question of the relative efficiency of the labour employed.

29. The working costs (labour and maintenance) are higher because of the relatively high rates of pay and more favorable conditions of service.

30. A comparison of rates of pay of various employees without regard to hours of duty, annual leave and other conditions of employment would be misleading.

31. The comparison, to be complete and reliable, should indicate not only what is paid to the various employees, but also what is given by them in return for that payment.

32. If the annual rate of pay to any class of employees is divided by the net hours of service given in return therefor, a figure is obtained, which may be accepted as a fair basis of comparison.

33. Even this figure, however, assumes equal efficiency or equal value during the period of service a condition which there is strong reason for believing does not exist. For the purpose of this report, however, it is assumed that the services rendered in each case are of approximately equal value.

127. *To the Chairman.*—The workman in America does, as a rule, give more valuable work during one hour than the workman in Australia does, for the simple reason that he cannot hold his job unless he does. He is not protected as the Australian public servant is, and is, therefore, working always, or nearly always, at his maximum capacity and his maximum efficiency. The same applies to the operators. The selection of the best goes on to a marvellous extent in America, so that I think I am quite justified in stating that the value of an hour's work in America is greater than an hour's work in Australia.

128. *To Mr. Fenton.*—The workmen last in some cases just as long as they live in Australia. I have seen men at 65 holding responsible billets, and I have seen workmen at 60 doing important work. I admit the system does test the individual. I should like it to be thoroughly understood that I am not discussing the economic question. I am simply stating facts, and I do not desire it to be assumed that I am drawing any deduction whatever from those facts beyond the effect on the cost. I am not trying to say that the American system is better or worse than the Australian. I am merely stating facts, and I state that, because of those facts, costs in Australia are greater than in America. Whether these facts or whether this difference in cost can be justified or not is a point with which I have nothing to do.

120. To Mr. Sampson.—I am simply dealing with the question of cost. What I say is that the Australian officer does not give the same value in an hour's service as the American. I am not justifying that state of affairs or the reverse; I am merely stating it as a fact. I have been asked, inferentially, why the telephone charges in Australia are high, and I am now giving some reasons—because we pay higher wages and give better conditions we do not get the same return as is given in America.

130. To the Chairman.—I did not go to America simply as a visitor, and I do not make this statement as a visitor. I went to America as an expert investigator on behalf of the Postmaster-General, for a definite purpose, and I went trained to observe. I went into their exchanges, and I examined the loads carried by the operators. My view is that, from top to bottom, better service is given in America. I again disclaim any intention of entering into the economic question. I am simply endeavouring to give the Committee the results of what I saw. The memorandum continues:—

34. Proceeding upon this basis, therefore, the following comparisons are indicative:—

35. Taking first the telephonists:—
The rate of pay in Australia averaged over the several capital cities is £28 per annum.

For this rate of pay the telephonists work at the rate of 37 hours weekly for 275 days a year.

This figure of 275 days annually is arrived at as follows:—

Days annually	365
Less—	
Sundays	52
Gazetted holidays	12
Annual leave	18
Average sick leave	8
	99
Net days work annually	275

The average day's work being 6½ hours, it follows that the hours worked annually are 1,635, and the average cost per hour—

Average salary (£28) = 13.87d.
1600

35. The relative figures for one group of companies in the United States of America are:—

Average salary assumed to be £25 per annum. This is thought to be in excess of the actual figure, as salaries range from 25s for beginners to £100 for the senior operators of longest service, in the highest paid companies in the larger cities. There is no compulsory minimum wage for adult telephonists in the United States of America.

Days	305
Less Sundays	52
National holidays	6
Leave	6
	64
	301

201 days at 8½ hours = 2,608 hours' work annually, or at a cost per hour's work of 0.03 pence.

37. That is to say, for each hour of work the Commonwealth pays over 50 per cent. more than these telephone companies in the United States of America. If this comparison were at all in the direction of reducing the difference in the rate of pay, for in the first year of service the American telephonist receives no pay for her recreation leave.

38. It is unnecessary to continue this comparison in detail, but the table which follows has been prepared on the same basis, and shows the rate of pay per hour

worked in Australia as compared with England and the United States of America for various classes of labour. (See Appendix "A.")

130A. Table B (also attached) shows telephone charges in other countries.

TABLE SHOWING COST PER NET HOUR'S WORK FOR TELEPHONISTS, MECHANICS, AND LINESMEN IN AUSTRALIA, ENGLAND, AND UNITED STATES OF AMERICA.

	Annual, Weekly, or Daily Rate of Pay.	Hours Worked per Week.	Hours per Annum on account of working pension rights.	Net Hours Worked available annually.	Cost per Net Hour of Work.	(Days.)		(Pence.)	
Telephonists.									
Australia	1st year, £29 2nd year, £32 3rd year, £34 4th year, £36 5th year, £38 6th year, £40 7th year, £42 8th year, £44 9th year, £46 10th year, £48 11th year, £50 12th year, £52 13th year, £54 14th year, £56 15th year, £58 16th year, £60 17th year, £62 18th year, £64 19th year, £66 20th year, £68 21st year, £70 22nd year, £72 23rd year, £74 24th year, £76 25th year, £78 26th year, £80 27th year, £82 28th year, £84 29th year, £86 30th year, £88 31st year, £90 32nd year, £92 33rd year, £94 34th year, £96 35th year, £98 36th year, £100	7-93	90	2,607-5	21-519	8	82	2,264	10-071
England	£1 per cent. has been added on account of working pension rights.	81	01	1,638	13-87				
U.S.A.—	Company A	15s. 0d. weekly to 37s. 6d. weekly	0	01	2,709	7-195			
Company B	Average, 6s. 8d. per diem	8	12	2,408	10-258				
Company C	Average, 6s. 8d. per diem	8	12	2,408	10-258				
U.S.A.—	Company A	9s. 6d. per diem to 11s. 6d. per diem	8	12	2,408	10-637			
Company B	Average, 9s. 6d. per diem	8	12	2,408	10-637				
Company C	Average, 9s. 6d. per diem	8	12	2,408	10-637				
U.S.A.—	Company A	6s. 3d. per diem to 11s. 6d. per diem	8	12	2,408	10-637			
Company B	Average, 9s. 6d. per diem	8	12	2,408	10-637				
Company C	Average, 9s. 6d. per diem	8	12	2,408	10-637				
U.S.A.—	Company A	2s. 6d. per diem to 3s. 6d. per diem	8	12	2,408	14-818			
Company B	Average, 3s. 6d. per diem	8	12	2,408	14-818				
Company C	Average, 3s. 6d. per diem	8	12	2,408	14-818				
Mechanics.									
Australia	1st year, £168 2nd year, £174 3rd year, £180 4th year, £186 5th year, £192 6th year, £198 7th year, £204 8th year, £210 9th year, £216 10th year, £222 11th year, £228 12th year, £234 13th year, £240 14th year, £246 15th year, £252 16th year, £258 17th year, £264 18th year, £270 19th year, £276 20th year, £282 21st year, £288 22nd year, £294 23rd year, £300 24th year, £306 25th year, £312 26th year, £318 27th year, £324 28th year, £330 29th year, £336 30th year, £342 31st year, £348 32nd year, £354 33rd year, £360 34th year, £366 35th year, £372 36th year, £378 37th year, £384 38th year, £390 39th year, £396 40th year, £402 41st year, £408 42nd year, £414 43rd year, £420 44th year, £426 45th year, £432 46th year, £438 47th year, £444 48th year, £450 49th year, £456 50th year, £462 51st year, £468 52nd year, £474 53rd year, £480 54th year, £486 55th year, £492 56th year, £498 57th year, £504 58th year, £510 59th year, £516 60th year, £522 61st year, £528 62nd year, £534 63rd 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TABLE SHOWING TELEPHONE CHARGES IN DIFFERENT COUNTRIES—continued.

Date.	Minimum Service.						Remarks.		
	Business.	Residence.	Business Minimum Charge.	Calls.	Extra Calls.	Residence Minimum Charge.			
Provinces ..	..	*8 0 0	0 0 0 8 15 0 9 0 0 1 0 0 10 16 0 14 8 0	500 1,100 1,900 1,900 2,200 4,000	7c. 6d. per 100 1c. per	5 0 0 5 0 0 5 0 0 7 0 0	200 500 500 500	*Calls to other Exchanges charges extra	
Fourth Africa—			10 8 0	2,000	..	0 11 0	2,000	..	There are intermediate charges for business service
First class Exchanges, Pretoria, Capetown and Witwatersrand systems.			7 10 0	900	1d.	5 0 0	600	1d.	Charged to compare with Australia
Local service ..			10 0 0	900	1d.	..	..	..	Each call over 5 miles counts as 2.
Area service ..			10 0 0	900	1d.	..	..	..	Each call over 10 miles counts as 3.
Second class Exchanges, Pietermaritzburg, Bloemfontein, Port Elizabeth, East London, Kimberley	10 0 0	5 0 0	..	..	..	..	..	..	..
Third class Exchanges with 15 subscribers and over	7 10 0	5 0 0	..	..	..	..	..	..	..
Fourth class Exchanges, under 15 subscribers	10 0 0	45 0 0	..	..	..	..	..	..	† 1 mile of line
Australia—									
In networks having a population of—									
From 1 to 10,000	..	..	3 0 0	None	1d.	3 0 0	None	1d.	} Cells over 2,500 half-yearly, 3 for 1d.
From 10,001 to 100,000	..	..	3 10 0	None	..	3 10 0	None	..	
From 100,001 upwards	..	..	4 0 0	None	..	4 0 0	None	..	
Assumed case, for comparison	..	..	8 3 4	2,000	..	..	..	..

The new telephone rates which are being changed in the city of New York show a considerable reduction on those hitherto current. The principle of measured service is not departed from, but in all classes of rates (except four-party lines) the minimum number of calls included free in the subscription has been raised, while the minimum charge has been reduced.

The most notable changes are as follow:—
Direct Lines.—Manhattan and the Bronx (the business district of New York). The old rates ran from an annual charge of £10 for 600 calls, £11 17s. 6d. for 800 calls, and so on up to £47 10s. for 5,700 calls. The new rates run from £3 6s. 8d. for 600 calls up to £23 6s. for 4,800 calls. Above this number additional calls may be purchased in blocks of 300 at 14d. each. Under the new rates, therefore, 5,700 calls would cost £10 18s. 9d., a difference of £2 1s. 3d. as compared with the old rates. An auxiliary line in future will cost £5 12s. 6d. instead of £6 6s. as formerly. Charges for excess calls above 2,500 will be 2d. instead of 2½d., and above 3,000 1½d. instead of 2d.

Under the old rates, Manhattan and the Bronx were divided into three districts, and calls between districts 1 and 3 cost 5d. each. Now the fee for a local call covers all calls in those districts.

Two-Party Lines.—These are now confined to residences only, and are not available in part of the Bronx.

The minimum charge is now £7 10s. for 720 calls instead of £8 16s. for 600 calls.

Four-Party Lines.—These were formerly available in a few places only; they now apply to part of Manhattan, Lower Bronx, and Brooklyn. They apply to residences only. New rate £3 6s. for 600 calls instead of £7 10s. as formerly.

It is noteworthy that the charges for party-line service, except for the minimum number of calls, are precisely the same as for direct-line service.

131. To Mr. Laird Smith.—A point that tends to decrease the cost of maintenance in America as compared with Australia, is that in America the custom is to employ one man who is capable of dealing with the various troubles that arise in connexion with the telephone service. This man is supposed to look after all troubles whether they occur on the lines or on the subscribers' equipment. With us, when a fault occurs, we have to make tests to find out where the trouble is, and very frequently we have to send a mechanic to the subscriber's instrument, and disconnect the instrument before we can say definitely that the fault is on the line. Then we have to send a lineman on to the line. Two men are thus employed on one job, and this naturally tends to increase our costs.

131a. To Mr. Sampson.—The classification of duties was fixed by the Arbitration Court, and is based on the practice in operation at the time the cases were taken to the Court.

132. To Senator Keating.—In regard to Appendix B, I have not made any comparison between London and Sydney, or London and Melbourne, because the conditions are so different. In London a penny a call is charged to subscribers within a certain area. Outside that area the charge is 2s. a call.

132a. To the Chairman.—I was asked also to show how the Australian system has developed per 100 of the population, and how that development compares with the experience of other countries. I beg to submit the following table, dated 1st January, 1914, showing that:—

Country and City (or Exchange Area).	Population estimated by or estimated by Exchange Area.	Number of Telephones.	Telephones per 100 of Population.
Japan—			
Kobe	440,700	5,800	1.3
Kyoto	620,000	15,100	2.4
Nagoya	447,051	9,500	1.3
Osaka	1,387,250	21,787	1.6
Tokyo	2,415,918	49,681	1.8
Yokohama	451,959	4,820	1.1
Netherlands—			
Amsterdam	525,000	17,212	2.0
The Hague	302,000	12,825	4.2
Rotterdam	460,000	15,600	3.0
New Zealand—			
Auckland	109,200	6,722	6.2
Christchurch	86,150	4,927	5.7
Norway—			
Christiania	247,468	20,600	8.4
Denmark—			
Copenhagen	435,000	5,301	1.2
Roumania*	338,000	4,263	1.5
Australia—			
Melbourne	591,600	8,750	4.3
Brisbane	100,000	6,671	4.2
Melbourne	671,400	27,100	4.2
Sydney	725,000	34,600	4.8
Austria—			
Lemberg	210,737	4,740	2.3
Pesgo	478,105	10,310	2.3
Trieste	293,292	5,324	2.2
Vienna	2,022,532	66,438	3.2
Belgium*			
Antwerp	499,329	8,620	1.6
Brussels	478,631	21,470	2.2
Ghent	291,603	5,638	1.0
Lige	339,537	6,660	1.5
Bulgaria—			
Sofia	103,000	1,660	1.3
Denmark—			
Copenhagen	621,000	65,680	8.9
France—			
Bordeaux	231,000	5,660	1.0
Lille	223,000	3,820	1.7
Lyons	547,000	7,930	1.5
Nantes	465,000	7,730	1.4
Paris	2,940,000	65,033	2.2
German Empire—			
Berlin	2,363,000	151,900	6.0
Dresden	515,000	20,673	3.8
Chemnitz	212,000	10,820	3.4
Cologne	529,400	20,422	4.0
Dresden	622,000	25,721	4.6
Dusseldorf	411,000	19,123	4.7
Essen	322,660	11,342	3.5
Frankfurt	445,000	28,922	6.5
Hamburg-Altona ..	1,310,000	77,322	5.9
Hanover	323,000	16,104	5.0
Leipzig	621,000	31,176	5.0
Hofburg	494,000	19,491	3.9
Munich	629,600	34,323	5.5
Nuremberg	507,000	16,221	4.2
Stuttgart	509,000	20,620	4.0
Great Britain—			
Belfast	475,000	8,650	1.8
Birmingham	1,145,000	19,780	1.7
Edinburgh	410,000	6,660	1.6
Bolton	335,000	4,171	1.2
Bristol	475,000	12,243	2.6
Bristol	475,000	6,620	1.4
Edinburgh	425,000	6,602	1.6
Edinburgh	425,000	6,602	1.6
Glasgow	1,160,000	40,840	3.4
Leeds	660,000	14,000	1.5
Liverpool	1,160,000	34,023	2.9
London	7,200,000	278,805	3.8
Bristol	1,265,000	31,443	2.5
Newcastle	620,000	11,501	1.8
Nottingham	470,000	8,774	1.8
Sheffield	716,000	11,331	1.6
Greece—			
Athens	167,000	851	0.5
Hungary—			
Budapest	600,000	27,044	4.5
Belgium	118,000	1,600	1.3
Italy—			
Milan	550,000	12,720	2.1
Naples	725,000	17,471	2.4
Palermo	349,000	1,780	0.5
Rome	628,000	11,719	1.9
Turin	428,000	6,517	1.5

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Ghent	291,603	5,638	1.0
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Bulgaria—			
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Paris	2,940,000	65,033	2.2
German Empire—			
Berlin	2,363,000	151,900	6.0
Dresden	515,000	20,673	3.8
Chemnitz	212,000	10,820	3.4
Cologne	529,400	20,422	4.0
Dresden	622,000	25,721	4.6
Dusseldorf	411,000	19,123	4.7
Essen	322,660	11,342	3.5
Frankfurt	445,000	28,922	6.5
Hamburg-Altona ..	1,310,000	77,322	5.9
Hanover	323,000	16,104	5.0
Leipzig	621,000	31,176	5.0
Hofburg	494,000	19,491	3.9
Munich	629,600	34,323	5.5
Nuremberg	507,000	16,221	4.2
Stuttgart	509,000	20,620	4.0
Great Britain—			
Belfast	475,000	8,650	1.8
Birmingham	1,145,000	19,780	1.7
Edinburgh	410,000	6,660	1.6
Bolton	335,000	4,171	1.2
Bristol	475,000	12,243	2.6
Bristol	475,000	6,620	1.4
Edinburgh	425,000	6,602	1.6
Edinburgh	425,000	6,602	1.6
Glasgow	1,160,000	40,840	3.4
Leeds	660,000	14,000	1.5
Liverpool	1,160,000	34,023	2.9
London	7,200,000	278,805	3.8
Bristol	1,265,000	31,443	2.5
Newcastle	620,000	11,501	1.8
Nottingham	470,000	8,774	1.8
Sheffield	716,000	11,331	1.6
Greece—			
Athens	167,000	851	0.5
Hungary—			
Budapest	600,000	27,044	4.5
Belgium	118,000	1,600	1.3
Italy—			
Milan	550,000	12,720	2.1
Naples	725,000	17,471	2.4
Palermo	349,000	1,780	0.5
Rome	628,000	11,719	1.9
Turin	428,000	6,517	1.5

* Statistics as of 1st January, 1913.
 † Statistics as of 31st March, 1914.
 ‡ Statistics as of 23rd June, 1913.
 § 70 per cent. of this development is secured by a private company.

Following on the same question, Senator Keating asked for information about party lines. I find that in American cities of over 500,000 population, 22 per cent. of the telephone subscribers have individual lines. In smaller cities, having populations of 350,000 to 500,000, 37 per cent. of the subscribers have individual lines. In Australia, 30 per cent. of the subscribers have individual lines, due, in my opinion, to the fact that we make too small a difference between the rate for an individual service and the rate for a party line. Probably the low American percentage is due to the system of living in residential quarters. In Chicago, 56 per cent. of the subscribers are on party lines; in Cleveland (Ohio), 48 per cent.; San Francisco, 38 per cent.; Grand Rapids, 23 per cent.; Allentown, 66 per cent.; and Toledo (Ohio), 74 per cent. It seems to be recognized in America that the individual service is costly, and I should prefer the party line because it can be obtained at very much lower rates. It should be borne in mind that in Great Britain the party line is not the only charge the subscriber has to bear. It has to guarantee to take calls up to a certain value annually, in addition to paying his ground rent.

133. To Mr. Laird Smith.—It is not easy to make a comparison between Australia and New Zealand. The first rates operate in New Zealand, and there was no exchange with ours that I know of until 1911. I saw the statistics. The latest return I have (for the year 1914) gives

Auckland as 7,268 and Wellington as 6,584 telephone stations. There is nothing in New Zealand to compare with either Sydney or Melbourne. So far as I know there is nothing in the world to compare with Sydney. I should like to make this point clear in connexion with the subject of telephone charges, that we in Australia give more for the money than any other country. For instance, a subscriber in the Sydney area can speak from Wahroonga in the north to Liverpool in the south—over a distance of something like 30 miles of telephone construction necessitating the employment of two or three exchanges—for 4d. I am not going to attempt to justify the charges which operate in Sydney. I do not think the principle of their application is right, but the principle was in existence in pre-Federation days, and has not been altered since. Protest has been made against these charges time and time again by various branches of the Postmaster-General's Department, but they continue. No country in the world gives such a service as that at a charge of 4d. per call.

134. *To Senator Keating.*—I know that in Tasmania trunk-line fees are charged in many cases for a conversation over 10 miles. The same thing happens in Melbourne. If a subscriber desires to talk over 12 miles down the bay he has to pay. But anomalies are bound to crop up under almost any system. In America they are well-defined areas in which conversations can take place without trunk payment, but it is worth while noting that in San Francisco the charge for a conversation from one side of the bay to the other, over a system no more costly than that connecting Sydney with North Sydney, is 15 cents. For a similar conversation in Sydney 4d. would be charged.

134a. *To the Chairman.*—I was asked a question regarding the general efficiency of the Perth Telephone Exchange—I have with me the returns for the last month showing the number of calls effected between Fremantle and Cottesloe, between Perth and Fremantle, and between Cottesloe and other centres. The percentage of effective calls from Perth on various days was 87 per cent., 84.8 per cent., 89.78 per cent., 85.1 per cent., and 90.4 per cent. From Fremantle to Perth the percentage of effective calls on various dates was 85.7 per cent., 88.08 per cent., 83.4 per cent., 84.2 per cent., 97.8 per cent., on the same days and under the same conditions. The efficiency of the automatic service in Perth was tested while I was in Perth, when the service was not working as well as it is working now, and the percentage of effective first-time calls was 93.55 per cent. These figures were obtained either by our officer calling in the presence of the subscriber, or by the subscriber calling in the presence of our officer. In both cases the return was initiated by the subscriber. The suggestion that this should be done was made by the Chamber of Commerce, so that there should be no question about the accuracy of the return, and I do not think the figures are such as we need be ashamed of. For the information of the Committee I may say that a number of people, such as the Hon. Marsh and others, present to the Department occasional reports of their experiences. I have three such reports with me now, but I do not propose to put them in because their experience is similar to our own.

135. *To Mr. Frston.*—I think our system of automatic telephones compares very favorably with any automatic system that I have seen in any part of the world. Speaking generally, apart from the unfortunate experience at the beginning

of the Perth system, our automatic experience has been satisfactory, though we had one unfortunate experience in Sydney.

135a. *To the Chairman.*—At a previous meeting of the Committee a question was asked with regard to the listening and observation service. Listening is necessary for various reasons—to observe the character of the service to the public, to enable us to check errors made either by the public or by our own operators; to obtain accurate statistics without which we could not design exchanges; to obtain statistics as to the calls answered by the operator, and the calls answered by the subscriber; to ascertain the frequency with which lines are reported to be busy, so that we may approach subscribers and ask them to get additional lines; to detect troubles in services on subscribers' lines, and to remove them before they give the subscriber cause for complaint; to settle disputes as to the correct registration of calls and as to the improper use of the service by unauthorized persons; to obtain information as to the holding times of junction lines, that is to say the time during which a junction line is engaged for conversation purposes. For these reasons I very strongly urge that the present system of observation be not interfered with in any way.

136. *To Senator Keating.*—These are observations on the service which must not be confused with observations on servants. The latter is quite distinct from the former, to which I am referring.

137. *To the Chairman.*—The *Telegraph and Telephone Journal*, for February, 1914, contains an article on the subject of automatic telephones, showing the systems introduced in various exchanges in Great Britain, and the experience obtained with them. This journal was forwarded to the High Commissioner by the Secretary to the General Post Office, London, under cover of a letter dated 12th August, 1915, and was forwarded to the Secretary of the Postmaster-General's Department, Melbourne, by the High Commissioner, with letter dated 16th August. The file number is G.15/16747. The report is favorable to the introduction of automatic service.

138. *To Senator Keating.*—It is probable that some of the troubles that have already occurred with the automatic systems have been due to the presence of dust in the mechanism. One of the best known automatic companies is now supplying switchboards with a separate cover for each switch, in order to get over the dust difficulty. The apparatus has been offered to the Commonwealth Government, but none is in operation at present, though the installation does not add greatly to the original cost. Every possible step is being taken at the present time to deal with the dust, but the difficulty is to get dust out of the small crevices. It has to be blown out first and picked up afterwards. I do not think there is any doubt that the more effectively the dust is dealt with the greater will be the accuracy of the mechanism. I have dealt with the subject of ground rents charged in other countries in the tables already submitted, under the general heading of "minimum charges." In some countries a minimum charge is imposed for a small number of calls. The minimum rate in Australia is £3 per annum based upon a population of 10,000 in the exchange area. The rate where the population is from 10,000 to 100,000 is £3 10s., and where the population exceeds 100,000 the charge is £4. The difference in these charges is not very great and it does not correspond to the difference in the cost of giving service, or to the difference in the facilities offered. The basis I have always regarded

as the correct one upon which to charge for telephone services is the cost of that service, particularly in a city. That principle may be interfered with in country districts for economic reasons, but in a city I think it is indisputable that the charges should be based upon the cost of the service. Therefore the difference between the charge of £4 in Sydney and that of £3 in smaller areas is not sufficiently great. I do not think, for instance, that the comparison between the charges in Sydney, where a subscriber pays £4 a year, plus 4d. per call, and the charges in Burnie, where the subscriber pays £3, plus 4d. per call, is fair to the latter place, nor do I think these relative charges are defensible.

Some of the companies operating telephone systems in the United States of America are in competition, but the principle of competition is falling into disfavor. There is a change coming over public opinion in its attitude towards telegraphs and telephones. The tendency is to view both as utilities of a national rather than a municipal character. But whilst the question of public ownership is being discussed, there does not seem to be any indication that public ownership will be adopted. The idea seems to be that the telephones shall be publicly controlled by regulation rather than publicly owned. The fact that in Australia it will shortly be possible to communicate by telephone from Brisbane to Adelaide will be largely due to the circumstance that the telephone is national in its character and administration. In America, the Bell Company, which owns the trunk-line system is compelled to throw its trunk lines open to the various smaller companies. I know it is possible in certain districts to speak on the trunk line to a distant State though I do not know whether it is possible to do this in all the States. In those American cities where two telephone companies are in competition, many subscribers are attached to both companies, so that the competition has led to a duplication of service. The American companies are established for profit, and so far as I was able to observe they fare very well. The Bell Company advertises very extensively and carries on its business in Canada, but I do not desire to stress the point that these American companies are out for profit for the reason that the Postmaster-General's Department is expected not to make a loss. At the same time I should like to see the same degree of economy and efficiency as is attained by the Bell Company attained in Australia. I do not think the outlay of the Bell Company is greater than that of the Commonwealth, for all the conditions go towards making our system the more costly. Besides which, the denser the area served and the bigger the demand tend to lighten the cost of line construction. In this respect our costs in both Sydney and Melbourne are great because we have such a large amount of unremunerative capital expended. As the system grows our costs will be reduced. The stocks maintained by the Bell Company are not so great as ours, because the Bell Company is able to direct upon cost of line construction at short notice. We cannot do that. They can order the cables they require for any job at short notice. We have frequently to order cables for a year in advance. I have heard of Mr. Goldman, the chairman of the British Parliamentary Telephone Commission. The statement made by that gentleman in an article in the *Nineteenth Century* to the effect that the Bell Company had in stock \$25,000,000 worth of reserve plant waiting for the development of their service to require it, does not, I think, refer to stocks of material but to spare conduits, spare cables, &c. It includes buildings, switchboards not yet filled,

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cables, &c. I have seen a building prepared to hold another switchboard when the time comes to put it in. The Bell Company provides switchboards capable of accommodating an increased number of subscribers. It is because of this preparation that new subscribers can be accommodated so quickly. In New York anybody can be connected to the telephone service within 24 hours. I do not know on what basis the statement in made in the *Nineteenth Century* article that the United States adds to its service annually as many telephone calls as are included in the entire English system, or that the mileage of her telephone circuits is increased by a distance greater than that between England and Australia. In the figures I have given, however I have shown that in twelve cities of over 500,000 population the average is 11.3 telephones per hundred of population. That means one for every nine people, and taking the family group at five, the figures would show one telephone for each adult family. It may be true that for a charge of from 9d. to 1s. per week American companies have put 500,000 farmers in direct telephonic touch with each other and with their markets. In Australia we provide a similar service for less than that sum. There are instances in New South Wales where twenty farmers' instruments are connected with one line. The charge for the first portion of that line, say, 2 miles of construction, is £3, and for each additional instrument an additional charge of 10s. is made. So that the cost among twenty subscribers would be £13, plus 3d. per call within their own exchange. Regarding trunk line charges, which in Germany are very low, our service is better and cheaper than in Germany. The trunk line charges in the United States are higher than in Australia. I know that more than one plant worth thousands of pounds has been "scrapped" by United States companies in order that a few pounds might be saved on a trunk call. I do not know whether the same is true of Germany.

It is inevitable that during the busy hours of the day delays should sometimes occur in regard to trunk line calls as between Melbourne and Geelong. This could be remedied by the expenditure of more money, but I do not think that expenditure would be justified in order to prevent one or two per cent. of the calls having to wait an hour. An outstanding fact in regard to trunk line calls is that nothing is heard of the 90 per cent. of calls that go through promptly and efficiently, but everything is heard about the few per cent. which do not. In Geelong the percentage of calls which go through without delay is a big one. The only way of overcoming the difficulty in busy times is by increasing the number of wires, for we are now working these lines as efficiently as our traffic officers know how. In America trunk line delays have been reduced by an increased number of lines, but in order to meet the increased capital and maintenance charges the charges for trunk calls have been increased. The question of introducing a system of increased charges for an immediate connexion has been considered, but discarded because it seemed too like giving the man who could afford to pay an extra charge an advantage over the man who could not. Trunk line delays have not been appreciably reduced by the establishment of the automatic system in Melbourne. The Geelong trunk line is already worked on the automatic system. When the measured service was introduced the question of establishing a flat rate for residence was discussed. It was then pointed out that there are some business lines making calls up to 100 per day over one line, and others with

only one or two calls per day over one line. There are some residences making up to 60 calls per day over one line, and there are others not averaging a single call per day. How could we justify a flat rate for a residence making 60 calls per day when a business man, making only two calls per day, would have to pay higher measured service charges? As I have said, my contention is that the basis of the charge should be the cost of providing the service, and the cost of supplying a service to a residence is the same as the cost of supplying a service to business premises.

139. *To Mr. Finlayson.*—I have not any figures showing revenue comparisons at manual and automatic exchanges. In the figures I have already given, I have assumed the revenue to be the same in both cases. According to figures quoted on pages 89 and 90 of the fourth annual report, the loss on Sydney telephones is approximately £3 8s. per line. By the introduction of the automatic system the most that can be expected is a reduction of that loss by £1 8s. per line. There will still be a deficit when automatics are introduced.

Appendix to Mr. Hesketh's evidence.

With the consent of the Committee, the following additions are made to Mr. Hesketh's evidence:—

1. On the departmental file dealing with the estimate for the new Sydney City Exchange the Deputy Postmaster-General, Sydney, was asked to arrange for the Electrical Engineer, when giving evidence before the Committee, to draw attention to the fact that the estimated cost of subscribers' equipment in the new area covered simple subscribers' only. The cost of any private branch exchange equipment was not included, as it is difficult to forecast the extent to which it will be used. I gather that when Mr. Nelson gave evidence before the Committee this fact was not mentioned.

2. With reference to Senator Keating's questions as to delays in connexion with the traffic between Geelong and Melbourne, the following statistics have since been obtained:—For the 18th, 19th, and 20th October, 1915, a total of 833 calls passed from Geelong to Melbourne and Melbourne to Geelong. Of these 722, or over 73 per cent., were connected within five minutes; 22 were delayed beyond this period from causes beyond the Department's control, as, for instance, the called number being engaged, the called number did not answer, or a messenger being required to send for the called persons; leaving 163 calls delayed beyond five minutes because of the trunk lines being engaged. Only 3 per cent. of the total number of calls were delayed more than 30 minutes, and this 3 per cent. included calls delayed from causes beyond the Department's control.

(Taken at Melbourne.)

FRIDAY, 15TH OCTOBER, 1915.

Present:

Mr. RILEY, Chairman;
 Senator Keating, Mr. Gregory,
 Senator Story, Mr. Sampson,
 Mr. Fenton, Mr. Laird Smith,
 Mr. Finlayson,

Thomas Hill, Engineer, Department of Home Affairs, sworn and examined.

140. *To the Chairman.*—I produce drawings, Nos. 1 and 2 being plans and elevation of the Richmond-Collingwood automatic telephone exchange. The estimated cost is £49,000. The plans have been approved, subject to a memorandum of the Postmaster-General's Department, dated 1st April, 1915, stating—"Designs of buildings, proposed exchanges, will be determined in many respects by the form of equipment decided upon, and for this reason it is considered undesirable to proceed with the buildings in advance of the placing of the equipment contracts." The design

is for a two-storied building in brick of the usual type, with corrugated iron roof, steel principals, concrete floors, and steel casements. The foundation is sufficiently strong to take one extra story.

141. *To Mr. Finlayson.*—If an extra story were built the walls would require to be stiffened, that could be done by the addition of piers.

142. *To Mr. Sampson.*—We have sufficient land on the site to give light all round the building, as it is a corner block. There is a building at the back, about 30 feet distant from the Commonwealth land. It will not interfere with the proposed exchange in any way. The exchange will be built right on the street alignment, on the angle of Glasgow and Wellington streets.

143. *To Mr. Finlayson.*—Accommodation will be provided on the ground for its use as a cable room, for lifters, for the mechanical branch, and for certain of the linemen, while the upper floor will be devoted wholly for exchange purposes. The building will be 97 feet long by 45 feet wide. As far as possible means have been taken to meet the dust trouble. There will be a separate staircase, which is considered necessary as a precaution against fire. I think the arrangement you saw at Geelong is the best proposal to overcome the dust nuisance. It is practically impossible to make an exchange building dust proof, and at the same time provide the necessary ventilation unless you adopt some expensive mechanical means of passing all the air with fans through a spray. There will be some vacant land after the proposed building is erected. We obtained a large area for the purposes of isolating the building from surrounding places as much as possible also to insure reasonable air and light space, and to provide for future extensions if necessary, and to furnish accommodation for the linemen's sheds and general postal purposes. At present there is only an ordinary depot in the railway station yards. I understand that will be retained, but this is hardly big enough for poles. I think the proposal to erect the building up to the street alignment is better than setting it back several feet, because by this plan we can make provision for extensions towards Northumberland-street. So far as the metropolitan area is concerned I do not favour an attempt to provide lawns around a Government building. I do not think it will be satisfactory in regard to this particular building, because in summer the north wind sweeps along Wellington-street, and unless you have a large area of green it would not be satisfactory. My experience is that in metropolitan areas small grassed plots in front of public buildings usually become receptacles for old newspapers and street sweepings.

144. *To Mr. Fenton.*—The angle roof which it is proposed to erect on this building is cheaper than a flat roof. I remember having a talk with Mr. Murdoch about eighteen months ago on the subject of flat roofs, which I rather favour, but I have not been in touch with this work for some time, and apparently the Department has gone back to the angle roof scheme. I am aware that in most up-to-date factories the flat roof is favoured, and when I talked the matter over with Mr. Murdoch I had in mind the fact that a flat roof would render fire fighting more efficient. A flat roof, however, would be more costly, because it would be necessary to stiffen up the steel principals, and on a building of the class proposed for the Richmond-Collingwood exchange I think it would add about £500 to £600 to the cost.

145. *To Mr. Sampson.*—We have had under consideration some such proposal as was mentioned by Mr. Diercks to make the exchange com-

partments dust proof, but nothing has been decided upon yet. I think it is more desirable to protect the vital parts of an exchange with glass screens, as is done at Geelong, than to attempt to render the whole building dust proof.

146. *To the Chairman.*—It is proposed to have a fibrous cement ceiling to the roof of the exchange room. I produce also drawings and plans of the proposed automatic exchange at Malvern, estimated to cost £5,000. We are obtaining approval for this building. Funds are available, and work could be put in hand at once if approval were given. It will be a similar class of building to the proposed Richmond-Collingwood exchange, namely, two-storied, and roughly 100 feet by 45 feet, with a cable room, workshop, lunch, and cloak rooms on the ground floor, and the first floor devoted to exchange work. It will be a brick building with corrugated iron roof, concrete floors, steel principals, and steel girders to carry the first floor. The building is not designed to carry another storey, but provision is made for extension to double the capacity if the business should warrant it. The building does not occupy the whole frontage, but provision will be made for a light area 10 feet wide, and an entrance for vehicles. The building could be extended 60 feet at the rear. It is proposed to erect it right out on to the footpath. This is considered the best course, because while the site is in a residential area at present, it will not be long before it will become a business locality with shops built right on to the footpath alignment, and if we had the telephone exchange set back from the street line, it would be, to some extent, hidden by the adjoining buildings.

147. *To Mr. Finlayson.*—It will be possible, of course, to put the building back a few feet, but in a district like this I would recommend that the plan to have it up to the footpath alignment be carried out, because if it were set back, say 12 feet, and later on adjoining buildings came up to the street line, there would be a dust pocket

erected right in front of the exchange building. It would be more economical later on to extend the building at the rear than at the front.

148. *To the Chairman.*—The ceiling to the exchange room will be of fibrous cement, as in the case of the Richmond-Collingwood exchange. The dining room will be about 24 feet by 15 feet. This is not a large room, but it must be remembered that it will be an automatic exchange, and therefore require less attendants.

149. *To Mr. Fenton.*—In this case, a brick building would be cheaper at Malvern than a reinforced concrete structure.

150. *To Mr. Finlayson.*—It would cost between £600 and £800 extra to have a flat roof. For exchange purposes a flat roof would give no added value.

151. *To the Chairman.*—It would take between four and five months to erect a building of this description.

152. *To Mr. Fenton.*—We are prepared to start with the work, but we are held up by the memorandum of the Postmaster-General's Department, of 1st April, 1915, to which I have referred.

153A. *To Mr. Gregory.*—It would not be necessary to prepare the specifications, but we would require about three weeks to get out the quantities and call for tenders. A quantity surveyor would require at least a week to carry out his duties, and I would prefer about three weeks' time in which to call for tenders.

153. *To Senator Story.*—I think we could carry out this work quite as cheaply departmentally as by the contract system.

154. *To Mr. Sampson.*—I cannot give off-hand comparisons based on past experience as to how the contract system stands in regard to departmental work, but I prepared a list of works some time ago giving information on this matter. The great difficulty is to get comparisons of actual tenders and work carried out.