

ASTRONOMICAL OBSERVATIONS.

Observations of meridian transits of stars and the sun have been made for the purpose of controlling the time service. The interval between observations is unduly long at times owing to unfavourable weather conditions, and to the circumstance that, unlike other astronomical observatories, there is no provision made for residences at the Observatory. Consequently, in the winter-time, unless the Astronomer resides at the Observatory it is not possible to take advantage of short intervals of clear sky at night.

THE TIME-SERVICE EQUIPMENT.

The astronomical clocks on which the time service depends are not sufficiently accurate for this duty, and the need of precision clocks has been recognized by the Government. Specifications have been prepared for the clocks, and it is expected that they will soon be obtained. The demand for them has been intensified by the inauguration of the provisional wireless time service, as without first-class clocks it is not possible to carry on accurate time over long intervals of bad weather.

THE TIME SERVICE.

The Observatory sends out the following time-signals. Most of them are automatically sent by the Observatory standard clock, which is usually kept accurate to the nearest second of time.

Automatic Time-signals.

- (1.) To the General Post Office, Wellington, by galvanometer daily, except Sundays and public holidays.
- (2.) To some of the watchmakers in Wellington, by galvanometer daily, except Sundays and public holidays.
- (3.) To ships and to the general public at Wellington, by electric lights at the Observatory daily, except Saturdays, Sundays, and holidays.
- (4.) To the Auckland Harbour Board, by electric lights at Auckland, on Tuesdays and Fridays.
- (5.) To the Lyttelton Harbour Board, by dropping the time-ball at Lyttelton, on Tuesdays and Fridays.
- (6.) To the South Island telegraph-offices, by galvanometer, on Tuesdays and Fridays.
- (7.) Wireless time-signals, through the Wellington Radio Station, on Tuesdays and Fridays.

All the automatic time-signals are sent at the exact hour of Greenwich mean time, and are automatically repeated at the first, second, fourth, and fifth minutes. Each signal begins at the 0 second, and lasts approximately one second.

Non-automatic Time-signals.

- (1.) To ships and watchmakers in Wellington, by telephone, on application to the Observatory.
- (2.) The Observatory time-signals sent to the General Post Office are distributed by telegraphic hand-signals to some 2,300 telegraph and telephone offices distributed all over New Zealand at 9 a.m. daily, except on Sundays and holidays.
- (3.) Similar hand-signals are also sent to all railway telegraph-offices in New Zealand at 9 a.m. daily, except on Sundays and holidays.
- (4.) The Wellington Telephone Exchange distributes time-signals by telephone to exchange subscribers, generally to the nearest minute of time: the clock in the exchange is checked by comparing it with the Observatory automatic time-signal, but the Observatory is not responsible for the accuracy of these time-signals.

The wireless time-signals sent from the Observatory have been received by many ships at considerable distances from New Zealand. The signals are transmitted by the Wellington Radio Station (latitude $41^{\circ} 16'$ south, longitude $174^{\circ} 46'$ east of Greenwich) on a wave-length of 600 metres, and are Telefunken quenched-spark signals. The maximum distance reported to the Observatory is over four thousand miles, when the R.M.S. "Marama" was on the San Francisco run, north of the Equator; while a report from the wireless operator on the s.s. "Tofua" is to the effect that the Observatory wireless time-signals were received right up to the Equator on the San Francisco run; and other reports have been received from ships over three thousand miles from Wellington.

The wireless time-signal service is provisional, pending the equipment of the Observatory for this service.

Reception of other Wireless Time-signals at the Observatory.

At present the Observatory is without any wireless receiving-gear. The gear lent to the Observatory from H.M.S. "Philomel" was returned to that ship. The equipment of the Observatory with a high-power wireless receiving-outfit is now under action. Additional office accommodation will be required for this purpose.

Wireless Time-signals for Longitude.

From 14th to 19th February inclusive a special series of wireless time-signals was sent from the Observatory through the Awanui Radio Station at 20 hours G.M.T. every night. The clock that automatically sent the signals was rated to gain about 1 second in 73 seconds sidereal time, and signals were sent from this clock for 6 minutes, beginning at 20 h. 6 m.

The complete programme included the usual series of mean-time signals sent at 20 h. 0 m., 20 h. 1 m., 20 h. 2 m., 20 h. 4 m., and 20 h. 5 m.; followed by the special signals referred to above. All signals were sent on a wave-length of 2,000 metres. A number of them were heard at the Samoan Observatory at Apia, and the precise results are being worked up. A similar series of wireless time-signals was sent to Tahiti for checking the longitude there.