



CU04612019

SYNOPTICAL VOLUME XIV

G. T. SURVEY OF INDIA

THE BUDHON MERIDIONAL SERIES

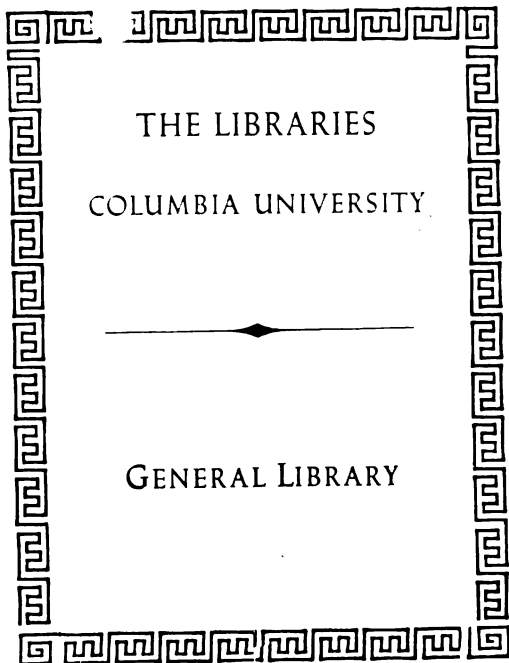
APPERTAINING TO THE
NORTH-EAST QUADRILATERAL.

PRESENTED

TO

526

In 25
Q 14



AUTHORITY OF

EXCELLENCY

E VICEROY

AND

GENERAL OF INDIA

N COUNCIL

A. D. 1863.



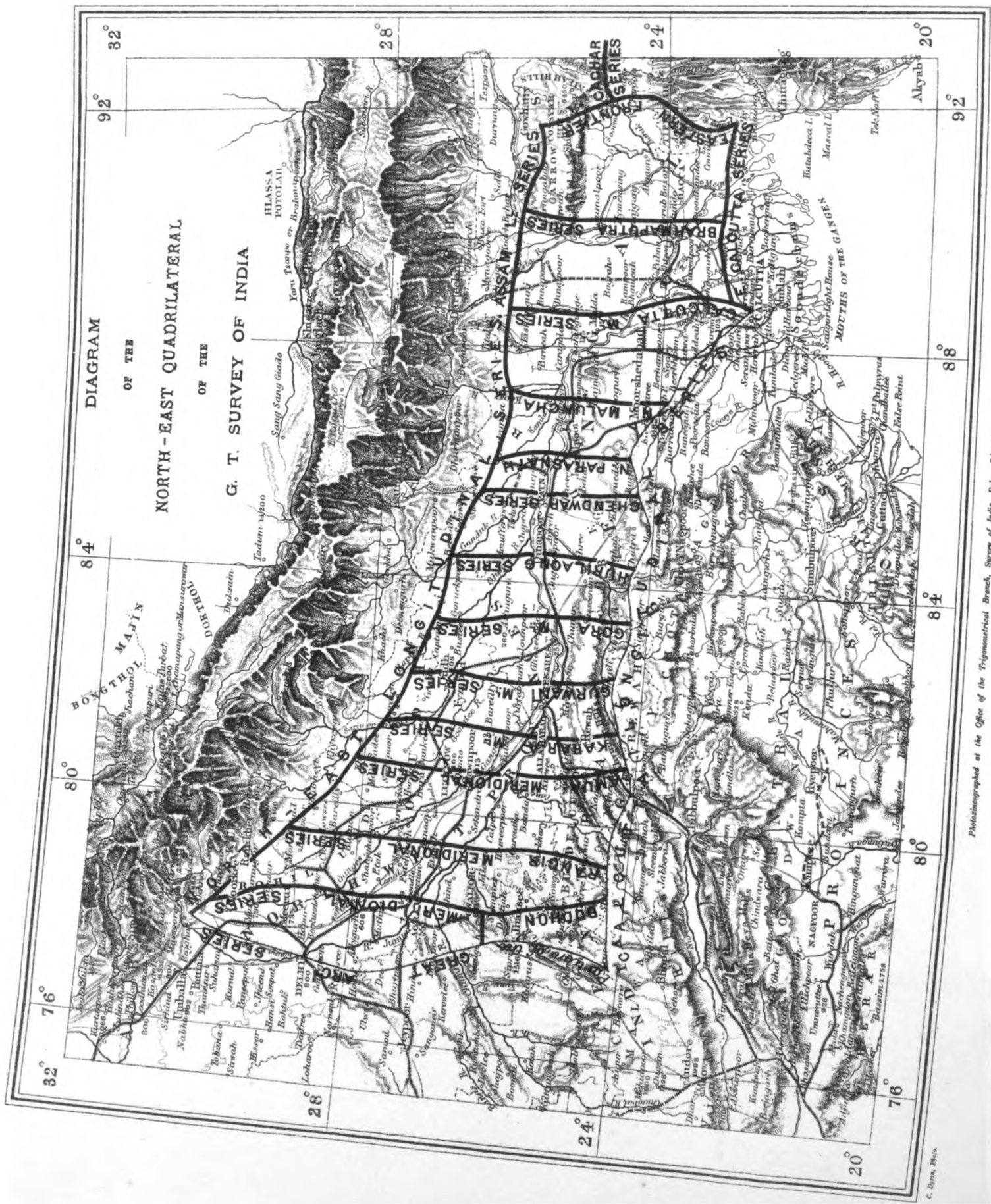


DIAGRAM
OF THE
NORTH - EAST QUADRILATERAL
OF THE
G. T. SURVEY OF INDIA

BOYDTHOL
MAJIN
DEOTTO

C. Dixon, Esq.

Photoinographed at the Office of the Triangulation Branch, Survey of India, Delhi, Dec., December 1908

C. G. Okun, Esq.

SYNOPSIS OF THE RESULTS OF THE OPERATIONS OF
THE GREAT TRIGONOMETRICAL SURVEY OF INDIA

VOLUME XIV.

DESCRIPTIONS AND CO-ORDINATES

OF THE

PRINCIPAL AND SECONDARY STATIONS AND OTHER FIXED POINTS OF

THE BUDHON MERIDIONAL SERIES

OR SERIES J

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.

CONTENTS.

ERRATA ET ADDENDA	iv
REFERENCES	v
PREFACE	vii
Introduction	iii—J.
Alphabetical List of Principal Stations	1—J.
Numerical do. do.	2—J.
Description of Principal Stations	8—J.
Addendum to Description of Principal Stations	11*—J.
Principal Triangles	11—J.
Secondary Triangles connecting Principal-Auxiliary Stations and Intersected Points	16—J.
Azimuths of Surrounding Stations and Points, at Principal, Principal-Auxiliary and Secondary Stations	22—J.
Co-ordinates and Descriptions of all Stations and Points	28—J.
CHARTS Nos. 1 and 2	

ERRATA ET ADDENDA.

- 5—*J.* line 21 from bottom *for* surmounted by *read* about 20 feet to the east of
 15—*J.* after Triangle No. 57 *insert* the following triangles:—

No. of Triangle	Station	Spherical Excess	Corrected Plane Angle	Distance		
				Log. feet	Feet	Miles
57 _a	Mahehari, LII	1'05	31 17 35'66	4'9420246	87503'4	16'573
	Mábegarh, I	1'05	65 23 37'74	5'1851627	153166'1	29'009
	Chándípahár, LIV	1'05	83 18 46'60	5'2235428	167318'0	31'689
57 _b	Mahehari, LII	'98	66 5 4'25	5'1541808	142620'1	27'011
	Chándípahár, LIV	'98	34 52 53'06	4'9504707	89221'7	16'898
	Godhna, XLIX	'99	79 2 2'69	5'1851627	153166'1	29'009

NOTE.—Stations XLIX, LII and LIV appertain to the Great Arc Meridional Series, Section 24° to 30°, of the North-West Quadrilateral, and I appertains to the North-East Longitudinal Series of the North-East Quadrilateral.

- 23—*J.* line 14 from top, col. 5 *for* Tinsmál, VII* *read* Tinsmál, VII*
 „ in cols. 5 and 6 *after* line 6 from bottom *insert* Mahehari, LII 4 34 26'63 |57_a|
 „ „ „ „ 1 „ „ Mábegarh, I 281 15 38'98 |57_a|
 24—*J.* „ 3 and 4 „ „ 16 „ „ Mahehari, LII 298 20 54'38 |57_b|
 25—*J.* „ „ „ „ 2 „ „ Chándípahár, LIV 101 23 45'00 |57_a|
 „ „ 5 and 6 „ „ 16 from top „ Godhna, XLIX 118 28 12'87 |57_b|
 Chándípahár, LIV 184 33 18'10 |57_a|
 27—*J.* az. of Rámghat House, col. 1 *for* 112° 34' 30' *read* 141° 1' 22'
 30—*J.* line 14 from top, col. 2 „ No. 79 „ No. 57_a
 33—*J.* lines 21 & 22 from top, col. 3 „ Moradabad s. on Collec- „ Moradabad Collector's Kachahri
 tor's Kachahri Staircase.
 34—*J.* latitude and longitude of Rámghat House „ { 28° 5' 42'' 2 „ { 28° 9' 0'' 6
 { 78 25 45 '4 { 78 28 32 '5

January, 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 Charts at the end of this volume 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: these 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.

January, 1883.

J. B. N. HENNESSEY,

In charge of Computing Office.

P R E F A C E.

The Budhon Meridional Series is the westernmost of all the meridional 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. When the reduction of this Quadrilateral came to be taken in hand it was found that the Budhon Series, while emanating from the Calcutta Longitudinal Series, and terminating on the Great Arc Series, Section 24° to 30° —the two Series above mentioned—was so slightly connected with the rest of the triangulation of the North-East Quadrilateral, that the mutual influence would be practically imperceptible. It was therefore determined to reduce the Series by itself. The general principles of the Simultaneous Reduction of the Series 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.* An abstract of the reduction itself is given in Appendix No. 1 to Part I of Volume VII, and all other details of the principal triangulation are given in Part II of that Volume.

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 for the several Series forming the North-West Quadrilateral, as follows:—

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

And for the following Series 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.

The present is the 14th Synoptical Volume and the first of those appertaining to the North-East Quadrilateral, and it gives the results of the whole of the triangulation, 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, having circles of 7 to 12 inches in diameter, 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 Introduction 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 Names and Descriptions of the Principal Stations, pages 1—*J*. to 10—*J*., were printed first of all; this was done in the year 1877, while the general reduction of the Series was in progress. Finally the secondary triangulation had to be adjusted in accordance with the principal, and then the printing of this volume was resumed.

The data given in this volume are the following:—

First (page 1—*J*.), an alphabetical list 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 (page 2—*J*.), a numerical list giving the names corresponding to the numbers.

Third (page 3—*J*.), descriptions of the principal stations—of their structure and positions—as taken from the original records of the observations, and supplemented by an Addendum, page 11*—*J*., which gives the most recent information of their condition which has been received up to date.

Fourth (page 11—*J*.), the angles and sides of the principal triangles, numbered and arranged in order from south to north.

Fifth (page 16—*J*.), 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 (page 22—*J*.), the azimuths of surrounding stations and points, at principal, principal-auxiliary † and secondary stations, the latter arranged in alphabetical order.

Seventh (page 28—*J*.), the co-ordinates and descriptions of all stations and points arranged in alphabetical order.

The heights of the stations depend in the first instance on the finally determined values of the stations of Budhon and Tinsmál of the Calcutta Longitudinal Series (of the South-East Quadrilateral), and of Sheopuri and Mahesari of the Great Arc Meridional Series, Section 24° to 30° (of the North-West Quadrilateral). In addition to these fixed heights, the heights of Stations XXII, XXIII, XL and XLII were determined by the Spirit-leveling Operations of this Branch of the Department, and those of Stations XXIV, XXXIV, XXXV, XXXVII and XXXIX 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 on pages 37 and 38 of 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 Kāráchi (Kurrachee). It may be here stated that all trigonometrically determined heights invariably refer to the upper surfaces of the central, masonry pillars on which the instrument stood. Spirit-leveled values sometimes refer to the upper surface and sometimes to the basement of the pillar, whichever the leveling staff was set upon; a description of the exact point referred to is given in each instance in footnotes to the pages of the co-ordinate List, commencing on page 28—*J*.

It has not been considered necessary to publish the whole of the details of the secondary triangulation. The sides and angles of 132 triangles, which were selected as most likely to be of general use, and the azimuths of

† NOTE.—By a principal-auxiliary station is meant a station auxiliary to a principal station at which observations were taken to fix unvisited points.

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, $80^{\circ} 17' 21''$, 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 Heavyside, as a part of the operations of this Survey. The combined result places the Observatory at Madras in Long. $5^{\text{h}} 20^{\text{m}} 59^{\text{s}}.42 = 80^{\circ} 14' 51''.30$. Thus the following precept may be accepted with considerable confidence,—

**All the values of longitude in this volume require a constant correction,
probably of $-2' 30''$.**

The orthography of Indian names in the present volume is in strict agreement with the Gazetted Lists for the N. W. Provinces wherever the locality has been identified, and conforms to the spirit of the orders of Government on the subject, as worked out in this and other provincial lists, where there is no clear literal authority. As a general rule the pronunciations of the vowels are as follow:—*a* has a variable sound as in woman, rural, paltry; *á* as in tartan; *i* as in bit; *í* as in ravine; *u* as in bull; *ú* as in rural; *o* as in note; *e* as *a* in say; *au* as *ou* in cloud; *ai* as *i* in ride.

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 this, whenever it was practicable to do so, in order to facilitate the future identification of the stations, and all the information which is at present forthcoming has 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. Mr. Hennessey moreover supervised the Simultaneous Reduction of the Series, while the Introduction to this volume was written by Colonel Branfill. Great pains have been taken to secure the utmost accuracy in preparing the data and passing them through the press.

CALCUTTA, }
December 1882. }

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

BUDHON MERIDIONAL SERIES.

BUDHON MERIDIONAL SERIES—(LONG. 78° 30'.)

INTRODUCTION.

In the year 1830 when the first measurement of the Calcutta Longitudinal Series was approaching completion, the Hon'ble the Court of Directors of the East India Company expressed a wish that a number of series of triangles should be carried northwards and southwards from certain sides of this triangulation, in order to connect together the isolated surveys which had already been made in various provinces and districts, and to furnish reliable bases for future surveys. The Surveyor General—then Captain G. Everest of the Bengal Artillery—in an exhaustive letter dated 12th October 1831, discussed all preliminaries for giving effect to the wishes of the Hon'ble Court, in regard to the number of the series to be undertaken, the character of the country to be traversed by each, the necessary additions to the then-existing establishment, and the probable cost of the operations.

During the year 1831-32 the requisite instruments for carrying out this scheme of triangulation were procured and instruction given to the officers and assistants selected for the work—one of a high order of accuracy—in which they had had no previous experience.

The first series undertaken was the Budhon, one of the 13 meridional chains now included in the North-East Quadrilateral. It follows the meridian of 78° 30' as nearly as was practicable, and lies immediately to the east of the Northern Section of the Great Arc Series (E. Long. 78° and N. Lat. 24° to 30°). It was begun in 1832-33 at its southern end in the Saugor (Ságar) District, based on the side Budhon-Tinsmál of the Calcutta Longitudinal Series.

For about the first two and a half degrees (155 miles) of its length it was carried for the most part as a single chain of triangles across the north-eastern spurs and outliers of the Vindhya range which forms the southern watershed of the great Gangetic plain, traversing the modern districts of Saugor, Lalitpur, and Jhánsi, the Native States at the N. W. corner of Bundelkhand, and that of Gwalior, in which a good many secondary stations and places of interest or importance were fixed, including Tehri, the ancient town of Orchha and its modern successor Jhánsi, Datia, Narwar, and Gwalior.

To the north of Gwalior the Series left the hills and descended into the valley of the Chambal and Jumna, requiring henceforward the aid of towers and the heavy labour of ray-clearing, which greatly retarded its progress. Leaving Gwalior it passed through the districts of Agra, Mainpuri, Etah and Aligarh, striking the Ganges in latitude 28°, whence it was con-

tinued as a double series, with shorter sides, arranged in five polygonal figures, to its northern limit about latitude 30° where it reached the outlying hills at the foot of the Himalayas and closed upon stations of the Great Arc and N. E. Longitudinal Series, having traversed the districts of Budaun, Moradabad, Bijnor, and Muzaffarnagar, with one station in the Tarái and two in British Garhwál. The Budhon Series was brought to a close in the year 1842-43, a period of ten years having been occupied in completing about six degrees of distance along the meridian or about 400 miles.

The officer selected for the conduct of this Series was Lieutenant Roderick Macdonald of the 69th Bengal Native Infantry, an officer of the Revenue Survey who had been reported by the head of that department as "well fitted for employment in the Great Trigonometrical Survey and desirous of obtaining it". He was appointed a Second Assistant in the Department in March 1832, and in October the sanction of Government was obtained for a party to be employed under his orders, as follows:—A Principal and one Junior Sub-Assistant with a Native Establishment of the usual strength.

The party was organized in Calcutta under the supervision of the Surveyor General

1st Season 1832-33.

PERSONNEL.

Lieut. R. Macdonald, 2nd Assistant.
Mr. W. N. James, Principal Sub-Assistant.
" J. H. Scully, 3rd Class "

Subsequently in March 1833.

" E. Cropley, 3rd Class Sub-Assistant.
" R. Loane, " "

himself, and started on its long march to the field on the 23rd November 1832 provided with a 15-inch Theodolite by Harris and Barrow for the principal observations. It reached the town of Saugor (Ságar) on the 28th of January 1833 when a part of the native establishment struck for higher wages, and had to be replaced by new hands picked up on the spot; but Lieutenant Macdonald

pushed on and arrived at Budhon H. S. his first station, 22 miles N. W. from Saugor, on the 2nd February. This station and that of Tinsmál distant 30 miles to the eastward, defined the west and east ends of the base or side of origin for the new Series. They were both found intact, but much overgrown by jungle infested with wild beasts, since last visited and observed at for the Calcutta Longitudinal Series by Mr. Olliver eight years previously (in 1825).

The selection of the requisite stations in advance was taken in hand at once, and the junior Sub-Assistant sent on to select the best point available in the desired direction and to burn lights thereat; these however could not be seen without some artificial elevation, and it was only on the 23rd February that the final observations at Budhon could be begun. They were finished by the 27th, and the main party marched to Tinsmál where it was found necessary to raise the station platform by 8.5 feet to command the ray to Patna (I)* and overlook a small temple that obstructed the view. Whilst the building was going on, Lieutenant Macdonald proceeded to select the next two stations in advance on the east flank, Dargawa (II) and Dhandkúa (III) and having returned to Tinsmál, completed the observations by the 15th of March. Whilst there, the Surveyor General, who was on his way to resume the operations on the Great Arc, visited the party, and before going on, left two more Sub-Assistants, Messrs. E. Cropley and R. Loane with Lieutenant Macdonald.

* The Roman number in brackets after the name of a station indicates its position in numerical order from south to north.

The signals observed during this season and for some seasons to come, were flags by day and vase lights by night.

Patna (I) was next visited, but hazy weather prevented the completion of the principal angles before the 23rd of April, the time between the two short periods of clearer weather being utilized by fixing as many secondary stations and points as practicable. Dargawa (II) and Dhandkúa (III) were next visited and the observations completed by the 3rd of May, when the principal observing was stopped by hazy weather and by obstruction met with from the inhabitants, who regarded the survey operations with suspicion and dislike, and hindered the advanced party continually.

Lieutenant Macdonald endeavoured to complete another triangle but failed, although he waited at Sirsaud (afterwards abandoned for Andhiári, IV) from 13th May to 25th June without having a single good night for observing. Indeed, the length of the rays here—over 30 miles—was too great for the requisite visibility at this season, unless the air were cleared by a general fall of rain. The party then went into recess quarters at Saugor.

The out-turn of work for the first season (1832-33) shews but three principal triangles completed, covering about 1000 square miles of country and stretching to a point nearly 50 miles north of the origin of the Series. But a good deal of secondary or minor triangulation had been accomplished, by which a number of points were determined, especially in and around the first triangle, when the weather was comparatively clear and suitable. A few commanding points were selected and observed at whilst marching between the principal stations, whereby many other places and landmarks which could be seen from two or more of the stations were fixed. For this work Lieutenant Macdonald appears to have used his large theodolite, employing his principal Sub-Assistant with a smaller instrument to supplement his work at the minor stations which he was unable to visit, whilst to the junior Sub-Assistant was entrusted the difficult task of selecting and building the principal stations in advance.

At the close of the recess an epidemic fever broke out at Saugor and attacked three

2nd Season 1833-34.

PERSONNEL.

Lieut. R. Macdonald, 1st Assistant.
 „ P. Bridgman, Bengal Artillery, 2nd Asst.
 (*sick and ineffective.*)
 Mr. W. N. James, Principal Sub-Assistant.
 „ J. H. Scully, 3rd Class „
 „ E. Cropley, „ „ (*sick and*
died 27th Oct.)
 „ R. Loane, 3rd Class Sub-Assistant.

of the Sub-Assistants, one of whom, Mr. E. Cropley, died on the 27th October. It may be now noted that Lieutenant Bridgman who had recently been appointed as 2nd Assistant to the party, was prevented by sickness from joining until 15th February 1834 and further incapacitated for field duties until April, when he was entrusted with the execution of a secondary series in the vicinity of Gwalior,

with Mr. Loane for his assistant: but although he kept the field until the end of July he appears to have contributed little or nothing worth mentioning to the season's work. Shortly afterwards he was transferred to the South Párasnáth Series; but his health failed completely, and he died on his voyage home.

The party was thus in fact no stronger than during the previous season, and the persistent opposition of the inhabitants in the Native States, was a source of great hindrance and anxiety; but the results of this season's work proved nevertheless very much more favourable than the preceding or many succeeding seasons, and appear to reflect no little credit on Lieutenant Macdonald and his assistants.

Lieutenant Macdonald took the field about the middle of October 1833, and found that Dhandkúa (III), the terminal station of the previous season, had been destroyed during the recess; this necessitated the remeasurement of the angles thereat, as well as at Patna (I) and Dargawa (II). These were completed by the 18th November, after which the new stations were visited in the following order:—Andhiári (IV), Gwáli (V), Kathera (VI) a remarkable Bundela stronghold, Bhitári (VII) first visit, Algi (VIII) first visit, Bhitári (VII) second visit, Daryapur (IX) first visit, Maharájpur (X), Karaia (XII), Narwar (XI), Algi (VIII) second visit, Daryapur (IX) second visit, Majhár (XIV) and Ráepur (XIII), by the 30th April 1834. No further observations could be made throughout the month of May owing to the hazy weather, and the season's work closed on the side Ráepur (XIII)—Majhár (XIV), on the 1st of June, when the party marched into recess quarters at Agra where it arrived on the 30th.

In all, twelve new principal triangles had been measured, extending the Series to a point near Gwalior, distant 140 miles north of its origin.

The secondary triangulation accomplished this season was considerable, the points fixed being numerous and fairly well spread over the country traversed, including the important towns of Tehri, the ancient Bundela capital Orchha, its modern successor Jhánsi, the large artificial lake Barwa Ságar, Datia, and Gwalior, besides others of less note.

Some of the chief secondary stations were made to form a minor series by which an independent value was obtained of the side Gwáli-Bhitári, as a check against certain unusually large discrepancies in the observations of some of the previous angles.

In addition to the principal and secondary triangulation accomplished, the preliminary selection of the stations in advance was carried to a distance of 60 miles, well into the plains across the Chambal and Jumna rivers, rendering this season's out-turn of work, notwithstanding many drawbacks and hindrances, one of the most successful noticed in this account.

At the commencement of the Budhon Series, the Surveyor General had directed that a connection should be made, as soon as it could be done without going out of the way, with the Great Arc Series adjacent, recently laid out by Mr. Rossenrode but not yet finally observed with the great theodolite.

The first opportunity of carrying out this connection occurred between Jhánsi and Gwalior, where the Great Arc Series approaches the Budhon Series in the secondary hill stations of Ladára and Karaia, and the principal station on the Ráepur hill, the first of which is visible from Algi (VIII), the second from Ráepur (XIII), and both first and second from Maharájpur (X). Lieutenant Macdonald therefore, occupied the sites of the two Great Arc Series secondary stations of Ladára and Karaia as principal stations, rebuilding the platforms, which had been destroyed by the inhabitants from superstitious motives; but he built a fresh principal station on the Ráepur hill, because the Great Arc Series station thereat could not be observed from the Budhon Series side owing to a small temple that occupied the peak of the hill and precluded the establishment of a common station suitable for both series. Thus a hexagonal figure was formed round Maharájpur (X), and, after measuring the angles, Lieutenant Macdonald reported that he had effected a connection with the Great Arc Series on the side Narwar (XI)—Karaia (XII), Narwar being identical with Ladára h.s. of the Great Arc. These two stations being only secondary points this connection could not be accepted. The three prin-

- oipal stations of the Great Arc Series, Shergarh, Dhobái, and Ráepur, although they are near to Narwar, Karaia and Ráepur of the Budhon Series, respectively, are in reality different points, and in fact no proper connection was effected. Subsequently however in 1877, the Surveyor General, then Colonel J. T. Walker, R.E., caused a more exact connection to be made between the two principal stations on the Ráepur hill, which were only about 41 feet apart, the temple above mentioned being on the summit of the peak, between them. The details of this connection will be found at page 73—*j*. of Volume VII of the *Account of the Operations of the Great Trigonometrical Survey of India*.

The Budhon Series had now been carried for one-third of its entire length in two

3rd Season 1834-35.

PERSONNEL.

Lieut. R. Macdonald, 1st Assistant.
Mr. W. N. James, Principal Sub-Assistant.
" J. H. Scully, 3rd Class "
" R. Loane, " "

seasons, to the northern limit of the hilly tract in which it began, and the provision of towers or artificial elevations, to carry the Series across the plain country to the north, became indispensable. The Surveyor General had already applied to the Government to sanction the erection of high towers for the purpose, like those being built by the Public Works Department for the Great Arc Series, which had been sanctioned during the year 1833. Those towers however promised to be so expensive that the Government hesitated to sanction any more for the time, or until their precise cost was known, and put forward a memorandum by the Hon'ble Colonel Morrison suggesting the adoption of a reflecting circle and a portable wooden mast, in place of a big theodolite and a masonry tower. The Surveyor General could not accept this suggestion, but proposed the construction of a lofty central pier of masonry for the instrument and signals to stand on, supplemented by a scaffolding with a stage for the observatory, the cost of which he estimated at Rs. 140 to Rs. 270; and if this should prove too costly, then he believed that a mast, such as he himself had recently used for the approximate Series of the Great Arc, would answer. He did not think such costly towers as those just erected for the Great Arc necessary, and pointed out the excessive depth given to their foundations by the Public Works Department, by whose officers they were built. Finally he expressed a hope that the Survey Officers should not be required to build their own towers or supervise the expenditure of large sums of public money, having already as much to attend to in their own proper professional line as they could well do. This representation however seems to have produced little or no effect, for we find the surveyors generally from that time forwards building their own towers as best they could, in a more modest but sufficiently effective way; and, notwithstanding some failures, this arrangement has probably proved the most economical.

Meanwhile, pending the settlement of the question as to what kind of tower stations should be adopted, Lieutenant Macdonald took the field on the 1st October 1834, and having taken extra precautions for the preservation of the two terminal stations observed at during the previous season—Ráepur (XIII) and Majhár (XIV)—proceeded by direction of the Surveyor General to select the stations in advance by the "ray trace" system, using small theodolites and perambulators. Much skill and judgment is necessary in carrying out this method, and some time was spent in acquiring the requisite accuracy; in short, a good deal of the work had to be revised. Moreover, progress was retarded by sickness, the services of the

principal Sub-Assistant Mr. James being lost through this cause for nearly three months of the field season. The principal station sites were finally selected across the Doáb as far as the Ganges, and the preliminary selection pushed on into the districts of Budaun and Moradabad beyond, before the party returned to recess quarters at Agra early in June.

No observing of principal angles was done this season, but the approximate series was completed for a distance of 100 miles, as far north as the Ganges, by 12 stations forming a single series of symmetrical triangles, and operations were in progress for a considerable distance beyond.

Lieutenant Macdonald himself was obliged by ill health to quit the field in April, and suffered so much from jungle fever during the ensuing recess that he applied to be relieved of his charge in September, and obtained sick leave. Unhappily he did not recover, but died before the end of the year. He was succeeded by Lieutenant E. L. Ommanney, of the Bengal Engineers, who had been appointed to the party in May to learn the practical duties of the Trigonometrical Survey, he having hitherto been employed on a survey of the Brahmaputra river. He joined the Budhon Series at Agra on the 13th June.

Mr. James was transferred to the Great Arc and his place not filled up until 1st March

4th Season 1835-36.

PERSONNEL.

Lieut. E. L. Ommanney, Bengal Engineers, 2nd Assistant.

Mr. J. H. Scully, 2nd Class Sub-Assistant.

1836, when Mr. J. Olliver, Chief Civil Assistant, joined, and the transfer of Mr. Scully also to the Great Arc towards the end of this season left the Series without any of its original staff. Lieutenant Ommanney took the field on

the 8th November 1835, and having received no sanction as yet for the erection of the towers, proceeded at once to run trial lines along the rays between the selected station sites, to ascertain that no serious obstacle existed in them which could not be readily removed, and he was engaged in this work until March 1836. But hitherto no rays were actually cleared owing to Lieutenant Ommanney's inexperience and to the refusal of the inhabitants to allow trees to be cut down.

The Government had recently (April 1835) considered the subject of ray clearing, and had directed that equitable compensation should be given in all cases of injury to the owners; and to enable a just valuation to be speedily made in the case of recusant proprietors, the civil authorities were ordered to direct the personal attendance of the *tahsildár* or *peshkár* (local subordinate Revenue Officers) at the spot, when called upon by the Survey Officers. At the same time the Survey Officers were enjoined to use every means to avoid bringing any highly prized or sacred tree in the ray passing from one station to another.

The latter part of this season was spent in clearing the rays between the stations in the plains, and in determining the height of the towers of observation which would inevitably be required to command them. Approximate angles were observed from the top of masts erected for the purpose, and before the close of the field season this work had been completed as far as Pondri (XXIV) in the middle of the Doáb.

In the case of the two first stations in the plain country—Gúrmi T.S. (XVII) and Bhind S. (XVIII)—the forts at these places offered suitable sites for stations, in the one case on a high bastion, and in the other on the gateway tower, on which during this season stations were built.

The final selection of stations forming a single series of symmetrical angles was extended as far as Moradabad in Lat. 29° , but this advanced part of the approximate series north of the Ganges was afterwards abandoned in favour of a double series of smaller triangles.

Several principal stations being now ready, Lieutenant Ommanney commenced the

5th Season 1836-37.

PERSONNEL.

Lieut. E. L. Ommanney, Bengal Engineers, 2nd
Assistant.

Mr. J. Olliver, Chief Civil Assistant.

field season of 1836-37 by resuming the final observations which he completed at the undermentioned stations as follows:—at Jhánkri H.S. (XVI) 18th to 27th October 1836, at Majhár H.S. (XIV) 28th to 31st October, at Ráepur H.S. (XIII) 1st to 4th November, at Sánichri (XV) 5th to 8th November, at Gúrmi T.S. (XVII) 11th to 23rd November, and at Bhind S. (XVIII) by 2nd December.

By the time the observing party arrived at Gúrmi T.S. the next forward station on the west flank had been built on the gateway of Panáhat Fort, and the first tower station erected, that at Athgath, had been sufficiently prepared to be observed to.

Lieutenant Ommanney had intended to build solid, conical, mud towers, 22 feet in diameter at base, 15 feet at top, and about 40 feet high, at an estimated cost of from Rs. 200 to Rs. 300 each, but this plan did not meet the Surveyor General's approval; as, *firstly*, the lower centre, or station mark must be on the ground, so as not to be affected by dilapidation of the superstructure; and, *secondly*, the upper centre mark for the frequent adjustment of instrument and signals, must be always plumb over the lower centre, for which purpose the latter must be easily accessible both at first and for subsequent re-examination. Lieutenant Ommanney modified his towers accordingly, having a masonry core pierced with a vertical shaft or central opening 18 inches in diameter, and a horizontal arched passage of masonry at ground level giving light and access to the lower centre or station mark, with an easy spiral slope or ramp winding round the tower and leading to the summit.

The first tower erected, Athgath T.S. (XIX) on the banks of the Chambal, was only built in the first instance to a height of 26 feet, which appears to have been sufficient for the back rays, but afterwards (in 1840) it was rebuilt and raised 10 feet higher.

No further principal observations were taken this season, after those concluded at Bhind S. on the 2nd December, and the rest of the season was spent in building the towers and in taking approximate angles with the aid of masts and scaffolds, as far as the Ganges.

By the close of the season four towers Sherpur, Firozabad, Baragaon and Pondri, were reported as "well advanced" towards completion, and four others, Kilármáo, Salímpur, Jamálpur and Sankráo, begun. But the earthwork of the Firozabad tower gave way and fell down twice, after it had been built up to a height of 28 feet.

By the end of the fourth season's work the following method of carrying on the principal triangulation in the plains, had been arrived at:—The country having been reconnoitred generally and no hills or artificial elevations suitable for stations met with, a ray trace, traverse or route survey was made in the desired direction for each new station, from which its precise bearing could be computed. A trial line was then run to ascertain that it contained no insurmountable obstacle, after which the line was cleared and the angles between adjacent lines measured by means of a small theodolite raised on the top of a high mast surrounded by a

scaffold with a stage for the observer. This measurement was termed the "Approximate Series," a term which in more recent times has been applied to the laying out and preparation of the principal triangulation generally. After this it only remained to build the towers requisite for the final observations with a large theodolite.

The apparently small progress made may be attributed to the want of officers and assistants experienced in the work of triangulating in a plain country and of building high towers in mud without professional aid. But the prime cause of delay was the attempt to maintain almost as large triangles in the plains as in the hills, thus necessitating observations over distances much too great for distinct vision, except in very unusually clear weather.

Final observations were made at 6 principal stations, forming a quadrilateral figure and two single triangles, by which the Series was advanced a meridional distance of 32 miles and reached the south bank of the Chambal river, the boundary between the Gwalior State and the Agra District.

On 31st May 1837 Lieutenant Ommanney resigned his appointment in the Department, and left the Series in charge of Mr. Olliver, Chief Civil Assistant, the only officer remaining with the party.

Before resuming the field work for Season 1837-38, the Surveyor General directed

6th Season 1837-38.

PERSONNEL.

Mr. J. Olliver, Chief Civil Assistant.

„ J. Driberg, 3rd Class Sub-Assistant.

Mr. Olliver to reduce the size of the triangles in laying out the Series to the north of the Ganges, and in place of a single series of triangles having 15 to 20 mile sides, to adopt a double series of consecutive polygonal figures, with sides from 8 to 15 miles in length, by which lower towers would suffice, greatly improved signals would be obtained, and some of the mounds which frequently obstructed the view on the longer rays might be utilized for station sites, whilst the double series would afford an effective check against error. Having regard however to the very backward state of the Series, none of the previous work which would serve, could be abandoned.

Mr. Olliver therefore, in great hopes of completing the section of the Series already laid out to the south of the Ganges, set to work to finish the 8 or 9 towers commenced under Lieutenant Ommanney the previous season. The more advanced of these—Athgath (XIX), Sherpur (XXI), Firozabad (XXII) and Pondri (XXIV)—still required much additional height which however their foundations were not calculated to bear with safety. Firozabad had already fallen twice from this cause. Mr. Olliver therefore pulled them down and rebuilt them afresh upon deeper and more solid foundations. In the case of Firozabad firm soil was only found at a depth of 16 feet below the surface. Having commenced work at all the towers at once to economize time, he was greatly impeded for want of funds; and was constrained to advance sums from his own private purse.

In his half-yearly report, dated 1st March 1838, he said that the progress hitherto had been rapid. The towers at Pondri (XXIV) and Baragaon (XXIII) were finished, Athgath (XIX) 25 feet high, and Kilármáo (XXV) 27 feet; but that Firozabad tower had fallen again after reaching a height of 40 feet.

This was the last of his (Mr. Olliver's) work here, for his services being urgently

• required with the new party just formed for the Great Arc (Section 18° to 24°) under Lieutenant Waugh, B.E., he suddenly left on the 4th March, having made over charge to the Sub-Assistant, Mr. Driberg. Early next month (April 1838) and before he could have made much progress, Mr. Driberg was ordered to repair with the whole of the Budhon Series party to the Head Quarters of the Surveyor General at Dehra Dún.

During the following season, 1838-39, this party was employed under Lieutenant Renny on the southern section of the Great Arc, and the Budhon Series was thus left in abeyance.

On the 13th November 1839 Lieutenant Renny was put in charge of the Budhon

7th Season 1839-40.
PERSONNEL.
Lieut. T. Renny, Bengal Engineers, 1st Assistant,
(*absent on other duty*).
Mr. C. Murphy, 1st Class Sub-Assistant.
" W. Rossenrode, 2nd " "
(*with Troughton and Simms' 18-inch Theodolite*
No. 2).

Series in the hope that his experience and ability would conduce to its more rapid progress and early completion. He was directed to re-organize an efficient party from the former Budhon Series party and from that of the Amua Series recently completed by Mr. Murphy, and to resume the operations where Lieutenant Ommanney had left off; but as his personal assistance was required in the astronomical observations at Kaliána, Mr. Murphy was placed in temporary executive charge.

The work of the season consisted in completing the towers and extending the approximate series. The stations of Bhind (XVIII), Gúrmi (XVII), and the towers at Firozabad (XXII), Baragaon (XXIII) and Pondri (XXIV) were repaired, the last-built tower of Athgath (XIX) raised from 25 to 36 feet, and that of Kilármáo (XXV) from 19 to 44 feet, a new tower at Sherpur (XXI) built, and those at Salímpur (XXVI), Jamálpur (XXVII) and Sankráo (XXVIII) completed, leaving Parauli (XXXI) alone unfinished of all those south of the Ganges.

As soon as Mr. Murphy had set on foot the tower building he proceeded to take up the approximate series to the north of the Ganges as a double series of consecutive polygons with shorter sides, ordered by the Surveyor General in 1837-38, abandoning the sixty miles of approximate series ahead which had been carried as far as Moradabad (Lat. 29°). By March 1840 he had laid out the Sakrora hexagon.

Lieutenant Renny now (March 1840) visited the party and remained long enough to satisfy himself that the work was being carried on in a correct and systematic way.

By the end of this field season the Sakrora tower had been built, and the ground in advance for the next polygon reconnoitred. The towers built under Mr. Murphy north of the Ganges appear to have been solid, as first intended by Lieutenant Ommanney.

Lieutenant Renny being engaged in the astronomical observations at Kaliánpur and

8th Season 1840-41.
PERSONNEL.
Lieut. T. Renny, Bengal Engineers, 1st Assistant,
(*absent on other duty*).
Mr. C. Murphy, 1st Class Sub-Assistant (*in*
executive charge).
" O. Mulheran, 2nd " "
" W. Glynn, 3rd " "

in the measurement of the Bider Base-line, Mr. Murphy remained in executive charge all this season. He began the season's work by selecting a second hexagon about the advanced station of Bánsnopál (XXXV), whilst the towers that had been damaged during the recent rainy season were being restored. One of them, Jamálpur (XXVII), had fallen, although the precaution had been taken of thatching the towers before the rains

set in. He then hastened southwards to resume the final observing which had been in abeyance four years since Lieutenant Ommanney finished at Bhind S. on the 2nd December 1836.

The final horizontal angles were now taken up and completed at the undermentioned stations as follows:—

at Firozabad T.S. (XXII)	between 7th and 9th November 1840
„ Panáhat S. (XX)	„ 10th „ 15th „ „
„ Athgath T.S. (XIX)	„ 16th „ 18th „ „
„ Sherpur „ (XXI)	„ 19th „ 20th „ „
„ Baragaon „ (XXIII)	„ 21st „ 30th „ „
„ Pondri „ (XXIV)	} in all December 1840
„ Kilármáo „ (XXV)	
„ Salímpur „ (XXVI)	} „ January, February, and to 8th March 1841.
„ Jamálpur „ (XXVII)	
„ Sankráo „ (XXVIII)	

The towers in advance were not sufficiently advanced for any further observations to be made; but before the end of the field season a third hexagon—that round Sirsa (XL)—was selected and marked by masonry pillars, up to the side Milik (XLIII)—Akbarpur (XLIV), the rays of the Sakrora and Bánsópál polygons all cleared, and the angles approximately measured with a small theodolite.

No vertical angles were measured this season, and scarcely any secondary triangulation at all accomplished. The vertical angles were not measured, doubtless because the signals on these comparatively long rays in the plains were not visible at the time of least refraction, the only safe time for a single observer to measure them, and they were deferred until the year 1842-43 when a pair of observers with two good instruments became available for the simultaneous reciprocal measurement, requisite at any other time of day. The party returned to recess quarters at Dehra Dún on the 4th June 1841.

The approximate series having now been brought up from the south to within 50

9th Season 1841-42.

PERSONNEL.

Lieut. T. Renny, Bengal Engineers, 1st Assistant.
(*absent on other duty*).

Mr. C. Murphy, 1st Class Sub-Assistant, (*in executive charge*).

Mr. O. Mulheran, 2nd „ „

„ W. Glynn, 3rd „ „

miles of the out-lying hills of the Sub-Himalayas about Hardwár (Haridwár), Mr. Murphy took the field in the middle of October 1841 at the north end, as being nearest to Dehra Dún, and proceeded to lay out the figures by which the junction with the Great Arc Series was to be effected.

Starting from the stations of Sheopuri T.S., Godhna T.S., and Chándípahár H.S., of the Great Arc, he selected Mahesari T.S., (now also belonging to the Great Arc) as the centre of a very irregular hexagonal figure, the north and north-east stations being on hills and one of them (Mábegarh) common to this and to the N.E. Longitudinal Series. Two more stations were then selected to form a pentagonal figure about Sarkára T.S. (XLV) by which the entire plan of the Series was completed about the end of February 1842. The rays

- of these two polygons having been cleared at the same time, and the necessary tower stations built to the required height (16 to 20 feet), there remained only a few rays in the Sirsa hexagon to clear, and the towers to build or complete in the southern polygons before having all ready for the final measurement of the angles.

But it required the utmost exertions of all concerned to finish the towers by the beginning of July, when the party returned to recess quarters, having accomplished a very laborious season's work successfully.

10th Season 1842-43.		
PERSONNEL.		
Budhon Series Party (1).	{ Lieut. T. Renny, B.E., 1st Assistant. Mr. C. Murphy, 1st Class Sub-Assistant. " O. Mulheran, 2nd " " " W. Glynn, 3rd " "	(1). Equipped with Troughton and Simms' 18-inch theodolite No. 2 and two 12-inch theodolites by Troughton and Simms for simultaneous reciprocal verticals.
Extra Party (2).	{ Mr. W. N. James, 1st Principal Sub-Assistant. " N. Parsick, Sub-Assistant. " T. Olliver, "	(2). With probably an 18-inch theodolite by Cary.
Extra Party (3).	{ Mr. G. Logan, 1st Assistant. " G. Terry, Sub-Assistant. " A. Olliver, "	(3). With 15-inch theodolite by Cary.

In view of the large amount of observing to be done, no astronomical observations for azimuth having yet been taken since the Series was begun, and no vertical angles observed since it entered the plains across the Chambal, (owing to want of visibility at time of minimum refraction), and to ensure its completion, the Surveyor General appointed two extra observing parties, and divided the work into three sections to be taken up simultaneously by the three parties as follows:—

In Lieutenant Renny's absence on military duty as Field Engineer to the Army of Reserve assembling at Ferozpur, Mr. Murphy with the main party was to complete the horizontal angles of the southern (Sakrora) polygon, and the unobserved triangle to the south of it, the whole of the verticals, and two Azimuths.

A third Azimuth was to be observed by one (or other) of the two extra parties.

Mr. James with two Sub-Assistants was to observe the horizontal angles of the next two polygons, the Bánggopál and Sirsa hexagons, measuring the vertical angles also in the afternoon whenever practicable.

Mr. Logan with two Sub-Assistants was to observe the angles of the two northernmost polygons, the Sarkára pentagon and the Mahesari hexagon.

Accordingly Mr. Murphy took the field on the 15th October 1842 and reached Ferozabad his first station for observation on the 11th November. Here in conjunction with his sub-assistants he measured three of the four vertical angles by simultaneous reciprocal observations, after which he proceeded to Panáhat and Gúrmi, where by the 10th December he had completed a set of azimuth observations (to ϵ Ursæ Minoris at both E. and W. elongations), besides the requisite vertical angles.

He then visited in succession the stations of Bhind (XVIII), Sherpur (XXI), Baragaon

(XXIII), Pondri (XXIV), Kilármáo (XXV), Jamálpur (XXVII), and Sarsotha (XXIX), where by the 25th January 1843 he had completed the vertical angles on all but seven rays of the single portion of the Series to the south, and by the middle of February, the horizontal angles at Jamálpur (XXVII), Sarsotha (XXIX), Kariámái (XXXII), Sakrora (XXX), Mehtra (XXXIV), and Rajauli (XXXIII) of the Sakrora hexagon were also finished besides vertical observations on three rays of this figure. On the 10th February Lieutenant Renny rejoined and assumed charge at Sankráo T.S. (XXVIII), where he at once took up the final observing and by the 25th had completed the second Azimuth (using 29 *Camelopardalis* Hev. at both elongations), the necessary horizontal and the simultaneous reciprocal verticals.

Lieutenant Renny then completed the horizontal and vertical angles remaining to be observed in the following order:— at Parauli (XXXI) by the 4th March, Chandanpur (XXXVI) by the 14th, whilst Messrs. Murphy and Glynn with the two 12-inch theodolites co-operated in observing the simultaneous reciprocal verticals. The main party now returned to Kilármáo, Pondri, and Kariámái, completing or re-observing the angles which Mr. Murphy had been unable to obtain satisfactorily on his first visit, all which were made good by the 9th April. Having completed the work assigned to the main party on the southern section, Lieutenant Renny marched northwards re-observing or supplementing the observations which were still wanting to complete the Series.

A good half of the vertical angles were, practically speaking, simultaneous, *i.e.* taken at both ends of a ray within five minutes of one another, but some only within 15 minutes, whilst in a few cases the observations of the vertical angle at one end of a ray were taken at a widely different time from the corresponding observations at the other. The verticals had necessarily to be observed at any time of day when the signals were visible, with the natural result of giving great variations in the deduced co-efficient of refraction.

Meanwhile the two extra parties under Messrs. Logan and James leaving Head Quarters, Dehra Dún, on 2nd November reached Agra on the 26th, and having completed their equipment proceeded to the section of the field work allotted to them.

Mr. James reached his first station Rajauli (XXXIII) on the 23rd December 1842, and completed his two horizontal angles there on the 30th. The two next angles occupied him at Mehtra (XXXIV) from the 4th to the 21st January 1843. He next measured the six angles at Bánsgopál (XXXV) between the 24th January and 4th February, after which he proceeded to Sirsa (XL) where he was employed nearly a whole month, from 7th February till 3rd March, observing an azimuth and completing five of the six angles. He observed 29 *Camelopardalis* Hev. at both elongations, the same star that Lieutenant Renny was simultaneously observing at Sankráo. He next visited Bhatauli (XLII), near Moradabad town which he observed to, and whilst here his party was inspected by the Surveyor General. The four angles at Aora T.S. (XXXIX) occupied from the 14th to 26th March, and the two at Barauli (XXXVII) till after the middle of April. He then returned to Sirsa and was occupied from 20th April till the 3rd May in making good the angle which he had been unable to complete during his former long visit. The rest of the observing allotted to him having been completed by the other two parties, Mr. James helped to complete the vertical angles for a few days before returning to recess quarters.

• Mr. Logan on the northern section of the work was rather more fortunate. He completed the angles at his first station Akbarpur (XLIV) by the 25th December 1842, then those at Nandi (XLVII), and three of the five angles at Sarkára (XLV) by the 10th January 1843; Harpálsid H. S. (XLVIII) was next observed at, and then Mahesari T.S., where however a portion of the angles had to be left unmeasured, by the 3rd of February. The Surveyor General visited and inspected the party whilst at Mahesari. The angles at Chándípahár near Hardwár, Godhna and Sheopuri, the stations of the Great Arc, were completed by the 16th February, after which the missing angles at Mahesari were observed, and all the four at Haldaur (XLVI), by 6th March. The missing angles at Sarkára (XLV) were next observed, and the party then proceeded to Milik (XLIII) where the measurement of the 4 angles occupied from the 12th to the 25th March, when the northernmost section allotted to Mr. Logan was finished, but Mr. James's work being backward, he continued his southward progress, completing the angles at Lút (XLI) and Kandarki (XXXVIII) by the end of the month.

Seeing Mr. James to be now in a fair way to complete the angles at the centre and east flank of the Series, and those on the west flank and to the southward being finished, Mr. Logan proceeded to co-operate with Lieutenant Renny in observing the remaining vertical angles all of which were completed by the middle of May, when all three parties marched to Head Quarters at Dehra Dún.

Three other angles were measured at the northern extremity of this season's work and in connection with the triangulation above described, by Captain J. S. Du'Vernet, when commencing the "North Connecting Series" afterwards named the North-East Longitudinal Series, in October and November 1842; but two of them were eventually superseded by re-measurements made by Lieutenant Renny eight years later, with superior instruments, which two are now incorporated with the North-East Longitudinal Series.

The calculations of the triangulation of this Series having been carried up from the side of origin, Budhon-Tinsmál of the Calcutta Longitudinal Series, to the terminal side, Sheopuri-Mahesari of the Great Arc, the following discrepancies were met with between the original values of the length and azimuth of the terminal side above named and those of the latitude and longitude of the terminal station Mahesari, and the values of the same as derived from the Great Arc after the reduction of the North-West Quadrilateral.

In Logarithm of the side	+ 0.000,0302,6	= 4.5 inches per mile nearly.
„ Latitude	+ 1".002	
„ Longitude	+ 0.307	
„ Azimuth	+ 8.284	

These discrepancies were treated as errors in the Budhon Series and were dispersed by the method of least squares, as described in Part I of Volume VII of the *Account of the Operations, &c.*

Soon afterwards, the two principal stations at Ráepur of this Series and the Great Arc which are only about 41 feet apart, (see page vii—j. above), were connected in the manner described at page 73—j. of Vol. VII quoted above.

The following discrepancies between the first corrected Budhon Series values, and the adopted values of the Great Arc were then met with at Ráepur H.S. (XIII) belonging to the Budhon Series :—

In Latitude	+ 0"·10
„ Longitude	— 0·02

These discrepancies were treated as errors in the first corrected results of the Budhon Series, and they were dispersed over the whole triangulation by introducing two additional equations of condition for satisfaction, the four primary equations which were required to dispose of the terminal errors being simultaneously maintained. For full description of the procedure see Part I of Vol. VII of the *Account of the Operations, &c.*

The trigonometrical heights above sea-level were checked at several stations (see page 63—J.) by the spirit leveling operations of the Trigonometrical and Revenue Surveys, and the errors thus disclosed, together with those of the terminal side Sheopuri-Mahesari, dispersed over the Series in four sections indicated at pages 37 and 38 of Part I of the above named volume.

In the section Budhon-Tinsmál to Firozabad-Baragaon, a distance of about 212 miles, the cumulative error was + 12 feet nearly. In the next section ending at Mehtra-Bánsopál, a distance of about 88 miles, it was as much as — 17 feet. In the next section ending at Bhatauli-Sirsa-Milik, a distance of about 34 miles, it was less than 1 foot; and in the last section, a distance of about 50 miles, it was nearly — 7 feet. For further details see pages 37 and 38 quoted above.

Secondary Triangulation.

As long as the Series lay in hilly country under Lieutenant Macdonald, the number of secondary stations, landmarks, and places of importance or interest fixed, was very considerable, including the towns of Tehri, Orchha, Jhánsi, Datia, Narwar, Gwalior, Barwa Ságar, and many hill forts, temples &c.

But after entering the plains in lat. 26° 30' where no view was to be had except by clearing the rays of trees and building high towers, scarcely any secondary points could be fixed without making special arrangements, and the whole strength of the establishment was barely sufficient for the principal triangulation until its close. Nevertheless, Shikohabad, Jalesar, Moradabad, Bijnor, and Kankhal were fixed.

Compiled from the very extensive and complete materials collected by Mr. Charles Wood.

May 1881.

B. R. BRANFILL.

BUDHON MERIDIONAL SERIES.

ALPHABETICAL LIST OF PRINCIPAL STATIONS.

Akbarpur	XLIV.	Kilármáo	XXV.
Algi	VIII.	Lút	XLI.
Andhiári	IV.	Mábegarh	I.
Atbgath	XIX.	(of North-East Longitudinal Series).	
Atora	XXXIX.	Maharájpur	X.
Bámsgopál	XXXV.	Mahesari	LII.
Baragaon	XXIII.	(of Great Arc Meridional Series).	
Barauli	XXXVII.	Majhár	XIV.
Bhatauli	XLII.	Mehtra	XXXIV.
Bhind	XVIII.	Milik	XLIII.
Bhitári	VII.	Nandi	XLVII.
Budhon	III.	Narwar	XI.
(of Calcutta Longitudinal Series).		Panáhat	XX.
Chandanpur	XXXVI.	Parauli	XXXI.
Dargawa	II.	Patna	I.
Daryapur	IX.	Pondri	XXIV.
Dhandkúa	III.	Ráepur	XIII.
Firozabad	XXII.	Rajauli	XXXIII.
Gúrmi	XVII.	Sakrora	XXX.
Gwáli	V.	Salímpur	XXVI.
Haldaur	XLVI.	Sánichri	XV.
Harpálsid	XLVIII.	Sankráo	XXVIII.
Jamálpur	XXVII.	Sarkára	XLV.
Jhánkri	XVI.	Sarsotha	XXIX.
Kandarki	XXXVIII.	Sheopuri	XLVIII.
Karaia	XII.	(of Great Arc Meridional Series).	
Kariámái	XXXII.	Sherpur	XXI.
Kathera	VI.	Sirsa	XL.
		Tinsmál	VII.
		(of Calcutta Longitudinal Series).	

BUDHON MERIDIONAL SERIES.

NUMERICAL LIST OF PRINCIPAL STATIONS.

III	.	.	.	.	Budhon.	XXVI	.	.	.	.	Salímpur.
	.	.	.	.	(of Calcutta Longitudinal Series).		.	.	.	.
VII	.	.	.	.	Tinsmál.	XXVII	.	.	.	.	Jamálpur.
	.	.	.	.	(of Calcutta Longitudinal Series).		.	.	.	.
I	.	.	.	.	Patna.	XXVIII	.	.	.	.	Sankráo.
II	.	.	.	.	Dargawa.	XXIX	.	.	.	.	Sarsotha.
III	.	.	.	.	Dhandkúa.	XXX	.	.	.	.	Sakrora.
IV	.	.	.	.	Andhiári.	XXXI	.	.	.	.	Parauli.
V	.	.	.	.	Gwáli.	XXXII	.	.	.	.	Kariámái.
VI	.	.	.	.	Kathera.	XXXIII	.	.	.	.	Rajauli.
VII	.	.	.	.	Bhitári.	XXXIV	.	.	.	.	Mehtra.
VIII	.	.	.	.	Algi.	XXXV	.	.	.	.	Bánsopál.
IX	.	.	.	.	Daryapur.	XXXVI	.	.	.	.	Chandanpur.
X	.	.	.	.	Maharájpur.	XXXVII	.	.	.	.	Barauli.
XI	.	.	.	.	Narwar.	XXXVIII	.	.	.	.	Kandarki.
XII	.	.	.	.	Karaia.	XXXIX	.	.	.	.	Atora.
XIII	.	.	.	.	Ráepur.	XL	.	.	.	.	Sirsa.
XIV	.	.	.	.	Majhár.	XLI	.	.	.	.	Lút.
XV	.	.	.	.	Sánichri.	XLII	.	.	.	.	Bhatauli.
XVI	.	.	.	.	Jhánkri.	XLIII	.	.	.	.	Milik.
XVII	.	.	.	.	Gúrmi.	XLIV	.	.	.	.	Akbarpur.
XVIII	.	.	.	.	Bhind.	XLV	.	.	.	.	Sarkára.
XIX	.	.	.	.	Athgath.	XLVI	.	.	.	.	Haldaur.
XX	.	.	.	.	Panáhat.	XLVII	.	.	.	.	Nandi.
XXI	.	.	.	.	Sherpur.	XLVIII	.	.	.	.	Harpálsid.
XXII	.	.	.	.	Firozabad.	I	.	.	.	.	Mábegarh.
XXIII	.	.	.	.	Baragaon.		.	.	.	.	(of North-East Longitudinal Series).
XXIV	.	.	.	.	Pondri.	XLVIII	.	.	.	.	Sheopuri.
XXV	.	.	.	.	Kilárnaó.	LII	.	.	.	.	(of Great Arc Meridional Series).
	.	.	.	.			.	.	.	.	Mahesari.
	.	.	.	.			.	.	.	.	(of Great Arc Meridional Series).

BUDHON MERIDIONAL SERIES.

DESCRIPTION OF PRINCIPAL STATIONS.



Of the 48 Principal Stations composing this Series, the first 16 are on hills occupying the southern half of its extent. They are low solid platforms, either level with the rock, marked in such case *in situ*, or raised above it. Where the platform is thus raised there is (presumably) a rock-mark or stone, above which one or more mark-stones, with the usual engraved circle and dot, are inserted in the platform; the uppermost even with its surface. When the Series entered the plains, artificial elevations had to be constructed; the necessity for constructing these was sometimes avoided, either in part or entirely, by taking advantage of existing buildings and bastions of forts with which the country abounded. The special erections consisted at first, generally speaking, of *kacha* towers, 20 to 30 feet square at base, having about 7 feet square in the interior made of *paka* brick laid in mud cement, with a central hollow about 1½ feet in diameter running vertically through it, and a mark-stone laid in masonry at about the level of the ground: an arched doorway and passage led to the mark-stone for convenience in plumbing; and a staircase exterior to the tower gave access to the top. Subsequently, the *paka* pillar instead of being perforated was made solid, of about 42 inches diameter at top and having one or more mark-stones built vertically within it: in certain instances no definite information is forthcoming as to the number of marks which were built into the pillar; in these cases no allusion is made in the descriptions to any mark save that at the summit.

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 Survey, Topographical Survey, and other reliable maps of the country traversed. The orthography is in literal agreement with the Gazetted List for the N.W. Provinces, wherever the locality is identified; and conforms to the spirit of the orders of Government on the subject, as worked out in this and other provincial lists, where there is no clear literal authority. The information as to the local sub-divisions in which the several stations occur has been derived where practicable from the Annual Reports received from the civil authorities to whose charge the stations have been committed.

III.—(*Of the Calcutta Longitudinal Series*). Budhon Hill Station, lat. 24° 5', long. 78° 34'—observed at in 1826, 1833 and 1864—is situated immediately above the village of that name: thána Barodia, tahsil Kurai, pargana Banda, district Saugor.

The pillar is solid and contains three marks, the two upper respectively 9 and 4 feet above the lowest. The station of 1826 was re-visited in 1833 for the purpose of originating the Budhon Meridional Series, but no alteration in its construction appears to have been made. When again visited in 1864 the mark-stones were found untampered with, the upper being accurately plumbed over the lower, which was adopted for the new station. The bearings and distances of surrounding villages are:—Jáman Kheri 1·5 miles N.W.; Burruho 1·5 miles N; Dubri 1·3 miles E.N.E.; Khirea 1·1 miles E.S.E.; and Kanera 2 miles due S.

VII.—(*Of the Calcutta Longitudinal Series*). Tinsmál Hill Station, lat. $24^{\circ} 7'$, long. $79^{\circ} 2'$ —observed at in 1826, 1833, 1834 and 1864—is situated on the top of a very conspicuous hill about three quarters of a mile S. by E. of the village of Tinsua from which it is approached: thána, tahsíl and pargana Banda, district Saugor.

The pillar is solid and has three marks, one engraved on the rock *in situ* and the others 3.5 and 8.5 feet above it respectively. The station of 1826 was re-visited in 1833 for the purpose of originating the Budhon Meridional Series, when its height was increased by 8.5 feet. It was again visited in 1834 to originate the Rangír Meridional Series, but no further alteration in its construction appears to have been made. On visiting it in 1864 the upper mark was found displaced and the position of the lower was adopted for the new station. The bearings and distances of other surrounding villages are:—Dalpatpur, from which a road leads up to the station, 1.5 miles N.E.; Lamnau 1.3 miles towards the W.; and the deserted village of Tinsi 0.8 mile S.S.E.

I. Patna Hill Station, lat. $24^{\circ} 20'$, long. $78^{\circ} 40'$ —observed at in 1833—is situated on a sandstone hill, standing on an elevated plateau, on the N. E. face of which is the large village of Patna distant half a mile from the station: tahsíl Mahroni, pargana Máraura Nárhat, district Lalitpur.

The pillar is solid, and has a mark-stone at its upper surface. The bearings and distances of other surrounding villages are:—Dongraa Kalán 2.2 miles N. by W.; Chanaura 2.2 miles N.E. by N.; and Baraudia 2.4 miles due E.

II. Dargawa Hill Station, lat. $24^{\circ} 37'$, long. $79^{\circ} 4'$ —observed at in 1833—is situated on a steep rocky ridge, running nearly north and south, at the northern foot of which is the village of Dargawa distant 0.4 mile from the station: pargana Baldeogarh of the Orchha or Tehri state.

The station is marked on the rock *in situ*. The bearings and distances of other surrounding villages are:—Parra 0.3 mile N.W.; Rasoi 1 mile N.N.W.; Bhadaura 1.4 miles S.S.W.; and Magarkhera 1.6 miles E.S.E.

III. Dhandkúa Hill Station, lat. $24^{\circ} 48'$, long. $78^{\circ} 46'$ —observed at in 1833 and 1834—is situated on a detached hill, which is deemed sacred by the inhabitants of those parts, and at the northern foot of which at a distance of 500 feet is the village of Dhandkúa: tahsíl Mahroni, pargana Bánpur, district Lalitpur.

The pillar is solid, and has a mark-stone at its upper surface. The bearings and distances of other surrounding villages are:—Pura 0.8 mile N.W. by N.; Billahta 0.8 mile S.S.W.; and Khakhrón 2.3 miles S.E. by E.

IV. Andhiári Hill Station, lat. $24^{\circ} 41'$, long. $78^{\circ} 16'$ —observed at in 1833—is situated on the highest point of the sandstone range of that name, and about 100 yards north of a remarkable cave: in the Gwalior state.

The pillar is solid, and has a mark-stone at its upper surface. The bearings and distances of surrounding villages are:—Sirsod 0.4 mile N. by W.; Jamursa 2.1 miles S.E.; and Larheri 2 miles S.W.

V. Gwáli Hill Station, lat. $25^{\circ} 10'$, long. $78^{\circ} 28'$ —observed at in 1833—is situated on a rocky ridge running north and south, and takes its name from a small village which is distant about $\frac{1}{4}$ of a mile to the E.: pargana Jhánsi, district Jhánsi.

The pillar is solid, and has a mark-stone at its upper surface. The bearings and distances of surrounding villages are:—Bijpur 1.2 miles N.E.; Lakhanpur 1.3 miles S.E. by S.; and Busai 1.6 miles S.W. by S.

VI. Kathera Hill Station, lat. $25^{\circ} 14'$, long. $79^{\circ} 0'$ —observed at in 1834—is situated on a high and steep hill which was formerly used as a stronghold: pargana Mau, district Jhánsi.

The pillar is solid, and has a mark-stone at its upper surface. The bearings and distances of surrounding villages are:—Laraun 1 mile S.W.; Kathera Muáf 1.6 miles W.; and Hanspura 0.4 mile E. by N.

VII. Bhitári Hill Station, lat. $25^{\circ} 28'$, long. $78^{\circ} 47'$ —observed at in 1834—is situated on a hill on the E. bank of the Betwa river, and distant 0.4 mile S.S.W. of the village after which it is named. The high road from Jhánsi to Garotha passes about a mile north of the station: in the Orchha or Tehri state.

The station is marked on a large block of quartz around which a platform has been built. The bearings and distances of neighboring villages are:—Tiletha 1.1 miles S. by W.; Bagat, on the left bank of the Dangrai Nadi, 2.8 miles E. by S.

VIII. Algi Hill Station, lat. $25^{\circ} 30'$, long. $78^{\circ} 24'$ —observed at in 1834—is situated on a hill about 3 miles north of the hill fort and large village of Dinara: in the Gwalior state.

The station is marked on the rock *in situ* around which a platform has been built. The bearings and distances of surrounding villages are:—Khirk 1.2 miles N.N.W.; Algi 1.1 miles S.W.; and Guraira Raj Orchha 0.5 mile due S.

IX. Daryapur Hill Station, lat. $25^{\circ} 42'$, long. $78^{\circ} 41'$ —observed at in 1834—is built on the site of a dilapidated fort surmounting a low isolated hill, on the southern brow of which is the village of Daryapur: tahsíl and pargana Datiya of the Datiya state.

The pillar is solid, and has a mark-stone at its upper surface. The bearings and distances of surrounding villages are:—Bhúla 0.9 mile S.; Dúrsara 1.3 miles N.E.; and Karkhara 1.6 miles N.N.W.

X. Maharájpur Hill Station, lat. $25^{\circ} 54'$, long. $78^{\circ} 17'$ —observed at in 1834—is situated on a hill rising immediately above the village of Maharájpur and surrounded by several lower hills: in the Gwalior state.

The pillar is solid, and has a mark-stone at its upper surface. The bearings and distances of surrounding villages are:—Rajare and Lailiapura 0.8 mile towards the W. by S.; Kanwai 1.5 miles N.N.E.; and Chetauni 1.8 miles S.E. by S.

XI. Narwar Hill Station, lat. $25^{\circ} 37'$, long. $77^{\circ} 58'$ —observed at in 1834—is situated on the N.E. extremity of a sandstone hill on which, at a few feet to the E.S.E., the secondary station Ladára h.s. (of the Great Arc Meridional Series, Section 24° to 30°) is built: in the Gwalior state.

The pillar is solid, and has a mark-stone at its upper surface. The bearings and distances of surrounding places are:—the large town and fort of Narwar about $1\frac{1}{2}$ miles N.W. by N.; Surkharia village 1.3 miles N.E.; and Shergarh 1.5 miles S. by E.

XII. Karaia Hill Station, lat. $25^{\circ} 54'$, long. $78^{\circ} 3'$ —observed at in 1834—is situated in the centre of an unfinished fort which occupies an eminence of the great sandstone range extending to the vicinity of Gwalior: in the Gwalior state.

The pillar is solid, and has a mark-stone at its upper surface. The bearings and distances of surrounding villages are:—Karaia 0.5 mile E.S.E.; Rethaunda 2 miles S. by W.; and Dhobai 1.8 miles N. by E.

NOTE.—This station is almost certainly identical with the secondary point Karaia h.s. of the Great Arc Meridional Series, Section 24° to 30° , in the original records of which however it is described as on the W. turret of a well known detached fortified hill on road Gwalior to Sironj; Karaia village lies on the eastern slope: it is marked by a circular platform with a mark-stone, having a \odot engraved on it.

XIII. Ráepur Hill Station, lat. $26^{\circ} 8'$, long. $78^{\circ} 7'$ —observed at in 1834 and 1836—is situated on a lofty conical peak of the Vindhyaçal range surmounted by a Hindu temple, on the western side of which Ráepur H.S. of the Great Arc Meridional Series, Section 24° to 30° , is built. The station commands a good view of the town and fort of Gwalior which lie about $9\frac{1}{2}$ miles to the N.E.: in the Gwalior state.

The pillar is solid, and has a mark-stone at its upper surface. The bearings and distances of neighboring villages are:—Ráepur $1\frac{1}{2}$ miles W.S.W.; and Naigaon 1.5 miles S.

XIV. Majhár Hill Station, lat. $26^{\circ} 6'$, long. $78^{\circ} 31'$ —observed at in 1834 and 1836—is situated on the same elevated plateau as Gujara fort from which it is distant about $1\frac{1}{2}$ miles due north: in the Gwalior state.

The pillar is solid, and has a mark-stone at its upper surface. The bearings and distances of neighboring places are:—Jamrúha fort 2 miles E.N.E.; and Naugamo village 3.1 miles E.S.E.

XV. Sánichri Hill Station, lat. $26^{\circ} 24'$, long. $78^{\circ} 15'$ —observed at in 1836—is built adjoining some ruins on a sacred hill which is the residence of a *guru* or religious instructor of the Raja, and stands above the ruins of the ancient town of Ainti: in the Gwalior state.

The pillar is solid, and has a mark-stone at its upper surface. The bearings and distances of surrounding places are:—Khitro fort 2 miles E. by N.; Burrúli village 1.4 miles N.N.W.; and Parbat village 0.6 mile W.S.W.

XVI. Jhánkri Hill Station, lat. $26^{\circ} 19'$, long. $78^{\circ} 35'$ —observed at in 1836—is situated on a low range of hills which runs nearly north and south, and has a couple of hamlets lying at the foot of the hill on the eastern side: in the Gwalior state.

The pillar is solid, and has a mark-stone at its upper surface. The bearings and distances of surrounding villages are:—Silauli 1.3 miles N.E. by E.; Makata 1.1 miles S.E.; and Chimara 1.9 miles W.S.W.

XVII. Gúrmi Tower Station, lat. $26^{\circ} 36'$, long. $78^{\circ} 33'$ —observed at in 1836 and 1842—is situated

on a bastion at the northern angle of the mud fort attached to the village of Gúirmi which lies between the Sánichri hills and the Chambal river : in the Gwalior state.

The station consists of a tower of sun-dried bricks and mud cement, raised to a height of 27 feet above the terreplein of the rampart, and having a mark-stone at top and another at bottom. The bearings and distances of surrounding villages are :—Sñauli 1·6 miles N.W. by W. ; Kaliánpura 1·6 miles S.W. by W. ; and Gopálpura 1·4 miles E. by S.

XVIII. Bhind Station, lat. $26^{\circ} 34'$, long. $78^{\circ} 50'$ —observed at in 1836 and 1842—is situated on the roof of the gateway in the north face of the masonry fort attached to the large village of Bhind which lies on the plain south of the Chambal river. The station is 34 feet above the level of the interior of the fort : in the Gwalior state.

The station consists of a masonry pillar, 5 feet high and 9 feet square, which carries the usual mark-stone at its upper surface. The bearings and distances of surrounding villages are :—Pura 0·4 mile N. by E. ; Khirpura 1·3 miles S. S. W. ; Haibatpura 1·8 miles W. ; and Kumaroa 1·7 miles N.W. by W.

XIX. Athgath Tower Station, lat. $26^{\circ} 48'$, long. $78^{\circ} 45'$ —observed at in 1840 and 1842—is situated amidst the ravines on the north bank of the Chambal river, and close to the northern skirts of the village of Athgath or Hathkanth : tahsil Panáhat, pargana Hathkanth, district Agra.

The station consists of a tower, 36 feet high and 14 feet square at top, having a central hollow core of masonry : it has a mark-stone at level of ground floor. The bearings and distances of surrounding villages are :—Kiári 1·3 miles W. by S. ; Piárapura 1·1 miles N.E. ; and Surekhipura 1·3 miles N.E. by E.

XX. Panáhat Station, lat. $26^{\circ} 53'$, long. $78^{\circ} 25'$ —observed at in 1840 and 1842—is situated on the roof of a vaulted building (apparently an interior gateway) of the dilapidated masonry fort at the south side of the village of Panáhat : tahsil and pargana Panáhat, district Agra.

The station mark is elevated 30 feet above the ground at the south side of the building, the walls of which were raised to form a platform around a pillar 3 feet high. The bearings and distances of surrounding villages are :—Biprauli 1·4 miles W.N.W. ; Utsana 1·1 miles S.S.E. ; and Sikhura 2·5 miles E.

XXI. Sherpur Tower Station, lat. $27^{\circ} 1'$, long. $78^{\circ} 42'$ —observed at in 1840 and 1842—is situated on the terreplein of the rampart at the northern corner of an old mud fort standing a short distance east of the village of Sherpur : thána Sarsaganj, tahsil and pargana Shikohabad, district Mainpuri.

The station consists of a tower of sun-dried bricks and mud cement, 30·8 feet high and 14 feet in diameter at top, having a central hollow core of burnt brick : it has a mark-stone at level of ground floor. The bearings and distances of surrounding villages are :—Madanpur 1 mile N.N.W. ; Pandrawan 0·3 mile S. by E. ; and Aidálpur 0·3 mile N.E.

XXII. Firozabad Tower Station, lat. $27^{\circ} 9'$, long. $78^{\circ} 26'$ —observed at in 1840, 1842 and 1843—is situated on the terreplein of the rampart at the S. E. corner of an old mud fort standing about $\frac{1}{4}$ mile W. of the town of Firozabad : pargana and tahsil Firozabad, district Agra.

The station consists of a tower of sun-dried bricks and mud cement, 43·8 feet high and 14 feet square at top, having a central hollow core of burnt brick : it has a mark-stone at 1 foot below the level of the terreplein. The bearings and distances of surrounding places are :—Firozabad station, of the E. I. Railway, 0·3 mile S.S.E. ; Rasúlpur village 1·1 miles E.S.E. ; Datauji 1·1 miles W.S.W. ; and Humáyúnpur 1·2 miles N.W.

XXIII. Baragaon Tower Station, lat. $27^{\circ} 15'$, long. $78^{\circ} 45'$ —observed at in 1840, 1842 and 1843—is situated on the crest of a mound distant $\frac{1}{4}$ mile to the S. E. of the village of Baragaon : thána Jasarána, tahsil and pargana Mustafabad, district Mainpuri.

The station consists of a tower of sun-dried bricks and mud cement, 45·4 feet high and 14 feet square at top, having a central core of burnt brick : it has a mark-stone at 1 foot below the ground floor. The Etáwab Branch of the Ganges Canal runs at $\frac{1}{4}$ mile S.W. of the station ; and the bearings and distances of surrounding villages are :—Nahu 1·1 miles N. ; Jasarána 2·8 miles S.S.W. ; Kuiari 2·2 miles S.E. ; and Kanohgahi 2·6 miles N.E.

XXIV. Pondri Tower Station, lat. $27^{\circ} 28'$, long. $78^{\circ} 27'$ —observed at in 1840 and 1843—is situated on a mound (about 25 feet in height) within the ruins of the mud fort attached to the small village of Pondri : tahsil and pargana Jalesar, district Agra.

The station consists of a tower of sun-dried bricks and mud cement, 44·3 feet high and 13 feet square at top, having a central hollow core of burnt brick : it has a mark-stone at 1 foot below the ground floor. The bearings and distances of surrounding villages are :—Punhara 1·5 miles W. by N. ; Kasua 1·3 miles N. ; Khaira Taj 1·2 miles E. by N. ; and Mahaki 1·8 miles S.S.W.

XXV. Kilármáo Tower Station, lat. $27^{\circ} 33'$, long. $78^{\circ} 49'$ —observed at in 1840, 1842 and 1843—is situated on the crest of a mound (about 20 feet in height) distant $\frac{1}{2}$ mile west of the small village of Kilármáo: thána, tahsíl, pargana and district Etah.

The station consists of a tower of sun-dried bricks and mud cement, 44.5 feet high and 14 feet square at top, having a central hollow core of burnt brick: it has a mark-stone at 1 foot below the ground floor. The bearings and distances of surrounding places are:—Etah town 6 miles W.; Nehchalpur village 0.9 mile W.N.W.; Jisukhpur 0.5 mile S.W.; and Murjadpur 0.6 mile N. by W.

XXVI. Salímpur Tower Station, lat. $27^{\circ} 47'$, long. $78^{\circ} 33'$ —observed at in 1841 and 1843—is situated on the crest of a mound (about 20 feet in height) distant 600 yards west of the small village of Salímpur: thána and tahsíl Kásganj, pargana Bilráam, district Etah.

The station consists of a tower of sun-dried bricks and mud cement, 48 feet high and 13 feet square at top, having a central hollow core of burnt brick: it has a mark-stone at 1 foot below the ground floor. The bearings and distances of surrounding villages are:—Badampur 0.9 mile E.S.E.; Naráinpur 0.5 mile S.; Kutubpur 1.2 miles N.W.; and Dharampur 1.3 miles N.E. by N.

XXVII. Jamálpur Tower Station, lat. $27^{\circ} 48'$, long. $78^{\circ} 52'$ —observed at in 1841 and 1843—is situated on a mound (about 12 feet in height) within the ruins of a mud fort distant nearly half-a-mile to the N.W. of the small village of Jamálpur: thána Saháwar, tahsíl Kásganj, pargana Saháwar, district Etah.

The station consists of a tower of sun-dried bricks and mud cement, 28 feet high and 14 feet in diameter at top, having a central hollow core of burnt brick: it has a mark-stone at 1 foot below the ground floor. The bearings and distances of surrounding villages are:—Firozpur 0.5 mile S.S.W.; Chadpur 0.5 mile N.W.; and Bhaloli 0.7 mile N.E.

XXVIII. Sankráo Tower Station, lat. $28^{\circ} 2'$, long. $78^{\circ} 35'$ —observed at in 1841 and 1843—is situated on the site of an old fort on a high spur of the bank which bounds the southern edge of the *khádar* or low lands of the Ganges, and stands close to the west side of the village of Sankráo which is distant within half-a-mile to the south of the old bed of that river: tahsíl Atrauli, pargana Gangíri, district Aligarh.

The station consists of a tower of burnt bricks and mud cement, 87.3 feet high and 14 feet in diameter at top, having a central hollow core of masonry: it has a mark-stone at 1 foot below the ground floor. The bearings and distances of surrounding villages are:—Bustamnala 1.1 miles W. by N.; Mohkampur 1.2 miles S.S.E.; and Sikri 1.1 miles E. by S.

XXIX. Sarsotha Tower Station, lat. $28^{\circ} 6'$, long. $78^{\circ} 48'$ —observed at in 1843—is situated on the northern edge of the *khádar* or low lands of the Ganges, and stands about half-a-mile N.E. of the hamlet of Sarsotha a place of Hindu pilgrimage: thána, tahsíl and pargana Sahaswán, district Budaun.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 23.8 feet high: it has a mark-stone in the foundation, another at 7 feet above ground level, and a third at summit. The bearings and distances of surrounding villages are:—Manikpur 1 mile S.W.; Alipur 0.6 mile N.W.; and Guhlal 2.3 miles N.E. by E.

XXX. Sakrora Tower Station, lat. $28^{\circ} 13'$, long. $78^{\circ} 36'$ —observed at in 1843—is situated on a mound (about 10 feet in height) within half-a-mile S. by W. of the village of Sakrora: thána Asadpur, tahsíl Gunnaur, pargana Asadpur, district Budaun.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 21 feet high: it has a mark-stone at summit. The bearings and distances of surrounding villages are:—Lahra 0.5 mile W.N.W.; Mirzapur 0.6 mile S.; and Baudrái 1.3 miles N.E. by E.

XXXI. Parauli Tower Station, lat. $28^{\circ} 10'$, long. $78^{\circ} 24'$ —observed at in 1843—is situated on high ground about 350 yards due north of the village of Parauli or Parhauri: thána Ramghat, tahsíl Anúpsahr, pargana Dibai, district Bulandshahr.

The station consists of a tower of unburnt bricks and mud cement, 15 feet in diameter at top, enclosing a central solid pillar of masonry 18.8 feet high: it has a mark-stone at ground level, another at 7 feet above it, and a third at summit. The bearings and distances of surrounding villages are:—Rampur 0.7 mile E.; Bajhera 0.6 mile S.E.; Jirájpur Khurd 1.2 miles W.; and Belon Nagla 0.9 mile N.

XXXII. Kariámái Tower Station, lat. $28^{\circ} 15'$, long. $78^{\circ} 48'$ —observed at in 1843—is situated on a slight elevation distant half-a-mile east of the village of Kariámái: thána Islámnagar, tahsíl Bisauli, pargana Islámnagar, district Budaun.

The station consists of a tower of unburnt bricks and mud cement, 15 feet in diameter at top, enclosing a central solid pillar of masonry 17.3 feet high: it has a mark-stone at ground level, and another at summit. The bearings and distances of surrounding villages are:—Bhartpur 0.4 mile S.S.E.; Udaipur 0.8 mile N.E.; and Firozpur 1.1 miles due N.

XXXIII. Rajauli Tower Station, lat. $28^{\circ} 22'$, long. $78^{\circ} 28'$ —observed at in 1843—is situated on the *khádar* or low lands of the Ganges, and stands 0·4 mile S.E. of the village of Rajauli or Rajawali: thána Rajpura, tahsíl Gunnaur, pargana Rajpura, district Budaun.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 23 feet high: it has a mark-stone at summit. The bearings and distances of surrounding villages are:—Paniwara 1·3 miles S.W.; Neora 1·3 miles S. by E.; and Gobindpur 1·1 miles due E.

XXXIV. Mehtra Tower Station, lat. $28^{\circ} 22'$, long. $78^{\circ} 41'$ —observed at in 1843—is situated on a mound (about 10 feet in height) distant $\frac{1}{2}$ mile north of the small village of Mehtra: tahsíl and pargana Sambhal, district Moradabad.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 16 feet high: it has a mark-stone at summit. The bearings and distances of surrounding villages are:—Bahpur Patti 1·1 miles E.; Sultánpur 2·4 miles W.; Mirzapur 0·9 mile N.N.E.; and Yazafpur 0·8 mile N.W. by N.

XXXV. Bánsopál Tower Station, lat. $28^{\circ} 33'$, long. $78^{\circ} 34'$ —observed at in 1843—is situated on a sandy mound (7 or 8 feet in height) distant 500 yards west of the temple of Bánsopál a place of Hindu pilgrimage: tahsíl and pargana Sambhal, district Moradabad.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 18·8 feet high: it has a mark-stone at a little below ground level, and another at summit. The bearings and distances of surrounding places are:—Sambhal town 3 miles N.E.; Turran Sarai 1·8 miles E. by S.; Gandhipura village 1 mile N. by E.; Busia village 1·7 miles W. by S.; and Bahádurpur Sarai 1·1 miles S.W. by S.

XXXVI. Chandanpur Tower Station, lat. $28^{\circ} 34'$, long. $78^{\circ} 21'$ —observed at in 1843—is situated at the distance of half-a-mile to the E.S.E. of the village of Chandanpur: tahsíl and pargana Hasanpur, district Moradabad.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 16·5 feet high: it has a mark-stone at ground level, another 7 feet above it, and a third at summit. The bearings and distances of surrounding villages are:—Deorara 0·8 mile S.; Khanraua 1·8 miles W.S.W.; and Chhapna 2·1 miles N.W. by N.

XXXVII. Barauli Tower Station, lat. $28^{\circ} 32'$, long. $78^{\circ} 48'$ —observed at in 1843—is situated on a mound (about 20 feet in height) which is apparently the site of a deserted village, and is distant nearly $1\frac{1}{2}$ miles N. E. of the village of Barauli: tahsíl and pargana Bilári, district Moradabad.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 16·5 feet high: it has a mark-stone at summit. The bearings and distances of surrounding villages are:—Khásepur 0·6 mile W.; Pipli 0·8 mile N.E.; and Akrauli Auliapur 1·1 miles E.S.E.

XXXVIII. Kandarki Tower Station, lat. $28^{\circ} 44'$, long. $78^{\circ} 27'$ —observed at in 1843—is situated close to the eastern side of the village of Kandarki: tahsíl and pargana Hasanpur, district Moradabad.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 18·7 feet high: it has a mark-stone at summit. The bearings and distances of surrounding villages are:—Khairpur 1·1 miles E.S.E.; Begpur 1 mile S.W. by W.; and Jehul 1 mile W.N.W.

XXXIX. Aora Tower Station, lat. $28^{\circ} 43'$, long. $78^{\circ} 40'$ —observed at in 1843—is situated on a mound (about 30 feet in height) immediately N. W. of the village of Aora or Athaura on the high road from Moradabad to Sambhal and Aligarh: tahsíl and pargana Sambhal, district Moradabad.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 17·8 feet high: it has a mark-stone at summit. The bearings and distances of surrounding villages are:—Athauri 0·4 mile S.; Bháuddínpur 0·8 mile W.; Harthali 1·3 miles N.W.; and Sháhpur 1·6 miles E.N.E.

XL. Sirsa Tower Station, lat. $28^{\circ} 55'$, long. $78^{\circ} 35'$ —observed at in 1843—is situated on a mound (about 15 feet in height) distant 600 yards north of the village of Sirsa: tahsíl and pargana Anroha, district Moradabad.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 26 feet high: it has a mark-stone at summit. The bearings and distances of surrounding villages are:—Daryapur 0·7 mile S.W. by W.; Mauye Chak 0·4 mile N.E. by N.; Raghunáthpur 1 mile S.E. by S.; and Háshampur 0·9 mile N.W.

XXI. Lút Tower Station, lat. $28^{\circ} 54'$, long. $78^{\circ} 21'$ —observed at in 1843—is situated in the lands of the village of Lút: tahsíl and pargana Hasanpur, district Moradabad.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 20 feet high: it has a mark-stone at summit. The bearings and distances of surrounding villages are:—Mahamdi 0.1 mile N.N.W.; Afzalpur 0.6 mile S. by E.; Kurala 0.6 mile N.E.; and Lakhanía 1.2 miles S.W.

XXII. Bhatauli Tower Station, lat. $28^{\circ} 54'$, long. $78^{\circ} 46'$ —observed at in 1843—is situated at the distance of about 1 mile west of the village of Bhatauli: tahsíl, pargana and district Moradabad.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 14.5 feet high: it has a mark-stone at summit. The bearings and distances of surrounding places are:—Moghalpur town 1.6 miles N.; Mahtakpur 1.2 miles W.S.W.; and Gopálpur 1.9 miles W. by N.

XXIII. Milik Tower Station, lat. $29^{\circ} 5'$, long. $78^{\circ} 28'$ —observed at in 1843—is situated in the lands of the village of Lodhipur Milik: tahsíl Chándpur, pargana Burhpur or Nurpur, district Bijnor.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 17.3 feet high: it has a mark-stone at summit. The bearings and distances of surrounding villages are:—Sahela 1.1 miles E.; Ber 0.6 mile S.S.E.; Shehbonpur 0.6 mile W.S.W.; and Mor Makdúmpur 1.2 miles N.E. by N.

XXIV. Akbarpur Tower Station, lat. $29^{\circ} 5'$, long. $78^{\circ} 41'$ —observed at in 1842 and 1843—is situated close to the high road from Hardwár to Moradabad, and distant about half-a-mile N.W. of the village of Akbarpur: tahsíl and pargana Amroha, district Moradabad.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 15 feet high: it has a mark-stone at summit. The bearings and distances of surrounding villages are:—Garhi 0.4 mile S. by W.; Burhpur 0.8 mile W. by S.; and Salimpur 0.5 mile N.E. by E.

XXV. Sarkára Tower Station, lat. $29^{\circ} 16'$, long. $78^{\circ} 35'$ —observed at in 1843—is situated close to the high road from Hardwár to Moradabad, and distant about 0.6 mile S.S.E. of the village of Sarkára: tahsíl Dhámpur, pargana Sherkot, district Bijnor.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 16.3 feet high: it has a mark-stone at summit. The bearings and distances of surrounding villages are:—Rajmul 0.3 mile S.S.E.; Nasirpur Bhunwari 1.3 miles W.S.W.; and Salimpur Sarai 0.8 mile S. by W.

XXVI. Haldaur Tower Station, lat. $29^{\circ} 17'$, long. $78^{\circ} 19'$ —observed at in 1843—is situated on a sandy mound (8 or 9 feet in height) in the lands of the village of Rasúlpur, and is distant about 1 mile S.W. of the large village of Haldaur: tahsíl Bijnor, pargana Daranagar, district Bijnor.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 19.7 feet high: it has a mark-stone at top. The bearings and distances of surrounding villages are:—Chajjupura 0.8 mile S.E. by E.; Uttarpur 0.8 mile S.W.; and Sikandarpur Sani 1.1 miles nearly due N.

XXVII. Nandi Tower Station, lat. $29^{\circ} 17'$, long. $78^{\circ} 49'$ —observed at in 1842 and 1843—is situated in the lands of the village of Púranpur, and is distant about half-a-mile E.S.E. of the village of Nandi: tahsíl and pargana Káshipur, district Tarái.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 12 feet high: it has a mark-stone at summit. The surrounding villages are:—Púranpur 0.6 mile N.; Itaipur; Haripura; and Mowa Dabra.

XXVIII. Harpálsid Hill Station, lat. $29^{\circ} 40'$, long. $78^{\circ} 36'$ —observed at in 1843—is situated on the peak immediately west of the hill of Harpálsid on the southern border of the Sub-Himalaya mountains, and is approached from Najibabad by Kotkadr and Bagnala: district Garhwál.

The station is denoted by the centre of a circle engraved on a stone which is fixed in the middle of a platform and is flush with the level of the ground. The station of 1843 was re-visited in 1866 in the course of the secondary operations of the Kumaun and Garhwál Survey, but, from the absence of information to the contrary, no alteration in its construction appears to have been made.

I.—(Of the North-East Longitudinal Series). Mábegarh Hill Station, lat. $29^{\circ} 53'$, long. $78^{\circ} 30'$ —observed at in 1842, 1843, 1850 and 1865—is situated on the hill of that name, and adjoins a rude temple to the north: pargana Ajmir, district Garhwál.

The station consists of a platform of stones and earth, 14 feet square at top, enclosing a central isolated pillar of masonry 6.9 feet

high: it has a mark-stone at 1 foot above ground level, and another at summit. The original station of 1842-43 which was common to the Budhon Meridional and the North Connecting Series—was re-visited in 1850 in the course of the operations of the North-East Longitudinal Series, and again in 1865 to originate the Kumaun and Garhwál Survey; on neither of these occasions was any alteration made in the construction of the station. The bearings and distances of surrounding villages are:—Kundra 1 mile S. by W.; Jaurási 1·8 miles W.; Harsu 1·6 miles N.; and Badoli 1·8 miles N.N.E.

XLVIII.—(*Of the Great Arc Meridional Series, Section 24° to 30°*). Sheopur Tower Station, lat. 29° 19', long. 78° 2'—observed at in 1836, 1837, 1843 and 1866—is built on an elevated mound, apparently the site of a ruined fort, standing on a high bank which bounds the bed of the Ganges on the west, and distant about half-a-mile east of the village of Sheopuri: tahsíl Jásath, pargana B́húma Sambalhera, district Muzaffarnagar.

The station consists of a hollow masonry tower 40·5 feet high, having a mark-stone in the ground floor. It was originally constructed as a station of the Great Arc Meridional Series, Section 24° to 30°, in the course of the operations of which it was visited in 1836, 1837 and 1866, the Budhon Series having connected with it in 1843: no change was however made on the occasion of the subsequent visits to the original tower. The bearings and distances of surrounding places are:—Miranpur town 3 miles S.W.; Jaspur village 1 mile N.N.E.; and Alampur 1·2 miles E.

LII.—(*Of the Great Arc Meridional Series, Section 24° to 30°*). Mahesari Tower Station, lat. 29° 30', long. 78° 11'—observed at in 1843, 1851, 1865 and 1866—is built on a sand ridge (about 20 feet in height), near the S.W. corner of the village of Mahesari: tahsíl Bijnor, pargana Mandáwar, district Bijnor.

The station consists of a tower of unburnt bricks and mud cement, 14 feet square at top, enclosing a central pillar of masonry 13·5 feet high which is solid to a height of 12 feet above ground level and perforated thereafter: it has a mark-stone at the level of the ground, and others at 7 and 12 feet respectively above this level. The station of 1843—which was 12 feet in height—was re-visited in 1851 in the course of the operations of the North-East Longitudinal Series, when the masonry pillar was found in good order and the upper mark-stone undisturbed. When again visited in 1865-66 in connection with the Great Arc Meridional Series, Section 24° to 30°, the pillar and upper mark-stone were found in good preservation: on this occasion however the height of the pillar was raised to 13½ feet, but no mark-stone was placed at its summit, a hollow cylindrical space, 4 inches in diameter, having been left for reference to the old mark-stone. The bearings and distances of surrounding places are:—Mandáwar 1·6 miles S.S.W.; Shahbazpur 1·2 miles W.; Ratanpur Baiya 0·8 mile N.N.W.; and the town of Kiratpur about 3 miles E.

February 1877.

J. B. N. HENNESSEY,

In charge of Computing Office.

BUDHON 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 subdivisions 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	Remarks on the Construction and Condition of the Station
III *	...	Saugor	Tah. Kurái, Táluka Pí-tihra, Thá. Baraudia	Budhon	... ..
VII *	...	„	P., Tah. and Thá. Banda	Tinsi	... ..
I	...	Lalitpur	Tah. Mahroni, P. Má-raura	Patna	The upper mark-stone wanting as reported in January 1870.
II	...	Bundelkhand Political Agency	P. Baldeogarh	Dargawa	... ..
III	...	Lalitpur	Tah. Mahroni, P. Bán-pur	Dhandkua	The pillar fallen down as reported in May 1867.
IV	Andheri	P'sagarh (Gwalior territory)	P. Marguli	Sarsud	No trace of the station found as reported in 1877.
V	...	Jhánsi	Tah. Jhánsi	Gwáli	No mark-stone found as reported in May 1867.
VI	Hánsपुरa	„	Tah. Mau	Hansपुरa	No mark-stone found as reported in May 1867. A pile of earth and stones raised over the pillar in 1879.
VII	<i>No report received.</i>
VIII	...	Jhánsi (Gwalior territory)	P. Karera	Algi Dinara	... ..

NOTE.—Stations III * and VII * appertain to the Calcutta Longitudinal Series of the South-East Quadrilateral. P. stands for pargana, Tah. for tahsil, and Thá. for thána.

No. of Station	Local name	District	Pargana, &c.	Village in which the Station lies	Remarks on the Construction and Condition of the Station
IX	...	Bundelkhand Political Agency	Tah. Datia	Daryapur	... ..
X	...	Narwar (Gwalior territory)	P. Karhia	Mahárájpur	... ..
XI	...	"	P. Narwar	...	... ..
XII	...	I'sagarh (Gwalior territory)	P. Chanderi	Karehra	... ..
XIII	...	Gwalior	P. Gird Gwalior	Raepur	... ..
XIV	...	"	P. Pichhor	Gujara	... ..
XV	Saníchari	"	P. Kotwál	Ántri	The pillar fallen down, only the mark remains, as reported in May 1877.
XVI	...	Sikarwári (Gwalior)	... ..	...	... ..
XVII	Gormín	Tonwarghár (Gwalior)	P. Gormín	Gormín	The tower fallen down as reported in May 1877.
XVIII	...	Bhind (Gwalior)	P. Bhind	Bhind	... ..
XIX	Hathkanth	Agra	P. Panáhat	Hathkanth	... ..
XX	...	"	Ditto.	Panáhat	... ..
XXI	Sarsaganj	Mainpuri	Tah. Shikohabad, Thá. Sarsaganj	Madanpur	The arch and the lower portion of the central pillar were found dug into up to the perforation.
XXII	...	Agra	P. Firozabad	Raepur	... ..
XXIII	Jasrána	Mainpuri	Tah. Mustafabad, Thá. Jasrána	Kushiari	About 20 feet of the pillar fallen down as reported in March 1873.
XXIV	...	...	... ..	...	The station was connected with the Revenue Survey line of levels in 1873, under Colonel Anderson, when the lower mark-stone was found intact and the height of summit of pillar above this mark to be 42.5 feet.
XXV	...	Etah	Tah., P. and Thá. Etah	Kilármau	The pillar 42 feet high as reported in 1874.
XXVI	Salímpur	"	Tah. and Thá. Kásganj, P. Bilráam	Salímpur	The pillar 35 feet high as reported in 1874.
XXVII	...	"	Tah. Kásganj, P. and Thá. Saháwar	Jamálpur	The pillar 25 feet high as reported in 1874.
XXVIII	Minár Sankra	Aligarh	Tah. Atrauli, P. Gangiri	Sankra	The mark-stone wanting as reported in 1867.

NOTE.—Stations XXI to XLVII were visited in 1865-66 by Mr. W. Ivey, Assistant Surveyor, who was especially deputed for the purpose. With regard to the central paka pillars, their condition when visited and the repairs effected are given in detail above. As respects the kacha towers, around the pillars, these were found either partially or wholly washed away; nor were any measures taken specially for their restoration. Mr. Ivey protected the stations in the following manner:—the summits of the pillars were capped by conical mounds of sun-dried bricks or earthwork to carry off the rainfall, and the pillars themselves were enclosed in same materials up to varying heights. After this he transferred all these stations to the charge of local officials.

P. stands for pargana, Tah. for tahsil, and Thá. for thána.

No. of Station	Local name	District	Pargana, &c.	Village in which the Station lies	Remarks on the Construction and Condition of the Station
XXIX	Mánikpur	Budaun	Tah., P. and Thá. Sahaswán	Mánikpur	The central pillar and its upper mark-stone were found uninjured.
XXX	...	"	Tah. Gunnaur, P. Asadpur	Sakrora	The central pillar and its upper mark engraved on a burnt brick were found uninjured.
XXXI	...	Bulandshahr	Tah. Anúpshahr, P. Dibai, Thá. Rámghat	Parauli	The central pillar and its upper mark-stone were found all right.
XXXII	...	Budaun	Tah. Bisauli, P. and Thá. Islámuagar	Kariámái	Ditto.
XXXIII	...	"	Tah. Gunnaur, P. and Thá. Rajpura	Rajauli	The central pillar was found half thrown down, it was raised by 3 feet with burnt bricks and mud cement, making its height about 14 feet above ground.
XXXIV	Mehtra Dharampur	Moradabad	P. Sambhal	Mehtra	The upper mark-stone was found intact, the central pillar partially dug into at base and summit.
XXXV	Benipur Chak	"	Ditto.	BánsGOPálpur	The central pillar and the upper mark-stone were found all right.
XXXVI	Chandanpur Khádar	"	P. Hasanpur	Chandanpur Khádar	Ditto.
XXXVII	Umra	"	P. Bilári	Barauli	The upper mark-stone was missing, and portion of the summit of the central pillar broken.
XXXVIII	Kandarki	"	P. Hasanpur	Kandarki	The central pillar and its upper mark engraved on a burnt brick were found perfect.
XXXIX	...	"	P. Sambhal	Atora	The upper mark-stone was missing, and portion of the summit of the pillar broken.
XL	...	"	P. Amroha	Sirsa	The central pillar and the mark-stone on its summit were found perfect.
XLI	Mahamdí	"	P. Hasanpur	Lút	The whole structure was found fallen down, with the exception of 4 feet of the central pillar above ground. The pillar was raised 4 feet in height above the old remains, with burnt bricks and mud cement.
XLII	Kázipur	"	Tah. Moradabad	Bhatauli	The central pillar and the mark-stone on its summit were found perfect.
XLIII	Lodipur Milik	Bijnor	Tah. Chándpur, P. Burhpur	Lodipur Milik	The central pillar and the mark engraved on a burnt brick, on its summit, were found perfect.

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 Construction and Condition of the Station
XLIV	...	Moradabad	Tah. Amroha	Akbarpur	The central pillar was found standing and slightly dug into at the base, and the mark-stone missing.
XLV	...	Bijnor	Tah. and P. Dhámpur	Bhíka Ját	The central pillar and the mark-stone on its summit were found perfect, the edges of the pillar slightly decayed.
XLVI	...	„	Tah. Bijnor, P. Dáranagar	Rasúlpur	The central pillar and the mark-stone on its summit were found perfect.
XLVII	Nanda	Tarái	P. Káshipur	Púranpur	The central pillar was found fallen down to within $1\frac{1}{2}$ feet of the ground level, this was repaired, raised to $2\frac{1}{2}$ feet above ground, with burnt bricks laid in mud cement, and a mark-stone placed on it.
XLVIII	...	Garhwál	P. Talla Salán, Táluka Bhábar	Bágnála	A portion of the masonry given way as reported in 1879.
I	...	„	P. Ganga Salán, Patti Ajmír	Nali Badholi	A portion of the masonry given way as reported in 1878.
XLVIII*	...	Muzaffarnagar	P. and Tah. Jásath, Thá. Míránpur	Sheopuri	... ..
LII	...	Bijnor	Tah. Bijnor, P. Mandáwar	Mahesari	... ..

NOTE.—Station I appertains to the North-East Longitudinal Series. Stations XLVIII* and LII appertain to the Great Arc Meridional Series, Section 24° to 30° . P. stands for pargana, Tah. for tahsil, and Thá. for thána.

September, 1882.

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

BUDHON MERIDIONAL SERIES.

PRINCIPAL TRIANGULATION. TRIANGLES.

No. of Triangle	Station	Spherical Excess	Corrected Plane Angle			Distance		
						Log. feet	Feet	Miles
1	Budhon, III	1'10	65	18	9'77	5'1693276	147682'0	27'970
	Tinsmál, VII	1'10	36	17	41'38	4'9832673	96220'4	18'224
	Patna, I	1'10	78	24	8'85	5'2020309	159232'2	30'158
2	Tinsmál, VII	1'85	61	1	25'95	5'2302896	169937'6	32'185
	Patna, I	1'86	69	29	22'98	5'2599285	181940'1	34'458
	Dargawa, II	1'85	49	29	11'07	5'1693276	147682'0	27'970
3	Patna, I	1'48	40	43	36'35	5'0731171	118336'0	22'412
	Dargawa, II	1'49	69	43	33'56	5'2307924	170134'5	32'222
	Dhandkúa, III	1'49	69	32	50'09	5'2302896	169937'6	32'185
4	Patna, I	2'03	56	48	43'89	5'2243154	167616'0	31'745
	Dhandkúa, III	2'04	65	2	7'10	5'2590521	181573'4	34'389
	Andhiári, IV	2'04	58	9	9'01	5'2307924	170134'5	32'222
5	Dhandkúa, III	2'08	68	20	25'89	5'2768654	189175'7	35'829
	Andhiári, IV	2'08	56	13	31'48	5'2283874	169194'9	32'044
	Gwáli, V	2'07	55	26	2'63	5'2243154	167616'0	31'745

NOTES.—1. The values of the side are given in the same line with the opposite angle.

2. Stations Budhon, III, and Tinsmál, VII, 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
6	Dhandkú, III	2°08	60 23 39°92	5°2443503	175529°6	33°244
	Gwáli, V	2°08	62 40 7°50	5°2536997	179349°3	33°968
	Kathera, VI	2°08	56 56 12°58	5°2283874	169194°9	32°044
7	Gwáli, V	1°27	38 27 19°24	5°0400524	109661°1	20°769
	Kathera, VI	1°27	57 0 33°47	5°1699658	147899°2	28°011
	Bhitári, VII	1°28	84 32 7°29	5°2443503	175529°6	33°244
8	Gwáli, V	1°13	54 35 51°47	5°0974530	125156°4	23°704
	Bhitári, VII	1°13	50 59 24°08	5°0766814	119311°3	22°597
	Algi, VIII	1°14	74 24 44°45	5°1699658	147899°2	28°011
9	Bhitári, VII	°82	65 3 15°56	5°0784683	119803°2	22°690
	Algi, VIII	°81	43 38 36°38	4°9599559	91191°8	17°271
	Daryapur, IX	°82	71 18 8°06	5°0974530	125156°4	23°704
10	Algi, VIII	1°31	66 16 16°61	5°1781672	150718°7	28°545
	Daryapur, IX	1°31	67 2 10°98	5°1806704	151589°9	28°710
	Maharájpur, X	1°31	46 41 32°41	5°0784683	119803°2	22°690
11	Daryapur, IX	1°21	40 58 4°93	5°0314303	107505°4	20°361
	Maharájpur, X	1°22	72 13 31°28	5°1935238	156143°5	29°573
	Majhár, XIV	1°22	66 48 23°79	5°1781672	150718°7	28°545
12	Maharájpur, X	°83	76 21 32°40	5°1103651	128933°3	24°419
	Majhár, XIV	°83	49 31 1°44	5°0039476	100913°1	19°112
	Ráepur, XIII	°83	54 7 26°16	5°0314303	107505°4	20°361
13	Algi, VIII	1°50	56 45 54°93	5°1567811	143476°6	27°174
	Maharájpur, X	1°50	61 8 20°47	5°1767521	150228°4	28°452
	Narwar, XI	1°50	62 5 44°60	5°1806704	151589°9	28°710
14	Maharájpur, X	°60	43 41 56°21	5°0121057	102826°7	19°475
	Narwar, XI	°59	30 52 39°52	4°8830021	76383°9	14°467
	Karaia, XII	°60	105 25 24°27	5°1567811	143476°6	27°174
15	Maharájpur, X	°53	59 53 1°24	4°9590868	91009°5	17°237
	Karaia, XII	°53	73 33 51°70	5°0039476	100913°1	19°112
	Ráepur, XIII	°52	46 33 7°06	4°8830021	76383°9	14°467
16	Majhár, XIV	°80	100 21 44°02	5°2125181	163124°1	30°895
	Ráepur, XIII	°79	28 36 16°95	4°8997812	79392°8	15°037
	Jhánkri, XVI	°79	51 1 59°03	5°1103651	128933°3	24°419
17	Ráepur, XIII	°86	40 42 28°51	5°0350055	108394°1	20°529
	Jhánkri, XVI	°86	38 15 26°99	5°0124512	102908°5	19°490
	Sánichri, XV	°87	101 2 4°50	5°2125181	163124°1	30°895
18	Majhár, XIV	°98	46 7 14°06	5°0124512	102908°5	19°490
	Ráepur, XIII	°98	69 18 46°13	5°1256909	133564°5	25°296
	Sánichri, XV	°98	64 33 59°81	5°1103651	128933°3	24°419
19	Jhánkri, XVI	°84	70 45 8°27	5°0904426	123152°3	23°324
	Sánichri, XV	°84	53 2 59°50	5°0180567	104245°4	19°743
	Gúrmi, XVII	°84	56 11 52°23	5°0350055	108394°1	20°529
20	Jhánkri, XVI	°74	47 50 57°33	4°9712527	93595°0	17°726
	Gúrmi, XVII	°75	76 29 11°95	5°0890180	122749°0	23°248
	Bhind, XVIII	°75	55 39 50°72	5°0180567	104245°4	19°743

PRINCIPAL TRIANGULATION. TRIANGLES.

No. of Triangle	Station	Spherical Excess	Corrected Plane Angle			Distance		
						Log. feet	Feet	Miles
21	Gúrmi, XVII	.60	57	45	4'50	4'9633306	91903'2	17'406
	Bhind, XVIII	.61	62	47	5'75	4'9851405	96636'4	18'302
	Athgath, XIX	.60	59	27	49'75	4'9712527	93595'0	17'726
22	Gúrmi, XVII	.77	65	42	21'93	5'0522102	112774'3	21'359
	Athgath, XIX	.76	62	56	23'71	5'0421273	110186'2	20'869
	Panáhat, XX	.76	51	21	14'36	4'9851405	96636'4	18'302
23	Athgath, XIX	.62	61	29	7'54	5'0098981	102305'3	19'376
	Panáhat, XX	.62	42	54	27'16	4'8990902	79266'6	15'013
	Sherpur, XXI	.62	75	36	25'30	5'0522102	112774'3	21'359
24	Panáhat, XX	.67	58	26	41'42	4'9884271	97370'4	18'442
	Sherpur, XXI	.66	58	0	18'27	4'9863624	96908'6	18'354
	Firozabad, XXII	.67	63	33	0'31	5'0098981	102305'3	19'376
25	Sherpur, XXI	.65	71	28	6'01	5'0369327	108876'2	20'620
	Firozabad, XXII	.64	50	32	31'92	4'9477261	88659'7	16'792
	Baragaon, XXIII	.65	57	59	22'07	4'9884271	97370'4	18'442
26	Firozabad, XXII	.92	66	30	21'91	5'0930261	123887'1	23'463
	Baragaon, XXIII	.92	59	47	19'95	5'0672111	116737'7	22'109
	Pondri, XXIV	.91	53	42	18'14	5'0369327	108876'2	20'620
27	Baragaon, XXIII	.98	62	54	57'89	5'0922214	123657'8	23'420
	Pondri, XXIV	.97	53	57	33'49	5'0503986	112304'9	21'270
	Kilármáo, XXV	.98	63	7	28'62	5'0930261	123887'1	23'463
28	Pondri, XXIV	.98	57	55	48'43	5'0697293	117416'6	22'238
	Kilármáo, XXV	.98	58	53	16'24	5'0741940	118629'9	22'468
	Sakimpur, XXVI	.99	63	10	55'33	5'0922214	123657'8	23'420
29	Kilármáo, XXV	.70	54	56	14'63	4'9963783	99169'6	18'782
	Sakimpur, XXVI	.69	49	20	8'25	4'9633247	91901'9	17'406
	Jamálpur, XXVII	.70	75	43	37'12	5'0697293	117416'6	22'238
30	Sakimpur, XXVI	.75	80	27	37'63	5'1015468	126341'7	23'928
	Jamálpur, XXVII	.74	48	49	5'33	4'9841721	96421'1	18'262
	Sankráo, XXVIII	.74	50	43	17'04	4'9963783	99169'6	18'782
31	Jamálpur, XXVII	.63	35	36	24'33	4'8687472	73917'5	14'000
	Sankráo, XXVIII	.64	60	2	31'15	5'0413751	109995'5	20'832
	Sarsotha, XXIX	.64	84	21	4'52	5'1015468	126341'7	23'928
32	Sankráo, XXVIII	.36	67	27	52'43	4'8901521	77651'9	14'707
	Sarsotha, XXIX	.35	50	59	11'94	4'8150687	65323'4	12'372
	Sakrora, XXX	.35	61	32	55'63	4'8687472	73917'5	14'000
33	Sarsotha, XXIX	.28	57	42	23'24	4'8266265	67085'2	12'706
	Sakrora, XXX	.28	44	12	14'96	4'7429723	55331'5	10'479
	Kariámái, XXXII	.29	78	5	21'80	4'8901521	77651'9	14'707
34	Sakrora, XXX	.25	50	32	9'19	4'7423343	55250'3	10'464
	Kariámái, XXXII	.25	59	50	44'37	4'7915573	61881'0	11'720
	Mehtra, XXXIV	.25	69	37	6'44	4'8266265	67085'2	12'706
35	Sakrora, XXX	.32	67	2	52'69	4'8670317	73626'1	13'944
	Mehtra, XXXIV	.32	62	14	35'62	4'8497616	70755'7	13'401
	Rajauli, XXXIII	.32	50	42	31'69	4'7915573	61881'0	11'720

BUDHON MERIDIONAL SERIES.

No. of Triangle	Station	Spherical Excess	Corrected Plane Angle	Distance		
				Log. feet	Feet	Miles
36	Sankráo, XXVIII	33	58 56 22'82	4'8372038	68739'1	13'019
	Sakrora, XXX	33	66 33 57'62	4'8670283	73625'5	13'944
	Parauli, XXXI	32	54 29 39'56	4'8150687	65323'4	12'372
37	Sakrora, XXX	37	70 5 48'01	4'9037644	80124'3	15'175
	Parauli, XXXI	36	56 7 56'35	4'8497616	70755'7	13'401
	Rajauli, XXXIII	36	53 46 15'64	4'8372038	68739'1	13'019
38	Mehtra, XXXIV	39	59 54 3'90	4'8805517	75954'2	14'385
	Rajauli, XXXIII	40	63 6 6'80	4'8937284	78294'0	14'828
	Bánsogópál, XXXV	39	56 59 49'30	4'8670317	73626'1	13'944
39	Rajauli, XXXIII	39	55 37 36'82	4'8578009	72077'7	13'651
	Bánsogópál, XXXV	39	63 56 28'51	4'8945904	78449'5	14'858
	Chandanpur, XXXVI	39	60 25 54'67	4'8805517	75954'2	14'385
40	Bánsogópál, XXXV	34	54 44 8'87	4'8245758	66769'1	12'646
	Chandanpur, XXXVI	34	63 27 2'37	4'8642249	73151'8	13'855
	Kandarki, XXXVIII	34	61 48 48'76	4'8578009	72077'7	13'651
41	Bánsogópál, XXXV	31	59 27 32'60	4'8322276	67956'0	12'870
	Kandarki, XXXVIII	31	52 33 4'04	4'7968539	62640'3	11'864
	Atora, XXXIX	31	67 59 23'36	4'8642249	73151'8	13'855
42	Mehtra, XXXIV	37	58 29 29'60	4'8614015	72677'8	13'765
	Bánsogópál, XXXV	36	54 48 30'81	4'8430198	69665'8	13'194
	Barauli, XXXVII	37	66 41 59'59	4'8937284	78294'0	14'828
43	Bánsogópál, XXXV	34	70 3 27'78	4'8926775	78104'8	14'793
	Barauli, XXXVII	34	48 55 49'75	4'7968539	62640'3	11'864
	Atora, XXXIX	34	61 0 42'47	4'8614015	72677'8	13'765
44	Kandarki, XXXVIII	38	63 45 26'37	4'8895968	77552'7	14'688
	Atora, XXXIX	38	64 26 6'14	4'8920916	77999'5	14'773
	Sirsa, XL	37	51 48 27'49	4'8322276	67956'0	12'870
45	Atora, XXXIX	34	46 52 26'71	4'7868408	61212'6	11'593
	Sirsa, XL	34	65 30 20'69	4'8826480	76321'7	14'455
	Bhatauli, XLII	35	67 37 12'60	4'8895968	77552'7	14'688
46	Sirsa, XL	31	65 23 49'00	4'8558889	71761'1	13'591
	Bhatauli, XLII	31	63 44 48'48	4'8499417	70785'1	13'406
	Akbarpur, XLIV	31	50 51 22'52	4'7868408	61212'6	11'593
47	Sirsa, XL	33	58 19 37'39	4'8376105	68803'5	13'031
	Akbarpur, XLIV	34	60 33 37'57	4'8476064	70405'5	13'334
	Milik, XLIII	34	61 6 45'04	4'8499417	70785'1	13'406
48	Kandarki, XXXVIII	37	58 50 3'37	4'8615230	72698'1	13'769
	Sirsa, XL	36	54 31 11'50	4'8400080	69184'4	13'103
	Lút, XLI	37	66 38 45'13	4'8920916	77999'5	14'773
49	Sirsa, XL	37	64 26 31'85	4'8826709	76325'7	14'456
	Lút, XLI	36	56 19 22'02	4'8476064	70405'5	13'334
	Milik, XLIII	37	59 14 6'13	4'8615230	72698'1	13'769
50	Akbarpur, XLIV	36	65 1 6'34	4'8829478	76374'4	14'465
	Milik, XLIII	36	60 14 12'40	4'8641688	73142'3	13'853
	Sarkára, XLV	36	54 44 41'26	4'8376105	68803'5	13'031

PRINCIPAL TRIANGULATION. TRIANGLES.

No. of Triangle	Station	Spherical Excess	Corrected Plane Angle			Distance		
						Log. feet	Feet	Miles
51	Milik, XLIII	.47	62	57	43.93	4.9366917	86435.4	16.371
	Sarkára, XLV	.48	65	7	44.57	4.9446874	88041.5	16.675
	Haldaur, XLVI	.47	51	54	31.50	4.8829478	76374.4	14.465
52	Sarkára, XLV	1.00	88	23	43.66	5.2240912	167529.5	31.729
	Haldaur, XLVI	1.00	60	33	27.57	5.1642053	145950.4	27.642
	Harpálsid, XLVIII	.99	31	2	48.77	4.9366917	86435.4	16.371
58	Akbarpur, XLIV	.41	56	29	1.04	4.8801843	75890.0	14.373
	Sarkára, XLV	.42	70	2	47.92	4.9322743	85560.7	16.205
	Nandi, XLVII	.41	53	28	11.04	4.8641688	73142.3	13.853
54	Sarkára, XLV	.87	81	40	59.46	5.1888038	154455.7	29.253
	Nandi, XLVII	.86	69	13	39.34	5.1642053	145950.4	27.642
	Harpálsid, XLVIII	.86	29	5	21.20	4.8801843	75890.0	14.373
55	Haldaur, XLVI	1.02	57	57	5.10	5.1523302	142013.7	26.897
	Harpálsid, XLVIII	1.02	32	54	28.08	4.9591707	91027.1	17.240
	Mahesari, LII	1.02	89	8	26.82	5.2240912	167529.5	31.729
56	Haldaur, XLVI	.53	56	0	34.87	4.9274737	84620.1	16.027
	Mahesari, LII	.53	60	52	34.12	4.9501475	89155.4	16.885
	Sheopuri, XLVIII	.53	63	6	51.01	4.9591707	91027.1	17.240
57	Harpálsid, XLVIII	.94	91	57	46.87	5.2235428	167318.0	31.689
	Mahesari, LII	.94	30	0	48.08	4.9229431	83742.0	15.860
	Mábegarh, I	.94	58	1	25.05	5.1523302	142013.7	26.897

NOTE.—Stations Sheopuri, XLVIII, and Mahesari, LII appertain to the Great Arc Series—Section 24° to 30°, and Mábegarh, I appertains to the North-East Longitudinal Series.

December 1878.

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

BUDHON 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			No. of Triangle	Station	Corrected Plane Angle ° / "	Distance			Theodolite used	
			Log. feet	Feet	Miles				Log. feet	Feet	Miles		
58	Budhon, III	12 7 27	5.029163	106945	20.254	63	Patna, I	23 40 14	4.522907	33335	6.314	Inch	
	Tinsmál, VII		4.733187	54099	10.246		Samaspur	h.s.		4.414436	25968	4.918	12
	Sagoni	h.s.	5.202031	159232	30.158		Pandúa	"		4.743873	55446	10.501	"
59	Budhon, III	53 10 44	4.887100	77108	14.604	64	Tinsmál, VII	59 23 15	5.111729	129339	24.496	"	
	Patna, I		4.733187	54099	10.246		Patna, I	19 56 9	4.709625	51242	9.705	15	
	Sagoni	h.s.	4.983267	96220	18.224		Dhoban	100 40 36	5.169328	147682	27.970	12	
60	Budhon, III	32 17 31	4.743873	55446	10.501	65	Patna, I	49 33 16	5.116371	130729	24.759	15	
	Patna, I	35 41 41	4.782158	60556	11.469		Dargawa, II	81 36 2	5.111729	129339	24.496	"	
	Samaspur	h.s.	4.983267	96220	18.224		Dhoban	h.s.	5.230290	169938	32.185	12	
61	Budhon, III	20 53 13	4.337091	21732	4.116	66	Tinsmál, VII	48 57 28	5.169863	147864	28.005	"	
	Sagoni	96 32 52	4.782158	60556	11.469		Dargawa, II	111 52 7	4.808807	64388	12.195	"	
	Samaspur	h.s.	4.733187	54099	10.246		Lakhanjhir	h.s.	5.259929	181940	34.458	"	
62	Budhon, III	15 4 8	4.414436	25968	4.918	67	Patna, I	60 27 43	5.169863	147864	28.005	15	
	Patna, I	59 21 55	4.934213	85943	16.277		Dargawa, II	89 13 29	4.933387	85780	16.240	"	
	Pandúa	h.s.	4.983267	96220	18.224		Lakhanjhir	h.s.	5.230290	169938	32.185	12	

Notes.—1. Names followed by Roman numerals are those of Principal Stations. Stations Budhon, III, and Tinsmál, VII appertain to the Calcutta Longitudinal Series of the South-East Quadrilateral.
2. The values of the side are given in the same line with the opposite angle.

SECONDARY TRIANGULATION. TRIANGLES.

No. of Triangle	Station	Corrected Plane Angle	Distance			No. of Triangle	Station	Corrected Plane Angle	Distance			Theodolite used
			Log. feet	Feet	Miles				Log. feet	Feet	Miles	
68	Tinsmál, VII Lakhanjhir Káli	29 58 50 99 12 27 50 48 43	4° 6' 18.177 4° 9' 13.830 4° 8' 08.807	41512 82003 64388	7.862 15.531 12.195	81	Patna, I Pandúa Barodia	57 33 10 90 54 35 31 32 15	4° 6' 22.171 4° 6' 59.533 4° 4' 14.436	32 41896 49040 25968	7.935 9.402 4.918	Inch 12 " " "
69	Patna, I Lakhanjhir Káli	59 41 57 91 22 1	4° 6' 18.177 4° 8' 69.717 4° 9' 33.387	41512 74083 85780	7.862 14.031 16.246	82	Patna, I Lakhanjhir Mahora	37 41 34 47 55 13 94 23 13	4° 7' 21.006 4° 8' 05.190 4° 9' 33.387	52603 63854 85780	9.963 12.094 16.246	15 12 "
70	Tinsmál, VII Lakhanjhir Jálampur	45 10 42 22 13 58 112 35 20	4° 6' 59.4304 4° 4' 42.1388 4° 8' 08.807	49466 26387 64388	9.368 4.998 12.195	88	Patna, I Pandúa Mahora	65 45 31 23 59 45	4° 7' 65.104 4° 8' 05.190 4° 4' 14.436	58224 63854 25968	11.027 12.094 4.918	15 12 12
71	Lakhanjhir Dhoban Jálampur	74 1 32 54 10 36 51 47 52	4° 7' 68.273 4° 6' 09.4304 4° 6' 08.0700	58651 49466 47941	11.108 9.368 9.080	84	Patna, I Barodia Ahmoi	84 14 1 16 48 15 78 57 44	4° 7' 01.739 4° 16.4992 4° 6' 59.533	50320 14621 49640	9.530 2.769 9.402	" " "
72	Tinsmál, VII Jálampur Jagthar Hill Staff	37 51 41 65 42 10	4° 2' 21.667 4° 3' 39.394 4° 4' 21.388	16660 24740 26387	3.155 4.086 4.998	85	Patna, I Pandúa Dongra Hill Temple	156 55 59 15 19 43	4° 5' 80.004 4° 16.8704 4° 4' 14.436	38098 14749 25968	7.216 2.793 4.918	15 12 "
73	Jálampur Jagthar Hill Staff Benaika Temple	106 32 35 31 40 44	4° 4' 83.018 4° 3' 25.013 4° 2' 21.667	30410 21135 16660	5.759 4.003 3.155	86	Patna, I Mahora Dongra Hill Temple	71 10 28 13 17 29	4° 7' 83.342 4° 16.8704 4° 8' 05.190	60721 14749 63854	11.500 2.793 12.094	15 12 "
74	Tinsmál, VII Jálampur Morári Hill Tree	24 32 19 21 5 54	4° 1' 85.497 4° 1' 23.394 4° 4' 21.388	15328 13286 26387	2.903 2.516 4.998	87	Samaapur Pandúa Rámpura Hill Staff	61 58 0 59 1 4	4° 5' 35.571 4° 5' 22.917 4° 5' 22.907	34322 33336 33335	6.500 6.314 6.314	" " "
75	Jálampur Benaika Temple Morári Hill Tree	151 8 51 12 4 49	4° 5' 48.313 4° 1' 85.497 4° 3' 25.013	35344 15328 21135	6.694 2.903 4.003	88	Pandúa Barodia Mandri	30 48 18 72 27 14 76 44 28	4° 3' 43.275 4° 6' 13.214 4° 6' 22.171	22043 41041 41896	4.175 7.773 7.955	" " "
76	Tinsmál, VII Jálampur Singan	20 46 42 151 12 26 8 0 52	4° 8' 26.981 4° 9' 59.780 4° 4' 21.388	67140 91155 26387	12.716 17.264 4.998	89	Barodia Ahmoi Mandri	24 6 44 16 36 14 139 17 2	4° 4' 98.502 4° 3' 43.275 4° 7' 01.739	31514 22043 50320	5.969 4.175 9.530	" " "
77	Lakhanjhir Jálampur Singan	49 38 32 96 12 14 34 9 14	4° 8' 26.981 4° 9' 42.467 4° 6' 59.4304	67140 87592 49466	12.716 16.589 9.368	90	Pandúa Mandri Gorar	16 25 46 22 57 26 140 36 48	4° 2' 62.280 4° 4' 01.861 4° 6' 13.214	18293 25227 41041	3.465 4.778 7.773	" " "
78	Tinsmál, VII Lakhanjhir Bhero	52 34 24 89 0 59 38 24 37	4° 9' 15.406 5° 0' 15.449 4° 8' 08.807	82301 103621 64388	15.587 19.625 12.195	91	Ahmoi Mandri Maltaun	13 32 1 15 20 41 151 7 18	4° 1' 83.844 4° 2' 37.231 4° 4' 98.502	15270 17268 31514	2.892 3.270 5.969	" " "
79	Tinsmál, VII Singan Bhero	13 23 0 111 55 19 54 41 41	4° 4' 12.530 5° 0' 15.449 4° 9' 59.780	25854 103621 91155	4.807 19.625 17.264	92	Mandri Gorar Maltaun	54 55 49 52 42 20 72 21 51	4° 1' 96.180 4° 1' 83.844 4° 2' 62.280	15710 15270 18293	2.975 2.892 3.465	" " "
80	Patna, I Samaapur Barodia	33 52 56 62 46 40 83 20 24	4° 4' 93.049 4° 6' 59.533 4° 7' 43.873	31121 49640 55446	5.894 9.402 10.501	98	Patna, I Dhandkua, III Bara Dongra Hill Temple	57 43 39 20 0 56	5° 1' 67.930 4° 7' 75.182 5° 2' 30.792	147207 59591 170135	27.880 11.286 32.222	15 "

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

No. of Triangle	Station	Corrected Plane Angle	Distance			No. of Triangle	Station	Corrected Plane Angle	Distance			Theodolite used
			Log. feet	Feet	Miles				Log. feet	Feet	Miles	
94	Dhandkúa, III Andhiári, IV Bara Dongra Hill Temple	45 1 13 58 35 58	5'086342 5'167930 5'224315	121995 147207 167616	23.105 27.880 31.745	107	Dhandkúa, III Mora Barh	71 22 49 26 44 52 81 52 19	5'057282 4'733904 5'076246	114099 54188 119192	21.610 10.263 22.574	Inch 15 " "
95	Dargawa, II Dhandkúa, III Sarkaura	56 44 38 21 4 7 102 11 15	5'005342 4'638699 5'073117	101238 43521 118336	19.174 8.243 22.412	108	Dhandkúa, III Mamaun Bijli	86 18 17 12 19 26 81 22 17	4'726554 4'056729 4'722515	53279 11395 52785	10.091 2.158 9.997	" 9 " "
96	Dargawa, II Dhandkúa, III Mamaun	10 6 26 13 3 37 156 49 57	4'722515 4'832322 5'073117	52785 67971 118336	9.997 12.873 22.412	109	Dhandkúa, III Barh Bijli	79 16 2 12 8 9 88 35 49	4'726370 4'056729 4'733904	53256 11395 54188	10.086 2.158 10.263	" "
97	Dargawa, II Sarkaura Tehri Palace	60 11 6 85 13 5	4'822841 4'882989 4'638699	66503 70382 43521	12.595 14.466 8.243	110	Dhandkúa, III Barh Bila Hill Staff	69 36 14 34 53 44	4'719843 4'505420 4'733904	52462 32020 54188	9.936 6.064 10.263	" "
98	Dhandkúa, III Sarkaura Tehri Palace	27 17 5 16 58 10	4'822841 4'626761 5'005342	66503 42341 101238	12.595 8.019 19.174	111	Dhandkúa, III Pabba Ratangawán	54 52 30 84 54 17	5'054472 4'951822 5'140053	113363 89500 138055	21.470 16.951 26.147	" "
99	Dhandkúa, III Andhiári, IV Ero	20 47 17 61 46 4 94 26 39	4'775744 5'182074 5'224315	59668 152081 167616	11.301 28.803 31.745	112	Dhandkúa, III Barh Ratangawán	74 36 14 70 34 35 34 49 11	4'961399 4'951822 4'733904	91495 89500 54188	17.329 16.951 10.263	" "
100	Dhandkúa, III Andhiári, IV Pabba	66 30 47 48 21 17 65 7 56	5'229015 5'140053 5'224315	169440 138055 167616	32.091 26.147 31.745	118	Dhandkúa, III Pabba Mohangarh Fort	26 45 46 25 11 14	4'897317 4'872796 5'140053	78944 74610 138055	14.951 14.131 26.147	" "
101	Andhiári, IV Gwáli, V Pabba	7 52 17 47 24 26 124 43 17	4'498592 5'229015 5'276865	31520 169440 189176	5.970 32.091 35.829	114	Dhandkúa, III Barh Mohangarh Fort	46 29 30 87 0 52	4'733889 4'872796 4'733904	54186 74610 54188	10.263 14.131 10.263	" "
102	Dhandkúa, III Gwáli, V Banarsa	27 17 18 19 18 21 133 24 21	5'028459 4'886465 5'228387	106772 76996 169195	20.222 14.582 32.044	115	Dhandkúa, III Ratangawán Majugawán Hill Staff	40 30 37 15 49 45	4'844159 4'467321 4'951822	69849 29331 89500	13.229 5.555 16.951	" "
103	Dhandkúa, III Pabba Banarsa	29 6 59 27 53 23 122 59 38	4'903591 4'886465 5'140053	80092 76996 138055	15.169 14.582 26.147	116	Andhiári, IV Bara Dongra Hill Temple Birári	55 42 20 76 45 29	5'015105 4'965929 5'086342	103539 92455 121995	19.610 17.510 23.105	" "
104	Dhandkúa, III Gwáli, V Mora	49 49 24 44 30 57 85 33 39	5'112819 5'076246 5'228387	120664 119192 169195	24.558 22.574 32.044	117	Andhiári, IV Ero Birári	61 52 26 78 50 28 39 17 6	4'919643 4'965929 4'775744	83108 92455 59668	15.740 17.510 11.301	" "
105	Gwáli, V Bhitári, VII Mora	56 30 33 54 46 33 68 42 54	5'121802 5'112819 5'169966	132374 129664 147899	25.071 24.558 28.011	118	Andhiári, IV Birári Kálapahár	44 48 39 15 30 58 119 40 23	4'875023 4'454316 4'965929	74993 28465 92455	14.203 5.391 17.510	" "
106	Dhandkúa, III Andhiári, IV Barh	46 47 3 16 50 7 116 22 50	5'134670 4'733904 5'224315	136355 54188 167616	25.825 10.263 31.745	119	Ero Birári Kálapahár	56 56 41 54 48 4 68 15 15	4'875023 4'864009 4'919643	74993 73115 83108	14.203 13.848 15.740	" † " † " †

† Instrument not known.

SECONDARY TRIANGULATION TRIANGLES.

Triangle No.	Station	Corrected Plane Angle	Distance			Theodolite used	Triangle No.	Station	Corrected Plane Angle	Distance			Theodolite used
			Log. feet	Feet	Miles					Log. feet	Feet	Miles	
120	Andhiári, IV Gwáli, V Amarpur	h.s. h.s. h.s.	4.787458 5.153013 5.270865	61300 142237 189176	11.610 26.939 35.829	15	Gwáli, V Bhitári, VII Sanyer Hill Staff	8 19 40 9 35 24	4.842783 4.903572 5.169966	69628 80089 147899	13.187 15.168 28.011	Inch 15 "	
121	Gwáli, V Pabba Amarpur	h.s. h.s. h.s.	4.808938 4.787458 4.498592	64408 61300 31520	12.198 11.610 5.970	15	Gwáli, V Pabba Sanyer Hill Staff	117 28 49 46 3 27	4.994224 4.903572 4.498592	98679 80089 31520	18.689 15.168 5.970	" " "	
122	Andhiári, IV Pabba Gurur	h.s. h.s. h.s.	5.118268 5.051143 5.229015	131301 112498 109440	24.868 21.306 32.091	15	Gwáli, V Bhitári, VII Jhansí Fort	18 3 22 42 11 10	4.722670 5.058453 5.169966	52804 114407 147899	10.001 21.668 28.011	" " "	
123	Andhiári, IV Amarpur Gurur	h.s. h.s. h.s.	4.845739 5.051143 5.153013	70103 112498 142237	13.277 21.306 26.939	9	Gwáli, V Algi, VIII Jhansí Fort	36 32 31 68 5 33	4.805822 5.058453 5.076681	73421 114407 119311	13.906 21.668 22.597	" " "	
124	Andhiári, IV Gurur Jhakaúra	h.s. h.s. h.s.	4.897021 4.957982 5.051143	78890 90778 112498	14.941 17.193 21.306	15	Gwáli, V Bhitári, VII Lahar Hill Staff	22 55 51 45 54 23	4.790931 5.056537 5.169966	61792 113904 147899	11.703 21.573 28.011	" " "	
125	Pabba Gurur Jhakaúra	h.s. h.s. h.s.	4.807021 4.902932 5.118268	78890 79971 131301	14.941 15.146 24.868	"	Gwáli, V Algi, VIII Lahar Hill Staff	31 40 2 69 29 32	4.805118 5.056537 5.076681	63844 113904 119311	12.092 21.573 22.597	" " "	
126	Gwáli, V Mora Jiár Hill Staff	h.s. h.s. h.s.	4.710531 5.036042 5.112819	51349 108879 129664	9.725 20.621 24.558	"	Gwáli, V Algi, VIII Ghatoli Hill Staff	52 14 47 30 32 21	4.978118 4.786106 5.076681	95086 61109 119311	18.009 11.574 22.597	" " "	
127	Kathera, VI Mora Jiár Hill Staff	h.s. h.s. h.s.	4.710531 4.839104 4.818990	51349 67625 65916	9.725 12.808 12.484	"	Kathera, VI Bhitári, VII Barwa Ságar High Tower	13 55 56 39 46 7	4.515361 4.939726 5.040052	32761 87040 109661	6.205 16.485 20.769	" " "	
128	Gwáli, V Pabba Talaphári	h.s. h.s. h.s.	4.832853 4.915940 4.498592	71261 82402 31520	13.496 15.607 5.970	"	Kathera, VI Bhitári, VII Korar Hill Fort	29 17 34 54 16 1	4.732353 4.952222 5.040052	53995 89582 109661	10.226 16.966 20.769	" " "	
129	Gwáli, V Amarpur Talaphári	h.s. h.s. h.s.	4.541123 4.915940 4.787458	34763 82402 61300	6.584 15.607 11.610	15	Bhitári, VII Daryapur, IX Korar Hill Fort	105 9 9 26 19 54	5.070026 4.732353 4.959956	117497 53995 91192	22.253 10.226 17.271	" " "	
130	Amarpur Talaphári Ranna Hill Staff	h.s. h.s. h.s.	4.573518 4.626548 4.541123	37456 42320 34763	7.094 8.015 6.584	9	Bhitári, VII Sonania Orchha Temple	25 21 40 86 28 31	4.359626 4.727033 4.695520	22889 53338 49604	4.335 10.102 9.395	" " "	
131	Gwáli, V Kathera, VI Sonania	h.s. h.s. h.s.	4.944648 5.039593 5.244350	88034 109545 175530	16.673 20.747 33.244	"	Bhitári, VII Algi, VIII Chandeva	46 0 35 55 25 19 78 34 6	4.963161 5.021742 5.097453	91867 105134 125156	17.399 19.912 23.704	" " "	
132	Kathera, VI Bhitári, VII Sonania	h.s. h.s. h.s.	4.605520 4.944648 5.040052	49604 88034 109661	9.395 16.673 20.769	"	Algi, VIII Maharajpur, X Chandeva	54 29 36 37 16 54 88 13 30	5.091529 4.903161 5.180670	123461 91867 151590	23.383 17.399 28.710	" " "	

* Base deduced by two sides and included angle. † Instrument not known.

No. of Triangle	Station	Corrected Plane Angle	Distance			Theodolite used	No. of Triangle	Station	Corrected Plane Angle	Distance			Theodolite used
			Log. feet	Feet	Miles					Log. feet	Feet	Miles	
146	Bhitári, VII Algi, VIII Gharabo	30 32 50 37 18 8 112 9 2	4.836826 4.913236 5.097453	68679 81891 125156	13.007 15.510 23.704	Inch 15 "	Maharájpur, X Chandeva Bharauni	43 43 36 112 0 56	4.738086 4.964026 5.091529	54712 92051 123461	10.362 17.434 23.383	" 15 "	
147	Algi, VIII Chandeva Gharabo	18 7 11 38 46 14 123 6 35	4.532876 4.836826 4.963161	34110 68679 91867	6.460 13.007 17.399	" " "	Chandeva Gharabo Sonáwal Temple	99 35 6 50 53 20	4.834082 4.730006 4.532876	68247 53704 34110	12.926 10.171 6.460	" " "	
148	Bhitári, VII Daryapur, IX Amra Fort	55 23 31 66 1 15	4.944215 4.989586 4.959956	87946 97031 91192	16.656 18.491 17.271	" " "	Algi, VIII Chandeva Ráon	62 58 19 51 55 39 65 6 2	4.955303 4.901632 4.963161	90220 79732 91867	17.087 15.101 17.399	" " "	
149	Bhitári, VII Daryapur, IX Bachondono Hill Temple	39 31 3 42 24 51	4.767948 4.793248 4.959956	58607 62122 91192	11.100 11.766 17.271	" " "	Maharájpur, X Chandeva Ráon	46 27 48 36 17 51 97 14 21	4.955303 4.867310 5.091529	90220 73073 123461	17.087 13.953 23.383	" " "	
150	Bhitári, VII Chandeva Bachondono Hill Temple	58 33 44 36 4 57	4.954225 4.793248 5.021742	89996 62122 103134	17.045 11.766 19.912	" " "	Daryapur, IX Maharájpur, X Gujára Hill Fort	39 45 15 68 53 5	5.007402 5.171380 5.178167	101719 148381 150719	19.265 28.103 28.545	" " "	
151	Bhitári, VII Daryapur, IX Salun Hill Temple	31 33 31 63 12 44	4.680272 4.912160 4.959956	47893 81688 91192	9.071 15.471 17.271	" " "	Maharájpur, X Chandeva Gujára Hill Fort	78 17 45 44 5 17	5.155815 5.007402 5.091529	85978 101719 123461	16.113 19.265 23.383	" " "	
152	Bhitári, VII Chandeva Salun Hill Temple	50 36 12 49 49 52	4.917934 4.912160 5.021742	82610 81688 103134	15.646 15.471 19.912	" " "	Daryapur, IX Maharájpur, X Rámgarh Hill Staff	25 52 39 24 45 48	4.929816 4.911974 5.178167	85978 81651 150719	16.113 15.464 28.545	" " "	
153	Algi, VIII Chandeva Suru Hill Staff	19 44 50 48 25 27	4.524223 4.869419 4.963161	33437 74932 91867	6.333 14.021 17.399	" " "	Maharájpur, X Majhár, XIV Rámgarh Hill Staff	47 27 45 51 25 54	4.904054 4.929816 5.031430	80178 85078 107305	15.185 16.113 20.361	" " "	
154	Algi, VIII Chandeva Kamad Fort	92 42 55 64 46 19	4.589769 5.006207 4.963161	38884 101440 91867	7.364 19.212 17.399	" " "	Maharájpur, X Majhár, XIV Geuro! Hill Staff	49 17 23 23 7 58	4.931876 4.646438 5.031430	85482 44304 107305	16.190 8.391 20.361	" " "	
155	Daryapur, IX Chandeva Kamad Fort	75 17 36 43 23 8	4.589769 4.441132 4.547395	38884 27614 33269	7.364 5.230 6.680	" " "	Maharájpur, X Chandeva Genrol Hill Staff	32 20 49 15 24 16	4.950550 4.646438 5.091529	89238 44304 123461	16.901 8.391 23.383	" " "	
156	Algi, VIII Chandeva Datia Palace	13 15 31 34 52 54	4.451625 4.848440 4.963161	28289 70541 91867	5.358 13.360 17.399	" " "	Majhár, XIV Chandeva Deogarh Hill Fort	69 46 39 13 33 43	5.155596 4.553304 5.180287	143086 35757 151456	27.100 6.772 28.685	" " "	
157	Algi, VIII Gharabo Datia Palace	31 22 42 77 2 10	4.576229 4.848440 4.836826	37690 70541 68679	7.138 13.360 13.007	" " "	Majhár, XIV Sánchezri, XV Bhandauli	25 16 22 132 38 54	4.889448 4.83446 5.125691	77526 68257 133564	14.683 12.927 25.296	" " "	
158	Algi, VIII Chandeva Bharauni	35 58 5 44 29 54 99 32 1	4.738086 4.814849 4.963161	54712 65290 91867	10.362 12.366 17.399	" " "	Athgath, XIX Sherpur, XXI Báh	34 1 24 106 10 4	4.722951 4.664439 4.899990	52839 46178 79267	10.007 8.746 15.013	12 "	

* Base deduced by two sides and included angle.

SECONDARY TRIANGULATION. TRIANGLES.

No. of Triangle	Station	Corrected Plane Angle			Distance			Theodolite used	No. of Triangle	Station	Corrected Plane Angle			Distance			Theodolite used
		°	'	"	Log. feet	Feet	Miles				Log. feet	Feet	Miles				
172	Sherpur, XXI Bāh Amānpur Temple	9	14	50	3° 9' 02.63	9338	1.769	Inch 12	181	Jamālpur, XXVII Sahaswān Platform Kādirbāri	14	1	29	4° 7' 22.231	52751	9.991	Inch 18
		56	9	23	4° 68' 36.33	48265	9.141	"			152	18	26	4° 7' 11.263	51435	9.742	†
					4° 7' 22.951	52839	10.007	"						5° 00' 50.06	101159	19.159	
173	Sherpur, XXI Baragon, XXIII Shikohābād	22	25	43	4° 8' 10.528	64644	12.243	18	182	Jamālpur, XXVII Kādirbāri Soron House	7	47	23	4° 1' 16.837	13087	2.479	18
		117	5	56	4° 5' 79.759	37998	7.197	"			24	23	55	4° 6' 00.813	39885	7.554	7
					4° 9' 47.726	88660	16.792	"						4° 7' 11.263	51435	9.742	
174	Sherpur, XXI Shikohābād Batesar House	98	46	51	4° 7' 97.584	62746	11.884	12	183	Jamālpur, XXVII Soron House Debrai Fort	32	20	2	4° 3' 40.094	21882	4.144	18
		44	27	27	4° 6' 48.037	44467	8.422	18			77	7	53	4° 5' 86.300	38574	7.306	7
					4° 5' 79.759	37998	7.197	"						4° 6' 00.813	39885	7.554	
175	Firozābād, XXII Pondri, XXIV Kotla	23	18	58	4° 8' 54.906	71599	13.560	"	184	Sankrāo, XXVIII Parauli, XXXI Rāmgat House	14	13	26	4° 4' 36.532	27323	5.175	18
		16	52	29	4° 7' 20.243	52510	9.945	7			27	14	10	4° 7' 06.648	50892	9.639	"
					5° 0' 67.211	116738	22.109	"						4° 8' 67.028	73626	13.944	"
176	Baragon, XXIII Shikohābād Labhauwa Palace	19	14	39	4° 3' 31.435	21450	4.063	18	185	Sheopuri, XLVIII Mahesari, LII Bijnor	30	39	45	4° 6' 65.774	46321	8.773	16
		64	6	40	4° 7' 67.525	58550	11.089	7			121	31	21	4° 7' 04.366	50625	9.588	7
					4° 8' 10.528	64644	12.243	"						4° 9' 27.474	84620	16.027	
177	Baragon, XXIII Kilārnāo, XXV Sakī Temple	8	10	37	4° 6' 28.828	42543	8.057	18	186	Godhna, XLIX Chāndīpahār, LIV Sūrajpahār	118	8	25	4° 2' 10.560	16239	3.076	"
		13	52	33	4° 8' 55.717	71733	13.586	"			56	25	0	5° 1' 78.861	150960	28.591	"
					5° 0' 50.399	112305	21.270	"						5° 1' 54.181	142620	27.011	"
178	Pondri, XXIV Kilārnāo, XXV Nandauli House	39	39	18	4° 9' 61.744	91568	17.342	"	187	Chāndīpahār, LIV Sūrajpahār Kankhal Solitary Temple	82	7	45	4° 2' 77.001	18963	3.591	"
		19	51	54	4° 6' 88.042	48758	9.234	"			39	50	38	4° 0' 88.665	12265	2.323	"
					5° 0' 92.221	123658	23.420	"						4° 2' 10.560	16239	3.076	"
179	Salimpur, XXVI Sankrāo, XXVIII Dāo House	17	15	53	4° 5' 91.172	39010	7.388	"	188	Chāndīpahār, LIV Sūrajpahār Kankhal Temple	56	23	15	4° 1' 34.476	13629	2.581	"
		29	55	20	4° 8' 16.675	65565	12.418	"			40	44	48	4° 0' 28.659	10682	2.023	"
					4° 9' 84.172	96421	18.262	"						4° 2' 10.560	16239	3.076	"
180	Jamālpur, XXVII Sankrāo, XXVIII Sahaswān Platform	33	21	35	4° 8' 42.681	69612	13.184	"	189	Chāndīpahār, LIV Sūrajpahār Jawālapur House	72	12	13	4° 3' 74.665	23695	4.488	"
		53	2	41	5° 0' 05.006	101159	19.150	"			39	32	13	4° 3' 85.415	24289	4.600	"
					5° 1' 01.547	126342	23.928	"						4° 2' 10.560	16239	3.076	"

NOTE.—Stations Sheopuri, XLVIII, Godhna, XLIX, Mahesari, LII, and Chāndīpahār, LIV appertain to the Great Arc Meridional Series—Sec 24° to 30°.
† Instrument not known.

December 1878.

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

BUDHON 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	Name of station with azimuths of surrounding points	No. of triangle giving distance	Name of station with azimuths of surrounding points	No. of triangle giving distance
<p>AHMOI h.s. Barodia Mandri Maltaun Patna, I</p>	<p>84 89 91 84</p>	<p>Alsi, VIII Kamad Fort Bhitari, VII Jahar Hill Staff Jhansi Fort Gwali, V</p>	<p>154 8 188 186 8</p>	<p>ANDHIARI, IV Dhandkua, III Birari Patna, I Bara Dongra Hill Temple Ero</p>	<p>4 116 4 94 99</p>
<p>AKBARPUR, XLIV Sirsa, XL Milik, XLIII Sarkara, XLV Nandi, XLVII Bhatauli, XLII</p>	<p>46 47 50 53 46</p>	<p>AMARPUR, h.s. Andhari, IV Runha Hill Staff Gurar Gwali, V Pabba Talapahari</p>	<p>120 130 123 120 121 129</p>	<p>ATHGATH, XIX Gurmi, XVII Panahat, XX Bah Sherpur, XXI Biind, XVIII</p>	<p>21 22 171 23 21</p>
<p>ALSI, VIII Ghatoli Hill Staff Narwar, XI Raon Maharajpur, X Bhatouni Suru Hill Staff Datisa Palace Chandeva Daryapur, IX Gharabo</p>	<p>189 18 161 10 158 153 156 144 9 146</p>	<p>ANDHIARI, IV Gurar Amarpur Gwali, V Jhakra Pabba Kalapahar Barh</p>	<p>122 120 5 124 100 118 106</p>	<p>ATORA, XXXIX Bangopal, XXXV Kandarki, XXXVIII Sirsa, XL Bhatauli, XLII Barauli, XXXVII BAR s. Amanpur Temple Sherpur, XXI Athgath, XIX</p>	<p>41 41 44 45 44 43</p>
<p>h.s. " " " " " " " " " " " "</p>	<p>28 18 1 77 88 51 39 68 153 52 46 38 210 21 47 83 337 26 38 94</p>	<p>s. " " " " " " " " " " " "</p>	<p>256 21 53 29 259 15 31 314 31 4 34 314 57 51 321 7 57</p>	<p>41 37 49 70 104 34 14 17 126 14 50 166 3 22 33 342 9 59 35</p>	<p>143 52 47 200 1 40 306 11 44</p>

Name of station with azimuths of surrounding points	No. of triangle giving distance	Name of station with azimuths of surrounding points	No. of triangle giving distance	Name of station with azimuths of surrounding points	No. of triangle giving distance
BANARSA h.s.		BHANDAULI s.		BIJNOR s.	
Pabba h.s. 115 10 49	103	Sinichri, XV 163 28 24	170	Sheopuri, XLVIII† 63 41 16	185
Gwáli, V 125 35 32	102	Majhár, XIV 296 7 18	170	Mahesari, LIII† 185 12 37	185
Dhandkúa, III 352 11 11	102				
BANSGOPAL, XXXV		BHARAUNI h.s.		BIRARI h.s.	
Rajauli, XXXIII 28 35 25.58	38	Algi, VIII 3 14 13	158	Bara Dongra Hill Temple 2 36 54	116
Chandanpur, XXXVI 92 31 54.48	39	Maharajpur, X 151 41 16	159	Ero h.s. 40 5 17	117
Kandarki, XXXVIII 147 16 3.69	40	Chandeva h.s. 263 42 12	158	Andhiári, IV 79 22 23	116
Atora, XXXIX 206 43 36.60	41			Kálapahár " 94 53 21	118
Barauli, XXXVII 276 47 4.72	42	BHATAULI, XLII		BUDHON, III*	
Mehtra, XXXIV 331 35 35.89	38	Atora, XXXIX 26 7 7.31	45	Patna, I 200 4 17.23	1
		Sirsa, XL 93 44 20.26	45	Pandúa h.s. 215 8 25	62
		Akbarpur, XLIV 157 29 9.05	46	Samaspur " 232 21 48	60
BARAGAON, XXIII				Sagoni " 253 15 1	58
Sherpur, XXI 11 8 4.60	25	BHERO h.s.		Tinsmá, VII* 265 22 28.10	1
Shikohabad s. 33 33 48	173	Lakhanjír h.s. 222 49 18	78		
Labhuwa Palace 52 48 27	176	Tinsmál, VII* 261 13 55	78	CHANDANPUR, XXXVI	
Firozabad, XXII 69 7 27.32	25	Singan " 315 55 36	79	Kandarki, XXXVIII 208 58 25.64	40
Pondri, XXIV 128 54 48.19	26			Bánsropál, XXXV 272 25 28.35	39
Kilármáo, XXV 191 49 47.06	27	BHIND, XVIII		Rajauli, XXXIII 332 51 23.41	39
Sakit Temple 200 0 24	177	Jhánkri, XVI 43 45 20.70	20		
		Gúrmi, XVII 99 25 12.17	20	CHANDEVA h.s.	
BARAULI, XXXVII		Athgath, XIX 162 12 18.53	21	Gharabo h.s. 0 30 21	147
Mehtra, XXXIV 30 11 31.46	42			Algi, VIII 39 16 35	144
Bánsropál, XXXV 96 53 31.42	42	BHITARI, VII		Datia Palace 74 9 29	156
Atora, XXXIX 145 49 21.51	43	Sonania h.s. 11 0 10	132	Bharauni " 83 46 29	158
		Orchha Temple 36 21 50	143	Suru Hill Staff 87 42 2	153
BARH h.s.		Gwáli, V 43 47 40.36	7	Ráon " 91 12 14	161
Andhiári, IV 59 40 40	106	Sanyer Hill Staff 53 23 4	133	Sonáwal Temple 100 5 27	160
Mohangarh Fort 216 16 58	114	Jhánsi Fort 85 58 50	135	Maharajpur, X 127 30 5	145
Mora h.s. 221 25 31	107	Lahar Hill Staff 89 42 3	137	Genrol Hill Staff 142 54 21	168
Ratangawán " 232 43 15	112	Algi, VIII 94 47 5.57	8	Gujára Hill Fort 171 35 22	164
Bijli " 291 9 41	109	Gharabo h.s. 125 19 56	146	Majhár, XIV 172 6 37	169
Dhandkúa, III 303 17 50	106	Chandeva " 140 47 41	144	Deogarh Hill Fort 185 40 20	169
Bila Hill Staff 338 11 34	110	Daryapur, IX 159 50 21.95	9	Daryapur, IX 263 10 32	155
		Salun Hill Temple 191 23 53	151	Salun Hill Temple 270 52 37	152
BARODIA h.s.		Bachondono Hill Temple 199 21 25	149	Bachondono Hill Temple 284 37 32	150
Mandri h.s. 157 21 51	68	Amra Fort 215 13 53	148	Kamad Fort s. 306 33 40	154
Ahmoi " 181 28 35	84	Korar Hill Fort 264 59 31	141	Bhitári, VII 320 42 29	144
Patna, I 198 16 50	80	Kathera, VI 319 15 31.79	7		
Pandúa " 229 49 5	81	Mora h.s. 349 1 7	105	CHANDIPAHAR, LIV†	
Samaspur " 281 37 14	80	Barwa Ságar High Tower 359 1 39	140	Godhna, XLIX† 39 27 20.67	198
				Kankhal Solitary Temple 75 28 1	187
BENAIRA TEMPLE s.		BIJLI h.s.		Jawálapur House s. 89 20 12	201
Jilampur h.s. 260 56 25	73	Dhandkúa, III 22 37 38	108	Kankhal Temple 101 12 31	188
Morári Hill Tree 273 1 14	75	Barh h.s. 111 13 27	109	Súrajpahár h.s. 157 35 46	186
Jagthar Hill Staff 292 37 9	73	Mamaun " 301 15 21	108		

* Of the Calcutta Longitudinal Series of the South-East Quadrilateral. † Of the Great Arc Meridional Series—Section 24° to 30°.

Name of station with azimuths of surrounding points	No. of triangle giving distance	Name of station with azimuths of surrounding points	No. of triangle giving distance	Name of station with azimuths of surrounding points	No. of triangle giving distance
DARGAWA, II Tinsmál, VII*	2 53 59 09	DHOBAN h.s. Tinsmál, VII*	64	DHOBAN h.s. Tinsmál, VII*	64
Dhoban	3 32 30	Jámampur	71	Jámampur	71
Lakhanjhir	22 4 24	Lakhanjhir	71	Lakhanjhir	71
Patna, I	52 23 12 01	Patna, I	64	Patna, I	64
Sarkaúra	65 22 9	Dargawa, II	65	Dargawa, II	65
Dhandkúá, III	122 6 47 06				
Tehri Palace	125 33 15				
Mamaun	132 13 13	ERO h.s. Andhiári, IV	99	Andhiári, IV	99
		Kálapahár	119	Kálapahár	119
		Birári	117	Birári	117
		Dhandkúá, III	99	Dhandkúá, III	99
DARYAPUR, IX		FIROZABAD, XXII		FIROZABAD, XXII	
Kamed Fort	7 55 40	Panáhat, XX	24	Panáhat, XX	24
Algi, VIII	51 6 2 42	Pondri, XXIV	26	Pondri, XXIV	26
Chandeva	83 13 16	Kotla	175	Kotla	175
Maharajpur, X	118 8 14 71	Baragaon, XXIII	25	Baragaon, XXIII	25
Rámgarh Hill Staff	144 0 54	Sherpur, XXI	24	Sherpur, XXI	24
Gujára Hill Fort	157 53 30				
Majhár, XIV	159 6 20 85	GHRABO h.s. Algi, VIII	146	Algi, VIII	146
Amra Fort	273 46 39	Soniwal Temple	160	Soniwal Temple	160
Salun Hill Temple	276 35 10	Datia Palace	157	Datia Palace	157
Bachondono Hill Temple	297 23 3	Chandeva	147	Chandeva	147
Korár Hill Fort	313 28 0	Bhitári, VII	146	Bhitári, VII	146
Bhitári, VII	339 47 53 54				
		GODHNA, XLIX†		GODHNA, XLIX†	
DEBRAI FORT s.		Súrjapahár	186	Súrjapahár	186
Soron House	215 24 27	Cháudipahár, LIV†	198	Cháudipahár, LIV†	198
Jámampur, XXVII	292 32 20				
		GORAR h.s. Mandri	90	Mandri	90
		Maltaun	92	Maltaun	92
		Pandúa	90	Pandúa	90
		GURAR h.s. Amarpur	123	Amarpur	123
		Pabba	122	Pabba	122
		Jhakaúra	124	Jhakaúra	124
		Andhiári, IV	122	Andhiári, IV	122
		GURMI, XVII		GURMI, XVII	
		Sánichri, XV	19	Sánichri, XV	19
		Panáhat, XX	22	Panáhat, XX	22
		Athgath, XIX	21	Athgath, XIX	21
		Bhind, XVIII	20	Bhind, XVIII	20
		Jhánkri, XVI	19	Jhánkri, XVI	19
		JALAMPUR h.s. Singan	76	Singan	76
		Benaika Temple	73	Benaika Temple	73
		Lakhanjhir	70	Lakhanjhir	70
		Dhoban	71	Dhoban	71
		Tinsmál, VII*	70	Tinsmál, VII*	70
		Morári Hill Tree	74	Morári Hill Tree	74
		Jagthar Hill Staff	72	Jagthar Hill Staff	72
		JAMALPUR, XXVII		JAMALPUR, XXVII	
		Kilármáo, XXV	29	Kilármáo, XXV	29
		Salampur, XXVI	29	Salampur, XXVI	29
		Debrái Fort	183	Debrái Fort	183
		Sankráo, XXVIII	80	Sankráo, XXVIII	80
		Soron House	182	Soron House	182
		Kádirbári	161	Kádirbári	161
		Sahaswáni Platform	180	Sahaswáni Platform	180
		Sarsotha, XXIX	81	Sarsotha, XXIX	81

* Of the Calcutta Longitudinal Series of the South-East Quadrilateral. † Of the Great Arc Meridional Series—Section 24° to 80°. ‡ Of the North-East Longitudinal Series.

AZIMUTHS OF STATIONS AND INTERSECTED POINTS.

Name of station with azimuths of surrounding points	No. of triangles giving distance	Name of station with azimuths of surrounding points	No. of triangles giving distance	Name of station with azimuths of surrounding points	No. of triangles giving distance
JAWALAPUR HOUSE s. Sárjapahár Chándipahár, LIV*	189 189	KARIAMAI, XXXII Sarsotha, XXIX Sakrota, XXX Mehtre, XXXIV	33 33 34	MAHARAJPUR, X Narwar, XI Karia, XII Ráepur, XIII Majhár, XIV Gujára Hill Fort Ráingrah Hill Staff Genrol Hill Staff Daryapur, IX Chandeva Bharauni Algi, VIII Ráon	13 14 12 11 163 165 167 10 145 169 10 162
JHAKARA h.s. Andhiári, IV Gurar Pabba	124 124 125	KATHERA, VI Dhandkua, III Mora Gwáli, V Jiár Hill Staff Sonania Barwa Sagar High Tower Bhitári, VII Korwar Hill Fort	6 127 6 127 131 140 7 141	MAHESARI, LII* Bijoor Sheopuri, XLVIII* Mabegarh, I† Harpálsid, XLVIII Haldaur, XLVI	185 56 57 55 55
JHANKRI, XVI Majhár, XIV Ráepur, XIII Sánichri, XV Gúrmí, XVII Blind, XVIII	16 16 17 19 20	KILARMAO, XXV Baragon, XXIII Pondri, XXIV Nandauli House Salimpur, XXVI Janálpur, XXVII Sakit Temple	27 27 178 28 29 177	MAHRORA s. Pandía Patna, I Dongra Hill Temple Lakhanjhir	83 82 86 82
KADIBARI s. Sahaswán Platforn Jamálpur, XXVII Soron House	181 181 182	KOTLA s. Firozabad, XXII Pondri, XXIV	175 175	MAJHAR, XIV Genrol Hill Staff Maharajpur, X Ráepur, XIII Bhandauli Sánichri, XV Jhánkri, XVI Deogarh Hill Fort Daryapur, IX Chandeva Ráingrah Hill Staff	167 11 12 170 18 16 169 11 169 166
KALAPAHAR h.s. Andhiári, IV Birári Ero	118 118 119	LAKHANJHIR h.s. Siagan Bhero Káli Patna, I Mahrota Dargawa, II. Dhoban Tinsmál, VIII† Jálampur	77 78 68 67 82 66 71 66 70	MAJHAR, XIV Genrol Hill Staff Maharajpur, X Ráepur, XIII Bhandauli Sánichri, XV Jhánkri, XVI Deogarh Hill Fort Daryapur, IX Chandeva Ráingrah Hill Staff	83 82 86 82
KALI h.s. Patna, I Lakhanjhir Tinsmál, VIII†	69 68 68	LUT, XLI Milik, XLIII Sirsá, XL Kandarki, XXXVIII	49 48 48	MAJHAR, XIV Genrol Hill Staff Maharajpur, X Ráepur, XIII Bhandauli Sánichri, XV Jhánkri, XVI Deogarh Hill Fort Daryapur, IX Chandeva Ráingrah Hill Staff	167 11 12 170 18 16 169 11 169 166
KAMAD FORT s. Algi, VIII Chandeva Daryapur, IX	154 154 155	MABEGARH, II Mahesari, LII* Harpálsid, XLVIII	57 57	MAJHAR, XIV Genrol Hill Staff Maharajpur, X Ráepur, XIII Bhandauli Sánichri, XV Jhánkri, XVI Deogarh Hill Fort Daryapur, IX Chandeva Ráingrah Hill Staff	167 11 12 170 18 16 169 11 169 166
KANDARKI, XXXVIII Chandanpur, XXXVI Lát, XLI Sirsá, XL Atora, XXXIX Báungopál, XXXV	40 48 44 41 40	MABEGARH, II Mahesari, LII* Harpálsid, XLVIII	57 57	MAJHAR, XIV Genrol Hill Staff Maharajpur, X Ráepur, XIII Bhandauli Sánichri, XV Jhánkri, XVI Deogarh Hill Fort Daryapur, IX Chandeva Ráingrah Hill Staff	167 11 12 170 18 16 169 11 169 166
KARAI, XII Narwar, XI Ráepur, XIII Maharajpur, X	14 15 14	MABEGARH, II Mahesari, LII* Harpálsid, XLVIII	57 57	MAJHAR, XIV Genrol Hill Staff Maharajpur, X Ráepur, XIII Bhandauli Sánichri, XV Jhánkri, XVI Deogarh Hill Fort Daryapur, IX Chandeva Ráingrah Hill Staff	167 11 12 170 18 16 169 11 169 166

* Of the Great Arc Meridional Series—Section 24° to 30°. † 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 triangles giving distance	Name of station with azimuths of surrounding points	° ' "	No. of triangles giving distance	Name of station with azimuths of surrounding points	° ' "	No. of triangles giving distance
MANDRI h.s. Maltaun Ahmoi Gorur Pandua Barodia	h.s. 182 43 30 " 198 4 11 " 237 39 19 " 260 36 45 " 337 21 13	91 89 90 88 88	PANAHAT, XX Firozabad, XXII Sherpur, XXI Athgath, XIX Gürmi, XVII	183 4 0'07 241 30 42'16 284 25 9'94 335 46 25'06	24 23 22 22	RAEPUR, XIII Karsia, XII Sánichri, XV Jhánkri, XVI Majhár, XIV Maharájpur, X	15 51 35'58 205 52 13'90 240 34 43'27 275 11 1'01 329 18 28'00	15 17 16 12 12
MUPHTRA, XXXIV Sakrora, XXX Rajauli, XXXIII Bánsopál, XXXV Barauli, XXXVII Kariámái, XXXII	29 30 14'39 91 44 50'33 151 38 54'02 210 8 24'59 319 53 7'70	34 35 38 42 34	PANDUA h.s. Samaspur Budhon, III* Barodia Mandri Gorur, I Patna, I Dongra Hill Temple Mahrorra Kámpura Hill Staff	h.s. 2 39 45 35 12 5 49 51 27 80 39 45 97 5 31 140 46 2 156 5 45 231 0 46 303 38 41	63 62 81 88 80 62 85 83 87	RAJAULI, XXXIII Parauli, XXXI Chundanpur, XXXVI Bánsopál, XXXV Mehtra, XXXIV Sakrora, XXX	16 7 6'86 152 54 34'44 208 32 11'65 271 38 18'85 322 20 50'86	37 39 88 85 85
MILIK, XLIII Lút, XLI Haldaur, XLVI Sarkára, XLV Akbarpur, XLIV Sirsa, XL	29 6 14'71 145 33 25'67 208 31 10'07 268 45 22'83 329 52 8'21	49 51 50 47 47	PARAULI, XXXI Rajauli, XXXIII Sakrora, XXX Rámghat House Sankráo, XXVIII	196 5 9'12 252 13 5'83 279 28 36 306 42 45'71	87 86 184 86	RAON h.s. Maharájpur, X Chandeava Algi, VIII	173 50 47 h.s. 271 5 8 336 11 10	162 161 161
MORA h.s. Dhandkúsa, III Barh Gwáli, V Jiár Hill Staff Bhitári, VII Kathera, VI	14 46 28 41 31 20 100 20 7 155 33 38 169 3 1 224 43 6	104 107 104 126 105 127	PATNA, I Barodia Budhon, III* Ahmoi Bara Dongra Hill Temple Andhiári, IV Dongra Hill Temple Dhandkúsa, III Dargawa, II Mahrorra Dhoban Lákhanjhir Tinsmál, VII* Pandua Káli Samaspur Sagoni	h.s. 18 17 59 20 6 43'66 102 32 0 133 45 52 134 40 45'12 183 48 50 191 29 31'04 232 13 8'87 254 59 18 281 46 25 292 40 52 301 42 33'71 320 44 49 321 36 54 344 25 3 345 56 36	80 1 84 93 4 85 3 2 82 64 67 1 62 69 60 59	SAGONI h.s. Budhon, III* Patna, I Samaspur Tinsmál, VII* SAKORA, XXX Sankráo, XXXVIII Parauli, XXXI Rajauli, XXXIII Mehtra, XXXIV Kariámái, XXXII Sarsótha, XXIX	73 18 50 165 57 58 169 51 42 h.s. 271 32 13 5 44 53'60 72 18 51'55 142 24 39'93 209 27 32'94 259 59 42'38 304 11 57'62	58 59 61 61 58
NANDI, XLVII Akbarpur, XLIV Sarkára, XLV Harpálsid, XLVIII	30 25 46'01 83 53 57'46 153 7 37'66	58 53 54	PONDRI, XXIV Firozabad, XXII Salámpur, XXVI Nandauli House Kilármáo, XXV Baragaon, XXIII Kotla	2 28 55'44 196 53 12'52 215 9 44 254 49 1'93 308 46 36'39 345 36 26	26 28 178 27 26 175	SALÁMPUR, XXVI Pondri, XXIV Dádo House Sankráo, XXXVIII Jamálpur, XXVII Kilármáo, XXV	16 56 10'40 166 41 34 183 57 26'76 264 25 5'14 313 45 14'08	28 179 30 29 28
NARWAR, XI Karnia, XII Maharájpur, X Algi, VIII	194 46 48'35 225 39 28'46 287 45 14'56	14 13 18	PABBA h.s. Andhiári, IV Jhakaúra Talapahári Gurur Amarpur Gwáli, V Sanyer Hill Staff Ratangawán Banarsa Mohangarh Fort Dhandkúsa, III	h.s. 28 6 35 35 40 37 53 37 41 69 40 11 82 45 51 152 49 52 198 53 19 282 45 26 295 5 16 297 47 25 322 58 39	100 125 128 122 121 101 134 111 108 113 100	SAMASPUR h.s. Budhon, III* Barodia	52 25 21 101 39 29	60 80

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

AZIMUTHS OF STATIONS AND INTERSECTED POINTS.

Name of station with azimuths of surrounding points	No. of triangle giving distance	Name of station with azimuths of surrounding points	No. of triangle giving distance	Name of station with azimuths of surrounding points	No. of triangle giving distance	Name of station with azimuths of surrounding points	No. of triangle giving distance
SAMASPUR h.s. Patna, I Pandua Rampura Hill Staff Sagoni	60 63 87 61	SARSOTHA, XXIX Sakrota, XXX Kariamáti, XXXII Jamálpur, XXVII	82 88 81	SARBA, XL Bhatauli, XLII Atora, XXXIX	45 44	SARATHI, XLV Milk, XLIII Haldaur, XLVI Nandi, XLVII Akbarpur, XLIV	50 51 52 53 50
SANTOBI, XV Réepur, XIII Gúrni, XVII Jhánkri, XVI Majhár, XIV Bhandauli	17 19 17 18 170	SHEOPURI, XLVIII* Mahesari, LII* Bijnor Haldaur, XLVI	56 185 56	SONANIA h.s. Gwál, V Orchha Temple Bhitári, VII Kathera, VI	131 143 132 131	SARAKARA, XLV Milk, XLIII Haldaur, XLVI Harpálsid, XLVIII Nandi, XLVII Akbarpur, XLIV	50 51 52 53 50
SANKRAO, XXVIII Salimpur, XXVI Dádo House Rámghat House Parauli, XXXI Sakrota, XXX Sarsottha, XXIX Sahaswán Platform Jamálpur, XXVII	80 179 184 36 82 31 180 80	SHERPUR, XXI Báth Amánpur Temple Batesar House Panáhat, XX Firozabad, XXII Shikohabad Baragaon, XXIII Athgath, XIX	171 172 174 23 24 173 25 23	SURAJPAHAR h.s. Kankhal Solitary Temple Kankhal Temple Godhna, XLIX* Jawálpur House Chándpáhár, LIV*	187 188 186 189 186	SARAKARA, XLV Milk, XLIII Haldaur, XLVI Harpálsid, XLVIII Nandi, XLVII Akbarpur, XLIV	50 51 52 53 50
SARKARA, XLV Milk, XLIII Haldaur, XLVI Harpálsid, XLVIII Nandi, XLVII Akbarpur, XLIV	50 51 52 53 50	SHIKOHABAD s. Batesar House Lábhauwa Palace Baragaon, XXIII Sherpur, XXI	174 176 173 173	TALAPAHARI h.s. Ranha Hill Staff Amarpur Gwál, V Pabba	130 129 128 128	SARAKARA, XLV Milk, XLIII Haldaur, XLVI Harpálsid, XLVIII Nandi, XLVII Akbarpur, XLIV	50 51 52 53 50
SARAKARA h.s. Dhandkúsa, III Tehri Palace Dargawa, II	95 97 95	SINGAR h.s. Bhero Lakhaujhr Jálampur Tinsmál, VIII†	79 77 76 76	TINSMAL, VII† Jagthar Hill Staff Morári Hill Tree Singan Bhero Budhon, III† Jálampur Sagoni Káli Patna, I Lakhaujhr Dhoban Dargawa, II	72 74 76 78 1 70 58 68 1 66 64 2	SARAKARA h.s. Dhandkúsa, III Tehri Palace Dargawa, II	95 97 95
SARAKARA, XXIX Sankráo, XXVIII	81	SIRSA, XL Kandarkí, XXXVIII Lút, XLI Milk, XLIII Akbarpur, XLIV	44 48 47 46	SIRSA, XL Bhatauli, XLII Atora, XXXIX	45 44	SARAKARA h.s. Dhandkúsa, III Tehri Palace Dargawa, II	95 97 95

* Of the Great Arc Meridional Series—Section 24° to 30°. † Of the Calcutta Longitudinal Series of the South-East Quadrilateral.

January 1879.

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

BUDHON 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 small italics are those of the territories, states or districts in which the stations or points are situated. In a few instances the names of stations are spelt in two ways, those in italics are taken from a list of authorized spellings of names circulated by Government and received subsequently to the printing of the earlier pages of this volume.

Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.
<p>Agwánpur s. (Moradabad) On house in fort.</p> <p>λ 28 55 48 L 78 45 56</p> <p>Ahmoi h.s. (Saugor) About $\frac{1}{2}$ mile N. of village so called.</p> <p>λ 24 20 35·11 L 78 37 1·80 No. 84</p> <p>Akbarpur, XLIV. (Vide page 9—J.)</p> <p>λ 29 4 56·85 L 78 40 50·96 H 719 h 15 No. 46</p> <p>Algi, VIII. (Vide page 4—J.)</p> <p>λ 25 29 46·20 L 78 23 58·16 H 1154 h 0 No. 8</p>	<p>Amánpur Temple, (Agra) Spire.</p> <p>λ 26 53 44·5 L 78 37 12·2 No. 172</p> <p>Amarpur h.s. (Gwalior) On a quartzose ridge running N.E. and S.W., which consists of two hills connected at their bases.</p> <p>λ 25 4 27·24 L 78 19 6·87 Nos. 120, 121</p> <p>Amra Fort. (Jhánsei)</p> <p>λ 25 41 14·14 L 78 56 55·25 No. 148</p> <p>Andhiári (<i>Andheri</i>), IV. (Vide page 4—J.)</p> <p>λ 24 41 6·77 L 78 16 16·17 H 1630 h Not forthcoming No. 4</p>	<p>Aran Fort, (Gwalior) Highest turret in village.</p> <p>λ 25 57 6·4 L 77 58 38·1 See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p> <p>Ater Temple, (Gwalior) Highest point of spire.</p> <p>λ 26 43 45 L 78 42 9</p> <p>Athgath, XIX. (Vide page 6—J.)</p> <p>λ 26 47 59·51 L 78 45 4·33 H 577 h 36 No. 21</p> <p>Atora, XXXIX. (Vide page 8—J.)</p> <p>λ 28 42 41·94 L 78 39 43·31 H_s 695·93* h 17·8 Nos. 41, 43</p>

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

Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.
<p>Awa House Chimney. (Muttra) N. chimney of Rája's house.</p> <p>λ 27 27 6 L 78 31 47</p>	<p>Barai Temple s. (Gwalior) Dome spire of hill temple.</p> <p>λ 26 6 13·69 L 78 3 15·22</p> <p>See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p>	<p>Benaika Temple s. (Saugor)</p> <p>λ 24 6 34·27 L 78 53 42·34</p> <p>No. 73</p>
<p>Bachondono Hill Temple. (Jhánasi)</p> <p>λ 25 37 45·1 L 78 50 24·5</p> <p>Nos. 149, 150</p>	<p>Barauli, XXXVII. (Vide page 8—J.)</p> <p>λ 28 32 2·39 L 78 47 56·11 H_s 657* h 16</p> <p>No. 43</p>	<p>Bhandauli s. (Gwalior) On the highest house in fort.</p> <p>λ 26 11 15·10 L 78 19 32·54</p> <p>No. 170</p>
<p>Báh s. (Agra) On Patrol Officer's house.</p> <p>λ 26 52 29·77 L 78 38 13·02</p> <p>No. 171</p>	<p>Barh h.s. (Lalitpur) On the highest part of a ridge which is the most elevated of three ranges which run in a direction a little E. of N., about 100 feet S. of a conspicuous Math sacred to devi. It is marked on a platform.</p> <p>λ 24 52 30·27 L 78 37 32·47</p> <p>Nos. 108, 107</p>	<p>Bharanni h.s. (Datia) About a mile S. of fort.</p> <p>λ 25 40 31·93 L 78 24 38·40</p> <p>Nos. 158, 159</p>
<p>Bámor Peak, (Gwalior) Tree.</p> <p>λ 25 47 22 L 78 4 59</p> <p>See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p>	<p>Barodia h.s. (Saugor) On the eastern bastion of the hill fort.</p> <p>λ 24 12, 16·74 L 78 36 47·78</p> <p>Nos. 80, 81</p>	<p>Bhatauli, XLII. (Vide page 9—J.)</p> <p>λ 28 54 0·60 L 78 46 0·69 H_s 689·37‡ h 14·5</p> <p>No. 45</p>
<p>Banarsa h.s. (Tehri or Orchha) About a mile N. of Mohangarh fort.</p> <p>λ 25 0 11·04 L 78 43 50·42</p> <p>Nos. 102, 103</p>	<p>Barodia, N. Turret, (Saugor) Tiled.</p> <p>λ 24 12 53·6 L 78 37 12·9</p> <p>See Synoptical Vol. of the Calcutta Longl. Series.</p>	<p>Bhero h.s. (Saugor) About ½ mile S. of Sagaria village.</p> <p>λ 24 4 37·58 L 78 43 46·89</p> <p>Nos. 78, 79</p>
<p>Bánda Hill Staff. (Gwalior) About ½ mile E. of village so called.</p> <p>λ 26 9 47 L 78 21 23</p>	<p>Barwa Ságar High Tower. (Jhánasi)</p> <p>λ 25 22 40·1 L 78 46 45·6</p> <p>No. 140</p>	<p>Bhind, XVIII. (Vide page 6—J.)</p> <p>λ 26 33 32·92 L 78 50 14·33 H 562 h 5¶</p> <p>No. 20</p>
<p>Bánagopál, XXXV. (Vide page 8—J.)</p> <p>λ 28 33 28·07 L 78 34 26·89 H_s 677† h 19</p> <p>No. 38</p>	<p>Batesar House. (Agra) Bania's house at E. end of the village.</p> <p>λ 26 56 9·2 L 78 35 6·7</p> <p>No. 174</p>	<p>Bhitári, VII. (Vide page 4—J.)</p> <p>λ 25 28 4·54 L 78 46 39·51 H 1055 h 0</p> <p>No. 7</p>
<p>Bara Dongra Hill Temple. (Lalitpur)</p> <p>λ 24 26 51·9 L 78 31 50·4</p> <p>Nos. 98, 94</p>	<p>Belgarh Hill Mark. (Gwalior) About a mile E. of Harsi village.</p> <p>λ 25 46 8 L 77 59 30</p>	<p>Bijli h.s. (Lalitpur) On a detached hill, about 2 miles S.W. of Kelgong fort.</p> <p>λ 24 49 19·54 L 78 46 31·60</p> <p>Nos. 108, 109</p>
<p>Baragaon, XXIII. (Vide page 6—J.)</p> <p>λ 27 15 2·94 L 78 44 42·45 H_s 573·30‡ h 45·4</p> <p>No. 25</p>	<p>Benaika Fort, (Saugor) Flag.</p> <p>λ 24 6 34·2 L 78 53 40·5</p> <p>See Synoptical Vol. of the Calcutta Longl. Series.</p>	

† Refers to the upper surface of the masonry pillar. ‡ Refers to the mark-stone imbedded at 1 foot below the ground floor of the tower. * Refers to the upper surface of brick-work of the tower. § Refers to the upper mark-stone and was determined as follows:—the point leveled to was at the base of the tower of which the height = 678·88 feet and to this was added 15·49 feet (the height of upper mark-stone above that point obtained by subtense observations). ¶ Above roof of gateway on which the pillar stands.

Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.
<p>Bijnor s. (<i>Bijnor</i>) On centre chimney of Collector's house.</p> <p>λ 29 22 41·52 L 78 10 31·27 No. 185</p> <p>Bila Hill Staff. (<i>Lalitpur</i>) On a detached hill, about 4 miles W. of Kua village and 1½ miles W. of a Nadi.</p> <p>λ 24 44 27·69 L 78 41 3·89 No. 110</p> <p>Birári h.s. (<i>Lalitpur</i>) On an isolated red stone hill lying between Barh and Ero and between Dhandkúa and Sirsod. The hill is rugged and of difficult ascent.</p> <p>λ 24 43 56·58 L 78 32 41·51 Nos. 116, 117</p> <p>Bitarwár Fort, (<i>Gwalior</i>) Central white dome.</p> <p>λ 25 47 20 L 78 9 8 See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p> <p>Budhon, III*. (<i>Vide page 3—j.</i>)</p> <p>λ 24 5 8·41 L 78 33 39·07 H 1867 h 9 No. 1</p> <p>Chandanpur, XXXVI. (<i>Vide page 8—j.</i>)</p> <p>λ 28 33 58·94 L 78 20 59·24 H 647 h 16 No. 39</p> <p>Chandeva h.s. (<i>Datia</i>) On a quartzose ridge running north and south, and derives its name from an ancient well, called Chandeva-ka-Báoli, situated about 50 yards east of the station. Marked by a circle and dot engraved on rock in the centre of a platform. The high road from Datia to Kálpí runs at the southern foot of the hill. The village of Bahádurpur lies at the N.E. extremity of the ridge and about ¼ mile from the station.</p> <p>λ 25 41 31·04 L 78 34 32·96 H 909 h 0 Nos. 144, 145</p>	<p>Chándípahár, LIV. (<i>Bijnor</i>) Hill station is situated on the highest part of the hill facing the town of Hardwár, a noted place of Hindu pilgrimage; in thána Nágál, tahsil Najíbabad, district Bijnor. On a peak about half a mile north of the station stands a conspicuous Hindu temple. The river Ganges flows to the W. of the station, at a distance of about a mile. Marked by a solid platform having mark-stones at top and bottom.</p> <p>λ 29 55 29·73 L 78 13 37·13 H 1913 h 6 No. 79 See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p> <p>Chándipahár Hill Temple, (<i>Bijnor</i>) Spire.</p> <p>λ 29 56 1 L 78 13 20</p> <p>Chinúr Hill Fort, (<i>Gwalior</i>) White circular turret W. end.</p> <p>λ 25 56 42·4 L 78 8 31·8 See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p> <p>Dádo House. (<i>Aligarh</i>) Chimney of zamíndár's house.</p> <p>λ 27 57 8·3 L 78 30 27·6 No. 179</p> <p>Dargawa, II. (<i>Vide page 4—j.</i>)</p> <p>λ 24 37 13·21 L 79 3 51·81 H 1452 h 0 No. 2</p> <p>Daryapur, IX. (<i>Vide page 5—j.</i>)</p> <p>λ 25 42 12·41 L 78 40 55·86 H 793 h Not forthcoming No. 9</p> <p>Datia Palace. (<i>Datia</i>) Steeple of a large and conspicuous building called Rájgarh which consists of four or five stories surmounted by a dome.</p> <p>λ 25 40 14·5 L 78 29 35·5 Nos. 156, 157</p>	<p>Dehrai Fort s. (<i>Etah</i>) On the S.W. tower of old fort.</p> <p>λ 27 50 37·35 L 78 44 58·29 No. 183</p> <p>Deogarh Hill Fort. (<i>Gwalior</i>) On a flat-topped hill of sandstone detached from the main range and consisting of a wall flanked by tower bastions around the outer edge of the hill.</p> <p>λ 26 5 1 L 78 37 8 No. 169</p> <p>Dhandkúa, III. (<i>Vide page 4—j.</i>)</p> <p>λ 24 47 35·33 L 78 45 44·02 H 1291 h Not forthcoming No. 3</p> <p>Dhoban h.s. (<i>Saugor</i>) About a mile N.W. of Dulohipur fort.</p> <p>λ 24 15 40·54 L 79 2 24·54 Nos. 64, 65</p> <p>Dholpahári h.s. (<i>Saugor</i>) About 1½ miles E. of Túru village.</p> <p>λ 23 58 41·28 L 78 57 42·04 See Synoptical Vol. of the Calcutta Longl. Series.</p> <p>Dongra Hill Temple. (<i>Lalitpur</i>)</p> <p>λ 24 22 29·5 L 78 39 46·8 Nos. 85, 86</p> <p>Dugáo Fort, (<i>Saugor</i>) N.W. angle of a high square building.</p> <p>λ 24 9 39·6 L 78 27 56·3 See Synoptical Vol. of the Calcutta Longl. Series.</p> <p>Ero h.s. (<i>Lalitpur</i>) On a flat-topped hill near village of the same name. The hill is rugged and of difficult ascent.</p> <p>λ 24 33 26·36 L 78 23 1·77 No. 99</p> <p>Ferozpur (Firozpur) s. (<i>Muzaffarnagar</i>) On the roof of a building about 25 feet high in village so called, ¼ mile S. of the Ganges, and 2 miles N.E. of Bhákarheri town.</p> <p>λ 29 30 6·27 L 78 1 0·80 See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p>

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

Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.
<p>Firozabad, XXII. (<i>Vide page 6—J.</i>)</p> <p>λ 27 8 37·46 L 78 25 56·23 H, 557·44* h 43·8† Nos. 24</p> <p>Genrol Hill Staff. (<i>Gwalior</i>) On hill at the W. foot of which is the village so called. λ 25 53 15·77 L 78 24 43·57 Nos. 167, 168</p> <p>Gharabo h.s. (<i>Datix</i>) Close to village so called and about 1½ miles S. of Sersa village. λ 25 35 53·17 L 78 34 29·67 Nos. 146, 147</p> <p>Ghatoli Hill Staff. (<i>Gwalior</i>) About a mile from the villages of Gatabara and Lidhaura which are situated respectively on the E. and W. sides of the hill. λ 25 14 58·60 L 78 18 11·15 No. 189</p> <p>Godhna, XLIX. (<i>Muzaffarnagar</i>) Tower Station is built on the high bank which bounds the bed of the Ganges to the west, and is distant about ¼ of a mile to the east of the village from which its name is derived; in pargana Púr Chhapar, tahsil Muzaffarnagar. The village of Kázkápur is about 4 miles to W. and that of Thugalpur 1½ miles to S. Marked by a hollow tower having a mark-stone in the ground floor. λ 29 37 18·46 L 77 56 30·16 H 901 h 51 See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p> <p>Gorar h.s. (<i>Saugor</i>) On the northern extremity of a detached hill, about a mile W. of Derli village. λ 24 17 15·24 L 78 38 3·15 No. 90</p> <p>Gujára Hill Fort. (<i>Gwalior</i>) λ 26 4 54 L 78 30 43 Nos. 163, 164</p>	<p>Gurar h.s. (<i>Gwalior</i>) On the high peak which overlooks the village so called. Marked by a platform erected in rear of a sandstone building in which are placed the figures of Hindu gods and goddesses. λ 24 58 14·51 L 78 8 23·74 Nos. 122, 123</p> <p>Gúrmi, XVII. (<i>Vide page 5—J.</i>) λ 26 36 3·63 L 78 33 17·00 H 575 h 27† No. 19</p> <p>Gwáli, V. (<i>Vide page 4—J.</i>) λ 25 10 25·82 L 78 28 5·22 H 1209 h Not forthcoming No. 5</p> <p>Gwalior Hill Temple, (<i>Gwalior</i>) At southern end of fort. λ 26 13 12·3 L 78 12 28·2 See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p> <p>Haldaur, XLVI. (<i>Vide page 9—J.</i>) λ 29 16 41·23 L 78 18 33·28 H 806 h 20 No. 51</p> <p>Harpálsid, XLVIII. (<i>Vide page 9—J.</i>) λ 29 39 50·90 L 78 35 47·99 H 2876 h 0 Nos. 52, 54</p> <p>Hill θ. (<i>Dehra Dún</i>) On the Siwálik hills, about ½ mile W. of Kharkhari village. λ 29 57 58·1 L 78 12 26·9 See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p>	<p>Himmatgarh Hill Fort Building. (<i>Gwalior</i>) S. Staircase of a square building. λ 26 3 5·3 L 78 5 24·9 See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p> <p>Himmatgarh Hill Fort Gate. (<i>Gwalior</i>) Cupola over eastern gate. λ 26 3 3·2 L 78 5 25·4 See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p> <p>Himmatgarh Peak, (<i>Gwalior</i>) Pointed Stone, W. of fort. λ 26 2 32·2 L 78 4 30·0 See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p> <p>Jagthar Hill Staff. (<i>Saugor</i>) About 2 miles W. of Pathari village. λ 24 4 38·31 L 78 58 45·28 No. 72</p> <p>Jajádeo Hill Temple, (<i>Gwalior</i>) Square. λ 25 43 17·3 L 77 57 15·2 See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p> <p>Jálapur h.s. (<i>Saugor</i>) About a mile N. of Ratanpur village. λ 24 7 7·20 L 78 57 27·66 Nos. 70, 71</p> <p>Jalesar s. (<i>Muttra</i>) On S.W. corner of Tahsildár's Kachahri. λ 27 28 16 L 78 20 52</p> <p>Jalesar Temple. (<i>Muttra</i>) Old temple E. of Jalesar. λ 27 28 9 L 78 21 32</p> <p>Jamálpur, XXVII. (<i>Vide page 7—J.</i>) λ 27 48 10·77 L 78 51 35·08 H 599 h 28 No. 29</p>

* Refers to the mark-stone imbedded at 1 foot below the level of the terreplein of the rampart on which the tower is built. † Above the terreplein of the rampart on which the tower stands.

Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.
<p>Jawálapur House s. (<i>Saháranpur</i>) On Bania's high paka house, marked with an iron spike.</p> <p>λ 29 55 26·87 L 78 9 1·09 No. 189</p>	<p>Kálapahár h.s. (<i>Lalitpur</i>) On one of a group of detached hills of moderate elevation covered with dense jungle and of not very steep ascent.</p> <p>λ 24 44 59·30 L 78 19 10·86 Nos. 118, 119</p>	<p>Kasar Fort s. (<i>Aligarh</i>) On N.E. tower of old fort.</p> <p>λ 27 55 11 L 78 33 47</p>
<p>Jawálapur s. (<i>Saháranpur</i>)</p> <p>λ 29 55 8·60 L 78 9 53·40 H 932</p> <p>See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p>	<p>Káli h.s. (<i>Saugor</i>) About 2 miles S. of Dhamoni fort.</p> <p>λ 24 10 28·15 L 78 47 52·96 Nos. 68, 69</p>	<p>Kathera, VI. (<i>Vide page 4—J.</i>)</p> <p>λ 25 14 20·91 L 78 59 39·05 H 1349 h <i>Not forthcoming</i> No. 6</p>
<p>Jerila Temple. (<i>Agra</i>) Spire of high temple.</p> <p>λ 27 19 32 L 78 30 12</p>	<p>Kamad Fort s. (<i>Datia</i>) On S.W. bastion of fort.</p> <p>λ 25 37 41·49 L 78 40 14·24 Nos. 154, 155</p>	<p>Kilármáo, XXV. (<i>Vide page 7—J.</i>)</p> <p>λ 27 33 11·44 L 78 48 58·27 H 605 h 44 No. 27</p>
<p>Jhakaura h.s. (<i>Lalitpur</i>) On a hill of quartzose structure, running E. and W., about ½ mile N.W. of village so called. This hill, though of moderate elevation, has a good command of the surrounding country.</p> <p>λ 24 55 4·28 L 78 22 15·18 Nos. 124, 125</p>	<p>Kandarki, XXXVIII. (<i>Vide page 8—J.</i>)</p> <p>λ 28 43 37·17 L 78 27 2·57 H 689 h 19 No. 40</p>	<p>Kimlása Pagoda. (<i>Saugor</i>)</p> <p>λ 24 12 21·2 L 78 24 24·9</p> <p>See Synoptical Vol. of the Calcutta Longitudinal Series.</p>
<p>Jhánkri, XVI. (<i>Vide page 5—J.</i>)</p> <p>λ 26 18 53·92 L 78 34 41·30 H 624 h <i>Not forthcoming</i> No. 16</p>	<p>Kankhal Solitary Temple, (<i>Saháranpur</i>) Spire, in the bed of the Ganges river, S. of town.</p> <p>λ 29 54 59·2 L 78 11 22·2 No. 187</p>	<p>Korar Hill Fort, (<i>Tehri or Orchha</i>) Southern highest building.</p> <p>λ 25 28 50·9 L 78 56 26·6 Nos. 141, 142</p>
<p>Jhánsi Fort, (<i>Gwalior</i>) Flag.</p> <p>λ 25 27 27·6 L 78 37 4·8 Nos. 135, 136</p>	<p>Kankhal Temple, (<i>Saháranpur</i>) Northernmost, on bank of the Ganges river near Bháramal's garden.</p> <p>λ 29 55 50·3 L 78 11 38·0 No. 188</p>	<p>Kotla s. (<i>Agra</i>) On gateway of Raja's palace.</p> <p>λ 27 16 25·63 L 78 30 9·45 No. 175</p>
<p>Jiár Hill Staff. (<i>Jhánsi</i>) On a detached hill on E. side of which lies the village so called.</p> <p>λ 25 14 20·23 L 78 47 22·49 Nos. 126, 127</p>	<p>Karaia, XII. (<i>Vide page 5—J.</i>)</p> <p>λ 25 53 47·07 L 78 2 43·76 H 1287 h <i>Not forthcoming</i> No. 14</p>	<p>Labhauwa Palace. (<i>Mainpuri</i>) Small turret on the S.E. angle of the building.</p> <p>λ 27 9 12·2 L 78 36 6·1 No. 178</p>
<p>Kádirbári s. (<i>Etah</i>) On a platform, with centre-mark, on a high mound W. of the village.</p> <p>λ 27 55 43·38 L 78 47 12·17 No. 181</p>	<p>Kariámái, XXXII. (<i>Vide page 7—J.</i>)</p> <p>λ 28 15 7·44 L 78 48 1·99 H 624 h 17 No. 33</p>	<p>Lachmangarh Hill Fort. (<i>Gwalior</i>) Staircase of southernmost building.</p> <p>λ 25 47 40·7 L 78 9 23·6</p> <p>See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p>

Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.
<p>Ladára h.s. (<i>Gwalior</i>) On N.E. extremity of sandstone hills 2 miles S.E. of Narwar town; denoted by a circular platform which has the usual mark-stone on its surface.</p> <p style="text-align: center;">o ' "</p> <p>λ 25 37 22·25 L 77 57 56·67</p> <p>See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p>	<p>Mahrora s. (<i>Lalitpur</i>) On Kamal bastion of Márogarh fort in town.</p> <p style="text-align: center;">o ' "</p> <p>λ 24 22 47·15 L 78 50 43·31 Nos. 82, 88</p>	<p>Milik, XLIII. (<i>Vide page 9—J.</i>)</p> <p style="text-align: center;">o ' "</p> <p>λ 29 4 42·70 L 78 27 55·61 H 742 h 17 Nos. 47, 49</p>
<p>Ladára Hill Tomb, (<i>Gwalior</i>) Eastern.</p> <p>λ 25 37 48·7 L 77 57 23·9</p> <p>See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p>	<p>Majhár, XIV. (<i>Vide page 5—J.</i>)</p> <p>λ 26 6 17·00 L 78 30 44·91 H 1028 h <i>Not forthcoming</i> No. 11</p>	<p>Mohangarh Fort. (<i>Tehri or Orchha</i>) Highest point in fort which consists of a paka wall with bastions running along the ridge.</p> <p>λ 24 59 42·88 L 78 43 21·04 Nos. 113, 114</p>
<p>Lahar Hill Staff. (<i>Gwalior</i>) On a detached hill about a mile N. of village so called.</p> <p>λ 25 28 0·94 L 78 35 25·21 Nos. 137, 138</p>	<p>Majhgawán Hill Staff. (<i>Tehri or Orchha</i>) Near Kandi village and about ½ a mile from the right bank of Jamni river.</p> <p>λ 24 50 7·22 L 78 50 15·44 No. 115</p>	<p>Mora h.s. (<i>Tehri or Orchha</i>) About a mile W. of Mera village.</p> <p>λ 25 6 37·18 L 78 51 13·89 Nos. 104, 105</p>
<p>Lakhanjhír h.s. (<i>Lalitpur</i>) About 1½ miles E. of Papro village.</p> <p>λ 24 14 35·34 L 78 53 51·38 Nos. 66, 67</p>	<p>Maltaun h.s. (<i>Saugor</i>) On a detached hill about a mile S.E. of fort so called.</p> <p>λ 24 18 9·42 L 78 35 23·94 Nos. 91, 92</p>	<p>Moradabad s. (<i>Moradabad</i>) On Collector's Kaohahri.</p> <p>λ 28 51 6 L 78 48 35</p>
<p>Lút, XLI. (<i>Vide page 9—J.</i>)</p> <p>λ 28 53 42·23 L 78 20 57·91 H 716 h 20 No. 48</p>	<p>Mamaun h.s. (<i>Tehri or Orchha</i>) About 1½ miles E. of the town of Tehri.</p> <p>λ 24 44 45·44 L 78 54 45·72 No. 96</p>	<p>Morári Hill Tree. (<i>Saugor</i>) Large tamarind tree.</p> <p>λ 24 6 16 L 79 0 3 Nos. 74, 75</p>
<p>Mábegarh, I.* (<i>Vide page 9—J.</i>)</p> <p>λ 29 52 39·58 L 78 29 52·03 H 5652 h 7 No. 57</p>	<p>Mandri h.s. (<i>Saugor</i>) About 2 miles W. of Palaitna village.</p> <p>λ 24 15 38·30 L 78 35 16·09 Nos. 88, 89</p>	<p>Náh House Chimney, (<i>Aligarh</i>) Of Zamíndár's house.</p> <p>λ 27 58 35 L 78 34 19</p>
<p>Maharájpur, X. (<i>Vide page 5—J.</i>)</p> <p>λ 25 53 54·44 L 78 16 40·27 H 1015 h <i>Not forthcoming</i> No. 10</p>	<p>Mangára Building, (<i>Gwalior</i>) S.W. corner.</p> <p>λ 26 5 25·5 L 78 5 38·2</p> <p>See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p>	<p>Nandauli House. (<i>Etah</i>) Staircase of Banis's house.</p> <p>λ 27 34 27·1 L 78 32 4·3 No. 178</p>
<p>Mahesari, LII.† (<i>Vide page 10—J.</i>)</p> <p>λ 29 30 18·21 L 78 11 18·88 H 821 h 14 No. 55</p>	<p>Mehtra, XXXIV. (<i>Vide page 8—J.</i>)</p> <p>λ 28 22 5·99 L 78 41 23·88 H 652½ h 16 No. 34</p>	<p>Nandi, XLVII. (<i>Vide page 9—J.</i>)</p> <p>λ 29 17 7·53 L 78 48 59·41 H 771 h 12 No. 53</p>
		<p>Nandráe Temple. (<i>Etah</i>) Spire of large temple.</p> <p>λ 27 46 53 L 78 39 37</p>

* Of the North-East Longitudinal Series.

† Of the Great Arc Series—Section 24° to 30°.

‡ Refers to the upper surface of brick-work of the tower.

Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.
<p>Narki s. (Agra) On small pillar on Raja's house.</p> <p>λ 27 17 42 L 78 26 47</p>	<p>Paniári Building. (Gwalior) Cupola of a square building surmounted by a dome.</p> <p>λ 26 6 13·8 L 78 4 31·1</p> <p>See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p>	<p>Ráipur (Raepur) Building, (Gwalior) Northernmost, in village.</p> <p>λ 25 44 12 L 77 34 35</p> <p>See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p>
<p>Narwar, XI. (Vide page 5—J.)</p> <p>λ 25 37 22·30 L 77 57 56·47 H 1489 h Not forthcoming</p> <p>No. 13</p>	<p>Paniári Village Building, (Gwalior) S. gate.</p> <p>λ 26 5 55 L 78 4 18</p>	<p>Ráipur (Raepur) Peak Temple. (Gwalior) Dome of square temple.</p> <p>λ 26 8 16·4 L 78 7 16·8</p> <p>See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p>
<p>Narwar Fort, (Gwalior) N. gateway of inner fort.</p> <p>λ 25 39 2·9 L 77 56 56·5</p> <p>See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p>	<p>Parauli, XXXI. (Vide page 7—J.)</p> <p>λ 28 9 45·27 L 78 23 31·39 H 643 h 19</p> <p>No. 36</p>	<p>Ráipur (Raepur) Temple. (Gwalior) In village.</p> <p>λ 26 7 51·2 L 78 5 51·8</p> <p>See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p>
<p>Orchha Temple. (Tehri or Orchha)</p> <p>λ 25 20 59·0 L 78 40 54·7</p> <p>No. 143</p>	<p>Pátan Temple. (Saugor)</p> <p>λ 24 7 27·7 L 78 54 47·0</p> <p>See Synoptical Vol. of the Calcutta Longitudinal Series.</p>	<p>Rajauli, XXXIII. (Vide page 8—J.)</p> <p>λ 28 22 27·53 L 78 27 39·95 H 629 h 23</p> <p>Nos. 35, 37</p>
<p>Pabba h.s. (Lalitpur) On a quartzose ridge running N.E. and S.W.</p> <p>λ 25 5 48·06 L 78 30 41·87</p> <p>Nos. 100, 101</p>	<p>Patna, I. (Vide page 4—J.)</p> <p>λ 24 20 3·70 L 78 39 36·15 H 1823 h Not forthcoming</p> <p>No. 1</p>	<p>Rámgarh Hill Staff. (Datia) On a quartz high ridge near the village so called.</p> <p>λ 25 53 6·59 L 78 32 10·49</p> <p>Nos. 165, 166</p>
<p>Painári Temple, (Saugor) On hill.</p> <p>λ 24 1 20·4 L 78 54 58·2</p> <p>See Synoptical Vol. of the Calcutta Longitudinal Series.</p>	<p>Pindarua Fort, (Saugor) Flag.</p> <p>λ 24 6 22·8 L 78 44 52·5</p> <p>See Synoptical Vol. of the Calcutta Longitudinal Series.</p>	<p>Rámghat House. (Bulandshahr) Bania's house at W. end of village.</p> <p>λ 28 5 42·2 L 78 25 45·4</p> <p>No. 184</p>
<p>Panáhat, XX. (Vide page 6—J.)</p> <p>λ 26 52 39·07 L 78 24 58·83 H 588 h 30</p> <p>No. 22</p>	<p>Pondri, XXIV. (Vide page 6—J.)</p> <p>λ 27 27 52·48 L 78 26 52·19 H_s 594·75* h 44·3</p> <p>No. 26</p>	<p>Rámpura Hill Staff. (Saugor) Near Rampur village.</p> <p>λ 24 13 35·97 L 78 47 42·45</p> <p>No. 87</p>
<p>Pandúa h.s. (Lalitpur) Also called Sakáto h.s. About 1½ miles N. of Petoria village.</p> <p>λ 24 16 44·45 L 78 42 33·75</p> <p>Nos. 62, 63</p>	<p>Ráipur (Raepur), XIII. (Vide page 5—J.)</p> <p>λ 26 8 14·29 L 78 7 16·15 H 1219 h Not forthcoming</p> <p>Nos. 12, 15</p>	<p>Ranha Hill Staff. (Gwalior)</p> <p>λ 24 59 37·25 L 78 13 34·53</p> <p>No. 180</p>
		<p>Ráon h.s. (Gwalior) On a high ridge of the dark quartzose formation, about two miles from the village and fort of Belhári. It is the highest hill in that direction. Close to the Ráon hill to the W. runs the Non river, a tributary of the Sindh.</p> <p>λ 25 41 48·89 L 78 18 6·76</p> <p>Nos. 161, 163</p>

* Refers to the mark-stone imbedded at 1 foot below the ground floor of the tower.

Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.
<p>Ratangawán h.s. (<i>Tehri or Orchha</i>) About a mile W. of village so called.</p> <p>λ 25 1 38·71 L 78 50 44·07 Nos. 111, 112</p>	<p>Sánichri (<i>Saníchari</i>), XV. (<i>Vide page 5—J.</i>)</p> <p>λ 26 23 31·20 L 78 15 30·00 H 825 h <i>Not forthcoming</i> Nos. 17, 18</p>	<p>Shikohabad s. (<i>Mainpuri</i>) On staircase of gateway on the Agra road, S. end of town.</p> <p>λ 27 6 9·32 L 78 38 6·93 No. 178</p>
<p>Ronda Fort, (<i>Saugor</i>) S.W. angle.</p> <p>λ 24 10 36·3 L 78 32 39·7 See Synoptical Volume of the Calcutta Longl. Series.</p>	<p>Sankráo, XXVIII. (<i>Vide page 7—J.</i>)</p> <p>λ 28 2 28·99 L 78 34 30·15 H 670 h 37 No. 30</p>	<p>Singan h.s. (<i>Saugor</i>) About 2 miles E. of Pitauli village.</p> <p>λ 24 1 33·53 L 78 47 0·90 Nos. 76, 77</p>
<p>Sagoni h.s. (<i>Saugor</i>) About 1½ miles E. of Tágár village.</p> <p>λ 24 7 42·60 L 78 42 58·34 Nos. 58, 59</p>	<p>Sanyer Hill Staff. (<i>Jhánsi</i>) About 5 miles W. of the town of Orchha.</p> <p>λ 25 21 12·80 L 78 36 30·21 Nos. 133, 134</p>	<p>Sirsa, XL. (<i>Vide page 8—J.</i>)</p> <p>λ 28 54 39·64 L 78 34 33·32 H 739·45† h 26·0 No. 44</p>
<p>Sahaswán Platform. (<i>Budaun</i>) On a high mound N. of village.</p> <p>λ 28 4 25·7 L 78 47 16·0 No. 180</p>	<p>Sarkára, XLV. (<i>Vide page 9—J.</i>)</p> <p>λ 29 15 46·92 L 78 34 47·36 H 761 h 16 No. 50</p>	<p>Sonania h.s. (<i>Tehri or Orchha</i>) On a detached hill near village so called.</p> <p>λ 25 20 2·19 L 78 44 56·30 Nos. 131, 132</p>
<p>Sakít Temple. (<i>Etah</i>) Spire of highest temple.</p> <p>λ 27 26 10·4 L 78 49 14·9 No. 177</p>	<p>Sarkaura h.s. (<i>Lalitpur</i>) On a detached hill near village so called.</p> <p>λ 24 34 13·34 L 78 56 43·22 No. 95</p>	<p>Sonáwal Temple. (<i>Datia</i>) On a sandstone hill so called.</p> <p>λ 25 43 3·9 L 78 24 54·8 No. 160</p>
<p>Sakrora, XXX. (<i>Vide page 7—J.</i>)</p> <p>λ 28 13 12·59 L 78 35 43·17 H 613 h 21 No. 32</p>	<p>Sarsotha, XXIX. (<i>Vide page 7—J.</i>)</p> <p>λ 28 5 59·88 L 78 47 40·39 H 606 h 24 No. 31</p>	<p>Soron House. (<i>Etah</i>) Bania's high house.</p> <p>λ 27 53 34·0 L 78 47 19·6 No. 182</p>
<p>Salímpur, XXVI. (<i>Vide page 7—J.</i>)</p> <p>λ 27 46 36·46 L 78 33 15·88 H 645 h 48 No. 28</p>	<p>Sheopuri, XLVIII*. (<i>Vide page 10—J.</i>)</p> <p>λ 29 18 59·08 L 78 1 58·60 H 871 h 41 No. 56</p>	<p>Súrajpahár h.s. (<i>Dehra Dún</i>) On the highest point of the hill.</p> <p>λ 29 57 58·35 L 78 12 26·76 No. 186</p>
<p>Salun Hill Temple. (<i>Jhánsi</i>)</p> <p>λ 25 41 17·8 L 78 49 36·0 Nos. 151, 152</p>	<p>Sherpur, XXI. (<i>Vide page 6—J.</i>)</p> <p>λ 27 0 41·38 L 78 41 33·12 H 578 h 31† No. 23</p>	<p>Súrajpur Building, (<i>Gwalior</i>) Square, E. end of S. wall.</p> <p>λ 25 58 19·6 L 78 4 25·4 See Synoptical Vol. of the Great Arc Series—Section 24° to 30°.</p>
<p>Samaspur h.s. (<i>Saugor</i>) Near Sanjra village.</p> <p>λ 24 11 14·54 L 78 42 17·02 Nos. 60, 61</p>		<p>Suru Hill Staff. (<i>Datia</i>) About 1½ miles N.W. of the town of Datia.</p> <p>λ 25 41 17·62 L 78 28 27·71 No. 153</p>

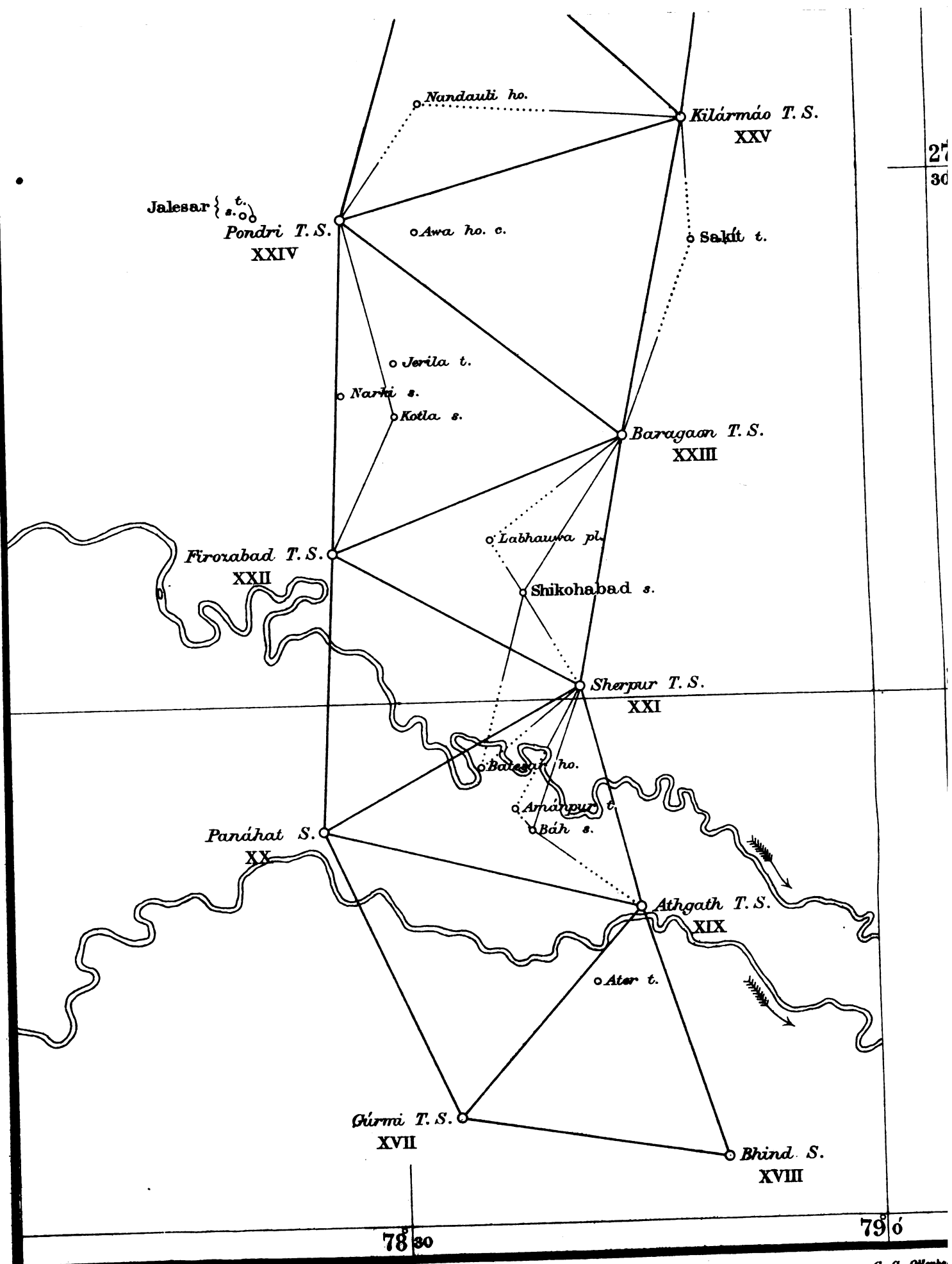
* Of the Great Arc Series—Section 24° to 30°. † Above the terreplein of the rampart on which the tower stands. ‡ Refers to the upper mark-stone of the tower and was determined as follows. The point leveled to was at the base of the tower of which the height = 715·22 feet and to this was added 24·23 feet (the height of upper mark-stone above that point obtained by subtense observations).

Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.	Name of station, district, description, co-ordinates &c.
<p>Talaphári h.s. (<i>Gwalior</i>) On the highest of the group of Talaphári hills which is of moderate elevation and of sandstone structure. The station lies about $\frac{1}{2}$ a mile off from the village of that name. The Betwanti flows through these hills.</p> <p style="text-align: center;">o ' "</p> <p>λ 24 58 49.05 L 78 20 18.21 Nos. 128, 129</p>	<p>Tehri Palace. (<i>Tehri or Orchha</i>) Flagstaff on palace in fort.</p> <p style="text-align: center;">o ' "</p> <p>λ 24 44 32.8 L 78 52 37.7 Nos. 97, 98</p>	<p>Tinsmál, VII*. (<i>Vide page 4—J.</i>)</p> <p style="text-align: center;">o ' "</p> <p>λ 24 7 12.97 L 79 2 12.45 H 2139 h 9 No. 1</p>

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

February 1879.

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



C. G. Ollender

THE END

1877

PROCEEDINGS OF THE

OF

THE

1877

MEMORIALS OF THE

Handwritten text, possibly a title or subtitle.

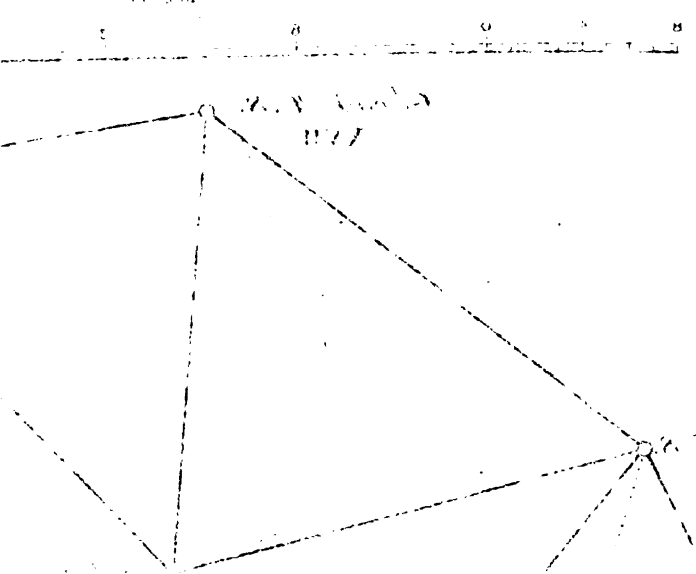
Handwritten text, possibly a date or location.

Handwritten text, possibly a name or title.

Handwritten text, possibly a description or reference.

Handwritten text, possibly a name or title.

Handwritten text, possibly a name or title.



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 $18^{\circ} 3'$ and $24^{\circ} 7'$, 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 $18^{\circ} 3' 5''$; $24^{\circ} 7' 11''$; and $29^{\circ} 30' 18''$. 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, Gurhágárh 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.
- Do. 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 Hurílóng 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.
-

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

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 Gurhágárh 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.
- Do. 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.

January, 1883.



