

1856-7.

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VICTORIA.

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# ELECTRIC TELEGRAPH.

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REPORT OF THE SUPERINTENDENT OF THE ELECTRIC TELEGRAPH  
OF THE PROCEEDINGS IN CONNECTION WITH THE ESTABLISH-  
MENT OF LINES OF ELECTRIC TELEGRAPH, TO 31ST DECEMBER,  
1856.

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PRESENTED TO BOTH HOUSES OF PARLIAMENT BY HIS EXCELLENCY'S COMMAND.

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By Authority:

JOHN FERRES, GOVERNMENT PRINTER, MELBOURNE.

# REPORT.

Telegraphic Department, General Superintendent's Office,  
Melbourne, 31st December, 1856.

In compliance with the request of His Excellency Major-General Macarthur, the Officer administering the Government at the date of your Despatch of the 13th ultimo, I do myself the honor to submit for the information of His Excellency the Governor, the following detailed report relative to the branch of the public service under my charge.

On the 10th of November, 1853, I was directed by His Excellency C. J. La Trobe, Esquire, to proceed with the construction of a line of electric telegraph to connect Melbourne with Williamstown. This work I successfully completed and placed in operation in the month of February, 1854, but owing to the absence of office accommodation the line was not publicly opened until the 3rd of March; and pending the introduction of the *Electric Telegraph Act*, 17 Victoria, No. 22, no charge was made for the transmission of messages by the public, until the 1st of May following,—after which date a charge of two shillings and sixpence for the first ten words of any private message (date, address and signature not counted) and threepence for each additional word, was collected, upon the transmission of such messages to or from Williamstown. Although this might at first seem comparatively a high rate, yet taking into consideration the nature of the facilities afforded and the circumstances of that portion of the public most benefitted by the use of the electric telegraph, the charge could scarcely be considered other than reasonable.

In the month of September, 1854, an extension of the line was commenced, and on the 5th of December following, communication with Geelong was established; the line from Geelong to the Heads having been in progress simultaneously, communication with Queenscliff was opened on the 30th of January, 1855; a branch line from Melbourne to Sandridge was also completed and placed in operation on the 1st July, 1855, so that at this period there were in operation 72 miles of line, as follows:—

Melbourne to Geelong via Williamstown	...	...	...	50 miles
Geelong to Queenscliff	...	...	...	20 "
Melbourne to Sandridge	...	...	...	2 "
Total	...	...	...	72

The following revised regulations and scale of charges were published on the 9th December, 1854, taking effect at the date of opening the line to Geelong.

## REGULATIONS.

1. No charge will be made for the date, address, or signature to any message.
2. Messages must be written with ink, in a clear and legible manner, and bear a proper date, address, and genuine signature.
3. Messages will be delivered free of charge within one mile of the office; over that distance portorage will be charged; and on messages to be delivered on shipboard an extra charge to cover boat expenses will be made.
4. Messages will be transmitted in the order of their reception, and no precedence will be allowed in transmission, except for Government Despatches, the Police service, and in cases of sickness or of death.
5. All messages will be held strictly confidential.
6. Payment of charges in advance will be required, except for replies to interrogatory messages, on which may have been written the words "Reply paid for."
7. To lessen, as much as possible, any liability to error in the transmission of messages from defective manuscript, it is desirable that the use of figures should be avoided, and that

words at length be substituted; and the public, in using the electric telegraph, are requested to be particular in giving a full and correct address to every message, so that no delay in delivery may occur.

#### SCALE OF CHARGES.

For any distance under ten (10) miles, one shilling and sixpence for the first ten words, and one penny for each additional word.

Over ten and under twenty (20) miles, two shillings for the first ten words, and twopence for each additional word.

Over twenty and under fifty (50) miles, four shillings for the first ten words, and threepence for each additional word.

Over fifty and under one hundred (100) miles, six shillings for the first ten words, and fourpence for each additional word.

The offices will be kept open for the transaction of business by the public generally, between the hours of 8 30 A.M. and 8 P.M.

These regulations and scale of charges are still in force, but I propose making some important changes in the latter upon the completion of the lines at present in progress, and to which I shall have occasion to refer in the course of my report.

The increased advantages thus afforded to the public by the facilities of electric communication have been readily availed of, and the value of this agent as a means of rapid correspondence, effectively developed in the various uses to which it is applied, by nearly all branches of our mercantile and professional population.

A reference to the financial return, marked B, will clearly illustrate this point, where a comparison may be drawn between the return for the month of November, 1854, and that for the month of December following, on the 5th of which latter month, as already stated, the line was opened to Geelong.

The system adopted in working, and the method of constructing the lines in this Colony, are essentially the same as have been employed in establishing lines throughout the provinces of Canada and the greater portion of America; their simplicity and peculiar adaptability to a new country having influenced me in introducing a like system and method here.

The instrument I have adopted is known as *Morse's Recording Telegraph*. A brief written description of the apparatus may therefore be of some interest; and as the arrangement is exceedingly simple, I will endeavor to render it intelligent without the aid of plates or diagrams, and avoiding as much as possible all technicalities.

Preparatory to a description of the apparatus, it may be advisable to say a few words respecting the construction and application of the *battery*, which is composed as follows:—a pint glass tumbler is filled to about two-thirds of its capacity with a solution of diluted sulphuric acid; within the tumbler is placed a stout cylinder of cast zinc, having at the upper end a projecting arm about three inches in length; within the zinc cylinder is placed a small porous cup made of unglazed earthenware; this cup is nearly filled with nitric acid; a narrow strip of thin platina is soldered to a conducting wire, and the platina immersed in the nitric acid; another conducting wire is attached to the arm of the zinc, and a single cell, as it is termed, of Grove's battery is thus complete. When it is desirable to increase the battery, additional cells are added by soldering a slip of platina to the projecting zinc arm; the platina then dips into the porous cup of the adjoining cell: and so the arrangement may be increased to any desired number of cells, one conducting wire being attached to the *first* platina in the series, and the other conducting wire being attached to the *last* projecting zinc arm. In working this form of telegraph, two distinct batteries are used: one is known as the *main* battery, consisting of a series of cells greater or less in number, according to the extent of wire to be traversed or the resisting force to be overcome; the other, the *local* battery, consisting of only one or two cells, is used for operating the pen lever of the registering instrument.

Each complete instrument consists of three distinct parts, combined in two galvanic circuits—the *signal or transmitting key*, the *relay or receiving magnet*, and the *register or recording apparatus*.

The key is simply a small horizontal brass lever, about four inches in length, having near its centre a blunt point, below which is placed a similar point called the anvil. The lever is

maintained in a slightly raised position by means of a spring, so that, upon moderately pressing the ivory knob attached to the end of the lever, the two points are brought into contact; upon removing the pressure the spring instantly raises the lever to its former position. By the use of this portion of the apparatus the main circuit between each office is completed or broken at pleasure—one termination of the main wire being attached to the lever itself, and the other to the anvil, it follows that when the two points are apart the *current* passing on the main wire is interrupted, and when the contact is made, by pressing them together, the circuit is once more completed. By thus interrupting and completing the circuit at certain intervals, and making contacts of varied duration, letters, words, and sentences are formed by the aid of the relay and the register, with its fillet of recording paper.

The *relay* is a small instrument consisting of an electro-magnet, the coils of which are formed of fine copper wire (No. 35), insulated by a silk covering; the armature of the magnet is attached to an upright lever, at the back of which is fastened a sensitive adjusting spring; the helices or coils containing cores of soft iron being placed horizontally, and the upright lever with the armature being placed opposite to the faces of the helices. The lever is attracted by the temporary magnetism inducted into the cores by the passing of a galvanic current through the coils, the passage of which current is entirely regulated by the motions of the signal or transmitting key. The upper end of the lever carries a connecting point, opposite to which (and so placed that they may come into contact on the armature being attached, and again separate on the back spring of the lever withdrawing the armature) another connecting point is placed. To each of these points is attached the terminations of a single-conducting wire from either pole of the local battery; its continuation being attached to the magnet of the register, through which the local current passes back by a return wire to the battery.

The *Register* or recording instrument, is a simple arrangement of a few clockwork wheels, which regulate the motion of two rollers slightly pressed together by a spring. The upper roller has a small groove around its centre, to admit the indentation of the point of the pen lever. A weight or spring is employed to move the wheels at an uniform rate, and a narrow slip of white paper is drawn through between the rollers. Nearly on a level with the lower side of the upper roller, is placed a horizontal spring-balanced-lever, carrying at its end next the roller a small upright steel point or pricker, corresponding to the groove, and at its other extremity the armature of an electro-magnet, below which is placed the electro-magnet itself, to which reference was made in describing the *relay*.

One of the conducting wires of the *main* battery having now been connected with the earth, the other is attached to the anvil of the key, continuing on from the lever to one side of the relay and passing out at the other to the main conducting wire on the tops of the posts, it reaches the distant station, enters at one side of the relay, passes through it to the key, thence again to the earth for its return current. The signal key being now pressed and released at either station, an effect is instantly produced, for the circuit being completed through the signal keys and coils of the relays, they in turn complete the local circuits through the magnets of the registers, which acting upon the armatures attached to their pen levers, immediately produce an impression upon that portion of the paper pressed into the groove in the upper roller by the point of the steel pricker. A line may be made by a moderately lengthened pressure upon the key: a dot by a single touch, or instant closing and breaking of the circuit; and a space by a brief pause. Many forms of alphabet are employed, but the one most generally adopted and at present in use upon the Victorian lines is as follows:—

#### ALPHABET.

a ---	h ----	o --	v ----
b ----	i --	p ----	w ----
c ---	j ----	q ----	x ----
d ----	k ----	r ---	y ----
e -	l ----	s ---	z ----
f ----	m ----	t --	& ----
g ----	n ---	u ----	&c. -----

## NUMERALS.

1	-----	6	-----
2	-----	7	-----
3	-----	8	-----
4	-----	9	-----
5	-----	0	-----

## PUNCTUATION.

,	Comma	-----	?	Interrogation	-----
;	Semicolon	-----	!	Exclamation	-----
:	Colon	-----	( )	Parenthesis	{-----}
.	Period	-----	" "	Quotation	{-----}

It will be observed from the arrangement of these characters that simplicity of combination has been much regarded, and they may readily be committed to memory after a little attention; but of course much depends upon the mental inclination and taste in acquiring the method of working the instruments. Some have become proficient after a few days study and practice; others again have occupied weeks and months before properly attaining even a medium degree of efficiency in this branch. The usual speed of transmission is about thirty words per minute; but messages are often passed with much greater rapidity by using the code of abbreviations in forwarding press intelligence.

The object of the instrument called the *relay* is to cause the weak and partially exhausted current of the *main* battery to bring into action the more energetic current of the *local* battery, operating on the pen lever of the recording instrument; for the strength of current from the main battery, after it had traversed the sinuosities of the conducting wire, and perhaps had overcome the resistance offered in passing through several intervening *relay* magnets, would not retain sufficient strength, if applied *directly*, to work the pen lever and indent the register paper; therefore, the employment of the delicate relay magnet and the local battery, which perform their work with the utmost efficiency. This is known as Morse's combination of circuits.

In working the instruments, the pen lever, by its motion in striking firmly upon a small brass sounding pillar, at the same time that it marks the paper, gives out one or more clear distinct raps as each letter or word is being transmitted. These noises are quite intelligent to persons thoroughly conversant with the system, and *reading* by sound, as it is termed, is not an uncommon accomplishment of the expert telegraphist. Each office has a distinguishing call or signal of one or more letters, by which attention is attracted through the signal key of any other office. The long, narrow ribbon of white paper upon which the messages are recorded is dated every morning, in order to facilitate the re-transcribing of messages to which reference might at any future period be desirable. When the register paper has been quite filled up it is labelled and filed away.

In other countries it has frequently happened that, in cases of dispute, a record of this permanent character, containing the daily register of telegraphic correspondence, exactly written by the instrument itself, perhaps years previously, has rendered important service in effecting decisions where the original despatch had been either lost or destroyed.

Communication by means of private cipher codes is often adopted, not only for the purpose of economising expense, but also to avoid the necessity of admitting the telegraphist to the secrecy of a special message. I need only observe however that the latter objection may readily be obviated, when I state that plainly written despatches may be transmitted correctly in any language using the Roman letters, without it being at all necessary that the manipulators who transmit or receive the messages should be familiar with the various languages employed.

In constructing the lines I have been careful in making a selection of the most durable descriptions of native timber for posts; and having ascertained, after considerable investigation, that the woods commonly known as blue gum, red gum, white gum, stringy bark and iron bark, were the best adapted for the purpose, I have used these woods exclusively, excepting in the short line between Melbourne and Sandridge, the posts of which are all of Baltic deal.

The measurement of each post is usually twenty-five feet in length, by six inches square at the base, tapered to five inches at the top; the base of the post is thoroughly charred over five feet six inches of its length and covered with a preparation of hot coal tar as a preservative; holes for the posts are excavated to a depth of five feet, by means of earth augers of such size as to leave merely sufficient space around the post after it has been placed in position to wedge it firmly, the surrounding earth not having been disturbed in excavating with the auger, the use of this instrument being on this account greatly superior to the ordinary means, besides being much more economical in point of time. The posts are set out at distances of fifty-eight and two-thirds yards apart, constituting thirty to the mile.

The form of insulator employed is that known as the "bell pattern;" the insulators are manufactured of the best quality of hard-baked and highly glazed earthenware, and the principle of action is exactly similar to that of an umbrella while upheld by the hand during a shower of rain, the handle or supporting pin of the insulator being preserved quite dry under the projecting lip or flange, thus affording as nearly perfect an insulation against the escape of current from the wire to the posts, as I have ever known to be used.

A single conducting wire only of number 6 galvanized iron is employed, and in the present stage of the department I find this to be quite sufficient to meet all ordinary requirements. In connection with this branch of my subject I may mention that two of the latest improved double acting Morse instruments, manufactured by Siemens O'Halske, of Berlin, have been provided; the peculiarity of their arrangement consisting in their capability for transmitting simultaneously two distinct messages in contrary directions upon a single wire. As these instruments, however, are only really valuable between important terminal stations, where no intermediate station occurs, or where such stations are excluded from the circuit, I do not contemplate introducing them immediately, except in the single acting form.

Having now described the means I have adopted in constructing and working the lines, I propose to exhibit by a financial statement the practical benefits which are derived from the establishment of the electric telegraph; and also to afford a comparative view of the results which may be naturally anticipated upon the greater extension of this invaluable adjunct to commercial intercourse.

STATEMENT shewing the general business of the TELEGRAPH DEPARTMENT in VICTORIA,  
during the Years 1854, 1855, and 1856.

(B.)

Year.	Month.	No. of Private Messages.	No. of Messages on Public Service.	Value of Messages on Public Service.	No. of Press Reports.	No. of Words in Press Reports.	Total Cash Receipts.	Total No. of Messages Transmitted.
				£ s. d.			£ s. d.	
1854	March ...	193	152	32 19 6	3	642	...	348
	April ...	209	171	38 12 8	2	424	...	382
	May ...	151	114	96 13 10	...	...	15 10 7	265
	June ...	195	132	95 5 0	...	...	25 19 6	327
	July ...	193	113	99 5 0	...	...	19 8 9	306
	August ...	197	117	104 16 0	...	...	14 8 3	314
	September...	190	126	128 0 5	...	...	17 12 0	316
	October ...	280	221	131 3 2	...	...	11 9 6	501
	November...	242	211	172 2 0	...	...	7 11 6	453
	December ...	437	213	138 2 10	7	480	111 2 6	657
		2,287	1,370	1,037 0 5	12	1,546	223 2 7	3,869
1855	January ...	607	216	209 3 6	9	645	158 11 7	832
	February ...	622	219	271 4 7	21	5,303	235 15 0	869
	March ...	904	237	230 3 10	22	4,873	288 2 7	1,163
	April ...	874	167	247 3 4	13	3,739	263 3 0	1,054
	May ...	772	216	270 4 7	25	5,789	258 19 3	1,013
	June ...	785	259	280 13 4	25	5,627	272 0 3	1,069
	July ...	642	221	267 16 4	26	4,460	242 0 11	889
	August ...	718	157	244 10 7	21	3,222	238 9 9	826
	September...	784	188	264 15 4	15	4,118	255 18 4	957
	October ...	927	249	246 9 10	12	4,034	325 13 9	1,238
	November...	996	208	251 15 4	5	4,496	321 4 3	1,209
	December ...	822	222	290 11 1	15	4,470	282 15 3	1,059
		9,473	2,559	3,074 11 8	209	50,778	3,162 15 11	12,241
1856	January ...	927	204	139 12 1	17	9,932	357 6 7	1,148
	February ...	882	226	191 17 4	19	5,786	296 6 0	1,127
	March ...	913	240	213 15 5	11	1,770	254 6 3	1,164
	April ...	889	200	172 6 0	6	6,579	315 7 8	1,095
	May ...	836	163	165 5 5	2	1,194	252 9 4	1,001
	June ...	880	254	209 19 4	6	1,844	232 15 1	1,140
	July ...	809	233	207 16 4	2	1,721	229 7 1	1,044
	August ...	648	232	235 18 4	4	140	224 5 2	884
	September...	709	224	205 6 10	5	658	205 10 3	938
	October ...	795	181	209 4 11	4	200	223 8 9	980
	November...	831	174	184 13 4	5	642	232 9 1	1,010
	December ...	1,256	354	246 7 11	33	6,361	402 2 2	1,643
		10,375	2,685	2,422 2 3	114	36,827	3,225 13 5	13,174
GENERAL ABSTRACT.								
1854	...	2,287	1,370	1,037 0 5	12	1,546	223 2 7	3,869
1855	...	9,473	2,559	3,074 11 8	209	50,778	3,162 15 11	12,241
1856	...	10,375	2,685	2,422 2 3	114	36,827	3,225 13 5	13,174
		12,135	6,814	6,533 14 4	335	89,151	6,611 9 11	29,284

The gross expenditure for salaries and expenses, incidental to the working and maintenance of the lines during the period included in the foregoing return, is as follows:—

		£ s. d.
1854	...	3,724 19 10
1855	...	3,417 13 11
1856	...	5,026 18 5
		£12,469 12 2

## DEBTOR AND CREDITOR STATEMENT.

Dr.			Cr.		
	£	s. d.		£	s. d.
Total Expenditure for working and maintenance, from March, 1854, to December, 1854 (inclusively) ... ..	12,469	12 2	Revenue from the transmission of private despatches... ..	6,611	9 11
Balance... ..	665	12 1	Value of despatches on the Public Service ... ..	6,533	14 4
	£	13,135 4 3		£	13,145 4 3

I consider this statement of the financial condition of the department as satisfactory, taking into account that many minor stations are non-productive in a pecuniary point of view; the station at the Flagstaff, Melbourne, for example—although creating an expenditure of nearly £500 per annum, renders no pecuniary return whatever; the stations at Queenscliff, Williamstown and Sandridge, although a great public accommodation, yet make no compensative addition to the revenue, at all proportioned to their cost of maintenance.

Having lately recommended, for the consideration of His Excellency and the Executive Council, an amended scale of charges, for adoption on opening the lines at present under construction, communicating with the gold fields; and believing that the reductions I have suggested will be productive of much benefit, by increasing the amount of business transacted through the agency of the electric telegraph, I entertain a confident hope, that so soon as the additional lines are completed and fairly at work, the revenue returns will prove sufficient to afford at least a moderate income, over and above the expense of maintenance, as interest upon the capital invested.

The cost of erecting the lines has varied considerably: the first (between Melbourne and Williamstown) having been contracted for at £193 15s. per mile; and the second (between Williamstown and Queenscliff) at £115 15s.; the contractor finding all requisite materials. More recently, contractors have taken such works at much lower rates, consequent upon the great reduction in the cost of labor and materials since the relative periods of performing such services.

In the month of November, 1855, it was decided to extend lines, respectively from Geelong to Ballarat, and from Melbourne to Sandhurst *via* Castlemaine. I therefore prepared estimates and specifications for the work, and the sum of £18,000 was placed upon the vote for public works, for the purpose of meeting the necessary expenditure; my intention having been to push the work to completion previous to the setting in of the wet winter weather; but owing to unexpected delay by the Legislative Council in passing the requisite vote, the work was thrown over until the month of May following, thus losing the most favorable portion of the year. Contracts were however taken for the construction of the lines at £73 15s. per mile between Geelong and Ballarat, and £64 per mile between Melbourne and Sandhurst, the Government supplying the wire, the contractor merely providing posts and insulators. Adding the value of the wire the total cost of these lines completed, will amount to £82 and £73 per mile respectively. The work was commenced early in the month of May, but owing to the inclemency of the succeeding three months, and the nearly impassable state of the roads, progress was necessarily retarded. I feel gratified however in being able to state that notwithstanding the difficulties which have presented themselves, both lines have been completed in a period little exceeding six months; the line between Geelong and Ballarat having been permanently opened on the 14th, and communication over the line from Melbourne to Sandhurst tested on the 20th of the current month.

Stations will be established at Sandhurst, Castlemaine, Kyneton, and Gisborne with the least possible delay, and I anticipate having the permanent communication open with these places almost immediately.

The importance of these lines as a means for rapid interchange of intelligence with the interior must, in my opinion, be highly appreciated by the general public, and I look forward to a very extended application of such an admirable facility for the transmission of general business correspondence in a country where communication by mail, during at least a portion of the year, is comparatively slow and expensive.



Our experience of many years in carrying out similar works in other new countries has led me to the conviction that an extended adoption of the electric telegraph, open to the public use at the lowest remunerative charge, is one of the greatest aids to colonization, in affording the most efficient means for intercommunication between isolated portions of a scattered population, in developing commercial resources, and in tending to protect the interests of every individual member of the community, by placing at his disposal a most trusty and powerful agent. I would, therefore, strongly advocate the general extension of the lines to all the important localities within the boundary of the Colony. Connected with this portion of my report I have much pleasure in adverting to the commendable movement lately made by the Governments of South Australia and Tasmania—the former in finally determining, in conjunction with this Government, to establish a line between Melbourne and Adelaide—the latter, in proceeding with the construction of extensive lines not only in Tasmania, but also by negotiating with this Government, relative to bearing a proportion of the expense of laying down a submarine cable across Bass's Straits, to connect the two Colonies. On the latter subject I had the honor to report specially, and I believe the matter has been satisfactorily adjusted between the two Governments.

With reference to the arrangements concluded with the Government of South Australia it is only necessary for me here to make a brief allusion, considering it more advisable to introduce the joint report of Mr. Todd and myself upon the subject, in elucidation of my views. Mr. Todd is the superintendent of telegraphs in South Australia, and having been deputed by the Government of that Colony proceeded to Melbourne in the month of August last for the purpose of arranging all necessary preliminaries relative to establishing the proposed line. I would here take occasion to mention that from the practical ability and great intelligence exhibited by Mr. Todd, combined with the perfect unanimity which exists between us, I anticipate favorable results in carrying out the management and working of our inter-colonial line, and the entire avoidance of those difficulties which have only too frequently interfered with similar undertakings in other countries.

An important feature connected with establishing a line of such magnitude as the one alluded to is the fact that after the line has been placed in permanent working order, many interesting and valuable experiments may be performed in determining certain astronomical observations, in comparison of time, and in obtaining much useful meteorological information bearing upon the climates of the respective Colonies.

In conjunction also with the inter-colonial Tasmanian line and the construction of the line I have proposed to connect Melbourne with Beechworth *via* Kilmore, Seymour, Benalla, &c., to meet a line from Sydney at Albury. I consider the Adelaide line as a connecting link in the general chain of communication, a chain which at no remote period may in itself form but a link in the vast line of electric communication which shall yet unite us with the countries of Great Britain.

In recommending the immediate establishment of a general uniform system of inter-colonial telegraphic communication I have acted upon the reasons already stated and from a firm belief that there can be no other public work from which the Colonies and especially Victoria may derive so great advantages and at such comparatively insignificant cost.

The establishment of the Transit and Meteorological Observatory at Williamstown, under the charge of Mr. Ellery, having been amalgamated with this department, much benefit has accrued therefrom. Time signals are at present transmitted from Williamstown daily, at one o'clock p.m., to Melbourne, Geelong, Ballarat, and Queenscliff simultaneously, and by an arrangement of local wires from the office at Williamstown to the top of the lighthouse on Gellibrand's Point where a flash signal is given, by means of the light itself, every evening at eight o'clock. I need not here allude to the many public advantages of time signals more especially to shipmasters in obtaining corrected comparisons of their chronometers without the risk of removing the instruments from the vessels: but as the present means of notifying the signals to the public are necessarily primitive and a more perfect and reliable method desirable, I purpose submitting for His Excellency's consideration plans and descriptions for an improved and inexpensive system of time balls, to be established and worked at each telegraph station throughout the Colony. The subject of observatories being of much interest and

importance, and one which will doubtless be brought under His Excellency's notice during the present session of the Legislature, I have deemed it advisable to embody herewith for His Excellency's information a detailed statement from the superintendent of the observatory, relative to that department of the service, shewing the nature of the work performed and the general uses to which it is applied.

In concluding my present report, I would respectfully beg to represent the pressing necessity which exists for constructing all lines of electric telegraph during the summer months, the additional labor, delays, and great increase in cost consequent upon carrying out such works at any other season, being, I would submit, the strongest argument in favor of selecting the best portion of the year for their advancement; and should the suggestions which I have already had the honor of laying before His Excellency for the development of extended telegraphic communication be adopted by the Legislature, I shall only feel that my early labors in first introducing the electric telegraph into this Colony have been happily rewarded.

I have the honor to be, Sir,

Your most obedient servant,

SAM. W. MCGOWAN,

Superintendent of the Electric Telegraph.

The Honorable the Commissioner of Trade  
and Customs, Melbourne.

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#### JOINT REPORT BY MESSRS. MCGOWAN AND TODD, REFERRED TO IN THE FOREGOING.

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Melbourne, 25th August, 1856.

We, the undersigned, viz., S. W. McGowan, superintendent of telegraphs in the Colony of Victoria, on the one part, and Charles Todd, observer and superintendent of telegraphs in the Colony of South Australia, on the other part, having been deputed by our respective Governments to confer with each other, for the purpose of reporting on the expediency of establishing a line of electric telegraph between the capitals of the two provinces: and further, to consider the best method of constructing such line, and afterwards effectually working it, so as to secure its chief objects, and conduce most to the interest of both Colonies, have now the honor herewith to report:—

1. That the importance of establishing a telegraph communication between the two Colonies cannot, in our opinion, be well over-estimated. That we consider it would be of great benefit both to the several Governments as well as to the commercial interests of the three Colonies of New South Wales, Victoria and South Australia, if they were connected by telegraphic lines, based on one uniform and scientific system, which should connect by branch lines, or otherwise, all places of commercial importance in the great scheme.

2. The advantages resulting from the construction of telegraph lines, connecting the three principal Colonies, are so manifest as to require no more than a passing allusion. Such lines—by affording the means of almost instantaneous communication, and giving, thereby, increased facilities to inter-colonial trading—would tend greatly to develop our commercial resources; and by placing each Colony on an equal footing with regard to European news, shipping, and general intelligence, the difficulties which now exist in effecting our postal arrangements, so as to satisfy the claims of all, would be in a great measure obviated. The telegraph would prove of great service to the police; and, by connecting several points on the sea coast, it would frequently be useful in cases of shipwreck, or of vessels in distress.

3. We think, therefore that each Government should pledge itself to construct a line of electric telegraph, for the purpose specified, within its own territory, which should meet the line constructed by the neighbouring Colony, either on their common boundary or at any point that may be afterwards determined upon.

4. With regard to this matter, we would call attention to the fact that the South Australian line will have but one station: or, at least, but one paying station on the east side of the Murray, viz., Mount Gambier; the intervening country, for one hundred and eighty (180) miles being little better than a desert. We deem it proper to call attention to this circumstance, inasmuch as the South Australian Government has based upon it a claim for assistance from the Government of Victoria.

5. We would recommend that the same instrument be used throughout, viz., "Morse's recording instrument," or perhaps that instrument as modified by Messrs. Siemens and Halske of Berlin, and also that the code, regulations, and general arrangements be the same, so far as possible, in the two Colonies.

6. As there is no Act in South Australia relating to electric telegraphs, similar to that in force in Victoria, we deem it highly desirable that such an Act should be passed by the Legislature of South Australia.

7. We consider that the most equitable arrangement with regard to the revenue would be an equal division of receipts derived from all inter-colonial messages between what stations soever they might pass; the cash accounts to be settled monthly, or at such intervals as may appear most convenient.

8. This arrangement would not in any way be affected by the establishment of a line of telegraph to Sydney, and should that line be carried out, as we hope it may, we would recommend a similar arrangement with regard to receipts for messages between South Australia and New South Wales, also an equal division between the three Colonies.

9. Until experience supplies us with proper data, we would advise that the rate of charges for messages not exceeding ten (10) words should be according to the following table, the names and addresses being free, and twopence (2d.), threepence (3d.), or fourpence (4d.) for every additional word, according to distance.

PROPOSED RATE OF CHARGES ON THE ADELAIDE AND MELBOURNE ELECTRIC TELEGRAPH.

Stations.	Geelong.	Ballaarat.	Baglan.	Warrnambool.	Belfast.	Portland.	Mount Gambier.	Guichen Bay.	Geolwa.	Port Elliot.	Adelaide.
Melbourne ... ..	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Geelong ... ..	2 0	3 0	3 0	4 0	4 0	4 0	5 0	5 0	6 0	6 0	6 0
Ballaarat ... ..	—	2 0	3 0	3 0	3 0	3 0	4 0	4 0	5 0	5 0	6 0
Baglan ... ..	—	—	2 0	3 0	3 0	3 0	4 0	4 0	5 0	5 0	6 0
Warrnambool ... ..	—	—	—	2 0	3 0	3 0	4 0	4 0	5 0	5 0	6 0
Belfast ... ..	—	—	—	—	2 0	3 0	3 0	3 0	4 0	4 0	5 0
Portland ... ..	—	—	—	—	—	2 0	3 0	3 0	4 0	4 0	5 0
Mount Gambier ... ..	—	—	—	—	—	—	3 0	3 0	4 0	4 0	5 0
Guichen Bay ... ..	—	—	—	—	—	—	—	2 0	3 0	3 0	4 0
Geolwa ... ..	—	—	—	—	—	—	—	—	3 0	3 0	4 0
Port Elliot ... ..	—	—	—	—	—	—	—	—	—	1 0	2 0
Adelaide ... ..	—	—	—	—	—	—	—	—	—	—	2 0

Press matter should be charged at the rate of one penny (1d.) per word for all distances not exceeding three hundred (300) miles, and twopence (2d.) for all greater distances.

All messages on the service of either Government should be sent free.

10. In recommending the foregoing rates of charges, consideration has been paid to the estimated cost of construction, the working expenses, and maintenance of the line, and also, as far as our imperfect data admitted, of the probable revenue resulting therefrom. These estimates we give below in detail, by which it will be seen that, putting all the messages at the lowest charges, and the number probably much lower than what will be actually sent, there will be, after deducting six (6) per cent. interest on the outlay, a considerable surplus.

#### I. ESTIMATED COST OF LINE.

In Victoria, say 300 miles, at £75 per mile	...	...	£22,500
In South Australia, say 320 miles, at £60 per mile	...	...	19,200
Total cost of line	...	...	£41,700 or say £45,000

## II. ESTIMATED ANNUAL WORKING EXPENSES AND MAINTENANCE OF LINE.

Stations (including all contingent expenses):—

In Victoria—Melbourne	...	...	...	£500
Geelong	...	...	...	500
Ballaarat	...	...	...	700
Raglan	...	...	...	700
Warrnambool	...	...	...	400
Belfast	...	...	...	500
Portland	...	...	...	600
Incidental expenses	...	...	...	800
Total				£4800 or say £5000
In South Australia—Adelaide	...	...	...	£870
Mount Barker	...	...	...	300
Strathalbyn	...	...	...	300
Goolwa	...	...	...	300
Port Elliot	...	...	...	300
Guichen Bay	...	...	...	300
Mount Gambier	...	...	...	300
Incidental expenses	...	...	...	600
Total				£3200 or say £3500
Total annual expenditure				£8500
Interest on outlay (£45,000), at 6 per cent.				2700
Annual maintenance				£11,200

## III. DETAILED ESTIMATE OF REVENUE.

Melbourne and Adelaide, 50 messages per diem, @ 6s.	...	...	...	£15
Adelaide, with all Gold Fields and intermediate stations, 50 messages per diem, @ 4s.	...	...	...	10
Melbourne, Gold Fields, and intermediate stations, 150 messages per diem, @ 4s.	...	...	...	30
Ten intermediate stations, averaging 10 messages per diem, or 100 messages, @ 3s.	...	...	...	15
Total daily receipts				£70

Of this revenue, we may assume that two-thirds (2) will accrue to Victoria, and one-third (1) to South Australia; supposing, therefore, the line to be in good working order, say three hundred (300) days in the year, the net yearly revenue accruing to the two Colonies will be as follows:—

	Gross Annual Revenue.	Expenditure.	Net Annual Revenue.
To Victoria	£ 14,000	£ 6,470	£ 7,530
To South Australia	7,000	4,730	2,270
Total	21,000	11,200	9,800

In conclusion, we would suggest, that the Governments of Victoria and South Australia should each urge upon the New South Wales Government the great importance of inter-colonial telegraphic communication; important as furthering our immediate interests, and in drawing closer the relations which should subsist between the three principal Colonies of

Australia; and further important, as being a step in the direction of our ultimate telegraphic connection, *via* India, with England; a scheme, vast and difficult as it may appear, and really is, will, we doubt not, at no very distant day be carried out.

SAM. W. MCGOWAN,  
CHARLES TODD.

Observatory, Williamstown,  
27th December, 1857.

SIR,

In compliance with your request, I have the honor to transmit the following report relative to the observatory under my charge.

In the year 1853 it was found necessary to institute some means of enabling mariners to obtain the errors and rates of their chronometers, upon which depend the safety of much human life and property; an observatory was therefore established on Gellibrand's Point, Williamstown, in the July of that year, so that observations necessary for giving a "time signal" might be obtained. The signal adopted was the drop of a ball on the Flagstaff, at Gellibrand's Point, at one o'clock local time, the Greenwich instant to which this time corresponds being known.

In order that proper and accurate observations should be obtained, a meridian instrument of a superior class became indispensable, as well as a good astronomical clock. Until such could be obtained a small transit instrument and a clock were purchased, and with the use of these the time signal was commenced, and continued unremittingly until April, 1854, when a superior clock and transit arrived from England, with which much greater precision was arrived at, than from the inferior instruments previously in use. As any observations beyond that of *time keeping* scarcely came within the reach of these instruments, that portion of astronomy constituted the chief duties of the observatory.

The building used was an inconveniently small room (being only eight feet square), attached to a two-roomed cottage which was allowed as quarters. In June, 1854, it was represented to the Chief Harbor Master, that on account of the great crowd of shipping, those lying towards the opposite shores could not see the time ball, it therefore became advisable to adopt some signal that would be more generally visible; for this purpose an apparatus was fitted to the lantern of the lighthouse, by which the light could be obscured and caused suddenly to re-appear. The signal was at first given by taking a previously compared chronometer to the upper chamber of the light house tower, from which the apparatus is worked, and obscuring the light at two minutes before eight o'clock exactly, being taken as the signal. In the course of a few months however arrangements were made so that the signal could be given directly from the observatory clock by means of the electric telegraph.

In October, 1854, the time ball was erected at the Electric Telegraph Office, Melbourne, and this with the Williamstown time ball was connected in such a way with the observatory, that both were dropped simultaneously, the difference of the local times of Melbourne and Williamstown being so small as not to affect the time as given to the public in any appreciable degree, and the advantage was gained of affording shipping, whether in the Bay or at Melbourne, the same Greenwich instant of signal.

In January last, the transit instrument hitherto used, having from an excess of temperature and a fault in manufacture become untrustworthy in its performance, an instrument of somewhat larger dimensions, in possession of Government, was transferred for the use of the observatory until a better instrument could be obtained from England.

In May, 1856, the piers of the transit instrument became very unsteady from water (the result of heavy rains) having found its way into the foundations. The site on that account was no longer tenable for an observatory, and I made application at once for a more suitable building, more especially seeing that besides the defective foundation for the piers, the room scarcely gave sufficient shelter for the instruments. The time signals were necessarily suspended, and in consequence numerous applications were made by masters of vessels to me to rate their chronometers before going to sea; this I was after a few days unable to do with the necessary

precision, and was therefore obliged to refuse, upon which a very numerously signed petition from shipmasters, was, I believe forwarded to Government, praying "that the usual time signals, which were of such great importance to them, as affecting the safety of life and property, be quickly resumed."

A small canvas tent was then erected, in which the instrument and clock piers were built, and which up to the present time is used as a transit room.

The observations made with the larger transit instrument have enabled me to give the usual time signals with every possible accuracy and satisfaction, and its capabilities have admitted of the extension of its use to some important observations to which I beg specially to refer. There has been much doubt expressed on different occasions as to the truth of the assigned positions of different stations, on the coast and within Port Phillip Bay, which has been strengthened by several communications from scientific navigators and observers, and knowing that the present positions were adopted differently from Parramatta by transport of chronometers (which method is liable to considerable error, unless a great number of measurements be made), I have been induced to give much attention to a series of observations, for the purpose of determining the true longitude of the observatory. From some observations made two years ago I came to the conclusion that the assigned longitude was somewhat erroneous, but not being in possession of sufficient instrumental means, I was unable to establish the fact.

As the question of the longitude involves observations of the moon, it becomes absolutely necessary to obtain the results of a great number of observations for its satisfactory solution, owing to the existence of practical difficulties in precision of observing this body, and some slight errors in the lunar tables.

The results of observations extending from June last, have been computed, and the mean results, compared with the assigned position before given, I have much pleasure in laying before you.

Previously assigned Longitude.				Corrected Longitude.			
h.	m.	s.	<sup>sec</sup>	h.	m.	s.	<sup>sec</sup>
— 9	39	41	80	— 9	39	58	748

In the course of nine months' meridional observations with the present transit instrument, a slight discrepancy between the *approximate observed* and *tabulated* zenith distances of the fixed stars became constantly apparent, such as could only arise from an erroneous assumption of latitude. It, therefore, became necessary, in order that any error of latitude might be discovered, to call into requisition extra instrumental assistance; with this view I made application for the use of an "altazimuth circle," in possession of Government, being the only instrument in the Colony available. This was obtained and the mounting completed about three months ago, since which time a number of observations have been taken with it, the results of which are very accordant, and show a considerable error in the assigned latitude.

Previously assigned Latitude.				Corrected Latitude.			
°	'	"	<sup>sec</sup>	°	'	"	<sup>sec</sup>
S 37	52	42	00	S 37	52	7	39

The result of future observations may possibly affect the accuracy of these positions in a slight degree, but not to an extent at all equal to the existing errors; I would, therefore, propose that the results of these observations be assumed in the interim as the true position. If (as I believe to be the case) the position of many stations on the coast have been assigned, either subject to the same error or differentially from Gellibrand's Point, the errors would affect navigation in a tangible degree, and if like errors exist at stations inland, they will, unless rectified, vitiate subsequent trigonometrical operations to a serious extent. It becomes, therefore, highly advisable that some of the more important stations be carefully tested from the new position as given to the observatory.

The general duties connected with the observatory consist chiefly of astronomical observations, with their consequent computations, the giving the usual time signals, meteorological observations, testing and comparing chronometers, and marine meteorological instruments. Of these, the astronomical observations and computations absorb the greatest amount of attention and time. The observations themselves are necessarily made during the night, and the computations are made during the day, as the duties connected with the electric telegraph will allow.

During the past year 987 astronomical observations have been recorded.

From the first establishment of the observatory, meteorological observations have been made. The instruments, at first, were of an inferior class, but in 1854 one or two good instruments were added to the staff, and in 1855 a standard barometer was transferred from the late Assay Office, and during the past year a superior staff have been supplied from the department of the Registrar-General; among others, an Ostler's anemometer, similar to those erected in Greenwich and Kew Observatories; and this, since its erection, has kept an unremitting and hourly register of the force and direction of the wind, as well as the periods and quantities of the rain-falls. The barometer has been of great service to the observatory, inasmuch as it affords means of giving corrections and zeros for the marine barometers, supplied to merchant vessels by the Board of Trade, for the purpose of carrying out the system of ocean meteorology; the frequent comparisons of these barometers being indispensable to reliable observations. A great mass of meteorological observations necessarily remain unreduced from want of time or assistance.

The present locality of the observatory appears the most conducive to its general utility. 1st. Its proximity and accessibility to commanders and officers of vessels in port, fully develop the use for which it was first instituted. 2nd. It has an important advantage over any other place in the vicinity of Melbourne, from the almost total absence of dust, which is so destructive to the pivots of astronomical instruments. 3rd. Its intimate connection with the electric telegraph renders its use available to any part of the country accessible by that mode of communication; and as this becomes more general, the advantages of the observatory will be universally felt; and on the establishment of internal communication by railway, the connection of the observatory with the electric telegraph will be found *indispensable*, as a means of maintaining that unison of time so necessary for the prevention of disorder and collision.

In April last I received a communication from the Royal Astronomical Society, with reference to an eclipse of the sun, which occurred on the fourth of that month, and requesting that, if possible, observations of the attending phenomena in the path of its totality should be obtained, "such being of infinite value in correcting the places of the sun and moon as assigned by theory." The communication came too late to hand for any steps being taken in the matter, but it would be desirable, that on future occasions, opportunities should be afforded of endeavouring to obtain such observations.

To place the observatory on an effective footing, a more permanent building is necessary, as well as several instrumental additions, and when thus established it will confer on the Colony every advantage desirable from an establishment of the kind, and at the same time will be enabled to keep pace with other observatories in scientific research.

I have the honor to be,

Sir,

Your most obedient servant,

ROBT. L. J. ELLERY,

Superintendent of Observatory.

The Superintendent of Electric Telegraph,  
Melbourne.