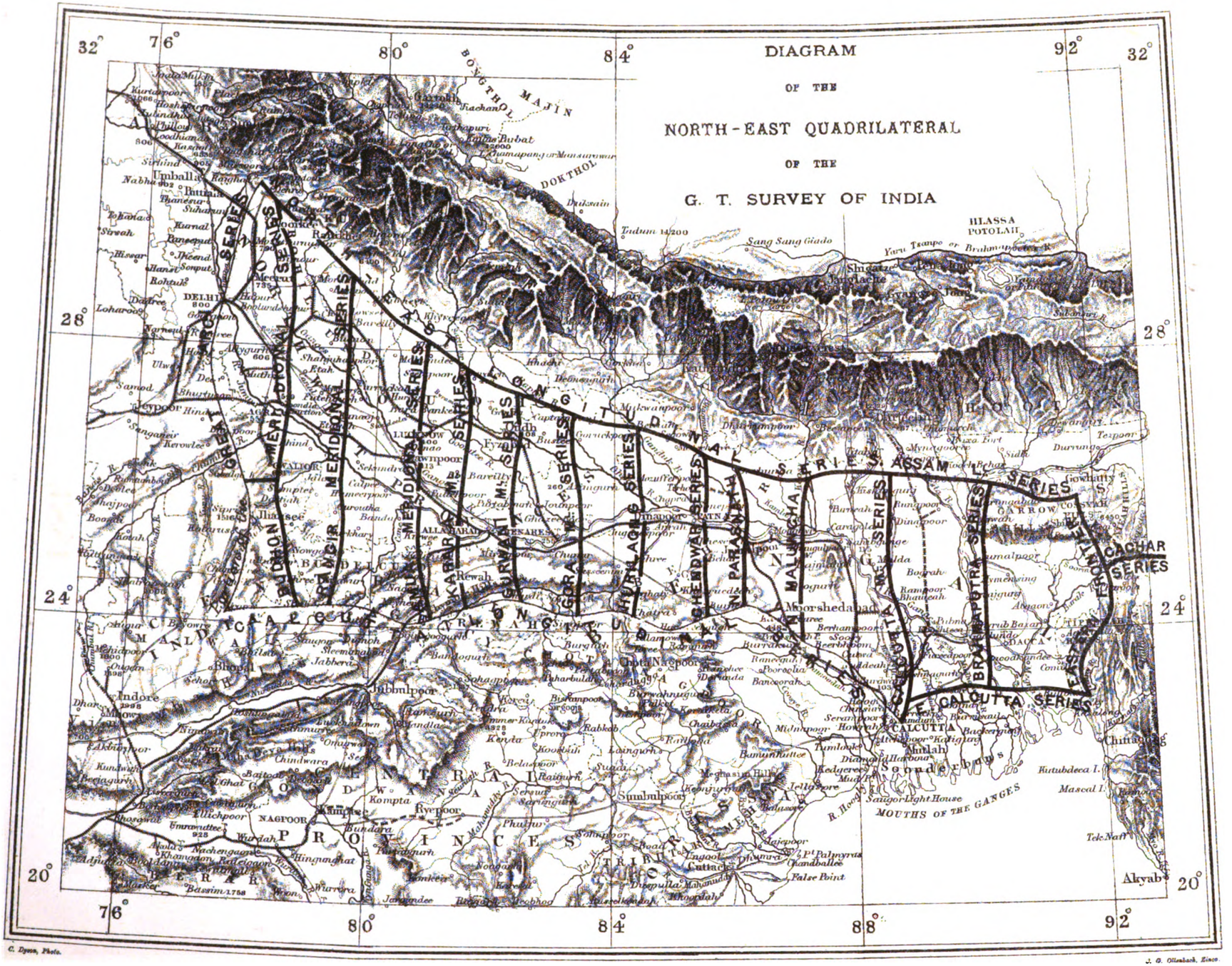

C. Dyce, Photo.

J. G. Ollenbach, Zinco.

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SYNOPSIS OF THE RESULTS OF THE OPERATIONS OF

THE GREAT TRIGONOMETRICAL SURVEY OF INDIA

VOLUME XVI.

DESCRIPTIONS AND CO-ORDINATES

OF THE

PRINCIPAL AND SECONDARY STATIONS AND OTHER FIXED POINTS OF

THE AMUA MERIDIONAL SERIES

OR SERIES L

AND THE KARARA MERIDIONAL SERIES

OR SERIES M

OF THE

NORTH-EAST QUADRILATERAL.

BY LIEUT.-GENERAL J. T. WALKER, C.B., R.E., F.R.S., &c., &c.,
SURVEYOR GENERAL OF INDIA, AND SUPERINTENDENT OF THE TRIGONOMETRICAL SURVEY,
AND HIS ASSISTANTS.

Dehra Dun:
PRINTED AT THE OFFICE OF THE TRIGONOMETRICAL BRANCH, SURVEY OF INDIA.
B. V. HUGHES.

1883.

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February, 1883.

J. B. N. HENNESSEY,
In charge of Computing Office.

REFERENCES.

The abbreviations employed in the text are as follows:—

h.s. denotes hill station secondary
s. „ station secondary

These abbreviations are only placed after stations where a theodolite has been set up and observations taken to surrounding points.

The latitudes and longitudes of all points shown on the Chart at the end of each series will be found in the text. The latter exhibits numerical values of triangles only to points of a superior class, to which alone, if exhibited on the Charts, lines are drawn: the lines are either continuous throughout, or dotted for half the length and continuous for the other half: the dots indicate that the bearing was not observed, and in such cases numerical values of azimuths are not given. For other points, difficult to identify or of comparatively less accuracy, numerical values of triangles or azimuths are not given.

February, 1883.

J. B. N. HENNESSEY,
In charge of Computing Office.

PREFACE.

The Amúa and the Karára Meridional Series are the third and the fourth meridional series from the west of the sixteen chains of triangles included in the Section of the Principal Triangulation of the Survey of India which has been named the North-East Quadrilateral. This Section embraces the area within the Meridians of 78° and 92° and the Parallels of 23° and 30°; and for reasons explained in Section 7 of Chapter I of Volume II of the *Account of the Operations of the Great Trigonometrical Survey*, its general reduction was postponed till that of the neighbouring Quadrilaterals, *viz.*, the North-West and South-East, had been completed, whereby two of the Series, the Great Arc, Section 24° to 30°, and the Calcutta Longitudinal, entering the periphery of the North-East Quadrilateral, became finally fixed. The general principles of the Simultaneous Reduction, and the procedure followed in carrying it out, are the same as have been explained in Volume II of the *Account of the Operations, &c.*, and full details of the whole of the principal triangulation which is at present included in the Quadrilateral, will be found in Volumes VII and VIII of the *Account of the Operations, &c.*

As however the entire contents of the volumes of the principal triangulation are not needed by geographers and surveyors, and moreover as these volumes give no details of the secondary triangulation—which is of considerable value for local requirements—it is obviously desirable that synopses of the final results of the whole of the operations, including the secondary as well as the principal triangulations, should be published for general use, in such a form as to be most suitable for convenience of reference. This has already been done as follows;—For the several Series forming the North-West Quadrilateral,

I. Great Indus Series.
II. Great Arc, Section 24° to 30°.
III. Karáchi Longitudinal Series.
IV. Gurhágarh Meridional Series.
V. Rahún Meridional Series.
VI. Jogí-Tíla and Sutlej Series.
VII. North-West Himalaya Series.

For those also of the South-East Quadrilateral, *viz.*,
VIII. Great Arc, Section 18° to 24°.
IX. Jabalpur Meridional Series.
X. Bider Longitudinal Series.
XI. Biláspur Meridional Series.
XII. Calcutta Longitudinal Series.
XIII. East Coast Series.

} Already published.

And for the following Series of the North-East Quadrilateral,
XIV. Budhon Meridional Series.
XV. Rangír Meridional Series.

The present is the 16th Synoptical Volume and the third of those appertaining to the North-East Quadrilateral; and it has been made to include both the Amúa and the Karára Meridional Series, partly because portions of the same districts enter both series and it is therefore convenient to have all the results in one volume, and partly because the available matter is insufficient for two volumes.

It gives the results of the whole of the triangulation executed in connection with these series, both the principal, which was executed with theodolites having azimuthal circles of 15 and 18 inches in diameter read by 3 micrometer microscopes, and the secondary, which was executed with smaller theodolites read by verniers.

By the process of reduction which has been followed the principal triangulation has been rendered perfectly consistent, both internally and externally; internally, so that if in any one of the several polygonal figures of which the chains may be composed, calculations are carried from one station to another in every possible direction, the same results will be inevitably deduced; and externally, so that the values of the co-ordinates of any station, when computed from the given co-ordinates of any other station, with the final linear and angular data, will be the same, whether the calculation is carried directly through the series, or circuitously through any of the other chains of triangles comprising the North-East Quadrilateral. All secondary triangulations which emanate from one side of the principal series and close on another side thereof, or on a contiguous series, have also been made consistent throughout.

As regards the general arrangement of this volume, it is necessary to point out that the several sections have been prepared and printed at different times, and that the work has extended over several years. The Introductions to each series and the Names and Descriptions of the Principal Stations were originally prepared for Volume VII of the *Account of the Operations, &c.*, and when a sufficient number of copies had been printed for that work, additional copies were struck off for the present Synopsis. The Alphabetical and Numerical Lists of Principal Stations, pages $1_{L.}$ and $2_{L.}$, and $1_{M.}$ and $2_{M.}$, as well as the Names and Descriptions of the Principal Stations of the Amúa Series, pages $3_{L.}$ to $8_{L.}$, were printed prior to the year 1868, when the general programme for the final reduction of the whole of the Triangulation of India was drawn up; there was then a long pause in the printing, while the Simultaneous Reductions of the North-West, South-East and North-East Quadrilaterals were being completed; this was done by the year 1877, when the secondary triangulation was adjusted in accordance with the principal, and then the printing of this volume was resumed.

The paging of each series starts from unity and is therefore not continuous throughout this volume. This was necessitated by the order of routine which had to be adopted in printing the successive subjects embraced in each and which is the same for all. The paging of each series is however distinguished by using a capital letter as a subscript to the numerals; thus all the paging which has reference to the Amúa Meridional Series has the subscript *L*, and that to the Karára Meridional Series the subscript *M*.

The data given in this volume are the following:—

First (pages $1_{L.}$, $1_{M.}$), alphabetical lists of the names of the principal stations, showing the numbers assigned to them, which were employed in the reductions as being more convenient to use than names.

Second (pages $2_{L.}$, $2_{M.}$), numerical lists giving the names corresponding to the numbers.

Third (pages $3_{L.}$, $3_{M.}$), descriptions of the principal stations—of their structure and positions—as taken from the original records of the observations, and supplemented by Addenda (pages $9^{*}_{L.}$, $11^{*}_{M.}$) giving the most recent information of their condition which has been received up to date.

Fourth (pages $9_{L.}$, $11_{M.}$), the angles and sides of the principal triangles, numbered and arranged in order from south to north.

Fifth (pages $12_{L.}$, $15_{M.}$), the angles and sides of certain secondary triangles. The numbering is here made consecutive to that of the principal triangles, in order to facilitate references which are made in other sections to the place where the length of a side is to be found.

Sixth (pages $14_{L.}$, $21_{M.}$), the azimuths of surrounding stations and points, at principal, principal-auxiliary, and secondary stations, the latter arranged in alphabetical order.

Seventh (pages $17_{L.}$, $26_{M.}$), the co-ordinates and descriptions of all stations and points arranged in alphabetical order.

The heights of the stations of the Amúa Meridional Series depend in the first instance on the finally determined values of the stations of Amúa and Lakanpúra of the Calcutta Longitudinal Series (of the South-East Quadrilateral), and on the spirit-leveled heights of two stations of the North-East Longitudinal Series, *viz.*, Kutia and Rámnagar, whilst those of the Karára Meridional Series depend on the finally determined values of the stations

of Karára and Marwás of the Calcutta Longitudinal and of Másí of the North-East Longitudinal Series. In addition to these fixed heights, the heights of Stations XVIII, XXVIII, XXIX and XXX of the Amúa Meridional Series, and the heights of Stations XVI, XVII, XXX, XXXI and XXXII of the Karára Meridional Series were determined by the Spirit-leveling Operations of this Branch of the Department, and those of Stations XI, XIII and XX of the first named series and of Stations XIX, XX, XXIII, XXVI, and XXVIII of the latter series were determined by similar operations of the Revenue Branch. The manner in which the heights of the remaining stations have been made to accord with those above designated, is explained in Section 7 of Chapter II, Part I of Volume VII of the *Account of the Operations, &c.* The datum to which all heights have been referred is the mean sea level of Karáchi (Kurrachee). It may be here stated that all trigonometrically determined heights invariably refer to the upper surfaces of the central masonry pillars which are constructed for the instruments to stand on. Spirit-leveled values sometimes refer to the upper surface and sometimes to the basement of the pillar, whichever the leveling staff was set on; a description of the exact point referred to is given in each instance in footnotes to the pages of the Co-ordinate Lists, commencing on pages 17—*L.* and 26—*M.* respectively.

It has not been considered necessary to publish the whole of the details of the secondary triangulation, portions having been executed originally for preliminary geographical purposes, to facilitate the construction of a first map of India, and the objects observed having in many instances been flags and temporary marks which must long since have disappeared. The sides and angles of 31 triangles for the Amúa Meridional Series and of 133 triangles for the Karára Meridional series, which were selected as most likely to be still in existence and of future use, and the azimuths of all these sides, have been given; but for a number of other points the co-ordinates only have been given. With the aid of Nos. X, XI and XII of the *Auxiliary Tables to facilitate calculations of the Survey Department of India*, Dehra Doon 1868, local surveyors, working on a system of rectangular co-ordinates, can readily transform the spheroidal co-ordinates here given to suit their own requirements.

The Longitudes depend on an astronomically determined value of the longitude of the Madras Observatory, 80° 17′ 21″, which was deduced about the year 1815. There has long been reason to believe that this value was about 3′ too great; but, pending the final determination of the longitude of the Madras Observatory, it has not been considered desirable to alter the value, which has therefore been maintained up to the present time. An electro-telegraphic determination of the longitude of Madras from Greenwich, commencing with the difference between Suez and Greenwich—determined, in 1874, under the superintendence of the Astronomer Royal—was completed in 1877 by the determination of the difference between Suez and Madras, by Captains Campbell and Heaviside, as a part of the operations of this Survey. The combined result places the Observatory at Madras in Long. $5^h\ 20^m\ 59^s{\cdot}42 = 80°\ 14'\ 51''{\cdot}30$. Thus the following precept may be accepted with considerable confidence,—

All the values of longitude in this volume require a constant correction, probably of − 2′ 30″.

As regards the orthography of Indian names in the present volume. The Alphabetical and Numerical Lists of Principal Stations, at the commencement of the volume, were printed before the year 1868, in accordance with the rules introduced by Colonel Everest for use in the Survey Department. Subsequently, in 1874, several provincial lists of spellings, constructed under the immediate orders of the Government of India, were received; and thereafter the newly authorised spellings were adopted for all names and other words contained in these lists; but for words for which there was no specific authority, the spellings have been framed in accordance with the methods followed in the preparation of the published lists, reference being made in the present instance more particularly to the Gazetted Lists for the North-West Provinces and Oudh. As a general rule the pronunciations of the vowels are as follows:—*a* has a variable sound as in wom*a*n, rur*a*l, p*a*ltry; *á* as in t*a*rtan; *i* as in b*i*t; *í* as in rav*i*ne; *u* as in b*u*ll; *ú* as in r*u*ral; *o* as in n*o*te; *e* as *a* in s*a*y; *au* as *ou* in cl*ou*d; *ai* as *i* in r*i*de.

The Charts accompanying this volume show the whole of the principal stations and triangulation, the positions of all the secondary points, and those portions of the secondary triangulations of which full details of the angles, sides and azimuths are given. With the aid of the Charts it is hoped that little difficulty will be met with in finding out any of the data which may be required. The descriptions of the secondary stations are in some cases

not as full and clear as is to be desired: this arises from the inadequacy of the information entered on the spot by the surveyors in their field books; every effort has been made to supplement the field books, whenever it was found practicable to do so, in order to facilitate the future identification of the stations; all the information which is forthcoming has now been given.

The general arrangement of this volume and the preparation of the data which it contains have been the work, at different times, of Mr. Hennessey, M.A., F.R.S., Major Herschel, R.E., F.R.S., and Mr. Cole, M.A. Major Herschel moreover supervised the Simultaneous Reduction of the North-East Quadrilateral of which these Series form a portion, while the Introductions to them were written by Mr. C. Wood, Surveyor 2nd Grade. Great pains have been taken to secure the utmost accuracy in preparing the data and passing them through the press.

CALCUTTA,
February, 1883.

J. T. WALKER, LIEUT.-GENERAL, R.E.,
Surveyor General, and Superintendent of the
Great Trigonometrical Survey of India.

AMUA MERIDIONAL SERIES.

AMUA MERIDIONAL SERIES—(LONG. 80° 32′).

INTRODUCTION.

The Amua Series is the third in order, reckoning from west to east, of the meridional chains of triangles included in the North-East Quadrilateral. It follows, as closely as the nature of the country traversed would admit of, the meridian of 80½° East Longitude. It was begun contemporaneously with the series immediately to the westward—the Rangír—and was executed throughout its length as a single chain of triangles. It emanates in the Native State of Nagode and the modern district of Jubbulpore, at the side Amua–Lakanpura of the Calcutta Longitudinal Series; and for the first 1½ degrees of its length, it is carried across the hills which, generally speaking, may be said to form the outliers of the Great Vindhya Range—the southern watershed of the Gangetic plain. In this section, the Series traverses the Native States of Panna and Chhatarpur at the south-east extremity of Bundelkhand, the states reckoned under the political control of the Baghelkhand Agency, and the British district of Banda; and the triangulation fixes the important towns of Maihar and Panna, the capitals of the Native States respectively so named. It then descends into the valley of the Jumna; and, passing through the Fatehpur and Cawnpore districts in the Doáb, strikes the right bank of the Ganges in parallel 26½° N. lat.: in this section, it fixes the position of the towns of Banda and Cawnpore. The Series, after crossing the Ganges, is carried through the north-western portion of Oudh, traversing the modern districts of Unao, Lucknow, Hardoi, Sitapur and Kheri, and is now held to terminate at the side Kokra–Dahlelnagar (XXIII–XXV) of the North-East Longitudinal Series; but it also furnished the two triangles north of this side which have been incorporated in the former series. It was brought to a close in the year 1838-39. Its direct length is 282 miles, covering 4 meridional degrees.

The execution of this Series was entrusted to Lieutenant T. Renny of the Bengal Engineers, who had shortly before been appointed to the Great Trigonometrical Survey, on the recommendation of the Surveyor General, Major Everest, by a General Order in the Military Department dated 23rd July 1832. Lieutenant Waugh, of the Bengal Engineers, was also appointed to the Department about the same time. Both officers were then in Calcutta; they were directed to proceed to Central India to acquire an insight into their new duties by sharing in the operations which were then being carried out on the extensive chain of triangles

known as the Great Arc, under the immediate superintendence of Major Everest. But as in marching from Calcutta to Central India they would have to pass through a region of which it has been said that as little was then known "as of the heart of Africa", Major Everest instructed them to carry a route-survey through this region and draw up a report of it for submission to the Government. Extracts of his instructions—which are interesting for the evidence they furnish of the urgent demand then existing for every sort of information obtainable for immediate geographical requirements—will be found at pages IV—K and V—K of the Introduction to the Rangír Meridional Series.

Season 1833-34.

PERSONNEL.

Lieut. T. Renny, Bengal Engineers, 2nd Assistant.
Mr. R. C. Tulloh, 3rd Class Sub-Assistant.
„ C. Lane, 3rd „ „

With two European Assistants; a native establishment consisting of a nucleus of 24 flagmen, 23 carriers for the large theodolite, 1 native doctor, and 2 harkáras (letter carriers), also 1 havildár, 1 náib, and 12 barkandázes for the protection of the instruments and Government property, and about 130 others for general employment; also with 50 head of baggage cattle, and an elephant for the office tent,—Lieutenant Renny started from Agra on the 30th November 1833. He was furnished with an 18-inch theodolite* (No. 1) by Troughton and Simms for the principal observations, and such other instruments as were needed for the preliminary operations. The party marched to its ground *viá* Gwalior, Datia, Jhánsi and Saugor in company with the party which was proceeding under Lieutenant Waugh to the Rangír Series. The co-operation of the Governor General's Agent in Bundelkhand as well as of the Political Agent for Baghelkhand having been secured, an escort of a duffadár's party of horse and a náik's party of foot was obtained at Saugor. The party reached its first station, Amua (XVII, of the Calcutta Longitudinal Series), on the 13th January 1834.

There Lieutenant Renny commenced operations by taking a series of circumpolar star observations for azimuth; his assistants were detached to select forward stations, and while he remained at Amua, he took observations to such hills in the distance as appeared to be suitable for eventual adoption as principal stations. The selection of stations in the direction of the meridian of Amua proved however to be a very difficult matter, because of an elevated table land in front, which was covered with low forest and jungle and could only be crossed by having towers of considerable height built at the stations of the triangulation and clearing the rays between them, as in the plains. After carefully reconnoitering the ground, Lieutenant Renny decided on giving the Series a bend to the east, avoiding the table land and entering a tract of country which presented fewer difficulties, and had the further advantage of enabling him to place his stations "in a cultivated tract rather than on jungly flats." Sending Mr. Tulloh to the Kaimúr range—where he fixed the station of Patra (II),—and Mr. Lane to the hill of Dharkána (IV), he himself returned to Lakanpura (XIX, of the Calcutta Longitudinal Series) and on 20th February began and completed the measurement of the angle between Amua and Maihar (I). Lieutenant Renny next explored the country to the north-east, and proceeded *viá* Dharkána (IV) to the Vindhyáchal range, selecting Sárang (VI) and Dágri (V) stations near the northern confines of Baghelkhand and bringing the Series

* For the history and description of this instrument, see page 65 of Appendix No. 2 to Vol. II. of the *Account of the Operations of the Great Trigonometrical Survey of India.*

back to its own meridian. Mr. Tulloh having succeeded in selecting a station in the plains, proceeded to select the stations of Kartár (VII), Marpha (VIII), and Sihonda (IX) which are situated in the Banda district. Lieutenant Renny now considered that his presence was no longer needed on the approximate series, and accordingly returned to resume the final observations, selecting *en route* the station of Potenda (III). He began observations on the 19th March at Maihar (I); and proceeding thence in order to Amua, Lakanpura, Patra (II), Potenda (III), Dharkána (IV), Sárang (VI), Dágri (V), Marpha (VIII), Kartár (VII), Sihonda (IX), and Pavia (X), he was able by 23rd June to complete the first ten triangles of the Series, thereby spanning a *meridional* distance of 100 miles and reaching the extremity of the hill tract through which the Series passes.

Lieutenant Renny had hoped to have a large amount of secondary triangulation executed in connection with the principal operations by one of his assistants. The country passed through possesses many places of considerable interest, prominent among which are the celebrated forts of Ajaigarh and Kalinjar which date back for their origin to the Chandel rule nearly 1000 years ago, and the fancied impregnability of whose walls induced their defenders to defy to some purpose even the British arms in the early portion of the present century; Nagode or Unchehra, a rája of which subsequently proved his loyalty by spontaneous support in the critical times of the Indian Mutiny; Panna, a place of considerable beauty and wealth; Maihar, Kothi and Soháwal, all the capitals of the Native States or *jagírs* named after them; and Chitarkot, a notable place of pilgrimage and boasting a sanctity the date of whose origin is lost in the mythical ages of Hindu legendary lore. But in these years the supply of instruments was very inadequate for the requirements of the Survey Department. Lieutenant Renny applied more than once to the Mathematical Instrument Office in Calcutta for a small theodolite for the execution of the proposed secondary triangulation, but on each occasion his application could not be complied with; and late in the season, when the 7-inch theodolite which was employed in the preliminary site selection became available for the secondary triangulation, the hot winds were setting in and the atmospheric conditions were such as to make observing impossible, otherwise than to luminous signals, which were only sufficiently numerous to be employed in the principal triangulation. Thus the secondary determinations, this season, were almost wholly restricted to such as could be made from the principal stations.

Towards the end of the season the approximate series passed out of the hill tracts into the plains. The cutting of lines to clear the rays between the stations became necessary. This at first aroused much opposition on the part of the villagers, and retarded the progress of the operations until such time as the District Officers were able to interfere. Further inconvenience was caused by the people of the country in digging up and carrying away the mark-stones, about which they appear to have entertained superstitious misgivings.

Lieutenant Renny continued his operations into the middle of June, when sickness broke out among the natives in his camp from constant exposure to the vicissitudes of the climate, the rainy season having now commenced. Earnestly commending his last four stations to the care of the Collector of Banda, he turned his steps towards the recess quarters at Cawnpore, which he reached on the 1st of July.

Season 1834-35.

PERSONNEL.

Lieut. T. Renny, Bengal Engineers, 1st Assistant.
Mr. R. C. Tulloh, 3rd Class Sub-Assistant.
„ C. Lane, 3rd „ „

During the recess of 1834, Lieutenant Renny received full instructions from the Surveyor General regarding a new system of selecting stations in the plains by, what was called, ray-tracing, which was to be adopted for laying out the triangulation in advance, and which consisted in running a traverse with a small theodolite and perambulator in the required direction, and as nearly as possible in a straight line, as described at page 41 of Vol. II. The operations of the ensuing field season were solely directed to the selection of stations, and no principal triangulation was attempted, as Lieutenant Renny's services were required elsewhere for the greater portion of the field season, in assisting at the measurement of the Dehra Dún Base-Line. Leaving in the Ordnance depôt at Cawnpore his large theodolite and such of his equipment as was required for the principal observations, Lieutenant Renny took the field with his party on the 13th of October. Happily he had at last succeeded in obtaining a second small theodolite, now indispensably necessary for the ray-tracing and other preliminary operations. After fairly starting the work of the field season, he proceeded by dâk to Dehra Dún, where he remained until the end of April, when the measurement of the base-line was completed; he then marched down country to rejoin his party, which he reached early in June, and found still at work on the Gangetic plains between Cawnpore and Lucknow.

The operations had unfortunately been greatly retarded for want of sufficient authority from the Government to support the surveyors in the necessary operations of cutting down all trees and removing all obstacles on the lines between the principal stations. Hitherto the District Officers had generally been ready to aid the surveyors by giving the requisite instructions to the local native officials to co-operate to such extent as might be necessary, and more particularly to assist the surveyors in ascertaining the owners of the removed trees and other obstacles and in estimating the proper amount of compensation to be paid them. But the Collector of Cawnpore, considering that the aid required of him far exceeded his powers to grant, referred the matter to the Commissioner of the Division, by whom it was forwarded for orders to the Secretary to Government in the Judicial Department. The reply was such as to paralyze, for a time, all vigorous prosecution of survey work. The Vice President in Council ruled that "The Officers in charge of the Trigonometrical Survey are not authorized "to remove trees or other property without the sanction of the owners previously obtained, "and it will rest with those officers to offer such remuneration as will induce the owners to "comply with their wishes." Now in order that the principal triangulation might be advanced at a fairly rapid rate, it was necessary to lay out and complete at least ten new triangles in the course of each field season; the sides of the triangles being of an average length of 14 miles, the clearing of at least twenty perfectly straight 14-mile lines was essentially necessary, and it was generally desirable that this work should be completed during the first half of the field season, so as to allow of the final observations being taken during the remainder of the season. To have raised the tower stations sufficiently high to overlook all intermediate obstacles would—as previous experience had shown—have much retarded, and increased the cost of the operations. Thus line clearing was absolutely necessary; but obviously a number of perfectly straight lines—of an aggregate length of, say, 280 miles—could not be

cleared without cutting down a considerable number of trees, more or less valuable; and if this might not be done without obtaining the sanction of the owners in every instance, the operations would be liable to be so enormously retarded, that they would have to be abandoned. The Surveyor General pointed out these facts to the Government, and prayed for the immediate issue of such orders as would effectually remove the evil. It was then ruled that "the "*Tehsíldár* or *Peshkár* or other native officials of the district, should invariably accompany "the surveyors, on the grounds that their presence will no doubt, from their superior knowledge "of the inhabitants and of the value of the property, greatly facilitate and expedite agreements "for permission to remove such trees as may interrupt the operations of the survey." This arrangement had the desired effect, by investing the operations of the surveyors with sufficient authority to silence all further opposition.

By the operations of the present season, the Series stood practically laid out to a little beyond the parallel of 27° in N. lat., having been carried through that portion of Oudh which lies south of the river Gumti. Some delay had occurred in obtaining the requisite authority to carry the operations into the Oudh territory; but the most serious obstacle to progress was the action of the Collector of Cawnpore as already described; thus the out-turn of work was less than Lieutenant Renny had expected his two assistants to accomplish in his absence. Stations were selected over a direct meridional distance of 120 miles, involving the execution of over 250 miles of ray-tracing by the route-survey method.

Season 1835-36.

PERSONNEL.

Lieut. T. Renny, Bengal Engineers, 1st Assistant.
Mr. C. Lane, 2nd Class Sub-Assistant.

Before the recess of 1835, Mr. Tulloh resigned his appointment in the Survey Department. No other assistant was available to take his place until towards the close of the following field season. Lieutenant Renny took the field earlier than usual in order to make up as well as he could both for the backwardness in the state of the ray-clearing and for the diminished strength of his party. He took care also to pave the way for an uninterrupted prosecution of the work in prospect by sending copies of the recent orders of Government, on the subject of cutting trees, to the several Civil officials. His progress was accordingly uninterrupted; but the want of a second assistant was much felt, now that all opposition was at an end and the operations could be carried on with vigour. Lieutenant Renny brought several old mud forts into use, by repairing and raising their bastions so as to convert them into principal stations, in doing which he was always careful to fix the lower centre mark in a solid portion of the original structure. Further, as regards the question of the advantages of lofty and expensive towers without line cutting, relatively to low and cheap towers with line cutting—which was still a moot point—Lieutenant Renny found that he could construct towers of earthwork and sundried bricks set in mud, 25 feet high, 16 feet square above and proportionately larger below, with mark-stones at intervals from the basement to the upper surface, at a cost not exceeding Rs. 3 for each foot of height, that is to say for less than Rs. 100 for the highest tower that it was found necessary to erect*. The average cost of clearing the lines between the stations was also found not to exceed Rs. 100, including the

* For details regarding the construction of these towers, see note on page 13 of Part I of Volume VII.

payment of compensation to the owners of the trees felled on the lines*. Thus the cost of each new tower station and of clearing the two rays leading to it did not exceed Rs. 300; whereas a tower sufficiently high to overlook all obstacles on the lines must have been built of the best masonry, and would probably have cost not less than Rs. 2,000; and the time occupied in its construction would have much exceeded what was required for building the simpler structures designed by Lieutenant Renny, and for clearing the rays between them.

Lieutenant Renny cleared the rays up to the side Barauli–Nimkár (XXV–XXVI), and then proceeded with the selection of the stations remaining to complete the Series up to the northern confines of the Oudh territory. And as permission to enter Nepal was withheld by the Government of India, of whom it had been solicited, the selection of stations was brought to a close at the side Rámuápur–Rámnagar (XXII–XXIV) of the North-East Longitudinal Series. During the latter end of April, the party was strengthened by the arrival of Mr. C. Murphy, 2nd Class Sub-Assistant, transferred from the operations on the northern section of the Great Arc, too late however to be of much help during the present field season. Writing from Cawnpore on 3rd June, Lieutenant Renny reported that he had continued clearing the rays between the stations, as long as the atmosphere was sufficiently clear to enable him to see the blue-lights which were burnt at the forward stations, to indicate their position; these blue-lights, when burnt on lofty poles, were usually visible over all intermediate trees and obstacles at the back stations, more particularly if observed at midnight, when very considerable refraction is generally prevalent; their employment thus frequently enabled the required direction of a ray to be exactly determined, without any other procedure; but as this method of operation was not always to be relied on, and depended for its success very much on the condition of the atmosphere, it was eventually superseded by ray-trace triangulations—described at page 42 of Volume II—which, though sometimes more laborious, were always feasible and certain in their results. Lieutenant Renny's subsequent operations, after finding further ray-clearing impossible, are quoted as follows from his report to the Surveyor General. "I conducted a route-survey for the selection of points for prin-"cipal stations up to the Nepal Hills. At this period, being the middle of last month, fever "and other complaints prevalent in the Tarái broke out in my camp, and before I had "returned to Sitapur both my Sub-Assistants were dangerously ill, and a great portion of my "establishment laid up. As the dimness of the atmosphere at this season would have pre-"vented me doing any more work until the commencement of the rains, and to detain my "establishment in camp would only have been exposing them to relapses, I proceeded here "as soon as my party was sufficiently convalescent to travel, and am happy in being able to "state that my Sub-Assistants are now out of danger, and the Native establishment daily "acquiring strength."

The operations of the season enabled Lieutenant Renny to construct two general maps of the country in which the operations had been carried on, compiled from information acquired in the course of the route-survey ray-traces between the principal stations.

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* The compensation paid for trees felled on sixteen rays in the Oudh territory was under Rs. 70 per ray on the average: the amount of this award was fixed by an official of His Highness the King of Oudh who had been specially deputed to accompany the party.

Season 1836-37.

PERSONNEL.

Lieut. T. Renny, Bengal Engineers, 1st Assistant.
Mr. C. Murphy, 2nd Class Sub-Assistant.
„ C. Lane, „ „

The party resumed field operations on the 1st October, Lieutenant Renny commencing operations by taking observations at the station of Jájmau (XVIII) which was only 4 miles distant from his recess quarters at Cawnpore, to the three stations, XVI, XVII and XIX, at which towers had already been built. He proceeded thence to Máwa (XVI), where he found it necessary to give an addition of 6 feet to the height of the tower; observing there both by day and night*, he was able by the 17th of the month to complete all the observations, horizontal as well as vertical. The next points visited were the hill stations of Sihonda and Pavia (IX and X) which form the side of continuation of the triangulation completed in the first field season; the single angle remaining to be observed at Sihonda (IX) was completed; at Pavia (X) the angle between Sihonda (IX) and Paprendi (XI) was partially observed, the remaining angle being wholly unobserved because the signal at the tower station at Músapur (XII) was invisible. The observation of the principal angles was then discontinued, as the sides of the triangles were of so great a length for operations in the plains that it appears to have been considered hopeless to attempt to measure them until the season of clear atmosphere which occurs during and shortly after the monsoons.

Having deposited in store at Cawnpore his large theodolite and such other portions of the materiel as he would not need, Lieutenant Renny devoted the remainder of the season to clearing rays, building new towers and raising the old ones wherever necessary. About 270 miles of rays were cleared, carrying this portion of the work up to the extreme northern limit of the Series; the heights of the towers at XXI, XXIV and XXV were increased 15 feet, 30 feet towers were erected at stations XXVI, XXVIII and XXIX, and one of 28—subsequently increased to 35—feet at XXVII.

Season 1837-38.

PERSONNEL.

Lieut. T. Renny, Bengal Engineers, 1st Assistant.
Mr. C. Murphy, 1st Class Sub-Assistant.
„ C. Lane, 1st „ „

The services of Lieutenant Renny were lost to the party until the 1st of March 1838, being required at the measurement of the Sironj Base-Line. Mr. Murphy accordingly took charge at the commencement of the field season, under the general direction of Lieutenant Renny, and proceeded on the 5th October towards Pavia (X) distant about 70 miles from Cawnpore where the recess quarters were established. On his march thither, he ascertained that the mark at Jahánabad station (XV), on the roof of a paka building, had been removed, and that the owners of the building would not allow it to be replaced. This difficulty was however got over with the assistance of the Magistrate of Fatehpur without retarding the progress of the work. Mr. Murphy arrived at Pavia (X) on the 14th October; and by the 20th he was able to complete all observations of horizontal angles which he believed to be necessary; the vertical angles were not observed as the signals were only visible during the night when refracted very considerably and very irregularly, so that the observations would be worthless unless reciprocated by others taken at the same time at the station under observation. The horizontal angles at Paprendi (XI) were then undertaken and completed; afterwards those at Kánákhera

* The night signals used were either vase-lights or blue-lights, the latter having superseded the former, to be in turn superseded a few years afterwards by powerful lamps with parabolic reflectors.

(XIII) which were all but completed. Mr. Murphy next proceeded to Músapur (XII), where he completed all the horizontal angles in three days, and measured reciprocal verticals with Mr. Lane at Pavia(x), who employed a 7-inch theodolite; these simultaneous verticals were observed on the 4th November to blue-lights, burnt an hour after sunset. Mr. Murphy reached Jáfrabad (XIV) on the 7th November, and by the 11th the three horizontal angles as well as simultaneous verticals on the ray to Músapur (XII) (observed to heliotropes *an hour before sunset*) were measured. The station of Jahánabad (XV) was reached on the 17th: by the 20th the horizontal angles were all disposed of; here simultaneous verticals were observed to lamps on the ray to Jáfrabad (XIV), but though the observations extended over an interval of nearly $2\frac{1}{2}$ hours beginning at an hour after sunset, the results of the means of the measures differed so considerably *inter se* that they were rejected and reserved for future re-measurement. Mr. Murphy remained at Jahánabad while Mr. Lane was marching to Dewarsán (XVII) for simultaneous verticals; they were taken on the 24th at the time of minimum refraction. Mr. Lane proceeded the same day to Jájmau (XVIII), while Mr. Murphy advanced to Dewarsán (XVII), and succeeded on that and the following night in completing the two horizontal angles at this station as well as in taking simultaneous verticals on the ray to Jájmau (XVIII) with Mr. Lane. On the completion of the observations at Dewarsán (XVII) Mr. Murphy fell ill, and had to proceed to Cawnpore for three weeks, at the end of which he returned to find that the favorable season for observing had ended. Crossing the Ganges into Oudh he resumed work on the 21st December at the station of Rau (XX), where he also took observations for fixing Christ's Church Cawnpore, which was then being built. He waited there five days without being able to obtain complete measures of even a single horizontal angle, though he succeeded in taking simultaneous verticals with Mr. Lane on the ray to Jájmau (XVIII). He then recrossed the river and proceeded to Namána (XIX) on the right flank of the Series. The winter rains had now set in, and the conditions of the atmosphere became so unfavorable that though he remained at that station from the 4th to the 28th of January, and worked whenever possible both by day and night, he could only obtain complete observations of two of the three horizontal angles; such few measures as were taken of the third angle were rejected and reobserved later on in the season. Pushing on to Jhalotar (XXI) the horizontal angles occupied him from the 3rd to the 14th of February; and thence returning to Rau (XX)—the observations at which had been left unfinished nearly two months before—he finished the work there by the 19th of February. He then proceeded to Etora (XXIII) where the horizontal observations occupied him from the 24th February to the 3rd March; after this he went to Bakseria (XXII) where by the 8th of the month he had completed the three horizontal angles as well as simultaneous verticals with Mr. Lane on the ray to Rau (XX). At this time Lieutenant Renny returned from the Sironj Base-Line and resumed the direct charge of the operations, examining the work performed by Mr. Murphy, affording him incidental aid in the measurement of the angles at Bakseria (XXII), and accompanying him to his next station Asu (XXIV); there the three horizontal angles as well as the simultaneous verticals on the ray to Bakseria (XXII) were measured between the 10th and 14th of March.

An examination of Mr. Murphy's work brought to light the circumstance that certain of his angles were deficient in respect to the number of zeros on which the measurements

had been taken. Lieutenant Renny reported that otherwise his arrangements for conducting the details of the work both expeditiously and economically appeared to have been very good. That no loss of time might be incurred in returning to observe such zeros of his angles as were deficient, Mr. Murphy volunteered to undertake the work during the ensuing rains, at a season of the year not usually devoted to field operations. Mr. Lane's share of the work was also favorably commented on by Lieutenant Renny.

On leaving Asu (xxiv), the party proceeded successively to Barauli (xxv) and Fatehnagar (xxvii), and by the end of March the three horizontal angles at each of these stations were disposed of.

Lieutenant Renny had meanwhile been apprized by the Surveyor General that his services would shortly be needed in carrying on the triangulation of the Great Arc to the south of Sironj; he was directed to proceed to Head Quarters as soon as his presence could be dispensed with on the Amua Series. He was anxious before leaving the party to establish some sort of check on the work that had been already executed; and for this purpose he determined to measure an azimuth of verification at the station of Nimkár (xxvi). He arrived there on the 2nd of April; and by the 16th of the month he completed the azimuthal observations and the measurement of two of the three horizontal angles at that station. The reduction of the azimuthal observations, and various necessary arrangements for the future conduct of the work, occupied Lieutenant Renny till the 1st of May, when he proceeded to Dehra Dún, marching *viâ* Bareilly and Hardwár.

Mr. Murphy, now again left to his own resources, resolved to finish at once the insufficiently measured angles to the south in preference to continuing his progress northwards; for he considered that a severe rainy season might possibly set in, and, by forcing him into recess quarters, prevent him from bridging over the gap that then existed in the work. He accordingly retraced his steps to Namána (xix), where a few months previously he had spent several weeks without the weather admitting of his completing the measures of more than two of the three angles; the third angle was now measured in the course of two days. The party then moved southwards to Pavia (x), where all that remained to be done was the completion of a single angle—between ix and xi—by measures on two zeros: this was effected on the 14th June; and by the 23rd of the same month, the deficiencies in the angles at xi and xiii were also made good. Thus, the Series stood complete up to the side (xxvi)-(xxvii), with the exception of the angle at xxvi (Nimkár) between xxiv and xxv. In addition to the tower-building already indicated, seven new tower stations, each 24 feet high, had been constructed at the northern end of the Series, thereby completing this troublesome portion of the operations.

Season 1838-39.

PERSONNEL.

Lieut. T. Renny, Bengal Engineers, 1st Assistant.
Mr. C. Murphy, 1st Class Sub-Assistant.
„ C. Lane, 1st „ „

During the field season of 1838-39 Lieutenant Renny merely exercised a general supervision over the operations without taking any personal share in them, as he was engaged on the measurement of the principal angles of the section of the Great Arc, to the south of Sironj, between the parallels of 18° and 24°.

The programme for this season's operations was as follows:—to measure the horizontal angles at nine principal stations to complete the Series; to observe an azimuth at Rámuápur,

the most northerly station on the Amua meridian, which was subsequently allotted to the North-East Longitudinal Series; and lastly, to take simultaneous vertical angles over a distance of nearly 200 miles in the length of the Series, so as to form a continuous chain of relative heights of which only seven links stood supplied by the observations of the previous season. With favorable weather all this might be completed in one field season.

Mr. Murphy moved into camp on the 15th October; and, having crossed the Ganges into Oudh, he proceeded to his first station, Nimkár (XXVI), where the angle between XXIV and XXV was duly observed on the 21st idem. The party proceeded thence in succession to the several northern stations, the horizontal angles at which were all disposed of by the 9th of December. The prescribed azimuth was then undertaken by observations to δ Ursæ Minoris at both elongations. By the end of the month the whole of the programme of work was completed, with the exception of the vertical observations. Mr. Lane had fallen ill at the commencement of the field season, and been unable to render any assistance, in consequence of which Mr. Murphy had engaged the temporary services of Mr. C. D. Campbell, a young candidate for employment in the Survey Department. A collision occurred between the men of the native establishment and a large body of armed men in Oudh—who were said to be desperate freebooters, and inhabited a small fort of their own in a jungle on the banks of the Gumti in the vicinity of the survey operations—which might have been attended with much loss of life had not Mr. Murphy been at hand to interpose and protect his people. But otherwise the operations in Oudh seem to have met with no opposition.

The vertical angles, whose measurement was the one thing remaining to complete the Series, were observed simultaneously at the opposite extremities of the rays, by Mr. Murphy at one end with Troughton and Simms' 18-inch theodolite No. 1—with which the whole of the horizontal angles of this Series were measured—and at the other end by either Mr. Lane or Mr. Campbell with a 7-inch theodolite. These operations were carried, under instruction, over the diagonal sides only of the Series, zigzagging from flank to flank, so as to fix every station in turn, but without giving check determinations on the flank sides as well, as that would have doubled the amount of work to be performed. The field operations were concluded on the 2nd of April. The party then proceeded *viâ* Cawnpore to the Surveyor General's Head Quarters at Dehra Dún.

On the completion of the Simultaneous Reduction of the North-East Quadrilateral, it was found that the errors which had actually been dispersed over the Amua Series, between its origin Amua-Lakanpura and terminus Dahlelnagar-Kokra, were as follows:—

In Logarithm of	the latter side	+ 0·000,0043,8 = 0·6	inches per mile nearly.
„ Azimuth	„	− 1″·286	
„ Latitude	of Dahlelnagar	+ 0·077	
„ Longitude	„	− 0·173	

The trigonometrical heights were checked at several points in subsequent years by connection with the Spirit Leveling Operations in the Trigonometrical and Revenue branches

of the Survey, see page 38 [of Vol. VII]. The sections into which the Series has thus been divided exhibit the following errors:—in the southern section ending at xviii, the maximum discordance was found to be + 7 feet; in the next, ending at the side xxviii–xxix, it was — 14 feet; and in the last section, it was + 4 feet. The errors were dispersed in the manner indicated at pages 38 and 39 of Part I of Volume VII.

Secondary Triangulation.

It will be seen on reference to the chart of this Series that little secondary triangulation was done in connection with the principal operations, excepting what was accomplished from the hill stations at the southern end of the Series. More could not have been done in the plains excepting by carrying chains of minor triangles for which neither the requisite agency nor instrumental equipment were at the time forthcoming. The positions of Sháhjahánpur and other secondary points, near the northern end of the Series, were fixed in the year 1849-50 by Mr. J. O. N. James, in connection with the operations of the North-East Longitudinal Series; it has been found convenient to exhibit the results with those of this Series; they will therefore be found in the Synoptical Volume for this Series.

Compiled, with Addenda by the Surveyor General, by

C. WOOD.

Surveyor 2nd Grade.

DEHRA DÚN: *November* 1881.

AMUA MERIDIONAL SERIES.

ALPHABETICAL LIST OF STATIONS.

AMUA MERIDIONAL SERIES.

NUMERICAL LIST OF STATIONS.

XVII	Amúa. (of Calcutta Longitudinal Series).
XIX	Lakanpúra. (of Calcutta Longitudinal Series).
I	Maihar.
II	Patra.
III	Potenda.
IV	Dharkána.
V	Dágri.
VI	Sárang.
VII	Kartár.
VIII	Marfa.
IX	Seonda.
X	Pavia.
XI	Paprendi.
XII	Músápúr.
XIII	Kánákhera.
XIV	Jafrábád.
XV	Jehánábád.
XVI	Máwa.
XVII	Dewarsán.
XVIII	Jájmáo.
XIX	Namána.
XX	Ráo.
XXI	Jalhotr.
XXII	Bakseria.
XXIII	Etora.
XXIV	Asu.
XXV	Baraoli.
XXVI	Nimkár.
XXVII	Fatenagar.
XXVIII	Daráwal.
XXIX	Sirwaia.
XXX	Parser.
XXXI	Bulandpúr.
XXXII	Jarúra.
XXIII	Kokra. (of North-East Longitudinal Series).
XXV	Dahlelnagar. (of North-East Longitudinal Series).

AMUA MERIDIONAL SERIES.

DESCRIPTION OF STATIONS.

XVII.—*(Of Calcutta Longitudinal Series).* Amúa Hill Station, lat. 24° 0′, long. 80° 32′, is situated in the Maihar district, and stands on the southernmost extremity of the Kaimúr range, immediately to the E. of the village of Amúa. The encamping ground of Siwaganj, on the high road from Mirzapore to Jubbulpore, is distant about 3 miles to the N.

The station is marked by the centre of a circle engraved on a stone which is fixed on the surface of a platform, and placed perpendicularly over a similar stone at the base. The same point was used on the original as well as revised triangulation of the Calcutta Longitudinal Series.

XIX.—*(Of Calcutta Longitudinal Series).* Lakanpúra Hill Station, lat. 24° 3′, long. 80° 50′, is situated in the Maihar district, and stands on a peak of a small range of hills, at a distance of about 1½ miles to the N. of the small village of Lakna or Lakanpúra.

The station is marked by the centre of a circle engraved on a stone which is fixed on the surface of a platform, 2 feet 4½ inches perpendicularly over the mark which was used on the original triangulation of the Calcutta Longitudinal Series. It was found in good preservation when visited in April, 1865, in the course of the revision of the Calcutta Longitudinal Series.

I. Maihar Hill Station, lat. 24° 17′, long. 80° 46′, is situated in the Maihar district, and stands on the eastern extremity of the Bírapáhár, at a distance of about 1½ miles to the N.W. of the town of Maihar.

The station is marked by the centre of a circle engraved on a stone which is fixed in the middle of a platform about 2 feet high.

II. Patra Hill Station, lat. 24° 17′, long. 81° 11′, is situated in the Rewah district, and stands on the Kaimúr range, about 2 miles E. of the small village of Patra, and 10 miles S.E. of Amarpatan.

The station is marked by the centre of a circle engraved on a stone which is fixed in the middle of a platform, 2 feet perpendicularly above a similar mark engraved on the rock *in situ*.

III. Potenda Platform Station, lat. 24° 37′, long. 81° 0′, is situated in the Rewah district, and stands on an open plain, about ¼ of a mile from the village of Potenda, and 6 miles E. of Mádhogarh.

The station is marked by the centre of a circle engraved on a stone which is fixed in the middle of a platform, 2 feet perpendicularly above a similar mark engraved on the rock *in situ*.

IV. Dharkána Hill Station, lat. 24° 28′, long. 80° 36′, is situated in the Nagode district, and stands on a detached hill of that name, about 3 miles S. of the small village of Chúnba, and 8 miles from the station of Nagode.

The station is marked by the centre of a circle engraved on a stone which is fixed in the middle of a platform, 1½ feet perpendicularly above a similar mark engraved on the rock *in situ*.

V. Dágri Hill Station, lat. 24° 51′, long. 80° 44′, is situated in the Nagode district, and stands on the south face of the Bindráchal range, distant about 8 miles to the N. of Koti, and immediately above the small village of Dágri.

The station is marked by the centre of a circle engraved on a stone which is fixed in the middle of a platform, about 6½ feet perpendicularly above a similar stone well imbedded in the ground.

VI. Sárang Hill Station, lat. 24° 46′, long. 80° 24′, is situated in the Panna district, and stands on a peak of that name in the Bindráchal range, distant about 3 miles S.W. of Ethwáñ, and 11 miles E. of Panna.

The station is denoted by the centre of a circle engraved on a stone which is fixed in the middle of a platform, about 3 feet perpendicularly above a similar stone flush with the natural surface of the ground.

VII. Kartár Hill Station, lat. 25° 2′, long. 80° 23′, is situated in the Banda district, and stands on a three-peaked isolated hill, close to the high road from Banda to Ságar.

The station is denoted by a dot engraved in the centre of a hole 1½ inches deep cut in the middle of a large boulder about 9 feet square.

VIII. Marfa Hill Station, lat. 25° 7′, long. 80° 44′, is situated in pargana Badaosa of the Banda district, and stands on an isolated hill of that name, on the north face of the Bindráchal range, at a distance of about 10 miles to the W. of Chitarkoti, a place of Hindoo pilgrimage. The hill was formerly fortified, and pretty considerably inhabited, judging from the several large tanks and ruins of buildings which are to be seen.

The station is on the ruins of an old building, and is denoted by the centre of a circle engraved on a stone which is fixed in the middle of a platform, about 5 feet perpendicularly above a similar mark at the level of the ground.

IX. Seonda Hill Station, lat. 25° 18′, long. 80° 24′, is situated in pargana Seonda of the Banda district, and stands on the eastern extremity of an isolated wedge-shaped hill immediately above the village of that name.

The station is denoted by the centre of a circle engraved on a long stone sunk to within 3 inches of the urface of a slightly elevated platform.

X. Pavia Hill Station, lat. 25° 27′, long. 80° 47′, is situated in pargana Seonda of the

Banda district, and stands on a low hill immediately S. of the village of that name. A platform in front of a small temple was used for the station.

The station is denoted by the centre of a circle engraved on a stone which was fixed in the middle of the platform and about 6½ feet perpendicularly above a similar stone imbedded below. The station subsequently required an additional elevation, and an earthen platform 11 feet in height was erected.

XI. Paprendi Tower Station, lat. 25° 38′, long. 80° 27′, is situated in pargana Pailáni of the Banda district, and stands on the centre tower on the east face of the mud fort of Paprendi.

The tower was first repaired, and heightened about 10 feet. This station is full 50 feet above the level of the surrounding country.

XII. Músápúr Tower Station, lat. 25° 47′, long. 80° 41′, is situated in pargana Gházípúr of the Fatepúr district, and stands on a mound, elevated about 20 feet above the level of the surrounding country, and lying to the south of the small village of Músápúr.

An earthen platform 23 feet high has been constructed at this station.

XIII. Kánákhera Tower Station, lat. 25° 51′, long. 80° 28′, is situated in pargana Pailáni of the Banda district, and stands on a solid building in the S.E. corner of a fort attached to the village of Kánákhera.

The building was repaired, and heightened about 12 feet, giving it an elevation of full 40 feet above the level of the surrounding country.

XIV. Jafrábád Tower Station, lat. 26° 1′, long. 80° 38′, is situated in pargana Bindki and district Fatepúr, and stands on the N.E. tower of the mud fort adjoining the village of Jafrábád.

The tower was repaired, and heightened 17 feet, and the station is full 40 feet above the level of the surrounding country.

XV. Jehánábád Tower Station, lat. 26° 6′, long. 80° 24′, is situated in pargana Kora and district Fatepúr, and stands on the eastern of two small buildings raised about 9 feet above the roof of a house within a garden, at the S.E. extremity of the town of Jehánábád.

The station is full 40 feet above the level of the surrounding country.

XVI. Máwa Tower Station, lat. 26° 16′, long. 80° 34′, is situated in pargana Sarh Salempúr of the Cawnpore district, and stands on a mound, about 20 feet in height, situated to the N. of the village of Máwa.

An earthen platform 24 feet high has been constructed at this station.

XVII. Dewarsán Tower Station, lat. 26° 16′, long. 80° 21′, is situated in pargana Sarh Salempúr of the Cawnpore district, and stands on the N.W. tower of the inner line of the mud fort attached to the village of Dewarsán.

The tower has an elevation of upwards of 25 feet above the surrounding country, and the station is raised an additional 7 feet.

XVIII. Jájmáo Tower Station, lat. 26° 26′, long. 80° 27′, is situated in pargana Jájmáo

of the Cawnpore district, and stands on the eastern extremity of the high ground overlooking the Ganges, where formerly stood the fort attached to the village of Jajmáo.

The station is on an earthen platform raised about 8 feet in height.

XIX. Namána Tower Station, lat. 26° 28′, long. 80° 39′, is situated in the Harha district, and stands on a mound, 25 feet high, distant about ½ of a mile to the S. of the village of Namána.

The station is on a earthen platform 18 feet in height.

XX. Ráo Tower Station, lat. 26° 39′, long. 80° 30′, is situated in the Rasúlábád district, and stands on a mound, 25 feet high, distant ½ of a mile N.W. of the village of Ráo.

The station is on an earthen platform 16½ feet in height.

XXI. Jalhotr Tower Station, lat. 26° 42′, long. 80° 41′, is situated in the Rasúlábád district, and stands on the S.W. tower of the fort attached to the village of Jalhotr.

The tower is about 20 feet high, and an additional elevation of 15 feet was obtained by the erection of an earthen platform.

XXII. Bakseria Tower Station, lat. 26° 51′, long. 80° 32′, is situated in the Lassípúr district, and stands on the ruins of an old fort ½ of a mile S. of the small village of Bakseria.

An earthen platform 15 feet in height has been erected, which gives an elevation of about 40 feet above the surrounding country.

XXIII. Etora Tower Station, lat. 26° 54′, long. 80° 42′, is situated in the Sandaila district, and stands on a mound, about 15 feet in height, distant ½ of a mile W. of the village of Etora.

An earthen platform 18 feet high has been constructed.

XXIV. Asu Tower Station, lat. 27° 5′, long. 80° 31′, is situated in the Sandaila district, and stands on a mound, 25 feet in height, close to the village of Asu, and distant 2 miles N. of the town of Sandaila.

A platform 30 feet high has been constructed.

XXV. Baraoli Tower Station, lat. 27° 8′, long. 80° 43′, is situated in the Sandaila district, and stands on a mound, 20 feet in height, adjoining the village of Baraoli.

A platform of sun-dried bricks and mud cement 30 feet high has been erected.

XXVI. Nimkár Tower Station, lat. 27° 21′, long. 80° 32′, is situated in the Khairábád district, and stands on a mound, 15 feet high, distant ½ of a mile N.W. of the town of Nimkár, and ½ a mile N. of the Gúmti river.

A platform of paka bricks and mud cement 30 feet high has been erected.

XXVII. Fatenagar Tower Station, lat. 27° 24′, long. 80° 43′, is situated in the Khairábád

district, and stands on an open plain 2½ miles S.E. of the large town of Macherhata, and ¼ of a mile S.E. of the village of Bulandpúr.

A platform of sun-dried bricks and mud cement 35 feet high has been erected.

XXVIII. Daráwal Tower Station, lat. 27° 34′, long. 80° 31′, is situated in the Khairábád district, and stands on a mound, about 20 feet high, distant ¼ of a mile N.E. of the village of Daráwal.

A tower of sun-dried bricks and mud cement 30 feet high has been erected.

XXIX. Sirwaia Tower Station, lat. 27° 38′, long. 80° 41′, is situated in the Khairábád district, and stands on the highest point of a mound on which, to the N.E. of the station, extends the village of Sirwaia.

A tower of sun-dried bricks and mud cement 30 feet high has been erected.

XXX. Parser Tower Station, lat. 27° 46′, long. 80° 32′, is situated in the Mahamdi district, and stands on a low mound, close to a large tank, distant about ½ a mile to the S.W. of the village of Parser.

A tower of sun-dried bricks and mud cement 24 feet high has been erected here.

XXXI. Bulandpúr Tower Station, lat. 27° 51′, long. 80° 43′, is situated in the Khairábád district, and stands within a small dilapidated mud fort, lying to the S. of the village of Bulandpúr.

A tower of sun-dried bricks and mud cement 24 feet high has been erected here.

XXXII. Jarúra Tower Station, lat. 28° 0′, long. 80° 31′, is situated in the Mahamdi district, and stands within a small dilapidated mud fort, to the west of, and hard by, the village of Jarúra.

A tower of sun-dried bricks and mud cement 28 feet high has been erected here.

XXIII.—*(Of the North-East Longitudinal Series).* Kokra Tower Station, lat. 28° 12′, long. 80° 31′, is situated in tehsíl Haidarábád of the Mahamdi district, and stands on flat ground on the verge of an extensive jungle. The village of Kokra is distant about 1½ miles to the S.W.

The station was constructed in 1833 for the triangulation of the Amúa Meridional Series, as a tower of sun-dried bricks and mud cement, 25 feet in height, with two mark-stones, one 2 feet below the level of the ground, the other at the surface of the tower. The upper mark was found wanting, and the tower in a dilapidated condition when the station was visited in 1843, in the course of the triangulation of the Pilibhít Terai Series. The old structure was then dismantled to the level of the lower mark, and a new tower 26 feet high constructed, with an isolated central pakka pillar which contained mark-stones at distances of 2, 6, 12, 18, 24, 27, and 28 feet, respectively, above the lowest mark-stone. When the station was subsequently visited in 1850, in the course of the North-East Longitudinal Series, the upper portion of the pillar and tower were found to have been destroyed. The structure was again dismantled to within 10 feet of the surface of the ground, and a mark-stone having been found there, it was used as a centre over which a new pillar, with an earthen tower around it, was constructed to the height of 26 feet above the level of the ground, which carried a mark-stone at its surface placed in the normal of the lower mark.

XXV.—*(Of the North-East Longitudinal Series).* Dahlelnagar Tower Station, lat. 28° 4′, long. 80° 41′, is situated in tehsíl Alíganj of the Mahamdi district, and occupies the highest part of the mound on which the village of Dahlelnagar stands.

A tower of sun-dried bricks and mud cement, 28 feet high, was erected here. It was found in good preservation when the station was visited in 1850, in the course of the triangulation of the North-East Longitudinal Series.

AMUA MERIDIONAL SERIES.

PRINCIPAL TRIANGULATION. ADDENDUM TO DESCRIPTION OF STATIONS.

NOTE.—Consequent on modern alterations of district and other boundaries, the sites occupied by the stations are in some instances now included in civil divisions of territory which differ from the district, pargana, or village, recorded in the preceding descriptions of stations: a complete list of all the stations of the Series including a suitably modified statement of the altered sub-divisions in question is accordingly given in the following table, and is derived chiefly from the annual reports, up to 1881, made by the Civil Officials to whose care the stations have been committed. The statement also gives additional information as to position, construction, and present condition of certain of the stations; where no entry regarding present condition is made against a station it is to be assumed that the station when last reported on by the district Official was in good order.

The spelling of names is in accordance with that given in the lists of more important places published under the orders of Government whenever such names occur in the lists.

No. of Station	Local name	District	Pargana, &c.	Village in which the Station lies	Villages surrounding the Station	Remarks on the Construction and Condition of the Station
XVII	Amua	Baghelkhand Agency	Maihar State	Amua	... ...	... ...
XIX	Lakhanpura	Jubbulpore	Thá. Bijerágho-garh, Tah. Murwára	Lakhanpura	... ...	... ...
I	Maihar	Baghelkhand Agency	Maihar State	Maihar	... ...	... ...
II	Patra	„	Tál. Amarpá-tan, Rewah State	...	... ...	... ...
III	Potenda	„	Tál. Mádhogarh, Rewah State	Potenda	... ...	Reported in 1874. "The stones of this station thrown away. A new platform was made on the same spot."
IV	Dharkána	„	Nagode State	Chunaha	... ...	... ...
V	Dágri	„	Kothi State	Dágri	... ...	... ...
VI	Sárang Pahár	Bundelkhand Political Agency	P. Panna	Ahargawa	... ...	... ...
VII	Khairar	Bánda	P. Bánda	Khairar	Kartal N. N. E. ½ miles Khora E. 5½	... ...
VIII	Marpha	„	P. Badausa	Kúlhúan	... ...	Reported in 1867. "The platform fell down last year."

NOTE.—Stations XVII and XIX appertain to the Calcutta Longitudinal Series. P. stands for pargana, Tah. for tahsíl, Thá. for thána, and Tál. for táluka.

No. of Station	Local name	District	Pargana, &c.	Village in which the Station lies	Villages surrounding the Station	Remarks on the Construction and Condition of the Station
					miles	
IX	Sihonda	Bánda	P. Sihonda Girwan	Sihonda Girwan	Sihonda Girwan S. 1¾ Bahádarpur W. S. W. 3 Gobindpur N. W. 2¾	... ...
X	Pauia	„	P. Augási	Pauia	... ...	... ...
XI	Piprenda	„	P. Pailáni	Piprenda	... ...	Portions of the tower washed down by the rain in 1867, and the upper mark-stone reported as lost in 1870.
XII	Músapur	Fatehpur	Tah. Gházipur, P. Mutaur	Músapur *alias* Deogaon	Mutaur N. by E. 1¼ Simási E. S. E. ¾ Paigambarpur N. W. by N. 2½	The pillar tumbled down during the heavy rains of 1872-73 as reported in 1874.
XIII	Kánákhera	Bánda	Tah. and P. Pailáni	Kánákhera	Narauli N. E. by E. 1½ Rámpur W. by S. 3	Portions of the tower washed down by the rain in 1867, and the upper mark-stone reported as lost in 1870.
XIV	Jáfrabad	Fatehpur	Tah. Kaliánpur, P. Kutia Gunír	Jáfrabad	Bindki N. N. W. 2 Kadjua N. W. by W. 5	A part of the tower fallen down, and no mark-stone found, as reported in 1872.
XV	Jahánabad	„	Tah. and P. Kora	Jahánabad	Kora N. ½ Sháhjahánpur W. N. W. 1 Sakrabad E. by N. 2	... ...
XVI	Mahowa	Cawnpore	P. Salímpur	Mahowa	Sirsol W. 1 Kharauli N. N. E. 1¼ Domanpur E. S. E. 2	Reported in 1872. "The pillar requires to be rebuilt."
XVII	Deor Sandáh	„	Ditto.	Deor Sandáh	Sárh S. E. 3 Simra E. by N. 1¼ Sultánpur N. W. by W. 1	Ditto.
XVIII	Jájmau	„	P. Jájmau	Jájmau	Cawnpore Railway Station W. by N. 4½ Pokarpur W. 1½	... ...
XIX	Newarna	Unao	Tah. Unao, P. Harha, Thá. Achalganj	Newarna	Newarna Rámsahai N. by E. ½ Pareri Kalán E. 3 Korári Kalán W. by N. 4	Reported in 1873. "Only the foundation exists."

NOTE.—P. stands for pargana, Tah. for tahsíl and Thá. for thána.

No. of Station	Local name	District	Pargana, &c.	Village in which the Station lies	Villages surrounding the Station	Remarks on the Construction and Condition of the Station
					miles	
XX	Rau Kirna	Unao	Tah., P. and Thá. Unao	Rau	Makhi N. E. 1½ Thána S. 2¾	Reported in 1873. "Only the foundation exists."
XXI	...	...	...	...	... ...	Reported in 1870. "Demolished with the fort (on which it stood) after the Indian Mutiny, and there is no trace of it."
XXII	Garhi Baksar	Unao	Tah. Mohán, P. Asíwan, Thá. Achalganj, Tál. Tikar	Chak Bíreshar	Haidarabad S. by E. 2½ Ajgain N. E. 3	Reported in 1873. "There is nothing remaining of it except a few marks of its former existence."
XXIII	Etora	Lucknow	Tah., P. and Thá. Malihabad, Tál. Sailamau	Etora	Bakhtiárnagar E. by S. 3½ Mirzaganj E. N. E. 3½ Biárigaon W. S. W. 3¼	Platform washed away by rain as reported in 1875.
XXIV	Asu Sarai	Hardoi	Tah., P. and Thá. Sandíla	Asu Sarai	Sandíla E. by S. 2¼	Reported in 1874 as being 24 feet high.
XXV	Barauli	„	Tah. Sandíla, P. Bálamau, Thá. Kachhona	Barauli	Barwan N. E. 2½ Atrauli N. by W. 2¾	Reported in 1874 as being 22 feet high.
XXVI	...	Sitapur	Tah., P. and Thá. Misrikh, Tál. Aurangabad	Nimkár	Aurangabad E. by S. 4 Beniganj S. W. by S. 4¾	... ...
XXVII	...	„	Tah. Misrikh, P. Machhrehta, Tál. Bariamau, Thá. Sitapur	Bulandapur	Kurauna S. W. by W. 4	... ...
XXVIII	...	„	Tah. Misrikh, Thá. Maholi, Tál. Dundáwal	Dundáwal	Bihat E. by S. 1 Pisáwan W. N. W. 5½	... ...
XXIX	...	„	Tah., P. and Thá. Sitapur, Tál. Halnapur	Sahrohi	Town of Sitapur S. E. by S. 4	... ...
XXX	...	„	Tah. Misrikh, P. and Thá. Maholi, Tál. Baragaon	Parsera	Baragaon S. S. E. 2 Mitauli N. N. W. 3½	... ...
XXXI	Bhulanpur	Kheri	Tah. and Thá. Lakhímpur, P. Basarah, Tál. Raja Oel	...	Basarah N. W. 1½ Oel E. by S. 5	... ...

NOTE.—P. stands for pargana, Tah. for tahsíl, Thá. for thána and Tál. for táluka.

No. of Station	Local name	District	Pargana, &c.	Village in which the Station lies	Villages surrounding the Station	Remarks on the Construction and Condition of the Station
XXXII	Jaraura	Kheri	Tah. Muhamdi, P. Haidarabad, Tál. Iláhibaksh Khán, Thá. Gola	...	miles Alipur S. by W. 2½ Haidarabad N. W. 4½	The station fallen down as reported in 1877.
XXIII	Kokra	„	Tah. Muhamdi, P. Haidarabad	...	Gauri E. by S. 2½ Hardua W. 2 Khamaria S. 1½	The station was constructed in 1833 for the Amua Meridional Series as a tower of sun-dried bricks and mud cement, 25 feet in height, with two mark-stones, one 2 feet below the level of the ground, the other at the surface of the tower. The upper mark-stone was found wanting, and the tower in a dilapidated condition when visited in 1843, in the course of the operations of the Pilibhít Tarái Series. The old structure was then dismantled to the level of the lower mark, and a new tower 26 feet high constructed, with an isolated central paka pillar which contained mark-stones at distances of 2, 6, 12, 18, 24, 27, and 28 feet, respectively, above the lowest mark-stone. When the station was subsequently visited in 1850, in the course of the North-East Longitudinal Series, the upper portion of the pillar and tower were found to have been destroyed. The structure was again dismantled to within 10 feet of the surface of the ground, and a mark-stone having been found there, it was used as a centre over which a new pillar, with an earthen tower around it, was constructed to the height of 26 feet above the level of the ground, which carried a mark-stone at its surface placed in the normal of the lower mark. Pillar partly fallen down as reported in 1871.
XXV	...	Kheri	Tah. Lakhímpur, P. Aliganj	...	Bhúrpur S. W. 1½ Aliganj N. W. 4 Khánpur E. N. E. 1	The central pillar as constructed about the year 1838, was enclosed in a tower of sun-dried bricks and mud cement. It was found in good preservation when visited in 1850 in the course of the operations of the North-East Longitudinal Series. Pillar partly fallen down as reported in 1871.

NOTE.—Stations XXIII and XXV appertain to the North-East Longitudinal Series. P. stands for pargana, Tah. for tahsíl, Thá. for thána, and Tál. for táluka.

August, 1882.

J. B. N. HENNESSEY,
In charge of Computing Office.

AMUA MERIDIONAL SERIES.

PRINCIPAL TRIANGULATION. TRIANGLES.

NOTE.—The preceding pages, 1—L. to 8—L., having been printed in 1869, the spelling of Indian proper names occurring in them is in accordance with the Departmental or old rules; these prevailed until 1874, when the Government or new rules for spelling were published. The transition now (1878) necessary from the old to the new rules is effected hereafter as follows. Names not already printed are rendered by only one method of spelling, *i.e.*, the new. Any name that has appeared in the preceding pages is given by both methods, *viz.*, in Roman type by the new rules and in Italics by the old; to avoid needless repetitions, this is done *only* in the *first* instance that a name of the kind occurs. It will be seen that the two methods of spelling differ but slightly.

No. of Triangle	Station	Spherical Excess	Corrected Plane Angle	Distance		
				Log. feet	Feet	Miles
		"	° ′ ″			
	Amua (*Amúa*), XVII	·71	42 12 34·93	4·9453592	88177·8	16·700
1	Lakanpura (*Lakanpúra*), XIX	·71	86 34 48·11	5·1173154	131013·3	24·813
	Maihar, I	·71	51 12 36·96	5·0098779	102300·6	19·375
	Lakanpura, XIX	·94	67 44 53·04	5·1427169	138904·7	26·308
2	Maihar, I	·94	76 16 11·47	5·1637365	145793·0	27·612
	Patra, II	·93	35 58 55·49	4·9453592	88177·8	16·700
	Maihar, I	1·36	59 35 8·07	5·1479144	140577·1	26·624
3	Patra, II	1·36	61 58 14·39	5·1580293	143889·6	27·252
	Potenda, III	1·36	58 26 37·54	5·1427169	138904·7	26·308
	Maihar, I	·96	72 14 24·75	5·1590216	144218·7	27·314
4	Potenda, III	·96	35 55 24·25	4·9486463	88847·7	16·827
	Dharkána, IV	·96	71 50 11·00	5·1580293	143889·6	27·252
	Potenda, III	1·25	67 18 35·20	5·1685977	147434·0	27·923
5	Dharkána, IV	1·25	48 12 13·58	5·0760416	119135·6	22·564
	Dágri, V	1·25	64 29 11·22	5·1590216	144218·7	27·314

NOTES.—1. The values of the side are given in the same line with the opposite angle.
2. Stations Amua, XVII, and Lakanpura, XIX, appertain to the Calcutta Longitudinal Series of the South-East Quadrilateral.

No. of Triangle	Station	Spherical Excess	Corrected Plane Angle	Distance		
				Log. feet	Feet	Miles
		"	° ′ ″			
	Dharkána, IV	1·12	50 0 18·10	5·0685557	117099·7	22·178
6	Dágri, V	1·12	55 17 42·25	5·0991918	125658·5	23·799
	Sárang, VI	1·12	74 41 59·65	5·1685977	147434·0	27·923
	Dágri, V	·86	44 9 41·85	4·9816614	95865·3	18·156
7	Sárang, VI	·87	77 31 3·11	5·1282360	134349·5	25·445
	Kartár, VII	·86	58 19 15·04	5·0685557	117099·7	22·178
	Dágri, V	·91	63 6 19·87	5·0971315	125063·8	23·686
8	Kartár, VII	·91	43 32 50·56	4·9850344	96612·7	18·298
	Marpha (*Marfa*), VIII	·91	73 20 49·57	5·1282360	134349·5	25·445
	Kartár, VII	·94	69 48 26·37	5·1171546	130964·8	24·804
9	Marpha, VIII	·93	46 31 24·34	5·0054338	101259·0	19·178
	Sihonda (*Seonda*), IX	·94	63 40 9·29	5·0971315	125063·8	23·686
	Marpha, VIII	1·15	64 32 41·82	5·1331946	135892·2	25·737
10	Sihonda, IX	1·15	54 58 30·47	5·0907764	123247·0	23·342
	Pavia, X	1·15	60 28 47·71	5·1171546	130964·8	24·804
	Sihonda, IX	1·09	58 51 54·81	5·1008475	126138·4	23·890
11	Pavia, X	1·09	53 53 37·23	5·0757683	119060·6	22·549
	Paprendi, XI	1·10	67 14 27·96	5·1331946	135892·2	25·737
	Pavia, X	·84	44 37 48·90	4·9732254	94021·1	17·807
12	Paprendi, XI	·85	64 53 31·98	5·0834550	121186·7	22·952
	Músapur (*Músápúr*), XII	·85	70 28 39·12	5·1008475	126138·4	23·890
	Paprendi, XI	·47	50 18 40·12	4·8804914	75943·6	14·383
13	Músapur, XII	·48	57 22 53·89	4·9197257	83123·9	15·743
	Kánákhera, XIII	·48	72 18 25·99	4·9732254	94021·1	17·807
	Músapur, XII	·44	57 42 48·79	4·8990308	79255·8	15·011
14	Kánákhera, XIII	·44	68 11 5·00	4·9397035	87036·9	16·484
	Jáfrabad (*Jáfrábád*), XIV	·44	54 6 6·21	4·8804914	75943·6	14·383
	Kánákhera, XIII	·48	56 50 23·65	4·9131469	81874·2	15·506
15	Jáfrabad, XIV	·48	69 1 39·89	4·9605784	91322·6	17·296
	Jahánabad (*Jehánábád*), XV	·48	54 7 56·46	4·8990308	79255·8	15·011
	Jáfrabad, XIV	·49	52 37 50·95	4·9006164	79545·6	15·065
16	Jahánabad, XV	·49	72 29 0·74	4·9797708	95448·9	18·077
	Máwa, XVI	·49	54 53 8·31	4·9131469	81874·2	15·506
	Jahánabad, XV	·34	59 0 28·68	4·8547637	71575·4	13·556
17	Máwa, XVI	·34	48 41 7·49	4·7973573	62713·0	11·877
	Dewarsán, XVII	·34	72 18 23·83	4·9006164	79545·6	15·065
	Máwa, XVI	·34	59 21 31·50	4·8451257	70004·4	13·258
18	Dewarsán, XVII	·34	59 2 13·78	4·8436724	69770·6	13·214
	Jájmau (*Jájmao*), XVIII	·34	61 36 14·72	4·8547637	71575·4	13·556
	Máwa, XVI	·34	51 36 32·79	4·8134820	65085·2	12·327
19	Jájmau, XVIII	·34	71 13 40·34	4·8955420	78621·6	14·890
	Namána, XIX	·34	57 9 46·87	4·8436724	69770·6	13·214
	Jájmau, XVIII	·38	67 44 40·81	4·9091738	81128·6	15·365
20	Namána, XIX	·38	64 18 42·75	4·8976001	78995·1	14·961
	Rau (*Ráo*), XX	·37	47 56 36·44	4·8134820	65085·2	12·327

No. of Triangle	Station	Spherical Excess	Corrected Plane Angle			Distance		
						Log. feet	Feet	Miles
		"	°	′	"			
	Namána, XIX	·37	44	33	21·17	4·7913808	61855·9	11·715
21	Rau, XX	·37	68	29	16·10	4·9139299	82021·9	15·534
	Jhalotar (*Jalhotr*), XXI	·37	66	57	22·73	4·9091738	81128·6	15·365
	Rau, XX	·33	63	41	23·19	4·8629283	72933·7	13·813
22	Jhalotar, XXI	·33	66	49	25·52	4·8738795	74796·2	14·166
	Bakseria, XXII	·33	49	29	11·29	4·7913808	61855·9	11·715
	Jhalotar, XXI	·32	46	7	20·44	4·7704535	58945·9	11·164
23	Bakseria, XXII	·33	70	46	5·65	4·8876870	77212·4	14·624
	Etora, XXIII	·32	63	6	33·91	4·8629283	72933·7	13·813
	Bakseria, XXII	·37	71	59	31·90	4·9343982	85980·2	16·284
24	Etora, XXIII	·37	67	18	56·98	4·9212456	83415·3	15·798
	Asu, XXIV	·37	40	41	31·12	4·7704535	58945·9	11·164
	Etora, XXIII	·42	46	56	50·78	4·8330122	68078·9	12·894
25	Asu, XXIV	·42	65	42	10·51	4·9289772	84913·6	16·082
	Barauli (*Baraoli*), XXV	·43	67	20	58·71	4·9343982	85980·2	16·284
	Asu, XXIV	·51	70	9	33·39	5·0001742	100040·1	18·947
26	Barauli, XXV	·51	70	2	23·85	4·9998468	99964·7	18·933
	Nimkár, XXVI	·50	39	48	2·76	4·8330122	68078·9	12·894
	Barauli, XXV	·46	37	59	26·64	4·8040218	63682·8	12·061
27	Nimkár, XXVI	·47	66	46	50·46	4·9780865	95079·4	18·007
	Fatehnagar (*Fatenagar*), XXVII	·47	75	13	42·90	5·0001742	100040·1	18·947
	Nimkár, XXVI	·37	75	18	17·78	4·9322553	85557·0	16·204
28	Fatehnagar, XXVII	·37	58	38	30·72	4·8781217	75530·4	14·305
	Darawal, XXVIII	·37	46	3	11·50	4·8040218	63682·8	12·061
	Fatehnagar, XXVII	·36	39	34	3·64	4·7589892	57410·2	10·873
29	Darawal, XXVIII	·36	68	45	26·31	4·9242982	84003·7	15·910
	Sirwaia, XXIX	·37	71	40	30·05	4·9322553	85557·0	16·204
	Daráwal, XXVIII	·30	59	40	13·30	4·8391159	69042·4	13·076
30	Sirwaia, XXIX	·30	74	27	48·72	4·8868711	77067·5	14·596
	Parser, XXX	·30	45	51	57·98	4·7589892	57410·2	10·873
	Sirwaia, XXIX	·33	47	55	31·62	4·7963020	62560·8	11·849
31	Parser, XXX	·34	77	4	19·35	4·9145877	82146·3	15·558
	Bulandpur (*Bulandpúr*), XXXI	·33	55	0	9·03	4·8391159	69042·4	13·076
	Parser, XXX	·37	68	2	30·29	4·9209844	83365·1	15·789
32	Bulandpur, XXXI	·37	67	51	3·77	4·9203988	83252·8	15·768
	Jarúra, XXXII	·37	44	6	25·94	4·7963020	62560·8	11·849
	Bulandpur, XXXI	·38	44	55	35·21	4·7950568	62381·6	11·815
33	Jarúra, XXXII	·38	64	23	0·19	4·9011956	79651·8	15·086
	Dahlelnagar, XXV	·39	70	41	24·60	4·9209844	83365·1	15·789
	Jarúra, XXXII	·33	65	10	33·05	4·8693168	74014·5	14·018
34	Dahlelnagar, XXV	·33	64	55	16·82	4·8684193	73861·7	13·989
	Kokra, XXIII	·33	49	54	10·13	4·7950568	62381·6	11·815

NOTE.—Stations Kokra, XXIII, and Dahlelnagar, XXV, appertain to the North-East Longitudinal Series.

October 1878.

J. B. N. HENNESSEY,

In charge of Computing Office.

AMUA MERIDIONAL SERIES.

SECONDARY TRIANGULATION. TRIANGLES.

PRINCIPAL-AUXILIARY STATIONS AND INTERSECTED POINTS.

Differences between the common sides of two triangles to stations and intersected points, are shown by the small figures in the column for "Distance in Feet" between the data of the two triangles, the earlier of which in order has supplied the greater value: where the difference is small it has usually been apportioned between the triangles, but where it is large no adjustment has been made, as one or other of the two values must be erroneous.

No. of triangle	Station	Corrected plane angle	Distance			Theodolite used
			Log. feet	Feet	Miles	
		° ′ ″				Inch
	Lakanpura, XIX	43 39 1	4·784372	60866	11·528	18
35	Maihar, I	46 7 19	4·803187	63561	12·038	„
	Tíndota h.s.	90 13 40	4·945359	88178	16·700	„
	Maihar, I	11 2 38	4·501547	31736	6·011	„
36	Tíndota h.s.	10 30 40	4·480327	30222	5·724	„
	Sunwári Fort		4·784372	60866	11·528	
	Lakanpura, XIX		5·007748	101800	19·280	
37	Maihar, I	69 13 28	5·035398	108492	20·548	„
	Pátol h.s.	49 27 23	4·945359	88178	16·700	„
	Tíndota h.s.	71 56 0	4·693807	49409	9·358	„
38	Pátol „	24 16 41	4·329782	21369	4·047	„
	Jura Fort		4·713208 *	51666	9·785	
	Lakanpura, XIX	46 3 7	4·767232	58510	11·081	„
39	Tíndota h.s.	82 29 37	4·906180	80571	15·260	„
	Sarda Fort		4·803188	63561	12·038	

No. of triangle	Station	Corrected plane angle	Distance			Theodolite used
			Log. feet	Feet	Miles	
		° ′ ″		4		Inch
	Maihar, I	69 51 40	4·767232	58510	11·081	18
40	Tíndota h.s.	7 44 3	3·923602	8387	1·588	„
	Sarda Fort		4·784372	60866	11·528	
	Maihar, I	26 0 19	4·968798	93067	17·626	„
41	Pátol h.s.	2 39 13	3·992433	9827	1·861	„
	Maihar Palace		5·007748	101800	19·280	
				5		
	Tíndota h.s.	129 55 28	4·968798	93067	17·626	„
42	Pátol „	24 52 41	4·708025	51053	9·669	„
	Maihar Palace		4·713208 *	51666	9·785	
	Amua, XVII	18 12 48	4·653605	45041	8·530	„
43	Maihar, I	47 10 32	5·024042	105692	20·017	„
	Járra Hill Mark		5·117315	131013	24·813	
				0		
	Maihar, I	53 31 3	4·856488	71860	13·610	„
44	Dharkána, IV	30 15 44	4·653605	45041	8·530	„
	Járra Hill Mark		4·948646	88848	16·827	

NOTES.—1. Names followed by Roman numerals are those of Principal Stations. Stations Amua, XVII, and Lakanpura, XIX, appertain to the Calcutta Longitudinal Series of the S. E. Quadrilateral.
2. The values of the side are given in the same line with the opposite angle. * Base deduced by two sides and included angle.

No. of triangle	Station		Corrected plane angle	Distance			Theodolite used
				Log. feet	Feet	Miles	
			° ′ ″				Inch
	Amua, XVII		22 49 30	5·238636	173235	32·810	18
45	Sárang, VI		16 6 45	5·093197	123936	23·473	„
	Dokhán Hill Mark			5·448183 *	280661	53·156	
	Tíndota	h.s.	34 56 47	4·486897	30683	5·811	„
46	Pátol	„	70 21 23	4·702846	50448	9·555	„
	Amarpátan Temple			4·713208 *	51666	9·785	
	Amua, XVII		19 30 15	5·194520	156502	29·641	„
47	Sárang, VI		17 16 35	5·143665	139208	26·365	„
	Murwári Hill Mark			5·448183 *	280661	53·156	
	Amua, XVII		28 57 12	5·110322	128921	24·417	„
48	Patra, II		36 25 10	5·198951	158107	29·944	„
	Kusla Hill Mark			5·383972 *	242087	45·850	
	Tíndota	h.s.	98 22 24	4·991329	98023	18·565	„
49	Pátol	„	50 11 46	4·881480	76117	14·416	„
	Unchehra Temple			4·713208 *	51666	9·785	
	Tíndota	h.s.	98 23 41	4·991678	98102	18·580	„
50	Pátol	„	50 12 17	4·881907	76192	14·430	„
	Unchehra Palace			4·713208 *	51666	9·785	
	Maihar, I		104 34 0	4·974494	94296	17·859	„
51	Tíndota	h.s.	36 46 17	4·765838	58323	11·046	„
	Shankargarh Fort			4·784372	60866	11·528	
	Maihar, I		53 50 25	5·051989	112717	21·348	„
52	Patra, II		30 24 8	4·849122	70652	13·381	„
	Lálpahár Hill Mark			5·142717	138905	26·308	
	Patra, II		31 34 8	4·868838	73933	14·002	„
53	Potenda, III		52 57 15	5·051989	112717	21·348	„
	Lálpahár Hill Mark			5·147914	140577	26·624	
	Dharkána, IV		73 13 54	5·081377	120608	22·842	„
54	Sárang, VI		12 46 26	4·444845	27851	5·275	„
	Dureha Hill Mark			5·099192	125658	23·799	
	Dharkána, IV		21 8 26	4·742024	55211	10·457	„
55	Sárang, VI		103 41 23	5·172413	148735	28·170	„
	Panna, Hill Mark			5·099192	125658	23·799	
	Dharkána, IV		40 53 7	4·985846	96793	18·332	18
56	Dágri, V		53 33 32	5·075414	118964	22·531	„
	Dho Hill Mark			5·168598	147434	27·923	
	Dharkána, IV		9 7 12	4·313053	20561	3·894	„
57	Sárang, VI		66 30 0	5·075414	118964	22·531	„
	Dho Hill Mark			5·099192	125658	23·799	
	Dágri, V		63 17 29	5·035458	108507	20·551	„
58	Sárang, VI		11 17 52	4·376511	23796	4·507	„
	Jáli Hill Mark			5·068556	117100	22·178	
	Kartár, VII		34 2 9	4·892762	78120	14·795	„
59	Sihonda, IX		12 28 28	4·479259	30148	5·710	„
	Umri Hill Mark			5·005434	101259	19·178	
	Sárang, VI		6 4 7	4·479259	30148	5·710	„
60	Kartár, VII		154 17 16	5·092445	123722	23·432	„
	Umri Hill Mark			4·981661	95865	18·156	
	Kartár, VII		8 24 56	4·304378	20155	3·817	„
61	Marpha, VIII		106 20 7	5·121085	132155	25·029	„
	Chandor Hill Temple			5·097132	125064	23·686	
	Sihonda, IX		76 11 16	5·131461	135351	25·635	„
62	Pavia, X		26 39 33	4·796143	62538	11·844	„
	Bánda Mark			5·133195	135892	25·737	
	Pavia, X		27 14 5	4·793873	62212	11·783	„
63	Paprendi, XI		84 39 26	5·131461	135351	25·635	„
	Bánda Mark			5·100848	126138	23·890	
	Jájmau, XVIII		61 33 43	4·850308	70845	13·418	„
64	Rau, XX		17 6 11	4·374637	23694	4·487	„
	Cawnpore Church			4·897600	78995	14·961	
	Jájmau, XVIII		32 14 40	4·120760	13206	2·501	„
65	Cawnpore Church			4·210082	16221	3·072	
	Savada	s.	106 48 30	4·374637	23694	4·487	†

NOTE.—Station Amua, XVII, appertains to the Calcutta Longitudinal Series of the South-East Quadrilateral.
* Base deduced by two sides and included angle. † Instrument not known.

November 1878.

J. B. N. HENNESSEY,
In charge of Computing Office.

AMUA MERIDIONAL SERIES.

AZIMUTHS OF SURROUNDING STATIONS AND POINTS, AT PRINCIPAL, PRINCIPAL-AUXILIARY, AND SECONDARY STATIONS.

The following table contains, in the first column, the name of each Principal, Principal-Auxiliary, or Secondary Station, at which azimuths of surrounding Points have been measured; immediately followed by those azimuths. The second column contains the number of the triangle which gives the distance between the Station and the Point.

Name of station with azimuths of surrounding points	° ′ ″	No. of triangle giving distance
AMUA, XVII*		
Dokhán Hill Mark	148 8 54	45
Murwári „	151 28 9	47
Járra „	199 38 57	43
Kusla „	215 59 43	48
Maihar, I	217 51 44·80	1
Lakanpura, XIX*	260 4 20·44	1
ASU, XXIV		
Nimkár, XXVI	180 51 27·76	26
Barauli, XXV	251 1 1·66	25
Etora, XXIII	316 43 12·59	24
Bakseria, XXII	357 24 44·08	24
BAKSERIA, XXII		
Rau, XX	9 39 52·81	22
Asu, XXIV	177 25 2·94	24
Etora, XXIII	249 24 35·21	23
Jhalotar, XXI	320 10 41·19	22

Name of station with azimuths of surrounding points	° ′ ″	No. of triangle giving distance
BARAULI, XXV		
Etora, XXIII	3 45 27·32	25
Asu, XXIV	71 6 26·46	25
Nimkár, XXVI	141 8 50·82	26
Fatehnagar, XXVII	179 8 17·92	27
BULANDPUR, XXXI		
Sirwaia, XXIX	6 38 13·87	31
Parser, XXX	61 38 23·23	31
Jarúra, XXXII	129 29 27·37	32
Dahlelnagar, XXV†	174 25 2·96	33
DAGRI, V		
Jáli Hill Mark	10 36 13	58
Dharkána, IV	18 35 58·44	5
Dho Hill Mark	72 9 30	56
Sárang, VI	73 53 41·81	6
Kartár, VII	118 3 24·52	7
Marpha, VIII	181 9 45·30	8
Potenda, III	314 6 45·97	5

Name of station with azimuths of surrounding points	° ′ ″	No. of triangle giving distance
DAHLELNAGAR, XXV†		
Jarúra, XXXII	65 5 47·39	33
Kokra, XXIII†	130 1 4·54	34
Bulandpur, XXXI	354 24 22·40	33
DARAWAL, XXVIII		
Parser, XXX	184 29 23·94	30
Sirwaia, XXIX	244 9 37·54	29
Fatehnagar, XXVII	312 55 4·21	28
Nimkár, XXVI	358 58 16·08	28
DEWARSAN, XVII		
Jájmau, XVIII	210 16 46·01	18
Máwa, XVI	269 19 0·13	17
Jahánabad, XV	341 37 24·30	17
DHARKANA, IV		
Dureha Hill Mark	75 18 13	54
Panna „	127 23 41	55
Sárang, VI	148 32 6·85	6

* Of the Calcutta Longitudinal Series of the South-East Quadrilateral. † Of the North-East Longitudinal Series.

Name of station with azimuths of surrounding points		° ′ ″	No. of triangle giving distance
Dharkana, IV			
Dho Hill Mark		157 39 19	56
Dágri, V		198 32 26·07	5
Potenda, III		246 44 40·90	4
Maihar, I		318 34 52·86	4
Járra Hill Mark		348 50 37	44
Etora, XXIII			
Jhalotar, XXI		6 22 36·61	23
Bakseria, XXII		69 29 10·84	23
Asu, XXIV		136 48 8·19	24
Barauli, XXV		183 44 59·39	25
Fatehnagar, XXVII			
Nimkár, XXVI		74 21 54·02	27
Daráwal, XXVIII		133 0 25·11	28
Sirwaia, XXIX		172 34 29·11	29
Barauli, XXV		359 8 10·65	27
Jafrabad, XIV			
Kánákhera, XIII		44 12 52·42	14
Jahánabad, XV		113 14 32·79	15
Máwa, XVI		165 52 24·23	16
Músapur, XII		350 6 45·77	14
Jahanabad, XV			
Dewarsán, XVII		161 39 0·01	17
Máwa, XVI		220 39 29·03	16
Jáfrabad, XIV		293 8 30·26	15
Kánákhera, XIII		347 16 27·20	15
Jajmau, XVIII			
Dewarsán, XVII		30 19 38·37	18
Saváda	s.	95 56 38	65
Cawnpore Church		128 11 18	64
Rau, XX		189 45 1·44	20
Namána, XIX		257 29 42·63	19
Máwa, XVI		328 43 23·31	18
Jarura, XXXII			
Kokra, XXIII †		179 50 17·20	34
Dahlelnagar, XXV †		245 0 50·58	33
Bulandpur, XXXI		309 23 51·15	32
Parser, XXX		353 30 17·46	32
Jhalotar, XXI			
Namána, XIX		6 27 44·26	21
Rau, XX		73 25 7·36	21
Bakseria, XXII		140 14 33·21	22
Etora, XXIII		186 21 53·97	23

Name of station with azimuths of surrounding points		° ′ ″	No. of triangle giving distance
Kanakhera, XIII			
Paprendi, XI		4 37 59·71	13
Jahánabad, XV		167 18 3·67	15
Jáfrabad, XIV		224 8 27·80	14
Músapur, XII		292 19 33·24	13
Kartar, VII			
Umri Hill Mark		150 30 53	59
Sihonda, IX		184 33 2·19	9
Chandor Hill Temple		245 56 34	61
Marpha, VIII		254 21 29·50	8
Dágri, V		297 54 20·97	7
Sárang, VI		356 13 36·87	7
Kokra, XXIII†			
Dahlelnagar, XXV†		309 56 5·64	34
Jarúra, XXXII		359 50 16·10	34
Lakanpura, XIX*			
Amua, XVII*		80 11 43·06	1
Sarda Fort		164 22 26	39
Maihar, I		166 46 31·88	1
Tíndota	h.s.	210 25 33	35
Pátol	„	228 5 41	37
Patra, II		234 31 25·86	2
Maihar, I			
Sarda Fort		10 29 24	40
Amua, XVII*		37 57 40·29	1
Járra Hill Mark		85 8 12	43
Dharkána, IV		138 39 15·07	4
Shankargarh Fort		196 3 44	51
Potenda, III		210 53 40·78	3
Lálpahár Hill Mark		216 38 25	52
Patra, II		270 28 50·21	2
Pátol	h.s.	277 31 35	37
Tíndota	„	300 37 44	35
Maihar Palace		303 31 54	41
Sunwári Fort		311 40 22	36
Lakanpura, XIX*		346 45 2·62	1
Marpha, VIII			
Dágri, V		1 9 54·31	8
Kartár, VII		74 30 44·79	8
Sihonda, IX		121 2 10·06	9
Chandor Hill Temple		180 50 52	61
Pavia, X		185 34 53·03	10

Name of station with azimuths of surrounding points	° ′ ″	No. of triangle giving distance
Mawa, XVI		
Jahánabad, XV	40 43 40·28	16
Dewarsán, XVII	89 24 48·11	17
Jájmau, XVIII	148 46 19·95	18
Namána, XIX	200 22 53·08	19
Jáfrabad, XIV	345 50 31·48	16
Musapur, XII		
Paprendi, XI	55 2 13·58	12
Kánákhera, XIII	112 25 7·95	13
Jáfrabad, XIV	170 7 57·18	14
Pavia, X	344 33 33·61	12
Namana, XIX		
Máwa, XVI	20 25 6·92	19
Jájmau, XVIII	77 34 54·13	19
Rau, XX	141 53 37·26	20
Jhalotar, XXI	186 26 58·80	21
Nimkar, XXVI		
Asu, XXIV	0 51 35·35	26
Daráwal, XXVIII	178 58 23·01	28
Fatehnagar, XXVII	254 16 41·16	27
Barauli, XXV	321 3 32·09	26
Paprendi, XI		
Sihonda, IX	7 4 10·33	11
Bánda Mark	24 29 7	63
Kánákhera, XIII	184 37 27·85	13
Músapur, XII	234 56 8·44	12
Pavia, X	299 49 41·27	11
Parser, XXX		
Daráwal, XXVIII	4 29 55·13	30
Jarúra, XXXII	173 31 6·50	32
Bulandpur, XXXI	241 33 37·16	31
Sirwaia, XXIX	318 37 56·85	30
Patol h.s.		
Lakanpura, XIX*	48 11 35	37
Jura Fort	94 23 45	38
Maihar Palace	94 59 45	41
Maihar, I	97 38 58	37
Unchehra Temple	120 18 50	49
Unchehra Palace	120 19 21	50
Amarpátan Temple	140 28 27	46

† Of the North-East Longitudinal Series. * Of the Calcutta Longitudinal Series of the South-East Quadrilateral.

Name of station with azimuths of surrounding points		No. of triangle giving distance
PATRA, II	° ′ ″	
Lakanpura, XIX*	54 40 11·17	2
Maihar, I	90 39 7·59	2
Kusla Hill Mark	101 38 18	48
Lálpahár „	121 3 16	52
Potenda, III	152 37 23·34	3
PAVIA, X		
Marpha, VIII	5 35 48·89	10
Sihonda, IX	66 4 37·75	10
Bánda Mark	92 44 11	62
Paprendi, XI	119 58 16·07	11
Músapur, XII	164 36 5·81	12
POTENDA, III		
Lálpahár Hill Mark	25 29 48	53
Maihar, I	30 59 12·24	3
Dharkána, IV	66 54 37·45	4
Dágri, V	134 13 13·90	5
Patra, II	332 32 33·34	3
RAU, XX		
Jájmau, XVIII	9 46 7·32	20

Name of station with azimuths of surrounding points		No. of triangle giving distance
RAU, XX	° ′ ″	
Cawnpore Church	26 52 18	64
Bakseria, XXII	189 38 50·52	22
Jhalotar, XXI	253 20 14·04	21
Namána, XIX	321 49 30·51	20
SARANG, VI		
Dokhán Hill Mark	7 1 45	45
Murwári „	8 11 35	47
Panna „	72 8 33	55
Umri „	170 9 59	60
Kartár, VII	176 14 5·68	7
Dágri, V	253 45 9·66	6
Dho Hill Mark	261 57 10	57
Jáli „	265 3 2	58
Dharkána, IV	328 27 10·43	6
Dureha Hill Mark	341 13 36	54
SAVADA s.		
Cawnpore Church	169 6 49	65
Jájmau, XVIII	275 55 19	65
SIHONDA, IX		
Kartár, VII	4 33 39·42	9

Name of station with azimuths of surrounding points		No. of triangle giving distance
SIHONDA, IX	° ′ ″	
Umri Hill Mark	17 2 7	59
Bánda Mark	169 43 42	62
Paprendi, XI	187 3 1·67	11
Pavia, X	245 54 57·57	10
Marpha, VIII	300 53 29·19	9
SIRWAIA, XXIX		
Daráwal, XXVIII	64 14 3·76	29
Parser, XXX	138 41 52·78	30
Bulandpur, XXXI	186 37 24·73	31
Fatehnagar, XXVII	352 33 33·34	29
TINDOTA h.s.		
Lakanpura, XIX*	30 27 55	35
Sunwári Fort	110 10 55	36
Sarda Fort	112 57 32	39
Maihar Palace	120 8 4	42
Maihar, I	120 41 35	35
Unchehra Palace	151 39 51	50
Unchehra Temple	151 41 8	49
Shankargarh Fort	157 27 52	51
Jura Fort	178 7 32	38
Amarpátan Temple	215 6 45	46

* Of the Calcutta Longitudinal Series of the South-East Quadrilateral.

November 1878.

J. B. N. HENNESSEY,

In charge of Computing Office.

AMUA MERIDIONAL SERIES.

CO-ORDINATES AND DESCRIPTIONS OF ALL STATIONS AND POINTS.

The following table gives the co-ordinates of all the stations and other fixed points, arranged in alphabetical order, also the descriptions of the secondary and intersected (or unvisited) points, and references to the preceding pages where the descriptions of the principal stations are given. In certain instances numbers are added which have reference to the given data of the triangles by which the station or point has been fixed; when these numbers are omitted it is to be understood that no triangles are given.

Note.—λ stands for Latitude North; L for Longitude East of Greenwich; H for Height of station in feet above mean sea level, if determined trigonometrically, H_s for the Height when found by spirit leveling, and *h* for Height of station tower or pillar. The trigonometrical heights always refer to the upper mark-stone or to the upper surface of the pillar on which the theodolite stood: the spirit leveled heights refer to the points on which the leveling staff stood as indicated in footnotes. For visited stations and for other points of superior accuracy the values of λ and L are given to two places of decimals; for well determined objects to one place, and for the remaining points to the nearest second. Principal stations are distinguished by the Roman numerals I, II, &c., secondary stations by the letters h.s. and s. The names in italics are those of the territories, states or districts in which the stations or points are situated. For alterations of district and other boundaries and consequent transfer of stations from one district to another since date of survey, see Addendum following page 8—L.

Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.
Amarpátan Temple. (*Baghelkhand, Rewah State*) λ 24 18 41·6 L 81 0 53·1 No. 46	**Badanpur Temple,** (*Baghelkhand, Maihar State*) Eastern. λ 24 9 44·1 L 80 52 17·7 See Synoptical Vol. of the Calcutta Longl. Series.	**Barauli, XXV.** (*Sandíla. Vide page 6—L.*) λ 27 8 17·01 L 80 43 6·92 H 464 *h* 30 No. 25
Amúa, XVII. (*Maihar. Vide page 3—L.*) λ 23 59 56·24 L 80 31 44·44 H 2113 *h* 4 No. 1	**Bakseria, XXII.** (*Lassípur. Vide page 6—L.*) λ 26 50 52·91 L 80 31 55·84 H 430 *h* 15 No. 22	**Bulandpur, XXXI.** (*Khairabad. Vide page 7—L.*) λ 27 51 11·46 L 80 42 35·92 H 504 *h* 24 No. 31
Asu, XXIV. (*Sandíla. Vide page 6—L.*) λ 27 4 38·20 L 80 31 14·26 H 480 *h* 30 No. 24	**Bánda Mark.** (*Bánda*) λ 25 28 19·35 L 80 22 4·03 Nos. 62, 63	**Cawnpore Church (Christ's),** (*Cawnpore*) Centre of steeple. λ 26 28 16·6 L 80 23 45·0 No. 64
Badanpur s. (*Baghelkhand, Maihar State*) In village. λ 24 9 0·43 L 80 51 36·44 See Synoptical Vol. of the Calcutta Longl. Series.	**Banjári Fort,** (*Jubbulpore*) N. W. Angle. λ 23 59 15·2 L 80 39 21·0 See Synoptical Vol. of the Calcutta Longl. Series.	**Chandor Hill Temple.** (*Bánda*) λ 25 10 21·9 L 80 44 31·9 No. 61

Name of station, district, description, co-ordinates &c.

Dágri, V.
(*Nagode. Vide page 4—L.*)

	° ′ ″
λ	24 51 5·38
L	80 44 7·31
H	1588
h	7

No. 5

Dahlelnagar, XXV.*
(*Muhamdi. Vide page 8—L.*)

λ	28 4 16·46
L	80 41 9·41
H	512
h	28

No. 33

Daráwal, XXVIII.
(*Khairabad. Vide page 7—L.*)

λ	27 33 35·96
L	80 31 15·81
H_s	473·28†
h	30

No. 28

Deora Fort,
(*Jubbulpore*) N.E. Bastion.

λ	23 57 14·5
L	80 34 41·9

See Synoptical Vol. of the Calcutta Longl. Series.

Deora Fort,
(*Jubbulpore*) S.W. Bastion.

λ	23 57 13·2
L	80 34 40·3

See Synoptical Vol. of the Calcutta Longl. Series.

Dewarsán XVII.
(*Cawnpore. Vide page 5—L.*)

λ	26 15 52·89
L	80 20 41·64
H	439
h	7

No. 17

Dharkána, IV.
(*Nagode. Vide page 4—L.*)

λ	24 28 0·81
L	80 35 38·29
H	1860
h	2

No. 4

Dho Hill Mark.
(*Bundelkhand*) On a peak of the Vindhyáchal range and about 3 miles S. of the small village of Bargari. It is denoted by a small platform with two centre mark-stones of which the lower is imbedded in the ground.

λ	24 46 10·69
L	80 27 27·54

Nos. 56, 57

Name of station, district, description, co-ordinates &c.

Dhobi Temple.
(*Jubbulpore*)

	° ′ ″
λ	24 2 47·9
L	80 56 9·2

See Synoptical Vol. of the Calcutta Longl. Series.

Dokhán Hill Mark.
(*Bundelkhand*) On a double-peaked hill about 3 miles south of Murwári. The hill is said to derive its name from its having two mines *viz.*, one of copper and the other of iron. The former is reported to have been closed about a century ago lest its riches should attract the cupidity of the neighbouring Rájas. It is denoted by a platform 2½ feet high having two mark-stones with circle and dot engraved on them, the upper is at the surface of the platform and the other at level of ground.

λ	24 17 18·82
L	80 19 57·46

No. 45

Dureha Hill Mark.
(*Bundelkhand-Baghelkhand*) On the northern extremity of the Rája's Pahár and immediately above the small village of Dureha. It is marked by a centre stone which is surmounted by a conical heap of stones.

λ	24 26 50·73
L	80 30 46·71

No. 54

Etora, XXIII.
(*Sandíla. Vide page 6—L.*)

λ	26 54 17·85
L	80 42 5·44
H	429
h	18

No. 23

Etwa Tiled Building.
(*Baghelkhand, Rewah State*)

λ	24 10 18
L	81 0 55

See Synoptical Vol. of the Calcutta Longl. Series.

Fatehnagar, XXVII.
(*Khairabad. Vide page 6—L.*)

λ	27 23 58·52
L	80 42 51·05
H	469
h	35

No. 27

Ghunsi Masjid.
(*Kheri*)

λ	27 57 40·0
L	80 33 53·1

Jáfrabad, XIV.
(*Fatehpur. Vide page 5—L.*)

λ	26 0 43·97
L	80 38 3·87
H	423
h	17

No. 14

Name of station, district, description, co-ordinates &c.

Jahánabad, XV.
(*Fatehpur. Vide page 5—L.*)

	° ′ ″
λ	26 6 3·35
L	80 24 18·54
H	435
h	*Not forthcoming*

No. 15

Jájmau, XVIII.
(*Cawnpore. Vide page 5—L.*)

λ	26 25 51·52
L	80 27 9·98
Hs	461·67‡
h	8

No. 18

Jalhotr, XXI.
(*Rasúlábád. Vide page 6—L.*)

λ	26 41 37·85
L	80 40 30·88
H	440
h	15

No. 21

Jáli Hill Mark.
(*Baghelkhand, Kothi State*) On an isolated hill called Lehrára Pahár and about 2 miles N. of the small village of Jáli and 6 miles from Kothi. The mark is engraved on one of a mass of rocks forming the summit of the hill.

λ	24 47 13·66
L	80 43 19·79

No. 58

Járra Hill Mark.
(*Baghelkhand, Nagode State*) On a small hill of the same name rising about 150 feet above the mass of Bundel flats. In its vicinity is the village of Tulsganu. It is marked by a platform 1 foot high with one centre stone.

λ	24 16 22·29
L	80 38 8·56

Nos. 43, 44

Jarúra, XXXII.
(*Muhamdi. Vide page 7—L.*)

λ	27 59 55·94
L	80 30 38·13
H	536
h	28

No. 32

Jiwár h.s.
(*Jubbulpore*)

λ	23 56 29·15
L	80 37 21·40

See Synoptical Vol. of the Calcutta Longl. Series.

Jukehi h.s.
(*Bundelkhand-Baghelkhand*)

λ	24 0 11·03
L	80 27 36·81

See Synoptical Vol. of the Calcutta Longl. Series.

* Of the North-East Longitudinal Series. † Refers to the mark-stone imbedded at the level of the ground, over which the tower has been built.
‡ Refers to the mark-stone let into the upper surface of the platform.

Name of station, district, description, co-ordinates &c.

Jura Fort,
(*Baghelkhand, Maihar State*) Bastion.

	°	′	″
λ	24	15	24·4
L	80	55	31·8

No. 38

Kánákhera, XIII.
(*Bánda. Vide page 5—L.*)

λ	25	51	20·95
L	80	27	58·79
Hs	415·62†		
h	12		

No. 13

Kanwára Fort,
(*Jubbulpore*) N. W. angle.

λ	23	55	19·9
L	80	29	18·8

See Synoptical Vol. of the Calcutta Longl. Series.

Kárítalai Fort,
(*Jubbulpore*) S. W. angle.

λ	24	3	15·5
L	80	45	6·5

See Synoptical Vol. of the Calcutta Longl. Series.

Kartár, VII.
(*Bánda. Vide page 4—L.*)

λ	25	1	29·85
L	80	22	38·18
H	1123		
h	0		

No. 7

Kokra, XXIII.*
(*Muhamdi. Vide page 7—L.*)

λ	28	12	7·34
L	80	30	35·80
H	519		
h	26		

No. 34

Kusla Hill Mark.
(*Baghelkhand, Nagode State*) On a high detached hill about 2 miles S. W. of the town of Unchehra and 6 miles N. of Maihar. It is marked by a platform about 7 feet high having two marks, the lower is engraved on the rock.

λ	24	21	2·71
L	80	48	29·37

No. 48

Lakanpúra, XIX.
(*Maihar. Vide page 3—L.*)

λ	24	2	49·92
L	80	49	51·67
H	1780		
h	4		

No. 1

Name of station, district, description, co-ordinates &c.

Lálpahár Hill Mark.
(*Baghelkhand*) On an isolated hill of that name, about 3 miles S. of the village of Bullanwára. The centre mark is engraved on the rock.

	°	′	″
λ	24	26	21·81
L	80	53	49·93

Nos. 52, 53

Latágaon Tiled Building,
(*Baghelkhand, Maihar State*) Southern.

λ	24	5	51
L	80	53	14

See Synoptical Vol. of the Calcutta Longl. Series.

Maihar, I.
(*Maihar. Vide page 3—L.*)

λ	24	17	0·34
L	80	46	13·62
H	1983		
h	2		

No. 1

Maihar Palace.
(*Baghelkhand, Maihar State*)

λ	24	16	6·6
L	80	47	42·2

Nos. 41, 42

Marpha, VIII.
(*Bánda. Vide page 4—L.*)

λ	25	7	2·29
L	80	44	28·64
H	1240		
h	5		

No. 8

Máwa, XVI.
(*Cawnpore. Vide page 5—L.*)

λ	26	16	0·74
L	80	33	47·94
H	440		
h	24		

No. 16

Muhamdi Fort.
(*Kheri*) Flag on the highest paka building in fort, N.W. side of the town.

λ	27	57	16·7
L	80	14	56·3

Murwári Hill Mark.
(*Bundelkhand*) On a conical hill round the north and west of whose base extends a village of the same name. About 3 miles distant from the large village of Khonpa. It is marked by a platform about 2½ feet high having two mark-stones with circle and dot engraved on them, one at the surface of the platform, the other on a level with the surface of the hill.

λ	24	20	7·53
L	80	19	45·46

No. 47

Name of station, district, description, co-ordinates &c.

Músapur, XII.
(*Fatehpur. Vide page 5—L.*)

	°	′	″
λ	25	46	34·62
L	80	40	47·38
H	406		
h	23		

No. 12

Namána, XIX.
(*Harha. Vide page 6—L.*)

λ	26	28	10·63
L	80	38	49·28
H	449		
h	18		

No. 19

Naugua h.s.
(*Jubbulpore-Baghelkhand*)

λ	24	4	56·25
L	80	57	34·88

See Synoptical Vol. of the Calcutta Longl. Series.

Nimkár, XXVI.
(*Khairabad. Vide page 6—L.*)

λ	27	21	8·09
L	80	31	30·85
H	486		
h	30		

No. 26

Palwa Temple.
(*Baghelkhand, Maihar State*)

λ	24	1	22·9
L	80	29	4·2

See Synoptical Vol. of the Calcutta Longl. Series.

Panna Hill Mark.
(*Bundelkhand*) On a hill immediately S. of the village of that name. The mark is on the top of a two storied shooting box built by the father of the present Rája (1834), the lower centre stone is sunk in the floor.

λ	24	42	54·17
L	80	14	16·65

No. 55

Paprendi, XI.
(*Bánda. Vide page 5—L.*)

λ	25	37	40·25
L	80	26	45·41
Hs	‡ 427·39 / −3		
h	10		

No. 11

* Of the North-East Longitudinal Series. † Refers to the lower mark-stone imbedded at summit of the building, over which the tower has been carried up to a height of 12 feet. ‡ The height 424·39 refers as nearly as can be ascertained to the surface described on page 5—L.

Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.
Parser, XXX. (*Muhamdi. Vide page 7—L.*) λ 27 46 16·81 L 80 32 22·98 H_s 484·70* *h* 24 No. 30	**Shankargarh Fort,** (*Baghelkhand, Nagode State*) Square building. λ 24 26 15·6 L 80 49 8·3 No. 51	**Sháhjahánpur, Rauza.** (*Sháhjahánpur*) Kalas of Bahádur Khán's Rauza. λ 27 52 59·4 L 79 57 17·9
Pátol h.s. (*Baghelkhand, Rewah State*) λ 24 14 47·17 L 81 4 24·19 No. 37	**Sárang, VI.** (*Panna. Vide page 4—L.*) λ 24 45 42·20 L 80 23 46·62 H 1692 *h* 3 No. 6	**Sháhjahánpur, Rosa Factory.** (*Sháhjahánpur*) Conductor of the steam engine chimney of Rosa Sugar Works and Distillery. λ 27 49 22·0 L 79 57 27·0
Patra, II. (*Rewah. Vide page 3—L.*) λ 24 16 46·74 L 81 11 14·97 H 2249 *h* 2 No. 2	**Sarda Fort,** (*Baghelkhand, Maihar State*) High bastion gateway. λ 24 15 38·7 L 80 45 57·1 Nos. 39, 40	**Singondi Temple,** (*Jubbulpore*) Black. λ 23 56 6·6 L 80 42 50·2 See Synoptical Vol. of the Calcutta Longl. Series.
Pavia, X. (*Bánda. Vide page 4—L.*) λ 25 27 17·39 L 80 46 39·44 H 481 *h* 18 No. 10	**Saváda s.** (*Cawnpore*) λ 26 26 8·13 L 80 24 12·47 No. 65	**Sirwaia, XXIX.** (*Khairabad. Vide page 7—L.*) λ 27 37 43·43 L 80 40 50·34 H_s 471·61* *h* 30 No. 29
Potenda, III. (*Rewah. Vide page 4—L.*) λ 24 37 23·04 L 80 59 34·36 H 993 *h* 2 No. 3	**Sihonda, IX.** (*Bánda. Vide page 4—L.*) λ 25 18 9·78 L 80 24 5·73 H 849 *h* *Not forthcoming* No. 9	**Sunwári Fort,** (*Baghelkhand, Maihar State*) N.W. angle. λ 24 13 41·2 L 80 50 17·5 No. 36
Raipur Masjid, (*Kheri*) Highest minaret. λ 27 58 37·4 L 80 33 0·8	**Sháhjahánpur City.** (*Sháhjahánpur*) Kalas of Dalel Khán's Rauza, mausoleum in city. λ 27 52 59·3 L 79 57 16·5	**Tíndota h.s.** (*Baghelkhand, Maihar State*) λ 24 11 52·83 L 80 55 39·37 No. 35
Rau, XX. (*Rasúlábád. Vide page 6—L.*) λ 26 38 42·61 L 80 29 37·44 H_s 429·42‡ *h* 16·5 No. 20	**Sháhjahánpur, Collector's Office.** (*Sháhjahánpur*) Most northern skylight of the Magistrate and Collector's office. λ 27 53 7·6 L 79 57 40·5	**Unchehra Palace.** (*Baghelkhand, Unchehra State*) λ 24 22 57·1 L 80 49 8·2 No. 50
	Sháhjahánpur, House. (*Sháhjahánpur*) Skylight of Mr. Barnes' paka house. λ 27 53 36·0 L 79 58 15·3	**Unchehra Temple.** (*Baghelkhand, Unchehra State*) λ 24 22 56·6 L 80 49 8·8 No. 49
	Sháhjahánpur, Koti. (*Sháhjahánpur*) Staircase of Hakím Mendi's two storied house. λ 27 53 53·6 L 79 58 12·4	**Umri Hill Mark.** (*Bundelkhand, Charkhári State*) λ 25 5 49·81 L 80 19 56·74 Nos. 59, 60

* Refers to the mark-stone imbedded at the level of the ground, over which the tower has been built. ‡ Refers to the mark-stone imbedded at the level of the ground, over which the platform has been built.

November 1878.

J. B. N. HENNESSEY,
In charge of Computing Office.

80° 30′ 81° 0′

80° 0′ 26° 30′

UA MERIDIONAL SERIES

OR

SERIES L

OF THE

NORTH-EAST QUADRILATERAL

Compiled and photozincographed under the orders of

MAJOR-GENERAL J. T. WALKER, C. B., R. E., F. R. S., &C.,

Surveyor General of India

and Superintendent of the Great Trigonometrical Survey

At the Office of the Survey, Dehra Dun January 1880.

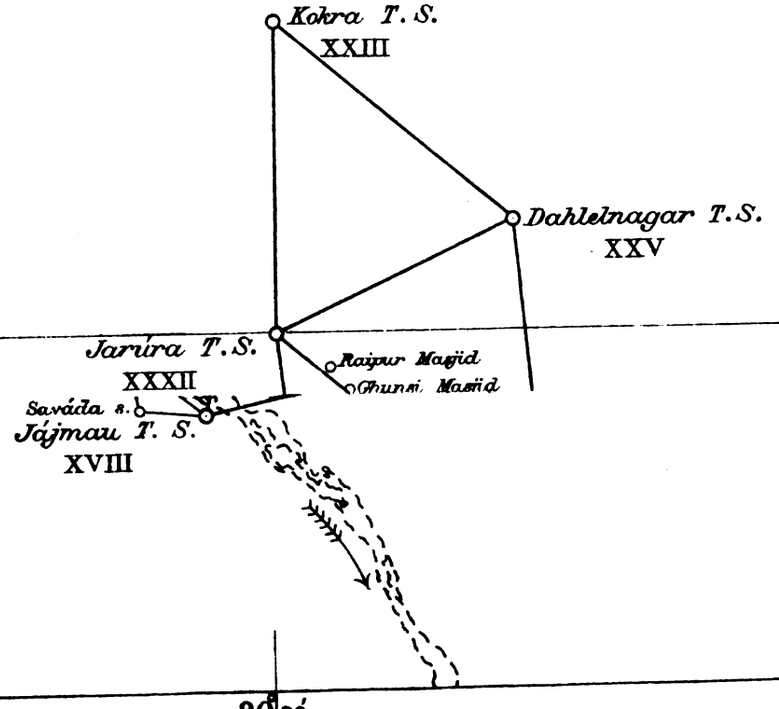
Scale 1 inch = 8 miles or $\frac{1}{506880}$

8 4 0 8 16 24 Miles

28° 30′

28° 0′

26° 0′

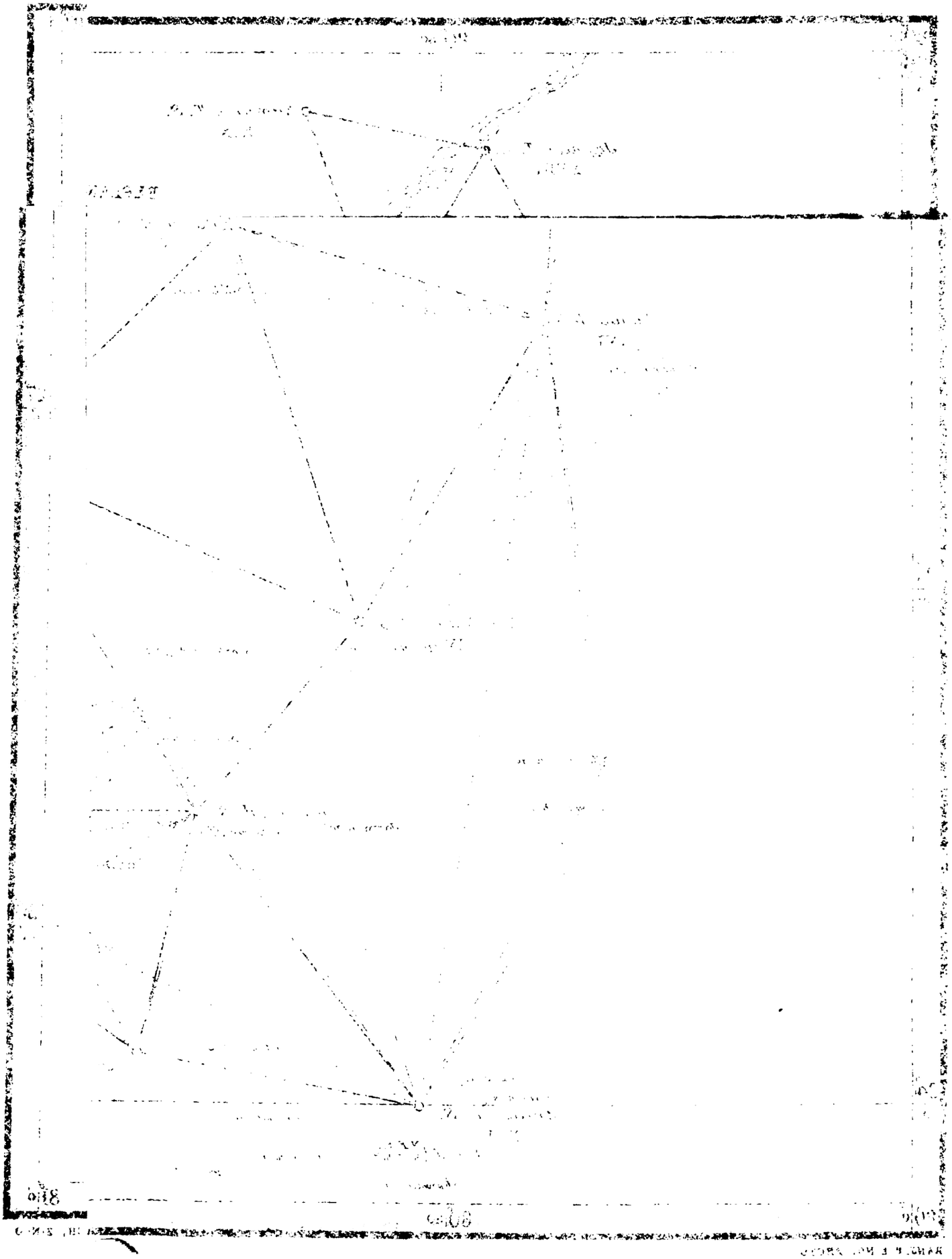


24° 0′

80° 30′ 81° 0′

C. G. OLLENBACH, SINCO.

RANJIT



KARARA MERIDIONAL SERIES.

KARARA MERIDIONAL SERIES.

INTRODUCTION.

The Karára Series is the fourth in order—reckoning eastwards from the Northern Section of the Great Arc—of the Meridional chains of triangles included in the North-East Quadrilateral. It emanates at the side Karára-Marwás of the Calcutta Longitudinal Series—in Baghelkhand, south of the river Son, (Soane)—and follows the meridian of Karára, 81° 18′, as closely as the nature of the country permitted. It spans a meridional distance of about 250 miles, and though commenced in the field season of 1837-38 was not brought to a close until 1844-45.

For the first 110 miles of its length, the Series is carried as a double chain of triangles traversing portions of the Districts of Allahabad, Banda and Fatehpur, and of the Native States of Rewah, Soháwal and Panna. The first 90 miles are situated on the Kaimúr range and the high land which, generally speaking, forms the southern watershed of the Gangetic plain between the meridians of 81° and 82°: the remaining 20 miles cross the lower end of the Doáb between the Jumna and the Ganges. The Series is thereafter continued as a chain formed for the most part of single triangles, through portions of the Districts of Rae Bareli, Bara Banki, Sitapur and Partabgarh, in the Province of Oudh, and it terminates at the side Khánpur-Másí of the North-East Longitudinal Series, in the plains at the feet of the Himalayan Mountains.

Season 1837-38.

PERSONNEL.

Lieut. W. Jones, Bengal Engineers, 1st Asst.
Mr. J. Scully, 2nd Class Sub-Assistant.

In January 1838 Lieutenant Jones of the Bengal Engineers, who was then employed on the measurement of the Sironj Base-Line, was directed by the Surveyor General to organize a small native establishment and make all other necessary preparations with a view to commencing the Karára Series before the close of the current field season. Owing to the paucity of officers available only one assistant could be attached to the party.

The party arrived at Karára on the 1st of March, when Lieutenant Jones and Mr. Scully immediately commenced selecting stations for the required triangulation. In those early days of the survey the opinion was generally held that the links composing a chain of principal triangles should be the fewest possible, and therefore that the sides of the triangles should not be less than 20 miles in length. This restriction, coupled with the prescribed

conditions for securing symmetry, hampered Lieutenant Jones greatly and materially retarded his progress. Thus, writing to the Surveyor General on the 18th May, he reports that "both the result of a minute examination of the ground as far as 60 miles to the north of "Karára and the repeated failures I have met with in my attempts to procure good and "symmetrical triangles compel me to state that I do not expect to succeed in producing such "work as I could wish, and as I feel that you will expect from me". Of one side Kaimúr-Jaliádhar, the shortness of which—seventeen miles—seems to have been a source of considerable concern to him, he says "it was not adopted until I had used every endeavour "during six weeks to get a better one,—until I had myself visited every part of the range "that appeared to offer the remotest chance of success, and cleared much of the heavy jungle "which considerably increases the difficulty of finding two points on this range mutually "visible and yet sufficiently distant". Eventually these difficulties led him to recommend the extension of the "work to the northward by a double series or succession of polygons using short sides"; this was assented to by the Surveyor General as being "very feasible and proper". Five principal stations had been selected by the commencement of June, when the rainy season commenced and sickness broke out in the camp. Lieutenant Jones thereupon proceeded to recess quarters at Allahabad.

Season 1838-39.

PERSONNEL.

Lieut. W. Jones, Bengal Engineers, 1st Asst.
Mr. J. Scully, 1st Class Sub-Assistant.

Lieutenant Jones marched out of Allahabad on the 1st October; but before he had fairly resumed work, the whole camp was seized with jungle fever which compelled him to return to Allahabad. Mr. Scully fell a victim to the disease, and died on the 18th November: Lieutenant Jones himself and the entire native establishment were reduced to such a state of prostration as to leave the Surveyor General no alternative but to suspend the operations, and direct Lieutenant Jones to proceed when sufficiently recovered to join him at Kaliána, where he might be suitably employed in learning the use of the Great Astronomical Circles which were employed on the Great Arc in obtaining determinations of latitude for geodetic requirements; one of these instruments was then being employed there, simultaneously with another at Kaliánpur, in determining the differential latitude, or arc of amplitude between the two stations.

At the commencement of the field season of 1839-40 Lieutenant Jones again proceeded to resume the Karára Series, with the aid of two assistants, Messrs. C. Lane and J. W. Rossenrode; but on the third march from the Head Quarters in Dehra Dún he was taken so seriously ill with jungle fever, that he had to abandon the undertaking, take sick leave, and eventually resign his appointment in the Survey Department.

Season 1841-42.

PERSONNEL.

Captain R. Shortrede, 2nd Bombay European Regiment, 1st Assistant.
Babu Ramdial De, 3rd Class Sub-Assistant.
Mr. D. Kirwan, do. do.

During the recess of 1841 Captain R. Shortrede—of the Bombay Army—was appointed to conduct the Series, and to organize an establishment for the resumption of the work from the point where it had been left by Lieutenant Jones three years previously. The party left the Head Quarters in Dehra Dún early in October; but, owing to various delays and mishaps, it did not reach the first station of operation, Jaliádhar, until the 8th of February, when

the most favorable season of the year for observing had already gone by, and the opportunity was thus lost for pushing the work across a malarious tract of country in which an outbreak of sickness might at any time compel the party to leave the field. The remainder of the month was spent in clearing hill summits of forest. The next month was for the most part spent at the station of Marwás, where Captain Shortrede hoped to commence the observations of the principal angles; but the haziness of the atmosphere rendered all the signals—both lamps and heliotropes—to be wholly invisible. Captain Shortrede therefore moved on to Karára, where the atmosphere proved to be even worse than at Marwás, so that no terrestrial angles could be observed. "On some days", wrote Captain Shortrede, "I could scarcely see the hill at about two miles distance on which I had the referring-mark". On one day the Marwás heliotrope was seen, but it was flaring and unsteady to such a degree that not a single satisfactory measure of the angle between it and the referring-mark could be got. A complete set of angles between a referring-mark and a circumpolar star was however measured here, in order to obtain a direct astronomical determination of the azimuth at Karára, to be employed as the fundamental azimuth of the Series in lieu of the value of azimuth which had been brought up from Sironj through the Calcutta Longitudinal Series. It consisted of two measures of the angle between the mark and the star on each of 12 'zeros', or settings of the horizontal circle of the principal theodolite, Troughton and Simms' 18-inch No. 1.* Complete sets of observations were taken at both elongations of the star, and very satisfactorily; but they form the sum total of the work of final observing which was accomplished during this season. They were concluded on the 8th of April, when Captain Shortrede proceeded to recess quarters at Allahabad, reporting that in the existing state of the weather and with a sick list continually increasing (he had already lost 7 men of his establishment, and had 20 others sick in hospital) he felt that it would be an unwarrantable exposure of human life to remain longer in the field, and that it was his duty to move for the recess season into Allahabad, where the sick might have a better chance of recovery.

Season 1842-43.

PERSONNEL.

Captain R. Shortrede, 2nd Bombay European Regiment, 1st Assistant.
Mr. J. W. Armstrong, 1st Class Sub-Assistant.
Babu Ramdial De, 3rd do.
Mr. D. Kirwan, do. do.

In the following field season the party, strengthened by Mr. J. W. Armstrong—who had acquired considerable experience in the principal triangulation, having been employed for some time on the Rangír Series—left Allahabad on the 15th of November 1842, and made such good progress that by the end of the field season all the stations south of the Jumna had been selected, and the principal observations had been completed for a distance of about 65 miles from the side of origin.

But the general design of the triangulation as laid out by Captain Shortrede differed materially from what had originally been intended by Colonel Everest, in that it consisted of a continuous net-work of triangles in which mutual observations were taken between all stations—however far apart—that happened to be mutually visible, instead of forming a succession of simple polygonal figures in which the mutual observations were restricted to the

* For a description of this instrument see pages 61 to 64 of the Appendices to Vol. II, and for an account of its peculiarities see page 96, and Appendix No. 4 of the same volume.

stations lying contiguous to each other. Theoretically of course the net-work is the best, as it ties the triangulation together more thoroughly; but practically it is far the most troublesome and tedious, to execute originally, and to treat eventually in the course of the general reduction of the triangulation; it is moreover very variable in its influence, tending to strengthen some portions of the net-work much more than other portions. For these reasons it had been deliberately rejected by Colonel Everest in favour of the simpler system of successive independent geometrical figures, which had been introduced on all the other chains of triangles executed up to that time, and has since been uniformly adopted.

On the termination of the field season the party retired to recess quarters at Allahabad where it arrived on the 2nd of June.

Season 1843-44.

PERSONNEL.

Captain R. Shortrede, 2nd Bombay European Regiment, 1st Assistant.
Mr. J. W. Armstrong, 1st Class Sub-Assistant.
„ D. Kirwan, 2nd „ „
Babu Ramdial De, 3rd „ „

Field operations were resumed on the 1st November, Captain Shortrede having meanwhile suggested that the triangulation should be extended over the plains to the north as a chain of single triangles, thus departing not only from his original net-work which had become quite impracticable, but from the simple polygonal form which might have been adopted. Captain Waugh, who had then succeeded Colonel Everest as Surveyor General, directed that the polygonal system should be adhered to as far as practicable; but that if much progress had already been made in laying out the Series as a chain of single triangles, it would not be right to incur the expense and delay which the abandonment of work already performed would occasion; otherwise, as there was no special difficulty in carrying the polygonal system over the country in which the operations were being conducted, he particularly wished that that system should not be departed from.

The selection of stations for a principal triangulation over a perfectly level plain—more particularly when richly cultivated and covered with towns, villages and trees—is, however, an undertaking which requires considerable practical experience, so that surveyors who have been operating for years with great success in a hilly country, may find themselves completely baffled and unable to advance, when they enter on an extensive plain covered with obstacles to distant vision and wholly devoid of commanding eminences. Thus in the early days of this Survey some years elapsed before the most appropriate method of operating in such plains was fully elaborated, as will be seen on reference to Section 3 of Chapter II of Volume II which gives a historical sketch of the successive methods adopted for the selection of stations. Captain Shortrede and his assistants had not as yet become sufficiently acquainted with the proper methods of procedure, and thus the selection of stations and the clearing of the lines between them proceeded very slowly; thus, during this season only five new stations were selected and prepared, by the construction of a tower* at each, as points of observation, and of these stations two were afterwards rejected; the measurement of the principal angles was correspondingly retarded, observations being taken at three stations only, *viz.*, Lálapur, Bagála and Pabhosa.

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* NOTE.—The average height of these five towers was 32 feet; the average time occupied in their construction was a month and twenty days; and their average cost 440 Rupees.

Captain Waugh, having called for copies of the angle books containing the observations of the last two seasons, found that Captain Shortrede had departed from the system of observing which had been introduced by Colonel Everest and was then generally practised in this Survey,* and of which it was a leading feature that two or more observations of every angle should be made at each zero-setting of the azimuthal circle, and the mean taken, the whole being recorded separately from the observations at the other zero-settings. Captain Shortrede took only one observation of an angle at each zero-setting, and he combined the pairs of single observations which were taken at 180° apart—with reversed faces—into one, as if both had been taken on a single zero. By this means his observations escaped criticism, as they were never repeated on the same divisions of the circle, and they became to all appearances much more accordant, having been combined together in a way that—as it so happened†—concealed a large portion of the instrumental error, which was obviously objectionable.

Captain Waugh moreover found that the reduction of the net-work of triangulation, which has already been mentioned, would require the simultaneous solution of about 200 equations of condition, the labour of which would be quite out of proportion to the value of the results; he therefore directed the exclusion of certain stations and the omission of all observations which were redundant, thereby reducing the principal triangulation of the Series to the form in which it now appears; all redundant stations were treated as secondaries.

Season 1844-45.

PERSONNEL.

Southern Section.
- Captain R. Shortrede, 2nd Bombay European Regiment, 1st Assistant.
- Mr. J. W. Armstrong, 3rd Principal Sub-Assistant.
- Mr. D. Kirwan, 2nd Class Sub-Assistant.
- „ J. B. N. Hennessey, 3rd Class Sub-Assistant.

Northern Section.
- Captain J.S. Du'Vernet, 2nd Madras European Regiment, 1st Assistant.
- Mr. J. Mulheran, 1st Class Sub-Assistant.
- „ W. Glynn, 2nd „ „

In order to expedite the completion of the Series, Captain Waugh deputed a second party, under Captain J. S. Du'Vernet, to operate at the northern end during the field season of 1844-45, commencing at a side of 'the North Connecting Series'—now known as the North-East Longitudinal Series—which had been established during the previous field season, in close proximity to the Karára meridian. He also directed the abandonment of polygonal figures and the adoption of single triangles, in both sections of the Series, "whereby the operations will be greatly accelerated, although this object will be only obtained at the sacrifice of some degree of precision"; he enjoined however that the single triangles were to be laid out "with every attention to symmetry and elegance".

The direct distance between the parallel up to which the triangulation had been completed, and the side of the 'North Connecting Series' on which it was intended to close, was about 160 miles. In this distance about 25 miles had been already prepared in the southern section by the construction of tower stations, and opening the lines between them, during the previous field season. In the northern section however no preparations had been made; nevertheless Captain Du'Vernet succeeded in carrying his triangulation down to the side Sora-Janai, thus completing a chain of 15 triangles which extended over a

* For full particulars of this system see Section 2 of Chapter II, Volume II, and for a brief outline see Section 1 of Chapter II of Volume VII.

† For an explanation of this see page 96 and Appendix 4 of Volume II.

direct distance of about 90 miles in a single field season, and executing much more than half the amount of work which remained to be accomplished.

In the southern section matters did not at first progress equally satisfactorily. When the better part of the field season was over, Captain Shortrede's services were placed at the disposal of the Bombay Government for other duties, and the charge of the party was made over to Mr. J. W. Armstrong. He set to work with great vigour to complete this section by carrying it up to the side to which the northern section was being brought down by Captain Du'Vernet; and by dint of great perseverance, and continuing to operate in the field until the middle of July, long after the hot weather had set in, he succeeded not only in accomplishing the task which he had undertaken, but in revising some angles of which the previous measures were discordant and unsatisfactory, and in improving a group of single unsymmetrical triangles by converting it into a tetragon. He also observed an azimuth of verification at Pabhosa.

The 18-inch Theodolite by Troughton and Simms which had hitherto been used by Captain Shortrede, was replaced at the commencement of this season by an 18-inch Theodolite by Cary, which had originally been obtained from the Madras Observatory and is described at page 68 of the Appendices to Volume II. But this instrument being also deemed unsatisfactory was replaced, in the month of April, by Harris and Barrow's 15-inch Theodolite, which had given very satisfactory results in Mr. Armstrong's hands on the Rangír Series, and is described at page 72 of the Appendices to Volume II.

The measurement of the principal angles in the northern section was executed by Captain Du'Vernet, with Saiyad Mir Mohsin's 18-inch Theodolite, described at page 67 of the Appendices to Volume II.

By the completion of the Karára Series the circuit of triangles which is formed by the Northern Section of the Great Arc and the Karára Series, and the sections of the two longitudinal chains at their extremities by which the two meridional chains are connected together, was also completed. The values of the closing errors as derived from the calculations of that time—which however were only approximate and preliminary to the final reductions—were small in latitude and longitude, but so large in side and azimuth that Captain Waugh proceeded in person to the station of Sora, at the side of junction between the two sections of the series, and determined an azimuth of verification there, by astronomical observations with the theodolite used by Captain Du'Vernet. The results led him to the conclusion that the southern portion of the Karára Series was the more defective of the two. Still however he was of opinion that the closing errors were "evidently of an accu-"mulative character, arising in fact from a want of minute precision in the instrumental "means employed, and therefore only to be remedied by a revision of the work with superior "means". The errors however were insignificant from a geographical point of view, and would exercise no effect on the Indian Atlas; they were also too minute to influence local topographical and revenue survey operations. Thus the Surveyor General, though distressed by their magnitude, concluded that he would not be "justified in recommending a revision "of the work, because an urgent necessity exists for extending the trigonometrical opera-

"tions over other parts of the country remaining to be triangulated".

On the completion of the Simultaneous Reduction of the North-East Quadrilateral, it was found that the errors which had actually been dispersed over the Karára Series, between the origin Karára-Marwás and terminus Khánpur-Másí, were as follows:—

In side	Logarithm	+ 0·000,0508,7
	giving a ratio of about 7⅓ inches per mile.	
„	Latitude	+ 0″·826
„	Longitude	+ 0 ·047
„	Azimuth	− 7 ·833

The trigonometrical determinations of the heights of the stations of this Series above the mean sea level, have been corrected by connecting the stations, wherever possible, with the lines of spirit levels which have been executed of late years in the course of operations in the Trigonometrical and the Revenue branches of the Survey Department. A list of the stations which have been so connected will be found on page 55—M; a statement of the several sections into which the Series is divided, as well as the method of adjustment employed is detailed on page 39 of Part I of Volume VII. It will here suffice to state that the spirit levels show that occasional errors of a magnitude which reaches a maximum of 7·7 feet have been made in the trigonometrical determinations of differences of level between contiguous stations; but in the long run these errors have a tendency to cancel each other, the total error generated between the sides of origin and terminus being less than the maximum single error.

Secondary Triangulation.

In the southern portion of the Series the principal stations are all situated on hills, and here therefore the secondary triangulation consists of the measurement of angles at those stations to fix all the most prominent and important points visible from them, such as the temples in Rewah. The angles were measured with the 18-inch theodolite which was employed for the principal triangulation. Usually two angles only of each triangle were measured, the point itself being unvisited; but in a few instances the points are stations of the net-work of triangulation which was primarily designed by Captain Shortrede and afterwards converted into a chain of simple consecutive figures by the elimination of superfluous stations; in these instances the third angle also was measured with the 18-inch theodolite.

On entering the plains it became necessary to fix points in and around the important city of Allahabad, lying about 20 miles to the east of the Series. Observations were taken from the stations of Bagála (XII) and Singraur (XV), with the 18-inch theodolite, which fixed a station in the Fort and the steeple of the Church, and thus furnished a base around which a minor triangulation was executed—probably with a 12-inch theodolite—by Mr. Mulheran when residing in Allahabad during the recess of 1845. In the following field season a chain of secondary triangles was carried up the Ganges from Mirzapore to Allahabad—

as a part of the operations of the Gurwáni Series—and extended to Singraur (XV), by Mr. Glynn; a branch chain was carried by Mr. Mulheran from Allahabad to Bagála (XII), passing through and connecting with his triangulation of the preceding year; both chains were executed with 12-inch theodolites. These triangulations have been adjusted to fit between the finally determined position-values of the principal stations of the two series on which they rest; the portion including and lying to the west of Allahabad is now published as appertaining to the Karára Series, while that to the east has been allotted to the Gurwáni Series.

A few secondary points were fixed in the vicinity of the side Karra (XVI) to Pariáon (XVIII) by a ray-trace triangulation executed by Mr. Mulheran in 1845. In the same year a point in the town of Rae Bareli, and a few other secondary points, were fixed by ray-trace triangulations depending on the sides Sora (XXIV) to Janai (XXV), Thána (XXXVII) to Imlia (XXXVI), and the terminal side Khánpur to Másí, in connection with Captain Du'Vernet's operations.

In 1845 Mr. Glynn was deputed by Captain Du'Vernet to carry a series of triangles with a 12-inch theodolite, from the side Pesar (XXX) to Utiámau (XXXII) up to the city of Lucknow, in order to fix points of importance in and around that city. It was supplemented and extended a few months subsequently by Mr. Mulheran. The stations of the triangulation not having been permanently marked are not now forthcoming; consequently the usual data of the triangles are not given, but merely the latitudes and longitudes of the domes, buildings and other permanent marks of which the positions were determined*.

In season 1852-53 a chain of secondary triangles was carried up the Gogra River, in connection with the operations of the Hurílaong Meridional Series; it crosses the terminal side of the Karára Series, and connects with the station of Másí, at the eastern extremity of that side. The details appertaining to stations No. 164 to 217 of this river triangulation are now published as a portion of the Karára Series. The angles were measured with a 12-inch theodolite by Mr. Belletty. This triangulation has been adjusted to fit exactly between the finally determined position-values of the station Másí and the station Orejhár, the latter being No. XXIV of the Gurwáni Series.

C. WOOD,

Surveyor 2nd Grade.

MUSSOOREE: *May* 1881.

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* One of these was the site of the transit telescope in the Royal Observatory, the astronomically determined position of which—as deduced by Lieut-Colonel Wilcox—was as follows:—

Latitude 26° 51′ 17″·8, by observations with the mural circle in 1842.
Longitude 80 59 11 ·4, by observations on moon culminating stars in 1841.

The corresponding trigonometrically deduced values are { Lat. 26° 51′ 12″·9 / Long. 80 58 57 ·6

Thus the astronomical determination of latitude exceeds the trigonometrical by 4″·9, which shows that—assuming both to be exact—the proximate local attractions to the south are more influential on the direction of the plumb line in Lucknow than the attraction of the distant Himalayan ranges to the north. The astronomical determination of longitude differs from the trigonometrical by less than 14″; the latter rests on an astronomical determination at Madras which was made within a few years of the one at Lucknow—see Chapter XI of Vol. II—and is now known to be about 2′ 30″ in excess of the true longitude from Greenwich; thus it seems probable that the astronomical longitudes of Madras and Lucknow were both affected in a nearly equal degree by the errors of the then existing Lunar Tables.

J. T. W.

ALPHABETICAL LIST OF STATIONS.

KARARA MERIDIONAL SERIES.

NUMERICAL LIST OF STATIONS.

XXIII	Karára. (of Calcutta Longitudinal Series).
XXVI	Marwás. (of Calcutta Longitudinal Series).
I	Kaimúr.
II	Jalíádhar.
III	Dádar.
IV	Náru.
V	Burwa.
VI	Kotar Kaimári.
VII	Doñri.
VIII	Sirmaol.
IX	Kachár.
X	Mhao.
XI	Lálápúr.
XII	Bagála.
XIII	Pabhosa.
XIV	Nagdílpúr.
XV	Singraor.
XVI	Karra.
XVII	Majilgáoñ.
XVIII	Pariáoñ.
XIX	Horesa.
XX	Sálaon.
XXI	Tángan.
XXII	Khára.
XXIII	Munai.
XXIV	Sora.
XXV	Janai.
XXVI	Taoli.
XXVII	Tikiri.
XXVIII	Parewa.
XXIX	Basantpúr.
XXX	Pesar.
XXXI	Turkani.
XXXII	Utíámáo.
XXXIII	Amoli.
XXXIV	Samnadío.
XXXV	Ragaopúr.
XXXVI	Imlía.
XXXVII	Thána.
XXXVIII	Asrafpúr.
XXXIV	Khánpúr. (of North-East Longitudinal Series).
XXXV	Másí. (of North-East Longitudinal Series).

KARARA MERIDIONAL SERIES.

DESCRIPTION OF PRINCIPAL STATIONS.

Of the 38 Principal Stations composing this Series, the 13 southernmost, as also the 2 initial stations, are on hills, and consist generally of low solid platforms, each carrying a mark at its upper surface and having a corresponding mark below; in a few instances the station is denoted by a pile of stones, on which the usual mark of a circle and dot is fixed, or in the absence of any platform this mark is engraved on the rock *in sitû*. When the Series entered on the plains, suitable artificial elevations had to be constructed, as usual, to admit of overlooking the curvature of the globe. At the first 10 stations, each of these structures consists of a basement 28 to 32 feet in diameter and 3 to 6 feet high, with a mark-stone fixed in its upper surface; this surface carries a masonry pillar, which in some instances is solid and includes at least one mark-stone and in others is perforated throughout its length: the pillar is either square or circular at base and 7 to 8 feet in width, terminating at top in a circle 4 feet in diameter; it is enclosed in a tower of unburnt bricks varying in diameter from 20 to 27 feet at base and from 16 to 21 feet at top: the tower is commonly faced with burnt brick as a protection against rain. At each of the remaining 15 stations of the Series as well as at the 2 terminal stations, the internal masonry pillar is without exception of the solid kind, while the external diameter of the tower varies from 17 to 22 feet at base and from 11 to 14 feet at top: the structure at one of these terminal stations, *viz.* Másí, underwent considerable alteration when revisited in course of the operations of the North-East Longitudinal Series.

The following descriptions have been compiled from those given in the original MS. General Report and other original records of this Series, supplemented in respect to the neighboring villages by information obtained from the Revenue and Topographical Survey maps of the country traversed. The information as to the local sub-divisions in which the several stations occur has been derived from the latest Annual Reports received from the District officers to whose charge the stations have been committed.

XXIII.—(*Of the Calcutta Longitudinal Series*). Karára Hill Station, lat. 24° 5′, long. 81° 18′—observed at in 1827, 1842 and 1865—is situated on the highest point of a small range of hills running north-east and south-west, and is distant about 3 miles E.N.E. of the village of Karára; pargana Mádhogarh of the

Rewah territories.

The pillar is solid and contains two marks, the upper 3·0 feet above the lower, which is engraved on the rock *in sitú*, having been placed there in 1827. The station was revisited in 1842 for the purpose of originating the Karára Meridional Series, but no alteration in its construction appears to have been made. On again visiting it in 1865, the upper mark was found displaced, and a new pillar carrying a mark-stone at summit in the normal of the old lower mark was then built to the same height as before. The distances and bearings of surrounding villages are:—Dal 1·6 miles W. by N.; Harai 1·8 miles E. by S.; and Mer 1·4 miles S.W.

XXVI.—(*Of the Calcutta Longitudinal Series*). Marwás Hill Station, lat. 24° 5′, long. 81° 49′—observed at in 1827, 1828, 1842 and 1865—is situated on a range of hills running east and west about 2 miles S.S.W. of the town of Marwás; pargana Marwás of the Rewah territories.

The pillar is solid and contains two marks, the upper 3·6 feet above the lower which is engraved on the rock *in sitú*, having been placed there in 1827. The station was revisited in 1842 for the purpose of originating the Karára Meridional Series, but no alteration appears to have been made in its construction. On again visiting it in 1865, the upper mark-stone was found undisturbed, and a new pillar was then built to the same height as before. The distances and bearings of neighboring villages are:—Amarha 0·9 mile N.W. by N.; and Sondia 2·2 miles N.E. by E.

I. Kaimúr Hill Station, lat. 24° 17′, long. 81° 12′—observed at in 1843—is situated on the flat top of a hill so called, and is distant about half a mile S.W. of a tank; pargana Gurha of the Rewah territories.

The station consists of a pile of stones 6 feet high, and is marked as usual with a circle and dot. The distances and bearings of surrounding villages are:—Bagdhari 1·8 miles S.W. by S.; Chanin 2·2 miles N.W.; Bhitarri 2·2 miles E.S.E.; and the hamlet of Hasthar 0·9 mile E. by N.

II. Jaliádhar (*Jalládhar*) Hill Station, lat. 24° 22′, long. 81° 27′—observed at in 1843— is situated on the summit of a long hill so called which is the highest in that part of the range; pargana Gurha of the Rewah territories.

No description of the construction of the station is forthcoming in the original records, but it may be assumed that it is marked by a structure somewhat similar either to that at Kaimúr or at Dádar. The distances and bearings of surrounding villages are:—Katra 2·7 miles W.N.W.; Mau 2·2 miles S.E.; and Bírpur 1·9 miles S. by E.

III. Dádar Hill Station, lat. 24° 36′, long. 81° 15′—observed at in 1843—is situated on the summit of a small detached hill about 1¼ miles S. by W. of the village of Dádar; pargana Rewah of the Rewah territories.

The station consists of a platform which has a mark-stone at its upper surface. The distances and bearings of surrounding villages are:—Bankunia 0·2 mile E.S.E.; Sakarwar 1·4 miles W.; Murárpur or Marha 1·5 miles N.W.; and Banjára about 1½ miles E.N.E.

IV. Náru Hill Station, lat. 24° 30′, long. 81° 0′—observed at in 1843—is situated at the north-eastern extremity of a large flat-topped hill called Nárugarh on which there are some tanks and several springs of water, and whose summit is enclosed by a stone wall from 5 to 7 feet in height and 4 feet in thickness: in the Soháwal state.

No description of the construction of the station is forthcoming in the original records, but it may be assumed that it is marked by a structure somewhat similar either to that at Kaimúr or at Dádar. The distances and bearings of surrounding villages are:—Gurhuru 1·1 miles E.; Richari 1·6 miles N.; Kaitha 2·8 miles S.W.; and Beharra 2·2 miles S.S.E.

V. Burwa Hill Station, lat. 24° 33′, long. 81° 31′—observed at in 1843—is situated on a detached hill about half a mile E. of Burwa: pargana Raipur of the Rewah territories.

The station consists of a pile of stones—the remains of a small Hindu temple—and is marked as usual with a circle and dot. The distances and bearings of surrounding villages are:—Buradi 0·8 mile S.S.W.; Barhái 1·1 miles N.; Gurgaon 2·2 miles E.; and the town of Raipur 2·6 miles N.W.

VI. Kotar Kaimári Hill Station, lat. 24° 43′, long. 81° 3′—observed at in 1843—is situated on a block named Dongi at the western and highest part of the hill called Kaimári, and is distant somewhat more than 2 miles N.E. of the large village of Kotar: the block itself is held in much veneration in the neighbor-

hood, for tradition affirms that it is the spot from which the father of Rámchandra shot an arrow across a distance of 15 or 16 miles. Pargana Simurria of the Rewah territories.

The station is marked on a large block of laterite being the southern and lower of two blocks which project conspicuously. The distances and bearings of surrounding places are:—Kotar Kaimári hill fort 0·8 mile E. by N.; Bhamaun 1 mile N.; Umri 1 mile W.; and Abair 1·4 miles S.S.E.

VII. Donri (*Doñri*) Hill Station, lat. 24° 54′, long. 81° 14′—observed at in 1843—is situated on the summit of a hill 1·3 miles N.N.E. of Donri village, and stands on the boundary between the Rewah and Panna territories; pargana Simurria of the Rewah territories.

The station consists of a square platform about 1 foot high, and is marked as usual with a circle and dot. The distances and bearings of surrounding villages are:—Kataik 2·5 miles S.W.; Mainaha 2·3 miles N. by W.; and Barua 1 mile N.N.E.

VIII. Sirmaul (*Sirmaol*) Hill Station, lat. 24° 53′, long. 81° 26′—observed at in 1843—is situated on the highest part of the hill, and is distant about 3¼ miles N. by E. of the village of Sirmaul: pargana Sirmaul of the Rewah territories.

The station consists of a square platform about 2 feet high which has a mark-stone at its upper surface. The distances and bearings of surrounding villages are:—Itma 1·2 miles W.N.W.; Pathera 2·1 miles N. by E.; Luk 2·6 miles N.E.; and Bagha 2 miles S.

IX. Kachár Hill Station, lat. 24° 57′, long. 81° 5′—observed at in 1843—is situated on the highest part of a hill so called, and is distant about 3 miles from Amua the residence of the Raja of Chaurasi. A stream in a rocky dell is about a mile to the S.E., and at 2 or 3 miles distance there is a waterfall which was formerly used as a place of Hindu pilgrimage: in the Panna state.

The station consists of a square platform about 1 foot high, and is marked as usual with a circle and dot. The distances and bearings of neighboring villages are:—Amama 3·4 miles S. by W.; Chutairi 3·5 miles S.W.; and Kulkaria 4·1 miles S.E.

X. Mau (*Mhao*) Hill Station, lat. 25° 1′, long. 81° 18′—observed at in 1843—is situated on the highest part of the north-eastern knob of a hill, and is distant about 2 miles N.E. of Mau village: tahsíl Mau, pargana Chhíbu, district Banda.

The station consists of a square platform, and is marked as usual with a circle and dot. The distances and bearings of surrounding villages are:—Gurdari 1·4 miles N.W. by N.; and Uba 2·6 miles S.E.

XI. Lálapur (*Lálápúr*) Hill Station, lat. 25° 14′, long. 81° 8′—observed at in 1844—is situated on the top of Valmík's *math* (a low temple) on an isolated hill, and is named after the village of Lálapur which lies close to its north-eastern foot: tahsíl Karwi, pargana Tarhawan, district Banda.

The station mark is engraved at 3 inches to the west of the intersection of lines joining the corners of the walls—15 inches high—of the terrace the internal dimensions of which are 8 feet by 7 feet. The distances and bearings of surrounding villages are:—Bagrahi (on the left bank of the Ohan nadi) nearly 0·5 mile W.; Ajaura 0·4 mile N. by E.; Kairi Kutnassa 1 mile E. by N.; and Urwara 1 mile S.S.W.

XII. Bagála Hill Station, lat. 25° 14′, long. 81° 39′—observed at in 1844—is situated on the highest part of a hill, and is named after the village of Bagála which lies at three quarters of a mile to the N.E.: thána, tahsíl and pargana Bárah, district Allahabad.

The station is marked on the rock *in situ*. The distances and bearings of surrounding villages are:—Unturi 1·1 miles E.S.E.; Londh Kalán 1·4 miles E.N.E.; Burgarh 2·3 miles W.; and Baisa and Shiurájpur 1·2 and 2·3 miles, respectively, S. by E.

XIII. Pabhosa Hill Station, lat. 25° 21′, long. 81° 22′—observed at in 1844—is situated on the ruins of an old temple at the highest part of a hill, elevated about 300 feet above the level of the Jumna (which flows at ¼ mile to the south) and remarkable from the circumstance of its being the only hill in the Doab; it is named after the village of Pabhosa which is distant 0·4 mile E.S.E.: thána Pachchhim Saríra, tahsíl Manjhanpur, pargana Atharban, district Allahabad.

The station is marked on a long block of stone imbedded in the mound. The distances and bearings of surrounding villages are:—Barehri 1 mile W.; Amind 1·6 miles N. by E.; and Singwal 2·3 miles E. by N.

XIV. Nagdílpur (*Nagdílpúr*) Tower Station, lat. 25° 34′, long. 81° 12′—observed at in 1845—is situated close to the west of the small village of Nagdílpur: tahsíl Khakhreru, pargana Ekdala, district Fatehpur.

The station consists of a tower of unburnt bricks 33 feet high—with diameters at top and bottom, respectively, of 17 and 23 feet—enclosing a central hollow pillar of masonry 7 feet in diameter at bottom and 4 feet at top; the whole standing on a basement 31 feet in diameter and 6 feet high, having the central portion (diameter 8 feet) of masonry and carrying a mark-stone at its upper surface. The distances and bearings of surrounding villages are:—Kabra 0·4 mile W. by S.; Ratanpur 0·6 mile N.W.; and Bírsinghpur 1 mile E.S.E.

XV. Singraur (*Singraor*) Tower Station, lat. 25° 35′, long. 81° 41′—observed at in 1844—stands on the left bank of the Ganges, and is distant 0·6 mile S.S.W. of the village of Singraur: thána and pargana Nawábganj, tahsíl Soraon, district Allahabad.

The station consists of a tower of unburnt bricks 32 feet high—with diameters at top and bottom, respectively, of 16 and 23 feet—enclosing a central hollow core of masonry 7 feet in diameter at bottom and 4 feet at top; the whole standing on a basement 32 feet in diameter and 6 feet high, having the central portion (diameter 8 feet) of masonry and carrying a mark-stone at its upper surface. The distances and bearings of surrounding villages are:—Jhaupurwa 0·9 mile S.W.; Patna 1·2 miles N.W.; Mansúrabad 1·7 miles E. by N.; and Rámnagar 1·3 miles S.E.

XVI. Karra Tower Station, lat. 25° 42′, long. 81° 25′—observed at in 1844 and 1845—is situated on the highest part of the old fort of Karra not far from the right bank of the Ganges which is depressed about 135 feet below it: tahsíl Siráthu, thána and pargana Karra, district Allahabad.

The station consists of a tower of burnt bricks 27 feet high—with diameters at top and bottom, respectively, of 21 and 27 feet—enclosing a central hollow pillar of masonry 7 feet in diameter at bottom and 4 feet at top; the whole standing on a basement 28 feet in diameter and 4½ feet high, which carries a mark-stone at its upper surface. The distances and bearings of surrounding villages are:—Karra 0·3 mile N.E.; Kamálpur 0·9 mile N.W.; Sultánpur 0·7 mile S.W.; and Akbarpur 1·5 miles E.S.E.

XVII. Majilgaon (*Majilgáon*) Tower Station, lat. 25° 45′, long. 81° 13′—observed at in 1845—is situated on a mound adjoining the western side of the village of Majilgaon and distant about half a mile N. of the Grand Trunk Road: tahsíl Khága, pargana Hathgaon, district Fatehpur.

The station consists of a tower of unburnt bricks 25 feet high—with diameters at top and bottom, respectively, of 16 and 20 feet, and faced with burnt brick—enclosing a central solid pillar of masonry 8 feet square at base and 4 feet diameter at top; the whole standing on a basement 29 feet in diameter and 3 feet high, having at its upper surface a mark-stone in the normal of which other mark-stones have been fixed in the solid pillar at distances from it of 5, 10, 15, 20 and 25 feet. The distances and bearings of surrounding villages are:—Kathogan 1·9 miles W. by S.; Búdwán 1 mile N. by W.; Kurhaha 1·1 miles E.S.E.; and Purain 2·1 miles S. by E.

XVIII. Pariáon (*Pariáon*) Tower Station, lat. 25° 50′, long. 81° 25′—observed at in 1845—is situated on a mound adjoining the village of Pariáon: thána and tahsíl Kunda, pargana Mánikpur, district Partabgarh.

The station consists of a tower of unburnt bricks 25 feet high—with diameters at top and bottom, respectively, of 16 and 20 feet, and faced with burnt brick—enclosing a central solid pillar of masonry 8 feet square at base and 4 feet diameter at top; the whole standing on a basement 29 feet in diameter and 3 feet high, having at its upper surface a mark-stone in the normal of which other mark-stones have been fixed in the solid pillar at distances from it of 5, 10, 15, 20 and 25 feet. The distances and bearings of surrounding villages are:— Murussapur 1·2 miles S.S.W.; Gauri 0·8 mile N.W.; Kiraudi 1 mile N. by E.; and Sayyid Yasímpur 1·4 miles S.E.

XIX. Horesa Tower Station, lat. 25° 55′, long. 81° 17′—observed at in 1845—is situated on a mound adjoining the western side of the village of Horesa, and is distant about 1¼ miles E. of the left bank of the Ganges: thána Jagatpur Tánghan, tahsíl, pargana and district Salon.

The station consists of a tower of unburnt bricks 25 feet high—with diameters at top and bottom, respectively, of 16 and 20 feet, and faced with burnt brick—enclosing a central hollow pillar of masonry 8 feet square at base and 4 feet diameter at top; the whole standing on a basement 29 feet in diameter and 3 feet high, having at its upper surface a mark-stone to which access was had by means of a small arched passage. The distances and bearings of surrounding villages are:—Madáripur 0·3 mile S.W. by S.; Puchkura 1·1 miles N.N.E.; and Gangauli 0·6 mile S.E. by S.

XX. Sálon (*Sálaon*) Tower Station, lat. 26° 2′, long. 81° 30′—observed at in 1845—is situated near a temple standing on the highest part of the mound on which the town of Salon is built: thána, tahsíl, pargana and district Salon.

The station consists of a tower of unburnt bricks 25 feet high—with diameters at top and bottom, respectively, of 16 and 20 feet, and faced with burnt brick—enclosing a central solid pillar of masonry 8 feet square at base and 4 feet diameter at top; the whole standing on a basement 29 feet in diameter and 3 feet high, having at its upper surface a mark-stone in the normal of which a second mark-stone has been fixed on the summit of the solid pillar. The distances and bearings of surrounding villages are:—Saindhia 1 mile S.W.; Rájapur 1·1 miles N.W. by W.; Sanda Saidun 1·3 miles N.E.; and Aunasudra 1·1 miles E.

XXI. Tánghan (*Tángan*) Tower Station, lat. 26° 3′, long. 81° 19′—observed at in 1845—is situated on a mound adjoining the village of Tánghan: thána Jagatpur Tánghan, tahsíl Lalganj, pargana Dalmau, district Rae Bareli.

The station consists of a tower of unburnt bricks 25 feet high—with diameters at top and bottom, respectively, of 16 and 20 feet, and faced with burnt brick—enclosing a central solid pillar of masonry 8 feet square at base and 4 feet diameter at top; the whole standing on a basement 29 feet in diameter and 3 feet high, having at its upper surface a mark-stone in the normal of which other mark-stones have been fixed in the solid pillar at distances from it of 5, 10, 15, 20 and 25 feet. The distances and bearings of surrounding villages are:—Jingna 0·8 mile S.W.; Jagatpur 0·4 mile N.W.; Pura Bijai Kalán 0·8 mile E.; and Bairihar 0·8 mile S.S.E.

XXII. Khára Tower Station, lat. 26° 8′, long. 81° 13′—observed at in 1845—is situated on a mound about 350 yards N.N.W. of the large village of Khára or Bela Khára: thána Jagatpur Tánghan, tahsíl, pargana and district Rae Bareli.

The station consists of a tower of unburnt bricks 25 feet high—with diameters at top and bottom, respectively, of 16 and 20 feet, and faced with burnt brick—enclosing a central solid pillar of masonry 8 feet square at base and 4 feet diameter at top; the whole standing on a basement 29 feet in diameter and 3 feet high, having at its upper surface a mark-stone in the normal of which another mark-stone has been fixed in the summit of the solid pillar, others being fixed intermediately. The distances and bearings of surrounding villages are:—Jalálpur 0·4 mile N.W.; Habíb-ka-purwa 1 mile N.E. by E.; and Gaura Umarni 0·9 mile S.W.

XXIII. Munai Tower Station, lat. 26° 11′, long. 81° 23′—observed at in 1845—is situated on a small mound about 300 yards S. by W. of the village of Munai: thána Mau, tahsíl, pargana and district Rae Bareli.

The station consists of a tower of unburnt bricks 25 feet high—with diameters at top and bottom, respectively, of 16 and 20 feet, and faced with burnt brick—enclosing a central solid pillar of masonry 8 feet square at base and 4 feet diameter at top; the whole standing on a basement 29 feet in diameter and 3 feet high, having at its upper surface a mark-stone in the normal of which other mark-stones have been fixed in the solid pillar at distances from it of 5, 10, 15, 20 and 25 feet. The distances and bearings of surrounding villages are:—Goyindwára 0·6 mile W. by S.; Nathuapur 1 mile E.N.E.; Banihapurwa 1·2 miles S.E.; and Sehi-ka-purwa 0·7 mile S.S.W.

XXIV. Sora Tower Station, lat. 26° 17′, long. 81° 15′—observed at in 1845—is situated on an elevated mound distant about 500 yards S.S.W. of the village of Sora: thána, tahsíl, pargana and district Rae Bareli.

The station consists of a tower of unburnt bricks 24 feet high—with diameters at top and bottom, respectively, of 14 and 19 feet—enclosing a central solid pillar of masonry having a mark-stone at its base, and others at 8, 16 and 24 feet respectively above it. The distances and bearings of surrounding villages are:—Tandu 0·5 mile S.E.; Majhgawan Ráo 1·3 miles W. by N.; Katkan-ka-purwa 0·8 mile N.; and Suranwán 1·4 miles E. by S.

XXV. Janai Tower Station, lat. 26° 22′, long. 81° 24′—observed at in 1845—is situated on a mound distant 600 yards N.W. by N. of the village of Janai: thána and tahsíl Digbijaiganj, pargana Simrauta, district Rae Bareli.

The station consists of a tower of unburnt bricks 24 feet high—with diameters at top and bottom, respectively, of 14 and 20 feet—enclosing a central solid pillar of masonry having a mark-stone at its base, and others at 8, 14, 20 and 24 feet respectively above it. The distances and bearings of surrounding villages are:—Chandapur 1·5 miles W.; Domapur 0·3 mile N.; Maharájpur 1·4 miles E. by S.; and Balipur 1·1 miles S.S.W.

XXVI. Tauli (*Taoli*) Tower Station, lat. 26° 27′, long. 81° 15′—observed at in 1845—is situated on

high ground distant about half a mile N.W. of the village of Tauli: thána and tahsíl Digbijaiganj, pargana Inhauna, district Rae Bareli.

The station consists of a tower of unburnt bricks 30 feet high—with diameters at top and bottom, respectively, of 14 and 19 feet—enclosing a central solid pillar of masonry having a mark-stone at its base, and others at 9, 17, 24 and 30 feet respectively above it. The distances and bearings of surrounding villages are:—Pahnasa 1·3 miles W.S.W.; Unchauri 0·6 mile N. by W.; Puránaganj 1·1 miles E.; and Ghorauna 1·2 miles S.

XXVII. Tikiri Tower Station, lat. 26° 33′, long. 81° 25′—observed at in 1845—is situated about 350 yards S.S.E. of the ruined village of Tikiri: thána Mohanganj, tahsíl Digbijaiganj, pargana Inhauna, district Rae Bareli.

The station consists of a tower of unburnt bricks 30 feet high—with diameters at top and bottom, respectively, of 12 and 20 feet—enclosing a central solid pillar of masonry having a mark-stone at its base, and others at 8, 14, 20, 26 and 30 feet respectively above it. The distances and bearings of surrounding villages are:—Rámpur 1·3 miles W.; Sewapur 1·2 miles N.; Jaitpur 1·4 miles E.; and Kadupur 0·8 mile S.S.E.

XXVIII. Parewa Tower Station, lat. 26° 38′, long. 81° 15′—observed at in 1845—is situated on low ground and is distant nearly 1 mile E. of the village of Parewa: district Bara Banki.

The station consists of a tower of unburnt bricks 30 feet high—with diameters at top and bottom, respectively, of 14 and 19 feet—enclosing a central solid pillar of masonry having a mark-stone at its base, and others at 10, 20 and 30 feet respectively above it. The distances and bearings of surrounding villages are:—Dahírapur 0·2 mile N.W.; Khaira Kunku 1·2 miles E. by S.; Sonbaba 0·8 mile S.S.E.; and Khajuria 0·6 mile S.W.

XXIX. Basantpur (*Basantpúr*) Tower Station, lat. 26° 43′, long. 81° 25′—observed at in 1845—is situated on slightly elevated ground within a couple of hundred yards S.S.W. of the village of Basantpur: thána Zaidpur, tahsíl Haidargarh, pargana Siddhaur, district Bara Banki.

The station consists of a tower of unburnt bricks 24 feet high—with diameters at top and bottom, respectively, of 14 and 19 feet—enclosing a central solid pillar of masonry having a mark-stone at its base, and others at 8, 14, 20 and 24 feet respectively above it. The distances and bearings of surrounding villages are:—Dandiya 0·8 mile W.; Simrawan 0·7 mile N.E. by N.; Díh Rámpur 0·7 mile E.S.E.; and Janipur 1 mile S.S.W.

XXX. Pesar Tower Station, lat. 26° 49′, long. 81° 15′—observed at in 1845—is situated on elevated ground adjoining the village of Pesar, and is distant a few yards from the left bank of the Reth river: thána and tahsíl Nawabganj, pargana Satrikh, district Bara Banki.

The station consists of a tower of unburnt bricks 25 feet high—with diameters at top and bottom, respectively, of 14 and 19 feet—enclosing a central solid pillar of masonry having a mark-stone at its base, and others at 8, 16 and 25 feet respectively above it. The distances and bearings of surrounding villages are:—Nagraura 1 mile W.; Gaiaspur 0·5 mile N.N.E.; Sarai Parsanda 0·6 mile S.E.; and Tehri 0·9 mile S.W. by S.

XXXI. Turkani Tower Station, lat. 26° 55′, long. 81° 25′—observed at in 1845—is situated on high ground immediately west of the village of Turkani, and is distant 0·4 mile from the left bank of the Kalyáni river: thána Nawabganj, tahsíl Rám Sanehi Ghat, pargana Daryabad, district Bara Banki.

The station consists of a tower of unburnt bricks 24 feet high—with diameters at top and bottom, respectively, of 14 and 20 feet—enclosing a central solid pillar of masonry having a mark-stone at its base, and others at 8, 16, 20 and 24 feet respectively above it. The distances and bearings of surrounding villages are:—Khidrapur 0·7 mile S.E.; Safdarganj 1·6 miles W.; and Auliapur 1 mile N.

XXXII. Utiámau (*Utiámáo*) Tower Station, lat. 27° 0′, long. 81° 15′—observed at in 1845—is situated on the ruins of the village of Utiámau, and is considerably elevated above the level of the surrounding plain: thána and tahsíl Nawabganj, pargana Dewa, district Bara Banki.

The station consists of a tower of unburnt bricks 24 feet high—with diameters at top and bottom, respectively, of 14 and 19 feet—enclosing a central solid pillar of masonry having a mark-stone at its base, and others at 8 and 24 feet respectively above it. The distances and bearings of surrounding villages are:—Shaikhpur 0·5 mile W.; Jíwanpur 0·6 mile N.; Ugeli 0·7 mile E.; and Kumurkha 0·5 mile S.E.

XXXIII. Amoli Tower Station, lat. 27° 6′, long. 81° 24′—observed at in 1845—is situated in low ground, and is distant 0·7 mile S.W. of the village of Amoli Kalán: thána and pargana Rámnagar, tahsíl Fatehpur, district Bara Banki.

The station consists of a tower of unburnt bricks 30 feet high—with diameters at top and bottom, respectively, of 14 and 20 feet—enclosing a central solid pillar of masonry having a mark-stone at its base, and others at 8, 14, 20, 26 and 30 feet respectively above it. The distances and bearings of surrounding villages are:—Khilaura 0·6 mile W.; Manaura 1·3 miles N. by W.; Biknapur 0·9 mile E.S.E.; and Thal Khurd 0·5 mile S.

XXXIV. Samnadio (*Samnadío*) Tower Station, lat. 27° 10′, long. 81° 14′—observed at in 1845—is situated on ground slightly elevated above the level of the surrounding country, and is at a short distance S.S.E. from the village of Samnadio or Samnadíh: thána, tahsíl and pargana Fatehpur, district Bara Banki.

The station consists of a tower of unburnt bricks 24 feet high—with diameters at top and bottom, respectively, of 14 and 19 feet—enclosing a central solid pillar of masonry having a mark-stone at base, and others at 8 and 24 feet respectively above it. The distances and bearings of surrounding villages are:—Kiratpur 0·2 mile S.W.; Rasúlpur 0·7 mile N.; Dasrathpur 0·7 mile S.E.; and the town of Fatehpur 0·9 mile E. by N.

XXXV. Ragaupur (*Ragaopúr*) Tower Station, lat. 27° 18′, long. 81° 23′—observed at in 1845—is situated in the low-lying lands between the Chauka and Sarju rivers, and is distant about half a mile S.W. of the village of Ragaupur: thána and tahsíl Bári, pargana Kundri, district Sitapur.

The station consists of a tower of unburnt bricks 30 feet high—with diameters at top and bottom, respectively, of 12 and 22 feet—enclosing a central solid pillar of masonry having a mark-stone at base, and others at 8, 24 and 30 feet respectively above it. The distances and bearings of surrounding villages are:—Uchlapur 0·8 mile W.; Burwi Burwa 0·4 mile N.; Majhgawán 0·7 mile E.; and Pura Shiughulám Singh 0·2 mile S.E. by S.

XXXVI. Imlia (*Imlía*) Tower Station, lat. 27° 19′, long. 81° 10′—observed at in 1845—is situated at the S.W. angle of an old fort in the village of Imlia: tahsíl Bári, thána and pargana Mahmudabad, district Sitapur.

The station consists of a tower of unburnt bricks 24 feet high—with diameters at top and bottom, respectively, of 14 and 20 feet—enclosing a central solid pillar of masonry having a mark-stone at base, and others at 8 and 24 feet respectively above it. The distances and bearings of surrounding villages are:—Ináyatpur 0·7 mile W.; Gobindpur 0·5 mile N.; Khwábipur 0·3 mile E.N.E.; and the town of Mahmudabad 2 miles S. by W.

XXXVII. Thána Tower Station, lat. 27° 28′, long. 81° 17′—observed at in 1845—is situated on the S.W. bastion of the fort in the village of Thána, and is distant nearly a mile from the right bank of the Gogra river; thána Thánagaon, tahsíl Biswán, pargana Kundri, district Sitapur.

The station consists of a tower of unburnt bricks 24 feet high—with diameters at top and bottom, respectively, of 12 and 20 feet—enclosing a central solid pillar of masonry having a mark-stone at base, and others at 8 and 24 feet respectively above it. The distances and bearings of surrounding villages are:—Chainpur 1·5 miles S.W. by S.; Wain 1·1 miles N. by W.; Thaura 1·4 miles N.E. by E.; and Dewaria 1·3 miles S.E.

XXXVIII. Ashrafpur (*Asrafpúr*) Tower Station, lat. 27° 29′, long. 81° 4′—observed at in 1845—is situated on high ground adjoining the southern side of the village of Ashrafpur: thána, tahsíl and pargana Biswán, district Sitapur.

The station consists of a tower of unburnt bricks 24 feet high—with diameters at top and bottom, respectively, of 14 and 20 feet—enclosing a central solid pillar of masonry having a mark-stone at base, and others at 8 and 24 feet respectively above it. The distances and bearings of surrounding villages are:—Pura Ashrafpur 0·4 mile W.; Ukbapur Khurd 1·3 miles E.N.E.; and Ramanbhari 0·2 mile S.E.

XXXIV.—(*Of the North-East Longitudinal Series*). Khánpur (*Khánpúr*) Tower Station, lat. 27° 39′; long. 81° 12′—observed at in 1844, 1845 and 1850—is situated in the centre on an old fortress within the village of Khánpur, and its site is elevated about 40 feet above the level of the surrounding country: thána Thánagaon, tahsíl Biswán, pargana Kundri, district Sitapur.

The station consists of an earthen tower 12 feet high—with diameters at top and bottom, respectively, of 13 and 17

feet—enclosing a central solid pillar of masonry having mark-stones at 6 and 12 feet respectively above the base. The station of 1844 was revisited in 1845 at the conclusion of the Karára Meridional Series, and was then apparently found in good preservation. It was again visited in 1850 in the course of the operations of the North-East Longitudinal Series; the mark-stone and pillar having been found intact, it was only necessary to repair the earthen tower. The distances and bearings of surrounding villages are:—Bidaura 1·4 miles S.W.; Mánpur 0·9 mile N.W.; Kunkari 1·5 miles E.; and Maururia Kalán 0·9 mile S. by W.

XXXV.—(*Of the North-East Longitudinal Series*). Másí Tower Station, lat. 27° 38′, long. 81° 26′—observed at in 1844, 1845 and 1849—is situated in an old fort that stands in the centre of the village of Másí, and its site is elevated about 8 feet above the level of the annual inundation: thána and tahsíl Kurásar, pargana Fakhrpur, district Bahraich.

The station consists of an earthen tower 24 feet high—with diameters at top and bottom, respectively, of 18 and 40 feet—enclosing a central solid pillar of masonry having mark-stones at 3, 8 and 24 feet respectively above the base. The station of 1844—which had the surrounding tower with diameters at top and bottom, respectively, of 11 and 18 feet—was revisited in 1845 at the conclusion of the Karára Meridional Series, and was then apparently found in good preservation. It was again visited in 1849 in the course of the operations of the North-East Longitudinal Series; the mark-stone at summit and the upper 4 or 5 feet of the central pillar which were then found removed were replaced and the surrounding tower extended to its present dimensions. The distances and bearings of surrounding villages are:—Shukulwa 0·9 mile S.W. by S.; Nasírpur 1·1 miles N.W.; Mansa, across the Sarju river, 1 mile E. by N.; and Bishanpur 0·9 mile S.S.E.

NOTE.—In a few instances, the names of principal stations, occurring in the foregoing descriptions, are given by two methods of spelling, distinguished from one another by the use of Roman and Italic type; as in XV. Singraur (*Singraor*): the latter spelling is taken from the Alphabetical and Numerical lists, which precede the descriptions and which were printed in 1869: the spelling in Roman type, is in accordance with the method authorized by the Government and illustrated in lists of Indian proper names published in 1874 and subsequently. It will be seen that the two methods differ but slightly; notwithstanding, where differences exist, both renderings are given, so as to remove all possible doubt as to the identity of a station. The method of spelling authorized by the Government, is hereafter exclusively adopted in the publication of this Series.

July 1877.

J. B. N. HENNESSEY,

In charge of Computing Office.

KARARA MERIDIONAL SERIES.

PRINCIPAL TRIANGULATION. ADDENDUM TO DESCRIPTION OF STATIONS.

NOTE.—Consequent on modern alterations of district and other boundaries, the sites occupied by the stations are in some instances now included in civil divisions of territory which differ from the district, pargana, or village, recorded in the preceding descriptions of stations: a complete list of all the stations of the Series including a suitably modified statement of the altered sub-divisions in question is accordingly given in the following table, and is derived chiefly from the annual reports, up to 1881, made by the Civil Officials to whose care the stations have been committed. The statement also gives present condition of certain of the stations; where no entry regarding present condition is made against a station it is to be assumed that the station when last reported on by the district Official was in good order.

The spelling of names is in accordance with that given in the lists of more important places published under the orders of Government whenever such names occur in the lists.

No. of Station	Local name	District	Pargana, &c.	Village in which the Station lies	Remarks on the Condition of the Station
XXIII	...	Baghelkhand Agency	P. Mádhogarh	Devardah	... ...
XXVI	...	„	Marwás, Rewah State	Marwás	... ...
I	...	„	P. Gurha, Rewah State	Satar	The platform partly washed down, and 3 feet high, as reported in 1873.
II	...	„	Ditto.	Tikar	... ...
III	...	„	Rewah State	Bankari	... ...
IV	...	„	Soháwal State	Durjanpur	... ...
V	...	„	P. Raepur	Raepur	... ...
VI	Kotar	„	P. Semaria	Kotar	... ...
VII	...	„	Ditto.	Donri	... ...
VIII	Sirmaur	„	P. Sirmaur	Sirmaur	... ...
IX	...	...	... ...	...	*No report received.*
X	Garda-ka-Pahár	Bánda	P. Chhíbu	Sesa Sub Karra	... ...

NOTE.—Stations XXIII and XXVI appertain to the Calcutta Longitudinal Series of the South-East Quadrilateral. P. stands for pargana.

No. of Station	Local name	District	Pargana, &c.	Village in which the Station lies	Remarks on the Condition of the Station
XI	...	Bánda	P. Tarhawan	Lálapur	... ...
XII	Ghogar Minár	Allahabad	Thá. and Tah. Bárah, P. and Táluka Bagála	Ghogar	No mark found as reported in 1867.
XIII	..	„	Tah. Manjhanpur, P. Atharban, Thá. Pachchhim Saríra	Pabhosa	Ditto.
XIV	Kabra Nagdalpur	Fatehpur	Tah. Khakhreru, P. Ekdala	Nagdalpur	Upper mark-stone missing as reported in 1867.
XV	...	Allahabad	Tah. Soraon, P. and Thá. Nawábganj	Singraur Khás	Considerable portion of the tower washed down by the rain as reported in 1874.
XVI	Kala Jaichand Minár	„	Tah. Siráthu, P. and Thá. Karra	Sawad Khat *alias* Karra	No mark-stone found as reported in 1867.
XVII	...	Fatehpur	Tah. Khajuha, P. Hathgaon	Majilgaon	Upper mark-stone missing as reported in 1867.
XVIII	...	Partabgarh	Tah. Kunda, P. Mánikpur, Thá. Sangrámgarh	Pariaun	... ...
XIX	...	Rae Bareli	Tah. and P. Salon, Thá Jagatpur	Horesa	... ...
XX	Salon	„	Tah., P. and Thá. Salon	Salon	... ...
XXI	Jagatpur Tánghan	„	Tah. Lalganj, P. Dalmau, Táluka Shankarpur	Tánghan	Mark-stone missing, and the pillar only 15 feet high, as reported in 1873 and 1874.
XXII	Bela Khára	„	Tah. and P. Rae Bareli, Táluka Khejurgaon, Thá. Jagatpur	Khára	... ...
XXIII	...	„	Tah., P. and Thá. Rae Bareli	Munai	... ...
XXIV	...	„	Tah., P. and Thá. Rae Bareli, Táluka Hardaspur	Sora	... ...
XXV	...	„	Tah. and Thá. Digbijaiganj, P. Simrauta, Táluka Chandapur	Janai	... ...
XXVI	...	„	Tah. and Thá. Digbijaiganj, P. Inhauna, Táluka Thulenda	Tauli	... ...
XXVII	Tikri	„	Tah. Digbijaiganj, P. Inhauna, Thá. Mohanganj	Tikri	... ...
XXVIII	...	...	... ...	...	*No report received.*

NOTE.—P. stands for pargana, Tah. for tahsíl, and Thá. for thána.

No. of Station	Local name	District	Pargana, &c.	Village in which the Station lies	Remarks on the Condition of the Station
XXIX	...	Bara Banki	Tah. Haidargarh, P. Siddhaur, Thá. Zaidpur	Basantpur	... ...
XXX	Sarai Parsanda	„	Tah. and Thá. Nawábganj, P. Satrikh	Sarai Parsanda	Entirely fallen down as reported in 1877.
XXXI	...	„	Tah. Rám Sanehi Ghát, P. Daryabad, Thá. Nawábganj	Turkani	... ...
XXXII	Jianpur	„	Tah. Nawábganj, P. Dewa, Thá. Kursi	Jianpur	... ...
XXXIII	...	„	Tah. Fatehpur, P. and Thá. Rámnagar	Amoli	... ...
XXXIV	Samnadih	„	Tah., P. and Thá. Fatehpur	Samnadih	... ...
XXXV	...	Sitapur	Tah. Bári, P. Kundri, Táluka Rámpur Mathura, Thá. Thánagaon	Raghuapur	... ...
XXXVI	...	„	Tah. Bári, P. Mahmudabad	Imlia	... ...
XXXVII	...	„	Tah. Biswán, P. Kundri, Thá. Thánagaon	Thánagaon	... ...
XXXVIII	...	„	Tah. and P. Biswán	Ashrafpur	... ...
XXXIV†	...	„	Tah. Biswán, P. Kundri, Thá. Tambaur	Khánpur	... ...
XXXV†	...	Bahraich	P. Fakhrpur, Thá. Sisia, Tah. Kurásar	Masi	... ...

NOTE.—Stations XXXIV† and XXXV† appertain to the North-East Longitudinal Series. P. stands for pargana, Tah. for tahsíl, and Thá. for thána.

September, 1882.

J. B. N. HENNESSEY,
In charge of Computing Office.

KARARA MERIDIONAL SERIES.

PRINCIPAL TRIANGULATION. TRIANGLES.

No. of Triangle	Station	Spherical Excess	Corrected Plane Angle			Distance		
						Log. feet	Feet	Miles
		"	°	′	"			
	Karára, XXIII	1·44	65	38	42·27	5·2116206	162787·3	30·831
1	Marwás, XXVI	1·44	40	57	7·58	5·0686232	117117·9	22·181
	Jaliádhar, II	1·44	73	24	10·15	5·2336163	171244·4	32·433
	Karára, XXIII.	·58	49	8	29·30	4·94837 67	88792·6	16·817
2	Jaliádhar, II	·58	44	49	45·61	4·9178545	82766·5	15·676
	Kaimúr, I	·58	86	1	45·09	5·0686232	117117·9	22·181
	Karára, XXIII	1·02	114	47	12·57	5·3408876	219223·7	41·520
3	Marwás, XXVI	1·01	20	2	42·82	4·9178545	82766·5	15·675
	Kaimúr, I	1·02	45	10	4·61	5·2336163	171244·4	32·433
	Kaimúr, I	·71	60	27	41·51	5·0281552	106697·7	20·208
4	Jaliádhar, II	·72	73	9	2·57	5·0695674	117372·8	22·230
	Dádar, III	·71	46	23	15·92	4·94837 67	88792·6	16·817
	Jaliádhar, II	·51	59	23	7·51	4·9694424	93205·7	17·653
5	Dádar, III	·51	40	29	14·56	4·8470672	70318·1	13·318
	Burwa, V	·51	80	7	37·93	5·0281552	106697·7	20·208

NOTES.—1. The values of the side are given in the same line with the opposite angle.
2. Stations Karára, XXIII, and Marwás, XXVI, appertain to the Calcutta Longitudinal Series of the South-East Quadrilateral.

No. of Triangle	Station	Spherical Excess	Corrected Plane Angle			Distance		
						Log. feet	Feet	Miles
		"	°	′	"			
	Dádar, III	·83	69	37	0·63	5·0923326	123689·4	23·426
6	Burwa, V	·83	65	26	36·42	5·0792423	120016·9	22·730
	Sirmaul, VIII	·82	44	56	22·95	4·9694424	93205·7	17·653
	Dádar, III	·57	34	29	57·49	4·8357662	68511·9	12·976
7	Sirmaul, VIII	·58	62	39	52·49	5·0312219	107453·8	20·351
	Donri, VII	·58	82	50	10·02	5·0792423	120016·9	22·730
	Donri, VII	·23	63	21	37·03	4·8034301	63596·0	12·045
8	Sirmaul, VIII	·23	42	17	16·08	4·6800900	47872·9	9·067
	Mau, X	·23	74	21	6·89	4·8357662	68511·9	12·976
	Sirmaul, VIII	·70	72	57	3·20	5·1508909	141543·8	26·808
9	Mau, X	·71	81	36	34·62	5·1657352	146465·4	27·740
	Bagála, XII	·70	25	26	22·18	4·8034301	63596·0	12·045
	Mau, X	1·01	46	21	47·52	5·0263431	106253·5	20·124
10	Bagála, XII	1·02	59	2	6·20	5·0999924	125890·3	23·843
	Pabhosa, XIII	1·02	74	36	6·28	5·1508909	141543·8	26·808
	Bagála, XII	1·01	70	46	50·34	5·1341807	136201·1	25·796
11	Pabhosa, XIII	1·01	61	46	23·53	5·1041031	127087·6	24·070
	Singraur, XV	1·00	47	26	46·13	5·0263431	106253·5	20·124
	Pabhosa, XIII	·95	44	31	54·37	4·9994105	99864·4	18·914
12	Singraur, XV	·95	62	26	0·42	5·1011698	126232·1	23·908
	Karra, XVI	·96	73	2	5·21	5·1341807	136201·1	25·796
	Pabhosa, XIII	·63	41	43	52·48	4·9244303	84029·2	15·915
13	Karra, XVI	·63	48	51	19·13	4·9780166	95064·1	18·005
	Nagdílpur, XIV	·63	89	24	48·39	5·1011698	126232·1	23·908
	Kaimúr, I	·70	48	42	37·89	4·9600983	91221·7	17·277
14	Dádar, III	·70	56	5	49·73	5·0033057	100764·1	19·084
	Náru, IV	·70	75	11	32·38	5·0695674	117372·8	22·230
	Dádar, III	·49	59	4	34·03	4·9266980	84469·1	15·998
15	Náru, IV	·48	53	2	20·68	4·8958580	78678·9	14·901
	Kotar Kaimári, VI	·49	67	53	5·29	4·9600983	91221·7	17·277
	Dádar, III	·54	53	50	3·29	4·9448882	88082·2	16·682
16	Kotar Kaimári, VI	·54	80	1	5·32	5·0312219	107453·8	20·351
	Donri, VII	·54	46	8	51·39	4·8958580	78678·9	14·901
	Kotar Kaimári, VI	·31	33	39	38·15	4·6957877	49635·0	9·401
17	Donri, VII	·31	66	43	36·14	4·9152056	82263·2	15·580
	Kachár, IX	·32	79	36	45·71	4·9448882	88082·2	16·682
	Donri, VII	·19	100	55	43·57	4·8762715	75209·3	14·244
18	Kachár, IX	·18	38	40	51·98	4·6800900	47872·9	9·067
	Mau, X	·18	40	23	24·45	4·6957877	49635·0	9·401
	Kachár, IX	·56	62	1	41·92	4·9913512	98028·2	18·566
19	Mau, X	·57	75	18	56·91	5·0308803	107369·3	20·335
	Lálapur, XI	·56	42	39	21·17	4·8762715	75209·3	14·244
	Mau, X	·65	41	58	6·26	4·9258369	84301·8	15·966
20	Lálapur, XI	·65	86	59	23·21	5·0999924	125890·3	23·843
	Pabhosa, XIII	·65	51	2	30·53	4·9913512	98028·2	18·566

No. of Triangle	Station	Spherical Excess	Corrected Plane Angle	Distance		
				Log. feet	Feet	Miles
		"	° ′ "			
	Lálapur, XI	·63	50 30 6·20	4·97801 66	95064·1	18·005
21	Pabhosa, XIII	·63	86 19 7·92	5·08970 28	122942·7	23·285
	Nagdílpur, XIV	·63	43 10 45·88	4·92583 69	84301·8	15·966
	Nagdílpur, XIV	·34	49 48 44·38	4·81578 10	65430·6	12·392
22	Karra, XVI	·34	51 20 59·97	4·82536 21	66890·1	12·669
	Majilgaon, XVII	·34	78 50 15·65	4·92443 03	84029·2	15·915
	Karra, XVI	·24	72 37 7·04	4·83999 38	69182·1	13·103
23	Majilgaon, XVII	·24	42 52 51·99	4·69310 66	49329·5	9·343
	Pariáon, XVIII	·24	64 30 0·97	4·81578 10	65430·6	12·392
	Majilgaon, XVII	·25	45 17 14·52	4·71486 17	51863·5	9·823
24	Pariáon, XVIII	·25	63 16 49·45	4·81416 67	65187·9	12·346
	Horesa, XIX	·25	71 25 56·03	4·83999 38	69182·1	13·103
	Pariáon, XVIII	·30	72 58 35·50	4·89338 19	78231·5	14·817
25	Horesa, XIX	·29	67 41 5·71	4·87903 33	75689·1	14·335
	Salon, XX	·29	39 20 18·79	4·71486 17	51863·5	9·823
	Horesa, XIX	·21	47 45 56·23	4·76520 79	58238·2	11·030
26	Salon, XX	·21	36 16 6·58	4·66774 67	46531·5	8·813
	Tánghan, XXI	·21	95 57 57·19	4·89338 19	78231·5	14·817
	Salon, XX	·23	49 54 22·19	4·72353 60	52909·8	10·021
27	Tánghan, XXI	·23	72 44 19·12	4·81986 56	66048·9	12·509
	Munai, XXIII	·23	57 21 18·69	4·76520 79	58238·2	11·030
	Tánghan, XXI	·18	72 35 36·54	4·76114 66	57696·1	10·927
28	Munai, XXIII	·17	46 21 21·25	4·64102 74	43755·0	8·287
	Khára, XXII	·17	61 3 2·21	4·72353 60	52909·8	10·021
	Horesa, XIX	·14	29 36 18·61	4·64102 74	43755·0	8·287
29	Tánghan, XXI	·14	118 42 6·39	4·89034 72	77686·8	14·713
	Khára, XXII	·14	31 41 35·00	4·66774 67	46531·5	8·813
	Khára, XXII	·24	61 32 16·38	4·77673 93	59805·3	11·327
30	Munai, XXIII	·24	60 27 12·40	4·77218 19	59181·0	11·209
	Sora, XXIV	·23	58 0 31·22	4·76114 66	57696·1	10·927
	Munai, XXIII	·25	53 0 31·77	4·76126 66	57712·1	10·930
31	Sora, XXIV	·26	71 7 41·60	4·83487 11	68370·9	12·949
	Janai, XXV	·26	55 51 46·63	4·77673 93	59805·3	11·327
	Sora, XXIV	·23	57 2 58·55	4·75248 61	56557·0	10·712
32	Janai, XXV	·23	64 2 56·30	4·78249 18	60602·7	11·478
	Tauli, XXVI	·23	58 54 5·15	4·76126 66	57712·1	10·930
	Janai, XXV	·25	61 16 49·47	4·79268 92	62042·5	11·750
33	Tauli, XXVI	·25	65 38 33·52	4·80921 26	64448·5	12·206
	Tikiri, XXVII	·25	53 4 37·01	4·75248 61	56557·0	10·712
	Tauli, XXVI	·28	61 33 8·06	4·81436 37	65217·4	12·352
34	Tikiri, XXVII	·28	61 40 51·16	4·81489 05	65296·6	12·367
	Parewa, XXVIII	·28	56 46 0·78	4·79268 92	62042·5	11·750
	Tikiri, XXVII	·28	59 44 27·48	4·81240 49	64923·9	12·296
35	Parewa, XXVIII	·29	60 4 15·97	4·81385 51	65141·1	12·337
	Basantpur, XXIX	·29	60 11 16·55	4·81436 37	65217·4	12·352

No. of Triangle	Station	Spherical Excess	Corrected Plane Angle	Distance		
				Log. feet	Feet	Miles
		"	° ′ ″			
	Parewa, XXVIII	·28	59 1 27·65	4·8062389	64008·7	12·123
36	Basantpur, XXIX	·29	60 33 29·37	4·8130084	65014·2	12·313
	Pesar, XXX	·28	60 25 2·98	4·8124049	64923·9	12·296
	Basantpur, XXIX	·30	61 27 2·94	4·8323947	67982·1	12·875
37	Pesar, XXX	·31	62 45 2·40	4·8376115	68803·7	13·031
	Turkani, XXXI	·30	55 47 54·66	4·8062389	64008·7	12·123
	Pesar, XXX	·30	57 44 57·23	4·8159682	65458·8	12·398
38	Turkani, XXXI	·30	60 48 36·91	4·8297601	67571·0	12·798
	Utiámau, XXXII	·31	61 26 25·86	4·8323947	67982·1	12·875
	Turkani, XXXI	·27	54 22 24·81	4·7797749	60224·7	11·406
39	Utiámau, XXXII	·28	63 33 43·35	4·8217994	66343·7	12·565
	Amoli, XXXIII	·28	62 3 51·84	4·8159682	65458·8	12·398
	Utiámau, XXXII	·24	58 20 42·58	4·7742597	59464·8	11·262
40	Amoli, XXXIII	·25	62 6 4·43	4·7905574	61738·7	11·693
	Samnadio, XXXIV	·25	59 33 12·99	4·7797749	60224·7	11·406
	Amoli, XXXIII	·30	60 4 53·91	4·8289775	67449·3	12·774
41	Samnadio, XXXIV	·30	70 5 18·08	4·8643192	73167·7	13·858
	Ragaupur, XXXV	·29	49 49 48·01	4·7742597	59464·8	11·262
	Samnadio, XXXIV	·30	67 49 20·70	4·8525750	71215·6	13·488
42	Ragaupur, XXXV	·29	50 53 22·59	4·7757791	59673·2	11·302
	Imlia, XXXVI	·29	61 17 16·71	4·8289775	67449·3	12·774
	Ragaupur, XXXV	·33	55 37 48·60	4·8257795	66954·5	12·681
43	Imlia, XXXVI	·34	62 58 29·18	4·8588927	72259·1	13·685
	Thána, XXXVII	·34	61 23 42·22	4·8525750	71215·6	13·488
	Imlia, XXXVI	·33	62 10 56·86	4·8472530	70348·2	13·324
44	Thána, XXXVII	·32	60 29 23·75	4·8402391	69221·2	13·110
	Ashrafpur, XXXVIII	·32	57 19 39·39	4·8257795	66954·5	12·681
	Thána, XXXVII	·35	60 53 53·13	4·8529845	71282·8	13·501
45	Ashrafpur, XXXVIII	·34	59 31 33·79	4·8470310	70312·3	13·317
	Khánpur, XXXIV	·34	59 34 33·08	4·8472530	70348·2	13·324
	Thána, XXXVII	·37	60 51 46·80	4·8709065	74285·9	14·069
46	Khánpur, XXXIV	·37	63 22 19·75	4·8809710	76027·6	14·399
	Másí, XXXV	·37	55 45 53·45	4·8470310	70312·3	13·317

NOTE.—Stations Khánpur, XXXIV, and Másí, XXXV, appertain to the North-East Longitudinal Series.

November 1878.

J. B. N. HENNESSEY,

In charge of Computing Office.

KARARA MERIDIONAL SERIES.

SECONDARY TRIANGULATION. TRIANGLES.

PRINCIPAL-AUXILIARY STATIONS AND INTERSECTED POINTS.

Differences between the common sides of two triangles to stations and intersected points, are shown by the small figures in the column for "Distance in Feet" between the data of the two triangles, the earlier of which in order has supplied the greater value: where the difference is small it has usually been apportioned between the triangles, but where it is large no adjustment has been made, as one or other of the two values must be erroneous.

No. of Triangle	Station	Corrected Plane Angle	Distance			Theodolite used
			Log. feet	Feet	Miles	
		° ′ ″				Inch
	Karára, XXIII	45 21 14	5·234039	171411	32·464	18
47	Jaliádhar, II	105 33 39	5·365670	232097	43·958	„
	Pabei h.s.	29 5 7	5·068623	117118	22·181	„
				0		
	Marwás, XXVI	79 2 13	5·234039	171411	32·464	„
48	Jaliádhar, II	32 9 27	4·968152	92929	17·600	„
	Pabei h.s.	68 48 20	5·211621	162787	30·831	„
	Dádar, III	68 26 33	4·950961	89323	16·917	„
49	Kotar Kaimári, VI	56 33 1	4·903814	80133	15·177	„
	Andhi Hill Mark (heliotrope)		4·895858	78679	14·901	
				1		
	Kaimúr, I	43 3 24	4·903814	80133	15·177	„
50	Dádar, III	46 43 52	4·931788	85465	16·187	„
	Andhi Hill Mark (heliotrope)		5·069567	117373	22·230	
	Burwa, V	114 29 7	5·276138	188859	35·769	„
51	Sirmaul, VIII	28 55 43	5·001658	100382	19·012	„
	Gurwa Parúr h.s.	36 35 10	5·092333	123689	23·426	„

No. of Triangle	Station	Corrected Plane Angle	Distance			Theodolite used
			Log. feet	Feet	Miles	
		° ′ ″		6		Inch
	Jaliádhar, II	48 26 35	5·001658	100382	19·012	18
52	Burwa, V	99 56 37	5·121010	132133	25·025	„
	Gurwa Parúr h.s.	31 36 48	4·847067	70318	13·318	„
	Dádar, III	35 57 26	4·790693	61758	11·697	„
53	Burwa, V	26 26 23	4·670531	46831	8·869	„
	Rewah Díwán's Temple		4·969442	93206	17·653	
	Dádar, III	34 1 12	4·799745	63059	11·943	„
54	Burwa, V	21 46 3	4·621147	41797	7·916	„
	Rewah Large Temple		4·969442	93206	17·653	
	Kotar Kaimári, VI	60 10 29	4·886118	76934	14·571	„
55	Donri, VII	36 28 52	4·722019	52725	9·986	„
	Haraha Hill Mark (heliotrope)		4·944888	88083	16·682	
				1		
	Donri, VII	30 14 44	4·625801	42247	8·001	„
56	Kachár, IX	113 28 14	4·886118	76934	14·571	„
	Haraha Hill Mark (héliotrope)		4·695788	49635	9·401	

NOTES.—1. Names followed by Roman numerals are those of Principal Stations. Stations Karára, XXIII, and Marwás, XXVI appertain to the Calcutta Longitudinal Series of the South-East Quadl.
2. The values of the side are given in the same line with the opposite angle.

No. of Triangle	Station	Corrected Plane Angle	Distance			Theodolite used
			Log. feet	Feet	Miles	
		° ′ ″				Inch
	Dádar, III	15 8 0	4·448975	28117	5·325	18
57	Donri, VII	78 45 26	5·023809	105635	20·007	„
	Pati Hill Mark (heliotrope)		5·031222	107454	20·351	
				0		
	Dádar, III	38 42 4	4·820571	66156	12·530	„
58	Kotar Kaimári, VI	93 15 32	5·023809	105635	20·007	„
	Pati Hill Mark (heliotrope)		4·895858	78679	14·901	
	Sirmaul, VIII	39 42 31	5·041972	110147	20·861	„
59	Bagála, XII	18 27 12	4·736968	54572	10·336	„
	Raghunáthpur Hill Mark (helio.)		5·165735	146465	27·740	
				1		
	Mau, X	50 51 6	5·041972	110147	20·861	„
60	Bagála, XII	43 53 35	4·993312	98472	18·650	„
	Raghunáthpur Hill Mark (helio.)		5·150891	141544	26·808	
	Sirmaul, VIII	43 43 5	4·643231	43978	8·329	„
61	Mau, X	44 19 23	4·647977	44461	8·421	„
	Chaukandi Hill Mark		4·803430	63596	12·045	
	Bagála, XII	27 24 19	5·103858	127016	24·056	„
62	Pabhosa, XIII	129 56 54	5·325417	211552	40·067	„
	Kohi Hill Mark (heliotrope)		5·026343	106253	20·124	
				3		
	Pabhosa, XIII	82 0 53	5·169382	147701	27·974	„
63	Nagdílpur, XIV	58 23 17	5·103858	127016	24·056	„
	Kohi Hill Mark (heliotrope)		4·978017	95064	18·005	
	Kachár, IX	68 8 27	5·007359	101709	19·263	„
64	Mau, X	68 31 19	5·008507	101978	19·314	„
	Bhauri Hill Mark (heliotrope)		4·876271	75209	14·244	
				4		
	Mau, X	48 45 45	4·984534	96501	18·277	„
65	Pabhosa, XIII	52 25 32	5·007359	101709	19·263	„
	Bhauri Hill Mark (heliotrope)		5·099992	125890	23·843	
	Mau, X	12 46 0	4·589083	38822	7·353	„
66	Bagála, XII	40 54 34	5·060879	115048	21·789	„
	Chandaha Hill Mark (heliotrope)		5·150891	141544	26·808	
				0		
	Mau, X	33 35 49	4·847585	70402	13·334	„
67	Pabhosa, XIII	64 43 24	5·060879	115048	21·789	„
	Chandaha Hill Mark (heliotrope)		5·099992	125890	23·843	

ALLAHABAD

SECONDARY SERIES.†

	Bagála, XII	45 46 1	4·973436	94067	17·816	„
68	Singraur, XV	58 45 36	5·050182	112249	21·259	„
	Allahabad Fort s.	75 28 23	5·104103	127088	24·070	*
	Bagála, XII	40 12 23	4·925830	84300	15·966	„
69	Singraur, XV	63 5 26	5·066135	116449	22·055	„
	Allahabad Church		5·104103	127088	24·070	
				4		
	Bagála, XII	5 33 38	4·074079	11860	2·246	„
70	Allahabad Fort s.	107 56 2	5·066135	116449	22·055	*
	Allahabad Church		5·050182	112249	21·259	
	Allahabad Fort s.	26 13 0	3·724221	5299	1·004	*
71	Allahabad Church		3·993189	9844	1·864	
	Allahabad „	98 37 58	4·074079	11860	2·246	*
	Allahabad Church		4·249044	17744	3·361	
72	Allahabad s.	84 42 30	4·256327	18044	3·417	*
	Jhúsi „	17 0 15	3·724221	5299	1·004	*
	Allahabad Fort s.	17 41 27	3·566024	3681	0·697	*
73	Allahabad Church		4·023151	10548	1·998	
	Allahabad House No. 4 „	101 46 41	4·074079	11860	2·246	*
				1		
	Allahabad Fort s.	8 31 33	3·222749	1670	0·316	*
74	Allahabad „	110 33 43	4·023151	10548	1·998	*
	Allahabad House No. 4 „	60 54 44	3·993189	9844	1·864	*
	Allahabad Fort s.	59 16 23	3·978234	9511	1·801	*
75	Allahabad House No. 4 „	13 8 36	3·400699	2516	0·477	*
	Allahabad Juma Masjid		4·023151	10548	1·998	
	Allahabad Fort s.	113 22 50	4·024370	10577	2·003	*
76	Allahabad „	7 56 14	3·201736	1591	0·301	*
	Allahabad Fort Flagstaff		3·993189	9844	1·864	
				0		
	Allahabad Fort s.	36 33 35	3·863796	7308	1·384	*
77	Jhúsi „	7 27 8	3·201736	1591	0·301	*
	Allahabad Fort Flagstaff		3·930663	8524	1·614	
	Allahabad Fort s.	7 18 18	3·222152	1668	0·316	*
78	Allahabad „	124 3 37	4·036097	10867	2·058	*
	Allahabad Temple No. 2		3·993189	9844	1·864	
	Allahabad Fort s.	81 49 12	4·079203	12001	2·273	*
79	Jhúsi „	53 30 13	3·988843	9746	1·846	*
	Allahabad Temple No. 1		3·930663	8524	1·614	
				0		
	Allahabad Fort s.	68 7 13	4·040300	10972	2·078	*
80	Allahabad „	55 30 57	3·988843	9746	1·846	*
	Allahabad Temple No. 1		3·993189	9844	1·864	
	Allahabad Fort s.	74 31 23	4·222525	16693	3·161	*
81	Allahabad Church		4·185556	15331	2·904	
	Badra „	43 12 49	4·074079	11860	2·246	*

* Instrument not known. † For the continuation of this triangulation see triangles No. 187 and following in the Synopsis of the Results of the Gurwáni Meridional Series.

No. of Triangle	Station	Corrected Plane Angle	Distance			Theodolite used
			Log. feet	Feet	Miles	
		° ′ ″				Inch
	Allahabad Fort s.	49 12 2	4·068217	11701	2·216	*
82	Badra „	33 28 11	3·930663	8524	1·614	*
	Jhúsi „	97 19 47	4·185556	15331	2·904	*
				1		
	Allahabad Fort s.	123 43 25	4·256327	18044	3·417	*
83	Allahabad Church		3·930663	8524	1·614	
	Jhúsi „	33 8 22	4·074079	11860	2·246	*
	Allahabad Fort s.	76 38 36	4·069783	11743	2·224	*
84	Jhúsi „	58 25 28	4·012106	10283	1·948	*
	Allahabad No. 2 „	44 55 56	3·930663	8524	1·614	*
	Jhúsi s.	43 30 11	3·983346	9624	1·823	*
85	Allahabad No. 2 „	79 21 29	4·137975	13740	2·602	*
	Allahabad No. 1 or Moia „	57 8 20	4·069783	11743	2·224	*
	Singraur, XV	5 16 35	4·247982	17700	3·352	18
86	Allahabad Fort s.	23 58 47	4·893349	78226	14·815	*
	Allahabad, Begam's Mausoleum		4·973436	94067	17·816	
				5		
	Allahabad Fort s.	130 57 49	4·478113	30069	5·695	*
87	Badra „	26 23 33	4·247982	17700	3·352	*
	Allahabad, Begam's Mausoleum		4·185556	15331	2·904	
	Allahabad Fort s.	27 7 19	3·655315	4522	0·856	*
88	Jhúsi „	93 37 37	3·995588	9899	1·875	*
	Jhúsi Temple		3·930663	8524	1·614	
				0		
	Allahabad Fort s.	22 4 43	3·856993	7194	1·363	*
89	Badra „	31 8 36	3·995588	9899	1·875	*
	Jhúsi Temple		4·185556	15331	2·904	
	Allahabad Fort s.	96 55 2	4·261631	18265	3·459	*
90	Jhúsi „	55 28 58	4·180708	15160	2·871	*
	Allahabad House No. 5		3·930663	8524	1·614	
				2		
	Allahabad Fort s.	47 43 0	4·091097	12334	2·336	*
91	Badra „	65 25 7	4·180708	15160	2·871	*
	Allahabad House No. 5		4·185556	15331	2·904	
	Allahabad Fort s.	57 53 34	4·327292	21247	4·024	*
92	Jhúsi „	102 14 23	4·389394	24513	4·643	*
	Ibráhímpur Idgáh		3·930663	8524	1·614	
				1		
	Allahabad Fort s.	8 41 32	3·984121	9641	1·826	*
93	Badra „	157 24 10	4·389394	24513	4·643	*
	Ibráhímpur Idgáh		4·185556	15331	2·904	
	Allahabad Fort s.	47 6 45	3·796897	6265	1·186	*
94	Jhúsi „	38 26 2	3·725495	5315	1·007	*
	Arail White Temple		3·930663	8524	1·614	

No. of Triangle	Station	Corrected Plane Angle	Distance			Theodolite used
			Log. feet	Feet	Miles	
		° ′ ″				Inch
	Allahabad Fort s.	162 25 15	4·129920	13487	2·554	*
95	Jhúsi „	6 34 28	3·708663	5113	0·968	*
	Allahabad Burial Ground		3·930663	8524	1·614	
	Bagála, XII	21 50 4	4·772550	59231	11·218	12
96	Allahabad Church		4·830526	67690	12·820	„
	Bhíta h.s.	133 0 44	5·066135	116449	22·055	
	Bagála, XII	59 47 41	4·767240	58511	11·082	„
97	Bhíta h.s.	29 4 14	4·517146	32896	6·230	„
	Balaún Hill Mark		4·830526	67690	12·820	
	Bhíta h.s.	39 15 34	4·569671	37125	7·031	„
98	Balaun Hill Mark		4·629567	42615	8·071	
	Uswar „	94 9 14	4·767240	58511	11·082	„
				1		
	Bagála, XII	76 6 51	4·569671	37125	7·031	„
99	Balaun Hill Mark		4·428584	26828	5·081	
	Uswar h.s.	59 20 16	4·517146	32896	6·230	„
	Bagála, XII	29 3 5	4·243195	17506	3·316	„
100	Uswar h.s.	102 51 44	4·545886	35147	6·657	„
	Bárah s.	48 5 11	4·428584	26828	5·081	„
				2		
	Bagála, XII	47 3 46	4·435279	27245	5·160	„
101	Balaun Hill Mark		4·545886	35147	6·657	
	Bárah s.	62 7 30	4·517146	32896	6·230	„
	Bagála, XII	70 45 52	4·527591	33697	6·382	„
102	Bárah s.	29 14 24	4·241377	17433	3·302	„
	Maduria h.s.	79 59 44	4·545886	35147	6·657	„
				0		
	Bagála, XII	41 42 47	4·256202	18039	3·416	„
103	Uswar h.s.	40 1 16	4·241377	17433	3·302	„
	Maduria „		4·428584	26828	5·081	
	Bagála, XII	29 28 35	4·522558	33309	6·308	„
104	Bhíta h.s.	60 8 43	4·768700	58708	11·119	„
	Ganges River No. 2 s.	90 22 42	4·830526	67690	12·820	„
	Bhíta h.s.	37 54 32	4·318361	20814	3·942	„
105	Ganges River No. 2 s.	62 36 2	4·478230	30077	5·696	„
	Ganges River No. 4 „	79 29 26	4·522558	33309	6·308	„
	Bhíta h.s.	46 42 40	4·357733	22789	4·316	„
106	Ganges River No. 4 s.	59 24 45	4·430587	26952	5·104	„
	Mámabhina „	73 52 35	4·478230	30077	5·696	„
	Ganges River No. 4 s.	59 8 22	4·522422	33298	6·306	„
107	Mámabhina „	84 52 50	4·586987	38636	7·317	„
	Allahabad Church		4·357733	22789	4·316	

* Instrument not known.

No. of Triangle	Station		Corrected Plane Angle	Distance			Theodolite used
				Log. feet	Feet	Miles	
			° ′ ″				Inch
	Bagála, XII		56 17 14	4·767908	58601	11·099	12
108	Maduria	h.s.	109 23 8	4·822527	66455	12·586	,,
	Bhíta Temple			4·241377	17433	3·302	
					15		
	Bagála, XII		14 34 27	4·613306	41049	7·774	,,
109	Uswar	h.s.	155 57 37	4·822527	66455	12·586	,,
	Bhíta Temple			4·428584	26828	5·081	
	Bagála, XII		78 14 14	4·419376	26265	4·974	,,
110	Uswar	h.s.	12 8 23	3·751425	5642	1·069	,,
	Bagála Hill Temple			4·428584	26828	5·081	
					1		
	Bagála, XII		119 57 1	4·318723	20832	3·945	,,
111	Maduria	h.s.	13 34 19	3·751425	5642	1·069	,,
	Bagála Hill Temple			4·241377	17433	3·302	
	Bagála, XII		20 46 10	4·098332	12541	2·375	,,
112	Bárah	s.	75 36 34	4·534738	34256	6·488	,,
	Parbajabad Hill Temple			4·545886	35147	6·657	
					1		
	Uswar	h.s.	42 13 46	4·098332	12541	2·375	,,
113	Bárah	s.	27 31 23	3·935638	8623	1·633	,,
	Parbajabad Hill Temple			4·243195	17506	3·316	
	Bagála, XII		78 17 26	4·342156	21987	4·164	,,
114	Maduria	h.s.	50 46 37	4·240418	17395	3·294	,,
	Bhúri Hill Temple			4·241377	17433	3·302	
	Bagála, XII		47 42 6	4·130333	13500	2·557	,,
115	Maduria	h.s.	25 4 23	3·888441	7735	1·465	,,
	Bagála House			4·241377	17433	3·302	
	Bagála, XII		58 55 52	4·280973	19097	3·617	,,
116	Maduria	h.s.	69 38 0	4·320186	20902	3·959	,,
	Bobandar Zamíndár's House			4·241377	17433	3·302	
	Bagála, XII		53 33 28	4·617941	41490	7·858	,,
117	Maduria	h.s.	106 41 10	4·693755	49403	9·357	,,
	Purkas Masjid			4·241377	17433	3·302	
	Bagála, XII		26 49 54	4·370825	23487	4·448	,,
118	Maduria	h.s.	133 35 38	4·576178	37686	7·137	,,
	Tilapur S.E. Temple			4·241377	17433	3·302	
					2		
	Bagála, XII		68 32 41	4·573115	37421	7·087	,,
119	Uswar	h.s.	69 36 4	4·576178	37686	7·137	,,
	Tilapur S. E. Temple			4·428584	26828	5·081	
	Bagála, XII		70 17 52	4·624277	42100	7·973	,,
120	Uswar	h.s.	72 50 12	4·630693	42726	8·092	,,
	Tilapur W. Temple			4·428584	26828	5·081	

No. of Triangle	Station		Corrected Plane Angle	Distance			Theodolite used
				Log. feet	Feet	Miles	
			° ′ ″		1		Inch
	Bagála, XII		28 35 5	4·457253	28658	5·428	12
121	Maduria	h.s.	134 29 40	4·630693	42726	8·092	,,
	Tilapur W. Temple			4·241377	17433	3·302	
	Bagála, XII		55 14 27	4·532863	34109	6·460	,,
122	Uswar	h.s.	84 30 16	4·616225	41326	7·827	,,
	Durgapur Temple			4·428584	26828	5·081	
					2		
	Bagála, XII		13 31 40	4·392968	24715	4·681	,,
123	Maduria	h.s.	156 58 31	4·616225	41326	7·827	,,
	Durgapur Temple			4·241377	17433	3·302	
	Singraur, XV		33 59 10	4·744285	55499	10·511	,,
124	Allahabad Church			4·608333	40582	7·686	
	Tikri Gopálpur	s.	121 53 16	4·925830	84300	15·966	,,
	Singraur, XV		27 45 18	4·326209	21194	4·014	,,
125	Tikri Gopálpur	s.		4·420291	26320	4·985	
	Kandipur	,,	116 54 41	4·608333	40582	7·686	,,
	Singraur,XV			3·933411	8578	1·625	
126	Tikri Gopálpur	s.	35 27 18	4·530977	33961	6·432	,,
	Haidarganj	,,	136 7 10	4·608333	40582	7·686	,,
					7		
	Singraur, XV			4·100899	12615	2·389	
127	Kandipur	s.	116 59 38	4·530977	33961	6·432	,,
	Haidarganj	,,	43 40 36	4·420291	26320	4·985	,,
	Singraur, XV			4·854707	71566	13·554	
128	Allahabad Church			4·361971	23013	4·359	
	Ojaini	s.	116 13 10	4·925830	84300	15·966	,,
	Singraur, XV		22 17 11	4·150174	14131	2·676	,,
129	Kandipur	s.	22 39 12	4·156899	14352	2·718	,,
	Hatiadi	,,	135 3 37	4·420291	26320	4·985	,,
					7		
	Singraur, XV			4·140161	13809	2·615	
130	Ojaini	s.	35 58 49	4·156899	14352	2·718	,,
	Hatiadi	,,	109 35 49	4·361971	23013	4·359	,,
	Singraur, XV		18 20 11	4·401555	25209	4·774	,,
131	Tikri Gopálpur	s.	131 14 11	4·780018	60258	11·413	,,
	Ganges River No. 8	,,		4·608333	40582	7·686	
					7		
	Singraur, XV		15 38 59	4·489922	30897	5·852	,,
132	Allahabad Church			4·780018	60258	11·413	
	Ganges River No. 8	s.	132 36 29	4·925830	84300	15·966	,,
	Allahabad Church			4·105360	12746	2·414	
133	Ganges River No. 8	s.	80 29 55	4·497177	31418	5·950	,,
	Chapri	,,	75 54 58	4·489922	30897	5·852	,,

No. of Triangle	Station		Corrected Plane Angle	Distance			Theodolite used
				Log. feet	Feet	Miles	
			° ′ ″		8		Inch
	Tikri Gopálpur	s.	28 12 57	4·105360	12746	2·414	12
134	Ganges River No. 3	„	82 32 12	4·426992	26730	5·062	„
	Chapri	„	69 14 51	4·401555	25209	4·774	„
	Allahabad Church			4·445883	27918	5·287	
135	Ganges River No. 3	s.		4·009233	10215	1·935	
	Ditto. No. 5	„	97 8 25	4·489922	30897	5·852	„
					8		
	Chapri	s.	91 29 51	4·445883	27918	5·287	„
136	Ganges River No. 3	„		4·389305	24508	4·642	
	Ditto. No. 5	„	27 9 14	4·105360	12746	2·414	„
	Allahabad Church			4·395466	24858	4·708	
137	Ganges River No. 3	s.	61 31 32	4·462194	28986	5·490	„
	Muhammadpur	„	69 33 3	4·489922	30897	5·852	„
					1		
	Allahabad Church			4·129002	13459	2·549	
138	Chapri	s.		4·462194	28986	5·490	
	Muhammadpur	„	87 29 0	4·497177	31418	5·950	„
					6		
	Ganges River No. 3	s.		4·285259	19287	3·653	
139	Ditto. No. 5	„	60 18 19	4·395466	24858	4·708	„
	Muhammadpur	„	77 19 9	4·445883	27918	5·287	„
	Ganges River No. 5	s.	96 17 42	4·366350	23246	4·403	„
140	Muhammadpur	„		4·042709	11033	2·090	
	Aikpera	„	55 33 20	4·285259	19287	3·653	„
					1		
	Chapri	s.		4·042709	11033	2·090	
141	Ganges River No. 5	„	63 8 37	4·339739	21864	4·141	„
	Aikpera	„	90 6 0	4·389305	24508	4·642	„
	Muhammadpur	s.	50 33 18	4·350160	22395	4·242	„
142	Allahabad Church			4·248172	17708	3·354	
	Allahabad Pháphamau	„	91 48 42	4·462194	28986	5·490	„
					3		
	Chapri	s.	43 12 16	4·350160	22395	4·242	„
143	Allahabad Church			4·464492	29140	5·519	
	Allahabad Pháphamau	„	73 49 26	4·497177	31418	5·950	„
					3		
	Ganges River No. 3	s.	37 6 21	4·350160	22395	4·242	„
144	Allahabad Church			4·568850	37055	7·018	
	Allahabad Pháphamau	„	56 20 14	4·489922	30897	5·852	„
	Allahabad Pháphamau	s.	57 23 55	4·334908	21623	4·095	„
145	Allahabad Church			4·354678	22630	4·286	
	Ganges River No. 6	„	60 45 23	4·350160	22395	4·242	„
	Singraur, XV		25 22 37	4·240600	17402	3·296	„
146	Tikri Gopálpur	s.	62 42 22	4·557315	36084	6·834	„
	Mubárakpur Flag			4·608333	40582	7·686	

No. of Triangle	Station		Corrected Plane Angle	Distance			Theodolite used
				Log. feet	Feet	Miles	
			° ′ ″		1		Inch
	Singraur, XV		53 7 55	4·466027	29243	5·539	12
147	Kandipur	s.	80 48 33	4·557315	36084	6·834	„
	Mubárakpur Flag			4·420291	26320	4·985	
	Singraur, XV		29 15 24	4·297824	19853	3·760	„
148	Tikri Gopálpur	s.	58 11 56	4·538121	34524	6·539	„
	Sarái Flag			4·608333	40582	7·686	
					13		
	Tikri Gopálpur	s.	73 2 15	4·433913	27159	5·144	„
149	Ganges River No. 3	„	44 21 43	4·297824	19853	3·760	„
	Sarái Flag			4·401555	25209	4·774	
	Singraur, XV			4·510756	32416	6·139	
150	Ojaini	s.	68 12 7	4·505649	32037	6·068	„
	Nawábganj Flag			4·361971	23013	4·359	
					2		
	Singraur, XV		54 20 46	4·531781	34024	6·444	„
151	Tikri Gopálpur	s.	49 54 58	4·505649	32037	6·068	„
	Nawábganj Flag			4·608333	40582	7·686	
	Singraur, XV			3·729643	5366	1·016	
152	Haidarganj	s.	83 5 14	4·528120	33738	6·390	„
	Koleha Dâk Bungalow			4·530977	33961	6·432	
	Singraur, XV			4·110418	12895	2·442	
153	Ojaini	s.	8 33 41	4·018688	10440	1·977	„
	Korai Flag			4·361971	23013	4·359	
					5		
	Singraur, XV			4·384371	24231	4·589	
154	Haidarganj	s.	7 33 49	4·018688	10440	1·977	„
	Korai Flag			4·530977	33961	6·432	
	Haidarganj	s.		3·804892	6381	1·209	
155	Tikri Gopálpur	„	37 25 16	3·718563	5231	0·991	„
	Mufti-ka-purwa Flag			3·933411	8578	1·625	
	Haidarganj	s.	41 2 24	3·805121	6384	1·209	„
156	Tikri Gopálpur	„	20 52 21	3·539632	3464	0·656	„
	Bhíka Masjid			3·933411	8578	1·625	
	Singraur, XV			4·051821	11267	2·134	
157	Ojaini	s.	130 34 26	4·498660	31525	5·971	„
	Fatehpur Mat			4·361971	23013	4·359	
					8		
	Singraur, XV		18 12 11	4·503389	31870	6·036	„
158	Ganges River No. 3	s.	17 59 57	4·498660	31525	5·971	„
	Fatehpur Mat			4·780018	60258	11·413	
	Singraur, XV			4·034577	10829	2·051	
159	Ojaini	s.	19 50 23	4·125254	13343	2·527	„
	Ganipur Flag			4·361971	23013	4·359	

No. of Triangle	Station	Corrected Plane Angle	Distance			Theodolite used
			Log. feet	Feet	Miles	
		° ′ ″				Inch
	Ojaini s.	19 13 6	3·828953	6745	1·277	12
160	Hatiadi „	23 9 15	3·906155	8057	1·526	„
	Ganges River No. 1		4·140161	13809	2·615	
	Ojaini s.	20 36 16	4·107457	12807	2·426	„
161	Hatiadi „	137 5 48	4·394016	24775	4·692	„
	Álamchand Factory		4·140161	13809	2·615	
	Singraur, XV	43 27 45	4·003950	10091	1·911	„
162	Hatiadi s.	34 34 22	3·920367	8325	1·577	„
	Ganges River a		4·156899	14352	2·718	
				3		
	Ojaini s.	41 2 1	4·003950	10091	1·911	„
163	Hatiadi „	75 1 27	4·171707	14849	2·812	„
	Ganges River a		4·140161	13809	2·615	
	Singraur, XV	31 25 51	4·132954	13582	2·572	„
164	Hatiadi s.	115 7 54	4·372535	23579	4·466	„
	Ojaini Masjid		4·156899	14352	2·718	
				1		
	Kandipur s.	73 35 54	4·132954	13582	2·572	„
165	Hatiadi „	19 55 43	3·683559	4826	0·914	„
	Ojaini Masjid		4·150174	14131	2·676	
	Singraur, XV	32 27 20	4·116713	13083	2·478	„
166	Hatiadi s.	111 28 54	4·355758	22686	4·297	„
	Ojaini Mat		4·156899	14352	2·718	
	Ganges River No. 3 s.		4·391501	24632	4·665	
167	Ditto. No. 5 „	28 6 6	4·118938	13150	2·491	„
	Chapri Masjid		4·445883	27918	5·287	
				5		
	Tikri Gopálpur s.	29 7 30	4·118938	13150	2·491	„
168	Ganges River No. 3 „	81 57 50	4·427376	26753	5·067	„
	Chapri Masjid		4·401555	25209	4·774	
	Chapri s.		4·455583	28548	5·407	
169	Muhammadpur „	17 33 33	4·210396	16233	3·074	„
	Begam Sarái		4·129002	13459	2·549	

No. of Triangle	Station	Corrected Plane Angle	Distance			Theodolite used
			Log. feet	Feet	Miles	
		° ′ ″				Inch
	Chapri s.		4·302088	20049	3·797	
170	Muhammadpur „	34 13 23	4·068153	11699	2·216	12
	Nimba Paka Koti		4·129002	13459	2·549	
				9		
	Chapri s.	37 38 1	3·900173	7946	1·505	„
171	Ganges River No. 3 „	64 1 21	4·068153	11699	2·216	„
	Nimba Paka Koti		4·105360	12746	2·414	
	Chapri s.	67 0 31	4·233674	17127	3·244	„
172	Muhammadpur „	66 39 18	4·232527	17082	3·235	„
	Mau Masjid		4·129002	13459	2·549	
				12		
	Ganges River No. 3 s.	62 28 53	4·232527	17082	3·235	„
173	Chapri „	76 5 9	4·271738	18696	3·541	„
	Mau Masjid		4·105360	12746	2·414	
	Ganges River No. 3 s.	28 41 18	4·369706	23426	4·437	„
174	Muhammadpur „	120 41 21	4·622897	41966	7·948	„
	Rangpur Temple		4·395466	24858	4·708	
				19		
	Ganges River No. 3 s.	47 39 41	4·540150	34686	6·569	„
175	Chapri „	116 34 41	4·622897	41966	7·948	„
	Rangpur Temple		4·105360	12746	2·414	
	Chapri s.		4·277112	18928	3·585	
176	Muhammadpur „	113 5 57	4·434412	27190	5·150	„
	Rasúlabad Ghát Temple		4·129002	13459	2·549	
				10		
	Muhammadpur s.	24 56 21	3·903079	8000	1·515	„
177	Allahabad Pháphamau „	86 5 44	4·277112	18928	3·585	„
	Rasúlabad Ghát Temple		4·248172	17708	3·354	
	Allahabad Pháphamau s.	34 27 56	4·178267	15075	2·855	„
178	Ganges River No. 6 „	23 41 27	4·029530	10704	2·027	„
	Allahabad Pháphamau Chimney		4·354678	22630	4·286	
				12		
	Ganges River No. 3 s.	16 41 45	4·029530	10704	2·027	„
179	Allahabad Pháphamau „	79 16 13	4·563548	36606	6·933	„
	Ditto. Pháphamau Chimney		4·568850	37055	7·018	

November 1879.

J. B. N. HENNESSEY,
In charge of Computing Office.

KARARA MERIDIONAL SERIES.

AZIMUTHS OF SURROUNDING STATIONS AND POINTS, AT PRINCIPAL, PRINCIPAL-AUXILIARY, AND SECONDARY STATIONS.

The following table contains, in the first column, the name of each Principal, Principal-Auxiliary, or Secondary Station, at which azimuths of surrounding Points have been measured; immediately followed by those azimuths. The second column contains the number of the triangle which gives the distance between the Station and the Point.

Name of station with azimuths of surrounding points		° ′ ″	No. of triangle giving distance
AIKPERA	S.		
Chapri	S.	124 52 5	141
Muhammadpur	„	159 24 45	140
Ganges River No. 5	„	214 58 5	140
ALLAHABAD FORT	S.		
Bagála, XII		50 43 39	68
Allahabad Juma Masjid		81 41 51	75
Allahabad Begam's Mausoleum		102 13 15	86
Allahabad Burial Ground		119 57 51	95
Allahabad Temple No. 2		125 8 23	78
Singraur, XV		126 12 2	68
Allahabad	S.	132 26 41	71
Allahabad House No. 4	„	140 58 14	73
Allahabad Church		158 39 41	70
Allahabad House No. 5		185 28 4	90
Allahabad Temple No. 1		200 33 54	79
Ibráhímpur Idgáh		224 29 32	92
Badra	S.	233 11 4	81
Allahabad Fort Flag Staff		245 49 31	76
Jhúsi Temple		255 15 47	88
Jhúsi	„	282 23 6	82
Arail White Temple		329 29 51	94
Allahabad No. 2	„	359 1 42	84

Name of station with azimuths of surrounding points		° ′ ″	No. of triangle giving distance
ALLAHABAD HOUSE No. 4	S.		
Allahabad	S.	21 52 27	74
Allahabad Church		219 11 2	73
Allahabad Fort	„	320 57 43	73
Allahabad Juma Masjid		334 6 19	75
ALLAHABAD No. 1 OR MOIA	S.		
Allahabad No. 2	S.	123 19 45	85
Jhúsi	„	180 28 5	85
ALLAHABAD No. 2	S.		
Allahabad Fort	S.	179 1 43	84
Jhúsi	„	223 57 39	84
Allahabad No. 1 or Moia	„	303 19 8	85
ALLAHABAD PHAPHAMAU	S.		
Rasúlabad Ghát Temple		2 23 36	177
Ganges River No. 3	S.	53 0 52	144
Chapri	„	70 30 4	143
Muhammadpur	„	88 29 20	142
Ganges River No. 6	„	299 16 43	145
Allahabad Pháphamau Chimney		333 44 39	178
Allahabad Church		356 40 38	142

Name of station with azimuths of surrounding points		° ′ ″	No. of triangle giving distance
ALLAHABAD	S.		
Allahabad Temple No. 2		76 29 44	78
Allahabad House No. 4	S.	201 52 24	74
Allahabad Church		213 48 9	71
Allahabad Temple No. 1		256 55 10	80
Jhúsi	„	298 30 39	72
Allahabad Fort Flag Staff		304 29 53	76
Allahabad Fort	„	312 26 7	71
AMOLI, XXXIII			
Utiámau, XXXII		54 51 18·76	39
Samnadio, XXXIV		116 57 23·44	40
Ragaupur, XXXV		177 2 17·65	41
Turkani, XXXI		352 47 26·64	39
ASHRAFPUR, XXXVIII			
Khánpur, XXXIV*		215 35 46·83	45
Thána, XXXVII		275 7 20·96	44
Imlia, XXXVI		332 27 0·67	44
BADRA	S.		
Jhúsi	S.	19 43 51	82
Jhúsi Temple		22 3 26	89

* Of the North-East Longitudinal Series.

Name of station with azimuths of surrounding points		° ′ ″	No. of triangle giving distance
BADRA s.			
Allahabad Fort	s.	53 12 2	81
Allahabad Begam's Mausoleum		79 35 35	87
Allahabad Church		96 24 51	81
Allahabad House No. 5		118 37 9	91
Ibráhímpur Idgáh		210 36 12	93
BAGALA, XII			
Raghunáthpur Hill Mark (hel.)		11 8 17	59
Sirmaul, VIII		29 35 28·82	9
Mau, X		55 1 51·70	9
Kohi Hill Mark (heliotrope)		86 39 40	62
Chandaha Hill Mark (heliotrope)		95 56 26	66
Pabhosa, XIII		114 3 58·92	10
Purkas Masjid		135 17 52	117
Tilapur W. Temple		160 16 15	120
Tilapur S.E. Temple		162 1 26	118
Durgapur Temple		175 19 40	122
Singraur, XV		184 50 50·27	11
Maduria	h.s.	188 51 20	102
Ganges River No. 2	s.	217 24 42	104
Allahabad Church		225 3 13	69
Uswar	h.s.	230 34 7	99
Allahabad Fort	s.	230 36 51	68
Bagála House		236 33 26	115
Parbajabad Hill Temple		238 51 2	112
Bhíta Temple		245 8 34	108
Bhíta	h.s.	246 53 17	96
Bobandar Zamíndár's House		247 47 12	116
Bárah	s.	259 37 12	100
Bhúri Hill Temple		267 8 46	114
Balaun Hill Mark		306 40 58	97
Bagála Hill Temple		308 48 21	110
BARAH s.			
Balaun Hill Mark		17 32 23	101
Bagála, XII		79 39 53	100
Maduria	h.s.	108 54 17	102
Uswar	,,	127 45 4	100
Parbajabad Hill Temple		155 16 27	112
BASANTPUR, XXIX			
Parewa, XXVIII		59 48 27·38	35
Pesar, XXX		120 21 57·04	36
Turkani, XXXI		181 49 0·28	37
Tikiri, XXVII		359 37 10·54	35
BHITA h.s.			
Balaun Hill Mark		37 53 53	97
Bagála, XII		66 58 7	96

Name of station with azimuths of surrounding points		° ′ ″	No. of triangle giving distance
BHITA h.s.			
Uswar	h.s.	77 9 27	98
Ganges River No. 2	s.	127 6 50	104
Ganges River No. 4	,,	165 1 22	105
Allahabad Church		199 58 51	96
Mámabhina	,,	211 44 2	106
BURWA, V			
Jaliádhar, II		21 7 12·66	5
Rewah Díwán's Temple		74 48 28	53
Rewah Large Temple		79 28 48	54
Dádar, III		101 14 51·10	5
Sirmaul, VIII		166 41 28·35	6
Gurwa Parúr	h.s.	281 10 35	51
CHAPRI s.			
Ganges River No. 3	s.	9 35 9	133
Begam Sarái		14 26 49	169
Tikri Gopálpur	,,	78 50 0	134
Muhammadpur	,,	226 29 29	138
Allahabad Pháphamau	,,	250 27 55	143
Rangpur Temple		253 0 28	175
Rasúlabad Ghát Temple		266 18 29	176
Ganges River No. 5	,,	278 5 18	136
Mau Masjid		293 30 0	172
Allahabad Church		293 40 11	133
Aikpera	,,	304 50 41	141
Nimba Paka Koti		331 57 8	170
DADAR, III			
Kaimúr, I		8 0 30·76	4
Andhi Hill Mark (heliotrope)		54 44 23	49
Náru, IV		64 6 21·19	14
Kotar Kaimári, VI		123 10 55·71	15
Pati Hill Mark (heliotrope)		161 53 0	57
Donri, VII		177 0 59·54	7
Sirmaul, VIII		211 30 57·60	6
Burwa, V		281 7 59·06	5
Rewah Large Temple		315 9 11	54
Rewah Díwán's Temple		317 5 25	53
Jaliádhar, II		321 37 14·13	4
DONRI, VII			
Kotar Kaimári, VI		43 9 26·03	16
Pati Hill Mark (heliotrope)		75 46 0	57
Haraha Hill Mark (heliotrope)		79 38 18	55
Kachár, IX		109 53 2·48	17
Mau, X		210 48 46·24	8
Sirmaul, VIII		274 10 23·50	7
Dádar, III		357 0 34·10	7

Name of station with azimuths of surrounding points		° ′ ″	No. of triangle giving distance
GANGES RIVER No. 2 s.			
Bagála, XII		37 27 28	104
Ganges River No. 4	s.	244 28 44	105
Bhíta	h.s.	307 4 46	104
GANGES RIVER No. 3 s.			
Tikri Gopálpur	s.	107 2 48	131
Fatehpur Mat		119 28 29	158
Singraur, XV		137 28 26	131
Sarái Flag		151 24 31	149
Chapri Masjid		189 0 38	167
Chapri	,,	189 35 0	133
Muhammadpur	,,	208 33 23	137
Allahabad Pháphamau	,,	232 58 34	144
Rangpur Temple		237 14 41	174
Allahabad Pháphamau Chimney		249 40 19	179
Ganges River No. 5	s.	250 55 55	135
Mau Masjid		252 3 53	173
Nimba Paka Koti		253 36 21	171
Allahabad Church		270 4 55	132
GANGES RIVER No. 4 s.			
Ganges River No. 2	s.	64 30 12	105
Allahabad Church		226 27 39	107
Mámabhina	,,	285 36 1	106
Bhíta	h.s.	345 0 46	105
GANGES RIVER No. 5 s.			
Aikpera	s.	34 58 35	140
Ganges River No. 3	,,	70 57 58	135
Chapri	,,	98 7 12	136
Chapri Masjid		99 4 4	167
Muhammadpur	,,	131 16 17	139
Allahabad Church		333 49 33	135
GANGES RIVER No. 6 s.			
Allahabad Church		58 32 53	145
Allahabad Pháphamau Chimney		95 36 49	178
Allahabad Pháphamau	s.	119 18 16	145
GURWA PARUR h.s.			
Jaliádhar, II		69 41 10	52
Burwa, V		101 17 58	51
Sirmaul, VIII		137 53 8	51
HAIDARGANJ s.			
Koleha Dák Bungalow		81 6 27	152
Kandipur	s.	120 31 5	127
Korai Flag		156 37 52	154

Name of station with azimuths of surrounding points		° ′ ″	No. of triangle giving distance
HAIDARGANJ s.			
Singraur, XV		164 11 41	126
Tikri Gopálpur	s.	300 18 51	126
Bhíka Masjid		341 21 15	156
Mufti-ka-purwa Flag		348 9 24	155
HATIADI s.			
Álamchand Factory		92 29 1	161
Singraur, XV		205 47 24	129
Ganges River a		240 21 46	162
Ojaini	s.	315 23 13	130
Ojaini Mat		317 16 18	166
Ojaini Masjid		320 55 18	164
Ganges River No. 1		338 32 28	160
Kandipur	s.	340 51 1	129
HORESA, XIX			
Majilgaon, XVII		19 38 27·95	24
Khára, XXII		163 9 10·48	29
Tánghan, XXI		192 45 29·23	26
Salon, XX		240 31 25·67	25
Pariáon, XVIII		308 12 31·67	24
IMLIA, XXXVI			
Ashrafpur, XXXVIII		152 29 44·08	44
Thána, XXXVII		214 40 41·27	43
Ragaupur, XXXV		277 39 10·79	42
Samnadio, XXXIV		338 56 27·79	42
JALIADHAR, II			
Karára, XXIII*		23 43 21·67	1
Kaimúr, I		68 33 7·86	2
Dádar, III		141 42 11·15	4
Burwa, V		201 5 19·17	5
Gurwa Parúr	h.s.	249 31 54	52
Pabei	„	278 9 43	47
Marwás, XXVI*		310 19 10·08	1
JANAI, XXV			
Munai, XXIII		3 55 14·90	31
Sora, XXIV		59 47 1·79	31
Tauli, XXVI		123 49 58·32	32
Tikiri, XXVII		185 6 48·04	33
JHUSI s.			
Allahabad No. 1 or Moia	s.	0 28 6	85
Allahabad No. 2	„	43 58 17	84
Arail White Temple		63 57 43	94
Allahabad Fort	„	102 23 45	82
Allahabad Burial Ground		108 58 13	95

Name of station with azimuths of surrounding points		° ′ ″	No. of triangle giving distance
JHUSI s.			
Allahabad Fort Flagstaff		109 50 53	77
Allahabad	s.	118 31 52	72
Allahabad Church		135 32 7	83
Allahabad Temple No. 1		155 53 58	79
Allahabad House No. 5		157 52 43	90
Jhúsi Temple		196 1 22	88
Badra	s.	199 43 32	82
Ibráhímpur Idgáh		*204 38 8	92
KACHAR, IX			
Kotar Kaimári, VI		9 26 14·79	17
Haraha Hill Mark (heliotrope)		43 17 43	56
Bhauri Hill Mark (heliotrope)		183 0 10	64
Lálapur, XI		189 6 54·12	19
Mau, X		251 8 36·60	18
Donri, VII		289 49 28·76	17
KAIMUR, I			
Náru, IV		139 16 39·03	14
Andhi Hill Mark (heliotrope)		144 55 54	50
Dádar, III		187 59 17·62	4
Jaliádhar, II		248 26 59·84	2
Marwás, XXVI*		289 18 39·88	3
Karára, XXIII*		334 28 45·51	2
KANDIPUR s.			
Hatiadi	s.	160 51 23	129
Singraur, XV		183 30 35	125
Ojaini Masjid		234 27 17	165
Mubárakpur Flag		264 19 8	147
Tikri Gopálpur	s.	300 25 16	125
Haidarganj	„	300 30 13	127
KARARA, XXIII*			
Kaimúr, I		154 31 23·14	2
Jaliádhar, II		203 39 53·02	1
Pabei	h.s.	249 1 7	47
Marwás, XXVI*		269 18 36·73	1
KARRA, XVI			
Pabhosa, XIII		7 39 26·14	12
Nagdílpur, XIV		56 30 45·90	13
Majilgaon, XVII		107 51 46·21	22
Pariáon, XVIII		180 28 53·49	23
Singraur, XV		294 37 19·97	12
KHANPUR, XXXIV†			
Ashrafpur, XXXVIII		35 39 20·40	45
Másí, XXXV†		272 42 26·86	46
Thána, XXXVII		336 4 46·98	45

Name of station with azimuths of surrounding points		° ′ ″	No. of triangle giving distance
KHARA, XXII			
Sora, XXIV		188 50 27·94	30
Munai, XXIII		250 22 44·56	28
Tánghan, XXI		311 25 46·94	28
Horesa, XIX		343 7 22·08	29
KOTAR KAIMARI, VI			
Náru, IV		10 59 3·45	15
Haraha Hill Mark (heliotrope)		162 54 23	55
Kachár, IX		189 25 13·35	17
Pati Hill Mark (heliotrope)		209 50 26	58
Donri, VII		223 4 51·81	16
Dádar, III		303 5 57·67	15
Andhi Hill Mark (heliotrope)		359 38 59	49
LALAPUR, XI			
Kachár, IX		9 8 12·68	19
Nagdílpur, XIV		188 59 20·26	21
Pabhosa, XIII		239 29 27·09	20
Mau, X		326 28 50·95	19
MADURIA h.s.			
Bagála, XII		8 51 33	102
Purkas Masjid		115 32 43	117
Tilapur S. E. Temple		142 27 11	118
Tilapur W. Temple		143 21 13	121
Durgapur Temple		165 50 4	123
Bhíta Temple		259 28 25	108
Uswar	h.s.	270 35 36	103
Bárah	s.	288 51 49	102
Bobandar Zamíndár's House		299 13 33	116
Bhúri Hill Temple		318 4 56	114
Bagála House		343 47 10	115
Bagála Hill Temple		355 17 14	111
MAJILGAON, XVII			
Nagdílpur, XIV		6 37 6·48	22
Horesa, XIX		199 36 43·49	24
Pariáon, XVIII		244 53 58·26	23
Karra, XVI		287 46 50·49	22
MAMABHINA s.			
Bhíta	h.s.	31 45 8	106
Ganges River No. 4	s.	105 37 43	106
Allahabad Church		190 30 33	107
MARWAS, XXVI*			
Karára, XXIII*		89 31 10·76	1
Kaimúr, I		109 33 54·59	3
Jaliádhar, II		130 28 19·78	1
Pabei	h.s.	209 30 33	48

* Of the Calcutta Longitudinal Series of the South-East Quadrilateral. † Of the North-East Longitudinal Series.

Name of station with azimuths of surrounding points			No. of triangle giving distance
Masi, XXXV*		° ′ ″	
Thána, XXXVII		37 2 55·85	46
Khánpur, XXXIV*		92 48 49·67	46
Mau, X			
Donri, VII		30 50 38·73	8
Kachár, IX		71 14 3·36	18
Bhauri Hill Mark (heliotrope)		139 45 22	64
Lálapur, XI		146 33 0·84	19
Pabhosa, XIII		188 31 7·75	10
Chandaha Hill Mark (heliotrope)		222 6 56	66
Bagála, XII		234 52 56·28	9
Chaukandi Hill Mark		272 19 9	61
Raghunáthpur Hill Mark (hel.)		285 44 2	60
Sirmaul, VIII		316 29 31·61	8
Muhammadpur s.			
Nimba Pakakoti		12 16 52	170
Ganges River No. 3	s.	28 34 18	137
Begam Sarái		28 56 42	169
Chapri	„	46 30 15	138
Rangpur Temple		267 52 57	174
Allahabad Pháphamau	„	268 27 57	142
Rasúlabad Ghát Temple		293 24 18	176
Ganges River No. 5	„	311 15 9	139
Allahabad Church		319 1 15	137
Aikpera	„	339 24 7	140
Mau Masjid		339 50 57	172
Munai, XXIII			
Tánghan, XXI		24 5 46·10	27
Khára, XXII		70 27 7·52	28
Sora, XXIV		130 54 20·16	30
Janai, XXV		183 54 52·18	31
Salon, XX		326 44 27·18	27
Nagdilpur, XIV			
Lálapur, XI		9 0 50·26	21
Kohi Hill Mark (heliotrope)		24 13 21	63
Majilgaon, XVII		186 36 30·01	22
Karra, XVI		236 25 14·73	13
Pabhosa, XIII		325 50 3·75	13
Naru, IV			
Kotar Kaimári, VI		190 57 50·88	15
Dádar, III		244 0 12·04	14
Kaimúr, I		319 11 45·12	14

Name of station with azimuths of surrounding points			No. of triangle giving distance
Ojaini s.		° ′ ″	
Álamchand Factory		114 47 43	161
Ganges River No. 1		116 10 53	160
Hatiadi	s.	135 23 59	130
Korai Flag		162 49 7	153
Singraur, XV		171 22 48	128
Ganges River a		176 26 0	163
Ganipur Flag		191 13 11	159
Nawábganj Flag		239 34 55	150
Allahabad Church		287 35 58	128
Fatehpur Mat		301 57 14	157
Pabei h.s.			
Marwás, XXVI†		29 33 56	48
Karára, XXIII†		69 17 9	47
Jaliádhar, II		98 22 16	47
Pabhosa, XIII			
Mau, X		8 32 34·27	10
Lálapur, XI		59 35 5·45	20
Bhauri Hill Mark (heliotrope)		60 58 6	65
Kohi Hill Mark (heliotrope)		63 53 21	62
Nagdílpur, XIV		145 54 14·00	13
Karra, XVI		187 38 7·11	12
Singraur, XV		232 10 2·43	11
Bagála, XII		293 56 26·97	10
Chandaha Hill Mark (heliotrope)		303 49 10	67
Parewa, XXVIII			
Pesar, XXX		180 42 21·81	36
Basantpur, XXIX		239 43 49·74	35
Tikiri, XXVII		299 48 6·00	34
Tauli, XXVI		356 34 7·06	34
Pariaon, XVIII			
Karra, XVI		0 28 55·46	23
Majilgaon, XVII		64 58 56·67	23
Horesa, XIX		128 15 46·37	24
Salon, XX		201 14 22·17	25
Pesar, XXX			
Parewa, XXVIII		0 42 25·79	36
Utiámau, XXXII		179 47 22·29	38
Turkani, XXXI		237 32 19·82	37
Basantpur, XXIX		300 17 22·53	36

Name of station with azimuths of surrounding points			No. of triangle giving distance
Ragaupur, XXXV		° ′ ″	
Samnadio, XXXIV		46 51 46·80	41
Imlia, XXXVI		97 45 9·68	42
Thána, XXXVII		153 22 58·61	43
Amoli, XXXIII		357 1 58·50	41
Salon, XX			
Pariáon, XVIII		21 16 33·64	25
Horesa, XIX		60 36 52·72	25
Tánghan, XXI		96 52 59·51	26
Munai, XXIII		146 47 21·93	27
Samnadio, XXXIV			
Imlia, XXXVI		158 58 16·49	42
Ragaupur, XXXV		226 47 37·49	41
Amoli, XXXIII		296 52 55·87	40
Utiámau, XXXII		356 26 9·11	40
Singraur, XV			
Korai Flag		1 58 17	153
Kandipur	s.	3 30 43	125
Bagála, XII		4 51 40·60	11
Hatiadi	„	25 47 54	129
Pabhosa, XIII		52 18 27·73	11
Karra, XVI		114 44 29·10	12
Nawábganj Flag		281 24 39	150
Allahabad Church		301 46 15	69
Allahabad Fort	s.	306 6 5	68
Sarái Flag		306 30 1	148
Mubárakpur Flag		310 22 48	146
Allahabad Begam's Mausoleum		311 22 40	86
Ganges River No. 3	s.	317 25 14	131
Ganipur Flag		335 23 15	159
Fatehpur Mat		335 37 25	157
Tikri Gopálpur	„	335 45 25	124
Ganges River a		342 20 9	162
Haidarganj	„	344 10 57	126
Ojaini	„	351 22 32	128
Koleha Dák Bungalow		353 16 1	152
Ojaini Mat		353 20 34	166
Ojaini Masjid		354 22 3	164
Sirmaul, VIII			
Dádar, III		31 35 42·81	6
Donri, VII		94 15 35·88	7
Mau, X		136 32 52·19	8
Chaukandi Hill Mark		180 15 57	61
Bagála, XII		209 29 56·09	9
Raghunáthpur Hill Mark (hel.)		249 12 27	59
Gurwa Parúr	h.s.	317 43 36	51
Burwa, V		346 39 19·04	6

* Of the North-East Longitudinal Series. † Of the Calcutta Longitudinal Series of the South-East Quadrilateral.

Name of station with azimuths of surrounding points		No. of triangle giving distance
Sora, XXIV	° ′ ″	
Khára, XXII	8 51 12·08	30
Tauli, XXVI	182 39 59·99	32
Janai, XXV	239 42 58·77	31
Munai, XXIII	310 50 40·63	30
Tanghan, XXI		
Horesa, XIX	12 46 18·61	26
Khára, XXII	131 28 25·14	28
Munai, XXIII	204 4 1·86	27
Salon, XX	276 48 21·21	26
Tauli, XXVI		
Sora, XXIV	2 40 13·77	32
Parewa, XXVIII	176 34 26·28	34
Tikiri, XXVII	238 7 34·62	33
Janai, XXV	303 46 8·39	32
Thana, XXXVII		
Imlia, XXXVI	34 43 55·83	43
Ashrafpur, XXXVIII	95 13 19·90	44
Khánpur, XXXIV*	156 7 13·38	45
Másí, XXXV*	216 59 0·55	46
Ragaupur, XXXV	333 20 13·27	43

Name of station with azimuths of surrounding points		No. of triangle giving distance
Tikiri, XXVII	° ′ ″	
Janai, XXV	5 7 16·22	33
Tauli, XXVI	58 11 53·48	33
Parewa, XXVIII	119 52 44·92	34
Basantpur, XXIX	179 37 12·68	35
Tikri Gopalpur s.		
Mufti-ka-purwa Flag	82 54 9	155
Bhíka Masjid	99 27 4	156
Haidarganj s.	120 19 25	126
Kandipur „	120 26 42	125
Singraur, XV	155 46 43	124
Nawábganj Flag	205 41 41	151
Sarái Flag	213 58 39	148
Mubárakpur Flag	218 29 5	146
Chapri Masjid	257 53 24	168
Chapri s.	258 47 57	134
Allahabad Church	277 39 59	124
Ganges River No. 3 „	287 0 54	131
Turkani, XXXI		
Basantpur, XXIX	1 49 11·16	37
Pesar, XXX	57 37 6·12	37

Name of station with azimuths of surrounding points		No. of triangle giving distance
Turkani, XXXI	° ′ ″	
Utiámau, XXXII	118 25 43·33	38
Amoli, XXXIII	172 48 8·41	39
Uswar h.s.		
Bagála Hill Temple	38 27 20	110
Bagála, XII	50 35 43	99
Maduria h.s.	90 36 59	103
Tilapur S. E. Temple	120 11 47	119
Tilapur W. Temple	123 25 55	120
Durgapur Temple	135 5 59	122
Bhíta Temple	254 38 6	109
Bhíta h.s.	257 6 13	98
Parbajabad Hill Temple	265 30 13	113
Bárah s.	307 43 59	100
Balaun Hill Mark	351 15 27	98
Utiamau, XXXII		
Samnadio, XXXIV	176 26 28·43	40
Amoli, XXXIII	234 47 11·25	39
Turkani, XXXI	298 20 54·88	38
Pesar, XXX	359 47 21·05	38

* Of the North-East Longitudinal Series.

November 1879.

J. B. N. HENNESSEY,

In charge of Computing Office.

KARARA MERIDIONAL SERIES.

CO-ORDINATES AND DESCRIPTIONS OF ALL STATIONS AND POINTS.

The following table gives the co-ordinates of all the stations and other fixed points, arranged in alphabetical order, also the descriptions of the secondary and intersected (or unvisited) points, and references to the preceding pages where the descriptions of the principal stations are given. In certain instances numbers are added which have reference to the given data of the triangles by which the station or point has been fixed; when these numbers are omitted it is to be understood that no triangles are given.

Note.—λ stands for Latitude North; L for Longitude East of Greenwich; H for Height of station in feet above mean sea level, if determined trigonometrically, H_s for the Height when found by spirit leveling, and h for Height of station tower or pillar. The trigonometrical heights always refer to the upper mark-stone or to the upper surface of the pillar on which the theodolite stood: the spirit leveled heights refer to the points on which the leveling staff stood as indicated in footnotes. For visited stations and for other points of superior accuracy the values of λ and L are given to two places of decimals; for well determined objects to one place, and for the remaining points to the nearest second. Principal stations are distinguished by the Roman numerals I, II, &c.; secondary stations by the letters h.s. and s. The names in italics are those of the territories, states or districts in which the stations or points are situated.

Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.
Aikpera s. (*Allahabad*) In field W. of the village. ° ′ ″ λ 25 27 44·56 L 81 52 14·48 Nos. 140, 141	**Allahabad, Berrill's Hotel.** (*Allahabad*) ° ′ ″ λ 25 25 49 L 81 54 21	**Allahabad, Fort Flagstaff.** (*Allahabad*) ° ′ ″ λ 25 26 0·3 L 81 55 15·6 Nos. 76, 77
Álamchand Factory, (*Allahabad*) Chimney. λ 25 33 1·0 L 81 37 42·7 No. 161	**Allahabad, Bhim's Lát,** (*Allahabad*) Column, in fort. λ 25 25 51·5 L 81 55 3·8	**Allahabad Fort** s. (*Allahabad*) On main gate of fort. λ 25 25 53·87 L 81 54 59·76 No. 68
Aliganj Temple. (*Lucknow*) λ 26 55 46·6 L 81 0 33·2	**Allahabad, Burial Ground,** (*Allahabad*) Colonel Humphrey's Tomb. λ 25 26 19·2 L 81 54 11·4 No. 95	**Allahabad, House No. 1.** (*Allahabad*) Flag on Treasurer's house in Dáraganj. λ 25 26 52 L 81 55 36
Allahabad, Begam's House. (*Allahabad*) λ 25 26 37 L 81 53 33	**Allahabad Church,** (*Allahabad*) Steeple. λ 25 27 43·3 L 81 54 12·7 Nos. 69, 70, 107	**Allahabad, House No. 2.** (*Allahabad*) Staircase of Gosáin's house in Kydganj. λ 25 25 47·3 L 81 54 3·1
Allahabad, Begam's Mausoleum. (*Allahabad*) In Khusro Bágh. λ 25 26 31·0 L 81 51 51·0 Nos. 86, 87	**Allahabad, Dáraganj, S.E. Temple.** (*Allahabad*) λ 25 26 27·8 L 81 55 33·5	**Allahabad, House No. 3.** (*Allahabad*) E. chimney of Mr. Lang's house. λ 25 27 53·5 L 81 54 6·3

Name of station, district, description, co-ordinates &c.

Allahabad, House No. 4 s.
(*Allahabad*) On Mr. Lowther's house in Colonelganj.

	° ′ ″
λ	25 27 15·03
L	81 53 47·29

Nos. 73, 74

Allahabad, House No. 5.
(*Allahabad*) E. chimney of Mr. Montgomery's house.

λ	25 28 23·4
L	81 55 15·5

Nos. 90, 91

Allahabad, House No. 6.
(*Allahabad*) Chimney of Mr. Wilson's house in Motiganj.

λ	25 25 32·4
L	81 53 11·2

Allahabad, House No. 7.
(*Allahabad*) Kalas of Rája Odidnarain's house in Motiganj.

λ	25 25 22·9
L	81 52 55·0

Allahabad, House No. 8.
(*Allahabad*) Top of Rámsahai's house in Kydganj.

λ	25 25 47
L	81 53 50

Allahabad, Juma Masjid,
(*Allahabad*) Kalas.

λ	25 25 50·3
L	81 54 32·6

No. 75

Allahabad, Magistrate's Kachahri.
(*Allahabad*)

λ	25 26 42
L	81 53 32

Allahabad, Mangal Dás's Temple.
(*Allahabad*) On right bank of the Jumna.

λ	25 25 11·3
L	81 54 14·9

Allahabad, Masonic Lodge.
(*Allahabad*)

λ	25 26 40
L	81 54 23

Allahabad, Mr. Macaura's House.
(*Allahabad*)

λ	25 27 52
L	81 54 39

Name of station, district, description, co-ordinates &c.

Allahabad No. 1, or Moia s.
(*Allahabad*) About 0·6 of a mile N.W. of village of the same name.

	° ′ ″
λ	25 23 19·65
L	81 56 29·36

No. 85

Allahabad No. 2 s.
(*Allahabad*) Close to Pura Fateh village, about 1 mile S. of Arail, the same distance N. of Daudnagar, and ¾ of a mile W. of Deorah village.

λ	25 24 12·02
L	81 55 1·66

No. 84

Allahabad, Pháphamau Chimney,
(*Allahabad*) Of Powder Works on right bank of the Ganges.

λ	25 29 49·7
L	81 54 50·2

Nos. 178, 179

Allahabad, Pháphamau s.
(*Allahabad*) At S.W. extremity of village on left bank of the Ganges.

λ	25 31 24·78
L	81 53 58·50

Nos. 142, 143, 144

Allahabad s.
(*Allahabad*) On a house in Chitpur, occupied by the Surveyor General's Office in 1845.

λ	25 26 59·68
L	81 53 40·50

Nos. 71, 72

Allahabad, Shah Hujjat's Masjid.
(*Allahabad*)

λ	25 26 7·2
L	81 52 54·3

Allahabad, Sikuti Temple,
(*Allahabad*) Spire.

λ	25 29 57·9
L	81 55 4·9

Allahabad, Sultán's Mausoleum.
(*Allahabad*) In Khusro Bágh.

λ	25 26 30·9
L	81 51 53·1

Allahabad Temple No. 1.
(*Allahabad*) N.E. Temple in Dáraganj.

λ	25 27 24·3
L	81 55 37·1

Nos. 79, 80

Allahabad Temple No. 2.
(*Allahabad*) N.E. temple in Samdabad.

λ	25 26 55·8
L	81 53 22·8

No. 78

Name of station, district, description, co-ordinates &c.

Amoli, XXXIII.
(*Vide page* 9—M.)

	° ′ ″
λ	27 5 40·72
L	81 23 48·91
H	420
h	30

No. 39

Andhi Hill Mark (heliotrope).
(*Baghelkhand, Rewah State*) On a detached hill on the right bank of Magardha nadi, and about 2½ miles N.E. of Beharra village.

λ	24 28 34·91
L	81 2 58·06

Nos. 49, 50

Arail White Temple.
(*Allahabad*)

λ	25 25 8·5
L	81 55 29·2

No. 94

Ashrafpur, XXXVIII.
(*Vide page* 9—M.)

λ	27 29 26·81
L	81 4 9·54
H	450
h	24

No. 44

Badra s.
(*Allahabad*) About 2 miles N. of Jhúsi, and the same distance N.E. of Dáraganj.

λ	25 27 24·86
L	81 57 13·68

No. 81

Badra, Sayyid's Tomb.
(*Allahabad*)

λ	25 27 16
L	81 57 13

Bagála, XII.
(*Vide page* 5—M.)

λ	25 14 9·15
L	81 39 13·31
H	617
h	0

No. 9

Bagála Hill Temple,
(*Allahabad*) Dome.

λ	25 13 34·1
L	81 40 1·2

Nos. 110, 111

Name of station, district, description, co-ordinates &c.

Bagála House.
(*Allahabad*) Zamíndár's house in village.

	°	′	″
λ	25	14	51·4
L	81	40	23·6

No. 115

Bahádurganj Temple.
(*Rae Bareli*) On left bank of the Ganges.

λ	25	49	27·8
L	81	22	32·6

Bahádurpur Mat.
(*Bara Banki*)

λ	26	57	16·2
L	81	15	21·1

Baisingpurwa Flag.
(*Bahraich*) On mound.

λ	27	37	26
L	81	21	38

Balaun Hill Mark.
(*Allahabad*) On a detached hill E. of Repatna, and N.W. of Osa village.

λ	25	10	54·40
L	81	44	0·53

No. 97

Bankesar Flag.
(*Allahabad*) On tree.

λ	25	33	50
L	81	57	20

Banwa, Khajúr Tree.
(*Bara Banki*)

λ	26	56	37
L	81	15	33

Bárah s.
(*Allahabad*) Near gateway of old fort.

λ	25	15	11·75
L	81	45	29·91

Nos. 100, 101

Bareti s.
(*Bara Banki*) About ½ a mile S.S.W. of village so called.

λ	26	57	51·75
L	81	9	33·13

Basantpur, XXIX.
(*Vide page* 8—M.)

λ	26	43	27·75
L	81	24	56·79
H	394		
h	24		

No. 35

Name of station, district, description, co-ordinates &c.

Basti s.
(*Bara Banki*) Close to and S.S.W. of village so called.

	°	′	″
λ	26	55	49·34
L	81	8	9·17

Begam Sarái.
(*Allahabad*) Flag on tree, E. end of village.

λ	25	27	12·6
L	81	48	14·5

No. 169

Beti Flag.
(*Sitapur*) About ½ a mile N.E. of village so called.

λ	27	17	22
L	81	11	27

Bhauri Hill Mark (heliotrope).
(*Bánda*) On a detached hill on left bank of Ohan nadi. Bhauri village lies at the N.E. foot of the hill.

λ	25	13	32·61
L	81	6	16·64

Nos. 64, 65

Bhíka Masjid,
(*Allahabad*) Spire of N. minaret.

λ	25	29	7·4
L	81	43	3·7

No. 156

Bhisamda Gola Flag.
(*Bahraich*) About ½ a mile W.S.W. of station No. 189 of the Gogra River Triangulation.

λ	27	12	5·5
L	81	32	53·4

Bhíta h.s.
(*Allahabad*) E. of village.

λ	25	18	31·93
L	81	50	31·82

No. 96

Bhíta Temple,
(*Allahabad*) White.

λ	25	18	45·5
L	81	50	10·5

Nos. 108, 109

Bhúri Hill Temple,
(*Allahabad*) Centre.

λ	25	14	17·7
L	81	42	22·5

No. 114

Name of station, district, description, co-ordinates &c.

Bobandar Zamíndár's House,
(*Allahabad*) Staircase.

	°	′	″
λ	25	15	27·4
L	81	42	44·1

No. 116

Bulbulpur Flag.
(*Bara Banki*)

λ	26	57	26
L	81	14	45

Burwa, V.
(*Vide page* 4—M.)

λ	24	33	14·48
L	81	31	17·03
H	1300		
h	*Not forthcoming*		

No. 5

Chandaha Hill Mark (heliotrope).
(*Bánda*) On a range of hills running N.E. and S.W. Bariári Khurd lies to N. and Dínhái to S.E.

λ	25	14	48·79
L	81	32	12·69

Nos. 66, 67

Chapri Masjid,
(*Allahabad*) Centre dome.

λ	25	29	52·5
L	81	48	58·0

Nos. 167, 168

Chapri s.
(*Allahabad*) At southern extremity of village on N. bank of the Ganges.

λ	25	29	48·34
L	81	48	58·67

Nos. 133, 134

Chaukandi Hill Mark.
(*Baghelkhand, Rewah State*) On a detached hill, N.W. of village so called.

λ	25	0	27·31
L	81	26	10·03

No. 61

Chilári Flag.
(*Sitapur*) On banian tree opposite to N.E. bastion near gateway.

λ	27	33	55
L	81	20	12

Chináhat s.
(*Lucknow*) About ½ of a mile S. of village so called.

λ	26	52	7·13
L	81	4	33·96

Name of station, district, description, co-ordinates &c.

Dádar, III.
(*Vide page 4—M.*)

	o ′ ″
λ	24 36 13·68
L	81 14 46·40
H	1088
h	*Not forthcoming*

No. 4

Daroda Flag.
(*Rae Bareli*) On tree.

λ	26 19 6
L	81 19 11

Daryabad Temple.
(*Allahabad*)

λ	25 43 2·1
L	81 24 40·3

Dhakuli s.
(*Bara Banki*) About 1¼ miles N.W. of Nawábganj, 1¼ miles W. of Bahádurpur, and 3 miles E. of Ganaura village.

λ	26 57 11·07
L	81 14 8·19

Donri, VII.
(*Vide page 5—M.*)

λ	24 53 56·77
L	81 13 45·65
H	1415
h	1

Nos. 7, 16

Durgapur Temple,
(*Allahabad*) Spire.

λ	25 20 57·2
L	81 38 36·6

Nos. 122, 123

Fatehpur Mat,
(*Allahabad*) Spire, N. of village on left bank of the Ganges.

λ	25 30 19·1
L	81 43 32·6

Nos. 157, 158

Gadia s.
(*Bara Banki*) About 2½ miles E. of Basti s., and 1 mile S.W. of Malukpur village.

λ	26 55 53·44
L	81 10 43·44

Ganges River a.
(*Allahabad*) On tamarind tree on N. bank.

λ	25 33 45
L	81 41 38

Nos. 162, 163

Name of station, district, description, co-ordinates &c.

Ganges River No. 1.
(*Allahabad*) Mango tree on right bank.

	o ′ ″
λ	25 31 53
L	81 40 29

No. 160

Ganges River No. 2 s.
(*Allahabad*) In field N. of Asraul village.

λ	25 21 50·95
L	81 45 42·20

No. 104

Ganges River No. 3 s.
(*Allahabad*) On right bank of the river.

λ	25 27 43·85
L	81 48 35·52

Nos. 131, 132

Ganges River No. 4 s.
(*Allahabad*) In field.

λ	25 23 19·75
L	81 49 7·05

No. 105

Ganges River No. 5 s.
(*Allahabad*) On right bank of the river.

λ	25 29 14·12
L	81 53 23·50

Nos. 135, 136

Ganges River No. 6 s.
(*Allahabad*)

λ	25 29 35·11
L	81 57 33·95

No. 145

Ganges River No. 7 s.
(*Allahabad*) Also called Nika s.; on N. bund of a tank, 0·3 of a mile S.E. of village of the same name, 1 mile from the left bank of the river, and 0·4 of a mile E. of Chatnagh village.

λ	25 24 35·38
L	81 57 56·51

See Synoptical Volume of the Gurwáni Meridional Series.

Ganges River No. 8 s.
(*Allahabad*) Also called Nimbi No. 1 s.; on N. bank, close to it the river forms two channels, the larger of which flows under Lowana and the smaller by the station, 0·7 of a mile W. of village of the same name. Marked by a mound 3 feet in height.

λ	25 23 14·54
L	81 58 4·49

See Synoptical Volume of the Gurwáni Meridional Series.

Ganges River No. 9* s.
(*Allahabad*) Also called Lowana s. or Lowen s.; on right bank, about 50 yards N. of village of the same name, and 1¼ miles E. of the Grand Trunk Road from Mirzapur to Allahabad.

λ	25 21 59·47
L	81 57 22·52

See Synoptical Volume of the Gurwáni Meridional Series.

Name of station, district, description, co-ordinates &c.

Ganipur Flag.
(*Allahabad*) On mango tree at W. extremity of village on left bank of the Ganges.

	o ′ ″
λ	25 33 3
L	81 42 11

No. 159

Ghuri s.
(*Rae Bareli*) About ½ a mile N.W. of village so called.

λ	26 16 13·66
L	81 16 43·75

Gochaura, Zamíndár's House.
(*Bara Banki*)

λ	26 51 7
L	81 18 48

Gogra River No. 164† s.
(*Bara Banki*). On right bank, 1·2 miles N.W. of Dhema, and 0·4 of a mile N.E. of Nausara.

λ	26 53 10·50
L	81 48 19·18

Gogra River No. 165 s.
(*Gonda*) On left bank, 0·6 of a mile N.W. of Sirsaipurwa, and 0·7 of a mile E. of the Sarju river.

λ	26 54 59·14
L	81 48 17·16

Gogra River No. 166 s.
(*Bara Banki*) Also called Rudpur Ghát station; on right bank of the river, 0·3 of a mile N. N. W. of Buláki Purwa, and 0·1 of a mile E. of Rudarpur.

λ	26 55 14·22
L	81 46 10·58

Gogra River No. 167 s.
(*Gonda*) On left bank, 0·7 of a mile S. of Upadia Purwa, and 0·2 of a mile W.N.W. of Pasika.

λ	26 56 43·91
L	81 47 14·23

Gogra River No. 168 s.
(*Bara Banki*) On right bank, 1·1 miles N. W. of Rudpur, 0·8 of a mile N. of Basgaon, and 0·5 of a mile E. of Garhi.

λ	26 56 26·22
L	81 44 32·43

Gogra River No. 169 s.
(*Gonda*) On left bank, in the centre of a large patch of Jháu jungle.

λ	26 58 28·87
L	81 45 17·39

* The continuation of this triangulation will be found in the Co-ordinate List of the Gurwáni Meridional Series. † The preceding portion of this triangulation will be found in the Co-ordinate List of the Gurwáni Meridional Series and the continuation in that of the North-East Longitudinal Series.

Name of station, district, description, co-ordinates &c.

Gogra River No. 170 s.
(*Bara Banki*) On right bank, 0·6 of a mile N.N.E. of Bhaia Purwa, 0·1 of a mile E.N.E. of Kanrsar, and 0·9 of a mile E.S.E. of Kamiári.

	°	′	″
λ	26	57	51·83
L	81	43	28·65

Gogra River No. 171 s.
(*Gonda*) On left bank, 0·8 of a mile N.N.E. of Kamiári Ghát 0·7 of a mile S.S.E. of Rami Purwa, and 0·5 of a mile W.S.W. of Ráipur.

λ	26	59	36·14
L	81	43	18·31

Gogra River No. 172 s.
(*Bara Banki*) On right bank.

λ	26	58	56·23
L	81	41	49·91

Gogra River No. 173 s.
(*Gonda*) On left bank, 0·9 of a mile S.S.E. of Garwar, and 0·6 of a mile S.W. of Aksaria.

λ	27	0	54·08
L	81	41	13·57

Gogra River No. 174 s.
(*Bara Banki*) Also called Lahramao Ghát station; on right bank, 1·4 miles N.E. of Manpur, and the same distance N.N.E. of Lahramao.

λ	27	0	4·77
L	81	39	27·58

Gogra River No. 175 s.
(*Gonda*) Also called Gharkunia Ghát station; on left bank, 0·3 of a mile W. of Gharkunia mud fort, 0·5 of a mile S. of Partábpur, and 0·6 of a mile S.E. of Deokalganj.

λ	27	2	22·73
L	81	39	26·27

Gogra River No. 176 s.
(*Bara Banki*) On right bank, 1·2 miles N.N.E. of Kawani, 1·3 miles E. of Sanawa, and 0·5 of a mile W.S.W. of Gurain Purwa.

λ	27	1	31·69
L	81	37	18·82

Gogra River No. 177 s.
(*Gonda*) On left bank, 0·3 of a mile S.E. of Gaora, 0·4 of a mile W. of Maikup Purwa, and 0·6 of a mile N.N.E. of Sanawa Ghát.

λ	27	3	38·29
L	81	37	8·17

Gogra River No. 178 s.
(*Bara Banki*) On right bank.

λ	27	2	35·92
L	81	35	34·82

Name of station, district, description, co-ordinates &c.

Gogra River No. 179 s.
(*Gonda*) On left bank, close to and E.S.E. of Basantpur, 0·4 of a mile W.S.W. of Lálpur, and 0·3 of a mile N.W. of Padmanpur.

	°	′	″
λ	27	4	28·32
L	81	35	1·97

Gogra River No. 180 s.
(*Bara Banki*) On right bank, 0·2 of a mile N.W. of Durga Austi Purwa, 0·6 of a mile N.N.W. of Para, and 0·8 of a mile N. E. of Sipaia.

λ	27	3	40·45
L	81	32	59·37

Gogra River No. 181 s.
(*Bahraich*) On left bank, 0·3 of a mile S.S.E. of Adampur, 0·9 of a mile W.S.W. of Ghuranpur, and 0·6 of a mile E.N.E. of Sipah.

λ	27	6	4·10
L	81	33	11·14

Gogra River No. 182 s.
(*Bara Banki*) On right bank, 1·0 mile N.N.W. of Balupur, 0·2 of a mile N.N.E. of Sisaura Purwa, and 0·8 of a mile E.N.E. of Lahrara.

λ	27	5	4·96
L	81	30	43·74

Gogra River No. 183 s.
(*Bahraich*) On left bank, 0·4 of a mile E.S.E. of Bairampur Ghát, 0·7 of a mile S.S.E. of Bairampur large village, and 0·2 of a mile N.W. of Khasapur.

λ	27	7	6·15
L	81	31	26·42

Gogra River No. 184 s.
(*Bara Banki*) Also called Ganespur Samádh; on right bank on paka shrine of a Hindu Saint, 0·6 of a mile N.N.E. of the large village of Ganespur, 0·5 of a mile N.E. of Firozpur, and 1·2 miles S.E. of Puraina on Sota.

λ	27	7	15·04
L	81	29	55·18

Gogra River No. 185 s.
(*Bahraich*) On left bank, 0·1 of a mile S.W. of Simpurwa, 0·4 of a mile W.S.W. of Niamatpur, and 1·0 mile N.N.W. of Bharah.

λ	27	8	21·54
L	81	31	34·64

Gogra River No. 186 s.
(*Bara Banki*) On right bank.

λ	27	9	42·56
L	81	30	8·87

Gogra River No. 187 s.
(*Bahraich*) On left bank, 0·6 of a mile S.S.W. of Putti, 0·9 of a mile W.S.W. of Obadhi, and 0·2 of a mile W.N.W. of Nasirganj.

λ	27	10	33·56
L	81	32	38·81

Name of station, district, description, co-ordinates &c.

Gogra River No. 188 s.
(*Bara Banki*) On right bank, 1·5 miles S.E. of Gurbakhsh Purwa, 1·1 miles S.S.E. of Sukhrámsing Purwa, and 0·5 of a mile E.S.E. of Kunine.

	°	′	″
λ	27	11	37·58
L	81	31	8·95

Gogra River No. 189 s.
(*Bahraich*) Also called Mathrepur station; is situated on a mound in the village, on left bank of the river, about ½ a mile W. of Sakhi, and the same distance E.N.E. of Bhisamda Gola.

λ	27	12	38·42
L	81	33	4·07

Gogra River No. 190 s.
(*Bara Banki*) Also called Pande Purwa; on right bank, 0·6 of a mile N.E. of Pande Purwa, and 0·1 of a mile S.S.E. of Pandit Purwa.

λ	27	13	40·63
L	81	30	41·95

Gogra River No. 191 s.
(*Bahraich*) On left bank.

λ	27	15	17·50
L	81	31	43·30

Gogra River No. 192 s.
(*Bara Banki*) Also called Baniapára station; on right bank, 0·7 of a mile N. of Jamaulia, and 0·2 of a mile N.E. of Sítárám Purwa.

λ	27	15	16·78
L	81	30	6·33

Gogra River No. 193 s.
(*Bahraich*) On left bank, 0·7 of a mile S.S.W. of Girwarsing Purwa, and 0·5 of a mile W. of Gorhaia.

λ	27	16	56·40
L	81	31	20·38

Gogra River No. 194 s.
(*Bara Banki*) On right bank, 0·4 of a mile N.N.E. of Khuji, and 0·5 of a mile E.S.E. of Banar.

λ	27	18	23·16
L	81	28	57·73

Gogra River No. 195 s.
(*Bahraich*) On left bank, 1·3 miles E. of Ghurata Ghát, 0·3 of a mile S.W. of Taukali Purwa, and 0·5 of a mile W.N.W. of Badraulia.

λ	27	19	1·53
L	81	30	49·54

Gogra River No. 196 s.
(*Bara Banki*) On right bank, 0·6 of a mile N.E. of Pasrámpur, 0·8 of a mile S.S.E. of Pharua Ghát, and 0·3 of a mile N. of Ghauania.

λ	27	20	9·35
L	81	27	45·83

Name of station, district, description, co-ordinates &c.

Gogra River No. 197 s.
(*Bahraich*) On left bank, 1·3 miles S.E. of Alipur, the same distance S. of Nandwal, and 0·5 of a mile S.W. of Deokali.

	°	′	″
λ	27	21	9·39
L	81	30	17·67

Gogra River No. 198 s.
(*Bahraich*) On left bank, 0·6 of a mile S.E. of Sarsat Purwa, 0·5 of a mile S.S.W. of Sepaia, and 0·6 of a mile W.S.W. of Hosainabad.

λ	27	22	18·04
L	81	28	11·77

Gogra River No. 199 s.
(*Sitapur*) On right bank, 0·2 of a mile W. of Puranpur, 0·7 of a mile N.N.E. of Lelipur, and 0·2 of a mile E.N.E. of Daolatpur.

λ	27	20	54·06
L	81	26	40·00

Gogra River No. 200 s.
(*Bahraich*) On left bank, 0·6 of a mile S.S.W. of Tulapur, and 1·4 miles W. of Bhaonri.

λ	27	23	32·83
L	81	26	6·63

Gogra River No. 201 s.
(*Sitapur*) Also called Bhaonri Ghát s.; on right bank.

λ	27	21	52·97
L	81	23	58·02

Gogra River No. 202 s.
(*Bahraich*) On left bank in the midst of a Jháu jungle.

λ	27	24	38·67
L	81	23	36·39

Gogra River No. 203 s.
(*Sitapur*) On right bank, 0·3 of a mile S.S.W. of Nindaora, 0·7 of a mile N.N.E. of Soharia, and 0·5 of a mile N.E. of Dombediha.

λ	27	23	16·77
L	81	22	32·12

Gogra River No. 204 s.
(*Sitapur*) On right bank, 0·9 of a mile E.S.E. of Para, and 0·4 of a mile S.W. of a Gola on nadi.

λ	27	25	1·69
L	81	21	48·96

Gogra River No. 205 s.
(*Bahraich*) On left bank, 0·3 of a mile N.N.W. of Baghati, 0·7 of a mile from Hazari Purwa in the same direction, and 0·4 of a mile S.S.E. of Kolaila Ghát.

λ	27	26	18·57
L	81	23	8·12

Name of station, district, description, co-ordinates &c.

Gogra River No. 206 s.
(*Sitapur*) On right bank, 0·1 of a mile W. of Ratnapur, 0·5 of a mile N.N.W. of Ofsaria, and 0·7 of a mile E.S.E. of Daorihar.

	°	′	″
λ	27	26	17·54
L	81	21	21·40

Gogra River No. 207 s.
(*Bahraich*) On left bank, 1·2 miles S.W. of Patkapur, and 0·7 of a mile N.W. of Chaubar.

λ	27	28	34·56
L	81	22	31·89

Gogra River No. 208 s.
(*Sitapur*) On right bank, 0·2 of a mile E.N.E. of Shankarpur, 0·7 of a mile S.W. of Mangalpura, and 0·8 of a mile N.N.W. of Bitani.

λ	27	28	14·79
L	81	19	54·34

Gogra River No. 209 s.
(*Bahraich*) On left bank, 0·5 of a mile W.N.W. of Kharkapur, and 0·7 of a mile from Naodhan in the same direction.

λ	27	30	13·62
L	81	22	9·19

Gogra River No. 210 s.
(*Sitapur*) On right bank, 1·2 miles N.N.E. of Rájpur, 0·5 of a mile E.N.E. of Bajwari, and 1·0 mile S. of Mujaon.

λ	27	30	29·25
L	81	20	16·42

Gogra River No. 211 s.
(*Sitapur*) On right bank, 0·3 of a mile N. of Randa, 1·1 miles E. of Ramipur, and 0·7 of a mile S.S.E. of Nasirpur.

λ	27	32	8·43
L	81	20	46·47

Gogra River No. 212 s.
(*Bahraich*) On left bank, 0·8 of a mile S.E. of Zalimsing Purwa, 0·7 of a mile W.S.W. of Bahirpur, and 0·9 of a mile W.N.W. of Belwar Purwa.

λ	27	32	1·07
L	81	22	52·13

Gogra River No. 213 s.
(*Bahraich*) On left bank, 0·9 of a mile S. of Sisai Bazar, and 0·7 of a mile W.N.W. of Sisai village.

λ	27	33	57·47
L	81	22	16·20

Gogra River No. 214 s.
(*Sitapur*) On right bank, 0·5 of a mile N.E. of Patkapur, and 0·8 of a mile E. of Mahuabág.

λ	27	34	48·13
L	81	19	57·60

Name of station, district, description, co-ordinates &c.

Gogra River No. 215 s.
(*Bahraich*) On left bank, 0·5 of a mile S.S.W. of Rámsing Purwa, and 0·4 of a mile N.N.W. of Bhola Purwa.

	°	′	″
λ	27	36	16·46
L	81	21	33·07

Gogra River No. 216 s.
(*Sitapur*) On right bank, 0·5 of a mile N. of Ranjit Purwa Tola, 0·2 of a mile N.N.E. of Ranjit Purwa, and 0·3 of a mile S.S.E. of Laodhan Tola.

λ	27	36	54·77
L	81	19	9·69

Gogra River No. 217 s.
(*Bahraich*) On left bank, 0·4 of a mile N.N.W. of Pandipura, the same distance W.S.W. of Dubha, and 0·7 of a mile S. of Ranjitsing Purwa.

λ	27	38	22·52
L	81	21	47·30

Gogra River *a* s.
(*Bahraich*) On left bank, 0·7 of a mile S.E. of Parsadsing Purwa, and 0·9 of a mile N.W. of Orai.

λ	27	37	3·79
L	81	23	13·05

Gogra River *β* s.
(*Bahraich*) On left bank, N. of Dubha and N.W. of Ranjitsing Purwa, and 0·9 of a mile W.N.W. of Nakhai.

λ	27	38	33·32
L	81	23	21·33

Gumsira Masjid.
(*Partabgarh*)

λ	25	43	43·7
L	81	26	1·1

Gurwa Parúr h.s.
(*Baghelkhand, Rewah State*) On Kaimúr range, 1¼ miles N. W. of Baghawa village, and about the same distance W. by S. of the Rewah Topographical Survey station of Gurwa Parúr.

λ	24	30	0·67
L	81	49	3·32
H	1652		

Nos. 51, 52

Gutni Building.
(*Partabgarh*)

λ	25	42	9
L	81	26	4

Haidarganj s.
(*Allahabad*) N. of village.

λ	25	29	39·88
L	81	42	51·65

Nos. 126, 127

Name of station, district, description, co-ordinates &c.

Haraha Hill Mark (heliotrope).
(*Bundelkhand, Panna State*) On a small detached range of hills running N. W. and S.E. Salaura village lies about 2 miles N.E., and Deori the same distance W.

	°	′	″
λ	24	51	39·06
L	81	0	3·86

Nos. 55, 56

Hatiadi s.
(*Allahabad*) N. E. of village.

λ	25	32	55·56
L	81	40	2·40

Nos. 129, 130

Hetapati Temple,
(*Allahabad*) Spire. Also called Saidaganj White Temple.

λ	25	29	31·0
L	81	58	21·2

Hiliapura Flag.
(*Sitapur*) Near village.

λ	27	24	50
L	81	14	21

Horesa, XIX.
(*Vide page 6—M.*)

λ	25	55	23·20
L	81	17	17·41
H_s	367·84*		
h	25·8		

No. 24

Ibráhímpur Idgáh,
(*Allahabad*) Centre dome.

λ	25	28	47·1
L	81	58	7·3

Nos. 92, 93

Imlia, XXXVI.
(*Vide page 9—M.*)

λ	27	19	18·90
L	81	10	4·55
H	451		
h	24		

No. 42

Ismailganj Masjid,
(*Lucknow*) S. minaret.

λ	26	52	30·0
L	81	3	12·3

Jaliádhar, II.
(*Vide page 4—M.*)

λ	24	22	24·55
L	81	26	42·96
H	2178		
h	*Not forthcoming*		

No. 1

Name of station, district, description, co-ordinates &c.

Janai, XXV.
(*Vide page 7—M.*)

	°	′	″
λ	26	22	6·80
L	81	23	58·30
H	417		
h	24		

No. 31

Jangírabad N. E. Bastion.
(*Allahabad*)

λ	25	41	7·6
L	81	25	32·2

Jhúsi s.
(*Allahabad*) On left bank of the Ganges, about 1½ miles E. of Allahabad Fort.

λ	25	25	35·75
L	81	56	30·59

Nos. 82, 83

Jhúsi Temple.
(*Allahabad*) Near Ghát.

λ	25	26	18·8
L	81	56	44·2

Nos. 88, 89

Kachár, IX.
(*Vide page 5—M.*)

λ	24	56	43·77
L	81	5	18·46
H	1467		
h	1		

No. 17

Kaharpur Flag.
(*Sitapur*) On tree.

λ	27	21	57
L	81	7	15

Kaimúr, I.
(*Vide page 4—M.*)

λ	24	17	2·15
L	81	11	49·65
H	2263		
h	6		

Nos. 2, 3

Kálikinkar Temple.
(*Partabgarh*) On left bank of the Ganges.

λ	25	47	21·2
L	81	23	42·9

Kandipur s.
(*Allahabad*) N. of village.

λ	25	30	43·33
L	81	40	53·01

No. 125

Name of station, district, description, co-ordinates &c.

Kanjwara s.
(*Bara Banki*) Near village so called.

	°	′	″
λ	27	0	2·35
L	81	12	17·81

Kantua Building.
(*Allahabad*) On right bank of the Ganges.

λ	25	46	31
L	81	23	49

Karára, XXIII.†
(*Vide page 3—M.*)

λ	24	4	42·01
L	81	18	14·47
H	1966		
h	3		

No. 1

Karra, XVI.
(*Vide page 6—M.*)

λ	25	41	56·64
L	81	24	38·96
H_s	382·80*		
h	27		

No. 12

Khánpur, XXXIV.‡
(*Vide page 9—M.*)

λ	27	39	0·60
L	81	11	50·98
H	439		
h	12		

No. 45

Khára, XXII.
(*Vide page 7—M.*)

λ	26	7	39·62
L	81	13	10·35
H	405		
h	25		

Nos. 28, 29

Kohi Hill Mark (heliotrope).
(*Bánda*) About 1 mile E. of Kolgadhia, and the same distance W. of Rehutia village.

λ	25	12	2·10
L	81	0	53·69

Nos. 62, 63

Koleha Dák Bungalow.
(*Allahabad*) E. angle of roof.

λ	25	29	31·7
L	81	41	53·8

No. 152

* Refers to the mark-stone let into the upper surface of the basement on which the tower has been built. † Of the Calcutta Longitudinal Series of the South-East Quadrilateral. ‡ Of the North-East Longitudinal Series.

Name of station, district, description, co-ordinates &c.

Korai Flag.
(*Allahabad*) On Nim tree in centre of village, on right bank of the Ganges.

	° ′ ″
λ	25 33 20
L	81 41 7

Nos. 153, 154

Kotar Kaimári, VI.
(*Vide page 4—M.*)

λ	24 43 19·82
L	81 2 52·16
H	1440
h	*Not forthcoming*

No. 15

Kuti Ghat Temple.
(*Allahabad*) On left bank of the Ganges.

λ	25 29 17·9
L	81 57 25·1

Lálapur, XI.
(*Vide page 5—M.*)

λ	25 14 13·95
L	81 8 23·73
H	773
h	*Not forthcoming*

No. 19

Lowana Tree.
(*Allahabad*) In centre of village.

λ	25 21 48
L	81 57 22

See Synoptical Volume of the Gurwáni Series.

Lucknow, Bari Masjid,
(*Lucknow*) Spire of N. minaret.

λ	26 52 10·3
L	80 57 17·1

Lucknow, Bari Masjid,
(*Lucknow*) Spire of S. minaret.

λ	26 52 8·4
L	80 57 17·2

Lucknow, Begam's Mausoleum,
(*Lucknow*) Kalas.

λ	26 51 10·7
L	80 57 59·4

Lucknow Church.
(*Lucknow*) N.W. spire of church in Mariao Cantonment, 1845.

λ	26 54 33·4
L	80 58 51·1

Lucknow Church.
(*Lucknow*) S.W. spire of church in Mariao Cantonment, 1845.

λ	26 54 33·3
L	80 58 51·0

Name of station, district, description, co-ordinates &c.

Lucknow, Constantia Building s.
(*Lucknow*)

	° ′ ″
λ	26 50 21·63
L	81 0 19·82

Lucknow, Dilkusha Building s.
(*Lucknow*)

λ	26 49 42·02
L	81 0 26·84

Lucknow, Hayát Baksh House,
(*Lucknow*) Gate opposite Dilkusha.

λ	26 50 26·8
L	80 59 20·2

Lucknow, Kamta Bungalow,
(*Lucknow*) Centre Kalas.

λ	26 52 32·6
L	81 3 53·1

Lucknow Karbala,
(*Lucknow*) Highest minaret.

λ	26 50 58·9
L	80 59 42·2

Lucknow, Mausoleum No. 1.
(*Lucknow*) Kalas of Ghází-Uddín Haidar's Mausoleum.

λ	26 51 29·4
L	80 59 19·5

Lucknow, Mausoleum No. 2.
(*Lucknow*) Kalas of Nasir-Uddín Haidar's Mausoleum.

λ	26 52 31·0
L	80 58 6·7

Lucknow Moti Mahal.
(*Lucknow*) W. tower of palace.

λ	26 51 24·1
L	80 58 58·0

Lucknow, New Palace.
(*Lucknow*) S. minaret of Masjid.

λ	26 50 44·4
L	80 59 15·9

Lucknow Observatory s.
(*Lucknow*)

λ	26 51 12·54
L	80 58 56·93

Lucknow Observatory Transit Telescope.
(*Lucknow*)

λ	26 51 12·89
L	80 58 57·58

Name of station, district, description, co-ordinates &c.

Lucknow Palace,
(*Lucknow*) Highest Chatri.

	° ′ ″
λ	26 51 30·4
L	80 58 30·3

Lucknow, Race Stand,
(*Lucknow*) N. spike.

λ	26 51 50
L	81 0 13

Lucknow Residency s.
(*Lucknow*)

λ	26 51 41·22
L	80 58 6·16

Lucknow, Saádat Ali's Mausoleum,
(*Lucknow*) Kalas.

λ	26 51 14·6
L	80 58 34·3

Lucknow, Shuja-Uddaula's House,
(*Lucknow*) Highest turret.

λ	26 51 7·6
L	80 58 20·3

Maduapur Paka Well.
(*Allahabad*) Near village.

λ	25 24 45·3
L	81 54 36·1

Maduria h.s.
(*Allahabad*) On a range of hills running S.W. and N.E., but which here turns to S.E. Kothangi lies E., and Marúri Gurarpur to N.W.

λ	25 16 59·79
L	81 39 42·55

Nos. 102, 103

Mahmudabad, Munshi's Temple.
(*Allahabad*)

λ	25 24 24
L	81 57 2

Majilgaon, XVII.
(*Vide page 6—M.*)

λ	25 45 15·01
L	81 13 17·73
H_s	395·53*
h	25

No. 22

Mámabhina s.
(*Allahabad*) On W. bank of tank.

λ	25 22 18·98
L	81 53 6·40

No. 106

* Refers to the mark-stone let into the upper surface of the pillar.

Name of station, district, description, co-ordinates &c.

Mánikpur Fort s.
(*Partabgarh*) About 1¼ miles S. of Shahabad Idgáh, and the same distance N. of Aliganj village.

	° ′ ″
λ	25 45 47·16
L	81 26 40·28

Manjpurwa Mat.
(*Bara Banki*)

λ	26 56 42·0
L	81 13 40·9

Mao Old Bastion, S.W.
(*Partabgarh*)

λ	25 40 49·7
L	81 27 25·2

Marwás, XXVI*.
(*Vide page 4—M.*)

λ	24 4 59·33
L	81 49 2·46
H	1776
h	4

No. 1

Másí, XXXV†
(*Vide page 10—M.*)

λ	27 38 25·17
L	81 25 36·15
H_s	425·89‡
h	24

No. 46

Masudpur s.
(*Bara Banki*) About ½ a mile N.E. of village so called.

λ	26 57 50·94
L	81 13 12·43

Mau, X.
(*Vide page 5—M.*)

λ	25 0 44·01
L	81 18 12·26
H	1381
h	*Not forthcoming*

Nos. 8, 18

Mau Masjid,
(*Allahabad*) Centre dome, on right bank of the Ganges.

λ	25 28 40·8
L	81 51 49·6

Nos. 172, 173

Mír Sáín's Takia.
(*Allahabad*) Khajúr tree amongst ruins.

λ	25 46 19
L	81 24 58

Name of station, district, description, co-ordinates &c.

Mubárakpur Flag.
(*Allahabad*) On tamarind tree, W. end of village.

	° ′ ″
λ	25 31 12
L	81 46 11

Nos. 146, 147

Mubárakpur Square Building.
(*Rae Bareli*)

λ	26 16 39·9
L	81 14 34·4

Mufti-ka-purwa Flag.
(*Allahabad*) On Ním tree in village.

λ	25 28 49
L	81 43 3

No. 155

Muhammadabad Flag.
(*Sitapur*) On tree near fort.

λ	27 17 50
L	81 9 59

Muhammadpur s.
(*Allahabad*) On S. end of village.

λ	25 31 20·12
L	81 50 45·24

Nos. 137, 138, 139

Munai, XXIII.
(*Vide page 7—M.*)

λ	26 10 51·18
L	81 23 6·97
H_s	397·56‡
h	25·5

No. 27

Muskabad Flag.
(*Sitapur*) On house.

λ	27 21 19
L	81 8 54

Nagdílpur, XIV.
(*Vide page 6—M.*)

λ	25 34 16·82
L	81 11 53·53
H	404
h	33

Nos. 13, 21

Náru, IV.
(*Vide page 4—M.*)

λ	24 29 38·28
L	80 59 57·90
H	1974
h	*Not forthcoming*

No. 14

Name of station, district, description, co-ordinates &c.

Naurangabad Khajúr Tree.
(*Bara Banki*)

	° ′ ″
λ	26 58 17
L	81 13 22

Nawábganj Flag.
(*Allahabad*)

λ	25 34 1
L	81 46 54

Nos. 150, 151

Nawábganj Flag.
(*Bara Banki*) On Ním tree in centre of village.

λ	26 56 9
L	81 14 26

Niatal Flag.
(*Sitapur*)

λ	27 21 39
L	81 8 34

Nimba Paka Koti.
(*Allahabad*) N.W. angle of staircase, on right bank of the Ganges.

λ	25 28 6·1
L	81 49 58·7

Nos. 170, 171

Núrpur Masjid,
(*Sitapur*) S. minaret.

λ	27 19 9·0
L	81 11 29·5

Núrpur s.
(*Sitapur*) About ½ a mile S.E. of village.

λ	27 18 49·81
L	81 11 49·26

Ojaini Masjid,
(*Allahabad*) S. minaret.

λ	25 31 11·1
L	81 41 35·9

Nos. 164, 165

Ojaini Mat.
(*Allahabad*) N. of village, on right bank of the Ganges.

λ	25 31 20·4
L	81 41 39·3

No. 166

Ojaini s.
(*Allahabad*) On Fakir's house N. of village, on right bank of the Ganges.

λ	25 31 18·18
L	81 41 48·29

No. 128

* Of the Calcutta Longitudinal Series of the South-East Quadrilateral. † Of the North-East Longitudinal Series. ‡ Refers to the upper surface of the pillar.

Orai s.
(*Bahraich*) On a branch of the Sarju river, about ½ a mile N.W. of Bagha village.

	° ′ ″
λ	27 35 43·41
L	81 22 44·89

Pabei h.s.
(*Baghelkhand, Rewah State*) On the highest part of the hill, about 1 mile E. of Pabei, 2 miles N. of Umrai, and 1 mile S. of Parkhuri village.

λ	24 18 20·39
L	81 57 17·31
H	1958

Nos. 47, 48

Pabhosa, XIII.
(*Vide page 5—M.*)

λ	25 21 17·32
L	81 21 35·58
H	565
h	0

Nos. 10, 20

Pahárnagar s.
(*Lucknow*) Near Tikura village.

λ	26 46 12·47
L	81 5 22·49

Paighambarpur Dargáh,
(*Allahabad*) Centre.

λ	25 31 9·0
L	81 58 11·8

Paintepur, N. Masjid,
(*Sitapur*) N. minaret.

λ	27 16 46·3
L	81 13 28·6

Parbajabad Hill Temple,
(*Allahabad*) Old.

λ	25 17 4·6
L	81 44 32·8

Nos. 112, 113

Parewa, XXVIII.
(*Vide page 8—M.*)

λ	26 38 4·00
L	81 14 38·32
H_s	405·62*
h	30

No. 34

Pariáon, XVIII.
(*Vide page 6—M.*)

λ	25 50 5·26
L	81 24 43·49
H	389
h	25

No. 23

Parila Temple,
(*Allahabad*) Spire.

	° ′ ″
λ	25 32 47·2
L	81 56 15·1

Pati Hill Mark (heliotrope).
(*Bundelkhand, Panna State*) About 1 mile N. of Deogaon, and the same distance E. of Partábpur village.

λ	24 52 48·20
L	81 8 49·66

Nos. 57, 58

Pesar, XXX.
(*Vide page 8—M.*)

λ	26 48 47·87
L	81 14 47·16
H_s	382·36†
h	25

No. 36

Purkas Masjid,
(*Allahabad*) Spire of N. minaret.

λ	25 19 56·9
L	81 32 54·5

No. 117

Rae Bareli Flag.
(*Rae Bareli*) On tree within N. gate of fort.

λ	26 14 1
L	81 16 12

Ragaupur, XXXV.
(*Vide page 9—M.*)

λ	27 17 44·37
L	81 23 7·00
H	389
h	30

No. 41

Raghunáthpur Hill Mark (heliotrope).
(*Baghelkhand, Rewah State*) About 1 mile S. of village so called, and the same distance E. of Jenkahai village.

λ	24 56 18·49
L	81 35 22·12

Nos. 59, 60

Rangpur Flag.
(*Allahabad*) On height, N.E. of temple.

λ	25 31 32
L	81 55 6

Rangpur Temple,
(*Allahabad*) Spire.

λ	25 31 28·6
L	81 55 0·8

Nos. 174, 175

Rasúlabad Ghát Temple.
(*Allahabad*) On right bank of the Ganges.

	° ′ ″
λ	25 30 5·6
L	81 53 54·9

Nos. 176, 177

Rewah, Díwán's Temple.
(*Baghelkhand, Rewah State*)

λ	24 30 33·8
L	81 20 31·7

No. 53

Rewah Fort.
(*Baghelkhand, Rewah State*) Highest building in fort.

λ	24 31 20·5
L	81 20 0·2

Rewah Large Temple.
(*Baghelkhand, Rewah State*)

λ	24 31 20·0
L	81 20 5·6

No. 54

Salon, XX.
(*Vide page 7—M.*)

λ	26 1 43·97
L	81 29 44·13
H_s	410·15*
h	25

No. 25

Samnadio, XXXIV.
(*Vide page 9—M.*)

λ	27 10 7·34
L	81 14 1·98
H	431
h	24

No. 40

Sarái Flag.
(*Allahabad*) On tamarind tree N. of village.

λ	25 31 40
L	81 46 14

Nos. 148, 149

Shahabad Idgáh.
(*Partabgarh*)

λ	25 46 57
L	81 26 26

Shahzádpur s.
(*Allahabad*) About 2 miles S. of Mao, and 2½ miles E. of Paharpur village.

λ	25 39 13·55
L	81 27 0·21

* Refers to the mark-stone let into the upper surface of the pillar. † Refers to the mark-stone let into the base of the tower.

Name of station, district, description, co-ordinates &c.

Sidik-ki-purwa House,
(*Allahabad*) Gable end.

	° ′ ″
λ	25 25 5
L	81 53 34

Singraur, XV.
(*Vide page* 6—M.)

λ	25 35 3·56
L	81 41 10·61
H	379
h	32

No. 11

Sirkini h.s.
(*Baghelkhand, Rewah State*) About a mile N.E. of Ramri village.

λ	24 33 25·37
L	81 27 8·54

Sirmaul, VIII.
(*Vide page* 5—M.)

λ	24 53 6·86
L	81 26 7·78
H	1115
h	2

No. 6

Sora, XXIV.
(*Vide page* 7—M.)

λ	26 17 18·83
L	81 14 50·30
H	409
h	24

No. 30

Sora Temple.
(*Rae Bareli*) In village.

λ	26 17 32·8
L	81 15 0·3

Name of station, district, description, co-ordinates &c.

Tánghan, XXI.
(*Vide page* 7—M.)

	° ′ ″
λ	26 2 52·72
L	81 19 10·10
H	409
h	25

No. 26

Tauli, XXVI.
(*Vide page* 7—M.)

λ	26 27 18·43
L	81 15 21·33
H_s	412·88*
h	30

No. 32

Thána, XXXVII.
(*Vide page* 9—M.)

λ	27 28 24·00
L	81 17 7·53
H	421
h	24†

No. 43

Tharwa Factory.
(*Allahabad*) Also called Thorui Factory; flag on top of Mr. Sandor's house.

λ	25 32 33
L	81 57 32

Tikiri, XXVII.
(*Vide page* 8—M.)

λ	26 32 42·59
L	81 25 1·56
H	408
h	30

No. 33

Name of station, district, description, co-ordinates &c.

Tikri Gopálpur s.
(*Allahabad*) On right bank of the Ganges.

	° ′ ″
λ	25 28 56·98
L	81 44 12·47

No. 124

Tilapur, S.E. Temple.
(*Allahabad*) Spire of large temple.

λ	25 20 4·2
L	81 37 6·5

Nos. 118, 119

Tilapur, W. Temple.
(*Allahabad*) Spire of small temple.

λ	25 20 47·5
L	81 36 36·1

Nos. 120, 121

Turkani, XXXI.
(*Vide page* 8—M.)

λ	26 54 48·85
L	81 25 20·89
H_s	390·22‡
h	24

No. 37

Uswar h.s.
(*Allahabad*) On a detached hill, at the S.E. foot of which lies the village so called.

λ	25 16 57·90
L	81 42 59·09

Nos. 98, 99

Utiámau, XXXII.
(*Vide page* 8—M.)

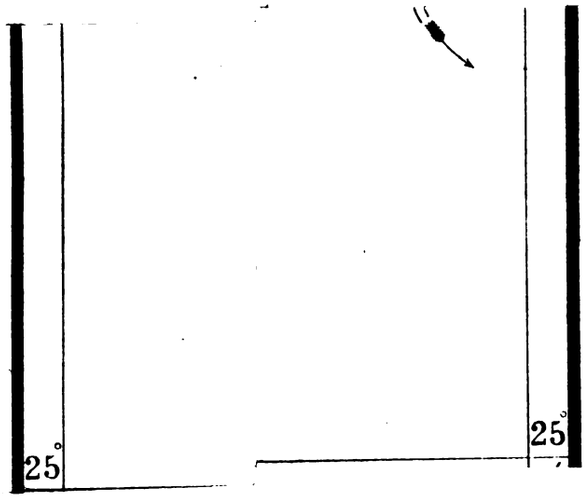
λ	26 59 57·08
L	81 14 44·42
H_s	404·66‡
h	24

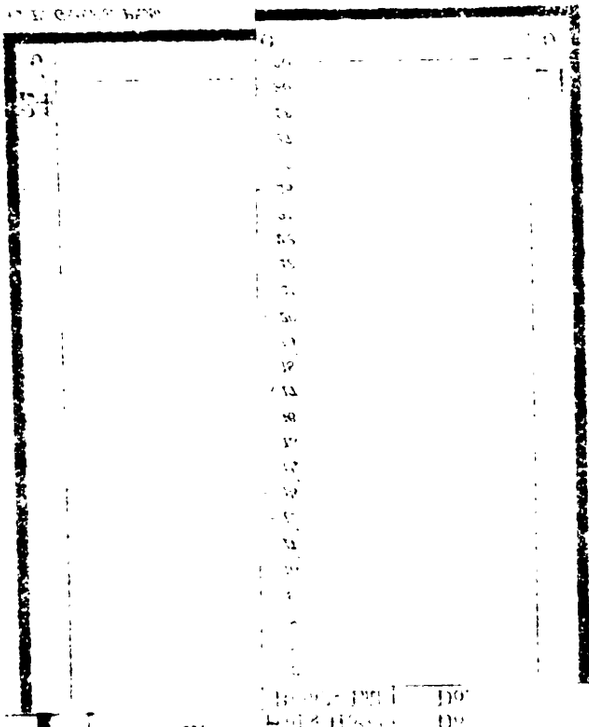
No. 38

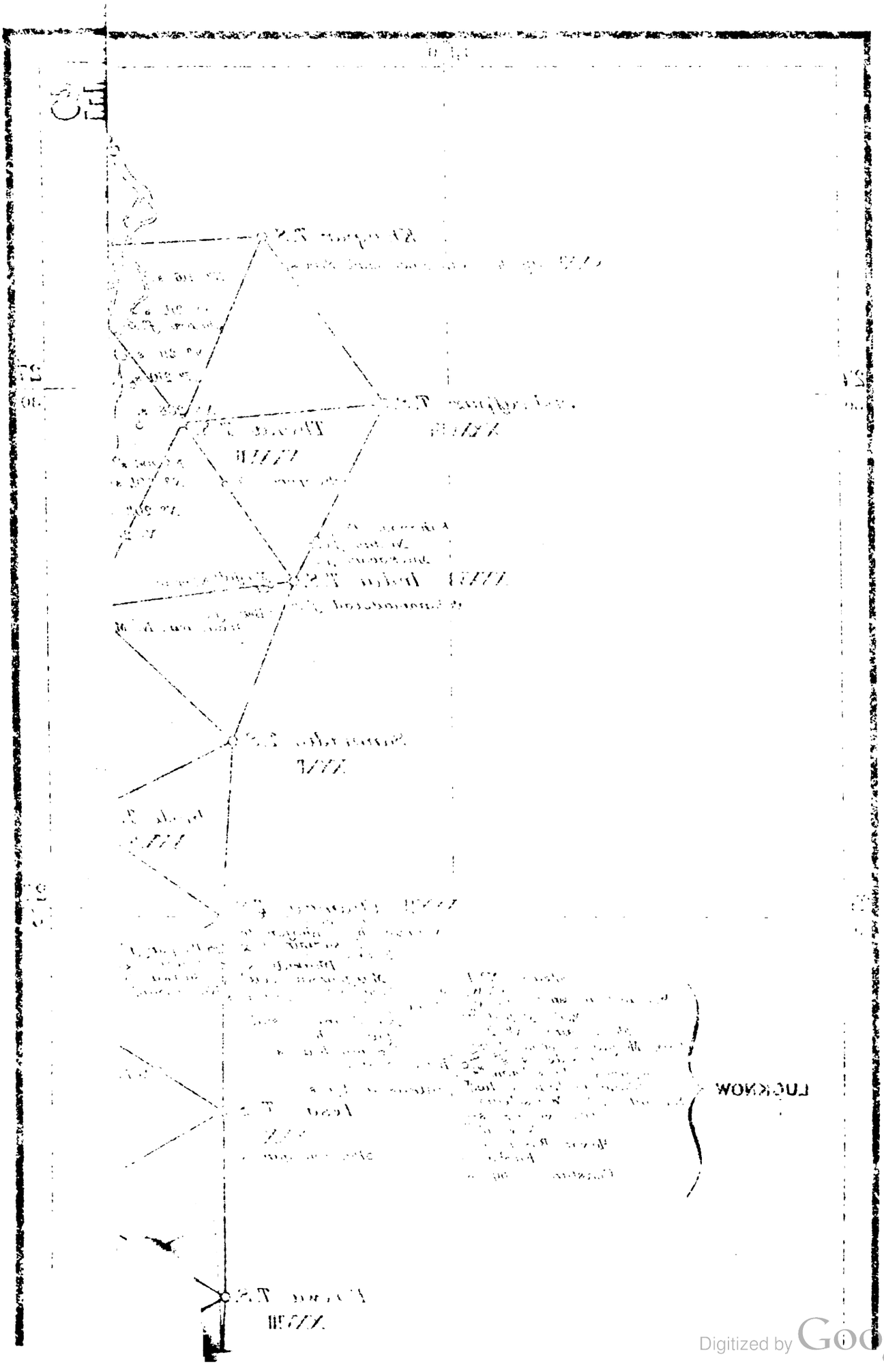
* The height 412·88 refers to the surface described on page 8—M. † Above the bastion of the fort on which the station is built.
‡ Refers to the mark-stone let into the base of the tower.

November 1879.

J. B. N. HENNESSEY,
In charge of Computing Office.







List of Published Works of the Great Trigonometrical Survey of India.

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.

An Account of the Measurement of two Sections of the Meridional Arc of India, bounded by the parallels of 18° 3′ 5″; 24° 7′ 11″; and 29° 30′ 18″. By Lieutenant-Colonel Everest, F.R.S., &c., late Surveyor General of India, and his Assistants. London, 1847.

Account of the Operations of the Great Trigonometrical Survey of India.

Volume I. The Standards of Measure and the Base-Lines, also an Introductory Account of the early Operations of the Survey, during the period of 1800-1830. By Colonel J. T. Walker, R.E., F.R.S., &c., &c., Superintendent of the Survey. Dehra Dún, 1870.

Do. II. History and General Description of the Principal Triangulation and of its Reduction. By Colonel J. T. Walker, C.B., R.E., F.R.S., &c., &c., Surveyor General of India and Superintendent of the Survey, and his Assistants. Dehra Dún, 1879.

Do. III. The Principal Triangulation, the Base-Line Figures, the Karáchi Longitudinal, N.W. Himalaya, and Great Indus Series of the North-West Quadrilateral. By Colonel J. T. Walker, R.E., F.R.S., &c., &c., Superintendent of the Survey, and his Assistants. Dehra Dún, 1873.

Do. IV. The Principal Triangulation, the Great Arc (Section 24°-30°), Rahún, Gurhágarh and Jogí-Tíla Meridional Series, and the Sutlej Series of the North-West Quadrilateral. By Colonel J. T. Walker, R.E., F.R.S., &c., &c., Superintendent of the Survey, and his Assistants. Dehra Dún, 1876.

Do. V. Details of the Pendulum Operations by Captains J. P. Basevi, R.E., and W. J. Heaviside, R.E., and of their Reduction. Prepared under the directions of Major-General J. T. Walker, C.B., R.E., F.R.S., &c., &c., Surveyor General of India and Superintendent of the Trigonometrical Survey. Dehra Dún and Calcutta, 1879.

Do. VI. The Principal Triangulation of the South-East Quadrilateral including the Great Arc—Section 18° to 24°, the East Coast Series, the Calcutta and the Bider Longitudinal Series, the Jabalpur and the Biláspur Meridional Series, and the Details of their Simultaneous Reduction. Prepared under the directions of Major-General J. T. Walker, C.B., R.E., F.R.S., &c., &c., Surveyor General of India and Superintendent of the Trigonometrical Survey. Dehra Dún, 1880.

List of Published Works of the Great Trigonometrical Survey of India—(Continued).

Account of the Operations of the Great Trigonometrical Survey of India—(*Continued*).

Volume VII. General Description of the Principal Triangulation of the North-East Quadrilateral including the Simultaneous Reduction and the Details of Five of the Component Series, the North-East Longitudinal, the Budhon Meridional, the Rangír Meridional, the Amua Meridional, and the Karára Meridional. Prepared under the directions of Lieutenant-General J. T. Walker, C.B., R.E., F.R.S., &c., &c., Surveyor General of India and Superintendent of the Trigonometrical Survey. Dehra Dún, 1882.

Do. VIII. Details of the Principal Triangulation of Eleven of the Component Series of the North-East Quadrilateral, including the following Series; the Gurwáni Meridional, the Gora Meridional, the Huríláong Meridional, the Chendwár Meridional, the North Párasnáth Meridional, the North Malúncha Meridional, the Calcutta Meridional, the East Calcutta Longitudinal, the Brahmaputra Meridional, the Eastern Frontier—Section 23° to 26°, and the Assam Longitudinal. Prepared under the directions of Lieut.-General J. T. Walker, C.B., R.E., F.R.S., &c., &c., Surveyor General of India and Superintendent of the Trigonometrical Survey. Dehra Dún, 1882.

Do. IX. Electro-Telegraphic Longitude Operations executed during the years 1875-77 and 1880-81, by Lieut.-Colonel W. M. Campbell, R.E., and Major W. J. Heaviside, R.E. Prepared under the directions of Lieut.-General J. T. Walker, C.B., R.E., F.R.S., Surveyor General of India and Superintendent of the Trigonometrical Survey. Dehra Dún, 1883.

Synopses of the Results of the Great Trigonometrical Survey of India, comprising Descriptions, Co-ordinates, &c., of the Principal and Secondary Stations and other Fixed Points, of the Several Series of Triangles, as follows;—

Volume I. The Great Indus Series, or Series *D* of the North-West Quadrilateral. By Colonel J. T. Walker, R.E., F.R.S., &c., &c., Superintendent of the Survey, and his Assistants. Dehra Dún, 1874.

Do. II. The Great Arc—Section 24° to 30°, or Series *A* of the North-West Quadrilateral. By Colonel J. T. Walker, R.E., F.R.S., &c., &c., Superintendent of the Survey, and his Assistants. Dehra Dún, 1874.

Do. III. The Karáchi Longitudinal Series, or Series *B* of the North-West Quadrilateral. By Colonel J. T. Walker, R.E., F.R.S., &c., &c., Superintendent of the Survey, and his Assistants. Dehra Dún, 1874.

Do. IV. The Gurhágarh Meridional Series, or Series *F* of the North-West Quadrilateral. By Colonel J. T. Walker, R.E., F.R.S., &c., &c., Superintendent of the Survey, and his Assistants. Dehra Dún, 1875.

Do. V. The Rahún Meridional Series, or Series *E* of the North-West Quadrilateral. By Colonel J. T. Walker, R.E., F.R.S., &c., &c., Superintendent of the Survey, and his Assistants. Dehra Dún, 1875.

Do. VI. The Jogí-Tíla Meridional Series, or Series *G*, and the Sutlej Series, or Series *H* of the North-West Quadrilateral. By Colonel J. T. Walker, R.E., F.R.S., &c., &c., Superintendent of the Survey, and his Assistants. Dehra Dún, 1875.

Do. VII. The North-West Himalaya Series, or Series *C* of the North-West Quadrilateral, and the Triangulation of the Kashmir Survey. By Major-General J. T. Walker, C.B., R.E., F.R.S., &c., &c., Surveyor General of India and Superintendent of the Survey, and his Assistants. Dehra Dún, 1879.

List of Published Works of the Great Trigonometrical Survey of India—(Continued).

Synopses of the Results of the G. T. Survey of India, &c.—(*Continued*).

Volume VIII. The Great Arc—Section 18° to 24°, or Series *A* of the South-East Quadrilateral. By Colonel J. T. Walker, C.B., R.E., F.R.S., &c., &c., Superintendent of the Survey, and his Assistants. Dehra Dún, 1878.

Do. IX. The Jabalpur Meridional Series, or Series *E* of the South-East Quadrilateral. By Colonel J. T. Walker, C.B., R.E., F.R.S., &c., &c., Surveyor General of India and Superintendent of the Survey, and his Assistants. Dehra Dún, 1878.

Do. X. The Bider Longitudinal Series, or Series *D* of the South-East Quadrilateral. By Major-General J. T. Walker, C.B., R.E., F.R.S., &c., &c., Surveyor General of India and Superintendent of the Survey, and his Assistants. Dehra Dún, 1880.

Do. XI. The Biláspur Meridional Series, or Series *F* of the South-East Quadrilateral. By Major-General J. T. Walker, C.B., R.E., F.R.S., &c., &c., Surveyor General of India and Superintendent of the Survey, and his Assistants. Dehra Dún, 1880.

Do. XII. The Calcutta Longitudinal Series, or Series *B* of the South-East Quadrilateral. By Major-General J. T. Walker, C.B., R.E., F.R.S., &c., &c., Surveyor General of India and Superintendent of the Survey, and his Assistants. Dehra Dún, 1880.

Do. XIII. The East Coast Series, or Series *C* of the South-East Quadrilateral. By Major-General J. T. Walker, C.B., R.E., F.R.S., &c., &c., Surveyor General of India and Superintendent of the Survey, and his Assistants. Dehra Dún, 1880.

Do. XIV. The Budhon Meridional Series, or Series *J* of the North-East Quadrilateral. By Lieutenant-General J. T. Walker, C.B., R.E., F.R.S., &c., &c., Surveyor General of India and Superintendent of the Survey, and his Assistants. Dehra Dún, 1883.

Do. XV. The Rangír Meridional Series, or Series *K* of the North-East Quadrilateral. By Lieutenant-General J. T. Walker, C.B., R.E., F.R.S., &c., &c., Surveyor General of India and Superintendent of the Survey, and his Assistants. Dehra Dún, 1883.

March, 1883.