

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 numerous 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.	'''	h.	m.	s.	'''
— 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.			
°	'	"	'''	°	'	"	'''
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.