Photogravure. Survey of India Offices, Calcutta, June 1900.

J. T. Walker.

LIEUTENANT GENERAL J. T. WALKER, C.B., R.E., F.R.S., L.L.D.

SUPERINTENDENT OF THE GREAT TRIGONOMETRICAL SURVEY OF INDIA from 1861 to 1884.

SURVEYOR GENERAL OF INDIA from 1878 to 1884.

[illegible] February 16th 1896.

ACCOUNT OF THE OPERATIONS OF THE

GREAT TRIGONOMETRICAL SURVEY OF INDIA

VOLUME XVII.

ELECTRO-TELEGRAPHIC LONGITUDE OPERATIONS

EXECUTED DURING THE YEARS 1894-95-96.

THE INDO-EUROPEAN ARCS

FROM

KARACHI TO GREENWICH.

PREPARED UNDER THE DIRECTIONS OF

MAJOR S. G. BURRARD, R.E., SUPERINTENDENT TRIGONOMETRICAL SURVEYS.

PUBLISHED UNDER THE ORDERS OF

COLONEL ST. G. C. GORE, R.E., SURVEYOR GENERAL OF INDIA.

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CONTENTS.

PART I.

DESCRIPTION OF THE INSTRUMENTAL EQUIPMENT AND OF THE OPERATIONS GENERALLY, WITH DETAILS OF THE SYSTEM OF OBSERVING AND OF REDUCING THE OBSERVATIONS DURING 1894-95-96.

PART I—(*Continued*).

PART II.

ABSTRACT OF THE OBSERVATIONS AND REDUCTION OF THE RESULTS DURING 1894-95-96.

PERSONAL EQUATION.

ARC JASK–BUSHIRE. 1894-95.

PART II—(*Continued*).

ARC KARACHI-BUSHIRE. 1894-95.

PART II—(*Continued*).

ARC KARACHI–JASK. 1894-95.

PART II—(*Continued*).

ARC POTSDAM-GREENWICH. 1895.

PART II—(*Continued*).

ARC TEHRAN-POTSDAM. 1895.

ARC TEHRAN-BUSHIRE. 1896.

PART II—(*Continued*).

APPENDICES.

LIST OF PLATES AND CHARTS.

PREFACE.

The present—the seventeenth—volume of the *Account of the Operations of the Great Trigonometrical Survey of India,* describes the Electro-Telegraphic Longitude Operations undertaken in 1894-95-96, for the determination of the difference of longitude between Karachi and Greenwich; the longitude station at Karachi had been previously used in the Indian Electro-Telegraphic Longitude Operations, and the arcs connecting it with Madras and other Indian longitude stations are described in Volumes IX, X and XV of this series.

The following determinations of the longitude of Madras were made prior to 1894:—

Date	Longitude of Madras		Authority	Book of Reference
	Arc	Time		
	° ′ ″	h m s		
1798	80 16 30	5 21 6·0	Lambton ...	Asiatic Researches, Vol. X.
1805	80 18 30	5 21 14·0	Lambton ...	Asiatic Researches, Vol. XII.
1815	80 17 21	5 21 9·4	Warren ...	G. T. Survey of India, Vol. II.
1826	80 17 15	5 21 9·0	Goldingham ...	Records of the Madras Observatory.
1831	80 15 55·5	5 21 3·7	Taylor ...	Vol. XVI, Memoirs, R. A. S.
1840	80 13 55·5	5 20 55·7	Riddle ...	Vol. XII, Memoirs, R. A. S.
1845	80 14 19·2	5 20 57·28	Taylor ...	Vol. XVI, Memoirs, R. A. S.
1847	80 15 56·55	5 21 3·77	Everest ...	Meridional Arc of India.
1858	80 14 19·5	5 20 57·3	Jacob ...	G. T. Survey of India, Vol. II.
1878	80 14 51·24	5 20 59·416	Campbell ...	Annual Report on the Great Trigonometrical Survey of India for 1876-77.
1883	80 14 50·03	5 20 59·335	Walker ...	G. T. Survey of India, Vol. IX.
1890	80 14 51·08	5 20 59·405	Strahan ...	G. T. Survey of India, Vol. XV.
1893	80 14 51·33	5 20 59·422	Strahan ...	G. T. Survey of India, Vol. XV.

The last four values are different discussions of the same observations. No account exists of Lambton's method of observation: his results alone remain on record. Warren's and Goldingham's values were deduced from the observations of Jupiter's satellites, and Taylor's from moon culminations. Riddle's, Everest's and Jacob's values were obtained from discussions of Taylor's lunar observations.

In 1874 the telegraphic longitude of Suez was measured by members of the Transit of Venus Expedition, and two years later the difference of longitude between Suez and Madras was telegraphically determined by Colonel (now General) Campbell and Colonel Heaviside. The combined result of these two operations was to place the Madras Observatory in longitude $5^h\ 20^m\ 59^s\cdot416$, a value subsequently modified by General Walker to $5^h\ 20^m\ 59^s\cdot335$.

The next modification made was in 1889: in the fourteen years previous to this date, a net-work of longitude triangles had been gradually thrown over the Indian Peninsula, the accuracy of the arcs of each triangle being tested by the smallness of the closing error; as early as 1876 the closing errors of the triangular circuits were considered unsatisfactorily large, in 1881 they averaged a quarter of a second of time, and in 1885 they became so large that it was considered useless to proceed with the work, unless their cause were discovered.

In 1889 these errors were proved to be due to imperfections in the object glasses of the collimators, and to eliminate the effect of these imperfections a new method of calculating the collimation-constant was introduced: all the Indian arcs of longitude, including Bombay-Aden and Aden-Suez, had consequently to be computed *de novo*; the large circuit errors were then found to have disappeared, and the longitude of Madras became $5^h\ 20^m\ 59^s\cdot405$.

When all the Indian longitude arcs were finally adjusted in 1893, by a simultaneous reduction by the method of minimum squares, the difference of longitude between Bombay and Madras was increased by $0^s\cdot017$, and the longitude of Madras made $5^h\ 20^m\ 59^s\cdot422$.

The Longitude of the Great Trigonometrical Survey of India.

No change has been made in the original value of longitude adopted for the Great Trigonometrical Survey of India; that value was Warren's value, 80° 17′ 21″, and was introduced by Colonel Lambton in 1815.

The precise error in the longitude of the principal triangulation is not, however, identical with the error in Warren's longitude of Madras: Kaliánpur is the origin of the triangulation, and its longitude was fixed by Colonel Everest as follows:—

	°	′	″
Warren's longitude of Madras	80	17	21
Difference of longitude between Madras and Kaliánpur found by triangulation ...	2	35	36·25
Everest's longitude of Kaliánpur	77	41	44·75

In Volume II of the *Account of the Operations of the Great Trigonometrical Survey of India*, General Walker contemplated the possibility of the quantity 2° 35′ 36″·25 having to be modified in the future, when his revisionary triangulation between Kaliánpur and Madras had been finally reduced,* and when possibly Clarke's spheroid had been substituted for Everest's; but in 1884 it was pointed out by Mr. Hennessey that the difference of longitude between Kaliánpur and Madras should be determined astronomically.

The astronomical determination was made in 1889, and the difference found to be 2° 35′ 29″·49. The actual error therefore in the adopted longitude of the Great Trigonometrical Survey of India is 6″·76 *less* than the error of Warren's Madras value. In 1840 Everest estimated the error in longitude of the Indian triangulation at about + 3′ 30″: in Vol. II of the *Account of the Operations of the Great Trigonometrical Survey of India*, General Walker, using Jacob's value of Madras, gave it as about + 3′, but in the interim between the printing and publication of that volume the first telegraphic determination of longitude was carried out, and in the preface to the volume General Walker reduced his estimate to about + 2′ 30″, the difference between Campbell's and Warren's values. In Vol. XV of the *Account of the Operations of the Great Trigonometrical Survey of India*, Colonel G. Strahan calculated the error to be + 2′ 22″·92.

Origin of the Operations undertaken in 1894-95-96.

In 1891, at a meeting of the International Geographical Congress at Berne, the question was raised as to why the Government of India did not correct the longitude of its maps, instead of continuing to publish them with an acknowledged error of 2′ 30″.

* The revision of the triangulation gave the result 2° 35′ 36″·63: Everest's spheroid was employed both in the original and the revisionary calculations.

A discussion followed in India as to whether any such alteration was feasible, and upon examination the longitude of India was found even then to be not known with *sufficient accuracy* to justify a change. Colonel Everest had to deal with the same problem half a century before. The longitude of his triangulation had been made dependent on Warren's value for Madras, but as time went on, Taylor had improved on Warren's value, and Colonel Hodgson, the Surveyor General of India, had had other independent observations taken at Calcutta: Everest had to decide whether he would make use of these later observations at Madras and Calcutta and substitute a new value of longitude for Warren's. His decision had best be given in his own words: "These data seem to me by no means *sufficiently* conclusive to warrant any alteration in "the quantities employed by Colonel Lambton in all previous operations of the Great Trigonometrical Survey, for just in "the same manner as Mr. Taylor has assigned a new value for the longitude of Madras, some future astronomer may in-"troduce another alteration. In fact the actual determination of the terrestrial longitude of any place is too difficult "and delicate a question to rest on a small number of observations, and if every new set of determinations were appealed "to as a test, there would be no end to the shifting of the origin: wherefore it seems to me better for the present at least "to use the same value as that employed by Colonel Lambton".

In 1815 Captain Warren's value was the best attainable, but in 1877 it was rendered obsolete by the telegraphic determination *viâ* Mokattam and Suez. Unfortunately this latter measurement, superior as it was to all previous results, had itself been subjected to somewhat severe criticism, and though it was sufficiently accurate to prove conclusively the existence of considerable errors in Warren's and Taylor's values, it was held to have been by no means determined with the highest accuracy attainable. In Volume I of the Annals of the Cape Observatory, Sir David Gill, K.C.B., F.R.S., H.M.'s Astronomer at the Cape, discussing the longitude of the Cape of Good Hope, which like that of Madras depends on the telegraphic determinations between Greenwich, Mokattam, Suez and Aden, writes: "The weak point of this "result is unquestionably the determination of the longitude Greenwich-Aden. Neither of the two series of operations "on which it depends was executed with such refinements or precautions as are necessary for the determination of funda-"mental longitudes, nor indeed, so far as I know, were these operations planned with a view to the securing of more "accuracy than would amply suffice for Transit of Venus purposes.

"For refined purposes, the results of the British Transit of Venus party are vitiated by the extraordinary variations "of the Personal Equation of the observers engaged in the determination of the Greenwich-Mokattam longitude, the "results varying over a range of six-tenths of a second of time on the seven nights upon which Personal Equation was "determined.

"For the longitude Mokattam-Suez there is no comparison of the Personal Equation of the observers before the "expedition and only a somewhat unsatisfactory one after it".

In 1893 when the reliability of the Mokattam-Suez-Aden arcs was under discussion, an astronomical party was ordered to proceed to Baluchistan and Persia to determine telegraphically the longitudes of points on the Makrán Coast and in the Persian Gulf. An opportunity was thus presented of obtaining *viâ* Tehran a new and refined determination of the longitude of Madras.

The opportunity was taken, and the party was ordered to extend their operations through Persia and Europe to Greenwich.

Results of the Observations described in this Volume.

The plan of the operations of 1894-95-96 is illustrated on Plate VII: six arcs of longitude were observed, the resulting values being as follows:—

Arc	Observed Difference of Longitude	Probable Error
	h m s	s
Karachi-Jask	0 36 59·697	± 0·0057
Jask-Bushire	0 27 45·057	± 0·0095
Karachi-Bushire	1 4 44·812	± 0·0097
Tehran-Bushire	0 2 21·443	± 0·0083
Tehran-Potsdam	2 33 24·228	± 0·0068
Potsdam-Greenwich	0 52 15·953	± 0·0058

The first three of these arcs form a circuit, and its closing error may be deduced thus:—

		h	m	s
Karachi-Jask	... ...	0	36	59·697
Jask-Bushire	... ...	0	27	45·057
Sum	...	1	4	44·754
Karachi-Bushire	... ...	1	4	44·812
Closing error	...			0·058

The value to be adopted for the difference of longitude between Karachi and Bushire is obtained as follows:—

		h	m	s	s
Karachi-Jask	... ...	0	36	59·697	±0·0057
Jask-Bushire	... ...	0	27	45·057	±0·0095
Karachi-Bushire (indirect)	... ...	1	4	44·754	±0·0110
Karachi-Bushire (direct)	... ...	1	4	44·812	±0·0097
Mean value, regard being paid to weights		1	4	44·787	±0·0073

The longitude of Madras can now be calculated, the values of the three arcs connecting Madras and Karachi being taken from pages 440 and 441 of Volume XV of the *Account of the Operations of the Great Trigonometrical Survey of India*.

Arc	Difference of Longitude	Probable Error	Station	Longitude East of Greenwich		Probable Error	
				In Time	In Arc	In Time	In Arc
	h m s	s		h m s	° ′ ″	s	″
Potsdam-Greenwich ...	0 52 15·953	± 0·0058	Potsdam ...	0 52 15·953	13 3 59·30	± 0·0058	± 0·087
Tehran-Potsdam ...	2 33 24·228	± 0·0068	Tehran	3 25 40·181	51 25 2·72	± 0·0089	± 0·134
Tehran-Bushire ...	0 2 21·443	± 0·0083	Bushire	3 23 18·738	50 49 41·07	± 0·0122	± 0·183
Karachi-Bushire ...	1 4 44·787	± 0·0073	Karachi	4 28 3·525	67 0 52·88	± 0·0142	± 0·213
Bombay-Karachi ...	0 23 12·196	± 0·0129	Bombay	4 51 15·721	72 48 55·82	± 0·0192	± 0·288
Bolarum-Bombay ...	0 22 48·801	± 0·0061	Bolarum	5 14 4·522	78 31 7·83	± 0·0201	± 0·302
Madras-Bolarum ...	0 6 54·615	± 0·0085	Madras	5 20 59·137	80 14 47·06	± 0·0219	± 0·329

The error in the value of longitude adopted for the triangulation of the Great Trigonometrical Survey of India is thus + 2′ 27″·18, being equal to (80° 17′ 21″ − 80° 14′ 47″·06 − 6″·76).

The Values of Longitude employed in Indian Maps.

Prior to the year 1900 there had always been two values of longitude employed in the mapping of the Survey of India. The Atlas Sheets had been based on Lambton's value (1805) for the longitude of Madras Observatory, *viz.*, 80° 18′ 30″: the Standard Sheets and all other mapping had been brought into accordance with the Great Trigonometrical Survey of India and based on Warren's value (1815) for the longitude of Madras, *viz.*, 80° 17′ 21″. In 1878 General Campbell's and Colonel Heaviside's Electro-Telegraphic observations of the difference of longitude between Madras, Aden and Suez showed that Lambton's and Warren's values were too large, and placed Madras in longitude 80° 14′ 51″: the error in the longitude of the Great Trigonometrical Survey of India was therefore shown to be 2′ 30″. After the completion of the Campbell-Heaviside determination a footnote was added to the maps of the Survey of India: on the Atlas Sheets this note ran thus:—

All Longitudes require a correction of − 1′ 9″ to reduce them to the origin of the Great Trigonometrical Survey, *viz.*, the Madras Observatory taken as 80° 17′ 21″ East of Greenwich, and a further correction of − 2′ 30″ to reduce them to the latest value 80° 14′ 51″ of that observatory.

On the Standard Sheets and on all mapping based on the Great Trigonometrical Survey the footnote was as follows:—

The Longitudes are referrible to the Greenwich Meridian, taking that of Madras Observatory as 80° 17′ 21″ East. They require a correction of − 2′ 30″ to make them accord with the most recent value of that observatory, *viz.*, 80° 14′ 51″.

In 1896 the observations of the difference of longitude between Karachi and Greenwich *viâ* Tehran and Potsdam, described in this volume, were completed, and placed Madras in longitude 80° 14′ 47″·06, thus increasing the apparent error of the Great Trigonometrical Survey to 2′ 34″*.

In the year 1900 the construction of a Map of India and Adjacent Countries on the scale of $\frac{1}{1000000}$ was commenced, and the question arose as to whether its longitude should be made to accord with that of the Great Trigonometrical Survey, or with the most recent determination, or whether a value of longitude should be obtained by combining the result of the Perso-European Arcs with that of the Aden-Suez Arcs, or with those of the German and American determinations. After full consideration it was decided by Colonel Gore, *firstly* to give the Map of India and Adjacent Countries a new and correct value of Longitude, instead of continuing the value adopted by the Great Trigonometrical Survey, and *secondly* to adopt for the new value the determination, made in 1894-96 by Captains Burrard and Lenox Conyngham, *viâ* Karachi, Tehran and Potsdam and described in this volume.

Another question, however, had to be decided: Kaliánpur is the origin of the Indian Survey: the Madras Observatory happened to be the place at which the earliest observations for longitude were taken: and the method which Colonel Everest employed of determining the longitude of Kaliánpur was to accept a value for the longitude of Madras and to calculate the differential longitude of Kaliánpur by means of the triangulation. The question that had now to be decided was: should the new value of longitude, which was to be introduced into Indian mapping, be made to accord with the astronomical value of Madras or with that of Kaliánpur?

The difference of longitude between Madras and Kaliánpur as determined astronomically is 7″·14 *less* than as measured by the revisionary triangulation. We do not know the cause of this discrepancy: the astronomical value may have been affected by Himalayan or continental or local attraction; the value deduced from the triangulation may have been rendered incorrect by the employment of Everest's values of the axes of the earth: it is not possible to say at present whether the astronomical or the geodetic determination is the more reliable.

If the astronomical value for the longitude of Madras were adopted, *viz.*, 80° 14′ 47″·06, the longitude of Kaliánpur calculated from the triangulation would be 77° 39′ 10″·43. If the astronomical value for the longitude of Kaliánpur were adopted, *viz.*, (80° 14′ 47″·06 − 2° 35′ 29″·49) = 77° 39′ 17″·57, the longitude of Madras calculated from the triangulation would be 80° 14′ 54″·20. The question at issue was not whether one alternative was more correct than the other, but which of two equally correct methods it was more advisable to adopt.

Kaliánpur was made the astronomical origin of latitude by Colonel Everest in 1840; in 1900, Colonel Gore decided to make it the astronomical origin of longitude also: the longitude of Madras will henceforth be deduced from the triangulation. A reference to Madras has to be retained in the footnotes on maps, because it is the only point at which a comparison between recent and former values of longitude can be instituted: the addition, however, of the word "Geodetic" to the footnote shows that Madras has ceased to be the astronomical origin of longitude.

In accordance with Colonel Gore's Departmental Order No. 13 of the 17th of May, 1900, the following footnote is now placed on sheets of the Map of India and Adjacent Countries on the scale of $\frac{1}{1000000}$:—

The Longitudes are referrible to the Greenwich Meridian, taking that of Madras Observatory as 80° 14′ 54″ East, the most recent Geodetic value.

For newly engraved Atlas Sheets the footnote will in future be as follows:—

The Longitudes are referrible to the Greenwich Meridian, taking that of Madras Observatory as 80° 18′ 30″ East. They require a correction of − 1′ 9″ to make them accord with the Great Trigonometrical Survey, and a further correction of − 2′ 27″ to make them accord with the most recent value of the Geodetic Longitude of Madras Observatory, *viz.*, 80° 14′ 54″.

For Standard Sheets and all mapping based on the longitude of the Great Trigonometrical Survey of India, the footnote will in future be as follows:—

The Longitudes are referrible to the Greenwich Meridian, taking that of Madras Observatory as 80° 17′ 21″ East. They require a correction of − 2′ 27″ to make them accord with the most recent value of the Geodetic Longitude of that Observatory, *viz.*, 80° 14′ 54″.

The Longitude and the footnote of every future map will have to be reconsidered.

In the present volume the descriptive chapters and diagrams, and the tabular arrangement of the numerical details of the observations and reductions are due to Captain G. P. Lenox Conyngham, R.E. The volume was printed at the

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* As the footnote stated a correction of 2′ 30″ to be necessary, when the value 80° 14′ 51″ was believed to be the correct longitude, it would have been but reasonable to assume that the correction would have to be increased to 2′ 34″ when the value 80° 14′ 47″ came to be substituted. But the problem was complicated in the early years of the century by the introduction of *two* stations of origin, Kaliánpur and Madras; the triangulation of India was made to emanate from Kaliánpur, whose longitude was unknown, and it picked up a value of longitude, when it connected with Madras. In the old footnotes to maps it was tacitly *assumed* that the astronomical value of the difference of longitude between Kaliánpur and Madras did not differ from the value derived from the triangulation: the astronomical value was, however, in reality 6″·76 less than the value given by the old triangulation and 7″·14 less than the value given by the revisionary triangulation. No cognisance was taken of this discrepancy in the old footnotes; the observations of 1894-95-96 showed the true error in longitude of the Great Trigonometrical Survey to be 2′ 27″; the "apparent" error 2′ 34″, deduced from a superficial consideration of the old footnotes, was 7″ too large.

Office of the Trigonometrical Branch in Dehra Dún under the supervision of Mr. J. Eccles, M.A., who has rendered valuable assistance to Captain Lenox Conyngham and myself in preparing the volume for publication. A portion of the volume was passed through the press by Mr. C. H. McA'Fee, Extra Deputy Superintendent, while officiating in charge of the Computing Office during the absence of Mr. Eccles in England. The comparison and correction of the press-proofs were carried out under Babus Amba Prasad, Shoshee Bhushan Shome and Shiv Nath Saha, the Senior Computers, who have all rendered good service. The members of the Computing Office, who were employed on the computations and who have worked with great zeal, were Babus Shiv Nath Saha, Ishan Chandra Dev, Ganga Prasad Máthur and Sarat Chandra Guha. Babu Sarat Kumar Mukerjee has superintended the printing of the volume, and taken much interest in the work. To all these officers my sincere thanks are due for their co-operation.

On February 16th, 1896, General J. T. Walker died. He was Superintendent of the Great Trigonometrical Survey of India from 1861 to 1883, and Surveyor General of India from 1878 to 1883. Under his guidance the Geodetic work of Lambton and Everest was widely expanded; the Vizagapatam, Bangalore and Cape Comorin Base-lines were measured, portions of the Great Arc of India and of the Great Longitudinal Arc were revised, sixteen series of Principal Triangulation were executed and the simultaneous reduction of the Triangulation of India was carried out; the Pendulum, Longitude, Tidal and Spirit-Levelling Operations were initiated, and the Zenith Sectors were introduced for Latitude Observations. The first nine volumes of the Account of the Operations of the Great Trigonometrical Survey of India were published by General Walker. We have placed his portrait in the fore part of this volume as a memorial of his work and as a tribute of admiration.

DEHRA DÚN: January, 1902.

S. G. BURRARD, MAJOR, R.E.,
Superintendent Trigonometrical Surveys.

ERRATA ET CORRIGENDA.

PART II.

Page					
41	in headings of columns 11 and 12	*from*	h m s	*omit*	h
61	col. 5, throughout table	*for*	51 Cephei (Hev.)	*read*	Cephei 51 (Hev.)
72	„ 2, line 12 from bottom	„	ν Piscium	„	υ Piscium
111	„ 6, throughout table	„	51 Cephei (Hev.)	„	Cephei 51 (Hev.)
172	„ 2, line 7 from bottom	„	β Lyræ	„	β' Lyræ
219	„ 5, „ 3 „	„	δ Ursæ Mid.	„	δ Ursæ Min.
220	„ 5, „ 12 „	„	σ^2 Ursæ Min.	„	σ^2 Ursæ Maj.
At the end of volume, in heading of Plate VII		„	Chart No. 1	„	Chart
„	Plate VII	„	Teheran	„	Tehran
„	in heading of Plate VIII	„	Chart No. 2	„	Chart
„	Plate VIII	„	Teheran	„	Tehran

ELECTRO-TELEGRAPHIC LONGITUDES.

PART I.

DESCRIPTION OF THE INSTRUMENTAL EQUIPMENT

AND OF

THE OPERATIONS GENERALLY

WITH

DETAILS OF THE SYSTEM OF OBSERVING

AND OF

REDUCING THE OBSERVATIONS

DURING

1894-95-96.

CHAPTER I.

INSTRUMENTAL EQUIPMENT.

1.

Equipment.

The instrumental equipment which was used for the measurement of all the Indian Longitude Arcs, as described in Volumes IX, X and XV, being in part nearly worn out, and in part superseded by more modern forms, new instruments, received from Europe and America in the summer of 1894, were substituted for the old and these will now be described, a comparison between the new and the old being given where it seems of interest.

2.

The Transit Instruments.

The pair of sister instruments was made by Messrs. Troughton and Simms of Charlton, Kent.

The object-glass of each has a clear aperture of $3\frac{7}{16}$ inches and a focal length of 36 inches.

The base, shewn in section in plate I, fig. 1, is a massive iron casting of oblong shape, which is placed with its greatest length east and west. At the east end there is a small extension with a central hole threaded to receive a screw, which screw bearing on a lewis let into the masonry pillar serves to raise or lower that end of the base and thus to level the instrument. At the other end there is a projection with a rectangular aperture which fits, with a good deal of play, over a stud screwed into another built-in lewis; through the sides of this projection run two horizontal antagonising screws which bear against the stud and afford the means of adjusting in azimuth. Near the west end of the base there are two other projections, one north and one south, with slotted holes; these projections rest on lewises and when the adjustments are complete can be clamped to them by screws passing through the slotted holes.

No weight rests on the azimuthal stud, the eastern levelling lewis and the north and south lewises receive the whole of it, so that the base is supported at three points only and is consequently stable.

The base is hollow and in the cavity underneath is the arrangement for lifting the telescope from its bearings for reversal. This consists of a lever, *aa* (Plate I, fig. 1), pivoted at the east end, while the west end rests on an eccentric cam, *b*, fixed to a horizontal axis which passes through to the outside of the base at its west end where it is fitted with a handle, *c*, by which it can be revolved through an arc of 180 degrees. When the handle is in its ordinary position of rest the lever is at its lowest, but as the handle is turned the cam causes the west end of the lever to rise until, when it has passed through an arc of 180 degrees, the lever attains its greatest elevation. Further revolution in the same direction is prevented, so that the lever can only be lowered by allowing the handle to return to its original position.

On the base at its east and west ends are securely screwed, each by 5 capstan-headed screws, the vertical pillars (see Plate II) on which the transit instrument rests; they are of cast iron, and their lower surfaces are planed so as to bear truly on the base. These pillars are 23 inches high so as to allow the telescope to revolve without either object end or eye end coming in contact with the base or with the rotator, a part to be presently described. Segmental gun metal bearings are brazed to the upper ends of these pillars and on these the pivots of the telescope rest. The form of these bearings is shown in Plate I, fig. 2. In a heavy instrument they are decidedly preferable to Ys, for the wear on the pivots is reduced owing to the surfaces in contact being more extensive.

Midway between the pillars the base is perforated by a hole bushed with a steel cylinder carefully turned to fit the pivot of the rotator. In Plate I, fig. 1 the rotator is shewn, *f* being the pivot. This pivot rests on the lever, *aa*, which has been already described, so that when the handle is turned the rotator is bodily lifted to such a height that the pin *g* is clear of the base, and the rotator can revolve freely on its pivot. The pillars, *hh*, of the rotator are provided at their upper ends with crutches, *jj*, each crutch having a pair of friction wheels as shewn in the diagram.

In the position *rotator down* these crutches are not in contact with anything, but on turning the handle they rise till they press against the conical horizontal axis of the telescope and eventually lift it out of its bearings. The pin *g* is of such length that it is not clear of the base till the pivots of the telescope are clear of their bearings so that all danger of revolving the rotator too soon and so knocking the pivots against the corners of the vertical pillars is avoided. Moreover the holes into which *g* can sink, one east and one west, are so placed that the rotator cannot be lowered unless the telescope is in the proper position for the pivots to drop into their bearings.

To facilitate the finding of the correct position for lowering, a flat spring is placed at one side of each of the holes intended to receive *g*, such that when the rotator is turned clockwise *g* slides over it, but if turned in the opposite direction is stopped by it; and when *g* is in light contact with one of these springs the rotator is in the position for lowering, that is, *g* is directly over its hole and the pivots over their bearings.

Originally the pillars of the rotator contained springs which pressed the crutches upwards against the telescope and so relieved the pivots of part of the weight. But this arrangement was found to cause a slight instability in azimuth and in consequence the springs were removed and the crutches after reversal allowed to drop clear.

Each of the fixed vertical pillars has two sockets on its outer side into which a bracket to receive the illuminating lamp fits.

The telescope, as has been said, has an aperture of $3\frac{7}{16}$ inches and a focal length of 36 inches. The tube and horizontal axis are in one piece, not, as in the old instruments, in three pieces screwed together and capable of being separated for transport. It is open to question whether this change is altogether an improvement for though the telescope is not very heavy it requires a large box and so becomes somewhat unwieldy and decidedly unsuitable for mule transport. The base is as heavy, but not so large, and is besides so strong that it is well able to stand the rather rough treatment which always falls to the lot of heavy packages.

The total length of the transit axis is $19\frac{3}{4}$ inches. Each arm is conical, being $4\frac{1}{4}$ inches in diameter where it joins the telescope tube and 2 inches in diameter just before it joins the pivot; the last inch before the pivot is somewhat thicker so as to give greater strength to the junction.

The pivots are of bell metal $1\frac{3}{8}$ inches in diameter; both are pierced, and through the one passes a brass rod which carries at its extremity the silvered reflector for throwing light upon the field of view, the other is merely closed by a glass window and through it passes the light from the axis lamp.

The two ends of the telescope tube are of equal length, *viz.* 18 inches.

Both the object glass in its cell, and the eye end which carries the micrometer, are attached to flanges on the main tube by three pairs of screws; one of each pair passes through the part to which it belongs and screws into the flange, the other is threaded through the former and presses against the latter. These screws afford the means of focussing.

The system of wires consists of five groups of five each, fastened to a diaphragm moveable by a micrometer screw, and there is also another wire which may be considered fixed though it can be adjusted so as to be placed conveniently near the position of no collimation error. The equatorial interval between adjacent wires is about 2·3 seconds and between groups twice this amount, the value of 1 division of the micrometer head being 0·039 seconds.

Six eye-pieces were provided with each instrument, two direct, two diagonal, and for nadir observations two Bohnenberger, one straight and one diagonal.

For star observations the diagonal eye-piece of power 70 was always used, and for levelling by mercury the diagonal Bohnenberger, of power 50.

When the instruments first arrived there was a comb in the micrometer of each for recording whole revolutions of the micrometer head, but it occupied so much of the field of view that it was thought objectionable and a small dial counter worked by the micrometer head was substituted for it.

Each telescope is provided with a pair of setting circles 4 inches in diameter and the usual attached levels. The circles are capable of being revolved so as to allow of setting for declination in various latitudes, but as a matter of fact they were set to read zenith distances from the first and never altered. There is also an arrangement for clamping the telescope in altitude and a slow motion screw for final adjustment, but these were never made use of, except temporarily; the instrument was always unclamped before a star was observed.

Plate II shows the transit in the position for observing a star.

The principal difference between the new transits and the old is that the new can be reversed with ease, without risk of any jar, while the old had to be lifted by four men acting together, carried round and then replaced. This operation which was attended by considerable risk of jar or derangement of the adjustments, so much so that reversals, though occasionally made in the middle of a night's work, were always regarded as undesirable and were generally made at the close, so that the instrument might have time to settle and the observer to examine his adjustments before beginning again. The advantage of this power of rapid reversal is great, for formerly one night's work, however successful, did not ordinarily give a complete value of the difference of longitude, which could only be obtained from the combination of several nights' observations including all combinations of the pivot positions of the two instruments; whereas now each group of stars being divided into two parts, one observed in each pivot position, we obtain, so far as the star observations are concerned, a complete value from every group, or four values per night, according to the ordinary programme. The power of reversal also enables the determination of collimation to be made with one collimator instead of two, which slightly reduces the bulk of the equipment and is in many ways convenient. Further with the new instruments it is possible to make nadir observations in mercury in both pivot positions and thus, by a comparison of the mean result with the mean of the collimator readings, to determine the inequality of the pivots.

In fact the power of reversal gives the observer more complete mastery of his instrument, and though by a proper procedure all undetermined errors could be, and always were, caused to cancel in the work done with the old transits, yet the analysis of any unexpected or anomalous discrepancy was rendered more difficult and uncertain.

The old instruments had one considerable advantage over the new as regards convenience of erecting, for the final adjustment in azimuth is now effected, as has been said, by a pair of antagonising screws working against a stud on a built-in lewis, and until the mortar or cement in which this lewis is embedded has thoroughly set, it moves more readily than the instrument, and so is useless. It is necessary in fact to adjust in azimuth roughly by hand, taking care that the stud is in the centre of its play, and then to brick the lewis carefully in and leave it until it is quite firm. With the old instruments this waiting was not necessary, they could be adjusted as soon as they were placed on the pillars.

3.

The Collimators.

The collimators which accompany the transits have objectives $3\frac{7}{16}$ inches in diameter, the same as in the transits themselves. Plate III, figure 1, shows a collimator on its base. This base is a heavy circular cradle of cast iron standing on three foot screws, which in turn rest on circular iron slabs. The cradle consists of two parts so fitted together that the upper can revolve on the lower with a sliding motion. The upper part has at opposite ends of a diameter two segmental bearings in which the collimator rests. Thus the axis of the collimator can be made horizontal by the foot screws, and can be revolved in azimuth by turning the sliding part of the cradle, and finally the cross wires can be rendered vertical by means of a pair of antagonising screws fixed to the base and working against a block attached to the tube of the telescope. Longitudinal movement of the telescope in its bearings is prevented by collars which encircle the tube and abut against the outer sides of the bearings.

4.

The Chronographs.

The chronographs were made by Messrs. Warner and Swasey of Cleveland, Ohio. Plate III, figure 2, is a general view of one of the instruments.

There are two main differences between them and the old ones, firstly the principle of the governor, and secondly the fact that there is only one recording pen instead of two. Plate I, figure 3, is an elevation of the governor. There is a train of wheels driven by a weight; the train ends in a bevel wheel which gears into another at the top of the governor spindle. When the machine is running the governor is caused to revolve with considerable velocity, and when more than a certain speed is reached, the governor balls rise, pivoting on the points, *aa*, the other ends of the rods which carry them rolling on the friction wheels, *bb*, up the arms, *cc*.

The part, *d*, is a heavy gun-metal ring capable of revolving smoothly but somewhat sluggishly on the fixed central block, *f*, and to it is attached the arm, *g*, having at its end the projecting head, *h*, made of hard steel. At the end of one of the rods which carry the balls there is a hard projecting pin, *p*; when the balls have risen to a certain height this pin, as it flies round, impinges on the head, *h*, so that the gun-metal ring, *d*, is carried round. This offers some resistance and the result is that the speed of revolution is reduced, the balls fall, disengaging *p* from *h*, and the governor runs free until the speed again increases and the action is repeated.

It might be supposed that the sudden knocking of the pin against the brake would abruptly check the motion and that it would be jerky and uneven, but this is not the case, the machine runs with beautiful evenness and steadiness of rate. The governor balls are heavy and thus when revolving rapidly their momentum is great, and the arm, *g*, being of considerable length and the moment of inertia of the ring, *d*, being small, no check of the movement occurs at the moment of impact but the drag on the system caused by the sluggishness of *d* reduces the velocity in an even manner. It is important that *d* should move without undue friction and it is necessary to keep its bearing surface well oiled.

To give means of regulating the speed of revolution the balls are weighted on one side, thus by turning them on their centres it is possible to regulate the distance of their centres of gravity from the spindle and so to alter the speed which is necessary to cause them to rise so far as to bring the brake into action. Graduations are provided so as to ensure both balls being similarly placed. Attention must be paid to this for otherwise a great strain would be thrown on the central spindle.

When the chronograph is not going a spring brake presses upon the flat surface below the bevel pinion of the governor and to start it, this must be drawn back by the attached lever.

The connection between the drum and the driving gear is effected by prolonging the axle of one of the toothed wheels to the outside of the cover of the wheel-work; this axle carries at its outer end a disc, and near the outer edge of the disc a pin is fixed. A disc of similar size to the one alluded to already, is fixed to the inner end of the axle of the drum, and has 8 radial slots of such width as to admit the pin easily, so that when the wheel-work is in motion this pin engaging in one of the slots causes the drum to revolve.

The pen carriage runs on three small wheels which rest on ledges on the sides of the bed within which the screw which imparts the longitudinal motion revolves. Of these wheels two are flat-edged and rest on the inner ledge, and the third has a V edge running in a corresponding groove on the outer.

Two flexible wires connect the coils of the electro-magnet to terminals on the base of the chronograph and the current is led from one of these terminals through the spring brake mentioned above, before proceeding to the pen coil, and the brake is so arranged that the circuit is broken when the chronograph is stopped.

The pen is controlled by the antagonistic action of an electro-magnet and a spring. The spring constantly pulls the armature to which the pen arm is attached away from the magnet, its influence being overcome when the current is passing through the coils. There are means of adjusting the amount of play of the armature, its proximity to the cores of the magnet and the strength of the spring.

The original pens supplied with the instruments were the ordinary glass pipettes, they were grasped by a holder which kept them nearly vertical and they rested with their points on the paper under the influence of their own weight. They worked tolerably well, but were very easily clogged by dust, and then it was difficult to clean them, moreover they did not draw so fine and sharp a line as the steel nibs formerly used, they were therefore subsequently discarded and replaced by nibs of the old type in suitable holders.

The drum is 14 inches long and 7 in diameter, and as the screw which carries the pen carriage forward has 12 threads to the inch, 168 revolutions is the run of the chronograph on one sheet of paper. A revolution is performed in 1 minute so that the machine can run for 2 hours and 48 minutes. The circumference of the drum being 22 inches the length of one second is 0·37 inches nearly. The paper is fastened to the drum by spring clips, one at each end, a convenient arrangement as it only takes a short time to remove one sheet and put on a fresh one.

It has already been remarked that there is only one recording pen instead of two as on the old chronographs. For the ordinary work of recording star transits this has some advantages. The pen carriage is lighter, the electrical arrangements are simpler and the necessity for applying a pen equation is done away with. A certain number of the records of the transit of a star across individual wires will ordinarily be lost by being confused with the records of the clock beats, but if a star is observed over 12 or 13 wires, there are, in practice, always quite enough left to give a satisfactory result. The case is, however, different when a star near the pole is being observed, for its motion across the field is so slow that it is frequently not practicable to observe it over more than 3 or 4 wires, and the loss of one or two of these records is a serious matter. Still for star observations in general the single pen is on the whole satisfactory.

When, however, we come to clock comparisons the case is very different, for if the clock beats happen to be coincident and the relative rate small, they will remain coincident for a considerable period, and then the difficulty of disentangling the one from the other is very great. The ordinary length of the beat as recorded on the drum when all is working well is about one-tenth of a second, and it cannot be made very much less without unduly relaxing the spring which acts in opposition to the electro-magnet. It is clear therefore that on the average the beats will interfere with each other once in 5 times—the sum of the lengths of the two beats being one-fifth of a second—and this, it will be admitted, is a serious drawback. But when comparisons by cable are being made the probability of interference is enormously increased, for though the beats of the local clock are short and good, those of the distant clock, transmitted through the cable, are greatly elongated, being always one-third and frequently as much as two-thirds of a second in length, so that it is the exception to have the beats separate. Furthermore it is impossible with one pen to carry out satisfactorily experiments on retardation through looped wires, for, when the interval between two signals is small, interference always occurs.

5.

The Commutators.

On Plate IV will be found a diagram of one of the commutators and the electrical apparatus, showing all the connections both permanent and temporary. The permanent connections are indicated by thick lines and the temporary by thin ones.

At the right-hand lower corner of the diagram is a Morse key (A) of the ordinary form; the central binding screw of the key is joined to one terminal of a simple galvanoscope (B) from the other terminal of which proceeds the line wire, a lightning discharger being interposed between the instrument and the line.

Above this is the Receiving Relay (R R). When the operations were begun this relay was one of the Siemens pattern with a resistance of about 300 ohms. It had been obtained from the Indian Telegraph Department and was very efficient on ordinary land lines, but it proved unequal to cable work. It was successfully used on the shorter of the two cable arcs, Jask-Bushire, but with difficulty, and on the long Karachi-Bushire arc it failed and each observer was obliged to borrow a large Allan and Brown Relay from the Indo-European Telegraph Department. As soon therefore as it could be managed more sensitive relays, of the Stroh pattern, were obtained, and the old ones were discarded.

In the diagram one of the new pattern relays is indicated. They were made by Messrs. Elliott Bros. and proved decidedly better than the old ones and undoubtedly facilitated work on the very long Tehran-Potsdam arc.

It will be noticed that one end of the tongue of the receiving relay is joined to the zinc pole of a small local battery, the other end of the tongue being connected to the binding screw, β, whence by suitable pegs the current can be led to various parts of the apparatus.

At the centre of the board there is an ordinary Morse sounder (M). This was on several occasions replaced by a Morse Inker with advantage.

On the left-hand top corner is the sending relay (S). To allow the strong current of the line battery to pass through the clock would have been improper; a local circuit with a small battery was therefore formed, including the clock and the coils of a relay of low resistance, and also if necessary, by inserting the appropriate pegs, the tappet and the coils of the chronograph pen; thus the beats of the pendulum of the clock were copied by the tongue of the relay, and one end of this tongue being in connection with the line battery and the other with the line wire, the beats were transmitted to the distant station.

The sending relay is on the Siemens pattern. Its resistance is low, some 15 ohms; the reason of this is that if it is desired to send clock beats to line and at the same time to record them on the chronograph, it is necessary to keep the total resistance of the local circuit low or the current will not be strong enough to work the pen. The pen coils have a resistance of about 18 ohms and that of the sending relay was with propriety made about the same.

In the diagram a small local circuit containing only the clock, a relay and one cell is shown, and the ends of the tongue of this relay, not the terminals on the clock, are connected with the commutator. When the astronomical clock was used this arrangement was not necessary as there was no objection to allowing a current strong enough to work the pens and the sending relay to pass through it, but when the break-circuit chronometer was used it was desirable to keep the strength of the current very low indeed, and hence the arrangement shown in the diagram.

The commutator calls for little description. It is to be noted that parts similarly lettered are connected underneath by unseen wires, also that the long bar marked E is in connection with the plate, E E, carrying six binding screws, which lies to the right of the commutator. This plate is known as the local earth plate; it is connected with the real earth plate and all wires which should go to earth are brought to one of its screws; thus, the second wires from the clock and the tappet though shown as going to earth were in reality brought to this plate.

The pen and the tappet are indicated conventionally, but their connections can be easily traced. On the right is a small diagram showing the connections between the pen carriage and the terminals on the chronograph stand, and those between the latter and the commutator.

Full particulars of the circuits required and the pegs necessary to produce them are given in chapter III.

6.

The Clocks.

In addition to the two astronomical clocks which were used before, two break-circuit chronometers were obtained from Messrs. Bond of Boston, Mass.

When first received they gave trouble and consequently the observers did not abandon their clocks, but their portability rendered them less liable to accidents in transit, and they ultimately did good service, for both clocks received injuries and without the chronometers the work would have been seriously hindered. These chronometers have besides the usual boxes with gimbals, very good padded leather cases in which they were packed for travelling. The break-circuit arrangement is of the usual type, namely a wheel with 60 teeth which revolves once in a minute, each tooth as it passes knocking back a light agate-shod spring and thus separating two contact points. One tooth is cut away so as to mark the 60th second of each minute by the absence of the usual signal.

CHAPTER II.

OBSERVATORY ARRANGEMENTS.

1.

Observatories.

New observatory tents were designed and made for the operations now being described. It was not that the old ones would have been unsuitable for the new equipment, but that they were very heavy and consisted of many parts joined by screws or bolts, and the loss of any part, during the voyage to some out-of-the-way place, would have been extremely inconvenient. The new tents though not quite so well shaped as the old ones are yet quite commodious enough and answer very well, their chief drawback as compared with the old is that they are less able to withstand the shock of a gale of wind, still, if properly guyed, they can stand as much as any ordinary tent, and on longitude work there is always a house close at hand so that, in the event of the weather being very bad, the telescope can easily be put in its box and conveyed to a place of security. This was in fact always done at the close of each night's work at Bushire and Tehran where there was frequently a high wind. With the old transit instruments this would have been difficult and troublesome as the telescope had to be taken to pieces before being put in its box, but with the new ones it was the work of a moment. Plate V gives a general view of the observatory, telescope, collimator and recorder's table.

2.

Pillars for the Instruments.

The pillar for the transit instrument is 2 feet 3 inches high, 2 feet 9 inches from east to west and 1 foot 4 inches from north to south. The top of the pillar is not a continuous flat surface, for a space 9 inches wide and 8 inches deep is left at the middle so as to form a convenient recess for the tappet to occupy, whence it can be taken up by the observer whether he is sitting to the north or to the south.

The collimator pillar is 3 feet 11¾ inches high, 2 feet 6 inches from north to south and 2 feet 2 inches from east to west. The distance between this pillar and the transit pillar is 11 feet 3 inches. This distance is merely a matter of convenience, allowing the collimator pillar to be outside the tent and as near as possible without interfering with free access from all sides. The top is merely a plain flat surface made as level as it can be by rough means.

The pillars rest on foundations sunk 2 to 3 feet below the surface of the ground, the excavation being of such a size as to leave a space 2 to 3 inches wide all round the pillar when built. The object of this space is to isolate the pillar from all surface tremors; it was usually filled in with loose dry sand, lest small articles should fall into it and be lost.

The pillars were always built as near as possible to the room in which the clock and chronograph were, so that the observer might be able to pass rapidly from the telescope to the chronograph and back again, in case any thing required his supervision.

The observatory was furnished with a table, a chair and a lamp for the recorder, who had beside him a sidereal chronometer which enabled him to warn the observer of the approach of a star. There were also two wicker stools of convenient height for the observer to sit on, and a broader wooden one on which he stood when taking observations by reflection in mercury.

For this operation a shallow amalgamated copper trough was used, such as is described in Volume XV, page 37. It was supported on a little wooden table with three legs which stood on the iron base of the transit instrument. The table was of such a length and height that it formed a bridge across the horizontal bar of the rotator, without touching it. When reversing the instrument it was not removed, as the rising rotator lifted it bodily, carried it round and dropped it in the proper position for the next observation. The position of the trough being necessarily quite central, it was found that if the rotation were performed rather slowly, there was but little tendency for the mercury to be spilled.

3.

The Clock Pillar.

At stations where it was necessary to erect a clock, a pillar was built to receive it. It was founded and isolated like the others. The lower portion is generally about 36 × 24 inches up to within a few inches of the ground level, where it is decreased to 24 × 24, leaving a ledge 12 inches wide in front; it is carried up at these dimensions for about 6 feet 8 inches. The ledge is convenient for supporting the clock when about to be bolted to blocks of wood which are built into the pillar for the purpose. It is very important that this pillar should have weight and rigidity sufficient to withstand the oscillation of the pendulum without vibration, which would have an immediate effect on the clock rate.

At Greenwich and Potsdam the observers were allowed direct connection with the standard clocks of the observatories, and so the clocks which form part of the equipment were not used.

4.

Arrangement of Wires.

The absence of the high masonry pillars on which the old transits were supported made it necessary slightly to change the arrangement of the wires in the observatory.

The most convenient plan was found to be to lead the wires to the top of one of the poles of the tent, and thence down the pole to the ground; a trench was dug from the foot of the pole to one side of the pillar and the wires laid in this, they were fastened separately to the pillar just below ground level, and led round and up to the centre of the recess where they were joined to the flexible double cable of the tappet. It was necessary of course to make at least one of the leads of well insulated wire.

Within the clock room the commutator was always placed quite close to the chronograph, generally on the same table, and the local batteries on the floor beneath it; the wires connecting these were led direct from terminal to terminal, but other wires, from the clock, the observatory, the line, earth, &c., were all collected overhead into one bundle and brought down through a hole in the commutator board, and then distributed from underneath to their appropriate binding screws. All the local circuits were metallic throughout.

5.

Batteries.

No batteries were carried as part of the equipment, cells of sufficient number for the work being borrowed locally from the nearest telegraph office.

CHAPTER III.

SYSTEM OF WORKING.

1.

General Principles.

The most satisfactory system of determining the difference of longitude between two places is, no doubt, that of observing the same stars and recording the times of transit of half the number at both stations in terms of the clock at one of them, and those of the other half, also at both stations, in terms of the clock at the other. That is to say, each local clock would for half the night's work be graduating not only its own chronograph but also, through the line wire, the chronograph at the distant station, and for the other half of the time would not be graduating either.

In this way the time which a star takes to pass from the meridian of one station to that of the other is found, and the right ascension of the star need only be known with sufficient accuracy to identify it, for which purpose an error of 5 seconds would seldom be of any consequence.

This system, however, entails the absolute control of a wire connecting the two stations for the whole period of work, and also presupposes that the line is in good order and that there will be little or no disturbance of signals due to induction or storms; for, in the event of such occurring, frequent re-adjustments of the relay are always necessary, and to be constantly running from the observatory to the chronograph room and back again, is most disturbing to the observer and also causes the loss of many stars.

In cases where the use of the line can only be had for short periods at intervals through the night, or where, owing to bad insulation, variable weather or any such cause, the signals are unsatisfactory and constant adjustment of the relay is required, the most suitable system is that of recording the times of transit of the same stars at each station by its own clock and chronograph, and then at certain pre-arranged times making direct comparisons of the clocks first on one chronograph and then on the other. The two comparisons are necessary in order to determine and eliminate the retardation of the signals in passing from one station to the other.

By this method the observer is always at hand to supervise the working of the relay when signals are being received from the distant station, and furthermore when he is observing transits he is much less liable to disturbance on account of any failure of the signals calling for his interference. Occasional trouble may, and no doubt will, occur owing to the pens not marking, or an accidental contact causing a short circuit, or, a more serious matter, a failure on the clock's part to make or break circuit; but with a little experience an observer acquires the power of instantly localising the source of the mischief, and the fact that he has no connection with the distant station relieves him of all fear that the remedy may be beyond his reach.

This method then is that most generally suitable, but there are causes which may make this also unattainable.

It is evident that after the observer at the eastern station has observed a set of stars an interval equal to the difference of longitude must elapse before the observer at the western station can do so, and if the difference of longitude is great, this gives rise not only to inconvenience but also to a great want of symmetry in the programme, for in the case of very long arcs of longitude it might easily occur that all the observations at the eastern station would be taken before the comparison for the epoch of which the clock error is required, and all those at the western station after it, so that interpolation to that epoch would not be possible. In practice, if the difference of longitude is more than about 50 minutes, the inconvenience and difficulty of using only the same stars at both stations become very great.

There is another source of difficulty in this method. If at both stations there is a danger of the sky being partly obscured at night by passing clouds, then though each observer may, out of a good list of stars, obtain a fair set of observations, yet since only those stars are of use which are observed by both, the value of the night's work may be reduced almost to *nil*. This is an objection which would not have much weight in India where there are many fine nights, but in Europe it is important.

The only way of avoiding these difficulties is to give up the attempt to observe the same stars at both stations, and for each observer to determine the error of his own clock by observations of stars that transit at a convenient time. If the right ascensions of the stars used were known with perfect accuracy, this method would introduce no new source of error, and would only be less advantageous than that of observing the same stars at both stations, on account of the additional labour involved in the computation of the stars' places. But, as a matter of fact, every right ascension has a probability of error of greater or less magnitude, and in order to keep this low it is necessary to select only well-observed stars from the best and most recent catalogues; this seriously reduces the number of stars from which to make the programme, and results in a lengthening of the intervals between stars, which not only makes the work more tedious, but makes the periods during which the clock's rate has to be assumed to be steady longer, thus increasing the probability of undiscovered variation.

When this system is employed no previous arrangement between the two observers is necessary except as regards the time at which the comparisons of the clocks shall take place. Each constructs his own programme with regard to his own convenience, being careful, however, closely to imbed each comparison between complete determinations of his clock's error, or, better still, each complete determination of clock error between comparisons, if control of the wire can be obtained sufficiently often to allow of this.

The conditions which prevailed during the measurement of the several arcs forming the chain connecting Karachi with Greenwich varied so greatly in every particular, that no fixed procedure could be adopted. Sometimes the system of observing the same stars at both stations was used, sometimes the observers worked quite independently, and sometimes the two methods were combined.

As a precise account of the programme on each arc will be given in the chapter devoted to the arc itself, no more detailed information on this head need be given here.

2.

The Electrical Arrangements.

The new chronographs made by Messrs. Warner and Swasey have only one recording pen, and consequently the arrangements of the circuits differ considerably from that formerly in use. The following are the circuits which it is desirable to be able to form readily by means of the commutator, though all are not ordinarily necessary. The numbers which follow are those of the pegs which must be inserted in the commutator in order to form the combination required; with their assistance the circuits will be easily traced on Plate IV.

1. Clock. Pen. Battery. For recording the beats of the clock on the drum of the chronograph. ... ... 2. 14. 8.
2. Clock. Pen. Observatory Tappet. Battery. For recording both the beats of the clock and any signals made by means of the tappet. 6. 4. 11. 20. 21.
3. Pen. Tappet. Battery. For recording tappet signals only. ... ... 8. 14. 15.

These three combinations are purely local and have no connection with the distant station.

The next three include signals received from the distant station. To allow the current from the line wire to pass through the coils of the receiving relay to earth, pegs 23 and 26 must always be inserted.

4. Receiving relay. Pen. Tappet. Battery. For recording any signals received from the distant station and also any made locally with the tappet. ... 23. 26. 22. 15.
5. Receiving relay. Clock. Pen. Battery. For recording signals from the distant station and at the same time the beats of the local clock. 23. 26. 22. 2.
6. Receiving relay. Sounder. Battery. For conversation. ... ... 23. 26. 24.

Lastly there are three cases in which signals are sent to the distant station, for these pegs 23 and 26 must be removed and peg 25 inserted, the last-named puts the tongue of the sending relay in connection with the line wire.

7. Clock. Sending relay. Battery. For sending clock beats to distant station. ... ... 25. 1. 13. 8.
8. Clock. Pen. Sending relay. Battery. For sending beats to line and at the same time recording them locally. ... ... 25. 1. 12. 14. 8.
9. Clock. Pen. Tappet. Sending relay. Battery. For sending beats to line and recording both these and tappet signals locally. 25. 1. 13. 11. 20. 21.

For sending signals to line by the Morse key no special peg is necessary, for the key when depressed immediately makes connection between the line battery and the line wire.

Of the above combinations No. 2 is the ordinary one for the recording of local transits, No. 5 that for making a clock comparison and No. 7 that for sending beats to line so that the other observer may do so.

No. 6 is the position for the exchange of ordinary Morse signals.

When the system is adopted of allowing each clock alternately to graduate both drums for half the night, Nos. 4 and 9 are the appropriate circuits.

3.

The Retardation of Signals.

In making a comparison of clocks by means of signals transmitted through a telegraph line, the results will differ according as the signal is sent from the west station to the east station or *vice versâ*, the difference between the two results is equal to the sum of the times taken by a signal to pass from east to west and from west to east; and all that can be done is to assume that these times are equal and that consequently the mean of the two comparisons gives the true difference; there is no alternative.

In order, however, to give every possible justification to this assumption several precautions are necessary.

It is evident that the retardation is due partly to the time the current of electricity takes to pass from one end of the line to the other, and partly to the time which the various instruments take to act; moreover, the latter element depends both on the time which the current takes to magnetise the electro-magnet of the relay, pen or other instrument, and on the distance which the moving part has to go.

In order to make the instrumental retardation as little likely to vary as possible, the system of using break of circuit, and not make, has been used throughout. This has two advantages:—firstly, in that the demagnetisation of an electro-magnet is effected more quickly than the magnetisation, and secondly, in that when the instant of the break of circuit is that which is to be recorded, the amount of motion allowed to the pen or the relay tongue, is unimportant, for the instant it begins to move the signal is made; on the make-circuit system the signal is not made till the motion is completed. Secondly, in order to make the time taken by the current in passing along the wire likely to be the same in both directions, the battery power is regulated so that the currents received at the two ends of the line are equal. And thirdly, the instruments in use at the two stations are precisely similar, and care is taken by the observers to adjust them in a similar manner.

When a signal is sent from one station to another the following are the instruments which come into play:—

1. The sending relay at the sending station.
2. The receiving relay at the receiving station.
3. The chronograph pen at the receiving station.

When, however, the clock beats are being recorded locally there is a source of retardation in the local chronograph pen which balances with great exactitude that of the sending relay, so that any lag of the tongue of the sending relay behind the actual beat of the clock may be neglected, as it is the same as that of the signal jerk of the pen when the latter is in circuit, and with which comparison is actually made.

The actual difference therefore between the comparisons made at the two stations is equal to twice the time taken by the current to pass along the line + twice the armature time of the receiving relay + twice the armature time of the chronograph pen, on the assumption that the armature times at both stations are the same.

4.

Personal Equation.

The relative personal equation of the observers was determined on as many occasions as possible by the observation of divided transits, in which both observers use the same telescope, one taking the transit of a star over the first eight or ten wires, and the other completing the observation of the same star over the last eight or ten wires, whence by reduction to the centre wire a value of the personal equation is at once obtained. This method repeated with numerous stars—the observers alternating their order of observation—affords an excellent value of their relative personal equation.

As it is not unknown for the relative personal equation of two observers to have different values according as the apparent motion of the star in the field of view is from right to left or from left to right, which depends on the aspect under which the star is observed, that is to say, on whether the observer is facing north or south during the observation, care was taken to include in the programme a large number of stars of both aspects, and to deduce therefrom separate values of the personal equation, but no systematic difference between the two was revealed.

The values obtained at different places, however, show a slight variation with the latitude; this is satisfactorily explained by Major Burrard in the following manner:— "Personal equation is probably an expression of the form ($C_1 \pm C_2 \sec \delta$), where C_1 is a constant representing the time taken for an eye impression to actuate the hand and C_2 is the constant equatorial interval between a transit wire and the point at which an observer estimates the star's bisection: C_1 is an interval of absolute time, C_2 of space reduced to time. The time taken by a star to traverse the space C_2 will increase with the declination and will be $C_2 \sec \delta$". Now as the stars observed at any place lie within a certain zenith distance, it is evident that the mean declination will depend on the latitude. The variation from this cause is small and only becomes appreciable in high latitudes, where the secant of δ begins to increase rapidly.

Observations of divided transits were made with both transit instruments, but no difference between the results was found.

Though the method of divided transits has been proved by long experience to be satisfactory, it is nevertheless desirable, where possible, to arrange for a cancelment of the personal equation, so that, should there be any error in the adopted value, it may have no effect on the final result.

The best practical method* of effecting this is to measure an arc twice, the observers changing places between the two measurements. The mean of the two values obtained is clearly free from all

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* It would be more complete still to make four measurements with the following changes of place:—Calling the two sets of instruments A and B, and the two observers a and b,

1st	Measurement	Aa	Bb
2nd	"	Ab	Ba
3rd	"	Bb	Aa
4th	"	Ba	Ab,

but this is so laborious as seldom to be possible.

effects of personal equation, and the difference between the two values is a measure of it. This method is not practicable unless there are rapid means of communication between the two stations.

Secondly, if the difference of longitude to be determined consists of two parts, there being a central station, and the same observer remains throughout the work at the central station, the other travelling round him, the personal equation will enter with opposite sign into the two parts, so that it will be eliminated from the sum. It is to be noted, however, that the longitude of the central station will not be freed from an error in the adopted value of the personal equation.

Lastly, if there be three stations and it be possible to measure the difference of longitude between every two, a circuit is obtained which affords a most valuable test of the precision of the work. If the same observer is at the west end of each arc, the personal equation will enter once into the direct measurement of the difference of longitude between the easternmost and westernmost stations, and twice into the indirect measurement consisting of the sum of the two partial arcs; if therefore the adopted value be in error, it will appear in the difference between the direct and indirect measures.

Full advantage of all these methods was taken, as will appear in the detailed account of the operations.

5.

The Idiometer.

A full description of this instrument, designed by Colonel W. M. Campbell, R.E., is given in Volume IX, Chapter V. Its object was to afford a means of measuring an observer's absolute personal equation. It is unfortunate that it cannot be satisfactorily used when there is only one recording pen on the chronograph. Observations with it were taken, however, and though the results were not good enough to be incorporated in the final value of the personal equation, being more of the nature of indications than of measures, still, so far as they go, they quite corroborate the evidence of the divided transit method.

6.

The reading of the chronographic records.

The chronographic record is transcribed—that is, converted into a numerical record— with the aid of a glass scale of diverging lines, by which the position of a star's transit-signal between two second-signals of the clock can be measured in tenths of a second, while hundredths may be readily estimated by eye. It is evident that there is room for an effect of personality in this operation, and this was guarded against, as a rule, by causing the same person to transcribe all the records of an arc, that is to say, those of both stations, so as to free the deduced difference of longitude from the effect of any personal idiosyncracy of reading. In some cases, however, this could not be done, and then an equation was determined by allowing the two readers to transcribe the same record independently and comparing the results. The differences were found to be small.

Plate VI is a reduced facsimile of the chronographic record of an ordinary night's work.

CHAPTER IV.

DETAILED DESCRIPTION OF THE METHODS OF OBSERVING.

1.

Instrumental Constants.

Wire Intervals. The whole system of transit wires—twenty-five in number—is attached to the micrometer slide, by means of which the central wire of the system can be placed in the position of no collimation error, or, as is generally more convenient, in a position for which that error has been determined: The usual practice was to observe the transit of each star over the fifteen central wires, but it was a very common occurrence to miss one or more wires; and the custom was frequently varied purposely, for instance, when it was desirable to observe two stars of nearly the same right ascension, the first fifteen of the twenty-five wires were used for the first and the last fifteen for the second star. The combination of these circumstances, *viz.*, the readily adjustable collimation error of the central wire and the frequent variation in the groups of wires over which transits were observed, led to the system of reducing the observation on each wire to the central wire in preference to using the mean of the wires. For this purpose the equatorial intervals between each wire and the central wire must be known with accuracy; these were carefully determined in seconds from observations of transits of slow moving stars. These equatorial intervals being known, the computation of time intervals for every star observed, and the reduction thereby of the observations to the central wire, can be rapidly effected. This method has the great advantage of showing at a glance the accordance of individual wire observations in each transit, and leads to the detection of mistakes—such as observations of wrong stars, or mis-readings of the chronographic record—at an early stage of the reductions. The stability of the wire intervals was found to be satisfactory.

Telescope Micrometer. The value of the micrometer screw is required for the determination of collimation and level errors. It was carefully determined by observation of circumpolar stars: the micrometer head was set successively to 0, 100, 200, &c., and the corresponding times of transit recorded on the chronograph.

2.

Determination of Collimation.

The collimation error being defined as the distance between the central transit wire and the point where a line through the optical centre of the object glass and perpendicular to the transit axis cuts the plane of the wire diaphragm, it may be measured in terms of the micrometer division by intersecting the crossed wires of the collimator, placed approximately horizontal, with the central transit wire and noting the reading of the micrometer, and then reversing the telescope in its Y's, intersecting and reading again; the mean of the two readings will then be that which corresponds to the position of the central wire when truly collimated.

This method was employed wherever a collimator was available.

In the form on which the determinations are recorded the reading of the micrometer when the collimator cross was intersected, the telescope being in the position *I.P.E.*, is called C_E, and in the position *I.P.W.*, C_W while the mean of two $= \frac{C_E + C_W}{2}$ is called C_0.

For actual observation the micrometer was always set to a convenient whole number not differing largely from C_0; this arbitrary number is called C_S and the collimation correction for the position *I. P. E.* is $= C_0 - C_S$ and is called c_E, that for *I. P. W.* is $= C_S - C_0$ and is called c_W. For each star the quantity c_E or c_W, as the case may be, has to be multiplied by a factor $c = m \sec \delta$, where m is the value of 1 division of the micrometer in seconds of time, and δ is the declination of the star.

3.

Determination of Level Error.

The dislevelment of the instrument was always determined by the use of the mercury trough. This method is extremely convenient and satisfactory especially when, as in the present case, the transit instruments can be rapidly reversed without jar.

It is clear that if the central wire be truly collimated, the supports at precisely the same level, and the pivots equal, the reflection of the wire from the mercury and the wire itself will coincide. If they do not coincide the amount by which the wire must be moved to produce coincidence is a measure of the dislevelment of the rotation axis, and this amount in terms of the micrometer divisions is the dislevelment sought. To determine this we have therefore first, by means of the collimator, to find the number C_0, then turning to the nadir, to produce coincidence between the central wire and its reflection in mercury and to note the micrometer reading. The difference between this reading and C_0 is the dislevelment for the position of the telescope in which the nadir observation was made. For the position *I. P. E.* the reading is called M_E and for *I. P. W.* M_W. The proper sign for the corrections, b_E and b_W, is given by the formulae $C_0 - M_E = b_E$, and $M_W - C_0 = b_W$, respectively.

For the correction of star transits no further information is required, but we do not as yet know whether the dislevelment is due to unequal height of supports or inequality of pivots, it is clear however that any difference between b_E and b_W must be due to the latter cause. In fact the difference between the height of the supports is $= \frac{b_E + b_W}{2}$, and the inequality of pivots is $= \frac{b_E - b_W}{2}$ or $C_0 - \frac{M_E + M_W}{2}$. Calling the mean of M_E and M_W M_0, we have the inequality of pivots $= C_0 - M_0$. If the quantity has a positive sign it denotes that the illuminated pivot is the smaller. The quantity M_0 was taken out for each occasion on which nadir observations were made and its steadiness is a useful check on the accuracy of the readings M_E and M_W.

There is a slight objection to this method of determining the inequality of pivots, in that C_0 depends on the intersection of the collimator cross with the central wire, and M_0 on the superposition of the wire on its image, so that any temporary idiosyncracy would not necessarily affect both operations equally and they would thus not be strictly comparable. The result is that $C_0—M_0$ is not quite trustworthy, but this does not affect the value of the difference of longitude, for M_E and M_W are quantities of precisely similar kind so that $\frac{M_E—M_W}{2}$ is an excellent measure of the difference in height of the supports and all effect of the remaining part of the dislevelment, due to pivot inequality, is eliminated by observing equal numbers of stars in the positions *I.P.E.* and *I.P.W.*

The observers had intended to take observations for dislevelment with the striding levels also, as an additional check, and also in order to ascertain, by a method not open to the objection described above, a value of the inequality of pivots, and a large number of such observations were as a matter of fact taken.—Unfortunately however the spirit levels proved unsatisfactory, their results being discordant and untrustworthy. So peculiar was their behaviour that after many fruitless attempts to discover the reason of their eccentricities they were sent back to the maker for examination.

The failure of the spirit levels, though it in no way affects the value of the results, was a disappointment, as the comparison of the two methods of measuring the dislevelment would have been of interest, and it is not impossible that with a more accurate value of the inequality of the pivots certain differences between results obtained in the two positions *I.P.E.* and *I.P.W.* would have disappeared, though the mean would not have been changed.

The quantity b_E or b_W, as the case may be, has to be multiplied by a factor $B = m \cos \zeta \sec \delta$, to give the correction to the observed times of transit of a star. The sign of b has been already explained; that of B depends on ζ and δ; ζ is the zenith distance considered + when south and — when north.

4.

Diurnal Aberration.

The effect of diurnal aberration on the time of a star's transit, though small, is yet appreciable, and though, if the difference in latitude between two stations be not great, it disappears in the difference of longitude, yet it has been considered expedient to compute its amount for each star in all the arcs under discussion. Since the secant of the star's declination enters into the amount of the correction to the time of transit, it has on former occasions been included with the collimation, but this has not now been done. The amount $= - 0^s{\cdot}0207 \times \cos \lambda \times \text{secant } \delta$ (λ being the latitude), has been entered by itself in a special column.

5.

Deduction of Deviation Correction from Star Observations.

In order to determine the azimuthal deviation of the transit instrument from the meridian, a large number of circumpolar stars were included in the programme, the number of stars at upper culmination being equal or nearly equal to that of those at lower culmination. Observations of such stars were scattered through the night's work as evenly as possible so that there should never be any long period without a check on the azimuthal deviation. They were also divided between the two instrumental positions. As it was never feasible to observe the same star at both culminations, it was essential to know each star's right ascension with great accuracy, a condition which considerably curtailed the number of stars from which to choose.

It is by no means uncommon for the pole to be obscured by clouds while the zenith is clear, and this renders it as a rule more difficult to secure the full number of circumpolar observations than to complete the programme of stars near the zenith, which are observed for time. It thus occurs that the actual observations for azimuthal deviation are not so symmetrical with regard to pivot position, and upper or lower culmination, as they were intended to be, and it has therefore been found advisable to compute the deviation correction from each star separately, instead of from the combined observations of a pair of stars one at upper and one at lower culmination. For this method it was necessary to deduce a preliminary value of the clock error. In India, and in fact wherever the latitude was not very great, the programme of stars for time observations always contained equal numbers of stars north and south of the zenith, and from these it was easy to obtain a preliminary value of the clock error without knowing the deviation correction, but if the latitude is high the apparent motion of stars north of the zenith is so slow, that they are unsuitable for time observations, and in these cases only a few stars of this aspect were included in the programme, and consequently there was occasionally some difficulty in obtaining a sufficiently good preliminary value of the clock error; two approximations however were always found to suffice. It is to be noted that when the stars at upper and lower culmination are equal in number any small error in the clock correction employed tends to disappear.

To deduce the deviation in seconds of time the difference between the corrected time of transit (obtained by applying the corrections for collimation and level to the observed time of transit), and the star's right ascension has to be divided by $\sin \zeta \sec \delta$. In practice the divisor used is $m \sin \zeta \sec \delta$, where m is the value of one division of the micrometer in seconds of time. This divisor is called A. The quantity m is introduced in order to express the deviation in terms of the micrometer divisions, in which the collimation and level corrections are also expressed. The sign of A depends on those of $\sin \zeta$ and $\sec \delta$, and attention must be paid to them when A is being computed; ζ as stated above is considered positive when the star is south of the zenith and negative when north thereof.

The four main corrections having been explained, an outline will now be given of the procedure appropriate to the two methods of finding the difference of longitude, namely, that in which the same stars are observed at both stations and that in which the observations are independent of one another. The method alluded to in Chapter III, in which the transits of the same stars at both stations are recorded in terms of the same clock, was never employed as the drawbacks to the method there mentioned were always present. It will be convenient to adopt the names used by Colonel Campbell in Volume IX and to call stars observed at both stations "Longitude Stars," and stars observed by one observer only to find his clock error "Clock Stars."

6.

Procedure when Longitude Stars are observed.

When the same star is observed at both stations, if each clock showed true local sidereal time, the recorded times of transit, corrected for instrumental errors, would be precisely the same. If, however, the clocks have errors, the difference between the corrected times of transit is equal to the algebraical difference of these errors; but as an interval equal to the difference of longitude elapses between the observations at the two stations and as the difference between the clock errors at a particular epoch is required, the time of transit at one station must receive a correction for its clock's rate during the elapsed interval. It is customary to apply this correction to the time recorded at the west station. Thus the difference between the clock errors at the epoch of the observation made at the east station is obtained.

The star observations are divided into groups, and the difference between the clock errors is found for the mean epoch of each group. Between groups of star observations a clock comparison is made and by interpolation the difference between the clock errors at the epoch of the comparison is found.

Now if T_E = the true local time at the east station at any epoch,
T_W = do. do. at the west station at the same epoch,
then $\Delta L = T_E - T_W$;
also if t_E = the time by the east clock at the epoch,
t_W = do. do. west do.
and E_E and E_W = the respective clock errors at this epoch,

then $T_E = t_E - E_E$, $T_W = t_W - E_W$,

so that $\Delta L = (t_E - t_W) + (E_W - E_E)$.

Now the actual difference between the clocks at any epoch is given by the clock comparison. If we call this difference D,

$$D = (t_E - t_W);$$

and the difference between the clock errors is given, as already explained, by the observation of the same star at both stations, whence $E_W - E_E$ is known

$$\therefore \Delta L = D + (E_W - E_E) \text{ is also known.}$$

The rate of the clock is obtained by comparing the times of transit of the same stars on consecutive nights. This is done at both stations and from the two results a relative rate is obtained, and the differences between the results of the clock comparisons taken at intervals during the night form a good check on the value deduced.

A complete clock comparison consists of two parts, firstly a comparison recorded on the chronograph at the east station, signals being sent from the west, and secondly a similar comparison recorded at the west station, signals being sent from the east; the mean of the two results is taken to be the true difference between the clocks at the mean epoch.

7.

Procedure when Clock Stars are observed.

When clock stars are observed it is first of all necessary to find with the utmost precision the right ascension of each star. All clock stars observed are taken from one of the following :—1. Berliner Astronomisches Jahrbuch. 2. Nautical Almanac. 3. Connaissance Des Temps. 4. Greenwich 10-year Catalogue for the mean epoch 1880.

It is to be noted that as different catalogues are liable to differ systematically from one another by small amounts, it would be improper for all the stars observed at one station to be taken from one source, and all those at the other from another. It is desirable that equal numbers of stars should be taken from each source by both observers.

The right ascensions of stars given in one of the first three are taken out directly, a simple interpolation being all that is required to give the apparent value for the epoch of observation. In correcting to this epoch, attention must be paid to the distance in longitude of the place of observation from Berlin, Greenwich or Paris as the case may be, for the stars' places are given for upper transit at these observatories respectively.

The places of stars taken from the catalogue have to be brought up by computation to the required date. If the observations did not extend beyond a week it was considered sufficient to compute for the two extreme dates and to interpolate for the remainder; if the period was longer three or more separate computations were made. The computation was effected by means of Professor Turner's edition of Stone's Tables in conjunction with Bessel's Day Numbers, as given in the Nautical Almanac. The result attained is the star's apparent right ascension at Greenwich mean midnight on the date of observation, and a further correction to the actual epoch of observation has to be made, which depends on the longitude of the place and on the star's right ascension.

The right ascension being known and the observed time of transit having been corrected for instrumental errors a value of the clock's error is obtained from each star. Thus, at each station independently, a mean value of the clock error corresponding to the mean epoch of a group of stars is obtained.

Clock comparisons yield the value of the difference beween the clocks at another epoch, and this last epoch is recorded in terms of each clock. The intervals between the epochs of the groups of stars at each station and that of the clock comparison are taken out, and corrections for rate for these intervals being applied, the actual error of each clock at the epoch of the clock comparison is obtained. Thus the error of each clock has been found, and also the difference between the clocks; hence, as in the case of longitude stars,

$$\Delta L = D + (E_W - E_E)$$

is known.

The clock rates are obtained in the same manner as before, but it is not necessary for the same stars to have been observed on consecutive nights; a good value can be deduced from the mean results of groups on the same or on different nights.

CHAPTER V.

SELECTION OF STATIONS AND SHORT NARRATIVE.

1.

The Selection of the Stations of Observation and the Telegraphic Connection.

The connection of Karachi with Greenwich by telegraph consists of the two great lines owned by the Indo-European Telegraph Company and Department respectively. The lines belonging to the Company extend from London to Tehran, and those belonging to the Government of India and managed by the Department stretch from Tehran to Karachi. Of the latter, the part between Tehran and Bushire consists of a triple land-line, and the connection between Bushire and Karachi is double as far as the intermediate station Jask at the mouth of the Persian Gulf, and thence triple. From Bushire to Jask there are two cables, and from Jask to Karachi one cable and two land-lines.

It was originally intended to divide the total distance into six sections, viz:—

Karachi to Bushire	...	...	...	by cable,
Bushire to Tehran	...	...	...	by land-line,
Tehran to Odessa	...	...	...	by land-line,
Odessa to Emden	...	...	...	by land-line,
Emden to Lowestoft	...	...	...	by cable,
Lowestoft to Greenwich		...	...	by land-line.

This scheme of division was based on three principles:—(1) The number of arcs must be kept as small as possible; (2) on each arc telegraphic connection must be direct without intermediate translating relays; and (3) owing to the supposed impracticability of joining up submarine cables and land-lines direct without the interposition of a translating apparatus, every place at which a change from cable to land-line occurred was considered an essential station of observation. The last principle at once made it necessary to include Bushire, Emden and Lowestoft. Tehran was introduced partly because its geographical longitude was required, and partly because it is the junction of the lines of telegraph belonging to the Indo-European Company and Department respectively. The remaining distance, Tehran to Emden, was considered too long for one arc, and was divided at Odessa.

The desirability of having as few divisions as possible need hardly be insisted upon. Every extra link tends to weaken the chain, and every additional arc increases the probable error of the terminal longitude. The length of an arc is, however, in practice limited by such telegraphic considerations as the condition of the wires, the battery power available and the sensitiveness of the relays. Intermediate translating relays on a line-wire are objectionable: the observers have no control over their adjustment, and their effect on the rate of the current in its two directions may not be the same. One intermediate translating relay is perhaps permissible, the whole line-wire being still under the control of either one or the other of the observers; the accidental insertion on the line of other wayside translations by forgetful telegraph-masters can then generally be detected by the alteration in the character of the distant signals as marked on the drum of the chronograph, but if two intermediate translations exist, that portion of the line between them is free of all control from the observatories.

This programme was, however, not carried out, for after the arrival of the observers in England they learnt that there would be no objection to joining the Lowestoft-Emden cable direct to land-lines at either side, and Lowestoft was consequently omitted. As moreover, on a line consisting of two dissimilar parts, the retardation might not be the same in both directions, it was considered desirable to have a portion of land-line at each end of the cable. Potsdam was therefore substituted for Emden.

A further change was the elimination of Odessa. In a consultation with the Astronomer Royal (Mr. W. H. M. Christie, F. R. S.) he gave it as his opinion that the introduction of an additional station of observation was more likely to cause an error in the resulting longitude of India than the presence of a single translation, and that therefore Odessa might be omitted with advantage.

The final scheme therefore consisted of the following arcs:—

	Miles		
Karachi-Bushire	1193	... ...	Cable.
Bushire-Tehran	655	... ...	Land-line.
Tehran-Potsdam	2500	... ...	Land-line.
Potsdam-Greenwich	815	... ...	Land-line & Cable.

With the double object of forming a circuit, such as had been found so valuable in the Indian work, and of determining its geographical longitude, Jask was added to the stations of observation and the arcs Karachi-Jask and Jask-Bushire were measured.

The substitution of Potsdam for Emden introduced a station not on the Indo-European Company's Line, but the use of lines belonging to the British and German governments was very readily granted by Sir W. H. Preece, K.C.B., the Engineer-in-chief of the British Post Office and Dr. Von Stephan the Post Master General in Germany. A German line between Berlin and Potsdam was also lent to complete the connection between Potsdam and Tehran.

Throughout the work the assistance afforded by all the telegraph officials with whom the observers came into contact was of the most cordial and efficient character, and the great zeal and resource displayed by Herr Post-Inspector Arpurth of the Berlin Post office, and Herr Meyer of the Indo-European Telegraph Company in Tehran deserve the most grateful recognition. As has been well said by the American Observers who made determinations of longitude in the East Indies, China and Japan, "the "fact cannot be too strongly expressed that without the zealous and persevering co-operation of the tele-

"graph officials no such undertaking as this can be successful, and no one without absolute experience "can realise the discouraging delays and difficulties which would be almost insurmountable without the "cordial assistance of the members of the cable staff."

2.

Short Narrative.

The observers appointed to undertake the work were Captain Burrard, R.E., and Lieutenant Lenox Conyngham, R.E., both of whom had had considerable previous experience of Longitude Operations, having together carried out the measurement of 13 arcs in India, Captain Burrard having also taken part in other measurements in co-operation with Majors Strahan and Heaviside, R.E.

The first step was to test the equipment and observe for personal equation; after this an experimental arc was measured at Dehra Dún, the telescopes being set up on the same meridian. The resulting difference of longitude corrected for personal equation was $0^{s}{\cdot}017$ and this result was considered sufficiently satisfactory to justify a commencement being made on the real work.

The first arc undertaken was Jask-Bushire, Captain Burrard going to Jask and Lieutenant Lenox Conyngham to Bushire. The connection was by cable and the principal difficulty encountered was in the clock comparisions, the relays belonging to the equipment not being of a suitable pattern. This difficulty was increased by the fact, that it was not possible to send reversing currents with the sending relays when clock signals were being exchanged. The measurement of this arc was completed in six nights, the weather being fine. Clock comparisons were made 28 times, 261 transits were observed at Jask and 273 at Bushire.

Captain Burrard then moved to Karachi and the second arc, Karachi-Bushire, was begun. The distance between these places is 1193 miles, and the relays of the equipment were found unequal to the work of recording signals sent through the cable. The officers of the Telegraph Department, however, kindly lent one of their large Allan and Brown relays to each observer, and these answered well. During the five nights' work 22 clock comparisons were made, 213 transit stars were observed at Karachi and 221 at Bushire.

The last of the Gulf arcs was Karachi-Jask. There is a land-line between these places and it was used for clock comparisons so that the relays of the equipments again came into use. Fine weather prevailed, and the arc was finished without incident. 39 clock comparisons were made and 219 transit stars were observed at each station. Captain Lenox Conyngham now returned to Karachi and a determination of the relative personal equation of the observers was made. Captains Burrard and Lenox Conyngham acknowledge gratefully the cordial and efficient assistance rendered by Mr. Possmann, Director of the Persian Gulf Telegraphs and his staff.

The Persian Gulf section of the work being now finished, the observers went to England. They had interviews with the Astronomer Royal and Mr. Preece, and the original scheme for the connection of Greenwich with Bushire was remodelled, as has already been explained. Both equipments being in England the opportunity was taken to have some of the instruments examined by the makers and a few alterations made. New relays were also purchased from Messrs. Elliott Brothers to replace those, which had proved unsatisfactory on the Gulf arcs.

The Astronomer Royal kindly wrote introducing the observers to Dr. Fœrster, Chief of the Observatory at Berlin, who, whilst cordially offering a site, suggested that Potsdam would be found a more suitable station, owing to the want of available space at Berlin. Professor Helmert, Chief of the Royal Geodetic Institute of Prussia, was accordingly addressed and he promised all the assistance in his power.

At Greenwich the Astronomer Royal lent an observing room, on the prime meridian, and here the instruments were set up. After observations for personal equation had been taken, Captain Lenox Conyngham moved to Potsdam, where he was cordially received by Professor Helmert and given every assistance. Under the orders of Herr Scheffler, Chief of the German Imperial Telegraphs, Herr Post-Inspector Arpurth was attached to the observatory at Potsdam to control the arrangements for the direct connection between Potsdam and Greenwich and to provide all necessary appliances.

Cloudy weather interfered with the progress of the work, and the system of observing the same stars at both stations was, for the reason explained in Chapter III, found impracticable. Recourse was therefore had to the independent method, each observer making use of every well placed star that he could. After a series of observations had been made, the observers changed places, Captain Burrard moving to Potsdam and Captain Lenox Conyngham to Greenwich, and a second similar series was undertaken. In all, 35 complete clock comparisons were made, and about 250 time stars were observed at each station.

Captain Burrard now moved to Greenwich, leaving his instruments standing at Potsdam, and personal equation was again measured. This measurement was not strictly necessary, for the interchange of observers had eliminated the effect of personality from the mean result, but it enabled a comparison to be made between the value obtained by the method of divided transits and that deducible from the two measurements of the arc of longitude. As will be seen in the discussion of the different measures of the personal equation, the two methods corroborate each other fairly well.

One set of instruments was now despatched to Odessa by sea and Captain Lenox Conyngham, travelling overland, met it on its arrival. In Odessa there were awaiting him his former recorder Babu Hanuman Prasad, and four khalasies, ready to accompany him to Tehran, where it was thought suitable assistance might be difficult to procure. The opportunity was taken of arranging with the officials of the Indo-European Telegraph Company for a suitable translation-apparatus.

The translation "*set*", as it is commonly called by telegraphists, consists of four relays, two of which are not essential to the work but are inserted for practical reasons which need not here be entered upon; their presence, however, introduces an additional armature time into the retardation of the current, and as every additional element is a possible source of error a simpler "*set*" consisting of two relays only was specially arranged, thus reducing to a minimum the disadvantage of having an intermediate translation.

From Odessa the party proceeded by steamer to Batoum, thence by rail to Baku, and again by steamer to Enzeli. The road journey from Enzeli to Tehran was arduous and the risk to the instruments considerable; all, however, reached Tehran without mishap. Thanks to the kindness of H. E. Sir Mortimer Durand, K.C.S.I., K.C.I.E., Her Majesty's Minister at Tehran, an excellent site for the observatory was found in an open space within the Legation walls.

The Telegraph Office was in the heart of the city, and a temporary line had to be erected to connect it with the observatory, a small clock room was constructed and the pillars for the telescope and collimator were built.

Although, as has been said, a translation set was ready at Odessa, the observers were not without hope that they would be able to exchange signals direct. Attempts were made to do this, but except on one Sunday night when owing to the diminution of traffic the conditions were unusually favourable, their efforts were unsuccessful, and the translating relays were therefore used throughout.

The measurement of this arc proved tedious, as the weather at both ends was unsettled; the most serious delay was caused by a storm in the Caucasus which carried away 30 miles of the telegraph line and interrupted telegraphic connection for 12 days.

Even with the translation at Odessa the clock signals were frequently interrupted by induced currents. To obviate this the German Telegraph authorities with characteristic liberality were good enough to grant the concession, that all telegraph traffic on the thirty-two wires running parallel to that of the Indo-European Telegraph Company, between Berlin, Warsaw and Odessa, should be stopped during the comparisons of the clocks. Even then the traffic on the Company's second wire between Odessa and Tehran would frequently cause induction currents sufficient to interfere with the comparisons, and Mr. Andrews, the company's Director in London, had to be asked to grant the further concession that the second wire might be kept silent while comparisons were being made on the first. Thence forward satisfactory comparisons became possible, though, owing to the length of the line, and the number of intermediate stations which required warning they were not easy to arrange.

It had at first been intended to take two comparisons per night, but the amount of time and trouble that was necessary to establish direct communication, and the great delays to traffic caused by the stoppage of so many wires in the midst of populous Europe, made it incumbent on the observers to take as little advantage as possible of the generous concessions that had been extended to them and they therefore decided to exchange clock signals but once in a night.

Nearly two months were spent on this arc and yet only 10 nights of really good work were obtained; the nights on which observations were successful at both stations were far apart, though every night for seven weeks without one exception both observers were present in their observatories. As an instance of the disappointments which are likely to occur to longitude observers, the following extract from Captain Burrard's report may be quoted:—" Out of the nine nights succeeding the re-open-" ing of telegraphic communication in the Caucasus we had been able to work on but one. On December " 6th about 10 p.m. Berlin time, Herr Arpurth was able to inform Tehran that the sky was cloudless " at Potsdam, and an hour later he received a message from Tehran—" weather perfect ". We set to work " with a will, and when the time arrived for clock comparison, we had both observed some 30 stars. " Tehran being the easterly station had to send clock to Potsdam first, and I at once saw by the character " of the signals, that all was not right on the line. I thought at first that some intermediate station " must be cutting in, but Herr Arpurth telephoned me from Berlin that there was a great storm on the " line near Warsaw, and the line wires were in contact. All of a sudden this contact presumably ceased, " for the signals of the Tehran clock arrived sharp and clear for the space of 40 seconds. Before, how-" ever, I could send my clock signals to Tehran, the contact must have recommenced: Captain Lenox " Conyngham received none, and a first rate night's work was lost through the want of half a clock " comparison".

The arc was eventually closed after 12 clock comparisons had been made and 274 time stars had been observed at Potsdam and 291 at Tehran. These numbers do not include those stars observed at either place on nights when the other was overclouded, but are the actual numbers that can be utilised in deducing the resulting longitude.

Captain Burrard had now to move from Potsdam to Bushire, while Captain Lenox Conyngham remained at Tehran. The latter officer made use of the time occupied by the journey by reading off all the chronographic records of the preceding arc, and in making a copy of the transcript which he deposited in the Legation Chancery, so that in the event of any accident occurring during his return to India there would still be means of recovering the observational data. He also made a connection by triangulation between his longitude station and that used by General Stebnitzki in 1874.

Tehran–Bushire, the last arc of the chain, proved an easy one. An excellent line wire was placed at the disposal of the observers during the greater part of the night by Colonel Wells, R.E., and clock signals were exchanged three times per night without difficulty or delay. Clouds interrupted observations on one or two occasions: but on the whole the weather was favourable.

Upon the completion of this arc Captain Lenox Conyngham left Tehran and returned to India *viâ* Resht, Baku, Batoum and Port Said. The two observers met at Dehra Dún and there on four successive nights observed a final value of personal equation. This closed the work of the expedition and completed the determination of the longitude of Karachi.

3.

Reduction of the Observations.

An abstract of the observations and the reduction of the results are given for each arc separately in tabular form, and to each is prefixed an explanation of the different tables and a discussion of the reasons for the differences between the several programmes. The object kept in view in drawing up the tables was to afford all the data necessary for any reader who might wish to examine the reductions and reproduce the results arrived at. In an appendix are given descriptions of the stations of observation sufficient for their identification. Plate VII is an outline map showing the arcs measured.

ELECTRO-TELEGRAPHIC LONGITUDES

PART II.

ABSTRACT OF THE OBSERVATIONS

AND

REDUCTION OF THE RESULTS

DURING

1894-95-96.

PERSONAL EQUATION.

1894-95-96.

EXPLANATION OF *TABLES I AND II.*

Personal Equation.

The direct determinations of personal equation were made by the method of divided transits. Observations of this kind were taken on five separate occasions, first at Dehra Dún before the commencement of the measurement of the arcs of longitude, secondly at Karachi after the measurement of the three Gulf arcs, thirdly at Greenwich before the Potsdam-Greenwich arc, fourthly at Greenwich again after that arc, and lastly at Dehra Dún at the close of the operations.

Moreover, the arcs were so arranged as to cause, as far as possible, a cancelment of any residual error. Firstly the arc Potsdam-Greenwich was measured twice over, the observers exchanging stations between the two measurements. Secondly the same observer remained at Tehran during the measurement of the two arcs Tehran-Potsdam and Tehran-Bushire, so that the personal equation is eliminated from the total arc Bushire-Potsdam. Lastly the arc Karachi-Bushire was measured twice, once direct and again in two parts, namely Jask-Bushire and Karachi-Jask; the same observer was at the western station of each arc and as the agreement between the two measurements was good, the value of the personal equation employed cannot have contained any appreciable error.

Table I. Contains an abstract of all the observed values. Each abstract is divided into two parts, the one containing stars of North, and the other those of South aspect. This is done to see whether there is evidence of a change in the value of the personal equation according to the apparent direction of motion of the star across the field of view. The results are inconclusive the difference being sometimes of one sign and sometimes of the other.

Table II. Contains an abstract of the means of the values in Table I and a statement of the adopted values.

For the three Persian Gulf arcs, *viz.*, Karachi-Bushire, Jask-Bushire, and Karachi-Jask the adopted value is the mean of the determinations at Dehra Dún in October and November 1894, and at Karachi in February 1895. The mean of the results by North and South stars respectively is taken as the value to be deduced from each full determination, and the mean of these two values is that adopted. For the Potsdam-Greenwich arc no value is required as the mean of the two measurements eliminates personal equation altogether; the double measurement of the Potsdam-Greenwich arc yields an independent measure of the personal equation.

The value at Greenwich by North stars is $-0^s{\cdot}376$ and by South stars $-0^s{\cdot}278$; this discrepancy is probably due to the slow apparent motion of stars of north aspect in so high a latitude as that of Greenwich, as has been explained in a previous chapter. As the north stars observed were few in number a weight proportional to the number of stars observed was given to each and the mean $-0^s{\cdot}311$ thus obtained.

The difference between the two values of the arc Potsdam-Greenwich is $0^s{\cdot}660$, showing a personal equation of $-0^s{\cdot}330$. A mean of $-0^s{\cdot}321$ is adopted as the value of the personal equation at Greenwich.

The final determination at Dehra Dún in May 1896 yields the value $-0^s{\cdot}266$, therefore for the two arcs Tehran-Potsdam and Tehran-Bushire the adopted value is $-\dfrac{0{\cdot}321 + 0{\cdot}266}{2} = -0{\cdot}294$.

TABLE I. ABSTRACT OF OBSERVED VALUES OF PERSONAL EQUATION

between Captains Burrard and Lenox-Conyngham.

At DEHRA DŪN — BEFORE THE KARACHI-JASK-BUSHIRE ARCS WERE BEGUN

Date and Instrument used	By North Stars: Star	Declination	Equation B − C	By South Stars: Star	Declination	Equation B − C
1894		° ′	s		° ′	s
Oct. 24, Telescope No. 1	3480	47 26	− 0·23	3489	26 42	− 0·25
	3521	39 5	− ·26	3498	12 10	− ·16
	3529	43 30	− ·23	3506	21 55	− ·29
	3534	47 13	− ·16	3540	29 48	− ·25
	3574	48 56	− ·16	3550	4 49	− ·02
				3558	21 35	− ·28
				3580	18 55	− ·34
Oct. 26, Telescope No. 1	3437	37 58	− 0·27	3429	14 19	− 0·14
	3480	47 26	− ·10	3451	31 56	− ·07
	3521	39 5	− ·12	3461	24 54	− ·29
	3529	43 30	− ·18	3489	26 42	− ·31
	3534	47 13	− ·22	3498	12 10	− ·15
	3574	48 56	− ·32	3506	21 55	− ·30
	3602	49 31	− ·01	3540	29 48	− ·18
	3618	42 48	− ·12	3558	21 35	− ·12
	3644	48 49	− ·12	3580	18 55	− ·09
	3679	44 8	− ·17	3592	23 11	− ·15
	3690	44 30	− ·29	3610	18 51	− ·22
	3630	37 49	− ·23	3652	19 20	− ·25
				3660	20 44	− ·25
				3671	12 37	− ·31
Nov. 6, Telescope No. 2	3574	48 56	− 0·09	3540	29 48	− 0·16
	3587	48 23	− ·11	3558	21 35	− ·25
	3602	49 31	− ·19	3580	18 55	− ·26
	3607	38 4	− ·30	3592	23 11	− ·30
	3618	42 48	− ·21	3610	18 51	− ·21
	3630	37 49	− ·20	3652	19 20	− ·26
	3644	48 49	− ·16	3660	20 44	− ·25
	3679	44 8	− ·25	3671	12 37	− ·27
	3690	44 30	− ·10	3716	28 5	− ·27
	3701	32 39	− ·23	3731	− 8 21	− ·23
	3725	37 13	− ·17	3738	11 40	− ·22
	3755	31 18	− ·24	3742	20 19	− ·24
				3749	0 50	− ·22
Nov. 7, Telescope No. 1	3574	48 56	− 0·05	3558	21 35	− 0·26
	3587	48 23	− ·21	3580	18 55	− ·29
	3597	52 30	− ·16	3592	23 11	− ·25
	3602	49 31	− ·21	3610	18 51	− ·35
	3607	38 4	− ·06	3652	19 20	− ·33
	3618	42 48	− ·30	3660	20 44	− ·28
	3630	37 49	− ·36	3671	12 37	− ·38
	3644	48 49	− ·23	3716	28 5	− ·39
	3679	44 8	− ·11	3731	− 8 21	− ·34
	3690	44 30	− ·32	3738	11 40	− ·38
	3701	32 39	− ·22	3742	20 19	− ·38
	3725	37 13	− ·21	3749	0 50	− ·19
	3755	31 18	− ·34			
	Means	43 18	− 0·196 ± ·0085	Means	18 13	− 0·247 ± ·0083

At KARACHI — AFTER THE KARACHI-JASK-BUSHIRE ARCS WERE FINISHED

Date and Instrument used	By North Stars: Star	Declination	Equation B − C	By South Stars: Star	Declination	Equation B − C
1895		° ′	s		° ′	s
Feb. 10, Telescope No. 1	667	41 53	− 0·29	654	17 1	− 0·22
	675	41 33	− ·36	662	9 45	− ·35
	693	33 53	− ·30	684	5 53	− ·10
	720	42 49	− ·37	703	17 41	− ·09
	728	28 44	− ·17	708	10 58	− ·23
	768	45 18	− ·36	717	15 24	− ·10
	791	27 43	− ·24	734	16 18	− ·17
	800	33 0	− ·27	738	20 28	− ·12
	809	37 44	− ·21	749	11 59	− ·24
	816	40 55	− ·31	754	22 45	− ·21
	828	21 26	− ·29	761	10 57	− ·28
				823	21 26	− ·15
				836	24 8	− ·22
Feb. 11, Telescope No. 1	563	47 27	− 0·31	579	24 2	− 0·21
	571	31 57	− ·16	624	9 42	− ·21
	586	43 38	− ·36	628	5 42	− ·29
	603	31 34	− ·31	654	17 1	− ·29
	608	34 46	− ·39	662	9 45	− ·16
	613	35 29	− ·15	684	5 53	− ·31
	637	27 19	− ·17	703	17 41	− ·30
	647	33 19	− ·25	708	10 58	− ·10
	667	41 53	− ·37	717	15 24	− ·36
	675	41 33	− ·17	734	16 18	− ·08
	693	33 53	− ·23			
	720	42 49	− ·27			
	728	28 44	− ·31			
Feb. 12, Telescope No. 2	563	47 27	− 0·16	579	24 2	− 0·15
	571	31 57	− ·33	618	17 54	− ·32
	586	43 38	− ·37	624	9 42	− ·27
	596	25 16	− ·26	628	5 42	− ·29
	608	34 46	− ·35	644	17 4	− ·33
	613	35 29	− ·30	654	17 1	− ·30
	637	27 19	− ·29	662	9 45	− ·29
	647	33 19	− ·30	684	5 53	− ·34
	667	41 53	− ·31	703	17 41	− ·33
	675	41 33	− ·32	708	10 58	− ·30
	693	33 53	− ·31	717	15 24	− ·35
	720	42 49	− ·32	734	16 18	− ·18
	728	28 44	− ·32	738	20 28	− ·27
Feb. 13, Telescope No. 2	545	39 33	− 0·19	539	12 35	− 0·26
	563	47 27	− ·23	557	20 34	− ·23
	571	31 57	− ·35	579	24 2	− ·25
	596	25 16	− ·30	618	17 54	− ·29
	603	31 34	− ·38	628	5 42	− ·33
	608	34 46	− ·36	644	17 4	− ·24
	613	35 29	− ·37	654	17 1	− ·33
	637	27 19	− ·33	662	9 45	− ·27
	647	33 19	− ·32	684	5 53	− ·33
	667	41 53	− ·38	703	17 41	− ·28
	675	41 33	− ·28	708	10 58	− ·18
	693	33 53	− ·33	717	15 24	− ·20
	720	42 49	− ·31			
	Means	36 5	− 0·294 ± ·0063	Means	14 34	− 0·244 ± ·0077

TABLE I. ABSTRACT OF OBSERVED VALUES OF PERSONAL EQUATION

between Captains Burrard and Lenox-Conyngham.

At GREENWICH — Before and after the Potsdam-Greenwich arc

Date and Instrument used	By North Stars: Star	Declination	Equation B−C	By South Stars: Star	Declination	Equation B−C
1895		° ′	s		° ′	s
May 28, Tel. No. 1	2077	55 28	− 0·48	2060	9 58	− 0·29
	2108	55 53	− ·39	2069	50 14	− ·31
	2116	53 13	− ·46	2073	44 27	− ·19
	2128	55 13	− ·18	2088	41 17	− ·26
	2136	52 36	− ·38	2101	42 39	− ·34
				2145	39 4	− ·29
				2150	16 19	− ·34
May 29, Telescope No. 1	2077	55 28	− 0·39	2038	45 50	− 0·38
	2116	53 13	− ·39	2047	39 6	− ·10
	2128	55 13	− ·24	2053	19 19	− ·31
	2136	52 36	− ·49	2060	9 58	− ·22
	2155	62 1	− ·25	2069	50 14	− ·31
	2169	54 15	− ·48	2073	44 27	− ·22
	2193	64 53	− ·49	2082	46 34	− ·17
	2208	52 17	− ·22	2088	41 17	− ·34
	2218	51 51	− ·43	2101	42 39	− ·17
	2260	57 32	− ·22	2145	39 4	− ·30
	2307	59 43	− ·48	2150	16 19	− ·31
				2175	15 10	− ·28
				2183*	27 54	− ·38
				2186	46 16	− ·40
				2197	49 57	− ·29
				2203	9 47	− ·44
				2227	16 47	− ·25
				2238	39 36	− ·31
				2246	50 19	− ·28
				2248	30 50	− ·27
				2272	5 12	− ·28
				2278	40 54	− ·30
				2288	24 48	− ·33
				2296	46 33	− ·41
				2320	39 41	− ·32
				2325	25 25	− ·29
				2337	5 57	− ·17
				2348	19 22	− ·32
				2352	29 33	− ·32
May 30, Telescope No. 1	2077	55 28	− 0·25	2073	44 27	− 0·25
	2108	55 53	− ·45	2082	46 34	− ·30
	2116	53 13	− ·33	2101	42 39	− ·19
	2128	55 13	− ·32	2145	39 4	− ·36
	2136	52 36	− ·34	2150	16 19	− ·15
	2155	62 1	− ·40			
	2169	54 15	− ·39			
	2193	64 53	− ·49			
July 31, Telescope No. 1	b Draconis	58 44	− 0·47	2929	23 14	− 0·29
	o Draconis	59 16	− ·36	109 Herculis	21 43	− 0·16
				α Lyræ	38 41	− ·13
				2988	− 9 9	− ·20
				3016	−20 27	− ·22
				β Lyræ	33 14	− ·37
				R Lyræ	43 48	− ·27
				γ Lyræ	32 33	− ·22
				ζ Aquilæ	13 42	− ·26
				3092	24 5	− ·33
	Means	56 16	− 0·376	Means	29 52	− 0·278
	Mean of May determination		−0·373			−0·286
	Mean of July ,,		− ·415			− ·245

Making no division between N. and S. stars the general mean of the May determination is −0s·318, and of the July determination −0s·273. The general mean of the whole giving each star an equal weight is −0s·311.

At DEHRA DŪN — After completion of all work

Date and Instrument used	By North Stars: Star	Declination	Equation B−C	By South Stars: Star	Declination	Equation B−C
1896		° ′	s		° ′	s
May 19, Telescope No. 2	4595 1st	39 1	− 0·26	4615	16 19	− 0·36
	4595 2nd	39 1	− ·24	4648	18 55	− ·13
	4627	35 18	− ·32	4662	15 19	− ·29
	4652	32 32	− ·29	4706	25 35	− ·35
	4684	51 28	− ·29	4721	13 27	− ·31
	4694	31 21	− ·27	4766	8 54	− ·34
	4699	44 22	− ·28	4808	30 49	− ·15
	4747	35 59	− ·31	4853	12 7	− ·22
	4783	38 52	− ·35	4905	19 32	− ·36
	4797	36 40	− ·35	4926	14 53	− ·26
	4816	37 25	− ·30	4933	16 48	− ·26
	4845	54 28	− ·32	4969	27 21	− ·28
	4870	40 54	− ·32	4991	26 42	− ·24
	4897	38 14	− ·30	5024	5 19	− ·23
	4942	40 3	− ·27	5048	20 57	− ·25
	4952	47 41	− ·42	5061	30 0	− ·20
	4980	48 33	− ·35	5067	12 56	− ·31
	5000	33 28	− ·29			
May 21, Telescope No. 2	4627	35 18	− 0·20	4615	16 19	− 0·16
	4684	51 28	− ·25	4637	18 27	− ·16
	4699	44 22	− ·23	4648	18 55	− ·23
	4736	53 1	− ·31	4662	15 9	− ·18
	4783	38 52	− ·27	4675	27 53	− ·15
	4797	36 40	− ·33	4721	13 27	− ·38
	4816	37 25	− ·31	4753	16 47	− ·24
	4845	54 28	− ·28	4766	8 54	− ·31
	4881	45 38	− ·34	4808	30 49	− ·21
	4897	38 14	− ·34	4853	12 7	− ·27
	4917	46 54	− ·25	4905	19 32	− ·28
	4942	40 3	− ·32	4926	14 53	− ·30
	4961	35 37	− ·21	4933	16 48	− ·24
	4980	48 33	− ·33	4969	27 21	− ·10
				4991	26 42	− ·24
May 22, Telescope No. 2	4699	44 22	− 0·30	4706	25 35	− 0·15
	4747	35 59	− ·21	4721	13 27	− ·13
				4753	16 47	− ·14
				4766	8 54	− ·15
				4808	30 49	− ·26
	Means	41 32	− 0·294	Means	18 48	− 0·238

TABLE II. ABSTRACT OF OBSERVED VALUES OF PERSONAL EQUATION

between Captains Burrard and Lenox Conyngham.

PLACE	Date	No. of Stars	Personal Equation B−C By North Stars	By South Stars	Mean		Distinguishing Letter
			s	s	s		
DEHRA DÚN	Oct., Nov. 1894 ...	89	− 0·196 ± 0·0085	− 0·247 ± 0·0083	− 0·2215 ± 0·0059		A
KARACHI	February 1895 ...	98	− 0·294 ± 0·0063	− 0·244 ± 0·0077	− 0·2690 ± 0·0050		B
GREENWICH	May 1895 ...	65	...	...	− 0·318 ± 0·0079	− 0s·311* ± 0·0073	C
GREENWICH	July 1895 ...	12	...	...	− 0·273 ± 0·0183		
POTSDAM-GREENWICH ... ... (by interchange of observers)	June, July 1895 ...	...	...	...	− 0·330 ± 0·0058		D
DEHRA DÚN	May 1896 ...	71	− 0·294 ± 0·0054	− 0·238 ± 0·0083	− 0·266 ± 0·0050		E

Adopted Values.

For the three Gulf arcs, $\frac{A+B}{2} = -0^s\cdot245$, p.e. $\pm\ 0^s\cdot0039$.

For Potsdam-Greenwich, $\frac{C+D}{2} = -0^s\cdot321$, p.e. $\pm\ 0^s\cdot0047$.

For Tehran-Potsdam and Tehran-Bushire, $\frac{\frac{C+D}{2}+E}{2} = -0^s\cdot294$, p.e. $\pm\ 0^s\cdot0034$.

* $0^s\cdot311$ is obtained by combining $0^s\cdot318$ and $0^s\cdot273$ with relative weights of 65 and 12.
The probable error is obtained thus:—(p.e. of $0^s\cdot311)^2 = \frac{65^2}{77^2}$ (p.e. of $0^s\cdot318)^2 + \frac{12^2}{77^2}$ (p.e. of $0^s\cdot273)^2$.

ARC JASK-BUSHIRE.

1894-95.

The programme.

The arrangement of the nightly programme was as follows:—

1. Determination of Collimation and Level.
2. 1st Clock Comparison.
3. Transits of stars for one hour.
4. 2nd Clock Comparison.
5. Determination of Collimation and Level.
6. Transits of stars for one hour.
7. 3rd Clock Comparison.
8. Determination of Collimation and Level.
9. Transits of stars for one hour.
10. 4th Clock Comparison.
11. Determination of Collimation and Level.
12. Transits of stars for one hour.
13. Determination of Collimation and Level.
14. 5th Clock Comparison.

The telescopes were reversed in their bearings in the middle of each group of transit stars. Each group contained a pair of circumpolar stars for the determination of Azimuthal Deviation, though owing to clouds in the neighbourhood of the pole it was not always possible to observe the full complement. In order to cancel the effects of errors in the determination of the Deviation the transit stars were selected half north and half south of the zenith.

The first two groups of transit stars were clock stars, that is, stars whose places are well known and which each observer selected for himself and observed independently. The last two groups were longitude stars, taken from a pre-arranged list, and were observed at both stations.

EXPLANATION OF *TABLE I.*

Abstract of Determinations of Collimation and Level Correction-Constants.

The first three columns call for no remark.

Column 4 contains the mean sidereal hour at which the several determinations were made.

Collimation.

Column 5, headed C_e, gives the reading of the micrometer when the collimator cross is intersected by the central transit wire, the telescope being in the position *I.P.E.* (*i.e.* Illuminated Pivot East).

,, 6, headed C_w, gives the corresponding reading, the telescope being *I.P.W.*

,, 7, headed C_0, gives the mean of the two preceding readings, *i.e.* $\frac{1}{2}(C_e+C_w)$. C_0 is therefore the reading of the micrometer when so set that the centre wire is truly collimated.

,, 8, headed C_s, gives the reading of the micrometer as set during the observation of star transits. This setting was arbitrary and was not changed in either instrument throughout the arc.

,, 9, headed c_e, gives the collimation correction-constant for the position *I.P.E.* c_e is equal to C_0-C_s.

,, 10, headed c_w, gives the corresponding correction-constant for the position *I.P.W.* c_w is equal to C_s-C_0.

Level.

Column 11, headed M_e, gives the reading of the micrometer when the centre wire and its reflection from the mercury trough coincide, the telescope being in the position *I.P.E.*

,, 12, headed M_w, gives the corresponding reading when the telescope is in the position *I.P.W.*

,, 13, headed M_0, gives the mean of the two preceding readings, *i.e.* $\frac{1}{2}(M_e + M_w)$.

This quantity is not used in the computations but it should remain constant and therefore affords a valuable safe-guard against blunders in reading M_e and M_w. The nature of the quantity is discussed in Chapter IV.

Column 14, headed b_e, gives the level correction-constant for the position *I.P.E.* b_e is equal to $C_0 - M_e$.

,, 15, headed b_w, gives the corresponding correction-constant for the position *I.P.W.* b_w is equal to $M_w - C_0$.

As the collimation is not liable to vary, a mean of all the values of C_0 on any night is taken, and c_e and c_w are found by taking the difference between this mean and C_s; but the level is not so stable and therefore the same values of b_e and b_w are not retained for the whole of a night's observations. The first two determinations were, on this arc, made in connection with the clock stars, and the other three with the longitude stars. Hence, as a rule, three values per night are made use of, the first is the mean of the first two determinations, the second is the mean of the third and fourth, and the third the mean of the fourth and fifth. On the last two nights of this arc clouds prevented the completion of the programme and hence the fifth determination was omitted.

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation C_e	C_w	C_o	C_s	$c_e = C_o - C_s$	$c_w = C_s - C_o$	Level M_e	M_w	M_o	$b_e = C_o - M_e$	$b_w = M_w - C_o$
1894			h m	d	d	d	d	d	d	d	d	d	d	d
Dec. 9	JASK	CAPTAIN BURRARD (Telescope No. 1)	0 15	1332·2	1624·0	1478·1				1549·9	1404·3	1477·1	−73·7	−75·7
			1 30	1333·8	1622·9	1478·4				1554·8	1401·7	1478·3		
			3 11	1330·3	1626·2	1478·3	1480·0			1553·0	1404·5	1478·8		
			4 9	1331·2	1626·1	1478·7				1557·8	1401·8	1479·8	−76·2	−75·6
			5 29	1330·5	1629·9	1480·2				1554·0	1403·0	1478·5		
					Mean	1478·7		−1·3	+1·3		Mean	1478·5		
" 10			23 17	1399·6	1559·6	1479·6				1480·9	1475·3	1478·1	− 0·9	− 2·2
			1 6	1398·0	1560·3	1479·2				1479·1	1478·4	1478·8		
			3 2	1396·5	1563·7	1480·1	1480·0			1478·7	1478·5	1478·6	+ 1·7	− 0·3
			4 11	1391·6	1564·2	1477·9				1476·1	1479·0	1477·6	+ 3·4	+ 0·5
			5 22	1393·1	1563·9	1478·5				1475·3	1480·1	1477·7		
					Mean	1479·1		−0·9	+0·9		Mean	1478·2		
" 11			23 20	1394·7	1561·2	1478·0				1474·1	1482·2	1478·2	+ 5·1	+ 3·4
			1 16	1390·2	1565·2	1477·7				1472·3	1481·2	1476·8		
			3 1	1390·4	1566·7	1478·6	1480·0			1471·7	1481·8	1476·8	+ 6·4	+ 4·5
			4 7	1389·9	1566·7	1478·3				1472·1	1483·8	1478·0	+ 5·9	+ 5·6
			5 27	1389·5	1567·8	1478·7				1472·6	1483·9	1478·3		
					Mean	1478·3		−1·7	+1·7		Mean	1477·6		
" 12			23 12	1389·2	1568·7	1479·0				1473·6	1481·5	1477·6	+ 5·6	+ 4·2
			1 19	1387·4	1569·2	1478·3				1472·7	1484·5	1478·6		
			3 2	1386·5	1571·0	1478·8	1480·0			1470·0	1485·4	1477·7	+ 7·7	+ 6·2
			4 12	1386·6	1570·9	1478·8				1472·2	1484·3	1478·3		
			5 24	1387·0	1571·5	1479·3				1472·7	1485·0	1478·9	+ 6·3	+ 5·9
					Mean	1478·8		−1·2	+1·2		Mean	1478·2		
" 13			23 12	1386·2	1569·5	1477·9				1471·0	1484·6	1477·8	+ 7·0	+ 5·9
			1 16	1386·5	1570·0	1478·3	1480·0			1471·8	1484·0	1477·9		
			2 50	1385·2	1572·2	1478·7				1471·4	1485·0	1478·2	+ 6·3	+ 6·5
			4 22	1383·6	1573·7	1478·7				1472·7	1484·8	1478·8		
					Mean	1478·4		−1·6	+1·6		Mean	1478·2		
" 14			23 17	1383·7	1572·8	1478·3				1473·2	1482·7	1478·0	+ 5·7	+ 5·2
			1 13	1383·7	1572·0	1477·9	1480·0			1472·2	1484·5	1478·4		
			2 45	1382·9	1574·8	1478·9				1472·4	1485·2	1478·8	+ 7·3	+ 7·6
			4 24	1381·2	1576·0	1478·6				1469·8	1486·7	1478·3		
					Mean	1478·4		−1·6	+1·6		Mean	1478·4		

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation						Level				
				C_e	C_w	C_o	C_s	$c_e = C_o - C_s$	$c_w = C_s - C_o$	M_e	M_w	M_o	$b_e = C_o - M_e$	$b_w = M_w - C_o$
1894			h m	d	d	d	d	d	d	d	d	d	d	d
Dec. 9	BUSHIRE	CAPTAIN LENOX CONYNGHAM (Telescope No. 2)	23 55	1609·3	1383·3	1496·3				1487·6	1506·3	1497·0	+10·6	+10·7
			1 10	1612·2	1381·6	1496·9				1485·2	1509·0	1497·1		
			3 30	1614·0	1381·6	1497·8	1500·0			1483·8	1511·8	1497·8	+12·7	+14·6
			4 25	1612·4	1380·2	1496·3				1484·7	1511·3	1498·0	+13·5	+15·2
			5 40	1614·5	1380·8	1497·7				1482·2	1513·0	1497·6		
					Mean	1497·0		−3·0	+3·0		Mean	1497·5		
„ 10			22 55	1521·8	1472·8	1497·3				1495·5	1499·9	1497·7	+ 1·1	+ 3·4
			1 0	1518·3	1474·9	1496·6				1496·3	1500·9	1498·6		
			3 10	1519·0	1475·3	1497·2	1500·0			1494·4	1501·4	1497·9	+ 2·1	+ 3·5
			4 28	1516·9	1476·5	1496·7				1495·3	1499·6	1497·5	+ 2·3	+ 3·2
			5 40	1518·4	1476·0	1497·2				1494·1	1500·8	1497·5		
					Mean	1497·0		−3·0	+3·0		Mean	1497·8		
„ 11			23 22	1521·8	1472·6	1497·2				1490·0	1506·3	1498·2	+ 7·2	+ 9·0
			0 48	1519·6	1474·3	1497·0				1489·7	1505·9	1497·8		
			3 20	1519·1	1474·1	1496·6	1500·0			1494·9	1500·3	1497·6	+ 2·0	+ 3·2
			4 25	1519·5	1474·4	1497·0				1495·2	1500·3	1497·8	+ 1·7	+ 3·5
			5 35	1520·1	1475·1	1497·6				1495·5	1500·9	1498·2		
					Mean	1497·1		−2·9	+2·9		Mean	1497·9		
„ 12			23 28	1517·2	1476·0	1496·6				1492·1	1503·0	1497·6	+ 5·1	+ 6·8
			1 0	1517·5	1477·4	1497·5				1492·0	1505·0	1498·5		
			3 15	1517·4	1476·4	1496·9	1500·0			1492·3	1504·3	1498·3	+ 4·9	+ 6·7
			4 25	1516·1	1478·5	1497·3				1492·2	1503·5	1497·9	+ 4·7	+ 6·9
			5 46	1519·4	1475·7	1497·6				1492·7	1504·6	1498·7		
					Mean	1497·2		−2·8	+2·8		Mean	1498·2		
„ 13			23 25	1516·5	1480·4	1498·5				1497·1	1499·3	1498·2	+ 1·1	+ 0·6
			1 55	1516·7	1480·3	1498·5	1500·0			1497·2	1498·4	1497·8		
			3 10	1515·9	1480·3	1498·1				1497·3	1500·3	1498·8	+ 0·8	+ 2·1
			4 30	1515·0	1481·2	1498·1				1497·7	1500·5	1499·1		
					Mean	1498·3		−1·7	+1·7		Mean	1498·5		
„ 14			23 25	1478·6	1518·1	1498·4				1500·8	1496·3	1498·6	− 2·0	− 1·9
			0 56	1478·9	1518·7	1498·8	1500·0			1500·4	1497·1	1498·8		
			3 15	1476·2	1520·9	1498·6				1500·2	1497·1	1498·7	− 2·1	− 1·8
			4 45	1475·0	1522·1	1498·6				1501·2	1496·4	1498·8		
					Mean	1498·6		−1·4	+1·4		Mean	1498·7		

EXPLANATION OF *TABLE II.*

Deduction of Deviation Error from Star Observations.

The first five columns call for no remark.

Column 6 shows whether the star was observed at upper or at lower culmination. U standing for upper and L for lower.

" 7 gives the number of wires over which the time of the star's transit was observed.

" 8 contains the value of the deviation constant A, which is equal to $m \sec \delta \sin \zeta$, where m is the value of 1 division of the micrometer head in seconds of time, *viz*: $0^s \cdot 039$. The sign of A depends on those of $\sec \delta$ and $\sin \zeta$, where δ is the star's declination, $(180° - \delta)$ being used for stars observed at lower culmination, and ζ is the star's zenith distance, considered negative if north.

" 9 contains the observed time of transit taken from the chronographic record.

" 10 contains the correction to the time of transit on account of diurnal aberration. This correction is equal to $- 0 \cdot 0207 \times$ *cosine latitude* $\times$ *secant declination.* It is therefore negative for all stars at upper culmination and positive for all at lower.

" 11 contains the correction for collimation, this is obtained by multiplying c_e or c_w as the case may be, by $m \sec \delta$, using $(180° - \delta)$ for stars at lower culmination.

" 12 contains the correction for level, obtained by multiplying b_e or b_w as the case may be, by $m \sec \delta \cos \zeta$, δ and ζ having the same meanings as before.

" 13 contains the chronometer error; this is a preliminary value obtained by taking the mean of the errors given by stars north and south of the zenith. If the numbers of stars at upper and lower culmination respectively be equal, a small error in the adopted value of this quantity will not affect the final mean value of the deviation error.

" 14 contains the seconds of the corrected time of transit called T. This is the sum of the seconds in the five preceding columns.

" 15 contains the star's R.A. at the time of the observation. This is either taken from one of the Almanacs or brought up by computation from the Greenwich Catalogue for epoch 1880.

" 16 contains the difference T − R.A.

" 17 contains the deviation error $a = \frac{T - R.A.}{A}$. It is to be noted that A contains the quantity m, so that a is in terms of the micrometer divisions.

" 18 contains the mean of the values in column 17. Sometimes one general mean is taken and sometimes the night is divided into two parts. This depends on whether the values in column 17 show any evidence of a change of position having taken place during the hours of work.

The last column shows whether the telescope was pointing to the East or to the West of North.

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for Diurnal Aberration	Correction for Collimation	Correction for Transit Axis Level	Correction for Chronometer Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R. A.	Apparent Clock Error = T − R. A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
		1894						h m s	s	s	s	m s	s	h m s	m s	d	d	
JASK (E) AND BUSHIRE (W)	JASK	Dec. 9	I. P. W.	4 H Draconis	L	4	+0·1837	0 8 47·27	+·09	− ·25	+ 3·42	+0 16·72	67·25	0 7 17·90	+ 1 49·35	+595·26		
			I. P. E.	Polaris	U	2	−1·5869	1 4 84·44	−·89	−2·31	−59·28	+0 17·16	39·12	1 20 34·89	−15 55·77	+602·29		
			I. P. W.	Polaris	U	2	−1·5869	1 4 84·98	−·89	+2·31	−60·89	+0 17·16	42·67	1 20 34·89	−15 52·22	+600·05	+597·24	E
			I. P. W.	Groom. 750	U	3	−0·4060	3 59 47·09	−·24	+ ·61	−17·97	+0 18·42	47·91	4 3 51·39	− 4 3·48	+599·70		
			I. P. W.	Lalan. (F) 2774	L	3	+0·4700	4 2 17·81	+·25	− ·66	+13·80	+0 18·42	49·62	3 58 12·13	+ 4 37·49	+590·40		
			I. P. E.	Groom. 944	U	2	−0·3941	5 24 40·02	−·23	− ·59	−17·68	+0 18·63	40·15	5 28 34·92	− 3 54·77	+595·71		
		Dec. 10	I. P. E.	4 H Draconis	L	4	+0·1837	0 7 7·19	+·09	+ ·17	+ ·04	+0 27·53	35·02	0 7 18·01	+ 0 17·01	+ 92·60	+ 95·17	E
			I. P. W.	Polaris	U	2	−1·5869	1 17 32·00	−·89	+1·60	− 1·05	+0 27·53	59·19	1 20 34·28	− 2 35·09	+ 97·73		
			I. P. E.	Bradley 402	U	2	−0·3486	3 6 36·61	−·20	− ·37	+ ·36	+0 28·97	65·37	3 7 33·87	− 0 28·50	+ 81·76		
			I. P. E.	Groom. 2213	L	3	+0·3695	3 2 8·92	+·20	+ ·35	− ·23	+0 28·97	38·21	3 2 6·71	+ 0 31·50	+ 85·25	+ 86·52	E
			I. P. W.	Groom. 750	U	2	−0·4060	4 2 44·08	−·24	+ ·42	− ·07	+0 29·09	73·28	4 3 51·38	− 0 38·10	+ 93·84		
			I. P. W.	Lalan. (F) 2774	L	2	+0·4700	3 58 23·28	+·25	− ·45	+ ·05	+0 29·09	52·22	3 58 12·17	+ 0 40·05	+ 85·21		
		Dec. 11	I. P. W.	Polaris	U	1	−1·5869	1 17 34·91	−·89	+3·02	+ 3·22	+0 38·70	78·96	1 20 33·65	− 2 14·69	+ 84·88	+ 87·11	E
			I. P. E.	Polaris	U	1	−1·5869	1 17 32·42	−·89	−3·02	+ 4·67	+0 38·70	71·88	1 20 33·65	− 2 21·77	+ 89·34		
			I. P. E.	Groom. 750	U	2	−0·4060	4 2 36·81	−·24	− ·80	+ 1·52	+0 40·22	77·51	4 3 51·37	− 0 33·86	+ 83·40	+ 80·72	E
			I. P. E.	Lalan. (F) 2774	L	3	+0·4700	3 58 8·74	+·25	+ ·86	− 1·17	+0 40·22	48·90	3 58 12·22	+ 0 36·68	+ 78·04		
		Dec. 12	I. P. W.	4 H Draconis	L	5	+0·1837	0 6 44·57	+·09	− ·23	− ·19	+0 49·50	93·74	0 7 18·25	+ 0 15·49	+ 84·32		
			I. P. W.	Polaris	U	1	−1·5869	1 17 19·53	−·89	+2·13	+ 3·38	+0 49·60	73·75	1 20 32·98	− 2 19·23	+ 87·74	+ 85·87	E
			I. P. E.	Polaris	U	1	−1·5869	1 17 26·15	−·89	−2·13	+ 4·50	+0 49·60	77·23	1 20 32·98	− 2 15·75	+ 85·54		
			I. P. E.	Groom. 750	U	2	−0·4060	4 2 24·88	−·24	− ·56	+ 1·83	+0 50·92	76·83	4 3 51·36	− 0 34·53	+ 85·05	+ 81·35	E
			I. P. E.	Lalan. (F) 2774	L	2	+0·4700	3 57 56·41	+·25	+ ·61	− 1·41	+0 50·92	106·78	3 58 12·26	+ 0 34·52	+ 73·45		
		Dec. 13	I. P. E.	4 H Draconis	L	4	+0·1837	0 6 33·98	+·09	+ ·30	− ·32	+0 59·71	93·76	0 7 18·36	+ 0 15·40	+ 83·83	+ 85·40	E
			I. P. E.	Polaris	U	3	−1·5869	1 17 12·76	−·89	−2·85	+ 5·39	+0 59·82	74·23	1 20 32·25	− 2 18·02	+ 86·97		
			I. P. W.	Bradley 402	U	3	−0·3486	3 6 3·24	−·20	+ ·65	+ 1·37	+1 0·84	65·90	3 7 33·66	− 0 27·76	+ 79·63	+ 80·10	E
			I. P. W.	Groom. 2213	L	3	+0·3695	3 1 37·24	+·20	− ·63	− ·87	+1 0·84	96·78	3 2 7·01	+ 0 29·77	+ 80·57		
		Dec. 14	I. P. E.	4 H Draconis	L	3	+0·1837	0 6 24·03	+·09	+ ·30	− ·26	+1 9·98	94·14	0 7 18·48	+ 0 15·66	+ 85·25	+ 86·96	E
			I. P. W.	Polaris	U	1	−1·5869	1 16 53·16	−·89	+2·85	+ 5·15	+1 10·50	130·77	1 20 31·46	− 2 20·69	+ 88·66		

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for				Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R. A.	Apparent Clock Error = T − R. A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
									Diurnal Aberration	Collimation	Transit Axis Level	Chronometer Error						
JASK (E) AND BUSHIRE (W)	BUSHIRE	1894						h m s	s	s	s	m s	s	h m s	m s	d	d	
		Dec. 9	I. P. W.	Bradley 3194	U	2	−0·4805	23 53 17·09	−·29	+1·71	+ 3·31	+0 12·65	34·47	23 54 26·39	− 0 51·92	+108·05		
			I. P. E.	Bradley 65	U	2	−1·2433	0 51 44·07	−·72	−4·33	+ 7·74	+0 12·40	59·16	0 54 17·90	− 2 18·74	+111·59	+112·00	E
			I. P. E.	B. A. C. 5140	L	4	+0·8359	3 12 13·18	+·47	+2·80	− 4·88	+0 11·70	23·27	3 10 48·76	+ 1 34·51	+113·06		
			I. P. W.	δ Ursæ Minoris	L	4	+0·5893	6 6 51·46	+·33	−1·96	− 4·27	+0 10·88	56·44	6 5 48·50	+ 1 7·94	+115·29		
		Dec. 10	I. P. W.	Bradley 1672	L	1	+1·1419	0 14 58·26	+·64	−3·85	− 1·99	+0 5·19	58·25	0 14 27·82	+ 0 30·43	+ 26·65	+ 26·49	E
			I. P. W.	Bradley 74	U	4	−0·2624	0 44 49·10	−·16	+ ·97	+ ·64	+0 5·03	55·58	0 45 2·49	− 0 6·91	+ 26·33		
		Dec. 11	I. P. E.	Bradley 3194	U	2	−0·4805	23 54 15·17	−·29	−1·66	+ 2·23	−0 2·46	12·99	23 54 25·77	− 0 12·78	+ 26·60	+ 27·27	E
			I. P. W.	Bradley 1672	L	4	+1·1419	0 15 11·34	+·64	−3·72	− 5·28	−0 2·56	0·42	0 14 28·53	+ 0 31·89	+ 27·93		
			I. P. W.	Bradley 402	U	2	−0·3351	3 7 27·69	−·20	+1·18	+·1·40	−0 3·54	26·53	3 7 33·81	− 0 7·28	+ 21·72	+ 22·22	E
			I. P. W.	B. A. C. 5140	L	4	+0·8359	3 11 16·45	+·47	−2·71	− 2·55	−0 3·67	7·99	3 10 49·01	+ 0 18·98	+ 22·71		
		Dec. 12	I. P. E.	Bradley 3194	U	4	−0·4805	23 54 23·81	−·29	−1·60	+ 1·58	−0 10·41	13·09	23 54 25·46	− 0 12·37	+ 25·74		
			I. P. W.	Bradley 1672	L	4	+1·1419	0 15 17·39	+·64	−3·59	− 3·99	−0 10·45	0·00	0 14 29·24	+ 0 30·76	+ 26·94	+ 26·09	E
			I. P. W.	Bradley 74	U	4	−0·2624	0 45 4·10	−·16	+ ·91	+ 1·28	−0 10·69	55·44	0 45 2·19	− 0 6·75	+ 25·72		
			I. P. W.	δ Ursæ Minoris	L	3	+0·5893	6 6 19·36	+·33	−1·83	− 1·94	−0 12·66	3·26	6 5 47·96	+ 0 15·30	+ 25·96		
		Dec. 13	I. P. W.	Bradley 3147	U	3	−0·5734	23 27 39·57	−·34	+1·15	+ ·22	−0 17·75	22·85	23 27 38·62	− 0 15·77	+ 27·50		
			I. P. W.	Bradley 3194	U	3	−0·4805	23 54 29·18	−·29	+ ·97	+ ·19	−0 17·86	12·19	23 54 25·15	− 0 12·96	+ 26·97		
			I. P. E.	Bradley 1672	L	3	+1·1419	0 15 16·46	+·64	+2·18	− ·64	−0 17·97	0·67	0 14 29·95	+ 0 30·72	+ 26·90		
			I. P. E.	Bradley 1730	L	3	+0·3393	0 48 41·27	+·18	+ ·63	− ·16	−0 18·19	23·73	12 48 14·75	+ 0 8·98	+ 26·47	+ 26·37	E
			I. P. E.	Bradley 1731	L	4	+0·3393	0 48 48·86	+·18	+ ·63	− ·16	−0 18·19	31·32	12 48 22·46	+ 0 8·86	+ 26·11		
			I. P. E.	B. A. C. 5140	L	3	+0·8359	3 11 27·25	+·47	+1·59	− ·33	−0 19·10	9·88	3 10 49·33	+ 0 20·55	+ 24·58		
			I. P. E.	Groom. 856	U	4	−0·1953	4 41 3·59	−·12	− ·42	+ ·12	−0 19·25	43·92	4 40 48·84	− 0 4·92	+ 25·19		
			I. P. W.	ε Ursæ Minoris	L	5	+0·2656	4 57 2·03	+·14	− ·48	− ·22	−0 19·30	42·17	4 56 34·94	+ 0 7·23	+ 27·22		
		Dec. 14	I. P. W.	Bradley 3194	U	2	−0·4805	23 54 53·49	−·29	+ ·80	− ·59	−0 25·05	28·36	23 54 24·85	+ 0 3·51	− 7·30		
			I. P. E.	Bradley 1672	L	3	+1·1419	0 14 42·21	+·64	+1·80	+ 1·17	−0 25·12	20·70	0 14 30·66	− 0 9·96	− 8·72		
			I. P. E.	Bradley 1730	L	5	+0·3393	0 48 35·75	+·18	+ ·52	+ ·29	−0 25·36	11·38	0 48 14·94	− 0 3·56	− 10·49	− 9·10	W
			I. P. E.	Bradley 1731	L	5	+0·3393	0 48 43·67	+·18	+ ·52	+ ·29	−0 25·36	19·30	0 48 22·65	− 0 3·35	− 9·88		
			I. P. W.	Bradley 402	U	2	−0·3351	3 8 4·24	−·20	+ ·57	− ·44	−0 26·21	37·96	3 7 33·58	+ 0 4·38	− 13·07		
			I. P. W.	B. A. C. 5140	L	2	+0·8359	3 11 6·56	+·47	−1·31	+ ·79	−0 26·23	40·28	3 10 49·54	− 0 9·26	− 11·08	− 12·23	W
			I. P. E.	Groom. 856	U	3	−0·1953	4 41 18·36	−·12	− ·35	− ·32	−0 26·26	51·31	4 40 48·86	+ 0 2·45	− 12·54		

EXPLANATION OF *TABLE III.*

Direct Comparison of Clocks.

The first four columns call for no remark.

Column 5 contains the time by the Jask clock of the middle of the period during which signals were being sent or received.

" 6 contains the time by the Bushire clock of the same instant.

" 7 contains the difference between the clocks as read off the chronographic record.

" 8 gives the mean, to the nearest whole second, of the times given in column 5.

" 9 gives the mean of those in column 6.

" 10 contains the mean of two corresponding differences in column 7, and is the difference between the clocks, freed from the effects of retardation, at the epoch given in terms of the two clocks respectively in columns 8 and 9.

" 11 contains the deduced relative hourly rate of the clocks. It is obtained as follows:—

The change in the difference between the clocks between two consecutive comparisons is divided by the interval between the comparisons, expressed in hours, and the result is the rate during the interval. Then the mean of two consecutive rates is taken and considered to be the rate at the epoch of the intervening comparison, opposite which it is accordingly entered. It will be seen that by this method the same weight is given to a rate deduced from two comparisons on the same night, as to one deduced from the last comparison on one night and the first on the next. If the interval between the comparisons be small the deduced rate will be seriously affected by any errors in the observed differences between the clocks; on the other hand, when the interval is from one night to the next there is a probability of a variation in the rate. Hence it appears that each method has its own disadvantages and that consequently the adoption of equal weights is justifiable.

TABLE III. DIRECT COMPARISON OF CLOCKS.

Arc	Astronomical Date	Comparison made at	Clock Signals transmitted from	Time of Comparison by Jask Clock	Corresponding Time by Bushire Clock	Observed Difference between the Clocks	Mean Time of Comparison by E Clock = T_E	Mean Time of Comparison by W Clock = T_W	Mean Difference between the Clocks at Epochs T_E and T_W = D	Relative Hourly Clock Rate at Epochs T_E and T_W
				h m s	h m s	h m s	h m s	h m s	h m s	s
JASK (E) AND BUSHIRE (W)	1894 Dec. 9	Jask	Bushire	23 50 1·000	23 22 19·653	0 27 41·347	23 53 31	23 25 49	0 27 41·174	−0·659
		Bushire	Jask	23 57 0·000	23 29 19·000	41·000				
		Bushire	Jask	1 47 1·000	1 19 21·200	39·800	1 49 31	1 21 51	39·900	·675
		Jask	Bushire	1 52 0·000	1 24 20·000	40·000				
		Bushire	Jask	3 30 39·595	3 3 1·000	38·595	3 32 9	3 4 31	38·720	·705
		Jask	Bushire	3 33 39·000	3 6 0·155	38·845				
		Bushire	Jask	4 32 38·812	4 5 1·000	37·812	4 35 49	4 8 12	37·956	·718
		Jask	Bushire	4 39 0·100	4 11 22·000	38·100				
		Bushire	Jask	5 51 37·000	5 24 0·096	36·904	5 53 19	5 25 42	37·032	·736
		Jask	Bushire	5 55 0·160	5 27 23·000	37·160				
	" 10	Bushire	Jask	23 39 24·420	23 12 1·000	0 27 23·420	23 41 13	23 13 50	0 27 23·556	−0·768
		Jask	Bushire	23 43 2·000	23 15 38·308	23·692				
		Bushire	Jask	1 37 22·000	1 10 0·100	21·900	1 40 23	1 13 1	22·008	·763
		Jask	Bushire	1 43 24·000	1 16 1·884	22·116				
		Bushire	Jask	3 19 21·640	2 52 1·000	20·640	3 21 51	2 54 31	20·745	·743
		Jask	Bushire	3 24 21·000	2 57 0·151	20·849				
		Bushire	Jask	4 34 1·695	4 6 42·000	19·695	4 36 41	4 9 21	19·823	·737
		Jask	Bushire	4 39 20·000	4 12 0·050	19·950				
		Bushire	Jask	5 49 19·803	5 22 1·000	18·803	5 52 40	5 25 21	18·894	·761
		Jask	Bushire	5 56 0·000	5 28 41·016	18·984				
	" 11	Bushire	Jask	23 38 5·790	23 11 1·000	0 27 4·790	23 40 35	23 13 31	0 27 4·893	−0·801
		Jask	Bushire	23 43 5·000	23 16 0·005	4·995				
		Bushire	Jask	1 42 0·102	1 14 57·000	3·102	1 45 3	1 17 59	3·201	·814
		Jask	Bushire	1 48 5·000	1 21 1·700	3·300				
		Bushire	Jask	3 24 3·710	2 57 2·000	1·710	3 26 3	2 59 1	1·831	·806
		Jask	Bushire	3 28 2·000	3 1 0·049	1·951				
		Bushire	Jask	4 35 2·784	4 8 2·000	0·784	4 37 32	4 10 31	0·880	·806
		Jask	Bushire	4 40 1·000	4 13 0·025	0·975				
		Bushire	Jask	5 56 1·680	5 29 2·000	0 26 59·680	5 57 31	5 30 31	0 26 59·795	·802
		Jask	Bushire	5 59 0·000	5 32 0·091	59·909				

TABLE III. DIRECT COMPARISON OF CLOCKS.

Arc	Astronomical Date	Comparison made at	Clock Signals transmitted from	Time of Comparison by Jask Clock	Corresponding Time by Bushire Clock	Observed Difference between the Clocks	Mean Time of Comparison by E Clock $= T_E$	Mean Time of Comparison by W Clock $= T_W$	Mean Difference between the Clocks at Epochs T_E and T_W $= D$	Relative Hourly Clock Rate at Epochs T_E and T_W
	1894			h m s	h m s	h m s	h m s	h m s	h m s	s
JASK (E) AND BUSHIRE (W)	Dec. 12	Bushire	Jask	23 35 1·000	23 8 15·295	0 26 45·705	23 37 1	23 10 15	0 26 45·863	− 0·779
		Jask	Bushire	23 39 0·021	23 12 14·000	46·021				
		Bushire	Jask	1 29 2·000	1 2 17·712	44·288	1 32 2	1 5 17	44·389	·755
		Jask	Bushire	1 35 1·000	1 8 16·510	44·490				
		Bushire	Jask	3 23 0·000	2 56 17·139	42·861	3 26 0	2 59 17	42·981	·744
		Jask	Bushire	3 29 0·101	3 2 17·000	43·101				
		Bushire	Jask	4 34 42·000	4 8 0·000	42·000	4 36 51	4 10 9	42·106	·752
		Jask	Bushire	4 39 0·199	4 12 18·000	42·199				
		Bushire	Jask	5 49 0·035	5 22 19·000	41·035	5 51 21	5 24 40	41·158	·750
		Jask	Bushire	5 53 42·000	5 27 0·720	41·280				
	„ 13	Bushire	Jask	23 31 28·000	23 5 0·110	0 26 27·890	23 34 29	23 8 1	0 26 28·014	− 0·729
		Jask	Bushire	23 37 30·000	23 11 1·862	28·138				
		Bushire	Jask	1 35 1·410	1 8 35·000	26·410	1 37 15	1 10 48	26·550	·733
		Jask	Bushire	1 39 28·000	1 13 1·310	26·690				
		Bushire	Jask	3 20 0·114	2 53 35·000	25·114	3 23 14	2 56 48	25·227	·733
		Jask	Bushire	3 26 27·000	3 0 1·660	25·340				
		Bushire	Jask	4 51 0·020	4 24 36·000	24·020	4 54 43	4 28 19	24·135	·720
		Jask	Bushire	4 58 26·000	4 32 1·750	24·250				
	„ 14	Bushire	Jask	23 32 11·502	23 6 1·000	0 26 10·502	23 35 11	23 9 1	0 26 10·620	− 0·718
		Jask	Bushire	23 38 11·000	23 12 0·263	10·737				
		Bushire	Jask	1 32 0·090	1 5 51·000	9·090	1 35 6	1 8 56	9·196	·710
		Jask	Bushire	1 38 11·000	1 12 1·699	9·301				
		Bushire	Jask	3 18 8·800	2 52 1·000	7·800	3 21 4	2 54 57	7·946	·707
		Jask	Bushire	3 24 0·092	2 57 52·000	8·092				
		Bushire	Jask	4 47 7·790	4 21 1·000	6·790	4 49 4	4 22 57	6·910	·706
		Jask	Bushire	4 51 0·030	4 24 53·000	7·030				

EXPLANATION OF *TABLE IV.*

Transits of Clock Stars and Deduction of the Clock Correction.

The heading contains the name of the arc, and indicates the station the observations at which are to be found below, giving at the same time the latitude of the station, the name of the observer and the telescope used.

Column 1 contains the astronomical date.

„ 2 contains the star's name, or number in the Greenwich Catalogue for 1880.

„ 3 contains the star's declination and when south it is indicated by a minus sign. This being given, and also the latitude of the station, it is possible to compute all the corrections to the observed time of transit without reference to any thing beyond the foregoing tables.

„ 4 contains the star's aspect, that is, it shews whether the star at culmination was north or south of the zenith of the station. It is convenient to give this information as it renders it easy to see whether the deviation correction has been entered with the proper sign.

„ 5, 6 & 7 explain themselves.

„ 8, 9 & 11 contain respectively the corrections for collimation, level and diurnal aberration. These corrections are computed in precisely the same manner as those in Table II.

„ 10 contains the deviation correction. To form this the appropriate value of a is taken from Table II and multiplied by $m \sec\delta \sin\zeta$. It is to be noted that the quantity a given in Table II is an error, not a correction, so that when forming the correction aA the sign must be changed.

„ 12 contains the corrected time of transit = T. This is the algebraic sum of the five preceding columns.

„ 13 contains the star's R.A. brought up from the Almanac or Catalogue to the epoch of the observation.

„ 14 contains the difference between the two preceding columns with the sign appropriate to a correction.

„ 15 contains the mean value of the clock correction by stars observed in the same instrumental position. In column 7 the mean of the observed times of transit of groups is taken out, and is the epoch of the mean clock correction in column 15.

„ 16 & 17 contain the daily mean of the two instrumental positions, and the epoch to which it corresponds. If there are two groups, one *I.P.E.* and one *I.P.W.*, the mean of the two clock corrections is taken as corresponding to the mean of the two epochs; but if there are three groups, as on December 9th, one *I.P.W.*, one *I.P.E.* and again one *I.P.W.*, the mean of the two values *I.P.W.* is taken for the mean of their epochs, and then this mean value and epoch are combined with the *I.P.E.* value and epoch to obtain the quantities to be entered in these columns.

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

Transits at JASK (E), *Lat.* 25° 38′, by BURRARD with Telescope No. 1.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit =T	Right Ascension =R.A.	Clock Correction			Mean Epoch $=T_E$
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A.−T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 9	τ Pegasi	23 10	S	W	9	23 15 13·51	+0·05	−3·19	− 1·08	−0·02	23 15 9·27	23 15 25·95	+0 16·68			
	υ Pegasi	22 50	S	W	18	23 19 55·40	+0·05	−3·18	− 1·19	−0·02	23 19 51·06	23 20 7·86	+0 16·80	+0 16·740		
	Mean	...	...	...	23 17 34										
	π Andromedæ	33 9	N	E	15	0 30 58·97	−0·06	−3·38	+ 3·64	−0·02	0 30 59·15	0 31 16·26	+0 17·11			
	δ Andromedæ	30 17	N	E	13	0 33 26·75	−0·06	−3·29	+ 2·15	−0·02	0 33 25·53	0 33 42·79	+0 17·26			
	α Cassiopeiæ	55 58	N	E	5	0 33 59·05	−0·09	−4·40	+20·84	−0·03	0 34 15·37	0 34 32·61	+0 17·24			
	ο Cassiopeiæ	47 43	N	E	14	0 38 26·19	−0·07	−3·93	+12·90	−0·03	0 38 35·06	0 38 52·25	+0 17·19			
	ζ Andromedæ	23 42	S	E	14	0 41 33·17	−0·05	−3·12	− 0·84	−0·02	0 41 29·14	0 41 46·43	+0 17·29			
	δ Piscium	7 1	S	E	14	0 43 7·26	−0·05	−2·73	− 7·41	−0·02	0 42 57·05	0 43 14·26	+0 17·21			
	ε Piscium	7 20	S	E	14	0 57 22·71	−0·05	−2·73	− 7·29	−0·02	0 57 12·62	0 57 29·92	+0 17·30	+0 17·229		
	Mean	...	...	...	0 39 50										
	μ Cassiopeiæ	54 25	N	W	12	1 0 44·79	+0·09	−4·41	+19·11	−0·03	1 0 59·55	1 1 17·05	+0 17·50			
	υ Piscium	26 43	N	W	14	1 13 27·32	+0·06	−3·29	+ 0·48	−0·02	1 13 24·55	1 13 41·93	+0 17·38			
	δ Cassiopeiæ	59 42	N	W	13	1 18 18·50	+0·10	−4·81	+25·68	−0·04	1 18 39·43	1 18 57·01	+0 17·58			
	η Piscium	14 48	S	W	13	1 25 42·24	+0·05	−2·98	− 4·48	−0·02	1 25 34·81	1 25 52·25	+0 17·44	+0 17·475	+0 17·168	0 27 57
	Mean	...	...	...	1 14 33										
„ 10	ι Andromedæ	42 41	N	E	14	23 32 30·15	−0·05	−0·05	+ 1·47	−0·03	23 32 31·49	23 32 58·59	+0 27·10			
	ι Piscium	5 3	S	E	13	23 34 7·14	−0·04	−0·03	− 1·30	−0·02	23 34 5·75	23 34 32·83	+0 27·08			
	φ Pegasi	18 32	S	E	16	23 46 41·90	−0·04	−0·04	− 0·49	−0·02	23 46 41·31	23 47 8·53	+0 27·22			
	ω Piscium	6 17	S	E	14	23 53 29·22	−0·04	−0·03	− 1·23	−0·02	23 53 27·90	23 53 55·11	+0 27·21			
	α Andromedæ	28 31	N	E	14	0 2 29·95	−0·04	−0·04	+ 0·21	−0·02	0 2 30·06	0 2 57·38	+0 27·32			
	γ Pegasi	14 36	S	E	14	0 7 23·12	−0·04	−0·04	− 0·72	−0·02	0 7 22·30	0 7 49·69	+0 27·39			
	π Andromedæ	33 9	N	E	14	0 30 48·32	−0·04	−0·04	+ 0·58	−0·02	0 30 48·80	0 31 16·25	+0 27·45			
	δ Andromedæ	30 17	N	E	13	0 33 14·98	−0·04	−0·04	+ 0·34	−0·02	0 33 15·22	0 33 42·78	+0 27·56	+0 27·291		
	Mean	...	...	...	0 0 6										

TABLE IV. **TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.**

Transits at JASK (E), *Lat.* 25° 38′, by BURRARD with Telescope No. 1.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_E
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 10	o Cassiopeiæ	47 43	N	W	14	0 38 22·74	+0·05	−0·12	+ 2·06	−0·03	0 38 24·70	0 38 52·23	+0 27·53			
	ζ Andromedæ	23 42	S	W	14	0 41 18·96	+0·04	−0·09	− 0·13	−0·02	0 41 18·76	0 41 46·42	+0 27·66			
	δ Piscium	7 1	S	W	13	0 42 47·89	+0·04	−0·08	− 1·18	−0·02	0 42 46·65	0 43 14·25	+0 27·60			
	μ Andromedæ	37 56	N	W	13	0 50 26·85	+0·04	−0·11	+ 0·99	−0·02	0 50 27·75	0 50 55·60	+0 27·85			
	ε Piscium	7 20	S	W	14	0 57 3·34	+0·04	−0·08	− 1·16	−0·02	0 57 2·12	0 57 29·91	+0 27·79			
	μ Cassiopeiæ	54 25	N	W	13	1 0 46·40	+0·06	−0·13	+ 3·05	−0·03	1 0 49·35	1 1 17·03	+0 27·68			
	β Andromedæ	35 4	N	W	14	1 3 22·85	+0·04	−0·10	+ 0·73	−0·02	1 3 23·50	1 3 51·32	+0 27·82			
	δ Cassiopeiæ	59 42	N	W	11	1 18 25·15	+0·07	−0·08	+ 4·09	−0·04	1 18 29·19	1 18 56·99	+0 27·80	+0 27·716	+0 27·504	0 27 5
		Mean	...	...	...	0 54 4										
„ 11	ι Andromedæ	42 41	N	E	8	23 32 18·92	−0·09	+0·26	+ 1·34	−0·03	23 32 20·40	23 32 58·58	+0 38·18			
	69 Gr. 80	− 4 32	S	E	13	0 24 4·10	−0·07	+0·17	− 1·70	−0·02	0 24 2·48	0 24 41·03	+0 38·55			
	73 „	62 21	N	E	14	0 26 18·43	−0·14	+0·34	+ 4·35	−0·04	0 26 22·94	0 27 1·31	+0 38·37			
	π Andromedæ	33 9	N	E	14	0 30 37·14	−0·08	+0·23	+ 0·53	−0·02	0 30 37·80	0 31 16·24	+0 38·44	+0 38·385		
		Mean	...	...	...	0 13 20										
	δ Andromedæ	30 17	N	W	12	0 33 3·74	+0·08	+0·15	+ 0·31	−0·02	0 33 4·26	0 33 42·77	+0 38·51			
	α Cassiopeiæ	55 58	N	W	10	0 33 50·83	+0·12	+0·20	+ 3·04	−0·03	0 33 54·16	0 34 32·57	+0 38·41			
	o Cassiopeiæ	47 43	N	W	12	0 38 11·59	+0·10	+0·18	+ 1·88	−0·03	0 38 13·72	0 38 52·22	+0 38·50			
	ζ Andromedæ	23 42	S	W	13	0 41 7·70	+0·07	+0·14	− 0·12	−0·02	0 41 7·77	0 41 46·41	+0 38·64			
	δ Piscium	7 1	S	W	14	0 42 36·56	+0·07	+0·13	− 1·08	−0·02	0 42 35·66	0 43 14·25	+0 38·59			
	ν Andromedæ	40 31	N	W	9	0 43 21·36	+0·09	+0·17	+ 1·14	−0·03	0 43 22·73	0 44 1·08	+0 38·35			
	133 Gr. 80	− 1 43	S	W	14	0 47 1·57	+0·07	+0·12	− 1·55	−0·02	0 47 0·19	0 47 38·78	+0 38·59			
	μ Andromedæ	37 56	N	W	12	0 50 15·77	+0·08	+0·16	+ 0·91	−0·02	0 50 16·90	0 50 55·59	+0 38·69			
	ε Piscium	7 20	S	W	14	0 56 52·06	+0·07	+0·13	− 1·06	−0·02	0 56 51·18	0 57 29·90	+0 38·72	+0 38·556		
		Mean	...	...	...	0 42 56										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

Transits at JASK (E), *Lat.* 25° 38′, by BURRARD with Telescope No. 1.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_E
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 11	β Andromedæ	35 4	N	E	14	1 3 11·70	−0·08	+0·24	+ 0·67	−0·02	1 3 12·51	1 3 51·31	+0 38·80			
	199 Gr. 80	7 2	S	E	9	1 7 37·20	−0·07	+0·19	− 1·08	−0·02	1 7 36·22	1 8 15·04	+0 38·82			
	200 „	7 2	S	E	11	1 7 38·62	−0·07	+0·19	− 1·08	−0·02	1 7 37·64	1 8 16·41	+0 38·77			
	202 „	− 8 29	S	E	6	1 8 30·06	−0·07	+0·17	− 1·91	−0·02	1 8 28·23	1 9 7·15	+0 38·92			
	υ Piscium	26 43	N	E	12	1 13 2·90	−0·07	+0·22	+ 0·07	−0·02	1 13 3·10	1 13 41·92	+0 38·82	+0 38·826	+0 38·581	0 41 48
		Mean	...	...	...	1 8 0										
„ 12	ω Piscium	6 17	S	W	12	23 53 6·77	+0·05	+0·15	− 1·11	−0·02	23 53 5·84	23 53 55·09	+0 49·25			
	α Andromedæ	28 31	N	W	14	0 2 7·67	+0·05	+0·19	+ 0·19	−0·02	0 2 8·08	0 2 57·36	+0 49·28			
	β Cassiopeiæ	58 35	N	W	8	0 2 40·51	+0·09	+0·26	+ 3·47	−0·04	0 2 44·29	0 3 33·76	+0 49·47			
	γ Pegasi	14 36	S	W	14	0 7 0·74	+0·05	+0·17	− 0·65	−0·02	0 7 0·29	0 7 49·67	+0 49·38			
	50 Gr. 80	7 37	S	W	14	0 14 23·10	+0·05	+0·16	− 1·04	−0·02	0 14 22·25	0 15 11·70	+0 49·45	+0 49·366		
		Mean	...	...	...	0 3 52										
	57 Gr. 80	1 21	S	E	14	0 19 13·09	−0·05	+0·20	− 1·37	−0·02	0 19 11·85	0 20 1·33	+0 49·48			
	69 „	− 4 32	S	E	12	0 23 53·07	−0·05	+0·19	− 1·67	−0·02	0 23 51·52	0 24 41·02	+0 49·50			
	73 „	62 21	N	E	19	0 26 7·25	−0·10	+0·37	+ 4·28	−0·04	0 26 11·76	0 27 1·28	+0 49·52			
	π Andromedæ	33 9	N	E	13	0 30 26·05	−0·06	+0·26	+ 0·52	−0·02	0 30 26·75	0 31 16·23	+0 49·48			
	δ Andromedæ	30 17	N	E	14	0 32 52·64	−0·05	+0·25	+ 0·31	−0·02	0 32 53·13	0 33 42·75	+0 49·62			
	α Cassiopeiæ	55 58	N	E	9	0 33 39·76	−0·08	+0·33	+ 3·00	−0·03	0 33 42·98	0 34 32·54	+0 49·56			
	ο Cassiopeiæ	47 43	N	E	14	0 38 0·49	−0·07	+0·30	+ 1·85	−0·03	0 38 2·54	0 38 52·20	+0 49·66			
	ζ Andromedæ	23 42	S	E	14	0 40 56·71	−0·05	+0·24	− 0·12	−0·02	0 40 56·76	0 41 46·40	+0 49·64			
	δ Piscium	7 1	S	E	13	0 42 25·58	−0·05	+0·21	− 1·06	−0·02	0 42 24·66	0 43 14·24	+0 49·58			
	ν Andromedæ	40 31	N	E	8	0 43 10·41	−0·06	+0·28	+ 1·12	−0·03	0 43 11·72	0 44 1·07	+0 49·35			
	133 Gr. 80	− 1 43	S	E	14	0 46 50·53	−0·05	+0·19	− 1·53	−0·02	0 46 49·12	0 47 38·77	+0 49·65	+0 49·549		
		Mean	...	...	...	0 34 20										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT JASK (E), *Lat.* 25° 38′, BY BURRARD WITH TELESCOPE No. 1.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_E
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 12	μ Andromedæ	37 56	N	W	14	0 50 4·67	+0·06	+0·20	+ 0·89	−0·02	0 50 5·80	0 50 55·58	+0 49·78			
	148 Gr. 80	28 26	N	W	13	0 51 19·13	+0·05	+0·18	+ 0·18	−0·02	0 51 19·52	0 52 9·23	+0 49·71			
	ε Piscium	7 20	S	W	13	0 56 40·93	+0·05	+0·16	− 1·05	−0·02	0 56 40·07	0 57 29·89	+0 49·82			
	μ Cassiopeiæ	54 25	N	W	14	1 0 24·20	+0·08	+0·24	+ 2·75	−0·03	1 0 27·24	1 1 17·00	+0 49·76			
	199 Gr. 80	7 2	S	W	8	1 7 26·07	+0·05	+0·16	− 1·06	−0·02	1 7 25·20	1 8 15·03	+0 49·83			
	200 „	7 2	S	W	12	1 7 27·49	+0·05	+0·16	− 1·06	−0·02	1 7 26·62	1 8 16·40	+0 49·78			
	202 „	− 8 29	S	W	4	1 8 19·04	+0·05	+0·14	− 1·88	−0·02	1 8 17·33	1 9 7·14	+0 49·81	+0 49·784	+0 49·562	0 33 12
		Mean	...	...	...	1 0 15										
„ 13	φ Pegasi	18 32	S	E	14	23 46 9·31	−0·07	+0·28	− 0·44	−0·02	23 46 9·06	23 47 8·50	+0 59·44			
	ω Piscium	6 17	S	E	14	23 52 56·53	−0·06	+0·26	− 1·10	−0·02	23 52 55·61	23 53 55·08	+0 59·47			
	4046 Gr. 80	− 3 36	S	E	13	23 55 28·56	−0·06	+0·24	− 1·61	−0·02	23 55 27·11	23 56 26·61	+0 59·50			
	α Andromedæ	28 31	N	E	14	0 1 57·43	−0·07	+0·31	+ 0·19	−0·02	0 1 57·84	0 2 57·35	+0 59·51			
	β Cassiopeiæ	58 35	N	E	6	0 2 30·35	−0·12	+0·44	+ 3·45	−0·04	0 2 34·08	0 3 33·73	+0 59·65			
	γ Pegasi	14 36	S	E	13	0 6 50·54	−0·06	+0·28	− 0·65	−0·02	0 6 50·09	0 7 49·66	+0 59·57	+0 59·523		
		Mean	...	...	...	23 57 39										
	50 Gr. 80	7 37	S	W	14	0 14 12·89	+0·06	+0·22	− 1·03	−0·02	0 14 12·12	0 15 11·69	+0 59·57			
	57 „	1 21	S	W	14	0 19 2·81	+0·06	+0·21	− 1·36	−0·02	0 19 1·70	0 20 1·32	+0 59·62			
	69 „	− 4 32	S	W	13	0 23 42·87	+0·06	+0·20	− 1·67	−0·02	0 23 41·44	0 24 41·01	+0 59·57			
	73 „	62 21	N	W	13	0 25 56·78	+0·13	+0·39	+ 4·26	−0·04	0 26 1·52	0 27 1·24	+0 59·72			
	π Andromedæ	33 9	N	W	14	0 30 15·71	+0·07	+0·27	+ 0·52	−0·02	0 30 16·55	0 31 16·22	+0 59·67			
	δ Andromedæ	30 17	N	W	14	0 32 42·36	+0·07	+0·26	+ 0·31	−0·02	0 32 42·98	0 33 42·74	+0 59·76			
	α Cassiopeiæ	55 58	N	W	8	0 33 29·38	+0·11	+0·35	+ 2·98	−0·03	0 33 32·79	0 34 32·52	+0 59·73			
	ο Cassiopeiæ	47 43	N	W	13	0 37 50·21	+0·09	+0·31	+ 1·84	−0·03	0 37 52·42	0 38 52·18	+0 59·76			
	ζ Andromedæ	23 42	S	W	14	0 40 46·37	+0·07	+0·25	− 0·12	−0·02	0 40 46·55	0 41 46·39	+0 59·84			
	δ Piscium	7 1	S	W	14	0 42 15·29	+0·06	+0·22	− 1·06	−0·02	0 42 14·49	0 43 14·23	+0 59·74			
	ν Andromedæ	40 31	N	W	10	0 42 59·87	+0·08	+0·29	+ 1·12	−0·03	0 43 1·33	0 44 1·05	+0 59·72			
	133 Gr. 80	− 1 43	S	W	14	0 46 40·27	+0·06	+0·20	− 1·52	−0·02	0 46 38·99	0 47 38·77	+0 59·78	+0 59·707		
		Mean	...	...	...	0 32 30										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

Transits at JASK (E), *Lat.* 25° 38′, by BURRARD with Telescope No. 1.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_E
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A.−T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 13	μ Andromedæ	37 56	N	E	12	0 49 54·48	−0·08	+0·34	+ 0·89	−0·02	0 49 55·61	0 50 55·57	+0 59·96			
	148 Gr. 80	28 26	N	E	13	0 51 8·87	−0·07	+0·31	+ 0·18	−0·02	0 51 9·27	0 52 9·22	+0 59·95			
	ε Piscium	7 20	S	E	14	0 56 30·81	−0·06	+0·26	− 1·04	−0·02	0 56 29·95	0 57 29·88	+0 59·93			
	μ Cassiopeiæ	54 25	N	E	14	1 0 13·92	−0·11	+0·41	+ 2·73	−0·03	1 0 16·92	1 1 16·98	+1 0·06			
	β Andromedæ	35 4	N	E	13	1 2 50·37	−0·08	+0·33	+ 0·66	−0·02	1 2 51·26	1 3 51·28	+1 0·02			
	199 Gr. 80	7 2	S	E	14	1 7 15·93	−0·06	+0·26	− 1·06	−0·02	1 7 15·05	1 8 15·02	+0 59·97	+0 59·982	+0 59·730	0 30 10
		Mean	...	...	...	0 57 59										
„ 14	ω Piscium	6 17	S	E	14	23 52 46·30	−0·06	+0·21	− 1·12	−0·02	23 52 45·31	23 53 55·07	+1 9·76			
	4046 Gr. 80	− 3 36	S	E	14	23 55 18·36	−0·06	+0·19	− 1·64	−0·02	23 55 16·83	23 56 26·60	+1 9·77			
	α Andromedæ	28 31	N	E	14	0 1 47·13	−0·07	+0·25	+ 0·19	−0·02	0 1 47·48	0 2 57·33	+1 9·85			
	β Cassiopeiæ	58 35	N	E	6	0 2 19·96	−0·12	+0·36	+ 3·51	−0·04	0 2 23·67	0 3 33·71	+1 10·04			
	γ Pegasi	14 36	S	E	14	0 6 40·31	−0·06	+0·22	− 0·66	−0·02	0 6 39·79	0 7 49·65	+1 9·86			
	50 Gr. 80	7 37	S	E	14	0 14 2·69	−0·06	+0·21	− 1·05	−0·02	0 14 1·77	0 15 11·68	+1 9·91			
	57 „	1 21	S	E	11	0 18 52·61	−0·06	+0·20	− 1·38	−0·02	0 18 51·35	0 20 1·31	+1 9·96			
	69 „	− 4 32	S	E	13	0 23 32·66	−0·06	+0·19	− 1·70	−0·02	0 23 31·07	0 24 41·00	+1 9·93			
	73 „	62 21	N	E	11	0 25 46·66	−0·13	+0·38	+ 4·34	−0·04	0 25 51·21	0 27 1·21	+1 10·00			
	π Andromedæ	33 9	N	E	13	0 30 5·52	−0·07	+0·26	+ 0·53	−0·02	0 30 6·22	0 31 16·20	+1 9·98			
	δ Andromedæ	30 17	N	E	14	0 32 32·14	−0·07	+0·25	+ 0·31	−0·02	0 32 32·61	0 33 42·73	+1 10·12			
	α Cassiopeiæ	55 58	N	E	8	0 33 19·24	−0·11	+0·34	+ 3·03	−0·03	0 33 22·47	0 34 32·50	+1 10·03	+1 9·934		
		Mean	...	...	...	0 14 45										
	σ Cassiopeiæ	47 43	N	W	14	0 37 39·97	+0·09	+0·28	+ 1·88	−0·03	0 37 42·19	0 38 52·16	+1 9·97			
	ζ Andromedæ	23 42	S	W	13	0 40 36·20	+0·07	+0·22	− 0·12	−0·02	0 40 36·35	0 41 46·38	+1 10·03			
	δ Piscium	7 1	S	W	14	0 42 5·03	+0·06	+0·19	− 1·08	−0·02	0 42 4·18	0 43 14·22	+1 10·04			
	ν Andromedæ	40 31	N	W	7	0 42 49·67	+0·08	+0·26	+ 1·14	−0·03	0 42 51·12	0 44 1·04	+1 9·92			
	133 Gr. 80	− 1 43	S	W	14	0 46 30·06	+0·06	+0·18	− 1·55	−0·02	0 46 28·73	0 47 38·76	+1 10·03			
	μ Andromedæ	37 56	N	W	14	0 49 44·14	+0·08	+0·25	+ 0·90	−0·02	0 49 45·35	0 50 55·55	+1 10·20			
	148 Gr. 80	28 26	N	W	10	0 50 58·63	+0·07	+0·23	+ 0·18	−0·02	0 50 59·09	0 52 9·21	+1 10·12			
	ε Piscium	7 20	S	W	14	0 56 20·55	+0·06	+0·19	− 1·06	−0·02	0 56 19·72	0 57 29·88	+1 10·16			
	μ Cassiopeiæ	54 25	N	W	13	1 0 3·54	+0·11	+0·30	+ 2·78	−0·03	1 0 6·70	1 1 16·96	+1 10·26			
	β Andromedæ	35 4	N	W	14	1 2 40·07	+0·08	+0·24	+ 0·67	−0·02	1 2 41·04	1 3 51·27	+1 10·23			
	199 Gr. 80	7 2	S	W	9	1 7 5·65	+0·06	+0·19	− 1·08	−0·02	1 7 4·80	1 8 15·01	+1 10·21			
	200 „	7 2	S	W	10	1 7 6·99	+0·06	+0·19	− 1·08	−0·02	1 7 6·14	1 8 16·39	+1 10·25	+1 10·118	+1 10·026	0 33 22
		Mean	...	...	...	0 51 58										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT BUSHIRE (W), *Lat.* 28° 55′, BY LENOX CONYNGHAM WITH TELESCOPE No. 2.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_W
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 9	γ Pegasi	14 36	S	W	14	0 7 37·59	+0·12	+0·41	− 1·11	−0·02	0 7 36·99	0 7 49·70	+0 12·71			
	27 Gr. 80	19 37	S	W	11	0 8 57·61	+0·12	+0·43	− 0·74	−0·02	0 8 57·40	0 9 10·07	+0 12·67			
	38 ,,	38 6	N	W	11	0 11 21·89	+0·15	+0·52	+ 0·87	−0·02	0 11 23·41	0 11 36·12	+0 12·71			
	44 ,,	43 12	N	W	12	0 12 54·92	+0·16	+0·55	+ 1·47	−0·03	0 12 57·07	0 13 9·73	+0 12·66			
	52 ,,	37 23	N	W	8	0 15 21·12	+0·15	+0·51	+ 0·80	−0·02	0 15 22·56	0 15 35·23	+0 12·67			
	55 ,,	13 44	S	W	11	0 19 0·11	+0·12	+0·41	− 1·16	−0·02	0 18 59·46	0 19 12·05	+0 12·59			
	68 ,,	29 10	N	W	13	0 24 21·67	+0·13	+0·47	+ 0·02	−0·02	0 24 22·27	0 24 34·84	+0 12·57			
	75 ,,	19 43	S	W	14	0 26 52·81	+0·12	+0·43	− 0·74	−0·02	0 26 52·60	0 27 5·18	+0 12·58			
	π Andromedæ	33 9	N	W	9	0 31 3·08	+0·14	+0·49	+ 0·38	−0·02	0 31 4·07	0 31 16·26	+0 12·19	+0 12·594		
		Mean	...	...	...	0 17 30										
	δ Andromedæ	30 17	N	E	12	0 33 29·75	−0·13	+0·47	+ 0·12	−0·02	0 33 30·19	0 33 42·79	+0 12·60			
	ζ Andromedæ	23 42	S	E	9	0 41 34·14	−0·13	+0·45	− 0·43	−0·02	0 41 34·01	0 41 46·43	+0 12·42			
	121 Gr. 80	40 30	N	E	13	0 43 47·37	−0·15	+0·53	+ 1·14	−0·03	0 43 48·86	0 44 1·29	+0 12·43			
	136 ,,	18 37	S	E	12	0 48 49·97	−0·12	+0·42	− 0·82	−0·02	0 48 49·43	0 49 1·82	+0 12·39			
	μ Andromedæ	37 56	N	E	12	0 50 41·85	−0·15	+0·51	+ 0·86	−0·02	0 50 43·05	0 50 55·61	+0 12·56	+0 12·480	+0 12·537	0 30 36
		Mean	...	...	...	0 43 41										
,, 10	3939 Gr. 80	42 20	N	E	9	23 21 57·59	−0·16	+0·06	+ 0·32	−0·03	23 21 57·78	23 22 3·04	+0 5·26			
	70 Pegasi	12 11	S	E	14	23 23 45·46	−0·12	+0·04	− 0·30	−0·02	23 23 45·06	23 23 50·36	+0 5·30			
	3949 Gr. 80	38 40	N	E	13	23 26 1·51	−0·15	+0·05	+ 0·22	−0·02	23 26 1·61	23 26 6·96	+0 5·35			
	3959 ,,	30 45	N	E	11	23 28 38·91	−0·14	+0·05	+ 0·04	−0·02	23 28 38·84	23 28 44·11	+0 5·27			
	ι Andromedæ	42 41	N	E	14	23 32 53·05	−0·16	+0·06	+ 0·33	−0·03	23 32 53·25	23 32 58·59	+0 5·34			
	3980 Gr. 80	43 45	N	E	14	23 35 7·99	−0·16	+0·06	+ 0·36	−0·03	23 35 8·22	23 35 13·57	+0 5·35			
	3988 ,,	15 45	S	E	10	23 37 18·85	−0·12	+0·04	− 0·24	−0·02	23 37 18·51	23 37 23·72	+0 5·21			
	3989 ,,	28 47	S	E	12	23 38 36·92	−0·13	+0·05	0·00	−0·02	23 38 36·82	23 38 42·17	+0 5·35			
	3991 ,,	45 50	N	E	13	23 40 43·64	−0·17	+0·06	+ 0·43	−0·03	23 40 43·93	23 40 49·29	+0 5·36			
	4013 ,,	18 32	S	E	13	23 47 3·69	−0·12	+0·04	− 0·19	−0·02	23 47 3·40	23 47 8·55	+0 5·15			
	4030 ,,	24 33	S	E	13	23 52 19·27	−0·13	+0·05	− 0·08	−0·02	23 52 19·09	23 52 24·19	+0 5·10			
	4047 ,,	26 32	S	E	9	23 56 35·88	−0·13	+0·05	− 0·05	−0·02	23 56 35·73	23 56 40·82	+0 5·09			
	4059 ,,	12 49	S	E	13	0 0 13·71	−0·12	+0·04	− 0·29	−0·02	0 0 13·32	0 0 18·49	+0 5·17			
	α Andromedæ	28 31	S	E	10	0 2 52·29	−0·13	+0·05	− 0·01	−0·02	0 2 52·18	0 2 57·38	+0 5·20	+0 5·250		
		Mean	...	...	...	23 40 18										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

Transits at BUSHIRE (W), *Lat. 28° 55′*, by LENOX CONYNGHAM with Telescope No. 2.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_W
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 10	15 Gr. 80	45 29	N	W	11	0 4 45·52	+0·17	+0·18	+ 0·42	−0·03	0 4 46·26	0 4 51·45	+0 5·19			
	γ Pegasi	14 36	S	W	11	0 7 44·69	+0·12	+0·13	− 0·26	−0·02	0 7 44·66	0 7 49·69	+0 5·03			
	27 Gr. 80	19 37	S	W	10	0 9 4·92	+0·12	+0·14	− 0·17	−0·02	0 9 4·99	0 9 10·06	+0 5·07			
	38 „	38 6	N	W	10	0 11 30·45	+0·15	+0·16	+ 0·21	−0·02	0 11 30·95	0 11 36·10	+0 5·15			
	44 „	43 12	N	W	8	0 13 3·99	+0·16	+0·17	+ 0·35	−0·03	0 13 4·64	0 13 9·71	+0 5·07			
	52 „	37 23	N	W	13	0 15 29·71	+0·15	+0·16	+ 0·19	−0·02	0 15 30·19	0 15 35·22	+0 5·03			
	55 „	13 44	S	W	11	0 19 7·11	+0·12	+0·13	− 0·28	−0·02	0 19 7·06	0 19 12·04	+0 4·98			
	75 „	19 43	S	W	12	0 27 0·20	+0·12	+0·14	− 0·17	−0·02	0 27 0·27	0 27 5·17	+0 4·90			
	π Andromedæ	33 9	N	W	12	0 31 11·00	+0·14	+0·16	+ 0·09	−0·02	0 31 11·37	0 31 16·25	+0 4·88			
	δ Andromedæ	30 17	N	W	13	0 33 37·49	+0·13	+0·15	+ 0·03	−0·02	0 33 37·78	0 33 42·78	+0 5·00			
	ζ Andromedæ	23 42	S	W	12	0 41 41·32	+0·13	+0·14	− 0·10	−0·02	0 41 41·47	0 41 46·42	+0 4·95			
	121 Gr. 80	40 30	N	W	13	0 43 55·86	+0·15	+0·17	+ 0·27	−0·03	0 43 56·42	0 44 1·28	+0 4·86	+0 5·009	+0 5·130	0 0 55
		Mean	...	...	...	0 21 31										
„ 11	3949 Gr. 80	38 40	N	E	12	23 26 9·01	−0·14	+0·35	+ 0·23	−0·02	23 26 9·43	23 26 6·94	−0 2·49			
	3959 „	30 45	N	E	13	23 28 46·36	−0·13	+0·32	+ 0·04	−0·02	23 28 46·57	23 28 44·10	−0 2·47			
	ι Andromedæ	42 41	N	E	12	23 33 0·42	−0·15	+0·37	+ 0·34	−0·03	23 33 0·95	23 32 58·58	−0 2·37			
	3980 Gr. 80	43 45	N	E	12	23 35 15·38	−0·16	+0·37	+ 0·37	−0·03	23 35 15·93	23 35 13·55	−0 2·38			
	3988 „	15 45	S	E	15	23 37 26·39	−0·12	+0·28	− 0·25	−0·02	23 37 26·28	23 37 23·71	−0 2·57			
	3989 „	48 47	S	E	11	23 38 44·47	−0·13	+0·32	0·00	−0·02	23 38 44·64	23 38 42·16	−0 2·48			
	4003 „	28 15	S	E	15	23 44 22·58	−0·13	+0·32	− 0·01	−0·02	23 44 22·74	23 44 20·17	−0 2·57			
	4013 „	18 32	S	E	13	23 47 11·11	−0·12	+0·29	− 0·20	−0·02	23 47 11·06	23 47 8·54	−0 2·52			
	4030 „	24 33	S	E	13	23 52 26·73	−0·12	+0·30	− 0·09	−0·02	23 52 26·80	23 52 24·18	−0 2·62			
	4047 „	26 32	S	E	11	23 56 43·28	−0·13	+0·31	− 0·05	−0·02	23 56 43·39	23 56 40·81	−0 2·58			
	4059 „	12 49	S	E	15	0 0 21·20	−0·11	+0·27	− 0·30	−0·02	0 0 21·04	0 0 18·48	−0 2·56			
	α Andromedæ	28 31	S	E	14	0 2 59·76	−0·13	+0·32	− 0·01	−0·02	0 2 59·92	0 2 57·37	−0 2·55	−0 2·513		
		Mean	...	...	...	23 43 37										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT BUSHIRE (W), *Lat.* 28° 55′, BY LENOX CONYNGHAM WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 11	15 Gr. 80	45 29	N	W	10	0 4 52·87	+0·16	+0·47	+ 0·43	−0·03	0 4 53·90	0 4 51·43	−0 2·47			
	γ Pegasi	14 36	S	W	15	0 7 52·12	+0·12	+0·35	− 0·27	−0·02	0 7 52·30	0 7 49·68	−0 2·62			
	27 Gr. 80	19 37	S	W	15	0 9 12·40	+0·12	+0·36	− 0·18	−0·02	0 9 12·68	0 9 10·05	−0 2·63			
	38 „	38 6	N	W	15	0 11 37·95	+0·14	+0·44	+ 0·21	−0·02	0 11 38·72	0 11 36·09	−0 2·63			
	44 „	43 12	N	W	13	0 13 11·36	+0·15	+0·46	+ 0·36	−0·03	0 13 12·30	0 13 9·70	−0 2·60			
	52 „	37 23	N	W	15	0 15 37·07	+0·14	+0·43	+ 0·19	−0·02	0 15 37·81	0 15 35·20	−0 2·61			
	55 „	13 44	S	W	8	0 19 14·59	+0·12	+0·34	− 0·28	−0·02	0 19 14·75	0 19 12·03	−0 2·72			
	75 „	19 43	S	W	13	0 27 7·59	+0·12	+0·36	− 0·18	−0·02	0 27 7·87	0 27 5·16	−0 2·71			
	π Andromedæ	33 9	N	W	13	0 31 18·39	+0·13	+0·41	+ 0·09	−0·02	0 31 19·00	0 31 16·24	−0 2·76			
	δ Andromedæ	30 17	N	W	15	0 33 44·89	+0·13	+0·40	+ 0·03	−0·02	0 33 45·43	0 33 42·77	−0 2·66			
	ζ Andromedæ	23 42	S	W	15	0 41 48·83	+0·12	+0·38	− 0·10	−0·02	0 41 49·21	0 41 46·41	−0 2·80			
	121 Gr. 80	40 30	N	W	9	0 44 3·27	+0·15	+0·45	+ 0·28	−0·03	0 44 4·12	0 44 1·26	−0 2·86	−0 2·673	−0 2·593	0 2 38
		Mean	...	...	...	0 21 38										
„ 12	ι Andromedæ	42 41	N	E	14	23 33 8·47	−0·15	+0·26	+ 0·33	−0·03	23 33 8·88	23 32 58·56	−0 10·32			
	3980 Gr. 80	43 45	N	E	15	23 35 23·37	−0·15	+0·26	+ 0·36	−0·03	23 35 23·81	23 35 13·53	−0 10·28			
	3988 „	15 45	S	E	14	23 37 34·33	−0·11	+0·20	− 0·24	−0·02	23 37 34·16	23 37 23·69	−0 10·47			
	3989 „	28 47	S	E	11	23 38 52·48	−0·12	+0·22	0·00	−0·02	23 38 52·56	23 38 42·14	−0 10·42			
	3991 „	45 50	N	E	12	23 40 59·04	−0·16	+0·27	+ 0·42	−0·03	23 40 59·54	23 40 49·25	−0 10·29			
	4003 „	28 15	S	E	14	23 44 30·55	−0·12	+0·22	− 0·01	−0·02	23 44 30·62	23 44 20·16	−0 10·46			
	4013 „	18 32	S	E	14	23 47 19·07	−0·11	+0·20	− 0·19	−0·02	23 47 18·95	23 47 8·52	−0 10·43			
	4030 „	24 33	S	E	13	23 52 34·70	−0·12	+0·22	− 0·08	−0·02	23 52 34·70	23 52 24·17	−0 10·53			
	4047 „	26 32	S	E	15	23 56 51·27	−0·12	+0·22	− 0·05	−0·02	23 56 51·30	23 56 40·79	−0 10·51			
	4059 „	12 49	S	E	15	0 0 29·16	−0·11	+0·19	− 0·29	−0·02	0 0 28·93	0 0 18·47	−0 10·46			
	α Andromedæ	28 31	S	E	15	0 3 7·73	−0·12	+0·22	− 0·01	−0·02	0 3 7·80	0 2 57·36	−0 10·44			
	15 Gr. 80	45 29	N	E	14	0 5 1·24	−0·15	+0·27	+ 0·41	−0·03	0 5 1·74	0 4 51·41	−0 10·33	−0 10·412		
		Mean	...	...	...	23 47 59										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT BUSHIRE (W), *Lat.* 28° 55′, BY LENOX CONYNGHAM WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 13	γ Pegasi	14 36	S	E	14	0 8 8·15	−0·07	+0·04	− 0·26	−0·02	0 8 7·84	0 7 49·66	−0 18·18			
	27 Gr. 80	19 37	S	E	13	0 9 28·44	−0·07	+0·04	− 0·17	−0·02	0 9 28·22	0 9 10·02	−0 18·20			
	38 „	38 6	N	E	15	0 11 54·06	−0·08	+0·05	+ 0·21	−0·02	0 11 54·22	0 11 36·06	−0 18·16			
	44 „	43 12	N	E	13	0 13 27·53	−0·09	+0·06	+ 0·35	−0·03	0 13 27·82	0 13 9·67	−0 18·15			
	52 „	37 23	N	E	14	0 15 53·20	−0·08	+0·05	+ 0·19	−0·02	0 15 53·34	0 15 35·17	−0 18·17			
	55 „	13 44	S	E	15	0 19 30·55	−0·07	+0·04	− 0·27	−0·02	0 19 30·23	0 19 12·01	−0 18·22			
	68 „	29 10	N	E	14	0 24 53·13	−0·08	+0·05	+ 0·01	−0·02	0 24 53·09	0 24 34·79	−0 18·30			
	75 „	19 43	S	E	15	0 27 23·63	−0·07	+0·04	− 0·17	−0·02	0 27 23·41	0 27 5·14	−0 18·27			
	π Andromedæ	33 9	N	E	15	0 31 34·45	−0·08	+0·05	+ 0·09	−0·02	0 31 34·49	0 31 16·22	−0 18.27			
	δ Andromedæ	30 17	N	E	15	0 34. 0·98	−0·08	+0·05	+ 0·03	−0·02	0 34 0·96	0 33 42·74	−0 18·22			
	ζ Andromedæ	23 42	S	E	15	0 42 4·89	−0·07	+0·05	− 0·10	−0·02	0 42 4·75	0 41 46·39	−0 18·36			
	121 Gr. 80	40 30	N	E	14	0 44 19·40	−0·09	+0·05	+ 0·27	−0·03	0 44 19·60	0 44 1·23	−0 18·37	−0 18·239	−0 18·102	0 5 50
		Mean	...	...	...	0 23 33										
„ 14	ι Andromedæ	42 41	N	W	13	23 33 23·68	+0·07	−0·10	− 0·11	−0·03	23 33 23·51	23 32 58·52	−0 24·99			
	3980 Gr. 80	43 45	N	W	13	23 35 38·74	+0·07	−0·10	− 0·12	−0·03	23 35 38·56	23 35 13·50	−0 25·06			
	3988 „	15 45	S	W	14	23 37 48·80	+0·06	−0·07	+ 0·08	−0·02	23 37 48·85	23 37 23·67	−0 25·18			
	3989 „	28 47	S	W	12	23 39 7·26	+0·06	−0·08	0·00	−0·02	23 39 7·22	23 38 42·12	−0 25·10			
	3991 „	45 50	N	W	15	23 41 14·39	+0·08	−0·10	− 0·15	−0·03	23 41 14·19	23 40 49·21	−0 24·98			
	4003 „	28 15	S	W	12	23 44 45·27	+0·06	−0·08	0·00	−0·02	23 44 45·23	23 44 20·14	−0 25·09			
	4013 „	18 32	S	W	15	23 47 33·63	+0·06	−0·08	+ 0·07	−0·02	23 47 33·66	23 47 8·50	−0 25·16			
	4030 „	24 33	S	W	15	23 52 49·40	+0·06	−0·08	+ 0·03	−0·02	23 52 49·39	23 52 24·15	−0 25·24			
	4047 „	26 32	S	W	15	23 57 6·06	+0·06	−0·08	+ 0·02	−0·02	23 57 6·04	23 56 40·77	−0 25·27			
	4059 „	12 49	S	W	14	0 0 43·58	+0·06	−0·07	+ 0·10	−0·02	0 0 43·65	0 0 18·45	−0 25·20			
	α Andromedæ	28 31	S	W	15	0 3 22·49	+0·06	−0·08	0·00	−0·02	0 3 22·45	0 2 57·33	−0 25·12			
	15 Gr. 80	45 29	N	W	12	0 5 16·58	+0·08	−0·10	− 0·14	−0.03	0 5 16·39	0 4 51·37	−0 25·02	−0 25·118		
		Mean	...	...	...	23 48 14										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT BUSHIRE (W), *Lat.* 28° 55′, BY LENOX CONYNGHAM WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 12	γ Pegasi	14 36	S	W	15	0 8 0·14	+0·11	+0·26	− 0·26	−0·02	0 8 0·23	0 7 49·67	−0 10·56			
	27 Gr. 80	19 37	S	W	13	0 9 20·40	+0·11	+0·28	− 0·17	−0·02	0 9 20·60	0 9 10·03	−0 10·57			
	38 „	38 6	N	W	10	0 11 45·95	+0·14	+0·33	+ 0·20	−0·02	0 11 46·60	0 11 36·07	−0 10·53			
	44 „	43 12	N	W	15	0 13 19·43	+0·15	+0·35	+ 0·34	−0·03	0 13 20·24	0 13 9·68	−0 10·56			
	52 „	37 23	N	W	12	0 15 45·10	+0·14	+0·33	+ 0·19	−0·02	0 15 45·74	0 15 35·19	−0 10·55			
	55 „	13 44	S	W	12	0 19 22·57	+0·11	+0·26	− 0·27	−0·02	0 19 22·65	0 19 12·02	−0 10·63			
	68 „	29 10	N	W	8	0 24 45·07	+0·12	+0·30	+ 0·01	−0·02	0 24 45·48	0 24 34·80	−0 10·68			
	75 „	19 43	S	W	10	0 27 15·58	+0·11	+0·28	− 0·17	−0·02	0 27 15·78	0 27 5·15	−0 10·63			
	π Andromedæ	33 9	N	W	14	0 31 26·38	+0·13	+0·31	+ 0·09	−0·02	0 31 26·89	0 31 16·23	−0 10·66			
	δ Andromedæ	30 17	N	W	15	0 33 52·94	+0·13	+0·30	+ 0·03	−0·02	0 33 53·38	0 33 42·75	−0 10·63			
	ζ Andromedæ	23 42	S	W	14	0 41 56·82	+0·12	+0·29	− 0·10	−0·02	0 41 57·11	0 41 46·40	−0 10·71			
	121 Gr. 80	40 30	N	W	13	0 44 11·24	+0·14	+0·34	+ 0·27	−0·03	0 44 11·96	0 44 1·25	−0 10·71	−0 10·618	−0 10·515	0 5 42
		Mean	...	...	...	0 23 25										
„ 13	ι Andromedæ	42 41	N	W	15	23 33 15·95	+0·09	+0·03	+ 0·33	−0·03	23 33 16·37	23 32 58·54	−0 17·83			
	3980 Gr. 80	43 45	N	W	14	23 35 30·91	+0·09	+0·03	+ 0·36	−0·03	23 35 31·36	23 35 13·52	−0 17·84			
	3988 „	15 45	S	W	14	23 37 41·89	+0·07	+0·02	− 0·24	−0·02	23 37 41·72	23 37 23·68	−0 18·04			
	3989 „	28 47	S	W	15	23 39 0·00	+0·07	+0·03	0·00	−0·02	23 39 0·08	23 38 42·13	−0 17·95			
	3991 „	45 50	N	W	15	23 41 6·57	+0·09	+0·03	+ 0·42	−0·03	23 41 7·08	23 40 49·23	−0 17·85			
	4003 „	28 15	S	W	15	23 44 38·05	+0·07	+0·03	− 0·01	−0·02	23 44 38·12	23 44 20·15	−0 17·97			
	4013 „	18 32	S	W	14	23 47 26·66	+0·07	+0·02	− 0·19	−0·02	23 47 26·54	23 47 8·51	−0 18·03			
	4030 „	24 33	S	W	13	23 52 42·23	+0·07	+0·03	− 0·08	−0·02	23 52 42·23	23 52 24·16	−0 18·07			
	4047 „	26 32	S	W	15	23 56 58·85	+0·07	+0·03	− 0·05	−0·02	23 56 58·88	23 56 40·78	−0 18·10			
	4059 „	12 49	S	W	15	0 0 36·75	+0·07	+0·02	− 0·29	−0·02	0 0 36·53	0 0 18·46	−0 18·07			
	α Andromedæ	28 31	S	W	14	0 3 15·24	+0·07	+0·03	− 0·01	−0·02	0 3 15·31	0 2 57·35	−0 17·96			
	15 Gr. 80	45 29	N	W	15	0 5 8·76	+0·09	+0·03	+ 0·41	−0·03	0 5 9·26	0 4 51·39	−0 17·87	−0 17·965		
		Mean	...	...	...	23 48 7										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT BUSHIRE (W), *Lat.* 28° 55′, BY LENOX CONYNGHAM WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 14	γ Pegasi	14 36	S	E	15	0 8 15·04	−0·06	−0·08	+ 0·09	−0·02	0 8 14·97	0 7 49·65	−0 25·32			
	27 Gr. 80	19 37	S	E	14	0 9 35·45	−0·06	−0·08	+ 0·06	−0·02	0 9 35·35	0 9 10·01	−0 25·34			
	38 ,,	38 6	N	E	12	0 12 1·60	−0·07	−0·10	− 0·07	−0·02	0 12 1·34	0 11 36·04	−0 25·30			
	44 ,,	43 12	N	E	15	0 13 35·25	−0·07	−0·10	− 0·12	−0·03	0 13 34·93	0 13 9·65	−0 25·28			
	52 ,,	37 23	N	E	15	0 16 0·74	−0·07	−0·10	− 0·06	−0·02	0 16 0·49	0 15 35·16	−0 25·33			
	55 ,,	13 44	S	E	14	0 19 37·44	−0·06	−0·08	+ 0·09	−0·02	0 19 37·37	0 19 12·00	−0 25·37			
	68 ,,	29 10	N	E	15	0 25 0·29	−0·06	−0·09	0·00	−0·02	0 25 0·12	0 24 34·78	−0 25·34			
	75 ,,	19 43	S	E	14	0 27 30·62	−0·06	−0·08	+ 0·06	−0·02	0 27 30·52	0 27 5·13	−0 25·39			
	π Andromedæ	33 9	N	E	15	0 31 41·86	−0·06	−0·09	− 0·03	−0·02	0 31 41·66	0 31 16·20	−0 25·46			
	δ Andromedæ	30 17	N	E	15	0 34 8·23	−0·06	−0·09	− 0·01	−0·02	0 34 8·05	0 33 42·73	−0 25·32			
	ζ Andromedæ	23 42	S	E	15	0 42 11·97	−0·06	−0·08	+ 0·03	−0·02	0 42 11·84	0 41 46·38	−0 25·46			
	121 Gr. 80	40 30	N	E	14	0 44 26·99	−0·07	−0·10	− 0·09	−0·03	0 44 26·70	0 44 1·22	−0 25·48	−0 25·366	−0 25·242	0 5 57
		Mean	...	...	...	0 23 40										

ARC JASK-BUSHIRE.

EXPLANATION OF *TABLE V.*

Observations of Transits of the same Stars at both Stations, and Deduction of the Difference of Corrected Times.

This Table includes observations at both stations.

The seconds of corrected time of transit in the case of the eastern station, Jask, are obtained precisely as in Table IV for clock stars. But in the case of the western station, Bushire, there is an additional correction on account of the rate of its clock.

The quantity sought is the difference between the errors of the two clocks at a particular epoch, namely, that at which the star transited at the eastern station. Now the interval between the transit of a star at the eastern station and its transit at the western station is equal to the difference of longitude, so that the observed time of transit at the western station requires a correction equal to the change in the western clock's error during an interval equal to the difference of longitude, *i.e.*, equal to the clock's hourly rate correction multiplied by the difference of longitude expressed in hours. This quantity is found for each night in the last column of Table VI. There is therefore a slight inter-dependence between these two tables, but no confusion results in practice, for the quantities required from Table V in order to form Table VI do not include the correction for clock rate: thus Table V may be brought up to the point immediately preceding this entry, then Table VI can be computed in its entirety, and lastly the final columns of Table V filled in.

EXPLANATION OF *TABLE V.*—(*Continued*).

It will be noticed that though the correction given in the last column of Table VI has only one value per night, the quantity entered in Table V has always two values per night. The reason of this is that in Table V only two places of decimals are kept, so that the final value might be burdened by an error not exceeding $0^s{\cdot}005$; in order to avoid this, care is taken to increase the value entered in Table V by 1 in the second place of decimals as often as is requisite to make the mean value correct to the third place of decimals. Thus on December 9th out of 22 entries, 13 are $0^s{\cdot}13$, and 9 are $0^s{\cdot}14$, so that the mean is $0^s{\cdot}134$ which agrees with the value in Table VI.

This method of compensation has been frequently adopted throughout the computations and will account for apparent arithmetical inconsistencies in various places.

Having obtained the seconds of corrected time at each station, the difference between them is taken out. These differences are combined into means according to the positions of the two instruments, and corresponding to the mean epochs of the groups, and lastly these means are combined into final means corresponding to final mean epochs.

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

JASK (E), *Lat.* 25° 38′, *Long.* 8h 51m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 8h 23m.

Transits Observed at JASK (E) by BURRARD with Telescope No. 1.

Astronomical Date	Star: Number in Gr. 80	Star: Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Seconds of Corrected Time
1894		° ′			h m s	s	s	s	s	s
Dec. 9	584	23 47	S	E	3 40 61·08	−0·05	−3·22	− 0·84	−0·02	56·95
	590	23 44	S	E	3 42 41·76	−0·05	−3·22	− 0·84	−0·02	37·63
	598	34 2	N	E	3 44 53·07	−0·06	−3·53	+ 4·06	−0·02	53·52
	603	31 34	N	E	3 47 15·15	−0·06	−3·45	+ 2·81	−0·02	14·43
		Mean	...	...	3 43 58					
	608	34 46	N	W	3 49 24·34	+0·06	−3·52	+ 4·48	−0·02	25·34
	613	35 29	N	W	3 51 50·51	+0·06	−3·55	+ 4·84	−0·02	51·84
	618	17 54	S	W	3 54 34·55	+0·05	−3·05	− 3·28	−0·02	28·25
	624	9 42	S	W	3 55 54·17	+0·05	−2·86	− 6·45	−0·02	44·89
	630	21 48	S	W	3 58 16·46	+0·05	−3·15	− 1·67	−0·02	11·67
	637	27 19	N	W	3 59 54·87	+0·06	−3·30	+ 0·78	−0·02	52·39
		Mean	...	...	3 54 59					
	787	36 31	N	W	4 45 16·90	+0·06	−3·57	+ 5·43	−0·02	18·80
	793	43 53	N	W	4 46 55·43	+0·07	−3·86	+10·03	−0·03	61·64
	800	33 0	N	W	4 49 51·75	+0·06	−3·45	+ 3·52	−0·02	51·86
	816	40 55	N	W	4 54 46·51	+0·07	−3·73	+ 8·06	−0·03	50·88
	823	21 26	S	W	4 56 36·31	+0·05	−3·14	− 1·79	−0·02	31·41
	829	19 40	S	W	4 59 8·53	+0·05	−3·09	− 2·57	−0·02	2·90
		Mean	...	...	4 52 6					
	846	15 28	S	E	5 3 30·72	−0·05	−3·02	− 4·24	−0·02	23·39
	851	38 21	N	E	5 5 54·04	−0·06	−3·67	+ 6·51	−0·02	56·80
	860	32 34	N	E	5 8 16·49	−0·06	−3·48	+ 3·34	−0·02	16·27
	869	11 13	S	E	5 9 64·98	−0·05	−2·92	− 5·85	−0·02	56·14
	872	40 0	N	E	5 11 23·68	−0·07	−3·73	+ 7·47	−0·03	27·32
	882	19 42	S	E	5 14 32·20	−0·05	−3·11	− 2·51	−0·02	26·51
		Mean	...	...	5 8 57					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

JASK (E), *Lat.* 25° 38′, *Long.* 3^h 51^m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3^h 23^m.

Transits Observed at BUSHIRE (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch = T_E
Star's Aspect	Instrumental Position	Observed Time	Correction for					Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
			Collimation	Level	Deviation	Diurnal Aberration	Rate of W Clock to T_E					
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
S	E	3 41 3·96	−0·13	+0·53	−0·43	−0·02	−0·13	3·78	+ 0 6·83			
S	E	3 42 44·51	−0·13	+0·53	−0·43	−0·02	−0·13	44·33	6·70			
N	E	3 44 59·48	−0·14	+0·59	+0·47	−0·02	−0·13	60·25	6·73			
N	W	3 47 20·29	+0·14	+0·66	+0·24	−0·02	−0·13	21·18	6·75	+ 0 6·753		
N	W	3 49 30·86	+0·14	+0·68	+0·54	−0·02	−0·13	32·07	+ 0 6·73			
N	W	3 51 57·18	+0·14	+0·69	+0·60	−0·02	−0·13	58·46	6·62			
S	W	3 54 35·49	+0·12	+0·58	−0·87	−0·02	−0·13	35·17	6·92			
S	W	3 55 52·79	+0·12	+0·54	−1·44	−0·02	−0·13	51·86	6·97			
S	W	3 58 18·66	+0·12	+0·60	−0·58	−0·02	−0·13	18·65	6·98			
N	W	3 59 58·89	+0·13	+0·64	+0·13	−0·02	−0·13	59·64	7·25	+ 0 6·912	+ 0 6·833	3 49 29
N	E	4 45 25·07	−0·14	+0·64	+0·72	−0·02	−0·13	26·14	+ 0 7·34			
N	E	4 47 7·11	−0·16	+0·70	+1·55	−0·03	−0·13	9·04	7·40			
N	E	4 49 58·49	−0·14	+0·62	+0·37	−0·02	−0·13	59·19	7·33			
N	E	4 54 56·72	−0·15	+0·68	+1·19	−0·03	−0·14	58·27	7·39			
S	E	4 56 39·31	−0·12	+0·56	−0·60	−0·02	−0·14	38·99	7·58			
S	E	4 59 11·08	−0·12	+0·55	−0·74	−0·02	−0·14	10·61	7·71	+ 0 7·458		
S	W	5 3 31·77	+0·12	+0·59	−1·05	−0·02	−0·14	31·27	+ 0 7·88			
N	W	5 6 3·00	+0·15	+0·74	+0·91	−0·02	−0·14	4·64	7·84			
N	W	5 8 23·02	+0·14	+0·69	+0·32	−0·02	−0·14	24·01	7·74			
S	W	5 10 4·82	+0·12	+0·57	−1·34	−0·02	−0·14	4·01	7·87			
N	W	5 11 33·51	+0·15	+0·75	+1·09	−0·03	−0·14	35·33	8·01			
S	W	5 14 34·53	+0·12	+0·62	−0·74	−0·02	−0·14	34·37	7·86	+ 0 7·867	+ 0 7·663	5 0 32

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

JASK (E), *Lat.* 25° 38′, *Long.* 3h 51m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Astronomical Date	Star		Transits Observed at JASK (E) by BURRARD with Telescope No. 1.							
	Number in Gr. 80	Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for				Seconds of Corrected Time
						Collimation	Level	Deviation	Diurnal Aberration	
1894		° ′			h m s	s	s	s	s	s
Dec. 10	557	20 34	S	E	3 32 26·71	−0·04	+0·07	−0·31	−0·02	26·41
	562	24 59	S	E	3 34 1·92	−0·04	+0·07	−0·04	−0·02	1·89
	571	31 57	N	E	3 37 15·63	−0·04	+0·08	+0·43	−0·02	16·08
	579	24 2	S	E	3 39 6·81	−0·04	+0·07	−0·10	−0·02	6·72
	584	23 47	S	E	3 40 46·66	−0·04	+0·07	−0·12	−0·02	46·55
	590	23 44	S	E	3 42 27·19	−0·04	+0·07	−0·12	−0·02	27·08
	598	34 2	N	E	3 44 42·38	−0·04	+0·08	+0·59	−0·02	42·99
		Mean	...	...	3 38 42					
	603	31 34	N	W	3 47 3·50	+0·04	−0·01	+0·41	−0·02	3·92
	608	34 46	N	W	3 49 13·98	+0·04	−0·01	+0·65	−0·02	14·64
	613	35 29	N	W	3 51 40·40	+0·04	−0·01	+0·70	−0·02	41·11
	618	17 54	S	W	3 54 18·10	+0·04	−0·01	−0·48	−0·02	17·63
	624	9 42	S	W	3 55 35·18	+0·04	−0·01	−0·93	−0·02	34·26
	630	21 48	S	W	3 58 1·29	+0·04	−0·01	−0·24	−0·02	1·06
	637	27 19	N	W	3 59 41·55	+0·04	−0·01	+0·11	−0·02	41·67
		Mean	...	...	3 53 39					
	787	36 31	N	E	4 45 7·31	−0·04	+0·16	+0·79	−0·02	8·20
	793	43 53	N	E	4 46 49·42	−0·05	+0·17	+1·45	−0·03	50·96
	800	33 0	N	E	4 49 40·53	−0·04	+0·16	+0·51	−0·02	41·14
	808	24 53	S	E	4 51 15·48	−0·04	+0·15	−0·05	−0·02	15·52
	816	40 55	N	E	4 54 38·99	−0·05	+0·17	+1·17	−0·03	40·25
	823	21 26	S	E	4 56 20·99	−0·04	+0.14	−0·26	−0·02	20·81
	829	19 40	S	E	4 58 52·64	−0·04	+0·14	−0·37	−0·02	52·35
		Mean	...		4 51 49					
	846	15 28	S	W	5 3 13·53	+0·04	+0·02	−0·61	−0·02	12·96
	851	38 21	N	W	5 5 45·33	+0·04	+0·02	+0·94	−0·02	46·31
	860	32 34	N	W	5 8 5·28	+0·04	+0·02	+0·48	−0·02	5·80
	869	11 13	S	W	5 9 46·42	+0·04	+0·02	−0·85	−0·02	45·61
	872	40 0	N	W	5 11 15·89	+0·05	+0·02	+1·08	−0·03	17·01
	877	21 59	S	W	5 12 29·74	+0·04	+0·02	−0·23	−0·02	29·55
	882	19 42	S	W	5 14 16·17	+0·04	+0·02	−0·36	−0·02	15·85
		Mean	...	...	5 9 16					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

JASK (E), *Lat.* 25° 38′, *Long.* 3^h 51^m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3^h 23^m.

Transits Observed at BUSHIRE (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch $- T_E$
Star's Aspect	Instrumental Position	Observed Time	Correction for: Collimation	Level	Deviation	Diurnal Aberration	Rate of W Clock to T_E	Seconds of Corrected Time	By each Star − W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
S	E	3 32 51·49	−0·12	+0·09	−0·16	−0·02	−0·14	51·14	+ 0 24·73			
S	E	3 34 26·99	−0·13	+0·09	−0·08	−0·02	−0·14	26·71	0 24·82			
N	E	3 37 40·93	−0·14	+0·10	+0·06	−0·02	−0·14	40·79	0 24·71			
S	E	3 39 31·74	−0·13	+0·09	−0·10	−0·02	−0·14	31·44	0 24·72			
S	E	3 41 11·62	−0·13	+0·09	−0·10	−0·02	−0·14	11·32	0 24·77			
S	E	3 42 52·22	−0·13	+0·09	−0·10	−0·02	−0·14	51·92	0 24·84			
N	E	3 45 7·90	−0·14	+0·10	+0·11	−0·02	−0·14	7·81	0 24·82	+ 0 24·773		
N	W	3 47 28·57	+0·14	+0·16	+0·06	−0·02	−0·14	28·77	+ 0 24·85			
N	W	3 49 39·39	+0·14	+0·16	+0·13	−0·02	−0·14	39·66	0 25·02			
N	W	3 52 5·79	+0·14	+0·16	+0·14	−0·02	−0·14	6·07	0 24·96			
S	W	3 54 42·84	+0·12	+0·14	−0·21	−0·02	−0·14	42·73	0 25·10			
S	W	3 55 59·57	+0·12	+0·13	−0·34	−0·02	−0·14	59·32	0 25·06			
S	W	3 58 26·21	+0·12	+0·14	−0·14	−0·02	−0·14	26·17	0 25·11			
S	W	4 0 6·82	+0·13	+0·15	−0·03	−0·02	−0·14	6·91	0 25·24	+ 0 25·049	+ 0 24·911	3 46 11
N	W	4 45 33·40	+0·14	+0·15	+0·17	−0·02	−0·14	33·70	+ 0 25·50			
N	W	4 47 16·16	+0·16	+0·17	+0·37	−0·03	−0·14	16·69	0 25·73			
N	W	4 50 6·56	+0·14	+0·15	+0·09	−0·02	−0·14	6·78	0 25·64			
S	W	4 51 41·17	+0·13	+0·14	−0·08	−0·02	−0·15	41·19	0 25·67			
N	W	4 55 5·50	+0·15	+0·16	+0·28	−0·03	−0·15	5·91	0 25·66			
S	W	4 56 46·57	+0·12	+0·13	−0·14	−0·02	−0·15	46·51	0 25·70			
S	W	4 59 18·25	+0·12	+0·13	−0·17	−0·02	−0·15	18·16	0 25·81	+ 0 25·673		
S	E	5 3 39·20	−0·12	+0·09	−0·25	−0·02	−0·15	38·75	+ 0 25·79			
N	E	5 6 12·15	−0·15	+0·11	+0·21	−0·02	−0·15	12·15	0 25·84			
N	E	5 8 31·71	−0·14	+0·11	+0·08	−0·02	−0·15	31·59	0 25·79			
S	E	5 10 12·09	−0·12	+0·09	−0·32	−0·02	−0·15	11·57	0 25·96			
N	E	5 11 42·92	−0·15	+0·11	+0·26	−0·03	−0·15	42·96	0 25·95			
S	E	5 12 55·87	−0·12	+0·09	−0·13	−0·02	−0·15	55·54	0 25·99			
S	E	5 14 42·28	−0·12	+0·09	−0·17	−0·02	−0·15	41·91	0 26·06	+ 0 25·911	+ 0 25·792	5 0 33

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

JASK (E), *Lat.* 25° 38′, *Long.* 3h 51m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Astronomical Date	Star		Transits Observed at JASK (E) by BURRARD with Telescope No. 1.							
	Number in Gr. 80	Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for				Seconds of Corrected Time
						Collimation	Level	Deviation	Diurnal Aberration	
1894		° ′			h m s	s	s	s	s	s
Dec. 11	562	24 59	S	W	3 33 50·61	+0·07	+0·19	−0·04	−0·02	50·81
	571	31 57	N	W	3 37 4·40	+0·08	+0·20	+0·40	−0·02	5·06
	579	24 2	S	W	3 38 55·47	+0·07	+0·19	−0·10	−0·02	55·61
	584	23 47	S	W	3 40 35·29	+0·07	+0·19	−0·11	−0·02	35·42
	590	23 44	S	W	3 42 15·80	+0·07	+0·19	−0·11	−0·02	15·93
	598	34 2	N	W	3 44 31·01	+0·08	+0·21	+0·55	−0·02	31·83
		Mean	...	...	3 39 32					
	603	31 34	N	E	3 46 52·17	−0·08	+0·29	+0·41	−0·02	52·77
	608	34 46	N	E	3 49 2·73	−0·08	+0·30	+0·61	−0·02	3·54
	613	35 29	N	E	3 51 29·05	−0·08	+0·30	+0·65	−0·02	29·90
	618	17 54	S	E	3 54 6·87	−0·07	+0·26	−0·44	−0·02	6·60
	624	9 42	S	E	3 55 23·90	−0·07	+0·24	−0·87	−0·02	23·18
	630	21 48	S	E	3 57 49·99	−0·07	+0·27	−0·23	−0·02	49·94
	637	27 19	N	E	3 59 30·41	−0·07	+0·28	+0·10	−0·02	30·70
		Mean	...	...	3 53 28					
	787	36 31	N	E	4 44 55·93	−0·08	+0·28	+0·73	−0·02	56·84
	793	43 53	N	E	4 46 38·23	−0·09	+0·30	+1·36	−0·03	39·77
	800	33 0	N	E	4 49 29·26	−0·08	+0·27	+0·48	−0·02	29·91
	808	24 53	S	E	4 51 4·14	−0·07	+0·25	−0·05	−0·02	4·25
	816	40 55	N	E	4 54 27·64	−0·09	+0·29	+1·09	−0·03	28·90
	823	21 26	S	E	4 56 9·63	−0·07	+0·24	−0·24	−0·02	9·54
	829	19 40	S	E	4 58 41·35	−0·07	+0·24	−0·35	−0·02	41·15
		Mean	...	...	4 51 38					
	846	15 28	S	W	5 3 2·11	+0·07	+0·22	−0·57	−0·02	1·81
	851	38 21	N	W	5 5 34·02	+0·08	+0·27	+0·88	−0·02	35·23
	860	32 34	N	W	5 7 53·88	+0·08	+0·26	+0·45	−0·02	54·65
	869	11 13	S	W	5 9 35·00	+0·07	+0·21	−0·79	−0·02	34·47
	882	19 42	S	W	5 14 4·79	+0·07	+0·23	−0·34	−0·02	4·73
		Mean	...	...	5 8 2					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

JASK (E), *Lat.* 25° 38′, *Long.* 3h 51m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Transits Observed at BUSHIRE (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch $= T_B$
Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Correction for Rate of W Clock to T_B	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
S	W	3 34 34·47	+0·12	+0·14	−0·06	−0·02	−0·15	34·50	+ 0 43·69			
N	W	3 37 48·37	+0·13	+0·15	+0·05	−0·02	−0·15	48·53	0 43·47			
S	W	3 39 39·23	+0·12	+0·13	−0·08	−0·02	−0·15	39·23	0 43·62			
S	W	3 41 19·08	+0·12	+0·13	−0·08	−0·02	−0·15	19·08	0 43·66			
S	W	3 42 59·63	+0·12	+0·13	−0·08	−0·02	−0·15	59·63	0 43·70			
N	W	3 45 15·32	+0·14	+0·15	+0·09	−0·02	−0·15	15·53	0 43·70	+ 0 43·640		
N	E	3 47 36·56	−0·13	+0·09	+0·05	−0·02	−0·15	36·40	+ 0 43·63			
N	E	3 49 47·34	−0·14	+0·09	+0·11	−0·02	−0·15	47·23	0 43·69			
N	E	3 52 13·78	−0·14	+0·09	+0·12	−0·02	−0·15	13·68	0 43·78			
S	E	3 54 50·77	−0·12	+0·08	−0·17	−0·02	−0·15	50·39	0 43·79			
S	E	3 56 7·61	−0·11	+0·07	−0·29	−0·02	−0·16	7·10	0 43·92			
S	E	3 58 34·19	−0·12	+0·08	−0·12	−0·02	−0·16	33·85	0 43·91			
S	E	4 0 14·80	−0·13	+0·09	−0·03	−0·02	−0·16	14·55	0 43·85	+ 0 43·796	+ 0 43·718	3 46 30
N	W	4 45 41·19	+0·14	+0·17	+0·14	−0·02	−0·16	41·46	+ 0 44·62			
N	W	4 47 23·94	+0·16	+0·18	+0·31	−0·03	−0·16	24·40	0 44·63			
N	W	4 50 14·37	+0·13	+0·16	+0·07	−0·02	−0·16	14·55	0 44·64			
S	W	4 51 49·02	+0·12	+0·15	−0·07	−0·02	−0·16	49·04	0 44·79			
N	W	4 55 13·29	+0·15	+0·18	+0·24	−0·03	−0·16	13·67	0 44·77			
S	W	4 56 54·39	+0·12	+0·14	−0·12	−0·02	−0·16	54·35	0 44·81			
S	W	4 59 26·04	+0·12	+0·14	−0·15	−0·02	−0·16	25·97	0 44·82	+ 0 44·726		
S	E	5 3 47·00	−0·12	+0·07	−0·21	−0·02	−0·16	46·56	+ 0 44·75			
N	E	5 6 20·01	−0·14	+0·08	+0·18	−0·02	−0·16	19·95	0 44·72			
N	E	5 8 39·56	−0·13	+0·08	+0·06	−0·02	−0·16	39·39	0 44·74			
S	E	5 10 19·92	−0·11	+0·06	−0·27	−0·02	−0·16	19·42	0 44·95			
S	E	5 14 50·11	−0·12	+0·07	−0·15	−0·02	−0·16	49·73	0 45·00	+ 0 44·832	+ 0 44·779	4 59 50

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

JASK (E), Lat. 25° 38′, Long. 3h 51m: AND BUSHIRE (W), Lat. 28° 55′, Long. 3h 23m.

Astronomical Date	Star		Transits Observed at JASK (E) by BURRARD with Telescope No. 1.							
	Number in Gr. 80	Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for				Seconds of Corrected Time
						Collimation	Level	Deviation	Diurnal Aberration	
1894		° ′			h m s	s	s	s	s	s
Dec. 12	562	24 59	S	W	3 33 39·82	+0·05	+0·26	−0·04	−0·02	40·07
	571	31 57	N	W	3 36 53·50	+0·05	+0·28	+0·41	−0·02	54·22
	579	24 2	S	W	3 38 44·60	+0·05	+0·26	−0·10	−0·02	44·79
	584	23 47	S	W	3 40 24·48	+0·05	+0·26	−0·11	−0·02	24·66
	590	23 44	S	W	3 42 5·02	+0·05	+0·26	−0·11	−0·02	5·20
	598	34 2	N	W	3 44 20·08	+0·06	+0·29	+0·55	−0·02	20·96
		Mean	...	...	3 39 21					
	603	31 34	N	E	3 46 41·32	−0·05	+0·35	+0·38	−0·02	41·98
	608	34 46	N	E	3 48 51·87	−0·06	+0·36	+0·61	−0·02	52·76
	613	35 29	N	E	3 51 18·23	−0·06	+0·36	+0·66	−0·02	19·17
	618	17 54	S	E	3 53 55·95	−0·05	+0·31	−0·45	−0·02	55·74
	624	9 42	S	E	3 55 12·97	−0·05	+0·29	−0·88	−0·02	12·31
	630	21 48	S	E	3 57 39·19	−0·05	+0·32	−0·23	−0·02	39·21
	637	27 19	N	E	3 59 19·55	−0·05	+0·34	+0·11	−0·02	19·93
		Mean	...	...	3 53 17					
	787	36 31	N	W	4 44 45·09	+0·06	+0·28	+0·74	−0·02	46·15
	793	43 53	N	W	4 46 27·31	+0·06	+0·30	+1·37	−0·03	29·01
	800	33 0	N	W	4 49 18·51	+0·06	+0·27	+0·48	−0·02	19·30
	808	24 53	S	W	4 50 53·26	+0·05	+0·25	−0·05	−0·02	53·49
	816	40 55	N	W	4 54 16·80	+0·06	+0·29	+1·10	−0·03	18·22
	823	21 26	S	W	4 55 58·80	+0·05	+0·24	−0·24	−0·02	58·83
	829	19 40	S	W	4 58 30·45	+0·05	+0·24	−0·35	−0·02	30·37
		Mean	...	...	4 51 27					
	846	15 28	S	E	5 2 51·31	−0·05	+0·25	−0·58	−0·02	50·91
	851	38 21	N	E	5 5 23·19	−0·06	+0·30	+0·89	−0·02	24·30
	860	32 34	N	E	5 7 43·09	−0·06	+0·29	+0·46	−0·02	43·76
	869	11 13	S	E	5 9 24·24	−0·05	+0·24	−0·80	−0·02	23·61
	872	40 0	N	E	5 10 53·77	−0·06	+0·31	+1·02	−0·03	55·01
	877	21 59	S	E	5 12 7·64	−0·05	+0·26	−0·22	−0·02	7·61
	882	19 42	S	E	5 13 54·13	−0·05	+0·26	−0·34	−0·02	53·98
		Mean	...	...	5 8 54					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

JASK (E), *Lat.* 25° 38′, *Long.* 3h 51m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Transits Observed at BUSHIRE (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch = T_E
Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Correction for Rate of W Clock to T_E	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
S	W	3 34 42.35	+0.12	+0.28	−0.08	−0.02	−0.15	42.50	+ 1 2.43			
N	W	3 37 56.22	+0.13	+0.30	+0.06	−0.02	−0.15	56.54	1 2.32			
S	W	3 39 47.14	+0.12	+0.28	−0.09	−0.02	−0.15	47.28	1 2.49			
S	W	3 41 26.96	+0.12	+0.28	−0.10	−0.02	−0.15	27.09	1 2.43			
S	W	3 43 7.56	+0.12	+0.28	−0.10	−0.02	−0.15	7.69	1 2.49			
N	W	3 45 23.19	+0.13	+0.31	+0.11	−0.02	−0.15	23.57	1 2.61	+ 1 2.462		
N	E	3 47 44.41	−0.13	+0.22	+0.05	−0.02	−0.15	44.38	+ 1 2.40			
N	E	3 49 55.21	−0.13	+0.23	+0.13	−0.02	−0.15	55.27	1 2.51			
N	E	3 52 21.62	−0.13	+0.23	+0.14	−0.02	−0.14	21.70	1 2.53			
S	E	3 54 58.68	−0.11	+0.20	−0.20	−0.02	−0.14	58.41	1 2.67			
S	E	3 56 15.48	−0.11	+0.18	−0.34	−0.02	−0.15	15.04	1 2.73			
S	E	3 58 42.03	−0.12	+0.20	−0.14	−0.02	−0.15	41.80	1 2.59			
S	E	4 0 22.66	−0.12	+0.21	−0.03	−0.02	−0.15	22.55	1 2.62	+ 1 2.579	+ 1 2.521	3 46 19
N	E	4 45 49.34	−0.13	+0.22	+0.17	−0.02	−0.15	49.43	+ 1 3.28			
N	E	4 47 32.12	−0.15	+0.24	+0.36	−0.03	−0.15	32.39	1 3.38			
N	E	4 50 22.46	−0.13	+0.22	+0.09	−0.02	−0.15	22.47	1 3.17			
S	E	4 51 57.17	−0.12	+0.20	−0.08	−0.02	−0.15	57.00	1 3.51			
N	E	4 55 21.50	−0.14	+0.24	+0.28	−0.03	−0.15	21.70	1 3.48			
S	E	4 57 2.52	−0.12	+0.19	−0.14	−0.02	−0.14	2.29	1 3.46			
S	E	4 59 34.22	−0.11	+0.19	−0.17	−0.02	−0.14	33.97	1 3.60	+ 1 3.411		
S	W	5 3 54.57	+0.11	+0.27	−0.25	−0.02	−0.15	54.53	+ 1 3.62			
N	W	5 6 27.54	+0.14	+0.33	+0.21	−0.02	−0.15	28.05	1 3.75			
N	W	5 8 47.17	+0.13	+0.32	+0.08	−0.02	−0.15	47.53	1 3.77			
S	W	5 10 27.58	+0.11	+0.26	−0.31	−0.02	−0.15	27.47	1 3.86			
N	W	5 11 58.29	+0.14	+0.34	+0.25	−0.03	−0.14	58.85	1 3.84			
S	W	5 13 11.30	+0.12	+0.28	−0.13	−0.02	−0.15	11.40	1 3.79			
S	W	5 14 57.74	+0.11	+0.28	−0.17	−0.02	−0.15	57.79	1 3.81	+ 1 3.777	+ 1 3.594	5 0 11

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

JASK (E), *Lat.* 25° 38′, *Long.* 3h 51m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Astronomical Date	Star: Number in Gr. 80	Star: Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Seconds of Corrected Time
			Transits Observed at JASK (E) by BURRARD with Telescope No. 1.							
1894		° ′			h m s	s	s	s	s	s
Dec. 13	557	20 34	S	W	3 31 54·23	+0·07	+0·27	−0·29	−0·02	54·26
	562	24 59	S	W	3 33 29·57	+0·07	+0·28	−0·04	−0·02	29·86
	571	31 57	N	W	3 36 43·17	+0·07	+0·29	+0·40	−0·02	43·91
	579	24 2	S	W	3 38 34·32	+0·07	+0·28	−0·10	−0·02	34·55
	584	23 47	S	W	3 40 14·21	+0·07	+0·27	−0·11	−0·02	14·42
	590	23 44	S	W	3 41 54·78	+0·07	+0·27	−0·11	−0·02	54·99
	598	34 2	N	W	3 44 9·91	+0·07	+0·30	+0·54	−0·02	10·80
	603	31 34	N	W	3 46 31·04	+0·07	+0·29	+0·38	−0·02	31·76
	608	34 46	N	W	3 48 41·56	+0·08	+0·30	+0·60	−0·02	42·52
	613	35 29	N	W	3 51 8·04	+0·08	+0·30	+0·65	−0·02	9·05
		Mean	...	...	3 41 20					
	618	17 54	S	E	3 53 45·76	−0·07	+0·25	−0·44	−0·02	45·48
	624	9 42	S	E	3 55 2·89	−0·06	+0·24	−0·87	−0·02	2·18
	630	21 48	S	E	3 57 29·00	−0·07	+0·26	−0·22	−0·02	28·95
	637	27 19	N	E	3 59 9·39	−0·07	+0·27	+0·10	−0·02	9·67
	647	33 19	N	E	4 3 13·60	−0·07	+0·29	+0·50	−0·02	14·30
	654	17 0	S	E	4 5 29·96	−0·06	+0·25	−0·49	−0·02	29·64
	660	40 13	N	E	4 6 42·97	−0·08	+0·31	+1·03	−0·03	44·20
	667	41 53	N	E	4 9 50·31	−0·08	+0·31	+1·17	−0·03	51·68
	675	41 33	N	E	4 11 57·54	−0·08	+0·31	+1·14	−0·03	58·88
		Mean	...	...	4 2 31					
Dec. 14	557	20 34	S	E	3 31 44·06	−0·07	+0·30	−0·31	−0·02	43·96
	562	24 59	S	E	3 33 19·36	−0·07	+0·31	−0·04	−0·02	19·54
	571	31 57	N	E	3 36 33·04	−0·07	+0·33	+0·43	−0·02	33·71
	579	24 2	S	E	3 38 24·11	−0·07	+0·31	−0·10	−0·02	24·23
	584	23 47	S	E	3 40 3·93	−0·07	+0·31	−0·12	−0·02	4·03
	590	23 44	S	E	3 41 44·56	−0·07	+0·31	−0·12	−0·02	44·66
	598	34 2	N	E	3 43 59·65	−0·07	+0·34	+0·59	−0·02	60·49
	603	31 34	N	E	3 46 20·78	−0·07	+0·33	+0·41	−0·02	21·43
	608	34 46	N	E	3 48 31·30	−0·08	+0·34	+0·65	−0·02	32·19
	613	35 29	N	E	3 50 57·71	−0·08	+0·34	+0·70	−0·02	58·65
		Mean	...	...	3 41 10					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

JASK (E), *Lat.* 25° 38′, *Long.* 3h 51m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Transits Observed at BUSHIRE (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch $= T_E$
Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Correction for Rate of W Clock to T_E	Seconds of Corrected Time	By each Star $= W - E$	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	h m s	h m s	h m s
S	E	3 33 14·74	−0·07	+0·03	−0·16	−0·02	−0·15	14·37	+ 1 20·11			
S	E	3 34 50·28	−0·07	+0·03	−0·08	−0·02	−0·14	50·00	1 20·14			
N	E	3 38 4·21	−0·08	+0·04	+0·06	−0·02	−0·14	4·07	1 20·16			
S	E	3 39 55·02	−0·07	+0·03	−0·09	−0·02	−0·14	54·73	1 20·18			
S	E	3 41 34·87	−0·07	+0·03	−0·10	−0·02	−0·14	34·57	1 20·15			
S	E	3 43 15·47	−0·07	+0·03	−0·10	−0·02	−0·14	15·17	1 20·18			
N	E	3 45 31·22	−0·08	+0·04	+0·11	−0·02	−0·14	31·13	1 20·33			
N	E	3 47 52·11	−0·08	+0·04	+0·06	−0·02	−0·14	51·97	1 20·21			
N	E	3 50 2·97	−0·08	+0·04	+0·13	−0·02	−0·14	2·90	1 20·38			
N	E	3 52 29·42	−0·08	+0·04	+0·14	−0·02	−0·14	29·36	1 20·31	+ 1 20·215		
S	W	3 55 6·20	+0·07	+0·08	−0·21	−0·02	−0·15	5·97	+ 1 20·49			
S	W	3 56 22·97	+0·07	+0·08	−0·34	−0·02	−0·14	22·62	1 20·44			
S	W	3 58 49·59	+0·07	+0·09	−0·14	−0·02	−0·14	49·45	1 20·50			
S	W	4 0 30·15	+0·07	+0·09	−0·03	−0·02	−0·14	30·12	1 20·45			
N	W	4 4 34·84	+0·08	+0·10	+0·09	−0·02	−0·14	34·95	1 20·65			
S	W	4 6 50·48	+0·07	+0·08	−0·22	−0·02	−0·14	50·25	1 20·61			
N	W	4 8 4·67	+0·09	+0·10	+0·26	−0·03	−0·14	4·95	1 20·75			
N	W	4 11 12·16	+0·09	+0·11	+0·31	−0·03	−0·14	12·50	1 20·82			
N	W	4 13 19·39	+0·09	+0·11	+0·30	−0·03	−0·14	19·72	1 20·84	+ 1 20·617	+ 1 20·416	3 51 56
S	E	3 33 21·72	−0·06	−0·09	+0·07	−0·02	−0·13	21·49	+ 1 37·53			
S	E	3 34 57·37	−0·06	−0·09	+0·04	−0·02	−0·13	57·11	1 37·57			
N	E	3 38 11·48	−0·06	−0·10	−0·03	−0·02	−0·13	11·14	1 37·43			
S	E	3 40 2·07	−0·06	−0·09	+0·04	−0·02	−0·13	1·81	1 37·58			
S	E	3 41 41·94	−0·06	−0·09	+0·05	−0·02	−0·13	41·69	1 37·66			
S	E	3 43 22·47	−0·06	−0·09	+0·05	−0·02	−0·13	22·22	1 37·56			
N	E	3 45 38·53	−0·07	−0·10	−0·05	−0·02	−0·13	38·16	1 37·67			
N	E	3 47 59·38	−0·06	−0·10	−0·03	−0·02	−0·14	59·03	1 37·60			
N	E	3 50 10·29	−0·07	−0·10	−0·06	−0·02	−0·14	9·90	1 37·71			
N	E	3 52 36·74	−0·07	−0·10	−0·07	−0·02	−0·14	36·34	1 37·69	+ 1 37·600		

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

JASK (E), *Lat.* 25° 38′, *Long.* 8^h 51^m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 8^h 23^m.

Astronomical Date	Star: Number in Gr. 80	Star: Declination	Transits Observed at JASK (E) by BURRARD with Telescope No. 1.: Star's Aspect	Instrumental Position	Observed Time	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Seconds of Corrected Time
1894		° ′			h m s	s	s	s	s	s
Dec. 14	618	17 54	S	W	3 53 35·45	+0·07	+0·31	−0·48	−0·02	35·33
	624	9 42	S	W	3 54 52·53	+0·06	+0·29	−0·94	−0·02	51·92
	630	21 48	S	W	3 57 18·64	+0·07	+0·32	−0·24	−0·02	18·77
	637	27 19	N	W	3 58 59·05	+0·07	+0·33	+0·11	−0·02	59·54
	647	33 19	N	W	4 3 3·33	+0·07	+0·35	+0·54	−0·02	4·27
	654	17 0	S	W	4 5 19·64	+0·06	+0·30	−0·53	−0·02	19·45
	660	40 13	N	W	4 6 32·64	+0·08	+0·37	+1·11	−0·03	34·17
	667	41 53	N	W	4 9 40·00	+0·08	+0·38	+1·27	−0·03	41·70
	675	41 33	N	W	4 11 47·19	+0·08	+0·38	+1·23	−0·03	48·85
		Mean	...	...	4 2 21					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

JASK (E), *Lat.* 25° 38′, *Long.* 3h 51m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Transits Observed at BUSHIRE (W) by LENOX CONYNGHAM with Telescope No. 2.										Difference of Corrected Times by E and W Clocks			Mean Epoch = T_E
Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Level	Deviation	Diurnal Aberration	Rate of W Clock to T_E	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
S	W	3 55 13·07	+0·06	−0·07	+0·10	−0·02	−0·13	13·01	+ 1 37·68			
S	W	3 56 29·68	+0·05	−0·07	+0·16	−0·02	−0·13	29·67	1 37·75			
S	W	3 58 56·52	+0·06	−0·07	+0·06	−0·02	−0·13	56·42	1 37·65			
S	W	4 0 37·30	+0·06	−0·08	+0·01	−0·02	−0·13	37·14	1 37·60			
N	W	4 4 42·16	+0·06	−0·08	−0·04	−0·02	−0·13	41·95	1 37·68			
S	W	4 6 57·38	+0·06	−0·07	+0·10	−0·02	−0·13	57·32	1 37·87			
N	W	4 8 12·21	+0·07	−0·09	−0·12	−0·03	−0·14	11·90	1 37·73			
N	W	4 11 19·73	+0·07	−0·09	−0·14	−0·03	−0·14	19·40	1 37·70			
N	W	4 13 26·98	+0·07	−0·09	−0·14	−0·03	−0·14	26·65	1 37·80	+ 1 37·718	+ 1 37·659	3 51 46

EXPLANATION OF *TABLE VI.*

Deduction of Clock Rate Correction.

From the results contained in Tables III, IV and V, the clock rate correction can now be deduced.

Column 1 contains the name of the arc.

" 2 contains the approximate difference of longitude in minutes and decimals of a minute.

" 3 contains the date.

" 4 contains the observed clock correction as deduced from observations of clock stars in Table IV.

" 5 contains the epoch to which the foregoing correction corresponds, also from Table IV.

" 6 contains the hourly clock rate as deduced from observation of clock stars. To obtain this the rate from day to day is computed by dividing the difference between two consecutive clock corrections, in column 4, by the number of hours between the epochs, as given in column 5. Then the mean of two consecutive rates is taken as belonging to the date which lies between them.

" 7 contains the hourly clock rate as deduced from observations of longitude stars. The rate from night to night is obtained from the observed times of transit of the same star on two consecutive nights, the difference between the two being divided by 24 hours. The mean of the results obtained from individual stars is taken as the rate during the 24 hours between the two nights, and the mean of the rates during two consecutive periods of 24 hours is taken as the rate on the night between them.

" 8 contains the mean of columns 6 and 7.

" 9, 10, 11, 12 and 13 contain similar quantities to those in columns 4, 5, 6, 7 and 8 but for the other station.

" 14 contains the relative hourly clock rate during each night deduced from the clock comparisons, the value entered is the mean of all the values appertaining to the night, contained in the last column of Table III.

We have now the hourly rate of each clock derived from star observations, and also the relative hourly rate of the clocks derived from the clock comparisons. It is clear that the last should be equal to the algebraic difference of the first two, *i.e.*, using the notation given on the Table, we should have

$$h_w - h_e = R, \text{ or } h_e = h_w - R.$$

Hence in forming the final value of the hourly clock rate we take $H_e = \frac{1}{2}(h_e + h_w - R)$, and the resulting value is entered in column 15.

Similarly $H_w = \frac{1}{2}(h_w + h_e + R)$, which is given in column 16.

In column 17 is given the change in the error of the Western clock during a period equal to the difference of longitude. The use of this quantity has already been explained in connection with Table V.

TABLE VI. DEDUCTION OF CLOCK RATE CORRECTION.

Arc	Approximate Difference of Longitude = ΔL	Astronomical Date	JASK or E Clock					BUSHIRE or W Clock					Relative Hourly Clock Rate deduced from Clock Comparisons = R	Adopted Hourly Clock Rate		Correction to Observed Time of Transit at W Station for Rate of W Clock = $H_w \times \Delta L$
			Observed Clock Correction	Time	Hourly Clock Rate for Nights of Observation deduced from Star Transits			Observed Clock Correction	Time	Hourly Clock Rate for Nights of Observation deduced from Star Transits				For E Clock = $\frac{1}{2}(h_e + h_w - R)$ = H_e	For W Clock = $\frac{1}{2}(h_e + h_w + R)$ = H_w	
					By Clock Stars	By Longitude Stars	Mean = h_e			By Clock Stars	By Longitude Stars	Mean = h_w				
		1894	m s	h m s	s	s	s	m s	h m s	s	s	s	s	s	s	s
JASK-BUSHIRE	m 27·75	Dec. 9	+0 17·168	0 27 57	+0·431	+0·440	+0·436	+0 12·537	0 30 36	−0·315	−0·316	−0·316	−0·699	+0·410	−0·290	−0·134
		„ 10	+0 27·504	0 27 5	+0·444	+0·453	+0·449	+0 5·130	0 0 55	−0·318	−0·320	−0·319	−0·754	+0·442	−0·312	−0·144
		„ 11	+0 38·581	0 41 48	+0·459	+0·457	+0·458	−0 2·593	0 2 38	−0·329	−0·328	−0·329	−0·806	+0·468	−0·338	−0·156
		„ 12	+0 49·562	0 33 12	+0·442	+0·438	+0·440	−0 10·515	0 5 42	−0·323	−0·324	−0·324	−0·756	+0·436	−0·320	−0·148
		„ 13	+0 59·730	0 30 10	+0·426	+0·426	+0·426	−0 18·102	0 5 50	−0·306	−0·303	−0·305	−0·729	+0·426	−0·304	−0·141
		„ 14	+1 10·026	0 33 22	+0·428	+0·426	+0·427	−0 25·242	0 5 57	−0·296	−0·292	−0·294	−0·710	+0·422	−0·288	−0·133

EXPLANATION OF *TABLE VII.*

Retardation of the Electric Current.

The retardation of the electric current computed in this Table does not enter into the difference of longitude, but much interest attaches to its value, and clearly any abnormal result would throw doubt upon the accuracy of the clock comparison whence it was deduced.

Column 1 contains the name of the arc.

" 2 contains the date.

" 3 contains the time by the East or Jask clock corresponding to the middle of the period during which a comparison was being made at Jask, that is, during which Bushire was transmitting signals to Jask.

" 4 contains the time, still by E clock, corresponding to the middle of the period during which Jask was transmitting signals to Bushire.

" 5 contains the interval between the times given in columns 3 and 4.

" 6 and 9 contain the differences between the clocks as observed at Bushire and Jask respectively.

The differences given in columns 6 and 9 have to be reduced to the same epoch and to do this the difference observed at Bushire receives a correction equal to the relative hourly clock rate, taken from the last column of Table III, multiplied by the interval given in column 5 reduced to the decimal of an hour. This correction and the corrected difference between the clocks as observed at Bushire are given in columns 7 and 8.

" 10 contains half the difference between columns 8 and 9.

TABLE VII. RETARDATION OF THE ELECTRIC CURRENT.

Arc	Astronomical Date	Time of Comparison by E Clock at Jask	Time of Comparison by E Clock at Bushire	Interval of Time between the Comparison at Jask and Bushire = I	Difference between the Clocks as Observed at Bushire	Correction for Relative Clock Rate during the Interval I	Difference between the Clocks as Observed at Bushire corrected for Clock Rate	Difference between the Clocks as Observed at Jask	Retardation of the Current
	1894	h m s	h m s	m s	h m s	s	h m s	h m s	s
JASK-BUSHIRE	Dec. 9	23 50 1	23 57 0	− 6 59	0 27 41·000	+ 0·077	0 27 41·077	0 27 41·347	0·135
		1 52 0	1 47 1	+ 4 59	39·800	− ·055	39·745	40·000	·128
		3 33 39	3 30 40	+ 2 59	38·595	·034	38·561	38·845	·142
		4 39 0	4 32 39	+ 6 21	37·812	·076	37·736	38·100	·182
		5 55 0	5 51 37	+ 3 23	36·904	·040	36·864	37·160	·148
	„ 10	23 43 2	23 39 24	+ 3 38	0 27 23·420	− ·046	0 27 23·374	0 27 23·692	0·159
		1 43 24	1 37 22	+ 6 2	21·900	·078	21·822	22·116	·147
		3 24 21	3 19 22	+ 4 59	20·640	·062	20·578	20·849	·136
		4 39 20	4 34 2	+ 5 18	19·695	·065	19·630	19·950	·160
		5 56 0	5 49 20	+ 6 40	18·803	·081	18·722	18·984	·131
	„ 11	23 43 5	23 38 6	+ 4 59	0 27 4·790	− ·065	0 27 4·725	0 27 4·995	0·135
		1 48 5	1 42 0	+ 6 5	3·102	·083	3·019	3·300	·141
		3 28 2	3 24 4	+ 3 58	1·710	·054	1·656	1·951	·148
		4 40 1	4 35 3	+ 4 58	0·784	·066	0·718	0·975	·129
		5 59 0	5 56 2	+ 2 58	0 26 59·680	·040	0 26 59·640	0 26 59·909	·135
	„ 12	23 39 0	23 35 1	+ 3 59	0 26 45·705	− ·053	0 26 45·652	0 26 46·021	0·185
		1 35 1	1 29 2	+ 5 59	44·288	·077	44·211	44·490	·140
		3 29 0	3 23 0	+ 6 0	42·861	·074	42·787	43·101	·157
		4 39 0	4 34 42	+ 4 18	42·000	·053	41·947	42·199	·126
		5 53 42	5 49 0	+ 4 42	41·035	·059	40·976	41·280	·152
	„ 13	23 37 30	23 31 28	+ 6 2	0 26 27·890	− ·075	0 26 27·815	0 26 28·138	0·162
		1 39 28	1 35 1	+ 4 27	26·410	·053	26·357	26·690	·167
		3 26 27	3 20 0	+ 6 27	25·114	·081	25·033	25·340	·154
		4 58 26	4 51 0	+ 7 26	24·020	·088	23·932	24·250	·159
	„ 14	23 38 11	23 32 12	+ 5 59	0 26 10·502	− ·072	0 26 10·430	0 26 10·737	0·154
		1 38 11	1 32 0	+ 6 11	9·090	·074	9·016	9·301	·143
		3 24 0	3 18 9	+ 5 51	7·800	·069	7·731	8·092	·181
		4 51 0	4 47 8	+ 3 52	6·790	·046	6·744	7·030	·143

EXPLANATION OF *TABLE VIII.*

Reduction of Clock Corrections and Clock Comparisons to the same Epochs.

Having now obtained the clock corrections at different epochs on each night, and also the differences between the clocks at other epochs, it remains to reduce them both to the same epochs.

This table deals only with observations of clock stars and the attendant comparisons.

Column 1 contains the date.

„ 2 and 3 contain the times in terms of the Jask clock at which the clock comparisons were made (taken from Table III) and their mean.

„ 4 and 5 contain the times in terms of the Bushire clock at which the clock comparisons were made (from Table III) and their mean.

„ 6 and 7 contain the observed differences between the clocks (from Table III) and their mean.

„ 8 and 9 contain the mean epochs of the clock corrections at the two stations (from Table IV).

„ 10 contains the difference between columns 3 and 8.

„ 11 contains the difference between columns 5 and 9.

„ 12 and 13 contain the clock corrections at the epochs given in columns 8 and 9 (from Table IV).

„ 14 and 15 contain the hourly clock rates (from Table VI).

„ 16 and 17 contain the corrections for rate for the periods entered in columns 10 and 11 respectively, that is, the product of columns 10 and 14, and of columns 11 and 15.

„ 18 and 19 contain the sums of columns 12 and 16 and of columns 13 and 17. The quantities obtained being the clock corrections at the epochs of the comparisons, that is, at the epochs contained in columns 3 and 5.

TABLE VIII. REDUCTION OF CLOCK CORRECTIONS AND CLOCK COMPARISONS TO THE SAME EPOCHS.

1	2	3	4	5	6	7	8	9
Date	Time of Clock Comparison from Table III				Difference between the Clocks at the Epoch of Clock Comparison from Table III		Mean Epoch of Clock Correction from Table IV	
	by Jask Clock		by Bushire Clock					
	T_E	Mean	T_W	Mean	D	Mean	Jask	Bushire
1894	h m s	h m s	h m s	h m s	h m s	h m s	h m s	h m s
December 9	23 53 31		23 25 49		0 27 41·174			
	1 49 31	0 51 31	1 21 51	0 23 50	39·900	0 27 40·537	0 27 57	0 30 36
„ 10	23 41 13		23 13 50		0 27 23·556			
	1 40 23	0 40 48	1 13 1	0 13 26	22·008	0 27 22·782	0 27 5	0 0 55
„ 11	23 40 35		23 13 31		0 27 4·893			
	1 45 3	0 42 49	1 17 59	0 15 45	3·201	0 27 4·047	0 41 48	0 2 38
„ 12	23 37 1		23 10 15		0 26 45·863			
	1 32 2	0 34 32	1 5 17	0 7 46	44·389	0 26 45·126	0 33 12	0 5 42
„ 13	23 34 29		23 8 1		0 26 28·014			
	1 37 15	0 35 52	1 10 48	0 9 25	26·550	0 26 27·282	0 30 10	0 5 50
„ 14	23 35 11		23 9 1		0 26 10·620			
	1 35 6	0 35 9	1 8 56	0 8 59	9·196	0 26 9·908	0 33 22	0 5 57

10	11	12	13	14	15	16	17	18	19
Difference of Times between Epochs of Clock Correction and Comparison = P		Clock Correction from Table IV		Hourly Clock Rate from Table VI		Correction for Difference of Time P		Clock Correction at Mean Epoch of Clock Comparison	
Jask	Bushire	Jask	Bushire	Jask	Bushire	Jask	Bushire	Jask	Bushire
m s	m s	m s	m s	s	s	s	s	s	s
+ 23 34	− 6 46	+ 0 17·168	+ 0 12·537	+0·410	−0·290	+ 0·161	+ 0·033	+ 17·329	+ 12·570
+ 13 43	+ 12 31	+ 0 27·504	+ 0 5·130	+0·442	−0·312	+ 0·101	− 0·065	+ 27·605	+ 5·065
+ 1 1	+ 13 7	+ 0 38·581	− 0 2·593	+0·468	−0·338	+ 0·008	− 0·074	+ 38·589	− 2·667
+ 1 20	+ 2 4	+ 0 49·562	− 0 10·515	+0·436	−0·320	+ 0·010	− 0·011	+ 49·572	− 10·526
+ 5 42	+ 3 35	+ 0 59·730	− 0 18·102	+0·426	−0·304	+ 0·040	− 0·018	+ 59·770	− 18·120
+ 1 47	+ 3 2	+ 1 10·026	− 0 25·242	+0·422	−0·288	+ 0·013	− 0·015	+ 70·039	− 25·257

EXPLANATION OF *TABLE IX*.

Reduction of Clock Comparisons and the Differences between the Clock Corrections to the same Epochs by Interpolation.

This table has the same object as the last but deals with the observations of longitude stars and the comparisons which are connected therewith.

Column 1 contains the date.

,, 2 contains the epochs whether of clock comparisons, from Table III, or of the differences of corrected times, from Table V, arranged in order of sequence, and all in terms of the East clock.

,, 3 contains the difference of the corrected times, from Table V, entered in line with its epoch.

,, 4 contains the difference between the two clocks by direct comparison, from Table III, entered in line with its epoch.

,, 5 is obtained by interpolation from column 3 and is the corrected difference between the observed times at the epoch of the middle comparison, in line with which it is entered.

,, 6 contains the difference between the clocks brought up by interpolation from column 4, to the epochs of the quantities in column 3.

If, as on the 13th and 14th December, only one value of the difference between the corrected times be available, column 5 must be left blank.

TABLE IX. REDUCTION OF CLOCK COMPARISONS AND THE DIFFERENCES BETWEEN THE CLOCK CORRECTIONS TO THE SAME EPOCHS BY INTERPOLATION.

Date	T_E Epochs	Difference between the Clock Corrections = Difference of Corrected Times of Table V	Difference between the Times of the two Clocks obtained by Direct Comparison from Table III	Difference between the Clock Corrections Interpolated to Epoch of Clock Comparison	Difference between the Clocks by Comparison Interpolated to Epoch of Clock Correction
1894	h m s	m s	m s	m s	m s
December 9	3 32 9	...	27 38·720	...	...
	3 49 29	+ 0 6·833	...	...	27 38·512
	4 35 49	...	27 37·956	+ 0 7·374	...
	5 0 32	+ 0 7·663	...	...	27 37·661
	5 53 19	...	27 37·032	...	...
" 10	3 21 51	...	27 20·745	...	...
	3 46 11	+ 0 24·911	...	...	27 20·445
	4 36 41	...	27 19·823	+ 0 25·509	...
	5 0 33	+ 0 25·792	...	...	27 19·531
	5 52 40	...	27 18·894	...	...
" 11	3 26 3	...	27 1·831	...	...
	3 46 30	+ 0 43·718	...	...	27 1·559
	4 37 32	...	27 0·880	+ 0 44·456	...
	4 59 50	+ 0 44·779	...	...	27 0·577
	5 57 31	...	26 59·795	...	...
" 12	3 26 0	...	26 42·981	...	...
	3 46 19	+ 1 2·521	...	...	26 42·728
	4 36 51	...	26 42·100	+ 1 3·255	...
	5 0 11	+ 1 3·594	...	...	26 41·805
	5 51 21	...	26 41·158	...	...
" 13	3 23 14	...	26 25·227	...	...
	3 51 56	+ 1 20·416	...	...	26 24·884
	4 54 43	...	26 24·135	...	...
" 14	3 21 4	...	26 7·946	...	...
	3 51 46	+ 1 37·659	...	...	26 7·585
	4 49 4	...	26 6·910	...	...

EXPLANATION OF *TABLE X.*

Deduction of the Difference of Longitude.

Tables VIII and IX contain all the data for computing the difference of longitude.

Column 1 contains the name of the arc.

„ 2 contains the date.

„ 3 and 4 contain the epochs for which data are available. The first on each night appertains to the clock star observations, and is taken from columns 3 and 5 of Table VIII. The others belong to the longitude stars, and are taken from column 2 Table IX.

„ 5 and 7 refer only to clock star observations, and contain the deduced clock corrections corresponding to the epochs in columns 3 and 4. The entries are taken from columns 18 and 19 of Table VIII.

„ 6 and 8 contain the numbers of clock or longitude stars observed at each station on each night.

„ 9 contains the difference between the corrections of the clocks. In the case of clock stars this is equal to the difference between columns 5 and 7, and in the case of longitude stars it is taken direct from column 3 or 5 of Table IX.

„ 10 contains the difference between the clocks by direct comparison at the epoch given in column 3; this quantity is to be found either in column 7 of Table VIII or in column 4 or 6 of Table IX.

„ 11 contains the observed difference of longitude, which is equal to the sum of the quantities in the two preceding columns. The mean and its probable error are entered at the bottom of the column.

„ 12 contains the value of the personal equation, and its probable error.

„ 13 contains the Final Difference of Longitude and its probable error.

TABLE X. DEDUCTION OF THE DIFFERENCE OF LONGITUDE.

Arc	Astronomical Date	Epoch		Jask E		Bushire W		Difference between the Corrections of the E and W Clocks = S	Difference between the Clocks by Direct Comparison, at the Epoch of S	Observed Difference of Longitude	Personal Equation	Final Difference of Longitude
		By E Clock = T_E	By W Clock = T_W	Deduced Clock Correction from Table VIII	No. of Stars	Deduced Clock Correction from Table VIII	No. of Stars					
JASK-BUSHIRE	1894	h m s	h m s	m s		s		m s	h m s	h m s	s	h m s 0 27 45·057 ± 0·0095
	Dec. 9	0 51 31	0 23 50	+0 17·329	13	+ 12·570	14	+0 4·759	0 27 40·537	0 27 45·296		
		3 49 29			22		22	0 6·833	38·512	45·345		
		4 35 49						0 7·374	37·956	45·330		
		5 0 32						0 7·663	37·661	45·324		
	" 10	0 40 48	0 13 26	+0 27·605	16	+ 5·065	26	+0 22·540	0 27 22·782	0 27 45·322		
		3 46 11			28		28	0 24·911	20·445	45·356		
		4 36 41						0 25·509	19·823	45·332		
		5 0 33						0 25·792	19·531	45·323		
	" 11	0 42 49	0 15 45	+0 38·589	18	− 2·667	24	+0 41·256	0 27 4·047	0 27 45·303		
		3 46 30			25		25	0 43·718	1·559	45·277		
		4 37 32						0 44·456	0·880	45·336		
		4 59 50						0 44·779	0·577	45·356		
	" 12	0 34 32	0 7 46	+0 49·572	23	− 10·526	24	+1 0·098	0 26 45·126	0 27 45·224		
		3 46 19			27		27	1 2·521	42·728	45·249		
		4 36 51						1 3·255	42·100	45·355		
		5 0 11						1 3·594	41·805	45·399		
	" 13	0 35 52	0 9 25	+0 59·770	24	− 18·120	24	+1 17·890	0 26 27·282	0 27 45·172		
		3 51 56			19		19	1 20·416	24·884	45·300		
	" 14	0 35 9	0 8 59	+1 10·039	24	− 25·257	24	+1 35·296	0 26 9·908	0 27 45·204		
		3 51 46			19		19	1 37·659	7·585	45·244		
									Mean ...	0 27 45·302	− 0·245	
									p.e.	± 0·0087	± 0·0039	

ARC KARACHI-BUSHIRE.

1894-95.

The programme.

The difference of longitude between these places is over an hour so that careful arrangement was necessary to avoid tedious delay to either observer. The following was the general scheme of the programme:—

Karachi		*Bushire*
Clock stars	... ...	Clock stars
	Clock Comparison.	
	(Interval)	
1st group of Longitude stars	... ...	Clock stars
	Clock Comparison.	
2nd group of Longitude stars	... ...	1st group of Longitude stars.
	Clock Comparison.	
Clock stars	... ...	2nd group of Longitude stars.
	Clock Comparison.	

Determinations of collimation and level were made five or six times during a night's work. The groups of stars were divided into equal numbers of north and south aspect, and the instruments were reversed systematically at least once during the observation of each group.

EXPLANATION OF *TABLE I.*

Abstract of Determinations of Collimation and Level Correction-Constants.

The first three columns call for no remark.

Column 4 contains the mean sidereal hour at which the several determinations were made.

Collimation.

Column 5, headed C_e, gives the reading of the micrometer when the collimator cross is intersected by the central transit wire, the telescope being in the position *I.P.E.* (*i.e.* Illuminated Pivot East).

" 6, headed C_w, gives the corresponding reading, the telescope being *I.P.W.*

" 7, headed C_0, gives the mean of the two preceding readings, *i.e.* $\frac{1}{2}(C_e + C_w)$. C_0 is therefore the reading of the micrometer when so set that the centre wire is truly collimated.

" 8, headed C_s, gives the reading of the micrometer as set during the observation of star transits. This setting was arbitrary and was not changed in either instrument throughout the arc.

" 9, headed c_e, gives the collimation correction-constant for the position *I.P.E.* c_e is equal to $C_0 - C_s$.

" 10, headed c_w, gives the corresponding correction-constant for the position *I.P.W.* c_w is equal to $C_s - C_0$.

Level.

Column 11, headed M_e, gives the reading of the micrometer when the centre wire and its reflection from the mercury trough coincide, the telescope being in the position *I.P.E.*

" 12, headed M_w, gives the corresponding reading when the telescope is in the position *I.P.W.*

" 13, headed M_0, gives the mean of the two preceding readings, *i.e.* $\frac{1}{2}(M_e + M_w)$.

This quantity is not used in the computations but it should remain constant and therefore affords a valuable safe-guard against blunders in reading M_e and M_w. The nature of the quantity is discussed in Chapter IV.

Column 14, headed b_e, gives the level correction-constant for the position *I.P.E.* b_e is equal to $C_0 - M_e$.

" 15, headed b_w, gives the corresponding correction-constant for the position *I.P.W.* b_w is equal to $M_w - C_0$.

As the collimation is not liable to vary, a mean of all the values of C_0 on any night is taken, and c_e and c_w are found by taking the difference between this mean and C_s; but the level is not so stable and therefore the same values of b_e and b_w are not retained for the whole of a night's observations. Three values per night are made use of, the first is the mean of the first two determinations, the second is the mean of the third and fourth, and the third the mean of the fourth and fifth, or the mean of the fourth, fifth and sixth.

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation						Level				
				C_e	C_w	C_o	C_s	$c_e = C_o - C_s$	$c_w = C_s - C_o$	M_e	M_w	M_o	$b_e = C_o - M_e$	$b_w = M_w - C_o$
			h *m*	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*
1894 Dec. 28	KARACHI	CAPTAIN BURRARD (Telescope No. 1)	0 19	1345·6	1614·8	1480·2				1492·3	1464·5	1478·4	− 12·6	− 15·1
			1 52	1343·4	1617·5	1480·5				1492·6	1465·0	1478·8		
			3 45	1340·1	1618·8	1479·5	1480·0			1490·2	1467·8	1479·0	− 10·7	− 12·9
			5 7	1337·7	1621·2	1479·5				1490·9	1466·1	1478·5	− 12·6	− 13·9
			7 12	1337·1	1622·3	1479·7				1494·0	1465·8	1479·9		
					Mean	1479·9		− 0·1	+ 0·1		Mean	1478·9		
" 29			0 11	1338·9	1620·1	1479·5				1495·0	1464·9	1480·0	− 14·2	− 14·0
			1 33	1338·1	1620·2	1479·2				1492·0	1465·6	1478·8		
			3 58	1331·5	1628·1	1479·8				1490·4	1468·0	1479·2	− 12·1	− 10·7
			5 9	...	...	...	1480·0			1492·3	1469·2	1480·8		
			6 10	1331·7	1625·9	1478·8				...	...	...	− 11·7	− 10·9
			7 9	1329·8	1628·8	1479·3				1489·7	1467·6	1478·7		
					Mean	1479·3		− 0·7	+ 0·7		Mean	1479·5		
" 30			0 19	1337·1	1622·2	1479·7				1490·8	1466·6	1478·7	− 10·5	− 12·3
			1 34	1335·1	1623·1	1479·1				1489·7	1468·4	1479·1		
			3 52	1330·9	1629·2	1480·1	1480·0			1489·2	1468·7	1479·0	− 10·0	− 11·1
			5 14	...	...	...				1490·4	1468·6	1479·5		
			6 10	1330·6	1629·0	1479·8				...	...	...	− 11·5	− 11·5
			7 0	1330·7	1630·3	1480·5				1492·2	1467·9	1480·1		
					Mean	1479·8		− 0·2	+ 0·2		Mean	1479·3		
" 31			0 18	1328·7	1629·5	1479·1				1490·9	1464·5	1477·7		
			1 42	1327·3	1631·6	1479·5	1480·0			1491·1	1467·8	1479·5	− 11·4	− 12·5
			4 5	1326·9	1631·5	1479·2				1490·2	1468·2	1479·2		
					Mean	1479·3		− 0·7	+ 0·7		Mean	1478·8		
1895 Jan. 1			0 37	1326·5	1634·5	1480·5				1492·8	1467·0	1479·9	− 12·1	− 12·6
			2 0	1324·9	1634·2	1479·6				1491·2	1467·5	1479·4		
			4 10	1320·9	1637·9	1479·4	1480·0			1492·2	1466·6	1479·4	− 12·3	− 12·5
			6 11	...	...	...				1492·2	1468·1	1480·2	− 11·8	− 12·2
			7 11	...	...	...				1491·2	1467·3	1479·3		
			7 20	1320·7	1639·3	1480·0				...	...	...		
					Mean	1479·9		− 0·1	+ 0·1		Mean	1479·7		

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation C_e	C_w	C_o	C_s	$c_e = C_o - C_s$	$c_w = C_s - C_o$	Level M_e	M_w	M_o	$b_e = C_o - M_e$	$b_w = M_w - C_o$
1894			h m	d	d	d	d	d	d	d	d	d	d	d
Dec. 28	BUSHIRE	CAPTAIN LENOX CONYNGHAM (Telescope No. 2)	0 32	1452·1	1544·9	1498·5				1497·2	1501·1	1499·2	+ 1·6	+ 2·1
			1 45	1449·9	1546·1	1498·0				1497·5	1501·0	1499·3		
			3 30	1452·2	1546·9	1499·6	1500·0			1498·7	1502·3	1500·5	+ 0·7	+ 2·1
			4 5	1450·6	1549·1	1499·9				1497·9	1499·9	1498·9		
			5 10	1450·6	1548·6	1499·6				1497·2	1501·3	1499·3	+ 1·4	+ 2·1
			6 20	1447·7	1549·3	1498·5				1497·8	1502·0	1499·9		
					Mean	1499·0		− 1·0	+ 1·0		Mean	1499·5		
„ 29			0 30	1446·0	1553·4	1499·7				1497·1	1501·8	1499·5	+ 1·4	+ 3·3
			1 40	1443·6	1555·1	1499·4				1498·3	1502·9	1500·6		
			3 35	1444·9	1553·6	1499·3	1500·0			1495·9	1502·3	1499·1	+ 2·2	+ 2·6
			4 5	1443·0	1553·8	1498·4				1497·8	1501·0	1499·4		
			5 10	1443·1	1555·1	1499·1				1497·6	1502·0	1499·8	+ 1·2	+ 2·2
			6 20	1441·6	1555·7	1498·7				1498·4	1500·9	1499·7		
					Mean	1499·1		− 0·9	+ 0·9		Mean	1499·7		
„ 30			0 20	1454·0	1544·3	1499·2				1498·3	1500·4	1499·4	+ 1·2	+ 1·6
			1 30	1454·4	1544·0	1499·2				1497·7	1501·1	1499·4		
			3 25	1450·4	1547·0	1498·7	1500·0			1498·2	1499·6	1498·9	+ 0·1	+ 0·7
			4 10	1450·5	1548·1	1499·3				1500·0	1500·1	1500·1		
			5 10	1449·4	1549·3	1499·4				1498·9	1500·2	1499·6	+ 0·1	+ 1·1
			6 20	1451·3	1547·4	1499·4				1498·5	1500·5	1499·5		
					Mean	1499·2		− 0·8	+ 0·8		Mean	1499·5		
„ 31			0 15	1458·0	1540·5	1499·3	1500·0			1499·9	1499·6	1499·8	+ 0·0	+ 0·8
			1 30	1457·0	1540·5	1498·8				1498·2	1500·2	1499·2		
					Mean	1499·1		− 0·9	+ 0·9		Mean	1499·5		
1895														
Jan. 1			0 20	1458·3	1540·7	1499·5				1499·1	1498·9	1499·0	− 0·1	− 0·4
			1 40	...	...	...				1499·3	1498·4	1498·9		
			3 30	1459·2	1538·9	1499·1				1499·3	1499·6	1499·5	− 0·1	+ 0·6
			4 5	1458·8	1539·4	1499·1	1500·0			1499·0	1499·8	1499·4		
			5 10	1460·0	1537·6	1498·8				1499·4	1499·7	1499·6	0·0	+ 0·8
			6 45	1461·3	1537·1	1499·2				1498·9	1500·2	1499·6		
					Mean	1499·1		− 0·9	+ 0·9		Mean	1499·3		

EXPLANATION OF *TABLE II.*

Deduction of Deviation Error from Star Observations.

The first five columns call for no remark.

Column 6 shows whether the star was observed at upper or at lower culmination. U standing for upper and L for lower.

" 7 gives the number of wires over which the time of the star's transit was observed.

" 8 contains the value of the deviation constant A, which is equal to $m \sec \delta \sin \zeta$, where m is the value of 1 division of the micrometer head in seconds of time, *viz*: $0^s{\cdot}039$. The sign of A depends on those of $\sec \delta$ and $\sin \zeta$, where δ is the star's declination, $(180^\circ - \delta)$ being used for stars observed at lower culmination, and ζ is the star's zenith distance, considered negative if north.

" 9 contains the observed time of transit taken from the chronographic record.

" 10 contains the correction to the time of transit on account of diurnal aberration. This correction is equal to $- 0{\cdot}0207 \times$ *cosine latitude* $\times$ *secant declination.* It is therefore negative for all stars at upper culmination and positive for all at lower.

" 11 contains the correction for collimation, this is obtained by multiplying c_e or c_w as the case may be, by $m \sec \delta$, using $(180^\circ - \delta)$ for stars at lower culmination.

" 12 contains the correction for level, obtained by multiplying b_e or b_w as the case may be, by $m \sec \delta \cos \zeta$, δ and ζ having the same meanings as before.

" 13 contains the chronometer error; this is a preliminary value obtained by taking the mean of the errors given by stars north and south of the zenith. If the numbers of stars at upper and lower culmination respectively be equal, a small error in the adopted value of this quantity will not affect the final mean value of the deviation error.

" 14 contains the seconds of the corrected time of transit called T. This is the sum of the seconds in the five preceding columns.

" 15 contains the star's R.A. at the time of the observation. This is either taken from one of the Almanacs or brought up by computation from the Greenwich Catalogue for epoch 1880.

" 16 contains the difference T − R.A.

" 17 contains the deviation error $a = \frac{T - R.A.}{A}$. It is to be noted that A contains the quantity m, so that a is in terms of the micrometer divisions.

" 18 contains the mean of the values in column 17. Sometimes one general mean is taken and sometimes the night is divided into twq parts. This depends on whether the values in column 17 show any evidence of a change of position having taken place during the hours of work.

The last column shows whether the telescope was pointing to the East or to the West of North.

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for Diurnal Aberration	Correction for Collimation	Correction for Transit Axis Level	Correction for Chronometer Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R. A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
KARACHI (E) and BUSHIRE (W)	KARACHI	1894						h m s	s	s	s	m s	s	h m s	m s	d	d	
		Dec. 28	I. P. E.	Polaris	U	2	−1·5988	1 20 31·27	−·85	−·18	−9·87	+0 2·23	22·60	1 20 19·47	+0 3·13	−1·96		
			I. P. W.	Groom. 2006	L	1	+1·1378	1 5 10·41	+·59	−·12	+7·31	+0 2·22	20·41	1 5 25·77	−0 5·36	−4·71	−3·96	W
			I. P. W.	Polaris	U	1	−1·5988	1 20 38·04	−·85	+·18	−11·82	+0 2·23	27·78	1 20 19·47	+0 8·31	−5·20		
			I. P. W.	19 H. Camelop.	U	4	−0·1663	5 5 22·02	−·10	+·02	−1·54	+0 2·72	23·12	5 5 21·27	+0 1·85	−11·12		
			I. P. E.	δ Ursæ Min.	L	1	+0·6090	6 5 34·21	+·31	+·07	+3·02	+0 3·10	40·71	6 5 46·26	−0 5·55	−9·11	−10·25	W
			I. P. W.	51 Cephei (Hev.)	U	1	−0·7053	6 51 56·32	−·38	+·08	−5·13	+0 3·12	54·01	6 51 46·60	+0 7·41	−10·51		
		Dec. 29	I. P. E.	43 Hev. Cephei	U	2	−0·4508	0 54 21·77	−·25	−·36	−3·57	+0 5·27	22·86	0 54 19·45	+0 3·41	−7·56	−8·61	W
			I. P. E.	Groom. 2006	L	1	+1·1378	1 5 1·82	+·59	+·87	+6·88	+0 5·30	15·46	1 5 26·45	−0 10·99	−9·66		
			I. P. W.	19 H. Camelop.	U	2	−0·1663	5 5 20·85	−·10	+·14	−1·28	+0 5·33	24·94	5 5 21·25	+0 3·69	−22·19	−19·04	W
			I. P. W.	51 Cephei (Hev.)	U	1	−0·7053	6 51 56·08	−·38	+·56	−4·03	+0 5·75	57·98	6 51 46·78	+0 11·20	−15·88		
		Dec. 30	I. P. W.	43 Hev. Cephei	U	2	−0·4508	0 54 21·34	−·25	+·10	−3·09	+0 6·95	25·05	0 54 19·15	+0 5·90	−13·09	−8·93	W
			I. P. W.	Groom. 2006	L	2	+1·1378	1 5 8·43	+·59	−·25	+5·96	+0 6·98	21·71	1 5 27·13	−0 5·42	−4·76		
			I. P. E.	19 H. Camelop.	U	5	−0·1663	5 5 17·80	−·10	−·04	−1·20	+0 7·10	23·56	5 5 21·24	+0 2·32	−13·95	−13·95	W
		Dec. 31	I. P. W.	43 Hev. Cephei	U	2	−0·4508	0 54 18·43	−·25	+·36	−3·14	+0 8·69	24·09	0 54 18·84	+0 5·25	−11·65	−13·67	W
			I. P. W.	Polaris	U	1	−1·5988	1 20 42·10	−·85	+1·25	−9·79	+0 8·72	41·43	1 20 16·35	+0 25·08	−15·69		
		1895																
		Jan. 1	I. P. W.	43 Hev. Cephei	U	2	−0·4508	0 54 19·13	−·25	+·05	−3·17	+0 9·63	25·39	0 54 18·52	+0 6·87	−15·24	−15·70	W
			I. P. W.	Polaris	U	1	−1·5988	1 20 41·86	−·85	+·18	−9·87	+0 9·80	41·12	1 20 15·30	+0 25·82	−16·15		
			I. P. E.	19 H. Camelop.	U	4	−0·1663	5 5 15·68	−·10	−·02	−1·47	+0 10·06	24·15	5 5 21·25	+0 2·90	−17·44		
			I. P. E.	δ Ursæ Min.	L	1	+0·6090	6 5 24·07	+·31	+·07	+2·94	+0 10·10	37·49	6 5 46·28	−0 8·79	−14·43	−17·18	W
			I. P. E.	51 Cephei (Hev.)	U	1	−0·7053	6 51 55·71	−·38	−·08	−4·36	+0 10·10	60·99	6 51 47·11	+0 13·88	−19·68		

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for: Diurnal Aberration	Collimation	Transit Axis Level	Chronometer Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R. A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
KARACHI (E) and BUSHIRE (W)	BUSHIRE	1894						h m s	s	s	s	m s	s	h m s	m s	d	d	
		Dec. 28	I. P. E.	Bradley 74	U	4	−0·2624	0 44 69·91	−·15	− ·32	+ ·30	−0 10·00	59·74	0 44 59·64	+0 0·10	− ·38		
			I. P. E.	Ursæ Minoris 2	U	3	−0·4308	0 54 29·96	−·24	− ·51	+ ·45	−0 10·00	19·66	0 54 19·37	+0 0·29	− ·67	+ 0·17	E
			I. P. W.	Polaris	U	2	−1·5356	1 20 24·38	−·83	+1·78	+ 1·87	−0 10·11	17·09	1 20 19·47	−0 2·38	+ 1·55		
			I. P. W.	Groom. 642	U	2	−0·5071	3 32 35·87	−·28	+ ·60	+ ·68	−0 10·56	26·31	3 32 24·67	+0 1·64	− 3·23		
			I. P. E.	Lalan. (F.) 2774	L	3	+0·4575	3 58 22·21	+·24	+ ·50	− ·15	−0 10·63	12·17	3 58 13·77	−0 1·60	− 3·50		
			I. P. W.	ε Ursæ Minoris	L	3	+0·2655	4 56 46·55	+·13	− ·28	− ·22	−0 10·85	35·33	4 56 35·19	+0 0·14	+ 0·53	− 1·41	W
			I. P. W.	δ Ursæ Minoris	L	2	+0·5891	6 5 58·62	+·31	− ·65	− ·59	−0 11·10	46·59	6 5 46·26	+0 0·33	+ 0·56		
		Dec. 29	I. P. W.	Bradley 74	U	6	−0·2624	0 44 74·66	−·15	+ ·29	|+ ·62	−0 15·57	59·85	0 44 59·47	+0 0·38	− 1·45		
			I. P. W.	Ursæ Minoris 2	U	2	−0·4308	0 54 34·85	−·24	+ ·46	+ ·93	−0 15·57	20·43	0 54 19·10	+0 1·33	− 3·09	− 1·62	W
			I. P. E.	Polaris	U	2	−1·5356	·1 20 35·71	−·83	−1·60	+ 1·25	−0 15·60	18·93	1 20 18·46	+0 0·47	− 0·31		
			I. P. W.	Lalan. (F.) 2774	L	3	+0·4575	3 58 27·72	+·24	− ·45	− ·54	−0 16·22	10·75	3 58 13·91	−0 3·16	− 6·91		
			I. P. W.	ε Ursæ Minoris	L	2	+0·2655	4 56 51·77	+·13	− ·26	− ·23	−0 16·39	35·02	4 56 35·25	−0 0·23	− 0·86	− 3·34	W
			I. P. E.	δ Ursæ Minoris	L	2	+0·5891	6 5 60·97	+·31	+ ·59	− ·34	−0 16·63	44·90	6 5 46·23	−0 1·33	− 2·26		
		Dec. 30	I. P. E.	Bradley 74	U	2	−0·2624	0 44 80·72	−·15	− ·26	+ ·23	−0 20·95	59·59	0 44 59·30	+0 0·29	− 1·11		
			I. P. E.	Ursæ Minoris 2	U	3	−0·4308	0 54 41·15	−·24	− ·41	+ ·34	−0 20·95	19·89	0 54 18·83	+0 1·06	− 2·46	− 1·75	W
			I. P. W.	Polaris	U	2	−1·5356	1 20 39·01	−·83	+1·42	+ 1·43	−0 21·03	20·00	1 20 17·41	+0 2·59	− 1·69		
			I. P. W.	Groom. 642	U	3	−0·5071	3 32 49·21	−·28	+ ·48	+ ·23	−0 21·61	28·03	3 32 24·32	+0 3·71	− 7·32	− 7·68	W
			I. P. E.	Lalan. (F.) 2774	L	3	+0·4575	3 58 31·42	+·24	+ ·40	− ·02	−0 21·68	10·36	3 58 14·04	−0 3·68	− 8·04		
			I. P. E.	ε Ursæ Minoris	L	2	+0·2655	4 56 56·08	+·13	+ ·23	− ·01	−0 21·83	34·60	4 56 35·30	−0 0·70	− 2·64	− 2·05	W
			I. P. E.	δ Ursæ Minoris	L	2	+0·5891	6 5 66·54	+·31	+ ·52	− ·03	−0 21·98	45·36	6 5 46·22	−0 0·86	− 1·46		
		Dec. 31	I. P. W.	Ursæ Minoris 2	U	4	−0·4308	0 54 46·20	−·24	+ ·46	− ·23	−0 26·20	19·99	0 54 18·56	+0 1·43	− 3·32	− 2·20	W
			I. P. E.	Polaris	U	3	−1·5356	1 20 46·65	−·83	−1·60	·00	−0 26·22	18·00	1 20 16·35	+0 1·65	− 1·07		
		1895 Jan. 1	I. P. W.	Bradley 74	U	5	−0·2624	0 44 90·75	−·15	+ ·29	− ·08	−0 31·32	59·49	0 44 58·96	+0 0·53	− 2·02		
			I. P. W.	Ursæ Minoris 2	U	·1	−0·4308	0 54 50·69	−·24	+ ·46	− ·11	−0 31·34	19·46	0 54 18·29	+0 1·17	− 2·72	− 1·94	W
			I. P. E.	Polaris	U	1	−1·5356	1 20 54·10	−·83	−1·60	− ·09	−0 31·58	20·00	1 20 15·30	+0 4·70	− 3·06		
			I. P. W.	δ Ursæ Minoris	L	4	+0·5891	6 5 79·25	+·31	− ·59	− ·02	−0 32·64	46·31	6 5 46·28	+0 0·03	+ 0·05		

EXPLANATION OF *TABLE III.*

Direct Comparison of Clocks.

The first four columns call for no remark.

Column 5 contains the time by the Karachi clock of the middle of the period during which signals were being sent or received.

„ 6 contains the time by the Bushire clock of the same instant.

„ 7 contains the difference between the clocks as read off the chronographic record.

„ 8 gives the mean, to the nearest whole second, of the times given in column 5.

„ 9 gives the mean of those in column 6.

„ 10 contains the mean of two corresponding differences in column 7, and is the difference between the clocks, freed from the effects of retardation, at the epoch given in terms of the two clocks respectively, in columns 8 and 9.

„ 11 contains the deduced relative hourly rate of the clocks. It is obtained as follows:—

The change in the difference between the clocks between two consecutive comparisons is divided by the interval between the comparisons, expressed in hours, and the result is the rate during the interval. Then the mean of two consecutive rates is taken and considered to be the rate at the epoch of the intervening comparison, opposite which it is accordingly entered. It will be seen that by this method the same weight is given to a rate deduced from two comparisons on the same night, as to one deduced from the last comparison on one night and the first on the next. If the interval between the comparisons be small the deduced rate will be seriously affected by any errors in the observed differences between the clocks; on the other hand, when the interval is from one night to the next there is a probability of a variation in the rate. Hence it appears that each method has its own disadvantages and that consequently the adoption of equal weights is justifiable.

TABLE III. DIRECT COMPARISON OF CLOCKS.

Arc	Astronomical Date	Comparison made at	Clock Signals transmitted from	Time of Comparison by Karachi Clock	Corresponding Time by Bushire Clock	Observed Difference between the Clocks	Mean Time of Comparison by E. Clock $= T_E$	Mean Time of Comparison by W. Clock $= T_W$	Mean Difference between the Clocks at Epochs T_E and T_W $= D$	Relative Hourly Clock Rate at Epochs T_E and T_W
	1894			h m s	h m s	h m s	h m s	h m s	h m s	s
KARACHI (E) and BUSHIRE (W)	Dec. 28	Bushire	Karachi	1 16 1·704	0 11 29·000	1 4 32·704				
		Karachi	Bushire	1 21 2·138	0 16 29·000	33·138	1 18 32	0 13 59	1 4 32·921	− 0·370
		Bushire	Karachi	4 17 1·582	3 12 30·000	31·582				
		Karachi	Bushire	4 22 35·024	3 18 3·000	32·024	4 19 48	3 15 17	31·803	·350
		Bushire	Karachi	5 20 0·211	4 15 29·000	31·211				
		Karachi	Bushire	5 25 35·000	4 21 3·299	31·701	5 22 48	4 18 16	31·456	·345
		Bushire	Karachi	6 29 1·792	5 24 31·000	30·792				
		Karachi	Bushire	6 33 35·000	5 29 3·701	31·299	6 31 18	5 26 47	31·046	·370
		Bushire	Karachi	7 32 1·372	6 27 31·000	30·372				
		Karachi	Bushire	7 40 2·000	6 35 31·101	30·899	7 36 2	6 31 31	30·636	·369
	„ 29	Bushire	Karachi	1 14 26·067	0 10 2·000	1 4 24·067				
		Karachi	Bushire	1 21 26·559	0 17 2·000	24·559	1 17 56	0 13 32	1 4 24·313	− 0·330
		Bushire	Karachi	4 24 23·108	3 20 0·000	23·108				
		Karachi	Bushire	4 30 25·598	3 26 2·000	23·598	4 27 24	3 23 1	23·353	·305
		Bushire	Karachi	5 21 24·000	4 17 1·166	22·834				
		Karachi	Bushire	5 26 25·297	4 22 2·000	23·297	5 23 55	4 19 32	23·066	·299
		Bushire	Karachi	6 25 24·500	5 21 2·000	22·500				
		Karachi	Bushire	6 31 25·000	5 27 2·000	23·000	6 28 25	5 24 2	22·750	·286
		Bushire	Karachi	7 30 0·200	6 25 38·000	22·200				
		Karachi	Bushire	7 35 24·000	6 31 1·299	22·701	7 32 42	6 28 20	22·451	·287
	„ 30	Bushire	Karachi	1 7 18·032	0 3 1·000	1 4 17·032				
		Karachi	Bushire	1 11 19·496	0 7 2·000	17·496	1 9 19	0 5 2	1 4 17·264	− 0·292
		Bushire	Karachi	4 17 17·134	3 13 1·000	16·134				
		Karachi	Bushire	4 22 18·553	3 18 2·000	16·553	4 19 48	3 15 32	16·344	·277
		Bushire	Karachi	5 20 17·850	4 16 2·000	15·850				
		Karachi	Bushire	5 25 18·285	4 21 2·000	16·285	5 22 48	4 18 32	16·068	·284
		Bushire	Karachi	6 23 14·501	5 18 59·000	15·501				
		Karachi	Bushire	6 27 17·000	5 23 1·000	16·000	6 25 16	5 21 0	15·751	·294
		Bushire	Karachi	7 29 16·212	6 25 1·000	15·212				
		Karachi	Bushire	7 35 17·658	6 31 2·000	15·658	7 32 17	6 28 2	15·435	·289

TABLE III. DIRECT COMPARISON OF CLOCKS.

Arc	Astronomical Date	Comparison made at	Clock Signals transmitted from	Time of Comparison by Karachi Clock	Corresponding Time by Bushire Clock	Observed Difference between the Clocks	Mean Time of Comparison by E Clock $=T_E$	Mean Time of Comparison by W Clock $=T_W$	Mean Difference between the Clocks at Epochs T_E and T_W $= D$	Relative Hourly Clock Rate at Epochs T_E and T_W
				h m s	h m s	h m s	h m s	h m s	h m s	s
KARACHI (E) and BUSHIRE (W)	1894 Dec. 31	Bushire	Karachi	1 6 11·010	0 2 1·000	1 4 10·010				
		Karachi	Bushire	1 14 15·000	0 10 4·550	10·450	1 10 13	0 6 3	1 4 10·230	− 0·269
		Bushire	Karachi	4 31 10·200	3 27 1·000	9·200				
		Karachi	Bushire	4 39 11·609	3 35 2·000	9·609	4 35 11	3 31 2	9·405	·256
	1895 Jan. 1	Bushire	Karachi	1 14 5·618	0 10 2·000	1 4 3·618				
		Karachi	Bushire	1 20 6·017	0 16 2·000	4·017	1 17 6	0 13 2	1 4 3·818	− 0·264
		Bushire	Karachi	4 14 4·798	3 10 2·000	2·798				
		Karachi	Bushire	4 21 5·000	3 17 1·715	3·285	4 17 35	3 13 32	3·042	·267
		Bushire	Karachi	5 19 4·505	4 15 2·000	2·505				
		Karachi	Bushire	5 24 5·000	4 20 2·010	2·990	5 21 35	4 17 32	2·748	·275
		Bushire	Karachi	6 23 3·206	5 19 1·000	2·206				
		Karachi	Bushire	6 30 5·000	5 26 2·302	2·698	6 26 34	5 22 32	2·452	·266
		Karachi	Bushire	7 32 5·000	6 28 2·584	2·416				
		Bushire	Karachi	7 43 3·000	6 39 1·125	1·875	7 37 34	6 33 32	2·146	·259

EXPLANATION OF *TABLE IV.*

Transits of Clock Stars and Deduction of the Clock Correction.

The heading contains the name of the arc, and indicates the station the observations at which are to be found below, giving at the same time the latitude of the station, the name of the observer and the telescope used.

Column 1 contains the astronomical date.

„ 2 contains the star's name, or number in the Greenwich Catalogue for 1880.

„ 3 contains the star's declination and when south it is indicated by a minus sign. This being given, and also the latitude of the station, it is possible to compute all the corrections to the observed time of transit without reference to anything beyond the foregoing tables.

„ 4 contains the star's aspect, that is, it shews whether the star at culmination was north or south of the zenith of the station. It is convenient to give this information as it renders it easy to see whether the deviation correction has been entered with the proper sign.

„ 5, 6 & 7 explain themselves.

„ 8, 9 & 11 contain respectively the corrections for collimation, level and diurnal aberration. These corrections are computed in precisely the same manner as those in Table II.

„ 10 contains the deviation correction. To form this the appropriate value of a is taken from Table II and multiplied by $m \sec \delta \sin \zeta$. It is to be noted that the quantity a given in Table II is an error, not a correction, so that when forming the correction a A the sign must be changed.

„ 12 contains the corrected time of transit = T. This is the algebraic sum of the five preceding columns.

„ 13 contains the star's R.A. brought up from the Almanac or Catalogue to the epoch of the observation.

„ 14 contains the difference between the two preceding columns with the sign appropriate to a correction.

„ 15 contains the mean value of the clock correction by stars observed in the same instrumental position. In column 7 the mean of the observed times of transit of groups is taken out, and is the epoch of the mean clock correction in column 15.

„ 16 & 17 contain the daily mean of the two instrumental positions, and the epoch to which it corresponds. If there are two groups, one *I.P.E.* and one *I.P.W.*, the mean of the two clock corrections is taken as corresponding to the mean of the two epochs; but if there are three groups, as on December 30th, one *I.P.W.*, one *I.P.E.* and again one *I.P.W.*, the mean of the two values *I.P.W.* is taken for the mean of their epochs, and then this mean value and epoch are combined with the *I.P.E.* value and epoch to obtain the quantities to be entered in these columns.

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

Transits at KARACHI (E), *Lat.* 24° 51′, by BURRARD with Telescope No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 28	ζ Andromedæ	23 42	S	E	12	0 41 44·65	0·00	−0·53	0·00	−0·02	0 41 44·10	0 41 46·23	+0 2·13			
	δ Piscium	7 1	S	E	12	0 43 12·42	0·00	−0·47	+ 0·05	−0·02	0 43 11·98	0 43 14·08	+0 2·10			
	136 Gr. 80	18 37	S	E	10	0 49 0·03	0·00	−0·51	+ 0·02	−0·02	0 48 59·52	0 49 1·63	+0 2·11			
	μ Andromedæ	37 56	N	E	11	0 50 53·79	0·00	−0·60	− 0·04	−0·02	0 50 53·13	0 50 55·36	+0 2·23			
	148 Gr. 80	28 25	N	E	5	0 52 7·46	0·00	−0·55	− 0·01	−0·02	0 52 6·88	0 52 9·05	+0 2·17			
	155 „	5 55	S	E	12	0 54 21·47	0·00	−0·46	+ 0·05	−0·02	0 54 21·04	0 54 23·19	+0 2·15			
	173 „	31 37	N	E	10	1 0 23·02	0·00	−0·57	− 0·02	−0·02	1 0 22·41	1 0 24·57	+0 2·16	+ 0 2·150		
		Mean	...	...	...	0 50 15										
	196 Gr. 80	29 32	N	W	9	1 5 51·07	0·00	−0·67	− 0·01	−0·02	1 5 50·37	1 5 52·58	+0 2·21			
	204 „	3 3	S	W	11	1 12 21·47	0·00	−0·54	+ 0·06	−0·02	1 12 20·97	1 12 23·22	+0 2·25			
	251 „	13 45	S	W	11	1 33 36·39	0·00	−0·59	+ 0·03	−0·02	1 33 35·81	1 33 38·10	+0 2·29			
	ν Piscium	4 57	S	W	12	1 35 56·62	0·00	−0·55	+ 0·05	−0·02	1 35 56·10	1 35 58·32	+0 2·22			
	φ Persei	50 10	N	W	6	1 37 3·37	+0·01	−0·82	− 0·10	−0·03	1 37 2·43	1 37 4·76	+0 2·33			
	ο Piscium	8 38	S	W	11	1 39 49·51	0·00	−0·57	+ 0·04	−0·02	1 39 48·96	1 39 51·28	+0 2·32			
	282 Gr. 80	50 16	N	W	12	1 45 27·28	+0·01	−0·92	− 0·10	−0·03	1 45 26·24	1 45 28·73	+0 2·49			
	α Trianguli	29 4	N	W	12	1 47 4·46	0·00	−0·67	− 0·01	−0·02	1 47 3·76	1 47 6·04	+0 2·28	+ 0 2·299	+ 0 2·225	1 11 12
		Mean	...	...	...	1 32 9										
	ε Geminorum	25 14	N	E	14	6 37 27·52	0·00	−0·54	0·00	−0·02	6 37 26·96	6 37 29·93	+0 2·97			
	ξ Geminorum	13 1	S	E	12	6 39 22·63	0·00	−0·49	+ 0·08	−0·02	6 39 22·20	6 39 25·25	+0 3·05			
	18 Monocerotis	2 32	S	E	14	6 42 21·82	0·00	−0·45	+ 0·15	−0·02	6 42 21·50	6 42 24·58	+0 3·08			
	θ Geminorum	34 5	N	E	11	6 45 51·43	0·00	−0·58	− 0·08	−0·02	6 45 50·75	6 45 53·95	+0 3·20	+ 0 3·075		
		Mean	...	...	...	6 41 16										
	1186 Gr. 80	25 30	N	W	13	6 48 50·41	0·00	−0·60	− 0·01	−0·02	6 48 49·78	6 48 52·83	+0 3·05			
	1193 „	26 13	N	W	10	6 52 18·25	0·00	−0·60	− 0·01	−0·02	6 52 17·62	6 52 20·75	+0 3·13			
	ζ Geminorum	20 44	S	W	14	6 57 51·96	0·00	−0·57	+ 0·03	−0·02	6 57 51·40	6 57 54·47	+0 3·07			
	1218 Gr. 80	16 6	S	W	11	7 2 19·61	0·00	−0·55	+ 0·06	−0·02	7 2 19·10	7 2 22·22	+0 3·12	+ 0 3·093	+ 0 3·084	6 48 18
		Mean	...	...	...	6 55 20										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT KARACHI (E), *Lat. 24° 51′*, BY BURRARD WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 29	ζ Andromedæ	23 42	S	W	14	0 41 41·52	+0·03	−0·59	+0·01	−0·02	0 41 40·95	0 41 46·21	+0 5·26			
	δ Piscium	7 1	S	W	13	0 43 9·35	+0·03	−0·52	+0·10	−0·02	0 43 8·94	0 43 14·07	+0 5·13			
	136 Gr. 80	18 37	S	W	13	0 48 56·94	+0·03	−0·57	+0·04	−0·02	0 48 56·42	0 49 1·62	+0 5·20			
	μ Andromedæ	37 56	N	W	13	0 50 50·82	+0·03	−0·67	−0·10	−0·02	0 50 50·06	0 50 55·34	+0 5·28			
	148 Gr. 80	28 25	N	W	13	0 52 4·54	+0·03	−0·61	−0·02	−0·02	0 52 3·92	0 52 9·04	+0 5·12	+0 5·198		
		Mean	...	...	...	0 47 21										
	ε Piscium	7 20	S	E	13	0 57 24·85	−0·03	−0·53	+0·10	−0·02	0 57 24·37	0 57 29·74	+0 5·37			
	173 Gr. 80	31 37	N	E	12	1 0 19·93	−0·03	−0·64	−0·05	−0·02	1 0 19·19	1 0 24·56	+0 5·37			
	β Andromedæ	35 4	N	E	13	1 3 46·51	−0·03	−0·66	−0·07	−0·02	1 3 45·73	1 3 51·09	+0 5·36			
	199 Gr. 80	7 1	S	E	10	1 8 10·03	−0·03	−0·53	+0·10	−0·02	1 8 9·55	1 8 14·88	+0 5·33			
	200 „	7 1	S	E	11	1 8 11·38	−0·03	−0·53	+0·10	−0·02	1 8 10·90	1 8 16·25	+0 5·35			
	244 „	40 53	N	E	14	1 30 33·53	−0·04	−0·70	−0·12	−0·02	1 30 32·65	1 30 38·06	+0 5·41	+0 5·365	+0 5·282	0 57 43
		Mean	...	...	...	1 8 4										
	ε Geminorum	25 14	N	E	13	6 37 24·74	−0·03	−0·50	−0·01	−0·02	6 37 24·18	6 37 29·95	+0 5·77			
	ξ Geminorum	13 1	S	E	14	6 39 19·91	−0·03	−0·46	+0·15	−0·02	6 39 19·55	6 39 25·27	+0 5·72			
	18 Monocerotis	2 32	S	E	12	6 42 18·95	−0·03	−0·42	+0·28	−0·02	6 42 18·76	6 42 24·59	+0 5·83			
	θ Geminorum	34 5	N	E	14	6 45 48·77	−0·03	−0·54	−0·14	−0·02	6 45 48·04	6 45 53·97	+0 5·93	+0 5·813		
		Mean	...	...	...	6 41 13										
	1186 Gr. 80	25 30	N	W	13	6 48 47·70	+0·03	−0·47	−0·01	−0·02	6 48 47·23	6 48 52·84	+0 5·61			
	1193 „	26 13	N	W	14	6 52 15·63	+0·03	−0·47	−0·02	−0·02	6 52 15·15	6 52 20·76	+0 5·61			
	ζ Geminorum	20 44	S	W	14	6 57 49·19	+0·03	−0·45	+0·06	−0·02	6 57 48·81	6 57 54·48	+0 5·67			
	1218 Gr. 80	16 6	S	W	13	7 2 16·99	+0·03	−0·43	+0·12	−0·02	7 2 16·69	7 2 22·23	+0 5·54	+0 5·608	+0 5·711	6 48 15
		Mean	...	...	...	6 55 17										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT KARACHI (E), *Lat. 24° 51'*, BY BURRARD WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit =T	Right Ascension =R.A.	Clock Correction: By each Star = R.A. – T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 30	ζ Andromedæ	23 42	S	W	13	0 41 39·97	+0·01	–0·52	+ 0·01	–0·02	0 41 39·45	0 41 46·20	+0 6·75			
	δ Piscium	7 1	S	W	14	0 43 7·71	+0·01	–0·46	+ 0·11	–0·02	0 43 7·35	0 43 14·06	+0 6·71			
	155 Gr. 80	5 55	S	W	14	0 54 16·74	+0·01	–0·45	+ 0·11	–0·02	0 54 16·39	0 54 23·17	+0 6·78	+ 0 6·747		
		Mean	...	...	...	0 46 21										
	ε Piscium	7 20	S	E	14	0 57 23·17	–0·01	–0·39	+ 0·11	–0·02	0 57 22·86	0 57 29·73	+0 6·87			
	173 Gr. 80	31 37	N	E	14	1 0 18·31	–0·01	–0·47	– 0·05	–0·02	1 0 17·76	1 0 24·54	+0 6·78			
	η Piscium	14 48	S	E	14	1 25 45·52	–0·01	–0·41	+ 0·06	–0·02	1 25 45·14	1 25 52·08	+0 6·94			
	238 Gr. 80	– 7 34	S	E	14	1 28 19·54	–0·01	–0·35	+ 0·19	–0·02	1 28 19·35	1 28 26·26	+0 6·91			
	244 "	40 53	N	E	14	1 30 31·83	–0·01	–0·52	– 0·13	–0·02	1 30 31·15	1 30 38·05	+0 6·90	+ 0 6·880		
		Mean	...	...	...	1 16 28										
	φ Persei	50 10	N	W	11	1 36 58·81	+0·01	–0·67	– 0·23	–0·03	1 36 57·89	1 37 4·72	+0 6·83			
	308 Gr. 80	53 59	N	W	14	1 55 12·82	+0·01	–0·71	– 0·29	–0·03	1 55 11·80	1 55 18·77	+0 6·97			
	γ Andromedæ	41 50	N	W	12	1 57 21·42	+0·01	–0·61	– 0·14	–0·02	1 57 20·66	1 57 27·46	+0 6·80	+ 0 6·867	+ 0 6·844	1 17 17
		Mean	...	...	...	1 49 51										
	ξ Geminorum	13 1	S	E	13	6 39 18·23	–0·01	–0·45	+ 0·11	–0·02	6 39 17·86	6 39 25·28	+0 7·42			
	18 Monocerotis	2 32	S	E	14	6 42 17·36	–0·01	–0·41	+ 0·21	–0·02	6 42 17·13	6 42 24·61	+0 7·48			
	θ Geminorum	34 5	N	E	13	6 45 47·06	–0·01	–0·53	– 0·11	–0·02	6 45 46·39	6 45 53·98	+0 7·59	+ 0 7·497		
		Mean	...	...	...	6 42 28										
	1193 Gr. 80	26 13	N	W	14	6 52 14·04	+0·01	–0·50	– 0·01	–0·02	6 52 13·52	6 52 20·78	+0 7·26			
	Piazzi VI. 305	29 31	N	W	13	6 56 45·01	+0·01	–0·51	– 0·05	–0·02	6 56 44·44	6 56 51·84	+0 7·40			
	ζ Geminorum	20 44	S	W	11	6 57 47·61	+0·01	–0·47	+ 0·04	–0·02	6 57 47·17	6 57 54·50	+0 7·33			
	1218 Gr. 80	16 6	S	W	9	7 2 15·37	+0·01	–0·46	+ 0·09	–0·02	7 2 14·99	7 2 22·25	+0 7·26	+ 0 7·313	+ 0 7·405	6 49 52
		Mean	...	...	...	6 57 16										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT KARACHI (E), *Lat. 24° 51′*, BY BURRARD WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 31	136 Gr. 80	18 37	S	W	14	0 48 53·48	+0·03	−0·51	+ 0·06	−0·02	0 48 53·04	0 49 1·60	+0 8·56			
	μ Andromedæ	37 56	N	W	14	0 50 47·34	+0·03	−0·60	− 0·15	−0·02	0 50 46·60	0 50 55·31	+0 8·71			
	148 Gr. 80	28 25	N	W	12	0 52 1·05	+0·03	−0·55	− 0·04	−0·02	0 52 0·47	0 52 9·01	+0 8·54			
	155 „	5 55	S	W	14	0 54 14·89	+0·03	−0·46	+ 0·17	−0·02	0 54 14·61	0 54 23·16	+0 8·55			
	ε Piscium	7 20	S	W	12	0 57 21·37	+0·03	−0·47	+ 0·16	−0·02	0 57 21·07	0 57 29·72	+0 8·65			
	173 Gr. 80	31 37	N	W	14	1 0 16·52	+0·03	−0·57	− 0·07	−0·02	1 0 15·89	1 0 24·53	+0 8·64	+ 0 8·608		
		Mean	...	...	...	0 53 56										
	η Piscium	14 48	S	E	14	1 25 43·76	−0·03	−0·45	+ 0·10	−0·02	1 25 43·36	1 25 52·06	+0 8·70			
	238 Gr. 80	− 7 34	S	E	14	1 28 17·71	−0·03	−0·38	+ 0·29	−0·02	1 28 17·57	1 28 26·25	+0 8·68			
	244 „	40 53	N	E	13	1 30 30·11	−0·04	−0·56	− 0·19	−0·02	1 30 29·30	1 30 38·03	+0 8·73			
	251 „	13 45	S	E	14	1 33 29·72	−0·03	−0·44	+ 0·11	−0·02	1 33 29·34	1 33 38·07	+0 8·73			
	ν Piscium	4 57	S	E	14	1 35 49·87	−0·03	−0·41	+ 0·18	−0·02	1 35 49·59	1 35 58·29	+0 8·70			
	φ Persei	50 10	N	E	13	1 36 56·87	−0·04	−0·62	− 0·35	−0·03	1 36 55·83	1 37 4·70	+0 8·87	+ 0 8·735	+ 0 8·672	1 12 52
		Mean	...	...	...	1 31 48										
1895																
Jan. 1	155 Gr. 80	5 55	S	W	14	0 54 13·59	0·00	−0·46	+ 0·20	−0·02	0 54 13·31	0 54 23·15	+0 9·84			
	173 „	31 37	N	W	13	1 0 15·39	0·00	−0·57	− 0·08	−0·02	1 0 14·72	1 0 24·52	+0 9·80			
	β Andromedæ	35 4	N	W	14	1 3 42·02	0·00	−0·58	− 0·13	−0·02	1 3 41·29	1 3 51·05	+0 9·76			
	196 Gr. 80	29 32	N	W	13	1 5 43·50	0·00	−0·56	− 0·06	−0·02	1 5 42·86	1 5 52·53	+0 9·67			
	238 „	− 7 34	S	W	9	1 28 16·53	0·00	−0·41	+ 0·33	−0·02	1 28 16·43	1 28 26·24	+0 9·81			
	244 „	40 53	N	W	13	1 30 29·05	+0·01	−0·62	− 0·22	−0·02	1 30 28·20	1 30 38·02	+0 9·82			
	251 „	13 45	S	W	14	1 33 28·58	0·00	−0·49	+ 0·12	−0·02	1 33 28·19	1 33 38·06	+0 9·87			
	ν Piscium	4 57	S	W	9	1 35 48·87	0·00	−0·46	+ 0·21	−0·02	1 35 48·60	1 35 58·28	+0 9·68	+ 0 9·781		
		Mean	...	...	...	1 16 29										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

Transits at KARACHI (E), *Lat. 24° 51′*, by BURRARD with Telescope No. 1.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit =T	Right Ascension =R.A.	Clock Correction			Mean Epoch = T_E
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A.−T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Jan. 1	φ Persei	50 10	N	E	13	1 36 55·65	−0·01	−0·66	− 0·41	−0·03	1 36 54·54	1 37 4·69	+0 10·15			
	ο Piscium	8 38	S	E	14	1 39 41·68	0·00	−0·45	+ 0·17	−0·02	1 39 41·38	1 39 51·25	+0 9·87			
	275 Gr. 80	16 26	S	E	13	1 42 19·97	0·00	−0·48	+ 0·09	−0·02	1 42 19·56	1 42 29·48	+0 9·92			
	281 "	10 31	S	E	5	1 45 8·45	0·00	−0·46	+ 0·15	−0·02	1 45 8·12	1 45 17·99	+0 9·87			
	282 "	50 16	N	E	8	1 45 19·65	−0·01	−0·66	− 0·41	−0·03	1 45 18·54	1 45 28·66	+0 10·12			
	α Trianguli	29 4	N	E	12	1 46 56·77	0·00	−0·53	− 0·05	−0·02	1 46 56·17	1 47 6·00	+0 9·83			
	β Arietis	20 18	S	E	14	1 48 41·24	0·00	−0·50	+ 0·05	−0·02	1 48 40·77	1 48 50·65	+0 9·88			
	296 Gr. 80	17 18	S	E	14	1 51 27·70	0·00	−0·49	+ 0·08	−0·02	1 51 27·27	1 51 37·14	+0 9·87			
	308 "	53 59	N	E	14	1 55 9·92	−0·01	−0·70	− 0·50	−0·03	1 55 8·68	1 55 18·73	+0 10·05	+0 9·951	+0 9·866	1 31 7
		Mean	...	...	...	1 45 45										
	ε Geminorum	25 14	N	W	14	6 37 20·52	0·00	−0·52	− 0·01	−0·02	6 37 19·97	6 37 29·99	+0 10·02			
	ξ Geminorum	13 1	S	W	14	6 39 15·50	0·00	−0·47	+ 0·14	−0·02	6 39 15·15	6 39 25·31	+0 10·16			
	18 Monocerotis	2 32	S	W	13	6 42 14·72	0·00	−0·44	+ 0·25	−0·02	6 42 14·51	6 42 24·64	+0 10·13			
	θ Geminorum	34 5	N	W	14	6 45 44·59	0·00	−0·56	− 0·13	−0·02	6 45 43·88	6 45 54·02	+0 10·14	+0 10·113		
		Mean	...	...	...	6 41 9										
	1186 Gr. 80	25 30	N	E	14	6 48 43·25	0·00	−0·51	− 0·01	−0·02	6 48 42·71	6 48 52·90	+0 10·19			
	1193 "	26 13	N	E	14	6 52 11·07	0·00	−0·51	− 0·02	−0·02	6 52 10·52	6 52 20·82	+0 10·30			
	ζ Geminorum	20 44	S	E	14	6 57 44·80	0·00	−0·49	+ 0·05	−0·02	6 57 44·34	6 57 54·53	+0 10·19			
	1218 Gr. 80	16 6	S	E	14	7 2 12·51	0·00	−0·47	+ 0·10	−0·02	7 2 12·12	7 2 22·29	+0 10·17	+0 10·213	+0 10·163	6 48 11
		Mean	...	...	...	6 55 13										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT BUSHIRE (W), *Lat.* 28° 55′, BY LENOX CONYNGHAM WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 28	ζ Andromedæ	23 42	S	E	15	0 41 56·21	−0·04	+0·07	0·00	−0·02	0 41 56·22	0 41 46·23	−0 9·99			
	136 Gr. 80	18 37	S	E	15	0 49 11·63	−0·04	+0·06	0·00	−0·02	0 49 11·63	0 49 1·63	−0 10·00			
	μ Andromedæ	37 56	N	E	15	0 51 5·23	−0·05	+0·08	0·00	−0·02	0 51 5·24	0 50 55·36	−0 9·88			
	157 Gr. 80	40 47	N	E	15	0 57 9·96	−0·05	+0·08	0·00	−0·02	0 57 9·97	0 56 59·93	−0 10·04			
	170 „	14 23	S	E	14	0 59 42·87	−0·04	+0·06	0·00	−0·02	0 59 42·87	0 59 32·84	−0 10·03			
	177 „	12 24	S	E	15	1 1 12·39	−0·04	+0·06	0·00	−0·02	1 1 12·39	1 1 2·27	−0 10·12			
	β Andromedæ	35 4	N	E	15	1 4 1·13	−0·05	+0·08	0·00	−0·02	1 4 1·14	1 3 51·11	−0 10·03			
	196 Gr. 80	29 32	N	E	14	1 6 2·68	−0·04	+0·07	0·00	−0·02	1 6 2·69	1 5 52·58	−0 10·11	−0 10·025		
		Mean	...	...	...	0 56 18										
	201 Gr. 80	15 35	S	W	15	1 8 43·07	+0·04	+0·08	0·00	−0·02	1 8 43·17	1 8 33·10	−0 10·07			
	ν Piscium	26 43	S	W	15	1 13 51·72	+0·04	+0·09	0·00	−0·02	1 13 51·83	1 13 41·75	−0 10·08			
	210 Gr. 80	44 59	N	W	15	1 16 19·28	+0·05	+0·11	0·00	−0·03	1 16 19·41	1 16 9·37	−0 10·04			
	222 „	44 52	N	W	14	1 21 32·31	+0·05	+0·11	0·00	−0·03	1 21 32·44	1 21 22·24	−0 10·20			
	η Piscium	14 48	S	W	15	1 26 2·15	+0·04	+0·08	0·00	−0·02	1 26 2·25	1 25 52·09	−0 10·16			
	239 Gr. 80	17 55	S	W	15	1 29 18·45	+0·04	+0·08	0·00	−0·02	1 29 18·55	1 29 8·50	−0 10·05			
	244 „	40 53	N	W	13	1 30 48·06	+0·05	+0·11	0·00	−0·02	1 30 48·20	1 30 38·07	−0 10·13			
	256 „	40 3	N	W	15	1 34 33·00	+0·05	+0·10	0·00	−0·02	1 34 33·13	1 34 22·98	−0 10·15	−0 10·110	−0 10·068	1 9 29
		Mean	...	...	...	1 22 39										
	562 Gr. 80	24 59	S	W	14	3 34 41·43	+0·04	+0·09	0·00	−0·02	3 34 41·54	3 34 30·94	−0 10·60			
	565 „	19 22	S	W	15	3 36 27·04	+0·04	+0·08	+ 0·01	−0·02	3 36 27·15	3 36 16·53	−0 10·62			
	ν Persei	42 15	N	W	15	3 38 15·17	+0·05	+0·11	− 0·02	−0·02	3 38 15·29	3 38 4·74	−0 10·55			
	579 Gr. 80	24 2	S	W	13	3 39 46·20	+0·04	+0·09	+ 0·01	−0·02	3 39 46·32	3 39 35·64	−0 10·68			
	590 „	23 44	S	W	15	3 43 6·64	+0·04	+0·09	+ 0·01	−0·02	3 43 6·76	3 42 56·09	−0 10·67	−0 10·624		
		Mean	...	...	...	3 38 27										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT BUSHIRE (W), *Lat.* 28° 55′, BY LENOX CONYNGHAM WITH TELESCOPE No. 2.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit =T	Right Ascension =R.A.	Clock Correction			Mean Epoch $= T_w$
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 28	ζ Persei	31 35	N	E	14	3 47 43·57	−0·05	+0·03	0·00	−0·02	3 47 43·53	3 47 32·95	−0 10·58			
	ε Persei	39 43	N	E	15	3 51 0·23	−0·05	+0·03	− 0·01	−0·02	3 51 0·18	3 50 49·58	−0 10·60			
	ξ Persei	35 30	N	E	15	3 52 20·87	−0·05	+0·03	− 0·01	−0·02	3 52 20·82	3 52 10·22	−0 10·60	−0 10·593	−0 10·609	3 44 25
		Mean	...	...	...	3 50 22										
„ 29	δ Andromedæ	30 17	N	W	10	0 33 57·94	+0·04	+0·15	0·00	−0·02	0 33 58·11	0 33 42·54	0 15·57			
	ζ Andromedæ	23 42	S	W	15	0 42 1·62	+0·04	+0·14	+ 0·01	−0·02	0 42 1·79	0 41 46·21	0 15·58			
	136 Gr. 80	18 37	S	W	15	0 49 17·09	+0·04	+0·13	+ 0·01	−0·02	0 49 17·25	0 49 1·61	0 15·64			
	μ Andromedæ	37 56	N	W	15	0 51 10·64	+0·04	+0·16	− 0·01	−0·02	0 51 10·81	0 50 55·34	0 15·47			
	157 Gr. 80	40 47	N	W	15	0 57 15·41	+0·05	+0·16	− 0·02	−0·02	0 57 15·58	0 56 59·91	0 15·67			
	170 „	14 23	S	W	15	0 59 48·30	+0·04	+0·13	+ 0·02	−0·02	0 59 48·47	0 59 32·83	0 15·64			
	177 „	12 24	S	W	15	1 1 17·81	+0·04	+0·13	+ 0·02	−0·02	1 1 17·98	1 1 2·26	0 15·72			
	β Andromedæ	35 4	N	W	15	1 4 6·45	+0·04	+0·15	− 0·01	−0·02	1 4 6·61	1 3 51·09	0 15·52	−0 15·601		
		Mean	...	...	...	0 52 22										
	196 Gr. 80	29 32	N	E	10	1 6 8·18	−0·04	+0·06	0·00	−0·02	1 6 8·18	1 5 52·57	0 15·61			
	201 „	15 35	S	E	15	1 8 48·65	−0·04	+0·05	+ 0·02	−0·02	1 8 48·66	1 8 33·09	0 15·57			
	υ Piscium	26 43	S	E	15	1 13 57·38	−0·04	+0·06	0·00	−0·02	1 13 57·38	1 13 41·74	0 15·64			
	210 Gr. 80	44 59	N	E	15	1 16 24·97	−0·05	+0·07	− 0·02	−0·03	1 16 24·94	1 16 9·35	0 15·59			
	222 „	44 52	N	E	13	1 21 37·98	−0·05	+0·07	− 0·02	−0·03	1 21 37·95	1 21 22·22	0 15·73			
	η Piscium	14 48	S	E	15	1 26 7·79	−0·04	+0·05	+ 0·02	−0·02	1 26 7·80	1 25 52·08	0 15·72			
	239 Gr. 80	17 55	S	E	15	1 29 24·11	−0·04	+0·06	+ 0·01	−0·02	1 29 24·12	1 29 8·49	0 15·63			
	244 „	40 53	N	E	15	1 30 53·80	−0·05	+0·07	− 0·02	−0·02	1 30 53·78	1 30 38·06	0 15·72	−0 15·651	−0 15·626	1 5 46
		Mean	...	...	...	1 19 10										
	ν Persei	42 15	N	E	15	3 38 20·90	−0·05	+0·11	− 0·04	−0·02	3 38 20·90	3 38 4·73	0 16·17			
	579 Gr. 80	24 2	S	E	15	3 39 51·83	−0·04	+0·09	+ 0·01	−0·02	3 39 51·87	3 39 35·64	0 16·23	−0 16·200		
		Mean	...	...	...	3 39 6										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT BUSHIRE (W), *Lat.* 28° 55′, BY LENOX CONYNGHAM WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 29	η Tauri	23 47	S	W	11	3 41 31·58	+0·04	+0·11	+ 0·01	−0·02	3 41 31·72	3 41 15·53	−0 16·19			
	590 Gr. 80	23 44	S	W	15	3 43 12·17	+0·04	+0·11	+ 0·01	−0·02	3 43 12·31	3 42 56·09	−0 16·22			
	ζ Persei	31 35	N	W	15	3 47 49·02	+0·04	+0·12	− 0·01	−0·02	3 47 49·15	3 47 32·95	−0 16·20			
	ε Persei	39 43	N	W	15	3 51 5·59	+0·05	+0·13	− 0·03	−0·02	3 51 5·72	3 50 49·58	−0 16·14			
	ξ Persei	35 30	N	W	13	3 52 26·38	+0·04	+0·12	− 0·02	−0·02	3 52 26·50	3 52 10·22	−0 16·28	−0 16·206	−0 16·203	3 43 10
		Mean	...	...	...	3 47 13										
„ 30	75 Gr. 80	19 43	S	E	14	0 27 25·86	−0·03	+0·05	+ 0·01	−0·02	0 27 25·87	0 27 4·96	−0 20·91			
	π Andromedæ	33 9	N	E	13	0 31 36·92	−0·04	+0·06	− 0·01	−0·02	0 31 36·91	0 31 15·99	−0 20·92			
	δ Andromedæ	30 17	N	E	14	0 34 3·37	−0·04	+0·05	0·00	−0·02	0 34 3·36	0 33 42·53	−0 20·83			
	ζ Andromedæ	23 42	S	E	15	0 42 7·15	−0·03	+0·05	+ 0·01	−0·02	0 42 7·16	0 41 46·20	−0 20·96			
	121 Gr. 80	40 30	N	E	13	0 44 21·98	−0·04	+0·06	− 0·02	−0·02	0 44 21·96	0 44 0·97	−0 20·99			
	136 „	18 37	S	E	15	0 49 22·60	−0·03	+0·05	+ 0·01	−0·02	0 49 22·61	0 49 1·60	−0 21·01			
	μ Andromedæ	37 56	N	E	15	0 51 16·26	−0·04	+0·06	− 0·01	−0·02	0 51 16·25	0 50 55·33	−0 20·92			
	157 Gr. 80	40 47	N	E	15	0 57 20·98	−0·04	+0·06	− 0·02	−0·02	0 57 20·96	0 56 59·90	−0 21·06	−0 20·950		
		Mean	...	...	...	0 42 12										
	170 Gr. 80	14 23	S	W	14	0 59 53·81	+0·03	+0·06	+ 0·02	−0·02	0 59 53·90	0 59 32·82	−0 21·08			
	177 „	12 24	S	W	14	1 1 23·25	+0·03	+0·06	+ 0·02	−0·02	1 1 23·34	1 1 2·25	−0 21·09			
	β Andromedæ	35 4	N	W	15	1 4 11·99	+0·04	+0·08	− 0·01	−0·02	1 4 12·08	1 3 51·08	−0 21·00			
	196 Gr. 80	29 32	N	W	13	1 6 13·60	+0·04	+0·07	0·00	−0·02	1 6 13·69	1 5 52·55	−0 21·14			
	201 „	15 35	S	W	14	1 8 54·07	+0·03	+0·06	+ 0·02	−0·02	1 8 54·16	1 8 33·07	−0 21·09			
	υ Piscium	26 43	S	W	15	1 14 2·66	+0·03	+0·07	0·00	−0·02	1 14 2·74	1 13 41·72	−0 21·02			
	210 Gr. 80	44 59	N	W	15	1 16 30·28	+0·04	+0·08	− 0·03	−0·03	1 16 30·34	1 16 9·33	−0 21·01			
	222 „	44 52	N	W	13	1 21 43·28	+0·04	+0·08	− 0·03	−0·03	1 21 43·34	1 21 22·20	−0 21·14	−0 21·071	−0 21·011	0 55 40
		Mean	...	...	...	1 9 7										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT BUSHIRE (W), *Lat.* 28° 55′, BY LENOX CONYNGHAM WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 30	551 Gr. 80	47 51	N	W	12	3 29 24·32	+0·05	+0·04	− 0·14	−0·03	3 29 24·24	3 29 2·72	−0 21·52			
	553 „	22 52	S	W	11	3 31 10·01	+0·03	+0·03	+ 0·03	−0·02	3 31 10·08	3 30 48·52	−0 21·56			
	562 „	24 59	S	W	11	3 34 52·47	+0·03	+0·03	+ 0·02	−0·02	3 34 52·53	3 34 30·94	−0 21·59			
	δ Persei	47 27	N	W	9	3 35 49·59	+0·05	+0·04	− 0·14	−0·03	3 35 49·51	3 35 28·03	−0 21·48			
	565 Gr. 80	19 22	S	W	11	3 36 38·08	+0·03	+0·03	+ 0·05	−0·02	3 36 38·17	3 36 16·52	−0 21·65			
	ν Persei	42 15	N	W	13	3 38 26·28	+0·04	+0·04	− 0·09	−0·02	3 38 26·25	3 38 4·73	−0 21·52			
	579 Gr. 80	24 2	S	W	10	3 39 57·24	+0·03	+0·03	+ 0·03	−0·02	3 39 57·31	3 39 35·63	−0 21·68	−0 21·571		
		Mean	...	...	...	3 35 11										
	η Tauri	23 47	S	E	11	3 41 37·17	−0·03	0·00	+ 0·03	−0·02	3 41 37·15	3 41 15·53	−0 21·62			
	590 Gr. 80	23 44	S	E	14	3 43 17·73	−0·03	0·00	+ 0·03	−0·02	3 43 17·71	3 42 56·08	−0 21·63			
	ζ Persei	31 35	N	E	15	3 47 54·63	−0·04	0·00	− 0·02	−0·02	3 47 54·55	3 47 32·95	−0 21·60			
	ε Persei	39 43	N	E	15	3 51 11·31	−0·04	0·00	− 0·07	−0·02	3 51 11·18	3 50 49·57	−0 21·61			
	ξ Persei	35 30	N	E	13	3 52 31·95	−0·04	0·00	− 0·04	−0·02	3 52 31·85	3 52 10·21	−0 21·64	−0 21·620	−0 21·596	3 41 15
		Mean	...	...	...	3 47 19										
„ 31	68 Gr. 80	29 10	N	E	15	0 25 0·81	−0·04	0·00	0·00	−0·02	0 25 0·75	0 24 34·56	−0 26·19			
	75 „	19 43	S	E	15	0 27 31·16	−0·04	0·00	+ 0·01	−0·02	0 27 31·11	0 27 4·94	−0 26·17			
	π Andromedæ	33 9	N	E	15	0 31 42·24	−0·04	0·00	− 0·01	−0·02	0 31 42·17	0 31 15·98	−0 26·19			
	δ Andromedæ	30 17	N	E	15	0 34 8·70	−0·04	0·00	0·00	−0·02	0 34 8·64	0 33 42·52	−0 26·12			
	ζ Andromedæ	23 42	S	E	15	0 42 12·48	−0·04	0·00	+ 0·01	−0·02	0 42 12·43	0 41 46·19	−0 26·24			
	121 Gr. 80	40 30	N	E	14	0 44 27·33	−0·05	0·00	− 0·02	−0·02	0 44 27·24	0 44 0·95	−0 26·29			
	136 „	18 37	S	E	15	0 49 27·88	−0·04	0·00	+ 0·02	−0·02	0 49 27·84	0 49 1·58	−0 26·26			
	μ Andromedæ	37 56	N	E	14	0 51 21·51	−0·04	0·00	− 0·02	−0·02	0 51 21·43	0 50 55·31	−0 26·12	−0 26·198		
		Mean	...	...	...	0 38 14										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT BUSHIRE (W), *Lat.* 28° 55′, BY LENOX CONYNGHAM WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1894		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 31	157 Gr. 80	40 47	N	W	14	0 57 26·12	+0·05	+0·04	− 0·02	−0·02	0 57 26·17	0 56 59·88	−0 26·29			
	170 „	14 23	S	W	15	0 59 59·05	+0·04	+0·03	+ 0·02	−0·02	0 59 59·12	0 59 32·81	−0 26·31			
	177 „	12 24	S	W	13	1 1 28·51	+0·04	+0·03	+ 0·02	−0·02	1 1 28·58	1 1 2·24	−0 26·34			
	β Andromedæ	35 4	N	W	15	1 4 17·21	+0·04	+0·04	− 0·01	−0·02	1 4 17·26	1 3 51·06	−0 26·20			
	196 Gr. 80	29 32	N	W	15	1 6 18·85	+0·04	+0·04	0·00	−0·02	1 6 18·91	1 5 52·54	−0 26·37			
	201 „	15 35	S	W	15	1 8 59·34	+0·04	+0·03	+ 0·02	−0.02	1 8 59·41	1 8 33·06	−0 26·35			
	υ Piscium	26 43	S	W	15	1 14 7·92	+0·04	+0·03	0·00	−0·02	1 14 7·97	1 13 41·71	−0 26·26			
	210 Gr. 80	44 59	N	W	15	1 16 35·63	+0·05	+0·04	− 0·03	−0·03	1 16 35·66	1 16 9·31	−0 26·35	−0 26·309	−0 26·254	0 52 12
	Mean	...	...	...	1 6 9											
1895																
Jan. 1	π Andromedæ	33 9	N	W	8	0 31 47·34	+0·04	−0·02	− 0·01	−0·02	0 31 47·33	0 31 15·97	−0 31·36			
	δ Andromedæ	30 17	N	W	19	0 34 13·82	+0·04	−0·02	0·00	−0·02	0 34 13·82	0 33 42·51	−0 31·31			
	121 Gr. 80	40 30	N	W	15	0 44 32·39	+0·05	−0·02	− 0·02	−0·02	0 44 32·38	0 44 0·93	−0 31·45			
	μ Andromedæ	37 56	N	W	15	0 51 26·62	+0·04	−0·02	− 0·01	−0·02	0 51 26·61	0 50 55·30	−0 31·31			
	β Andromedæ	35 4	N	W	14	1 4 22·46	+0·04	−0·02	− 0·01	−0·02	1 4 22·45	1 3 51·05	−0 31·40			
	196 Gr. 80	29 32	N	W	14	1 6 24·05	+0·04	−0·02	0·00	−0·02	1 6 24·05	1 5 52·53	−0 31·52	−0 31·392		
	Mean	...	...	...	0 48 48											
	210 Gr. 80	44 59	N	E	15	1 16 40·91	−0·05	−0·01	− 0·03	−0·03	1 16 40·79	1 16 9·29	−0 31·50			
	222 „	44 52	N	E	11	1 21 54·04	−0·05	−0·01	− 0·03	−0·03	1 21 53·92	1 21 22·16	−0 31·76			
	η Piscium	14 48	S	E	15	1 26 23·74	−0·04	0·00	+ 0·02	−0·02	1 26 23·70	1 25 52·06	−0 31·64			
	244 Gr. 80	40 53	N	E	13	1 31 9·76	−0·05	−0·01	− 0·02	−0·02	1 31 9·66	1 30 38·02	−0 31·64			
	264 „	19 46	S	E	15	1 37 19·77	−0·04	0·00	+ 0·01	−0·02	1 37 19·72	1 36 47·98	−0 31·74	−0 31·656		
	Mean	...	...	...	1 26 42											

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT BUSHIRE (W), *Lat.* 28° 55′, BY LENOX CONYNGHAM WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit =T	Right Ascension =R.A.	Clock Correction: By each Star = R.A.−T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_w
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Jan. 1	285 Gr. 80	29 4	N	W	15	1 47 37·60	+0·04	−0·02	0·00	−0·02	1 47 37·60	1 47 5·93	−0 31·67			
	β Arietis	20 18	S	W	15	1 49 22·31	+0·04	−0·02	+ 0·01	−0·02	1 49 22·32	1 48 50·65	−0 31·67			
	294 Gr. 80	36 44	N	W	14	1 50 26·88	+0·04	−0·02	− 0·01	−0·02	1 50 26·87	1 49 55·21	−0 31·66			
	296 „	17 18	S	W	15	1 52 8·86	+0·04	−0·02	+ 0·02	−0·02	1 52 8·88	1 51 37·14	−0 31·74	−0 31·685		
		Mean	...	...	...	1 49 54										
	317 Gr. 80	32 47	N	E	10	1 57 22·00	−0·04	0·00	− 0·01	−0·02	1 57 21·93	1 56 50·09	−0 31·84			
	γ Andromedæ	41 50	N	E	13	1 57 59·29	−0·05	−0·01	− 0·02	−0·02	1 57 59·19	1 57 27·43	−0 31·76	−0 31·800	−0 31·633	1 30 47
		Mean	...	...	...	1 57 41										
	δ Persei	47 27	N	E	10	3 36 0·19	−0·05	−0·01	− 0·04	−0·03	3 36 0·06	3 35 28·02	−0 32·04			
	565 Gr. 80	19 22	S	E	8	3 36 48·79	−0·04	0·00	+ 0·01	−0·02	3 36 48·74	3 36 16·52	−0 32·22			
	ν Persei	42 15	N	E	10	3 38 36·86	−0·05	−0·01	− 0·02	−0·02	3 38 36·76	3 38 4·72	−0 32·04			
	577 Gr. 80	24 8	S	E	9	3 39 30·64	−0·04	0·00	+ 0·01	−0·02	3 39 30·59	3 38 58·36	−0 32·23	−0 32·133		
		Mean	...	...	...	3 37 44										
	η Tauri	23 47	S	W	13	3 41 47·57	+0·04	+0·03	+ 0·01	−0·02	3 41 47·63	3 41 15·53	−0 32·10			
	590 Gr. 80	23 44	S	W	13	3 43 28·17	+0·04	+0·03	+ 0·01	−0·02	3 43 28·23	3 42 56·08	−0 32·15			
	ζ Persei	31 35	N	W	12	3 48 4·94	+0·04	+0·03	0·00	−0·02	3 48 4·99	3 47 32·95	−0 32·04			
	ε Persei	39 43	N	W	14	3 51 21·58	+0·05	+0·03	− 0·02	−0·02	3 51 21·62	3 50 49·57	−0 32·05			
	ξ Persei	35 30	N	W	10	3 52 42·24	+0·04	+0·03	− 0·01	−0·02	3 52 42·28	3 52 10·21	−0 32·07	−0 32·082	−0 32·108	3 42 37
		Mean	...	...	...	3 47 29										

ARC KARACHI-BUSHIRE.

EXPLANATION OF *TABLE V.*

Observations of Transits of the same Stars at both Stations, and Deduction of the Difference of Corrected Times.

This Table includes observations at both stations.

The seconds of corrected time of transit in the case of the Eastern station, Karachi, are obtained precisely as in Table IV for clock stars. But in the case of the Western station, Bushire, there is an additional correction on account of the rate of its clock.

The quantity sought is the difference between the errors of the two clocks at a particular epoch, namely, that at which the star transited at the Eastern station. Now the interval between the transit of a star at the Eastern station and its transit at the Western station is equal to the difference of longitude, so that the observed time of transit at the Western station requires a correction equal to the change in the Western clock's error during an interval equal to the difference of longitude, *i.e.*, equal to the clock's hourly rate correction multiplied by the difference of longitude expressed in hours. This quantity is found for each night in the last column of Table VI. There is therefore a slight inter-dependence between these two tables, but no confusion results in practice, for the quantities required from Table V in order to form Table VI do not include the correction for clock rate: thus Table V may be brought up to the point immediately preceding this entry, then Table VI can be computed in its entirety, and lastly the final columns of Table V filled in.

EXPLANATION OF *TABLE V.*—(*Continued*).

It will be noticed that though the correction given in the last column of Table VI has only one value per night, the quantity entered in Table V has always two values per night. The reason of this is that in Table V only two places of decimals are kept, so that the final value might be burdened by an error not exceeding $0^s \cdot 005$; in order to avoid this, care is taken to increase the value entered in Table V by 1 in the second place of decimals as often as is requisite to make the mean value correct to the third place of decimals.

Thus on December 28th out of 30 entries, 24 are $0^s \cdot 26$, and 6 are $0^s \cdot 25$, so that the mean is $0^s \cdot 258$ which agrees with the value in Table VI.

This method of compensation has been frequently adopted throughout the computations and will account for apparent arithmetical inconsistencies in various places.

Having obtained the seconds of corrected time at each station, the difference between them is taken out. These differences are combined into means according to the positions of the two instruments, and corresponding to the mean epochs of the groups, and lastly these means are combined into final means corresponding to final mean epochs.

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

KARACHI (E), *Lat.* 24° 51′, *Long.* 4h 28m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Astronomical Date	Star		Transits Observed at KARACHI (E) by BURRARD with Telescope No. 1.							
	Number in Gr. 80	Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for				Seconds of Corrected Time
						Collimation	Level	Deviation	Diurnal Aberration	
1894		° ′			h m s	s	s	s	s	s
Dec. 28	731	41 3	N	E	4 29 24·21	−0·01	−0·53	−0·15	−0·02	23·50
	738	20 28	S	E	4 32 3·14	0·00	−0·44	+0·03	−0·02	2·71
	750	28 25	N	E	4 34 44·47	0·00	−0·47	−0·03	−0·02	43·95
	761	10 57	S	E	4 38 35·55	0·00	−0·41	+0·10	−0·02	35·22
	772	31 15	N	E	4 42 28·17	0·00	−0·48	−0·05	−0·02	27·62
	784	42 25	N	E	4 45 22·27	−0·01	−0·53	−0·16	−0·03	21·54
		Mean	...	...	4 37 6					
	792	14 5	S	W	4 46 34·62	0·00	−0·51	+0·08	−0·02	34·17
	800	33 0	N	W	4 50 8·72	0·00	−0·59	−0·07	−0·02	8·04
	808	24 53	N	W	4 51 43·00	0·00	−0·55	0·00	−0·02	42·43
	810	39 30	N	W	4 53 8·51	+0·01	−0·63	−0·13	−0·02	7·74
	816	40 55	N	W	4 55 7·93	+0·01	−0·63	−0·15	−0·02	7·14
	823	21 26	S	W	4 56 48·25	0·00	−0·54	+0·03	−0·02	47·72
	828	41 6	N	W	4 59 8·71	+0·01	−0·63	−0·15	−0·02	7·92
	833	18 30	S	W	5 1 13·74	0·00	−0·52	+0·05	−0·02	13·25
		Mean	...	...	4 54 14					
	947	30 26	N	W	5 31 52·93	0·00	−0·62	−0·05	−0·02	52·24
	951	29 9	N	W	5 32 37·00	0·00	−0·61	−0·03	−0·02	36·34
	962	16 29	S	W	5 35 12·66	0·00	−0·56	+0·06	−0·02	12·14
	968	23 9	S	W	5 36 56·11	0·00	−0·59	+0·01	−0·02	55·51
	975	14 27	S	W	5 41 13·33	0·00	−0·55	+0·07	−0·02	12·83
	984	39 7	N	W	5 44 12·42	0·00	−0·67	−0·13	−0·02	11·60
	990	19 50	S	W	5 46 9·26	0·00	−0·57	+0·04	−0·02	8·71
	997	31 41	N	W	5 48 9·50	0·00	−0·63	−0·06	−0·02	8·79
		Mean	...	...	5 39 33					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

KARACHI (E), *Lat.* 24° 51′, *Long.* $4^h\ 28^m$: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* $3^h\ 23^m$.

Transits Observed at BUSHIRE (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch = T_E
Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Correction for Rate of W Clock to T_E	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
N	E	4 29 37·11	−0·05	+0·07	−0·02	−0·02	−0·26	36·83	+ 0 13·33			
S	E	4 32 16·22	−0·04	+0·06	+0·01	−0·02	−0·26	15·97	0 13·26			
S	E	4 34 57·49	−0·04	+0·06	0·00	−0·02	−0·26	57·23	0 13·28			
S	E	4 38 48·71	−0·04	+0·05	+0·02	−0·02	−0·26	48·46	0 13·24			
N	E	4 42 41·26	−0·05	+0·06	0·00	−0·02	−0·26	40·99	0 13·37			
N	E	4 45 35·17	−0·05	+0·07	−0·02	−0·02	−0·26	34·89	0 13·35	+ 0 13·305		
S	W	4 46 47·56	+0·04	+0·08	+0·01	−0·02	−0·26	47·41	+ 0 13·24			
N	W	4 50 21·49	+0·05	+0·10	0·00	−0·02	−0·25	21·37	0 13·33			
S	W	4 51 55·93	+0·04	+0·09	0·00	−0·02	−0·25	55·79	0 13·36			
N	W	4 53 21·29	+0·05	+0·10	−0·01	−0·02	−0·26	21·15	0 13·41			
N	W	4 55 20·55	+0·05	+0·11	−0·01	−0·02	−0·26	20·42	0 13·28			
S	W	4 57 1·22	+0·04	+0·09	+0·01	−0·02	−0·26	1·08	0 13·36			
N	W	4 59 21·41	+0·05	+0·11	−0·02	−0·02	−0·26	21·27	0 13·35			
S	W	5 1 26·75	+0·04	+0·08	+0·01	−0·02	−0·26	26·60	0 13·35	+ 0 13·335	+ 0 13·320	4 45 40
N	E	5 32 6·16	−0·04	+0·06	0·00	−0·02	−0·26	5·90	+ 0 13·66			
N	E	5 32 50·35	−0·04	+0·06	0·00	−0·02	−0·26	50·09	0 13·75			
S	E	5 35 26·04	−0·04	+0·06	+0·01	−0·02	−0·26	25·79	0 13·65			
S	E	5 37 9·45	−0·04	+0·06	+0·01	−0·02	−0·25	9·21	0 13·70			
S	E	5 41 26·83	−0·04	+0·05	+0·01	−0·02	−0·25	26·58	0 13·75			
N	E	5 44 25·58	−0·05	+0·07	−0·01	−0·02	−0·26	25·31	0 13·71			
S	E	5 46 22·70	−0·04	+0·06	+0·01	−0·02	−0·26	22·45	0 13·74			
N	E	5 48 22·85	−0·05	+0·06	0·00	−0·02	−0·26	22·58	0 13·79	+ 0 13·719		

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

KARACHI (E), *Lat.* 24° 51′, *Long.* 4ʰ 28ᵐ: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3ʰ 23ᵐ.

Astronomical Date	Star		Transits Observed at KARACHI (E) by BURRARD with Telescope No. 1.							
	Number in Gr. 80	Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for				Seconds of Corrected Time
						Collimation	Level	Deviation	Diurnal Aberration	
1894		° ′			h m s	s	s	s	s	s
Dec. 28	1003	28 55	N	E	5 49 52·79	0·00	−0·56	−0·03	−0·02	52·18
	1010	25 56	N	E	5 51 27·86	0·00	−0·54	−0·01	−0·02	27·29
	1014	37 12	N	E	5 52 33·11	0·00	−0·60	−0·11	−0·02	32·38
	1021	22 24	S	E	5 55 20·25	0·00	−0·53	+0·02	−0·02	19·72
	1022	19 42	S	E	5 57 13·39	0·00	−0·52	+0·04	−0·02	12·89
	1030	29 31	N	E	5 59 39·49	0·00	−0·56	−0·04	−0·02	38·87
	1037	14 47	S	E	6 1 33·50	0·00	−0·50	+0·07	−0·02	33·05
	1049	32 43	N	E	6 5 26·76	0·00	−0·57	−0·06	−0·02	26·11
		Mean	...	...	5 56 38					
Dec. 29	738	20 28	S	E	4 31 60·20	−0·03	−0·50	+0·06	−0·02	59·71
	750	28 25	N	E	4 34 41·68	−0·03	−0·53	−0·05	−0·02	41·05
	772	31 15	N	E	4 42 25·41	−0·03	−0·54	−0·10	−0·02	24·72
	784	42 25	N	E	4 45 19·51	−0·04	−0·60	−0·30	−0·03	18·54
		Mean	...	...	4 38 37					
	792	14 5	S	W	4 46 31·64	+0·03	−0·42	+0·14	−0·02	31·37
	800	33 0	N	W	4 50 6·00	+0·03	−0·49	−0·13	−0·02	5·39
	808	24 53	N	W	4 51 40·09	+0·03	−0·46	0·00	−0·02	39·64
	816	40 55	N	W	4 55 5·17	+0·04	−0·53	−0·27	−0·02	4·39
	823	21 26	S	W	4 56 45·40	+0·03	−0·44	+0·05	−0·02	45·02
	828	41 6	N	W	4 59 5·93	+0·04	−0·53	−0·27	−0·02	5·15
	833	18 30	S	W	5 1 10·80	+0·03	−0·43	+0·09	−0·02	10·47
		Mean	...	...	4 54 21					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

KARACHI (E), *Lat.* 24° 51′, *Long.* 4^h 28^m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3^h 23^m.

Transits Observed at BUSHIRE (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch $= T_E$
Star's Aspect	Instrumental Position	Observed Time	Correction for: Collimation	Level	Deviation	Diurnal Aberration	Rate of W Clock to T_E	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
N	W	5 50 6·22	+0·04	+0·09	0·00	−0·02	−0·26	6·07	+ 0 13·89			
S	W	5 51 41·26	+0·04	+0·09	0·00	−0·02	−0·26	41·11	0 13·82			
N	W	5 52 46·37	+0·05	+0·10	−0·02	−0·02	−0·26	46·23	0 13·85			
S	W	5 55 33·74	+0·04	+0·09	+0·01	−0·02	−0·26	33·60	0 13·88			
S	W	5 57 26·90	+0·04	+0·09	+0·01	−0·02	−0·26	26·76	0 13·87			
N	W	5 59 52·89	+0·04	+0·09	0·00	−0·02	−0·25	52·75	0 13·88			
S	W	6 1 47·07	+0·04	+0·08	+0·01	−0·02	−0·25	46·93	0 13·88			
N	W	6 5 40·18	+0·05	+0·10	0·00	−0·02	−0·26	40·05	0 13·94	+ 0 13·876	+ 0 13·798	5 48 6
S	E	4 32 21·77	−0·04	+0·05	+0·02	−0·02	−0·24	21·54	+ 0 21·83			
S	E	4 35 3·11	−0·04	+0·05	0·00	−0·02	−0·24	2·86	0 21·81			
N	E	4 42 46·80	−0·04	+0·05	−0·01	−0·02	−0·24	46·54	0 21·82			
N	E	4 45 40·79	−0·05	+0·06	−0·04	−0·02	−0·24	40·50	0 21·96	+ 0 21·855		
S	W	4 46 53·13	+0·04	+0·08	+0·03	−0·02	−0·24	53·02	+ 0 21·65			
N	W	4 50 27·04	+0·04	+0·10	−0·01	−0·02	−0·24	26·91	0 21·52			
S	W	4 52 1·51	+0·04	+0·09	+0·01	−0·02	−0·23	1·40	0 21·76			
N	W	4 55 26·19	+0·05	+0·11	−0·04	−0·02	−0·23	26·06	0 21·67			
S	W	4 57 6·87	+0·04	+0·09	+0·02	−0·02	−0·23	6·77	0 21·75			
N	W	4 59 27·00	+0·05	+0·11	−0·04	−0·02	−0·23	26·87	0 21·72			
S	W	5 1 32·31	+0·04	+0·09	+0·02	−0·02	−0·24	32·20	0 21·73	+ 0 21·686	+ 0 21·771	4 46 29

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

KARACHI (E), *Lat.* 24° 51′, *Long.* 4h 28m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Astronomical Date	Star: Number in Gr. 80	Star: Declination	Transits Observed at KARACHI (E) by BURRARD with Telescope No. 1.: Star's Aspect	Instrumental Position	Observed Time	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Seconds of Corrected Time
1894		° ′			h m s	s	s	s	s	s
Dec. 29	947	30 26	N	E	5 31 50·13	−0·03	−0·52	−0·08	−0·02	49·48
	951	29 9	N	E	5 32 34·14	−0·03	−0·52	−0·06	−0·02	33·51
	962	16 29	S	E	5 35 9·74	−0·03	−0·47	+0·11	−0·02	9·33
	968	23 9	S	E	5 36 53·09	−0·03	−0·49	+0·02	−0·02	52·57
	975	14 27	S	E	5 41 10·44	−0·03	−0·46	+0·14	−0·02	10·07
	984	39 7	N	E	5 44 9·49	−0·03	−0·57	−0·23	−0·02	8·64
	990	19 50	S	E	5 46 6·41	−0·03	−0·48	+0·07	−0·02	5·95
	997	31 41	N	E	5 48 6·75	−0·03	−0·53	−0·10	−0·02	6·07
		Mean	...	...	5 39 30					
	1003	28 55	N	W	5 49 50·04	+0·03	−0·48	−0·06	−0·02	49·51
	1010	25 56	N	W	5 51 25·20	+0·03	−0·47	−0·02	−0·02	24·72
	1014	37 12	N	W	5 52 30·53	+0·03	−0·52	−0·20	−0·02	29·82
	1021	22 24	S	W	5 55 17·61	+0·03	−0·46	+0·03	−0·02	17·19
	1022	19 42	S	W	5 57 10·75	+0·03	−0·45	+0·07	−0·02	10·38
	1030	29 31	N	W	5 59 36·81	+0·03	−0·48	−0·07	−0·02	36·27
	1043	23 8	S	W	6 3 17·85	+0·03	−0·46	+0·02	−0·02	17·42
	1049	32 43	N	W	6 5 24·15	+0·03	−0·50	−0·12	−0·02	23·54
		Mean	...	...	5 56 49					
Dec. 30	727	14 37	S	W	4 27 47·74	+0·01	−0·44	+0·10	−0·02	47·39
	731	41 3	N	W	4 29 19·94	+0·01	−0·55	−0·20	−0·02	19·18
	738	20 28	S	W	4 31 58·65	+0·01	−0·46	+0·04	−0·02	58·22
	750	28 25	N	W	4 34 40·09	+0·01	−0·49	−0·04	−0·02	39·55
	761	10 57	S	W	4 38 31·03	+0·01	−0·43	+0·13	−0·02	30·72
	772	31 15	N	W	4 42 23·82	+0·01	−0·50	−0·07	−0·02	23·24
	784	42 25	N	W	4 45 17·88	+0·01	−0·55	−0·22	−0·03	17·09
		Mean	...	...	4 35 43					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

KARACHI (E), *Lat.* 24° 51′, *Long.* 4ʰ 28ᵐ: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3ʰ 23ᵐ.

Transits Observed at BUSHIRE (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			
Star's Aspect	Instrumental Position	Observed Time	Correction for: Collimation	Level	Deviation	Diurnal Aberration	Rate of W Clock to T_E	Seconds of Corrected Time	By each Star − W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	Mean Epoch $= T_E$
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
N	W	5 32 11·61	+0·04	+0·10	0·00	−0·02	−0·24	11·49	+ 0 22·01			
N	W	5 32 55·82	+0·04	+0·10	0·00	−0·02	−0·24	55·70	0 22·19			
S	W	5 35 31·49	+0·04	+0·09	+0·03	−0·02	−0·24	31·39	0 22·06			
S	W	5 37 14·94	+0·04	+0·09	+0·01	−0·02	−0·24	14·82	0 22·25			
S	W	5 41 32·29	+0·04	+0·08	+0·03	−0·02	−0·24	32·18	0 22·11			
N	W	5 44 31·03	+0·04	+0·11	−0·03	−0·02	−0·23	30·90	0 22·26			
S	W	5 46 28·21	+0·04	+0·09	+0·02	−0·02	−0·23	28·11	0 22·16			
N	W	5 48 28·33	+0·04	+0·10	−0·01	−0·02	−0·23	28·21	0 22·14	+ 0 22·148		
N	E	5 50 11·85	−0·04	+0·05	0·00	−0·02	−0·23	11·61	+ 0 22·10			
S	E	5 51 46·93	−0·04	+0·05	+0·01	−0·02	−0·24	46·69	0 21·97			
N	E	5 52 52·04	−0·04	+0·06	−0·02	−0·02	−0·24	51·78	0 21·96			
S	E	5 55 39·37	−0·04	+0·05	+0·02	−0·02	−0·24	39·14	0 21·95			
S	E	5 57 32·63	−0·04	+0·05	+0·02	−0·02	−0·24	32·40	0 22·02			
N	E	5 59 58·58	−0·04	+0·05	0·00	−0·02	−0·24	58·33	0 22·06			
S	E	6 3 39·70	−0·04	+0·05	+0·01	−0·02	−0·23	39·47	0 22·05			
N	E	6 5 45·91	−0·04	+0·05	−0·01	−0·02	−0·23	45·66	0 22·12	+ 0 22·029	+ 0 22·089	5 48 10
S	W	4 28 16·29	+0·03	+0·04	+0·02	−0·02	−0·24	16·12	+ 0 28·73			
N	W	4 29 48·07	+0·04	+0·06	−0·02	−0·02	−0·24	47·89	0 28·71			
S	W	4 32 27·14	+0·03	+0·04	+0·01	−0·02	−0·24	26·96	0 28·74			
S	W	4 35 8·42	+0·04	+0·05	0·00	−0·02	−0·24	8·25	0 28·70			
S	W	4 38 59·60	+0·03	+0·04	+0·02	−0·02	−0·24	59·43	0 28·71			
N	W	4 42 52·13	+0·04	+0·05	0·00	−0·02	−0·24	51·96	0 28·72			
N	W	4 45 46·15	+0·04	+0·06	−0·03	−0·02	−0·24	45·96	0 28·87	+ 0 28·740		

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

KARACHI (E), *Lat.* 24° 51′, *Long.* 4h 28m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Astronomical Date	Star		Transits Observed at KARÀCHI (E) by BURRARD with Telescope No. 1.							
	Number in Gr. 80	Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Seconds of Corrected Time
1894		° ′			h m s	s	s	s	s	s
Dec. 30	792	14 5	S	E	4 46 29·88	−0·01	−0·39	+0·11	−0·02	29·57
	800	33 0	N	E	4 50 4·17	−0·01	−0·46	−0·09	−0·02	3·59
	808	24 53	N	E	4 51 38·40	−0·01	−0·43	0·00	−0·02	37·94
	810	39 30	N	E	4 53 3·95	−0·01	−0·49	−0·18	−0·02	3·25
	816	40 55	N	E	4 55 3·31	−0·01	−0·49	−0·20	−0·02	2·59
	823	21 26	S	E	4 56 43·69	−0·01	−0·42	+0·04	−0·02	43·28
	828	41 6	N	E	4 59 4·11	−0·01	−0·49	−0·20	−0·02	3·39
	833	18 30	S	E	5 1 8·99	−0·01	−0·41	+0·06	−0·02	8·61
		Mean ...	...	...	4 54 10					
	947	30 26	N	E	5 31 48·32	−0·01	−0·51	−0·06	−0·02	47·72
	951	29 9	N	E	5 32 32·45	−0·01	−0·51	−0·05	−0·02	31·86
	962	16 29	S	E	5 35 8·07	−0·01	−0·46	+0·08	−0·02	7·66
	968	23 9	S	E	5 36 51·50	−0·01	−0·48	+0·02	−0·02	51·01
	975	14 27	S	E	5 41 8·78	−0·01	−0·45	+0·10	−0·02	8·40
	984	39 7	N	E	5 44 7·82	−0·01	−0·56	−0·17	−0·02	7·06
	990	19 50	S	E	5 46 4·63	−0·01	−0·47	+0·05	−0·02	4·18
	997	31 41	N	E	5 48 4·85	−0·01	−0·52	−0·08	−0·02	4·22
		Mean ...	...	...	5 39 28					
	1003	28 55	N	W	5 49 48·48	+0·01	−0·51	−0·04	−0·02	47·92
	1010	25 56	N	W	5 51 23·52	+0·01	−0·50	−0·01	−0·02	23·00
	1014	37 12	N	W	5 52 28·97	+0·01	−0·55	−0·15	−0·02	28·26
	1021	22 24	S	W	5 55 15·87	+0·01	−0·48	+0·03	−0·02	15·41
	1022	19 42	S	W	5 57 9·07	+0·01	−0·47	+0·05	−0·02	8·64
	1030	29 31	N	W	5 59 35·19	+0·01	−0·51	−0·05	−0·02	34·62
	1043	23 8	S	W	6 3 16·14	+0·01	−0·48	+0·02	−0·02	15·67
	1049	32 43	N	W	6 5 22·50	+0·01	−0·52	−0·09	−0·02	21·88
		Mean ...	...	...	5 56 50					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

KARACHI (E), *Lat.* 24° 51′, *Long.* 4h 28m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Transits Observed at BUSHIRE (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch = T_E
Star's Aspect	Instrumental Position	Observed Time	Correction for					Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
			Collimation	Level	Deviation	Diurnal Aberration	Rate of W Clock to T_E					
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
S	E	4 46 58·67	−0·03	0·00	+0·02	−0·02	−0·24	58·40	+ 0 28·83			
N	E	4 50 32·66	−0·04	0·00	−0·01	−0·02	−0·24	32·35	0 28·76			
S	E	4 52 7·04	−0·03	0·00	+0·01	−0·02	−0·24	6·76	0 28·82			
N	E	4 53 32·45	−0·04	0·00	−0·02	−0·02	−0·24	32·13	0 28·88			
N	E	4 55 31·82	−0·04	+0·01	−0·02	−0·02	−0·24	31·51	0 28·92			
S	E	4 57 12·40	−0·03	0·00	+0·01	−0·02	−0·24	12·12	0 28·84			
N	E	4 59 32·62	−0·04	+0·01	−0·02	−0·02	−0·24	32·31	0 28·92			
S	E	5 1 37·89	−0·03	0·00	+0·02	−0·02	−0·24	37·62	0 29·01	+ 0 28·873	+ 0 28·807	4 44 57
N	W	5 32 17·11	+0·04	+0·05	0·00	−0·02	−0·24	16·94	+ 0 29·22			
N	W	5 33 1·20	+0·04	+0·05	0·00	−0·02	−0·24	1·03	0 29·17			
S	W	5 35 36·93	+0·03	+0·04	+0·02	−0·02	−0·24	36·76	0 29·10			
S	W	5 37 20·39	+0·03	+0·05	+0·01	−0·02	−0·24	20·22	0 29·21			
S	W	5 41 37·73	+0·03	+0·04	+0·02	−0·02	−0·24	37·56	0 29·16			
N	W	5 44 36·51	+0·04	+0·05	−0·02	−0·02	−0·24	36·32	0 29·26			
S	W	5 46 33·65	+0·03	+0·04	+0·01	−0·02	−0·24	33·47	0 29·29			
N	W	5 48 33·72	+0·04	+0·05	0·00	−0·02	−0·24	33·55	0 29·33	+ 0 29·218		
N	E	5 50 17·32	−0·04	0·00	0·00	−0·02	−0·24	17·02	+ 0 29·10			
S	E	5 51 52·33	−0·03	0·00	0·00	−0·02	−0·24	52·04	0 29·04			
N	E	5 52 57·48	−0·04	0·00	−0·01	−0·02	−0·24	57·17	0 28·91			
S	E	5 55 44·87	−0·03	0·00	+0·01	−0·02	−0·24	44·59	0 29·18			
S	E	5 57 38·01	−0·03	0·00	+0·01	−0·02	−0·24	37·73	0 29·09			
N	E	6 0 4·02	−0·04	0·00	0·00	−0·02	−0·24	3·72	0 29·10			
S	E	6 3 45·05	−0·03	0·00	+0·01	−0·02	−0·24	44·77	0 29·10			
N	E	6 5 51·32	−0·04	0·00	−0·01	−0·02	−0·24	51·01	0 29·13	+ 0 29·081	+ 0 29·150	5 48 9

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

KARACHI (E), *Lat.* 24° 51′, *Long.* 4ʰ 28ᵐ: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3ʰ 23ᵐ.

Astronomical Date	Star: Number in Gr. 80	Star: Declination	Transits Observed at Karachi (E) by Burrard with Telescope No. 1: Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Seconds of Corrected Time
1895		° ′			h m s	s	s	s	s	s
Jan. 1	772	31 15	N	W	4 42 21·04	0·00	−0·56	−0·09	−0·02	20·37
	784	42 25	N	W	4 45 15·16	+0·01	−0·62	−0·27	−0·03	14·25
		Mean ...	...	...	4 43 48					
	792	14 5	S	E	4 46 26·98	0·00	−0·48	+0·13	−0·02	26·61
	800	33 0	N	E	4 50 1·34	0·00	−0·56	−0·11	−0·02	0·65
	808	24 53	N	E	4 51 35·57	0·00	−0·53	0·00	−0·02	35·02
	810	39 30	N	E	4 53 1·15	−0·01	−0·60	−0·22	−0·02	0·30
	816	40 55	N	E	4 54 60·54	−0·01	−0·61	−0·24	−0·02	59.66
	823	21 26	S	E	4 56 40·73	0·00	−0·51	+0·04	−0·02	40·24
	828	41 6	N	E	4 59 1·33	−0·01	−0·61	−0·25	−0·02	0·44
	833	18 30	S	E	5 1 6·19	0·00	−0·50	+0·08	−0·02	5·75
		Mean ...	...	...	4 54 6					
	947	30 26	N	W	5 31 45·64	0·00	−0·56	−0·08	−0·02	44·98
	951	29 9	N	W	5 32 29·73	0·00	−0·55	−0·06	−0·02	29·10
	962	16 29	S	W	5 35 5·37	0·00	−0·50	+0·10	−0·02	4·95
	975	14 27	S	W	5 41 6·06	0·00	−0·49	+0·12	−0·02	5·67
	984	39 7	N	W	5 44 5·29	0·00	−0·60	−0·21	−0·02	4·46
	990	19 50	S	W	5 46 2·00	0·00	−0·51	+0·06	−0·02	1·53
	997	31 41	N	W	5 48 2·38	0·00	−0·57	−0·09	−0·02	1·70
		Mean ...	...	...	5 39 48					
	1003	28 55	N	E	5 49 45·53	0·00	−0·54	−0·05	−0·02	44·92
	1010	25 56	N	E	5 51 20·69	0·00	−0·53	−0·01	−0·02	20·13
	1014	37 12	N	E	5 52 25·92	0·00	−0·58	−0·18	−0·02	25·14
	1022	19 42	S	E	5 57 6·20	0·00	−0·50	+0·06	−0·02	5·74
	1037	14 47	S	E	6 1 26·18	0·00	−0·48	+0·12	−0·02	25·80
		Mean ...	...	...	5 54 25					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

KARACHI (E), *Lat.* 24° 51′, *Long.* 4^h 28^m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3^h 23^m.

Transits Observed at BUSHIRE (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			
Star's Aspect	Instrumental Position	Observed Time	Correction for					Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	Mean Epoch = T_E
			Collimation	Level	Deviation	Diurnal Aberration	Rate of W Clock to T_E					
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
N	W	4 43 2·64	+0·04	+0·04	0·00	−0·02	−0·23	2·47	+ 0 42·10			
N	W	4 45 56·50	+0·05	+0·04	−0·02	−0·02	−0·23	56·32	0 42·07	+ 0 42·085		
S	E	4 47 9·24	−0·04	0·00	+0·02	−0·02	−0·23	8·97	+ 0 42·36			
N	E	4 50 43·14	−0·04	0·00	−0·01	−0·02	−0·23	42·84	0 42·19			
S	E	4 52 17·64	−0·04	0·00	+0·01	−0·02	−0·23	17·36	0 42·34			
N	E	4 53 43·03	−0·05	0·00	−0·02	−0·02	−0·23	42·71	0 42·41			
N	E	4 55 42·27	−0·05	0·00	−0·02	−0·02	−0·23	41·95	0 42·29			
S	E	4 57 22·93	−0·04	0·00	+0·01	−0·02	−0·23	22·65	0 42·41			
N	E	4 59 43·21	−0·05	0·00	−0·02	−0·02	−0·23	42·89	0 42·45			
S	E	5 1 48·42	−0·04	0·00	+0·01	−0·02	−0·24	48·13	0 42·38	+ 0 42·354	+ 0 42·220	4 48 57
N	E	5 32 27·64	−0·04	0·00	0·00	−0·02	−0·23	27·35	+ 0 42·37			
N	E	5 33 11·96	−0·04	0·00	0·00	−0·02	−0·23	11·67	0 42·57			
S	E	5 35 47·65	−0·04	0·00	+0·02	−0·02	−0·23	47·38	0 42·43			
S	E	5 41 48·47	−0·04	0·00	+0·02	−0·02	−0·23	48·20	0 42·53			
N	E	5 44 47·14	−0·04	0·00	−0·02	−0·02	−0·23	46·83	0 42·37			
S	E	5 46 44·40	−0·04	0·00	+0·01	−0·02	−0·23	44·12	0 42·59			
N	E	5 48 44·42	−0·04	0·00	0·00	−0·02	−0·23	44·13	0 42·43	+ 0 42·470		
N	W	5 50 27·66	+0·04	+0·04	0·00	−0·02	−0·23	27·49	+ 0 42·57			
S	W	5 52 2·86	+0·04	+0·03	0·00	−0·02	−0·23	2·68	0 42·55			
N	W	5 53 8·01	+0·04	+0·04	−0·01	−0·02	−0·24	7·82	0 42·68			
S	W	5 57 48·56	+0·04	+0·03	+0·01	−0·02	−0·23	48·39	0 42·65			
S	W	6 2 8·71	+0·04	+0·03	+0·02	−0·02	−0·23	8·55	0 42·75	+ 0 42·640	+ 0 42·555	5 47 7

EXPLANATION OF *TABLE VI.*

Deduction of Clock Rate Correction.

From the results contained in Tables III, IV and V, the clock rate correction can now be deduced.

Column 1 contains the name of the arc.

„ 2 contains the approximate difference of longitude in hours, minutes and decimals of a minute.

„ 3 contains the date.

„ 4 contains the observed clock correction as deduced from observations of clock stars in Table IV.

„ 5 contains the epoch to which the foregoing correction corresponds, also from Table IV.

„ 6 contains the hourly clock rate as deduced from observation of clock stars. To obtain this the rate from day to day is computed by dividing the difference between two clock corrections whose epochs are as nearly as possible 24 hours apart by the number of hours in the actual interval.

„ 7 contains the hourly clock rate as deduced from observations of longitude stars. The rate from night to night is obtained from the observed times of transit of the same star on two consecutive nights, the difference between the two being divided by 24 hours. The mean of the results obtained from individual stars is taken as the rate during the 24 hours between the two nights, and the mean of the rates during two consecutive periods of 24 hours is taken as the rate on the night between them.

„ 8 contains the mean of columns 6 and 7.

„ 9, 10, 11, 12 and 13 contain similar quantities to those in columns 4, 5, 6, 7 and 8 but for the other station.

„ 14 contains the relative hourly clock rate during each night deduced from the clock comparisons, the value entered is the mean of all the values appertaining to the night, contained in the last column of Table III.

We have now the hourly rate of each clock derived from star observations, and also the relative hourly rate of the clocks derived from the clock comparisons. It is clear that the last should be equal to the algebraic difference of the first two, *i.e.*, using the notation given on the Table, we should have

$$h_w - h_e = R, \quad \text{or} \quad h_e = h_w - R.$$

Hence in forming the final value of the hourly clock rate we take $H_e = \frac{1}{2}(h_e + h_w - R)$, and the resulting value is entered in column 15.

Similarly $H_w = \frac{1}{2}(h_w + h_e + R)$, which is given in column 16.

In column 17 is given the change in the error of the Western clock during a period equal to the differeuce of longitude. The use of this quantity has already been explained in connection with Table V.

TABLE VI. DEDUCTION OF CLOCK RATE CORRECTION.

Arc	Approximate Difference of Longitude = ΔL	Astronomical Date	KARACHI or E Clock: Observed Clock Correction	Time	Hourly Clock Rate for Nights of Observation deduced from Star Transits: By Clock Stars	By Longitude Stars	Mean = h_e	BUSHIRE or W Clock: Observed Clock Correction	Time	Hourly Clock Rate for Nights of Observation deduced from Star Transits: By Clock Stars	By Longitude Stars	Mean = h_w	Relative Hourly Clock Rate deduced from Clock Comparisons = R	Adopted Hourly Clock Rate: For E Clock = ½ (h_e + h_w − R) = H_e	For W Clock = ½ (h_e + h_w + R) = H_w	Correction to Observed Time of Transit at W Station for Rate of W Clock = H_w × ΔL
Karachi-Bushire	h m	1894	m s	h m s	s	s	s	m s	h m s	s	s	s	s	s	s	s
		Dec. 28	+0 2·225	1 11 12	+0·128			−0 10·068	1 9 29	−0·236						
			+0 3·084	6 48 18	+0·109	+0·116	+0·118	−0 10·609	3 44 25	−0·233	−0·233	−0·234	−0·361	+0·122	−0·239	−0·258
		„ 29	+0 5·282	0 57 43	+0·096			−0 15·626	1 5 46	−0·231						
	1 4·78		+0 5·711	6 48 15	+0·092	+0·093	+0·094	−0 16·203	3 43 10	−0·229	−0·229	−0·230	−0·301	+0·083	−0·219	−0·236
		„ 30	+0 6·844	1 17 17	+0·070			−0 21·011	0 55 40	−0·223						
			+0 7·405	6 49 52	+0·067	+0·065	+0·067	−0 21·596	3 41 15	−0·224	−0·223	−0·223	−0·287	+0·065	−0·222	−0·240
		„ 31	+0 8·672	1 12 52	+0·063	+0·062	+0·062	−0 26·254	0 52 12	−0·219	−0·221	−0·220	−0·263	+0·053	−0·211	−0·228
		1895 Jan. 1	+0 9·866	1 31 7	+0·049			−0 31·633	1 30 47	−0·218						
			+0 10·163	6 48 11	+0·058	+0·059	+0·056	−0 32·108	3 42 37	−0·219	−0·219	−0·219	−0·266	+0·052	−0·214	−0·231

EXPLANATION OF *TABLE VII.*

Retardation of the Electric Current.

The retardation of the electric current computed in this Table does not enter into the difference of longitude, but much interest attaches to its value, and clearly any abnormal result would throw doubt upon the accuracy of the clock comparison whence it was deduced.

Column 1 contains the name of the arc.

„ 2 contains the date.

„ 3 contains the time by the East or Karachi clock corresponding to the middle of the period during which a comparison was being made at Karachi, that is, during which Bushire was transmitting signals to Karachi.

„ 4 contains the time, still by E clock, corresponding to the middle of the period during which Karachi was transmitting signals to Bushire.

„ 5 contains the interval between the times given in columns 3 and 4.

„ 6 and 9 contain the differences between the clocks as observed at Bushire and Karachi respectively.

The differences given in columns 6 and 9 have to be reduced to the same epoch and to do this the difference observed at Bushire receives a correction equal to the relative hourly clock rate, taken from the last column of Table III, multiplied by the interval given in column 5 reduced to the decimal of an hour. This correction and the corrected difference between the clocks as observed at Bushire are given in columns 7 and 8.

„ 10 contains half the difference between columns 8 and 9.

TABLE VII. RETARDATION OF THE ELECTRIC CURRENT.

Arc	Astronomical Date	Time of Comparison by E Clock at Karachi	Time of Comparison by E Clock at Bushire	Interval of Time between the Comparison at Karachi and Bushire = I	Difference between the Clocks as Observed at Bushire	Correction for Relative Clock Rate during the Interval I	Difference between the Clocks as Observed at Bushire corrected for Clock Rate	Difference between the Clocks as Observed at Karachi	Retardation of the Current
	1894	h m s	h m s	m s	h m s	s	h m s	h m s	s
KARACHI-BUSHIRE	Dec. 28	1 21 2	1 16 2	+ 5 0	1 4 32·704	− 0·031	1 4 32·673	1 4 33·138	0·233
		4 22 35	4 17 2	+ 5 33	31·582	·034	31·548	32·024	·238
		5 25 35	5 20 0	+ 5 35	31·211	·031	31·180	31·701	·261
		6 33 35	6 29 2	+ 4 33	30·792	·027	30·765	31·299	·267
		7 40 2	7 32 1	+ 8 1	30·372	·051	30·321	30·899	·289
	,, 29	1 21 27	1 14 26	+ 7 1	1 4 24·067	− ·042	1 4 24·025	1 4 24·559	0·267
		4 30 26	4 24 23	+ 6 3	23·108	·031	23·077	23·598	·261
		5 26 25	5 21 24	+ 5 1	22·834	·026	22·808	23·297	·245
		6 31 25	6 25 25	+ 6 0	22·500	·029	22·471	23·000	·265
		7 35 24	7 30 0	+ 5 24	22·200	·025	22·175	22·701	·263
	,, 30	1 11 19	1 7 18	+ 4 1	1 4 17·032	− ·020	1 4 17·012	1 4 17·496	0·242
		4 22 19	4 17 17	+ 5 2	16·134	·024	16·110	16·553	·222
		5 25 18	5 20 18	+ 5 0	15·850	·022	15·828	16·285	·229
		6 27 17	6 23 15	+ 4 2	15·501	·021	15·480	16·000	·260
		7 35 18	7 29 16	+ 6 2	15·212	·028	15·184	15·658	·237
	,, 31	1 14 15	1 6 11	+ 8 4	1 4 10·010	− ·040	1 4 9·970	1 4 10·450	0·240
		4 39 12	4 31 10	+ 8 2	9·200	·032	9·168	9·609	·221
	1895 Jan. 1	1 20 6	1 14 6	+ 6 0	1 4 3·618	− ·027	1 4 3·591	1 4 4·017	0·213
		4 21 5	4 14 5	+ 7 0	2·798	·030	2·768	3·285	·259
		5 24 5	5 19 5	+ 5 0	2·505	·023	2·482	2·990	·254
		6 30 5	6 23 3	+ 7 2	2·206	·032	2·174	2·698	·262
		7 32 5	7 43 3	+10 58	1·875	+ ·047	1·922	2·416	·247

ARC KARACHI-BUSHIRE.

EXPLANATION OF *TABLE VIII.*

Reduction of Clock Corrections and Clock Comparisons to the same Epochs.

Having now obtained the clock corrections at different epochs on each night, and also the differences between the clocks at other epochs, it remains to reduce them both to the same epochs.

This table deals only with observations of clock stars and the attendant comparisons. Since the clock stars observed after the interval are not connected with any particular clock comparison, the mean of all the comparisons is taken. The epoch of this mean falls about halfway between the epochs of the observed clock corrections at the two stations.

Column 1 contains the date.

" 2 and 3 contain the times in terms of the Karachi clock at which the clock comparisons were made (taken from Table III) and their mean.

" 4 and 5 contain the times in terms of the Bushire clock at which the clock comparisons were made (from Table III) and their mean.

" 6 and 7 contain the observed differences between the clocks (from Table III) and their mean.

EXPLANATION OF *TABLE VIII*.—(*Continued*).

Columns 8 and 9 contain the mean epochs of the clock corrections at the two stations (from Table IV).

„ 10 contains the difference between columns 3 and 8.

„ 11 contains the difference between columns 5 and 9.

„ 12 and 13 contain the clock corrections at the epochs given in columns 8 and 9 (from Table IV).

„ 14 and 15 contain the hourly clock rates (from Table VI).

„ 16 and 17 contain the corrections for rate for the periods entered in columns 10 and 11 respectively: that is, the product of columns 10 and 14, and of columns 11 and 15.

„ 18 and 19 contain the sums of columns 12 and 16 and of columns 13 and 17. The quantities obtained being the clock corrections at the epochs of the comparisons, that is, at the epochs contained in columns 3 and 5.

TABLE VIII. REDUCTION OF CLOCK CORRECTIONS

Date	Time of Clock Comparison from Table III				Difference between the Clocks at the Epoch of Clock Comparison from Table III		Mean Epoch of Clock Correction from Table IV	
	by Karachi Clock		by Bushire Clock					
	T_E	Mean	T_W	Mean	D	Mean	Karachi	Bushire
1894	h m s	h m s	h m s	h m s	h m s	h m s	h m s	h m s
December 28	1 18 32	1 18 32	0 13 59	0 13 59	1 4 32·921	1 4 32·921	1 11 12	1 9 29
	4 19 48		3 15 17		1 4 31·803			
	5 22 48		4 18 16		31·456			
	6 31 18		5 26 47		31·046			
	7 36 2	5 57 29	6 31 31	4 52 58	30·636	1 4 31·235	6 48 18	3 44 25
„ 29	1 17 56	1 17 56	0 13 32	0 13 32	1 4 24·313	1 4 24·313	0 57 43	1 5 46
	4 27 24		3 23 1		1 4 23·353			
	5 23 55		4 19 32		23·066			
	6 28 25		5 24 2		22·750			
	7 32 42	5 58 7	6 28 20	4 53 44	22·451	1 4 22·905	6 48 15	3 43 10
„ 30	1 9 19	1 9 19	0 5 2	0 5 2	1 4 17·264	1 4 17·264	1 17 17	0 55 40
	4 19 48		3 15 32		1 4 16·344			
	5 22 48		4 18 32		16·068			
	6 25 16		5 21 0		15·751			
	7 32 17	5 55 2	6 28 2	4 50 47	15·435	1 4 15·900	6 49 52	3 41 15
„ 31	1 10 13	1 10 13	0 6 3	0 6 3	1 4 10·230	1 4 10·230	1 12 52	0 52 12
1895 January 1	1 17 6	1 17 6	0 13 2	0 13 2	1 4 3·818	1 4 3·818	1 31 7	1 30 47
	4 17 35		3 13 32		1 4 3·042			
	5 21 35		4 17 32		2·748			
	6 26 34		5 22 32		2·452			
	7 37 34	5 55 50	6 33 32	4 51 47	2·146	1 4 2·597	6 48 11	3 42 37

AND CLOCK COMPARISONS TO THE SAME EPOCHS.

Difference between Times of Epochs of Clock Correction and Comparison = P		Clock Correction from Table IV		Hourly Clock Rate from Table VI		Correction for Difference of Times P		Clock Correction at Mean Epoch of Clock Comparison	
Karachi	Bushire	Karachi	Bushire	Karachi	Bushire	Karachi	Bushire	Karachi	Bushire
m s	h m s	m s	m s	s	s	s	s	s	s
+ 7 20	− 0 55 30	+ 0 2·225	− 0 10·068	+0·122	−0·239	+ 0·015	+ 0·221	+ 2·240	− 9·847
− 50 49	+ 1 8 33	+ 0 3·084	− 0 10·609	+0·122	−0·239	− 0·103	− 0·273	+ 2·981	− 10·882
+ 20 13	− 0 52 14	+ 0 5·282	− 0 15·626	+0·083	−0·219	+ 0·028	+ 0·191	+ 5·310	− 15·435
− 50 8	+ 1 10 34	+ 0 5·711	− 0 16·203	+0·083	−0·219	− 0·069	− 0·258	+ 5·642	− 16·461
− 7 58	− 0 50 38	+ 0 6·844	− 0 21·011	+0·065	−0·222	− 0·009	+ 0·187	+ 6·835	− 20·824
− 54 50	+ 1 9 32	+ 0 7·405	− 0 21·596	+0·065	−0·222	− 0·059	− 0·257	+ 7·346	− 21·853
− 2 39	− 0 46 9	+ 0 8·672	− 0 26·254	+0·053	−0·211	− 0·002	+ 0·162	+ 8·670	− 26·092
− 14 1	− 1 17 45	+ 0 9·866	− 0 31·633	+0·052	−0·214	− 0·012	+ 0·278	+ 9·854	− 31·355
− 52 21	+ 1 9 10	+ 0 10·163	− 0 32·108	+0·052	−0·214	− 0·046	− 0·247	+10·117	− 32·355

EXPLANATION OF *TABLE IX.*

Reduction of Clock Comparisons and the Differences between the Clock Corrections to the same Epochs by Interpolation.

This table has the same object as the last but deals with the observations of longitude stars and the comparisons which are connected therewith. Only the second, third and fourth comparisons are used in connection with the longitude stars, for though the second group was observed at Bushire after the last of these comparisons, yet its result is corrected back so as to correspond with the epoch of the observation of the same stars at Karachi and thus the epochs of the groups lie respectively between the second and third, and third and fourth comparisons.

Column 1 contains the date.

,, 2 contains the epochs whether of clock comparisons, from Table III, or of the differences of corrected times, from Table V, arranged in order of sequence, and all in terms of the East clock.

,, 3 contains the difference of the corrected times, from Table V, entered in line with its epoch.

,, 4 contains the difference between the two clocks by direct comparison, from Table III, entered in line with its epoch.

,, 5 is obtained by interpolation from column 3 and is the corrected difference between the observed times at the epoch of the middle comparison, in line with which it is entered.

,, 6 contains the difference between the clocks brought up by interpolation from column 4, to the epochs of the quantities in column 3.

TABLE IX. REDUCTION OF CLOCK COMPARISONS AND THE DIFFERENCES BETWEEN THE CLOCK CORRECTIONS TO THE SAME EPOCHS BY INTERPOLATION.

Date		T_E Epochs	Difference between the Clock Corrections = Difference of Corrected Times of Table V	Difference between the Times of the two Clocks obtained by Direct Comparison from Table III	Difference between the Clock Corrections Interpolated to Epoch of Clock Comparison	Difference between the Clocks by Comparison Interpolated to Epoch of Clock Correction
1894		h m s	m s	h m s	m s	h m s
December	28	4 19 48	...	1 4 31·803	...	...
		4 45 40	+ 0 13·320	...	...	1 4 31·661
		5 22 48	...	31·456	+ 0 13·604	...
		5 48 6	+ 0 13·798	...	...	31·305
		6 31 18	...	31·046	...	...
„	29	4 27 24	...	1 4 23·353	...	...
		4 46 29	+ 0 21·771	...	...	1 4 23·256
		5 23 55	...	23·066	+ 0 21·964	...
		5 48 10	+ 0 22·089	...	...	22·947
		6 28 25	...	22·750	...	...
„	30	4 19 48	...	1 4 16·344	...	...
		4 44 57	+ 0 28·807	...	...	1 4 16·234
		5 22 48	...	16·068	+ 0 29·012	...
		5 48 9	+ 0 29·150	...	...	15·939
		6 25 16	...	15·751	...	...
1895						
January	1	4 17 35	...	1 4 3·042	...	...
		4 48 57	+ 0 42·220	...	...	1 4 2·898
		5 21 35	...	2·748	+ 0 42·408	...
		5 47 7	+ 0 42·555	...	...	2·632
		6 26 34	...	2·452	...	...

EXPLANATION OF *TABLE X.*

Deduction of the Difference of Longitude.

Tables VIII and IX contain all the data for computing the difference of longitude.

Column 1 contains the name of the arc.

„ 2 contains the date.

„ 3 and 4 contain the epochs for which data are available. The first and last on each night appertain to the clock star observations, and are taken from columns 3 and 5 of Table VIII. The others belong to the longitude stars, and are taken from column 2 of Table IX.

„ 5 and 7 refer only to clock star observations, and contain the deduced clock corrections corresponding to the epochs in columns 3 and 4. The entries are taken from columns 18 and 19 of Table VIII.

„ 6 and 8 contain the numbers of clock or longitude stars observed at each station on each night.

„ 9 contains the difference between the corrections of the clocks. In the case of clock stars this is equal to the difference between columns 5 and 7, and in the case of longitude stars it is taken direct from column 3 or 5 of Table IX.

„ 10 contains the difference between the clocks by direct comparison at the epoch given in column 3; this quantity is to be found either in column 7 of Table VIII or in column 4 or 6 of Table IX.

„ 11 contains the observed difference of longitude, which is equal to the sum of the quantities in the two preceding columns. The mean and its probable error are entered at the bottom of the column.

„ 12 contains the value of the personal equation, and its probable error.

„ 13 contains the Final Difference of Longitude and its probable error.

TABLE X. DEDUCTION OF THE DIFFERENCE OF LONGITUDE.

Arc	Astronomical Date	Epoch		Karachi E		Bushire W		Difference between the Corrections of the E and W Clocks = S	Difference between the Clocks by Direct Comparison, at the Epoch of S	Observed Difference of Longitude	Personal Equation	Final Difference of Longitude
		By E Clock = T_E	By W Clock = T_W	Deduced Clock Correction from Table VIII	No. of Stars	Deduced Clock Correction from Table VIII	No. of Stars					
	1894	h m s	h m s	s		s		m s	h m s	h m s	s	
KARACHI-BUSHIRE	Dec. 28	1 18 32	0 13 59	+ 2·240	23	− 9·847	24	+0 12·087	1 4 32·921	1 4 45·008		h m s s 1 4 44·812 ± 0·0097
		4 45 40			30		30	0 13·320	31·661	44·981		
		5 22 48						0 13·604	31·456	45·060		
		5 48 6						0 13·798	31·305	45·103		
		5 57 29	4 52 58	+ 2·981		− 10·882		0 13·863	31·235	45·098		
	„ 29	1 17 56	0 13 32	+ 5·310	19	− 15·435	23	+0 20·745	1 4 24·313	1 4 45·058		
		4 46 29			27		27	0 21·771	23·256	45·027		
		5 23 55						0 21·964	23·066	45·030		
		5 48 10						0 22·089	22·947	45·036		
		5 58 7	4 53 44	+ 5·642		− 16·461		0 22·103	22·905	45·008		
	„ 30	1 9 19	0 5 2	+ 6·835	18	− 20·824	28	+0 27·659	1 4 17·264	1 4 44·923		
		4 44 57			31		81	0 28·807	16·234	45·041		
		5 22 48						0 29·012	16·068	45·080		
		5 48 9						0 29·150	15·939	45·089		
		5 55 2	4 50 47	+ 7·346		− 21·853		0 29·199	15·900	45·099		
	„ 31	1 10 13	0 6 3	+ 8·670	12	− 26·092	16	+0 34·762	1 4 10·230	1 4 44·992		
	1895 Jan. 1	1 17 6	0 13 2	+ 9·854	25	− 31·355	26	+0 41·209	1 4 3·818	1 4 45·027		
		4 48 57			22		22	0 42·220	2·898	45·118		
		5 21 35						0 42·408	2·748	45·156		
		5 47 7						0 42·555	2·632	45·187		
		5 55 50	4 51 47	+10·117		− 32·355		0 42·472	2·597	45·069		
									Mean ...	1 4 45·057	− 0·245	
									p.e. ...	± 0·0089	± 0·0039	

ARC KARACHI-JASK.

1894-95.

The programme.

No clock stars were observed on this arc; the difference of longitude being only 37 minutes there was no difficulty in arranging a programme to suit both observers. It was divided into two parts each part containing a clock comparison, a group of star observations and then, after the times of transit had been recorded at both stations, a second clock comparison. An interval of about an hour and a half separated the two parts of the programme.

Between these stations there is telegraphic communication both by cable and landline, the latter was always used except during two extra comparisons which were made on January 27th; on these two occasions the retardation was $0^s \cdot 152$ and $0^s \cdot 134$ respectively (*vide* Table VII) giving a meau of $0^s \cdot 143$. The mean of the retardation by landline is $0^s \cdot 051$, or but little more than one-third of that by cable.

On several occasions intermediate stations failed to "join direct" so that one or even two translations intervened. The occasions are mentioned in the footnotes to Table VII and it will be noticed that the retardation is in every case high.

EXPLANATION OF *TABLE I.*

Abstract of Determinations of Collimation and Level Correction-Constants.

The first three columns call for no remark.

Column 4 contains the mean sidereal hour at which the several determinations were made.

Collimation.

Column 5, headed C_e, gives the reading of the micrometer when the collimator cross is intersected by the central transit wire, the telescope being in the position *I.P.E.* (*i.e.* Illuminated Pivot East).

„ 6, headed C_w, gives the corresponding reading, the telescope being *I.P.W.*

„ 7, headed C_0, gives the mean of the two preceding readings, *i.e.* $\frac{1}{2}(C_e+C_w)$. C_0 is therefore the reading of the micrometer when so set that the centre wire is truly collimated.

„ 8, headed C_s, gives the reading of the micrometer as set during the observation of star transits. This setting was arbitrary and was not changed in either instrument throughout the arc.

„ 9, headed c_e, gives the collimation correction-constant for the position *I.P.E.* c_e is equal to C_0-C_s.

„ 10, headed c_w, gives the corresponding correction-constant for the position *I.P.W.* c_w is equal to C_s-C_0.

Level.

Column 11, headed M_e, gives the reading of the micrometer when the centre wire and its reflection from the mercury trough coincide, the telescope being in the position *I.P.E.*

„ 12, headed M_w, gives the corresponding reading when the telescope is in the position *I.P.W.*

„ 13, headed M_0, gives the mean of the two preceding readings, *i.e.* $\frac{1}{2}(M_e+M_w)$.

This quantity is not used in the computations but it should remain constant and therefore affords a valuable safe-guard against blunders in reading M_e and M_w. The nature of the quantity is discussed in Chapter IV.

Column 14, headed b_e, gives the level correction-constant for the position *I.P.E.* b_e is equal to C_0-M_e.

„ 15, headed b_w, gives the corresponding correction-constant for the position *I.P.W.* b_w is equal to M_w-C_0.

As the collimation is not liable to vary, a mean of all the values of C_0 on any night is taken, and c_e and c_w are found by taking the difference between this mean and C_s; but the level is not so stable and therefore the same values of b_e and b_w are not retained for the whole of a night's observations. Hence two values per night are generally made use of, the first is the mean of the first two determinations which were made before the interval, and the second is the mean of the remainder.

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation						Level				
				C_e	C_w	C_o	C_s	$c_e = C_o - C_s$	$c_w = C_s - C_o$	M_e	M_w	M_o	$b_e = C_o - M_e$	$b_w = M_w - C_o$
1895			h m	d	d	d	d	d	d	d	d	d	d	d
Jan. 21	KARACHI	CAPTAIN BURRARD (Telescope No. 1)	1 39	1304·1	1656·6	1480·4	1480·0			1472·3	1486·7	1479·5		
			3 26	1299·7	1660·1	1479·9				1472·3	1487·0	1479·7	+ 7·7	+ 6·3
			3 38	1299·6	1660·4	1480·0				1472·5	1485·6	1479·1		
					Mean	1480·1		+ 0·1	− 0·1		Mean	1479·4		
„ 23			1 52	1303·1	1656·2	1479·7	1480·0			1470·4	1487·3	1478·9		
			3 23	1300·4	1660·0	1480·2				1470·7	1487·2	1479·0	+ 9·8	+ 7·1
			3 28	...	...	...				1471·1	1488·4	1479·8		
			5 27	1297·1	1664·6	1480·9				1471·3	1487·8	1479·6	+ 9·1	+ 7·5
			7 0	1296·7	1665·7	1481·2				1471·4	1488·1	1479·8		
					Mean	1480·5		+ 0·5	− 0·5		Mean	1479·4		
„ 24			2 30	1306·4	1653·5	1480·0	1480·0			1472·0	1486·5	1479·3	+ 8·1	+ 6·9
			3 26	1302·6	1656·8	1479·7				1471·9	1487·4	1479·7		
			5 52	1297·9	1661·4	1479·7				1470·7	1488·8	1479·8	+ 9·1	+ 9·1
			6 51	1297·5	1664·0	1480·8				1471·2	1489·5	1480·4		
					Mean	1480·1		+ 0·1	− 0·1		Mean	1479·8		
„ 25			2 20	1305·4	1655·0	1480·2	1480·0			1471·0	1488·2	1479·6	+ 9·6	+ 7·8
			3 27	1299·9	1660·2	1480·1				1470·4	1487·9	1479·2		
			5 38	...	...	...				1468·9	1487·7	1478·3		
			5 52	1296·5	1664·1	1480·3				1469·6	1487·7	1478·7	+ 11·6	+ 7·8
			6 51	1295·5	1665·4	1480·5				1467·6	1488·8	1478·2		
					Mean	1480·3		+ 0·3	− 0·3		Mean	1478·8		

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation						Level				
				C_e	C_w	C_o	C_s	$c_e = C_o - C_s$	$c_w = C_s - C_o$	M_e	M_w	M_o	$b_e = C_o - M_e$	$b_w = M_w - C_o$
1895			h m	d	d	d	d	d	d	d	d	d	d	d
Jan. 21	JASK	CAPTAIN LENOX CONYNGHAM (Telescope No. 2)	2 15	1557·4	1434·6	1496·0	1495·0			1488·7	1503·0	1495·9	+ 6·7	+ 6·0
			3 35	1553·8	1438·6	1496·2				1490·0	1501·2	1495·6		
					Mean	1496·1		+ 1·1	− 1·1		Mean	1495·8		
„ 23			2 14	1416·2	1572·9	1494·6	1495·0			1496·4	1493·6	1495·0	− 2·3	− 1·7
			3 44	1414·1	1574·5	1494·3				1497·7	1492·5	1495·1		
			5 30	1415·1	1575·8	1495·5				1496·8	1491·8	1494·3		
			5 58	1414·0	1575·0	1494·5				1495·8	1493·2	1494·5	− 1·7	− 1·8
			7 10	1415·1	1574·6	1494·9				1495·8	1492·4	1494·1		
			7 15	...	...	...				1497·5	1494·4	1496·0		
					Mean	1494·8		− 0·2	+ 0·2		Mean	1494·8		
„ 24			2 13	1418·7	1571·1	1494·9	1495·0			1495·4	1493·1	1494·3	− 1·3	− 2·9
			3 40	1422·2	1570·4	1496·3				1498·7	1492·7	1495·7		
			5 22	1420·6	1571·7	1496·2				1497·0	1493·1	1495·1		
			5 34	...	...	...				1498·5	1493·7	1496·1	− 1·9	− 2·0
			7 15	1421·9	1569·4	1495·7				1497·6	1494·7	1496·2		
					Mean	1495·8		+ 0·8	− 0·8		Mean	1495·5		
„ 25			2 10	1426·5	1565·2	1495·9	1495·0			1499·0	1493·8	1496·4	− 2·4	− 2·4
			3 35	1422·7	1569·0	1495·9				1497·3	1492·9	1495·1		
			5 25	1420·5	1570·1	1495·3				1497·1	1493·9	1495·5	− 1·8	− 1·6
			7 16	1419·9	1572·1	1496·0				1498·0	1494·5	1496·3		
					Mean	1495·8		+ 0·8	− 0·8		Mean	1495·8		

TABLE I. **ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS,**

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation						Level				
				C_e	C_w	C_o	C_s	$c_e = C_o - C_s$	$c_w = C_s - C_o$	M_e	M_w	M_o	$b_e = C_o - M_e$	$b_w = M_w - C_o$
1895			h m	d	d	d	d	d	d	d	d	d	d	d
Jan. 26	KARACHI	CAPTAIN BURRARD (Telescope No. 1)	2 10	1302·1	1657·0	1479·6	1480·0			1470·4	1488·6	1479·5		
			2 25	...	...	...				1469·4	1487·6	1478·5	+ 10·2	+ 8·0
			3 25	1297·7	1662·3	1480·0				1470·0	1488·0	1479·0		
			5 45	1292·1	1668·1	1480·1				1468·8	1491·1	1480·0	+ 11·0	+ 10·6
			7 18	1292·2	1669·0	1480·6				1469·3	1490·3	1479·8		
					Mean	1480·1		+ 0·1	− 0·1		Mean	1479·4		
„ 27			2 20	1302·6	1656·1	1479·4	1480·0			1470·2	1486·8	1478·5	+ 10·0	+ 8·2
			3 34	1297·8	1661·2	1479·5				1469·1	1489·0	1479·1		
			5 26	1293·1	1666·1	1479·6				1469·1	1490·7	1479·9	+ 10·3	+ 10·4
			6 55	1290·9	1669·4	1480·2				1469·6	1489·4	1479·5		
					Mean	1479·7		− 0·3	+ 0·3		Mean	1479·3		
„ 30			2 6	1305·0	1654·6	1479·8	1480·0			1471·7	1486·6	1479·2	+ 8·6	+ 7·2
			3 28	1301·3	1658·0	1479·7				1470·2	1487·0	1478·6		
			5 30	1297·3	1660·7	1479·0				1468·8	1488·7	1478·8	+ 10·8	+ 9·3
			6 56	1297·0	1662·8	1479·9				1468·7	1489·0	1478·9		
					Mean	1479·6		− 0·4	+ 0·4		Mean	1478·9		
Feb. 2			2 38	1439·4	1520·9	1480·2	1480·0			1471·1	1487·2	1479·2	+ 9·4	+ 7·2
			3 40	1437·4	1523·0	1480·2				1470·5	1487·6	1479·1		
					Mean	1480·2		+ 0·2	− 0·2		Mean	1479·1		

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation						Level				
				C_e	C_w	C_0	C_s	$c_e = C_0 - C_s$	$c_w = C_s - C_0$	M_e	M_w	M_0	$b_e = C_0 - M_e$	$b_w = M_w - C_0$
1895			h m	d	d	d	d	d	d	d	d	d	d	d
Jan. 26	JASK	CAPTAIN LENOX CONYNGHAM (Telescope No. 2)	2 10	1424·6	1567·8	1496·2	1495·0			1498·9	1492·5	1495·7	− 2·4	− 3·2
			3 45	1421·4	1569·5	1495·5				1498·1	1493·2	1495·7		
			5 18	1422·2	1570·1	1496·2				1497·5	1493·6	1495·6	− 1·5	− 2·7
			7 15	1420·6	1571·9	1496·3				1497·7	1493·1	1495·4		
					Mean	1496·1		+ 1·1	− 1·1		Mean	1495·6		
" 27			2 10	1423·0	1568·2	1495·6	1495·0			1497·7	1494·2	1496·0	− 2·5	− 2·4
			3 44	1421·3	1570·3	1495·8				1498·7	1492·4	1495·6		
			5 15	1419·1	1571·5	1495·3				1497·2	1493·5	1495·4	− 1·9	− 2·6
			7 20	1420·3	1571·6	1496·0				1498·0	1492·7	1495·4		
					Mean	1495·7		+ 0·7	− 0·7		Mean	1495·6		
" 30			2 16	1418·9	1572·7	1495·8	1495·0			1499·2	1492·1	1495·7	− 3·0	− 3·0
			3 45	1418·2	1573·0	1495·6				1497·9	1493·1	1495·5		
			5 30	1416·7	1573·6	1495·2				1497·7	1493·4	1495·6	− 3·6	− 3·5
			7 18	1418·0	1573·1	1495·6				1500·7	1490·8	1495·8		
					Mean	1495·6		+ 0·6	− 0·6		Mean	1495·7		
Feb. 2			2 20	1419·0	1572·4	1495·7	1495·0			1498·4	1493·3	1495·9	− 2·3	− 2·3
			3 58	1417·2	1574·4	1495·8				1497·7	1493·6	1495·7		
					Mean	1495·8		+ 0·8	− 0·8		Mean	1495·8		

EXPLANATION OF *TABLE II.*

Deduction of Deviation Error from Star Observations.

The first six columns call for no remark.

Column 7 shows whether the star was observed at upper or at lower culmination. U standing for upper and L for lower.

„ 8 gives the number of wires over which the time of the star's transit was observed.

„ 9 contains the value of the deviation constant A, which is equal to m *sec* δ *sin* ζ, where m is the value of 1 division of the micrometer head in seconds of time, *viz*: $0^s \cdot 039$. The sign of A depends on those of *sec* δ and *sin* ζ, where δ is the star's declination, $(180° - \delta)$ being used for stars observed at lower culmination, and ζ is the star's zenith distance, considered negative if north.

„ 10 contains the observed time of transit taken from the chronographic record.

„ 11 contains the correction to the time of transit on account of diurnal aberration. This correction is equal to $- 0 \cdot 0207 \times$ *cosine latitude* $\times$ *secant declination.* It is therefore negative for all stars at upper culmination and positive for all at lower.

„ 12 contains the correction for collimation, this is obtained by multiplying c_e or c_w, as the case may be, by m *sec* δ, using $(180° - \delta)$ for stars at lower culmination.

„ 13 contains the correction for level, obtained by multiplying b_e or b_w, as the case may be, by m *sec* δ *cos* ζ, δ and ζ having the same meanings as before.

„ 14 contains the clock error; this is a preliminary value obtained by taking the mean of the errors given by stars north and south of the zenith. If the numbers of stars at upper and lower culminations respectively be equal, a small error in the adopted value of this quantity will not affect the final mean value of the deviation error.

„ 15 contains the seconds of the corrected time of transit called T. This is the sum of the seconds in the five preceding columns.

„ 16 contains the star's R.A. at the time of the observation. This is either taken from one of the Almanacs or brought up by computation from the Greenwich Catalogue for epoch 1880.

„ 17 contains the difference T − R.A.

„ 18 contains the deviation error $a = \frac{T - R.A.}{A}$. It is to be noted that A contains the quantity m, so that a is in terms of the micrometer divisions.

„ 19 contains the mean of the values in column 18. Sometimes one general mean is taken and sometimes the night is divided into two parts. This depends on whether the values in column 18 show any evidence of a change of position having taken place during the hours of work.

The last column shows whether the telescope was pointing to the East or to the West of North.

TABLE II. DEDUCTION OF DEVIATION ERROR, a, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for: Diurnal Aberration	Correction for: Collimation	Correction for: Transit Axis Level	Correction for: Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R. A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
		1895							h m s	s	s	s	m s	s	h m s	m s	d	d	
KARACHI-JASK	KARACHI	Jan. 21	I. P. E.	E	4 Ursæ Min.	L	25	+0·1819	2 9 35·83	+·09	−·02	−·32	−0 24·16	11·42	2 9 17·46	−0 6·04	−33·21	−36·03	W
			I. P. E.	E	Groom. 750	U	2	−0·4095	4 3 82·10	−·23	+·05	+1·79	−0 24·16	59·55	4 3 46·10	+0 13·45	−32·85		
		Jan. 23	I. P. W.	E	δ Ursæ Min.	L	3	+0·6086	6 5 47·10	+·31	+·33	−1·79	−0 21·31	24·64	6 5 48·18	−0 23·54	−38·68	−36·55	W
			I. P. E.	E	51 Cephei (Hev.)	U	3	−0·7059	6 52 30·62	−·38	+·40	+3·36	−0 21·31	12·69	6 51 48·40	+0 24·29	−34·41		
		Jan. 24	I. P. W.	E	4 Ursæ Min.	L	5	+0·1819	2 9 31·93	+·09	+·02	−·29	−0 19·85	11·90	2 9 17·80	−0 5·90	−32·44	−34·26	W
			I. P. E.	E	γ Ursæ Min.	L	5	+0·1256	3 20 69·18	+·06	−·01	−·13	−0 19·85	49·25	3 20 53·78	−0 4·53	−36·07		
			I. P. W.	E	δ Ursæ Min.	L	3	+0·6086	6 5 46·67	+·31	+·07	−2·18	−0 19·85	25·02	6 5 48·32	−0 23·30	−38·28	−35·85	W
			I. P. E.	E	51 Cephei (Hev.)	U	3	−0·7059	6 52 28·74	−·38	+·08	+3·36	−0 19·85	11·95	6 51 48·36	+0 23·59	−33·42		
		Jan. 25	I. P. W.	E	4 Ursæ Min.	L	4	+0·1819	2 9 30·71	+·09	+·06	−·32	−0 18·50	12·04	2 9 17·92	−0 5·88	−32·33	−34·56	W
			I. P. E.	E	γ Ursæ Min.	L	8	+0·1256	3 20 67·87	+·06	−·04	−·15	−0 18·50	49·24	3 20 53·86	−0 4·62	−36·78		
			I. P. E.	E	δ Ursæ Min.	L	3	+0·6086	6 5 45·88	+·31	−·20	−2·77	−0 18·50	24·72	6 5 48·48	−0 23·76	−39·04	−37·11	W
			I. P. W.	E	51 Cephei (Hev.)	U	3	−0·7059	6 52 29·37	−·38	−·24	+2·88	−0 18·50	13·13	6 51 48·30	+0 24·83	−35·17		
		Jan. 26	I. P. W.	E	36 H. Cassiop.	U	5	−0·0942	2 28 21·51	−·06	−·01	+·69	−0 16·75	5·38	2 28 2·54	+0 2·84	−30·15	−35·47	W
			I. P. E.	E	δ Ursæ Min.	L	2	+0·6086	6 5 42·58	+·31	−·07	−2·63	−0 16·75	23·44	6 5 48·66	−0 25·22	−41·44	−40·79	W
			I. P. W.	E	51 Cephei (Hev.)	U	3	−0·7059	6 52 29·82	−·38	−·08	+3·92	−0 16·75	16·53	6 51 48·20	+0 28·33	−40·13		
		Jan. 27	I. P. W.	E	γ Ursæ Min.	L	1	+0·1256	3 20 64·40	+·06	−·04	−·13	−0 14·55	49·74	3 20 54·01	−0 4·27	−34·00	−37·15	W
			I. P. W.	E	ζ Ursæ Min.	L	4	+0·1830	3 47 55·66	+·09	−·06	−·39	−0 14·55	40·75	3 47 47·32	−0 6·57	−35·90		
			I. P. W.	E	δ Ursæ Min.	L	3	+0·6086	6 5 40·12	+·31	−·20	−2·49	−0 14·55	23·19	6 5 48·86	−0 25·67	−42·18		
			I. P. E.	E	51 Cephei (Hev.)	U	3	−0·7059	6 52 25·20	−·38	−·24	+3·81	−0 14·55	13·84	6 51 48·07	+0 25·77	−36·51		
		Jan. 30	I. P. E.	E	γ Ursæ Min.	L	9	+0·1256	3 20 60·38	+·06	+·05	−·13	−0 10·57	49·79	3 20 54·24	−0 4·45	−35·43	−33·26	W
			I. P. E.	E	ζ Ursæ Min.	L	4	+0·1830	3 47 52·68	+·09	+·08	−·41	−0 10·57	41·87	3 47 47·62	−0 5·75	−31·42		
			I. P. E.	E	δ Ursæ Min.	L	3	+0·6086	6 5 41·95	+·31	+·26	−2·58	−0 10·57	29·37	6 5 49·54	−0 20·17	−33·14		
			I. P. E.	E	51 Cephei (Hev.)	U	3	−0·7059	6 52 18·16	−·38	−·32	+3·99	−0 10·57	10·88	6 51 47·55	+0 23·33	−33·05		
		Feb. 2	I. P. W.	E	ζ Ursæ Min.	L	2	+0·1830	3 47 51·36	+·09	+·04	−·30	−0 9·67	41·52	3 47 47·94	−0 6·42	−35·09	−34·59	W
			I. P. W.	E	Groom. 750	U	5	−0·4095	4 3 65·76	−·23	−·09	+1·68	−0 9·67	57·45	4 3 43·49	+0 13·96	−34·09		

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for: Diurnal Aberration	Correction for: Collimation	Correction for: Transit Axis Level	Correction for: Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R. A.	Apparent Clock Error = T − R.A.	Deviation Error (T − R.A.)/A = a	Mean a	Deviation East or West of North
KARACHI-JASK	JASK	1895							h m s	s	s	s	m s	s	h m s	m s	d	d	
		Jan. 21	I. P. W.	W	Piazzi II. 60	U	3	−0·2078	2 20 20·53	−·12	−·28	+·86	+1 32·29	53·28	2 22 20·60	−0 27·32	+131·47		
			I. P. W.	W	36 H. Cassiop.	U	10	−0·0928	2 26 17·27	−·06	−·14	+·52	+1 32·29	49·88	2 28 2·83	−0 12·95	+139·55		
			I. P. E.	W	5 H. Camelop.	U	9	−0·0845	3 37 33·80	−·06	+·13	+·56	+1 32·29	6·72	3 39 17·78	−0 11·06	+130·89		
			I. P. W.	W	Lalan. (F) 2774	L	6	+0·4684	3 57 46·70	+·24	+·55	−1·09	+1 32·29	18·69	3 58 18·31	+1 0·38	+128·90	+132·01	E
			I. P. W.	W	17 Camelop.	U	15	−0·0516	5 18 38·41	−·04	−·09	+·41	+1 32·29	10·98	5 20 17·84	−0 6·86	+132·95		
			I. P. W.	W	Groom. 966	U	15	−0·1130	5 23 58·20	−·07	−·16	+·58	+1 32·29	30·84	5 25 45·72	−0 14·88	+131·68		
			I. P. W.	W	Groom. 944	U	6	−0·3934	5 26 10·89	−·22	−·50	+1·39	+1 32·29	43·85	5 28 34·46	−0 50·61	+128·65		
		Jan. 23	I. P. W.	W	4 Ursæ Min.	L	7	+0·1809	2 7 41·77	+·09	−·04	+·07	+1 35·82	17·71	2 9 17·68	+0 0·03	+ 0·17		
			I. P. W.	W	Piazzi II. 60	U	4	−0·2078	2 20 45·56	−·12	+·05	−·24	+1 35·82	21·07	2 22 20·36	+0 0·71	− 3·42	− 1·58	W
			I. P. W.	W	36 H. Cassiop.	U	15	−0·0928	2 26 27·08	−·06	+·03	−·15	+1 35·82	2·72	2 28 2·71	+0 0·01	− 0·11		
			I. P. W.	W	5 H. Camelop.	U	4	−0·0845	3 37 42·30	−·06	+·02	−·14	+1 35·82	17·94	3 39 17·69	+0 0·25	− 2·96		
			I. P. W.	W	δ Ursæ Min.	L	6	+0·6037	6 4 9·10	+·31	−·13	+·44	+1 36·14	45·86	6 5 48·18	−0 2·32	− 3·84	− 3·57	W
			I. P. E.	W	51 Cephei (Hev.)	U	8	−0·6990	6 50 15·74	−·38	−·16	−·64	+1 36·14	50·70	6 51 48·40	+0 2·30	− 3·29		
		Jan. 24	I. P. E.	W	Piazzi II. 60	U	5	−0·2078	2 20 44·41	−·12	+·20	−·19	+1 37·31	21·61	2 22 20·23	+0 1·38	− 6·64		
			I. P. E.	W	36 H. Cassiop.	U	20	−0·0928	2 26 25·53	−·06	+·10	−·11	+1 37·31	2·77	2 28 2·65	+0 0·12	− 1·29	− 3·31	W
			I. P. E.	W	5 H. Camelop.	U	7	−0·0845	3 37 40·57	−·06	+·10	−·11	+1 37·31	17·81	3 39 17·64	+0 0·17	− 2·01		
			I. P. E.	W	δ Ursæ Min.	L	4	+0·6037	6 4 10·92	+·31	−·52	+·47	+1 37·63	48·81	6 5 48·32	+0 0·49	+ 0·81	+ 2·59	E
			I. P. W.	W	51 Cephei (Hev.)	U	8	−0·6990	6 50 9·46	−·38	−·64	−·76	+1 37·63	45·31	6 51 48·36	−0 3·05	+ 4·36		
		Jan. 25	I. P. W.	W	Piazzi II. 60	U	6	−0·2078	2 20 41·81	−·12	−·20	−·34	+1 38·78	19·93	2 22 20·11	−0 0·18	+ 0·87		
			I. P. W.	W	36 H. Cassiop.	U	20	−0·0928	2 26 23·70	−·06	−·10	−·21	+1 38·78	2·11	2 28 2·59	−0 0·48	+ 5·17	+ 2·33	E
			I. P. E.	W	5 H. Camelop.	U	10	−0·0845	3 37 38·86	−·06	+·10	−·17	+1 38·78	17·51	3 39 17·59	−0 0·08	+ 0·95		
			I. P. E.	W	δ Ursæ Min.	L	3	+0·6037	6 4 9·00	+·31	−·52	+·44	+1 39·16	48·39	6 5 48·48	−0 0·09	− 0·15	+ 1·96	E
			I. P. W.	W	51 Cephei (Hev.)	U	5	−0·6990	6 50 7·93	−·38	−·64	−·61	+1 39·16	45·46	6 51 48·30	−0 2·84	+ 4·06		

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for Diurnal Aberration	Correction for Collimation	Correction for Transit Axis Level	Correction for Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R.A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
		1895							h m s	s	s	s	m s	s	h m s	m s	d	d	
KARACHI (E) and JASK (W)	JASK	Jan. 26	*I. P. W.*	W	Piazzi II. 60	U	6	−0·2078	2 20 40·24	−·12	−·28	−·46	+1 40·50	19·88	2 22 19·98	−0 0·10	+0·48	+2·76	E
			I. P. W.	W	36 H. Cassiop.	U	10	−0·0928	2 26 22·06	−·06	−·14	−·28	+1 40·50	2·08	2 28 2·54	−0 0·46	+4·96		
			I. P. W.	W	5 H. Camelop.	U	10	−0·0845	3 37 37·26	−·06	−·13	−·27	+1 40·50	17·30	3 39 17·54	−0 0·24	+2·84		
			I. P. W.	W	δ Ursæ Min.	L	4	+0·6037	6 4 6·30	+·31	+·72	+·67	+1 40·90	48·90	6 5 48·66	+0 0·24	+0·40	−0·27	W
			I. P. E.	W	51 Cephei (Hev.)	U	5	−0·6990	6 50 8·03	−·38	+·87	−·57	+1 40·90	48·85	6 51 48·20	+0 0·65	−0·93		
		Jan. 27	*I. P. E.*	W	Piazzi II. 60*	U	5	−0·2078	2 20 13·81	−·12	+25·37*	−·36	+1 41·69	20·39	2 22 19·83	+0 0·56	−2·69	+0·27	E
			I. P. E.	W	36 H. Cassiop.*	U	10	−0·0928	2 26 7·94	−·06	+12·83*	−·22	+1 41·69	2·18	2 28 2·48	−0 0·30	+3·23		
			I. P. W.	W	δ Ursæ Min.	L	4	+0·6037	6 4 5·33	+·31	+·46	+·64	+1 41·95	48·69	6 5 48·86	−0 0·17	−0·28	+0·95	E
			I. P. E.	W	51 Cephei (Hev.)	U	5	−0·6990	6 50 5·14	−·38	+·56	−·72	+1 41·95	46·55	6 51 48·07	−0 1·52	+2·17		
		Jan. 30	*I. P. W.*	W	36 H. Cassiop.	U	15	−0·0928	2 26 17·50	−·06	−·08	−·26	+1 44·77	1·87	2 28 2·30	−0 0·43	+4·63	+3·38	E
			I. P. E.	W	5 H. Camelop.	U	10	−0·0845	3 37 32·64	−·06	+·07	−·25	+1 44·77	17·17	3 39 17·35	−0 0·18	+2·13		
			I. P. E.	W	δ Ursæ Min.	L	4	+0·6037	6 4 4·55	+·31	−·39	+·89	+1 45·19	50·55	6 5 49·54	+0 1·01	+1·67	+2·61	E
			I. P. E.	W	51 Cephei (Hev.)	U	4	−0·6990	6 50 1·14	−·38	+·48	−1·36	+1 45·19	45·07	6 51 47·55	−0 2·48	+3·55		
		Feb. 2	*I. P. E.*	W	47 H. Cephei	U	7	−0·1625	2 50 17·43	−·10	+·16	−·28	+1 49·60	6·81	2 52 7·06	−0 0·25	+1·54	+0·75	E
			I. P. W.	W	5 H. Camelop.	U	8	−0·0845	3 37 27·88	−·06	−·10	−·19	+1 49·60	17·13	3 39 17·19	−0 0·06	+0·71		
			I. P. W.	W	ζ Ursæ Min.	L	5	+0·1820	3 45 58·00	+·09	+·15	+·10	+1 49·60	47·94	3 47 47·94	−0 0·00	−0·00		

* At transit of these two stars, the micrometer was set by mistake to read 1395·0 instead of 1495·0, and consequently the correction for collimation is large.

EXPLANATION OF *TABLE III.*

Direct Comparison of Clocks.

The first four columns call for no remark.

Column 5 contains the time by the Karachi clock of the middle of the period during which signals were being sent or received.

„ 6 contains the time by the Jask clock of the same instant.

„ 7 contains the difference between the clocks as read off the chronographic record.

„ 8 gives the mean, to the nearest whole second, of the times given in column 5.

„ 9 gives the mean of those in column 6.

„ 10 contains the mean of two corresponding differences in column 7, and is the difference between the clocks, freed from the effects of retardation, at the epoch given in terms of the two clocks respectively, in columns 8 and 9.

„ 11 contains the deduced relative hourly rate of the clocks. It is obtained as follows:—

The change in the difference between the clocks between two consecutive comparisons is divided by the interval between the comparisons, expressed in hours, and the result is the rate during the interval. Then the mean of two consecutive rates is taken and considered to be the rate at the epoch of the intervening comparison, opposite which it is accordingly entered. It will be seen that by this method the same weight is given to a rate deduced from two comparisons on the same night, as to one deduced from the last comparison on one night and the first on the next. If the interval between the comparisons be small the deduced rate will be seriously affected by any errors in the observed differences between the clocks; on the other hand, when the interval is from one night to the next there is a probability of a variation in the rate. Hence it appears that each method has its own disadvantages and that consequently the adoption of equal weights is justifiable.

TABLE III. DIRECT COMPARISON OF CLOCKS.

Arc	Astronomical Date	Comparison made at	Clock Signals transmitted from	Time of Comparison by Karachi Clock	Corresponding Time by Jask Clock	Observed Difference between the Clocks	Mean Time of Comparison by E Clock $= T_E$	Mean Time of Comparison by W Clock $= T_W$	Mean Difference between the Clocks at Epochs T_E and T_W $= D$	Relative Hourly Clock Rate at Epochs T_E and T_W
	1895			h m s	h m s	h m s	h m s	h m s	h m s	s
KARACHI (E) and JASK (W)	Jan. 21	Jask	Karachi	2 32 2·000	1 53 6·100	0 38 55·900				
		Karachi	Jask	2 38 1·070	1 59 5·000	56·070	2 35 2	1 56 6	0 38 55·985	+ 0·039
		Jask	Karachi	4 0 0·000	3 21 4·045	55·955				
		Karachi	Jask	4 5 3·129	3 26 7·000	56·129	4 2 32	3 23 36	56·042	+ ·039
	" 22	Jask	Karachi	2 19 2·000	1 40 5·151	0 38 56·849				
		Karachi	Jask	2 30 1·968	1 51 5·000	56·968	2 24 32	1 45 35	0 38 56·908	+ 0·030
		Jask	Karachi	4 4 58·000	3 26 1·105	56·895				
		Karachi	Jask	4 8 5·000	3 29 8·000	57·000	4 6 32	3 27 35	56·947	+ ·012
	" 23	Jask	Karachi	2 25 57·000	1 47 0·085	0 38 56·915				
		Karachi	Jask	2 31 2·005	1 52 5·000	57·005	2 28 30	1 49 33	0 38 56·960	− 0·001
		Jask	Karachi	3 59 57·000	3 21 0·097	56·903				
		Karachi	Jask	4 6 1·010	3 27 4·000	57·010	4 2 59	3 24 2	56·956	+ ·004
		Jask	Karachi	5 41 57·000	5 3 0·080	56·920				
		Karachi	Jask	5 47 1·030	5 8 4·000	57·030	5 44 29	5 5 32	56·975	+ ·006
		Jask	Karachi	7 32 57·000	6 54 0·080	56·930				
		Karachi	Jask	8 14 2·022	7 35 5·000	57·022	7 53 30	7 14 33	56·976	+ ·001
	" 24	Jask	Karachi	2 18 57·000	1 40 0·065	0 38 56·935				
		Karachi	Jask	2 28 2·070	1 49 5·000	57·070	2 23 30	1 44 33	0 38 57·003	+ 0·003
		Jask	Karachi	3 58 57·000	3 20 0·070	56·930				
		Karachi	Jask	4 4 3·095	3 25 6·000	57·095	4 1 30	3 22 33	57·013	·000
		Jask	Karachi	5 41 57·000	5 3 0·100	56·900				
		Karachi	Jask	5 48 2·106	5 9 5·000	57·106	5 45 0	5 6 3	57·003	+ ·009
		Jask	Karachi	7 34 57·000	6 56 0·000	57·000				
		Karachi	Jask	7 41 3·095	7 2 6·000	57·095	7 38 0	6 59 3	57·048	+ ·010

TABLE III. DIRECT COMPARISON OF CLOCKS.

Arc	Astronomical Date	Comparison made at	Clock Signals transmitted from	Time of Comparison by Karachi Clock	Corresponding Time by Jask Clock	Observed Difference between the Clocks	Mean Time of Comparison by E Clock $= T_E$	Mean Time of Comparison by W Clock $= T_W$	Mean Difference between the Clocks at Epochs T_E and T_W $= D$	Relative Hourly Clock Rate at Epochs T_E and T_W
	1895			h m s	h m s	h m s	h m s	h m s	h m s	s
KARACHI (E) and JASK (W)	Jan. 25	Jask	Karachi	2 21 57·000	1 43 0·100	0 38 56·900				
		Karachi	Jask	2 29 2·020	1 50 5·000	57·020	2 25 30	1 46 33	0 38 56·960	+ 0·024
		Jask	Karachi	4 0 57·000	3 22 0·000	57·000				
		Karachi	Jask	4 7 3·095	3 28 6·000	57·095	4 4 0	3 25 3	57·048	+ ·055
		Jask	Karachi	5 40 57·000	5 1 59·905	57·095				
		Karachi	Jask	5 46 3·190	5 7 6·000	57·190	5 43 30	5 4 33	57·142	+ ·040
		Jask	Karachi	7 36 57·000	6 57 59·870	57·130				
		Karachi	Jask	7 43 1·244	7 4 4·000	57·244	7 39 59	7 1 2	57·187	+ ·009
	„ 26	Jask	Karachi	2 19 1·000	1 40 3·946	0 38 57·054				
		Karachi	Jask	2 26 3·154	1 47 6·000	57·154	2 22 32	1 43 35	0 38 57·104	− 0·006
		Jask	Karachi	3 59 1·000	3 20 3·937	57·063				
		Karachi	Jask	4 4 2·117	3 25 5·000	57·117	4 1 32	3 22 34	57·090	− ·017
		Jask	Karachi	5 43 0·000	5 4 3·000	57·000				
		Karachi	Jask	5 48 3·090	5 9 6·000	57·090	5 45 32	5 6 35	57·045	− ·038
		Jask	Karachi	7 38 57·890	7 0 1·000	56·890				
		Karachi	Jask	7 47 6·000	7 8 9·000	57·000	7 43 2	7 4 5	56·945	− ·048
	„ 27	Jask	Karachi	0 58 4·090	0 19 8·000	0 38 56·090				
		Karachi	Jask	1 2 7·190	0 23 11·000	56·190	1 0 6	0 21 10	0 38 56·140	− 0·032
		Jask *	Karachi	1 12 3·980	0 33 8·000	55·980				
		Karachi	Jask	1 17 6·282	0 38 10·000	56·282	1 14 35	0 35 39	† 56·131	
		Jask	Karachi	1 26 4·060	0 47 8·000	56·060				
		Karachi	Jask	1 31 5·184	0 52 9·000	56·184	1 28 35	0 49 39	† 56·122	
		Jask *	Karachi	1 50 4·023	1 11 8·000	56·023				
		Karachi	Jask	2 3 6·287	1 24 10·000	56·287	1 56 35	1 17 39	† 56·155	
		Jask	Karachi	2 24 4·070	1 45 8·000	56·070				
		Karachi	Jask	2 29 5·162	1 50 9·000	56·162	2 26 35	1 47 39	56·116	− ·028
		Jask	Karachi	4 1 4·012	3 22 8·000	56·012				
		Karachi	Jask	4 7 5·095	3 28 9·000	56·095	4 4 5	3 25 9	56·054	− ·034
		Jask	Karachi	5 36 3·935	4 57 8·000	55·935				
		Karachi	Jask	5 43 5·080	5 4 9·000	56·080	5 39 35	5 0 39	56·008	− ·028
		Jask	Karachi	7 42 3·890	7 3 8·000	55·890				
		Karachi	Jask	7 47 5·015	7 8 9·000	56·015	7 44 34	7 5 39	55·953	− ·019

* Submarine cable in use during this comparison. † Not used for determination of Clock Rate, intervals being very small.

TABLE III. DIRECT COMPARISON OF CLOCKS.

Arc	Astronomical Date	Comparison made at	Clock Signals transmitted from	Time of Comparison by Karachi Clock	Corresponding Time by Jask Clock	Observed Difference between the Clocks	Mean Time of Comparison by E Clock $= T_E$	Mean Time of Comparison by W Clock $= T_W$	Mean Difference between the Clocks at Epochs T_E and T_W $= D$	Relative Hourly Clock Rate at Epochs T_E and T_W
KARACHI (E) and JASK (W)	1895			h m s	h m s	h m s	h m s	h m s	h m s	s
	Jan. 30	Jask	Karachi	2 42 4·123	2 3 9·000	0 38 55·123				
		Karachi	Jask	2 46 5·270	2 7 10·000	55·270	2 44 5	2 5 10	0 38 55·197	+ 0·039
		Jask	Karachi	4 5 4·273	3 26 9·000	55·273				
		Karachi	Jask	4 13 4·373	3 34 9·000	55·373	4 9 4	3 30 9	55·323	+ 0·067
		Jask	Karachi	5 48 4·339	5 9 9·000	55·339				
		Karachi	Jask	5 53 5·464	5 14 10·000	55·464	5 50 35	5 11 40	55·402	+ 0·057
		Jask	Karachi	7 37 4·473	6 58 9·000	55·473				
		Karachi	Jask	7 41 4·569	7 2 9·000	55·569	7 39 5	7 0 9	55·521	+ 0·060
	Feb. 2	Jask	Karachi	2 40 4·010	2 1 5·000	0 38 59·010				
		Karachi	Jask	2 44 5·140	2 5 6·000	59·140	2 42 5	2 3 6	0 38 59·075	+ 0·064
		Jask	Karachi	3 59 4·100	3 20 5·000	59·100				
		Karachi	Jask	4 4 5·240	3 25 6·000	59·240	4 1 35	3 22 36	59·170	+ 0·072

ARC KARACHI-JASK.

TABLE IV.

Transits of Clock Stars and Deduction of the Clock Correction.

As no clock stars were observed on this arc, this table does not occur.

EXPLANATION OF *TABLE V.*

Observations of Transits of the same Stars at both Stations, and Deduction of the Difference of Corrected Times.

This Table includes observations at both stations.

The seconds of corrected time of transit in the case of the eastern station, Karachi, are obtained precisely as in Table IV of the other arcs. But in the case of the western station, Jask, there is an additional correction on account of the rate of its clock.

The quantity sought is the difference between the errors of the two clocks at a particular epoch, namely, that at which the star transited at the eastern station. Now the interval between the transit of a star at the eastern station and its transit at the western station is equal to the difference of longitude, so that the observed time of transit at the western station requires a correction equal to the change in the western clock's error during an interval equal to the difference of longitude, *i.e.*, equal to the clock's hourly rate correction multiplied by the difference of longitude expressed in hours. This quantity is found for each night in the last column of Table VI. There is therefore a slight inter-dependence between these two tables, but no confusion results in practice, for the quantities required from Table V in order to form Table VI do not include the correction for clock rate: thus Table V may be brought up to the point immediately preceding this entry, then Table VI can be computed in its entirety, and lastly the final columns of Table V filled in.

It will be noticed that on January 30th and February 2nd the entry in Table V does not quite agree with the last column of Table VI. The reason of this is that in Table V only two places of decimals are kept, so that the final value might be burdened by an error not exceeding $0^s\cdot005$; in order to avoid this, care is taken to increase the value entered in Table V by 1 in the second place of decimals as often as is requisite to make the mean value correct to the third place of decimals. On the first six nights the errors caused by keeping only two places of decimals cancel each other, so that compensation has only to be made during the last two.

Having obtained the seconds of corrected time at each station, the difference between them is taken out. These differences are combined into means according to the positions of the two instruments, and corresponding to the mean epochs of the groups, and lastly these means are combined into final means corresponding to final mean epochs.

TABLE V. **OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH**

KARACHI (E), *Lat.* 24° 51′, *Long.* 4h 28m: AND JASK (W), *Lat.* 25° 38′, *Long.* 3h 51m.

Astronomical Date	Star: Number in Gr. 80	Star: Declination	Transits Observed at KARACHI (E) by BURRARD with Telescope No. 1.: Star's Aspect	Instrumental Position	Observed Time	Correction for: Collimation	Level	Deviation	Diurnal Aberration	Seconds of Corrected Time
		° ′			h m s	s	s	s	s	s
1895										
Jan. 21	431	17 55	S	E	2 50 18·52	0·00	+0·31	+0·16	−0·02	18·97
	438	39 15	N	E	2 52 27·31	0·00	+0·37	−0·41	−0·02	27·25
	444	20 55	S	E	2 53 36·59	0·00	+0·32	+0·09	−0·02	36·98
	450	38 28	N	E	2 55 36·32	0·00	+0·37	−0·38	−0·02	36·29
	455	3 41	S	E	2 57 11·45	0·00	+0·28	+0·46	−0·02	12·17
	460	38 26	N	E	2 58 51·35	0·00	+0·37	−0·38	−0·02	51·32
		Mean	...	...	2 54 40					
	464	40 33	N	W	3 1 45·04	−0·01	+0·31	−0·46	−0·02	44·86
	471	28 41	N	W	3 3 42·15	0·00	+0·28	−0·10	−0·02	42·31
	475	19 20	S	W	3 6 1·74	0·00	+0·26	+0·13	−0·02	2·11
	483	− 1 35	S	W	3 7 49·00	0·00	+0·22	+0·57	−0·02	49·77
	489	30 10	N	W	3 9 21·34	0·00	+0·28	−0·14	−0·02	21·46
	495	43 38	N	W	3 11 8·38	−0·01	+0·32	−0·57	−0·03	8·09
	508	20 46	S	W	3 15 34·26	0·00	+0·26	+0·10	−0·02	34·60
		Mean	...	...	3 7 54					
Jan. 23	425	14 39	S	E	2 46 2·83	+0·02	+0·39	+0·26	−0·02	3·48
	428	37 55	N	E	2 47 26·48	+0·02	+0·47	−0·41	−0·02	26·54
	431	17 55	S	E	2 50 15·65	+0·02	+0·40	+0·18	−0·02	16·23
	438	39 15	N	E	2 52 24·41	+0·02	+0·47	−0·45	−0·02	24·43
	444	20 55	S	E	2 53 33·75	+0·02	+0·40	+0·10	−0·02	34·25
	450	38 28	N	E	2 55 33·42	+0·02	+0·47	−0·42	−0·02	33·47
	455	3 41	S	E	2 57 8·47	+0·02	+0·35	+0·51	−0·02	9·33
	460	38 26	N	E	2 58 48·45	+0·02	+0·47	−0·42	−0·02	48·50
		Mean	...	...	2 52 39					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

KARACHI (E), *Lat.* 24° 51′, *Long.* 4ʰ 28ᵐ: AND JASK (W), *Lat.* 25° 38′, *Long.* 3ʰ 51ᵐ.

Transits Observed at JASK (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch = T_E
Star's Aspect	Instrumental Position	Observed Time	Correction for: Collimation	Level	Deviation	Diurnal Aberration	Rate of W Clock	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
S	E	2 48 23·35	+0·05	+0·27	−0·73	−0·02	+0·05	22·97	− 1 56·00			
N	E	2 50 29·18	+0·05	+0·32	+1·54	−0·02	+0·05	31·12	1 56·13			
S	E	2 51 41·09	+0·05	+0·28	−0·45	−0·02	+0·05	41·00	1 55·98			
N	E	2 53 38·36	+0·05	+0·32	+1·44	−0·02	+0·05	40·20	1 56·09			
S	E	2 55 17·70	+0·04	+0·24	−1·91	−0·02	+0·05	16·10	1 56·07			
N	E	2 56 53·41	+0·05	+0·32	+1·44	−0·02	+0·05	55·25	1 56·07	− 1 56·057		
N	W	2 59 46·49	−0·06	+0·29	+1·73	−0·02	+0·05	48·48	− 1 56·38			
N	W	3 1 45·60	−0·05	+0·26	+0·30	−0·02	+0·05	46·14	1 56·17			
S	W	3 4 6·33	−0·04	+0·24	−0·59	−0·02	+0·05	5·97	1 56·14			
S	W	3 5 55·73	−0·04	+0·21	−2·32	−0·02	+0·05	53·61	1 56·16			
N	W	3 7 24·55	−0·05	+0·27	+0·46	−0·02	+0·05	25·26	1 56·20			
N	W	3 9 9·43	−0·06	+0·30	+2·18	−0·03	+0·05	11·87	1 56·22			
S	W	3 13 38·64	−0·05	+0·25	−0·46	−0·02	+0·05	38·41	1 56·19	− 1 56·209	− 1 56·133	3 1 17
S	W	2 44 6·44	+0·01	−0·07	+0·01	−0·02	+0·04	6·41	− 1 57·07			
N	W	2 45 29·59	+0·01	−0·08	−0·02	−0·02	+0·04	29·52	1 57·02			
S	W	2 48 19·18	+0·01	−0·07	+0·01	−0·02	+0·04	19·15	1 57·08			
N	W	2 50 27·41	+0·01	−0·08	−0·02	−0·02	+0·04	27·34	1 57·09			
S	W	2 51 37·17	+0·01	−0·07	+0·01	−0·02	+0·04	37·14	1 57·11			
N	W	2 53 36·48	+0·01	−0·08	−0·02	−0·02	+0·04	36·41	1 57·06			
S	W	2 55 12·20	+0·01	−0·06	+0·02	−0·02	+0·04	12·19	1 57·14			
N	W	2 56 51·55	+0·01	−0·08	−0·02	−0·02	+0·04	51·48	1 57·02	− 1 57·074		

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

KARACHI (E), *Lat.* 24° 51′, *Long.* 4h 28m: AND JASK (W), *Lat.* 25° 38′, *Long.* 3h 51m.

Astronomical Date	Star		Transits Observed at KARACHI (E) by BURRARD with Telescope No. 1.							
	Number in Gr. 80	Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for				Seconds of Corrected Time
						Collimation	Level	Deviation	Diurnal Aberration	
1895		° ′			h m s	s	s	s	s	s
Jan. 23	464	40 33	N	W	3 1 42·12	−0·03	+0·35	−0·51	−0·02	41·91
	471	28 41	N	W	3 3 39·32	−0·02	+0·31	−0·11	−0·02	39·48
	475	19 20	S	W	3 5 58·86	−0·02	+0·29	+0·14	−0·02	59·25
	483	− 1 35	S	W	3 7 46·14	−0·02	+0·25	+0·63	−0·02	46·98
	489	30 10	N	W	3 9 18·52	−0·02	+0·32	−0·15	−0·02	18·65
	495	43 38	N	W	3 11 5·45	−0·03	+0·36	−0·63	−0·03	5·12
	500	− 1 19	S	W	3 13 21·26	−0·02	+0·25	+0·63	−0·02	22·10
	508	20 46	S	W	3 15 31·38	−0·02	+0·29	+0·11	−0·02	31·74
		Mean ...	...	...	3 8 33					
	1081	49 20	N	W	6 17 12·73	−0·03	+0·41	−0·90	−0·03	12·18
	1089	8 56	S	W	6 18 39·72	−0·02	+0·28	+0·39	−0·02	40·35
	1099	30 33	N	W	6 22 11·93	−0·02	+0·34	−0·16	−0·02	12·07
	1110	32 32	N	W	6 25 58·97	−0·02	+0·34	−0·23	−0·02	59·04
	1116	4 56	S	W	6 27 6·79	−0·02	+0·27	+0·48	−0·02	7·50
	1125	− 1 8	S	W	6 28 39·85	−0·02	+0·26	+0·62	−0·02	40·69
	1130	16 53	S	W	6 30 19·54	−0·02	+0·30	+0·20	−0·02	20·00
		Mean ...	...	...	6 24 19					
	1144	28 21	N	E	6 33 18·46	+0·02	+0·40	−0·10	−0·02	18·76
	1145	28 18	N	E	6 35 6·46	+0·02	+0·40	−0·10	−0·02	6·76
	1155	17 45	S	E	6 36 39·59	+0·02	+0·37	+0·18	−0·02	40·14
	1161	29 5	N	E	6 38 28·88	+0·02	+0·40	−0·12	−0·02	29·16
	1168	13 1	S	E	6 39 45·73	+0·02	+0·35	+0·30	−0·02	46·38
	1170	41 25	N	E	6 41 21·11	+0·03	+0·45	−0·54	−0·02	21·03
	1175	2 32	S	E	6 42 44·77	+0·02	+0·33	+0·54	−0·02	45·64
	1179	16 19	S	E	6 44 9·22	+0·02	+0·36	+0·22	−0·02	9·80
		Mean ...	...	...	6 38 57					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

KARACHI (E), *Lat.* 24° 51′, *Long.* 4h 28m: AND JASK (W), *Lat.* 25° 38′, *Long.* 3h 51m.

Transits Observed at JASK (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch = T_E
Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Correction for Rate of W Clock	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
N	E	2 59 44·99	−0·01	−0·11	−0·02	−0·02	+0·04	44·87	− 1 57·04			
N	E	3 1 42·54	−0·01	−0·10	0·00	−0·02	+0·04	42·45	1 57·03			
S	E	3 4 2·36	−0·01	−0·09	+0·01	−0·02	+0·04	2·29	1 56·96			
S	E	3 5 49·84	−0·01	−0·08	+0·03	−0·02	+0·04	49·80	1 57·18			
N	E	3 7 21·69	−0·01	−0·10	−0·01	−0·02	+0·04	21·59	1 57·06			
N	E	3 9 8·36	−0·01	−0·12	−0·03	−0·03	+0·04	8·21	1 56·91			
S	E	3 11 24·99	−0·01	−0·08	+0·03	−0·02	+0·04	24·95	1 57·15			
S	E	3 13 34·83	−0·01	−0·09	+0·01	−0·02	+0·04	34·76	1 56·98	− 1 57·039	− 1 57·057	3 0 36
N	W	6 15 15·14	+0·01	−0·10	−0·09	−0·03	+0·04	14·97	− 1 57·21			
S	W	6 16 43·32	+0·01	−0·07	+0·04	−0·02	+0·04	43·32	1 57·03			
N	W	6 20 15·06	+0·01	−0·08	−0·01	−0·02	+0·04	15·00	1 57·07			
N	W	6 24 2·00	+0·01	−0·08	−0·02	−0·02	+0·04	1·93	1 57·11			
S	W	6 25 10·35	+0·01	−0·07	+0·05	−0·02	+0·04	10·36	1 57·14			
S	W	6 26 43·57	+0·01	−0·06	+0·06	−0·02	+0·04	43·60	1 57·09			
S	W	6 28 22·98	+0·01	−0·07	+0·02	−0·02	+0·04	22·96	1 57·04	− 1 57·099		
N	E	6 31 21·78	−0·01	−0·07	−0·01	−0·02	+0·04	21·71	− 1 57·05			
N	E	6 33 9·82	−0·01	−0·07	−0·01	−0·02	+0·04	9·75	1 57·01			
S	E	6 34 43·22	−0·01	−0·07	+0·02	−0·02	+0·04	43·18	1 56·96			
N	E	6 36 32·20	−0·01	−0·07	−0·01	−0·02	+0·04	32·13	1 57·03			
S	E	6 37 49·41	−0·01	−0·07	+0·03	−0·02	+0·04	49·38	1 57·00			
N	E	6 39 24·22	−0·01	−0·08	−0·05	−0·02	+0·04	24·10	1 56·93			
S	E	6 40 48·71	−0·01	−0·06	+0·05	−0·02	+0·04	48·71	1 56·93			
S	E	6 42 12·92	−0·01	−0·07	+0·02	−0·02	+0·04	12·88	1 56·92	− 1 56·979	− 1 57·039	6 31 38

TABLE V. **OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH**

KARACHI (E), *Lat.* 24° 51′, *Long.* 4ʰ 28ᵐ: AND JASK (W), *Lat.* 25° 38′, *Long.* 3ʰ 51ᵐ.

Astronomical Date	Star		Transits Observed at KARACHI (E) by BURRARD with Telescope No. 1.							
	Number in Gr. 80	Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for				Seconds of Corrected Time
						Collimation	Level	Deviation	Diurnal Aberration	
1895		° ′			h m s	s	s	s	s	s
Jan. 24	425	14 39	S	W	2 46 1·46	0·00	+0·27	+0·24	−0·02	1·95
	428	37 55	N	W	2 47 25·15	0·00	+0·33	−0·38	−0·02	25·08
	431	17 55	S	W	2 50 14·29	0·00	+0·28	+0·17	−0·02	14·72
	438	39 15	N	W	2 52 23·08	0·00	+0·33	−0·43	−0·02	22·96
	444	20 55	S	W	2 53 32·34	0·00	+0·28	+0·10	−0·02	32·70
	450	38 28	N	W	2 55 32·05	0·00	+0·33	−0·40	−0·02	31·96
	455	3 41	S	W	2 57 7·18	0·00	+0·25	+0·48	−0·02	7·89
	460	38 26	N	W	2 58 47·12	0·00	+0·33	−0·40	−0·02	47·03
		Mean ...	...	...	2 52 38					
	464	40 33	N	E	3 1 40·42	+0·01	+0·40	−0·47	−0·02	40·34
	471	28 41	N	E	3 3 37·67	0·00	+0·36	−0·10	−0·02	37·91
	475	19 20	S	E	3 5 57·28	0·00	+0·33	+0·13	−0·02	57·72
	483	− 1 35	S	E	3 7 44·51	0·00	+0·28	+0·59	−0·02	45·36
	489	30 10	N	E	3 9 16·81	0·00	+0·36	−0·14	−0·02	17·01
	495	43 38	N	E	3 11 3·81	+0·01	+0·41	−0·59	−0·03	3·61
	500	− 1 19	S	E	3 13 19·68	0·00	+0·28	+0·59	−0·02	20·53
	508	20 46	S	E	3 15 29·73	0·00	+0·33	+0·10	−0·02	30·14
		Mean ...	...	...	3 8 31					
	1081	49 20	N	W	6 17 11·20	−0·01	+0·49	−0·88	−0·03	10·77
	1089	8 56	S	W	6 18 38·30	0·00	+0·34	+0·38	−0·02	39·00
	1099	30 33	N	W	6 22 10·50	0·00	+0·41	−0·16	−0·02	10·73
	1108	28 17	N	W	6 24 5·66	0·00	+0·40	−0·09	−0·02	5·95
	1110	32 32	N	W	6 25 57·45	0·00	+0·41	−0·22	−0·02	57·62
	1116	4 56	S	W	6 27 5·25	0·00	+0·33	+0·47	−0·02	6·03
	1125	− 1 8	S	W	6 28 38·40	0·00	+0·32	+0·61	−0·02	39·31
	1130	16 53	S	W	6 30 18·04	0·00	+0·36	+0·20	−0·02	18·58
		Mean ...	...	...	6 24 16					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

KARACHI (E), *Lat.* 24° 51′, *Long.* 4ʰ 28ᵐ: AND JASK (W), *Lat.* 25° 38′, *Long.* 3ʰ 51ᵐ.

Transits Observed at JASK (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch $= T_E$
Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Correction for Rate of W Clock	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
S	W	2 44 5·00	−0·03	−0·11	+0·03	−0·02	+0·04	4·91	− 1 57·04			
N	W	2 45 28·19	−0·04	−0·14	−0·03	−0·02	+0·04	28·00	1 57·08			
S	W	2 48 17·71	−0·03	−0·12	+0·02	−0·03	+0·04	17·60	1 57·12			
N	W	2 50 25·93	−0·04	−0·14	−0·04	−0·02	+0·04	25·73	1 57·23			
S	W	2 51 35·71	−0·03	−0·12	+0·01	−0·02	+0·04	35·59	1 57·11			
N	W	2 53 34·94	−0·04	−0·14	−0·04	−0·02	+0·04	34·74	1 57·22			
S	W	2 55 10·84	−0·03	−0·10	+0·05	−0·02	+0·04	10·78	1 57·11			
N	W	2 56 50·06	−0·04	−0·14	−0·04	−0·02	+0·04	49·86	1 57·17	− 1 57·135		
N	E	2 59 43·43	+0·04	−0·06	−0·04	−0·02	+0·04	43·39	− 1 56·95			
N	E	3 1 41·02	+0·04	−0·06	−0·01	−0·02	+0·04	41·01	1 56·90			
S	E	3 4 0·79	+0·03	−0·05	+0·01	−0·02	+0·04	0·80	1 56·92			
S	E	3 5 48·36	+0·03	−0·04	+0·06	−0·02	+0·04	48·43	1 56·93			
N	E	3 7 20·12	+0·04	−0·06	−0·01	−0·02	+0·04	20·11	1 56·90			
N	E	3 9 6·75	+0·04	−0·07	−0·05	−0·03	+0·04	6·68	1 56·93			
S	E	3 11 23·54	+0·03	−0·04	+0·06	−0·02	+0·04	23·61	1 56·92			
S	E	3 13 33·26	+0·03	−0·05	+0·01	−0·02	+0·04	33·27	1 56·87	− 1 56·915	− 1 57·025	3 0 35
N	E	6 15 13·65	+0·05	−0·10	+0·06	−0·03	+0·04	13·67	− 1 57·10			
S	E	6 16 41·96	+0·03	−0·07	−0·03	−0·02	+0·04	41·91	1 57·09			
N	E	6 20 13·66	+0·04	−0·08	+0·01	−0·02	+0·04	13·65	1 57·08			
N	E	6 22 8·95	+0·04	−0·08	+0·01	−0·02	+0·04	8·94	1 57·01			
N	E	6 24 0·56	+0·04	−0·09	+0·01	−0·02	+0·04	0·54	1 57·08			
S	E	6 25 9·08	+0·03	−0·07	−0·04	−0·02	+0·04	9·02	1 57·01			
S	E	6 26 42·23	+0·03	−0·07	−0·05	−0·02	+0·04	42·16	1 57·15			
S	E	6 28 21·57	+0·03	−0·08	−0·02	−0·02	+0·04	21·52	1 57·06	− 1 57·073		

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

KARACHI (E), *Lat.* 24° 51′, *Long.* 4h 28m: AND JASK (W), *Lat.* 25° 38′, *Long.* 3h 51m.

Astronomical Date	Star: Number in Gr. 80	Star: Declination	Transits Observed at KARACHI (E) by BURRARD with Telescope No. 1.: Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Seconds of Corrected Time
1895		° ′			h m s	s	s	s	s	s
Jan. 24	1144	28 21	N	E	6 33 17·01	0·00	+0·40	−0·10	−0·02	17·29
	1145	28 18	N	E	6 35 4·93	0·00	+0·40	−0·09	−0·02	5·22
	1155	17 45	S	E	6 36 38·23	0·00	+0·37	+0·18	−0·02	38·76
	1161	29 5	N	E	6 38 27·44	0·00	+0·40	−0·12	−0·02	27·70
	1168	13 1	S	E	6 39 44·35	0·00	+0·35	+0·29	−0·02	44·97
	1170	41 25	N	E	6 41 19·71	+0·01	+0·45	−0·53	−0·02	19·62
	1175	2 32	S	E	6 42 43·41	0·00	+0·33	+0·53	−0·02	44·25
	1179	16 19	S	E	6 44 7·89	0·00	+0·36	+0·22	−0·02	8·45
		Mean	...	...	6 38 55					
Jan. 25	425	14 39	S	W	2 46 0·13	−0·01	+0·31	+0·25	−0·02	0·66
	428	37 55	N	W	2 47 23·67	−0·01	+0·37	−0·38	−0·02	23·63
	431	17 55	S	W	2 50 12·79	−0·01	+0·32	+0·17	−0·02	13·25
	438	39 15	N	W	2 52 21·62	−0·01	+0·38	−0·43	−0·02	21·54
	444	20 55	S	W	2 53 30·88	−0·01	+0·32	+0·10	−0·02	31·27
	450	38 28	N	W	2 55 30·59	−0·01	+0·37	−0·40	−0·02	30·53
	455	3 41	S	W	2 57 5·74	−0·01	+0·28	+0·48	−0·02	6·47
	460	38 26	N	W	2 58 45·79	−0·01	+0·38	−0·40	−0·02	45·74
		Mean	...	...	2 52 36					
	464	40 33	N	E	3 1 39·01	+0·02	+0·47	−0·48	−0·02	39·00
	471	28 41	N	E	3 3 36·23	+0·01	+0·42	−0·10	−0·02	36·54
	475	19 20	S	E	3 5 55·86	+0·01	+0·39	+0·13	−0·02	56·37
	483	− 1 35	S	E	3 7 43·09	+0·01	+0·33	+0·60	−0·02	44·01
	489	30 10	N	E	3 9 15·36	+0·01	+0·43	−0·15	−0·02	15·63
	495	43 38	N	E	3 11 2·37	+0·02	+0·49	−0·60	−0·03	2·25
	500	− 1 19	S	E	3 13 18·26	+0·01	+0·33	+0·59	−0·02	19·17
	508	20 46	S	E	3 15 28·40	+0·01	+0·40	+0·10	−0·02	28·89
		Mean	...	...	3 8 30					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

KARACHI (E), *Lat.* 24° 51′, *Long.* 4^h 28^m: AND JASK (W), *Lat.* 25° 38′, *Long.* 3^h 51^m.

Transits Observed at JASK (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch $= T_E$
Star's Aspect	Instrumental Position	Observed Time	Correction for: Collimation	Level	Deviation	Diurnal Aberration	Rate of W Clock	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
N	W	6 31 20·31	−0·04	−0·09	+0·01	−0·02	+0·04	20·21	− 1 57·08			
N	W	6 33 8·35	−0·04	−0·09	+0·01	−0·02	+0·04	8·25	1 56·97			
S	W	6 34 41·79	−0·03	−0·08	−0·01	−0·02	+0·04	41·69	1 57·07			
N	W	6 36 30·71	−0·04	−0·09	+0·01	−0·02	+0·04	30·61	1 57·09			
S	W	6 37 47·91	−0·03	−0·08	−0·02	−0·02	+0·04	47·80	1 57·17			
N	W	6 39 22·72	−0·04	−0·10	+0·04	−0·02	+0·04	22·64	1 56·98			
S	W	6 40 47·26	−0·03	−0·07	−0·04	−0·02	+0·04	47·14	1 57·11			
S	W	6 42 11·49	−0·03	−0·08	−0·02	−0·02	+0·04	11·38	1 57·07	− 1 57·068	− 1 57·071	6 31 36
S	E	2 44 3·59	+0·03	−0·09	−0·02	−0·02	+0·05	3·54	− 1 57·12			
N	E	2 45 26·67	+0·04	−0·11	+0·02	−0·02	+0·05	26·65	1 56·98			
S	E	2 48 16·32	+0·03	−0·10	−0·01	−0·02	+0·05	16·27	1 56·98			
N	E	2 50 24·48	+0·04	−0·12	+0·03	−0·02	+0·05	24·46	1 57·08			
S	E	2 51 34·26	+0·03	−0·10	−0·01	−0·02	+0·05	34·21	1 57·06			
N	E	2 53 33·53	+0·04	−0·12	+0·03	−0·02	+0·05	33·51	1 57·02			
S	E	2 55 9·37	+0·03	−0·09	−0·03	−0·02	+0·05	9·31	1 57·16			
N	E	2 56 48·62	+0·04	−0·12	+0·03	−0·02	+0·05	48·60	1 57·14	− 1 57·068		
N	W	2 59 41·95	−0·04	−0·12	+0·03	−0·02	+0·05	41·85	− 1 57·15			
N	W	3 1 39·60	−0·04	−0·11	+0·01	−0·02	+0·05	39·49	1 57·05			
S	W	3 3 59·32	−0·03	−0·10	−0·01	−0·02	+0·05	59·21	1 57·16			
S	W	3 5 46·93	−0·03	−0·08	−0·04	−0·02	+0·05	46·81	1 57·20			
N	W	3 7 18·64	−0·04	−0·11	+0·01	−0·02	+0·05	18·53	1 57·10			
N	W	3 9 5·27	−0·04	−0·12	+0·04	−0·03	+0·05	5·17	1 57·08			
S	W	3 11 22·06	−0·03	−0·08	−0·04	−0·02	+0·05	21·94	1 57·23			
S	W	3 13 31·77	−0·03	−0·10	−0·01	−0·02	+0·05	31·66	1 57·23	− 1 57·150	− 1 57·109	3 0 33

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

KARACHI (E), *Lat.* 24° 51′, *Long.* 4h 28m: AND JASK (W), *Lat.* 25° 38′, *Long.* 3h 51m.

Astronomical Date	Star		Transits Observed at KARACHI (E) by BURRARD with Telescope No. 1.							
	Number in Gr. 80	Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Seconds of Corrected Time
1895		° ′			h m s	s	s	s	s	s
Jan. 25	1081	49 20	N	E	6 17 9·62	+0·02	+0·63	−0·91	−0·03	9·33
	1089	8 56	S	E	6 18 36·72	+0·01	+0·44	+0·40	−0·02	37·55
	1099	30 33	N	E	6 22 8·88	+0·01	+0·52	−0·17	−0·02	9·22
	1108	28 17	N	E	6 24 4·13	+0·01	+0·51	−0·10	−0·02	4·53
	1110	32 32	N	E	6 25 55·87	+0·01	+0·53	−0·23	−0·02	56·16
	1116	4 56	S	E	6 27 3·76	+0·01	+0·42	+0·49	−0·02	4·66
	1125	− 1 8	S	E	6 28 36·83	+0·01	+0·40	+0·63	−0·02	37·85
	1130	16 53	S	E	6 30 16·54	+0·01	+0·46	+0·21	−0·02	17·20
		Mean	...	...	6 24 14					
	1144	28 21	N	W	6 33 15·69	−0·01	+0·34	−0·10	−0·02	15·90
	1145	28 18	N	W	6 35 3·70	−0·01	+0·34	−0·10	−0·02	3·91
	1155	17 45	S	W	6 36 36·87	−0·01	+0·31	+0·19	−0·02	37·34
	1161	29 5	N	W	6 38 26·16	−0·01	+0·34	−0·12	−0·02	26·35
	1168	13 1	S	W	6 39 43·08	−0·01	+0·30	+0·30	−0·02	43·65
	1170	41 25	N	W	6 41 18·47	−0·02	+0·39	−0·55	−0·02	18·27
	1175	2 32	S	W	6 42 42·15	−0·01	+0·28	+0·55	−0·02	42·95
	1179	16 19	S	W	6 44 6·57	−0·01	+0·31	+0·22	−0·02	7·07
		Mean	...	...	6 38 54					
Jan. 26	425	14 39	S	E	2 45 58·17	0·00	+0·40	+0·25	−0·02	58·80
	428	37 55	N	E	2 47 21·95	0·00	+0·49	−0·39	−0·02	22·03
	431	17 55	S	E	2 50 11·01	0·00	+0·41	+0·17	−0·02	11·57
	438	39 15	N	E	2 52 19·69	0·00	+0·49	−0·44	−0·02	19·72
	444	20 55	S	E	2 53 29·12	0·00	+0·42	+0·10	−0·02	29·62
	450	38 28	N	E	2 55 28·73	0·00	+0·49	−0·41	−0·02	28·79
	455	3 41	S	E	2 57 3·91	0·00	+0·37	+0·50	−0·02	4·76
	460	38 26	N	E	2 58 43·89	0·00	+0·49	−0·41	−0·02	43·95
		Mean	...	...	2 52 35					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

KARACHI (E), *Lat.* 24° 51′, *Long.* 4ʰ 28ᵐ: AND JASK (W), *Lat.* 25° 38′, *Long.* 3ʰ 51ᵐ.

Transits Observed at JASK (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch = T_E
Star's Aspect	Instrumental Position	Observed Time	Correction for					Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
			Collimation	Level	Deviation	Diurnal Aberration	Rate of W Clock					
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
N	E	6 15 12·10	+0·05	−0·10	+0·05	−0·03	+0·05	12·12	− 1 57·21			
S	E	6 16 40·41	+0·03	−0·07	−0·02	−0·02	+0·05	40·38	1 57·17			
N	E	6 20 12·08	+0·04	−0·08	+0·01	−0·02	+0·05	12·08	1 57·14			
N	E	6 22 7·36	+0·04	−0·08	0·00	−0·02	+0·05	7·35	1 57·18			
N	E	6 23 59·02	+0·04	−0·08	+0·01	−0·02	+0·05	59·02	1 57·14			
S	E	6 25 7·45	+0·03	−0·07	−0·03	−0·02	+0·05	7·41	1 57·25			
S	E	6 26 40·64	+0·03	−0·06	−0·03	−0·02	+0·05	40·61	1 57·24			
S	E	6 28 20·00	+0·03	−0·07	−0·01	−0·02	+0·05	19·98	1 57·22	− 1 57·194		
N	W	6 31 18·71	−0·04	−0·07	0·00	−0·02	+0·05	18·63	− 1 57·27			
N	W	6 33 6·77	−0·04	−0·07	0·00	−0·02	+0·05	6·69	1 57·22			
S	W	6 34 40·13	−0·03	−0·06	−0·01	−0·02	+0·05	40·06	1 57·28			
N	W	6 36 29·16	−0·04	−0·07	+0·01	−0·02	+0·05	29·09	1 57·26			
S	W	6 37 46·37	−0·03	−0·06	−0·02	−0·02	+0·05	46·29	1 57·36			
N	W	6 39 21·09	−0·04	−0·08	+0·03	−0·02	+0·05	21·03	1 57·24			
S	W	6 40 45·68	−0·03	−0·06	−0·03	−0·02	+0·05	45·59	1 57·36			
S	W	6 42 9·87	−0·03	−0·06	−0·01	−0·02	+0·05	9·80	1 57·27	− 1 57·283	− 1 57·239	6 31 34
S	E	2 44 1·86	+0·04	−0·09	−0·02	−0·02	+0·04	1·81	− 1 56·99			
N	E	2 45 24·98	+0·05	−0·11	+0·03	−0·02	+0·04	24·97	1 57·06			
S	E	2 48 14·59	+0·04	−0·10	−0·02	−0·02	+0·04	14·53	1 57·04			
N	E	2 50 22·79	+0·05	−0·12	+0·03	−0·02	+0·04	22·77	1 56·95			
S	E	2 51 32·59	+0·05	−0·10	−0·01	−0·02	+0·04	32·55	1 57·07			
N	E	2 53 31·81	+0·05	−0·12	+0·03	−0·02	+0·04	31·79	1 57·00			
S	E	2 55 7·68	+0.04	−0·09	−0·04	−0·02	+0·04	7·61	1 57·15			
N	E	2 56 46·85	+0·05	−0·12	+0·03	−0·02	+0·04	46·83	1 57·12	− 1 57·048		

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

KARACHI (E), *Lat.* 24° 51′, *Long.* 4^h 28^m: AND JASK (W), *Lat.* 25° 38′, *Long.* 3^h 51^m.

Astronomical Date	Star		Transits Observed at KARACHI (E) by BURRARD with Telescope No. 1.							
	Number in Gr. 80	Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Seconds of Corrected Time
1895		° ′			h m s	s	s	s	s	s
Jan. 26	464	40 33	N	W	3 1 37·46	−0·01	+0·39	−0·49	−0·02	37·33
	471	28 41	N	W	3 3 34·73	0·00	+0·35	−0·11	−0·02	34·95
	475	19 20	S	W	3 5 54·24	0·00	+0·33	+0·14	−0·02	54·69
	483	− 1 35	S	W	3 7 41·48	0·00	+0·28	+0·61	−0·02	42·35
	489	30 10	N	W	3 9 13·85	0·00	+0·36	−0·15	−0·02	14·04
	495	43 38	N	W	3 11 0·81	−0·01	+0·41	−0·61	−0·03	0·57
	500	− 1 19	S	W	3 13 16·58	0·00	+0·28	+0·61	−0·02	17·45
	508	20 46	S	W	3 15 26·68	0·00	+0·33	+0·10	−0·02	27·09
		Mean	...	...	3 8 28					
	1081	49 20	N	E	6 17 7·79	+0·01	+0·60	−1·00	−0·03	7·37
	1089	8 56	S	E	6 18 34·81	0·00	+0·41	+0·44	−0·02	35·64
	1099	30 33	N	E	6 22 7·15	0·00	+0·49	−0·18	−0·02	7·44
	1108	28 17	N	E	6 24 2·25	0·00	+0·49	−0·11	−0.02	2·61
	1110	32 32	N	E	6 25 54·05	0·00	+0·50	−0·25	−0·02	54·28
	1116	4 56	S	E	6 27 1·81	0·00	+0·40	+0·54	−0·02	2·73
	1125	− 1 8	S	E	6 28 34·93	0·00	+0·38	+0·69	−0·02	35·98
	1130	16 53	S	E	6 30 14·71	0·00	+0·44	+0·23	−0·02	15·36
		Mean	...	...	6 24 12					
	1144	28 21	N	W	6 33 13·95	0·00	+0·47	−0·11	−0·02	14·29
	1145	28 18	N	W	6 35 1·79	0·00	+0·47	−0·11	−0·02	2·13
	1155	17 45	S	W	6 36 34·88	0·00	+0·43	+0·20	−0·02	35·49
	1161	29 5	N	W	6 38 24·29	0·00	+0·47	−0·13	−0·02	24·61
	1168	13 1	S	W	6 39 41·15	0·00	+0·41	+0·33	−0·02	41·87
	1170	41 25	N	W	6 41 16·54	−0·01	+0·52	−0·60	−0·02	16·43
	1175	2 32	S	W	6 42 40·19	0·00	+0·38	+0·60	−0·02	41·15
	1179	16 19	S	W	6 44 4·55	0·00	+0·42	+0·24	−0·02	5·19
		Mean	...	...	6 38 52					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

KARACHI (E), *Lat.* 24° 51′, *Long.* 4ʰ 28ᵐ: AND JASK (W), *Lat.* 25° 38′, *Long.* 3ʰ 51ᵐ.

Transits Observed at JASK (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch = T_E
Star's Aspect	Instrumental Position	Observed Time	Correction for					Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
			Collimation	Level	Deviation	Diurnal Aberration	Rate of W Clock					
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
N	W	2 59 40·23	−0·06	−0·16	+0·04	−0·02	+0·04	40·07	− 1 57·26			
N	W	3 1 37·83	−0·05	−0·14	+0·01	−0·02	+0·04	37·67	1 57·28			
S	W	3 3 57·62	−0·04	−0·13	−0·01	−0·02	+0·04	57·46	1 57·23			
S	W	3 5 45·18	−0·04	−0·11	−0·05	−0·02	+0·04	45·00	1 57·35			
N	W	3 7 16·92	−0·05	−0·14	+0·01	−0·02	+0·04	16·76	1 57·28			
N	W	3 9 3·54	−0·06	−0·16	+0·05	−0·03	+0·04	3·38	1 57·19			
S	W	3 11 20·32	−0·04	−0·11	−0·05	−0·02	+0·04	20·14	1 57·31			
S	W	3 13 30·07	−0·05	−0·13	−0·01	−0·02	+0·04	29·90	1 57·19	− 1 57·261	− 1 57·155	3 0 32
N	W	6 15 10·46	−0·07	−0·15	−0·01	−0·03	+0·04	10·24	− 1 57·13			
S	W	6 16 38·75	−0·04	−0·10	0·00	−0·02	+0·04	38·63	1 57·01			
N	W	6 20 10·42	−0·05	−0·12	0·00	−0·02	+0·04	10·27	1 57·17			
N	W	6 22 5·69	−0·05	−0·12	0·00	−0·02	+0·04	5·54	1 57·07			
N	W	6 23 57·34	−0·05	−0·12	0·00	−0·02	+0·04	57·19	1 57·09			
S	W	6 25 5·78	−0·04	−0.10	0·00	−0·02	+0·04	5·66	1 57·07			
S	W	6 26 38·98	−0·04	−0·09	+0·01	−0·02	+0·04	38·88	1 57·10			
S	W	6 28 18·37	−0·04	−0·11	0·00	−0·02	+0·04	18·24	1 57·12	− 1 57·095		
N	E	6 31 17·05	+0·05	−0·07	0·00	−0·02	+0·04	17·05	− 1 57·24			
N	E	6 33 5·11	+0·05	−0·07	0·00	−0·02	+0·04	5·11	1 57·02			
S	E	6 34 38·49	+0·04	−0·06	0·00	−0·02	+0·04	38·49	1 57·00			
N	E	6 36 27·49	+0·05	−0·07	0·00	−0·02	+0·04	27·49	1 57·12			
S	E	6 37 44·72	+0·04	−0·06	0·00	−0·02	+0·04	44·72	1 57·15			
N	E	6 39 19·44	+0·06	−0·07	0·00	−0·02	+0·04	19·45	1 56·98			
S	E	6 40 44·07	+0·04	−0·05	0·00	−0·02	+0·04	44·08	1 57·07			
S	E	6 42 8·24	+0·04	−0·06	0·00	−0·02	+0·04	8·24	1 56·95	− 1 57·066	− 1 57·081	6 31 32

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

KARACHI (E), *Lat.* 24° 51′, *Long.* 4h 28m: AND JASK (W), *Lat.* 25° 38′, *Long.* 3h 51m.

Astronomical Date	Star: Number in Gr. 80	Star: Declination	Transits Observed at Karachi (E) by Burrard with Telescope No. 1.: Star's Aspect	Instrumental Position	Observed Time	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Seconds of Corrected Time
1895		° ′			h m s	s	s	s	s	s
Jan. 27	428	37 55	N	E	2 47 19·65	−0·01	+0·47	−0·41	−0·02	19·68
	431	17 55	S	E	2 50 8·80	−0·01	+0·40	+0·18	−0·02	9·35
	438	39 15	N	E	2 52 17·51	−0·01	+0·48	−0·46	−0·02	17·50
	444	20 55	S	E	2 53 26·84	−0·01	+0·41	+0·10	−0·02	27·32
	450	38 28	N	E	2 55 26·53	−0·01	+0·48	−0·43	−0·02	26·55
	455	3 41	S	E	2 57 1·73	−0·01	+0·36	+0·52	−0·02	2·58
	460	38 26	N	E	2 58 41·63	−0·01	+0·48	−0·43	−0·02	41·65
		Mean	...	...	2 53 29					
	464	40 33	N	W	3 1 35·25	+0·02	+0·40	−0·51	−0·02	35·14
	471	28 41	N	W	3 3 32·40	+0·01	+0·36	−0·11	−0·02	32·64
	475	19 20	S	W	3 5 52·05	+0·01	+0·33	+0·15	−0·02	52·52
	483	− 1 35	S	W	3 7 39·19	+0·01	+0·28	+0·64	−0·02	40·10
	489	30 10	N	W	3 9 11·53	+0·01	+0·37	−0·16	−0·02	11·73
	495	43 38	N	W	3 10 58·60	+0·02	+0·42	−0·64	−0·03	58·37
	500	− 1 19	S	W	3 13 14·30	+0·01	+0·29	+0·64	−0·02	15·22
	508	20 46	S	W	3 15 24·46	+0·01	+0·34	+0·11	−0·02	24·90
		Mean	...	...	3 8 26					
	1081	49 20	N	W	6 17 5·71	+0·02	+0·56	−0·92	−0·03	5·34
	1089	8 56	S	W	6 18 32·79	+0·01	+0·39	+0·40	−0·02	33·57
	1099	30 33	N	W	6 22 5·00	+0·01	+0·47	−0·17	−0·02	5·29
	1108	28 17	N	W	6 24 0·18	+0·01	+0·46	−0·10	−0·02	0·53
	1110	32 32	N	W	6 25 51·96	+0·01	+0·47	−0·23	−0·02	52·19
	1125	− 1 8	S	W	6 28 32·87	+0·01	+0·36	+0·63	−0·02	33·85
	1130	16 53	S	W	6 30 12·61	+0·01	+0·42	+0·21	−0·02	13·23
		Mean	...	...	6 23 46					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

KARACHI (E), *Lat.* 24° 51′, *Long.* 4^h 28^m: AND JASK (W), *Lat.* 25° 38′, *Long.* 3^h 51^m.

Transits Observed at JASK (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch = T_E
Star's Aspect	Instrumental Position	Observed Time	Correction for					Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
			Collimation	Level	Deviation	Diurnal Aberration	Rate of W Clock					
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
N	W	2 45 23·78	−0·03	−0·11	0·00	−0·02	+0·03	23·65	− 1 56·03			
S	W	2 48 13·30	−0·03	−0·10	0·00	−0·02	+0·03	13·18	1 56·17			
N	W	2 50 21·58	−0·03	−0·12	0·00	−0·02	+0·03	21·44	1 56·06			
S	W	2 51 31·29	−0·03	−0·10	0·00	−0·02	+0·03	31·17	1 56·15			
N	W	2 53 30·58	−0·03	−0·12	0·00	−0·02	+0·03	30·44	1 56·11			
S	W	2 55 6·41	−0·03	−0·09	0·00	−0·02	+0·03	6·30	1 56·28			
N	W	2 56 45·66	−0·03	−0·12	0·00	−0·02	+0·03	45·52	1 56·13	− 1 56·133		
N	E	2 59 39·01	+0·04	−0·12	0·00	−0·02	+0·03	38·94	− 1 56·20			
N	E	3 1 36·61	+0·03	−0·11	0·00	−0·02	+0·03	36·54	1 56·10			
S	E	3 3 56·39	+0·03	−0·10	0·00	−0·02	+0·03	56·33	1 56·19			
S	E	3 5 44·00	+0·03	−0·09	−0·01	−0·02	+0·03	43·94	1 56·16			
N	E	3 7 15·73	+0·03	−0·11	0·00	−0·02	+0·03	15·66	1 56·07			
N	E	3 9 2·32	+0·04	−0·13	0·00	−0·03	+0·03	2·23	1 56·14			
S	E	3 11 19·13	+0·03	−0·09	0·00	−0·02	+0·03	19·08	1 56·14			
S	E	3 13 28·87	+0·03	−0·10	0·00	−0·02	+0·03	28·81	1 56·09	− 1 56·136	− 1 56·135	3 0 58
N	W	6 15 9·35	−0·04	−0·15	+0·02	−0·03	+0·03	9·18	− 1 56·16			
S	W	6 16 37·55	−0·03	−0·10	−0·01	−0·02	+0·03	37·42	1 56·15			
N	W	6 20 9·28	−0·03	−0·12	0·00	−0·02	+0·03	9·14	1 56·15			
N	W	6 22 4·54	−0·03	−0·11	0·00	−0·02	+0·03	4·41	1 56·12			
N	W	6 23 56·20	−0·03	−0·12	+0·01	−0·02	+0·03	56·07	1 56·12			
S	W	6 26 37·89	−0·03	−0·09	−0·02	−0·02	+0·03	37·76	1 56·09			
S	W	6 28 17·19	−0·03	−0·10	−0·01	−0·02	+0·03	17·06	1 56·17	− 1 56·137		

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

KARACHI (E), *Lat.* 24° 51′, *Long.* 4h 28m: AND JASK (W), *Lat.* 25° 38′, *Long.* 3h 51m.

Astronomical Date	Star		Transits Observed at KARACHI (E) by BURRARD with Telescope No. 1.							
	Number in Gr. 80	Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for				Seconds of Corrected Time
						Collimation	Level	Deviation	Diurnal Aberration	
1895		° ′			h m s	s	s	s	s	s
Jan. 27	1144	28 21	N	E	6 33 11·39	−0·01	+0·45	−0·10	−0·02	11·71
	1145	28 18	N	E	6 34 59·46	−0·01	+0·45	−0·10	−0·02	59·78
	1155	17 45	S	E	6 36 32·70	−0·01	+0·42	+0·19	−0·02	33·28
	1161	29 5	N	E	6 38 21·90	−0·01	+0·46	−0·12	−0·02	22·21
	1168	13 1	S	E	6 39 38·85	−0·01	+0·40	+0·30	−0·02	39·52
	1170	41 25	N	E	6 41 14·26	−0·02	+0·51	−0·55	−0·02	14·18
	1175	2 32	S	E	6 42 37·88	−0·01	+0·37	+0·55	−0·02	38·77
	1179	16 19	S	E	6 44 2·36	−0·01	+0·41	+0·22	−0·02	2·96
		Mean	...	...	6 38 50					
Jan. 30	428	37 55	N	W	2 47 15·66	+0·02	+0·34	−0·37	−0·02	15·63
	431	17 55	S	W	2 50 4·78	+0·02	+0·29	+0·16	−0·02	5·23
	438	39 15	N	W	2 52 13·47	+0·02	+0·35	−0·41	−0·02	13·41
	444	20 55	S	W	2 53 22·92	+0·02	+0·30	+0·09	−0·02	23·31
	450	38 28	N	W	2 55 22·50	+0·02	+0·35	−0·39	−0·02	22·46
	455	3 41	S	W	2 56 57·83	+0·02	+0·26	+0·47	−0·02	58·56
	460	38 26	N	W	2 58 37·71	+0·02	+0·35	−0·39	−0·02	37·67
		Mean	...	...	2 53 25					
	464	40 33	N	E	3 1 30·87	−0·02	+0·42	−0·46	−0·02	30·79
	471	28 41	N	E	3 3 28·19	−0·02	+0·38	−0·10	−0·02	28·43
	475	19 20	S	E	3 5 47·92	−0·02	+0·35	+0·13	−0·02	48·36
	483	− 1 35	S	E	3 7 35·23	−0·02	+0·30	+0·57	−0·02	36·06
	489	30 10	N	E	3 9 7·44	−0·02	+0·38	−0·14	−0·02	7·64
	495	43 38	N	E	3 10 54·24	−0·02	+0·44	−0·57	−0·03	54·06
	500	− 1 19	S	E	3 13 10·34	−0·02	+0·30	+0·57	−0·02	11·17
	508	20 46	S	E	3 15 20·42	−0·02	+0·36	+0·10	−0·02	20·84
		Mean	...	...	3 8 22					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

KARACHI (E), *Lat.* 24° 51′, *Long.* 4ʰ 28ᵐ: AND JASK (W), *Lat.* 25° 38′, *Long.* 3ʰ 51ᵐ.

Transits Observed at JASK (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch $= T_E$
Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Correction for Rate of W Clock	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
N	E	6 31 15·92	+0·03	−0·08	0·00	−0·02	+0·03	15·88	− 1 55·83			
N	E	6 33 3·99	+0·03	−0·08	0·00	−0·02	+0·03	3·95	1 55·83			
S	E	6 34 37·35	+0·03	−0·08	−0·01	−0·02	+0·03	37·30	1 55·98			
N	E	6 36 26·37	+0·03	−0·08	0·00	−0·02	+0·03	26·33	1 55·88			
S	E	6 37 43·62	+0·03	−0·07	−0·01	−0·02	+0·03	43·58	1 55·94			
N	E	6 39 18·34	+0·04	−0·09	+0·01	−0·02	+0·03	18·31	1 55·87			
S	E	6 40 42·90	+0·03	−0·07	−0·02	−0·02	+0·03	42·85	1 55·92			
S	E	6 42 7·08	+0·03	−0·08	−0·01	−0·02	+0·03	7·03	1 55·93	− 1 55·898	− 1 56·018	6 31 18
N	W	2 45 20·51	−0·03	−0·14	+0·04	−0·02	+0·05	20·41	− 1 55·22			
S	W	2 48 10·19	−0·02	−0·12	−0·02	−0·02	+0·05	10·06	1 55·17			
N	W	2 50 18·33	−0·03	−0·15	+0·04	−0·02	+0·05	18·22	1 55·19			
S	W	2 51 28·14	−0·02	−0·12	−0·01	−0·02	+0·05	28·02	1 55·29			
N	W	2 53 27·33	−0·03	−0·14	+0·04	−0·02	+0·05	27·23	1 55·23			
S	W	2 55 3·26	−0·02	−0·11	−0·05	−0·02	+0·05	3·11	1 55·45			
N	W	2 56 42·44	−0·03	−0·14	+0·04	−0·02	+0·05	42·34	1 55·33	− 1 55·269		
N	E	2 59 35·74	+0·03	−0·15	+0·04	−0·02	+0·05	35·69	− 1 55·10			
N	E	3 1 33·37	+0·03	−0·13	+0·01	−0·02	+0·05	33·31	1 55·12			
S	E	3 3 53·16	+0·02	−0·12	−0·02	−0·02	+0·05	53·07	1 55·29			
S	E	3 5 40·76	+0·02	−0·10	−0·06	−0·02	+0·05	40·65	1 55·41			
N	E	3 7 12·49	+0·03	−0·13	+0·01	−0·02	+0·05	12·43	1 55·21			
N	E	3 8 59·03	+0·03	−0·15	+0·06	−0·03	+0·05	58·99	1 55·07			
S	E	3 11 15·96	+0·02	−0·10	−0·06	−0·02	+0·05	15·85	1 55·32			
S	E	3 13 25·63	+0·03	−0·12	−0·01	−0·02	+0·05	25·56	1 55·28	− 1 55·225	− 1 55·247	3 0 54

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

KARACHI (E), *Lat.* 24° 51′, *Long.* 4h 28m: AND JASK (W), *Lat.* 25° 38′, *Long.* 3h 51m.

Astronomical Date	Star: Number in Gr. 80	Star: Declination	Transits Observed at KARACHI (E) by BURRARD with Telescope No. 1.: Star's Aspect	Instrumental Position	Observed Time	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Seconds of Corrected Time
1895		° ′			h m s	s	s	s	s	s
Jan. 30	1081	49 20	N	W	6 17 1·85	+0·02	+0·50	−0·82	−0·03	1·52
	1089	8 56	S	W	6 18 29·05	+0·02	+0·36	+0·36	−0·02	29·77
		Mean	...	...	6 17 45					
	1144	28 21	N	E	6 33 7·72	−0·02	+0·47	−0·09	−0·02	8·06
	1145	28 18	N	E	6 34 55·71	−0·02	+0·47	−0·09	−0·02	56·05
	1161	29 5	N	E	6 38 18·17	−0·02	+0·48	−0·11	−0·02	18·50
	1168	13 1	S	E	6 39 35·21	−0·02	+0·42	+0·27	−0·02	35·86
	1170	41 25	N	E	6 41 10·46	−0·02	+0·53	−0·49	−0·02	10·46
		Mean	...	...	6 37 25					
Feb. 2	428	37 55	N	W	2 47 14·76	−0·01	+0·34	−0·38	−0·02	14·69
	444	20 55	S	W	2 53 22·07	−0·01	+0·30	+0·10	−0·02	22·44
	450	38 28	N	W	2 55 21·68	−0·01	+0·35	−0·40	−0·02	21·60
	455	3 41	S	W	2 56 56·94	−0·01	+0·26	+0·48	−0·02	57·62
	460	38 26	N	W	2 58 36·80	−0·01	+0·35	−0·40	−0·02	36·72
		Mean	...	...	2 54 18					
	464	40 33	N	E	3 1 30·12	+0·01	+0·46	−0·48	−0·02	30·08
	471	28 41	N	E	3 3 27·35	+0·01	+0·41	−0·10	−0·02	27·65
	475	19 20	S	E	3 5 47·04	+0·01	+0·38	+0·13	−0·02	47·54
	483	− 1 35	S	E	3 7 34·22	+0·01	+0·33	+0·60	−0·02	35·14
	489	30 10	N	E	3 9 6·48	+0·01	+0·42	−0·15	−0·02	6·74
	495	43 38	N	E	3 10 53·43	+0·01	+0·48	−0·60	−0·03	53·29
	500	− 1 19	S	E	3 13 9·34	+0·01	+0·33	+0·59	−0·02	10·25
	508	20 46	S	E	3 15 19·50	+0·01	+0·39	+0·10	−0·02	19·98
		Mean	...	...	3 8 21					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

KARACHI (E), *Lat.* 24° 51′, *Long.* 4h 28m: AND JASK (W), *Lat.* 25° 38′, *Long.* 3h 51m.

Transits Observed at JASK (W) by LENOX CONYNGHAM with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch = T_E
Star's Aspect	Instrumental Position	Observed Time	Correction for: Collimation	Level	Deviation	Diurnal Aberration	Rate of W Clock	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
N	E	6 15 6·13	+0·04	−0·20	+0·06	−0·03	+0·05	6·05	− 1 55·47			
S	E	6 16 34·39	+0·02	−0·14	−0·03	−0·02	+0·04	34·26	1 55·51	− 1 55·490		
N	W	6 31 12·74	−0·03	−0·15	+0·01	−0·02	+0·04	12·59	− 1 55·47			
N	W	6 33 0·81	−0·03	−0·15	+0·01	−0·02	+0·04	0·64	1 55·41			
N	W	6 36 23·19	−0·03	−0·15	+0·01	−0·02	+0·04	23·04	1 55·46			
S	W	6 37 40·44	−0·02	−0·14	−0·02	−0·02	+0·04	40·28	1 55·58			
N	W	6 39 15·16	−0·03	−0·17	+0·04	−0·02	+0·04	15·02	1 55·44	− 1 55·472	− 1 55·481	6 27 35
N	E	2 45 15·73	+0·04	−0·11	+0·01	−0·02	+0·04	15·69	− 1 59·00			
S	E	2 51 23·38	+0·03	−0·09	0·00	−0·02	+0·04	23·34	1 59·10			
N	E	2 53 22·58	+0·04	−0·11	+0·01	−0·02	+0·04	22·54	1 59·06			
S	E	2 54 58·44	+0·03	−0·09	−0·01	−0·02	+0·04	58·39	1 59·23			
N	E	2 56 37·63	+0·04	−0·11	+0·01	−0·02	+0·04	37·59	1 59·13	− 1 59·104		
N	W	2 59 31·00	−0·04	−0·11	+0·01	−0·02	+0·04	30·88	− 1 59·20			
N	W	3 1 28·58	−0·04	−0·10	0·00	−0·02	+0·04	28·46	1 59·19			
S	W	3 3 48·39	−0·03	−0·09	0·00	−0·02	+0·04	48·29	1 59·25			
S	W	3 5 35·99	−0·03	−0·08	−0·01	−0·02	+0·04	35·89	1 59·25			
N	W	3 7 7·68	−0·04	−0·10	0·00	−0·02	+0·04	7·56	1 59·18			
N	W	3 8 54·32	−0·04	−0·11	+0·01	−0·03	+0·04	54·19	1 59·10			
S	W	3 11 1·11	−0·03	−0·08	−0·01	−0·02	+0·04	11·01	1 59·24			
S	W	3 13 20·81	−0·03	−0·09	0·00	−0·02	+0·04	20·71	1 59·27	− 1 59·210	− 1 59·157	3 1 20

EXPLANATION OF *TABLE VI.*

Deduction of Clock Rate Correction.

From the results contained in Tables III and V, the clock rate correction can now be deduced.

Column 1 contains the name of the arc.

,, 2 contains the approximate difference of longitude in hours and minutes.

,, 3 contains the date.

As no clock stars were observed on this arc, columns 4, 5, 6, 9, 10 and 11 are blank.

,, 7 contains the hourly clock rate as deduced from observations of longitude stars. The rate from night to night is obtained from the observed times of transit of the same star on two consecutive nights, the difference between the two being divided by 24 hours. The mean of the results obtained from individual stars is taken as the rate during the 24 hours between the two nights, and the mean of the rates during two consecutive periods of 24 hours is taken as the rate on the night between them.

,, 8 contains the rate given in column 7 which is used as h_e.

,, 12 and 13 contain similar quantities to those in columns 7 and 8 but for the other station.

,, 14 contains the relative hourly clock rate during each night deduced from the clock comparisons, the value entered is the mean of all the values appertaining to the night, contained in the last column of Table III.

We have now the hourly rate of each clock derived from star observations, and also the relative hourly rate of the clocks derived from the clock comparisons. It is clear that the last should be equal to the algebraic difference of the first two, *i.e.*, using the notation given on the Table, we should have

$$h_w - h_e = R, \quad \text{or} \quad h_e = h_w - R.$$

Hence in forming the final value of the hourly clock rate we take $H_e = \frac{1}{2}(h_e + h_w - R)$, and the resulting value is entered in column 15.

Similarly $H_w = \frac{1}{2}(h_w + h_e + R)$, which is given in column 16.

In column 17 is given the change in the error of the Western clock during a period equal to the difference of longitude. The use of this quantity has already been explained in connection with Table V.

TABLE VI. DEDUCTION OF CLOCK RATE CORRECTION.

Arc	Approximate Difference of Longitude = ΔL	Astronomical Date	KARACHI or E Clock: Observed Clock Correction	Time	Hourly Clock Rate for Nights of Observation deduced from Star Transits: By Clock Stars	By Longitude Stars	Mean = h_e	JASK or W Clock: Observed Clock Correction	Time	Hourly Clock Rate for Nights of Observation deduced from Star Transits: By Clock Stars	By Longitude Stars	Mean = h_w	Relative Hourly Clock Rate deduced from Clock Comparisons = R	Adopted Hourly Clock Rate: For E Clock = $\frac{1}{2}(h_e + h_w - R) = H_e$	For W Clock = $\frac{1}{2}(h_e + h_w + R) = H_w$	Correction to Observed Time of Transit at W Station for Rate of W Clock = $H_w \times \Delta L$
KARACHI-JASK	h m 0 37	1895				s	s				s	s	s	s	s	s
		Jan. 21				+0·059	+0·059				+0·078	+0·078	+0·039	+0·049	+0·088	+0·054
		„ 22				+0·059	+0·059				+0·078	+0·078	+0·021	+0·058	+0·079	+0·049
		„ 23				+0·060	+0·060				+0·070	+0·070	+0·003	+0·063	+0·067	+0·041
		„ 24				+0·060	+0·060				+0·063	+0·063	+0·005	+0·059	+0·064	+0·039
		„ 25				+0·066	+0·066				+0·067	+0·067	+0·032	+0·051	+0·082	+0·051
		„ 26				+0·084	+0·084				+0·060	+0·060	−0·027	+0·085	+0·059	+0·036
		„ 27				+0·074	+0·074				+0·047	+0·047	−0·028	+0·074	+0·047	+0·029
		„ 30				+0·033	+0·033				+0·056	+0·056	+0·056	+0·017	+0·072	+0·044
		Feb. 2				+0·012	+0·012				+0·068	+0·068	+0·066	+0·007	+0·073	+0·045

EXPLANATION OF *TABLE VII.*

Retardation of the Electric Current.

The retardation of the electric current computed in this Table does not enter into the difference of longitude, but much interest attaches to its value, and clearly any abnormal result would throw doubt upon the accuracy of the clock comparison whence it was deduced.

Column 1 contains the name of the arc.

" 2 contains the date.

" 3 contains the time by the East or Karachi clock corresponding to the middle of the period during which a comparison was being made at Karachi, that is, during which Jask was transmitting signals to Karachi.

" 4 contains the time, still by E clock, corresponding to the middle of the period during which Karachi was transmitting signals to Jask.

" 5 contains the interval between the times given in columns 3 and 4.

" 6 and 9 contain the differences between the clocks as observed at Jask and Karachi respectively.

The differences given in columns 6 and 9 have to be reduced to the same epoch and to do this the difference observed at Jask receives a correction equal to the relative hourly clock rate, taken from the last column of Table III, multiplied by the interval given in column 5 reduced to the decimal of an hour. This correction and the corrected difference between the clocks as observed at Jask are given in columns 7 and 8.

" 10 contains half the difference between columns 8 and 9.

TABLE VII. RETARDATION OF THE ELECTRIC CURRENT.

Arc	Astronomical Date	Time of Comparison by E Clock at Karachi	Time of Comparison by E Clock at Jask	Interval of Time between the Comparison at Karachi and Jask = I	Difference between the Clocks as Observed at Jask	Correction for Relative Clock Rate during the Interval I	Difference between the Clocks as Observed at Jask corrected for Clock Rate	Difference between the Clocks as Observed at Karachi	Retardation of the Current
	1895	h m s	h m s	m s	h m s	s	h m s	h m s	s
KARACHI-JASK	Jan. 21	2 38 1·070	2 32 2·000	5 59·070	0 38 55·900	+ 0·004	0 38 55·904	0 38 56·070	0·083*
		4 5 3·129	4 0 0·000	5 3·129	55·955	·003	55·958	56·129	·086*
	„ 22	2 30 1·968	2 19 2·000	10 59·968	0 38 56·849	+ 0·005	0 38 56·854	0 38 56·968	0·057
		4 8 5·000	4 4 58·000	3 7·000	56·895	·000	56·895	57·000	·053
	„ 23	2 31 2·005	2 25 57·000	5 5·005	0 38 56·915	0·000	0 38 56·915	0 38 57·005	0·045
		4 6 1·010	3 59 57·000	6 4·010	56·903	+ ·001	56·904	57·010	·053
		5 47 1·040	5 41 57·000	5 4·040	56·920	·000	56·920	57·030	·055
		8 14 2·022	7 32 57·000	41 5·022	56·930	·000	56·930	57·022	·046
	„ 24	2 28 2·070	2 18 57·000	9 5·070	0 38 56·935	+ 0·001	0 38 56·936	0 38 57·070	0·067†
		4 4 3·095	3 58 57·000	5 6·095	56·930	− ·001	56·929	57·095	·083‡
		5 48 2·106	5 41 57·000	6 5·106	56·900	·002	56·898	57·106	·104‡
		7 41 3·095	7 34 57·000	6 6·095	57·000	+ ·002	57·002	57·095	·047
	„ 25	2 29 2·020	2 21 57·000	7 5·020	0 38 56·900	+ 0·006	0 38 56·906	0 38 57·020	0·057
		4 7 3·095	4 0 57·000	6 6·095	57·000	·005	57·005	57·095	·045
		5 46 3·190	5 40 57·000	5 6·190	57·095	·003	57·098	57·190	·046
		7 43 1·244	7 36 57·000	6 4·244	57·130	·002	57·132	57·244	·056

* Gwadur in translation. † Ormara in translation. ‡ Ormara and Charbar in translation.

TABLE VII. RETARDATION OF THE ELECTRIC CURRENT.

Arc	Astronomical Date	Time of Comparison by E Clock: at Karachi	Time of Comparison by E Clock: at Jask	Interval of Time between the Comparison at Karachi and Jask = I	Difference between the Clocks as Observed at Jask	Correction for Relative Clock Rate during the Interval I	Difference between the Clocks: as Observed at Jask corrected for Clock Rate	Difference between the Clocks: as Observed at Karachi	Retardation of the Current
	1895	h m s	h m s	m s	h m s	s	h m s	h m s	s
KARACHI-JASK	Jan. 26	2 26 3·154	2 19 1·000	7 2·154	0 38 57·054	− 0·001	0 38 57·053	0 38 57·154	0·051
		4 4 2·117	3 59 1·000	5 1·117	57·063	·000	57·063	57·117	·027
		5 48 3·090	5 43 0·000	5 3·090	57·000	·003	56·997	57·090	·047
		7 47 6·000	7 38 57·890	8 8·110	56·890	·007	56·883	57·000	·059
	„ 27	1 2 7·090	0 58 4·090	4 3·000	0 38 56·090	− 0·001	0 38 56·089	0 38 56·190	0·051
		1 17 6·282	1 12 3·980	5 2·302	55·980	·001	55·979	56·282	·152*
		1 31 5·184	1 26 4·060	5 1·124	56·060	·001	56·059	56·184	·063
		2 3 6·287	1 50 4·023	13 2·264	56·023	·003	56·020	56·287	·134*
		2 29 5·162	2 24 4·050	5 1·112	56·070	·005	56·065	56·162	·049
		4 7 5·095	4 1 4·012	6 1·083	56·012	·003	56·009	56·095	·043
		5 43 5·096	5 36 3·920	7 1·176	55·935	·003	55·932	56·080	·074†
		7 47 5·015	7 42 3·890	5 1·125	55·890	·002	55·888	56·015	·064†
	„ 30	2 46 5·242	2 42 4·133	4 1·109	0 38 55·123	+ 0·006	0 38 55·129	0 38 55·270	0·071†
		4 13 4·373	4 5 4·253	8 0·120	55·273	·009	55·282	55·373	·046
		5 53 5·464	5 48 4·339	5 1·125	55·339	·005	55·344	55·464	·060
		7 41 4·569	7 37 4·473	4 0·096	55·473	·004	55·477	55·569	·046
	Feb. 2	2 44 5·140	2 40 4·010	4 1·130	0 38 59·010	+ 0·005	0 38 59·015	0 38 59·140	0·063
		4 4 5·240	3 59 4·100	5 1·140	59·100	·006	59·106	59·240	·067

* By submarine cable. † Ormara in translation.

ARC KARACHI-JASK.

TABLE VIII.

Reduction of Clock Corrections and Clock Comparisons to the same Epochs.

As no clock stars were observed on this arc, this table does not occur.

EXPLANATION OF *TABLE IX.*

Reduction of Clock Comparisons and the Differences between the Clock Corrections to the same Epochs by Interpolation.

This table deals with the observations of longitude stars and the comparisons which are connected therewith.

Column 1 contains the date.

„ 2 contains the epochs whether of clock comparisons, from Table III, or of the differences of corrected times, from Table V, arranged in order of sequence, and all in terms of the East clock.

„ 3 contains the difference of the corrected times, from Table V, entered in line with its epoch.

„ 4 contains the difference between the two clocks by direct comparison, from Table III, entered in line with its epoch.

„ 5 is obtained by interpolation from column 3 and is the corrected difference between the observed times at the epoch of the middle comparison, in line with which it is entered.

„ 6 contains the difference between the clocks brought up by interpolation from column 4, to the epochs of the quantities in column 3.

If, as on the 21st January, only one value of the difference between the corrected times be available, column 5 must be left blank.

TABLE IX. REDUCTION OF CLOCK COMPARISONS AND THE DIFFERENCES BETWEEN THE CLOCK CORRECTIONS TO THE SAME EPOCHS BY INTERPOLATION.

Date		T_E Epochs	Difference between the Clock Corrections = Difference of Corrected Times of Table V	Difference between the Times of the two Clocks obtained by Direct Comparison from Table III	Difference between the Clock Corrections Interpolated to Epoch of Clock Comparison	Difference between the Clocks by Comparison Interpolated to Epoch of Clock Correction
1895		h m s	m s	m s	m s	m s
January	21	2 35 2	...	38 55·985	...	...
		3 1 17	− 1 56·133	...	...	38 56·002
		4 2 32	...	38 56·042	...	...
"	23	2 28 30	...	38 56·960	...	...
		3 0 36	− 1 57·057	...	...	38 56·959
		4 2 59	...	38 56·956	− 1 57·052	...
		5 44 29	...	38 56·975	57·043	...
		6 31 38	− 1 57·039	...	...	38 56·975
		7 53 30	...	38 56·976	...	...
"	24	2 23 30	...	38 57·003	...	...
		3 0 35	− 1 57·025	...	...	38 57·007
		4 1 30	...	38 57·013	− 1 57·038	...
		5 45 0	...	38 57·003	57·061	...
		6 31 36	− 1 57·071	...	...	38 57·022
		7 38 0	...	38 57·048	...	...
"	25	2 25 30	...	38 56·960	...	...
		3 0 33	− 1 57·109	...	...	38 56·991
		4 4 0	...	38 57·048	− 1 57·148	...
		5 43 30	...	38 57·142	57·209	...
		6 31 34	− 1 57·239	...	...	38 57·161
		7 39 59	...	38 57·187	...	...

TABLE IX. REDUCTION OF CLOCK COMPARISONS AND THE DIFFERENCES BETWEEN THE CLOCK CORRECTIONS TO THE SAME EPOCHS BY INTERPOLATION.

Date		T_E Epochs	Difference between the Clock Corrections = Difference of Corrected Times of Table V	Difference between the Times of the two Clocks obtained by Direct Comparison from Table III	Difference between the Clock Corrections Interpolated to Epoch of Clock Comparison	Difference between the Clocks by Comparison Interpolated to Epoch of Clock Correction
1895		h m s	m s	m s	m s	m s
January	26	2 22 32	...	38 57·104	...	...
		3 0 32	− 1 57·155	...	...	38 57·099
		4 1 32	...	38 57·090	− 1 57·134	...
		5 45 32	...	38 57·045	57·097	...
		6 31 32	− 1 57·081	...	...	38 57·005
		7 43 2	...	38 56·945	...	...
"	27	2 26 35	...	38 56·116	...	...
		3 0 58	− 1 56·135	...	...	38 56·094
		4 4 5	...	38 56·054	− 1 56·100	...
		5 39 35	...	38 56·008	56·047	...
		6 31 18	− 1 56·018	...	...	38 55·985
		7 44 34	...	38 55·953	...	...
"	30	2 44 5	...	38 55·197	...	...
		3 0 54	− 1 55·247	...	...	38 55·222
		4 9 4	...	38 55·323	− 1 55·324	...
		5 50 35	...	38 55·402	55·439	...
		6 27 35	− 1 55·481	...	...	38 55·443
		7 39 5	...	38 55·521	...	...
February	2	2 42 5	...	38 59·075	...	...
		3 1 20	− 1 59·157	...	...	38 59·098
		4 1 35	...	38 59·170	...	...

EXPLANATION OF *TABLE X.*

Deduction of the Difference of Longitude.

Table IX contains all the data for computing the difference of longitude.

Column 1 contains the name of the arc.

" 2 contains the date.

" 3 contains the epochs for which data are available. They are taken from column 2 of Table IX.

" 4, 5 and 7 are blank as no clock stars were observed.

" 6 and 8 contain the numbers of longitude stars observed at each station on each night.

" 9 contains the difference between the corrections of the clocks. It is taken from column 3 or 5 of Table IX.

" 10 contains the difference between the clocks by direct comparison at the epoch given in column 3; this quantity is to be found either in column 4 or 6 of Table IX.

" 11 contains the observed difference of longitude, which is equal to the sum of the quantities in the two preceding columns. The mean and its probable error are entered at the bottom of the column.

" 12 contains the value of the personal equation, and its probable error.

" 13 contains the Final Difference of Longitude and its probable error.

TABLE X. DEDUCTION OF THE DIFFERENCE OF LONGITUDE.

Arc	Astronomical Date	Epoch: By E Clock = T_E	Epoch: By W Clock = T_W	Karachi E: Deduced Clock Correction from Table VIII	Karachi E: No. of Stars	Jask W: Deduced Clock Correction from Table VIII	Jask W: No. of Stars	Difference between the Corrections of the E and W Clocks = S	Difference between the Clocks by Direct Comparison, at the Epoch of S	Observed Difference of Longitude	Personal Equation	Final Difference of Longitude
	1895	h m s						m s	h m s	h m s		
KARACHI–JASK	Jan. 21	3 1 17			13		13	−1 56·133	0 38 56·002	0 36 59·869		h m s 0 36 59·697 ± 0·0057
	„ 23	3 0 36			31		31	−1 57·057	0 38 56·959	0 36 59·902		
		4 2 59						1 57·052	56·956	59·904		
		5 44 29						1 57·043	56·975	59·932		
		6 31 38						1 57·039	56·975	59·936		
	„ 24	3 0 35			32		32	−1 57·025	0 38 57·007	0 36 59·982		
		4 1 30						1 57·038	57·013	59·975		
		5 45 0						1 57·061	57·003	59·942		
		6 31 36						1 57·071	57·022	59·951		
	„ 25	3 0 33			32		32	−1 57·109	0 38 56·991	0 36 59·882		
		4 4 0						1 57·148	57·048	59·900		
		5 43 30						1 57·209	57·142	59·933		
		6 31 34						1 57·239	57·161	59·922		
	„ 26	3 0 32			32		32	−1 57·155	0 38 57·099	0 36 59·944		
		4 1 32						1 57·134	57·090	59·956		
		5 45 32						1 57·097	57·045	59·948		
		6 31 32						1 57·081	57·005	59·924		
	„ 27	3 0 58			30		30	−1 56·135	0 38 56·094	0 36 59·959		
		4 4 5						1 56·100	56·054	59·954		
		5 39 35						1 56·047	56·008	59·961		
		6 31 18						1 56·018	55·985	59·967		
	„ 30	3 0 54			22		22	−1 55·247	0 38 55·222	0 36 59·975		
		4 9 4						1 55·324	55·323	59·999		
		5 50 35						1 55·439	55·402	59·963		
		6 27 35						1 55·481	55·443	59·962		
	Feb. 2	3 1 20			13		13	−1 59·157	0 38 59·098	0 36 59·941		
									Mean ...	0 36 59·942	− 0·245	
									p.e. ...	± 0·0042	± 0·0039	

ARC POTSDAM-GREENWICH.

1895.

The programme.

The difference of longitude between these places is 52 minutes, so that a programme of longitude stars would have been tedious; it was at first intended to arrange the observations in the same way as had been done on the arc Karachi-Bushire, that is to say, to have a programme of longitude stars supplemented at each station by an independent set of clock star observations. The weather however at both stations was broken and cloudy which rendered the longitude stars liable to fail; they were therefore abandoned and each observer worked independently of the other.

The normal number of clock comparisons per night was fixed at three on this arc, but sometimes on account of clouds putting an end to the work and sometimes on account of interruption of communication through storms or accidental causes the average obtained did not quite amount to two. Some anxiety had been felt as to the success of exchanging signals direct through a line composed partly of cable and partly of land-line, but no difficulty was experienced: the signals received had the slow deliberate character which had been observed when submarine cable was in use on the Persian Gulf arcs, but they were perfectly clear and satisfactory, and the values of the retardation deduced from the comparisons are consistent and good.

Owing to the position of the Observatory at Greenwich which was lent for the work it was not possible to erect the collimator, and the collimation correction could not be determined in the usual way.

The course adopted was to deduce the value of C_0 from observations of circumpolar stars in both positions of the telescope, and also from the differences between the observed clock corrections obtained in the two positions, using a tentative value of C_0. The transit stars being divided equally between the positions *I.P.E.* and *I.P.W.*, a small error in the adopted value of C_0 would have no ultimate effect except on the value of the deviation correction; in determining the latter it is, as a rule, impossible to distribute the observations between the two positions of the telescope and between stars at upper and lower culminations so as to eliminate entirely the effect of collimation error; consequently it was considered necessary to deduce the error of the value of C_0 tentatively adopted, and then to recompute all the observations at Greenwich with the new value so found.

A preliminary Table A contains an abstract of the results of the computations for the deduction of C_0 on each night. It will be seen that the value is remarkably steady, and it was considered proper therefore to adopt a mean value for all observations made at Greenwich.

This mean value is entered in Table I in the column headed C_0 which usually contains the value obtained by means of the collimator.

TABLE A.

Abstract of determinations, from star observations at Greenwich, of the reading of the micrometer, when the central wire was truly collimated.

Date		Method	Reading of micrometer	Mean of night = C_0	Remarks
1895					
June	21	By groups of clock stars *I.P.E.* and *I.P.W.* ...	16·5	16·5	Observations by Burrard.
	22	do. do. ...	16·6	...	
	„	do. do. ...	16·9	16·8	
	27	do. do. ...	16·2	...	
	„	do. do. ...	16·6	...	
	„	do. do. ...	16·2	16·3	
	29	do. do. ...	16·8	16·8	
July	1	do. do. ...	16·6	...	
	„	do. do. ...	16·4	16·5	
	12	do. do. ...	16·3	...	Observations by Lenox Conyngham.
	„	do. do. ...	16·6	16·5	
	15	do. do. ...	16·9	...	
	„	do. do. ...	16·5	...	
	„	By a circumpolar star observed both *I.P.E.* and *I.P.W.*	16·6	...	
	„	do. do. ...	16·5	16·6	
	19	By groups of clock stars	16·6	...	
	„	do. do.	16·1	...	
	„	By a circumpolar star	16·0	...	
	„	do. do.	16·1	...	
	„	do. do.	16·1	16·2	
	21	By groups of clock stars	16·4	...	
	„	do. do.	17·3	...	
	„	By a circumpolar star	16·3	...	
	„	do. do.	16·6	16·7	
	22	By groups of clock stars	16·4	...	
	„	do. do.	16·5	...	
	„	By a circumpolar star	16·7	16·5	
		Mean ...	...	16·5	

EXPLANATION OF *TABLE I.*

Abstract of Determinations of Collimation and Level Correction-Constants.

Column 1 contains the astronomical date.

" 2 contains the names of the stations.

" 3 contains the names of the observers and indicates the telescope used by each.

" 4 contains the mean sidereal hours at which the several determinations were made.

Collimation.

Column 5, headed C_e, gives the reading of the micrometer when the collimator cross is intersected by the central transit wire, the telescope being in the position *I.P.E.* (*i.e.* Illuminated Pivot East).

" 6, headed C_w, gives the corresponding reading, the telescope being *I.P.W.*

" 7, headed C_0, gives the mean of the two preceding readings, *i.e.* $\frac{1}{2}(C_e+C_w)$. C_0 is therefore the reading of the micrometer when so set that the centre wire is truly collimated. For Greenwich the value of C_0 is taken from Table A.

" 8, headed C_s, gives the reading of the micrometer as set during the observation of star transits. This setting was arbitrary and was not changed in either instrument throughout the arc.

" 9, headed c_e, gives the collimation correction-constant for the position *I.P.E.* c_e is equal to C_0-C_s.

" 10, headed c_w, gives the corresponding correction-constant for the position *I.P.W.* c_w is equal to C_s-C_0.

EXPLANATION OF *TABLE I*—(*Continued*).

Level.

Column 11, headed M_e, gives the reading of the micrometer when the centre wire and its reflection from the mercury trough coincide, the telescope being in the position *I.P.E.*

„ 12, headed M_w, gives the corresponding reading when the telescope is in the position *I.P.W.*

„ 13, headed M_o, gives the mean of the two preceding readings, *i.e.* $\frac{1}{2}(M_e+M_w)$.

This quantity is not used in the computations but it should remain constant and therefore affords a valuable safe-guard against blunders in reading M_e and M_w. The nature of the quantity is discussed in Chapter IV.

Column 14, headed b_e, gives the level correction-constant for the position *I.P.E.* b_e is equal to $C_o - M_e$.

„ 15, headed b_w, gives the corresponding correction-constant for the position *I.P.W.* b_w is equal to $M_w - C_o$.

As the collimation is not liable to vary, a mean of all the values of C_o on any night is taken, and c_e and c_w are found by taking the difference between this mean and C_s; but the level is not so stable and therefore the same values of b_e and b_w are not retained for the whole of a night's observations. Hence two values per night are generally made use of, the first is the mean of the first two determinations and the second is the mean of the last two.

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation C_e	Collimation C_w	Collimation C_0	Collimation C_s	Collimation $c_e = C_0 - C_s$	Collimation $c_w = C_s - C_0$	Level M_e	Level M_w	Level M_0	Level $b_e = C_0 - M_e$	Level $b_w = M_w - C_0$
1895			h m	d	d	d	d	d	d	d	d	d	d	d
June 21	POTSDAM	CAPTAIN LENOX CONYNGHAM (with Telescope No. 2)	15 20	1586·2	1599·1	1592·7	1590·0			1589·8	1594·0	1591·9	+ 1·2	+ 1·6
			17 0	1584·6	1600·1	1592·4				1593·2	1594·5	1593·9	− 0·8	+ 1·1
			17 25	1585·4	1600·4	1592·9				1593·7	1593·1	1593·4		
					Mean	1592·7		+ 2·7	− 2·7		Mean	1593·1		
„ 22			15 10	1584·8	1599·7	1592·3	1590·0			1594·5	1592·3	1593·4	− 2·1	− 0·9
			17 40	1587·1	1599·2	1593·2				1595·0	1591·2	1593·1	− 2·9	− 2·1
			19 10	1585·2	1600·1	1592·7				1596·1	1589·9	1593·0		
					Mean	1592·7		+ 2·7	− 2·7		Mean	1593·2		
„ 27			14 50	1600·6	1585·8	1593·2	1590·0			1591·8	1596·1	1594·0	+ 0·5	+ 2·0
			17 10	1597·1	1590·0	1593·6				1593·7	1594·5	1594·1	− 0·6	+ 0·9
			19 5	1595·0	1591·2	1593·1				1594·1	1593·8	1594·0		
					Mean	1593·3		+ 3·3	− 3·3		Mean	1594·0		
„ 29			15 55	1585·9	1599·7	1592·8	1590·0			1594·0	1593·4	1593·7	− 2·2	− 0·4
			17 10	1586·4	1600·5	1593·5				1596·3	1591·7	1594·0	− 3·9	− 1·9
			19 10	1586·1	1599·5	1592·8				1597·5	1590·4	1594·0		
					Mean	1593·0		+ 3·0	− 3·0		Mean	1593·9		
July 1			15 30	1585·1	1598·9	1592·0	1590·0			1595·1	1591·2	1593·2		
			15 45	1587·5	1600·1	1593·8				...	...	...	− 3·7	− 2·9
			17 30	1584·6	1601·8	1593·2				1598·3	1588·9	1593·6		
					Mean	1593·0		+ 3·0	− 3·0		Mean	1593·4		

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation						Level				
				C_e	C_w	C_o	C_s	$c_e = C_o - C_s$	$c_w = C_s - C_o$	M_e	M_w	M_o	$b_e = C_o - M_e$	$b_w = M_w - C_o$
1895			h m			d	d	d	d	d	d	d	d	d
June 21	GREENWICH	CAPTAIN BURRARD (Telescope No. 1)	14 17			16·5	15·0	+ 1·5	− 1·5	22·2	8·2	15·2	− 5·9	− 8·1
			15 46							22·6	8·6	15·6		
											Mean	15·4		
„ 22			14 45			16·5	15·0	+ 1·5	− 1·5	23·0	7·7	15·4	− 6·0	− 7·9
			15 57							21·9	9·4	15·6	− 5·1	− 7·6
			17 5							21·3	8·4	14·9		
											Mean	15·3		
„ 27			14 48			16·5	15·0	+ 1·5	− 1·5	22·6	6·7	14·6	− 5·6	− 8·9
			15 36							21·5	8·4	15·0	− 4·7	− 7·7
			17 21							20·8	9·2	15·0		
											Mean	14·9		
„ 29			14 34			16·5	15·0	+ 1·5	− 1·5	23·2	6·3	14·8	− 5·8	− 9·1
			15 59							21·4	8·4	14·9	− 5·0	− 8·3
			17 42							21·5	7·9	14·7		
											Mean	14·8		
July 1			14 58			16·5	15·0	+ 1·5	− 1·5	24·9	5·7	15·3		
			15 1							24·4	5·7	15·1	− 6·7	− 9·9
			16 12							21·7	7·4	14·6	− 5·0	− 9·1
			17 25							21·2	7·3	14·3		
											Mean	14·8		

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation C_e	C_w	C_o	C_s	$c_e = C_o - C_s$	$c_w = C_s - C_o$	Level M_e	M_w	M_o	$b_e = C_o - M_e$	$b_w = M_w - C_o$
1895			h m	d	d	d	d	d	d	d	d	d	d	d
July 12	POTSDAM	CAPTAIN BURRARD (Telescope No. 2)	16 10	1582·4	1603·7	1593·0	1595·0			1605·8	1581·0	1593·4	− 12·9	− 12·0
			17 41	1580·9	1605·0	1592·9				1606·0	1581·0	1593·5		
					Mean	1593·0		− 2·0	+ 2·0		Mean	1593·5		
„ 15			15 29	1581·8	1603·6	1592·7	1595·0			1607·7	1579·2	1593·5	− 14·6	− 13·4
			18 13	1582·2	1604·0	1593·1				1607·2	1579·7	1593·5	− 13·7	− 12·8
			19 30	1582·2	1603·3	1592·8				1605·9	1580·4	1593·2		
					Mean	1592·9		− 2·1	+ 2·1		Mean	1593·4		
„ 19			16 30	1581·1	1605·0	1593·1	1595·0			1608·0	1579·0	1593·5	− 15·4	− 15·5
			18 37	1582·6	1603·7	1593·2				1609·2	1576·4	1592·8		
					Mean	1593·2		− 1·8	+ 1·8		Mean	1593·2		
„ 21			17 22	1583·8	1603·2	1593·5	1595·0			1608·5	1577·3	1592·9	− 14·6	− 15·2
			19 2	1584·1	1602·9	1593·5				1607·6	1579·2	1593·4		
					Mean	1593·5		− 1·5	+ 1·5		Mean	1593·2		
„ 22			16 27	1582·4	1603·4	1592·9	1595·0			1608·8	1578·1	1593·5	− 15·4	− 15·6
			17 47	1583·5	1604·0	1593·8				1609·2	1577·8	1593·5	− 16·5	− 16·4
			19 22	1583·1	1605·0	1594·1				1610·9	1576·5	1593·7		
					Mean	1593·6		− 1·4	+ 1·4		Mean	1593·6		

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation						Level				
				C_e	C_w	C_o	C_s	$c_e = C_o - C_s$	$c_w = C_s - C_o$	M_e	M_w	M_o	$b_e = C_o - M_e$	$b_w = M_w - C_o$
1895	GREENWICH	CAPTAIN LENOX CONYNGHAM (Telescope No. 1)	h m			d	d	d	d	d	d	d	d	d
July 12			16 12			16·5	15·0	+ 1·5	− 1·5	12·3	17·3	14·8	+ 4·1	+ 0·9
			17 26							12·5	17·5	15·0	+ 4·6	+ 1·7
			18 59							11·3	18·9	15·1		
											Mean	15·0		
„ 15			{ 16 20			16·5	15·0	+ 1·5	− 1·5	15·7	16·7 }	16·2		
			{ 16 27							15·2	15·6 }	15·4	+ 2·0	− 0·2
			17 27							13·6	16·4	15·0	+ 3·0	+ 0·3
			19 29							13·4	17·2	15·3		
											Mean	15·5		
„ 19			16 32			16·5	15·0	+ 1·5	− 1·5	9·0	21·0	15·0	+ 8·3	+ 5·3
			17 45							7·3	22·6	15·0	+ 8·8	+ 5·3
			19 20							8·0	20·9	14·5		
											Mean	14·8		
„ 21			16 30			16·5	15·0	+ 1·5	− 1·5	13·5	17·2	15·4	+ 3·4	+ 1·2
			17 28							12·7	18·1	15·4	+ 4·0	+ 1·9
			19 0							12·2	18·6	15·4		
											Mean	15·4		
„ 22			16 30			16·5	15·0	+ 1·5	− 1·5	14·4	15·1	14·8	+ 3·0	− 0·9
			17 25							12·6	16·1	14·4	+ 3·8	+ 0·1
			19 15							12·8	17·0	14·9		
											Mean	14·7		

EXPLANATION OF *TABLE II.*

Deduction of Deviation Error from Star Observations.

The first six columns call for no remark.

Column 7 shows whether the star was observed at upper or at lower culmination. U standing for upper and L for lower.

„ 8 gives the number of wires over which the time of the star's transit was observed.

„ 9 contains the value of the deviation constant A, which is equal to $m \sec \delta \sin \zeta$, where m is the value of 1 division of the micrometer head in seconds of time, *viz*: $0^s \cdot 039$. The sign of A depends on those of $\sec \delta$ and $\sin \zeta$, where δ is the star's declination, $(180° - \delta)$ being used for stars observed at lower culmination, and ζ is the star's zenith distance, considered negative if north.

„ 10 contains the observed time of transit taken from the chronographic record.

„ 11 contains the correction to the time of transit on account of diurnal aberration. This correction is equal to $- 0 \cdot 0207 \times$ *cosine latitude* $\times$ *secant declination.* It is therefore negative for all stars at upper culmination and positive for all at lower.

„ 12 contains the correction for collimation, this is obtained by multiplying c_e or c_w, as the case may be, by $m \sec \delta$, using $(180° - \delta)$ for stars at lower culmination.

„ 13 contains the correction for level, obtained by multiplying b_e or b_w, as the case may be, by $m \sec \delta \cos \zeta$, δ and ζ having the same meanings as before.

„ 14 contains the clock error; this is a preliminary value obtained by taking the mean of the errors given by stars north and south of the zenith. If the numbers of stars at upper and lower culminations respectively be equal, a small error in the adopted value of this quantity will not affect the final mean value of the deviation error.

„ 15 contains the seconds of the corrected time of transit called T. This is the sum of the seconds in the five preceding columns.

„ 16 contains the star's R.A. at the time of the observation. This is either taken from one of the Almanacs or brought up by computation from the Greenwich Catalogue for epoch 1880.

„ 17 contains the difference T − R.A.

„ 18 contains the deviation error $a = \frac{T - R.A.}{A}$. It is to be noted that A contains the quantity m, so that a is in terms of the micrometer divisions.

„ 19 contains the mean of the values in column 18. Sometimes one general mean is taken and sometimes the night is divided into two parts. This depends on whether the values in column 18 show any evidence of a change of position having taken place during the hours of work.

The last column shows whether the telescope was pointing to the East or to the West of North.

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station, Observer and Telescope	Astronomical Date	Instrumental Position	Clock in use	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for: Diurnal Aberration	Correction for: Collimation	Correction for: Transit Axis Level	Correction for: Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R.A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
POTSDAM (E) and GREENWICH (W)	POTSDAM, CAPTAIN LENOX CONYNGHAM (Telescope No. 2)	1895		The Potsdam Observatory Standard Clock (Dencker No. 28)					h m s	s	s	s	m s	s	h m s	m s	d	d	
		June 21	I. P. W.		Groom. 750	L	1	+0·3158	16 2 30·13	+·15	+1·27	− 0·56	+0 56·75	27·74	16 3 30·98	−0 3·24	−10·26		
			I. P. E.		Groom. 848	L	2	+0·1234	16 33 42·69	+·05	−0·42	− 0·12	+0 56·75	38·95	16 34 40·78	−0 1·83	−14·83		
			I. P. W.		ε Ursæ Min.	U	5	−0·1416	16 55 56·76	−·09	−0·77	+ 0·40	+0 56·75	53·05	16 56 51·08	+0 1·97	−13·91	−13·00	W
		June 22	I. P. W.		Groom. 750	L	5	+0·3158	16 2 27·94	+·15	+1·27	+ 0·31	+0 57·41	27·08	16 3 31·20	−0 4·12	−13·05		
			I. P. E.		Groom. 848	L	5	+0·1234	16 33 41·89	+·05	−0·42	+ 0·20	+0 57·41	39·13	16 34 40·85	−0 1·72	−13·94		
			I. P. W.		Groom. 848	L	5	+0·1234	16 33 41·29	+·05	+0·42	+ 0·09	+0 57·41	39·26	16 34 40·85	−0 1·59	−12·88		
			I. P. W.		ε Ursæ Min.	U	5	−0·1416	16 55 56·83	−·09	−0·77	− 0·22	+0 57·42	53·17	16 56 51·02	+0 2·15	−15·18		
			I. P. E.		Groom. 966	L	8	+0·1184	17 24 41·12	+·05	−0·40	+ 0·19	+0 57·42	38·38	17 25 40·07	−0 1·69	−14·27		
			I. P. E.		δ Ursæ Min.	U	3	−0·3672	18 5 28·33	−·21	+1·76	− 1·57	+0 57·43	25·74	18 6 22·01	+0 3·73	−10·16		
			I. P. W.		δ Ursæ Min.	U	3	−0·3672	18 5 31·25	−·21	−1·76	− 1·13	+0 57·44	25·59	18 6 22·01	+0 3·58	− 9·75		
			I. P. W.		Cephei 51 (Hev.)	L	3	+0·5148	18 50 0·00	+·25	+2·14	+ 1·27	+0 57·45	1·11	18 51 6·89	−0 5·78	−11·23		
			I. P. E.		Cephei 51 (Hev.)	L	2	+0·5148	18 50 4·32	+·25	−2·14	+ 1·75	+0 57·46	1·64	18 51 6·89	−0 5·25	−10·20	−12·30	W
		June 27	I. P. E.		δ Scorpii	U	3	+0·0403	15 53 10·19	−·01	+0·14	+ 0·01	+1 0·14	10·47	15 54 10·50	−0 0·03	− 0·74		
			I. P. E.		Groom. 750	L	3	+0·3158	16 2 33·89	+·15	−1·55	− 0·17	+1 0·14	32·46	16 3 32·18	+0 0·28	+ 0·89		
			I. P. W.		Groom. 750	L	3	+0·3158	16 2 31·39	+·15	+1·55	− 0·69	+1 0·14	32·54	16 3 32·18	+0 0·36	+ 1·14		
			I. P. W.		Groom. 848	L	5	+0·1234	16 33 40·13	+·05	+0·52	− 0·19	+1 0·15	40·66	16 34 41·18	−0 0·52	− 4·21		
			I. P. E.		Groom. 848	L	5	+0·1234	16 33 41·18	+·05	−0·52	− 0·05	+1 0·15	40·81	16 34 41·18	−0 0·37	− 3·00		
			I. P. W.		ε Ursæ Min.	U	4	−0·1416	16 55 51·15	−·09	−0·94	+ 0·49	+1 0·16	50·77	16 56 50·64	+0 0·13	− 0·92		
			I. P. E.		ε Ursæ Min.	U	4	−0·1416	16 55 49·29	−·09	+0·94	+ 0·12	+1 0·16	50·42	16 56 50·64	−0 0·22	+ 1·55		
			I. P. W.		19 H. Camelop.	L	6	+0·1531	17 4 12·42	+·07	+0·67	− 0·27	+1 0·17	13·06	17 5 13·19	−0 0·13	− 0·85		
			I. P. E.		δ Ursæ Min.	U	4	−0·3672	18 5 18·91	−·21	+2·15	− 0·32	+1 0·19	20·72	18 6 21·50	−0 0·78	+ 2·12		
			I. P. W.		δ Ursæ Min.	U	3	−0·3672	18 5 23·18	−·21	−2·15	+ 0·49	+1 0·19	21·50	18 6 21·50	0·00	0·00		
			I. P. W.		Cephei 51 (Hev.)	L	2	+0·5148	18 50 4·23	+·25	+2·62	− 0·54	+1 0·20	6·76	18 51 7·28	−0 0·52	− 1·01		
			I. P. E.		Cephei 51 (Hev.)	L	3	+0·5148	18 50 10·24	+·25	−2·62	+ 0·36	+1 0·20	8·43	18 51 7·28	+0 1·15	+ 2·23	− 0·23	W

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station, Observer and Telescope	Astronomical Date	Instrumental Position	Clock in use	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for Diurnal Aberration	Correction for Collimation	Correction for Transit Axis Level	Correction for Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R. A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
POTSDAM, (E) and GREENWICH (W)	POTSDAM, CAPTAIN LENOX CONYNGHAM (Telescope No. 2)	1895		The Potsdam Observatory Standard Clock (Dencker No. 28)					h m s	s	s	s	m s	s	h m s	m s	d	d	
		June 29	I. P. W.		Groom. 750	L	3	+0·3158	16 2 26·70	+·15	+ 1·41	+0·14	+1 1·12	29·52	16 3 32·57	−0 3·05	− 9·66		
			I. P. E.		Groom. 750	L	3	+0·3158	16 2 29·17	+·15	− 1·41	+0·76	+1 1·12	29·79	16 3 32·57	−0 2·78	− 8·80		
			I. P. W.		Groom. 848	L	5	+0·1234	16 33 37·80	+·05	+ 0·47	+0·04	+1 1·13	39·49	16 34 41·31	−0 1·82	−14·75		
			I. P. E.		Groom. 848	L	5	+0·1234	16 33 39·26	+·05	− 0·47	+0·21	+1 1·13	40·18	16 34 41·31	−0 1·13	− 9·16		
			I. P. E.		ε Ursæ Min.	U	5	−0·1416	16 55 50·62	−·09	+ 0·86	−0·54	+1 1·13	51·98	16 56 50·48	+0 1·50	−10·59		
			I. P. W.		ε Ursæ Min.	U	3	−0·1416	16 55 52·44	−·09	− 0·86	−0·10	+1 1·13	52·52	16 56 50·48	+0 2·04	−14·41		
			I. P. E.		δ Ursæ Min.	U	3	−0·3672	18 5 25·07	−·21	+ 1·96	−2·11	+1 1·15	25·86	18 6 21·34	+0 4·52	−12·31		
			I. P. W.		δ Ursæ Min.	U	3	−0·3672	18 5 28·10	−·21	− 1·96	−1·03	+1 1·15	26·05	18 6 21·34	+0 4·71	−12·83		
			I. P. W.		23 H. Camelop.	L	5	+0·1600	18 27 13·46	+·07	+ 0·65	+0·27	+1 1·16	15·61	18 28 17·51	−0 1·90	−11·87		
			I. P. E.		Cephei 51 (Hev.)	L	3	+0·5148	18 50 0·95	+·25	− 2·38	+2·36	+1 1·16	2·34	18 51 7·35	−0 5·01	− 9·73		
			I. P. W.		Cephei 51 (Hev.)	L	5	+0·5148	18 49 56·70	+·25	+ 2·38	+1·15	+1 1·16	1·64	18 51 7·35	−0 5·71	−11·09	−11·38	W
		July 1	I. P. E.		Groom. 750	L	4	+0·3158	16 2 27·27	+·15	− 1·41	+1·28	+1 2·17	29·46	16 3 33·01	−0 3·55	−11·24		
			I. P. E.		Groom. 848	L	5	+0·1234	16 33 37·56	+·05	− 0·47	+0·36	+1 2·18	39·68	16 34 41·47	−0 1·79	−14·51		
			I. P. W.		Groom. 848	L	5	+0·1234	16 33 36·81	+·05	+ 0·47	+0·28	+1 2·18	39·79	16 34 41·47	−0 1·68	−13·61		
			I. P. W.		ε Ursæ Min.	U	4	−0·1416	16 55 51·71	−·09	− 0·86	−0·72	+1 2·19	52·23	16 56 50·30	+0 1·93	−13·63		
			I. P. W.		19 H. Camelop.	L	4	+0·1531	17 4 8·09	+·07	+ 0·61	+0·39	+1 2·20	11·36	17 5 13·50	−0 2·14	−13·98		
			I. P. E.		Groom. 966	L	4	+0·1184	17 24 36·49	+·05	− 0·45	+0·33	+1 2·21	38·63	17 25 40·53	−0 1·90	−16·05		
			I. P. W.		Groom. 966	L	4	+0·1184	17 24 35·84	+·05	+ 0·45	+0·26	+1 2·21	38·81	17 25 40·53	−0 1·72	−14·53	−13·94	W

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station, Observer and Telescope	Astronomical Date	Instrumental Position	Clock in use	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for Diurnal Aberration	Correction for Collimation	Correction for Transit Axis Level	Correction for Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R.A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
POTSDAM (E) and GREENWICH (W)	POTSDAM, CAPTAIN BURRARD (Telescope No. 2)	1895		The Potsdam Observatory Standard Clock (Dencker No. 28)					h m s	s	s	s	m s	s	h m s	m s	d	d	
		July 12	I. P. E.		ε Ursæ Min.	U	4	−0.1417	16 55 46.16	−.09	−0.57	− 3.19	+1 8.71	51.02	16 56 49.15	+0 1.87	−13.20		
			I. P. E.		19 H. Camelop	L	5	+0.1530	17 4 1.67	+.07	+0.41	+ 1.74	+1 8.71	12.60	17 5 14.51	−0 1.91	−12.48		
			I. P. W.		Groom. 966	L	4	+0.1184	17 24 29.59	+.05	−0.30	+ 1.08	+1 8.71	39.13	17 25 41.24	−0 2.11	−17.82	−14.50	W
		July 15	I. P. E.		ζ Ursæ Min.	U	7	−0.0814	15 46 45.88	−.06	−0.39	− 2.47	+1 10.05	53.01	15 47 52.22	+0 0.79	− 9.71		
			I. P. E.		δ Ursæ Min.	U	1	−0.3675	18 5 22.67	−.21	−1.37	− 7.88	+1 10.06	23.27	18 6 18.80	+0 4.47	−12.16		
			I. P. E.		Cephei 51 (Hev.)	L	3	+0.5144	18 49 43.48	+.25	+1.67	+ 8.27	+1 10.06	3.73	18 51 9.58	−0 5.85	−11.37	−11.08	W
		July 19	I. P. E.		δ Ursæ Min.	U	2	−0.3675	18 5 20.94	−.21	−1.18	− 8.32	+1 12.14	23.37	18 6 17.83	+0 5.54	−15.07	−15.07	W
		July 21			Pole obscured by clouds: no circumpolar stars visible. Deviation error deduced from readings of a fixed Collimator: July 12 (1581.7), July 15 (1582.1), July 19 (1581.9), July 21 (1584.0) and July 22 (1583.0)													−13.00	W
		July 22	I. P. W.		ε Ursæ Min.	U	4	−0.1417	16 55 39.14	−.09	+0.40	− 3.85	+1 13.45	49.05	16 56 47.89	+0 1.16	− 8.19		
			I. P. W.		19 H. Camelop.	L	4	+0.1530	17 3 58.75	+.07	−0.29	+ 2.11	+1 13.45	14.09	17 5 15.58	−0 1.49	− 9.74		
			I. P. W.		δ Ursæ Min.	U	4	−0.3675	18 5 14.51	−.21	+0.91	− 8.86	+1 13.45	19.80	18 6 17.02	+0 2.78	− 7.56		
			I. P. W.		23 H. Camelop.	L	4	+0.1599	18 27 0.90	+.07	−0.30	+ 2.36	+1 13.45	16.48	18 28 19.03	−0 2.55	−15.95	}	
			I. P. E.		23 H. Camelop.	L	4	+0.1599	18 27 0.21	+.07	+0.30	+ 2.38	+1 13.45	16.41	18 28 19.03	−0 2.62	−16.39	}*	
			I. P. W.		23 H. Camelop.	L	4	+0.1599	18 27 1.49	+.07	−0.30	+ 2.36	+1 13.45	17.07	18 28 19.03	−0 1.96	−12.26	}	
			I. P. W.		Cephei 51 (Hev.)	L	2	+0.5144	18 49 40.59	+.25	−1.11	+ 9.91	+1 13.45	3.09	18 51 11.45	−0 8.36	−16.25	−11.32	W

* One value for Mean from 23 H. Camelop.

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station, Observer and Telescope	Astronomical Date	Instrumental Position	Clock in use	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for Diurnal Aberration	Correction for Collimation	Correction for Transit Axis Level	Correction for Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R.A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.) / A = a	Mean a	Deviation East or West of North
									h m s	s	s	s	m s	s	h m s	m s	s	s	
POTSDAM (E) and GREENWICH (W)	GREENWICH, CAPTAIN BURRARD (Telescope No. 1)	1895 June 21	I. P. W.	The Greenwich Observatory Sidereal Standard Clock	β Ursæ Min.	U	8	−0·0573	14 50 12·81	−·05	−0·22	− 1·09	+0 54·52	5·97	14 51 5·52	+0 0·45	− 7·85		
			I. P. W.		47 H. Cephei	L	5	+0·1549	14 51 8·38	+·07	+0·31	+ 1·07	+0 54·52	4·35	14 52 5·29	−0 0·94	− 6·07		
			I. P. W.		γ Scorpii	U	15	+0·0416	14 57 3·65	−·01	−0·06	− 0·08	+0 54·52	58·02	14 57 58·17	−0 0·15	− 3·61		
			I. P. E.		48 H. Cephei	L	5	+0·1382	15 6 1·83	+·06	−0·27	+ 0·66	+0 54·52	56·80	15 6 57·58	−0 0·78	− 5·64		
			I. P. E.		B.A.C. 5140	U	2	−0·5560	15 10 38·86	−·31	+1·41	− 4·49	+0 54·52	29·99	15 11 28·32	+0 1·67	− 3·00	− 5·23	W
		June 22	I. P. W.		47 H. Cephei	L	2	+0·1549	14 51 7·76	+·07	+0·31	+ 1·04	+0 54·68	3·86	14 52 5·40	−0 1·54	− 9·94		
			I. P. W.		γ Scorpii	U	10	+0·0416	14 57 3·47	−·01	−0·06	− 0·08	+0 54·68	58·00	14 57 58·17	−0 0·17	− 4·09		
			I. P. E.		48 H. Cephei	L	4	+0·1382	15 6 1·91	+·06	−0·27	+ 0·67	+0 54·68	57·05	15 6 57·68	−0 0·63	− 4·56		
			I. P. E.		B.A.C. 5140	U	2	−0·5560	15 10 38·28	−·31	+1·41	− 4·56	+0 54·68	29·50	15 11 27·85	+0 1·65	− 2·97		
			I. P. W.		κ Libræ	U	9	+0·0389	15 35 2·05	−·01	−0·06	− 0·11	+0 54·68	56·55	15 35 56·67	−0 0·12	− 3·08		
			I. P. W.		λ Libræ	U	10	+0·0391	15 46 22·73	−·01	−0·06	− 0·10	+0 54·68	17·24	15 47 17·27	−0 0·03	− 0·77		
			I. P. W.		σ Scorpii	U	13	+0·0418	16 13 56·82	−·01	−0·06	− 0·07	+0 54·68	51·36	16 14 51·55	−0 0·19	− 4·55		
			I. P. E.		Groom. 848	L	5	+0·1256	16 33 44·58	+·05	−0·24	+ 0·49	+0 54·68	39·56	16 34 40·85	−0 1·29	−10·27		
			I. P. E.		ε Ursæ Min.	U	3	−0·1464	16 55 58·00	−·09	+0·43	− 1·26	+0 54·68	51·76	16 56 51·02	+0 0·74	− 5·05	− 5·03	

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station, Observer and Telescope	Astronomical Date	Instrumental Position	Clock in use	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for: Diurnal Aberration	Correction for: Collimation	Correction for: Transit Axis Level	Correction for: Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R.A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
									h m s	s	s	s	m s	s	h m s	m s	d	d	
POTSDAM (E) and GREENWICH (W)	GREENWICH, CAPTAIN BURRARD (Telescope No. 1)	1895 June 27	I. P. W.	The Greenwich Observatory Sidereal Standard Clock	γ Scorpii	U	15	+0.0416	14 57 2.33	−.01	−0.06	− 0.09	+0 55.80	57.97	14 57 58.15	−0 0.18	− 4.33		
			I. P. W.		48 H. Cephei	L	3	+0.1382	15 6 0.61	+.06	+0.27	+ 0.99	+0 55.80	57.73	15 6 58.17	−0 0.44	− 3.18		
			I. P. W.		B.A.C. 5140	U	2	−0.5560	15 10 38.97	−.31	−1.41	− 6.77	+0 55.80	26.28	15 11 25.75	+0 0.53	− 0.95		
			I. P. W.		λ Libræ	U	15	+0.0391	15 46 21.62	−.01	−0.06	− 0.10	+0 55.80	17.25	15 47 17.27	−0 0.02	− 0.51		
			I. P. W.		δ Scorpii	U	3	+0.0403	15 53 14.79	−.01	−0.06	− 0.09	+0 55.80	10.43	15 54 10.50	−0 0.07	− 1.74		
			I. P. E.		Groom. 750	L	3	+0.3232	16 2 33.02	+.16	−0.71	+ 1.62	+0 55.80	29.89	16 3 32.18	−0 2.29	− 7.09		
			I. P. E.		Groom. 848	L	4	+0.1256	16 33 44.37	+.05	−0.24	+ 0.45	+0 55.80	40.43	16 34 41.18	−0 0.75	− 5.97		
			I. P. W.		ε Ursæ Min.	U	5	−0.1464	16 55 58.08	−.09	−0.43	− 1.90	+0 55.80	51.46	16 56 50.64	+0 0.82	− 5.60		
			I. P. W.		θ Ophiuchi	U	15	+0.0416	17 14 41.38	−.01	−0.06	− 0.08	+0 55.80	37.03	17 15 37.09	−0 0.06	− 1.44	− 3.42	W
		June 29	I. P. E.		β Ursæ Min.	U	6	−0.0573	14 50 10.03	−.05	+0.22	− 0.78	+0 56.05	5.47	14 51 5.03	+0 0.44	− 7.68		
			I. P. E.		47 H. Cephei	L.	4	+0.1549	14 52 8.36	+.07	−0.31	+ 0.77	+0 56.05	4.94	14 52 6.20	−0 1.26	− 8.13		
			I. P. E.		48 H. Cephei	L	2	+0.1382	15 6 1.36	+.06	−0.27	+ 0.64	+0 56.05	57.84	15 6 58.36	−0 0.52	− 3.76		
			I. P. E.		B.A.C. 5140	U	1	−0.5560	15 10 33.15	−.31	+1.41	− 4.41	+0 56.05	25.89	15 11 24.91	+0 0.98	− 1.76		
			I. P. W.		κ Libræ	U	10	+0.0389	15 35 0.74	−.01	−0.06	− 0.12	+0 56.05	56.60	15 35 56.66	−0 0.06	− 1.54	− 4.57	W
		July 1	I. P. E.		B.A.C. 5140	U	2	−0.5560	15 10 35.71	−.31	+1.41	− 5.10	+0 56.50	28.21	15 11 23.96	+0 4.25	− 7.64		
			I. P. W.		κ Libræ	U	10	+0.0389	15 35 0.28	−.01	−0.06	− 0.13	+0 56.50	56.58	15 35 56.65	−0 0.07	− 1.80		
			I. P. E.		α Scorpii	U	10	+0.0423	16 22 4.73	−.01	+0.06	− 0.05	+0 56.50	1.23	16 23 1.36	−0 0.13	− 3.07		
			I. P. E.		Groom. 848	L	5	+0.1256	16 33 43.94	+.05	−0.24	+ 0.48	+0 56.50	40.73	16 34 41.47	−0 0.74	− 5.89	− 4.60	W

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station, Observer and Telescope	Astronomical Date	Instrumental Position	Clock in use	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for: Diurnal Aberration	Correction for: Collimation	Correction for: Transit Axis Level	Correction for: Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R.A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
POTSDAM (E) and GREENWICH (W)	GREENWICH, CAPTAIN LENOX CONYNGHAM (Telescope No. 1)	1895		The Greenwich Observatory Sidereal Standard Clock					h m s	s	s	s	m s	s	h m s	m s	d	d	
		July 12	I. P. E		Groom. 750	L	4	+0·3232	16 4 59·60	+·16	−0·71	−1·41	+0 57·76	55·40	16 3 35·67	+2 19·73	+432·33		
			I. P. W.		Groom. 848	L	8	+0·1256	16 34 39·01	+·05	+0·24	−0·09	+0 57·76	36·97	16 34 42·36	+0 54·61	+434·79		
			I. P. E.		19 H. Camelop.	L	6	+0·1561	17 5 25·52	+·07	−0·31	−0·55	+0 57·76	22·49	17 5 14·51	+1 7·98	+435·49		
			I. P. E.		θ Ophiuchi	U	15	+0·0416	17 14 57·51	−·01	+0·06	+0·04	+0 57·76	55·36	17 15 37·15	+0 18·21	+437·74		
			I. P. W		δ Ursæ Min.	U	4	−0·3783	18 2 36·28	−·22	−0·99	+0·91	+0 57·76	33·74	18 6 19·32	−2 45·58	+437·70		
			I. P. E.		23 H. Camelop	L	8	+0·1632	18 28 32·25	+·07	−0·33	−0·66	+0 57·76	29·09	18 28 18·26	+1 10·83	+434·01		
			I. P. E.		Cephei 51 (Hev.)	L	4	+0·5272	18 54 4·20	+·26	−1·20	−2·76	+0 57·76	58·26	18 51 9·14	+3 49·12	+434·60	+435·24	E
		July 15	I. P. E.		ε Ursæ Min.	U	5	−0·1464	16 55 51·02	−·09	+0·43	+0·49	+0 58·11	49·96	16 56 48·79	+0 1·17	−7·99		
			I. P. W.		ε Ursæ Min.	U	6	−0·1464	16 55 52·51	−·09	−0·43	−0·05	+0 58·11	50·05	16 56 48·79	+0 1·26	−8·61		
			I. P. E.		19 H. Camelop.	L	4	+0·1561	17 4 16·05	+·07	−0·31	−0·27	+0 58·11	13·65	17 5 14·82	−0 1·17	−7·50		
			I. P. W.		δ Ursæ Min.	U	3	−0·3783	18 5 24·39	−·22	−0·99	+0·16	+0 58·11	21·45	18 6 18·80	+0 2·65	−7·01		
			I. P. E.		δ Ursæ Min.	U	3	−0·3783	18 5 21·29	−·22	+0·99	+1·61	+0 58·11	21·78	18 6 18·80	+0 2·98	−7·88		
			I. P. E.		23 H. Camelop.	L	4	+0·1632	18 27 19·80	+·07	−0·33	−0·43	+0 58·11	17·22	18 28 18·47	−0 1·25	−7·66		
			I. P. E.		Cephei 51 (Hev.)	L	3	+0·5272	18 50 10·47	+·26	−1·20	−1·80	+0 58·11	5·84	18 51 9·58	−0 3·74	−7·09	−7·68	W
		July 19	I. P. W.		ε Ursæ Min.	U	4	−0·1464	16 55 50·02	−·09	−0·43	+1·31	+0 58·68	49·49	16 56 48·29	+0 1·20	−8·20		
			I. P. E.		ε Ursæ Min.	U	4	−0·1464	16 55 48·89	−·09	+0·43	+2·04	+0 58·68	49·95	16 56 48·29	+0 1·66	−11·34		
			I. P. E.		θ Ophiuchi	U	10	+0·0416	17 14 37·94	−·01	+0·06	+0·08	+0 58·68	36·75	17 15 37·15	−0 0·40	−9·62		
			I. P. W.		Groom. 966	L	7	+0·1205	17 24 42·00	+·05	+0·22	−0·47	+0 58·68	40·48	17 25 41·74	−0 1·26	−10·46		
			I. P. W.		δ Ursæ Min.	U	4	−0·3783	18 5 21·19	−·22	−0·99	+2·85	+0 58·68	21·51	18 6 17·83	+0 3·68	−9·73		
			I. P. E.		δ Ursæ Min.	U	3	−0·3783	18 5 18·05	−·22	+0·99	+4·73	+0 58·68	22·23	18 6 17·83	+0 4·40	−11·63		
			I. P. E.		23 H. Camelop.	L	5	+0·1632	18 27 19·44	+·07	−0·33	−1·25	+0 58·68	16·61	18 28 18·76	−0 2·15	−13·17		
			I. P. W.		Cephei 51 (Hev.)	L	4	+0·5272	18 50 7·59	+·26	+1·20	−3·18	+0 58·68	4·55	18 51 10·59	−0 6·04	−11·46		
			I. P. E.		Cephei 51 (Hev.)	L	2	+0·5272	18 50 10·93	+·26	−1·20	−5·28	+0 58·68	3·39	18 51 10·59	−0 7·20	−13·66	−11·03	W

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station, Observer and Telescope	Astronomical Date	Instrumental Position	Clock in use	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for: Diurnal Aberration	Correction for: Collimation	Correction for: Transit Axis Level	Correction for: Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R. A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
		1895							h m s	s	s	s	m s	s	h m s	m s	d	d	
POTSDAM (E) and GREENWICH (W)	GREENWICH, CAPTAIN LENOX CONYNGHAM (Telescope No. 1)	July 21	I. P. E.	The Greenwich Observatory Sidereal Standard Clock	ε Ursæ Min.	U	5	−0·1464	16 55 48·52	−·09	+0·43	+ 0·84	+0 58·85	48·55	16 56 48·03	+0 0·52	− 3·55		
			I. P. W.		ε Ursæ Min.	U	6	−0·1464	16 55 49·69	−·09	−0·43	+ 0·30	+0 58·85	48·32	16 56 48·03	+0 0·29	− 1·98		
			I. P. W.		19 H. Camelop.	L	5	+0·1561	17 4 15·90	+·07	+0·31	− 0·16	+0 58·85	14·97	17 5 15·46	−0 0·49	− 3·14		
			I. P. E.		θ Ophiuchi	U	14	+0·0416	17 14 38·06	−·01	+0·06	+ 0·03	+0 58·85	36·99	17 15 37·14	−0 0·15	− 3·60		
			I. P. E.		Groom. 966	L	6	+0·1205	17 24 43·26	+·05	−0·22	− 0·30	+0 58·86	41·65	17 25 41·90	−0 0·25	− 2·07		
			I. P. E.		δ Ursæ Min.	U	4	−0·3783	18 5 16·25	−·22	+0·99	+ 2·15	+0 58·86	18·03	18 6 17·29	+0 0·74	− 1·96		
			I. P. W.		δ Ursæ Min.	U	3	−0·3783	18 5 19·69	−·22	−0·99	+ 1·02	+0 58·86	18·36	18 6 17·29	+0 1·07	− 2·83		
			I. P. W.		23 H. Camelop.	L	4	+0·1632	18 27 19·16	+·07	+0·33	− 0·27	+0 58·86	18·15	18 28 18·94	−0 0·79	− 4·84		
			I. P. E.		Cephei 51 (Hev.)	L	3	+0·5272	18 50 11·45	+·26	−1·20	− 2·40	+0 58·86	6·97	18 51 11·18	−0 4·21	− 7·99	− 3·55	W
		July 22	I. P. W.		ε Ursæ Min.	U	5	−0·1464	16 55 50·23	−·09	−0·43	− 0·22	+0 58·96	48·45	16 56 47·89	+0 0·56	− 3·83		
			I. P. E.		ε Ursæ Min.	U	5	−0·1464	16 55 48·31	−·09	+0·43	+ 0·74	+0 58·96	48·35	16 56 47·89	+0 0·46	− 3·21		
			I. P. E.		19 H. Camelop.	L	5	+0·1561	17 4 16·97	+·07	−0·31	− 0·40	+0 58·96	15·29	17 5 15·58	−0 0·29	− 1·86		
			I. P. E.		23 H. Camelop.	L	5	+0·1632	18 27 20·35	+·07	−0·33	− 0·54	+0 58·96	18·51	18 28 19·03	−0 0·52	− 3·19		
			I. P. E.		Cephei 51 (Hev.)	L	2	+0·5272	18 50 13·41	+·26	−1·20	− 2·28	+0 58·96	9·15	18 51 11·45	−0 2·30	− 4·36	− 3·29	W

EXPLANATION OF *TABLE III.*

Direct Comparison of Clocks.

The first four columns call for no remark.

Column 5 contains the time by the Potsdam clock of the middle of the period during which signals were being sent or received.

" 6 contains the time by the Greenwich clock of the same instant.

" 7 contains the difference between the clocks as read off the chronographic record.

" 8 gives the mean, to the nearest whole second, of the times given in column 5.

" 9 gives the mean of those in column 6.

" 10 contains the mean of two corresponding differences in column 7, and is the difference between the clocks, freed from the effects of retardation, at the epoch given, in terms of the two clocks respectively, in columns 8 and 9.

" 11 contains the deduced relative hourly rate of the clocks. It is obtained as follows:—

The change in the difference between the clocks between two consecutive comparisons is divided by the interval between the comparisons, expressed in hours, and the result is the rate during the interval. Then the mean of two consecutive rates is taken and considered to be the rate at the epoch of the intervening comparison, opposite which it is accordingly entered. It will be seen that by this method the same weight is given to a rate deduced from two comparisons on the same night, as to one deduced from the last comparison on one night and the first on the next. If the interval between the comparisons be small the deduced rate will be seriously affected by any errors in the observed differences between the clocks; on the other hand, when the interval is from one night to the next there is a probability of a variation in the rate. Hence it appears that each method has its own disadvantages and that consequently the adoption of equal weights is justifiable.

TABLE III. DIRECT COMPARISON OF CLOCKS.

Arc	Astronomical Date	Comparison made at	Clock Signals transmitted from	Time of Comparison by Potsdam Clock	Corresponding Time by Greenwich Clock	Observed Difference between the Clocks	Mean Time of Comparison by E Clock = T_E	Mean Time of Comparison by W Clock = T_W	Mean Difference between the Clocks at Epochs T_E and T_W = D	Relative Hourly Clock Rate at Epochs T_E and T_W
POTSDAM (E) and GREENWICH (W)	1895			h m s	h m s	h m s	h m s	h m s	h m s	s
	June 21	Potsdam	Greenwich	18 21 15·410	17 29 2·000	0 52 13·410				
		Greenwich	Potsdam	18 32 14·000	17 40 0·888	13·112	18 26 45	17 34 31	0 52 13·261	− 0·019
	„ 22	Greenwich	Potsdam	15 27 21·000	14 35 8·298	0 52 12·702				
		Potsdam	Greenwich	15 33 9·020	14 40 56·000	13·020	15 30 15	14 38 2	0 52 12·861	− 0·007
		Greenwich	Potsdam	16 45 9·000	15 52 56·265	12·735				
		Potsdam	Greenwich	16 50 55·003	15 58 42·000	13·003	16 48 2	15 55 49	12·869	− ·006
		Greenwich	Potsdam	18 21 21·000	17 29 8·314	12·686				
		Potsdam	Greenwich	18 29 4·990	17 36 52·000	12·990	18 25 13	17 33 0	12·838	− ·019
	„ 23	Greenwich	Potsdam	15 39 21·000	14 47 8·693	0 52 12·307				
		Potsdam	Greenwich	15 45 12·614	14 53 0·000	12·614	15 42 17	14 50 4	0 52 12·461	− 0·015
	„ 25	Greenwich	Potsdam	15 9 17·000	14 17 5·300	0 52 11·700				
		Potsdam	Greenwich	15 39 1·963	14 46 50·000	11·963	15 24 9	14 31 58	0 52 11·832	− 0·014
	„ 27	Greenwich	Potsdam	16 20 14·000	15 28 3·065	0 52 10·935				
		Potsdam	Greenwich	16 24 13·293	15 32 2·000	11·293	16 22 14	15 30 3	0 52 11·114	+ 0·003
		Greenwich	Potsdam	17 11 14·000	16 19 3·010	10·990				
		Potsdam	Greenwich	17 16 13·273	16 24 2·000	11·273	17 13 44	16 21 33	11·132	+ ·007
		Greenwich	Potsdam	18 29 12·000	17 37 1·030	10·970				
		Potsdam	Greenwich	18 35 13·271	17 43 2·000	11·271	18 32 13	17 40 2	11·121	− ·002
	„ 29	Greenwich	Potsdam	15 32 14·000	14 40 3·699	0 52 10·301				
		Potsdam	Greenwich	15 50 8·600	14 57 58·000	10·600	15 41 11	14 49 1	0 52 10·451	− 0·009
		Greenwich	Potsdam	17 8 13·000	16 16 2·706	0 52 10·294				
		Potsdam	Greenwich	17 15 12·598	16 23 2·000	10·598	17 11 43	16 19 32	10·446	− ·008
	„ 30	Potsdam	Greenwich	16 6 12·292	15 14 2·000	0 52 10·292				
		Greenwich	Potsdam	16 16 11·000	15 24 1·000	10·000	16 11 12	15 19 2	0 52 10·146	− 0·013

TABLE III. DIRECT COMPARISON OF CLOCKS.

Arc	Astronomical Date	Comparison made at	Clock Signals transmitted from	Time of Comparison by Potsdam Clock	Corresponding Time by Greenwich Clock	Observed Difference between the Clocks	Mean Time of Comparison by E Clock $= T_E$	Mean Time of Comparison by W Clock $= T_W$	Mean Difference between the Clocks at Epochs T_E and T_W $= D$	Relative Hourly Clock Rate at Epochs T_E and T_W
POTSDAM (E) and GREENWICH (W)	1895			h m s	h m s	h m s	h m s	h m s	h m s	s
	July 1	Greenwich	Potsdam	16 48 13·000	15 56 3·329	0 52 9·671				
		Potsdam	Greenwich	16 54 3·914	16 1 54·000	9·914	16 51 8	15 58 59	0 52 9·793	− 0·003
		Greenwich	Potsdam	18 12 13·000	17 20 3·325	9·675				
		Potsdam	Greenwich	18 18 5·932	17 25 56·000	9·932	18 15 9	17 23 0	9·804	− ·005
	„ 12	Greenwich	Potsdam	16 33 1·077	15 40 56·000	0 52 5·077				
		Potsdam	Greenwich	16 39 7·340	15 47 2·000	5·340	16 36 4	15 43 59	0 52 5·209	− 0·009
		Greenwich	Potsdam	17 42 58·000	16 50 52·900	5·100				
		Potsdam	Greenwich	17 46 7·315	16 54 2·000	5·315	17 44 33	16 52 27	5·208	− ·015
		Greenwich	Potsdam	18 44 2·000	17 51 56·932	5·068				
		Potsdam	Greenwich	18 54 7·285	18 2 2·000	5·285	18 49 5	17 56 59	5·177	− ·020
	„ 13	Greenwich	Potsdam	16 32 2·000	15 39 57·220	0 52 4·780				
		Potsdam	Greenwich	16 46 7·085	15 54 2·000	5·085	16 39 5	15 47 0	0 52 4·933	− 0·012
	„ 15	Greenwich	Potsdam	16 51 56·195	15 59 52·000	0 52 4·195				
		Potsdam	Greenwich	17 0 56·505	16 8 52·000	4·505	16 56 26	16 4 22	0 52 4·350	− 0·010
		Greenwich	Potsdam	18 13 10·183	17 21 6·000	4·183				
		Potsdam	Greenwich	18 19 7·000	17 27 2·505	4·495	18 16 9	17 24 4	4·339	− ·010
		Greenwich	Potsdam	19 25 8·160	18 33 4·000	4·160				
		Potsdam	Greenwich	19 39 7·000	18 47 2·510	4·490	19 32 8	18 40 3	4·325	− ·012
	„ 17	Greenwich	Potsdam	16 52 2·000	15 59 58·470	0 52 3·530				
		Potsdam	Greenwich	17 2 1·825	16 9 58·000	3·825	16 57 2	16 4 58	0 52 3·678	− 0·014
	„ 18	Potsdam	Greenwich	17 1 57·485	16 9 54·000	0 52 3·485				
		Greenwich	Potsdam	17 29 57·195	16 37 54·000	3·195	17 15 57	16 23 54	0 52 3·340	− 0·016

TABLE III. DIRECT COMPARISON OF CLOCKS.

Arc	Astronomical Date	Comparison made at	Clock Signals transmitted from	Time of Comparison by Potsdam Clock	Corresponding Time by Greenwich Clock	Observed Difference between the Clocks	Mean Time of Comparison by E Clock = T_E	Mean Time of Comparison by W Clock = T_W	Mean Difference between the Clocks at Epochs T_E and T_W = D	Relative Hourly Clock Rate at Epochs T_E and T_W
	1895			h m s	h m s	h m s	h m s	h m s	h m s	s
POTSDAM (E) and GREENWICH (W)	July 19	Greenwich	Potsdam	16 56 6·796	16 4 4·000	0 52 2·796				
		Potsdam	Greenwich	17 7 57·080	16 15 54·000	3·080	17 2 2	16 9 59	0 52 2·938	− 0·012
		Greenwich	Potsdam	18 35 6·780	17 43 4·000	2·780				
		Potsdam	Greenwich	18 40 5·070	17 48 2·000	3·070	18 37 36	17 45 33	2·925	·010
		Greenwich	Potsdam	19 55 6·750	19 3 4·000	2·750				
		Potsdam	Greenwich	20 11 5·070	19 19 2·000	3·070	20 3 6	19 11 3	2·910	·014
	" 20	Greenwich	Potsdam	17 7 6·400	16 15 4·000	0 52 2·400				
		Potsdam	Greenwich	17 12 4·000	16 20 1·300	2·700	17 9 35	16 17 33	0 52 2·550	− 0·017
	" 21	Greenwich	Potsdam	17 4 2·995	16 12 1·000	0 52 1·995				
		Potsdam	Greenwich	17 12 5·000	16 20 2·698	2·302	17 8 4	16 16 2	0 52 2·149	− 0·009
		Greenwich	Potsdam	19 10 2·995	18 18 1·000	1·995				
		Potsdam	Greenwich	19 15 7·000	18 23 4·708	2·292	19 12 35	18 20 33	2·144	·008
	" 22	Greenwich	Potsdam	17 11 5·703	16 19 4·000	0 52 1·703				
		Potsdam	Greenwich	17 14 57·985	16 22 56·000	1·985	17 13 2	16 21 0	0 52 1·844	− 0·019
		Greenwich	Potsdam	18 12 5·689	17 20 4·000	1·689				
		Potsdam	Greenwich	18 16 3·950	17 24 2·000	1·950	18 14 5	17 22 3	1·820	·009
		Potsdam	Greenwich	19 25 3·000	18 33 1·024	1·976				
		Greenwich	Potsdam	19 29 5·680	18 37 4·000	1·680	19 27 4	18 35 3	1·828	·005
	" 23	Potsdam	Greenwich	17 10 3·615	16 18 2·000	0 52 1·615				
		Greenwich	Potsdam	17 14 5·313	16 22 4·000	1·313	17 12 4	16 20 3	0 52 1·464	− 0·017
	" 24	Greenwich	Potsdam	17 17 58·000	16 25 57·092	0 52 0·908				
		Potsdam	Greenwich	17 25 3·202	16 33 2·000	1·202	17 21 31	16 29 30	0 52 1·055	− 0·018
	" 25	Greenwich	Potsdam	17 32 58·462	16 40 58·000	0 52 0·462				
		Potsdam	Greenwich	17 37 2·765	16 45 2·000	0·765	17 35 1	16 43 0	0 52 0·614	− 0·018

EXPLANATION OF *TABLE IV.*

Transits of Clock Stars and Deduction of the Clock Correction.

The heading contains the name of the arc, and indicates the station the observations at which are to be found below, giving at the same time the latitude of the station, the name of the observer and the telescope used.

Column 1 contains the astronomical date.

„ 2 contains the star's name, or number in the Greenwich Catalogue for 1880.

„ 3 contains the star's declination and when south it is indicated by a minus sign. This being given, and also the latitude of the station, it is possible to compute all the corrections to the observed time of transit without reference to anything beyond the foregoing tables.

„ 4 contains the star's aspect, that is, it shews whether the star at culmination was north or south of the zenith of the station. It is convenient to give this information as it renders it easy to see whether the deviation correction has been entered with the proper sign.

„ 5, 6 & 7 explain themselves.

„ 8, 9 & 11 contain respectively the corrections for collimation, level and diurnal aberration. These corrections are computed in precisely the same manner as those in Table II.

„ 10 contains the deviation correction. To form this the appropriate value of a is taken from Table II and multiplied by $m \sec \delta \sin \zeta$. It is to be noted that the quantity a given in Table II is an error, not a correction, so that when forming the correction a A the sign must be changed.

„ 12 contains the corrected time of transit = T. This is the algebraic sum of the five preceding columns.

„ 13 contains the star's R.A. brought up from the Almanac or Catalogue to the epoch of the observation.

„ 14 contains the difference between the two preceding columns with the sign appropriate to a correction.

„ 15 contains the mean value of the clock correction by stars observed in the same instrumental position. In column 7 the mean of the observed times of transit of groups is taken out, and is the epoch of the mean clock correction in column 15.

„ 16 & 17 contain the daily mean of the two instrumental positions, and the epoch to which it corresponds. If there are two groups, one *I.P.E.* and one *I.P.W.*, the mean of the two clock corrections is taken as corresponding to the mean of the two epochs; but if there are three groups, as on December 9th, one *I.P.W.*, one *I.P.E.* and again one *I.P.W.*, the mean of the two values *I.P.W.* is taken for the mean of their epochs, and then this mean value and epoch are combined with the *I.P.E.* value and epoch to obtain the quantities to be entered in these columns.

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (E), *Lat.* 52° 23′, BY LENOX CONYNGHAM WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit =T	Right Ascension =R.A.	Clock Correction: By each Star = R.A.−T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
June 21	σ′ Coronæ	34 7	S	W	3	16 9 50·92	−0·13	+0·07	+ 0·19	−0·01	16 9 51·04	16 10 47·49	+0 56·45			
	ε Ophiuchi	− 4 26	S	W	15	16 11 51·90	−0·10	+0·03	+ 0·42	−0·01	16 11 52·24	16 12 48·81	+0 56·57			
	τ Herculis	46 34	S	W	12	16 15 41·41	−0·15	+0·09	+ 0·07	−0·02	16 15 41·40	16 16 37·97	+0 56·57			
	η Draconis	61 45	N	W	13	16 21 41·12	−0·22	+0·13	− 0·17	−0·03	16 21 40·83	16 22 37·63	+0 56·80	+0 56·598		
		Mean	...	...	...	16 14 46										
	2576 Gr. 80	11 43	S	E	15	16 26 47·15	+0·11	+0·04	+ 0·33	−0·01	16 26 47·62	16 27 44·25	+0 56·63			
	σ Herculis	42 39	S	E	12	16 29 48·98	+0·14	+0·06	+ 0·12	−0·02	16 29 49·28	16 30 46·03	+0 56·75			
	ζ Herculis	31 47	S	E	12	16 36 25·44	+0·12	+0·05	+ 0·21	−0·01	16 36 25·81	16 37 22·56	+0 56·75			
	η Herculis	39 7	S	E	14	16 38 23·66	+0·13	+0·06	+ 0·15	−0·02	16 38 23·98	16 39 20·71	+0 56·73			
	2615 Gr. 80	8 47	S	E	14	16 39 53·17	+0·11	+0·03	+ 0·35	−0·01	16 39 53·65	16 40 50·26	+0 56·61	+0 56·694		
		Mean	...	...	...	16 34 16										
	Groom. 2377	56 58	N	W	10	16 42 24·93	−0·19	+0·11	− 0·07	−0·02	16 42 24·76	16 43 21·68	+0 56·92			
	2623 Gr. 80	7 26	S	W	8	16 44 19·46	−0·11	+0·04	+ 0·36	−0·01	16 44 19·74	16 45 16·33	+0 56·59			
	2640 „	18 36	S	W	12	16 49 51·29	−0·11	+0·05	+ 0·29	−0·01	16 49 51·51	16 50 48·13	+0 56·62	+0 56·710	+0 56·674	16 32 13
		Mean	...	...	...	16 45 32										
„ 22	ε Coronæ	27 11	S	W	14	15 52 19·79	−0·12	−0·04	+ 0·23	−0·01	15 52 19·85	15 53 17·21	+0 57·36			
	θ Draconis	58 51	N	W	14	15 59 1·63	−0·20	−0·07	− 0·10	−0·02	15 59 1·24	15 59 58·75	+0 57·51			
	2521 Gr. 80	16 56	S	W	12	16 5 48·88	−0·11	−0·03	+ 0·29	−0·01	16 5 49·02	16 6 46·25	+0 57·23			
	σ′ Coronæ	34 7	S	W	7	16 9 50·35	−0·13	−0·04	+ 0·18	−0·01	16 9 50·35	16 10 47·49	+0 57·14			
	ε Ophiuchi	− 4 26	S	W	11	16 11 51·19	−0·10	−0·02	+ 0·40	−0·01	16 11 51·46	16 12 48·82	+0 57·36			
	τ Herculis	46 34	S	W	15	16 15 40·86	−0·15	−0·05	+ 0·07	−0·02	16 15 40·71	16 16 37·97	+0 57·26			
	γ Herculis	19 24	S	W	5	16 16 22·64	−0·11	−0·03	+ 0·27	−0·01	16 16 22·76	16 17 20·08	+0 57·32			
	η Draconis	61 45	N	W	12	16 21 40·65	−0·22	−0·07	− 0·16	−0·03	16 21 40·17	16 22 37·61	+0 57·44			
	β Herculis	21 43	S	W	13	16 24 47·67	−0·11	−0·03	+ 0·26	−0·01	16 24 47·78	16 25 45·15	+0 57·37			
	2576 Gr. 80	11 43	S	W	12	16 26 46·78	−0·11	−0·03	+ 0·32	−0·01	16 26 46·95	16 27 44·25	+0 57·30	+0 57·329		
		Mean	...	...	...	16 12 25										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (E), *Lat.* 52° 23′, BY LENOX CONYNGHAM WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
June 22	σ Herculis	42 39	S	E	15	16 29 48·48	+0·14	−0·11	+ 0·11	−0·02	16 29 48·60	16 30 46·02	+0 57·42			
	ζ Herculis	31 47	S	E	13	16 36 24·95	+0·12	−0·09	+ 0·20	−0·01	16 36 25·17	16 37 22·55	+0 57·38			
	η Herculis	39 7	S	E	11	16 38 23·08	+0·13	−0·10	+ 0·14	−0·02	16 38 23·23	16 39 20·71	+0 57·48			
	ω Herculis	32 36	S	E	14	17 15 49·07	+0·12	−0·09	+ 0·19	−0·01	17 15 49·28	17 16 46·68	+0 57·40			
	2729 Gr. 80	23 4	S	E	11	17 18 48·10	+0·11	−0·08	+ 0·25	−0·01	17 18 48·37	17 19 45·78	+0 57·41			
	σ Ophiuchi	4 14	S	E	14	17 20 23·45	+0·10	−0·05	+ 0·35	−0·01	17 20 23·84	17 21 21·22	+0 57·38			
	2745 Gr. 80	0 25	S	E	12	17 22 33·47	+0·10	−0·05	+ 0·37	+0·01	17 22 33·88	17 23 31·36	+0 57·48			
	2752 „	26 12	S	E	9	17 25 34·84	+0·12	−0·08	+ 0·23	−0·01	17 25 35·10	17 26 32·54	+0 57·44			
	β Draconis	52 23	S	E	9	17 27 9·16	+0·17	−0·13	0·00	−0·02	17 27 9·18	17 28 6·66	+0 57·48			
	α Ophiuchi	12 38	S	E	13	17 29 8·80	+0·11	−0·06	+ 0·31	−0·01	17 29 9·15	17 30 6·52	+0 57·37			
	2775 Gr. 80	24 22	S	E	15	17 32 16·71	+0·11	−0·08	+ 0·24	−0·01	17 32 16·97	17 33 14·32	+0 57·35			
	ι Herculis	46 4	S	E	12	17 35 35·37	+0·15	−0·12	+ 0·08	−0·02	17 35 35·46	17 36 33·02	+0 57·56			
	72 Ophiuchi	9 33	S	E	4	18 1 27·52	+0·11	−0·08	+ 0·33	−0·01	18 1 27·87	18 2 25·21	+0 57·34			
	ο Herculis	28 45	S	E	10	18 2 32·01	+0·12	−0·12	+ 0·22	−0·01	18 2 32·22	18 3 29·62	+0 57·40	+0 57·421	+0 57·375	16 46 4
		Mean	...	...	..	17 19 43										
	2988 Gr. 80	− 9 9	S	W	18	18 35 37·02	−0·11	−0·04	+ 0·42	−0·01	18 35 37·28	18 36 34·65	+0 57·37			
	110 Herculis	20 27	S	W	10	18 40 13·92	−0·11	−0·07	+ 0·27	−0·01	18 40 14·00	18 41 11·36	+0 57·36			
	β Lyræ	33 14	S	W	9	18 45 17·54	−0·12	−0·09	+ 0·19	−0·01	18 45 17·51	18 46 14·95	+0 57·44			
	ο Draconis	59 16	N	W	13	18 48 44·98	−0·20	−0·16	− 0·11	−0·02	18 48 44·49	18 49 42·00	+0 57·51	+0 57·420		
		Mean	...	...	...	18 42 28										
	ζ Aquilæ	13 42	S	E	15	18 59 40·13	+0·11	−0·09	+ 0·31	−0·01	18 59 40·45	19 0 37·85	+0 57·40			
	3092 Gr. 80	24 5	S	E	13	19 1 20·81	+0·11	−0·11	+ 0·25	−0·01	19 1 21·05	19 2 18·47	+0 57·42			
	3101 „	5 54	S	E	13	19 2 56·50	+0·10	−0·08	+ 0·35	−0·01	19 2 56·86	19 3 54·23	+0 57·37	+0 57·397		
		Mean	...	...	...	19 1 19										
	3107 Gr. 80	− 8 7	S	W	22	19 6 4·45	−0·11	−0·04	+ 0·42	−0·01	19 6 4·71	19 7 2·06	+0 57·35			
	3113 „	2 7	S	W	12	19 7 30·39	−0·10	−0·05	+ 0·37	−0·01	19 7 30·60	19 8 27·94	+0 57·34	+0 57·345	+0 57·390	18 57 59
		Mean	...	..	...	19 6 47										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (E), *Lat.* 52° 23′, BY LENOX CONYNGHAM WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit =T	Right Ascension =R.A.	Clock Correction: By each Star = R.A.−T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
June 27	ν′ Boötis	41 11	S	E	13	15 26 11·82	+0·17	+0·03	0·00	−0·02	15 26 12·00	15 27 12·32	+1 0·32			
	ε Coronæ	27 11	S	E	12	15 52 16·80	+0·14	+0·02	0·00	−0·01	15 52 16·95	15 53 17·19	+1 0·24			
	θ Draconis	58 51	N	E	11	15 58 58·02	+0·25	+0·04	0·00	−0·02	15 58 58·29	15 59 58·66	+1 0·37	+1 0·310		
		Mean	...	...	...	15 45 49										
	σ′ Coronæ	34 7	S	W	14	16 9 47·49	−0·15	+0·09	0·00	−0·01	16 9 47·42	16 10 47·47	+1 0·05			
	ε Opiuchi	− 4 26	S	W	14	16 11 48·70	−0·13	+0·04	+ 0·01	−0·01	16 11 48·61	16 12 48·83	+1 0·22			
	τ Herculis	46 34	S	W	13	16 15 37·90	−0·19	+0·11	0·00	−0·02	16 15 37·80	16 16 37·93	+1 0·13			
	γ Herculis	19 24	S	W	4	16 16 20·02	−0·13	+0·07	+ 0·01	−0·01	16 16 19·96	16 17 20·07	+1 0·11			
	σ Herculis	42 39	S	W	14	16 29 45·86	−0·17	+0·10	0·00	−0·02	16 29 45·77	16 30 46·00	+1 0·23	+1 0·148	+1 0·229	16 1 15
		Mean	...	...	...	16 16 40										
	ζ Herculis	31 47	S	E	14	16 36 22·09	+0·15	+0·02	0·00	−0·01	16 36 22·25	16 37 22·54	+1 0·29			
	η Herculis	39 7	S	E	15	16 38 20·26	+0·16	+0·02	0·00	−0·02	16 38 20·42	16 39 20·70	+1 0·28			
	2615 Gr. 80	8 47	S	E	15	16 39 49·98	+0·13	+0·01	+ 0·01	−0·01	16 39 50·12	16 40 50·27	+1 0·15			
	Groom. 2377	56 58	N	E	10	16 42 20·95	+0·23	+0·04	0·00	−0·02	16 42 21·20	16 43 21·62	+1 0·42			
	2623 Gr. 80	7 26	S	E	13	16 44 16·03	+0·13	+0·01	+ 0·01	−0·01	16 44 16·17	16 45 16·34	+1 0·17			
	49 Herculis	15 9	S	E	14	16 46 20·60	+0·13	+0·02	+ 0·01	−0·01	16 46 20·75	16 47 20·91	+1 0·16	+1 0·245		
		Mean	...	...	...	16 41 15										
	2640 Gr. 80	18 36	S	W	14	16 49 48·05	−0·13	+0·07	+ 0·01	−0·01	16 49 47·99	16 50 48·14	+1 0·15			
	κ Ophiuchi	9 32	S	W	14	16 51 44·65	−0·13	+0·06	+ 0·01	−0·01	16 51 44·58	16 52 44·76	+1 0·18			
	2664 Gr. 80	35 34	S	W	10	16 58 46·89	−0·16	+0·09	0·00	−0·02	16 58 46·80	16 59 46·97	+1 0·17			
	2683 „	40 39	S	W	14	17 3 23·98	−0·17	+0·10	0·00	−0·02	17 3 23·89	17 4 24·21	+1 0·32	+1 0·205	+1 0·225	16 48 36
		Mean	...	...	...	16 55 56										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (E), *Lat.* 52° 23′, BY LENOX CONYNGHAM WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
June 27	2814 Gr. 80	25 40	S	E	10	17 43 36·20	+0·14	−0·02	0·00	−0·01	17 43 36·31	17 44 36·59	+1 0·28			
	ξ Draconis	56 53	N	E	12	17 50 45·38	+0·23	−0·04	0·00	−0·02	17 50 45·55	17 51 46·09	+1 0·54			
	γ Draconis	51 30	S	E	12	17 53 12·49	+0·20	−0·04	0·00	−0·02	17 53 12·63	17 54 13·03	+1 0·40			
	67 Ophiuchi	2 56	S	E	12	17 54 25·89	+0·13	−0·02	+0·01	−0·01	17 54 26·00	17 55 26·31	+1 0·31			
	2859 Gr. 80	20 50	S	E	12	17 56 56·29	+0·14	−0·02	0·00	−0·01	17 56 56·40	17 57 56·64	+1 0·24			
	72 Ophiuchi	9 33	S	E	13	18 1 24·90	+0·13	−0·02	+0·01	−0·01	18 1 25·01	18 2 25·26	+1 0·25			
	ο Herculis	28 45	S	E	12	18 2 29·25	+0·15	−0·02	0·00	−0·01	18 2 29·37	18 3 29·66	+1 0·29	+1 0·330		
		Mean	...	...	...	17 54 41										
	η Serpentis	− 2 56	S	W	13	18 14 55·61	−0·13	+0·02	+0·01	−0·01	18 14 55·50	18 15 55·68	+1 0·18			
	2929 Gr. 80	23 14	S	W	12	18 16 48·69	−0·14	+0·03	0·00	−0·01	18 16 48·57	18 17 48·83	+1 0·26			
	109 Herculis	21 43	S	W	14	18 18 16·13	−0·14	+0·03	0·00	−0·01	18 18 16·01	18 19 16·31	+1 0·30			
	b Draconis	58 44	N	W	12	18 21 25·53	−0·25	+0·07	0·00	−0·02	18 21 25·33	18 22 25·63	+1 0·30			
	3016 Gr. 80	−20 27	S	W	11	18 42 29·69	−0·14	+0·01	+0·01	−0·01	18 42 29·56	18 43 29·76	+1 0·20			
	β′ Lyræ	33 14	S	W	14	18 45 14·84	−0·15	+0·04	0·00	−0·01	18 45 14·72	18 46 15·01	+1 0·29			
	ο Draconis	59 16	N	W	11	18 48 41·96	−0·25	+0·07	0·00	−0·02	18 48 41·76	18 49 42·05	+1 0·29	+1 0·260		
		Mean	...	...	...	18 29 42										
	ζ Aquilæ	13 42	S	E	14	18 59 37·56	+0·13	−0·02	+0·01	−0·01	18 59 37·67	19 0 37·92	+1 0·25			
	3092 Gr. 80	24 5	S	E	14	19 1 18·16	+0·14	−0·02	0·00	−0·01	19 1 18·27	19 2 18·54	+1 0·27			
	3101 „	5 54	S	E	14	19 2 53·96	+0·13	−0·02	+0·01	−0·01	19 2 54·07	19 3 54·31	+1 0·24	+1 0·253	+1 0·276	18 28 51
		Mean	...	...	...	19 1 17										
June 29	2521 Gr. 80	16 56	S	E	10	16 5 44·71	+0·12	−0·07	+0·27	−0·01	16 5 45·02	16 6 46·24	+1 1·22			
	σ′ Coronæ	34 7	S	E	12	16 9 46·22	+0·14	−0·10	+0·17	−0·01	16 9 46·42	16 10 47·46	+1 1·04			
	ε Ophiuchi	− 4 26	S	E	14	16 11 47·20	+0·12	−0·05	+0·37	−0·01	16 11 47·63	16 12 48·83	+1 1·20	+1 1·153		
		Mean	...	...	...	16 9 6										

TABLE IV.- TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (E), *Lat.* 52° 23′, BY LENOX CONYNGHAM WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
June 29	τ Herculis	46 34	S	W	12	16 15 37·02	−0·17	−0·02	+ 0·06	−0·02	16 15 36·87	16 16 37·91	+1 1·04			
	η Draconis	61 45	N	W	11	16 21 36·85	−0·24	−0·03	− 0·15	−0·03	16 21 36·40	16 22 37·77	+1 1·37			
	β Herculis	21 43	S	W	10	16 24 43·93	−0·12	−0·01	+ 0·24	−0·01	16 24 44·03	16 25 45·15	+1 1·12			
	2576 Gr. 80	11 43	S	W	12	16 26 43·05	−0·12	−0·01	+ 0·29	−0·01	16 26 43·20	16 27 44·26	+1 1·06			
	σ Herculis	42 39	S	W	14	16 29 44·91	−0·16	−0·02	+ 0·10	−0·02	16 29 44·81	16 30 45·99	+1 1·18	+1 1·154		
	Mean	...	...	...	16 23 41											
	ζ Herculis	31 47	S	E	8	16 36 21·04	+0·14	−0·09	+ 0·18	−0·01	16 36 21·26	16 37 22·54	+1 1·28			
	2632 Gr. 80	31 53	S	E	13	16 48 0·57	+0·14	−0·09	+ 0·18	−0·01	16 48 0·79	16 49 2·00	+1 1·21			
	2640 „	18 36	S	E	12	16 49 46·64	+0·12	−0·07	+ 0·26	−0·01	16 49 46·94	16 50 48·15	+1 1·21			
	κ Ophiuchi	9 32	S	E	9	16 51 43·18	+0·12	−0·06	+ 0·30	−0·01	16 51 43·53	16 52 44·77	+1 1·24	+1 1·235	+1 1·174	16 25 44
	Mean	...	...	...	16 46 28											
	2664 Gr. 80	35 34	S	W	15	16 58 45·79	−0·14	−0·02	+ 0·16	−0·02	16 58 45·77	16 59 46·97	+1 1·20			
	2683 „	40 39	S	W	8	17 3 23·05	−0·15	−0·02	+ 0·12	−0·02	17 3 22·98	17 4 24·21	+1 1·23			
	μ Herculis	27 47	S	W	10	17 41 22·62	−0·13	−0·08	+ 0·21	−0·01	17 41 22·61	17 42 23·85	+1 1·24			
	2814 Gr. 80	25 40	S	W	11	17 43 35·40	−0·13	−0·07	+ 0·22	−0·01	17 43 35·41	17 44 36·60	+1 1·19			
	θ Herculis	37 16	S	W	13	17 51 40·87	−0·15	−0·09	+ 0·14	−0·02	17 51 40·75	17 52 41·95	+1 1·20	+1 1·212		
	Mean	...	...	...	17 27 46											
	67 Ophiuchi	2 56	S	E	8	17 54 24·59	+0·12	−0·10	+ 0·34	−0·01	17 54 24·94	17 55 26·33	+1 1·39			
	2859 Gr. 80	20 50	S	E	15	17 56 55·16	+0·12	−0·14	+ 0·25	−0·01	17 56 55·38	17 57 56·65	+1 1·27			
	72 Ophiuchi	9 33	S	E	11	18 1 23·78	+0·12	−0·11	+ 0·30	−0·01	18 1 24·08	18 2 25·28	+1 1·20			
	ο Herculis	28 45	S	E	13	18 2 28·26	+0·13	−0·16	+ 0·20	−0·01	18 2 28·42	18 3 29·68	+1 1·26	+1 1·280		
	Mean	...	...	...	17 58 48											
	109 Herculis	21 43	S	W	5	18 18 15·06	−0·12	−0·07	+ 0·24	−0·01	18 18 15·10	18 19 16·33	+1 1·23			
	b Draconis	58 44	N	W	22	18 20 24·90	−0·22	−0·14	− 0·09	−0·02	18 21 24·43	18 22 25·64	+1 1·21			
	α Lyræ	38 41	S	W	13	18 32 24·77	−0·15	−0·09	+ 0·13	−0·02	18 32 24·64	18 33 25·86	+1 1·22	+1 1·220		
	Mean	...	...	...	18 23 41											

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

Transits at POTSDAM (E), *Lat.* 52° 23′, by LENOX CONYNGHAM with Telescope No. 2.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_E
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
June 29	β′ Lyræ	33 14	S	E	12	18 45 13·65	+0·14	−0·17	+ 0·17	−0·01	18 45 13·78	18 46 15·03	+1 1·25			
	o Draconis	59 16	N	E	9	18 48 40·95	+0·23	−0·29	− 0·10	−0·02	18 48 40·77	18 49 42·07	+1 1·30			
	ζ Aquilæ	13 42	S	E	10	18 59 36·49	+0·12	−0·12	+ 0·28	−0·01	18 59 36·76	19 0 37·95	+1 1·19			
	3092 Gr. 80	24 5	S	E	10	19 1 17·20	+0·13	−0·15	+ 0·23	−0·01	19 1 17·40	19 2 18·57	+1 1·17	+1 1·228	+1 1·235	18 11 0
		Mean	...	...	...	18 53 42										
July 1	τ Herculis	46 34	S	E	11	16 15 35·80	+0·17	−0·21	+ 0·08	−0·02	16 15 35·82	16 16 37·89	+1 2·07			
	γ Herculis	19 24	S	E	4	16 16 17·65	+0·12	−0·13	+ 0·31	−0·01	16 16 17·94	16 17 20·06	+1 2·12			
	η Draconis	61 45	N	E	17	16 21 35·45	+0·24	−0·30	− 0·19	−0·03	16 21 35·17	16 22 37·45	+1 2·28			
	β Herculis	21 43	S	E	14	16 24 42·77	+0·12	−0·13	+ 0·30	−0·01	16 24 43·05	16 25 45·14	+1 2·09			
	2576 Gr. 80	11 43	S	E	10	16 26 41·87	+0·12	−0·11	+ 0·36	−0·01	16 26 42·23	16 27 44·26	+1 2·03			
	σ Herculis	42 39	S	E	11	16 29 43·73	+0·16	−0·19	+ 0·12	−0·02	16 29 43·80	16 30 45·97	+1 2·17	+1 2·127		
		Mean	...	...	...	16 22 26										
	ζ Herculis	31 47	S	W	13	16 36 20·42	−0·14	−0·12	+ 0·22	−0·01	16 36 20·37	16 37 22·53	+1 2·16			
	η Herculis	39 7	S	W	13	16 37 18·70	−0·15	−0·14	+ 0·16	−0·02	16 37 18·55	16 39 20·68	+1 2·13			
	2615 Gr. 80	8 47	S	W	12	16 39 48·06	−0·12	−0·08	+ 0·38	−0·01	16 39 48·23	16 40 50·28	+1 2·05			
	Groom. 2377	56 58	N	W	11	16 42 19·84	−0·21	−0·20	− 0·08	−0·02	16 42 19·33	16 43 21·57	+1 2·24			
	2683 Gr. 80	40 39	S	W	8	17 3 22·21	−0·15	−0·14	+ 0·14	−0·02	17 3 22·04	17 4 24·21	+1 2·17			
	α Herculis	14 30	S	W	7	17 8 52·33	−0·12	−0·09	+ 0·34	−0·01	17 8 52·45	17 9 54·49	+1 2·04			
	π Herculis	36 56	S	W	12	17 10 24·32	−0·14	−0·14	+ 0·18	−0·02	17 10 24·20	17 11 26·27	+1 2·07			
	2712 Gr. 80	10 59	S	W	11	17 12 41·56	−0·12	−0·09	+ 0·36	−0·01	17 12 41·70	17 13 43·68	+1 1·98			
	W Herculis	32 36	S	W	15	17 15 44·72	−0·14	−0·13	+ 0·22	−0·01	17 15 44·66	17 16 46·69	+1 2·03			
	2729 Gr. 80	23 4	S	W	9	17 18 43·71	−0·13	−0·11	+ 0·29	−0·01	17 18 43·75	17 19 45·81	+1 2·06			
	σ Ophiuchi	4 14	S	W	12	17 20 19·00	−0·12	−0·07	+ 0·40	−0·01	17 20 19·20	17 21 21·27	+1 2·07	+1 2·091		
		Mean	...	...	...	17 0 32										
	2745 Gr. 80	0 25	S	E	12	17 22 28·80	+0·12	−0·09	+ 0·42	−0·01	17 22 29·24	17 23 31·42	+1 2·18	+1 2·180	+1 2·122	16 56 30
		Mean	...	...	...	17 22 29										

TABLE IV. **TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.**

Transits at POTSDAM (E), *Lat.* 52° 23′, by BURRARD with Telescope No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
July 12	2623 Gr. 80	7 26	S	W	5	16 44 7·57	+0·08	−0·33	+ 0·40	−0·01	16 44 7·71	16 45 16·34	+1 8·63			
	2632 ”	31 53	S	W	12	16 47 53·36	+0·09	−0·51	+ 0·23	−0·01	16 47 53·16	16 49 1·93	+1 8·77			
	2640 ”	18 36	S	W	11	16 49 39·40	+0·08	−0·41	+ 0·33	−0·01	16 49 39·39	16 50 48·12	+1 8·73			
	κ Ophiuchi	9 32	S	W	13	16 51 35·92	+0·08	−0·34	+ 0·39	−0·01	16 51 36·04	16 52 44·76	+1 8·72	+1 8·713		
		Mean	...	...	...	16 48 19										
	ε Herculis	31 5	S	E	8	16 55 10·63	−0·09	−0·54	+ 0·24	−0·01	16 55 10·23	16 56 19·15	+1 8·92			
	2683 Gr. 80	40 39	S	E	9	17 3 15·67	−0·10	−0·64	+ 0·15	−0·02	17 3 15·06	17 4 24·14	+1 9·08			
	α Herculis	14 30	S	E	11	17 8 45·89	−0·08	−0·41	+ 0·36	−0·01	17 8 45·75	17 9 54·49	+1 8·74			
	δ Herculis	24 58	S	E	7	17 9 37·51	−0·09	−0·49	+ 0·28	−0·01	17 9 37·20	17 10 45·97	+1 8·77			
	π Herculis	36 56	S	E	6	17 10 17·92	−0·10	−0·60	+ 0·19	−0·02	17 10 17·39	17 11 26·22	+1 8·83			
	2712 Gr. 80	10 59	S	E	15	17 12 35·07	−0·08	−0·38	+ 0·38	−0·01	17 12 34·98	17 13 43·69	+1 8·71			
	W Herculis	32 36	S	E	15	17 15 38·26	−0·09	−0·56	+ 0·23	−0·01	17 15 37·83	17 16 46·65	+1 8·82	+1 8·839	+1 8·776	16 58 7
		Mean	...	...	...	17 7 54										
	2729 Gr. 80	23 4	S	W	15	17 18 37·12	+0·08	−0·44	+ 0·30	−0·01	17 18 37·05	17 19 45·80	+1 8·75			
	σ Ophiuchi	4 14	S	W	12	17 20 12·37	+0·08	−0·31	+ 0·42	−0·01	17 20 12·55	17 21 21·29	+1 8·74			
	2745 Gr. 80	0 25	S	W	12	17 22 22·40	+0·08	−0·29	+ 0·44	−0·01	17 22 22·62	17 23 31·44	+1 8·82			
	2752 ”	26 12	S	W	14	17 25 23·84	+0·09	−0·46	+ 0·28	−0·01	17 25 23·74	17 26 32·56	+1 8·82			
	β Draconis	52 23	S	W	12	17 26 58·41	+0·13	−0·76	0·00	−0·02	17 26 57·76	17 28 6·54	+1 8·78			
	α Ophiuchi	12 38	S	W	14	17 28 57·79	+0·08	−0·37	+ 0·37	−0·01	17 28 57·86	17 30 6·59	+1 8·73	+1 8·773		
		Mean	...	...	...	17 23 45										
	2775 Gr. 80	24 22	S	E	14	17 32 5·88	−0·08	−0·48	+ 0·29	−0·01	17 32 5·60	17 33 14·36	+1 8·76			
	ι Herculis	46 4	S	E	11	17 35 24·81	−0·11	−0·71	+ 0·09	−0·02	17 35 24·06	17 36 32·96	+1 8·90			
	β Ophiuchi	4 37	S	E	13	17 37 11·41	−0·08	−0·34	+ 0·41	−0·01	17 37 11·39	17 38 20·18	+1 8·79	+1 8·817	+1 8·795	17 29 20
		Mean	...	...	...	17 34 54										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (E), *Lat.* 52° 23′, BY BURRARD WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
July 15	ε Coronæ	27 11	S	E	7	15 52 7·41	−0·09	−0·57	+ 0·20	−0·01	15 52 6·94	15 53 17·04	+1 10·10			
	2752 Gr. 80	26 12	S	E	13	17 25 22·87	−0·09	−0·57	+ 0·21	−0·01	17 25 22·41	17 26 32·54	+1 10·13			
	β Draconis	52 23	S	E	12	17 26 57·42	−0·13	−0·92	0·00	−0·02	17 26 56·35	17 28 6·50	+1 10·15			
	α Ophiuchi	12 38	S	E	12	17 28 56·79	−0·08	−0·45	+ 0·28	−0·01	17 28 56·53	17 30 6·58	+1 10·05	+1 10·108		
		Mean	...	...	...	17 3 21										
	2775 Gr. 80	24 22	S	W	12	17 32 4·62	+0·09	−0·50	+ 0·22	−0·01	17 32 4·42	17 33 14·34	+1 9·92			
	L Herculis	46 4	S	W	13	17 35 23·43	+0·12	−0·74	+ 0·07	−0·02	17 35 22·86	17 36 32·94	+1 10·08			
	β Ophiuchi	4 37	S	W	6	17 37 10·14	+0·08	−0·35	+ 0·32	−0·01	17 37 10·18	17 38 20·19	+1 10·01			
	μ Herculis	27 47	S	W	14	17 41 13·99	+0·09	−0·53	+ 0·20	−0·01	17 41 13·74	17 42 23·85	+1 10·11			
	2814 Gr. 80	25 40	S	W	6	17 43 26·85	+0·09	−0·51	+ 0·21	−0·01	17 43 26·63	17 44 36·60	+1 9·97			
	ξ Draconis	56 53	N	W	5	17 50 36·59	+0·15	−0·94	− 0·06	−0·02	17 50 35·72	17 51 45·95	+1 10·23			
	θ Herculis	37 16	S	W	12	17 51 32·36	+0·10	−0·63	+ 0·14	−0·02	17 51 31·95	17 52 41·93	+1 9·98			
	γ Draconis	51 30	S	W	8	17 53 3·58	+0·13	−0·83	+ 0·01	−0·02	17 53 2·87	17 54 12·95	+1 10·08			
	67 Ophiuchi	2 56	S	W	10	17 54 16·20	+0·08	−0·34	+ 0·33	−0·01	17 54 16·26	17 55 26·40	+1 10·14	+1 10·058	+1 10·083	17 23 50
		Mean	...	...	...	17 44 19										
	2859 Gr. 80	20 50	S	E	13	17 56 46·85	−0·09	−0·51	+ 0·24	−0·01	17 56 46·48	17 57 56·69	+1 10·21			
	72 Ophiuchi	9 33	S	E	12	18 1 15·40	−0·08	−0·42	+ 0·29	−0·01	18 1 15·18	18 2 25·35	+1 10·17			
	o Herculis	28 45	S	E	7	18 2 20·08	−0·09	−0·59	+ 0·20	−0·01	18 2 19·59	18 3 29·71	+1 10·12			
	2893 Gr. 80	31 23	S	E	2	18 6 50·43	−0·10	−0·62	+ 0·18	−0·01	18 6 49·88	18 7 59·96	+1 10·08			
	o Draconis	59 16	N	E	11	18 48 33·28	−0·16	−1·03	− 0·10	−0·02	18 48 31·97	18 49 42·06	+1 10·09			
	γ Lyræ	32 33	S	E	13	18 53 54·24	−0·10	−0·59	+ 0·17	−0·01	18 53 53·71	18 55 3·84	+1 10·13	+1 10·133		
		Mean	...	...	...	18 18 17										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (E), *Lat.* 52° 23′, BY BURRARD WITH TELESCOPE NO. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
July 15	ζ Aquilæ	13 42	S	W	14	18 59 28·12	+0·08	−0·40	+ 0·27	−0·01	18 59 28·06	19 0 38·10	+1 10·04			
	3092 Gr. 80	24 5	S	W	13	19 1 8·78	+0·09	−0·48	+ 0·22	−0·01	19 1 8·60	19 2 18·71	+1 10·11			
	3101 „	5 54	S	W	11	19 2 44·35	+0·08	−0·34	+ 0·31	−0·01	19 2 44·39	19 3 54·50	+1 10·11			
	3107 „	− 8 7	S	W	12	19 5 52·05	+0·08	−0·25	+ 0·38	−0·01	19 5 52·25	19 7 2·36	+1 10·11			
	3113 „	2 7	S	W	13	19 7 18·13	+0·08	−0·32	+ 0·33	−0·01	19 7 18·21	19 8 28·23	+1 10·02	+1 10·078		
		Mean	...	...	...	19 3 18										
	3123 Gr. 80	4 39	S	E	11	19 10 12·35	−0·08	−0·36	+ 0·32	−0·01	19 10 12·22	19 11 22·42	+1 10·20			
	θ Lyræ	37 57	S	E	10	19 11 36·77	−0·10	−0·65	+ 0·14	−0·02	19 11 36·14	19 12 46·22	+1 10·08			
	κ Cygni	53 10	N	E	11	19 13 34·38	−0·14	−0·88	− 0·01	−0·02	19 13 33·33	19 14 43·47	+1 10·14			
	3152 Gr. 80	26 4	S	E	8	19 17 26·12	−0·09	−0·53	+ 0·21	−0·01	19 17 25·70	19 18 35·84	+1 10·14	+1 10·140	+1 10·108	18 54 32
		Mean	...	...	...	19 13 12										
„ 19	ξ Draconis	56 53	N	W	11	17 50 34·72	+0·13	−1·09	− 0·08	−0·02	17 50 33·66	17 51 45·90	+1 12·24			
	θ Herculis	37 16	S	W	10	17 51 30·42	+0·09	−0·73	+ 0·19	−0·02	17 51 29·95	17 52 41·91	+1 11·96			
	γ Draconis	51 30	S	W	13	17 53 1·70	+0·11	−0·96	+ 0·01	−0·02	17 53 0·84	17 54 12·91	+1 12·07	+1 12·090		
		Mean	...	...	...	17 51 42										
	η Serpentis	− 2 56	S	E	4	18 14 43·85	−0·07	−0·34	+ 0·48	−0·01	18 14 43·91	18 15 55·82	+1 11·91			
	109 Herculis	21 43	S	E	16	18 18 4·80	−0·07	−0·55	+ 0·32	−0·01	18 18 4·49	18 19 16·40	+1 11·91			
	b Draconis	58 44	N	E	9	18 21 15·05	−0·13	−1·14	− 0·12	−0·02	18 21 13·64	18 22 25·51	+1 11·87			
	α Lyræ	38 41	S	E	3	18 32 14·67	−0·09	−0·74	+ 0·18	−0·02	18 32 14·00	18 33 25·91	+1 11·91	+1 11·900	+1 11·995	18 6 39
		Mean	...	...	...	18 21 35										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (E), *Lat.* 52° 23′, BY BURRARD WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
July 21	ξ Draconis	56 53	N	E	9	17 50 34·08	−0·11	−1·03	− 0·07	−0·02	17 50 32·85	17 51 45·86	+1 13·01			
	γ Draconis	51 30	S	E	6	17 53 1·01	−0·09	−0·91	+ 0·01	−0·02	17 53 0·00	17 54 12·88	+1 12·88	+1 12·945		
	Mean	...	...	...	17 51 48										
	o Herculis	28 45	S	W	12	18 2 17·05	+0·07	−0·61	+ 0·23	−0·01	18 2 16·73	18 3 29·70	+1 12·97			
	2929 Gr. 80	23 14	S	W	14	18 16 36·15	+0·06	−0·56	+ 0·27	−0·01	18 16 35·91	18 17 48·92	+1 13·01			
	109 Herculis	21 43	S	W	10	18 18 3·59	+0·06	−0·54	+ 0·28	−0·01	18 18 3·38	18 19 16·40	+1 13·02			
	α Lyræ	38 41	S	W	23	18 32 13·37	+0·07	−0·73	+ 0·15	−0·02	18 32 12·84	18 33 25·90	+1 13·06	+1 13·015		
	Mean	...	...	...	18 17 18										
	110 Herculis	20 27	S	E	8	18 39 59·01	−0·06	−0·51	+ 0·28	−0·01	18 39 58·71	18 41 11·57	+1 12·86			
	o Draconis	59 16	N	E	7	18 48 30·46	−0·11	−1·10	− 0·12	−0·02	18 48 29·11	18 49 42·01	+1 12·90	+1 12·880	+1 12·964	18 17 40
	Mean	...	...	...	18 44 15										
„ 22	Groom. 2377	56 58	N	E	14	16 42 8·93	−0·10	−1·09	− 0·06	−0·02	16 42 7·66	16 43 21·14	+1 13·48			
	2623 Gr. 80	7 26	S	E	14	16 44 3·17	−0·05	−0·42	+ 0·31	−0·01	16 44 3·00	16 45 16·29	+1 13·29			
	49 Herculis	15 9	S	E	13	16 46 7·75	−0·06	−0·49	+ 0·27	−0·01	16 46 7·46	16 47 20·84	+1 13·38			
	2632 Gr. 80	31 53	S	E	12	16 47 49·05	−0·06	−0·66	+ 0·18	−0·01	16 47 48·50	16 49 1·84	+1 13·34	+1 13·373		
	Mean	...	...	...	16 45 2										
	2640 Gr. 80	18 36	S	W	12	16 49 34·93	+0·06	−0·53	+ 0·25	−0·01	16 49 34·70	16 50 48·05	+1 13·35			
	κ Ophiuchi	9 32	S	W	9	16 51 31·48	+0·05	−0·45	+ 0·30	−0·01	16 51 31·37	16 52 44·72	+1 13·35			
	ε Herculis	31 5	S	W	14	16 55 6·07	+0·06	−0·66	+ 0·18	−0·01	16 55 5·64	16 56 19·06	+1 13·42			
	2683 Gr. 80	40 39	S	W	9	17 3 10·99	+0·07	−0·78	+ 0·12	−0·02	17 3 10·38	17 4 24·02	+1 13·64			
	2686 „	24 22	S	W	15	17 5 31·99	+0·06	−0·58	+ 0·22	−0·01	17 5 31·68	17 6 45·27	+1 13·59	+1 13·470	+1 13·42[illegible]	16 51 [illegible]
	Mean	...	...	...	16 56 59										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (E), *Lat.* 52° 23′, BY BURRARD WITH TELESCOPE No. 2.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit =T	Right Ascension =R.A.	Clock Correction			Mean Epoch =T_E
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
July 22	2729 Gr. 80	23 4	S	E	14	17 18 32·90	−0·06	−0·56	+ 0·23	−0·01	17 18 32·50	17 19 45·75	+1 13·25			
	σ Ophiuchi	4 14	S	E	13	17 20 8·07	−0·05	−0·40	+ 0·32	−0·01	17 20 7·93	17 21 21·26	+1 13·33			
	2752 Gr. 80	26 12	S	E	2	17 25 19·56	−0·06	−0·60	+ 0·21	−0·01	17 25 19·10	17 26 32·51	+1 13·41			
	β Draconis	52 23	S	E	10	17 26 54·11	−0·09	−0·97	0·00	−0·02	17 26 53·03	17 28 6·39	+1 13·36			
	α Ophiuchi	12 38	S	E	11	17 28 53·50	−0·06	−0·47	+ 0·28	−0·01	17 28 53·24	17 30 6·56	+1 13·32			
	2775 Gr. 80	24 22	S	E	14	17 32 1·53	−0·06	−0·58	+ 0·22	−0·01	17 32 1·10	17 33 14·32	+1 13·22			
	ι Herculis	46 4	S	E	15	17 35 20·34	−0·08	−0·85	+ 0·07	−0·02	17 35 19·46	17 36 32·86	+1 13·40			
	β Ophiuchi	4 37	S	E	9	17 37 7·05	−0·05	−0·40	+ 0·32	−0·01	17 37 6·91	17 38 20·18	+1 13·27	+1 13·320		
	Mean	...	...	...	...	17 28 2										
	μ Herculis	27 47	S	W	9	17 41 10·73	+0·06	−0·62	+ 0·20	−0·01	17 41 10·36	17 42 23·82	+1 13·46			
	2814 Gr. 80	25 40	S	W	14	17 43 23·50	+0·06	−0·60	+ 0·22	−0·01	17 43 23·17	17 44 36·58	+1 13·41			
	ο Herculis	28 45	S	W	13	18 2 16·65	+0·06	−0·66	+ 0·20	−0·01	18 2 16·24	18 3 29·69	+1 13·45			
	2893 Gr. 80	31 23	S	W	13	18 6 46·97	+0·06	−0·69	+ 0·18	−0·01	18 6 46·51	18 7 59·94	+1 13·43			
	b Draconis	58 44	N	W	14	18 21 13·37	+0·10	−1·21	− 0·09	−0·02	18 21 12·15	18 22 25·46	+1 13·31			
	α Lyræ	38 41	S	W	17	18 32 13·10	+0·07	−0·79	+ 0·13	−0·02	18 32 12·49	18 33 25·89	+1 13·40			
	β Lyræ	33 14	S	W	9	18 45 2·19	+0·06	−0·72	+ 0·17	−0·01	18 45 1·69	18 46 15·11	+1 13·42			
	ο Draconis	59 16	N	W	9	18 48 29·75	+0·11	−1·23	− 0·10	−0·02	18 48 28·51	18 49 42·00	+1 13·49			
	R Lyræ	43 48	S	W	9	18 50 58·61	+0·07	−0·87	+ 0·09	−0·02	18 50 57·88	18 52 11·26	+1 13·38			
	γ Lyræ	32 33	S	W	14	18 53 50·96	+0·06	−0·71	+ 0·17	−0·01	18 53 50·47	18 55 3·85	+1 13·38	+1 13·413		
	Mean	...	...	...	...	18 22 33										
	κ Cygni	53 10	N	E	11	19 13 31·26	−0·09	−1·06	− 0·01	−0·02	19 13 30·08	19 14 43·46	+1 13·38			
	3152 Gr. 80	26 4	S	E	10	19 17 22·87	−0·06	−0·64	+ 0·21	−0·01	19 17 22·37	19 18 35·87	+1 13·50			
	b Aquilæ	11 43	S	E	13	19 18 47·78	−0·06	−0·49	+ 0·29	−0·01	19 18 47·51	19 20 1·12	+1 13·61	+1 13·497	+1 13·411	18 22 26
	Mean	...	...	...	...	19 16 34										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT GREENWICH (W), *Lat. 51° 29′*, BY BURRARD WITH TELESCOPE No. 1.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_W
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
June 21	2293 Gr. 80	38 14	S	W	12	14 44 8·15	−0·07	−0·39	+ 0·06	−0·02	14 44 7·73	14 45 2·23	+0 54·50			
	ψ Boötis	27 21	S	W	14	14 59 5·33	−0·07	−0·32	+ 0·09	−0·01	14 59 5·02	14 59 59·46	+0 54·44			
	2342 Gr. 80	25 17	S	W	12	15 1 49·97	−0·06	−0·31	+ 0·10	−0·01	15 1 49·69	15 2 44·01	+0 54·32			
	2345 „	26 42	S	W	12	15 3 0·40	−0·07	−0·32	+ 0·10	−0·01	15 3 0·10	15 3 54·48	+0 54·38	+0 54·410		
	Mean	...	...	..		14 57 1										
	2357 Gr. 80	2 10	S	E	14	15 13 5·37	+0·06	−0·15	+ 0·15	−0·01	15 13 5·42	15 13 59·84	+0 54·42			
	η Coronæ	30 40	S	E	15	15 18 0·44	+0·07	−0·25	+ 0·08	−0·01	15 18 0·33	15 18 54·76	+0 54·43			
	μ Boötis	37 45	S	E	11	15 19 40·00	+0·07	−0·28	+ 0·06	−0·02	15 19 39·83	15 20 34·20	+0 54·37			
	ι Draconis	59 20	N	E	8	15 21 44·96	+0·11	−0·44	− 0·05	−0·03	15 21 44·55	15 22 38·95	+0 54·40			
	β Coronæ	29 28	S	E	11	15 22 38·45	+0·07	−0·24	+ 0·09	−0·01	15 22 38·36	15 23 32·79	+0 54·43			
	ν′ Boötis	41 11	S	E	13	15 26 18·14	+0·08	−0·30	+ 0·05	−0·02	15 26 17·95	15 27 12·38	+0 54·43			
	α Coronæ	27 4	S	E	14	15 29 22·98	+0·07	−0·23	+ 0·09	−0·01	15 29 22·90	15 30 17·30	+0 54·40	+0 54·411		
	Mean	...	...	...		15 21 33										
	ε Coronæ	27 11	S	W	3	15 52 23·03	−0·07	−0·32	+ 0·09	−0·01	15 52 22·72	15 53 17·21	+0 54·49			
	θ Draconis	58 51	N	W	12	15 59 4·93	−0·11	−0·60	− 0·05	−0·02	15 59 4·15	15 59 58·76	+0 54·61			
	2510 Gr. 80	17 20	S	W	13	16 2 28·72	−0·06	−0·27	+ 0·12	−0·01	16 2 28·50	16 3 22·87	+0 54·37			
	2521 „	16 56	S	W	5	16 5 52·18	−0·06	−0·27	+ 0·12	−0·01	16 5 51·96	16 6 46·25	+0 54·29	+0 54·440	+0 54·418	15 25 1
	Mean	...	...	...		15 59 57										
June 22	Groom. 2164	59 43	N	W	10	14 47 56·05	−0·12	−0·60	− 0·06	−0·03	14 47 55·24	14 48 49·77	+0 54·53			
	Piazzi XIV. 221	14 52	S	W	14	14 50 24·05	−0·06	−0·25	+ 0·12	−0·01	14 50 23·85	14 51 18·50	+0 54·65			
	β Boötis	40 48	S	W	10	14 57 8·08	−0·08	−0·40	+ 0·05	−0·02	14 57 7·63	14 58 2·27	+0 54·64			
	ψ Boötis	27 21	S	W	13	14 59 5·17	−0·07	−0·32	+ 0·09	−0·01	14 59 4·86	14 59 59·45	+0 54·59	+0 54·603		
	Mean	...	...	...		14 53 38										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT GREENWICH (W), *Lat.* 51° 29′, BY BURRARD WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
June 22	2342 Gr. 80	25 17	S	E	12	15 1 49·58	+0·06	−0·23	+ 0·10	−0·01	15 1 49·50	15 2 44·01	+0 54·51			
	2345 „	26 42	S	E	12	15 3 0·01	+0·07	−0·24	+ 0·09	−0·01	15 2 59·92	15 3 54·48	+0 54·56			
	2349 „	− 0 56	S	E	14	15 7 43·03	+0·06	−0·14	+ 0·15	−0·01	15 7 43·09	15 8 37·77	+0 54·68			
	2357 „	2 10	S	E	15	15 13 5·12	+0·06	−0·15	+ 0·15	−0·01	15 13 5·17	15 13 59·83	+0 54·66			
	η Coronæ	30 40	S	E	13	15 18 0·28	+0·07	−0·25	+ 0·08	−0·01	15 18 0·17	15 18 54·75	+0 54·58			
	μ Boötis	37 45	S	E	15	15 19 39·81	+0·07	−0·29	+ 0·06	−0·02	15 19 39·63	15 20 34·19	+0 54·56			
	ι Draconis	59 20	N	E	10	15 21 44·77	+0·11	−0·45	− 0·05	−0·03	15 21 44·35	15 22 38·92	+0 54·57			
	β Coronæ	29 28	S	E	6	15 22 38·21	+0·07	−0·25	+ 0·08	−0·01	15 22 38·10	15 23 32·78	+0 54·68			
	ν′ Boötis	41 11	S	E	14	15 26 17·87	+0·08	−0·30	+ 0·05	−0·02	15 26 17·68	15 27 12·37	+0 54·69	+0 54·610	+0 54·607	15 4 16
		Mean	...	...	...	15 14 53										
	α Coronæ	27 4	S	W	13	15 29 23·04	−0·07	−0·31	+ 0·09	−0·01	15 29 22·74	15 30 17·30	+0 54·56			
	2432 Gr. 80	20 1	S	W	12	15 36 0·54	−0·06	−0·28	+ 0·11	−0·01	15 36 0·30	15 36 54·83	+0 54·53			
	α Serpentis	6 45	S	W	12	15 38 14·05	−0·06	−0·22	+ 0·14	−0·01	15 38 13·90	15 39 8·49	+0 54·59			
	β Serpentis	15 45	S	W	15	15 40 28·90	−0·06	−0·26	+ 0·12	−0·01	15 40 28·69	15 41 23·20	+0 54·51			
	κ Serpentis	18 28	S	W	14	15 43 9·17	−0·06	−0·27	+ 0·11	−0·01	15 43 8·94	15 44 3·57	+0 54·63			
	ε Serpentis	4 47	S	W	12	15 44 43·20	−0·06	−0·21	+ 0·14	−0·01	15 44 43·06	15 45 37·65	+0 54·59			
	σ′ Coronæ	34 7	S	W	14	16 9 53·34	−0·07	−0·34	+ 0·07	−0·02	16 9 52·98	16 10 47·49	+0 54·51			
	ε Ophiuchi	− 4 26	S	W	14	16 11 54·29	−0·06	−0·17	+ 0·16	−0·01	16 11 54·21	16 12 48·80	+0 54·59	+0 54·564		
		Mean	...	...	...	15 46 43										
	τ Herculis	46 34	S	E	14	16 15 43·57	+0·08	−0·29	+ 0·02	−0·02	16 15 43·36	16 16 37·97	+0 54·61			
	η Draconis	61 45	N	E	9	16 21 43·46	+0·12	−0·41	− 0·07	−0·03	16 21 43·07	16 22 37·89	+0 54·82			
	β Herculis	21 43	S	E	13	16 24 50·56	+0·06	−0·19	+ 0·10	−0·01	16 24 50·52	16 25 45·15	+0 54·63			
	2576 Gr. 80	11 43	S	E	13	16 26 49·65	+0·06	−0·16	+ 0·13	−0·01	16 26 49·67	16 27 44·25	+0 54·58			
	σ Herculis	42 39	S	E	13	16 29 51·47	+0·08	−0·27	+ 0·04	−0·02	16 29 51·30	16 30 46·03	+0 54·73			
	ζ Herculis	31 47	S	E	15	16 36 27·93	+0·07	−0·22	+ 0·08	−0·02	16 36 27·84	16 37 22·55	+0 54·71			
	η Herculis	39 7	S	E	12	16 38 26·18	+0·08	−0·25	+ 0·05	−0·02	16 38 26·04	16 39 20·71	+0 54·67			
	2615 Gr. 80	8 47	S	E	13	16 39 55·70	+0·06	−0·15	+ 0·13	−0·01	16 39 55·73	16 40 50·26	+0 54·53	+0 54·660	+0 54·612	16 7 59
		Mean	...	...	...	16 29 14										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT GREENWICH (W), *Lat.* 51° 29′, BY BURRARD WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
June 22	Groom. 2377	56 58	N	W	8	16 42 27·60	−0·11	−0·54	− 0·03	−0·02	16 42 26·90	16 43 21·67	+0 54·77			
	2623 Gr. 80	7 26	S	W	13	16 44 21·96	−0·06	−0·21	+ 0·14	−0·01	16 44 21·82	16 45 16·33	+0 54·51			
	49 Herculis	15 9	S	W	11	16 46 26·47	−0·06	−0·25	+ 0·12	−0·01	16 46 26·27	16 47 20·90	+0 54·63			
	2632 Gr. 80	31 53	S	W	13	16 48 7·72	−0·07	−0·33	+ 0·08	−0·02	16 48 7·38	16 49 2·00	+0 54·62			
	2640 "	18 56	S	W	13	16 49 53·75	−0·06	−0·26	+ 0·11	−0·01	16 49 53·53	16 50 48·13	+0 54·60			
	κ Ophiuchi	9 32	S	W	12	16 51 50·40	−0·06	−0·22	+ 0·13	−0·01	16 51 50·24	16 52 44·75	+0 54·51	+0 54·607		
		Mean	..	...	...	16 47 1										
	ε Herculis	31 5	S	E	9	16 55 24·61	+0·07	−0·22	+ 0·08	−0·01	16 55 24·53	16 56 19·19	+0 54·66			
	2664 Gr. 80	35 34	S	E	11	16 58 52·44	+0·07	−0·23	+ 0·07	−0·02	16 58 52·33	16 59 46·97	+0 54·64	+0 54·650	+0 54·629	16 52 5
		Mean	...	...	...	16 57 9										
" 27	ψ Boötis	27 21	S	W	12	14 59 4·08	−0·07	−0·36	+ 0·06	−0·01	14 59 3·70	14 59 59·41	+0 55·71			
	2342 Gr. 80	25 17	S	W	13	15 1 48·62	−0·06	−0·34	+ 0·06	−0·01	15 1 48·27	15 2 43·97	+0 55·70			
	2345 "	26 42	S	W	12	15 2 59·12	−0·07	−0·35	+ 0·06	−0·01	15 2 58·75	15 3 54·44	+0 55·69			
	2349 "	− 0 56	S	W	13	15 7 42·13	−0·06	−0·21	+ 0·11	−0·01	15 7 41·96	15 8 37·75	+0 55·79			
	2357 "	2 10	S	W	12	15 13 4·30	−0·06	−0·23	+ 0·10	−0·01	15 13 4·10	15 13 59·81	+0 55·71	+0 55·720		
		Mean	...	...	...	15 4 56										
	η Coronæ	30 40	S	E	12	15 17 59·17	+0·07	−0·24	+ 0·05	−0·01	15 17 59·04	15 18 54·71	+0 55·67			
	μ Boötis	37 45	S	E	15	15 19 38·69	+0·07	−0·27	+ 0·04	−0·02	15 19 38·51	15 20 34·15	+0 55·64			
	ι Draconis	59 20	N	E	10	15 21 43·52	+0·11	−0·42	− 0·04	−0·03	15 21 43·14	15 22 38·81	+0 55·67			
	β Coronæ	29 28	S	E	8	15 22 37·12	+0·07	−0·23	+ 0·06	−0·01	15 22 37·01	15 23 32·74	+0 55·73	+0 55·678	+0 55·699	15 12 43
		Mean	...	...	...	15 20 30										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT GREENWICH (W), *Lat.* 51° 29′, BY BURRARD WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
1895 June 27	κ Serpentis	18 28	S	W	14	15 43 8·16	−0·06	−0·26	+ 0·08	−0·01	15 43 7·91	15 44 3·56	+0 55·65			
	ε Serpentis	4 47	S	W	14	15 44 42·20	−0·06	−0·21	+ 0·10	−0·01	15 44 42·02	15 45 37·64	+0 55·62			
	2466 Gr. 80	42 45	S	W	14	15 48 10·41	−0·08	−0·40	+ 0·03	−0·02	15 48 9·94	15 49 5·56	+0 55·62			
	ε Coronæ	27 11	S	W	12	15 52 21·90	−0·07	−0·31	+ 0·06	−0·01	15 52 21·57	15 53 17·19	+0 55·62	+0 55·628		
	Mean	...	...	...	15 47 6											
	θ Draconis	58 51	N	E	14	15 59 3·12	+0·11	−0·35	− 0·03	−0·02	15 59 2·83	15 59 58·66	+0 55·83			
	2521 Gr. 80	16 56	S	E	13	16 5 50·67	+0·06	−0·16	+ 0·08	−0·01	16 5 50·64	16 6 46·24	+0 55·60			
	σ′ Coronæ	34 7	S	E	14	16 9 52·12	+0·07	−0·21	+ 0·05	−0·02	16 9 52·01	16 10 47·47	+0 55·46			
	ε Ophiuchi	− 4 26	S	E	14	16 11 53·07	+0·06	−0·10	+ 0·11	−0·01	16 11 53·13	16 12 48·83	+0 55·70			
	τ Herculis	46 34	S	E	13	16 15 42·55	+0·08	−0·26	+ 0·02	−0·02	16 15 42·37	16 16 37·93	+0 55·56			
	ζ Herculis	31 47	S	E	11	16 36 26·87	+0·07	−0·20	+ 0·05	−0·02	16 36 26·77	16 37 22·54	+0 55·77			
	η Herculis	39 7	S	E	12	16 38 25·09	+0·08	−0·23	+ 0·04	−0·02	16 38 24·96	16 39 20·70	+0 55·74			
	2615 Gr. 80	8 47	S	E	14	16 39 54·52	+0·06	−0·14	+ 0·09	−0·01	16 39 54·52	16 40 50·27	+0 55·75			
	Groom. 2377	56 58	N	E	13	16 42 26·06	+0·11	−0·33	− 0·02	−0·02	16 42 25·80	16 43 21·62	+0 55·82			
	2623 Gr. 80	7 26	S	E	14	16 44 20·64	+0·06	−0·13	+ 0·09	−0·01	16 44 20·65	16 45 16·34	+0 55·69			
	49 Herculis	15 9	S	E	15	16 46 25·20	+0·06	−0·15	+ 0·08	−0·01	16 46 25·18	16 47 20·91	+0 55·73			
	2632 Gr. 80	31 53	S	E	13	16 48 6·37	+0·07	−0·20	+ 0·05	−0·02	16 48 6·27	16 49 2·00	+0 55·73			
	2640 „	18 36	S	E	13	16 49 52·44	+0·06	−0·16	+ 0·08	−0·01	16 49 52·41	16 50 48·14	+0 55·73	+0 55·701		
	Mean	...	...	...	16 29 52											
	ε Herculis	31 5	S	W	14	16 55 23·84	−0·07	−0·33	+ 0·05	−0·01	16 55 23·48	16 56 19·20	+0 55·72			
	2664 Gr. 80	35 34	S	W	13	16 58 51·61	−0·07	−0·35	+ 0·04	−0·02	16 58 51·21	16 59 46·97	+0 55·76			
	2683 „	40 39	S	W	13	17 3 28·78	−0·08	−0·39	+ 0·03	−0·02	17 3 28·32	17 4 24·21	+0 55·89			
	2686 „	24 22	S	W	15	17 5 49·69	−0·06	−0·29	+ 0·07	−0·01	17 5 49·40	17 6 45·35	+0 55·95			
	α Herculis	14 30	S	W	11	17 8 59·10	−0·06	−0·25	+ 0·08	−0·01	17 8 58·86	17 9 54·48	+0 55·62			
	δ Herculis	24 58	S	W	12	17 9 50·62	−0·06	−0·29	+ 0·07	−0·01	17 9 50·33	17 10 45·99	+0 55·66			
	2712 Gr. 80	10 59	S	W	13	17 12 48·21	−0·06	−0·23	+ 0·09	−0·01	17 12 48·00	17 13 43·67	+0 55·67			
	W Herculis	32 36	S	W	12	17 15 51·31	−0·07	−0·34	+ 0·05	−0·02	17 15 50·93	17 16 46·69	+0 55·76	+0 55·754	+0 55·696	16 28 18
	Mean	...	...	...	17 6 23											

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT GREENWICH (W), *Lat.* 51° 29′, BY BURRARD WITH TELESCOPE No. 1.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_W
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A.—T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
June 29	ρ Boötis	30 50	S	W	14	14 26 25·27	−0·07	−0·38	+ 0·07	−0·01	14 26 24·88	14 27 20·84	+0 55·96			
	2256 Gr. 80	30 12	S	W	14	14 29 13·53	−0·07	−0·38	+ 0·07	−0·01	14 29 13·14	14 30 9·06	+0 55·92	+0 55·940		
		Mean	...	...	...	14 27 49										
	2357 Gr. 80	2 10	S	E	15	15 13 3·74	+0·06	−0·15	+ 0·13	−0·01	15 13 3·77	15 13 59·81	+0 56·04			
	η Coronæ	30 40	S	E	15	15 17 58·80	+0·07	−0·24	+ 0·07	−0·01	15 17 58·69	15 18 54·70	+0 56·01			
	μ Boötis	37 45	S	E	15	15 19 38·32	+0·07	−0·28	+ 0·05	−0·02	15 19 38·14	15 20 34·13	+0 55·99			
	ι Draconis	59 20	N	E	13	15 21 43·20	+0·11	−0·44	− 0·05	−0·03	15 21 42·79	15 22 38·77	+0 55·98			
	β Coronæ	49 28	S	E	5	15 22 36·82	+0·07	−0·24	+ 0·08	−0·01	15 22 36·72	15 23 32·73	+0 56·01			
	ν′ Boötis	41 11	S	E	14	15 26 16·42	+0·08	−0·29	+ 0·04	−0·02	15 26 16·23	15 27 12·30	+0 56·07			
	α Coronæ	27 4	S	E	15	15 29 21·31	+0·07	−0·23	+ 0·08	−0·01	15 29 21·22	15 30 17·26	+0 56·04	+0 56·020	+0 55·980	14 54 40
		Mean	...	...	...	15 21 31										
	2432 Gr. 80	20 1	S	W	15	15 35 59·19	−0·06	−0·32	+ 0·10	−0·01	15 35 58·90	15 36 54·80	+0 55·90			
	α Serpentis	6 45	S	W	9	15 38 12·70	−0·06	−0·25	+ 0·13	−0·01	15 38 12·51	15 39 8·48	+0 55·97			
	β Serpentis	15 45	S	W	9	15 40 27·54	−0·06	−0·30	+ 0·11	−0·01	15 40 27·28	15 41 23·18	+0 55·90			
	κ Serpentis	18 28	S	W	10	15 43 7·87	−0·06	−0·31	+ 0·10	−0·01	15 43 7·59	15 44 3·55	+0 55·96			
	ε Serpentis	4 47	S	W	2	15 44 42·07	−0·06	−0·24	+ 0·13	−0·01	15 44 41·89	15 45 37·64	+0 55·75			
	ε Coronæ	27 11	S	W	5	15 52 21·64	−0·07	−0·36	+ 0·08	−0·01	15 52 21·28	15 53 17·18	+0 55·90			
	2752 Gr. 80	26 12	S	W	3	17 25 36·92	−0·06	−0·32	+ 0·08	−0·01	17 25 36·61	17 26 32·56	+0 55·95			
	β Draconis	52 23	N	W	10	17 27 11·27	−0·10	−0·53	0·00	−0·02	17 27 10·62	17 28 6·65	+0 56·03			
	α Ophiuchi	12 38	S	W	14	17 29 10·84	−0·06	−0·26	+ 0·11	−0·01	17 29 10·62	17 30 6·57	+0 55·95			
	2775 Gr. 80	24 22	S	W	12	17 32 18·72	−0·06	−0·31	+ 0·09	−0·01	17 32 18·43	17 33 14·35	+0 55·92	+0 55·923		
		Mean	...	...	...	16 24 55										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT GREENWICH (W), *Lat.* 51° 29′, BY BURRARD WITH TELESCOPE No. 1.

Astronomical Date	Sar			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_W
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
June 29	ι Herculis	46 4	S	E	15	17 35 37·07	+0·08	−0·28	+ 0·02	−0·02	17 35 36·87	17 36 33·03	+0 56·16			
	μ Herculis	27 47	S	E	13	17 41 27·85	+0·07	−0·20	+ 0·08	−0·01	17 41 27·79	17 42 23·85	+0 56·06			
	2814 Gr. 80	25 40	S	E	15	17 43 40·75	+0·06	−0·19	+ 0·09	−0·01	17 43 40·70	17 44 36·60	+0 55·90			
	2823 „	40 0	S	E	12	17 47 46·73	+0·08	−0·25	+ 0·05	−0·02	17 47 46·59	17 48 42·67	+0 56·08	+0 56·050	+0 55·987	17 3 32
	Mean	...	...	...	17 42 8											
July 1	2357 Gr. 80	2 10	S	E	9	15 13 3·34	+0·06	−0·17	+ 0·14	−0·01	15 13 3·36	15 13 59·80	+0 56·44			
	η Coronæ	30 40	S	E	15	15 17 58·44	+0·07	−0·28	+ 0·07	−0·01	15 17 58·29	15 18 54·68	+0 56·39			
	μ Boötis	37 45	S	E	15	15 19 37·96	+0·07	−0·32	+ 0·05	−0·02	15 19 37·74	15 20 34·10	+0 56·36			
	ι Draconis	59 20	N	E	10	15 21 43·02	+0·11	−0·51	− 0·05	−0·03	15 21 42·54	15 22 38·72	+0 56·18			
	β Coronæ	29 28	S	E	14	15 22 36·37	+0·07	−0·28	+ 0·08	−0·01	15 22 36·23	15 23 32·71	+0 56·48	+0 56·370		
	Mean	...	...	...	15 19 0											
	ν Boötis	41 11	S	W	14	15 26 16·51	−0·08	−0·50	+ 0·04	−0·02	15 26 15·95	15 27 12·27	+0 56·32			
	α Coronæ	27 4	S	W	15	15 29 21·28	−0·07	−0·39	+ 0·08	−0·01	15 29 20·89	15 30 17·24	+0 56·35			
	2432 Gr. 80	20 1	S	W	15	15 35 58·84	−0·06	−0·35	+ 0·10	−0·01	15 35 58·52	15 36 54·79	+0 56·27			
	α Serpentis	6 45	S	W	14	15 38 12·39	−0·06	−0·28	+ 0·13	−0·01	15 38 12·17	15 39 8·47	+0 56·30			
	β Serpentis	15 45	S	W	15	15 40 27·14	−0·06	−0·32	+ 0·11	−0·01	15 40 26·86	15 41 23·17	+0 56·31			
	κ Serpentis	18 28	S	W	13	15 43 7·44	−0·06	−0·34	+ 0·10	−0·01	15 43 7·13	15 44 3·54	+0 56·41			
	ε Serpentis	4 47	S	W	14	15 44 41·57	−0·06	−0·26	+ 0·13	−0·01	15 44 41·37	15 45 37·63	+0 56·26	+0 56·317	+0 56·344	15 27 56
	Mean	...	...	...	15 36 52											

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT GREENWICH (W), *Lat. 51° 29′*, BY BURRARD WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
July 1	η Draconis	61 45	N	E	5	16 21 41·63	+0·12	−0·40	− 0·07	−0·03	16 21 41·25	16 22 37·72	+0 56·47			
	β Herculis	21 43	S	E	15	16 24 48·91	+0·06	−0·18	+ 0·10	−0·01	16 24 48·88	16 25 45·14	+0 56·26			
	2576 Gr. 80	11 43	S	E	14	16 26 47·96	+0·06	−0·15	+ 0·12	−0·01	16 26 47·98	16 27 44·26	+0 56·28			
	σ Herculis	42 39	S	E	12	16 29 49·77	+0·08	−0·26	+ 0·04	−0·02	16 29 49·61	16 30 45·97	+0 56·36			
	ζ Herculis	31 47	S	E	15	16 36 26·22	+0·07	−0·22	+ 0·07	−0·02	16 36 26·12	16 37 22·53	+0 56·41			
	η Herculis	39 7	S	E	13	16 38 24·41	+0·08	−0·24	+ 0·05	−0·02	16 38 24·28	16 39 20·68	+0 56·40			
	Groom. 2377	56 58	N	E	10	16 42 25·42	+0·11	−0·35	− 0·03	−0·02	16 42 25·13	16 43 21·57	+0 56·44			
	2623 Gr. 80	7 26	S	E	15	16 44 20·02	+0·06	−0·14	+ 0·13	−0·01	16 44 20·06	16 45 16·35	+0 56·29	+0 56·364		
		Mean	...	...	...	16 33 6										
	2664 Gr. 80	35 34	S	W	13	16 58 51·02	−0·07	−0·42	+ 0·06	−0·02	16 58 50·57	16 59 46·96	+0 56·39			
	2683 "	40 39	S	W	15	17 3 28·29	−0·08	−0·46	+ 0·04	−0·02	17 3 27·77	17 4 24·21	+0 56·44			
	2686 "	24 22	S	W	14	17 5 49·21	−0·06	−0·34	+ 0·09	−0·01	17 5 48·89	17 6 45·36	+0 56·47			
	α Herculis	14 30	S	W	9	17 8 58·46	−0·06	−0·29	+ 0·11	−0·01	17 8 58·21	17 9 54·49	+0 56·28			
	δ Herculis	24 58	S	W	9	17 9 50·03	−0·06	−0·35	+ 0·09	−0·01	17 9 49·70	17 10 46·00	+0 56·30			
	π Herculis	36 56	S	W	5	17 10 30·37	−0·07	−0·43	+ 0·06	−0·02	17 10 29·91	17 11 26·27	+0 56·36	+0 56·373		
		Mean	...	...	...	17 6 15										
	2712 Gr. 80	10 59	S	E	11	17 12 47·41	+0·06	−0·15	+ 0·12	−0·01	17 12 47·43	17 13 43·68	+0 56·25			
	W Herculis	32 36	S	E	14	17 15 50·51	+0·07	−0·22	+ 0·07	−0·02	17 15 50·41	17 16 46·68	+0 56·27	+0 56·260	+0 56·343	16 59 59
		Mean	...	...	...	17 14 19										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT GREENWICH (W), *Lat. 51° 29′*, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Sar			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_W
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
July 12	η Draconis	61 45	N	W	15	16 21 33·11	−0·12	+0·07	+ 6·35	−0·03	16 21 39·38	16 22 37·44	+0 58·06			
	β Herculis	21 43	S	W	13	16 24 56·43	−0·06	+0·03	− 9·05	−0·01	16 24 47·34	16 25 45·09	+0 57·75			
	2576 Gr. 80	11 43	S	W	12	16 26 57·65	−0·06	+0·03	−11·01	−0·01	16 26 46·60	16 27 44·23	+0 57·63			
	σ Herculis	42 39	S	W	14	16 29 51·70	−0·08	+0·05	− 3·52	−0·02	16 29 48·13	16 30 45·86	+0 57·73			
	ζ Herculis	31 47	S	W	15	16 36 31·46	−0·07	+0·04	− 6·70	−0·02	16 36 24·71	16 37 22·46	+0 57·75			
	η Herculis	39 7	S	W	10	16 38 27·55	−0·08	+0·04	− 4·66	−0·02	16 38 22·83	16 39 20·59	+0 57·76			
	2615 Gr. 80	8 47	S	W	13	16 40 4·23	−0·06	+0·03	−11·58	−0·01	16 39 52·61	16 40 50·26	+0 57·65			
	Groom. 2377	56 58	N	W	12	16 42 20·53	−0·11	+0·06	+ 2·96	−0·02	16 42 23·42	16 43 21·37	+0 57·95			
	2623 Gr. 80	7 26	S	W	14	16 44 30·57	−0·06	+0·03	−11·84	−0·01	16 44 18·69	16 45 16·34	+0 57·65	+0 57·770		
		Mean	...	...	...	16 33 54										
	49 Herculis	15 9	S	E	9	16 46 33·31	+0·06	+0·13	−10·36	−0·01	16 46 23·13	16 47 20·90	+0 57·77			
	2683 Gr. 80	40 39	S	E	14	17 3 30·19	+0·08	+0·21	− 4·18	−0·02	17 3 26·28	17 4 24·14	+0 57·86			
	α Herculis	14 30	S	E	10	17 9 7·07	+0·06	+0·13	−10·49	−0·01	17 8 56·76	17 9 54·49	+0 57·73			
	δ Herculis	24 58	S	E	14	17 9 56·34	+0·06	+0·16	− 8·31	−0·01	17 9 48·24	17 10 45·98	+0 57·74			
	π Herculis	36 56	S	E	6	17 10 33·48	+0·07	+0·19	− 5·31	−0·02	17 10 28·41	17 11 26·22	+0 57·81			
	2712 Gr. 80	10 59	S	E	15	17 12 57·07	+0·06	+0·12	−11·14	−0·01	17 12 46·10	17 13 43·69	+0 57·59			
	W Herculis	32 36	S	E	9	17 15 55·18	+0·07	+0·18	− 6·49	−0·02	17 15 48·92	17 16 46·65	+0 57·73			
	2729 Gr. 80	23 4	S	E	14	17 18 56·69	+0·06	+0·15	− 8·75	−0·01	17 18 48·14	17 19 45·80	+0 57·66			
	σ Ophiuchi	4 14	S	E	15	17 20 35·96	+0·06	+0·11	−12·45	−0·01	17 20 23·67	17 21 21·29	+0 57·62	+0 57·723	+0 57·747	16 51 51
		Mean	...	...	...	17 9 47										
	ι Herculis	46 4	S	W	9	17 35 37·59	−0·08	+0·09	− 2·31	−0·02	17 35 35·27	17 36 32·96	+0 57·69			
	β Ophiuchi	4 37	S	W	15	17 37 34·92	−0·06	+0·05	−12·36	−0·01	17 37 22·54	17 38 20·18	+0 57·64			
	μ Herculis	27 47	S	W	15	17 41 33·82	−0·07	+0·07	− 7·66	−0·01	17 41 26·15	17 42 23·86	+0 57·71			
	2814 Gr. 80	25 40	S	W	13	17 43 47·09	−0·06	+0·07	− 8·18	−0·01	17 43 38·91	17 44 36·61	+0 57·70			
	2828 „	40 0	S	W	10	17 47 49·37	−0·08	+0·08	− 4·40	−0·02	17 47 44·95	17 48 42·66	+0 57·71			
	η Serpentis	− 2 56	S	W	14	18 15 11·88	−0·06	+0·04	−13·75	−0·01	18 14 58·10	18 15 55·79	+0 57·69			
	2929 Gr. 80	23 14	S	W	13	18 16 59·88	−0·06	+0·06	− 8·70	−0·01	18 16 51·17	18 17 48·92	+0 57·75			
	109 Herculis	21 43	S	W	12	18 18 27·71	−0·06	+0·06	− 9·05	−0·01	18 18 18·65	18 19 16·39	+0 57·74	+0 57·704		
		Mean	...	...	...	17 54 38										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT GREENWICH (W), *Lat.* 51° 29′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. – T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
July 12	b Draconis	58 44	N	E	15	18 21 23·33	+0·11	+0·34	+ 4·09	−0·02	18 21 27·85	18 22 25·58	+0 57·73			
	α Lyræ	38 41	S	E	15	18 32 32·61	+0·07	+0·22	− 4·79	−0·02	18 32 28·09	18 33 25·91	+0 57·82			
	2988 Gr. 80	− 9 9	S	E	15	18 35 51·99	+0·06	+0·09	−14·93	−0·01	18 35 37·20	18 36 34·87	+0 57·67			
	110 Herculis	20 27	S	E	14	18 40 22·97	+0·06	+0·16	− 9·31	−0·01	18 40 13·87	18 41 11·54	+0 57·67			
	3016 Gr. 80	−20 27	S	E	15	18 42 49·17	+0·06	+0·06	−17·15	−0·01	18 42 32·13	18 43 29·94	+0 57·81			
	β′ Lyræ	33 14	S	E	15	18 45 23·54	+0·07	+0·20	− 6·31	−0·02	18 45 17·48	18 46 15·11	+0 57·63			
	ο Draconis	59 16	N	E	8	18 48 39·43	+0·11	+0·35	+ 4·44	−0·03	18 48 44·30	18 49 42·08	+0 57·78			
	γ Lyræ	32 33	S	E	9	18 54 12·35	+0·07	+0·20	− 6·53	−0·02	18 54 6·07	18 55 3·83	+0 57·76	+0 57·734	+0 57·719	18 17 24
		Mean	...	...	...	18 40 9										
„ 15	ζ Herculis	31 47	S	W	15	16 36 24·29	−0·07	−0·01	+ 0·12	−0·02	16 36 24·31	16 37 22·44	+0 58·13			
	η Herculis	39 7	S	W	12	16 38 22·50	−0·08	−0·01	+ 0·08	−0·02	16 38 22·47	16 39 20·55	+0 58·08			
	2615 Gr. 80	8 47	S	W	13	16 39 52·04	−0·06	−0·01	+ 0·20	−0·01	16 39 52·16	16 40 50·25	+0 58·09			
	Groom. 2377	56 58	N	W	12	16 42 23·30	−0·11	−0·01	− 0·05	−0·02	16 42 23·11	16 43 21·31	+0 58·20			
	2623 Gr. 80	7 26	S	W	13	16 44 18·13	−0·06	−0·01	+ 0·21	−0·01	16 44 18·26	16 45 16·32	+0 58·06			
	49 Herculis	15 9	S	W	11	16 46 22·68	−0·06	−0·01	+ 0·18	−0·01	16 46 22·78	16 47 20·88	+0 58·10	+0 58·110		
		Mean	...	...	...	16 41 17										
	2632 Gr. 80	31 53	S	E	12	16 48 3·44	+0·07	+0·09	+ 0·12	−0·02	16 48 3·70	16 49 1·90	+0 58·20			
	2640 „	18 36	S	E	14	16 49 49·66	+0·06	+0·07	+ 0·17	−0·01	16 49 49·95	16 50 48·10	+0 58·15			
	κ Ophiuchi	9 32	S	E	14	16 51 46·29	+0·06	+0·06	+ 0·20	−0·01	16 51 46·60	16 52 44·75	+0 58·15			
	2664 Gr. 80	35 34	S	E	8	16 58 48·41	+0·07	+0·09	+ 0·10	−0·02	16 58 48·65	16 59 46·88	+0 58·23			
	2683 „	40 39	S	E	15	17 3 25·60	+0·08	+0·10	+ 0·07	−0·02	17 3 25·83	17 4 24·10	+0 58·27			
	α Herculis	14 30	S	E	14	17 8 56·04	+0·06	+0·06	+ 0·19	−0·01	17 8 56·34	17 9 54·48	+0 58·14			
	δ Herculis	24 58	S	E	9	17 9 47·48	+0·06	+0·08	+ 0·15	−0·01	17 9 47·76	17 10 45·96	+0 58·20			
	2712 Gr. 80	10 59	S	E	15	17 12 45·32	+0·06	+0·06	+ 0·20	−0·01	17 12 45·63	17 13 43·68	+0 58·05	+0 58·174	+0 58·142	16 50 51
		Mean	...	...	...	17 0 25										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT GREENWICH (W), *Lat.* 51° 29′, BY LENOX CONYNGHAM WITH TELESCOPE NO. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
July 15	W Herculis	32 36	S	W	14	17 15 48·58	−0·07	−0·01	+ 0·11	−0·02	17 15 48·59	17 16 46·63	+0 58·04			
	72 Ophiuchi	9 33	S	W	14	18 1 27·09	−0·06	+0·01	+ 0·20	−0·01	18 1 27·23	18 2 25·35	+0 58·12	+0 58·080		
		Mean	...	...	...	17 38 38										
	2911 Gr. 80	42 7	S	E	8	18 11 27·29	+0·08	+0·15	+ 0·07	−0·02	18 11 27·57	18 12 25·63	+0 58·06			
	η Serpentis	− 2 56	S	E	13	18 14 57·34	+0·06	+0·07	+ 0·24	−0·01	18 14 57·70	18 15 55·80	+0 58·10			
	2929 Gr. 80	23 14	S	E	15	18 16 50·50	+0·06	+0·11	+ 0·15	−0·01	18 16 50·81	18 17 48·92	+0 58·11			
	ζ Aquilæ	13 42	S	E	9	18 59 39·69	+0·06	+0·09	+ 0·19	−0·01	18 59 40·03	19 0 38·10	+0 58·08			
	3152 Gr. 80	26 4	S	E	9	19 17 37·49	+0·06	+0·12	+ 0·14	−0·01	19 17 37·80	19 18 35·84	+0 58·04	+0 58·078	+0 58·079	18 7 22
		Mean	...	...	...	18 36 6										
„ 19	2623 Gr. 80	7 26	S	W	4	16 44 17·34	−0·06	+0·15	+ 0·30	−0·01	16 44 17·72	16 45 16·30	+0 58·58			
	49 Herculis	15 9	S	W	15	16 46 21·81	−0·06	+0·17	+ 0·26	−0·01	16 46 22·17	16 47 20·86	+0 58·69			
	2632 Gr. 80	31 53	S	W	15	16 48 2·91	−0·07	+0·23	+ 0·17	−0·02	16 48 3·22	16 49 1·87	+0 58·65			
	2640 „	18 36	S	W	14	16 49 49·11	−0·06	+0·18	+ 0·24	−0·01	16 49 49·46	16 50 48·07	+0 58·61			
	κ Ophiuchi	9 32	S	W	13	16 51 45·76	−0·06	+0·15	+ 0·29	−0·01	16 51 46·13	16 52 44·74	+0 58·61	+0 58·628		
		Mean	...	...	...	16 48 3										
	2683 Gr. 80	40 39	S	E	14	17 3 24·75	+0·08	+0·42	+ 0·11	−0·02	17 3 25·34	17 4 24·06	+0 58·72			
	2686 „	24 22	S	E	12	17 5 45·92	+0·06	+0·31	+ 0·21	−0·01	17 5 46·49	17 6 45·29	+0 58·80			
	α Herculis	14 30	S	E	14	17 8 55·27	+0·06	+0·27	+ 0·27	−0·01	17 8 55·86	17 9 54·47	+0 58·61			
	δ Herculis	24 58	S	E	11	17 9 46·71	+0·06	+0·32	+ 0·21	−0·01	17 9 47·29	17 10 45·94	+0 58·65			
	π Herculis	36 56	S	E	7	17 10 26·90	+0·07	+0·39	+ 0·13	−0·02	17 10 27·47	17 11 26·16	+0 58·69			
	2712 Gr. 80	10 59	S	E	13	17 12 44·55	+0·06	+0·25	+ 0·28	−0·01	17 12 45·13	17 13 43·66	+0 58·53			
	W Herculis	32 36	S	E	15	17 15 47·44	+0·07	+0·36	+ 0·16	−0·02	17 15 48·01	17 16 46·61	+0 58·60			
	2729 Gr. 80	23 4	S	E	12	17 18 46·61	+0·06	+0·31	+ 0·22	−0·01	17 18 47·19	17 19 45·77	+0 58·58	+0 58·648	+0 58·638	16 59 23
		Mean	...	...	...	17 10 42										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT GREENWICH (W), *Lat.* 51° 29′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
July 19	2745 Gr. 80	0 25	S	W	12	17 22 32·35	−0·06	+0·13	+ 0·33	−0·01	17 22 32·74	17 23 31·43	+0 58·69			
	2752 „	26 12	S	W	7	17 25 33·51	−0·06	+0·21	+ 0·20	−0·01	17 25 33·85	17 26 32·52	+0 58·67			
	β Draconis	52 23	N	W	9	17 27 7·39	−0·10	+0·34	− 0·01	−0·02	17 27 7·60	17 28 6·45	+0 58·85			
	α Ophiuchi	12 38	S	W	10	17 29 7·55	−0·06	+0·16	+ 0·28	−0·01	17 29 7·92	17 30 6·58	+0 58·66			
	2775 Gr. 80	24 22	S	W	15	17 32 15·47	−0·06	+0·20	+ 0·21	−0·01	17 32 15·81	17 33 14·33	+0 58·52	+0 58·678		
		Mean	...	...	...	17 27 19										
	β Ophiuchi	4 37	S	E	13	17 37 20·95	+0·06	+0·22	+ 0·31	−0·01	17 37 21·53	17 38 20·19	+0 58·66			
	μ Herculis	27 47	S	E	14	17 41 24·50	+0·07	+0·33	+ 0·19	−0·01	17 41 25·08	17 42 23·84	+0 58·76	+0 58·710	+0 58·694	17 33 21
		Mean	...	...	...	17 39 23										
	2859 Gr. 80	20 50	S	W	14	17 56 57·57	−0·06	+0·19	+ 0·23	−0·01	17 56 57·92	17 57 56·69	+0 58·77			
	72 Ophiuchi	9 33	S	W	14	18 1 26·30	−0·06	+0·15	+ 0·29	−0·01	18 1 26·67	18 2 25·36	+0 58·69			
	o Herculis	28 45	S	W	15	18 2 30·64	−0·07	+0·22	+ 0·19	−0·01	18 2 30·97	18 3 29·71	+0 58·74	+0 58·733		
		Mean	...	...	...	18 0 18										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT GREENWICH (W), *Lat. 51° 29′*, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
July 19	2911 Gr. 80	42 7	S	E	13	18 11 26·39	+0·08	+0·45	+0·09	−0·02	18 11 26·99	18 12 25·61	+0 58·62			
	η Serpentis	− 2 56	S	E	14	18 14 56·63	+0·06	+0·20	+0·35	−0·01	18 14 57·23	18 15 55·82	+0 58·59			
	2929 Gr. 80	23 14	S	E	14	18 16 49·72	+0·06	+0·33	+0·22	−0·01	18 16 50·32	18 17 48·92	+0 58·60			
	109 Herculis	21 43	S	E	12	18 18 17·19	+0·06	+0·32	+0·23	−0·01	18 18 17·69	18 19 16·40	+0 58·71			
	b Draconis	58 44	N	E	15	18 21 26·22	+0·11	+0·65	−0·10	−0·02	18 21 26·86	18 22 25·51	+0 58·65			
	2969 Gr. 80	− 8 19	S	E	14	18 28 33·71	+0·06	+0·17	+0·37	−0·01	18 28 34·30	18 29 32·95	+0 58·65			
	α Lyræ	38 41	S	E	15	18 32 26·60	+0·07	+0·43	+0·12	−0·02	18 32 27·20	18 33 25·91	+0 58·71			
	2988 Gr. 80	− 9 9	S	E	14	18 35 35·63	+0·06	+0·17	+0·38	−0·01	18 35 36·23	18 36 34·91	+0 58·68	+0 58·651		
		Mean	...	...	...	18 22 26										
	110 Herculis	20 27	S	W	14	18 40 12·56	−0·06	+0·19	+0·24	−0·01	18 40 12·92	18 41 11·57	+0 58·65			
	3016 Gr. 80	−20 27	S	W	14	18 42 30·84	−0·06	+0·07	+0·43	−0·01	18 42 31·27	18 43 29·99	+0 58·72			
	β′ Lyræ	33 14	S	W	12	18 45 16·13	−0·07	+0·23	+0·16	−0·02	18 45 16·43	18 46 15·12	+0 58·69			
	o Draconis	59 16	N	W	6	18 48 43·10	−0·11	+0·40	−0·11	−0·03	18 48 43·25	18 49 42·04	+0 58·79	+0 58·713		
		Mean	...	...	...	18 44 11										
	ζ Aquilæ	13 42	S	E	15	18 59 38·90	+0·06	+0·28	+0·27	−0·01	18 59 39·50	19 0 38·13	+0 58·63	+0 58·630		
		Mean	...	...	...	18 59 39										
	3092 Gr. 80	24 5	S	W	15	19 1 19·73	−0·06	+0·20	+0·22	−0·01	19 1 20·08	19 2 18·72	+0 58·64	+0 58·640	+0 58·668	18 38 9
		Mean	...	...	...	19 1 20										
July 21	2615 Gr. 80	8 47	S	W	10	16 39 51·34	−0·06	+0·03	+0·09	−0·01	16 39 51·39	16 40 50·21	+0 58·82			
	Groom. 2377	56 58	N	W	10	16 42 22·21	−0·11	+0·08	−0·02	−0·02	16 42 22·14	16 43 21·17	+0 59·03			
	2623 Gr. 80	7 26	S	W	15	16 44 17·44	−0·06	+0·03	+0·10	−0·01	16 44 17·50	16 45 16·29	+0 58·79			
	49 Herculis	15 9	S	W	15	16 46 21·97	−0·06	+0·04	+0·08	−0·01	16 46 22·02	16 47 20·84	+0 58·82	+0 58·865		
		Mean	...	...	...	16 43 13										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT GREENWICH (W), *Lat.* 51° 29′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
July 21	2632 Gr. 80	31 53	S	E	13	16 48 2·73	+0·07	+0·15	+ 0·05	−0·02	16 48 2·98	16 49 1·85	+0 58·87			
	2640 „	18 36	S	E	14	16 49 48·95	+0·06	+0·12	+ 0·08	−0·01	16 49 49·20	16 50 48·06	+0 58·86			
	κ Ophiuchi	9 32	S	E	13	16 51 45·66	+0·06	+0·10	+ 0·09	−0·01	16 51 45·90	16 52 44·73	+0 58·83	+0 58·853		
		Mean	...	...	...	16 49 52										
	2664 Gr. 80	35 34	S	W	11	16 58 47·95	−0·07	+0·06	+ 0·05	−0·02	16 58 47·97	16 59 46·82	+0 58·85			
	2683 „	40 39	S	W	13	17 3 25·10	−0·08	+0·06	+ 0·03	−0·02	17 3 25·09	17 4 24·03	+0 58·94			
	α Herculis	14 30	S	W	14	17 8 55·53	−0·06	+0·04	+ 0·09	−0·01	17 8 55·59	17 9 54·46	+0 58·87			
	δ Herculis	24 58	S	W	8	17 9 46·99	−0·06	+0·05	+ 0·07	−0·01	17 9 47·04	17 10 45·92	+0 58·88	+0 58·885		
		Mean	...	...	...	17 5 14										
	2712 Gr. 80	10 59	S	E	13	17 12 44·61	+0·06	+0·10	+ 0·09	−0·01	17 12 44·85	17 13 43·66	+0 58·81			
	W Herculis	32 36	S	E	14	17 15 47·49	+0·07	+0·15	+ 0·05	−0·02	17 15 47·74	17 16 46·59	+0 58·85			
	2729 Gr. 80	23 4	S	E	13	17 18 46·70	+0·06	+0·13	+ 0·07	−0·01	17 18 46·95	17 19 45·76	+0 58·81			
	σ Ophiuchi	4 14	S	E	13	17 20 22·20	+0·06	+0·09	+ 0·10	−0·01	17 20 22·44	17 21 21·27	+0 58·83			
	2745 Gr. 80	0 25	S	E	14	17 22 32·28	+0·06	+0·08	+ 0·11	−0·01	17 22 32·52	17 23 31·43	+0 58·91	+0 58·842	+0 58·862	16 59 6
		Mean	...	...	...	17 18 3										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT GREENWICH (W), *Lat. 51° 29′*, BY LENOX CONYNGHAM WITH TELESCOPE NO. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
July 21	β Ophiuchi	4 37	S	W	8	17 37 21·28	−0·06	+0·05	+ 0·10	−0·01	17 37 21·36	17 38 20·18	+0 58·82			
	μ Herculis	27 47	S	W	14	17 41 24·89	−0·07	+0·08	+ 0·06	−0·01	17 41 25·02	17 42 23·83	+0 58·81			
	2814 Gr. 80	25 40	S	W	14	17 43 37·70	−0·06	+0·07	+ 0·07	−0·01	17 43 37·77	17 44 36·58	+0 58·81	+0 58·813		
	Mean	...	...	...	...	17 40 48										
	2823 Gr. 80	40 0	S	E	15	17 47 43·35	+0·08	+0·20	+ 0·04	−0·02	17 47 43·65	17 48 42·60	+0 58·95			
	ξ Draconis	56 53	N	E	15	17 50 46·37	+0·11	+0·28	− 0·02	−0·02	17 50 46·72	17 51 45·86	+0 59·14			
	θ Herculis	37 16	S	E	9	17 51 42·70	+0·07	+0·19	+ 0·04	−0·02	17 51 42·98	17 52 41·89	+0 58·91	+0 59·000		
	Mean	...	...	...	...	17 50 4										
	α Lyræ	38 41	S	W	13	18 32 27·04	−0·07	+0·09	+ 0·04	−0·02	18 32 27·08	18 33 25·90	+0 58·82			
	2988 Gr. 80	− 9 ·9	S	W	14	18 35 36·05	−0·06	+0·04	+ 0·12	−0·01	18 35 36·14	18 36 34·92	+0 58·78	+0 58·800		
	Mean	...	...	...	...	18 34 2										
	β′ Lyræ	33 14	S	E	12	18 45 16·01	+0·07	+0·18	+ 0·05	−0·02	18 45 16·29	18 46 15·12	+0 58·83	+0 58·830	+0 58·861	18 12 33
	Mean	...	...	...	...	18 45 16										
July 22	η Herculis	39 7	S	W	14	16 38 21·57	−0·08	−0·04	+ 0·04	−0·02	16 38 21·47	16 39 20·47	+0 59·00			
	2615 Gr. 80	8 47	S	W	12	16 39 51·30	−0·06	−0·03	+ 0·09	−0·01	16 39 51·29	16 40 50·21	+0 58·92			
	Groom. 2377	56 58	N	W	10	16 42 22·17	−0·11	−0·06	− 0·02	−0·02	16 42 21·96	16 43 21·14	+0 59·18			
	2623 Gr. 80	7 26	S	W	11	16 44 17·43	−0·06	−0·03	+ 0·09	−0·01	16 44 17·42	16 45 16·29	+0 58·87			
	49 Herculis	15 9	S	W	14	16 46 21·96	−0·06	−0·03	+ 0·08	−0·01	16 46 21·94	16 47 20·84	+0 58·90			
	2632 Gr. 80	31 53	S	W	15	16 48 3·03	−0·07	−0·04	+ 0·05	−0·02	16 48 2·95	16 49 1·84	+0 58·89			
	2640 „	18 36	S	W	13	16 49 49·19	−0·06	−0·03	+ 0·07	−0·01	16 49 49·16	16 50 48·05	+0 58·89			
	κ Ophiuchi	9 32	S	W	10	16 51 45·86	−0·06	−0·03	+ 0·09	−0·01	16 51 45·85	16 52 44·72	+0 58·87	+0 58·940		
	Mean	...	...	...	...	16 45 7										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT GREENWICH (W), *Lat.* 51° 29′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit =T	Right Ascension =R.A.	Clock Correction: By each Star = R.A.−T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
July 22	2664 Gr. 80	35 34	S	E	14	16 58 47·67	+0·07	+0·14	+ 0·04	−0·02	16 58 47·90	16 59 46·81	+0 58·91			
	2683 „	40 39	S	E	13	17 3 24·82	+0·08	+0·15	+ 0·03	−0·02	17 3 25·06	17 4 24·02	+0 58·96			
	α Herculis	14 30	S	E	10	17 8 55·35	+0·06	+0·10	+ 0·08	−0·01	17 8 55·58	17 9 54·45	+0 58·87			
	δ Herculis	24 58	S	E	9	17 9 46·83	+0·06	+0·11	+ 0·06	−0·01	17 9 47·05	17 10 45·92	+0 58·87			
	β Ophiuchi	4 37	S	E	14	17 37 21·04	+0·06	+0·10	+ 0·09	−0·01	17 37 21·28	17 38 20·18	+0 58·90			
	μ Herculis	27 47	S	E	14	17 41 24·57	+0·07	+0·15	+ 0·06	−0·01	17 41 24·84	17 42 23·82	+0 58·98			
	b Draconis	58 44	N	E	12	18 21 26·10	+0·11	+0·28	− 0·03	−0·02	18 21 26·50	18 22 25·46	+0 58·96			
	110 Herculis	20 27	S	E	3	18 40 12·39	+0·06	+0·13	+ 0·07	−0·01	18 40 12·64	18 41 11·57	+0 58·93			
	3016 Gr. 80	−20 27	S	E	2	18 42 30·94	+0·06	+0·05	+ 0·13	−0·01	18 42 31·17	18 43 30·01	+0 58·84			
	β′ Lyræ	33 14	S	E	2	18 45 15·96	+0·07	+0·17	+ 0·05	−0·02	18 45 16·23	18 46 15·11	+0 58·88			
	o Draconis	59 16	N	E	13	18 48 42·84	+0·11	+0·29	− 0·03	−0·03	18 48 43·18	18 49 42·00	+0 58·82	+0 58·902	+0 58·921	17 19 44
		Mean	...	...	...	17 54 21										
	ζ Aquilæ	13 42	S	W	13	18 59 39·22	−0·06	0·00	+ 0·08	−0·01	18 59 39·23	19 0 38·14	+0 58·91			
	3092 Gr. 80	24 5	S	W	13	19 1 19·86	−0·06	0·00	+ 0·06	−0·01	19 1 19·85	19 2 18·73	+0 58·88			
	3101 „	5 54	S	W	15	19 2 55·67	−0·06	0·00	+ 0·09	−0·01	19 2 55·69	19 3 54·54	+0 58·85			
	3107 „	− 8 7	S	W	13	19 6 3·58	−0·06	0·00	+ 0·11	−0·01	19 6 3·62	19 7 2·42	+0 58·80			
	3113 „	2 7	S	W	15	19 7 29·50	−0·06	0·00	+ 0·10	−0·01	19 7 29·53	19 8 28·28	+0 58·75			
	3123 „	4 39	S	W	9	19 10 23·62	−0·06	0·00	+ 0·09	−0·01	19 10 23·64	19 11 22·47	+0 58·83	+0 58·837		
		Mean	...	...	...	19 4 39										
	θ Lyræ	37 57	S	E	8	19 11 47·05	+0·07	+0·18	+ 0·04	−0·02	19 11 47·32	19 12 46·24	+0 58·92	+0 58·920	+0 58·879	18 48 5[illegible]
		Mean	...	...	...	19 11 47										

ARC POTSDAM-GREENWICH.

TABLE V.

Observations of Transits of the same Stars at both Stations, and Deduction of the Difference of Corrected Times.

As no Longitude stars were observed on this arc, this table does not occur.

EXPLANATION OF *TABLE VI.*

Deduction of Clock Rate Correction.

From the results contained in Tables III and IV, the clock rate correction can now be deduced.

Column 1 contains the name of the arc.

,, 2 contains the approximate difference of longitude in minutes and seconds.

,, 3 contains the date.

,, 4 contains the observed clock correction as deduced from observations of clock stars in Table IV.

,, 5 contains the epoch to which the foregoing correction corresponds, taken also from Table IV.

,, 6 contains the hourly clock rate correction as deduced from observation of clock stars. To obtain this the rate from day to day is computed by dividing the difference between two consecutive clock corrections, in column 4, by the number of hours between the epochs, as given in column 5. Then the mean of two consecutive rates is taken as belonging to the date which lies between them.

As no longitude stars were observed on this arc, columns 7, 12 and 17 are blank.

,, 8 contains a repetition of the quantity in column 6.

,, 9, 10, 11 and 13 contain similar quantities to those in columns 4, 5, 6 and 8 but for the other station.

,, 14 contains the relative hourly clock rate during each night deduced from the clock comparisons, the value entered is the mean of all the values appertaining to the night, contained in the last column of Table III.

We have now the hourly rate of each clock derived from star observations, and also the relative hourly rate of the clocks derived from the clock comparisons. It is clear that the last should be equal to the algebraic difference of the first two, *i.e.*, using the notation given on the Table, we should have

$$h_w - h_e = R, \quad \text{or} \quad h_e = h_w - R.$$

Hence in forming the final value of the hourly clock rate we take $H_e = \frac{1}{2}(h_e + h_w - R)$, and the resulting value is entered in column 15.

Similarly $H_w = \frac{1}{2}(h_w + h_e + R)$, which is given in column 16.

TABLE VI. DEDUCTION OF CLOCK RATE CORRECTION.

Arc	Approximate Difference of Longitude = ΔL	Astronomical Date	POTSDAM or E Clock: Observed Clock Correction	POTSDAM or E Clock: Time	POTSDAM or E Clock: Hourly Clock Rate for Nights of Observation deduced from Star Transits: By Clock Stars	By Longitude Stars	Mean = h_e	GREENWICH or W Clock: Observed Clock Correction	GREENWICH or W Clock: Time	GREENWICH or W Clock: Hourly Clock Rate for Nights of Observation deduced from Star Transits: By Clock Stars	By Longitude Stars	Mean = h_w	Relative Hourly Clock Rate deduced from Clock Comparisons = R	Adopted Hourly Clock Rate: For E Clock = ½ (h_e + h_w − R) = H_e	Adopted Hourly Clock Rate: For W Clock = ½ (h_e + h_w + R) = H_w	Correction to Observed Time of Transit at W Station for Rate of W Clock = H_w × ΔL
POTSDAM-GREENWICH	m s 53 27	1895	m s	h m	s		s	m s	h m	s		s	s	s	s	
		June 21	+0 56·674	16 32	+0·029		+0·029	+0 54·418	15 25	+0·008		+0·008	− 0·019	+ 0·028	+ 0·009	
		„ 22	+0 57·375	16 46	+0·007		+0·007	+0 54·607	15 4	+0·012		+0·012	− 0·011	+ ·015	+ ·004	
		„ „	+0 57·390	18 58				+0 54·612	16 8							
		„ „	...	...				+0 54·629	16 52							
		„ 27	+1 0·229	16 1	+0·019		+0·019	+0 55·690	15 13	−0·002		−0·002	− 0·001	+ 0·009	+ 0·008	
		„ „	+1 0·225	16 49				+0 55·696	16 28							
		„ „	+1 0·276	18 29												
		„ 29	+1 1·174	16 26	+0·034		+0·034	+0 55·980	14 55	+0·003		+0·003	− 0·009	+ 0·023	+ 0·014	
		„ „	+1 1·235	18 11				+0 55·987	17 4							
		July 1	+1 2·122	16 57	+0·019		+0·019	+0 56·344	15 28	−0·001		−0·001	− 0·004	+ ·011	+ ·007	
		„ „	...	...				+0 56·343	17 0							
		„ 12	+1 8·776	16 58	+0·038		+0·038	+0 57·747	16 52	−0·020		−0·020	− 0·015	+ 0·017	+ 0·002	
		„ „	+1 8·795	17 29				+0 57·719	18 17							
		„ 15	+1 10·083	17 24	+0·017		+0·017	+0 58·142	16 51	−0·050		−0·050	− 0·011	− ·011	− ·022	
		„ „	+1 10·108	18 55				+0 58·079	18 7							
		„ 19	+1 11·995	18 7	+0·020		+0·020	+0 58·638	16 59	+0·018		+0·018	− 0·012	+ 0·025	+ 0·013	
		„ „	...	...				+0 58·694	17 33							
		„ „	...	...				+0 58·668	18 38							
		„ 21	+1 12·964	18 18	+0·020		+0·020	+0 58·862	16 59	−0·001		−0·001	− 0·009	+ 0·014	+ 0·005	
		„ „	...	...				+0 58·861	18 13							
		„ 22	+1 13·422	16 51	−0·007		−0·007	+0 58·921	17 20	−0·028		−0·028	− 0·011	− 0·012	− 0·023	
		„ „	+1 13·411	18 22				+0 58·879	18 49							

EXPLANATION OF *TABLE VII.*

Retardation of the Electric Current.

The retardation of the electric current computed in this Table does not enter into the difference of longitude, but much interest attaches to its value, and clearly any abnormal result would throw doubt upon the accuracy of the clock comparison whence it was deduced.

Column 1 contains the name of the arc.

„ 2 contains the date.

„ 3 contains the time by the East or Potsdam clock corresponding to the middle of the period during which a comparison was being made at Potsdam, that is, during which Greenwich was transmitting signals to Potsdam.

„ 4 contains the time, still by E. clock, corresponding to the middle of the period during which Potsdam was transmitting signals to Greenwich.

„ 5 contains the interval between the times given in columns 3 and 4.

„ 6 and 9 contain the differences between the clocks as observed at Greenwich and Potsdam respectively.

The differences given in columns 6 and 9 have to be reduced to the same epoch and to do this the difference observed at Greenwich receives a correction equal to the relative hourly clock rate, taken from the last column of Table III, multiplied by the interval given in column 5 reduced to the decimal of an hour. This correction and the corrected difference between the clocks as observed at Greenwich are given in columns 7 and 8.

„ 10 contains half the difference between columns 8 and 9.

TABLE VII. RETARDATION OF THE ELECTRIC CURRENT.

Arc	Astronomical Date		Time of Comparison by E Clock at Potsdam	Time of Comparison by E Clock at Greenwich	Interval of Time between the Comparison at Potsdam and Greenwich = I	Difference between the Clocks as Observed at Greenwich	Correction for Relative Clock Rate during the Interval I	Difference between the Clocks as Observed at Greenwich corrected for Clock Rate	Difference between the Clocks as Observed at Potsdam	Retardation of the Current
	1895		h m s	h m s	m s	h m s	s	h m s	h m s	s
POTSDAM-GREENWICH	June	21	18 21 15	18 32 14	− 10 59	0 52 13·112	+ 0·004	0 52 13·116	0 52 13·410	0·147
	"	22	15 33 9	15 27 21	+ 5 48	12·702	− ·002	12·700	13·020	·160
	"	"	16 50 55	16 45 9	+ 5 46	12·735	+ ·001	12·736	13·003	·134
	"	"	18 29 5	18 21 21	+ 7 45	12·686	− ·002	12·684	12·990	·153
	"	23	15 45 13	15 39 21	+ 5 52	12·307	·002	12·305	12·614	·155
	"	25	15 39 2	15 9 17	+ 29 45	11·700	·007	11·693	11·963	·135
	"	27	16 24 13	16 20 14	+ 3 59	10·935	·001	10·934	11·293	·180
	"	"	17 16 13	17 11 14	+ 4 59	10·990	+ ·002	10·992	11·273	·141
	"	"	18 35 13	18 29 12	+ 6 1	10·970	− ·001	10·969	11·271	·151
	"	29	15 50 9	15 32 14	+ 17 55	10·301	·004	10·297	10·600	·152
	"	"	17 15 13	17 8 13	+ 7 0	10·294	·000	10·294	10·598	·152
	"	30*	16 6 12	16 16 11	− 9 59	10·000	+ ·002	10·002	10·292	·145
	July	1	16 54 4	16 48 13	+ 5 51	0 52 9·671	− 0·001	0 52 9·670	0 52 9·914	0·122
	"	"	18 18 6	18 12 13	+ 5 53	9·675	+ ·001	9·676	9·932	·128
	"	12	16 39 7	16 33 1	+ 6 6	5·077	− ·002	5·075	5·340	·133
	"	"	17 46 7	17 42 58	+ 3 9	5·100	·000	5·100	5·315	·108
	"	"	18 54 7	18 44 2	+ 10 5	5·068	·005	5·063	5·285	·111
	"	13	16 46 7	16 32 2	+ 14 5	4·780	·003	4·777	5·085	·154
	"	15	17 0 57	16 51 56	+ 9 1	4·195	·002	4·193	4·505	·156
	"	"	18 19 7	18 13 10	+ 5 57	4·183	·001	4·182	4·495	·157
	"	"	19 39 7	19 25 8	+ 13 59	4·160	·003	4·157	4·490	·167
	"	17	17 2 2	16 52 2	+ 10 0	3·530	·002	3·528	3·825	·149
	"	18	17 1 57	17 29 57	− 28 0	3·195	+ ·006	3·201	3·485	·142
	"	19	17 7 57	16 56 7	+ 11 50	2·796	− ·003	2·793	3·080	·144
	"	"	18 40 5	18 35 7	+ 4 58	2·780	·001	2·779	3·070	·146
	"	"	20 11 5	19 55 7	+ 15 58	2·750	·003	2·747	3·070	·162
	"	20	17 12 4	17 7 6	+ 4 58	2·400	·001	2·399	2·700	·151
	"	21	17 12 5	17 4 3	+ 8 2	1·995	·002	1·993	2·302	·155
	"	"	19 15 7	19 10 3	+ 5 4	1·995	·000	1·995	2·292	·149
	"	22	17 14 58	17 11 6	+ 3 52	1·703	·001	1·702	1·985	·142
	"	"	18 16 4	18 12 6	+ 3 58	1·689	·002	1·687	1·950	·132
	"	"	19 25 3	19 29 6	− 4 3	1·680	·000	1·680	1·976	·148
	"	23	17 10 4	17 14 5	− 4 1	1·313	+ ·001	1·314	1·615	·151
	"	24	17 25 3	17 17 58	+ 7 5	0·908	− ·002	0·906	1·202	·148
	"	25	17 37 3	17 32 58	+ 4 5	0·462	·001	0·461	0·765	·152

* A new relay but of the same pattern was used on June 30th and afterwards.

ARC POTSDAM-GREENWICH.

EXPLANATION OF *TABLE VIII.*

Reduction of Clock Corrections and Clock Comparisons to the same Epochs.

Having now obtained the clock corrections at different epochs on each night, and also the differences between the clocks at other epochs, it remains to reduce them both to the same epochs.

This table deals only with observations of clock stars and the attendant comparisons.

Column 1 contains the date.

„ 2 contains the time in terms of the Potsdam clock at which the clock comparison was made (taken from Table III).

„ 3 contains the time in terms of the Greenwich clock at which the clock comparison was made (from Table III).

„ 4 contains the observed difference between the clocks (from Table III).

„ 5 and 6 contain the mean epochs of the clock corrections at the two stations (from Table IV).

EXPLANATION OF *TABLE VIII.*—(*Continued*).

Column 7 contains the difference between columns 2 and 5.

„ 8 contains the difference between columns 3 and 6.

„ 9 and 10 contain the clock corrections at the epochs given in columns 5 and 6 (from Table IV).

„ 11 and 12 contain the hourly clock rates (from Table VI).

„ 13 and 14 contain the corrections for rate for the periods entered in columns 7 and 8 respectively, that is, the product of columns 7 and 11, and of columns 8 and 12.

„ 15 and 16 contain the sums of columns 9 and 13 and of columns 10 and 14. The quantities obtained being the clock corrections at the epochs of the comparisons, that is, at the epochs contained in columns 2 and 3.

In columns 5, 6, 9 and 10 will be noticed certain entries in italics; their meaning is as follows:—

It not unfrequently happened that owing to passing clouds no group of clock star observations corresponding to one of the clock comparisons was obtained at one station, though at the other nothing was missing. Gaps of this nature were therefore filled by interpolation; thus in column 5 or 6, according as the Potsdam or Greenwich observations were incomplete, was entered the epoch of the clock comparison from column 2 or 3 as the case might be, and then the clock correction at this epoch was deduced from the nearest value, in column 9 or 10, by applying the rate correction from column 11 or 12, for the interval separating the required epoch from that of the clock correction used. Epochs thus inserted which are not those of any actual sets of observations, and the values of the clock correction deduced for them, are printed in italics.

TABLE VIII. REDUCTION OF CLOCK CORRECTIONS

Date		From Table III: Time of Clock Comparison by Potsdam Clock	From Table III: Time of Clock Comparison by Greenwich Clock	From Table III: Difference between the Clocks at the Epoch of Clock Comparison	Mean Epoch of Clock Correction from Table IV: Potsdam	Mean Epoch of Clock Correction from Table IV: Greenwich	Difference between Times of Epochs of Clock Correction and Comparison = P: Potsdam	Difference between Times of Epochs of Clock Correction and Comparison = P: Greenwich
1895		h m s	h m s	h m s	h m s	h m s	h m s	h m s
June	21	18 26 45	17 34 31	0 52 13·261	16 32 13	15 25 1	+ 1 54 32	+ 2 9 30
"	22	15 30 15	14 38 2	12·861	15 30 15	15 4 16	0	− 0 26 14
"	"	16 48 2	15 55 49	12·869	16 46 4	16 7 59	+ 0 1 58	− 12 10
"	"	18 25 13	17 33 0	12·838	18 57 59	16 52 5	− 32 46	+ 40 55
"	27	16 22 14	15 30 3	11·114	16 1 15	15 12 43	+ 20 59	+ 17 20
"	"	17 13 44	16 21 33	11·132	16 48 36	16 28 18	+ 25 8	− 6 45
"	"	18 32 13	17 40 2	11·121	18 28 51	17 40 2	+ 3 22	0
"	29	15 41 11	14 49 1	10·451	16 25 44	14 54 40	− 44 33	− 5 39
"	"	17 11 43	16 19 32	10·446	18 11 0	17 3 32	− 59 17	− 44 0
July	1	16 51 8	15 58 59	9·793	16 56 30	15 27 56	− 5 22	+ 31 3
"	"	18 15 9	17 23 0	9·804	18 15 9	16 59 59	0	+ 23 1
July	12	16 36 4	15 43 59	0 52 5·209	16 58 7	15 43 59	− 0 22 3	0
"	"	17 44 33	16 52 27	5·208	17 29 20	16 51 51	+ 15 13	+ 0 0 36
"	"	18 49 5	17 56 59	5·177	18 49 5	18 17 24	0	− 20 25
"	15	16 56 26	16 4 22	4·350	17 23 50	16 4 22	− 27 24	0
"	"	18 16 9	17 24 4	4·339	18 16 9	16 50 51	0	+ 33 13
"	"	19 32 8	18 40 3	4·325	18 54 32	18 7 22	+ 37 36	+ 32 41
"	19	17 2 2	16 9 59	2·938	17 2 2	16 59 23	0	− 49 24
"	"	18 37 36	17 45 33	2·925	18 6 39	17 33 21	+ 30 57	+ 12 12
"	"	20 3 6	19 11 3	2·910	20 3 6	18 38 9	0	+ 32 54
"	21	17 8 4	16 16 2	2·149	17 8 4	16 59 6	0	− 43 4
"	"	19 12 35	18 20 33	2·144	18 17 40	18 12 33	+ 54 55	+ 8 0
"	22	17 13 2	16 21 0	1·844	16 51 1	16 21 0	+ 22 1	0
"	"	18 14 5	17 22 3	1·820	18 22 26	17 19 44	− 8 21	+ 2 19
"	"	19 27 4	18 35 3	1·828	19 27 4	18 48 52	0	− 13 49

AND CLOCK COMPARISONS TO THE SAME EPOCHS.

Clock Correction from Table IV		Hourly Clock Rate from Table VI		Correction for Difference of Times P		Clock Correction at Mean Epoch of Clock Comparison	
Potsdam	Greenwich	Potsdam	Greenwich	Potsdam	Greenwich	Potsdam	Greenwich
m s	m s	s	s	s	s	m s	m s
+ 0 56·674	+ 0 54·418	+ 0·028	+ 0·009	+ 0·053	+ 0·019	+ 0 56·727	+ 0 54·437
0 57·356	0 54·607	+ 0·015	+ 0·004	0·000	− 0·002	+ 0 57·356	+ 0 54·605
0 57·375	0 54·612	+ 0·015	+ 0·004	0·000	− 0·001	+ 0 57·375	+ 0 54·611
0 57·390	0 54·629	+ 0·015	+ 0·004	− 0·008	+ 0·003	+ 0 57·382	+ 0 54·632
1 0·229	0 55·699	+ 0·009	+ 0·008	+ 0·003	+ 0·002	+ 1 0·232	+ 0 55·701
1 0·225	0 55·696	+ 0·009	+ 0·008	+ 0·004	0·000	+ 1 0·229	+ 0 55·696
1 0·276	0 55·706	+ 0·009	+ 0·008	0·000	0·000	+ 1 0·276	+ 0 55·706
1 1·174	0 55·980	+ 0·023	+ 0·014	− 0·017	− 0·001	+ 1 1·157	+ 0 55·979
1 1·235	0 55·987	+ 0·023	+ 0·014	− 0·023	− 0·010	+ 1 1·212	+ 0 55·977
1 2·122	0 56·344	+ 0·011	+ 0·007	− 0·001	+ 0·004	+ 1 2·121	+ 0 56·348
1 2·136	0 56·343	+ 0·011	+ 0·007	0·000	+ 0·003	+ 1 2·136	+ 0 56·346
+ 1 8·776	+ 0 57·745	+ 0·017	+ 0·002	− 0·006	0·000	+ 1 8·770	+ 0 57·745
1 8·795	0 57·747	+ 0·017	+ 0·002	+ 0·004	0·000	+ 1 8·799	+ 0 57·747
1 8·818	0 57·719	+ 0·017	+ 0·002	0·000	− 0·001	+ 1 8·818	+ 0 57·718
1 10·083	0 58·159	− 0·011	− 0·022	+ 0·005	0·000	+ 1 10·088	+ 0 58·159
1 10·073	0 58·142	− 0·011	− 0·022	0·000	− 0·012	+ 1 10·073	+ 0 58·130
1 10·108	0 58·079	− 0·011	− 0·022	− 0·007	− 0·012	+ 1 10·101	+ 0 58·067
1 11·963	0 58·638	+ 0·025	+ 0·013	0·000	− 0·011	+ 1 11·968	+ 0 58·627
1 11·995	0 58·694	+ 0·025	+ 0·013	+ 0·013	+ 0·003	+ 1 12·008	+ 0 58·697
1 12·044	0 58·668	+ 0·025	+ 0·013	0·000	+ 0·007	+ 1 12·044	+ 0 58·675
1 12·948	0 58·862	+ 0·014	+ 0·005	0·000	− 0·004	+ 1 12·948	+ 0 58·858
1 12·964	0 58·861	+ 0·014	+ 0·005	+ 0·013	+ 0·001	+ 1 12·977	+ 0 58·862
1 13·422	0 58·943	− 0·012	− 0·023	− 0·004	0·000	+ 1 13·418	+ 0 58·943
1 13·411	0 58·921	− 0·012	− 0·023	+ 0·002	− 0·001	+ 1 13·413	+ 0 58·920
1 13·398	0 58·879	− 0·012	− 0·023	0·000	+ 0·005	+ 1 13·398	+ 0 58·884

ARC POTSDAM-GREENWICH.

TABLE IX.

Reduction of Clock Comparisons and the Differences between the Clock Corrections to the same Epochs by Interpolation.

As no longitude stars were observed on this arc, this table does not occur.

EXPLANATION OF *TABLE X*.

Deduction of the Difference of Longitude.

Table VIII contains all the data for computing the difference of longitude.

Column 1 contains the name of the arc.

„ 2 contains the date.

„ 3 and 4 contain the epochs for which data are available. The first on each night appertains to the clock star observations and is taken from Table VIII, columns 2 and 3.

„ 5 and 7 refer only to clock star observations, and contain the deduced clock corrections corresponding to the epochs in columns 3 and 4. The entries are taken from Table VIII, columns 15 and 16.

„ 6 and 8 contain the numbers of stars observed at each station on each night.

„ 9 contains the difference between the corrections of the clocks. This is equal to the difference between columns 5 and 7.

„ 10 contains the difference between the clocks by direct comparison at the epoch given in column 3; this quantity is to be found in column 4 of Table VIII.

„ 11 contains the observed difference of longitude, which is equal to the sum of the quantities in the two preceding columns.

No entry is made in the column headed personal equation, for the interchange of observers which took place between July 1st and 12th causes the sign of the personal equation to be + during the first half of the observations and — during the second half, so that the final mean is free from its effects.

Column 13 contains the Final Difference of Longitude and its probable error.

TABLE X. DEDUCTION OF THE DIFFERENCE OF LONGITUDE.

Arc	Astronomical Date	Epoch		Potsdam E		Greenwich W		Difference between the Corrections of the E and W Clocks = S	Difference between the Clocks by Direct Comparison, at the Epoch of S	Observed Difference of Longitude	Personal Equation	Final Difference of Longitude
		By E Clock = T_E	By W Clock = T_W	Deduced Clock Correction from Table VIII	No. of Stars	Deduced Clock Correction from Table VIII	No. of Stars					
POTSDAM-GREENWICH	1895	h m s	h m s	m s		m s		m s	h m s	h m s		h m s
	June 21	18 26 45	17 34 31	+0 56·727	12	+0 54·437	15	+0 2·290	0 52 13·261	0 52 15·551		0 52 15·953 ± 0·0058
	„ 22	15 30 15	14 38 2	57·356	33	54·605	37	0 2·751	12·861	15·612		
	„ „	16 48 2	15 55 49	57·375		54·611		0 2·764	12·869	15·633		
	„ „	18 25 13	17 33 0	57·382		54·632		0 2·750	12·838	15·588		
	„ 27	16 22 14	15 30 3	+1 0·232	35	55·701	34	0 4·531	11·114	15·645		
	„ „	17 13 44	16 21 33	0·229		55·696		0 4·533	11·132	15·665		
	„ „	18 32 13	17 40 2	0·276		55·706		0 4·570	11·121	15·691		
	„ 29	15 41 11	14 49 1	1·157	28	55·979	23	0 5·178	10·451	15·629		
	„ „	17 11 43	16 19 32	1·212		55·977		0 5·235	10·446	15·681		
	July 1	16 51 8	15 58 59	2·121	18	56·348	28	0 5·773	9·793	15·566		
	„ „	18 15 9	17 23 0	2·136		56·346		0 5·790	9·804	15·594		
									Mean ...	0 52 15·623		
									p.e. ...	± 0·0093		
	July 12	16 36 4	15 43 59	+1 8·770	20	+0 57·745	34	+0 11·025	0 52 5·209	0 52 16·234		
	„ „	17 44 33	16 52 27	8·799		57·747		0 11·052	5·208	16·260		
	„ „	18 49 5	17 56 59	8·818		57·718		0 11·100	5·177	16·277		
	„ 15	16 56 26	16 4 22	10·088	28	58·159	21	0 11·929	4·350	16·279		
	„ „	18 16 9	17 24 4	10·073		58·130		0 11·943	4·339	16·282		
	„ „	19 32 8	18 40 3	10·101		58·067		0 12·034	4·325	16·359		
	„ 19	17 2 2	16 9 59	11·968	7	58·627	37	0 13·341	2·938	16·279		
	„ „	18 37 36	17 45 33	12·008		58·697		0 13·311	2·925	16·236		
	„ „	20 3 6	19 11 3	12·044		58·675		0 13·369	2·910	16·279		
	„ 21	17 8 4	16 16 2	12·948	8	58·858	25	0 14·090	2·149	16·239		
	„ „	19 12 35	18 20 33	12·977		58·862		0 14·115	2·144	16·259		
	„ 22	17 13 2	16 21 0	13·418	30	58·943	26	0 14·475	1·844	16·319		
	„ „	18 14 5	17 22 3	13·413		58·920		0 14·493	1·820	16·313		
	„ „	19 27 4	18 35 3	13·398		58·884		0 14·514	1·828	16·342		
									Mean ...	0 52 16·283		
									p.e. ...	± 0·0069		

ARC TEHRAN-POTSDAM.

1895.

The programme.

The difference of longitude being 2 hours 33 minutes clock stars only were observed. An attempt was made at first to secure two clock comparisons per night, but the difficulty of procuring direct communication over the long lines between Potsdam and Odessa, and Odessa and Tehran was so great, and the time occupied so considerable, that the observers, feeling that they must exercise all possible moderation in availing themselves of the concessions granted by the Indo-European Telegraph Company and by the German Government, decided to be content with one only. The programme therefore resolved itself at each station into two careful determinations of the clock correction, the comparison taking place between them.

Owing to unfavorable weather and to a break of the telegraph line caused by a storm in the Caucasus, the observations were scattered over a long period, *viz*:—from October 31st to December 13th. On the first two nights of observation, October 31st and November 1st, the clock at Tehran gave trouble, as pointed out in the foot-notes to Table III. On October 31st after a certain number of stars had been observed the break circuit action failed, and the spring carrying the agate block and contact point was found to have worked loose and had to be tightened. The precise instant of the break of contact depends on the relative position of the agate block and of the tooth of the wheel which strikes against it, and any readjustment is liable to cause a change in the clock's time as recorded on the chronograph. The results therefore of this night's observations were received with caution, but being found to accord satisfactorily with the general mean they have been retained. The opinion expressed by the observer was that the change of the instant of break of circuit would not exceed $0^{s}{\cdot}02$.

On November 1st the clock was wound before the clock comparison, and during the operation stopped for two seconds, the escapement wheel jarring back instead of continuing to revolve. The night's work was computed on the supposition that the loss of time was exactly two seconds, but the results were discordant and have been rejected.

The clock continued to give trouble always stopping when being wound and consequently it was after some days discarded and the break circuit chronometer taken into use.

EXPLANATION OF *TABLE I.*

Abstract of Determinations of Collimation and Level Correction-Constants.

The first three columns call for no remark.

Column 4 contains the mean sidereal hour at which the several determinations were made.

Collimation.

Column 5, headed C_e, gives the reading of the micrometer when the collimator cross is intersected by the central transit wire, the telescope being in the position *I.P.E.* (*i.e.* Illuminated Pivot East).

„ 6, headed C_w, gives the corresponding reading, the telescope being *I.P.W.*

„ 7, headed C_0, gives the mean of the two preceding readings, *i.e.* $\frac{1}{2}(C_e+C_w)$. C_0 is therefore the reading of the micrometer when so set that the centre wire is truly collimated.

„ 8, headed C_s, gives the reading of the micrometer as set during the observation of star transits. This setting was arbitrary and was not changed in either instrument throughout the arc.

„ 9, headed c_e, gives the collimation correction-constant for the position *I.P.E.* c_e is equal to C_0-C_s.

„ 10, headed c_w, gives the corresponding correction-constant for the position *I.P.W.* c_w is equal to C_s-C_0.

Level.

Column 11, headed M_e, gives the reading of the micrometer when the centre wire and its reflection from the mercury trough coincide, the telescope being in the position *I.P.E.*

„ 12, headed M_w, gives the corresponding reading when the telescope is in the position *I.P.W.*

„ 13, headed M_0, gives the mean of the two preceding readings, *i.e.* $\frac{1}{2}(M_e+M_w)$.

This quantity is not used in the computations but it should remain constant and therefore affords a valuable safe-guard against blunders in reading M_e and M_w. The nature of the quantity is discussed in Chapter IV.

Column 14, headed b_e, gives the level correction-constant for the position *I.P.E.* b_e is equal to C_0-M_e.

„ 15, headed b_w, gives the corresponding correction-constant for the position *I.P.W.* b_w is equal to M_w-C_0.

A mean of the values of C_0 on any night is taken, and c_e and c_w are found by taking the difference between this mean and C_s; but the level is not stable and the same values of b_e and b_w are not always retained for the whole of a night's observations. It will be noticed that the value of C_0 varies greatly between October 31st and November 4th. This was due to movements of the wire diaphragm made intentionally.

On November 6th two values of C_0 are used; this is because a change in the position of the central wire was noted by the observer at the time.

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation						Level				
				C_e	C_w	C_o	C_s	$c_e = C_o - C_s$	$c_w = C_s - C_o$	M_e	M_w	M_o	$b_e = C_o - M_e$	$b_w = M_w - C_o$
1895			h m	d	d	d	d	d	d	d	d	d	d	d
Oct. 31	TEHRAN	CAPTAIN LENOX CONYNGHAM (Telescope No. 1)	2 55	1214·4	1154·0	1184·2	1185·0			1183·3	1184·2	1183·7	+ 0·6	− 1·0
			5 12	1213·6	1155·9	1184·8				1184·4	1182·7	1183·5	+ 0·2	− 1·3
			7 8	...	...	...				1184·1	1183·7	1183·9		
					Mean	1184·5		− 0·5	+ 0·5		Mean	1183·7		
Nov. 1			2 35	1373·5	1323·8	1348·7	1350·0			1341·3	1355·3	1348·3	+ 7·7	+ 7·0
			3 50	1372·5	1326·0	1349·3				1341·5	1356·8	1349·2	+ 8·3	+ 7·5
			6 55	1371·7	1326·6	1349·2				1340·1	1356·4	1348·3		
					Mean	1349·1		− 0·9	+ 0·9		Mean	1348·6		
„ 4			2 45	1721·9	1692·5	1707·2	1705·0			1713·7	1701·7	1707·7	− 6·1	− 5·6
			4 15	1722·3	1692·4	1707·4				1713·1	1701·7	1707·4		
					Mean	1707·3		+ 2·3	− 2·3		Mean	1707·6		
„ 6			2 50	1719·1	1696·4	1707·8	1705·0	+ 2·8	− 2·8	1710·3	1704·5	1707·4	− 2·5	− 3·3
			4 15	1722·9	1697·5	1710·2				1713·1	1705·9	1709·5	− 3·3	− 4·5
			6 30	1721·8	1696·3	1709·1				1712·8	1704·5	1708·7		
					Mean	1709·7		+ 4·7	− 4·7		Mean	1708·5		
„ 25			4 35	1755·9	1662·3	1709·1	1710·0			1700·2	1718·0	1709·1		
			5 25	...	...	...				1699·0	1717·9	1708·5		
			6 15	...	...	...				1699·1	1718·5	1708·8	+ 9·6	+ 8·5
			7 20	...	...	...				1700·0	1717·3	1708·7		
			8 5	1755·8	1663·3	1709·6				1700·5	1717·6	1709·1		
					Mean	1709·4		− 0·6	+ 0·6		Mean	1708·8		
„ 28			4 45	1769·3	1649·8	1709·6	1710·0			1703·9	1714·1	1709·0		
			5 25	...	...	...				1703·1	1713·7	1708·4		
			5 58	...	...	...				1704·1	1714·0	1709·1	+ 5·8	+ 4·1
			7 45	...	...	...				1703·8	1713·5	1708·7		
			8 25	1769·5	1650·1	1709·8				1704·5	1713·6	1709·1		
					Mean	1709·7		− 0·3	+ 0·3		Mean	1708·9		

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation						Level				
				C_e	C_w	C_o	C_s	$c_e = C_o - C_s$	$c_w = C_s - C_o$	M_e	M_w	M_o	$b_e = C_o - M_e$	$b_w = M_w - C_o$
1895			h m	d	d	d	d	d	d	d	d	d	d	d
Oct. 31	POTSDAM	CAPTAIN BURRARD (Telescope No. 2)	0 0	1603·5	1580·0	1591·8	1592·0			1592·5	1593·1	1592·8		
			2 5	1602·9	1582·1	1592·5				1591·7	1592·7	1592·2	− 0·6	+ 0·5
			4 12	1601·1	1581·9	1591·5				1593·2	1591·3	1592·3		
					Mean	1591·9		− 0·1	+ 0·1		Mean	1592·4		
Nov. 1			0 35	1603·7	1581·6	1592·7	1592·0			1592·4	1591·8	1592·1		
			2 6	1603·2	1582·3	1592·8				1593·2	1592·2	1592·7	+ 0·3	− 0·6
			4 10	1602·4	1583·4	1592·9				1591·9	1592·7	1592·3		
					Mean	1592·8		+ 0·8	− 0·8		Mean	1592·4		
„ 4			1 0	1600·5	1583·5	1592·0	1592·0			1593·0	1590·8	1591·9		
			2 30	1601·6	1582·4	1592·0				1592·0	1592·6	1592·3	− 0·5	− 0·1
			4 0	1600·8	1583·7	1592·3				1592·8	1592·5	1592·7		
					Mean	1592·1		+ 0·1	− 0·1		Mean	1592·3		
„ 6			1 8	1600·7	1582·5	1591·6	1592·0			1592·7	1592·1	1592·4	− 0·3	+ 0·1
			2 30	1600·1	1584·1	1592·1				1591·6	1591·9	1591·8		
					Mean	1591·9		− 0·1	+ 0·1		Mean	1592·1		
„ 25			1 55	1598·2	1587·4	1592·8	1592·0			1591·3	1592·9	1592·1		
			3 47	...	...	...				1593·0	1591·7	1592·4	+ 0·3	− 0·8
			4 35	1596·8	1589·5	1593·2				1593·8	1592·0	1592·9		
					Mean	1593·0		+ 1·0	− 1·0		Mean	1592·5		
„ 28			1 45	1597·1	1588·2	1592·7	1592·0			1593·0	1592·9	1593·0		
			4 0	...	...	...				1592·6	1593·0	1592·8	− 0·7	+ 0·1
			5 5	1594·9	1589·1	1592·0				1593·7	1591·7	1592·7		
					Mean	1592·4		+ 0·4	− 0·4		Mean	1592·8		

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation						Level				
				C_e	C_w	C_o	C_s	$c_e = C_o - C_s$	$c_w = C_s - C_o$	M_e	M_w	M_o	$b_e = C_o - M_e$	$b_w = M_w - C_o$
1895			h m	d	d	d	d	d	d	d	d	d	d	d
Dec. 5	TEHRAN	CAPTAIN LENOX CONYNGHAM (Telescope No. 1)	5 10	1785·0	1632·5	1708·8	1710·0			1705·6	1712·0	1708·8		
			6 20	...	...	...				1706·6	1710·8	1708·7	+ 2·6	+ 2·0
			7 5	1784·8	1633·4	1709·1				1707·2	1710·4	1708·8		
			8 15	...	...	...				1707·5	1709·3	1708·4	+ 1·8	+ 0·8
			9 5	1785·0	1633·9	1709·5				1707·1	1709·9	1708·5		
					Mean	1709·1		− 0·9	+ 0·9		Mean	1708·6		
" 7			5 20	1795·6	1623·3	1709·5	1710·0			1707·5	1711·1	1709·3	+ 3·1	+ 2·4
			6 20	...	...	...				1705·2	1712·7	1709·0		
					Mean	1709·5		− 0·5	+ 0·5		Mean	1709·2		
" 10			5 23	1806·6	1613·6	1710·1	1710·0			1704·2	1714·8	1709·5		
			6 15	1807·3	1612·8	1710·1				1703·7	1713·9	1708·8	+ 5·9	+ 3·8
			7 5	1808·0	1612·0	1710·0				1704·8	1713·0	1708·9		
			8 48	...	...	...				1705·4	1714·2	1709·8	+ 5·4	+ 3·6
			9 18	1808·4	1611·7	1710·1				1704·0	1714·0	1709·0		
					Mean	1710·1		+ 0·1	− 0·1		Mean	1709·2		
" 13			5 42	1814·9	1605·3	1710·1	1710·0			1703·8	1715·5	1709·7		
			7 26	1814·3	1606·2	1710·3				1704·1	1714·9	1709·5	+ 6·3	+ 4·8
			9 35	1815·8	1605·9	1710·9				1704·3	1715·1	1709·7		
					Mean	1710·4		+ 0·4	− 0·4		Mean	1709·6		

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation						Level				
				C_e	C_w	C_0	C_s	$c_e = C_0 - C_s$	$c_w = C_s - C_0$	M_e	M_w	M_0	$b_e = C_0 - M_e$	$b_w = M_w - C_0$
1895			h m	d	d	d	d	d	d	d	d	d	d	d
Dec. 5	POTSDAM	CAPTAIN BURRARD (Telescope No. 2)	2 20	1593·3	1590·8	1592·1	1592·0			1593·8	1591·4	1592·6	− 1·4	− 1·2
			5 40	1594·0	1590·8	1592·4				1593·6	1590·7	1592·2		
					Mean	1592·3		+ 0·3	− 0·3		Mean	1592·4		
„ 7			2 15	1594·7	1590·6	1592·7	1592·0			1592·9	1592·7	1592·8	+ 0·1	+ 0·3
			4 15	1593·4	1591·8	1592·6				1592·2	1593·2	1592·7		
					Mean	1592·7		+ 0·7	− 0·7		Mean	1592·8		
„ 10			2 30	1593·2	1591·7	1592·5	1592·0			1593·9	1590·7	1592·3		
			3 55	1593·2	1591·8	1592·5				1593·0	1591·0	1592·0	− 0·9	− 1·5
			6 10	1592·6	1591·2	1591·9				1592·7	1590·7	1591·7		
					Mean	1592·3		+ 0·3	− 0·3		Mean	1592·0		
„ 13			3 0	1594·4	1590·7	1592·6	1592·0			1593·2	1591·4	1592·3		
			4 40	1593·0	1591·7	1592·4				1593·5	1592·0	1592·8	− 0·6	− 0·5
			6 0	1593·1	1591·9	1592·5				1592·7	1592·6	1592·7		
					Mean	1592·5		+ 0·5	− 0·5		Mean	1592·6		

EXPLANATION OF *TABLE II.*

Deduction of Deviation Error from Star Observations.

The first five columns call for no remark.

Column 6 shows whether the star was observed at upper or at lower culmination. U standing for upper and L for lower.

„ 7 gives the number of wires over which the time of the star's transit was observed.

„ 8 contains the value of the deviation constant A, which is equal to $m \sec \delta \sin \zeta$, where m is the value of 1 division of the micrometer head in seconds of time, *viz*: $0^s \cdot 039$. The sign of A depends on those of *sec* δ and *sin* ζ, where δ is the star's declination, ($180° - \delta$) being used for stars observed at lower culmination, and ζ is the star's zenith distance, considered negative if north.

„ 9 contains the observed time of transit taken from the chronographic record.

„ 10 contains the correction to the time of transit on account of diurnal aberration. This correction is equal to $-0 \cdot 0207 \times$ *cosine latitude* $\times$ *secant declination.* It is therefore negative for all stars at upper culmination and positive for all at lower.

„ 11 contains the correction for collimation, this is obtained by multiplying c_e or c_w, as the case may be, by $m \sec \delta$, using ($180° - \delta$) for stars at lower culmination.

„ 12 contains the correction for level, obtained by multiplying b_e or b_w, as the case may be, by $m \sec \delta \cos \zeta$, δ and ζ having the same meanings as before.

„ 13 contains the clock error; this is a preliminary value obtained by taking the mean of the errors given by stars north and south of the zenith. If the numbers of stars at upper and lower culminations respectively be equal, a small error in the adopted value of this quantity will not affect the final mean value of the deviation error.

„ 14 contains the seconds of the corrected time of transit called T. This is the sum of the seconds in the five preceding columns.

„ 15 contains the star's R.A. at the time of the observation. This is either taken from one of the Almanacs or brought up by computation from the Greenwich Catalogue for epoch 1880.

„ 16 contains the difference T − R.A.

„ 17 contains the deviation error $a = \frac{T - R.A.}{A}$. It is to be noted that A contains the quantity m, so that a is in terms of the micrometer divisions.

„ 18 contains the mean of the values in column 17. Sometimes one general mean is taken and sometimes the night is divided into two parts. This depends on whether the values in column 17 show any evidence of a change of position having taken place during the hours of work.

The last column shows whether the telescope was pointing to the East or to the West of North.

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for Diurnal Aberration	Correction for Collimation	Correction for Transit Axis Level	Correction for Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R.A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.) / A = a	Mean a	Deviation East or West of North
TEHRAN (E) and POTSDAM (W)	TEHRAN	1895						h m s	s	s	s	m s	s	h m s	m s	d	d	
		Oct. 31	I. P. W.	B. A. C. 5140	L	4	+0·7866	3 10 17·85	+·41	−0·47	+ 0·52	+0 35·75	54·06	3 10 25·69	+0 28·37	+36·07		
			I. P. E.	Groom. 642	U	3	−0·4683	3 31 55·43	−·26	− ·30	+ ·23	+0 35·75	30·85	3 32 47·76	−0 16·91	+36·11		
			I. P. W.	Groom. 750	U	3	−0·3599	4 3 16·28	−·20	+ ·24	− ·31	+0 35·75	51·76	4 4 6·31	−0 14·55	+40·43	+37·54	E
		Nov. 1	I. P. E.	B. A. C. 5140	L	3	+0·7866	3 11 40·39	+·41	+0·85	− 3·98	−0 45·09	52·58	3 10 25·50	+0 27·08	+34·43		
			I. P. W.	Groom. 642	U	3	−0·4683	3 33 14·45	−·26	+ ·55	+ 2·69	−0 45·10	32·33	3 32 47·92	−0 15·59	+33·29		
			I. P. W.	Groom. 750	U	3	−0·3599	4 4 37·40	−·20	+ ·43	+ 2·30	−0 45·21	54·72	4 4 6·48	−0 11·76	+32·68		
			I. P. E.	Groom. 856	U	6	−0·1772	4 41 36·61	−·11	− ·22	+ 1·45	−0 45·10	52·63	4 40 58·50	−0 5·87	+33·13		
			I. P. E.	Cephei 51 (Hev.)	U	6	−0·6251	6 52 17·26	−·34	− ·72	+ 4·13	−0 43·14	37·19	6 51 59·14	−0 21·95	+35·11	+33·73	E
		Nov. 4	I. P. W.	12 Eridani	U	9	+0·0405	3 8 7·03	−·02	−0·10	− 0·10	−0 25·27	41·54	3 7 40·74	+0 0·80	+19·75		
			I. P. W.	B. A. C. 5140	L	3	+0·7866	3 10 57·71	+·40	+2·16	+ 2·90	−0 25·27	37·90	3 10 24·83	+0 13·07	+16·62		
			I. P. W.	Groom. 642	U	3	−0·4683	3 33 7·92	−·26	−1·39	− 2·15	−0 25·26	38·86	3 32 48·40	−0 9·54	+20·37		
			I. P. E.	5 H. Camelop.	U	13	−0·0691	3 39 49·30	−·05	+0·28	− 0·59	−0 25·26	23·68	3 39 25·12	−0 1·44	+20·84		
			I. P. E.	ξ Ursæ Min.	L	8	+0·1728	3 48 10·64	+·08	− ·43	+ ·46	−0 25·25	45·50	3 47 41·62	+0 3·88	+22·45		
			I. P. E.	γ Eridani	U	10	+0·0305	3 53 37·80	−·02	+ ·09	− ·16	−0 25·24	12·47	3 53 11·78	+0 0·69	+22·62		
			I. P. E.	Groom. 750	U	5	−0·3599	4 4 25·31	−·20	+1·09	− 1·87	−0 25·23	59·10	4 4 7·04	−0 7·94	+22·06		
			I. P. E.	Groom. 848	U	13	−0·1017	4 35 17·31	−·07	+0·36	− 0·74	−0 25·22	51·64	4 34 53·77	−0 2·13	+20·94		
			I. P. E.	α Bur	U	8	+0·0512	4 37 40·62	−·02	+ ·12	− ·07	−0 25·21	15·44	4 37 14·33	+0 1·11	+21·68		
			I. P. E	Groom. 856	U	7	−0·1772	4 41 20·93	−·11	+ ·57	− 1·07	−0 25·21	55·11	4 40 58·84	−0 3·73	+21·05	+20·84	E

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for: Diurnal Aberration	Correction for: Collimation	Correction for: Transit Axis Level	Correction for: Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R A.)/A = a	Mean a	Deviation East or West of North
TEHRAN (E) and POTSDAM (W)	TEHRAN	1895						h m s	s	s	s	m s	s	h m s	m s	d	d	
		Nov. 6	*I. P. W.*	48 H. Cephei	U	7	−0·1181	3 7 34·28	−·08	−0·50	− 0·44	−0 23·96	9·30	3 7 10·87	−0 1·57	+13·29		
			I. P. E.	B. A. C. 5140	L	4	+0·7864	3 11 1·37	+·40	−2·63	+ 1·29	−0 23·95	36·48	3 10 24·43	+0 12·05	+15·32		
			I. P. E.	γ Ursæ Min.	L	13	+0·1211	3 21 16·48	+·05	−0·36	+ 0·10	−0 23·94	52·33	3 20 50·67	+0 1·66	+13·71		
			I. P. E.	Groom. 642	U	3	−0·4683	3 33 3·41	−·26	+1·70	− ·96	−0 23·93	39·96	3 32 48·72	−0 8·76	+18·71		
			I. P. E.	5 H. Camelop.	U	6	−0·0691	3 39 48·29	−·05	+0·34	− ·24	−0 23·92	24·42	3 39 25·20	−0 0·78	+11·29		
			I. P. W.	Groom. 750	U	5	−0·3599	4 4 27·93	−·20	−1·32	− 1·01	−0 23·89	1·51	4 4 7·43	−0 5·92	+16·45		
			I. P. W.	ε Ursæ Min.	L	4	+0·2535	16 56 57·12	+·12	+1·35	+ 0·60	−0 23·83	35·36	4 56 30·48	+0 4·88	+19·25	+15·43	E
		Nov. 25	*I. P. E.*	ε Ursæ Min.	L	3	+0·2535	4 57 23·72	+·12	+0·17	− 1·29	−0 50·33	32·39	4 56 28·79	+0 3·60	+14·20		
			I. P. W.	ε Ursæ Min.	L	2	+0·2535	4 57 24·11	+·12	− ·17	− 1·14	−0 50·33	32·59	4 56 28·79	+0 3·80	+14·99		
			I. P. W	19 H. Camelop	U	7	−0·1415	5 6 18·53	−·09	+ ·12	+ 1·28	−0 50·33	29·51	5 5 31·14	−0 1·63	+11·52		
			I. P W	Groom. 914	U	4	−0·3491	5 29 37·20	−·20	+ ·28	+ 2·54	−0 50·33	49·49	5 28 53·84	−0 4·35	+12·46		
			I. P. W.	ω Draconis	L	7	+0·1041	5 38 22·28	+·05	− ·06	− 0·23	−0 50·33	31·71	5 37 30·26	+0 1·45	+13·93		
			I. P. E.	δ Ursæ Min.	L	5	+0·5563	18 6 31·37	+·28	+ ·39	− 3·38	−0 50·33	38·33	6 5 30·13	+0 8·20	+14·74		
			I. P. W.	δ Ursæ Min.	L	3	+0·5563	18 6 31·57	+·28	− ·39	− 2·99	−0 50·33	38·14	6 5 30·13	+0 8·01	+14·40		
			I. P. E.	Cephei 51 (Hev.)	U	4	−0·6254	6 52 46·11	−·34	− ·48	+ 4·77	−0 50·33	59·73	6 52 10·48	−0 10·75	+17·19		
			I. P. W.	Cephei 51 (Hev.)	U	4	−0·6254	6 52 47·99	−·34	+ ·48	+ 4·22	−0 50·33	2·02	6 52 10·48	−0 8·46	+13·53		
			I. P. E.	λ Ursæ Min.	L	2	+1·7996	7 27 17·87	+·94	+1·31	−11·95	−0 50·33	17·84	7 25 55·66	+0 22·18	+12·32	+13·93	

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for: Diurnal Aberration	Correction for: Collimation	Correction for: Transit Axis Level	Correction for: Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R.A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
TEHRAN (E) and POTSDAM (W)	TEHRAN	1895						h m s	s	s	s	m s	s	h m s	m s	d	d	
		Nov. 28	*I. P. E.*	ε Ursæ Min.	L	5	+0·2535	4 57 22·49	+ ·12	+0·09	− 0·78	−0 49·09	32·83	4 56 28·62	+0 4·21	+16·61		
			I. P. E.	19 H. Camelop.	U	4	−0·1415	5 6 17·58	− ·09	− ·06	+ ·87	−0 49·07	29·23	5 5 31·32	−0 2·09	+14·77		
			I. P. E.	ψ Draconis Aust.	L	5	+0·1211	5 44 34·34	+ ·05	+ ·04	− ·23	−0 49·04	45·16	5 43 43·08	+0 2·08	+17·18		
			I. P. W.	δ Ursæ Min.	L	4	+0·5563	6 6 28·86	+ ·28	− ·20	− 1·44	−0 49·00	38·50	6 5 29·48	+0 9·02	+16·21		
			I. P. E.	δ Ursæ Min.	L	5	+0·5563	6 6 29·18	+ ·28	+ ·20	− 2·04	−0 49·00	38·62	6 5 29·48	+0 9·14	+16·43		
			I. P. E.	Piazzi VI 292	U	8	−0·2209	7 10 4·93	− ·13	− ·09	+ 1·20	−0 48·95	16·96	7 9 21·17	−0 4·21	+19·06		
			I. P. E.	τ Draconis	L	11	+0·1271	19 18 20·28	+ ·06	+ ·04	− 0·25	−0 48·94	31·19	7 17 29·15	+0 2·04	+16·05		
			I. P. W.	λ Ursæ Min.	L	4	+1·7991	7 27 13·20	+ ·94	− ·66	− 5·10	−0 48·92	19·46	7 25 52·56	+0 26·90	+14·95		
			I. P. W.	2320 B.A.C.	U	2	−1·6870	7 54 55·39	− ·91	+ ·63	+ 5·17	−0 48·88	11·40	7 54 34·78	−0 23·38	+13·86		
			I. P. E.	κ Cephei	L	7	+0·1640	8 13 10·80	+ ·08	+ ·05	− 0·41	−0 48·81	21·71	8 12 18·48	+0 3·23	+19·70	+16·48	E
		Dec. 5	*I. P. W.*	δ Ursæ Min.	L	6	+0·5562	6 6 24·21	+ ·28	−0·59	− 0·70	−0 45·44	37·76	6 5 27·82	+0 9·94	+17·87		
			I. P. E.	23 H. Camelop.	U	6	−0·1507	6 29 19·43	− ·09	− ·20	+ ·41	−0 45·43	34·12	6 28 36·83	−0 2·71	+17·98		
			I. P. W.	Cephei 51 (Hev.)	U	5	−0·6255	6 52 46·30	− ·34	+ ·72	+ ·99	−0 45·42	2·25	6 52 14·26	−0 12·01	+19·20		
			I. P. E.	2320 B.A.C.	U	3	−1·6875	7 54 58·32	− ·91	−1·90	+ 2·27	−0 45·41	12·37	7 54 43·21	−0 30·84	+18·28		
			I. P. E.	Cephei 24 (Hev.)	L	1	+1·5492	8 2 48·16	+ ·81	+1·69	− 1·92	−0 45·36	3·38	8 1 30·20	+0 33·18	+21·42		
			I. P. E.	Bradley 1147	U	5	−0·1047	8 7 17·45	− ·07	−0·15	+ 0·22	−0 45·36	32·09	8 6 33·82	−0 1·73	+16·52		
			I. P. E.	κ Cephei	L	5	+0·1640	8 13 6·67	+ ·08	+ ·16	− ·13	−0 45·33	21·45	8 12 17·86	+0 3·59	+21·89		
			I. P. W.	73 Draconis	L	9	+0·1374	8 33 36·71	+ ·06	− ·13	− ·04	−0 45·33	51·27	8 32 48·54	+0 2·73	+19·87	+19·13	E
		Dec. 7	*I. P. E.*	ψ Draconis Aust.	L	12	+0·1211	5 44 30·37	+ ·05	+0·06	− 0·12	−0 45·29	45·07	5 43 42·85	+0 2·22	+18·33		
			I. P. W.	δ Ursæ Mid.	L	6	+0·5562	6 6 24·58	+ ·28	− ·33	− ·84	−0 45·25	38·44	6 5 27·41	+0 11·03	+19·83		
			I. P. W.	23 H. Camelop.	U	10	−0·1507	6 29 19·20	− ·09	+ ·11	+ ·37	−0 45·20	34·39	6 28 37·01	−0 3·38	+22·43		
			I. P. E.	Cephei 51 (Hev.)	U	8	−0·6255	6 52 46·27	− ·34	− ·40	+ 1·54	−0 45·15	1·92	6 52 14·95	−0 13·03	+20·83	+20·36	E

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for: Diurnal Aberration	Collimation	Transit Axis Level	Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R. A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
		1895						h m s	s	s	s	m s	s	h m s	m s	d	d	
TEHRAN (E) and POTSDAM (W)	TEHRAN	Dec. 10	I. P. E.	ψ Draconis Aust.	L	9	+0·1211	5 44 29·73	+·05	−0·01	− 0·23	−0 44·70	44·84	5 43 42·80	+0 2·04	+16·85		
			I. P. W.	35 Draconis	L	7	+0·1592	5 54 47·86	+·07	+ ·02	− ·25	−0 44·69	3·01	5 54 0·27	+0 2·74	+17·21		
			I. P. W.	δ Ursæ Min.	L	8	+0·5562	6 6 22·35	+·28	+ ·07	− 1·34	−0 44·68	36·68	6 5 26·93	+0 9·75	+17·53		
			I. P. E	δ Ursæ Min.	L	3	+0·5562	6 6 22·87	+·28	− ·07	− 2·08	−0 44·68	36·32	6 5 26·93	+0 9·39	+16·88		
			I. P. E.	23 H. Camelop.	U	9	−0·1507	6 29 18·21	−·09	+ ·02	+ 0·92	−0 44·67	34·39	6 28 37·24	−0 2·85	+18·92		
			I. P. W.	Cephei 51 (Hev.)	U	8	−0·6256	6 52 46·71	−·34	− ·08	+ 1·89	−0 44·66	3·52	6 52 15·81	−0 12·29	+19·65		
			I. P. E.	Cephei 24 (Hev.)	L	1	+1·5492	8 2 44·86	+·81	− ·19	− 5·75	−0 44·65	55·08	8 1 25·54	+0 29·54	+19·07		
			I. P. E.	Bradley 1147	U	13	−0·1047	8 7 16·46	−·07	+ ·02	+ 0·66	−0 44·64	32·43	8 6 34·28	−0 1·85	+17·67		
			I. P. E.	κ Cephei	L	5	+0·1640	8 13 5·25	+·08	− ·02	− ·38	−0 44·63	20·30	8 12 17·46	+0 2·84	+17·32		
			I. P. W.	Groom. 1418	U	1	−0·3718	8 25 9·15	−·21	− ·05	+ 1·1	−0 44·63	25·39	8 24 31·96	−0 6·57	+17·67		
			I. P. W.	73 Draconis	L	10	+0·1374	8 33 35·38	+·06	+ ·01	− 0·18	−0 44·62	50·65	8 32 48·21	+0 2·44	+17·76		
			I. P. E.	σ² Ursæ Min.	U	9	−0·0538	9 2 1·16	−·04	+ ·01	+ ·47	−0 44·61	16·99	9 1 17·92	−0 0·93	+17·29		
			I. P. W.	Bradley 2777	L	3	+0·1676	9 8 17·34	+·08	+ ·02	− ·26	−0 44·60	32·58	9 7 29·46	+0 3·12	+18·62	+17·88	E
		Dec. 13	I. P. W.	Cephei 51 (Hev.)	U	2	−0·6256	6 52 48·87	−·34	−0·32	+ 2·39	−0 44·86	5·74	6 52 16·61	−0 10·87	+17·38		
			I. P. E.	τ Draconis	L	7	+0·1271	7 18 16·07	+·06	− ·05	− 0·27	−0 44·84	30·97	7 17 28·41	+0 2·56	+20·14		
			I. P. E.	Cephei 24 (Hev.)	L	3	+1·5492	8 2 41·23	+·81	− ·75	− 6·71	−0 44·81	49·77	8 1 22·74	+0 27·03	+17·45		
			I. P. E.	Bradley 1147	U	7	−0·1047	8 7 16·82	−·07	+ ·06	+ 0·77	−0 44·81	32·77	8 6 34·56	−0 1·79	+17·10		
			I. P. E.	κ Cephei	L	7	+0·1640	8 13 5·54	+·08	− ·07	− ·44	−0 44·80	20·31	8 12 17·22	+0 3·09	+18·84		
			I. P. W.	76 Draconis	L	10	+0·2517	8 50 47·97	+·12	+ ·11	− ·64	−0 44·77	2·79	8 49 57·57	+0 5·22	+20·74		
			I. P. W.	σ² Ursæ Majoris	U	10	−0·0538	9 2 1·34	−·04	− ·04	+ ·42	−0 44·76	16·92	9 1 18·1[illegible]	−0 1·20	+22·30		
			I P. E	Bradley 2777	L	5	+0·1676	9 8 17·64	+·08	− ·07	− ·46	−0 44·75	32·44	9 7 29·18	+0 3·26	+19·45		
			I. P. E.	B.A.C. 7504	L	3	+0·5550	9 20 57·76	+·28	− ·26	− 2·22	−0 44·73	10·83	9 20 1·50	+0 9·33	+16·78		
			I. P. E.	1 (Hev.) Draconis	U	6	−0·1960	9 23 3·91	−·12	+ ·11	+ 1·19	−0 44·70	20·30	9 22 23·69	−0 3·30	+16·84	+18·70	

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for Diurnal Aberration	Correction for Collimation	Correction for Transit Axis Level	Correction for Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R.A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
		1895						h m s	s	s	s	m s	s	h m s	m s	d	d	
TEHRAN (E) and POTSDAM (W)	POTSDAM	Oct. 31	*I. P. W.*	B.A.C. 4165	L	2	+0·8173	0 14 18·34	+·41	−0·13	−0·50	+0 7·76	25·88	0 14 5·34	+0 20·54	+25·13		
			I. P. E.	B.A.C. 4165	L	1	+0·8173	0 14 18·86	+·41	+0·13	+·60	+0 7·76	27·76	0 14 5·34	+0 22·42	+27·44		
			I. P. W.	43 H. Cephei	U	3	−0·2847	0 54 24·76	−·17	+0·05	+·22	+0 7·76	32·62	0 54 39·20	−0 6·58	+23·09		
			I. P. E.	43 H. Cephei	U	2	−0·2847	0 54 25·49	−·17	−0·05	−·26	+0 7·76	32·77	0 54 39·20	−0 6·43	+22·59		
			I. P. E.	Polaris	U	1	−1·0608	1 20 49·89	−·57	−0·18	−·86	+0 7·76	56·04	1 21 22·76	−0 26·72	+25·19		
			I. P. W.	Polaris	U	2	−1·0608	1 20 58·65	−·57	+0·18	+·72	+0 7·76	66·74	1 21 22·76	−0 16·02	+15·10	+23·09	E
		Nov. 1	*I. P. E.*	43 H. Cephei	U	3	−0·2847	0 54 24·02	−·17	+0·41	+0·13	+0 8·00	32·39	0 54 39·14	−0 6·75	+23·70		
			I. P. W.	43 H. Cephei	U	1	−0·2847	0 54 25·23	−·17	−0·41	−·26	+0 8·00	32·39	0 54 39·14	−0 6·75	+23·70		
			I. P. W.	Polaris	U	2	−1·0608	1 20 50·01	−·57	−1·43	−·86	+0 8·00	55·15	1 21 22·66	−0 27·51	+25·93		
			I. P. E.	Polaris	U	1	−1·0608	1 20 46·47	−·57	+1·43	+·43	+0 8·00	55·76	1 21 22·66	−0 26·90	+25·36		
			I. P. W.	50 Cassiop.	U	1	−0·0419	1 54 26·12	−·04	−0·10	−·07	+0 8·00	33·91	1 54 35·20	−0 1·29	+30·79		
			I. P. W.	Groom. 750	U	3	−0·2564	4 3 53·57	−·15	−0·38	−·24	+0 8·00	60·80	4 4 6·48	−0 5·68	+22·11	+25·27	E
		Nov. 4	*I. P. W.*	Polaris	U	2	−1·0608	1 20 48·99	−·57	−0·18	−0·14	+0 7·80	55·90	1 21 22·39	−0 26·49	+24·97		
			I. P. E.	Polaris	U	1	−1·0608	1 20 51·05	−·57	+0·18	−·72	+0 7·80	57·74	1 21 22·39	−0 24·65	+23·24		
			I. P. E.	50 Cassiop.	U	4	−0·0419	1 54 26·63	−·04	+0·01	−·06	+0 7·80	34·34	1 54 35·22	−0 0·88	+21·00		
			I. P. W.	50 Cassiop.	U	4	−0·0419	1 54 26·20	−·04	−0·01	−·01	+0 7·80	33·94	1 54 35·22	−0 1·28	+30·55		
			I. P. W.	4 Ursæ Min.	L	3	+0·1426	2 9 5·83	+·06	+0·02	+·01	+0 7·80	13·72	2 9 11·31	+0 2·41	+16·91		
			I. P. W.	48 H. Cephei	U	3	−0·0749	3 7 1·92	−·06	−0·02	−·02	+0 7·80	9·62	3 7 10·78	−0 1·16	+15·49		
			I. P. E.	ζ Ursæ Min.	L	4	+0·1434	3 47 36·25	+·06	−0·02	+·06	+0 7·80	44·15	3 47 41·62	+0 2·53	+17·64	+21·40	E

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for Diurnal Aberration	Correction for Collimation	Correction for Transit Axis Level	Correction for Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R. A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
		1895						h m s	s	s	s	m s	s	h m s	m s	d	d	
TEHRAN (E) and POTSDAM (W)	POTSDAM	Nov. 6	*I. P. E.*	Polaris	U	2	−1·0608	1 20 51·93	−·57	−0·18	−0·43	+0 7·59	58·34	1 21 22·02	−0 23·68	+22·32		
			I. P. W.	Polaris	U	2	−1·0608	1 20 52·20	−·57	+·18	+·14	+0 7·59	59·54	1 21 22·02	−0 22·48	+22·13		
			I. P. W.	50 Cassiop.	U	4	−0·0419	1 54 27·03	−·04	+·01	+·01	+0 7·59	34·60	1 54 35·24	−0 0·64	+15·28		
			I. P. E.	50 Cassiop.	U	4	−0·0419	1 54 26·93	−·04	−·01	−·04	+0 7·59	34·43	1 54 35·24	−0 0·81	+19·33		
			I. P. E.	4 Ursæ Min.	L	3	+0·1426	2 9 6·49	+·06	+·02	+·04	+0 7·59	14·20	2 9 11·31	+0 2·89	+20·27	+19·87	E
		Nov. 25	*I. P. W.*	4 Ursæ Min.	L	3	+0·1426	2 9 6·96	+·06	+0·19	+0·10	+0 7·38	14·69	2 9 11·89	+0 2·80	+19·63		
			I. P. E.	β Ursæ Min.	L	4	+0·1167	2 50 51·35	+·05	−·15	−·03	+0 7·38	58·60	2 50 57·27	+0 1·33	+11·40		
			I. P. E.	47 H. Cephei	U	5	−0·0913	2 52 11·11	−·07	+·20	+·05	+0 7·38	18·67	2 52 20·15	−0 1·48	+16·21		
			I. P. W.	48 H. Cephei	U	5	−0·0749	3 7 3·03	−·06	−·18	−·13	+0 7·38	10·04	3 7 11·25	−0 1·21	+16·15		
			I. P. W.	B.A.C. 5140	L	2	+0·6035	3 10 24·95	+·30	+·94	+·58	+0 7·38	34·15	3 10 23·52	+0 10·63	+17·60	+16·20	E
		Nov. 28	*I. P. E.*	4 Ursæ Min.	L	1	+0·1426	2 9 6·65	+·06	−0·07	+0·08	+0 7·00	13·72	2 9 12·05	+0 1·67	+11·71		
			I. P. W.	β Ursæ Min.	L	4	+0·1167	2 50 51·65	+·05	+·06	−·01	+0 7·00	58·75	2 50 57·36	+0 1·39	+11·91		
			I. P. W.	47 H. Cephei	U	4	−0·0913	2 52 11·80	−·07	−·08	+·02	+0 7·00	18·67	2 52 20·12	−0 1·45	+15·88		
			I. P. W.	48 H. Cephei	U	2	−0·0749	3 7 3·41	−·06	−·07	+·02	+0 7·00	10·30	3 7 11·25	−0 0·95	+12·68		
			I. P. W.	B.A.C. 5140	L	2	+0·6035	3 10 24·36	+·30	+·38	−·07	+0 7·00	31·97	3 10 23·72	+0 8·25	+13·67		
			I. P. W.	Groom. 848	U	3	−0·0626	4 34 47·33	−·05	−·06	+·01	+0 7·00	54·23	4 34 55·08	−0 0·85	+13·58		
			I. P. E.	ε Ursæ Min.	L	9	+0·2040	4 56 24·48	+·09	−·11	+·14	+0 7·00	31·60	4 56 28·62	+0 2·98	+14·61	+13·43	

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for: Diurnal Aberration	Correction for: Collimation	Correction for: Transit Axis Level	Correction for: Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R.A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
TEHRAN (E) and POTSDAM (W)	POTSDAM	1895						h m s	s	s	s	m s	s	h m s	m s	d	d	
		Dec. 5	*I. P. W.*	γ Ursæ Min.	L	5	+0·1046	3 20 46·94	+·04	+0·04	+ 0 09	+0 4·85	51·96	3 20 50·84	+0 1·12	+10·71		
			I. P. W.	ε Ursæ Min.	L	2	+0·2040	4 56 26·54	+·09	+ ·09	+ ·24	+0 4·85	31·81	4 56 28·31	+0 3·50	+17·16	+13·94	E
		Dec. 7	*I. P. E.*	β Ursæ Min.	L	6	+0·1167	2 50 55·25	+·05	−0·11	− 0·01	+0 3·68	58·86	2 50 57·67	+0 1·19	+10·20		
			I. P. E.	47 H. Cephei	U	6	−0·0913	2 52 14·86	−·07	+ ·14	+ ·02	+0 3·68	18·63	2 52 19·95	−0 1·32	+14·46		
			I. P. E.	48 H. Cephei	U	4	−0·0749	3 7 6·50	−·06	+ ·12	+ ·02	+0 3·68	10·26	3 7 11·18	−0 0·92	+12·28		
			I. P. W.	γ Ursæ Min.	L	4	+0·1046	3 20 48·20	+·04	+ ·09	− ·02	+0 3·68	51·99	3 20 50·89	+0 1·10	+10·52		
			I. P. W.	ζ Ursæ Min.	L	4	+0·1434	3 47 39·39	+·06	+ ·13	− ·04	+0 3·68	43·22	3 47 41·22	+0 2·00	+13·95		
			I. P. E.	Groom. 750	U	3	−0·2566	4 4 2·46	−·15	+ ·33	+ ·04	+0 3·68	6·36	4 4 9·99	−0 3·63	+14·15	+12·59	E
		Dec. 10	*I. P. E.*	48 H. Cephei	U	6	−0·0749	3 7 7·83	−·06	+0·05	− 0·14	+0 2·69	10·37	3 7 11·11	−0 0·74	+ 9·88		
			I. P. E.	B.A.C. 5140	L	3	+0·6032	3 10 26·68	+·30	− ·28	+ ·65	+0 2·69	30·04	3 10 25·20	+0 4·84	+ 8·02		
			I. P. E.	γ Ursæ Min.	L	3	+0·1046	3 20 49·06	+·04	− ·04	+ ·06	+0 2·69	51·81	3 20 50·99	+0 0·82	+ 7·84		
			I. P. W.	19 Ursæ Min.	L	5	+0·1268	4 13 41·62	+·05	+ ·05	+ ·15	+0 2·69	44·56	4 13 42·57	+0 1·99	+15·69		
			I. P. E.	Groom. 966	U	6	−0·0576	5 25 50·72	−·05	+ ·05	− ·12	+0 2·69	53·29	5 25 54·51	−0 1·22	+21·18	+12·52	E
		Dec. 13	*I. P. E.*	B.A.C. 5140	L	4	+0·6032	3 10 31·46	+·30	−0·47	+ 0·43	+0 1·90	33·62	3 10 25·70	+0 7·92	+13·13		
			I. P. E.	γ Ursæ Min.	L	6	+0·1046	3 20 50·20	+·04	− ·06	+ ·43	+0 1·90	52·51	3 20 51·09	+0 1·42	+13·57		
			I. P. W.	ζ Ursæ Min.	L	4	+0·1434	3 45 41·21	+·06	+ ·09	+ ·06	+0 1·90	43·32	3 47 41·41	+0 1·91	+13·32		
			I. P. W.	Groom. 750	U	3	−0·2566	4 4 4·70	−·15	− ·24	− ·20	+0 1·90	6·01	4 4 9·86	−0 3·85	+15·00		
			I. P. E.	19 Ursæ Min.	L	5	+0·1268	4 12 42·57	+·05	− ·08	+ ·06	+0 1·90	44·50	4 13 42·62	+0 1·88	+14·83		
			I. P. E.	Groom. 966	U	6	−0·0576	5 25 51·73	−·05	+ ·08	− ·08	+0 1·90	53·58	5 25 54·62	−0 1·04	+18·05	+14·65	E

EXPLANATION OF *TABLE III.*

Direct Comparison of Clocks.

The first four columns call for no remark.

Column 5 contains the time by the Tehran clock of the middle of the period during which signals were being sent or received.

„ 6 contains the time by the Potsdam clock of the same instant.

„ 7 contains the difference between the clocks as read off the chronographic record.

„ 8 gives the mean, to the nearest whole second, of the times given in column 5.

„ 9 gives the mean of those in column 6.

„ 10 contains the mean of two corresponding differences in column 7, and is the difference between the clocks, freed from the effects of retardation, at the epoch given, in terms of the two clocks respectively, in columns 8 and 9.

„ 11 contains the deduced relative hourly rate of the clocks. It is obtained as follows:—

The change in the difference between the clocks between two consecutive comparisons is divided by the interval between the comparisons, expressed in hours, and the result is the rate during the interval.

TABLE III. DIRECT COMPARISON OF CLOCKS.

Arc	Astronomical Date	Comparison made at	Clock Signals transmitted from	Time of Comparison by Tehran Clock	Corresponding Time by Potsdam Clock	Observed Difference between the Clocks	Mean Time of Comparison by E Clock $-T_E$	Mean Time of Comparison by W Clock $-T_W$	Mean Difference between the Clocks at Epochs T_E and T_W $-D$	Relative Hourly Clock Rate at Epochs T_E and T_W
	1895			h m s	h m s	h m s	h m s	h m s	h m s	s
TEHRAN (E) and POTSDAM (W)	Oct. 31	Potsdam	Tehran	5 42 0·750	3 9 5·000	2 32 55·750				
		Tehran	Potsdam	5 51 56·140	3 19 0·000	2 32 56·140	5 46 58	3 14 3	2 32 55·945	*
	Nov. 1	Potsdam	Tehran	6 1 17·699	3 27 1·000	2 34 16·699				
		Tehran	Potsdam	6 10 17·000	3 36 0·035	2 34 16·965	6 5 45	3 31 31	2 34 16·832	†
	" 2	Potsdam	Tehran	5 31 0·041	2 57 4·000	2 33 56·041				
		Tehran	Potsdam	5 38 57·315	3 5 1·000	2 33 56·315	5 34 59	3 1 3	2 33 56·178	
										+ 0·021
	" 4	Potsdam	Tehran	5 24 0·031	2 50 3·000	2 33 57·031				
		Tehran	Potsdam	5 31 58·311	2 58 1·000	2 33 57·311	5 27 59	2 54 2	2 33 57·171	
		Potsdam	Tehran	6 29 0·050	3 55 3·000	2 33 57·050				+ 0·033
		Tehran	Potsdam	6 42 58·365	4 9 1·000	2 33 57·365	6 35 59	4 2 2	2 33 57·208	
										− 0·039
	" 6	Potsdam	Tehran	5 51 0·200	3 17 5·000	2 33 55·200				
		Tehran	Potsdam	6 9 56·531	3 36 1·000	2 33 55·531	6 0 28	3 26 33	2 33 55·366	
	" 24	Potsdam	Tehran	6 30 24·000	3 56 2·115	2 34 21·885				
		Tehran	Potsdam	6 38 25·150	4 4 3·000	2 34 22·150	6 34 25	4 0 3	2 34 22·018	

* At Tehran break contact of Clock altered just before Clock Comparison. † At Tehran the pendulum was jarred just before Clock Comparison.

TABLE III. DIRECT COMPARISON OF CLOCKS.

Arc	Astronomical Date	Comparison made at	Clock Signals transmitted from	Time of Comparison by Tehran Clock	Corresponding Time by Potsdam Clock	Observed Difference between the Clocks	Mean Time of Comparison by E Clock = T_E	Mean Time of Comparison by W Clock = T_W	Mean Difference between the Clocks at Epochs T_E and T_W = D	Relative Hourly Clock Rate at Epochs T_E and T_W
TEHRAN (E) and POTSDAM (W)	1895			h m s	h m s	h m s	h m s	h m s	h m s	s
	Nov. 25	Potsdam	Tehran	6 25 1·602	3 50 40·000	2 34 21·602				− 0·011
		Tehran	Potsdam	6 28 24·900	3 54 3·000	2 34 21·900	6 26 43	3 52 22	2 34 21·751	
										− 0·026
	„ 28	Potsdam	Tehran	6 45 20·688	4 11 1·000	2 34 19·688				
		Tehran	Potsdam	6 51 21·035	4 17 1·000	2 34 20·035	6 48 21	4 14 1	2 34 19·862	
										− 0·034
	Dec. 5	Potsdam	Tehran	7 15 15·000	4 41 1·000	2 34 14·000				
		Tehran	Potsdam	7 20 18·269	4 46 4·000	2 34 14·269	7 17 47	4 43 33	2 34 14·135	
										− 0·028
	„ 7	Potsdam	Tehran	7 25 16·000	4 51 3·350	2 34 12·650				
		Tehran	Potsdam	Current interrupted before comparison was made.			7 25 16	4 51 3	2 34 12·801*	− 0·024
										− 0·022
	„ 10	Potsdam	Tehran	7 33 12·075	4 59 1·000	2 34 11·075				
		Tehran	Potsdam	7 38 13·395	5 4 2·000	2 34 11·395	7 35 43	5 1 32	2 34 11·235	
										− 0·010
	„ 13	Potsdam	Tehran	7 40 9·367	5 5 59·000	2 34 10·367				
		Tehran	Potsdam	7 44 12·668	5 10 2·000	2 34 10·668	7 42 11	5 8 1	2 34 10·518	

* Obtained by applying the mean value of retardation (+0s·151) to the difference observed at Potsdam.

EXPLANATION OF *TABLE IV.*

Transits of Clock Stars and Deduction of the Clock Correction.

The heading contains the name of the arc, and indicates the station the observations at which are to be found below, giving at the same time the latitude of the station, the name of the observer and the telescope used.

Column 1 contains the astronomical date.

„ 2 contains the star's name, or number in the Greenwich Catalogue for 1880.

„ 3 contains the star's declination and when south it is indicated by a minus sign. This being given, and also the latitude of the station, it is possible to compute all the corrections to the observed time of transit without reference to anything beyond the foregoing tables.

„ 4 contains the star's aspect, that is, it shews whether the star at culmination was north or south of the zenith of the station. It is convenient to give this information as it renders it easy to see whether the deviation correction has been entered with the proper sign.

„ 5, 6 & 7 explain themselves.

„ 8, 9 & 11 contain respectively the corrections for collimation, level and diurnal aberration. These corrections are computed in precisely the same manner as those in Table II.

„ 10 contains the deviation correction. To form this the appropriate value of a is taken from Table II and multiplied by $m \sec \delta \sin \zeta$. It is to be noted that the quantity a given in Table II is an error, not a correction, so that when forming the correction a A the sign must be changed.

„ 12 contains the corrected time of transit = T. This is the algebraic sum of the five preceding columns.

„ 13 contains the star's R.A. brought up from the Almanac or Catalogue to the epoch of the observation.

„ 14 contains the difference between the two preceding columns with the sign appropriate to a correction.

„ 15 contains the mean value of the clock correction by stars observed in the same instrumental position. In column 7 the mean of the observed times of transit of groups is taken out, and is the epoch of the mean clock correction in column 15.

„ 16 & 17 contain the daily mean of the two instrumental positions, and the epoch to which it corresponds. If there are two groups, one *I.P.E.* and one *I.P.W.*, the mean of the two clock corrections is taken as corresponding to the mean of the two epochs; but if there are three groups, one *I.P.W.*, one *I.P.E.* and again one *I.P.W.*, the mean of the two values *I.P.W.* is taken for the mean of their epochs, and then this mean value and epoch are combined with the *I.P.E.* value and epoch to obtain the quantities to be entered in these columns.

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat.* 35° 42′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
1895 Oct. 31	α Persei	49 30	N	W	15	3 16 18·50	+0·03	−0·06	+ 0·54	−0·03	3 16 18·98	3 16 54·95	+0 35·97			
	520 Gr. 80	20 26	S	W	15	3 17 51·73	+0·02	−0·04	− 0·41	−0·02	3 17 51·28	3 18 27·18	+0 35·90			
	525 „	48 42	N	W	12	3 20 4·11	+0·03	−0·06	+ 0·50	−0·03	3 20 4·55	3 20 40·54	+0 35·99	(a)		
	549 „	24 7	S	W	15	3 27 42·43	+0·03	−0·04	− 0·32	−0·02	3 27 42·07	3 28 17·97	+0 35·90	+0 35·940		
		Mean	...	...	...	3 20 29										
	553 Gr. 80	22 52	S	E	15	3 30 16·49	−0·02	+0·02	− 0·35	−0·02	3 30 16·12	3 30 52·01	+0 35·89			
	ν Persei	42 15	N	E	14	3 37 32·54	−0·03	+0·03	+ 0·23	−0·02	3 37 32·75	3 38 8·72	+0 35·97			
	η Tauri	23 47	S	E	15	3 40 43·46	−0·02	+0·02	− 0·33	−0·02	3 40 43·11	3 41 18·99	+0 35·88			
	ζ Persei	31 35	S	E	15	3 47 0·78	−0·02	+0·03	− 0·12	−0·02	3 47 0·65	3 47 36·57	+0 35·92			
	ε Persei	39 43	N	E	15	3 50 17·44	−0·03	+0·03	+ 0·14	−0·02	3 50 17·56	3 50 53·42	+0 35·86			
	ξ Persei	35 30	S	E	14	3 51 37·99	−0·02	+0·03	− 0·01	−0·02	3 51 37·97	3 52 13·93	+0 35·96	(b)		
	A′ Tauri	21 48	S	E	15	3 57 58·14	−0·02	+0·02	− 0·38	−0·02	3 57 57·74	3 58 33·64	+0 35·90	+0 35·911	+0 35·926	3 32 47
		Mean	...	...	...	3 45 4										
	c Persei	47 26	N	W	7	4 0 31·57	+0·03	−0·06	+ 0·44	−0·02	4 0 31·96	4 1 7·71	+0 35·75			
	657 Gr. 80	48 9	N	W	13	4 6 40·63	+0·03	−0·06	+ 0·47	−0·03	4 6 41·04	4 7 16·71	+0 35·67			
	677 „	21 31	S	W	14	4 12 52·76	+0·02	−0·04	− 0·38	−0·02	4 12 52·34	4 13 28·06	+0 35·72	(c)		
	721 „	42 49	N	W	15	4 25 30·72	+0·03	−0·05	+ 0·25	−0·02	4 25 30·93	4 26 6·77	+0 35·84	+0 35·745	+0 35·877 $= \frac{1}{2}\left(\frac{a+c}{2}+b\right)$	3 43 41
		Mean	...	...	...	4 11 24										
	ψ′ Aurigæ	49 20	N	W	14	6 16 17·98	+0·03	−0·08	+ 0·53	−0·03	6 16 18·43	6 16 54·23	+0 35·80			
	1092 Gr. 80	21 42	S	W	10	6 18 53·53	+0·02	−0·05	− 0·38	−0·02	6 18 53·10	6 19 28·75	+0 35·65			
	51 Aurigæ	39 29	N	W	9	6 30 51·89	+0·03	−0·07	+ 0·12	−0·02	6 30 51·95	6 31 27·80	+0 35·85	+0 35·767		
		Mean	...	...	...	6 22 1										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat.* 35° 42′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit =T	Right Ascension =R.A.	Clock Correction: By each Star = R.A.−T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Oct. 31	θ Geminorum	34 5	S	E	13	6 45 20·77	−0·02	+0·01	− 0·05	−0·02	6 45 20·69	6 45 56·65	+0 35·96			
	15 Lyncis	58 33	N	E	10	6 47 40·31	−0·04	+0·01	+ 1·09	−0·03	6 47 41·34	6 48 17·34	+0 36·00			
	ζ Geminorum	20 44	S	E	20	6 57 21·36	−0·02	+0·01	− 0·40	−0·02	6 57 20·93	6 57 56·85	+0 35·92	+0 35·960	+0 35·864	6 36 4
		Mean	...	...	...	6 50 7										
Nov. 1	τ Persei	52 20	N	W	5	2 47 38·29	+0·06	+0·43	+ 0·61	−0·03	2 47 39·36	2 46 54·16	−0 45·20			
	434 Gr. 80	31 31	S	W	18	2 51 44·48	+0·04	+0·32	− 0·11	−0·02	2 51 44·71	2 50 59·50	−0 45·21			
	438 „	39 15	N	W	13	2 52 52·25	+0·05	+0·35	+ 0·10	−0·02	2 52 52·73	2 52 7·57	−0 45·16			
	454 „	26 3	S	W	18	2 56 32·56	+0·04	+0·30	− 0·24	−0·02	2 56 32·64	2 55 47·35	−0 45·29	(a) −0 45·215		
		Mean	...	...	...	2 52 12										
	β Persei	40 33	N	E	13	3 2 9·70	−0·05	+0·39	+ 0·14	−0·02	3 2 10·16	3 1 25·05	−0 45·11			
	471 Gr. 80	28 41	S	E	13	3 4 7·22	−0·04	+0·34	− 0·18	−0·02	3 4 7·32	3 3 22·30	−0 45·02			
	δ Arietis	19 20	S	E	13	3 6 27·04	−0·04	+0·30	− 0·39	−0·02	3 6 26·89	3 5 41·81	−0 45·08			
	488 Gr. 80	20 40	S	E	13	3 9 41·42	−0·04	+0·31	− 0·36	−0·02	3 9 41·31	3 8 56·34	−0 44·97			
	α Persei	49 30	N	E	8	3 17 38·94	−0·05	+0·45	+ 0·48	−0·03	3 17 39·79	3 16 54·98	−0 44·81			
	520 Gr. 80	20 26	S	E	15	3 19 12·26	−0·04	+0·31	− 0·37	−0·02	3 19 12·14	3 18 27·20	−0 44·94			
	525 „	48 42	N	E	11	3 21 24·73	−0·05	+0·44	+ 0·45	−0·03	3 21 25·54	3 20 40·56	−0 44·98			
	528 „	49 9	N	E	15	3 22 41·16	−0·05	+0·45	+ 0·47	−0·03	3 22 42·00	3 21 56·96	−0 45·04	(b) −0 44·994		
		Mean	...	...	...	3 12 55										
	549 Gr. 80	24 7	S	W	18	3 29 3·14	+0·04	+0·29	− 0·29	−0·02	3 29 3·16	3 28 17·99	−0 45·17			
	553 „	22 52	S	W	18	3 31 37·28	+0·04	+0·29	− 0·32	−0·02	3 31 37·27	3 30 52·02	−0 45·25			
	δ Persei	47 27	N	W	18	3 36 16·74	+0·05	+0·39	+ 0·39	−0·02	3 36 17·55	3 35 32·27	−0 45·28			
	ν Persei	42 15	N	W	18	3 38 53·36	+0·05	+0·36	+ 0·20	−0·02	3 38 53·95	3 38 8·75	−0 45·20			
	η Tauri	23 47	S	W	18	3 42 4·20	+0·04	+0·29	− 0·30	−0·02	3 42 4·21	3 41 19·01	−0 45·20	(c) −0 45·220	−0 45·106 $=\frac{1}{2}\left(b+\frac{a+c}{2}\right)$	3 13 25
		Mean	...	...	...	3 35 35										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat.* 35° 42′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Nov. 1	ο Persei	47 26	N	W	18	4 1 52·17	+0·05	+0·42	+ 0·39	−0·02	4 1 53·01	4 1 7·73	−0 45·28			
	657 Gr. 80	48 9	N	W	19	4 8 1·11	+0·05	+0·43	+ 0·42	−0·03	4 8 1·98	4 7 16·74	−0 45·24			
	677 „	21 31	S	W	18	4 14 13·34	+0·04	+0·30	− 0·34	−0·02	4 14 13·32	4 13 28·08	−0 45·24			
	δ Tauri	17 18	S	W	18	4 17 42·33	+0·04	+0·29	− 0·43	−0·02	4 17 42·21	4 16 57·08	−0 45·13	(d) −0 45·223		
		Mean	...	...	...	4 10 27										
	715 Gr. 80	53 41	N	E	13	4 24 32·55	−0·06	+0·52	+ 0·68	−0·03	4 24 33·66	4 23 48·79	−0 44·87			
	721 „	42 49	N	E	13	4 26 51·15	−0·05	+0·44	+ 0·22	−0·02	4 26 51·74	4 26 6·80	−0 44·94			
	731 „	41 3	N	E	13	4 30 14·47	−0·05	+0·43	+ 0·16	−0·02	4 30 14·99	4 29 30·10	−0 44·89			
	735 „	53 16	N	E	13	4 32 28·62	−0·06	+0·51	+ 0·66	−0·03	4 32 29·70	4 31 44·78	−0 44·92			
	776 „	37 18	N	E	13	4 43 40·19	−0·04	+0·41	+ 0·05	−0·02	4 43 40·59	4 42 55·49	−0 45·10			
	787 „	36 32	N	E	13	4 46 25·84	−0·04	+0·40	+ 0·02	−0·02	4 46 26·20	4 45 41·24	−0 44·96			
	ι Aurigæ	33 0	S	E	13	4 50 58·81	−0·04	+0·39	− 0·07	−0·02	4 50 59·07	4 50 14·15	−0 44·92	(e) −0 44·943		
		Mean	...	...	...	4 36 27										
	α Aurigæ	45 54	N	W	20	5 9 45·83	+0·05	+0·41	+ 0·33	−0·02	5 9 46·60	5 9 1·39	−0 45·21			
	λ Aurigæ	40 1	N	W	18	5 12 35·05	+0·05	+0·38	+ 0·13	−0·02	5 12 35·59	5 11 50·40	−0 45·19			
	877 Gr. 80	21 59	S	W	13	5 13 47·48	+0·04	+0·31	− 0·33	−0·02	5 13 47·48	5 13 2·50	−0 44·98	(f) −0 45·127	−0 45·059 $=\frac{1}{2}\left(e+\frac{d+f}{2}\right)$	4 38 51
		Mean	...	...	...	5 12 3										
	*1092 Gr. 80	21 42	S	W	20	6 20 13·90	+0·04	+0·30	− 0·34	−0·02	6 20 13·88	6 19 28·78	−0 45·10			
	1099 „	30 33	S	W	18	6 22 38·53	+0·04	+0·34	− 0·13	−0·02	6 22 38·76	6 21 53·55	−0 45·21			
	1104 „	20 17	S	W	13	6 23 32·89	+0·04	+0·30	− 0·37	−0·02	6 23 32·84	6 22 47·80	−0 45·04			
	1127 „	28 6	S	W	18	6 29 24·60	+0·04	+0·33	− 0·20	−0·02	6 29 24·75	6 28 39·66	−0 45·09	−0 45·110		
		Mean	...	...	...	6 23 57										

* Before the observation of 1092 the clock was wound, and stopped for 2 seconds apparently. It was assumed that exactly 2 seconds were lost, and the times of transit were consequently increased by that amount.

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat.* 35° 41', BY LENOX CONYNGHAM WITH TELESCOPE No. 1.																
Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_E
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Nov. 1	51 Aurigæ	39 29	N	E	13	6 32 12·30	−0·05	+0·42	+ 0·11	−0·02	6 32 12·76	6 31 27·84	−0 44·92			
	1144 Gr. 80	28 21	S	E	13	6 33 45·01	−0·04	+0·36	− 0·19	−0·02	6 33 45·12	6 33 0·17	−0 44·95			
	ε Geminorum	25 14	S	E	13	6 38 17·33	−0·04	+0·35	− 0·26	−0·02	6 38 17·36	6 37 32·55	−0 44·81			
	θ Geminorum	34 5	S	E	13	6 46 41·20	−0·04	+0·39	− 0·04	−0·02	6 46 41·49	6 45 56·69	−0 44·80	−0 44·870	−0 44·990	6 30 51
		Mean	...	...	...	6 37 44										
„ 4	454 Gr. 80	26 3	S	E	13	2 56 12·93	+0·10	−0·26	− 0·15	−0·02	2 56 12·60	2 55 47·39	−0 25·21			
	ρ Persei	38 26	N	E	13	2 58 57·17	+0·11	−0·30	+ 0·05	−0·02	2 58 57·01	2 58 31·70	−0 25·31			
	β Persei	40 33	N	E	13	3 1 50·45	+0·12	−0·31	+ 0·09	−0·02	3 1 50·33	3 1 25·10	−0 25·23			
	471 Gr. 80	28 41	S	E	13	3 3 47·80	+0·10	−0·27	− 0·11	−0·02	3 3 47·50	3 3 22·34	−0 25·16	−0 25·228		
		Mean	...	...	...	3 0 12										
	δ Arietis	19 20	S	W	10	3 6 7·76	−0·09	−0·22	− 0·32	−0·02	3 6 7·11	3 5 41·85	−0 25·26			
	12 Eridani	−29 24	S	W	13	3 8 7·03	−0·10	−0·10	− 0·84	−0·02	3 8 5·97	3 7 40·74	−0 25·23			
	488 Gr. 80	20 40	S	W	10	3 9 22·30	−0·10	−0·23	− 0·22	−0·02	3 9 21·73	3 8 56·38	−0 25·35			
	α Persei	49 30	N	W	7	3 17 20·55	−0·14	−0·33	+ 0·30	−0·03	3 17 20·35	3 16 55·04	−0 25·31			
	520 Gr. 80	20 26	S	W	10	3 18 53·16	−0·10	−0·22	− 0·23	−0·02	3 18 52·59	3 18 27·24	−0 25·35			
	525 „	48 42	N	W	13	3 21 6·13	−0·14	−0·32	+ 0·28	−0·03	3 21 5·92	3 20 40·63	−0 25·29			
	528 „	49 9	N	W	10	3 22 22·57	−0·14	−0·32	+ 0·29	−0·03	3 22 22·37	3 21 57·02	−0 25·35			
	549 „	24 7	S	W	13	3 28 43·86	−0·10	−0·23	− 0·18	−0·02	3 28 43·33	3 28 18·04	−0 25·29			
	553 „	22 52	S	W	13	3 31 17·98	−0·10	−0·23	− 0·20	−0·02	3 31 17·43	3 30 52·07	−0 25·36			
	δ Persei	47 27	N	W	13	3 35 58·01	−0·13	−0·32	+ 0·26	−0·02	3 35 57·80	3 35 32·34	−0 25·46	(a) −0 25·325	−0 25·277	3 10 4
		Mean	...	...	...	3 19 56										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat.* 35° 42′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Nov. 4	η Tauri	23 47	S	E	13	3 41 44·66	+0·10	−0·25	− 0·18	−0·02	3 41 44·31	3 41 19·06	−0 25·25			
	ε Persei	39 43	N	E	13	3 51 18·93	+0·12	−0·31	+ 0·07	−0·02	3 51 18·79	3 50 53·51	−0 25·28			
	γ Eridani	−13 48	S	E	13	3 53 37·80	+0·09	−0·16	− 0·63	−0·02	3 53 37·08	3 53 11·78	−0 25·30			
	A′ Tauri	21 48	S	E	13	3 58 59·36	+0·10	−0·25	− 0·21	−0·02	3 58 58·98	3 58 33·72	−0 25·26			
	c Persei	47 26	N	E	13	4 1 33·01	+0·13	−0·34	+ 0·24	−0·02	4 1 33·02	4 1 7·82	−0 25·20			
	787 Gr. 80	36 32	N	E	13	4 46 6·72	+0·11	−0·30	+ 0·01	−0·02	4 46 6·52	4 45 41·33	−0 25·19			
	ι Aurigæ	33 0	S	E	13	4 50 39·68	+0·11	−0·28	− 0·05	−0·02	4 50 39·44	4 50 14·23	−0 25·21			
	809 Gr. 80	37 44	N	E	13	4 52 38·19	+0·11	−0·30	+ 0·04	−0·02	4 52 38·02	4 52 12·79	−0 25·23			
	ε Aurigæ	43 40	N	E	13	4 54 56·78	+0·12	−0·33	+ 0·16	−0·02	4 54 56·71	4 54 31·41	−0 25·30	(*b*) −0 25·247	−0 25·286	3 49 30
		Mean	...	...	...	4 19 4										
	835 Gr. 80	20 17	S	W	13	5 2 6·04	−0·10	−0·22	− 0·23	−0·02	5 2 5·47	5 1 40·01	−0 25·46	(*c*) −0 25·460	−0 25·320 $=\frac{1}{2}\left(b+\frac{a+c}{2}\right)$	4 15 3
		Mean	...	...	...	5 2 6										
„ 6	ρ Persei	38 26	N	W	13	2 58 55·95	−0·14	−0·16	+ 0·04	−0·02	2 58 55·67	2 58 31·73	−0 23·94			
	β Persei	40 33	N	W	13	3 1 49·35	−0·14	−0·17	+ 0·07	−0·02	3 1 49·09	3 1 25·13	−0 23·96			
	471 Gr. 80	28 41	S	W	13	3 3 46·48	−0·12	−0·15	− 0·08	−0·02	3 3 46·11	3 3 22·37	−0 23·74			
	δ Arietis	19 20	S	W	13	3 6 6·27	−0·12	−0·13	− 0·24	−0·02	3 6 5·76	3 5 41·88	−0 23·88	−0 23·880		
		Mean	...	...	...	3 2 40										
	α Persei	49 30	N	E	13	3 17 18·69	+0·17	−0·15	+ 0·22	−0·03	3 17 18·90	3 16 55·08	−0 23·82			
	520 Gr. 80	20 26	S	E	13	3 18 51·28	+0·12	−0·10	− 0·17	−0·02	3 18 51·11	3 18 27·27	−0 23·84			
	549 „	24 7	S	E	13	3 28 42·03	+0·12	−0·10	− 0·13	−0·02	3 28 41·90	3 28 18·07	−0 23·83			
	553 „	22 52	S	E	13	3 31 16·11	+0·12	−0·10	− 0·14	−0·02	3 31 15·97	3 30 52·11	−0 23·86			
	δ Persei	47 27	N	E	8	3 35 56·11	+0·16	−0·14	+ 0·18	−0·02	3 35 56·29	3 35 32·39	−0 23·90			
	ν Persei	42 15	N	E	13	3 38 32·52	+0·15	−0·13	+ 0·09	−0·02	3 38 32·61	3 38 8·85	−0 23·76			
	η Tauri	23 47	S	E	13	3 41 43·12	+0·12	−0·10	− 0·14	−0·02	3 41 42·98	3 41 19·10	−0 23·88			
	ζ Persei	31 35	S	E	13	3 48 0·63	+0·13	−0·11	− 0·05	−0·02	3 48 0·58	3 47 36·70	−0 23·88	−0 23·846		
		Mean	...	...	...	3 32 33										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat.* 35° 42′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit =T	Right Ascension =R.A.	Clock Correction: By each Star = R.A.−T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Nov. 6	ε Persei	39 43	N	W	13	3 51 17·80	−0·14	−0·17	+ 0·06	−0·02	3 51 17·53	3 50 53·56	−0 23·97			
	ξ Persei	35 30	S	W	10	3 52 38·24	−0·13	−0·16	0·00	−0·02	3 52 37·93	3 52 14·06	−0 23·87			
	A′ Tauri	21 48	S	W	13	3 58 58·14	−0·12	−0·13	− 0·16	−0·02	3 58 57·71	3 58 33·76	−0 23·95			
	c Persei	47 26	N	W	13	4 1 31·96	−0·16	−0·19	+ 0·18	−0·02	4 1 31·77	4 1 7·87	−0 23·90	−0 23·923	−0 23·874	3 30 59
		Mean	...	...	...	3 56 7										
	η Aurigæ	41 6	N	W	13	4 59 38·61	−0·24	−0·23	+ 0·08	−0·02	4 59 38·20	4 59 14·41	−0 23·79			
	835 Gr. 80	20 17	S	W	13	5 2 4·41	−0·20	−0·18	− 0·17	−0·02	5 2 3·84	5 1 40·06	−0 23·78			
	μ Aurigæ	38 22	N	W	13	5 6 43·92	−0·23	−0·22	+ 0·04	−0·02	5 6 43·49	5 6 19·69	−0 23·80			
	α Aurigæ	45 54	N	W	13	5 9 25·61	−0·26	−0·25	+ 0·15	−0·02	5 9 25·23	5 9 1·56	−0 23·67	−0 23·760		
		Mean	...	...	...	5 4 28										
	ψ′ Aurigæ	49 21	N	E	4	6 17 18·28	+0·28	−0·19	+ 0·22	−0·03	6 17 18·56	6 16 54·49	−0 24·07			
	1092 Gr. 80	21 42	S	E	13	6 19 53·04	+0·20	−0·11	− 0·16	−0·02	6 19 52·95	6 19 28·93	−0 24·02			
	1099 „	30 33	S	E	13	6 22 17·81	+0·21	−0·15	− 0·06	−0·02	6 22 17·79	6 21 53·72	−0 24·07			
	1104 „	20 17	S	E	6	6 23 12·15	+0·20	−0·13	− 0·17	−0·02	6 23 12·03	6 22 47·95	−0 24·08			
	1127 „	28 6	S	E	13	6 29 3·88	+0·21	−0·14	− 0·09	−0·02	6 29 3·84	6 28 39·83	−0 24·01	−0 24·050	−0 23·905	5 43 25
		Mean	...	...	...	6 22 21										
Nov. 25	ι Aurigæ	33 0	S	E	13	4 51 4·67	−0·03	+0·45	− 0·03	−0·02	4 51 5·04	4 50 14·72	−0 50·32			
	809 Gr. 80	37 44	N	E	13	4 53 3·23	−0·03	+0·47	+ 0·03	−0·02	4 53 3·68	4 52 13·31	−0 50·37			
	ε Aurigæ	43 40	N	E	13	4 55 21·81	−0·03	+0·51	+ 0·10	−0·02	4 55 22·37	4 54 31·97	−0 50·40	−0 50·363		
		Mean	...	...	...	4 53 10										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat. 35° 42′*, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit =T	Right Ascension =R.A.	Clock Correction			Mean Epoch $=T_E$
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A.−T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Nov. 25	835 Gr. 80	20 17	S	W	13	5 2 30·77	+0·02	+0·34	− 0·15	−0·02	5 2 30·96	5 1 40·47	−0 50·49			
	μ Aurigæ	38 22	N	W	8	5 7 10·29	+0·03	+0·42	+ 0·03	−0·02	5 7 10·75	5 6 20·19	−0 50·56			
	α Aurigæ	45 54	N	W	13	5 9 51·98	+0·03	+0·47	+ 0·14	−0·02	5 9 52·60	5 9 2·11	−0 50·49			
	λ Aurigæ	40 1	N	W	11	5 12 41·10	+0·03	+0·43	+ 0·05	−0·02	5 12 41·59	5 11 51·07	−0 50·52	−0 50·515		
		Mean	...	...	...	5 8 4										
	888 Gr. 80	37 17	N	E	13	5 18 26·61	−0·03	+0·47	+ 0·02	−0·02	5 18 27·05	5 17 36·55	−0 50·50	−0 50·500	−0 50·47+	5 6 57
		Mean	...	...	...	5 18 27										
	ζ Tauri	21 5	S	W	13	5 32 17·36	+0·03	+0·34	− 0·15	−0·02	5 32 17·56	5 31 27·09	−0 50·47			
	953 Gr. 80	25 50	S	W	13	5 34 9·08	+0·03	+0·36	− 0·10	−0·02	5 34 9·35	5 33 18·87	−0 50·48			
	978 „	39 9	N	W	13	5 42 49·77	+0·03	+0·43	+ 0·04	−0·02	5 42 50·25	5 41 59·69	−0 50·56			
	984 „	39 7	N	W	13	5 45 8·46	+0·03	+0·43	+ 0·04	−0·02	5 45 8·94	5 44 18·44	−0 50·50	−0 50·503		
		Mean	...	...	...	5 38 36										
	994 Gr. 80	27 35	S	E	13	5 47 38·88	−0·03	+0·42	− 0·09	−0·02	5 47 39·16	5 46 48·81	−0 50·35			
	998 „	20 15	S	E	13	5 49 4·96	−0·02	+0·38	− 0·15	−0·02	5 49 5·15	5 48 14·73	−0 50·42			
	β Aurigæ	44 56	N	E	13	5 52 45·55	−0·03	+0·52	+ 0·12	−0·02	5 52 46·14	5 51 55·74	−0 50·40			
	1021 Gr. 80	22 24	S	E	13	5 56 16·33	−0·03	+0·39	− 0·13	−0·02	5 56 16·54	5 55 26·12	−0 50·42	−0 50·398	−0 50·45	5 45
		Mean	...	...	...	5 51 26										
	1179 Gr. 80	16 19	S	E	13	6 44 42·02	−0·02	+0·37	− 0·19	−0·02	6 44 42·16	6 43 51·81	−0 50·35			
	θ Geminorum	34 5	S	E	13	6 46 47·41	−0·03	+0·45	− 0·02	−0·02	6 46 47·79	6 45 57·52	−0 50·27			
	15 Lyncis	58 34	N	E	13	6 49 7·88	−0·04	+0·66	+ 0·40	−0·03	6 49 8·87	6 48 18·61	−0 50·26	−0 50·293		
		Mean	...	...	...	6 46 52										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat.* 35° 42′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Nov. 25	63 Aurigæ	39 29	N	W	13	7 5 21·68	+0·03	+0·43	+ 0·05	−0·02	7 5 22·17	7 4 31·61	−0 50·56			
	1227 Gr. 80	24 18	S	W	13	7 6 58·66	+0·03	+0·36	− 0·12	−0·02	7 6 58·91	7 6 8·42	−0 50·49			
	1237 "	25 4	S	W	13	7 9 11·78	+0·03	+0·36	− 0·11	−0·02	7 9 12·04	7 8 21·48	−0 50·56			
	λ Geminorum	16 44	S	W	13	7 12 58·33	+0·02	+0·33	− 0·18	−0·02	7 12 58·48	7 12 8·09	−0 50·39	−0 50·500		
		Mean	...	...	...	7 8 38										
	1303 Gr. 80	27 8	S	E	10	7 30 22·03	−0·03	+0·41	− 0·09	−0·02	7 30 22·30	7 29 32·01	−0 50·29			
	1312 "	58 57	N	E	13	7 35 3·94	−0·05	+0·67	+ 0·41	−0·03	7 35 4·94	7 34 14·57	−0 50·37			
	1317 "	50 41	N	E	13	7 37 3·03	−0·04	+0·57	+ 0·22	−0·03	7 37 3·75	7 36 13·22	−0 50·53			
	κ Geminorum	24 39	S	E	13	7 39 1·38	−0·03	+0·40	− 0·11	−0·02	7 39 1·62	7 38 11·25	−0 50·37	−0 50·390		
		Mean	...	...	...	7 35 23										
	π Geminorum	33 40	S	W	13	7 41 39·33	+0·03	+0·40	− 0·02	−0·02	7 41 39·72	7 40 49·34	−0 50·38			
	1343 Gr. 80	27 2	S	W	13	7 47 59·21	+0·03	+0·37	− 0·09	−0·02	7 47 59·50	7 47 9·01	−0 50·49			
	1363 "	25 41	S	W	13	7 55 29·54	+0·03	+0·36	− 0·10	−0·02	7 55 29·81	7 54 39·34	−0 50·47			
	χ Geminorum	28 5	S	W	13	7 57 59·13	+0·03	+0·37	− 0·08	−0·02	7 57 59·43	7 57 8·94	−0 50·49	−0 50·458	−0 50·410	7 20 25
		Mean	...	...	...	7 50 47										
Nov. 28	ε Aurigæ	43 40	N	E	13	4 55 20·62	−0·02	+0·31	+ 0·12	−0·02	4 55 21·01	4 54 32·04	−0 48·97			
	η Aurigæ	41 6	N	E	13	5 0 3·57	−0·02	+0·30	+ 0·08	−0·02	5 0 3·91	4 59 14·97	−0 48·94			
	835 Gr. 80	20 17	S	E	13	5 2 29·38	−0·01	+0·23	− 0·18	−0·02	5 2 29·40	5 1 40·53	−0 48·87			
	μ Aurigæ	38 22	N	E	13	5 7 8·95	−0·01	+0·29	+ 0·04	−0·02	5 7 9·25	5 6 20·25	−0 49·00	−0 48·945		
		Mean	...	...	...	5 1 16										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat.* 35° 42′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_E
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Nov. 28	α Aurigæ	45 54	N	W	13	5 9 50·76	+0·02	+0·23	+ 0·16	−0·02	5 9 51·15	5 9 2·18	−0 48·97			
	λ Aurigæ	40 1	N	W	13	5 12 39·85	+0·02	+0·21	+ 0·06	−0·02	5 12 40·12	5 11 51·14	−0 48·98			
	877 Gr. 80	21 59	S	W	9	5 13 51·99	+0·01	+0·17	− 0·16	−0·02	5 13 51·99	5 13 3·11	−0 48·88			
	888 „	37 17	N	W	13	5 18 25·46	+0·01	+0·20	+ 0·02	−0·02	5 18 25·67	5 17 36·62	−0 49·05			
	β Tauri	28 31	S	W	13	5 20 33·37	+0·01	+0·18	− 0·09	−0·02	5 20 33·45	5 19 44·52	−0 48·93			
	ζ Tauri	21 5	S	W	13	5 32 16·08	+0·01	+0·17	− 0·17	−0·02	5 32 16·07	5 31 27·15	−0 48·92			
	953 Gr. 80	25 50	S	W	13	5 34 7·81	+0·01	+0·17	− 0·12	−0·02	5 34 7·85	5 33 18·94	−0 48·91			
	ο Aurigæ	49 47	N	W	13	5 38 41·00	+0·02	+0·24	+ 0·24	−0·03	5 38 41·47	5 37 52·55	−0 48·92			
	978 Gr. 80	39 9	N	W	13	5 40 48·52	+0·02	+0·21	+ 0·05	−0·02	5 40 48·78	5 41 59·77	−0 49·01	−0 48·952	−0 48·949	5 12 56
		Mean	...	...	...	5 24 35										
	994 Gr. 80	27 35	S	E	13	5 47 37·69	−0·01	+0·25	− 0·10	−0·02	5 47 37·81	5 46 48·88	−0 48·93			
	998 „	20 15	S	E	13	5 49 3·72	−0·01	+0·23	− 0·18	−0·02	5 49 3·74	5 48 14·80	−0 48·94			
	α Orionis	7 23	S	E	13	5 50 22·80	−0·01	+0·20	− 0·31	−0·02	5 50 22·66	5 49 33·77	−0 48·89			
	β Aurigæ	44 56	N	E	13	5 52 44·34	−0·02	+0·31	+ 0·15	−0·02	5 52 44·76	5 51 55·82	−0 48·94	−0 48·925	−0 48·939	5 37 16
		Mean	...	...	...	5 49 57										
	1227 Gr. 80	24 18	S	E	13	7 6 57·28	−0·01	+0·24	− 0·14	−0·02	7 6 57·35	7 6 8·51	−0 48·84			
	λ Geminorum	16 44	S	E	13	7 12 57·05	−0·01	+0·22	− 0·22	−0·02	7 12 57·02	7 12 8·18	−0 48·84			
	δ Geminorum	22 11	S	E	13	7 14 44·73	−0·01	+0·24	− 0·16	−0·02	7 14 44·78	7 13 55·95	−0 48·83			
	ι Geminorum	28 0	S	E	11	7 20 6·07	−0·01	+0·25	− 0·10	−0·02	7 20 6·19	7 19 17·36	−0 48·83	−0 48·835		
		Mean	...	...	...	7 13 41										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat. 35° 42′*, BY LENOX CONYNGHAM WITH TELESCOPE NO. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit =T	Right Ascension =R.A.	Clock Correction: By each Star = R.A.−T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch =T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Nov. 28	1283 Gr. 80	49 53	N	W	13	7 22 52·55	+0·02	+0·24	+ 0·24	−0·03	7 22 53·02	7 22 4·05	−0 48·97			
	α Canis Min.	5 30	S	W	13	7 34 41·63	+0·01	+0·14	− 0·33	−0·02	7 34 41·43	7 33 52·58	−0 48·85			
	1317 Gr. 80	50 41	N	W	13	7 37 1·76	+0·02	+0·24	+ 0·26	−0·03	7 37 2·25	7 36 13·34	−0 48·91			
	κ Geminorum	24 39	S	W	13	7 39 0·13	+0·01	+0·17	− 0·14	−0·02	7 39 0·15	7 38 11·34	−0 48·81	−0 48·885	−0 48·860	7 23 33
		Mean	...	...	...	7 33 24										
	1343 Gr. 80	27 2	S	W	9	7 47 57·88	+0·01	+0·18	− 0·11	−0·02	7 47 57·94	7 47 9·11	−0 48·83			
	1363 „	25 41	S	W	5	7 55 28·19	+0·01	+0·17	− 0·12	−0·02	7 55 28·23	7 54 39·44	−0 48·79			
	χ Geminorum	28 5	S	W	13	7 57 57·79	+0·01	+0·18	− 0·10	−0·02	7 57 57·86	7 57 9·05	−0 48·81			
	27 Lyncis	51 48	N	W	13	8 1 28·14	+0·02	+0·25	+ 0·29	−0·03	8 1 28·67	8 0 39·77	−0 48·90	−0 48·833		
		Mean	...	...	...	7 55 43										
	1390 Gr. 80	25 50	S	E	13	8 5 1·13	−0·01	+0·25	− 0·12	−0·02	8 5 1·23	8 4 12·41	−0 48·82			
	β Cancri	9 30	S	E	13	8 11 42·30	−0·01	+0·21	− 0·29	−0·02	8 11 42·19	8 10 53·41	−0 48·78			
	31 Lyncis	43 31	N	E	13	8 16 32·73	−0·02	+0·31	+ 0·12	−0·02	8 16 33·12	8 15 44·48	−0 48·64			
	Bradley 1197	− 3 34	S	E	13	8 21 17·66	−0·01	+0·18	− 0·41	−0·02	8 21 17·40	8 20 28·57	−0 48·83	−0 48·768	−0 48·800	8 4 41
		Mean	...	...	...	8 13 38										
Dec. 5	β Tauri	28 31	S	E	13	5 20 30·11	−0·04	+0·11	− 0·11	−0·02	5 20 30·05	5 19 44·66	−0 45·39			
	902 Gr. 80	21 51	S	E	10	5 22 10·45	−0·04	+0·11	− 0·19	−0·02	5 22 10·31	5 21 24·82	−0 45·49			
	α Leporis	−17 54	S	E	10	5 28 56·12	−0·04	+0·06	− 0·63	−0·02	5 28 55·49	5 28 10·09	−0 45·40			
	994 Gr. 80	27 35	S	E	10	5 47 34·52	−0·04	+0·11	− 0·12	−0·02	5 47 34·45	5 46 49·04	−0 45·41			
	998 „	20 15	S	E	13	5 49 0·53	−0·04	+0·10	− 0·21	−0·02	5 49 0·36	5 48 14·95	−0 45·41	−0 45·420		
		Mean	...	...	...	5 33 38										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat.* 35° 42′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 5	β Aurigæ	44 56	N	W	13	5 52 41·27	+0·05	+0·11	+ 0·17	−0·02	5 52 41·58	5 51 56·01	−0 45·57			
	1025 Gr. 80	20 8	S	W	13	5 58 31·77	+0·04	+0·08	− 0·21	−0·02	5 58 31·66	5 57 46·10	−0 45·56			
	ν Orionis	14 47	S	W	13	6 2 25·20	+0·04	+0·08	− 0·28	−0·02	6 2 25·02	6 1 39·52	−0 45·50			
	ψ′ Aurigæ	49 21	N	W	13	6 17 40·72	+0·05	+0·12	+ 0·27	−0·03	6 17 41·13	6 16 55·56	−0 45·57	−0 45·550		
		Mean	...	...	...	6 2 50										
	51 Aurigæ	39 29	N	E	13	6 32 14·32	−0·05	+0·13	+ 0·06	−0·02	6 32 14·44	6 31 28·99	−0 45·45			
	1144 Gr. 80	28 21	S	E	13	6 33 46·67	−0·04	+0·11	− 0·11	−0·02	6 33 46·61	6 33 1·20	−0 45·41			
	δ Monocerotis	10 0	S	E	13	6 36 2·11	−0·04	+0·09	− 0·33	−0·02	6 36 1·81	6 35 16·46	−0 45·35			
	ε Geminorum	25 14	S	E	13	6 38 19·07	−0·04	+0·11	− 0·15	−0·02	6 38 18·97	6 37 33·56	−0 45·41	−0 45·405		
		Mean	...	...	...	6 35 6										
	1167 Gr. 80	48 54	N	W	10	6 40 31·23	+0·05	+0·12	+ 0·26	−0·03	6 40 31·63	6 39 46·00	−0 45·63			
	1179 „	16 19	S	W	13	6 44 37·71	+0·04	+0·08	− 0·26	−0·02	6 44 37·55	6 43 52·07	−0 45·48			
	θ Geminorum	34 5	S	W	13	6 46 43·13	+0·04	+0·09	− 0·02	−0·02	6 46 43·22	6 45 57·81	−0 45·41			
	15 Lyncis	58 34	N	W	13	6 49 3·80	+0·07	+0·14	+ 0·55	−0·03	6 49 4·53	6 48 19·05	−0 45·48	−0 45·500	−0 45·469	6 14 12
		Mean	...	...	...	6 45 14										
	1312 Gr. 80	58 57	N	W	13	7 34 60·00	+0·07	+0·06	+ 0·57	−0·03	7 34 60·67	7 34 15·07	−0 45·60			
	1317 „	50 41	N	W	13	7 36 58·80	+0·06	+0·05	+ 0·30	−0·03	7 36 59·18	7 36 13·64	−0 45·54			
	κ Geminorum	24 39	S	W	13	7 38 57·08	+0·04	+0·03	− 0·16	−0·02	7 38 56·97	7 38 11·56	−0 45·41			
	π Geminorum	33 40	S	W	13	7 41 34·99	+0·04	+0·04	− 0·03	−0·02	7 41 35·02	7 40 49·69	−0 45·33	−0 45·470		
		Mean	...	...	...	7 38 8										
	1343 Gr. 80	27 2	S	E	13	7 47 54·81	−0·04	+0·08	− 0·13	−0·02	7 47 54·70	7 47 9·33	−0 45·37			
	χ Geminorum	28 5	S	E	11	7 57 54·68	−0·04	+0·08	− 0·11	−0·02	7 57 54·59	7 57 9·28	−0 45·31			
	27 Lyncis	51 48	N	E	13	8 1 25·18	−0·06	+0·11	+ 0·33	−0·03	8 1 25·53	8 0 40·08	−0 45·45			
	β Cancri	9 30	S	E	13	8 11 39·29	−0·04	+0·06	− 0·33	−0·02	8 11 38·96	8 10 53·63	−0 45·33	−0 45·365		
		Mean	...	...	...	7 59 43										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat.* 35° 42′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 5	Groom. 1450	38 22	N	W	13	8 26 56·27	+0·04	+0·04	+ 0·04	−0·02	8 26 56·37	8 26 10·76	−0 45·61			
	δ Cancri	18 32	S	W	13	8 39 33·19	+0·04	+0·03	− 0·23	−0·02	8 39 33·01	8 38 47·59	−0 45·42			
	1483 Gr. 80	32 52	S	W	13	8 46 55·83	+0·04	+0·04	− 0·04	−0·02	8 46 55·85	8 46 10·51	−0 45·34			
	ζ Hydræ	6 21	S	W	13	8 50 40·44	+0·04	+0·03	− 0·37	−0·02	8 50 40·12	8 49 54·71	−0 45·41	−0 45·445		
	Mean	...	...	...	8 41 1										
	ι Ursæ Maj.	48 27	N	E	13	8 52 51·94	−0·05	+0·10	+ 0·25	−0·03	8 52 52·21	8 52 6·99	−0 45·22			
	10 Ursæ Maj.	42 12	N	E	13	8 54 40·01	−0·05	+0·09	+ 0·11	−0·02	8 54 40·14	8 53 54·84	−0 45·30			
	κ Ursæ Maj.	47 34	N	E	13	8 57 18·21	−0·05	+0·10	+ 0·23	−0·02	8 57 18·47	8 56 33·20	−0 45·27			
	B.A.C. 3097	38 52	N	E	13	9 0 41·48	−0·04	+0·09	+ 0·05	−0·02	9 0 41·56	8 59 56·43	−0 45·13	−0 45·230	−0 45·378	8 18 49
	Mean	...	...	...	8 56 23										
Dec. 7	953 Gr. 80	25 50	S	E	13	5 34 4·34	−0·02	+0·13	− 0·15	−0·02	5 34 4·28	5 33 19·12	−0 45·16			
	o Aurigæ	49 47	N	E	13	5 38 37·71	−0·03	+0·18	+ 0·30	−0·03	5 38 38·13	5 37 52·79	−0 45·34			
	978 Gr. 80	39 9	N	E	13	5 42 45·14	−0·03	+0·16	+ 0·06	−0·02	5 42 45·31	5 41 59·98	−0 45·33			
	994 „	27 35	S	E	13	5 47 34·32	−0·02	+0·13	− 0·13	−0·02	5 47 34·28	5 46 49·08	−0 45·20	−0 45·258		
	Mean	...	...	...	5 40 45										
	α Orionis	7 23	S	W	13	5 50 19·51	+0·02	+0·08	− 0·38	−0·02	5 50 19·21	5 49 33·95	−0 45·26			
	1021 Gr. 80	22 24	S	W	6	5 56 11·79	+0·02	+0·10	− 0·20	−0·02	5 56 11·69	5 55 26·39	−0 45·30			
	1025 „	20 8	S	W	12	5 58 31·56	+0·02	+0·10	− 0·23	−0·02	5 58 31·43	5 57 46·14	−0 45·29			
	ν Orionis	14 47	S	W	13	6 2 25·02	+0·02	+0·09	− 0·29	−0·02	6 2 24·82	6 1 39·56	−0 45·26			
	1043 Gr. 80	23 8	S	W	13	6 4 12·05	+0·02	+0·10	− 0·19	−0·02	6 4 11·96	6 3 26·63	−0 45·33	−0 45·288	−0 45·273	5 49 33
	Mean	...	...	...	5 58 20										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat.* 35° 42′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_E
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 7	51 Aurigæ	39 29	N	W	12	6 32 14·16	+0·03	+0·12	+ 0·07	−0·02	6 32 14·36	6 31 29·05	−0 45·31			
	1144 Gr. 80	28 21	S	W	13	6 33 46·54	+0·02	+0·11	− 0·12	−0·02	6 33 46·53	6 33 1·24	−0 45·29			
	S Monocerotis	10 0	S	W	13	6 36 1·90	+0·02	+0·09	− 0·35	−0·02	6 36 1·64	6 35 16·50	−0 45·14			
	ε Geminorum	25 14	S	W	13	6 38 18·85	+0·02	+0·10	− 0·16	−0·02	6 38 18·79	6 37 33·61	−0 45·18	−0 45·230		
		Mean	...	...	...	6 35 5										
	1167 Gr. 80	48 54	N	E	13	6 40 30·87	−0·03	+0·18	+ 0·28	−0·03	6 40 31·27	6 39 46·06	−0 45·21			
	1179 „	16 19	S	E	13	6 44 37·46	−0·02	+0·12	− 0·27	−0·02	6 44 37·27	6 43 52·12	−0 45·15			
	θ Geminorum	34 5	S	E	13	6 46 42·88	−0·02	+0·15	− 0·03	−0·02	6 46 42·96	6 45 57·87	−0 45·09			
	15 Lyncis	58 34	N	E	13	6 49 3·54	−0·04	+0·21	+ 0·59	−0·03	6 49 4·27	6 48 19·13	−0 45·14	−0 45·148	−0 45·189	6 40 10
		Mean	...	...	...	6 45 14										
Dec. 10	953 Gr. 80	25 50	S	E	13	5 34 3·68	0·00	+0·25	− 0·13	−0·02	5 34 3·78	5 33 19·17	−0 44·61			
	ο Aurigæ	49 47	N	E	13	5 38 37·01	+0·01	+0·34	+ 0·26	−0·03	5 38 37·59	5 37 52·86	−0 44·73			
	978 Gr. 80	39 9	N	E	13	5 42 44·42	+0·01	+0·30	+ 0·05	−0·02	5 42 44·76	5 42 0·05	−0 44·71			
	994 „	27 35	S	E	13	5 47 33·63	0·00	+0·26	− 0·11	−0·02	5 47 33·76	5 46 49·14	−0 44·62	−0 44·668		
		Mean	...	...	...	5 40 45										
	998 Gr. 80	20 15	S	W	12	5 48 59·80	0·00	+0·15	− 0·20	−0·02	5 48 59·73	5 48 15·04	−0 44·69			
	α Orionis	7 23	S	W	13	5 50 18·88	0·00	+0·13	− 0·33	−0·02	5 50 18·66	5 49 33·99	−0 44·67			
	β Aurigæ	44 56	N	W	13	5 52 40·47	−0·01	+0·21	+ 0·16	−0·02	5 52 40·81	5 51 56·13	−0 44·68			
	1021 Gr. 80	22 24	S	W	10	5 56 11·18	0·00	+0·16	− 0·17	−0·02	5 56 11·15	5 55 26·45	−0 44·70			
	1025 „	20 8	S	W	13	5 58 30·91	0·00	+0·15	− 0·20	−0·02	5 58 30·84	5 57 46·19	−0 44·65	−0 44·678	−0 44·673	5 47 3
		Mean	...	...	...	5 53 20										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat.* 35° 42′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit =T	Right Ascension =R.A.	Clock Correction			Mean Epoch = T_E
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A.−T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 10	51 Aurigæ	39 29	N	E	13	6 32 13·53	+0·01	+0·30	+ 0·06	−0·02	6 32 13·88	6 31 29·12	−0 44·76			
	1144 Gr. 80	28 21	S	E	13	6 33 45·87	0·00	+0·26	− 0·10	−0·02	6 33 46·01	6 33 1·32	−0 44·69			
	S Monocerotis	10 0	S	E	13	6 36 1·30	0·00	+0·21	− 0·31	−0·02	6 36 1·18	6 35 16·56	−0 44·62			
	ε Geminorum	25 14	S	E	13	6 38 18·22	0·00	+0·25	− 0·14	−0·02	6 38 18·31	6 37 33·68	−0 44·63	−0 44·675		
		Mean	...	...	...	6 35 5										
	1167 Gr. 80	48 54	N	W	13	6 40 30·41	−0·01	+0·22	+ 0·24	−0·03	6 40 30·83	6 39 46·15	−0 44·68			
	1179 „	16 19	S	W	13	6 44 36·94	0·00	+0·15	− 0·24	−0·02	6 44 36·83	6 43 52·19	−0 44·64			
	θ Geminorum	34 5	S	W	13	6 46 42·35	0·00	+0·18	− 0·02	−0·02	6 46 42·49	6 45 57·94	−0 44·55			
	15 Lyncis	58 34	N	W	13	6 49 3·09	−0·01	+0·26	+ 0·52	−0·03	6 49 3·83	6 48 19·24	−0 44·59	−0 44·615	−0 44·645	6 40 9
		Mean	...	...	...	6 45 13										
	β Cancri	9 30	S	E	13	8 11 38·51	0·00	+0·19	− 0·31	−0·02	8 11 38·37	8 10 53·77	−0 44·60			
	1405 Gr. 80	27 34	S	E	11	8 14 30·87	0·00	+0·23	− 0·11	−0·02	8 14 30·97	8 13 46·37	−0 44·60			
	31 Lyncis	43 31	N	E	13	8 16 29·09	+0·01	+0·29	+ 0·13	−0·02	8 16 29·50	8 15 44·95	−0 44·55			
	Bradley 1197	− 3 34	S	E	13	8 21 13·85	0·00	+0·16	− 0·44	−0·02	8 21 13·55	8 20 28·92	−0 44·63	−0 44·595		
		Mean	...	...	...	8 15 58										
	1425 Gr. 80	24 30	S	W	13	8 23 12·89	0·00	+0·15	− 0·15	−0·02	8 23 12·87	8 22 28·21	−0 44·66			
	Groom. 1450	38 22	N	W	11	8 26 55·52	0·00	+0·18	+ 0·04	−0·02	8 26 55·72	8 26 10·94	−0 44·78			
	δ Cancri	18 32	S	W	13	8 39 32·51	0·00	+0·14	− 0·22	−0·02	8 39 32·41	8 38 47·74	−0 44·67			
	ι Cancri	29 8	S	W	13	8 41 10·21	0·00	+0·16	− 0·09	−0·02	8 41 10·26	8 40 25·70	−0 44·56	−0 44·668	−0 44·632	8 24 21
		Mean	...	...	...	8 32 43										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat.* 35° 42′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 10	ι Ursæ Maj.	48 27	N	E	13	8 52 51·35	+0·01	+0·31	+ 0·23	−0·03	8 52 51·87	8 52 7·21	−0 44·66			
	10 Ursæ Maj.	42 12	N	E	13	8 54 39·33	+0·01	+0·28	+ 0·11	−0·02	8 54 39·71	8 53 55·04	−0 44·67			
	κ Ursæ Maj.	47 34	N	E	13	8 57 17·61	+0·01	+0·30	+ 0·21	−0·02	8 57 18·11	8 56 33·42	−0 44·69			
	B.A.C. 3097	38 52	N	E	13	9 0 40·84	0·00	+0·27	+ 0·05	−0·02	9 0 41·14	8 59 56·62	−0 44·52	−0 44·635		
	Mean	...	...	...	8 56 22										
	1524 Gr. 80	22 28	S	W	13	9 4 8·68	0·00	+0·15	− 0·17	−0·02	9 4 8·64	9 3 23·98	−0 44·66			
	1534 „	43 39	N	W	13	9 7 46·18	−0·01	+0·19	+ 0·13	−0·02	9 7 46·47	9 7 1·81	−0 44·66			
	83 Cancri	18 9	S	W	13	9 13 56·54	0·00	+0·14	− 0·22	−0·02	9 13 56·44	9 13 11·74	−0 44·70			
	α Lyncis	34 50	S	W	13	9 15 29·04	0·00	+0·17	− 0·01	−0·02	9 15 29·18	9 14 44·53	−0 44·65	−0 44·668	−0 44·652	9 3 31
	Mean	...	...	...	9 10 40										
Dec. 13	β Aurigæ	44 56	N	E	13	5 52 40·51	+0·02	+0·34	+ 0·16	−0·02	5 52 41·01	5 51 56·20	−0 44·81			
	8 Monocerotis	4 39	S	E	13	6 19 1·93	+0·02	+0·21	− 0·38	−0·02	6 19 1·76	6 18 17·02	−0 44·74			
	51 Aurigæ	39 29	N	E	8	6 32 13·72	+0·02	+0·32	+ 0·06	−0·02	6 32 14·10	6 31 29·19	−0 44·91			
	ε Geminorum	25 14	S	E	13	6 38 18·40	+0·02	+0·27	− 0·15	−0·02	6 38 18·52	6 37 33·75	−0 44·77	−0 44·808		
	Mean	...	...	...	6 20 34										
	1167 Gr. 80	48 54	N	W	13	6 40 30·56	−0·02	+0·28	+ 0·25	−0·03	6 40 31·04	6 39 46·25	−0 44·79			
	θ Geminorum	34 5	S	W	13	6 46 42·59	−0·02	+0·23	− 0·02	−0·02	6 46 42·76	6 45 58·02	−0 44·74			
	15 Lyncis	58 34	N	W	13	6 49 3·21	−0·03	+0·33	+ 0·54	−0·03	6 49 4·02	6 48 19·35	−0 44·67			
	ζ Geminorum	20 43	S	W	13	6 58 42·90	−0·02	+0·19	− 0·20	−0·02	6 58 42·85	6 57 58·11	−0 44·74			
	63 Aurigæ	39 29	N	W	11	7 5 16·71	−0·02	+0·24	+ 0·06	−0·02	7 5 16·97	7 4 32·19	−0 44·78	−0 44·744		
	Mean	...	...	...	6 52 3										
	1237 Gr. 80	25 4	S	E	13	7 9 6·72	+0·02	+0·27	− 0·15	−0·02	7 9 6·84	7 8 21·99	−0 44·85			
	λ Geminorum	16 44	S	E	13	7 12 53·35	+0·02	+0·24	− 0·25	−0·02	7 12 53·34	7 12 8·57	−0 44·77	−0 44·810	−0 44·777	6 48 5[illegible]
	Mean	...	...	...	7 11 0										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat.* 35° 42′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 13	27 Lyncis	51 48	N	E	13	8 1 24·62	+0·03	+0·38	+ 0·33	−0·03	8 1 25·33	8 0 40·42	−0 44·91			
	β Cancri	9 30	S	E	13	8 11 38·70	+0·02	+0·22	− 0·33	−0·02	8 11 38·59	8 10 53·86	−0 44·73			
	31 Lyncis	43 31	N	E	13	8 16 29·26	+0·02	+0·33	+ 0·14	−0·02	8 16 29·73	8 15 45·06	−0 44·67			
	1425 Gr. 80	24 30	S	E	13	8 23 12·92	+0·02	+0·26	− 0·16	−0·02	8 23 13·02	8 22 28·31	−0 44·71	−0 44·755		
		Mean	...	...	...	8 13 11										
	Groom. 1450	38 22	N	W	13	8 26 55·71	−0·02	+0·24	+ 0·04	−0·02	8 26 55·95	8 26 11·05	−0 44·90			
	δ Cancri	18 32	S	W	5	8 39 32·72	−0·02	+0·19	− 0·23	−0·02	8 39 32·64	8 38 47·84	−0 44·80			
	ι Cancri	29 8	S	W	13	8 41 10·45	−0·02	+0·21	− 0·10	−0·02	8 41 10·52	8 40 25·80	−0 44·72			
	1483 Gr. 80	32 52	S	W	13	8 46 55·31	−0·02	+0·22	− 0·04	−0·02	8 46 55·45	8 46 10·79	−0 44·66			
	ι Ursæ Maj.	48 27	N	W	13	8 52 51·57	−0·02	+0·27	+ 0·24	−0·03	8 52 52·03	8 52 7·34	−0 44·69			
	10 Ursæ Maj.	42 12	N	W	13	8 54 39·54	−0·02	+0·25	+ 0·11	−0·02	8 54 39·86	8 53 55·15	−0 44·71			
	κ Ursæ Maj.	47 34	N	W	13	8 57 17·74	−0·02	+0·27	+ 0·22	−0·02	8 57 18·19	8 56 33·55	−0 44·64			
	B.A.C. 3097	38 52	N	W	13	9 0 41·03	−0·02	+0·24	+ 0·05	−0·02	9 0 41·28	8 59 56·74	−0 44·54			
	1524 Gr. 80	22 28	S	W	13	9 4 8·80	−0·02	+0·20	− 0·18	−0·02	9 4 8·78	9 3 24·08	−0 44·70	−0 44·707	−0 44·731	8 32 16
		Mean	...	...	...	8 49 21										
	1534 Gr. 80	43 39	N	E	13	9 7 46·11	+0·02	+0·34	+ 0·14	−0·02	9 7 46·59	9 7 1·93	−0 44·66			
	83 Cancri	18 9	S	E	13	9 13 56·47	+0·02	+0·25	− 0·23	−0·02	9 13 56·49	9 13 11·84	−0 44·65			
	α Lyncis	34 50	S	E	13	9 15 29·05	+0·02	+0·30	− 0·01	−0·02	9 15 29·34	9 14 44·64	−0 44·70			
	1555 Gr. 80	26 38	S	E	13	9 19 21·68	+0·02	+0·27	− 0·13	−0·02	9 19 21·82	9 18 37·19	−0 44·63			
	θ Ursæ Maj.	52 9	N	E	13	9 26 40·11	+0·03	+0·38	+ 0·34	−0·03	9 26 40·83	9 25 56·16	−0 44·67			
	10 Leonis Min.	36 51	N	E	13	9 28 37·01	+0·02	+0·31	+ 0·02	−0·02	9 28 37·34	9 27 52·66	−0 44·68	−0 44·665	−0 44·686	9 4 0
		Mean	...	...	...	9 18 38										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (W), *Lat.* 52° 23′, BY BURRARD WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Oct. 31	68 Gr. 80	29 10	S	E	10	0 24 31·24	0·00	−0·02	− 0·40	−0·01	0 24 30·81	0 24 38·68	+0 7·87			
	71 „	53 57	N	E	10	0 25 54·87	−0·01	−0·04	+ 0·04	−0·02	0 25 54·84	0 26 2·68	+0 7·84			
	ζ Cassiopeiæ	53 20	N	E	15	0 31 3·40	−0·01	−0·04	+ 0·03	−0·02	0 31 3·36	0 31 11·33	+0 7·97			
	δ Andromedæ	30 18	S	E	15	0 33 39·04	0·00	−0·03	− 0·39	−0·01	0 33 38·61	0 33 46·64	+0 8·03			
	α Cassiopeiæ	55 58	N	E	9	0 34 29·14	−0·01	−0·04	+ 0·10	−0·02	0 34 29·17	0 34 37·03	+0 7·86	+0 7·914		
		Mean	...	...	...	0 29 56										
	o Cassiopeiæ	47 43	S	W	12	0 38 48·60	+0·01	+0·03	− 0·11	−0·02	0 38 48·51	0 38 56·41	+0 7·90			
	ζ Andromedæ	23 42	S	W	15	0 41 42·80	0·00	+0·02	− 0·47	−0·01	0 41 42·34	0 41 50·20	+0 7·86			
	ν Andromedæ	40 31	S	W	15	0 43 57·69	+0·01	+0·03	− 0·24	−0·02	0 43 57·47	0 44 5·11	+0 7·64			
	131 Gr. 80	60 33	N	W	15	0 46 44·54	+0·01	+0·04	+ 0·26	−0·03	0 46 44·82	0 46 52·66	+0 7·84			
	μ Andromedæ	37 56	S	W	15	0 50 51·83	0·00	+0·02	− 0·28	−0·02	0 50 51·55	0 50 59·60	+0 8·05	+0 7·858	+0 7·886	0 37 11
		Mean	...	...	...	0 44 25										
	168 Gr. 80	5 6	S	E	15	0 59 22·94	0·00	−0·02	− 0·66	−0·01	0 59 22·25	0 59 30·08	+0 7·83			
	μ Cassiopeiæ	54 25	N	E	13	1 1 13·97	−0·01	−0·04	+ 0·06	−0·02	1 1 13·96	1 1 21·84	+0 7·88			
	β Andromedæ	35 4	S	E	15	1 3 47·64	0·00	−0·02	− 0·33	−0·02	1 3 47·27	1 3 55·27	+0 8·00			
	194 Gr. 80	1 54	S	E	12	1 5 6·20	0·00	−0·01	− 0·69	−0·01	1 5 5·49	1 5 13·31	+0 7·82			
	υ Piscium	26 43	S	E	15	1 13 38·27	0·00	−0·02	− 0·43	−0·02	1 13 37·80	1 13 45·72	+0 7·92			
	δ Cassiopeiæ	59 42	N	E	13	1 18 53·52	−0·01	−0·04	+ 0·23	−0·02	1 18 53·68	1 19 1·80	+0 8·12	+0 7·928		
		Mean	...	...	...	1 7 0										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (W), *Lat.* 52° 23′, BY BURRARD WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
1895 Oct. 31	η Piscium	14 49	S	W	7	1 25 48·55	0·00	+0·02	− 0·57	−0·01	1 25 47·99	1 25 55·87	+0 7·88			
	υ Persei	48 6	S	W	14	1 31 29·54	+0·01	+0·03	− 0·10	−0·02	1 31 29·46	1 31 37·37	+0 7·91			
	φ Persei	50 10	S	W	16	1 37 1·39	+0·01	+0·03	− 0·05	−0·02	1 37 1·36	1 37 9·40	+0 8·04			
	ο Piscium	8 38	S	W	15	1 39 47·65	0·00	+0·01	− 0·63	−0·01	1 39 47·02	1 39 54·95	+0 7·93			
	275 Gr. 80	16 26	S	W	15	1 42 25·92	0·00	+0·02	− 0·55	−0·01	1 42 25·38	1 42 33·28	+0 7·90			
	α Trianguli	29 5	S	W	15	1 47 2·42	0·00	+0·02	− 0·41	−0·01	1 47 2·02	1 47 10·00	+0 7·98			
	β Arietis	20 18	S	W	15	1 48 47·05	0·00	+0·02	− 0·51	−0·01	1 48 46·55	1 48 54·48	+0 7·93	+0 7·939	+0 7·934	1 22 58
		Mean	...	...	...	1 38 55										
	ζ Persei	31 35	S	W	15	3 47 29·14	0·00	+0·02	− 0·37	−0·01	3 47 28·78	3 47 36·57	+0 7·79			
	ε Persei	39 43	S	W	15	3 50 45·80	+0·01	+0·02	− 0·26	−0·02	3 50 45·55	3 50 53·42	+0 7·87			
	λ Tauri	12 12	S	W	10	3 54 48·70	0·00	+0·02	− 0·59	−0·01	3 54 48·12	3 54 55·98	+0 7·86	+0 7·840		
		Mean	...	...	...	3 51 1										
	A′ Tauri	21 48	S	E	12	3 58 26·22	0·00	−0·02	− 0·49	−0·01	3 58 25·70	3 58 33·64	+0 7·94			
	c Persei	47 26	S	E	9	4 1 0·01	−0·01	−0·03	− 0·12	−0·02	4 0 59·83	4 1 7·71	+0 7·88			
	657 Gr. 80	48 9	S	E	15	4 7 8·97	−0·01	−0·03	− 0·10	−0·02	4 7 8·81	4 7 16·71	+0 7·90			
	664 „	15 8	S	E	14	4 9 45·59	0·00	−0·02	− 0·56	−0·01	4 9 45·00	4 9 52·83	+0 7·83	+0 7·888	+0 7·864	3 57 33
		Mean	...	...	...	4 4 5										
Nov. 1	133 Gr. 80	− 1 43	S	E	15	0 47 35·25	+0·03	+0·01	− 0·80	−0·01	0 47 34·48	0 47 42·39	+0 7·91			
	γ Cassiopeiæ	60 10	N	E	15	0 50 18·56	+0·06	+0·02	+ 0·27	−0·02	0 50 18·89	0 50 26·77	+0 7·88	+0 7·895		
		Mean	...	...	...	0 48 57										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (W), *Lat.* 52° 23′, BY BURRARD WITH TELESCOPE NO. 2.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_W
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Nov. 1	ε Piscium	7 20	S	W	15	0 57 26·19	−0·03	−0·01	− 0·70	−0·01	0 57 25·44	0 57 33·53	+0 8·09			
	168 Gr. 80	5 6	S	W	15	0 59 22·78	−0·03	−0·02	− 0·73	−0·01	0 59 21·99	0 59 30·08	+0 8·09			
	μ Cassiopeiæ	54 25	N	W	13	1 1 13·86	−0·05	−0·04	+ 0·06	−0·02	1 1 13·81	1 1 21·84	+0 8·03			
	β Andromedæ	35 4	S	W	14	1 3 47·55	−0·04	−0·03	− 0·36	−0·02	1 3 47·10	1 3 55·27	+0 8·17			
	194 Gr. 80	1 54	S	W	14	1 5 6·04	−0·03	−0·01	− 0·76	−0·01	1 5 5·23	1 5 13·31	+0 8·08			
	199 „	7 1	S	W	10	1 8 11·40	−0·03	−0·02	− 0·70	−0·01	1 8 10·64	1 8 18·65	+0 8·01			
	200 „	7 1	S	W	13	1 8 12·81	−0·03	−0·02	− 0·70	−0·01	1 8 12·05	1 8 20·03	+0 7·98			
	υ Piscium	26 43	S	W	15	1 13 38·09	−0·04	−0·02	− 0·48	−0·01	1 13 37·54	1 13 45·72	+0 8·18			
	δ Cassiopeiæ	59 42	N	W	6	1 18 53·52	−0·06	−0·04	+ 0·25	−0·02	1 18 53·65	1 19 1·80	+0 8·15	+0 8·087		
		Mean	...	...	...	1 6 12										
	η Piscium	14 49	S	E	14	1 25 48·46	+0·03	+0·01	− 0·62	−0·01	1 25 47·87	1 25 55·88	+0 8·01			
	φ Persei	50 10	S	E	12	1 37 1·38	+0·05	+0·02	− 0·06	−0·02	1 37 1·37	1 37 9·41	+0 8·04			
	ο Piscium	8 38	S	E	15	1 39 47·56	+0·03	+0·01	− 0·69	−0·01	1 39 46·90	1 39 54·96	+0 8·06			
	275 Gr. 80	16 26	S	E	15	1 42 25·82	+0·03	+0·01	− 0·60	−0·01	1 42 25·25	1 42 33·28	+0 8·03			
	280 „	54 38	N	E	15	1 45 2·36	+0·05	+0·02	+ 0·07	−0·02	1 45 2·48	1 45 10·50	+0 8·02			
	α Trianguli	29 5	S	E	15	1 47 2·45	+0·03	+0·01	− 0·45	−0·01	1 47 2·03	1 47 10·01	+0 7·98			
	β Arietis	20 18	S	E	15	1 48 47·04	+0·03	+0·01	− 0·56	−0·01	1 48 46·51	1 48 54·49	+0 7·98			
	296 Gr. 80	17 18	S	E	15	1 51 33·54	+0·03	+0·01	− 0·59	−0·01	1 51 32·98	1 51 40·94	+0 7·96	+0 8·010	+0 8·020	1 10 53
		Mean	...	...	...	1 42 11										
	γ Andromedæ	41 50	S	W	15	1 57 24·01	−0·04	−0·03	− 0·24	−0·02	1 57 23·68	1 57 31·77	+0 8·09			
	α Arietis	22 58	S	W	15	2 1 11·97	−0·03	−0·02	− 0·52	−0·01	2 1 11·39	2 1 19·47	+0 8·08	+0 8·085	+0 8·048	1 37 28
		Mean	...	...	...	1 59 18										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (W), *Lat.* 52° 23′, BY BURRARD WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Nov. 1	η Tauri	23 47	S	W	17	3 41 11·46	−0·03	−0·02	− 0·51	−0·01	3 41 10·89	3 41 19·01	+0 8·12			
	591 Gr. 80	23 49	S	W	15	3 42 53·38	−0·03	−0·02	− 0·51	−0·01	3 42 52·81	3 43 0·81	+0 8·00			
	ζ Persei	31 35	S	W	15	3 47 28·95	−0·04	−0·03	− 0·41	−0·01	3 47 28·46	3 47 36·60	+0 8·14			
	c Persei	47 26	S	W	15	4 0 59·72	−0·05	−0·03	− 0·13	−0·02	4 0 59·49	4 1 7·74	+0 8·25	+0 8·128		
		Mean	...	...	...	3 48 8										
	ε Persei	39 43	S	E	14	3 50 45·74	+0·04	+0·02	− 0·28	−0·02	3 50 45·50	3 50 53·45	+0 7·95			
	ξ Persei	35 30	S	E	13	3 52 6·28	+0·04	+0·01	− 0·35	−0·02	3 52 5·96	3 52 13·95	+0 7·99			
	λ Tauri	12 12	S	E	15	3 54 48 56	+0·03	+0·01	− 0·65	−0·01	3 54 47·94	3 54 55·99	+0 8·05			
	A′ Tauri	21 48	S	E	12	3 58 26·07	+0·03	+0·01	− 0·54	−0·01	3 58 25·56	3 58 33·66	+0 8·10	+0 8·023	+0 8·076	3 51 5
		Mean	...	...	...	3 54 2										
Nov. 4	υ Piscium	26 43	S	W	15	1 13 38·22	0·00	0·00	− 0·40	−0·01	1 13 37·81	1 13 45·73	+0 7·92			
	δ Cassiopeiæ	59 42	N	W	15	1 18 53·86	−0·01	−0·01	+ 0·21	−0·02	1 18 54·03	1 19 1·80	+0 7·77	+0 7·845		
		Mean	...	...	...	1 16 16										
	η Piscium	14 49	S	E	15	1 25 48·62	0·00	−0·02	− 0·52	−0·01	1 25 48·07	1 25 55·88	+0 7·81			
	υ Persei	48 6	S	E	15	1 31 29·65	+0·01	−0·03	− 0·09	−0·02	1 31 29·52	1 31 37·38	+0 7·86			
	φ Persei	50 10	S	E	15	1 37 1·61	+0·01	−0·03	− 0·05	−0·02	1 37 1·52	1 37 9·42	+0 7·90			
	o Piscium	8 38	S	E	15	1 39 47·62	0·00	−0·01	− 0·58	−0·01	1 39 47·02	1 39 54·97	+0 7·95			
	296 Gr. 80	17 18	S	E	9	1 51 33·61	0·00	−0·02	− 0·50	−0·01	1 51 33·08	1 51 40·95	+0 7·87	+0 7·878		
		Mean	...	...	...	1 37 8										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (W), *Lat.* 52° 23′, BY BURRARD WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Nov. 4	γ^1 Andromedæ	41 50	S	W	12	1 57 24·17	−0·01	−0·01	− 0·20	−0·02	1 57 23·93	1 57 31·79	+0 7·86			
	γ^2 Andromedæ	41 50	S	W	12	1 57 25·02	−0·01	−0·01	− 0·20	−0·02	1 57 24·78	1 57 32·66	+0 7·88			
	β Trianguli	34 30	S	W	16	2 3 14·60	0·00	0·00	− 0·31	−0·02	2 3 14·27	2 3 22·20	+0 7·93			
	350 Gr. 80	19 25	S	W	13	2 12 13·91	0·00	0·00	− 0·48	−0·01	2 12 13·42	2 12 21·32	+0 7·90			
	355 „	55 22	N	W	15	2 14 59·65	−0·01	−0·01	+ 0·08	−0·02	2 14 59·69	2 15 7·53	+0 7·84			
	ξ^2 Ceti .	8 0	S	W	15	2 22 31·51	0·00	0·00	− 0·59	−0·01	2 22 30·91	2 22 38·72	+0 7·81	+0 7·870	+0 7·868	1 39 38
	Mean	...	...	...	2 7 58											
	δ Arietis	19 20	S	W	5	3 5 34·56	0·00	0·00	− 0·48	−0·01	3 5 34·07	3 5 41·85	+0 7·78			
	500 Gr. 80	− 1 19	S	W	15	3 12 57·04	0·00	0·00	− 0·67	−0·01	3 12 56·36	3 13 4·09	+0 7·73			
	508 „	20 46	S	W	14	3 15 6·87	0·00	0·00	− 0·47	−0·01	3 15 6·39	3 15 14·27	+0 7·88			
	α Persei	49 30	S	W	10	3 16 47·28	−0·01	−0·01	− 0·06	−0·02	3 16 47·18	3 16 55·04	+0 7·86			
	ο Tauri	8 40	S	W	15	3 19 6·65	0·00	0·00	− 0·58	−0·01	3 19 6·06	3 19 13·99	+0 7·93	+0 7·836		
	Mean	...	...	...	3 13 55											
	ξ Tauri	9 22	S	E	13	3 21 25·63	0·00	−0·01	− 0·58	−0·01	3 21 25·03	3 21 32·91	+0 7·88			
	f Tauri	12 35	S	E	10	3 25 1·48	0·00	−0·02	− 0·55	−0·01	3 25 0·90	3 25 8·82	+0 7·92			
	551 Gr. 80	47 51	S	E	15	3 28 59·32	+0·01	−0·03	− 0·10	−0·02	3 28 59·18	3 29 7·07	+0 7·89			
	δ Persei	47 28	S	E	15	3 35 24·62	+0·01	−0·03	− 0·10	−0·02	3 35 24·48	3 35 32·34	+0 7·86			
	ν Persei	42 15	S	E	15	3 38 1·07	+0·01	−0·03	− 0·20	−0·02	3 38 0·83	3 38 8·81	+0 7·98			
	η Tauri	23 47	S	E	8	3 41 11·69	0·00	−0·02	− 0·43	−0·01	3 41 11·23	3 41 19·06	+0 7·83			
	ζ Persei	31 35	S	E	10	3 47 29·20	0·00	−0·02	− 0·35	−0·01	3 47 28·82	3 47 36·66	+0 7·84	+0 7·886	+0 7·861	3 23 56
	Mean	...	...	...	3 33 56											
Nov. 6	υ Piscium	26 43	S	E	15	1 13 38·55	0·00	−0·01	− 0·37	−0·01	1 13 38·16	1 13 45·73	+0 7·57			
	δ Cassiopeiæ	59 42	N	E	14	1 18 54·17	−0·01	−0·02	+ 0·20	−0·02	1 18 54·32	1 19 1·80	+0 7·48	+0 7·525		
	Mean	...	...	...	1 16 16											

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (W), *Lat. 52° 23'*, BY BURRARD WITH TELESCOPE No. 2.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_W
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Nov. 6	η Piscium	14 49	S	W	15	1 25 48·94	0·00	0·00	− 0·49	−0·01	1 25 48·44	1 25 55·89	+0 7·45			
	υ Persei	48 6	S	W	15	1 31 29·89	+0·01	+0·01	− 0·09	−0·02	1 31 29·80	1 31 37·39	+0 7·59			
	φ Persei	50 10	S	W	15	1 37 1·84	+0·01	+0·01	− 0·05	−0·02	1 37 1·79	1 37 9·43	+0 7·64			
	o Piscium	8 38	S	W	15	1 39 47·95	0·00	0·00	− 0·54	−0·01	1 39 47·40	1 39 54·98	+0 7·58			
	275 Gr. 80	16 26	S	W	10	1 42 26·29	0·00	0·00	− 0·47	−0·01	1 42 25·81	1 42 33·30	+0 7·49			
	α Trianguli	29 5	S	W	15	1 47 2·74	0·00	0·00	− 0·35	−0·01	1 47 2·38	1 47 10·04	+0 7·66			
	β Arietis	20 18	S	W	14	1 48 47·42	0·00	0·00	− 0·44	−0·01	1 48 46·97	1 48 54·52	+0 7·55			
	296 Gr. 80	17 18	S	W	15	1 51 33·85	0·00	0·00	− 0·47	−0·01	1 51 33·37	1 51 40·96	+0 7·59	+0 7·569	+0 7·547	1 28 23
		Mean	...	...	...	1 40 30										
	γ Andromedæ	41 50	S	E	15	1 57 24·42	−0·01	−0·02	− 0·19	−0·02	1 57 24·18	1 57 31·81	+0 7·63			
	α Arietis	22 58	S	E	15	2 1 12·36	0·00	−0·01	− 0·41	−0·01	2 1 11·93	2 1 19·50	+0 7·57			
	ξ^2 Ceti	8 0	S	E	15	2 22 31·71	0·00	−0·01	− 0·55	−0·01	2 22 31·14	2 22 38·74	+0 7·60	+0 7·600	+0 7·585	1 53 47
		Mean	...	...	...	2 7 3										
Nov. 25	350 Gr. 80	19 25	S	W	15	2 12 14·40	−0·04	−0·03	− 0·36	−0·01	2 12 13·96	2 12 21·41	+0 7·45			
	355 „	55 22	N	W	15	2 15 0·09	−0·07	−0·05	+ 0·06	−0·02	2 15 0·01	2 15 7·61	+0 7·60			
	365 „	66 56	N	W	9	2 20 23·55	−0·10	−0·07	+ 0·40	−0·03	2 20 23·75	2 20 31·56	+0 7·81			
	ξ^2 Ceti	8 0	S	W	15	2 22 32·01	−0·04	−0·02	− 0·44	−0·01	2 22 31·50	2 22 38·83	+0 7·33			
	387 Gr. 80	5 8	S	W	15	2 30 19·26	−0·04	−0·02	− 0·46	−0·01	2 30 18·73	2 30 26·04	+0 7·31			
	ν Arietis	21 31	S	W	15	2 32 48·71	−0·04	−0·03	− 0·35	−0·01	2 32 48·28	2 32 55·69	+0 7·41	+0 7·485		
		Mean	...	...	...	2 22 13										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (W), *Lat.* 52° 23′, BY BURRARD WITH TELESCOPE No. 2.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_W
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Nov. 25	θ Persei	48 48	S	E	15	2 36 59·64	+0·06	+0·02	− 0·06	−0·02	2 36 59·64	2 37 7·03	+0 7·39			
	μ Ceti	9 41	S	E	15	2 39 13·34	+0·04	+0·01	− 0·43	−0·01	2 39 12·95	2 39 20·24	+0 7·29			
	414 Gr. 80	28 49	S	E	15	2 41 36·96	+0·04	+0·01	− 0·29	−0·01	2 41 36·71	2 41 44·04	+0 7·33			
	41 Arietis	26 50	S	E	15	2 43 45·73	+0·04	+0·01	− 0·30	−0·01	2 43 45·47	2 43 52·79	+0 7·32			
	σ Arietis	14 39	S	E	15	2 45 39·15	+0·04	+0·01	− 0·40	−0·01	2 45 38·79	2 45 46·08	+0 7·29			
	τ Persei	52 20	S	E	14	2 46 46·97	+0·06	+0·02	0·00	−0·02	2 46 47·03	2 46 54·41	+0 7·38			
	ε Arietis	20 56	S	E	14	2 53 9·97	+0·04	+0·01	− 0·35	−0·01	2 53 9·66	2 53 17·02	+0 7·36			
	454 Gr. 80	26 3	S	E	15	2 55 40·47	+0·04	+0·01	− 0·31	−0·01	2 55 40·20	2 55 47·60	+0 7·40			
	γ Persei	53 6	N	E	14	2 57 9·94	+0·06	+0·02	+ 0·01	−0·02	2 57 10·01	2 57 17·31	+0 7·30			
	ρ Persei	38 26	S	E	3	2 58 24·73	+0·05	+0·02	− 0·19	−0·02	2 58 24·59	2 58 31·92	+0 7·33			
	β Persei	40 34	S	E	17	3 1 18·11	+0·05	+0·02	− 0·17	−0·02	3 1 17·99	3 1 25·32	+0 7·33			
	471 Gr. 80	28 41	S	E	14	3 3 15·35	+0·04	+0·01	− 0·29	−0·01	3 3 15·10	3 3 22·57	+0 7·47	+0 7·349	+0 7·417	2 36 14
		Mean	...	...	...	2 50 15										
	δ Arietis	19 20	S	W	18	3 5 35·06	−0·04	−0·03	− 0·36	−0·01	3 5 34·62	3 5 42·06	+0 7·44			
	508 Gr. 80	20 46	S	W	15	3 15 7·46	−0·04	−0·03	− 0·35	−0·01	3 15 7·03	3 15 14·51	+0 7·48			
	α Persei	49 30	S	W	15	3 16 48·04	−0·06	−0·05	− 0·05	−0·02	3 16 47·86	3 16 55·35	+0 7·49			
	ο Tauri	8 40	S	W	14	3 19 7·26	−0·04	−0·02	− 0·44	−0·01	3 19 6·75	3 19 14·21	+0 7·46			
	ξ Tauri	9 22	S	W	18	3 21 26·21	−0·04	−0·02	− 0·44	−0·01	3 21 25·70	3 21 33·14	+0 7·44			
	f Tauri	12 35	S	W	16	3 25 2·12	−0·04	−0·02	− 0·41	−0·01	3 25 1·64	3 25 9·06	+0 7·42			
	551 Gr. 80	47 51	S	W	13	3 29 0·14	−0·06	−0·05	− 0·07	−0·02	3 28 59·94	3 29 7·41	+0 7·47	+0 7·457	+0 7·403	3 4 34
		Mean	...	...	...	3 18 52										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (W), *Lat.* 52° 23′, BY BURRARD WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Nov. 25	657 Gr. 80	48 9	S	E	11	4 7 10·02	+0·06	+0·02	− 0·07	−0·02	4 7 10·01	4 7 17·28	+0 7·27			
	664 "	15 8	S	E	15	4 9 46·28	+0·04	+0·01	− 0·39	−0·01	4 9 45·93	4 9 53·25	+0 7·32			
	γ Tauri	15 23	S	E	15	4 13 46·76	+0·04	+0·01	− 0·39	−0·01	4 13 46·41	4 13 53·73	+0 7·32			
	δ Tauri	17 18	S	E	15	4 16 50·45	+0·04	+0·01	− 0·38	−0·01	4 16 50·11	4 16 57·50	+0 7·39	+0 7·325		
		Mean	...	...	...	4 11 53										
	703 Gr. 80	17 41	S	W	15	4 19 22·59	−0·04	−0·03	− 0·38	−0·01	4 19 22·13	4 19 29·59	+0 7·46			
	ε Tauri	18 57	S	W	5	4 22 26·88	−0·04	−0·03	− 0·37	−0·01	4 22 26·43	4 22 33·92	+0 7·49			
	719 Gr. 80	15 28	S	W	12	4 24 37·19	−0·04	−0·03	− 0·39	−0·01	4 24 36·72	4 24 44·16	+0 7·44			
	727 "	14 38	S	W	15	4 27 51·04	−0·04	−0·03	− 0·40	−0·01	4 27 50·56	4 27 58·04	+0 7·48	+0 7·468	+0 7·397	4 17 44
		Mean	...	...	...	4 23 34										
Nov. 28	350 Gr. 80	19 25	S	E	15	2 12 14·70	+0·02	−0·02	− 0·30	−0·01	2 12 14·39	2 12 21·41	+0 7·02			
	355 "	55 22	N	E	13	2 15 0·48	+0·03	−0·05	+ 0·05	−0·02	2 15 0·49	2 15 7·60	+0 7·11			
	ξ² Ceti	8 0	S	E	15	2 22 32·22	+0·02	−0·02	− 0·37	−0·01	2 22 31·84	2 22 38·83	+0 6·99			
	μ Ceti	9 41	S	E	14	2 39 13·65	+0·02	−0·02	− 0·36	−0·01	2 39 13·28	2 39 20·25	+0 6·97			
	414 Gr. 80	28 49	S	E	15	2 41 37·27	+0·02	−0·03	− 0·24	−0·01	2 41 37·01	2 41 44·05	+0 7·04			
	41 Arietis	26 50	S	E	15	2 43 46·06	+0·02	−0·03	− 0·25	−0·01	2 43 45·79	2 43 52·80	+0 7·01	+0 7·023		
		Mean	...	...	...	2 29 4										
	σ Arietis	14 39	S	W	15	2 45 39·46	−0·02	0·00	− 0·33	−0·01	2 45 39·10	2 45 46·09	+0 6·99			
	τ Persei	52 20	S	W	13	2 46 47·38	−0·03	+0·01	0·00	−0·02	2 46 47·34	2 46 54·42	+0 7·08			
	ε Arietis	20 56	S	W	15	2 53 10·35	−0·02	0·00	− 0·29	−0·01	2 53 10·03	2 53 17·04	+0 7·01			
	454 Gr. 80	26 3	S	W	14	2 55 40·87	−0·02	0·00	− 0·26	−0·01	2 55 40·58	2 55 47·61	+0 7·03			
	γ Persei	53 6	N	W	15	2 57 10·37	−0·03	+0·01	+ 0·01	−0·02	2 57 10·34	2 57 17·32	+0 6·98			
	ρ Persei	38 26	S	W	5	2 58 25·14	−0·02	0·00	− 0·16	−0·02	2 58 24·94	2 58 31·94	+0 7·00	+0 7·015	+0 7·019	2 40 57
		Mean	...	...	...	2 52 49										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (W), *Lat.* 52° 23′, BY BURRARD WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Nov. 28	β Persei	40 34	S	W	15	3 1 18·54	−0·02	+0·01	− 0·14	−0·02	3 1 18·37	3 1 25·34	+0 6·97			
	δ Arietis	19 20	S	W	15	3 5 35·44	−0·02	0·00	− 0·30	−0·01	3 5 35·11	3 5 42·08	+0 6·97			
	500 Gr. 80	− 1 19	S	W	15	3 12 57·88	−0·02	0·00	− 0·42	−0·01	3 12 57·43	3 13 4·30	+0 6·87			
	508 „	20 46	S	W	15	3 15 7·91	−0·02	0·00	− 0·29	−0·01	3 15 7·59	3 15 14·53	+0 6·94			
	ο Tauri	8 40	S	W	15	3 19 7·62	−0·02	0·00	− 0·36	−0·01	3 19 7·23	3 19 14·23	+0 7·00			
	ξ Tauri	9 22	S	W	15	3 21 26·59	−0·02	0·00	− 0·36	−0·01	3 21 26·20	3 21 33·16	+0 6·96	+0 6·983		
		Mean	...	...	...	3 12 35										
	f Tauri	12 35	S	E	15	3 25 2·40	+0·02	−0·02	− 0·34	−0·01	3 25 2·05	3 25 9·08	+0 7·03			
	551 Gr. 80	47 51	S	E	15	3 29 0·51	+0·02	−0·04	− 0·06	−0·02	3 29 0·41	3 29 7·44	+0 7·03			
	δ Persei	47 28	S	E	15	3 35 25·68	+0·02	−0·04	− 0·07	−0·02	3 35 25·57	3 35 32·73	+0 7·16			
	ν Persei	42 15	S	E	15	3 38 2·18	+0·02	−0·04	− 0·12	−0·02	3 38 2·02	3 38 9·19	+0 7·17			
	η Tauri	23 47	S	E	15	3 41 12·61	+0·02	−0·03	− 0·27	−0·01	3 41 12·32	3 41 19·39	+0 7·07	+0 7·092	+0 7·038	3 23 10
		Mean	...	...	...	3 33 45										
	737 Gr. 80	0 47	S	W	15	4 31 46·81	−0·02	0·00	− 0·41	−0·01	4 31 46·37	4 31 53·44	+0 7·07			
	τ Tauri	22 46	S	W	15	4 35 54·81	−0·02	0·00	− 0·28	−0·01	4 35 54·50	4 36 1·53	+0 7·03			
	4 Camelop.	56 35	N	W	15	4 39 15·52	−0·03	+0·01	+ 0·07	−0·02	4 39 15·55	4 39 22·48	+0 6·93			
	776 Gr. 80	37 18	S	W	15	4 42 49·33	−0·02	0·00	− 0·17	−0·02	4 42 49·12	4 42 56·12	+0 7·00	+0 7·008		
		Mean	...	...	...	4 37 27										
	789 Gr. 80	5 26	S	E	17	4 45 34·76	+0·02	−0·02	− 0·38	−0·01	4 45 34·37	4 45 41·31	+0 6·94			
	ι Aurigæ	33 0	S	E	15	4 50 7·91	+0·02	−0·03	− 0·21	−0·01	4 50 7·68	4 50 14·77	+0 7·09			
	809 Gr. 80	37 44	S	E	15	4 52 6·47	+0·02	−0·03	− 0·17	−0·02	4 52 6·27	4 52 13·37	+0 7·10			
	ε Aurigæ	43 40	S	E	11	4 54 25·18	+0·02	−0·04	− 0·11	−0·02	4 54 25·03	4 54 32·04	+0 7·01	+0 7·035	+0 7·022	4 44 1
		Mean	...	...	...	4 50 34										

TABLE IV. **TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.**

TRANSITS AT POTSDAM (W), *Lat.* 52° 23′, BY BURRARD WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 6	α Persei	49 30	S	E	5	3 16 50·67	+0·02	−0·08	− 0·04	−0·02	3 16 50·55	3 16 55·40	+0 4·85			
	o Tauri	8 40	S	E	13	3 19 9·91	+0·01	−0·04	− 0·38	−0·01	3 19 9·49	3 19 14·26	+0 4·77	+0 4·810		
		Mean	...	...	...	3 18 0										
	551 Gr. 80	47 51	S	W	16	3 29 2·85	−0·02	−0·07	− 0·06	−0·02	3 29 2·68	3 29 7·49	+0 4·81	+0 4·810		
		Mean	...	...	...	3 29 3										
	703 Gr. 80	17 41	S	W	14	4 19 25·36	−0·01	−0·04	− 0·32	−0·01	4 19 24·98	4 19 29·72	+0 4·74			
	ε Tauri	18 57	S	W	6	4 22 29·63	−0·01	−0·04	− 0·31	−0·01	4 22 29·26	4 22 34·05	+0 4·79			
	719 Gr. 80	15 28	S	W	15	4 24 39·90	−0·01	−0·04	− 0·34	−0·01	4 24 39·50	4 24 44·28	+0 4·78			
	α Tauri	16 18	S	W	4	4 29 54·21	−0·01	−0·04	− 0·33	−0·01	4 29 53·82	4 29 58·59	+0 4·77			
	809 Gr. 80	37 44	S	W	7	4 52 8·93	−0·01	−0·06	− 0·17	−0·02	4 52 8·67	4 52 13·49	+0 4·82	+0 4·780		
		Mean	...	...	...	4 29 44										
	η Aurigæ	41 6	S	E	12	4 59 10·43	+0·02	−0·07	− 0·14	−0·02	4 59 10·22	4 59 15·10	+0 4·88			
	α Aurigæ	45 54	S	E	17	5 8 57·75	+0·02	−0·08	− 0·09	−0·02	5 8 57·58	5 9 2·34	+0 4·76			
	888 Gr. 80	37 17	S	E	18	5 17 32·33	+0·02	−0·07	− 0·18	−0·02	5 17 32·08	5 17 36·77	+0 4·69			
	β Tauri	28 31	S	E	22	5 19 40·25	+0·01	−0·06	− 0·25	−0·01	5 19 39·94	5 19 44·66	+0 4·72	+0 4·763	+0 4·791	4 7 6
		Mean	...	...	...	5 11 35										
	δ Orionis	− 0 22	S	W	19	5 26 38·74	−0·01	−0·03	− 0·43	−0·01	5 26 38·26	5 26 43·02	+0 4·76			
	ϕ^1 Orionis	9 25	S	W	19	5 29 3·70	−0·01	−0·03	− 0·37	−0·01	5 29 3·28	5 29 8·10	+0 4·82	+0 4·790	+0 4·786	4 39 33
		Mean	...	...	...	5 27 51										
Dec. 7	ν Arietis	21 31	S	W	14	2 32 52·35	−0·03	+0·01	− 0·27	−0·01	2 32 52·05	2 32 55·70	+0 3·65			
	θ Persei	48 48	S	W	15	2 37 3·41	−0·04	+0·02	− 0·05	−0·02	2 37 3·32	2 37 7·03	+0 3·71			
	μ Ceti	9 41	S	W	15	2 39 17·04	−0·03	+0·01	− 0·34	−0·01	2 39 16·67	2 39 20·27	+0 3·60			
	414 Gr. 80	28 49	S	W	15	2 41 40·62	−0·03	+0·01	− 0·22	−0·01	2 41 40·37	2 41 44·06	+0 3·69			
	41 Arietis	26 50	S	W	4	2 43 49·45	−0·03	+0·01	− 0·24	−0·01	2 43 49·18	2 43 52·82	+0 3·64	+0 3·658		
		Mean	...	...	...	2 38 57										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (W), *Lat.* 52° 23′, BY BURRARD WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 7	τ Persei	52 20	S	E	15	2 46 50·71	+0·04	+0·01	0·00	−0·02	2 46 50·74	2 46 54·42	+0 3·68			
	454 Gr. 80	26 3	S	E	2	2 55 44·24	+0·03	0·00	− 0·24	−0·01	2 55 44·02	2 55 47·64	+0 3·62			
	γ Persei	53 6	N	E	10	2 57 13·73	+0·04	+0·01	+ 0·01	−0·02	2 57 13·77	2 57 17·34	+0 3·57			
	β Persei	40 34	S	E	20	3 1 21·85	+0·04	+0·01	− 0·13	−0·02	3 1 21·75	3 1 25·37	+0 3·62			
	δ Arietis	19 20	S	E	5	3 5 38·78	+0·03	0·00	− 0·28	−0·01	3 5 38·52	3 5 42·11	+0 3·59			
	508 Gr. 80	20 46	S	E	12	3 15 11·28	+0·03	0·00	− 0·27	−0·01	3 15 11·03	3 15 14·57	+0 3·54			
	α Persei	49 30	S	E	15	3 16 51·80	+0·04	+0·01	− 0·04	−0·02	3 16 51·79	3 16 55·41	+0 3·62	+0 3·606	+0 3·632	2 50 50
		Mean	...	...	...	3 2 42										
	ο Tauri	8 40	S	W	15	3 19 11·00	−0·02	+0·01	− 0·34	−0·01	3 19 10·64	3 19 14·27	+0 3·63			
	f Tauri	12 35	S	W	14	3 25 5·87	−0·03	+0·01	− 0·32	−0·01	3 25 5·52	3 25 9·13	+0 3·61			
	551 Gr. 80	47 51	S	W	15	3 29 3·88	−0·04	+0·02	− 0·06	−0·02	3 29 3·78	3 29 7·50	+0 3·72			
	δ Persei	47 28	S	W	15	3 35 29·16	−0·04	+0·02	− 0·06	−0·02	3 35 29·06	3 35 32·80	+0 3·74			
	ν Persei	42 15	S	W	15	3 38 5·65	−0·04	+0·02	− 0·12	−0·02	3 38 5·49	3 38 9·26	+0 3·77			
	η Tauri	23 47	S	W	15	3 41 16·09	−0·03	+0·01	− 0·26	−0·01	3 41 15·80	3 41 19·46	+0 3·66			
	591 Gr. 80	23 49	S	W	15	3 42 57·92	−0·03	+0·01	− 0·26	−0·01	3 42 57·63	3 43 1·27	+0 3·64	+0 3·681		
		Mean	...	...	...	3 33 1										
	ε Persei	39 43	S	E	15	3 50 50·46	+0·04	0·00	− 0·14	−0·02	3 50 50·34	3 50 54·01	+0 3·67			
	ξ Persei	35 30	S	E	17	3 52 10·98	+0·03	0·00	− 0·18	−0·02	3 52 10·81	3 52 14·50	+0 3·69			
	λ Tauri	12 12	S	E	15	3 54 53·15	+0·03	0·00	− 0·32	−0·01	3 54 52·85	3 54 56·47	+0 3·62			
	A′ Tauri	21 48	S	E	16	3 58 30·89	+0·03	0·00	− 0·27	−0·01	3 58 30·64	3 58 34·17	+0 3·53			
	c Persei	47 26	S	E	15	4 1 4·80	+0·04	+0·01	− 0·06	−0·02	4 1 4·77	4 1 8·40	+0 3·63			
	657 Gr. 80	48 9	S	E	15	4 7 13·80	+0·04	+0·01	− 0·05	−0·02	4 7 13·78	4 7 17·44	+0 3·66	+0 3·633	+0 3·657	3 45 14
		Mean	...	...	...	3 57 27										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (W), *Lat.* 52° 23′, BY BURRARD WITH TELESCOPE No. 2.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_W
	Name	Declination	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 10	ρ Persei	38 26	S	W	10	2 58 29·52	−0·01	−0·07	− 0·15	−0·02	2 58 29·27	2 58 31·97	+0 2·70			
	β Persei	40 34	S	W	15	3 1 22·87	−0·02	−0·08	− 0·13	−0·02	3 1 22·62	3 1 25·37	+0 2·75			
	471 Gr. 80	28 41	S	W	17	3 3 20·11	−0·01	−0·06	− 0·22	−0·01	3 3 19·81	3 3 22·62	+0 2·81	+0 2·753		
		Mean	...	...	...	3 1 4										
	δ Arietis	19 20	S	E	14	3 5 39·72	+0·01	−0·03	− 0·28	−0·01	3 5 39·41	3 5 42·11	+0 2·70			
	500 Gr. 80	− 1 19	S	E	19	3 13 2·21	+0·01	−0·02	− 0·39	−0·01	3 13 1·80	3 13 4·34	+0 2·54			
	508 „	20 46	S	E	15	3 15 12·31	+0·01	−0·03	− 0·27	−0·01	3 15 12·01	3 15 14·58	+0 2·57			
	α Persei	49 30	S	E	14	3 16 52·85	+0·02	−0·05	− 0·04	−0·02	3 16 52·76	3 16 55·41	+0 2·65			
	ο Tauri	8 40	S	E	15	3 19 11·97	+0·01	−0·03	− 0·34	−0·01	3 19 11·60	3 19 14·28	+0 2·68			
	ξ Tauri	9 22	S	E	9	3 21 30·92	+0·01	−0·03	− 0·34	−0·01	3 21 30·55	3 21 33·21	+0 2·66	+0 2·633	+0 2·693	3 8 10
		Mean	...	...	...	3 15 15										
	f Tauri	12 35	S	W	15	3 25 6·80	−0·01	−0·05	− 0·32	−0·01	3 25 6·41	3 25 9·14	+0 2·73			
	c Persei	47 26	S	W	15	4 1 5·79	−0·02	−0·09	− 0·06	−0·02	4 1 5·60	4 1 8·42	+0 2·82			
	657 Gr. 80	48 9	S	W	15	4 7 14·81	−0·02	−0·09	− 0·05	−0·02	4 7 14·63	4 7 17·47	+0 2·84			
	664 „	15 8	S	W	19	4 9 51·09	−0·01	−0·05	− 0·30	−0·01	4 9 50·72	4 9 53·41	+0 2·69			
	γ Tauri	15 23	S	W	15	4 13 51·54	−0·01	−0·05	− 0·30	−0·01	4 13 51·17	4 13 53·90	+0 2·73			
	δ Tauri	17 18	S	W	16	4 16 55·31	−0·01	−0·05	− 0·29	−0·01	4 16 54·95	4 16 57·67	+0 2·72	+0 2·755		
		Mean	...	...	...	4 2 21										
	ε Tauri	18 57	S	E	17	4 22 31·72	+0·01	−0·03	− 0·28	−0·01	4 22 31·41	4 22 34·10	+0 2·69			
	719 Gr. 80	15 28	S	E	20	4 24 42·04	+0·01	−0·03	− 0·30	−0·01	4 24 41·71	4 24 44·33	+0 2·62			
	727 „	14 38	S	E	20	4 27 55·92	+0·01	−0·03	− 0·31	−0·01	4 27 55·58	4 27 58·21	+0 2·63			
	α Tauri	16 18	S	E	20	4 29 56·32	+0·01	−0·03	− 0·30	−0·01	4 29 55·99	4 29 58·64	+0 2·65			
	739 Gr. 80	15 49	S	E	20	4 32 11·37	+0·01	−0·03	− 0·30	−0·01	4 32 11·04	4 32 13·65	+0 2·61	+0 2·640	+0 2·698	4 14 54
		Mean	...	...	...	4 27 27										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT POTSDAM (W), *Lat.* 52° 23′, BY BURRARD WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 10	λ Aurigæ	40 1	S	W	14	5 11 48·84	−0·02	−0·07	− 0·14	−0·02	5 11 48·59	5 11 51·37	+0 2·78			
	877 Gr. 80	21 59	S	W	10	5 13 0·91	−0·01	−0·06	− 0·27	−0·01	5 13 0·56	5 13 3·33	+0 2·77			
	888 „	37 17	S	W	20	5 17 34·46	−0·01	−0·07	− 0·16	−0·02	5 17 34·20	5 17 36·86	+0 2·66			
	β Tauri	28 31	S	W	20	5 19 42·35	−0·01	−0·06	− 0·22	−0·01	5 19 42·05	5 19 44·74	+0 2·69	+0 2·725		
		Mean	...	...	...	5 15 32										
	ο Aurigæ	49 47	S	E	10	5 37 50·22	+0·02	−0·05	− 0·03	−0·02	5 37 50·14	5 37 52·86	+0 2·72			
	α Orionis	7 23	S	E	6	5 49 31·84	+0·01	−0·03	− 0·35	−0·01	5 49 31·46	5 49 33·99	+0 2·53			
	β Aurigæ	44 56	S	E	15	5 51 53·69	+0·02	−0·05	− 0·09	−0·02	5 51 53·55	5 51 56·13	+0 2·58	+0 2·610	+0 2·668	5 30 59
		Mean	...	...	...	5 46 25										
Dec. 13	500 Gr. 80	− 1 19	S	E	18	3 13 3·03	+0·02	−0·01	− 0·46	−0·01	3 13 2·57	3 13 4·34	+0 1·77			
	508 „	20 46	S	E	15	3 15 13·03	+0·02	−0·02	− 0·32	−0·01	3 15 12·70	3 15 14·58	+0 1·88			
	α Persei	49 30	S	E	17	3 16 53·60	+0·03	−0·04	− 0·04	−0·02	3 16 53·53	3 16 55·42	+0 1·89			
	ο Tauri	8 40	S	E	13	3 19 12·74	+0·02	−0·02	− 0·40	−0·01	3 19 12·33	3 19 14·28	+0 1·95			
	f Tauri	12 35	S	E	15	3 25 7·59	+0·02	−0·02	− 0·37	−0·01	3 25 7·21	3 25 9·15	+0 1·94			
	551 Gr. 80	47 51	S	E	15	3 29 5·62	+0·03	−0·03	− 0·07	−0·02	3 29 5·53	3 29 7·52	+0 1·99	+0 1·903		
		Mean	...	...	...	3 19 46										
	δ Persei	47 28	S	W	15	3 35 31·02	−0·03	−0·03	− 0·07	−0·02	3 35 30·87	3 35 32·82	+0 1·95			
	ν Persei	42 15	S	W	15	3 38 7·45	−0·03	−0·03	− 0·14	−0·02	3 38 7·23	3 38 9·29	+0 2·06			
	η Tauri	23 47	S	W	15	3 41 17·88	−0·02	−0·02	− 0·30	−0·01	3 41 17·53	3 41 19·48	+0 1·95			
	591 Gr. 80	23 49	S	W	15	3 42 59·76	−0·02	−0·02	− 0·30	−0·01	3 42 59·41	3 43 1·30	+0 1·89			
	ζ Persei	31 35	S	W	15	3 47 35·49	−0·02	−0·02	− 0·24	−0·01	3 47 35·20	3 47 37·13	+0 1·93			
	ε Persei	39 43	S	W	15	3 50 52·32	−0·03	−0·02	− 0·16	−0·02	3 50 52·09	3 50 54·04	+0 1·95	+0 1·955	+0 1·929	3 31 15
		Mean	...	...	...	3 42 44										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

Transits at POTSDAM (W), *Lat.* 52° 23′, by BURRARD with Telescope No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit =T	Right Ascension =R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1895		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Dec. 13	ξ Persei	35 30	S	W	12	3 52 12·84	−0·02	−0·02	− 0·20	−0·02	3 52 12·58	3 52 14·52	+0 1·94			
	λ Tauri	12 12	S	W	15	3 54 55·04	−0·02	−0·02	− 0·38	−0·01	3 54 54·61	3 54 56·49	+0 1·88			
	A′ Tauri	21 48	S	W	15	3 58 32·63	−0·02	−0·02	− 0·31	−0·01	3 58 32·27	3 58 34·21	+0 1·94			
	c Persei	47 26	S	W	15	4 1 6·62	−0·03	−0·03	− 0·07	−0·02	4 1 6·47	4 1 8·44	+0 1·97			
	657 Gr. 80	48 9	S	W	15	4 7 15·66	−0·03	−0·03	− 0·06	−0·02	4 7 15·52	4 7 17·49	+0 1·97			
	664 "	15 8	S	W	11	4 9 51·91	−0·02	−0·02	− 0·36	−0·01	4 9 51·50	4 9 53·43	+0 1·93	+0 1·938		
		Mean	...	...	...	4 0 39										
	γ Tauri	15 23	S	E	15	4 13 52·41	+0·02	−0·02	− 0·36	−0·01	4 13 52·04	4 13 53·91	+0 1·87			
	δ Tauri	17 18	S	E	15	4 16 56·16	+0·02	−0·02	− 0·34	−0·01	4 16 55·81	4 16 57·69	+0 1·88			
	703 Gr. 80	17 41	S	E	15	4 19 28·27	+0·02	−0·02	− 0·34	−0·01	4 19 27·92	4 19 29·79	+0 1·87			
	ε Tauri	18 57	S	E	15	4 22 32·51	+0·02	−0·02	− 0·33	−0·01	4 22 32·17	4 22 34·12	+0 1·95			
	719 Gr. 80	15 28	S	E	15	4 24 42·88	+0·02	−0·02	− 0·36	−0·01	4 24 42·51	4 24 44·36	+0 1·85			
	727 "	14 38	S	E	14	4 27 56·73	+0·02	−0·02	− 0·36	−0·01	4 27 56·36	4 27 58·24	+0 1·88			
	α Tauri	16 18	S	E	15	4 29 57·15	+0·02	−0·02	− 0·35	−0·01	4 29 56·79	4 29 58·66	+0 1·87	+0 1·881	+0 1·910	4 11 26
		Mean	...	...	...	4 22 12										
	888 Gr. 80	37 17	S	E	14	5 17 35·36	+0·02	−0·03	− 0·19	−0·02	5 17 35·14	5 17 36·91	+0 1·77			
	β Tauri	28 31	S	E	15	5 19 43·20	+0·02	−0·02	− 0·26	−0·01	5 19 42·93	5 19 44·76	+0 1·83			
	δ Orionis	− 0 22	S	E	15	5 26 41·82	+0·02	−0·01	− 0·45	−0·01	5 26 41·37	5 26 43·13	+0 1·76			
	φ¹ Orionis	9 25	S	E	14	5 29 6·80	+0·02	−0·02	− 0·40	−0·01	5 29 6·39	5 29 8·22	+0 1·83	+0 1·798		
		Mean	...	...	...	5 23 17										
	ζ Tauri	21 5	S	W	15	5 31 25·93	−0·02	−0·02	− 0·32	−0·01	5 31 25·56	5 31 27·41	+0 1·85			
	σ Orionis	− 2 40	S	W	4	5 33 31·75	−0·02	−0·01	− 0·47	−0·01	5 33 31·24	5 33 33·16	+0 1·92			
	ο Aurigæ	49 47	S	W	15	5 37 51·16	−0·03	−0·03	− 0·04	−0·02	5 37 51·04	5 37 52·92	+0 1·88			
	130 Tauri	17 41	S	W	15	5 41 22·42	−0·02	−0·02	− 0·34	−0·01	5 41 22·03	5 41 23·97	+0 1·94			
	ν Aurigæ	39 7	S	W	10	5 44 17·25	−0·03	−0·02	− 0·17	−0·02	5 44 17·01	5 44 18·82	+0 1·81			
	α Orionis	7 23	S	W	15	5 49 32·60	−0·02	−0·01	− 0·41	−0·01	5 49 32·15	5 49 34·03	+0 1·88	+0 1·880	+0 1·839	5 31 29
		Mean	...	...	...	5 39 40										

ARC TEHRAN-POTSDAM.

TABLE V.

Observations of Transits of the same Stars at both Stations, and Deduction of the Difference of Corrected Times.

As no Longitude stars were observed on this arc, this table does not occur.

EXPLANATION OF *TABLE VI.*

Deduction of Clock Rate Correction.

From the results contained in Tables III and IV, the clock rate correction can now be deduced.

Owing to the want of continuity of the observations, there was a difficulty in deducing the clock rates. The method adopted has been to deduce the rate from the differences between the results of groups on the same night, and also from the differences between the results on different nights, using for the latter observed clock corrections whose epochs were as nearly as possible 24 hours apart; and from the two to form a mean rate founded on star observations. The relative rate deduced from the clock comparisons was afterwards combined with this mean rate in the usual way.

An example will make this clear:

On Dec. 7th there are in column 4 two values of the clock correction; from these and the interval between them, the rate + ·101 is deduced, and entered in column 6: from the first clock correction of Dec. 5th and the first of Dec. 7th the rate + ·002 is found and entered in column 7; also from the second clock correction of Dec. 7th and the second of Dec. 10th the rate + ·007 is found and also entered in column 7. Thus the entry in column 6 appertains solely to Dec. 7th, while those in column 7 appertain to the intervals 5th to 7th and 7th to 10th respectively. The mean of the three therefore is taken as the rate on Dec. 7th.

Column 1 contains the name of the arc.

„ 2 contains the approximate difference of longitude in hours, minutes and decimals of a minute.

„ 3 contains the date.

„ 4 contains the observed clock correction as deduced from observations of clock stars in Table IV.

„ 5 contains the epoch to which the foregoing correction corresponds, taken also from Table IV.

„ 6 contains the hourly clock rate as deduced from observation of different groups of clock stars on the same night.

„ 7 contains the clock rate correction as deduced from observations of corresponding groups of stars on successive nights.

„ 8 contains the mean value for the night.

„ 9, 10, 11, 12 and 13 contain similar quantities to those in columns 4, 5, 6, 7 and 8 but for the other station.

„ 14 contains the relative hourly clock rate during each night deduced from the clock comparisons, the value entered is obtained from the last column of Table III. Where there is only one "Mean Difference between the Clocks" on any night, the value is generally the mean of the two rates derived from the mean difference on this night and on the nights immediately preceding and following it.

We have now the hourly rate of each clock derived from star observations, and also the relative hourly rate of the clocks derived from the clock comparisons. It is clear that the last should be equal to the algebraic difference of the first two, *i.e.*, using the notation given on the Table, we should have

$$h_w - h_e = R, \quad \text{or} \quad h_e = h_w - R.$$

Hence in forming the final value of the hourly clock rate we take $H_e = \frac{1}{2}(h_e + h_w - R)$, and the resulting value is entered in column 15.

Similarly $H_w = \frac{1}{2}(h_w + h_e + R)$, which is given in column 16.

As no longitude stars were observed on this arc, column 17 is blank.

TABLE VI. DEDUCTION OF CLOCK RATE CORRECTION.

Arc	Approximate Difference of Longitude = ΔL	Astronomical Date	TEHRAN or E Clock: Observed Clock Correction	TEHRAN or E Clock: Time	TEHRAN or E Clock: Hourly Clock Rate for Nights of Observation deduced from Star Transits: By Groups	By Nights	Mean $= h_e$	POTSDAM or W Clock: Observed Clock Correction	POTSDAM or W Clock: Time	POTSDAM or W Clock: Hourly Clock Rate for Nights of Observation deduced from Star Transits: By Groups	By Nights	Mean $= h_w$	Relative Hourly Clock Rate deduced from Clock Comparisons = R	Adopted Hourly Clock Rate: For E Clock $= \frac{1}{2}(h_e + h_w - R) = H_e$	Adopted Hourly Clock Rate: For W Clock $= \frac{1}{2}(h_e + h_w + R) = H_w$	Correction to Observed Time of Transit at W Station for Rate of W Clock $= H_w \times \Delta L$
TEHRAN-POTSDAM	h m 2 33·42	1895	m s	h m	s	s	s	m s	h m	s	s	s	s	s	s	
		Oct. 31	+0 35·926	3 33				+0 7·886	0 37							
		" "	+0 35·864	6 36	−0·020		−0·020	+0 7·864	3 58	−0·007		0·000		−0·020	0·000	
		Nov. 1	−0 45·106	3 13				+0 8·020	1 11		+0·006					
		" "	−0 45·059	4 39				...	...							
		" "	−0 44·990	6 31	+0·035		+0·035	+0 8·076	3 51	+0·021		+0·008		+0·035	+0·008	
		" 4	−0 25·277	3 10				+0 7·868	1 35		−0·003					
		" "	...	...				+0 7·861	3 24	−0·004						
		" "	−0 25·320	4 15	−0·039		−0·005	...	...			−0·004	+0·033	−0·021	+0·012	
		" 6	−0 23·874	3 31		+0·030		+0 7·547	1 28		−0·006					
		" "	−0 23·905	5 43	−0·014		+0·008	+0 7·585	1 54	+0·088		+0·027	−0·039	+0·037	−0·002	
		" 25	−0 50·474	5 7				+0 7·417	2 36		0·000					
		" "	−0 50·410	7 20	+0·029		+0·025	+0 7·397	4 18	−0·012		−0·006	−0·019	+0·019	0·000	
		" 28	−0 48·949	5 13		+0·020		+0 7·019	2 41		−0·005					
		" "	...	...				+0 7·022	4 44	+0·001						
		" "	−0 48·800	8 5	+0·052		+0·036	...	...			−0·006	−0·030	+0·030	0·000	
		Dec. 5	−0 45·46[illegible]	6 14		+0·020		+0 4·791	4 7		−0·013					
		" "	−0 45·378	8 19	+0·044		+0·022	+0 4·786	4 40	−0·009		−0·016	−0·031	+0·019	−0·013	
		" 7	−0 45·273	5 50		+0·002		+0 3·632	2 51		−0·025					
		" "	−0 45·189	6 40	+0·101		+0·037	+0 3·657	3 45	+0·028		−0·004	−0·025	+0·029	+0·004	
		" 10	−0 44·673	5 47		+0·007		+0 2·693	3 8		−0·014					
		" "	−0 44·652	9 4	+0·006		+0·004	+0 2·668	5 31	−0·011		−0·012	−0·016	+0·004	−0·012	
		" 13	−0 44·777	6 49		−0·002		+0 1·929	3 31		−0·010					
		" "	−0 44·686	9 4	+0·040		+0·019	+0 1·839	5 31	−0·045		−0·023	−0·010	+0·003	−0·007	

EXPLANATION OF *TABLE VII.*

Retardation of the Electric Current.

The retardation of the electric current computed in this Table does not enter into the difference of longitude, but much interest attaches to its value, and clearly any abnormal result would throw doubt upon the accuracy of the clock comparison whence it was deduced.

Column 1 contains the name of the arc.

" 2 contains the date.

" 3 contains the time by the East or Tehran clock corresponding to the middle of the period during which a comparison was being made at Tehran, that is, during which Potsdam was transmitting signals to Tehran.

" 4 contains the time, still by E. clock, corresponding to the middle of the period during which Tehran was transmitting signals to Potsdam.

" 5 contains the interval between the times given in columns 3 and 4.

" 6 and 9 contain the differences between the clocks as observed at Potsdam and Tehran respectively.

The differences given in columns 6 and 9 have to be reduced to the same epoch and to do this the difference observed at Potsdam receives a correction equal to the relative hourly clock rate, taken from the last column of Table III, multiplied by the interval given in column 5 reduced to the decimal of an hour. This correction and the corrected difference between the clocks as observed at Potsdam are given in columns 7 and 8.

" 10 contains half the difference between columns 8 and 9.

TABLE VII. RETARDATION OF THE ELECTRIC CURRENT.

Arc	Astronomical Date	Time of Comparison by E Clock		Interval of Time between the Comparison at Tehran and Potsdam = I	Difference between the Clocks as Observed at Potsdam	Correction for Relative Clock Rate during the Interval I	Difference between the Clocks		Retardation of the Current
		at Tehran	at Potsdam				as Observed at Potsdam corrected for Clock Rate	as Observed at Tehran	
TEHRAN-POTSDAM	1895	h m s	h m s	m s	h m s	s	h m s	h m s	s
	Oct. 31	5 51 56	5 42 1	9 55	2 32 55·750	+ 0·003	2 32 55·753	2 32 56·140	0·194
	Nov. 1	6 10 17	6 1 18	8 59	2 34 16·699	− 0·004	2 34 16·695	2 34 16·965	0·135
	„ 2	5 38 57	5 31 0	7 57	33 56·041	+ ·003	33 56·044	33 56·315	·136
	„ 4	5 31 58	5 24 0	7 58	33 57·031	+ ·003	33 57·034	33 57·311	·139
	„ „	6 42 58	6 29 0	13 58	33 57·050	+ ·008	33 57·058	33 57·365	·154
	„ 6	6 9 56	5 51 0	18 56	33 55·200	− ·012	33 55·188	33 55·531	·172
	„ 24	6 38 25	6 30 24	8 1	34 21·885	− ·001	34 21·884	34 22·150	·133
	„ 25	6 28 25	6 25 2	3 23	34 21·602	− ·001	34 21·601	34 21·900	·150
	„ 28	6 51 21	6 45 21	6 0	34 19·688	− ·003	34 19·685	34 20·035	·175
	Dec. 5	7 20 18	7 15 15	5 3	2 34 14·000	− 0·003	2 34 13·997	2 34 14·269	0·136
	„ 7	...	7 25 16	...	...	...	...	...	·151*
	„ 10	7 38 13	7 33 12	5 1	34 11·075	− ·002	34 11·073	34 11·395	·161
	„ 13	7 44 13	7 40 9	4 4	34 10·367	− ·001	34 10·366	34 10·668	·151

* Deduced from the values of 2nd November to 13th December.

EXPLANATION OF *TABLE VIII.*

Reduction of Clock Corrections and Clock Comparisons to the same Epochs.

Having now obtained the clock corrections at different epochs on each night, and also the differences between the clocks at other epochs, it remains to reduce them both to the same epochs.

This table deals only with observations of clock stars and the attendant comparisons.

Column 1 contains the date.

„ 2 contains the time in terms of the Tehran clock at which the clock comparison was made (taken from Table III).

„ 3 contains the time in terms of the Potsdam clock at which the clock comparison was made (from Table III).

„ 4 and 5 contain the mean epochs of the clock corrections at the two stations (from Table IV).

„ 6 contains the difference between columns 2 and 4.

„ 7 contains the difference between columns 3 and 5.

„ 8 and 9 contain the clock corrections at the epochs given in columns 4 and 5 (from Table IV).

„ 10 and 11 contain the hourly clock rates (from Table VI).

„ 12 and 13 contain the corrections for rate for the periods entered in columns 6 and 7 respectively, that is, the product of columns 6 and 10, and of columns 7 and 11.

„ 14 and 15 contain the sums of columns 8 and 12 and of columns 9 and 13. The quantities obtained being the clock corrections at the epochs of the comparisons, that is, at the epochs contained in columns 2 and 3.

TABLE VIII. REDUCTION OF CLOCK CORRECTIONS

Date		From Table III — Time of Clock Comparison		Mean Epoch of Clock Correction from Table IV		Difference between Times of Epochs of Clock Correction and Comparison = P	
		by Tehran Clock	by Potsdam Clock	Tehran	Potsdam	Tehran	Potsdam
1895		h m s	h m s	h m s	h m s	h m	h m
Oct.	31	5 46 58	3 14 3	3 32 47	0 37 11	+ 2 14	+ 2 37
				3 45 31	1 22 58	+ 2 1	+ 1 51
				6 36 4	3 57 33	− 0 50	− 0 44
Nov.	2	6 5 45	3 31 31	3 13 25	1 10 53	+ 2 52	+ 2 21
				4 38 51	1 37 28	+ 1 27	+ 1 54
				6 30 51	3 51 5	− 0 25	− 0 20
"	4	5 27 59	2 54 2	3 10 4	1 39 38	+ 2 18	+ 1 14
						+ 1 38	+ 2 22
		6 35 59	4 2 2	3 49 30	3 23 56	+ 2 46	− 0 30
				4 15 3	...	+ 2 21	+ 0 38
"	6	6 0 28	3 26 33	3 30 59	1 28 23	+ 2 29	+ 1 58
				5 43 25	1 53 47	+ 0 17	+ 1 33
"	25	6 26 43	3 52 22	5 6 57	2 36 14	+ 1 20	+ 1 16
				5 45 1	3 4 34	+ 0 42	+ 0 48
				7 20 25	4 17 44	− 0 54	− 0 25
"	28	6 48 21	4 14 1	5 12 56	2 40 57	+ 1 35	+ 1 33
				5 37 16	3 23 10	+ 1 11	+ 0 51
				7 23 33	...	− 0 35	...
				8 4 41	4 44 1	− 1 16	− 0 30
Dec.	5	7 17 47	4 43 33	6 14 12	4 7 6	+ 1 4	+ 0 36
				8 18 49	4 39 33	− 1 1	+ 0 4
"	7	7 25 16	4 51 3	5 49 33	2 50 50	+ 1 36	+ 2 0
				6 40 10	3 45 14	+ 0 45	+ 1 6
"	10	7 35 43	5 1 32	5 47 3	3 8 10	+ 1 49	+ 1 53
				6 40 9	4 14 54	+ 0 56	+ 0 47
				8 24 21	...	− 0 49	...
				9 3 31	5 30 59	− 1 28	− 0 29
"	13	7 42 11	5 8 1	6 48 55	3 31 15	+ 0 53	+ 1 37
				8 31 16	4 11 26	− 0 49	+ 0 57
				9 4 0	5 31 29	− 1 22	− 0 23

AND CLOCK COMPARISONS TO THE SAME EPOCHS.

Clock Correction from Table IV		Hourly Clock Rate from Table VI		Correction for Difference of Times P		Clock Correction at Mean Epoch of Clock Comparison	
Tehran	Potsdam	Tehran	Potsdam	Tehran	Potsdam	Tehran	Potsdam
m s	m s	s	s	s	s	m s	m s
+ 0 35·926	+ 0 7·886	− 0·020	0·000	− 0·045	0·000	+ 0 35·881	+ 0 7·886
0 35·877	0 7·934			− 0·041	0·000	+ 0 35·836	+ 0 7·934
0 35·864	0 7·864			+ 0·017	0·000	+ 0 35·881	+ 0 7·864
− 0 45·106	+ 0 8·020	+ 0·035	+ 0·008	+ 0·100	+ 0·019	− 0 45·006	+ 0 8·039
0 45·059	0 8·048			+ 0·051	+ 0·015	− 0 45·008	+ 0 8·063
0 44·990	0 8·076			− 0·015	− 0·003	− 0 45·005	+ 0 8·073
− 0 25·277	+ 0 7·868	− 0·021	+ 0·012	− 0·048	+ 0·015	− 0 25·325	+ 0 7·883
				− 0·034	+ 0·028	− 0 25·320	+ 0 7·855
0 25·286	0 7·861			− 0·058	− 0·006	− 0 25·344	+ 0 7·896
0 25·320	...			− 0·049	+ 0·008	− 0 25·369	+ 0 7·869
− 0 23·874	+ 0 7·547	+ 0·037	− 0·002	+ 0·092	− 0·004	− 0 23·782	+ 0 7·543
0 23·905	0 7·585			+ 0·010	− 0·003	− 0 23·895	+ 0 7·582
− 0 50·474	+ 0 7·417	+ 0·019	0·000	+ 0·025	0·000	− 0 50·449	+ 0 7·417
0 50·451	0 7·403			+ 0·013	0·000	− 0 50·438	+ 0 7·403
0 50·410	0 7·397			− 0·017	0·000	− 0 50·427	+ 0 7·397
− 0 48·949	+ 0 7·019	+ 0·030	0·000	+ 0·047	0·000	− 0 48·902	+ 0 7·019
0 48·939	0 7·038			+ 0·035	0·000	− 0 48·904	+ 0 7·038
0 48·860	...			− 0·017	...	− 0 48·877	...
0 48·800	0 7·022			− 0·038	0·000	− 0 48·838	+ 0 7·022
− 0 45·469	+ 0 4·791	+ 0·019	− 0·013	+ 0·020	− 0·008	− 0 45·449	+ 0 4·783
0 45·378	0 4·786			− 0·019	− 0·001	− 0 45·397	+ 0 4·785
− 0 45·273	+ 0 3·632	+ 0·029	+ 0·004	+ 0·046	+ 0·008	− 0 45·227	+ 0 3·640
0 45·189	0 3·657			+ 0·022	+ 0·004	− 0 45·167	+ 0 3·661
− 0 44·673	+ 0 2·693	+ 0·004	− 0·012	+ 0·007	− 0·023	− 0 44·666	+ 0 2·670
0 44·645	2·698			+ 0·004	− 0·009	− 0 44·641	+ 0 2·689
0 44·632	...			− 0·003	...	− 0 44·635	...
0 44·652	0 2·668			− 0·006	+ 0·006	− 0 44·658	+ 0 2·674
− 0 44·777	+ 0 1·929	+ 0·003	− 0·007	+ 0·003	− 0·011	− 0 44·774	+ 0 1·918
0 44·731	0 1·910			− 0·002	− 0·007	− 0 44·733	+ 0 1·903
0 44·686	0 1·839			− 0·004	+ 0·003	− 0 44·690	+ 0 1·842

ARC TEHRAN-POTSDAM.

TABLE IX.

Reduction of Clock Comparisons and the Differences between the Clock Corrections to the same Epochs by Interpolation.

As no longitude stars were observed on this arc, this table does not occur.

EXPLANATION OF *TABLE X.*

Deduction of the Difference of Longitude.

Tables III and VIII contain all the data for computing the difference of longitude.

Column 1 contains the name of the arc.

" 2 contains the date.

" 3 and 4 contain the epochs of the clock comparisons from Table VIII.

" 5 and 7 contain the deduced clock corrections corresponding to the epochs in columns 3 and 4. The entries are taken from Table VIII, columns 14 and 15.

" 6 and 8 contain the numbers of stars observed at each station on each night.

" 9 contains the difference between the corrections of the clocks. This is equal to the difference between columns 5 and 7.

" 10 contains the difference between the clocks by direct comparison at the epoch given in column 3; this quantity is taken from Table III.

" 11 contains the observed difference of longitude, which is equal to the sum of the quantities in the two preceding columns. The mean and its probable error are entered at the bottom of the column.

" 12 contains the value of the personal equation and its probable error.

" 13 contains the Final Difference of Longitude and its probable error.

TABLE X. DEDUCTION OF THE DIFFERENCE OF LONGITUDE.

Arc	Astronomical Date	Epoch		Tehran E		Potsdam W		Difference between the Corrections of the E and W Clocks = S	Difference between the Clocks by Direct Comparison, at the Epoch of S	Observed Difference of Longitude	Personal Equation	Final Difference of Longitude
		By E Clock = T_E	By W Clock = T_W	Deduced Clock Correction from Table VIII	No. of Stars	Deduced Clock Correction from Table VIII	No. of Stars					
	1895	h m s	h m s	m s		m s		m s	h m s	h m s	s	h m s
TEHRAN-POTSDAM	Oct. 31	5 46 58	3 14 3	+0 35·881	21	+0 7·886	30	+0 27·995	2 32 55·945	2 33 23·940		2 33 24·228 ± 0·0068
				35·836		7·934		0 27·902	55·945	23·847		
				35·881		7·864		0 28·017	55·945	23·962		
	Nov. 1	6 5 45	3 31 31	−0 45·006	39	+0 8·039	29	−0 53·045	2 34 16·832	2 33 23·787*		
				45·008		8·063		0 53·071	16·832	23·761*		
				45·005		8·073		0 53·078	16·832	23·754*		
	„ 4	5 27 59	2 54 2	−0 25·325	24	+0 7·883	25	−0 33·208	2 33 57·171	2 33 23·963		
		6 35 59	4 2 2	25·320		7·855		0 33·175	57·171	23·996		
				25·344		7·896		0 33·240	57·208	23·968		
				25·369		7·869		0 33·238	57·208	23·970		
	„ 6	6 0 28	3 26 33	−0 23·782	25	+0 7·543	13	−0 31·325	2 33 55·366	2 33 24·041		
				23·895		7·582		0 31·477	55·366	23·889		
	„ 25	6 26 43	3 52 22	−0 50·449	31	+0 7·417	33	−0 57·866	2 34 21·751	2 33 23·885		
				50·438		7·403		0 57·841	21·751	23·910		
				50·427		7·397		0 57·824	21·751	23·927		
	„ 28	6 48 21	4 14 1	−0 48·902	33	+0 7·019	31	−0 55·921	2 34 19·862	2 33 23·941		
				48·904		7·019		0 55·923	19·862	23·939		
				48·877		7·038		0 55·915	19·862	23·947		
				48·838		7·022		0 55·860	19·862	24·002		
	Dec. 5	7 17 47	4 43 33	−0 45·449	33	+0 4·783	14	−0 50·232	2 34 14·135	2 33 23·905		
				45·397		4·785		0 50·182	14·135	23·953		
	„ 7	7 25 16	4 51 3	−0 45·227	17	+0 3·640	25	−0 48·867	2 34 12·801	2 33 23·934		
				45·167		3·661		0 48·828	12·801	23·973		
	„ 10	7 35 43	5 1 32	−0 44·666	33	+0 2·670	27	−0 47·336	2 34 11·235	2 33 23·899		
				44·641		2·689		0 47·330	11·235	23·905		
				44·635		2·674		0 47·309	11·235	23·926		
				44·658		2·674		0 47·332	11·235	23·903		
	„ 13	7 42 11	5 8 [illegible]	−0 44·774	30	+0 1·918	35	−0 46·692	2 34 10·518	2 33 23·826		
				44·733		1·903		0 46·636	10·518	23·882		
				44·690		1·842		0 46·532	20·518	23·986		
									Mean ...	2 33 23·934	+ 0·294	
									p.e. ...	± 0·0059	± 0·0034	

* Results on November 1st rejected for reason see explanatory chapter.

ARC TEHRAN-BUSHIRE.

1896.

ARC TEHRAN-BUSHIRE.

The programme.

The difference of longitude being only 2 minutes a programme consisting of longitude stars only was clearly indicated. It was made to include 3 clock comparisons and 2 groups of star observations, one group coming between the 1st and 2nd comparisons and the other between the 2nd and 3rd. After six successful nights' work had been accomplished, cloudy weather set in at both stations, and in consequence it was decided to fall back on independent clock star observations unless an improvement took place. On March 15th a few longitude stars were observed at both stations and then each observer secured a group of clock stars; on March 16th clock stars only were obtained.

EXPLANATION OF *TABLE I.*

Abstract of Determinations of Collimation and Level Correction-Constants.

The first three columns call for no remark.

Column 4 contains the mean sidereal hour at which the several determinations were made.

Collimation.

Column 5, headed C_e, gives the reading of the micrometer when the collimator cross is intersected by the central transit wire, the telescope being in the position *I.P.E.* (*i.e.* Illuminated Pivot East).

„ 6, headed C_w, gives the corresponding reading, the telescope being *I.P.W.*

„ 7, headed C_0, gives the mean of the two preceding readings, *i.e.* $\frac{1}{2}(C_e+C_w)$. C_0 is therefore the reading of the micrometer when so set that the centre wire is truly collimated.

„ 8, headed C_s, gives the reading of the micrometer as set during the observation of star transits. This setting was arbitrary and was not changed in either instrument throughout the arc.

„ 9, headed c_e, gives the collimation correction-constant for the position *I.P.E.* c_e is equal to C_0-C_s.

„ 10, headed c_w, gives the corresponding correction-constant for the position *I.P.W.* c_w is equal to C_s-C_0.

Level.

Column 11, headed M_e, gives the reading of the micrometer when the centre wire and its reflection from the mercury trough coincide, the telescope being in the position *I.P.E.*

„ 12, headed M_w, gives the corresponding reading when the telescope is in the position *I.P.W.*

„ 13, headed M_0, gives the mean of the two preceding readings, *i.e.* $\frac{1}{2}(M_e+M_w)$.

This quantity is not used in the computations but it should remain constant and therefore affords a valuable safe-guard against blunders in reading M_e and M_w. The nature of the quantity is discussed in Chapter IV.

Column 14, headed b_e, gives the level correction-constant for the position *I.P.E.* b_e is equal to C_0-M_e.

„ 15, headed b_w, gives the corresponding correction-constant for the position *I.P.W.* b_w is equal to M_w-C_0.

A mean of the values of C_0 on any night is taken, and c_e and c_w are found by taking the difference between this mean and C_s; but the level is not stable and the same values of b_e and b_w are not always retained for the whole of a night's observations.

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation						Level				
				C_e	C_w	C_o	C_s	$c_e = C_o - C_s$	$c_w = C_s - C_o$	M_e	M_w	M_o	$b_e = C_o - M_e$	$b_w = M_w - C_o$
1896			h m	d	d	d	d	d	d	d	d	d	d	d
Mar. 4	TEHRAN	CAPTAIN LENOX CONYNGHAM (Telescope No. 1)	7 35	1701·0	1721·6	1711·3	1710·0			1711·0	1710·4	1710·7		
			9 0	...	...	...				1713·3	1709·1	1711·2	− 0·4	− 1·4
			9 35	1702·8	1719·8	1711·3				1710·9	1710·2	1710·6		
			10 48	...	...	...				1712·5	1708·8	1710·7	− 1·1	− 1·9
			11 40	1702·7	1720·0	1711·4				1713·8	1709·1	1711·5		
					Mean	1711·3		+ 1·3	− 1·3		Mean	1710·9		
„ 5			7 35	1715·8	1706·2	1711·0	1710·0			1710·0	1711·0	1710·5		
			8 55	...	...	...				1709·9	1711·2	1710·6	+ 1·2	+ 0·3
			9 35	1716·1	1705·7	1710·9				1709·5	1711·8	1710·7		
			10 42	...	...	...				1710·5	1711·1	1710·8	+ 0·4	+ 0·1
			11 34	1716·3	1705·7	1711·0				1711·7	1710·4	1711·1		
					Mean	1711·0		+ 1·0	− 1·0		Mean	1710·7		
„ 6			7 40	1722·4	1700·1	1711·3	1710·0			1709·1	1711·9	1710·5		
			8 58	...	...	...				1709·5	1711·4	1710·5	+ 2·2	+ 0·6
			9 32	1723·7	1699·3	1711·5				1708·9	1712·7	1710·8		
			10 52	...	...	...				1711·0	1711·6	1711·3	+ 1·1	+ 0·7
			11 35	1722·8	1700·1	1711·5				1711·0	1711·9	1711·5		
					Mean	1711·4		+ 1·4	− 1·4		Mean	1710·9		
„ 7			7 45	1720·6	1701·8	1711·2	1710·0			1712·6	1709·5	1711·1		
			8 56	...	...	...				1709·7	1711·1	1710·4	+ 0·1	− 1·1
			9 35	1722·2	1700·9	1711·6				1711·9	1710·5	1711·2		
			10 46	...	...	...				1711·8	1709·6	1710·7	− 0·9	− 1·9
			11 38	1722·9	1700·2	1711·6				1713·6	1708·6	1711·1		
					Mean	1711·5		+ 1·5	− 1·5		Mean	1710·9		
„ 8			7 48	1722·7	1699·0	1710·9	1710·0			1711·6	1710·5	1711·1		
			8 58	...	...	...				1711·2	1710·3	1710·8	− 0·3	− 0·8
			9 35	1724·0	1698·2	1711·1				1711·4	1710·1	1710·8		
			10 45	...	...	...				1712·9	1709·4	1711·2	− 0·9	− 0·9
			11 35	1723·9	1698·7	1711·3				1711·7	1711·1	1711·4		
					Mean	1711·1		+ 1·1	− 1·1		Mean	1711·1		

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation						Level				
				C_e	C_w	C_o	C_s	$c_e = C_o - C_s$	$c_w = C_s - C_o$	M_e	M_w	M_o	$b_e = C_o - M_e$	$b_w = M_w - C_o$
1896			h m	d	d	d	d	d	d	d	d	d	d	d
Mar. 4	BUSHIRE	CAPTAIN BURRARD (Telescope No. 2)	8 0	1534·6	1626·6	1580·6	1580·0			1584·8	1576·4	1580·6		
			9 37	...	...	...				1584·3	1578·0	1581·2	− 4·4	− 2·6
			10 42	1533·4	1627·0	1580·2				...	...	...		
			11 30	1532·1	1627·8	1580·0				1585·1	1578·8	1582·0		
					Mean	1580·3		+ 0·3	− 0·3		Mean	1581·3		
„ 5			8 2	1534·5	1625·6	1580·1	1580·0			1579·0	1583·7	1581·4		
			9 32	...	...	...				1579·0	1584·3	1581·7		
			10 43	1534·0	1625·6	1579·8				...	...	...	+ 1·0	+ 3·9
			11 30	...	...	...				1579·0	1583·8	1581·4		
					Mean	1580·0		0·0	0·0		Mean	1581·5		
„ 6			8 8	...	...	...	1580·0			1575·0	1587·0	1581·0		
			8 52	1529·2	1631·5	1580·4				...	...	...		
			9 32	...	...	...				1575·4	1586·5	1581·0	+ 5·8	+ 6·2
			10 48	1529·0	1632·4	1580·7				...	...	...		
			11 27	...	...	...				1574·0	1586·9	1580·5		
					Mean	1580·6		+ 0·6	− 0·6		Mean	1580·8		
„ 7			8 19	...	...	...	1580·0			1571·4	1591·9	1581·7		
			8 53	1528·5	1632·6	1580·6				...	...	...		
			9 38	...	...	...				1569·9	1592·3	1581·1	+ 10·2	+ 11·5
			10 42	1527·8	1633·7	1580·8				...	...	...		
			11 23	1527·3	1634·0	1580·7				1570·2	1592·5	1581·4		
					Mean	1580·7		+ 0·7	− 0·7		Mean	1581·4		
„ 8			8 20	...	...	...	1580·0			1567·2	1594·1	1580·7		
			8 52	1535·7	1626·5	1581·1				...	...	...		
			9 33	...	...	...				1568·9	1594·5	1581·7	+ 12·5	+ 13·8
			10 42	1533·2	1627·4	1580·3				...	...	...		
			11 23	...	...	...				1568·4	1595·0	1581·7		
					Mean	1580·7		+ 0·7	− 0·7		Mean	1581·4		

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation						Level				
				C_e	C_w	C_o	C_s	$c_e = C_o - C_s$	$c_w = C_s - C_o$	M_e	M_w	M_o	$b_e = C_o - M_e$	$b_w = M_w - C_o$
1896			h m	d	d	d	d	d	d	d	d	d	d	d
Mar. 10	TEHRAN	CAPTAIN LENOX CONYNGHAM (Telescope No. 1)	7 50	1725·9	1695·7	1710·8	1710·0			1712·0	1710·5	1711·3		
			8 56	...	...	...				1710·5	1709·9	1710·2	− 0·2	− 0·4
			9 35	1726·3	1695·9	1711·1				1711·1	1711·4	1711·3		
			10 48	...	...	...				1710·5	1711·0	1710·8	+ 0·1	0·0
			11 35	1726·5	1695·7	1711·1				1711·2	1710·6	1710·9		
					Mean	1711·0		+ 1·0	− 1·0		Mean	1710·9		
„ 15			8 35	1727·5	1693·5	1710·5	1708·9	+ 1·5	− 1·5	1710·3	1710·2	1710·3		
			9 35	...	...	...	1710·0			1711·6	1708·7	1710·2	− 0·9	− 1·1
			10 5	1728·9	1692·4	1710·7				1712·0	1708·9	1710·5		
			11 10	...	...	...				1712·4	1707·8	1710·1	− 1·9	− 1·8
			11 55	1728·9	1691·3	1710·1		+ 0·4	− 0·4	1712·4	1709·1	1710·8		
					Mean	1710·4					Mean	1710·4		
„ 16			8 20	1728·8	1692·0	1710·4	1710·0			1712·0	1709·7	1710·9	− 1·0	− 0·9
			9 50	1729·6	1692·4	1711·0				1711·4	1709·8	1710·6		
			10 55	...	...	...				1711·1	1709·6	1710·4	− 0·4	− 1·0
			11 40	1729·9	1691·3	1710·6				1711·1	1709·8	1710·5		
					Mean	1710·7		+ 0·7	− 0·7		Mean	1710·6		

TABLE I. ABSTRACT OF DETERMINATIONS OF COLLIMATION AND LEVEL CORRECTION-CONSTANTS.

Astronomical Date	Station	Observer and Telescope	Mean Hour Sidereal	Collimation						Level				
				C_e	C_w	C_o	C_s	$c_e = C_o - C_s$	$c_w = C_s - C_o$	M_e	M_w	M_o	$b_e = C_o - M_e$	$b_w = M_w - C_o$
1896			h m	d	d	d	d	d	d	d	d	d	d	d
Mar. 10	BUSHIRE	CAPTAIN BURRARD (Telescope No. 2)	8 21	...	...	...	1595·0			1583·5	1607·2	1595·4		
			8 52	1527·8	1662·4	1595·1				...	...	...		
			9 32	...	...	...				1582·8	1607·1	1595·0	+ 11·6	+ 12·3
			10 43	1526·4	1663·4	1594·9				...	...	...		
			11 25	1524·7	1664·8	1594·8				1583·5	1607·3	1595·4		
					Mean	1594·9		− 0·1	+ 0·1		Mean	1595·3		
„ 15			8 25	...	...	...	1595·0			1580·1	1610·0	1595·1		
			9 30	1527·6	1663·5	1595·6				...	...	...		
			10 3	...	...	...				1580·3	1609·8	1595·1	+ 15·2	+ 14·8
			11 53	1525·9	1664·3	1595·1				...	...	...		
			12 3	...	...	...				1580·2	1610·8	1595·5		
					Mean	1595·4		+ 0·4	− 0·4		Mean	1595·2		
„ 16			9 13	1521·6	1667·7	1594·7	1595·0			1579·4	1610·8	1595·1	+ 15·0	+ 16·4
			11 19	1521·0	1668·1	1594·6				1579·9	1611·4	1595·7		
					Mean	1594·7		− 0·3	+ 0·3		Mean	1595·4		

EXPLANATION OF *TABLE II.*

Deduction of Deviation Error from Star Observations.

The first five columns call for no remark.

Column 6 shows whether the star was observed at upper or at lower culmination. U standing for upper and L for lower.

" 7 gives the number of wires over which the time of the star's transit was observed.

" 8 contains the value of the deviation constant A, which is equal to $m \sec \delta \sin \zeta$, where m is the value of 1 division of the micrometer head in seconds of time, *viz*: $0^s \cdot 039$. The sign of A depends on those of $\sec \delta$ and $\sin \zeta$, where δ is the star's declination, $(180^\circ - \delta)$ being used for stars observed at lower culmination, and ζ is the star's zenith distance, considered negative if north.

" 9 contains the observed time of transit taken from the chronographic record.

" 10 contains the correction to the time of transit on account of diurnal aberration. This correction is equal to $-0 \cdot 0207 \times$ *cosine latitude* $\times$ *secant declination.* It is therefore negative for all stars at upper culmination and positive for all at lower.

" 11 contains the correction for collimation, this is obtained by multiplying c_e or c_w, as the case may be, by $m \sec \delta$, using $(180^\circ - \delta)$ for stars at lower culmination.

" 12 contains the correction for level, obtained by multiplying b_e or b_w, as the case may be, by $m \sec \delta \cos \zeta$, δ and ζ having the same meanings as before.

" 13 contains the clock error; this is a preliminary value obtained by taking the mean of the errors given by stars north and south of the zenith. If the numbers of stars at upper and lower culminations respectively be equal, a small error in the adopted value of this quantity will not affect the final mean value of the deviation error.

" 14 contains the seconds of the corrected time of transit called T. This is the sum of the seconds in the five preceding columns.

" 15 contains the star's R.A. at the time of the observation. This is either taken from one of the Almanacs or brought up by computation from the Greenwich Catalogue for epoch 1872 or 1880.

" 16 contains the difference T − R.A.

" 17 contains the deviation error $a = \frac{T - R.A.}{A}$. It is to be noted that A contains the quantity m, so that a is in terms of the micrometer divisions.

" 18 contains the daily mean of the values in column 17.

The last column shows whether the telescope was pointing to the East or to the West of North.

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for: Diurnal Aberration	Correction for: Collimation	Correction for: Transit Axis Level	Correction for: Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R.A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
		1896						h m s	s	s	s	m s	s	h m s	m s	d	d	
TEHRAN (E) and BUSHIRE (W)	TEHRAN	Mar. 4	*I. P. E.*	Groom. 1374	U	8	−0·0889	7 49 15·04	−·06	+0·19	−0·04	−1 25·78	49·35	7 47 51·22	−0 1·87	+21·03		
			I. P. E.	Groom. 1418	U	8	−0·3717	8 25 53·65	−·21	+·63	−·13	−1 25·75	28·19	8 24 37·71	−0 9·52	+25·70		
			I. P. E.	73 Draconis	L	8	+0·1373	8 34 16·49	+·06	−·19	+·02	−1 25·75	50·63	8 32 47·42	+0 3·21	+23·38		
			I. P. W.	σ^2 Ursæ Majoris	U	11	−0·0538	9 2 45·17	−·04	−·13	−·12	−1 25·72	19·16	9 1 20·39	−0 1·23	+22·86		
			I. P. W.	B.A.C. 7504	L	6	+0·5549	9 21 27·09	+·28	+·85	+·49	−1 25·70	63·01	9 19 50·60	+0 12·41	+22·36		
			I. P. W.	1 (Hev.) Draconis	U	8	−0·1962	9 23 51·85	−·12	−·35	−·26	−1 25·70	25·42	9 22 29·42	−0 4·00	+20·39		
			I. P. E.	24 Cephei	L	13	+0·1189	10 9 12·00	+·05	−·16	+·04	−1 25·67	46·26	10 7 43·35	+0 2·91	+24·47		
			I. P. E.	B.A.C. 3495	U	8	−0·3230	10 16 12·04	−·18	+·56	−·31	−1 25·66	46·45	10 14 53·36	−0 6·91	+21·39		
			I. P. E.	Bradley 2993	L	5	+0·4317	10 22 46·31	+·22	−·66	+·29	−1 25·65	20·51	10 21 10·28	+0 10·23	+23·72		
			I. P. W.	Bradley 3058	L	6	+0·3130	10 56 28·81	+·15	+·47	+·34	−1 25·64	64·13	10 54 56·93	+0 7·20	+23·00		
			I. P. W.	λ Draconis	U	13	−0·0636	11 26 44·89	−·05	−·15	−·18	−1 25·60	18·91	11 25 20·35	−0 1·44	+22·64		
			I. P. W.	B.A.C. 8213	L	6	+0·5763	11 28 53·72	+·29	+·89	+·70	−1 25·60	30·00	11 27 17·27	+0 12·73	+22·09	+22·75	E
		Mar. 5	*I. P. W.*	σ^2 Ursæ Majoris	U	10	−0·0538	9 2 44·78	−·04	−0·10	+0·03	−1 24·36	20·31	9 1 20·37	−0 0·06	+1·12		
			I. P. W.	1 (Hev.) Draconis	U	12	−0·1962	9 23 54·94	−·12	−·27	+·06	−1 24·34	30·27	9 22 29·37	+0 0·90	−4·59		
			I. P. W.	24 Cephei	L	13	+0·1189	10 9 7·58	+·05	+·12	·00	−1 24·32	43·43	10 7 43·37	+0 0·06	+0·50		
			I. P. W.	B.A.C. 3495	U	9	−0·3230	10 16 20·05	−·18	−·43	+·03	−1 24·31	55·16	10 14 53·31	+0 1·85	−5·73		
			I. P. W.	Bradley 2993	L	1	+0·4317	10 22 33·00	+·22	+·51	−·03	−1 24·30	9·40	10 21 10·35	−0 0·95	−2·20	−2·18	W
		Mar. 6	*I. P. E.*	Cephei 24 (Hev.)	L	2	+0·1549	8 2 37·87	+·08	−0·26	−0·24	−1 23·18	14·27	8 1 15·62	−0 1·35	−8·07		
			I. P. E.	Groom. 3212	L	5	+0·3428	8 15 41·14	+·17	−·55	−·44	−1 23·17	17·15	8 14 17·18	−0 0·03	−0·08		
			I. P. E.	Groom. 1418	U	8	−0·3717	8 25 58·76	−·21	+·68	+·69	−1 23·16	36·76	8 24 37·39	−0 0·63	+1·71		
			I. P. E.	73 Draconis	L	8	+0·1373	8 34 11·03	+·06	−·20	−·11	−1 23·15	47·63	8 32 47·53	+0 0·10	+0·73		
			I. P. W.	σ^2 Ursæ Majoris	U	10	−0·0538	9 2 43·68	−·04	−·14	+·05	−1 23·14	20·41	9 1 20·33	+0 0·08	−1·49		
			I. P. W.	B.A.C. 7504	L	6	+0·5549	9 21 13·81	+·28	+·92	−·21	−1 23·12	51·68	9 19 50·93	+0 0·75	+1·35		
			I. P. W.	1 (Hev.) Draconis	U	9	−0·1962	9 23 52·86	−·12	−·38	+·11	−1 23·12	29·35	9 22 29·32	+0 0·03	−0·15		
			I. P. E.	24 Cephei	L	10	+0·1189	10 9 7·27	+·05	−·18	−·04	−1 23·09	44·01	10 7 43·40	+0 0·61	+5·13		
			I. P. E.	B.A.C. 3495	U	9	−0·3230	10 16 15·72	−·18	+·60	+·31	−1 23·08	53·37	10 14 53·27	+0 0·10	−0·31		
			I. P. W.	λ Draconis	U	13	−0·0636	11 26 43·52	−·05	−·16	+·07	−1 23·07	20·31	11 25 20·38	−0 0·07	+1·10		
			I. P. W.	B.A.C. 8213	L	3	+0·5763	11 28 40·09	+·29	+·96	−·26	−1 23·07	18·01	11 27 17·27	+0 0·74	+1·28	+0·12	E

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for Diurnal Aberration	Correction for Collimation	Correction for Transit Axis Level	Correction for Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R. A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = a	Mean a	Deviation East or West of North
								h m s	s	s	s	m s	s	h m s	m s	d	d	
TEHRAN (E) and BUSHIRE (W)	TEHRAN	1896 Mar. 7	*I. P.* E.	Groom. 1418	U	5	−0·3717	8 25 58·70	− ·21	+0·73	+ 0 03	−1 22·32	36·93	8 24 37·22	−0 0·29	+ 0·78		
			I. P. E.	73 Draconis	L	5	+0·1373	8 34 10·05	+ ·06	− ·22	− ·01	−1 22·32	47·56	8 32 47·58	−0 0·02	− 0·15		
			I. P. W.	σ² Ursæ Majoris	U	7	−0·0538	9 2 42·84	− ·04	− ·15	− ·10	−1 22·30	20·25	9 1 20·31	−0 0·06	+ 1·12		
			I. P. W.	B.A.C. 7504	L	6	+0·5549	9 21 13·52	+ ·28	+ ·99	+ ·39	−1 22·29	52·89	9 19 51·07	+0 1·82	+ 3·28		
			I. P. W.	1 (Hev.) Draconis	U	6	−0·1962	9 23 52·30	− ·12	− ·41	− ·21	−1 22·29	29·27	9 22 29·26	+0 0·01	− 0·05		
			I. P. W.	24 Cephei	L	7	+0·1189	10 9 5·98	+ ·05	+ ·19	+ ·07	−1 22·28	44·01	10 7 43·42	+0 0·59	+ 4·96		
			I. P. W.	B.A.C. 3495	U	10	−0·3230	10 16 16·92	− ·18	− ·64	− ·53	−1 22·27	53·30	10 14 53·24	+0 0·06	− 0·18		
			I. P. E.	λ Draconis	U	13	−0·0636	11 26 42·46	− ·05	+ ·17	− ·08	−1 22·26	20·24	11 25 20·39	−0 0·15	+ 2·37		
			I. P. E.	B.A.C. 8213	L	5	+0·5763	11 28 42·10	+ ·29	−1·02	+ ·33	−1 22·26	19·44	11 27 17·26	+0 2·18	+ 3·79	+ 1·77	E
		Mar. 8	*I. P. E.*	Groom. 1418	U	5	−0·3717	8 25 57·32	− ·21	+0·54	− 0·09	−1 21·90	35·66	8 24 37·05	−0 1·39	+ 3·74		
			I. P. E.	73 Draconis	L	6	+0·1373	8 34 9·81	+ ·06	− ·16	+ ·02	−1 21·90	47·83	8 32 47·63	+0 0·20	+ 1·46		
			I. P. W.	B.A.C. 7504	L	5	+0·5549	9 21 11·42	+ ·28	+ ·72	+ ·28	−1 21·89	50·81	9 19 51·21	−0 0·40	− 0·72		
			I. P. W.	1 (Hev.) Draconis	U	13	−0·1962	9 23 51·82	− ·12	− ·30	− ·15	−1 21·89	29·36	9 22 29·20	+0 0·16	− 0·82		
			I. P. E.	B.A.C. 3495	U	12	−0·3230	10 16 14·75	− ·18	+ ·47	− ·25	−1 21·88	52·91	10 14 53·21	−0 0·30	+ 0·93		
			I. P. E.	Bradley 2993	L	8	+0·4317	10 22 33·39	+ ·22	− ·56	+ ·24	−1 21·87	11·42	10 21 10·51	+0 0·91	+ 2·12		
			I. P. W.	λ Draconis	U	10	−0·0636	11 26 42·44	− ·05	− ·12	− ·08	−1 21·86	20·33	11 25 20·40	−0 0·07	+ 1·10	+ 1·12	E
		Mar. 10	*I. P. E.*	Groom. 1418	U	7	−0·3717	8 25 57·21	− ·21	+0·49	− 0·06	−1 21·05	36·38	8 24 36·73	−0 0·35	+ 0·94		
			I. P. E.	73 Draconis	L	7	+0·1373	8 34 9·10	+ ·06	− ·15	+ ·01	−1 21·05	47·97	8 32 47·75	+0 0·22	+ 1·60		
			I. P. W.	σ² Ursæ Majoris	U	8	−0·0538	9 2 41·31	− ·04	− ·10	− ·03	−1 21·04	20·10	9 1 20·27	−0 0·17	+ 3·16		
			I. P. W.	B.A.C. 7504	L	6	+0·5549	9 21 11·37	+ ·28	+ ·66	+ ·14	−1 21·04	51·41	9 19 51·49	−0 0·08	− 0·14		
			I. P. W.	1 (Hev.) Draconis	U	8	−0·1962	9 23 50·94	− ·12	− ·27	− ·08	−1 21·04	29·43	9 22 29·08	+0 0·35	− 1·78		
			I. P. W.	B.A.C. 3495	U	13	−0·3230	10 16 14·58	− ·18	− ·43	·00	−1 21·02	52·95	10 14 53·17	−0 0·22	+ 0·67		
			I. P. W.	Bradley 2993	L	6	+0·4317	10 22 31·47	+ ·22	+ ·51	·00	−1 21·01	11·19	10 21 10·64	+0 0·55	+ 1·28		
			I. P. E.	λ Draconis	U	13	−0·0636	11 26 40·98	− ·05	+ ·11	+ ·01	−1 20·98	20·07	11 25 20·43	−0 0·36	+ 5·66		
			I. P. E	B.A.C. 8213	L	5	+0·5763	11 28 40·69	+ ·29	− ·68	− ·04	−1 20·98	19·28	11 27 17·14	+0 2·14	+ 3·71	+ 1·68	E

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Arc	Station	Astronomical Date	Instrumental Position	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for Diurnal Aberration	Correction for Collimation	Correction for Transit Axis Level	Correction for Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R.A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.) / A = a	Mean a	Deviation East or West of North
TEHRAN (E) and BUSHIRE (W)	TEHRAN	1896						h m s	s	s	s	m s	s	h m s	m s	d	d	
		Mar. 15	I. P. E.	σ^2 Ursæ Majoris	U	8	−0·0538	9 2 34·95	− ·04	+0·15	− 0·08	−1 15·06	19·92	9 1 20·13	−0 0·21	+ 3·90		
			I. P. E.	B.A.C. 7504	L	6	+0·5549	9 21 10·27	+ ·28	− ·99	+ ·32	−1 15·05	54·83	9 19 52·52	+0 2·31	+ 4·16		
			I. P. E.	1 (Hev.) Draconis	U	10	−0·1962	9 23 43·06	− ·12	+ ·41	− ·17	−1 15·05	28·13	9 22 28·72	−0 0·59	+ 2·99		
			I. P. W.	Groom. 1586	U	10	−0·0831	9 50 27·78	− ·06	− ·20	− ·12	−1 15·07	12·33	9 49 12·55	−0 0·22	+ 2·65		
			I. P. W.	ι Cephei	L	13	+0·0925	10 47 10·67	+ ·04	+ ·04	+ ·03	−1 15·00	55·78	10 45 55·22	+0 0·56	+ 6·05		
			I. P. W.	λ Draconis	U	13	−0·0636	11 26 35·42	− ·05	− ·05	− ·17	−1 14·94	20·21	11 25 20·44	−0 0·23	+ 3·60		
			I. P. W.	B.A.C. 8213	L	6	+0·5763	11 28 33·53	+ ·29	+ ·27	+ ·66	−1 14·94	19·81	11 27 17·11	+0 2·70	+ 4·69	+ 4·01	E
		Mar. 16	I. P. W.	σ^2 Ursæ Majoris	U	9	−0·0538	9 2 33·72	− ·04	−0·07	− 0·08	−1 13·73	19·80	9 1 20·10	−0 0·30	+ 5·58		
			I. P. E.	30 H. Ursæ Maj.	U	11	−0·0486	10 17 57·24	− ·04	+ ·07	− ·03	−1 13·66	43·58	10 16 43·53	+0 0·05	− 1·03		
			I. P. E.	9 H. Draconis	U	12	−0·1064	10 27 37·83	− ·07	+ ·11	− ·05	−1 13·65	24·17	10 26 24·16	+0 0·01	− 0·09		
			I. P. E.	π Cephei	L	6	+0·1391	11 5 43·55	+ ·06	− ·10	+ ·02	−1 13·62	29·91	11 4 29·33	+0 0·58	+ 4·17		
			I. P. W.	λ Draconis	U	13	−0·0636	11 26 34·14	− ·05	− ·08	− ·09	−1 13·60	20·32	11 25 20·44	−0 0·12	+ 1·89		
			I. P. W.	B.A.C. 8213	L	1	+0·5763	11 28 34·05	+ ·29	+ ·48	+ ·37	−1 13·60	21·59	11 27 17·19	+0 4·40	+ 7·63	+ 3·03	E

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = m sec δ sin ζ	Observed Time of Transit	Correction for: Diurnal Aberration	Correction for: Collimation	Correction for: Transit Axis Level	Correction for: Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R.A.	Apparent Clock Error = T − R.A.	Deviation Error = (T−R.A.)/A = *a*	Mean *a*	Deviation East or West of North
TEHRAN (E) and BUSHIRE (W)	BUSHIRE	1896						h m s	s	s	s	m s	s	h m s	m s	d	d	
		Mar. 4	*I. P. E.*	Groom. 1418	U	3	−0·4058	8 24 26·87	−·22	+0·15	− 1·18	+0 4·46	30·08	8 24 37·71	−0 7·63	+18·80		
			I. P. E.	73 Draconis	L	13	+0·1422	8 32 44·84	+·07	− ·04	+ 0·15	+0 4·46	49·48	8 32 47·42	+0 2·06	+14·49		
			I. P. W.	σ^2 Ursæ Majoris	U	3	−0·0635	9 1 15·05	−·05	− ·03	− ·21	+0 4·47	19·23	9 1 20·39	−0 1·16	+18·27		
			I. P. W.	B.A.C. 7504	L	2	+0·5917	9 19 54·44	+·30	+ ·20	+ ·73	+0 4·48	60·15	9 19 50·60	+0 9·55	+16·14		
			I. P. W.	1 (Hev.) Draconis	U	4	−0·2168	9 22 21·76	−·13	− ·08	− ·43	+0 4·49	25·61	9 22 29·42	−0 3·81	+17·57		
			I. P. E.	B.A.C. 3495	U	5	−0·3534	10 14 44·44	−·20	+ ·13	− 1·06	+0 4·54	47·85	10 14 53·36	−0 5·51	+15·59		
			I. P. E.	Bradley 2993	L	1	+0·4591	10 21 12·19	+·23	− ·15	+ 0·92	+0 4·56	17·75	10 21 10·28	+0 7·47	+16·27		
			I. P. W.	Bradley 3058	L	1	+0·3312	10 54 56·60	+·17	+ ·11	+ ·36	+0 4·57	61·81	10 54 56·93	+0 4·88	+14·73		
			I. P. W.	λ Draconis	U	4	−0·0741	11 25 14·82	−·05	− ·03	− ·22	+0 4·59	19·11	11 25 20·35	−0 1·24	+16·73		
			I. P. W.	B.A.C. 8213	L	3	+0·6149	11 27 20·72	+·31	+ ·20	+ ·77	+0 4·59	26·59	11 27 17·27	+0 9·32	+15·16	+ 16·38	E
		Mar. 5	*I. P. W.*	Groom. 1418	U	1	−0·4058	8 24 24·35	−·22	0·00	+ 1·05	+0 5·57	30·75	8 24 37·54	−0 6·79	+16·73		
			I. P. W.	73 Draconis	L	6	+0·1422	8 32 43·64	+·07	·00	− 0·13	+0 5·59	49·17	8 32 47·47	+0 1·70	+11·95		
			I. P. E.	Bradley 2777	L	2	+0·1747	9 7 24·64	+·08	·00	− ·05	+0 5·63	30·30	9 7 27·20	+0 3·10	+17·74		
			I. P. E.	B.A.C. 7504	L	1	+0·5917	9 19 52·66	+·30	·00	− ·28	+0 5·65	58·33	9 19 50·77	+0 7·56	+12·78		
			I. P. E.	1 (Hev.) Draconis	U	5	−0·2168	9 22 19·82	−·13	·00	+ ·16	+0 5·66	25·51	9 22 29·37	−0 3·86	+17·80		
			I. P. W.	24 Cephei	L	6	+0·1224	10 7 39·57	+·06	·00	− ·09	+0 5·72	45·26	10 7 43·37	+0 1·89	+15·44		
			I. P. W.	B.A.C. 3495	U	3	−0·3534	10 14 42·32	−·20	·00	+ ·94	+0 5·76	48·82	10 14 53·31	−0 4·49	+12·71		
			I. P. E.	Bradley 3058	L	2	+0·3312	10 54 56·91	+·17	·00	− ·14	+0 5·80	62·74	10 54 56·95	+0 5·79	+17·48	+ 15·33	E
		Mar. 6	*I. P. E.*	Groom. 3212	L	3	+0·3634	8 14 15·32	+·18	−0·24	− 0·90	+0 7·65	22·01	8 14 17·18	+0 4·83	+13·29		
			I. P. E.	Groom. 1418	U	3	−0·4058	8 24 21·39	−·22	+ ·29	+ 1·56	+0 7·66	30·68	8 24 37·39	−0 6·71	+16·54		
			I. P. W.	B.A.C. 7504	L	2	+0·5917	9 19 51·35	+·30	+ ·39	− 1·75	+0 7·75	58·04	9 19 50·93	+0 7·11	+12·02		
			I. P. W.	1 (Hev.) Draconis	U	3	−0·2168	9 22 17·77	−·13	− ·16	+ 1·02	+0 7·76	26·26	9 22 29·32	−0 3·06	+14·11		
			I. P. E.	24 Cephei	L	6	+0·1224	10 7 37·50	+·06	− ·08	− 0·13	+0 7·84	45·19	10 7 43·40	+0 1·79	+14·62		
			I. P. E.	B.A.C. 3495	U	3	−0·3534	10 14 38·90	−·20	+ ·26	+ 1·39	+0 7·85	48·20	10 14 53·27	−0 5·07	+14·35		
			I. P. W.	Bradley 3058	L	2	+0·3312	10 54 54·71	+·17	+ ·22	− 0·86	+0 7·92	62·16	10 54 56·99	+0 5·17	+15·61	+ 14·36	E
		Mar. 7	*I. P. W.*	Groom. 1418	U	3	−0·4058	8 24 16·84	−·22	−0·34	+ 3·09	+0 9·91	29·28	8 24 37·22	−0 7·94	+19·57		
			I. P. W.	73 Draconis	L	6	+0·1422	8 32 40·06	+·07	+ ·10	− 0·39	+0 9·92	49·76	8 32 47·58	+0 2·18	+15·33		
			I. P. E.	B.A.C. 7504	L	3	+0·5917	9 19 53·05	+·30	− ·46	− 2·88	+0 9·97	59·98	9 19 51·07	+0 8·91	+15·06		
			I. P. E.	1 (Hev.) Draconis	U	5	−0·2168	9 22 13·53	−·13	+ ·19	+ 1·67	+0 9·98	25·24	9 22 29·26	−0 4·02	+18·54		
			I. P. W.	24 Cephei	L	8	+0·1224	10 7 35·51	+·06	+ ·09	− 0·27	+0 10·02	45·41	10 7 43·42	+0 1·99	+16·26		
			I. P. W.	B.A.C. 3495	U	3	−0·3534	10 14 35·18	−·20	− ·30	+ 2·76	+0 10·03	47·47	10 14 53·24	−0 5·77	+16·33		
			I. P. E.	Bradley 3058	L	2	+0·3312	10 54 53·81	+·17	− ·25	− 1·42	+0 10·06	62·37	10 54 57·04	+0 5·33	+16·09	+ 16·74	E

TABLE II. DEDUCTION OF DEVIATION ERROR, *a*, FROM STAR OBSERVATIONS.

Arc	Station	Astronomical Date	Instrumental Position	Star's Name	Culmination	No. of Wires Observed	Deviation Constant A = $m \sec \delta \sin \zeta$	Observed Time of Transit	Correction for: Diurnal Aberration	Correction for: Collimation	Correction for: Transit Axis Level	Correction for: Clock Error	Seconds of Corrected Time of Transit = T	Right Ascension (Increased by 12 hours for Lower Culmination) = R. A.	Apparent Clock Error = T − R.A.	Deviation Error = (T − R.A.)/A = *a*	Mean *a*	Deviation East or West of North
TEHRAN (E) and BUSHIRE (W)	BUSHIRE	1896						h m s	s	s	s	m s	s	h m s	m s	d	d	
		Mar. 8	I. P. E.	Groom. 1418	U	2	−0·4058	8 24 11·85	−·22	+0·34	+ 3·36	+0 11·60	26·93	8 24 37·05	−0 10·12	+24·94		
			I. P. W.	1 (Hev.) Draconis	U	3	−0·2168	9 22 10·96	−·13	− ·19	+ 2·26	+0 11·81	24·71	9 22 29·20	−0 4·49	+20·71		
			I. P. E.	B.A.C. 3495	U	3	−0·3534	10 14 19·69	−·20	+ ·30	+ 3·00	+0 23·73	46·52	10 14 53·21	−0 6·69	+18·93		
			I. P. W.	Bradley 3058	L	3	+0·3312	10 54 42·66	+·17	+ ·25	− 1·92	+0 23·80	64·96	10 54 57·05	+0 7·91	+23·88	+22·12	E
		Mar. 10	I. P. E.	Groom. 1418	U	3	−0·4058	8 24 4·89	−·22	−0·05	+ 3·12	+0 27·49	35·23	8 24 36·73	−0 1·50	+ 3·70		
			I. P. E.	73 Draconis	L	4	+0·1422	8 32 21·28	+·07	+ ·01	− 0·40	+0 27·51	48·47	8 32 47·75	+0 0·72	+ 5·06		
			I. P. W.	B.A.C. 7504	L	2	+0·5917	9 19 29·70	+·30	− ·07	− 3·47	+0 27·59	54·05	9 19 51·49	+0 2·56	+ 4·33		
			I. P. W.	1 (Hev.) Draconis	U	5	−0·2168	9 21 58·75	−·13	+ ·03	+ 2·02	+0 27·60	88·27	9 22 29·08	−0 0·81	+ 3·74		
			I. P. E.	24 Cephei	L	4	+0·1224	10 7 16·80	+·06	+ ·01	− 0·27	+0 27·69	44·29	10 7 43·49	+0 0·80	+ 6·54		
			I. P. E.	B.A.C. 3495	U	2	−0·3534	10 14 21·19	−·20	− ·04	+ 2·78	+0 27·74	51·47	10 14 53·17	−0 1·70	+ 4·81		
			I. P. W.	Bradley 3058	L	1	+0·3312	10 54 32·60	+·17	− ·04	− 1·71	+0 27·82	58·84	10 54 57·06	+0 1·78	+ 5·37	+ 4·79	E
		Mar. 15	I. P. W.	Groom. 1586	U	5	−0·0951	9 48 18·99	−·06	−0·05	+ 1·43	+0 52·67	72·98	9 49 12·55	+0 0·43	− 4·52		
			I. P. E.	Bradley 3058	L	3	+0·3312	10 54 6·44	+·17	− ·14	− 2·11	+0 52·67	57·03	10 54 57·26	−0 0·23	− 0·69		
			I. P. E.	λ Draconis	U	2	−0·0741	11 24 26·43	−·05	+ ·05	+ 1·30	+0 52·67	80·40	11 25 20·44	−0 0·04	+ 0·54	− 1·56	W
		Mar. 16	I. P. E.	Groom. 1586	U	8	−0·0951	9 48 17·04	−·06	−0·04	+ 1·45	+0 54·33	72·72	9 49 12·52	+0 0·20	− 2·1		
			I. P. W.	30 H. Ursæ Maj.	U	5	−0·0579	10 15 48·54	−·04	+ ·03	+ 1·25	+0 54·41	104·19	10 16 43·53	+0 0·66	−11·4		
			I. P. W.	9 H. Draconis	U	4	−0·1202	10 25 29·08	−·07	+ ·05	+ 1·82	+0 54·45	85·33	10 26 24·16	+0 1·17	− 9·7		
			I. P. W.	ι Cephei	L	5	+0·0939	10 45 0·31	+·04	− ·03	− 0·12	+0 54·49	54·69	10 45 55·25	−0 0·56	− 6·0		
			I. P. W.	Bradley 3058	L	2	+0·3312	10 54 3·47	+·17	− ·11	− 2·28	+0 54·52	55·77	10 54 57·26	−0 1·49	− 4·5		
			I. P. E.	π Cephei	L	2	+0·1441	11 3 34·65	+·07	+ ·04	− 0 53	+0 54·57	88·80	11 4 29·33	−0 0·53	− 3·7	− 6·23	W

EXPLANATION OF *TABLE III.*

Direct Comparison of Clocks.

The first four columns call for no remark.

Column 5 contains the time by the Tehran clock of the middle of the period during which signals were being sent or received.

„ 6 contains the time by the Bushire clock of the same instant.

„ 7 contains the difference between the clocks as read off the chronographic record.

„ 8 gives the mean, to the nearest whole second, of the times given in column 5.

„ 9 gives the mean of those in column 6.

„ 10 contains the mean of two corresponding differences in column 7, and is the difference between the clocks, freed from the effects of retardation, at the epoch given, in terms of the two clocks respectively, in columns 8 and 9.

„ 11 contains the deduced relative hourly rate of the clocks. It is obtained as follows:—

The change in the difference between the clocks between two consecutive comparisons is divided by the interval between the comparisons, expressed in hours, and the result is the rate during the interval.

TABLE III. DIRECT COMPARISON OF CLOCKS.

Arc	Astronomical Date	Comparison made at	Clock Signals transmitted from	Time of Comparison by Tehran Clock	Corresponding Time by Bushire Clock	Observed Difference between the Clocks	Mean Time of Comparison by E Clock = T_E	Mean Time of Comparison by W Clock = T_W	Mean Difference between the Clocks at Epochs T_E and T_W = D	Relative Hourly Clock Rate at Epochs T_E and T_W
TEHRAN (E) and BUSHIRE (W)	1896			h m s	h m s	h m s	h m s	h m s	h m s	s
	Mar. 4	Bushire	Tehran	8 10 1·450	8 6 10·000	0 3 51·450				
		Tehran	Bushire	8 14 22·565	8 10 31·000	0 3 51·565	8 12 12	8 8 21	0 3 51·508	− 0·012
		Bushire	Tehran	9 50 1·430	9 46 10·000	0 3 51·430				
		Tehran	Bushire	9 53 29·545	9 49 38·000	0 3 51·545	9 51 45	9 47 54	0 3 51·488	− 0·014
		Bushire	Tehran	11 55 1·400	11 51 10·000	0 3 51·400				
		Tehran	Bushire	11 57 50·506	11 53 59·000	0 3 51·506	11 56 26	11 52 35	0 3 51·453	− 0·013
	„ 5	Bushire	Tehran	8 13 1·210	8 9 10·000	0 3 51·210				
		Tehran	Bushire	8 16 30·329	8 12 39·000	0 3 51·329	8 14 46	8 10 55	0 3 51·270	+ 0·009
		Bushire	Tehran	9 45 1·264	9 41 10·000	0 3 51·264				
		Tehran	Bushire	9 48 7·357	9 44 16·000	0 3 51·357	9 46 34	9 42 43	0 3 51·311	+ 0·024
		Bushire	Tehran	11 18 1·296	11 14 10·000	0 3 51·296				
		Tehran	Bushire	11 20 49·387	11 16 58·000	0 3 51·387	11 19 25	11 15 34	0 3 51·342	+ 0·028
	„ 6	Bushire	Tehran	8 5 2·011	8 1 10·000	0 3 52·011				
		Tehran	Bushire	8 7 30·114	8 3 38·000	0 3 52·114	8 6 16	8 2 24	0 3 52·063	+ 0·046
		Bushire	Tehran	9 46 1·110	9 42 9·000	0 3 52·110				
		Tehran	Bushire	9 49 3·211	9 45 11·000	0 3 52·211	9 47 32	9 43 40	0 3 52·161	+ 0·056
		Bushire	Tehran	11 44 1·208	11 40 9·000	0 3 52·208				
		Tehran	Bushire	11 46 32·330	11 42 40·000	0 3 52·330	11 45 17	11 41 25	0 3 52·269	+ 0·059
	„ 7	Bushire	Tehran	8 16 1·487	8 12 8·000	0 3 53·487				
		Tehran	Bushire	8 19 27·589	8 15 34·000	0 3 53·589	8 17 45	8 13 51	0 3 53·538	+ 0·055
		Bushire	Tehran	9 47 1·530	9 43 8·000	0 3 53·530				
		Tehran	Bushire	9 51 10·687	9 47 17·000	0 3 53·687	9 49 6	9 45 13	0 3 53·609	+ 0·057
		Bushire	Tehran	11 45 1·687	11 41 8·000	0 3 53·687				
		Tehran	Bushire	11 47 30·791	11 43 37·000	0 3 53·791	11 46 16	11 42 23	0 3 53·739	+ 0·059

TABLE III. DIRECT COMPARISON OF CLOCKS.

Arc	Astronomical Date	Comparison made at	Clock Signals transmitted from	Time of Comparison by Tehran Clock	Corresponding Time by Bushire Clock	Observed Difference between the Clocks	Mean Time of Comparison by E Clock $=T_E$	Mean Time of Comparison by W Clock $=T_W$	Mean Difference between the Clocks at Epochs T_E and T_W $=D$	Relative Hourly Clock Rate at Epochs T_E and T_W
	1896			h m s	h m s	h m s	h m s	h m s	h m s	s
TEHRAN (E) and BUSHIRE (W)	Mar. 8	Bushire	Tehran	8 18 1·713	8 14 7·000	0 3 54·713				
		Tehran	Bushire	8 19 36·813	8 15 42·000	0 3 54·813	8 18 49	8 14 55	0 3 54·763	+ 0·051
		Bushire	Tehran	9 50 1·785	9 46 7·000	0 3 54·785				
		Tehran	Bushire	9 54 5·902	9 50 11·000	0 3 54·902	9 52 4	9 48 9	0 3 54·844	+ 0·052*
		Tehran	Bushire	9 56 5·692	9 51 59·000	0 4 6·692				
		Bushire	Tehran	10 0 8·000	9 56 1·465	0 4 6·535	9 58 7	9 54 0	0 4 6·614	+ 0·045*
		Bushire	Tehran	11 41 8·000	11 37 1·389	0 4 6·611				
		Tehran	Bushire	11 43 46·000	11 39 39·228	0 4 6·772	11 42 27	11 38 20	0 4 6·692	+ 0·056
	„ 10	Bushire	Tehran	8 13 11·000	8 9 1·397	0 4 9·603				
		Tehran	Bushire	8 20 13·709	8 16 4·000	0 4 9·709	8 16 42	8 12 33	0 4 9·656	+ 0·063
		Bushire	Tehran	9 44 11·000	9 40 1·309	0 4 9·691				
		Tehran	Bushire	9 47 39·797	9 43 30·000	0 4 9·797	9 45 55	9 41 46	0 4 9·744	+ 0·060
		Bushire	Tehran	11 45 11·000	11 41 1·187	0 4 9·813				
		Tehran	Bushire	11 47 25·915	11 43 16·000	0 4 9·915	11 46 18	11 42 9	0 4 9·864	...
	„ 15	Bushire	Tehran	8 37 2·000	8 32 33·206	0 4 28·794				
		Tehran	Bushire	8 41 56·891	8 37 28·000	0 4 28·891	8 39 29	8 35 1	0 4 28·843	− 0·001
		Bushire	Tehran	10 15 2·000	10 10 33·212	0 4 28·788				
		Tehran	Bushire	10 17 19·895	10 12 51·000	0 4 28·895	10 16 11	10 11 42	0 4 28·842	0·000
		Bushire	Tehran	12 13 30·787	12 9 2·000	0 4 28·787				
		Tehran	Bushire	12 16 33·896	12 12 5·000	0 4 28·896	12 15 2	12 10 34	0 4 28·842	+ 0·009
	„ 16	Bushire	Tehran	8 45 0·156	8 40 31·000	0 4 29·156				
		Tehran	Bushire	8 48 10·273	8 43 41·000	0 4 29·273	8 46 35	8 42 6	0 4 29·215	+ 0·023
		Bushire	Tehran	10 3 31·000	9 59 1·810	0 4 29·190				
		Tehran	Bushire	10 5 48·311	10 1 19·000	0 4 29·311	10 4 40	10 0 10	0 4 29·251	+ 0·042
		Bushire	Tehran	11 51 32·000	11 47 2·700	0 4 29·300				
		Tehran	Bushire	11 54 15·400	11 49 46·000	0 4 29·400	11 52 54	11 48 24	0 4 29·350	+ 0·055

* Bushire clock stopped while being wound between these two comparisons.

EXPLANATION OF *TABLE IV.*

Transits of Clock Stars and Deduction of the Clock Correction.

The heading contains the name of the arc, and indicates the station the observations at which are to be found below, giving at the same time the latitude of the station, the name of the observer and the telescope used.

Column 1 contains the astronomical date.

„ 2 contains the star's name, or number in the Greenwich Catalogue for 1880.

„ 3 contains the star's declination and when south it is indicated by a minus sign. This being given, and also the latitude of the station, it is possible to compute all the corrections to the observed time of transit without reference to anything beyond the foregoing tables.

„ 4 contains the star's aspect, that is, it shews whether the star at culmination was north or south of the zenith of the station. It is convenient to give this information as it renders it easy to see whether the deviation correction has been entered with the proper sign.

„ 5, 6 & 7 explain themselves.

„ 8, 9 & 11 contain respectively the corrections for collimation, level and diurnal aberration. These corrections are computed in precisely the same manner as those in Table II.

„ 10 contains the deviation correction. To form this the appropriate value of a is taken from Table II and multiplied by $m \sec \delta \sin \zeta$. It is to be noted that the quantity a given in Table II is an error, not a correction, so that when forming the correction aA the sign must be changed.

„ 12 contains the corrected time of transit = T. This is the algebraic sum of the five preceding columns.

„ 13 contains the star's R.A. brought up from the Almanac or Catalogue to the epoch of the observation.

„ 14 contains the difference between the two preceding columns with the sign appropriate to a correction.

„ 15 contains the mean value of the clock correction by stars observed in the same instrumental position. In column 7 the mean of the observed times of transit of groups is taken out, and is the epoch of the mean clock correction in column 15.

„ 16 & 17 contain the daily mean of the two instrumental positions, and the epoch to which it corresponds. If there are two groups, one *I.P.E.* and one *I.P.W.*, the mean of the two clock corrections is taken as corresponding to the mean of the two epochs; but if there are three groups, one *I.P.W.*, one *I.P.E.* and again one *I.P.W.*, the mean of the two values *I.P.W.* is taken for the mean of their epochs, and then this mean value and epoch are combined with the *I.P.E.* value and epoch to obtain the quantities to be entered in these columns.

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat.* 35° 42′, BY LENOX CONYNGHAM WITH TELESCOPE No. 1.

Astronomical Date	Star			Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for				Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction			Mean Epoch = T_E
	Name	Declina-tion	Aspect				Collimation	Level	Deviation	Diurnal Aberration			By each Star = R.A. − T	Mean by Stars in same Instrumental Position in each Group	Daily Mean of the two Instrumental Positions	
1896		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Mar. 15	π Leonis	8 32	S	W	9	9 56 0·75	−0·02	−0·04	− 0·07	−0·02	9 56 0·60	9 54 45·42	−1 15·18			
	l Leonis	11 6	S	W	13	10 45 5·24	−0·02	−0·06	− 0·07	−0·02	10 45 5·07	10 43 49·96	−1 15·11			
	1743 Gr. 80	34 47	S	W	8	10 48 48·05	−0·02	−0·09	0·00	−0·02	10 48 47·92	10 47 32·87	−1 15·05			
	1745 „	34 4	S	W	10	10 51 17·10	−0·02	−0·08	− 0·01	−0·02	10 51 16·97	10 50 1·85	−1 15·12			
	1751 „	40 59	N	W	7	10 54 57·10	−0·02	−0·09	+ 0·02	−0·02	10 54 56·99	10 53 41·92	−1 15·07	−1 15·106		
		Mean	...	...	...	10 39 14										
	β Ursæ Maj.	56 56	N	E	12	10 56 53·31	+0·03	−0·13	+ 0·10	−0·03	10 56 53·28	10 55 38·42	−1 14·86			
	α Ursæ Maj.	62 19	N	E	10	10 58 38·60	+0·03	−0·14	+ 0·16	−0·04	10 58 38·61	10 57 23·72	−1 14·89			
	χ Leonis	7 54	S	E	11	11 0 56·70	+0·02	−0·07	− 0·07	−0·02	11 0 56·56	10 59 41·57	−1 14·99			
	ψ Ursæ Maj.	45 4	N	E	11	11 5 7·54	+0·02	−0·10	+ 0·04	−0·02	11 5 7·48	11 3 52·61	−1 14·87	−1 14·903		
		Mean	...	...	...	11 0 24										
	ν Ursæ Maj.	33 39	S	W	12	11 14 9·90	−0·02	−0·08	− 0·01	−0·02	11 14 9·77	11 12 54·93	−1 14·84			
	σ Leonis	6 36	S	W	11	11 17 4·13	−0·02	−0·06	− 0·08	−0·02	11 17 3·95	11 15 48·89	−1 15·06			
	1816 Gr. 80	17 2	S	W	10	11 21 28·86	−0·02	−0·07	− 0·05	−0·02	11 21 28·70	11 20 13·69	−1 15·01			
	1843 „	44 12	N	W	11	11 34 6·73	−0·02	−0·10	+ 0·03	−0·02	11 34 6·84	11 32 51·62	−1 15·22	−1 15·033		
		Mean	...	...	...	11 21 42										
	1850 Gr. 80	21 56	S	E	11	11 36 40·31	+0·02	−0·08	− 0·04	−0·02	11 36 40·19	11 35 25·37	−1 14·82			
	χ Ursæ Maj.	48 21	N	E	10	11 41 52·18	+0·02	−0·11	+ 0·05	−0·02	11 41 52·12	11 40 37·27	−1 14·85			
	β Leonis	15 9	S	E	12	11 45 2·86	+0 02	−0·07	− 0·06	−0·02	11 45 2·73	11 43 47·86	−1 14·87			
	γ Ursæ Maj.	54 16	N	E	13	11 49 40·60	+0·03	−0·12	+ 0·08	−0·03	11 49 40·56	11 48 25·77	−1 14·79	−1 14·833	−1 14·969	11 11 10
		Mean	...	...	...	11 43 19										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT TEHRAN (E), *Lat.* 35° 42′, BY LENOX CONYNGHAM WITH TELESCOPE NO. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1896		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Mar. 16	10 Ursæ Maj.	42 12	N	W	11	8 55 10·36	−0·04	−0·05	+ 0·02	−0·02	8 55 10·27	8 53 56·42	−1 13·85			
	κ Ursæ Maj.	47 34	N	W	11	8 57 48·78	−0·04	−0·05	+ 0·04	−0·02	8 57 48·71	8 56 34·92	−1 13·79			
	B.A.C. 3097	38 52	N	W	7	9 1 11·75	−0·03	−0·04	+ 0·01	−0·02	9 1 11·67	8 59 58·03	−1 13·64			
	1524 Gr. 80	22 28	S	W	10	9 4 39·23	−0·03	−0·04	− 0·03	−0·02	9 4 39·11	9 3 25·27	−1 13·84	−1 13·780		
	Mean	...	...	...	8 59 43										
	1534 Gr. 80	43 39	N	E	5	9 8 16·98	+0·04	−0·05	+ 0·02	−0·02	9 8 16·97	9 7 3·37	−1 13·60			
	83 Cancri	18 9	S	E	11	9 14 26·87	+0·03	−0·04	− 0·04	−0·02	9 14 26·80	9 13 13·07	−1 13·73			
	40 Lyncis	34 50	S	E	13	9 15 59·78	+0·03	−0·05	0·00	−0·02	9 15 59·74	9 14 46·03	−1 13·71			
	1555 Gr. 80	26 38	S	E	10	9 19 52·33	+0·03	−0·04	− 0·02	−0·02	9 19 52·28	9 18 38·54	−1 13·74	−1 13·695		
	Mean	...	...	...	9 14 39										
	1567 Gr. 80	34 7	S	E	12	9 25 42·82	+0·03	−0·05	0·00	−0·02	9 25 42·78	9 24 29·06	−1 13·72			
	θ Ursæ Maj.	52 9	N	E	6	9 27 11·59	+0·04	−0·06	+ 0·05	−0·03	9 27 11·59	9 25 57·92	−1 13·67			
	10 Leonis Min.	36 51	N	E	12	9 29 7·96	+0·03	−0·05	0·00	−0·02	9 29 7·92	9 27 54·20	−1 13·72			
	1580 Gr. 80	36 17	N	E	12	9 30 42·07	+0·03	−0·05	0·00	−0·02	9 30 42·03	9 29 28·31	−1 13·72	−1 13·708		
	Mean	...	...	...	9 28 11										
	1585 Gr. 80	25 9	S	W	12	9 33 9·54	−0·03	−0·04	− 0·02	−0·02	9 33 9·43	9 31 55·47	−1 13·96			
	1595 „	26 23	S	W	5	9 36 56·16	−0·03	−0·04	− 0·02	−0·02	9 36 56·05	9 35 42·19	−1 13·86			
	ε Leonis	24 15	S	W	12	9 41 13·49	−0·03	−0·04	− 0·03	−0·02	9 41 13·37	9 39 59·56	−1 13·81			
	1613 Gr. 80	46 30	N	W	10	9 43 10·33	−0·04	−0·05	+ 0·03	−0·02	9 43 10·25	9 41 56·46	−1 13·79	−1 13·855	−1 13·760	9 20 18
	Mean	...	...	...	9 38 37										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

Transits at TEHRAN (E), Lat. 35° 42′, by LENOX CONYNGHAM with Telescope No. 1.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_E
1896		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Mar. 16	31 Leonis Min.	37 14	N	E	11	10 23 9·11	+0·03	−0·02	0·00	−0·02	10 23 9·10	10 21 55·38	−1 13·72			
	36 Ursæ Maj.	56 31	N	E	11	10 25 16·37	+0·05	−0·03	+ 0·08	−0·03	10 25 16·44	10 24 2·65	−1 13·79			
	1709 Gr. 80	36 52	N	E	9	10 31 40·32	+0·03	−0·02	0·00	−0·02	10 31 40·31	10 30 26·45	−1 13·86			
	1713 „	32 31	S	E	12	10 34 8·82	+0·03	−0·02	− 0·01	−0·02	10 34 8·80	10 32 55·07	−1 13·73	−1 13·775		
		Mean	...	...	...	10 28 34										
	1722 Gr. 80	57 45	N	W	11	10 38 27·74	−0·05	−0·07	+ 0·08	−0·03	10 38 27·67	10 37 13·70	−1 13·97			
	42 Leonis Min.	31 14	S	W	10	10 41 21·83	−0·03	−0·05	− 0·01	−0·02	10 41 21·72	10 40 7·89	−1 13·83			
	l Leonis	11 6	S	W	11	10 45 3·92	−0·03	−0·04	− 0·05	−0·02	10 45 3·78	10 43 49·96	−1 13·82			
	1743 Gr. 80	34 47	S	W	11	10 48 46·70	−0·03	−0·05	0·00	−0·02	10 48 46·60	10 47 32·87	−1 13·73	−1 13·838		
		Mean	...	...	...	10 43 25										
	α Ursæ Maj.	62 19	N	E	8	10 58 37·23	+0·06	−0·03	+ 0·11	−0·04	10 58 37·33	10 57 23·72	−1 13·61			
	χ Leonis	7 54	S	E	10	11 0 55·39	+0·03	−0·01	− 0·06	−0·02	11 0 55·33	10 59 41·57	−1 13·76			
	ψ Ursæ Maj.	45 4	N	E	10	11 5 6·25	+0·04	−0·02	+ 0·03	−0·02	11 5 6·28	11 3 52·62	−1 13·66			
	δ Leonis	21 5	S	E	11	11 9 51·04	+0·03	−0·02	− 0·03	−0·02	11 9 51·00	11 8 37·41	−1 13·59	−1 13·655		
		Mean	...	...	...	11 3 37										
	ν Ursæ Maj.	33 40	S	W	12	11 14 8·59	−0·03	−0·05	− 0·01	−0·02	11 14 8·48	11 12 54·94	−1 13·54			
	σ Leonis	6 36	S	W	10	11 17 2·80	−0·03	−0·03	− 0·06	−0·02	11 17 2·66	11 15 48·90	−1 13·76			
	1816 Gr. 80	17 2	S	W	11	11 21 27·53	−0·03	−0·04	− 0·04	−0·02	11 21 27·40	11 20 13·69	−1 13·71			
	1843 „	44 12	N	W	11	11 34 5·37	−0·04	−0·05	+ 0·02	−0·02	11 34 5·28	11 32 51·62	−1 13·66	−1 13·668	−1 13·734	10 54 20
		Mean	...	...	...	11 21 41										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT BUSHIRE (W), *Lat.* 28° 55′, BY BURRARD WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit = T	Right Ascension = R.A.	Clock Correction: By each Star = R.A. − T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1896		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Mar. 15	42 Leonis Min.	31 14	N	E	3	10 39 14·80	+0·02	+0·69	0·00	−0·02	10 39 15·49	10 40 7·90	+0 52·41			
	l Leonis	11 6	S	E	15	10 42 56·70	+0·02	+0·57	+ 0·02	−0·02	10 42 57·29	10 43 49·96	+0 52·67			
	1743 Gr. 80	34 47	N	E	12	10 46 39·65	+0·02	+0·72	− 0·01	−0·02	10 46 40·36	10 47 32·87	+0 52·51			
	1745 „	34 4	N	E	7	10 49 8·66	+0·02	+0·71	− 0·01	−0·02	10 49 9·36	10 50 1·85	+0 52·49			
	1751 „	40 59	N	E	14	10 52 48·57	+0·02	+0·76	− 0·02	−0·02	10 52 49·31	10 53 41·92	+0 52·61			
	χ Leonis	7 54	S	E	11	10 58 48·35	+0·02	+0·56	+ 0·02	−0·02	10 58 48·93	10 59 41·57	+0 52·64			
	ψ Ursæ Majoris	45 4	N	E	11	11 2 59·25	+0·02	+0·81	− 0·02	−0·03	11 3 0·03	11 3 52·61	+0 52·58			
	β Crateris	−22 16	S	E	7	11 5 41·64	+0·02	+0·39	+ 0·05	−0·02	11 5 42·08	11 6 34·69	+0 52·61			
	δ Leonis	21 5	S	E	12	11 7 44·14	+0·02	+0·62	+ 0·01	−0·02	11 7 44·77	11 8 37·40	+0 52·63	+0 52·572		
		Mean	...	...	...	10 54 0										
	1843 Gr. 80	44 12	N	W	11	11 31 58·08	−0·02	+0·77	− 0·02	−0·02	11 31 58·79	11 32 51·62	+0 52·83			
	χ Ursæ Majoris	48 21	N	W	10	11 39 43·79	−0·02	+0·90	− 0·03	−0·03	11 39 44·61	11 40 37·27	+0 52·66			
	β Leonis	15 9	S	W	13	11 42 54·56	−0·02	+0·58	+ 0·01	−0·02	11 42 55·11	11 43 47·86	+0 52·75			
	γ Ursæ Majoris	54 16	N	W	14	11 47 32·24	−0·02	+0·89	− 0·04	−0·02	11 47 33·05	11 48 25·77	+0 52·72			
	1884 Gr. 80	22 40	S	W	13	11 55 34·09	−0·02	+0·62	+ 0·01	−0·02	11 55 34·68	11 56 27·43	+0 52·75			
	o Virginis	9 18	S	W	15	11 59 3·87	−0·02	+0·55	+ 0·02	−0·02	11 59 4·40	11 59 57·17	+0 52·77	+0 52·747	+0 52·660	11 20 4
		Mean	...	...	...	11 46 8										
Mar. 16	1585 Gr. 80	25 9	S	E	9	9 31 0·53	−0·01	+0·64	+ 0·02	−0·02	9 31 1·16	9 31 55·47	+0 54·31			
	ε Leonis	24 15	S	E	12	9 39 4·63	−0·01	+0·64	+ 0·02	−0·02	9 39 5·26	9 39 59·56	+0 54·30			
	1613 Gr. 80	46 31	N	E	9	9 41 1·26	−0·02	+0·81	− 0·10	−0·03	9 41 1·92	9 41 56·46	+0 54·54			
	1616 „	40 7	N	E	15	9 42 58·72	−0·02	+0·75	− 0·06	−0·02	9 42 59·37	9 43 53·79	+0 54·42			
	μ Leonis	26 30	S	E	11	9 45 58·68	−0·01	+0·65	+ 0·01	−0·02	9 45 59·31	9 46 53·66	+0 54·35			
	ζ Leonis	23 56	S	E	6	10 10 2·20	−0·01	+0·63	+ 0·02	−0·02	10 10 2·82	10 10 57·09	+0 54·27			
	γ′ Leonis	20 22	S	E	7	10 13 22·06	−0·01	+0·62	+ 0·04	−0·02	10 13 22·69	10 14 16·97	+0 54·28			
	μ Ursæ Majoris	42 1	N	E	13	10 15 16·41	−0·02	+0·77	− 0·07	−0·02	10 15 17·07	10 16 11·41	+0 54·34	+0 54·351		
		Mean	...	...	...	9 52 21										

TABLE IV. TRANSITS OF CLOCK STARS AND DEDUCTION OF THE CLOCK CORRECTION.

TRANSITS AT BUSHIRE (W), *Lat.* 28° 55′, BY BURRARD WITH TELESCOPE No. 2.

Astronomical Date	Star: Name	Star: Declination	Star: Aspect	Instrumental Position	No. of Wires Observed	Observed Time of Transit	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Corrected Time of Transit =T	Right Ascension =R.A.	Clock Correction: By each Star = R.A.−T	Clock Correction: Mean by Stars in same Instrumental Position in each Group	Clock Correction: Daily Mean of the two Instrumental Positions	Mean Epoch = T_W
1896		° ′				h m s	s	s	s	s	h m s	h m s	m s	m s	m s	h m s
Mar. 16	31 Leonis Min.	37 14	N	W	9	10 21 0·32	+0·01	+0·79	− 0·04	−0·02	10 21 1·06	10 21 55·38	+0 54·32			
	1706 Gr. 80	35 31	N	W	13	10 26 42·17	+0·01	+0·78	− 0·03	−0·02	10 26 42·91	10 27 37·26	+0 54·35			
	1709 „	36 52	N	W	13	10 29 31·47	+0·01	+0·79	− 0·04	−0·02	10 29 32·21	10 30 26·45	+0 54·24			
	1713 „	32 31	N	W	13	10 31 59·91	+0·01	+0·76	− 0·02	−0·02	10 32 0·64	10 32 55·07	+0 54·43			
	1722 „	57 45	N	W	8	10 36 18·63	+0·02	+1·04	− 0·22	−0·03	10 36 19·44	10 37 13·70	+0 54·26			
	42 Leonis Min.	31 14	N	W	13	10 39 12·81	+0·01	+0·74	− 0·01	−0·02	10 39 13·53	10 40 7·89	+0 54·36			
	l Leonis	11 6	S	W	13	10 42 54·84	+0·01	+0·62	+ 0·07	−0·02	10 42 55·52	10 43 49·96	+0 54·44	+0 54·343	+0 54·347	10 12 26
		Mean	...	...	...	10 32 31										
	1743 Gr. 80	34 47	N	W	10	10 46 37·77	+0·01	+0·77	− 0·03	−0·02	10 46 38·50	10 47 32·87	+0 54·37			
	1745 „	34 4	N	W	10	10 49 6·73	+0·01	+0·77	− 0·03	−0·02	10 49 7·46	10 50 1·84	+0 54·38			
	1751 „	40 59	N	W	13	10 52 46·66	+0·02	+0·82	− 0·07	−0·02	10 52 47·41	10 53 41·91	+0 54·50			
	β Ursæ Majoris	56 56	N	W	7	10 54 43·16	+0·02	+1·03	− 0·20	−0·03	10 54 43·98	10 55 38·41	+0 54·43			
	α Ursæ Majoris	62 19	N	W	6	10 56 28·65	+0·03	+1·14	− 0·28	−0·04	10 56 29·50	10 57 23·72	+0 54·22			
	χ Leonis	7 54	S	W	11	10 58 46·56	+0·01	+0·60	+ 0·09	−0·02	10 58 47·24	10 59 41·57	+0 54·33	+0 54·372		
		Mean	...	...	...	10 53 5										
	ψ Ursæ Majoris	45 4	N	E	12	11 2 57·34	−0·02	+0·80	− 0·09	−0·03	11 2 58·00	11 3 52·62	+0 54·62			
	β Crateris	−22 16	S	E	8	11 5 39·79	−0·01	+0·39	+ 0·20	−0·02	11 5 40·35	11 6 34·69	+0 54·34			
	δ Leonis	21 5	S	E	10	11 7 42·43	−0·01	+0·62	+ 0·03	−0·02	11 7 43·05	11 8 37·41	+0 54·36			
	ν Ursæ Majoris	33 40	N	E	9	11 11 59·71	−0·02	+0·70	− 0·02	−0·02	11 12 0·35	11 12 54·94	+0 54·59			
	σ Leonis	6 36	S	E	13	11 14 53·84	−0·01	+0·54	+ 0·09	−0·02	11 14 54·44	11 15 48·90	+0 54·46			
	1816 Gr. 80	17 2	S	E	12	11 19 18·60	−0·01	+0·60	+ 0·05	−0·02	11 19 19·22	11 20 13·69	+0 54·47			
	1843 „	44 12	N	E	14	11 31 56·35	−0·02	+0·78	− 0·09	−0·02	11 31 57·00	11 32 51·62	+0 54·62	+0 54·494	+0 54·433	11 3 28
		Mean	...	...	...	11 13 30										

ARC TEHRAN-BUSHIRE.

EXPLANATION OF *TABLE V.*

Observations of Transits of the same Stars at both Stations, and Deduction of the Difference of Corrected Times.

This Table includes observations at both stations.

The seconds of corrected time of transit in the case of the eastern station, Tehran, are obtained precisely as in Table IV for clock stars. But in the case of the western station, Bushire, there is an additional correction on account of the rate of its clock.

The quantity sought is the difference between the errors of the two clocks at a particular epoch, namely, that at which the star transited at the eastern station. Now the interval between the transit of a star at the eastern station and its transit at the western station is equal to the difference of longitude, so that the observed time of transit at the western station requires a correction equal to the change in the western clock's error during an interval equal to the difference of longitude, *i.e.*, equal to the clock's hourly rate correction multiplied by the difference of longitude expressed in hours. This quantity is found for each night in the last column of Table VI. There is therefore a slight inter-dependence between these two tables, but no confusion results in practice, for the quantities required from Table V in order to form Table VI do not include the correction for clock rate: thus Table V may be brought up to the point immediately preceding this entry, then Table VI can be computed in its entirety, and lastly the final columns of Table V filled in.

Having obtained the seconds of corrected time at each station, the difference between them is taken out. These differences are combined into means according to the positions of the two instruments, and corresponding to the mean epochs of the groups, and lastly these means are combined into final means corresponding to final mean epochs.

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

TEHRAN (E), *Lat.* 35° 42′, *Long.* 3h 26m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Astronomical Date	Star		Transits Observed at TEHRAN (E) by LENOX CONYNGHAM with Telescope No. 1.							
	Name	Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for				Seconds of Corrected Time
						Collimation	Level	Deviation	Diurnal Aberration	
1896		° ′			h m s	s	s	s	s	s
Mar. 4	1425 Gr. 80	24 29	S	E	8 23 55·14	+0·06	−0·02	−0·19	−0·02	54·97
	1454 „	46 12	N	E	8 35 18·56	+0·07	−0·02	+0·23	−0·02	18·82
	γ Cancri	21 51	S	E	8 38 44·42	+0·05	−0·02	−0·23	−0·02	44·20
	δ Cancri	18 32	S	E	8 40 14·87	+0·05	−0·02	−0·28	−0·02	14·60
	B.A.C. 2989	44 7	N	E	8 46 26·81	+0·07	−0·02	+0·18	−0·02	27·02
	B.A.C. 3025	46 2	N	E	8 51 16·31	+0·07	−0·02	+0·23	−0·02	16·57
		Mean ...	...	...	8 39 19					
	1524 Gr. 80	22 28	S	W	9 4 51·54	−0·05	−0·06	−0·22	−0·02	51·19
	1534 „	43 39	N	W	9 8 29·19	−0·07	−0·07	+0·18	−0·02	29·21
	1539 „	35 4	S	W	9 10 20·02	−0·06	−0·07	−0·01	−0·02	19·86
	83 Cancri	18 9	S	W	9 14 39·30	−0·05	−0·05	−0·29	−0·02	38·89
	40 Lyncis	34 50	S	W	9 16 11·97	−0·06	−0·07	−0·02	−0·02	11·80
	1571 Gr. 80	23 26	S	W	9 27 15·92	−0·06	−0·06	−0·21	−0·02	15·57
	10 Leon. Min.	36 51	N	W	9 29 20·14	−0·06	−0·07	+0·02	−0·02	20·01
		Mean ...	...	...	9 15 53					
	λ Ursæ Maj.	43 26	N	E	10 12 18·40	+0·07	−0·06	+0·17	−0·02	18·56
	1686 Gr. 80	35 57	N	E	10 21 13·83	+0·06	−0·05	0·00	−0·02	13·82
	1706 „	35 31	S	E	10 29 2·75	+0·06	−0·05	0·00	−0·02	2·74
	1709 „	36 52	N	E	10 31 52·13	+0·06	−0·05	+0·02	−0·02	52·14
	1714 „	16 40	S	E	10 34 48·32	+0·05	−0·04	−0·30	−0·02	48·01
	1717 „	28 4	S	E	10 36 4·25	+0·06	−0·05	−0·14	−0·02	4·10
	1722 „	57 45	N	E	10 38 38·73	+0·09	−0·07	+0·63	−0·03	39·35
	1730 „	19 26	S	E	10 42 16·87	+0·05	−0·04	−0·27	−0·02	16·59
		Mean ...	...	...	10 30 47					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

TEHRAN (E), *Lat.* 35° 42′, *Long.* 3h 26m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Transits Observed at BUSHIRE (W) by BURRARD with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch $= T_E$
Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Correction for Rate of W Clock	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
S	E	8 22 24·96	+0·01	−0·19	−0·05	−0·02	0·00	24·71	− 1 30·26			
N	E	8 33 48·50	+0·02	−0·23	+0·27	−0·03	0·00	48·53	1 30·29			
S	E	8 37 14·27	+0·01	−0·18	−0·09	−0·02	0·00	13·99	1 30·21			
S	E	8 38 44·70	+0·01	−0·18	−0·12	−0·02	0·00	44·39	1 20·21			
N	E	8 44 56·73	+0·02	−0·23	+0·23	−0·02	0·00	56·73	1 30·29			
N	E	8 49 46·30	+0·02	−0·23	+0·27	−0·03	0·00	46·33	1 30·24	− 1 30·250		
S	W	9 3 20·96	−0·01	−0·11	−0·08	−0·02	0·00	20·74	− 1 30·45			
N	W	9 6 58·85	−0·02	−0·13	+0·22	−0·02	0·00	58·90	1 30·31			
N	W	9 8 49·76	−0·01	−0·12	+0·08	−0·02	0·00	49·69	1 30·17			
S	W	9 13 8·77	−0·01	−0·10	−0·12	−0·02	0·00	8·52	1 30·37			
N	W	9 14 41·75	−0·01	−0·12	+0·08	−0·02	0·00	41·68	1 30·12			
S	W	9 25 45·45	−0·01	−0·11	−0·07	−0·02	0·00	45·24	1 30·33			
N	W	9 27 49·78	−0·01	−0·12	+0·11	−0·02	0·00	49·74	1 30·27	− 1 30·289	− 1 30·270	8 57 36
N	E	10 10 48·35	+0·02	−0·23	+0·22	−0·02	0·00	48·34	− 1 30·22			
N	E	10 19 43·67	+0·01	−0·21	+0·10	−0·02	0·00	43·55	1 30·27			
N	E	10 27 32·71	+0·01	−0·21	+0·09	−0·02	0·00	32·58	1 30·16			
N	E	10 30 22·01	+0·01	−0·21	+0·11	−0·02	0·00	21·90	1 30·24			
S	E	10 33 18·06	+0·01	−0·17	−0·14	−0·02	0·00	17·74	1 30·27			
S	E	10 34 34·04	+0·01	−0·19	−0·01	−0·02	0·00	33·83	1 30·27			
N	E	10 37 8·84	+0·02	−0·28	+0·57	−0·03	0·00	9·12	1 30·23			
S	E	10 40 46·63	+0·01	−0·18	−0·11	−0·02	0·00	46·33	1 30·26	− 1 30·240		

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

TEHRAN (E), Lat. 35° 42′, Long. 3h 26m: AND BUSHIRE (W), Lat. 28° 55′, Long. 3h 23m.

Astronomical Date	Star: Name	Star: Declination	Transits Observed at TEHRAN (E) by LENOX CONYNGHAM with Telescope No. 1.: Star's Aspect	Instrumental Position	Observed Time	Correction for: Collimation	Correction for: Level	Correction for: Deviation	Correction for: Diurnal Aberration	Seconds of Corrected Time
1896		° ′			h m s	s	s	s	s	s
March 4	1751 Gr. 80	40 59	N	W	10 55 7·72	−0·07	−0·10	+0·11	−0·02	7·64
	1767 „	38 48	N	W	11 0 13·45	−0·06	−0·09	+0·06	−0·02	13·34
	ψ Urs. Maj.	45 4	N	W	11 5 18·24	−0·07	−0·10	+0·21	−0·02	18·26
	δ Leonis	21 5	S	W	11 10 3·39	−0·05	−0·08	−0·24	−0·02	3·00
	1794 Gr. 80	23 40	S	W	11 11 9·13	−0·06	−0·08	−0·20	−0·02	8·77
	ν Urs. Maj.	33 39	S	W	11 14 20·60	−0·06	−0·09	−0·04	−0·02	20·39
	1807 Gr. 80	6 36	S	W	11 17 15·08	−0·05	−0·07	−0·44	−0·02	14·50
	B.A.C. 3868	44 3	N	W	11 18 36·31	−0·07	−0·10	+0·18	−0·02	36·30
	1816 Gr. 80	17 2	S	W	11 21 39·73	−0·05	−0·07	−0·30	−0·02	39·29
		Mean	...	...	11 10 25					
„ 5	1425 Gr. 80	24 29	S	E	8 23 53·52	+0·04	+0·05	+0·01	−0·02	53·60
	1454 „	46 12	N	E	8 35 17·36	+0·06	+0·07	−0·02	−0·02	17·45
	γ Cancri	21 51	S	E	8 38 42·82	+0·04	+0·05	+0·02	−0·02	42·91
	δ Cancri	18 32	S	E	8 40 13·12	+0·04	+0·05	+0·02	−0·02	13·21
	B.A.C. 3025	46 2	N	E	8 51 15·18	+0·06	+0·07	−0·02	−0·02	15·27
		Mean	...	...	8 37 52					
	B.A.C. 3097	38 52	N	W	9 1 22·33	−0·05	+0·01	0·00	−0·02	22·27
	1524 Gr. 80	22 28	S	W	9 4 49·72	−0·04	+0·01	+0·02	−0·02	49·69
	1534 „	43 39	N	W	9 8 27·75	−0·05	+0·02	−0·01	−0·02	27·69
	83 Cancri	18 9	S	W	9 14 37·55	−0·04	+0·01	+0·02	−0·02	37·52
	40 Lyncis	34 50	S	W	9 16 10·52	−0·05	+0·01	0·00	−0·02	10·46
	10 Leo. Min	36 51	N	W	9 29 18·65	−0·05	+0·01	0·00	−0·02	18·59
		Mean	...	...	9 12 28					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

TEHRAN (E), *Lat.* 35° 42′, *Long.* 3h 26m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Transits Observed at BUSHIRE (W) by BURRARD with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch $= T_E$
Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Correction for Rate of W Clock	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
N	W	10 53 37·20	−0·02	−0·13	+0·18	−0·02	0·00	37·21	− 1 30·43			
N	W	10 58 42·92	−0·01	−0·13	+0·14	−0·02	0·00	42·90	1 30·44			
N	W	11 3 47·84	−0·02	−0·14	+0·25	−0·03	0·00	47·90	1 30·36			
S	W	11 8 32·87	−0·01	−0·11	−0·09	−0·02	0·00	32·64	1 30·36			
S	W	11 9 38·57	−0·01	−0·11	−0·06	−0·02	0·00	38·37	1 30·40			
N	W	11 12 50·17	−0·01	−0·12	+0·06	−0·02	0·00	50·08	1 30·31			
S	W	11 15 44·51	−0·01	−0·09	−0·24	−0·02	0·00	44·15	1 30·35			
N	W	11 17 5·83	−0·02	−0·14	+0·23	−0·02	0·00	5·88	1 30·42			
S	W	11 20 9·19	−0·01	−0·10	−0·14	−0·02	0·00	8·92	1 30·37	− 1 30·382	− 1 30·311	10 50 36
S	W	8 22 23·53	0·00	+0·17	−0·05	−0·02	0·00	23·63	− 1 29·97			
N	W	8 33 46·90	0·00	+0·21	+0·25	−0·03	0·00	47·33	1 30·12			
S	W	8 37 12·80	0·00	+0·16	−0·08	−0·02	0·00	12·86	1 30·05			
S	W	8 38 43·20	0·00	+0·16	−0·11	−0·02	0·00	43·23	1 29·98			
N	W	8 49 44·69	0·00	+0·21	+0·25	−0·03	0·00	45·12	1 30·15	− 1 30·054		
N	E	8 59 51·99	0·00	+0·05	+0·13	−0·02	0·00	52·15	− 1 30·12			
S	E	9 3 19·63	0·00	+0·04	−0·07	−0·02	0·00	19·58	1 30·11			
N	E	9 6 57·36	0·00	+0·05	+0·21	−0·02	0·00	57·60	1 30·09			
S	E	9 13 7·43	0·00	+0·04	−0·12	−0·02	0·00	7·33	1 30·19			
N	E	9 14 40·26	0·00	+0·05	+0·08	−0·02	0·00	40·37	1 30·09			
N	E	9 27 48·21	0·00	+0·05	+0·10	−0·02	0·00	48·34	1 30·25	− 1 30·142	− 1 30·098	8 55 10

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

TEHRAN (E), *Lat.* 35° 42′, *Long.* 3ʰ 26ᵐ: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3ʰ 23ᵐ.

Astronomical Date	Star		Transits Observed at TEHRAN (E) by LENOX CONYNGHAM with Telescope No. 1.							
	Name	Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for				Seconds of Corrected Time
						Collimation	Level	Deviation	Diurnal Aberration	
1896		° ′			h m s	s	s	s	s	s
March 5	λ Urs. Maj.	43 26	N	W	10 12 17·09	−0·05	+0·01	−0·01	−0·02	17·02
	1686 Gr. 80	35 57	N	W	10 21 12·70	−0·05	0·00	0·00	−0·02	12·63
	1706 „	35 31	S	W	10 29 1·64	−0·05	0·00	0·00	−0·02	1·57
	1709 „	36 52	N	W	10 31 50·03	−0·05	0·00	0·00	−0·02	50·96
	1714 „	16 40	S	W	10 34 45·94	−0·04	0·00	+0·02	−0·02	46·90
	1722 „	57 45	N	W	10 38 38·28	−0·07	+0·01	−0·05	−0·03	38·14
	1780 „	19 26	S	W	10 42 15·49	−0·04	+0·00	+0·02	−0·02	15·45
		Mean	...	...	10 30 0					
	ψ Urs. Maj.	45 4	N	E	11 5 16·74	+0·06	+0·02	−0·02	−0·02	16·78
	δ Leonis	21 5	S	E	11 10 1·47	+0·04	+0·02	+0·02	−0·02	1·53
		Mean	...	...	11 7 39					
„ 6	B.A.C. 2798	42 20	N	E	8 19 6·30	+0·07	+0·11	0·00	−0·02	6·46
	Bradley 1197	− 3 33	S	E	8 21 52·90	+0·05	+0·07	+0·02	−0·02	53·02
	1425 Gr. 80	24 29	S	E	8 23 52·33	+0·06	+0·09	−0·01	−0·02	52·45
	1454 „	46 12	N	E	8 35 16·16	+0·08	+0·12	+0·01	−0·02	16·35
	γ Cancri	21 51	S	E	8 38 41·53	+0·06	+0·09	−0·01	−0·02	41·65
	δ Cancri	18 32	S	E	8 40 11·94	+0·06	+0·09	−0·01	−0·02	12·06
	B.A.C. 2989	44 7	N	E	8 46 24·29	+0·08	+0·12	+0·01	−0·02	24·48
	B.A.C. 3025	46 2	N	E	8 51 13·92	+0·08	+0·12	+0·01	−0·02	14·01
		Mean	...	...	8 34 35					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

TEHRAN (E), *Lat.* 35° 42′, *Long.* 3h 26m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Transits Observed at BUSHIRE (W) by BURRARD with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch = T_E
Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Correction for Rate of W Clock	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
N	W	10 10 46·67	0·00	+0·20	+0·21	−0·02	0·00	47·06	− 1 29·96			
N	W	10 19 42·12	0·00	+0·19	+0·09	−0·02	0·00	42·38	1 30·25			
N	W	10 27 31·15	0·00	+0·18	+0·08	−0·02	0·00	31·39	1 30·18			
N	W	10 30 20·41	0·00	+0·19	+0·10	−0·02	0·00	20·68	1 30·28			
S	W	10 33 16·61	0·00	+0·15	−0·13	−0·02	0·00	16·61	1 30·29			
N	W	10 37 7·20	0·00	+0·25	+0·54	−0·03	0·00	7·96	1 30·18			
S	W	10 40 45·19	0·00	+0·16	−0·10	−0·02	0·00	45·23	1 30·22	− 1 30·194		
N	E	11 3 46·35	0·00	+0·05	+0·23	−0·03	0·00	46·60	− 1 30·18			
S	E	11 8 31·45	0·00	+0·04	−0·09	−0·02	0·00	31·38	1 30·15	− 1 30·165	− 1 30·180	10 48 50
N	E	8 17 35·08	+0·03	+0·30	+0·18	−0·02	0·00	35·57	− 1 30·89			
S	E	8 20 22·23	+0·02	+0·19	−0·30	−0·02	0·00	22·12	1 30·90			
S	E	8 22 21·36	+0·03	+0·25	−0·05	−0·02	0·00	21·57	1 30·88			
N	E	8 33 44·82	+0·03	+0·31	+0·24	−0·03	0·00	45·37	1 30·98			
S	E	8 37 10·57	+0·03	+0·24	−0·07	−0·02	0·00	10·75	1 30·90			
S	E	8 38 41·08	+0·02	+0·23	−0·10	−0·02	0·00	41·21	1 30·85			
N	E	8 44 52·93	+0·03	+0·30	+0·20	−0·02	0·00	53·44	1 31·04			
N	E	8 49 42·40	+0·03	+0·31	+0·24	−0·03	0·00	42·95	1 31·06	− 1 30·938		

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

TEHRAN (E), *Lat.* 35° 42′, *Long.* 3h 26m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Astronomical Date	Star: Name	Star: Declination	Transits Observed at Tehran (E) by Lenox Conyngham with Telescope No. 1.: Star's Aspect	Instrumental Position	Observed Time	Correction for: Collimation	Level	Deviation	Diurnal Aberration	Seconds of Corrected Time
1896		° ′			h m s	s	s	s	s	s
March 6	B.A.C. 3097	38 52	N	W	9 1 21·32	−0·07	+0·03	0·00	−0·02	21·26
	1524 Gr. 80	22 28	S	W	9 4 48·68	−0·06	+0·02	−0·01	−0·02	48·61
	1534 „	43 39	N	W	9 8 26·73	−0·08	+0·03	0·00	−0·02	26·66
	1539 „	35 4	S	W	9 10 17·43	−0·07	+0·03	0·00	−0·02	17·37
	83 Cancri	18 9	S	W	9 14 36·43	−0·06	+0·02	−0·01	−0·02	36·36
	40 Lyncis	34 50	S	W	9 16 9·30	−0·07	+0·03	0·00	−0·02	9·24
	1571 Gr. 80	23 26	S	W	9 27 13·11	−0·06	+0·02	−0·01	−0·02	13·04
	10Leon.Min.	36 51	N	W	9 29 17·45	−0·07	+0·03	0·00	−0·02	17·39
		Mean ...	...	...	9 14 1					
	λ Ursæ Maj.	43 26	N	E	10 12 15·93	+0·08	+0·06	0·00	−0·02	16·05
	1686 Gr. 80	35 57	N	E	10 21 11·24	+0·07	+0·05	0·00	−0·02	11·34
	1706 „	35 31	S	E	10 29 0·23	+0·07	+0·05	0·00	−0·02	0·33
	1709 „	36 52	N	E	10 31 49·63	+0·07	+0·05	0·00	−0·02	49·73
	1714 „	16 40	S	E	10 34 45·53	+0·06	+0·04	−0·01	−0·02	45·60
	1717 „	28 4	S	E	10 36 1·54	+0·06	+0·05	0·00	−0·02	1·63
	1722 „	57 45	N	E	10 38 36·68	+0·10	+0·07	+0·02	−0·03	36·84
	1730 „	19 26	S	E	10 42 14·05	+0·06	+0·04	−0·01	−0·02	14·12
		Mean ...	...	...	10 30 44					
	1751 Gr. 80	40 59	N	W	10 55 5·21	−0·07	+0·04	0·00	−0·02	5·16
	1767 „	38 48	N	W	11 0 10·82	−0·07	+0·03	0·00	−0·02	10·76
	ψ Ursæ Maj.	45 4	N	W	11 5 15·73	−0·08	+0·04	+0·01	−0·02	15·68
	δ Leonis	21 5	S	W	11 10 0·49	−0·06	+0·03	−0·01	−0·02	0·43
	1794 Gr. 80	23 40	S	W	11 11 6·37	−0·06	+0·03	−0·01	−0·02	6·31
	ν Ursæ Maj.	33 39	S	W	11 14 17·81	−0·07	+0·03	0·00	−0·02	17·75
	1807 Gr. 80	6 36	S	W	11 17 12·05	−0·06	+0·02	−0·01	−0·02	11·98
	B.A.C. 3868	44 3	N	W	11 18 33·81	−0·08	+0·04	+0·01	−0·02	33·76
	1816 Gr. 80	17 2	S	W	11 21 36·85	−0·06	+0·03	−0·01	−0·02	36·79
		Mean ...	...	...	11 10 22					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

TEHRAN (E), *Lat.* 35° 42′, *Long.* 3h 26m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Transits Observed at BUSHIRE (W) by BURRARD with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch = T_E
Star's Aspect	Instrumental Position	Observed Time	Correction for: Collimation	Level	Deviation	Diurnal Aberration	Rate of W Clock	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
N	W	8 59 49·69	−0·03	+0·30	+0·12	−0·02	0·00	50·06	− 1 31·20			
S	W	9 3 17·31	−0·03	+0·26	−0·07	−0·02	0·00	17·45	1 31·16			
N	W	9 6 55·02	−0·03	+0·32	+0·20	−0·02	0·00	55·49	1 31·17			
N	W	9 8 45·93	−0·03	+0·29	+0·07	−0·02	0·00	46·24	1 31·13			
S	W	9 13 5·24	−0·02	+0·25	−0·11	−0·02	0·00	5·34	1 31·02			
N	W	9 14 38·01	−0·03	+0·29	+0·07	−0·02	0·00	38·32	1 30·91			
S	W	9 25 41·86	−0·03	+0·26	−0·06	−0·02	0·00	42·01	1 31·03			
N	W	9 27 45·96	−0·03	+0·30	+0·10	−0·02	0·00	46·31	1 31·08	− 1 31·089	− 1 31·014	8 54 18
N	E	10 10 44·61	+0·03	+0·30	+0·19	−0·02	0·00	45·11	− 1 30·94			
N	E	10 19 39·95	+0·03	+0·28	+0·08	−0·02	0·00	40·32	1 31·02			
N	E	10 27 28·98	+0·03	+0·27	+0·08	−0·02	0·00	29·34	1 30·99			
N	E	10 30 18·21	+0·03	+0·28	+0·10	−0·02	0·00	18·60	1 31·13			
S	E	10 33 14·43	+0·02	+0·23	−0·12	−0·02	0·00	14·54	1 31·06			
S	E	10 34 30·36	+0·03	+0·25	−0·01	−0·02	0·00	30·61	1 31·02			
N	E	10 37 4·91	+0·04	+0·37	+0·50	−0·03	0·00	5·79	1 31·05			
S	E	10 40 42·96	+0·02	+0·23	−0·10	−0·02	0·00	43·09	1 31·03	− 1 31·030		
N	W	10 53 33·44	−0·03	+0·31	+0·15	−0·02	0·00	33·85	− 1 31·31			
N	W	10 58 39·10	−0·03	+0·30	+0·12	−0·02	0·00	39·47	1 31·29			
N	W	11 3 43·98	−0·03	+0·33	+0·22	−0·03	0·00	44·47	1 31·21			
S	W	11 8 29·19	−0·02	+0·25	−0·08	−0·02	0·00	29·32	1 31·11			
S	W	11 9 34·95	−0·03	+0·26	−0·06	−0·02	0·00	35·10	1 31·21			
N	W	11 12 46·36	−0·03	+0·29	+0·06	−0·02	0·00	46·66	1 31·09			
S	W	11 15 40·83	−0·02	+0·23	−0·21	−0·02	0·00	40·81	1 31·17			
N	W	11 17 1·98	−0·03	+0·32	+0·20	−0·02	0·00	2·45	1 31·31			
S	W	11 20 5·54	−0·02	+0·25	−0·12	−0·02	0·00	5·63	1 31·16	− 1 31·207	− 1 31·119	10 50 33

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

TEHRAN (E), *Lat.* 35° 42′, *Long.* 3h 26m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Astronomical Date	Star		Transits Observed at TEHRAN (E) by LENOX CONYNGHAM with Telescope No. 1.								
						Correction for					
	Name	Declination	Star's Aspect	Instrumental Position	Observed Time	Collimation	Level	Deviation	Diurnal Aberration	Seconds of Corrected Time
1896		° ′			h m s	s	s	s	s	s
March 7	1425 Gr. 80	24 29	S	E	8 23 51·61	+0·06	0·00	−0·01	−0·02	51·64
	1454 ”	46 12	N	E	8 35 15·48	+0·08	+0·01	+0·02	−0·02	15·57
	γ Cancri	21 51	S	E	8 38 40·86	+0·06	0·00	−0·01	−0·02	40·89
	δ Cancri	18 32	S	E	8 40 11·18	+0·06	0·00	−0·02	−0·02	11·20
	B.A.C. 2989	44 7	N	E	8 46 23·62	+0·08	+0·01	+0·01	−0·02	23·70
	B.A.C. 3025	46 2	N	E	8 51 13·15	+0·08	+0·01	+0·02	−0·02	13·24
		Mean ...	...	...	8 39 16					
	B.A.C. 3097	38 52	N	W	9 1 20·46	−0·07	−0·05	0·00	−0·02	20·32
	1524 Gr. 80	22 28	S	W	9 4 47·84	−0·06	−0·04	−0·01	−0·02	47·71
	1534 ”	43 39	N	W	9 8 25·89	−0·08	−0·06	+0·01	−0·02	25·74
	1539 ”	35 4	S	W	9 10 16·61	−0·07	−0·05	0·00	−0·02	16·47
	83 Cancri	18 9	S	W	9 14 35·60	−0·06	−0·04	−0·02	−0·02	35·46
	40 Lyncis	34 50	S	W	9 16 8·52	−0·07	−0·05	0·00	−0·02	8·38
	1571 Gr. 80	23 26	S	W	9 27 12·34	−0·06	−0·05	−0·01	−0·02	12·20
	10 Leon. Min.	36 51	N	W	9 29 16·71	−0·07	−0·05	0·00	−0·02	16·57
		Mean ...	...	...	9 14 0					
	λ Ursæ Maj.	43 26	N	W	10 12 15·54	−0·08	−0·10	+0·01	−0·02	15·35
	1686 Gr. 80	35 57	N	W	10 21 10·77	−0·07	−0·09	0·00	−0·02	10·59
	1706 ”	35 31	S	W	10 28 59·78	−0·07	−0·09	0·00	−0·02	59·60
	1709 ”	36 52	N	W	10 31 49·14	−0·07	−0·09	0·00	−0·02	48·96
	1714 ”	16 40	S	W	10 34 45·02	−0·06	−0·07	−0·02	−0·02	44·85
	1717 ”	28 4	S	W	10 36 1·10	−0·07	−0·08	−0·01	−0·02	0·92
	1722 ”	57 45	N	W	10 38 36·39	−0·11	−0·13	+0·04	−0·03	36·16
	1730 ”	19 26	S	W	10 42 13·61	−0·06	−0·08	−0·02	−0·02	13·43
		Mean ...	...	...	10 30 44					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

TEHRAN (E), *Lat.* 35° 42′, *Long.* 3ʰ 26ᵐ: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3ʰ 23ᵐ.

Transits Observed at BUSHIRE (W) by BURRARD with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch = T_E
Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Correction for Rate of W Clock	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
S	W	8 22 18·93	−0·03	+0·49	−0·06	−0·02	0·00	19·31	− 1 32·33			
N	W	8 33 42·26	−0·04	+0·61	+0·28	−0·03	0·00	43·08	1 32·49			
S	W	8 37 8·15	−0·03	+0·48	−0·09	−0·02	0·00	8·49	1 32·40			
S	W	8 38 38·61	−0·03	+0·46	−0·12	−0·02	0·00	38·90	1 32·30			
N	W	8 44 50·39	−0·04	+0·60	+0·24	−0·02	0·00	51·17	1 32·53			
N	W	8 49 39·99	−0·04	+0·61	+0·28	−0·03	0·00	40·81	1 32·43	− 1 32·413		
N	E	8 59 47·18	+0·03	+0·50	+0·14	−0·02	0·00	47·83	− 1 32·49			
S	E	9 3 14·96	+0·03	+0·42	−0·08	−0·02	0·00	15·31	1 32·40			
N	E	9 6 52·51	+0·04	+0·53	+0·23	−0·02	0·00	53·29	1 32·45			
N	E	9 8 43·41	+0·03	+0·48	+0·09	−0·02	0·00	43·99	1 32·48			
S	E	9 13 2·70	+0·03	+0·41	−0·13	−0·02	0·00	2·99	1 32·47			
N	E	9 14 35·51	+0·03	+0·48	+0·08	−0·02	0·00	36·08	1 32·30			
S	E	9 25 39·35	+0·03	+0·43	−0·07	−0·02	0·00	39·72	2 32·48			
N	E	9 27 43·49	+0·03	+0·49	+0·11	−0·02	0·00	44·10	1 32·47	− 1 32·443	− 1 32·428	8 56 38
N	W	10 10 41·97	−0·04	+0·60	+0·22	−0·02	0·00	42·73	− 1 32·62			
N	W	10 19 37·41	−0·03	+0·55	+0·10	−0·02	0·00	38·01	1 32·58			
N	W	10 27 26·40	−0·03	+0·55	+0·09	−0·02	0·00	26·99	1 32·61			
N	W	10 30 15·64	−0·03	+0·55	+0·11	−0·02	0·00	16·25	1 32·71			
S	W	10 33 11·96	−0·03	+0·45	−0·14	−0·02	0·00	12·22	1 32·63			
S	W	10 34 27·97	−0·03	+0·50	−0·01	−0·02	0·00	28·41	1 32·51			
N	W	10 37 2·30	−0·05	+0·73	+0·59	−0·03	0·00	3·54	1 32·62			
S	W	10 40 40·53	−0·03	+0·47	−0·11	−0·02	0·00	40·84	1 32·59	− 1 32·609		

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

TEHRAN (E), *Lat.* 35° 42′, *Long.* 3^h 26^m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3^h 23^m.

Astronomical Date	Star		Transits Observed at TEHRAN (E) by LENOX CONYNGHAM with Telescope No. 1.							
	Name	Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for				Seconds of Corrected Time
						Collimation	Level	Deviation	Diurnal Aberration	
1896		° ′			h m s	s	s	s	s	s
March 7	1751 Gr. 80	40 59	N	E	10 55 4·18	+0·08	−0·05	+0·01	−0·02	4·20
	1767 ,,	38 48	N	E	11 0 9·81	+0·07	−0·04	0·00	−0·02	9·82
	ψ Urs. Maj.	45 4	N	E	11 5 14·87	+0·08	−0·05	+0·01	−0·02	14·89
	δ Leonis	21 5	S	E	11 9 59·64	+0·06	−0·04	−0·02	−0·02	59·62
	1794 Gr. 80	23 40	S	E	11 11 5·42	+0·06	−0·04	−0·01	−0·02	5·41
	ν Urs. Maj.	33 39	S	E	11 14 17·01	+0·07	−0·04	0·00	−0·02	17·02
	1807 Gr. 80	6 36	S	E	11 17 11·16	+0·06	−0·03	−0·03	−0·02	11·14
	B.A.C. 3868	44 3	N	E	11 18 32·86	+0·08	−0·05	+0·01	−0·02	32·88
	1816 Gr. 80	17 2	S	E	11 21 35·94	+0·06	−0·03	−0·02	−0·02	35·93
		Mean	...	...	11 10 21					
,, 8	1454 Gr. 80	46 12	N	E	8 35 14·88	+0·06	−0·02	+0·01	−0·02	14·91
	γ Cancri	21 51	S	E	8 38 40·30	+0·05	−0·01	−0·01	−0·02	40·31
	δ Cancri	18 32	S	E	8 40 10·66	+0·04	−0·01	−0·01	−0·02	10·66
	B.A.C. 2989	44 7	N	E	8 46 23·05	+0·06	−0·02	+0·01	−0·02	23·08
	B.A.C. 3025	46 2	N	E	8 51 12·59	+0·06	−0·02	+0·01	−0·02	12·62
		Mean	...	...	8 42 20					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

TEHRAN (E), *Lat.* 35° 42′, *Long.* 3h 26m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Transits Observed at BUSHIRE (W) by BURRARD with Telescope No. 2.										Difference of Corrected Times by E and W Clocks			Mean Epoch = T_E
Star's Aspect	Instrumental Position	Observed Time	Correction for: Collimation	Level	Deviation	Diurnal Aberration	Rate of W Clock	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions		
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s	
N	E	10 53 30·94	+0·04	+0·51	+0·18	−0·02	0·00	31·65	− 1 32·55				
N	E	10 58 36·65	+0·03	+0·50	+0·14	−0·02	0·00	37·30	1 32·52				
N	E	11 3 41·60	+0·04	+0·54	+0·26	−0·03	0·00	42·41	1 32·48				
S	E	11 8 26·81	+0·03	+0·42	−0·09	−0·02	0·00	27·15	1 32·47				
S	E	11 9 32·55	+0·03	+0·43	−0·07	−0·02	0·00	32·92	1 32·49				
N	E	11 12 44·07	+0·03	+0·47	+0·07	−0·02	0·00	44·62	1 32·40				
S	E	11 15 38·47	+0·03	+0·37	−0·25	−0·02	0·00	38·60	1 32·54				
N	E	11 16 59·59	+0·04	+0·53	+0·24	−0·02	0·00	60·38	1 32·50				
S	E	11 20 3·06	+0·03	+0·41	−0·14	−0·02	0·00	3·34	1 32·59	− 1 32·504	− 1 32·557	10 50 33	
N	E	8 33 40·22	+0·04	+0·67	+0·37	−0·03	0·00	41·27	− 1 33·64				
S	E	8 37 6·32	+0·03	+0·52	−0·12	−0·02	0·00	6·73	1 33·58				
S	E	8 38 36·77	+0·03	+0·50	−0·16	−0·02	0·00	37·12	1 33·54				
N	E	8 44 48·43	+0·04	+0·65	+0·31	−0·02	0·00	49·41	1 33·67				
N	E	8 49 37·93	+0·04	+0·67	+0·36	−0·03	0·00	38·97	1 33·65	− 1 33·616			

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

TEHRAN (E), *Lat.* 35° 42′, *Long.* 3h 26m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Astronomical Date	Star		Transits Observed at Tehran (E) by Lenox Conyngham with Telescope No. 1.							
	Name	Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Seconds of Corrected Time
1896		° ′			h m s	s	s	s	s	s
March 8	B.A.C. 3097	38 52	N	W	9 1 19·96	−0·05	−0·04	0·00	−0·02	19·85
	1524 Gr. 80	22 28	S	W	9 4 47·40	−0·05	−0·03	−0·01	−0·02	47·29
	1534 „	43 39	N	W	9 8 25·43	−0·06	−0·04	+0·01	−0·02	25·32
	1539 „	35 4	S	W	9 10 16·13	−0·05	−0·04	0·00	−0·02	16·02
	83 Cancri	18 9	S	W	9 14 35·15	−0·04	−0·03	−0·01	−0·02	35·05
	40 Lyncis	34 50	S	W	9 16 8·04	−0·05	−0·04	0·00	−0·02	7·93
	1571 Gr. 80	23 26	S	W	9 27 11·88	−0·05	−0·03	−0·01	−0·02	11·77
	10 Leo. Min.	36 51	N	W	9 29 16·31	−0·05	−0·04	0·00	−0·02	16·20
		Mean	...	...	9 14 0					
	λ Urs. Maj.	43 26	N	E	10 12 14·77	+0·06	−0·05	+0·01	−0·02	14·77
	1686 Gr. 80	35 57	N	E	10 21 10·03	+0·05	−0·04	0·00	−0·02	10·02
	1706 „	35 31	S	E	10 28 59·03	+0·05	−0·04	0·00	−0·02	59·02
	1709 „	36 52	N	E	10 31 48·41	+0·05	−0·04	0·00	−0·02	48·40
	1714 „	16 40	S	E	10 34 44·34	+0·04	−0·03	−0·01	−0·02	44·32
	1722 „	57 45	N	E	10 38 35·53	+0·08	−0·06	+0·03	−0·03	35·55
	1730 „	19 26	S	E	10 42 12·88	+0·05	−0·04	−0·01	−0·02	12·86
		Mean	...	...	10 29 58					
	1751 Gr. 80	40 59	N	W	10 55 4·00	−0·06	−0·05	0·00	−0·02	3·87
	1767 „	38 48	N	W	11 0 9·70	−0·05	−0·04	0·00	−0·02	9·59
	ψ Urs. Maj.	45 4	N	W	11 5 14·64	−0·06	−0·05	+0·01	−0·02	14·52
	δ Leonis	21 5	S	W	11 9 59·49	−0·05	−0·04	−0·01	−0·02	59·37
	1794 Gr. 80	23 40	S	W	11 11 5·23	−0·05	−0·04	−0·01	−0·02	5·11
	ν Urs. Maj.	33 39	S	W	11 14 16·72	−0·05	−0·04	0·00	−0·02	16·61
		Mean	...	...	11 5 58					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

TEHRAN (E), *Lat.* 35° 42′, *Long.* 3ʰ 26ᵐ: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3ʰ 23ᵐ.

Transits Observed at BUSHIRE (W) by BURRARD with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch $= T_E$
Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Correction for Rate of W Clock	Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
N	W	8 59 45·32	−0·03	+0·68	+0·19	−0·02	0·00	46·14	− 1 33·71			
S	W	9 3 13·14	−0·03	+0·57	−0·10	−0·02	0·00	13·56	1 33·73			
N	W	9 6 50·59	−0·04	+0·71	+0·30	−0·02	0·00	51·54	1 33·78			
N	W	9 8 41·67	−0·03	+0·65	+0·11	−0·02	0·00	42·38	1 33·64			
S	W	9 13 1·06	−0·03	+0·55	−0·17	−0·02	0·00	1·39	1 33·66			
N	W	9 14 33·69	−0·03	+0·65	+0·11	−0·02	0·00	34·40	1 33·53			
S	W	9 25 37·58	−0·03	+0·58	−0·09	−0·02	0·00	38·02	1 33·75			
N	W	9 27 41·68	−0·03	+0·66	+0·15	−0·02	0·00	42·44	1 33·76	− 1 33·695	− 1 33·656	8 58 10
									*			
N	E	10 10 28·33	+0·04	+0·65	+0·30	−0·02	0·00	29·30	− 1 45·47			
N	E	10 19 23·87	+0·03	+0·60	+0·13	−0·02	0·00	24·61	1 45·41			
N	E	10 27 12·89	+0·03	+0·59	+0·12	−0·02	0·00	13·61	1 45·41			
N	E	10 30 2·16	+0·03	+0·60	+0·15	−0·02	0·00	2·92	1 45·48			
S	E	10 32 58·53	+0·03	+0·49	−0·19	−0·02	0·00	58·84	1 45·48			
N	E	10 36 48·52	+0·05	+0·80	+0·78	−0·03	0·00	50·12	1 45·43			
S	E	10 40 27·00	+0·03	+0·51	−0·15	−0·02	0·00	27·37	1 45·49	− 1 45·453		
N	W	10 53 17·38	−0·04	+0·69	+0·24	−0·02	0·00	18·25	− 1 45·62			
N	W	10 58 23·07	−0·03	+0·68	+0·19	−0·02	0·00	23·89	1 45·70			
N	W	11 3 27·86	−0·04	+0·73	+0·34	−0·03	0·00	28·86	1 45·66			
S	W	11 8 13·22	−0·03	+0·57	−0·12	−0·02	0·00	13·62	1 45·75			
S	W	11 9 19·01	−0·03	+0·58	−0·09	−0·02	0·00	19·45	1 45·66			
N	W	11 12 30·45	−0·03	+0·64	+0·09	−0·02	0·00	31·13	1 45·48	− 1 45·645	− 1 45·549	10 47 58

* The Bushire clock was wound between these groups, and stopped during the winding.

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

TEHRAN (E), *Lat.* 35° 42′, *Long.* 3h 26m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Astronomical Date	Star: Name	Star: Declination	Transits Observed at TEHRAN (E) by LENOX CONYNGHAM with Telescope No. 1.: Star's Aspect	Instrumental Position	Observed Time	Correction for: Collimation	Level	Deviation	Diurnal Aberration	Seconds of Corrected Time
1896		° ′			h m s	s	s	s	s	s
March 10	1454 Gr. 80	46 12	N	E	8 35 13·99	+0·06	−0·01	+0·02	−0·02	14·04
	γ Cancri	21 51	S	E	8 38 39·44	+0·04	−0·01	−0·02	−0·02	39·43
	δ Cancri	18 32	S	E	8 40 9·82	+0·04	−0·01	−0·02	−0·02	9·81
	B.A.C. 2989	44 7	N	E	8 46 22·25	+0·05	−0·01	+0·01	−0·02	22·28
	B.A.C. 3025	46 2	N	E	8 51 11·82	+0·06	−0·01	+0·02	−0·02	11·87
		Mean	...	...	8 42 19					
	B.A.C. 3097	38 52	N	W	9 1 19·10	−0·05	−0·02	0·00	−0·02	19·01
	1524 Gr. 80	22 28	S	W	9 4 46·52	−0·04	−0·02	−0·02	−0·02	46·42
	1534 „	43 39	N	W	9 8 24·57	−0·05	−0·02	+0·01	−0·02	24·49
	1539 „	35 4	S	W	9 10 15·27	−0·05	−0·02	0·00	−0·02	15·18
	83 Cancri	18 9	S	W	9 14 34·26	−0·04	−0·02	−0·02	−0·02	34·16
	40 Lyncis	34 50	S	W	9 16 7·24	−0·05	−0·02	0·00	−0·02	7·15
	1571 Gr. 80	23 26	S	W	9 27 10·98	−0·04	−0·02	−0·01	−0·02	10·89
	10Leon.Min.	36 51	N	W	9 29 15·36	−0·05	−0·02	0·00	−0·02	15·27
		Mean	...	...	9 13 59					
	λ Urs. Maj.	43 26	N	W	10 12 14·07	−0·05	0·00	+0·01	−0·02	14·01
	1686 Gr. 80	35 57	N	W	10 21 9·35	−0·05	0·00	0·00	−0·02	9·28
	1706 „	35 31	S	W	10 28 58·33	−0·05	0·00	0·00	−0·02	58·26
	1709 „	36 52	N	W	10 31 47·64	−0·05	0·00	0·00	−0·02	47·57
	1714 „	16 40	S	W	10 34 43·57	−0·04	0·00	−0·02	−0·02	43·49
	1717 „	28 4	S	W	10 35 59·60	−0·04	0·00	−0·01	−0·02	59·53
	1722 „	57 45	N	W	10 38 34·91	−0·07	0·00	+0·05	−0·03	34·86
	1730 „	19 26	S	W	10 42 12·16	−0·04	0·00	−0·02	−0·02	12·08
		Mean	...	...	10 30 42					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

TEHRAN (E), *Lat.* 35° 42′, *Long.* 3ʰ 26ᵐ: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3ʰ 23ᵐ.													
Transits Observed at BUSHIRE (W) by BURRARD with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch = T_B	
Star's Aspect	Instrumental Position	Observed Time			Correction for				Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
			Collimation	Level	Deviation	Diurnal Aberration	Rate of W Clock						
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
N	E	8 33 24·87	−0·01	+0·62	+0·08	−0·03	0·00	25·53	− 1 48·51			
S	E	8 36 50·52	0·00	+0·48	−0·02	−0·02	0·00	50·96	1 48·47			
S	E	8 38 20·94	0·00	+0·46	−0·03	−0·02	0·00	21·35	1 48·46			
N	E	8 44 33·03	−0·01	+0·60	+0·07	−0·02	0·00	33·67	1 48·61			
N	E	8 49 22·48	−0·01	+0·62	+0·08	−0·03	0·00	23·14	1 48·73	− 1 48·556		
N	W	8 59 29·69	0·00	+0·60	+0·04	−0·02	0·00	30·31	− 1 48·70			
S	W	9 2 57·27	0·00	+0·51	−0·02	−0·02	0·00	57·74	1 48·68			
N	W	9 6 35·07	+0·01	+0·64	+0·07	−0·02	0·00	35·77	1 48·72			
N	W	9 8 25·96	0·00	+0·58	+0·02	−0·02	0·00	26·54	1 48·64			
S	W	9 12 45·12	0·00	+0·49	−0·04	−0·02	0·00	45·55	1 48·61			
N	W	9 14 18·04	0·00	+0·58	+0·02	−0·02	0·00	18·62	1 48·53			
S	W	9 25 21·80	0·00	+0·52	−0·02	−0·02	0·00	22·28	1 48·61			
N	W	9 27 25·92	0·00	+0·59	+0·03	−0·02	0·00	26·52	1 48·75	− 1 48·655	− 1 48·606	8 58 9
N	E	10 10 24·65	−0·01	+0·60	+0·06	−0·02	0·00	25·28	− 1 48·73			
N	E	10 19 19·92	0·00	+0·55	+0·03	−0·02	0·00	20·48	1 48·80			
N	E	10 27 8·92	0·00	+0·55	+0·03	−0·02	0·00	9·48	1 48·78			
N	E	10 29 58·24	0·00	+0·56	+0·03	−0·02	0·00	58·81	1 48·76			
S	E	10 32 54·32	0·00	+0·46	−0·04	−0·02	0·00	54·72	1 48·77			
S	E	10 34 10·32	0·00	+0·51	0·00	−0·02	0·00	10·81	1 48·72			
N	E	10 36 45·17	−0·01	+0·74	+0·17	−0·03	0·00	46·04	1 48·82			
S	E	10 40 22·86	0·00	+0·47	−0·03	−0·02	0·00	23·28	1 48·80	− 1 48·773		

TABLE V. OBSERVATIONS OF TRANSITS OF THE SAME STARS AT BOTH

TEHRAN (E), *Lat. 35° 42′, Long. 3h 26m*: AND BUSHIRE (W), *Lat. 28° 55′, Long. 3h 23m*.

Transits Observed at TEHRAN (E) by LENOX CONYNGHAM with Telescope No. 1.

Astronomical Date	Star: Name	Star: Declination	Star's Aspect	Instrumental Position	Observed Time	Correction for Collimation	Correction for Level	Correction for Deviation	Correction for Diurnal Aberration	Seconds of Corrected Time
1896		° ′			h m s	s	s	s	s	s
March 10	1751 Gr. 80	40 59	N	E	10 55 2·78	+0·05	+0·01	+0·01	−0·02	2·83
	1767 „	38 48	N	E	11 0 8·39	+0·05	0·00	0·00	−0·02	8·42
	ψ Urs. Maj.	45 4	N	E	11 5 13·42	+0·06	+0·01	+0·01	−0·02	13·48
	δ Leonis	21 5	S	E	11 9 58·20	+0·04	0·00	−0·02	−0·02	58·20
	1794 Gr. 80	23 40	S	E	11 11 4·00	+0·04	0·00	−0·01	−0·02	4·01
	ν Urs. Maj.	33 39	S	E	11 14 15·58	+0·05	0·00	0·00	−0·02	15·61
	1807 Gr. 80	6 36	S	E	11 17 9·78	+0·04	0·00	−0·03	−0·02	9·77
	B.A.C. 3868	44 3	N	E	11 18 31·43	+0·05	+0·01	+0·01	−0·02	31·48
	1816 Gr. 80	17 2	S	E	11 21 34·60	+0·04	0·00	−0·02	−0·02	34·60
		Mean	...	...	11 10 20					
March 15	B.A.C. 3097	38 52	N	E	9 1 12·93	+0·07	−0·04	+0·01	−0·02	12·95
	1524 Gr. 80	22 28	S	E	9 4 40·37	+0·06	−0·04	−0·04	−0·02	40·33
	1534 „	43 39	N	E	9 8 18·44	+0·08	−0·05	+0·03	−0·02	18·48
	1571 „	23 26	S	E	9 27 4·86	+0·06	−0·04	−0·04	−0·02	4·82
		Mean	...	...	9 10 19					
	1599 Gr. 80	30 27	S	W	9 38 45·55	−0·02	−0·05	−0·02	−0·02	45·44
	ε Leonis	24 15	S	W	9 41 14·81	−0·02	−0·05	−0·03	−0·02	14·69
	1613 Gr. 80	46 30	N	W	9 43 11·65	−0·02	−0·06	+0·04	−0·02	11·59
	1618 „	54 33	N	W	9 46 21·17	−0·03	−0·07	+0·09	−0·03	21·13
	1629 „	41 33	N	W	9 52 37·45	−0·02	−0·06	+0·02	−0·02	37·37
		Mean	...	...	9 44 26					

STATIONS, AND DEDUCTION OF THE DIFFERENCE OF CORRECTED TIMES.

TEHRAN (E), *Lat.* 35° 42′, *Long.* 3h 26m: AND BUSHIRE (W), *Lat.* 28° 55′, *Long.* 3h 23m.

Transits Observed at BUSHIRE (W) by BURRARD with Telescope No. 2.									Difference of Corrected Times by E and W Clocks			Mean Epoch $= T_E$
Star's Aspect	Instrumental Position	Observed Time	Correction for					Seconds of Corrected Time	By each Star = W − E	Mean by Stars in same Instrumental Position	Mean of the two Positions	
			Collimation	Level	Deviation	Diurnal Aberration	Rate of W Clock					
		h m s	s	s	s	s	s	s	m s	m s	m s	h m s
N	W	10 53 13·36	+0·01	+0·62	+0·05	−0·02	0·00	14·02	− 1 48·81			
N	W	10 58 19·09	0·00	+0·60	+0·04	−0·02	0·00	19·71	1 48·71			
N	W	11 3 24·10	+0·01	+0·65	+0·07	−0·03	0·00	24·80	1 48·68			
S	W	11 8 9·01	0·00	+0·51	−0·03	−0·02	0·00	9·47	1 48·73			
S	W	11 9 14·87	0·00	+0·52	−0·02	−0·02	0·00	15·35	1 48·66			
N	W	11 12 26·37	0·00	+0·57	+0·02	−0·02	0·00	26·94	1 48·67			
S	W	11 15 20·69	0·00	+0·45	−0·07	−0·02	0·00	21·05	1 48·72			
N	W	11 16 42·07	+0·01	+0·64	+0·07	−0·02	0·00	42·77	1 48·71			
S	W	11 19 45·38	0·00	+0·49	−0·04	−0·02	0·00	45·81	1 48·79	− 1 48·720	− 1 48·747	10 50 31
N	E	8 59 4·78	+0·02	+0·74	−0·01	−0·02	0·00	5·51	− 2 7·44			
S	E	9 2 32·19	+0·02	+0·63	+0·01	−0·02	0·00	32·83	2 7·50			
N	E	9 6 10·09	+0·02	+0·79	−0·02	−0·02	0·00	10·86	2 7·62			
S	E	9 24 56·85	+0·02	+0·64	+0·01	−0·02	0·00	57·50	2 7·32	− 2 7·470		
N	W	9 36 37·12	−0·02	+0·67	0·00	−0·02	0·00	37·75	− 2 7·69			
S	W	9 39 6·28	−0·02	+0·63	+0·01	−0·02	0·00	6·88	2 7·81			
N	W	9 41 3·18	−0·02	+0·79	−0·03	−0·03	0·00	3·89	2 7·70			
N	W	9 44 12·49	−0·03	+0·89	−0·05	−0·03	0·00	13·27	2 7·86			
N	W	9 50 28·97	−0·02	+0·75	−0·02	−0·02	0·00	29·66	2 7·71	− 2 7·754	− 2 7·612	9 27 23

EXPLANATION OF *TABLE VI.*

Deduction of Clock Rate Correction.

From the results contained in Tables III, IV and V, the clock rate correction can now be deduced.

Column 1 contains the name of the arc.

„ 2 contains the approximate difference of longitude in hours, minutes and decimals of a minute.

„ 3 contains the date.

„ 4 contains the observed clock correction as deduced from observations of clock stars in Table IV.

„ 5 contains the epoch to which the foregoing correction corresponds, taken also from Table IV.

„ 6 contains the hourly clock rate as deduced from observation of clock stars.

„ 7 contains the hourly clock rate as deduced from observations of longitude stars. The rate from night to night is obtained from the observed times of transit of the same star on two consecutive nights, the difference between the two being divided by 24 hours. The mean of the results obtained from individual stars is taken as the rate during the 24 hours between the two nights, and the mean of the rates during two consecutive periods of 24 hours is taken as the rate on the night between them. The observations of March 15th were not used as a satisfactory value was obtainable from the clock stars, and the interval of 5 days from the last set of longitude star observations was somewhat excessive.

„ 8 contains a repetition of the quantities in column 6 or 7.

„ 9, 10, 11, 12 and 13 contain similar quantities to those in columns 4, 5, 6, 7 and 8 but for the other station.

„ 14 contains the relative hourly clock rate during each night deduced from the clock comparisons, the value entered is the mean of all the values appertaining to the night contained in the last column of Table III; except that for the 9th March, when no clock comparison was made, the rate used is the mean of those for 8th and 10th.

We have now the hourly rate of each clock derived from star observations, and also the relative hourly rate of the clocks derived from the clock comparisons. It is clear that the last should be equal to the algebraic difference of the first two, *i.e.*, using the notation given on the Table, we should have

$$h_w - h_e = R, \quad \text{or} \quad h_e = h_w - R.$$

Hence in forming the final value of the hourly clock rate we take $H_e = \frac{1}{2}(h_e + h_w - R)$, and the resulting value is entered in column 15.

Similarly $H_w = \frac{1}{2}(h_w + h_e + R)$, which is given in column 16.

In column 17 is given the change in the error of the Western clock during a period equal to the difference of longitude. The use of this quantity has already been explained in connection with Table V.

TABLE VI. DEDUCTION OF CLOCK RATE CORRECTION.

Arc	Approximate Difference of Longitude = ΔL	Astronomical Date	TEHRAN or E Clock: Observed Clock Correction	Time	Hourly Clock Rate for Nights of Observation deduced from Star Transits: By Clock Stars	By Longitude Stars	Mean = h_e	BUSHIRE or W Clock: Observed Clock Correction	Time	Hourly Clock Rate for Nights of Observation deduced from Star Transits: By Clock Stars	By Longitude Stars	Mean = h_w	Relative Hourly Clock Rate deduced from Clock Comparisons = R	Adopted Hourly Clock Rate: For E Clock = ½ (h_e + h_w − R) = H_e	For W Clock = ½ (h_e + h_w + R) = H_w	Correction to Observed Time of Transit at W Station for Rate of W Clock = H_w × ΔL
TEHRAN-BUSHIRE	h m 0 2·37	1896	m s	h m	s	s	s	m s	h m	s	s	s	s	s	s	s
		Mar. 4				+0·057	+0·057				+0·051	+0·051	−0·013	+ 0·061	+ 0·048	+ 0·002
		" 5				+0·048	+0·048				+0·086	+0·086	+0·020	+ 0·057	+ 0·077	+ 0·003
		" 6				+0·034	+0·034				+0·093	+0·093	+0·054	+ 0·037	+ 0·091	+ 0·004
		" 7				+0·020	+0·020				+0·072	+0·072	+0·057	+ 0·018	+ 0·075	+ 0·003
		" 8				+0·019	+0·019				+0·086	+0·086	+0·051	+ 0·027	+ 0·078	+ 0·003
		" 9				+0·019	+0·019				+0·086	+0·086	+0·056	+ 0·025	+ 0·081	+ 0·003
		" 10				+0·019	+0·019				+0·086	+0·086	+0·061	+ 0·022	+ 0·083	+ 0·003
		" 15	−1 14·969	11 11	+0·053		+0·053	+0 52·660	11 20	+0·074		+0·074	+0·003	+ 0·062	+ 0·065	+ 0·003
		" 16	−1 13·760	9 20	+0·017		+0·017	+0 54·347	10 12	+0·101		+0·101	+0·040	+ 0·039	+ 0·079	+ 0·003
		" "	−1 13·734	10 54				+0 54·433	11 3							

EXPLANATION OF *TABLE VII.*

Retardation of the Electric Current.

The retardation of the electric current computed in this Table does not enter into the difference of longitude, but much interest attaches to its value, and clearly any abnormal result would throw doubt upon the accuracy of the clock comparison whence it was deduced.

Column 1 contains the name of the arc.

,, 2 contains the date.

,, 3 contains the time by the East or Tehran clock corresponding to the middle of the period during which a comparison was being made at Tehran, that is, during which Bushire was transmitting signals to Tehran.

,, 4 contains the time, still by E. clock, corresponding to the middle of the period during which Tehran was transmitting signals to Bushire.

,, 5 contains the interval between the times given in columns 3 and 4.

,, 6 and 9 contain the differences between the clocks as observed at Bushire and Tehran respectively.

The differences given in columns 6 and 9 have to be reduced to the same epoch and to do this the difference observed at Bushire receives a correction equal to the relative hourly clock rate, taken from the last column of Table III, multiplied by the interval given in column 5 reduced to the decimal of an hour. This correction and the corrected difference between the clocks as observed at Bushire are given in columns 7 and 8.

,, 10 contains half the difference between columns 8 and 9.

TABLE VII. RETARDATION OF THE ELECTRIC CURRENT.

Arc	Astronomical Date	Time of Comparison by E Clock at Tehran	Time of Comparison by E Clock at Bushire	Interval of Time between the Comparison at Tehran and Bushire = I	Difference between the Clocks as Observed at Bushire	Correction for Relative Clock Rate during the Interval I	Difference between the Clocks as Observed at Bushire corrected for Clock Rate	Difference between the Clocks as Observed at Tehran	Retardation of the Current
TEHRAN-BUSHIRE	1896	h m s	h m s	m s	h m s	s	h m s	h m s	s
	March 4	8 14 23	8 10 1	+ 4 22	0 3 51·450	− 0·001	0 3 51·449	0 3 51·565	0·058
		9 53 30	9 50 1	+ 3 29	51·430	·001	51·429	51·545	·058
		11 57 51	11 55 1	+ 2 50	51·400	·001	51·399	51·506	·054
	„ 5	8 16 30	8 13 1	+ 3 29	0 3 51·210	− 0·001	0 3 51·209	0 3 51·329	0·060
		9 48 7	9 45 1	+ 3 6	51·264	+ ·001	51·265	51·357	·046
		11 20 49	11 18 1	+ 2 48	51·296	·001	51·297	51·387	·045
	„ 6	8 7 30	8 5 2	+ 2 28	0 3 52·011	+ 0·001	0 3 52·012	0 3 52·114	0·051
		9 49 3	9 46 1	+ 3 2	52·110	·003	52·113	52·211	·049
		11 46 32	11 44 1	+ 2 31	52·208	·002	52·210	52·330	·060
	„ 7	8 19 28	8 16 1	+ 3 27	0 3 53·487	+ 0·004	0 3 53·491	0 3 53·589	0·049
		9 51 11	9 47 2	+ 4 9	53·530	·003	53·533	53·687	·077
		11 47 31	11 45 2	+ 2 29	53·687	·003	53·690	53·791	·051
	„ 8	8 19 37	8 18 2	+ 1 35	0 3 54·713	+ 0·001	0 3 54·714	0 3 54·813	0·050
		9 54 6	9 50 2	+ 4 4	54·785	+ ·004	54·789	54·902	·057
		9 56 6	10 0 8	− 4 2	0 4 6·535	− ·003	0 4 6·532	0 4 6·692	·080
		11 43 46	11 41 8	+ 2 38	6·611	+ ·002	6·613	6·772	·080
	„ 10	8 20 14	8 13 11	+ 7 3	0 4 9·603	+ 0·008	0 4 9·611	0 4 9·709	0·049
		9 47 40	9 44 11	+ 3 29	9·691	·003	9·694	9·797	·052
		11 47 26	11 45 11	+ 2 15	9·813	·002	9·815	9·915	·050
	„ 15	8 41 57	8 37 2	+ 4 55	0 4 28·794	0·000	0 4 28·794	0 4 28·891	0·049
		10 17 20	10 15 2	+ 2 18	28·788	·000	28·788	28·895	·054
		12 16 34	12 13 31	+ 3 3	28·787	·000	28·787	28·896	·055
	„ 16	8 48 10	8 45 0	+ 3 10	0 4 29·156	+ 0·001	0 4 29·157	0 4 29·273	0·058
		10 5 48	10 3 31	+ 2 17	29·190	·001	29·191	29·311	·060
		11 54 15	11 51 32	+ 2 43	29·300	·002	29·302	29·400	·049
								Mean ...	0·0558

EXPLANATION OF *TABLE VIII.*

Reduction of Clock Corrections and Clock Comparisons to the same Epochs.

Having now obtained the clock corrections at different epochs on each night, and also the differences between the clocks at other epochs, it remains to reduce them both to the same epochs.

This table deals only with observations of clock stars and the attendant comparisons.

Column 1 contains the date.

" 2 and 3 contain the times in terms of the Tehran clock at which the clock comparisons were made (taken from Table III) and their mean.

" 4 and 5 contain the times in terms of the Bushire clock at which the clock comparisons were made (from Table III) and their mean.

" 6 and 7 contain the observed differences between the clocks (from Table III) and their mean.

" 8 and 9 contain the mean epochs of the clock corrections at the two stations (from Table IV).

" 10 contains the difference between columns 3 and 8.

" 11 contains the difference between columns 5 and 9.

" 12 and 13 contain the clock corrections at the epochs given in columns 8 and 9 (from Table IV).

" 14 and 15 contain the hourly clock rates (from Table VI).

" 16 and 17 contain the corrections for rate for the periods entered in columns 10 and 11 respectively, that is, the product of columns 10 and 14, and of columns 11 and 15.

" 18 and 19 contain the sums of columns 12 and 16 and of columns 13 and 17. The quantities obtained being the clock corrections at the epochs of the comparisons, that is, at the epochs contained in columns 3 and 5.

TABLE VIII. REDUCTION OF CLOCK CORRECTIONS AND CLOCK COMPARISONS TO THE SAME EPOCHS.

1	2	3	4	5	6	7	8	9
Date	Time of Clock Comparison from Table III				Difference between the Clocks at the Epoch of Clock Comparison from Table III		Mean Epoch of Clock Correction from Table IV	
	by Tehran Clock		by Bushire Clock					
	T_E	Mean	T_W	Mean	D	Mean	Tehran	Bushire
1896	h m s	h m s	h m s	h m s	h m s	h m s	h m s	h m s
March 15	8 39 29		8 35 1		0 4 28·843			
	10 16 11		10 11 42		28·842			
	12 15 2	10 23 34	12 10 34	10 19 6	28·842	0 4 28·842	11 11 10	11 20 4
" 16	8 46 35		8 42 6		0 4 29·215			
	10 4 40	9 25 38	10 0 10	9 21 8	29·251	0 4 29·233	9 20 18	10 12 26
	11 52 54	11 52 54	11 48 24	11 48 24	29·350	0 4 29·350	10 54 20	11 3 18

10	11	12	13	14	15	16	17	18	19
Difference between Times of Epochs of Clock Correction and Comparison = P		Clock Correction from Table IV		Hourly Clock Rate from Table VI		Correction for Difference of Times P		Clock Correction at Mean Epoch of Clock Comparison	
Tehran	Bushire	Tehran	Bushire	Tehran	Bushire	Tehran	Bushire	Tehran	Bushire
m s	h m s	m s	m s	s	s	s	s	m s	m s
−47 36	−1 0 58	−1 14·969	+0 52·660	+0·062	+0·065	−0·049	−0·066	−1 15·018	+0 52·594
+5 20	−0 51 18	−1 13·760	+0 54·347	+0·039	+0·079	+0·003	−0·068	−1 13·757	+0 54·279
+58 34	+0 45 6	−1 13·734	+0 54·433	+0·039	+0·079	+0·038	+0·059	−1 13·696	+0 54·492

EXPLANATION OF *TABLE IX.*

Reduction of Clock Comparisons and the Differences between the Clock Corrections to the same Epochs by Interpolation.

This table deals with the observations of longitude stars and the comparisons which are connected therewith.

Column 1 contains the date.

„ 2 contains the epochs whether of clock comparisons, from Table III, or of the differences of corrected times, from Table V, arranged in order of sequence, and all in terms of the East clock.

„ 3 contains the difference of the corrected times, from Table V, entered in line with its epoch.

„ 4 contains the difference between the two clocks by direct comparison, from Table III, entered in line with its epoch.

„ 5 is obtained by interpolation from column 3 and is the corrected difference between the observed times at the epoch of the middle comparison, in line with which it is entered.

„ 6 contains the difference between the clocks brought up by interpolation from column 4, to the epochs of the quantities in column 3.

TABLE IX. REDUCTION OF CLOCK COMPARISONS AND THE DIFFERENCES BETWEEN THE CLOCK CORRECTIONS TO THE SAME EPOCHS BY INTERPOLATION.

Date	T_E Epochs	Difference between the Clock Corrections = Difference of Corrected Times of Table V	Difference between the Times of the two Clocks obtained by Direct Comparison from Table III	Difference between the Clock Corrections Interpolated to Epoch of Clock Comparison	Difference between the Clocks by Comparison Interpolated to Epoch of Clock Correction
1896	h m s	m s	m s	m s	m s
March 4	8 12 12	...	3 51·508	...	...
	8 57 36	− 1 30·270	...	...	3 51·499
	9 51 45	...	3 51·488	− 1 30·290	...
	10 50 36	− 1 30·311	...	...	3 51·471
	11 56 26	...	3 51·453	...	...
„ 5	8 14 46	...	3 51·270	...	...
	8 55 10	− 1 30·098	...	...	3 51·288
	9 46 34	...	3 51·311	− 1 30·135	...
	10 48 50	− 1 30·180	...	...	3 51·332
	11 19 25	...	3 51·342	...	...
„ 6	8 6 16	...	3 52·063	...	...
	8 54 18	− 1 31·014	...	...	3 52·109
	9 47 32	...	3 52·161	− 1 31·062	...
	10 50 33	− 1 31·119	...	...	3 52·219
	11 45 17	...	3 52·269	...	...

TABLE IX. REDUCTION OF CLOCK COMPARISONS AND THE DIFFERENCES BETWEEN THE CLOCK CORRECTIONS TO THE SAME EPOCHS BY INTERPOLATION.

Date	T_B Epochs	Difference between the Clock Corrections = Difference of Corrected Times of Table V	Difference between the Times of the two Clocks obtained by Direct Comparison from Table III	Difference between the Clock Corrections Interpolated to Epoch of Clock Comparison	Difference between the Clocks by Comparison Interpolated to Epoch of Clock Correction
1896	h m s	m s	m s	m s	m s
March 7	8 17 45	...	3 53·538	...	...
	8 56 38	− 1 32·428	...	...	3 53·568
	9 49 6	...	3 53·609	− 1 32·487	...
	10 50 33	− 1 32·557	...	...	3 53·677
	11 46 16	...	3 53·739	...	...
" 8	8 18 49	...	3 54·763	...	...
	8 58 10	− 1 33·656	...	...	3 54·797
	9 52 4	...	3 54·844*	...	...
	9 58 7	...	4 6·614*	...	...
	10 47 58	− 1 45·549	...	...	4 6·651
	11 42 27	...	4 6·692	...	...
" 10	8 16 42	...	4 9·656	...	...
	8 58 9	− 1 48·606	...	...	4 9·697
	9 45 55	...	4 9·744	− 1 48·666	...
	10 50 31	− 1 48·747	...	...	4 9·808
	11 46 18	...	4 9·864	...	...
" 15	8 39 29	...	4 28·843	...	...
	9 27 23	− 2 7·612	...	...	4 28·843
	10 16 11	...	4 28·842	...	...

* Bushire clock stopped while being wound between these two comparisons.

EXPLANATION OF *TABLE* X.

Deduction of the Difference of Longitude.

Tables VIII and IX contain all the data for computing the difference of longitude.

Column 1 contains the name of the arc.

„ 2 contains the date.

„ 3 and 4 contain the epochs for which data are available. Those appertaining to dates from 4th to 10th March and 1st line of 15th belong to longitude stars *only* and are taken from Table IX, column 2. The others belong to clock star observations *only* and are taken from Table VIII, columns 3 and 5.

„ 5 and 7 refer only to clock star observations, and contain the deduced clock corrections corresponding to the epochs in columns 3 and 4. The entries are taken from Table VIII, columns 18 and 19.

„ 6 and 8 contain the numbers of clock or longitude stars observed at each station on each night.

„ 9 contains the difference between the corrections of the clocks. In the case of longitude stars this is taken from Table IX, columns 3 and 5 and in the case of clock stars is equal to the difference between the quantities in columns 5 and 7 of the present table. It will be noticed however that each of the entries in column 9, which belong to longitude stars differs by $+ 0^s{\cdot}003$ from that in Table IX, columns 3 and 5. The reason of this is that in Table V the entry in the column for the correction for rate of W clock is throughout $0^s{\cdot}00$, but a reference to the last column of Table VI will show that it should in every case be $+ 0^s{\cdot}003$, thus by keeping only two places of decimals in Table V a constant error of $0^s{\cdot}003$ is caused. This might have been corrected in the column for the mean difference of the corrected times, but it has been thought preferable to defer doing so till now. The last three entries having reference to clock stars are not affected by this error and are therefore formed in the usual way.

„ 10 contains the difference between the clocks by direct comparison at the epoch given in column 3; this quantity is to be found either in column 7 of Table VIII or in column 4 or 6 of Table IX.

„ 11 contains the observed difference of longitude, which is equal to the sum of the quantities in the two preceding columns. The mean and its probable error are entered at the bottom of the column.

„ 12 contains the value of the personal equation, and its probable error.

„ 13 contains the Final Difference of Longitude, and its probable error.

TABLE X. DEDUCTION OF THE DIFFERENCE OF LONGITUDE.

Arc	Astronomical Date	Epoch: By E Clock = T_E	Epoch: By W Clock = T_W	Tehran E: Deduced Clock Correction from Table VIII	Tehran E: No. of Stars	Bushire W: Deduced Clock Correction from Table VIII	Bushire W: No. of Stars	Difference between the Corrections of the E and W Clocks = S *	Difference between the Clocks by Direct Comparison at the Epoch of S	Observed Difference of Longitude	Personal Equation	Final Difference of Longitude
TEHRAN-BUSHIRE	1896	h m s	h m s	m s		m s		m s	h m s	h m s	s	h m s
	March 4	8 57 36			30		30	−1 30·267	0 3 51·499	0 2 21·232		0 2 21·443 ± 0·0083
		9 51 45						1 30·287	51·488	21·201		
		10 50 36						1 30·308	51·471	21·163		
	„ 5	8 55 10			20		20	−1 30·095	0 3 51·288	0 2 21·193		
		9 46 34						1 30·132	51·311	21·179		
		10 48 50						1 30·177	51·332	21·155		
	„ 6	8 54 18			33		33	−1 31·011	0 3 52·109	0 2 21·098		
		9 47 32						1 31·059	52·161	21·102		
		10 50 33						1 31·116	52·219	21·103		
	„ 7	8 56 38			31		31	−1 32·425	0 3 53·568	0 2 21·143		
		9 49 6						1 32·484	53·609	21·125		
		10 50 33						1 32·554	53·677	21·123		
	„ 8	8 58 10			26		26	−1 33·653	0 3 54·797	0 2 21·144		
		10 47 58						1 45·546	0 4 6·651	21·105		
	„ 10	8 58 9			30		30	−1 48·603	0 4 9·697	0 2 21·094		
		9 45 55						1 48·663	9·744	21·081		
		10 50 31						1 48·744	9·808	21·064		
	„ 15	9 27 23			9		9	−2 7·609	0 4 28·843	0 2 21·234		
		10 23 34	10 19 6	−1 15·018	17	+0 52·594	15	2 7·612	28·842	21·230		
	„ 16	9 25 38	9 21 8	−1 13·757	32	+0 54·279	28	−2 8·036	0 4 29·233	0 2 21·197		
		11 52 54	11 48 24	13·696		54·492		2 8·188	29·350	21·162		
									Mean ...	0 2 21·149	+ 0·294	
									p.e. ...	± 0·0076	± 0·0034	

* For explanation of the discrepancy between the entries in this column and the quantities in Table IX *vide* explanation of this table.

APPENDICES.

APPENDIX.

No. 1.

DESCRIPTIONS OF POINTS USED FOR LONGITUDE STATIONS.

KARACHI. The longitude station is situated in the enclosure of the Telegraph Office, 61 feet north and 152 feet west from the Telegraph Office Station. It is 34 feet 6 inches S.E. from the centre of the doorway of the store-room, and 73 feet N.N.W. from the N.W. corner of the block of dwelling quarters standing in the angle between Macleod Road and Telegraph Road: the longitude station at Karachi is the same as that used for the Indian Electro-Telegraphic Longitude Operations, and its geodetic elements by the Great Trigonometrical Survey of India are given on page 259 of Volume IX of the *Account of the Operations of the Great Trigonometrical Survey of India.*

The Telegraph Office Station is a point on the eastern terrace of the upper story of the block of dwelling quarters referred to above and was fixed by one triangle in connection with the neighbouring hill stations, A and Mutráni, of the Great Trigonometrical Survey of India (*vide* Tables A, B, C, pages 254—259 of Volume IX of the *Account of the Operations of the Great Trigonometrical Survey of India*). The station is marked by a circle and dot engraved on the floor of the terrace at distances of 5 feet 8 inches, 14 feet 2 inches, 28 feet 9 inches and 34 feet 4 inches from the N.E., N.W., S.W., and S.E. angles of the terrace respectively.

JASK. A base-line for triangulation was measured in 1894 by Sub-Assistant Superintendent Yusuf Sharif along the sea-shore at Jask, and its two terminals carefully marked. The longitude station at Jask is 924 feet from the west end of the base. The azimuth of the longitude station at the west end station of the base-line is 228° 47′ 57″.

The west end station of Yusuf Sharif's base-line at Jask is situated near the extreme point of Cape Jask, and is marked with a cairn of stones 6 feet high. A circular masonry pillar with circle and dot marks the position of the station under the cairn.

The longitude station is 42 feet from the S.E. edge of the door of the Telegraph Office, measured perpendicularly to the front wall of the building.

The latitude of the Jask Longitude Station was observed and found to be 25° 38′ 11″·51 ± 0″·08. The azimuth of the east end of the base-line at the west end is 246° 9′ 53″.

One of the stations of Yusuf Sharif's triangulation, situated in the hills, is very conspicuous from Jask: the azimuth of this hill station at the west end of the base is 234° 15′ 21″.

There is no visible cause of *local* attraction in the vicinity of Jask: the station is situated on a flat plain of shingle and sand: hills are visible to the north-east but distant. S. G. B.

BUSHIRE. The longitude station is situated at Reshire about 6 miles south of Bushire, about 70 feet east of the Reshire Telegraph Office.

A tile bearing a circle and dot was placed at a depth of 2½ feet from the surface of the ground: over it a solid pillar was built 2½ feet high: at the top of this pillar and flush with the ground a mark-stone bearing a circle and dot was embedded in mortar. The mark-stone is 101 feet 7 inches from the S.E. corner of the building in which the Telegraph Office is located, and 70 feet 11½ inches from the N.E. corner of the same building. The longitude station is a pillar erected 11 feet 7½ inches due south of the mark-stone.

The latitude of Reshire was observed and found to be 28° 54′ 35″·67 : the latitude station is a pillar erected 23 feet 11 inches due east of the mark-stone.

The following azimuths were observed from the mark-stone :—

South-East corner of Telegraph Office	44° 54′
North-East corner of Telegraph Office	110° 12′
South-East corner of North Block of Quarters	174° 43′
South-West corner of Family Quarters...	316° 5′

There is no visible cause of *local* attraction in the *immediate* vicinity of Reshire: the station is situated on a flat sandy plain: rock is met with at a slight depth below the surface: distant hills marking the boundary of the Shiraz plateau are visible along the eastern horizon. S. G. B.

Tidal observations were taken on the coast at Reshire, near Bushire, from 1892 to 1900. The Telegraph Office at Reshire was connected with the tidal observatory by levelling, and bench-marks were cut on the steps both of the main office and of the Superintendent's house. The upper surface of the stone cap of the longitude pillar was found to be 67 feet above mean sea-level. Owing to a popular belief that the astronomical survey marks at Reshire had some influence in stopping the rain which was badly wanted, a strong demonstration was made on January 6th, 1897, by a mob, who destroyed the longitude and latitude pillars and the bench-marks. On the 21st April 1897 the pillars and bench-marks were replaced by the Persian Government in the presence of the Governor of Bushire.

TEHRAN. The longitude pillar was built in the open space used for exercising horses in the N.W. corner of the grounds of the British Legation.

It is situated 50·8 feet from the western boundary wall, 53·5 feet from the wall of the shed to the north and 119·5 feet from the wall of the stables to the south.

A permanent mark of this description [↑ I L.S. ⊙ 1896 G.T.S.] was erected over the gate leading into the public road which runs along the north side of the Legation grounds. From the longitude pillar this mark is 86·5 feet distant on an azimuth of 214°.

The position of the pillar with reference to certain conspicuous points was determined by triangulation; the results are shown in the following table :—

Description	Distance from Longitude Pillar	
	In Latitude	In Longitude
Point of Clock Tower of British Legation ...	4″·16 S.	0·360 E.
Centre of Yusufabad Gate in Northern Rampart ...	11·46 N.	1·052 W.
Northern Tower of Shah's Palace	64·24 S.	1·147 E.
S.E. Corner of Roof of French Legation ...	2·41 S.	1·667 W.

The following is extracted from Captain Burrard's report, dated 1897 :—

Triangulation at Tehran.

Whilst I was moving from Germany to the Persian Gulf, Captain Lenox Conyngham had to stand fast at Tehran; during these weeks he occupied himself in connecting his longitude station with that of General Stebnitzki's, and in fixing the position of his observatory with reference to conspicuous points. Dr. Auwers in Berlin gave Captain Lenox Conyngham many particulars about Stebnitzki's operations, which had been executed in 1874 in connection with the Transit of Venus, but the actual identification of the places would have been very difficult, had it not been for the friendly co-operation of General Schindler at Tehran. This officer was well acquainted with Stebnitzki's work and was able to point out the place from which he had observed. Unfortunately in the last twenty years the town had changed much: houses had been demolished, others built, and new trees had grown, so that points which were conspicuous enough in 1874 were now no longer visible.

The points given by General Stebnitzki are:—

(1) The Kiosk near the house of the Sipah Salar Muhammad Khán.
(2) The centre of the instrument room of the Telegraph Office.
(3) The western tower of the Darwazeh Nassrieh.
(4) The central staircase of the Russian Legation.

Of these No. (2) now forms the women's quarters in the house of a Persian nobleman and was thus unapproachable even in the interests of science. The description of No. (3) was wanting in exactitude, as there were several small minarets on this gate, and it was uncertain which was referred to. No. (4) was situated in the heart of the town at a long distance from Captain Lenox Conyngham's longitude station, and owing to the absence of suitable conspicuous points their connection by triangulation was impracticable. Fortunately, with the kind assistance of General Schindler, Captain Lenox Conyngham was able to identify No. (1) and the position of Stebnitzki's observatory.

The high walls surrounding the houses in Tehran rendered triangulation difficult, but Captain Lenox Conyngham found four accessible points, which were visible from both his station and Stebnitzki's, and he was thus able to make a satisfactory connection. With the object of fixing the position of his observatory with reference to surrounding points and thus facilitating its identification in the future, Captain Lenox Conyngham measured a base along the ramparts on the north side of the town, and at each end of it measured the angles between his longitude station and several conspicuous objects. He then observed the azimuth of his base, and thus possessed sufficient data to enable him to calculate the distances from his station, in both latitude and longitude, of all the points that he had fixed.

In the report by Major-General Stebnitzki on "The geographical position of the city of Tehran", which was published in the 36th volume of the Records of the Topographical Department of the Russian General Staff, the actual point in Tehran finally fixed is not the General's observing station, which was identified by Captain Lenox Conyngham near the house of the Sipah Salar Muhammad Khán, but the central point of the instrument room of the former office of the Indo-European Telegraph Company. The latter point was probably selected in preference to the former as being the more durable.

The centre of this office is stated by General Stebnitzki to be $0^s \cdot 942$ west of his observing station at the Sipah Salar's house.

From the triangulation executed by Captain Lenox Conyngham, it has been calculated that our new longitude station at Tehran is $2^s \cdot 005$ west of the observing station at the Sipah Salar's house.

LENOX CONYNGHAM'S STATION IS THEREFORE $1^s \cdot 063$ WEST OF STEBNITZKI'S.

POTSDAM. The transit instrument was erected on the southern pillar of the Eastern Meridian House of the Königliche Geodätische Institut, at Potsdam.

GREENWICH. The transit instrument was erected on a pillar, situated on the prime meridian, in the Meridian House which stands to the north of the large Transit Room.

APPENDIX.

No. 2.

THE LONGITUDE OF MADRAS.

The longitude of Madras has now been telegraphically determined by five independent series of observations: the following table and Plate VIII show the several lines of operation :—

	Colored in Plate VIII	Route	Date	Observers
Series A ...	Yellow & brown	Greenwich, Moscow, Vladivostok, Hongkong, Singapore, Madras.	1874-75	Generals Scharnhorst and Kuhlberg from Moscow to Vladivostok. Commanders Green, Davis and Norris of the U. S. Navy from Vladivostok to Madras.
Series B ...	Blue ...	Greenwich, Berlin, Tehran, Karachi, Madras.	1874	Dr. Knorre at Berlin. Colonel Stebnitzki at Tehran. Dr. Becker at Isfahan. General Addison at Karachi. Mr. Pogson at Madras.
Series C ...	Red ...	Greenwich, Potsdam, Tehran, Bushire, Karachi, Madras.	1894-96	Captains Burrard and Lenox Conyngham.
Series D ...	Blue and red ...	Greenwich, Berlin, Malta, Suez, Aden, Madras.	1874-77	Drs. Auwers, Knorre, Löw and Mr. Gill from Berlin to Aden. Colonels Campbell and Heaviside from Aden to Madras.
Series E ...	Green and red...	Greenwich, Mokattam, Suez, Aden, Madras.	1874-77	Mr. Criswick at Greenwich. Captain Ord Browne at Mokattam. Mr. Hunter at Suez. Colonels Campbell and Heaviside from Suez to Madras.

The Closing Error at Potsdam.

Arc	Difference of Longitude	Probable Error	Authority
	h m s	s	
Berlin-Greenwich	0 53 34·910	± 0·010	Page 219, Verhandlungen der Internation. Erdmessung, 1893.
Berlin-Potsdam	0 1 18·721	± 0·005	Astronomisch-Geodätische Arbeiten. Berlin, 1895.
Difference ...	0 52 16·189	± 0·011	

The direct measurement of Potsdam-Greenwich, given in this volume, is $0^h\ 52^m\ 15^s{\cdot}953$, or $0^s{\cdot}236$ less than the value derived above.

The Closing Error at Tehran.

Arc	Difference of Longitude	Probable Error	Authority
	h m s	s	
Tehran-Berlin	2 32 6·610	± 0·11	Die Venus-Durchgänge 1874 and 1882 by Dr. Auwers, 1896.
Berlin-Potsdam	0 1 18·721	± 0·005	Astronomisch-Geodätische Arbeiten. Berlin, 1895.
Deduct distance between Stebnitzki's and Lenox Conyngham's stations at Tehran	0 0 1·063	...	See Appendix I, page (5)
Tehran-Potsdam ...	2 33 24·268	± 0·11	

The direct measurement of Tehran-Potsdam, given in this volume, is $2^h\ 33^m\ 24^s{\cdot}228$, and thus differs by $0^s{\cdot}040$ from the value derived above.

Series A.

The following table contains the values of the arcs of longitude measured across Siberia and down the Chinese coast:—

Arc	Difference of Longitude	Probable Error	Authority
	h m s	s	
Pulkowa-Greenwich	2 1 18·63	± 0·008	Astronomische Nachrichten No. 3202, Vol. 134.
Moscow-Pulkowa	0 28 58·45	0·010	General Scharnhorst's Report, Vol. 37. Records of the Russian General Staff.
Kazan-Moscow	0 46 11·97	0·030	
Ekaterinburg-Kazan	0 45 59·64	0·043	
Omsk-Ekaterinburg	0 51 1·51	0·043	
Tomsk-Omsk	0 46 18·61	0·043	
Kansk-Tomsk	0 43 1·19	0·043	
Irkutsk-Kansk	0 34 18·09	0·043	
Chita-Irkutsk	0 36 52·07	0·043	
Stritensk-Chita	0 16 45·54	0·043	
Albazin-Stritensk	0 25 31·67	0·043	
Blagovyeshchensk-Albazin	0 13 45·99	0·043	
Khabarovka-Blagovyeshchensk ...	0 30 10·96	0·043	
Sum ...	9 0 14·32	...	
Khabarovka-Vladivostok	0 12 43·04	0·043	
Vladivostok-Shanghai	0 41 34·82	0·023	Determinations of longitude, East Indies, China, Japan. By officers of the U. S. Navy.
Shanghai-Hongkong	0 29 17·28	0·029	
Hongkong-Cape St. James	0 28 21·43	0·021	
Cape St. James-Singapore	0 12 52·42	0·021	
Singapore-Madras	1 34 25·58	0·019	
Sum ...	3 39 14·57	...	
Longitude of Madras = Difference of Sums	5 20 59·75	± 0·155	

The difference of longitude between Singapore and Madras was also measured by Dr. Oudemans and Mr. Pogson, but without any determination of personal equation. An account is given in "Telegraphic Determinations of Longitude," by Norman Pogson, and in the Astronom. Nachrichten, No. 2486 of 1883. In the "Triangulation Von Java" Dr. Oudemans himself, in discussing the longitude of Batavia, accepts the American value without modification.

Series B.

An account, written by General Addison, of Series B is to be found in Vol. XXXVIII of the Monthly Notices of the Royal Astronomical Society, and the resulting longitude of Madras is there given as $5^h\ 20^m\ 59^s \cdot 65$. But in "Die Venus-Durchgänge 1874 and 1882," published at Berlin in 1896, Dr. Auwers discusses this series of longitudes, and considerably modifies General Addison's results, decreasing the value of every arc. The following table shows Dr. Auwers' values:—

Arc	Difference of Longitude	Probable Error	Authority
	h m s	s	
Berlin-Greenwich	0 53 34·91	±0·010	Die Venus-Durchgänge 1874 and 1882, Berlin, 1896
Tehran-Berlin	2 32 6·61	±0·048 (Tehran-Berlin and Isfahan-Tehran)	Die Venus-Durchgänge 1874 and 1882, Berlin, 1896
Isfahan-Tehran	0 0 58·70		Die Venus-Durchgänge 1874 and 1882, Berlin, 1896
Karachi-Isfahan	1 1 12·94	±0·11	Die Venus-Durchgänge 1874 and 1882, Berlin, 1896
Madras-Karachi	0 53 5·85	±0·11	Pogson's "Telegraphic Longitudes".
Sum = Longitude of Madras	5 20 59·01	±0·163	

A constant error of about 10 seconds of time runs throughout the observations at Karachi. Mr. Pogson writes "an error of *exactly* ten seconds in General Addison's time determination is the only possible explanation," but Dr. Auwers states the error to be "nearly eleven seconds." General Addison, the observer, attributes it to his neglect to obtain the pivot error of his transit instrument, and is of opinion, though the resulting longitude of Karachi may be wrong, that "the difference between Isfahan and Madras remains unaffected, the errors on the east and west sides of "Karachi correcting each other." Mr. Pogson considers that "no conceivable pivot correction nor any other instru- "mental error could account for so large a difference," but on the supposition that the observer mistook the time by exactly ten seconds, he agrees with General Addison that the effect would be reversed east and west of Karachi and "would therefore be eliminated in the final difference between Greenwich and Madras."

No determination was made of personal equation between the Madras and Isfahan observers.

Series C.

The results of this series are given in this Volume. The value obtained for the longitude of Madras is—

$5^h\ 20^m\ 59^s \cdot 137$ with a probable error of $\pm\ 0^s \cdot 0219$.

Series D.

This series is discussed by Dr. Copeland in Vol. III, Chapter XXIII, of the Dunecht Observatory Publications, and by Dr. Auwers in a paper on "The Longitude of Aden," published in the Astronom. Nachrichten, No. 3180, dated August 15th, 1893. Dr. Auwers' discussion is reprinted in "Die Venus-Durchgänge 1874 and 1882."

Arc	Difference of Longitude	
	By Dr. Copeland	By Dr. Auwers
	h m s	h m s
Berlin-Greenwich	0 53 34·865	0 53 34·910
Alexandria-Malta-Berlin	1 5 58·942	1 5 58·866
Suez-Alexandria	0 10 38·923	0 10 39·266
Aden (Gill's station)-Suez	0 49 43·750	0 49 43·630
Longitude of Gill's station at Aden	2 59 56·480	2 59 56·672

The difference of longitude between Gill's station at Aden and the Madras Observatory can be found as follows:—

Gill's point at Aden is 0s·877 east of Campbell's. Then from pages 410 and 441 of Vol. XV of the *Account of the Operations of the Great Trigonometrical Survey of India*,

	h	m	s
Madras-Bellary	0	13	16·545
Bellary-Bombay	0	16	26·871
Bombay-Aden (Campbell's station)	1	51	20·022
Sum	2	21	3·438
Deduct difference between Campbell's and Gill's stations			0·877
Madras is east of Aden (Gill's station) by	2	21	2·561

The resulting longitude of Madras by Series D thus becomes:—

	h	m	s	s
Copeland's reduction	5	20	59·041	
Auwers' reduction	5	20	59·233	± 0·127

In Volume I of the Annals of the Cape Observatory, Mr. David Gill, who was one of the observers on this series, writes:—"In the case of Lord Lindsay's Expedition (*i.e.* of Series D) the observations lay no claim to high "refinement. They were made throughout in the open air, with small portable instruments, which in the case of "Alexandria were placed on the roof of a hotel, where the observer had to abstain from movement during each complete "observation, otherwise the level was disturbed by the change of his position. At Aden and Alexandria the chrono- "meters had to be carried a long distance between the observing station and the telegraph office. The observers were "without personal assistance and the crucial observations for time had often to be made under conditions of extreme "fatigue, amounting on one or two occasions nearly to exhaustion on the part of the observers engaged.

"In fact the character of the work was only such as it was possible to organise and execute *en route*, and the "results fully realised the accuracy expected from them."

Series E.

The following table gives the results of Series E:—

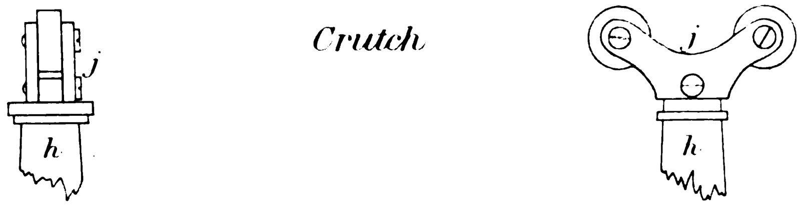
Arc	Difference of Longitude h m s	Probable Error s	Authority
Mokattam-Greenwich	2 5 6·24	± 0·067	Airy's Transit of Venus, 1874.
Suez-Mokattam	0 5 6·93	± 0·089	Ditto ditto
Aden-Suez	0 49 42·813	± 0·041	Vol. XV, G. T. Survey of India.
Bombay-Aden	1 51 20·022	± 0·033	Ditto ditto
Bellary-Bombay	0 16 26·871	± 0·012	Ditto ditto
Madras-Bellary	0 13 16·545	± 0·007	Ditto ditto
Longitude of Madras	5 20 59·421	± 0·123	

In the Annals of the Cape Observatory Mr. Gill points out, that this Series E was not executed with such refinements or precautions as are necessary for the determination of fundamental longitudes, and Mr. Hunter, the Suez observer, in his report to Sir George Airy states, that the micrometer screw of his transit instrument was "decidedly drunken", and that he had to abandon its use, and "to trust to observing the pole-star in both positions of the instrument over the "fixed wires for collimation" (page 322 of the Account of Observations of the Transit of Venus, 1874, by Sir George Airy). The personal equation of the Greenwich and Mokattam observers varied from $0^s \cdot 025$ to $0^s \cdot 655$ (page 288, Transit of Venus, 1874).

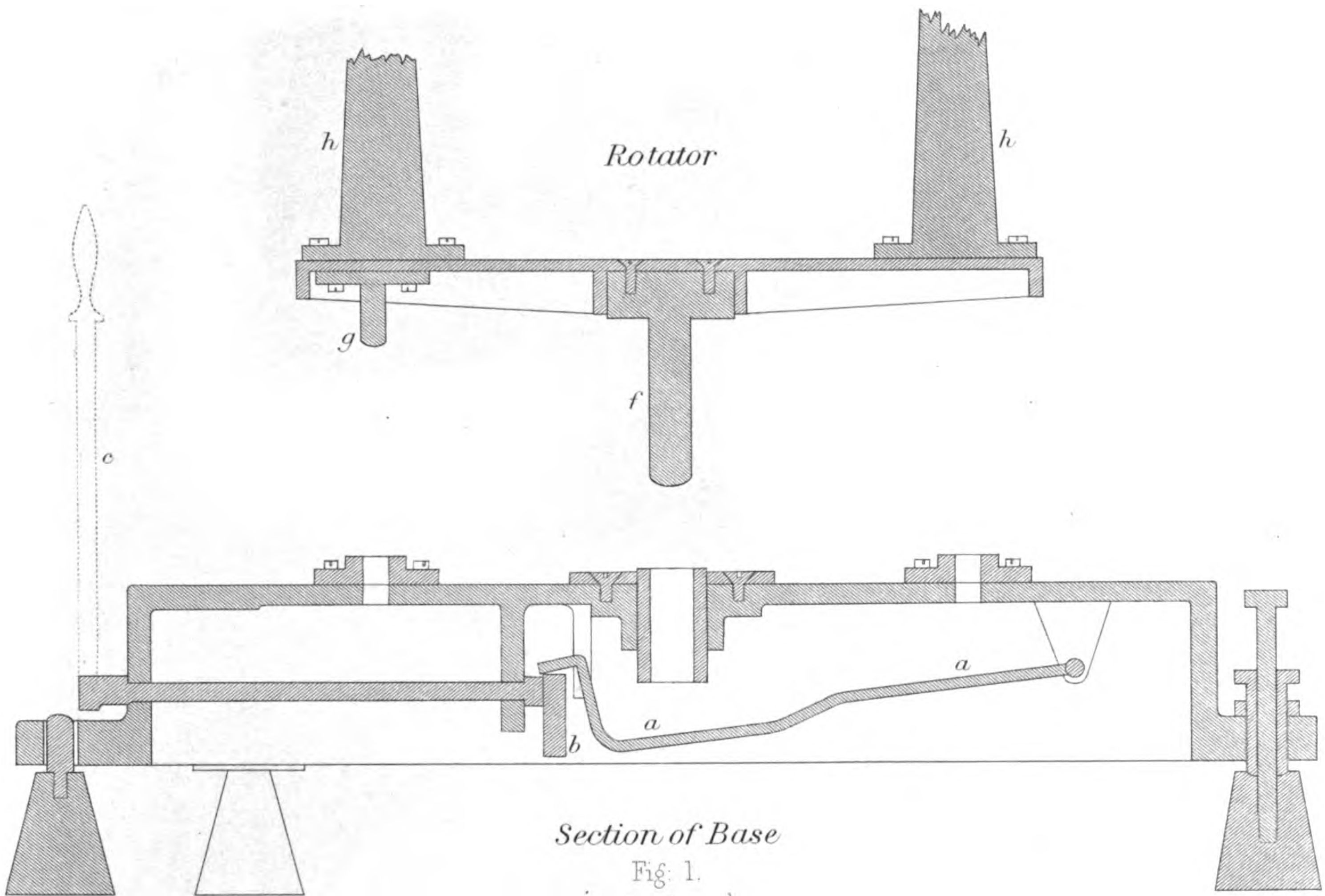
The results of the five series of operations may thus be tabulated as follows:—

	Longitude of Madras	Probable Error
	h m s	s
Series A	5 20 59·750	±0·155
" B	5 20 59·010	±0·163
" C	5 20 59·137	±0·022
" D	5 20 59·233	±0·127
" E	5 20 59·421	±0·123

Crutch



Rotator



Section of Base

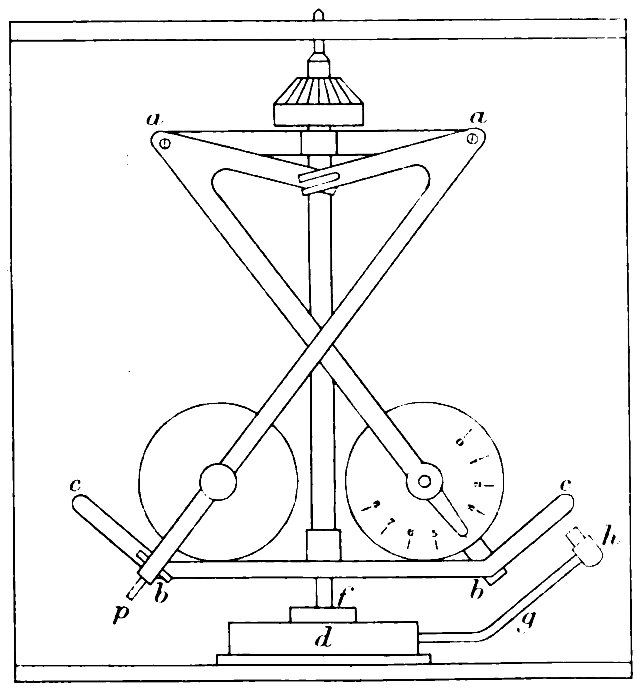
Fig. 1.

Scale about $\frac{1}{4}$

Governor of Chronograph

Fig. 3.

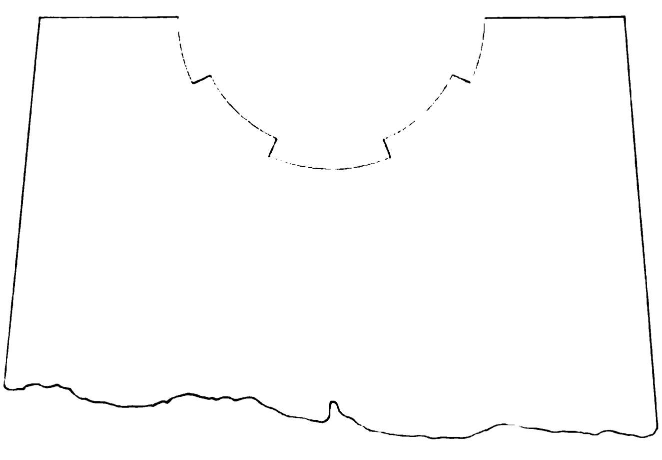
Scale about $\frac{1}{2}$



Segmental Bearing

Fig. 2.

Actual size.



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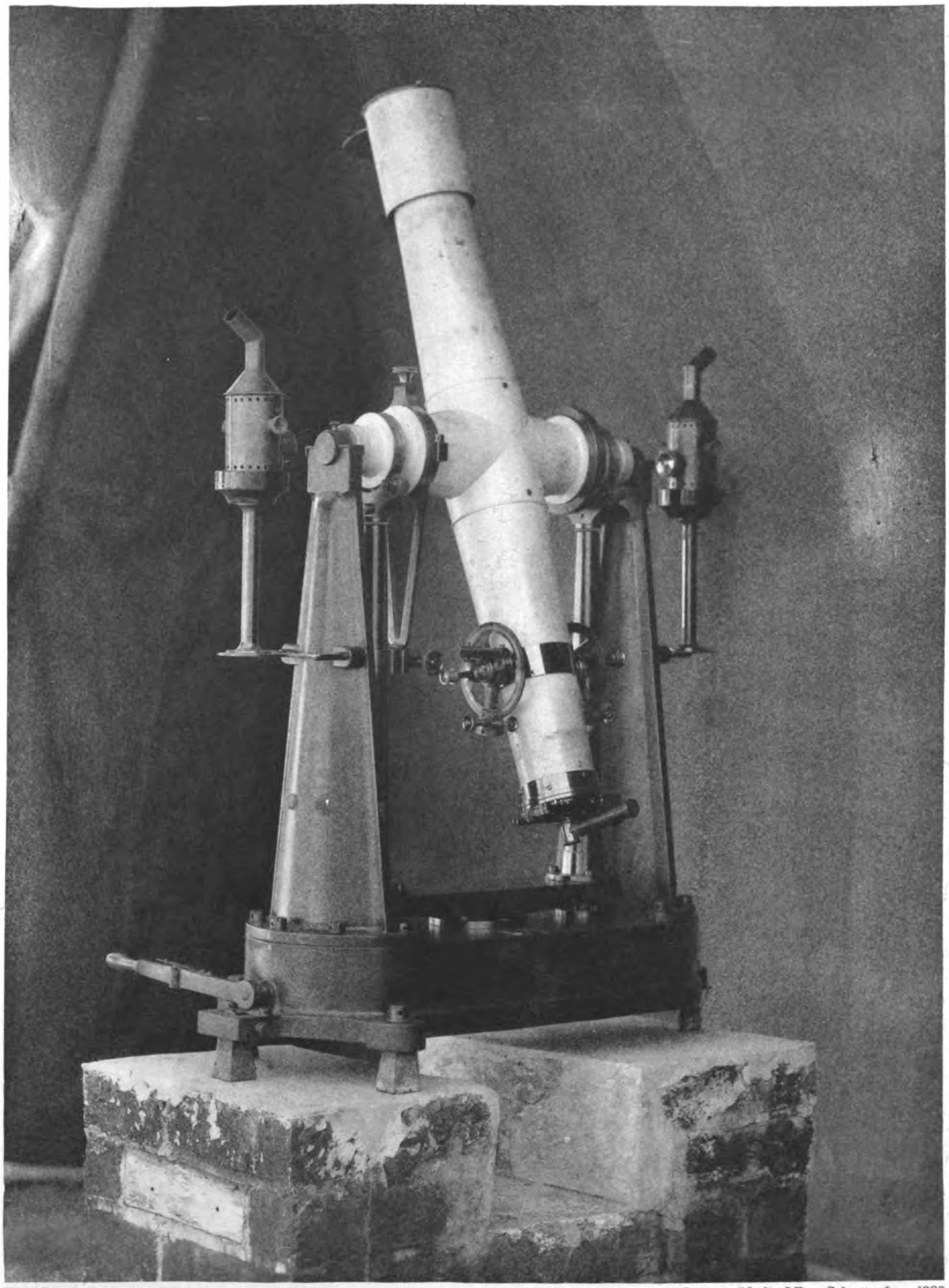


Photogravure.

Survey of India Offices, Calcutta, June 1899.

COLLIMATOR.

PLATE III.

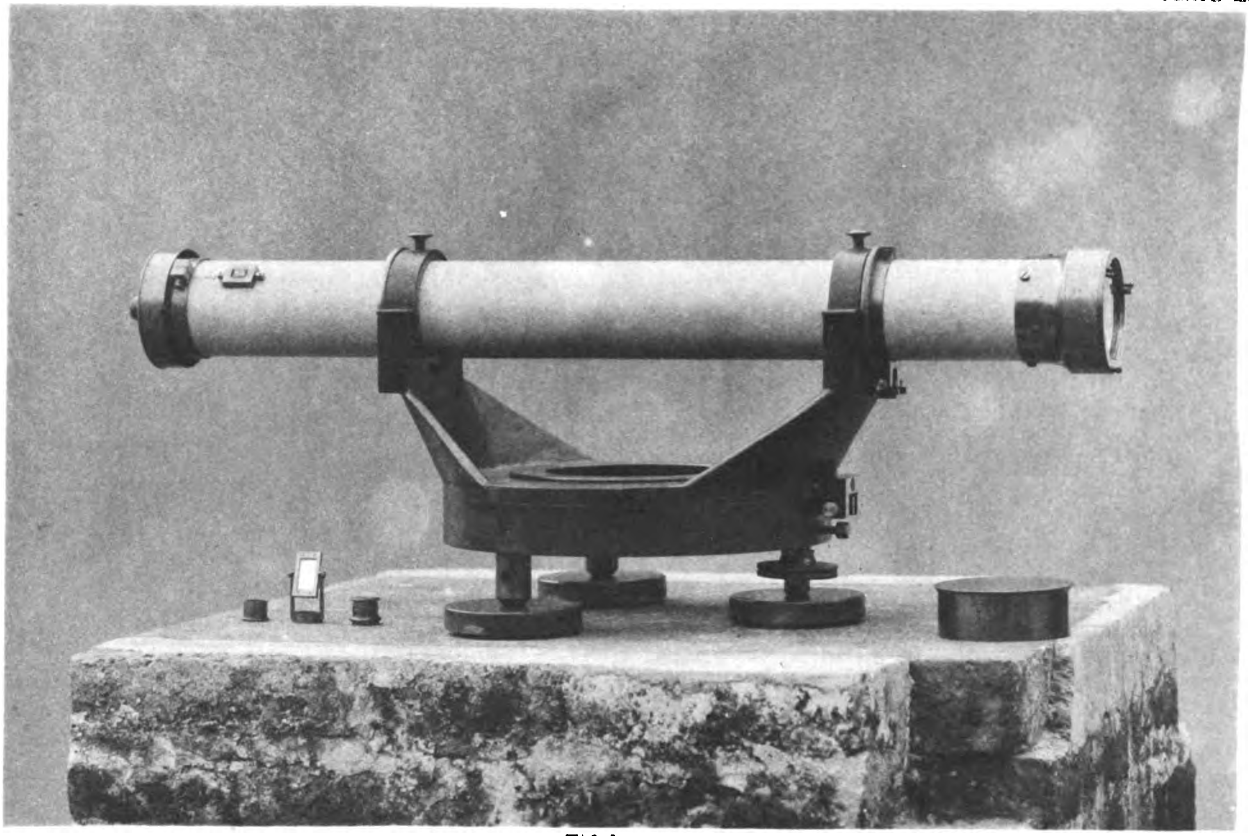
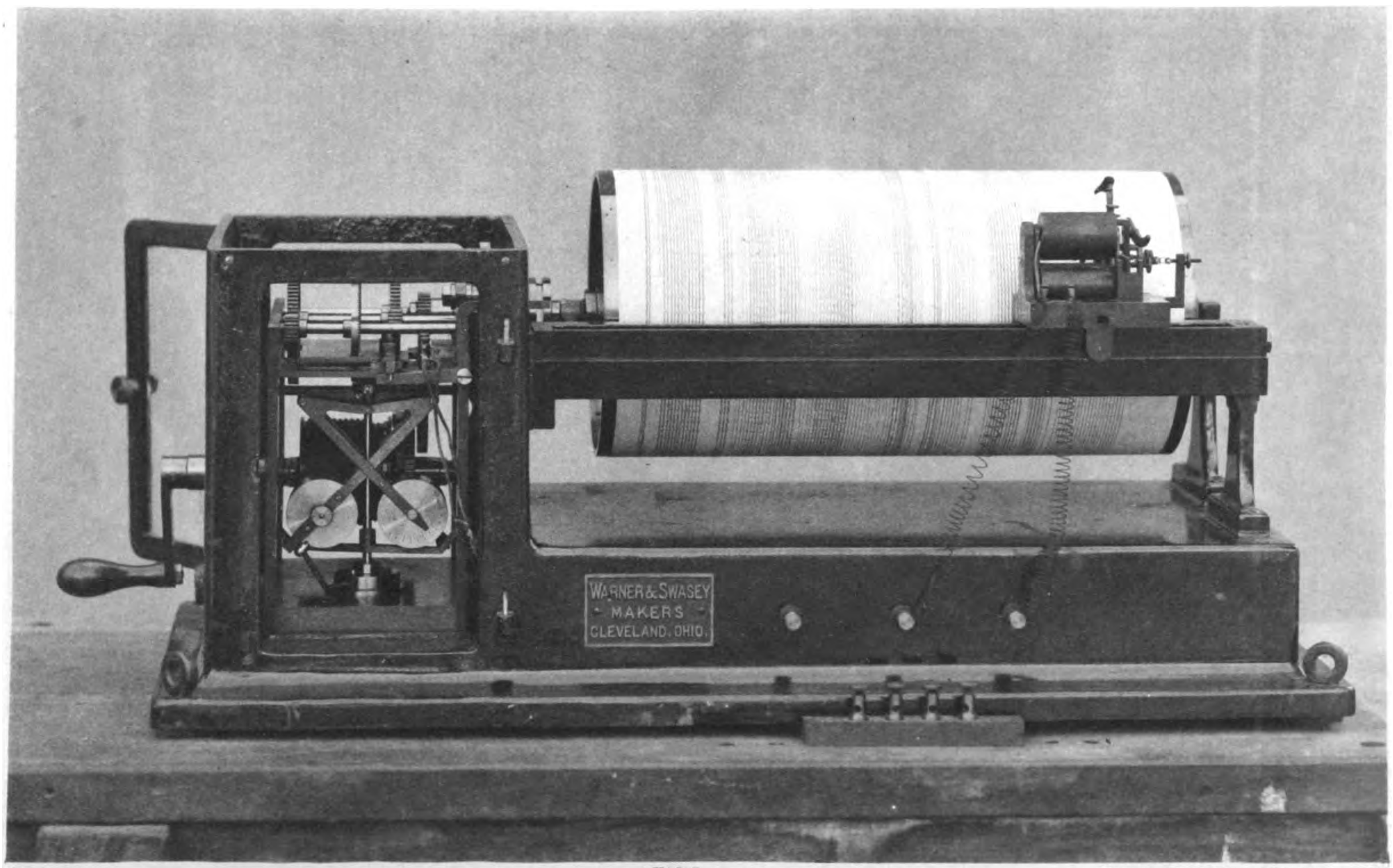


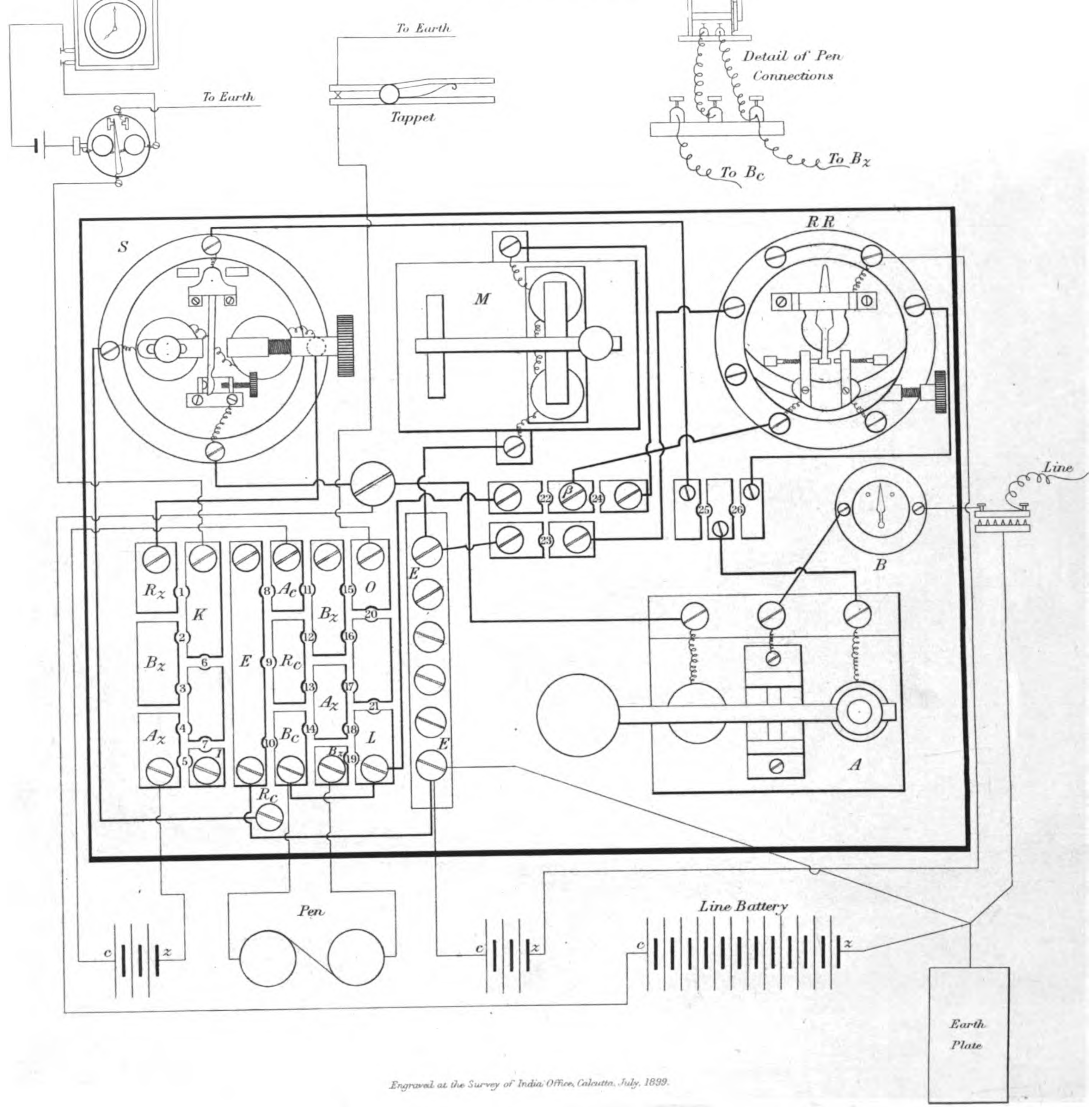
Fig. 1.

CHRONOGRAPH.



Photogravure. Fig 2. Survey of India Offices, Calcutta, June 1899.

COMMUTATOR BOARD



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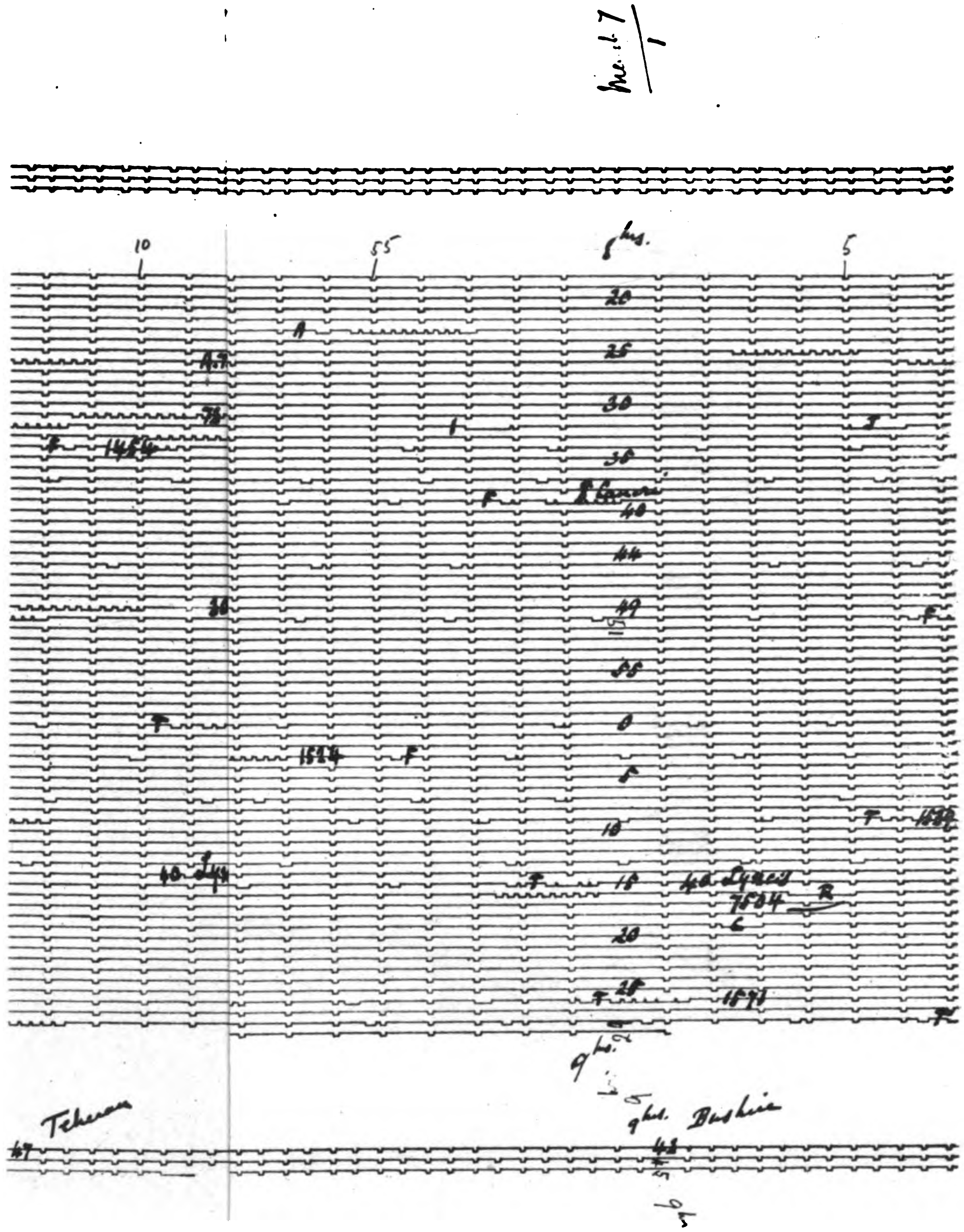
GENERAL VIEW OF OBSERVATORY TENT
WITH TRANSIT INSTRUMENT AND COLLIMATOR.

Photogravure.

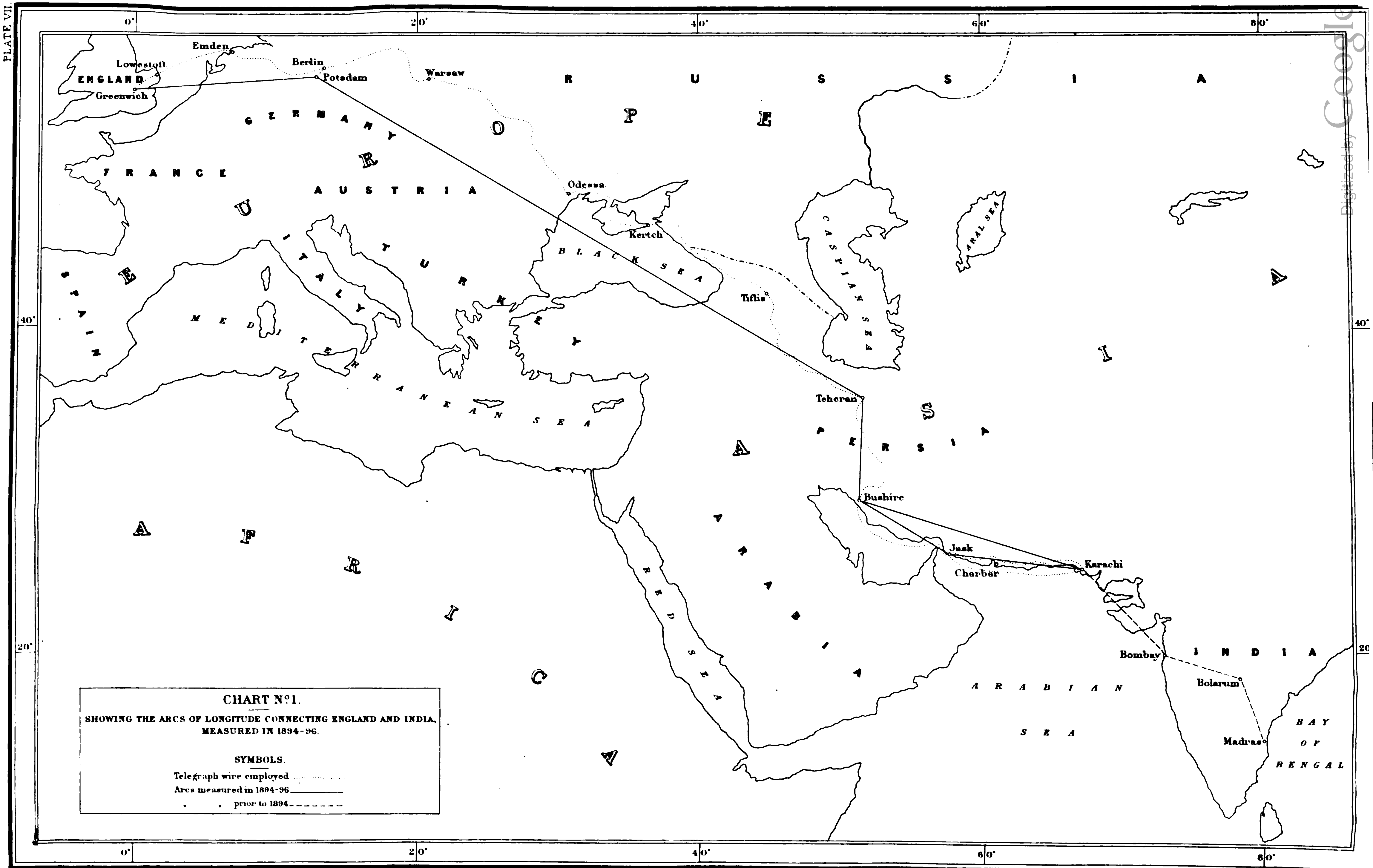
Survey of India Offices, Calcutta, June 1899.



Note.

Photogravure.

Survey of India Offices. Calcutta. August 1899.



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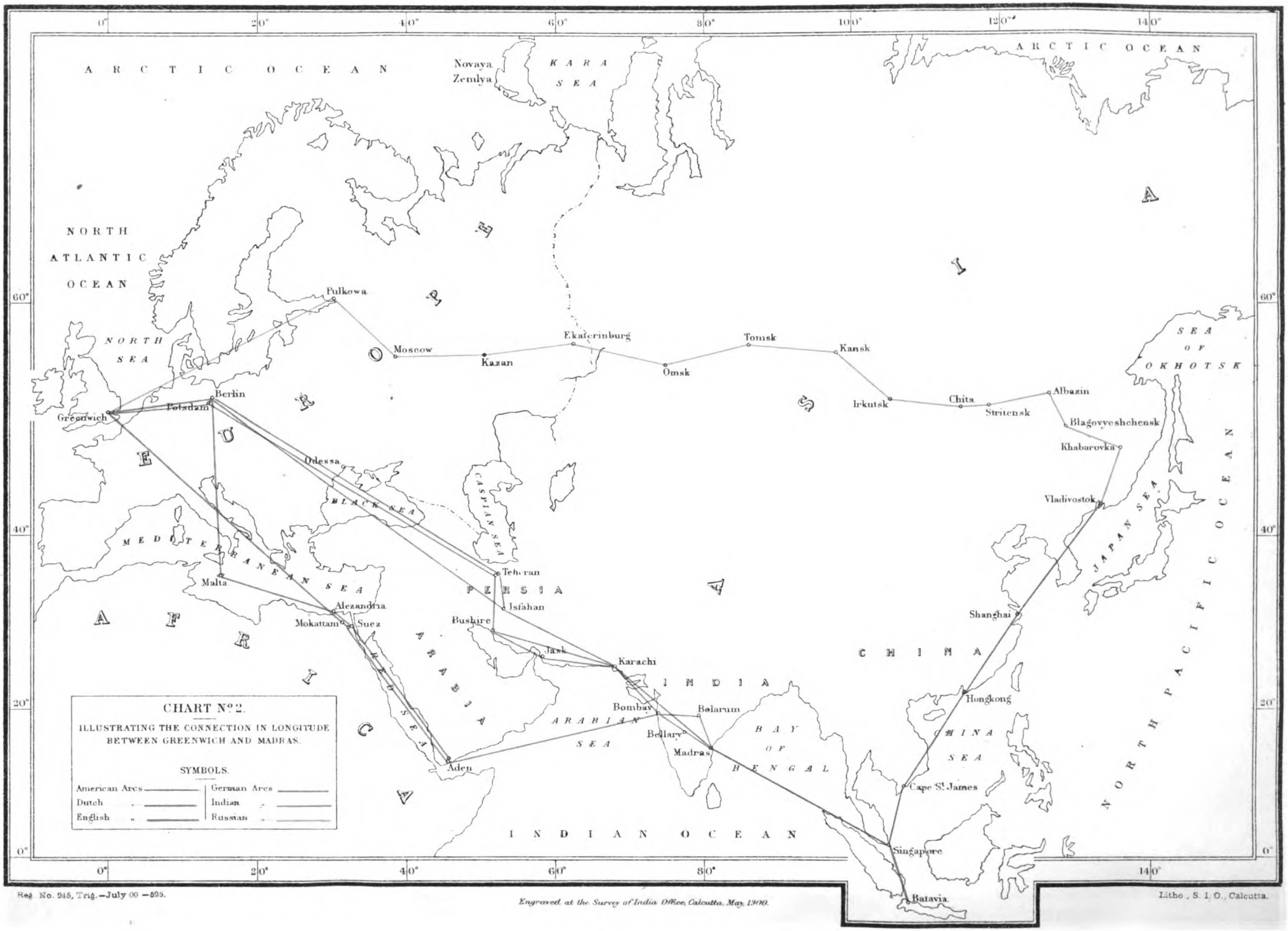

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An Account of the Measurement of an Arc of the meridian between the parallels of 18° 3′ and 24° 7′, being a continuation of the Grand Meridional Arc of India, as detailed by the late Lieutenant-Colonel Lambton in the Volumes of the Asiatic Society of Calcutta. By Captain George Everest, of the Bengal Artillery, F.R.S., &c. London, 1830. (*Out of print*).

An Account of the Measurement of two Sections of the Meridional Arc of India, bounded by the parallels 18° 3′ 15″; 24° 7′ 11″; and 29° 30′ 48″. By Lieutenant-Colonel Everest, F.R.S., &c., late Surveyor General of India, and his Assistants. London, 1847. (*Out of print*).

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Do. X. Electro-Telegraphic Longitude Operations executed during the years 1881-82, 1882-83 and 1883-84, by Major G. Strahan, R.E., and Major W. J. Heaviside, R.E. Prepared under the directions of Colonel C. T. Haig, R.E., Deputy Surveyor General, Trigonometrical Branch, and published under the orders of Colonel H. R. Thuillier, R. E., Surveyor General of India. Dehra Dún, 1887.

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* No copies available at the Trigonometrical Branch Office, Dehra Dún.

List of Principal Works published by the Great Trigonometrical Survey of India.

Account of the Operations of the Great Trigonometrical Survey of India—(*Continued*).

Volume XI. Astronomical Observations for Latitude made during the period 1805 to 1885, with a General Description of the Operations and Final Results. Prepared under the directions of Lieut.-Colonel G. Strahan, R.E., Deputy Surveyor General, Trigonometrical Branch, and published under the orders of Colonel H. R. Thuillier, R.E., Surveyor General of India. Dehra Dún, 1890.

Do. XII. General Description of the Principal Triangulation of the Southern Trigon, including the Simultaneous Reduction and the Details of two of the component Series, the Great Arc Meridional—Section 8° to 18°, and the Bombay Longitudinal. Prepared under the directions of Lieut.-Colonel G. Strahan, R.E., Deputy Surveyor General, Trigonometrical Branch, and published under the orders of Colonel H. R. Thuillier, R.E., Surveyor General of India. Dehra Dún, 1890.

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