quantity in the resulting clock correction. The ideal time of exchange would be at that epoch, when the effect of rate is eliminated. But for various reasons this is found to be impracticable. In the programme then of two independent time determinations, for obvious reasons the exchange was arranged to take place about midway between the two epochs. An interpolation between the two epochs gives the clock correction at the instant required, that of the signals. This assumes that the rate is constant during the interval, and is represented by a straight line. If extrapolation is necessary, as sometimes occurs, the rate value has less weight.

Transmission Time. On the assumption that the time of transmission is the same in both directions and that the chronometers have the same rate, the difference of records at two stations of the exchange of time signals will represent twice the time of transmission.

We are obliged to assume that the transmission time is the same in both directions, but to the difference of the records of exchange of time signals there must be applied the relative rate for the interval between the means of the times of the two exchanges. This interval is confined to about two minutes.

From the two independent time determinations made at each station on the same night the hourly rate of each chronometer when in circuit is obtained. The algebraic difference of these hourly rates gives the relative hourly rate of the two chronometers and the proportional part for the above interval is the quantity entered in the column 'Relative rate' of Table. . . . .

On exchange by land-lines, it will be seen, referring to the diagram of the switchboard that the deduced transmission time is free from any retardation by the signal relays or by the secondary circuits of the chronographs. The effect upon the comparison of the clocks of retardation by the signal relays and secondary circuits will disappear in the mean of the two exchanges provided the sum of the retardations by signal relay and secondary at one station is equal to that at the other. This condition is, however, not necessary for finding the time of transmission.

Personal Equation.—Fortunately for the connection between Canada (Vancouver) and Australia (Southport), also New Zealand (Doubtless Bay), the personal equation between the two observers was eliminated. This is, of course, on the supposition that the personal equations remained constant. As the climatic conditions, as far as temperature was concerned, and the surroundings were favourable for personal comfort, there was no *a priori* reason for suspecting any change during the campaign in the personal equation. The elimination referred to was due to the fact that the number of stations was odd, and that the observers occupied alternate stations. I occupied the terminal and middle stations, while Mr. Werry occupied the other two—Fanning and Norfolk Islands,—and for these two stations differential personal equation must be applied. To determine such we observed on our return with the same two transits of the Transpacific longitude, on several nights in a manner identical with that at work in the South seas, and under similar climatic conditions. It may be remarked that it was impracticable before leaving Ottawa to observe for personal equation. In the first place it was winter, thermometer below zero, and secondly my Cooke transit had not yet arrived when Mr. Werry set out for Fanning island, via Samoa.

For the longitude of Brisbane, Sydney and Wellington, I observed with each of the observers at the respective observatories, by determining the clock correction for the respective common epochs.

Instrumental Constants.

Thread Intervals.—These were determined by both instruments by observing the transits of slow-moving (polar) stars and the intervals were all referred to the mean and not to the middle thread. The times of transit are corrected for level (if any change of level has taken place during the transit) and for rate. Multiplying the