DIAGRAM

OF

THE SOUTHERN TRIGON

OF THE

G. T. SURVEY OF INDIA
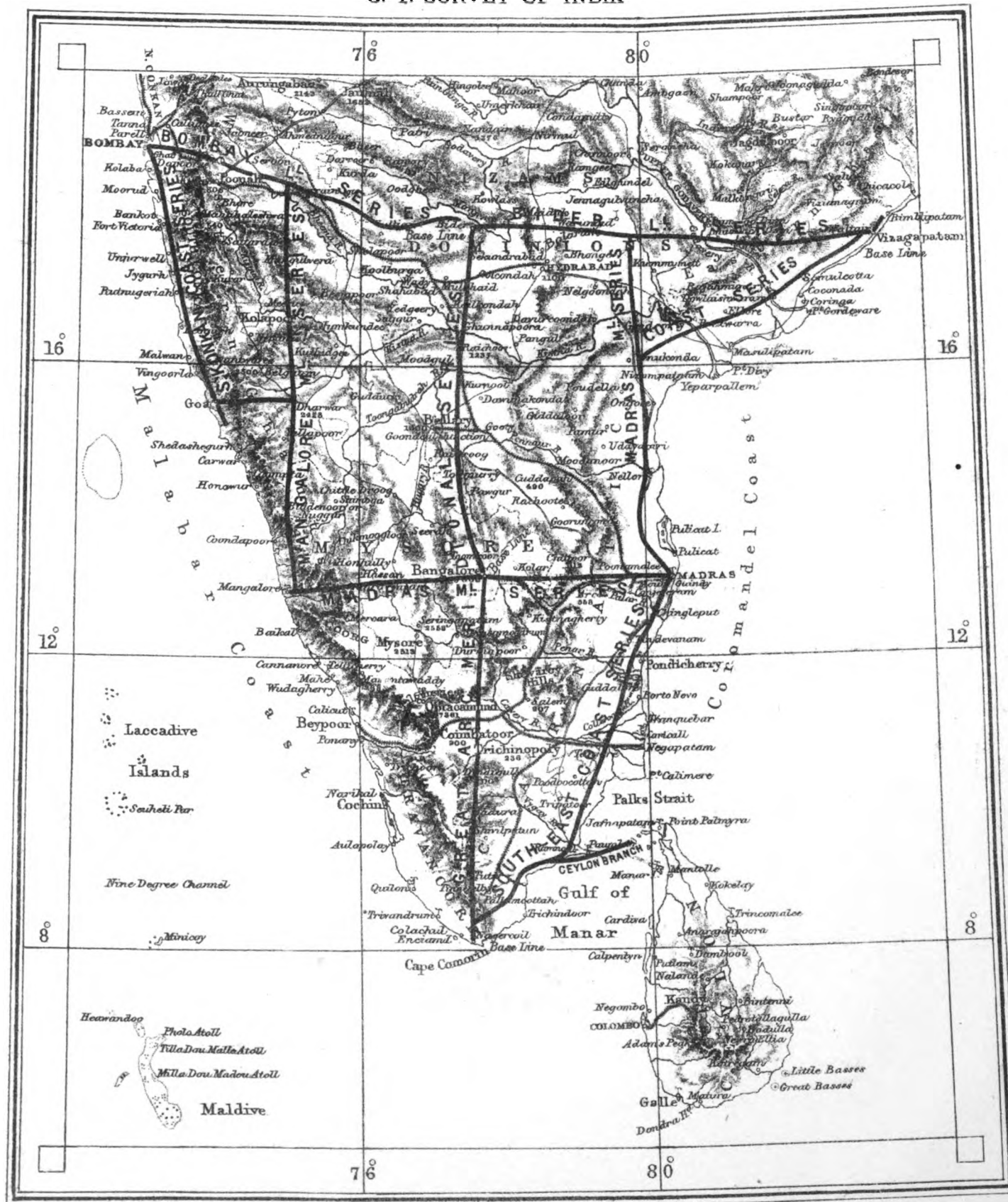
SYNOPSIS OF THE RESULTS OF THE OPERATIONS OF

THE GREAT TRIGONOMETRICAL SURVEY OF INDIA

VOLUME XXIII.

DESCRIPTIONS AND CO-ORDINATES

OF THE

PRINCIPAL AND SECONDARY STATIONS AND OTHER FIXED POINTS OF

THE SOUTH KONKAN COAST SERIES

OR SERIES C

OF THE

SOUTHERN TRIGON.

PREPARED IN THE OFFICE OF THE TRIGONOMETRICAL BRANCH, SURVEY OF INDIA,
COLONEL G. STRAHAN, R.E., DEPUTY SURVEYOR GENERAL, IN CHARGE.

PUBLISHED UNDER THE ORDERS OF
COLONEL H. R. THUILLIER, R.E., SURVEYOR GENERAL OF INDIA.

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ERRATA, ADDENDA ᴇᴛ CORRIGENDA.

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PAGE

VI—*c.* in line 3 from top	*for* — o″·oɪɪ	*read* + o″·oɪɪ

VII—*c.* „ lines 1 and 8 ⎫
VIII—*c.* „ „ 3, 10 and 15 ⎭ from top „ 19 feet „ 17 feet

Page 17—*c.* *add* the following Triangles to Secondary Stations.

No. of Triangle	Station		Corrected Plane Angle	Distance			Theodolite used
				Log. feet	Feet	Miles	
			o ′ ″				Inch
196	Tinai	h.s.	67 47 35	4·569880	37143	7·035	18
	Marsingal	„	47 55 39	4·473930	29780	5·640	„
	Páldi	„	64 16 46	4·558039	36144	6·845	9
					2		
197	Martkanni	h.s.	47 38 37	4·569880	37143	7·035	18
	Marsingal	„	50 44 23	4·590152	38918	7·371	„
	Páldi	„	81 37 0	4·696589	49727	9·418	9
			*				
198	Páldi	h.s.	45 40 46	4·401984	25234	4·779	„
	Tinai	„	76 43 7	4·535635	34327	6·501	18
	Devali	„	57 36 7	4·473930	29780	5·640	9
					3		
199	Marsingal	h.s.	19 14 32	4·401984	25234	4·779	18
	Tinai	„	8 55 32	4·074801	11880	2·250	„
	Devali	„	151 49 56	4·558039	36144	6·845	9

* Base deduced by two sides and included angle.

Pages 19—c. to 22—c.   add the following Azimuths.

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
DEVALI h.s.		°	′	″		PALDI h.s.		°	′	″	
Tinai	h.s.	74	46	5	198	Martkanni	h.s.	15	22	3	197
Páldi	″	132	22	12	198	Marsingal	″	293	45	3	196
Marsingal	″	226	36	1	199	Devali	″	312	21	3	198
						Tinai	″	358	1	49	196
MARSINGAL h.s.											
Devali	h.s.	46	36	25	199	TINAI h.s.					
Martkanni	″	63	2	13	197	Páldi	h.s.	178	1	52	196
Páldi	″	113	46	36	196	Devali	″	254	44	59	198
MARTKANNI h.s.											
Páldi	h.s.	195	21	36	197						
Marsingal	″	243	0	13	197						

Pages 26—c. to 36—c.   add Stations and Points with their Descriptions, &c.

Name of Station or Point	District	Description	Latitude North	Longitude East of Greenwich	No. of Triangle
			° ′ ″	° ′ ″	
Devali h. s. *Daywulli Hill*	North Kánara	About 3¼ miles N.N.W. of the village so called, and 2 miles N. of the road leading from Supa táluka across the Western Gháts into the Portuguese Territory of Goa. 1811-14.	15 27 25·17	74 23 31·13	198 199
Páldi h. s.* *Palla Hill S.*	″	On the boundary between the Portuguese Territory of Goa and the British district of North Kánara, about 500 feet S. of Darsinga Principal Station. It was re-fixed in the season 1866-67. Marked by a circle and dot cut on the rock. 1811-14.	15 31 14·55	74 19 11·71	196 197
Peaked Hill *Peaked Ghaut*	″	... ...	14 47 47	74 15 16	...
Sherevagutta Rock *Sherevagoota*	″	... ...	14 51 58	74 21 33	...
Shinganhalligudda Peak *Shinganhullygooda*	″	... ...	14 56 40	74 22 18	...

* The description and co-ordinates of the station here given supersede those on page 30—c.

August, 1891.

          J. ECCLES,

In charge of Computing Office.

REFERENCES.

The abbreviations employed in the text are as follows:—

h.s. denotes hill station (secondary),

s. „ station „

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

The latitudes and longitudes of all points shown on the Chart at the end of the 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 Chart, lines are drawn: the lines are either continuous throughout, or dotted for half the length and continuous for the other half: the dots indicate that the bearing was not observed. For other points difficult to identify or of comparatively less accuracy, numerical values of triangles and azimuths are not given.

August, 1891.

J. ECCLES,

In charge of Computing Office.

PREFACE.

The South Konkan Coast Series of which the details are given in this volume, forms part of the western boundary, of the Southern Trigon, or that section of the triangulation of India which embraces the portion of the peninsula lying south of the line joining Bombay and Vizagapatam. The general principles of the simultaneous reduction, and the procedure followed in carrying it out, are explained in Volume II of the *Account of the Operations, &c.*; and full details of the whole of the triangulation appertaining to the trigon will be found in Volumes XII and XIII of the *Account of the Operations, &c.*

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

For the several Series forming the North-West Quadrilateral,

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

For those forming the South-East Quadrilateral,
  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.
XIII A.   South Párasnáth and South Malúncha Series.

Already published.

And for the following Series of the North-East Quadrilateral,

XIV. Budhon Meridional Series.
XV. Rangír Meridional Series.
XVI. Amua and Karára Meridional Series.
XVII. Gurwáni and Gora Meridional Series.
XVIII. Huríláong and Chendwár Meridional Series. } Already published.
XIX. North Párasnáth and North Malúncha Meridional Series.
XX. Calcutta and Brahmaputra Meridional Series.
XXI. East Calcutta Longitudinal and Eastern Frontier Series, Section 23° to 26°.
XXII. *Assam Valley Triangulation, E. of Meridian 92°.

     The present is the 25th Synoptical Volume in order of publication and the first of those appertaining to the Southern Trigon; it gives the results, both of the principal triangulation, which was executed with theodolites having azimuthal circles of 15 and 24 inches in diameter read by 3 and 5 micrometer microscopes respectively, and of the secondary triangulation, which was executed with 15 and 18 inch theodolites read by 3 and 2 micrometer microscopes respectively, and with smaller theodolites, having circles of 9 and 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 Southern Trigon. All secondary triangulation emanating from one side of the principal Series and closing on another side thereof, or on a contiguous Series, have also been made consistent throughout.

     As regards the general arrangement of this volume, it may be pointed out that the Introduction and the Names and Descriptions of the Principal Stations, were originally prepared for Volume XIII 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 Introduction was printed first of all in the year 1888; it gives a historical and descriptive sketch of the progress of the whole operations in the field—both principal and secondary—from year to year, mentions the Officers by whom they were conducted, the theodolites with which principal angles were measured, and indicates the work done by each of the Assistants. Soon after the secondary triangulation was adjusted in accordance with the principal, and then the printing of the volume was resumed.

     The data given in this volume are the following:—

First (page 1—$_c$), 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, and also a numerical list giving the names corresponding to the numbers.

Second (page 2—$_c$), descriptions of the structure and positions of the principal stations as taken from the original records of the observations.

Third (page 7—$_c$), the angles and sides of the principal triangles, numbered and arranged in order from north to south.

Fourth (page 10—$_c$), 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.

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     * This is an offshoot of the Assam Longitudinal Series, and falls entirely outside of the limits of the North-East Quadrilateral. The volume is issued in a preliminary form, and therefore only a limited number of copies are available to meet any immediate demand for data: the final publication will be hereafter made on the completion of the triangulation in Burma, into the general reduction of which this Series will enter.

Fifth (page 18—*c*,), the azimuths of surrounding stations and points, at principal, principal-auxiliary and secondary stations, the latter arranged in alphabetical order.

Sixth (page 24—*o*), the co-ordinates and descriptions of all stations and points arranged in alphabetical order.

It has not been considered necessary to publish the whole of the details of the secondary triangulation; the sides and angles of 170 triangles, which were selected as most likely to be of future use, and the azimuths of all these sides, have been given; but for a number of other points the co-ordinates only have been given. With the aid of Tables Nos. XXVI, XXVII, XXVIII, XXIX and XXX of the *Auxiliary Tables to facilitate the calculations of the Survey of India*, Dehra Dún, 1887, 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 heights above mean sea level of the stations depend in the first instance on the final trigonometrically determined values of the stations of Mándvi and Karanja of the Bombay Longitudinal Series, and of Yalúr and Samshergad of the Mangalore Meridional Series, and on the heights of the stations of Agoada nd Pil determined by the Spirit-levelling Operations. The manner in which the heights of the remaining stations have been made to accord with those above designated is explained on pages V—*c*. to VIII—*c*. of the Introduction to this Series and on pages 27 and 28 of Part I of Volume XII of the *Account of the Operations, &c.* The heights in this volume are referred to the mean level of the sea. It may be here stated that trigonometrically determined heights invariably refer to the upper surface of the masonry pillar or structure on which the instrument stood. Spirit-levelled values refer to the upper surface of the protecting pillar on which the levelling staff was set: 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 24—*c*. In some cases the heights are taken from Topographical Survey maps—reduced to G. T. S. datum—and the surface to which these refer may be assumed to be the ground level.

The longitudes depend on an astronomically determined value of the longitude of the Madras Observatory, deduced about the year 1815. The longitude of the Madras Observatory has however been re-determined by the Electro-Telegraphic method, from observations made at Greenwich, Mokattam (in Egypt), Suez, Aden, Bombay and at certain stations of the triangulation in India.

This value of the longitude of the Madras Observatory is equivalent to 80° 14′ 51″ E.; and as the originally adopted value, on which the longitudes of the whole of the stations of this Survey are based, is 80° 17′ 21″ E.—see page 135 of Volume II of the *Account of the Operations, &c.*—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 accordance with the provincial lists of spellings constructed under the immediate orders of the Government of India. The newly authorised spellings were adopted for all names and other words contained in these lists; but for words for which there was no specific authority, the spellings have been framed in accordance with the methods followed in the preparation of the published lists, reference being made in the present instance more particularly to the Gazetted List for Bombay. As a general rule the pronunciations of the vowels are as follows:—*a* has a variable sound as in wom*a*n, rur*a*l, p*a*ltry; *á* as in t*a*rtan; *i* as in b*i*t; *í* as in rav*i*ne; *u* as in b*u*ll; *ú* as in r*u*ral; *o* as in n*o*te; *e* as *a* in s*a*y; *au* as *ou* in cl*ou*d; *ai* as *i* in r*i*de. Final vowels and those in well-known terminals are unaccented. When the popular spelling of a name has been accepted by Government, its correct orthography is generally given in parenthesis where the name occurs for the first time.

The chart accompanying this volume shows 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 chart it is hoped that little difficulty will be met with in finding out any of the data which may be required. The descriptions of the secondary stations are in some cases not as full and clear as is to be desired: this arises from the inadequacy of the information entered on the spot by the surveyors in their field books; every effort has been made to supplement the field books, whenever it was found practicable to do so, in order to facilitate the future identification of the stations, and all the information which is forthcoming has now been given.

The general arrangement of the volume is in accordance with that adopted in previous Synoptical Volumes. The data which it contains have been prepared chiefly under the superintendence of Mr. W. H. Cole, M.A., Deputy Superintendent, the Officer in charge of the Computing Office. The Introduction to this Series was written by Captain S. G. Burrard, R.E., Deputy Superintendent. The volume like its predecessors has been printed at the Trigono-metrical Branch Office at Dehra; Mr. Peychers and Mr. H. G. Shaw have rendered valuable service in the examination of the press proofs generally, and Mr. Peychers more particularly in regard to the numerical details which require the utmost care in supervision through the press, and in this respect from his natural aptitude and experience his assistance has been most valuable.

MUSSOOREE, }

August, 1891. }

G. STRAHAN, COLONEL, R.E.,

Dy. Surveyor General,

In charge Trigonometrical Surveys.

SOUTH KONKAN COAST SERIES.

SOUTH KONKAN COAST SERIES.

INTRODUCTION.

On the conclusion of the original triangulation of the Bombay Longitudinal Series and after the completion of the Bider Base-line, in the measurement of which the Bombay Party assisted, Lieutenant W. S. Jacob, of the Bombay Engineers, undertook the South Konkan Coast Series, which was accordingly commenced early in 1842. In the previous October Mr. Thomas Sanger, Sub-Assistant, Great Trigonometrical Survey, had been despatched to select and build the principal stations: he had been ordered to make the side Karanja–Singi the base of the new Series, but finding on arrival that it was not suitable, he took upon himself the responsiblity of starting from the side Karanja–Mándvi, a change that subsequently met with the Executive Officer's approval.

The portion of country between Bombay and Mangalore over which the triangulation was to pass was fairly well known, having some years previously been surveyed by Major Jervis, an Engineer Officer who had worked under the Bombay Government independently of the Surveyor General. Mr. Sanger's approximate series consisted of two lines of stations, one running near the coast and the other along the line of gháts, and by the end of the field season it had been carried down to the parallel of 16°.

The Bider Base-line having been finished by February, Lieutenant Jacob proceeded to Mándvi to commence observing the final angles; on his arrival he found the station mark had been entirely destroyed and every stone of the platform had been removed and rolled down the hill. Fortunately the lower mark-stone had been set in a circular excavation in the rock of about 15 inches diameter, so that it was possible to restore the point to within 2 or 3 inches of the original position, and angles between several points being taken, it was proved that the error did not exceed that amount. Lieutenant Jacob considered a probable error of 3 inches as rejectaneous on a line of 40 miles, and determined therefore as far as the Konkan Series was concerned to treat the side Karanja–Mándvi as correct. Having been considerably delayed by this occurrence, Lieutenant Jacob did not commence his operations until the end of February: the haziness of the weather greatly obstructed his progress, and finding it hopeless to attempt to obtain good angles he brought the season's field-work to a close on the 21st of March at the station of Mahábaleshvar.

Lieutenant Jacob had constantly suffered from illness brought on by exposure in peculiarly pestilential tracts of country, and in the summer of 1842 his health entirely gave way: he proceeded to England on medical certificate and his connection with the Survey

Department terminated* : he was succeeded on December 14th, 1842, by Lieutenant Harry Rivers of the Bombay Engineers, an officer of great mathematical ability, who had been appointed to the Trigonometrical Survey only three months previously.

During the field season of 1842-43 the party were employed on the North Konkan Series, now known as the Singi Meridional, and it was not till November, 1843, that work on the South Konkan Coast Series was resumed. The first station visited was Kanta (III), and by the 1st of January, 1844, the observations of the final angles had been carried down as far as Ghirya (IX)

Season 1843-44.

PERSONNEL.

Lieut. H. Rivers, Bombay Engineers, 2nd Assist.
Mr. J. Fraser, 1st Class, Sub-Assistant.
„ T. Sanger, 1st „ „
„ J. Da Costa, 2nd „ „

and Valvan (x). Mr. DaCosta was then sent to Surat to select the stations for the North Konkan Series, and Mr. Sanger proceeded south in advance of the main party to complete the approximate work of the South Konkan Coast Series to Goa. The weather continued remarkably favourable, and no difficulties or delays occurred to hinder the observations, so that by the 15th of February Lieutenant Rivers had practically completed the field-work of the Series including the observation of astronomical azimuths at Chaukola and Kumbhári. The southern stations were visited in the following order :—Chaukola, Salili, Kumbhári, Pil, Agoada, Parule ; and the party embarked at the last named for Bombay the day after closing work. Apparently as an after-thought, astronomical observations for azimuth were taken in October, 1844, at Mirya.

The instrument employed on the South Konkan Coast Series was the same 15-inch Theodolite by Dollond†, that was used in the observations of the Bombay Longitudinal Series. It was constructed on a design and under the direction of Captain Kater, and possessed, like all Dollond's instruments, a very fine telescope : but the horizontal circle was one of the first that had ever been engine-divided, and proved of an inferior order, giving angles differing to the extent of 13″ on different parts of the limb. The microscopes too were not adjustable for "run", and corrections varying with the temperature had therefore to be applied to the recorded readings of the angles.

Weak as the instrument undoubtedly was, its defects were not nearly sufficient to account for the want of harmony visible in the results of the observations : the condemnation of this Series by Sir Andrew Waugh to the third rank of geodetical undertakings, if indeed it deserves to be classed as such at all, must be considered to be entirely due to the fewness of the zero changes made during the measurement of the angles. The method of changing zero pursued on this Series gave readings at every 20° of the limb instead of at every 10° according to the recognised system in force in the G. T. Survey, a deviation from established practice which resulted in the triangular error being on an average 4″ and amounting in one instance to no less than 13″. The greatest triangular error in the Bombay Longitudinal Series, executed with the same instrument, was 3″ and the average 1″.

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* Lieutenant Jacob afterwards became Government Astronomer at Madras.
† For a full description of the instrument and the work performed by it, see Appendix No. 2 of Volume II of the *Account of the Operations, &c.*

The heights of the Principal Stations were deduced from those of Mándvi and Karanja as determined by the Bombay Longitudinal Series; the observations of vertical angles were however chiefly confined to the flanks of the series, and were seldom taken on the diagonal rays connecting the two flanks : the usual check obtained by having two independent determinations for each station was therefore altogether wanting. This peculiarity arose not from any mistake or oversight but because the Officer in charge of the operations considered that results derived from cross rays would be valueless since the laws of refraction must be different on the summit of the Gháts and along the sea-coast. Sir Andrew Waugh has pointed out, that, if a difference in the laws of refraction *does* exist, the original determination of the height of the first station on the Gháts must itself have been affected thereby, and the discrepancy so introduced must have remained constant throughout the eastern flank; he has moreover put his opinion on record that the heights of the stations on the Gháts would have been more accurately determined by frequent reference to the sea-level and repeated cross observations. As before stated the vertical observations emanated from Mándvi and Karanja and proceeded in two distinct lines along each flank. These lines afterwards met at the station of Mirya with the following discrepant results :—

Height of Mirya deduced from Karanja by observations along the Coast Line   490·0 feet

,,   ,,   Mándvi   ,,   ,,   Gháts   452·2   ,,

Difference   — 37·8

The height of Mirya was also determined by direct reference to the sea-level and found to be 464·4 feet. The error generated through five stations along the Gháts was therefore —12·2 feet, and that generated through four stations along the coast +25·6 feet. This result, which shews the coast error to be twice as large as the ghát error, clearly exposes the fallacy of avoiding cross observations. From Mirya the observations again proceeded in separate lines along the flanks as far as Valvan, where there were two deductions differing by 3·4 feet, and further south at Agoada and Salili there were also double deductions differing 10·8 feet and 12·2 feet respectively.

In 1866 and 1867 the southern extremity of the South Konkan Coast Series was connected with the Mangalore Meridional Series by Captain (now Colonel) C. T. Haig, R.E., and Lieutenant H. Trotter, R.E.: the connecting series followed the parallel of 15° 30′ and consisted of a small chain of six single triangles; it was known at the time as the Goa Longitudinal Series, but this name is no longer recognised and the six small triangles have been incorporated for purposes of reduction and publication in the South Konkan Coast Series: as however the angles were observed in the same seasons and by the same officers and party as those of the neighbouring portion of the Mangalore Meridional Series, it has been considered advisable for the sake of continuity in description to give the historical account of the work in the Introduction to the latter to which therefore readers are referred.

The triangulation of the South Konkan Coast Series has been included in the simultaneous reduction of the Southern Trigon: the errors actually dispersed on this Series between

the origin Karanja–Mándvi and the terminus Samshergad–Yalúr (the side of junction between the Mangalore Meridional Series and the old Goa Longitudinal Series) are:—

In Latitude	...	...	...	...	—	$0\overset{''}{\cdot}011$
„ Longitude	...	...	...	...	+	$0\cdot218$
„ Azimuth	...	...	...	...	—	$1\cdot469$
„ Side { Logarithm	...	...	...	+	$0\cdot000,01478$,

{ giving a ratio of about $2\frac{1}{8}$ inches per mile.

Owing to the large circuit errors in the values of Lieutenant Rivers' heights, the omission of the cross rays in his observations, and the adverse criticism passed on the work by Sir Andrew Waugh, it was decided in 1885 when the compilation of this volume was being taken in hand to revise all the vertical angles of the Series. The revision which was carried out by Messrs. Belcham and Prunty, Assistants in the Tidal and Levelling Party, in the field season of 1885-86, had for its origin the height of Karanja, which was derived directly by reciprocal vertical observations to and from Trombay, a station whose height had been previously determined by Spirit-levelling: on account of the uncertain refraction on rays between the top of the gháts and the sea-coast, the reciprocal vertical angles were observed on all such rays *simultaneously* from the upper and lower stations—a precaution ordered by Colonel C. T. Haig, R.E., the Deputy Surveyor General, with a view to minimizing the errors caused by refraction, of which Lieutenant Rivers forty years before had been so afraid; a comparison between the new heights and the old exhibited discrepancies with a range of 43 feet, which in Colonel Haig's words "amply justified the revision"; the resulting heights were accepted as "exceptionally accurate" and were reported as "probably true to within two or three feet." As, however, in the next field season (1886-87), a line of spirit-levelling had to be executed to connect the new Tidal Station of Mormugáo with that at Kárwár, and Pil, the southernmost station of the South Konkan Coast Series, was in the immediate vicinity, Colonel Haig decided to have a short line of spirit-levels taken to it for the purpose of determining "any small residual error that there might be in the trigonometrical levelling": he also directed Agoada which is only 5 miles north of Mormugáo Tidal Station to be *directly* connected with the latter.* By these two connections, contrary to the Deputy Surveyor

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* The manner in which this connection was effected is described by the Officer in charge of the Tidal and Levelling Party as follows:—
'Before going to Agoada, Mr. Corkery and Narsing Das set their watches by the tide gauge clock at Mormugáo tidal observatory in order
'that their observations at Agoada and the observatory clerk's at Mormugáo might be made simultaneously. Agoada Station was then
'connected by double levelling with a bench-mark laid down at Agoada Fort Jetty, in a convenient position for observing the difference
'between its height and that of the tide as shown upon a levelling staff set up in the water. One complete observation consisted in
'reading the back and forward staff and the height of the water on the latter, and noting the time. Observations were taken at intervals
'of 5 minutes, beginning about one hour before high-water and continuing for an equal time after high-water, and the duration of actual
'high-water was sufficient to enable a couple of observations to be taken then, so that a whole set comprised about 26 observations.
'A similar set of observations was taken before, during and after low-water. Observations were not taken at night. * * * While these
'observations were being taken at Agoada the observatory clerk was taking simultaneous observations at the Mormugáo tidal observatory.
' * * * They were taken on the 22nd, 23rd and 24th May. I wished to obtain the exact times of high and low-water at Agoada
'to compare with the corresponding times at Mormugáo; but the sea was not smooth enough to enable this to be done in the available
'time'. After interpolating between the data furnished by the Kárwár and Bombay tidal observations, it was found that 'no corrections
'for minute differences of time or for difference of range were required. One set of observations at Agoada combined with the synchro-
'nous set at Mormugáo gave one value of the height of the Agoada bench-mark, above the zero of the tide-gauge at Mormugáo. Six
'such values were obtained—three at high-water and three at low-water—the mean of which gave the final height of the bench-mark
'above the zero of the gauge. The difference of level between the zero of the gauge and mean sea-level * * * was a known quantity
'by means of which the heights above mean sea-level of the bench-mark and Agoada Station were finally deduced. * * * The
'height of Agoada Station now obtained is probably accurate to $0\cdot03$ of a foot'.

General's sanguine expectations an accumulated error of 19 feet was shown up in the trigono-metrical heights at both places. It must be concluded that reciprocal observations though made simultaneously are not equally affected by refraction; if the refraction at both stations is *the same*, the subtended angle, which is half the difference of a pair of reciprocal vertical angles, should remain constant, and not be affected by variations in the *amount* of refraction; on this Series however it was found in many instances to vary between limits far exceeding those of errors of observation.

Besides disclosing an error of 19 feet in what were considered as "exceptionally accurate" trigonometrical heights, the line of levels brought to light another peculiarity: it was that the spirit-levelled values of Agoada and Pil agreed exactly with the old results, discarded and much abused, of Lieutenant Rivers. This agreement gave rise to a discussion, as to whether the rejection of Rivers' heights was justifiable after all: there were but two circuits of vertical observations able to be formed in the old work throughout the Series: one closed at Mirya with an error of 38 feet, the other at Agoada with an error of 11: in the face of such discrepancies the correct results at Agoada and Pil could not be regarded as any-thing but happy coincidences due to cancelment of errors, and it was finally decided to throw out Rivers' observations altogether as unworthy of combination with those of the revision.

The question then arose as to whether Lieutenant Rivers' value of the height of Mirya, which it will be remembered he derived directly from the sea-level, should be retained as an absolute height and used as a means for dispersing residual errors of trigono-metrical work or whether it should be rejected also. By reference to the old angle books it was found that Rivers had determined the height of Mirya above mean sea-level as follows:— He first placed an upright pole in the water, and on three successive days marked upon it the level of the sea at high and low tide: half-way between the upper and lower marks he drew a horizontal line, which represented the mean sea level, and which he found to be 3·2 feet below the highest point that the tide rose to. He then erected a second pole on a firm rock, that was just covered at high water, and proceeded to his trigonometrical station of Mirya, a little over half-a-mile off, from which he observed the angles of depression to the top and bottom of the pole. From these two angles and the measured length of the pole he computed the height of Mirya above *high water* and then referred it to mean sea level by increasing it 3·2 feet. His observations extended over a week, three different poles, a 7-foot, a 13-foot and a 19-foot being all employed. His angles of depression were never repeated more than twice (*i.e.* once on each face of the instrument), and on some days they were only observed once on but one face. The results were very discrepant, more than half were rejected on the spot for apparently no other reason than discordance, and those retained depended on three days' ob-servations only, two of which differed by 7 feet. Sir Andrew Waugh writes:—"The average "height of the pole was about 15 feet: the height of Mirya Station is 464 feet. Consequently "the unknown quantity sought is 31 times greater than the known base it is derived from: "from this circumstance it appears that the principle employed in determining the height of "Mirya has been extended beyond its legitimate limits." Whilst passing this criticism on Lieutenant Rivers' *method*, the Surveyor General gave it as his final opinion that on the whole the determination of the height of Mirya might be considered true within two feet.

Now the vertical observations of 1885-86 brought out the height of Mirya as 464 feet, the identical value obtained by Rivers. If therefore Rivers' results were to be retained, the residual error of 19 feet mentioned above in the modern trigonometrical work would have to be distributed between Mirya and Agoada; while if Rivers' results were to be discarded, the same residual would have to be distributed between Karanja and Agoada, and in this case Rivers' height would be shown to be 8½ feet in error. The number of triangles in the Series between Karanja and Mirya was eight, and between Mirya and Agoada five: one triangle only had a closing vertical error as large as 4 feet, whilst the average discrepancy per circuit was 1½ feet: the sum of all the circuit errors between Mirya and Agoada amounted to only 11 feet. It was considered astonishing that a residual error of 19 feet should have appeared at Agoada at all, but that it was generated wholly between Mirya and Agoada, is in the face of the small circuit discrepancies, incredible. It was therefore decided in spite of the accordance of the old and modern results, and notwithstanding Sir Andrew Waugh's opinion that Rivers' height of Mirya was correct to within 2 feet, to reject Rivers' observations *in toto*. This has now been done: the residual error of 19 feet has been dispersed between Karanja and Agoada, and the height of Mirya has been determined as 473 feet. It is probable even now, in spite of the additional precautions taken in measuring the vertical angles, that on account of peculiarities in refraction the heights of the South Konkan Coast Series are not so reliable as ordinary modern trigonometrical heights: it would in fact be no matter for surprise, if an error of 5 feet was discovered hereafter in the height of any one of the stations.

Secondary Work.

The Secondary work of Lieutenants Jacob and Rivers was scanty, only about 80 points of this class being fixed in the entire length—nearly 250 miles—of the Series: the principal places whose positions were determined were:—The towns of Poona and Ratnagíri, and the forts of Ráigad, Partábgad, Matgad and Bhaura; the Agoada light-house and the more important headlands likely to be of use in navigation were now accurately fixed for the first time. In 1864, Lieutenant-Colonel J. T. Walker, the Superintendent of the Great Trigonometrical Survey, ordered Captain C. T. Haig, who was then employed on the triangulation of the Mangalore Meridional Series, to detach, as opportunities offered, one of his assistants to the South Konkan and to allot to him the work of laying down all points of importance along the coast. Accordingly, Mr. Anding with a small party was sent to Bombay in January, 1865; and, working at intervals, he was able in that and the next field season to add about 35 additional points along the length of the coast-line between the extremities of the South Konkan Series.

July, 1888.

S. G. BURRARD,

In charge of Computing Office.

SOUTH KONKAN COAST SERIES.

PRINCIPAL TRIANGULATION. ALPHABETICAL LIST OF STATIONS.

Adhúr	. . . . . .	V.	
Agoada	. . . . . .	XIII.	
Bailúr	. . . . . .	XX.	
Bori	. . . . . .	XVII.	
Chaukola	. . . . . .	XII.	
Darsinga	. . . . . .	XIX.	
Ghirya	. . . . . .	IX.	
Jarma	. . . . . .	XVIII.	
Kanta	. . . . . .	III.	
Karanja	. . . . . .	XXXIV.	
(Of the Bombay Longitudinal Series).			
Kumbhári	. . . . . .	XVI.	
Kumbhárli	. . . . . .	VI.	
Mahábaleshvar	. . . . . .	IV.	
Mándvi	. . . . . .	XXXI.	
(Of the Bombay Longitudinal Series).			
Manoli	. . . . . .	VIII.	
Mirya	. . . . . .	VII.	
Parule	. . . . . .	XI.	
Pil	. . . . . .	XV.	
Salili	. . . . . .	XIV.	
Samshergad	. . . . . .	XXIII.	
(Of the Mangalore Meridional Series).			
Titvi	. . . . . .	I.	
Torna	. . . . . .	II.	
Valvan	. . . . . .	X.	
Yalúr	. . . . . .	XXII.	
(Of the Mangalore Meridional Series).			

PRINCIPAL TRIANGULATION. NUMERICAL LIST OF STATIONS.

XXXI } (Of the Bombay Longitudinal Series). { Mándvi.			
XXXIV } { Karanja.			
I . . . . . . Titvi.	XI . . . . . . Parule.		
II . . . . . . Torna.	XII . . . . . . Chaukola.		
III . . . . . . Kanta.	XIII . . . . . . Agoada.		
IV . . . . . . Mahábaleshvar.	XIV . . . . . . Salili.		
V . . . . . . Adhúr.	XV . . . . . . Pil.		
VI . . . . . . Kumbhárli.	XVI . . . . . . Kumbhári.		
VII . . . . . . Mirya.	XVII . . . . . . Bori.		
VIII . . . . . . Manoli.	XVIII . . . . . . Jarma.		
IX . . . . . . Ghirya.	XIX . . . . . . Darsinga.		
X . . . . . . Valvan.	XX . . . . . . Bailúr.		
	XXII } (Of the Mangalore Meridional Series). { Yalúr.		
	XXIII } { Samshergad.		

SOUTH KONKAN COAST SERIES.

DESCRIPTION OF PRINCIPAL STATIONS.

All the Principal Stations hereafter described, with the exception of that on the bastion of Agoada fort, are situated on hills. Stations numbered XXXI, and XXXIV (of the Bombay Longitudinal Series), II, III, XIV, XVII, XVIII, XX, and XXII and XXIII (of the Mangalore Meridional Series), each consists of a circular and isolated pillar of masonry, either solid or perforated, from 2 to 3⅓ feet in diameter, and from 3¼ to 5 feet in height excepting at two stations at which the pillars are sunk in the ground and have their surfaces flush with the ground level. Around each pillar and level with its upper surface, a platform of stones and earth 10 to 14 feet square was built for the accommodation of the observatory tent. Stations numbered I and XIX are denoted simply by circle and dot cut on the rock *in sitú*. The remaining stations have platforms of stones and earth, some circular and 10 to 13 feet in diameter, and some square 8 to 14 feet in side, and varying in height from 1 to 5⅓ feet. In the centre and upper surface of the pillar or platform is embedded a stone on which is engraved a mark (circle and dot) in the normal of one or more similar marks below, the lowermost mark being in some instances cut on the rock *in sitú*.

At all the stations the upper marks have been protected by small pillars of masonry in the form of a frustum of a pyramid, 28 inches square at base, 20 inches at top and 3½ feet in height, excepting at Agoada station where the pillar is 3 feet in diameter and 5 feet in height. These protecting pillars carry sufficiently accurate marks on their upper surfaces for Topographical and Revenue Survey purposes, as shewn at page 74 of Volume II of the *Account of the Operations &c.*

The following descriptions have been compiled from those given by the Officers who executed the Series, and by the Officer in charge Tidal and Levelling Operations, under whose superintendence the vertical angles of the Series executed between the years 1842-44, were revised, supplemented as regards adjacent villages from the Topographical Survey Maps of the country traversed, and corrected, so far as the local sub-divisions in which the several stations are situated, from the latest Annual Reports furnished by the District Officers to whose charge the stations were committed.

The orthography is based on the official lists published under the orders of the Government of India, except that the long *e* is unaccented as in all previous volumes of this series, and the short *e* is shewn thus, *ĕ*; the same remarks apply to *o*. Final vowels and those in well-known terminals are unaccented. When the popular spelling of a name has been accepted by Government, its correct transliteration is given in parenthesis where the name occurs for the first time.

XXXI. (*Of the Bombay Longitudinal Series*). Mándvi Hill Station, lat. 18° 38', long. 73° 35'—observed at in 1839, 1841 and 1842—is on a ridge of the Western Ghâts and occupies the peak locally known as Mándvi: it is 1½ miles W. of the village of Vaula, whence there is a very fair path to the station, Tikona hill fort 1¾ miles W. is connected with it by a remarkable ridge about a mile in length along which there is a footpath. The station is at the N. end of the summit of the hill which rises precipitously from all sides to a height of about 500 feet above the level of the high ridges of the table-land. The hill is composed generally of hard vesicular basalt; the lower part is of amygdaloid. The station is in the lands of the village of Tikona, táluka Povàn Mával, Bhor State.

The station of 1839 consisted of a platform having a mark-stone in its upper surface and another inserted in a circular hole, 15 inches in diameter, excavated in the rock below. No change appears to have been made in 1841. When visited in 1842 in connection with the operations of the South Konkan Coast Series, the platform had been entirely destroyed and the lower mark removed: a new station was built consisting of a platform enclosing a solid, circular and isolated pillar of masonry, having two marks, one engraved on the rock *in sitú* in the excavation mentioned above and the other 2 feet above it on a stone embedded in the upper surface of the pillar which is flush with the ground. The upper part of the pillar has three stones for the support of the theodolite stand. From observations taken both at and to this station, its position was found to be identical with that of 1839. In 1881 the mark in the upper surface of the pillar, which is 5 inches lower than the surrounding platform, was found in position but the pillar was somewhat damaged. In 1885 the station was found to consist of a roughly constructed pillar of

masonry 2½ feet in diameter and 2 feet deep surrounded by an annulus and the upper mark was firmly embedded in position. The directions and distances of the circumjacent villages are:—Malaundi N.W. by N., mile 1; Kásig S.W. by W., miles 1½; Kolván S., miles 3½; and Andhali S.E. by E., miles 1¾. *Note.*—In 1842 another mark surrounded by a smaller circle was also cut on the rock *in sitú*: this mark is 3·35 inches to the S.E. and a little above the lower mark of the present station.

XXXIV. (*Of the Bombay Longitudinal Series*). Karanja Hill Station, lat. 18° 51′, long. 72° 59′— observed at in 1839 and 1842—is situated on the highest part of the southern and higher of two hills on the island of Uran about 6 miles S.E. of Bombay. The hill is locally called Dronagiri, and has the cart road from the town of Uran to Karanja skirting its eastern base. There are two very good reservoirs of water on the hill, one at ¼ of a mile N.W. of the station and the other ¾ of a mile in the same direction and contiguous to a dilapidated chapel. The station is in the lands of the village of Chanja, táluka Panvel, district Kolába.

The station as built in 1839 is described as "marked by a circle and centre on a square pile of stones." No change appears to have been made in 1842. It was visited in 1866 in connection with the Bombay Island Triangulation but no statement is forthcoming to show that any change was then made. In 1881 Mr. W. G. Beverley found the station to consist of a solid, circular pillar of masonry 3 feet in diameter enclosed in a platform of stones about 10 feet square and 4 feet high. The pillar was much damaged and a flag-staff of the Harbour Surveying Department was found inserted in it, consequently the mark-stone was not in its place but on the side of the platform: the mark-stone was firmly refixed in the centre and upper surface of the pillar. When again visited in 1885, the station was in good preservation. The directions and distances of the circumjacent villages are:— Uran N., miles 1½; Karanja S.E., mile 1; Chanja N.E. by E., mile 1; and Nagaon N.W., miles 1½.

I. Titvi Hill Station, lat. 18° 23′, long. 73° 4′—observed at in 1842—is situated on the highest part of a range of hills running nearly parallel to the coast, and at a distance of about 8 miles from it. The large village of Nándgaon which is ¼ mile from the coast and on the main road from Borlai to Murúd lies 6 miles W. of the station and that of Murúd 4¼ miles S.W. The station is in the lands of the village of Titvi, táluka Roha, district Kolába.

The station is denoted by a circle and dot engraved on the surface of a large laterite rock surmounted by a cairn of stones. When visited in 1885-86 it was in good preservation. The azimuths and distances of the circumjacent villages are:—Dhangar (hamlet) 222°, mile ¼; Titvi 176°, mile 1; Khandár 186°, miles 2; Sasoli 178°, miles 2¾; and Chenera 194°, miles 2½.

II. Torna Hill Station, lat. 18° 16′, long. 73° 40′—observed at in 1842—is situated on the highest part of the hill fort of Torna or Prichandgad, and near the western brow of the hill: it is 89 yards E. of the western or Konkan gate of the fort and 60 yards W. of Mengais' temple and sadar (court) house. The ascent from the village of Yela at the E. foot of the hill is good till the fortifications are reached, after which it becomes steep and dangerous, the summit being reached by steps cut in the rock. It is in the lands of the village of Yela, táluka Prichandgad, Bhor State, Sátára Agency.

The station consists of a platform enclosing a solid, circular and isolated pillar of masonry, 3 feet in diameter and 2 feet deep, having its surface flush with the ground level which contains two marks, one in its upper surface and the other 2·08 feet below it in the foundation. The directions and distances of the circumjacent villages are:—Vagdari N.N.W., miles 1½; Yela Buzurg N.E. by N., miles 1¾; Rájgad (fort) E.S.E., miles 4¼; Bársi hamlet S.S.W., miles 1½; and Phanas hamlet W.N.W., mile 1.

III. Kanta Hill Station, lat. 17° 58′, long. 73° 8′—observed at in 1843—is situated on the centre and highest of the three conspicuous peaks lying in a straight line and about ⅓ a mile apart. These peaks rise above the table-land on the S. side of the Sávitri river. The large village of Bánkot is on the slope of the table-land about 2¾ miles N.W. The station is in the lands of the village of Kanta, táluka Dápoli, district Ratnágiri.

The station of 1843 was marked by a circle and dot cut on the rock. When visited in 1885-86, it was found to consist of a kacha circular pillar 2 feet in diameter and 3½ feet in height, surrounded by a platform of loose stones. As there was no mark-stone in the upper surface of the pillar it was removed and the mark of 1843 was found engraved on the rock *in sitú*. On completion of the observations a pillar of paka masonry of the same dimensions as the kacha pillar was built, carrying a mark-stone in its upper surface, in the normal of the mark on the rock. The azimuths and distances of the following villages and objects are:—Ambavli 348°, miles 1½; Panháli 280°, miles 1¾; Gudagad 245°, miles 1¼; Shipola 198°, mile 1; Western peak 124° 17′, mile ½; and Eastern peak 301° 43′, mile ¾.

IV. Mahábaleshvar or Malcolmpeth Hill Station, lat. 17° 55′, long. 73° 43′—observed at in 1842—is situated near the S.W. end of the rocky ridge locally known as Sindola, and is the highest point in the sanitarium of Mahábaleshvar. It is immediately above the house called "The Four Oaks", from which a path leads to the Beckwith Monument and Christ's Church distant ¾ of a mile W. by N. The station is in táluka Jávli, district Sátára.

The station consists of a circular platform of stones 13 feet in diameter having a mark-stone in its upper surface and another 4·54 feet below it at the ground level. Around the upper mark-stone three large stones are fixed for the theodolite stand. When visited in 1885-86 the station was in good preservation.

V. **Adhúr Hill Station**, lat. 17° 24′, long. 73° 13′—observed at in 1843—is situated on a very conspicuous hill, the foot of which is washed by the sea on its S., N. and W. sides which are very precipitous: it is 3¼ miles S.W. by W. of the village of Pálshet on the high road from Bombay to Bandar Rohila. The ascent from the E. is tolerably easy. The station is 60 feet N. of the southern extremity of the hill and 79 feet from the S.E. corner, 81·75 feet from the S.W. corner and 86 feet from the centre (top) of Durga Devi temple which is 17 feet square and 15 feet high. It is in the lands of the village of Adhúr, táluka Chiplún, district Ratnágiri.

The station consists of a platform of stones 12 by 13 feet and 1 foot high, having a mark-stone in its upper surface and another 1·01 feet below it. When visited in 1885-86 the station was in good preservation. The directions and distances of the circumjacent villages are:—Adhúr E. by N., miles 2; Budhal N.E. by N., mile ¼; Karul E.S.E., miles 2; and Bori (Custom Office) S.E., miles 1¾.

VI. **Kumbhárli Hill Station**, lat. 17° 25′, long. 73° 43′—observed at in 1843—is situated on a flat-topped hill called Torna, about 30 feet from its western edge which is precipitous: it is 1½ miles of the Engineer's Bungalow near milestone No. 38 on the high road from Karád to Chiplún and immediately above and on the N. side of the Police Chauki at the head of the Kumbhárli Ghát. The station is best approached from the village of Helvak, *viá* Torna on the table-land. It is in the lands of the village of Torna, táluka Pátan, district Sátára.

The station described in 1843 is as follows:—"The station is marked in the rock." When visited in 1885-86 it was found to consist of a rough stone platform 10 feet in diameter with a mark-stone 8 inches square firmly fixed in the centre and flush with the upper surface of the platform which is 2½ feet above the level of the hill. The directions and distances of the circumjacent villages are:—Torna E.S.E., miles 1¼; Bopoli S.E. by S., miles 1¾; Dhankal S., miles 2; Kembsa S.W. by S., miles 2; and Pophli N.W. by W., miles 3½.

VII. **Mirya Hill Station**, lat. 17° 2′, long. 73° 18′—observed at in 1843 and 1844—is situated on the summit of a very conspicuous hill locally known as Mirya Dongar, and is surrounded on three sides by the sea: it is about 2 miles W. of Shirgaon village and 3 miles N.N.W. of the Ratnágiri Light-house. The station is in the lands of the village of Vada Mirya, táluka and district Ratnágiri.

The station was originally denoted by the usual circle and dot engraved on the top of a large rock around which a platform was built. When visited in 1885-86, the mark on the rock was found intact. The azimuths and approximate distances of the following places are:—Mirya No. 1 230°, mile 1; Mirya No. 2 285°, mile ¾; Mirya Dharmshála 216°, miles 1¼; and Ratnágiri Collector's Office 320°, miles 3.

VIII. **Manoli Hill Station**, lat. 16° 55′, long. 73° 51′—observed at in 1843—is situated on the W. edge of a small table-land at the W. end of Manoli hill: it is 18 feet E. of a precipice and somewhat lower than the highest point of the range which is extensive and runs E. and W. The village of Ámba, near the head of Ámbághát on the road from Kolhápur to Ratnágiri, lies 4 miles N. of the station. The ascent, which is steep in two or three parts and through dense forest, is from the village of Manoli. It is in the lands of the village of Manoli, táluka Vishálgad, Kolhápur State.

The station, as described in 1843, consisted of a platform having a mark-stone in its upper surface and another mark 1·54 feet below it engraved on the rock. When visited in 1885-86 it was found to consist of a rough but substantial stone platform 13 feet in diameter and 3½ feet above the ground, with a mark-stone about 7 inches square set in the centre and on a level with the surface of the platform. The approximate directions and distances of the following villages are:—Manoli N., miles 2; and Malkapur E., miles 9.

IX. **Ghirya Hill Station**, lat. 16° 30′, long. 73° 22′—observed at in 1843—is situated on a low flat-topped hill, locally known as Kurutiam, rising perpendicularly above the coast line, about 4 miles S. of the large village of Vijaydurg. It is in the lands of the village of Ghirya, táluka Devgad, district Ratnágiri.

The station in 1843 was marked by the usual circle and dot engraved on the rock. When visited in 1885-86 it was found to consist of a stone masonry platform 7¾ feet square and 1·83 feet high, in the centre of which stood a staff in a circular hole 19 inches deep and 12 inches in diameter, cut partly into the rock. On removing the platform three flat surfaces (intended for the theodolite stand) were found cut around the circular hole the centre of which agreed with the centre of the circle circumscribed around the equilateral triangle formed by joining the centres of the three flat surfaces above mentioned. A mark-stone was fixed in the centre of this hole flush with the surface of the rock. From observations to the surrounding stations it became evident that the mark occupied the same position with that engraved on the rock in 1843 and which had been destroyed in cutting the hole for the staff. The azimuths and approximate distances of the surrounding places are:—Kumár Vádi 270°, mile ½; Chaundasir temple 240°, mile ¾; Kothavadi temple 300°, miles 1½; and Puruli hamlet 324°, miles 3½.

X. **Valvan Hill Station**, lat. 16° 25′, long. 73° 54′—observed at in 1843—is situated on the western knoll of an extensive semicircular range of hills, called Mursumbi Dongar, about 3 miles N. of the village of Valvan and 4 miles N. of Dajipur, a village with a travellers' bungalow near the head of Phondághát, on the high road from Kolhápur to Devgad. The knoll on which the station is gradually slopes westward for about

300 yards and then ends precipitously, overlooking the table-land on which lies a small hamlet belonging to Valvan. The station is approached from Valvan by a gradually ascending path up to the foot of the knoll after which the ascent is rather steep. It is in the lands of the village of Valvan, estate Bávda, Kolhápur State.

The station built in 1843 consisted of a platform having a mark-stone in its upper surface and another mark 9½ inches below cut on a large piece of rock around which the platform was built. When visited in 1885-86 it consisted of a dot and circle 6 inches in diameter deeply engraved on a rock projecting about 4½ feet above the surrounding ground, around which was a 10-foot square platform of rough stone-work, with steps on the west side.

XI. Parule Hill Station, lat. 15° 58', long. 73° 33'—observed at in 1843 and 1844—is situated on the highest point and at the N.E. end of a flat-topped, conspicuous hill, rising immediately above the coast line, about 6¾ miles S.S.E. of the town of Málvan. It is in the lands of the village of Parule, táluka Vengurla, district Ratnágiri.

The station originally consisted of a platform which contained two mark-stones, one in its upper surface and the other 5·83 feet below it. When visited in 1885-86 it was found to be a platform of stones 9 feet square and 5¾ feet high; the upper mark-stone had been removed, but the lower was intact, over which the usual rectangular pillar of masonry has been built. The azimuths and approximate distances of the circumjacent places are:—Asba hamlet 210°, miles 1½; Parule 252°, miles 1½; Pat 276°, miles 4; and Málvan Custom house 151°, miles 7.

XII. Chaukola Hill Station, lat. 15° 56', long. 74° 2'—observed at in 1843—is situated on about the centre of a small flat-topped hill, the most westerly point of the group of hills forming the Chaukola plateau: it is about 2½ miles S. by W. of the Amboli Sanitarium at the top of the Ambolighát, and ⅔ of a mile S.E. of the 46th mile-stone on the road from Belgaum to Vengurla. There is a much higher point about ¼ a mile N.E., but this did not suit the ray to Valvan station. It is in the lands of the village of Chaukola, Sávant-vádi State.

The station consists of a platform 12 feet square having a mark-stone in its upper surface and another mark 2·13 feet below it cut in the rock. When visited in 1885-86, the station was found in good preservation. The directions and distances of the circumjacent places are:—Chaukola S.E. by E., miles 3½; Phansauda S.S.W., miles 1¾; and Nenanvádi S.E. by E., miles 1¼.

XIII. Agoada Station, lat. 15° 30', long. 73° 49'—observed at in 1844 and 1867—is situated in the centre of the N.E. bastion of the upper fort of Agoada, 273 feet 4 inches from the Light-house, the azimuth of which is 346° 42' 30". A few miles lower down is the town of Panjim or New Goa, now (1888) the chief town of the Portuguese territory.

The station, as built in 1843, was marked by a circle and dot on brass let into the stone at the surface of a pillar and a mark-stone embedded 1·77 feet below it. When visited in 1867 the station pillar was found intact: over this a circular protecting pillar of masonry, 3 feet in diameter and 5 feet in height, was built, carrying a mark-stone in its upper surface. When again visited in 1885-86, the protecting pillar was found in good preservation.

XIV. Salili Hill Station, lat. 15° 35', long. 74° 7'—observed at in 1844 and 1867—is situated on the highest point of the hill isolated from the line of the Western Gháts, and runs E. and W. The sister hill called Vágiri lies to the N.W. with a very conspicuous clump of trees on its summit. The ascent which is steep and over rugged ground is from the village of Salili at the S. foot of the hill. It is in the lands of the village of Salili, táluka Sanquelim (Sánkuli), Portuguese territory.

The station is said to be the same as that of Captain Garling's triangulation, but no description was given of it when visited in 1844. When visited in 1867 a circular, perforated and isolated pillar of masonry 32 inches in diameter and 4·96 feet in height was built carrying a mark-stone in its upper surface, in the normal of the mark of 1844. A platform 14 feet square was built, through which and the central pillar an aperture gives access to the lower mark. When again visited in 1885-86, the station was found in good preservation and to consist of a platform 14 feet square, and about 3 feet above the surface of the hill, enclosing an isolated pillar of masonry 32 inches in diameter, with a mark-stone let in flush with the upper surface of the pillar. The approximate directions and distances of the following places are:—Salili S., miles 1⅓; and Sanquelim (town) W. by S., miles 5.

XV. Pil Hill Station, lat. 15° 6', long. 74° 3'—observed at in 1844—is situated on the highest point of the hill locally known as Peril. There are two good springs of water on the hill lying N.W. and S.E. respectively, both within a quarter of a mile of the station. It is in the lands of the village of Mor Pil, pargana Bálli, district Goa, Portuguese territory.

The station is marked in the usual manner on two stones, the difference of height between them being 1·71 feet. When visited in 1886, the station was found slightly damaged but the upper mark-stone was intact. The azimuths and approximate distances of the following places are:—Baitul 128°, miles 4½; Mor Pil 148°, mile 1; Cape Ramas 70°, miles 4; and Kopi 59°, miles 2.

XVI. Kumbhári Hill Station, lat. 15° 9', long. 74° 20'—observed at in 1844—is situated on a peak of the Western Gháts overlooking the Konkan, about 3 and 6 miles S.E. of the villages of Kumbhári, and Bhattia respectively, and 14 miles S.E. of the town of Sanguem (Sangi). The summit of the hill is pointed and very precipitous on the N. and W. sides, and has just sufficient space for the station: on the E. and S. the hill

slopes down gradually. It is on the boundary of Kagloli and Kumbhári villages, the former in the Supa táluka, district Kánara, and the latter in the Sanguem táluka, Portuguese territory.

The station consists of a platform 12 feet square and 2½ feet high which contains two mark-stones, one in its upper surface and the other 1·25 feet below it. Around the upper mark three large stones are fixed for the theodolite stand.

XVII. Bori Hill Station, lat. 15° 21′, long. 74° 5′—observed at in 1867—is situated on a high hill about 5 miles S.S.E. of Panda in Portuguese territory. The best route to the station is by the river Rachol which should be ascended as far as the village of Bori, whence there is a stiff climb of two hours over a very rough road. It is probably within about 4 feet of the station of " Boree " of Colonel Lambton's triangulation. The station is in Portuguese territory.

The station consists of a platform enclosing a circular, perforated and isolated pillar of masonry 4 feet high, which contains two mark-stones, one in its upper surface and the other below it : an aperture gives access to the lower mark.

XVIII. Jarma Hill Station, lat. 15° 36′, long. 74° 9′—observed at in 1866—is situated on the eastern of two remarkable hills which rise almost from sea level to a height of about 2,000 feet and are detached from the main line of the Western Gháts : the station is on the centre and highest of three summits, the northern having a grove of trees forming quite a landmark, about 6⅓ miles E. by N. of the town of Sanquelim on the main road from Bicholim to Khánápur, and 4 miles S.W. by S. of Chorlen Ghát. The station is in the lands of the village of Jarma, táluka Sanquelim, Portuguese territory.

The station consists of a platform enclosing a circular, isolated and perforated pillar of masonry which contains two mark-stones, one in its upper surface and the other below it : an aperture gives access to the lower mark.

XIX. Darsinga Hill Station, lat. 15° 31′, long. 74° 19′—observed at in 1866—is situated on the extreme western edge of the precipitous crest of a high and commanding plateau, somewhat detached from the main line of the Western Gháts. The stone marking the trijunction of the districts of Kánara, Belgaum and Goa is about 11 chains S. It is about 3 miles N. of the small village of Paldi, and 2½ miles S.W. of Mundil. The only easy ascent is from the village of Paldi at the S. side of the hill. The station is in the lands of the village of Paldi, táluka Supa, district North Kánara.

The station is denoted only by a circle and dot cut on the rock *in sitú.*

XX. Bailúr Hill Station, lat. 15° 45′, long. 74° 22′—observed at in 1866—is situated on the highest ridge of the hill, about 6¼ miles W. by S. of Kiniya village on the road from Jámboti to Belgaum, and 4¼ miles S.S.W. of that of Tudiya. It is in the lands of the village of Betgeri, táluka and district Belgaum.

The station consists of a platform of loose rubble enclosing a circular, isolated and perforated pillar of masonry 5 feet high, which contains two mark-stones, one in its upper surface and the other below : an aperture gives access to the lower mark. The directions and distances of the circumjacent villages are :—Betgeri N.E. by N., mile ¾ ; Mahálunga W.N.W., miles 2½ ; and Boknúr E.N.E., miles 1⅓.

XXII. (*Of the Mangalore Meridional Series*). Yalúr Hill Station, lat. 15° 45′, long. 74° 34′—observed at in 1866—is situated near the S.W. corner of the ramparts of the hill fort of Yalúr lying 2⅓ miles E. of the Railway Station of Desúr, and about 7 miles S. by E. of the cantonment of Belgaum. The station is in Kurundvád State, Southern Marátha Agency.

The station consists of a platform of loose stones enclosing a circular, perforated and isolated pillar of masonry, which contains two mark-stones, one in the upper surface of the pillar and the other 6 feet below ; an aperture gives access to the lower mark. The approximate directions and distances of the circumjacent villages are :—Yalúr N. by W., miles 2 ; Solgi N.W., mile 1 ; Desúr S.W. by W., miles 2 ; Nágunhatti E. by S., miles 2¾ ; and Nandihalli S.E., miles 2¾.

XXIII. (*Of the Mangalore Meridional Series*). Samshergad Hill Station, lat. 15° 34′, long. 74° 34′—observed at in 1866—is situated on the highest of the three conical shaped hills, about 3 miles W. of the large village of Nandgad on the high road from Tinaighát to Kittúr, and 5½ miles S.S.E. of the town and Railway Station of Khánápur. The station is in the lands of the village of Nandgad, táluka Khánápur, district Belgaum.

The station consists of a platform of loose stones enclosing a circular, perforated and isolated pillar of masonry, which contains two mark-stones, one in the upper surface of the pillar and the other below ; an aperture gives access to the lower mark. The directions and distances of the circumjacent villages are :—Naikol W.S.W., miles 1¾ ; Sávargali N.W. by N., miles 1¼ ; Hirébhalke S.W., miles 2 ; and Karanjol S. by E., miles 2.

October, 1889.

W. H. COLE,
In charge of Computing Office.

SOUTH KONKAN COAST SERIES.

PRINCIPAL TRIANGULATION. TRIANGLES.

No. of Triangle	Station	Spherical Excess	Corrected Plane Angle			Distance		
			°	′	″	Log. feet	Feet	Miles
1	Karanja, XXXIV	2·66	59	30	3·04	5·3054821	202060·8	38·269
	Mándvi, XXXI	2·66	48	22	35·23	5·2437838	175300·8	33·201
	Titvi, I	2·66	72	7	21·73	5·3486654	223185·2	42·270
2	Mándvi, XXXI	2·05	75	50	14·30	5·3280751	212850·7	40·313
	Titvi, I	2·05	37	10	12·91	5·1226506	132632·7	25·120
	Torna, II	2·05	66	59	32·79	5·3054821	202060·8	38·269
3	Titvi, I	2·46	70	51	35·03	5·3390893	218317·9	41·348
	Torna, II	2·45	42	3	30·86	5·1897902	154806·9	29·319
	Kanta, III	2·46	67	4	54·11	5·3280751	212850·7	40·313
4	Torna, II	2·04	66	1	9·91	5·3087350	203580·0	38·557
	Kanta, III	2·03	35	30	29·70	5·1119810	129413·9	24·510
	Mahábaleshvar, IV	2·04	78	28	20·39	5·3390893	218317·9	41·348
5	Kanta, III	3·21	77	59	56·61	5·4088953	256386·6	48·558
	Mahábaleshvar, IV	3·20	51	2	35·71	5·3092603	203826·3	38·603
	Adhúr, V	3·20	50	57	27·68	5·3087350	203580·0	38·557

NOTES.—1. The values of the side are given in the same line with the opposite angle.
2. Stations Mándvi, XXXI and Karanja, XXXIV appertain to the Bombay Longitudinal Series.

No. of Triangle	Station	Spherical Excess	Corrected Plane Angle			Distance		
			°	′	″	Log. feet	Feet	Miles
		″						
6	Mahábaleshvar, IV	2·62	44	10	38·28	5·2520881	178685·0	33·842
	Adhúr, V	2·63	46	32	31·34	5·2697939	186120·4	35·250
	Kumbhárli, VI	2·63	89	16	50·38	5·4088953	256386·6	48·558
7	Kanta, III	2·98	40	2	51·06	5·2697939	186120·4	35·250
	Mahábaleshvar, IV	2·98	95	13	16·83	5·4594916	288065·8	54·558
	Kumbhárli, VI	2·98	44	43	52·11	5·3087350	203580·0	38·557
8	Adhúr, V	1·94	77	42	10·54	5·3060366	202319·0	38·318
	Kumbhárli, VI	1·93	42	39	3·26	5·1470452	140296·0	26·571
	Mirya, VII	1·93	59	38	46·20	5·2520881	178685·0	33·842
9	Kumbhárli, VI	2·51	59	52	39·85	5·2846240	192585·7	36·475
	Mirya, VII	2·51	54	47	59·51	5·2599281	181940·0	34·458
	Manoli, VIII	2·52	65	19	20·64	5·3060366	202319·0	38·318
10	Mirya, VII	2·78	70	56	13·37	5·3497576	223747·2	42·376
	Manoli, VIII	2·77	54	37	15·65	5·2855911	193015·0	36·556
	Ghirya, IX	2·77	54	26	30·98	5·2846240	192585·7	36·475
11	Manoli, VIII	2·63	53	56	30·44	5·2746823	188227·2	35·649
	Ghirya, IX	2·62	52	7	3·72	5·2642733	183769·4	34·805
	Valvan, X	2·63	73	56	25·84	5·3497576	223747·2	42·376
12	Ghirya, IX	2·67	62	45	27·24	5·3086180	203525·1	38·546
	Valvan, X	2·67	61	55	54·27	5·3053377	201993·6	38·256
	Parule, XI	2·67	55	18	38·49	5·2746823	188227·2	35·649
13	Valvan, X	2·30	51	1	3·21	5·2248834	167835·3	31·787
	Parule, XI	2·30	58	28	59·02	5·2649602	184060·3	34·860
	Chaukola, XII	2·30	70	29	57·77	5·3086180	203525·1	38·546
14	Parule, XI	2·18	56	33	7·90	5·2418706	174530·2	33·055
	Chaukola, XII	2·18	70	5	22·85	5·2937351	196668·6	37·248
	Agoada, XIII	2·17	53	21	29·25	5·2248834	167835·3	31·787
15	Chaukola, XII	1·16	40	24	36·98	5·0537361	113171·2	21·434
	Agoada, XIII	1·16	48	15	3·20	5·1147675	130246·9	24·668
	Salili, XIV	1·17	91	20	19·82	5·2418706	174530·2	33·055
16	Parule, XI	1·61	29	45	1·30	5·1147675	130246·9	24·668
	Chaukola, XII	1·62	110	30	1·55	5·3906779	245854·4	46·563
	Salili, XIV	1·62	39	44	57·15	5·2248834	167835·3	31·787
17	Agoada, XIII	1·43	76	22	30·92	5·2463174	176326·4	33·395
	Salili, XIV	1·43	65	1	58·88	5·2161063	164477·4	31·151
	Pil, XV	1·43	38	35	30·20	5·0537361	113171·2	21·434
18	Salili, XIV	1·36	34	41	9·05	5·0172178	104044·2	19·705
	Pil, XV	1·37	70	38	31·42	5·2367736	172493·9	32·669
	Kumbhári, XVI	1·37	74	40	19·53	5·2463174	176326·4	33·395
19	Agoada, XIII	1·52	50	4	23·99	5·2367736	172493·9	32·669
	Salili, XIV	1·52	99	43	9·20	5·3457752	221704·9	41·990
	Kumbhári, XVI	1·52	30	12	26·81	5·0537361	113171·2	21·434
20	Salili, XIV	·67	64	58	3·09	5·0342890	108215·4	20·495
	Agoada, XIII	·66	43	40	9·79	4·9162892	82468·7	15·619
	Bori, XVII	·67	71	21	47·12	5·0537361	113171·2	21·434

No. of Triangle	Station	Spherical Excess	Corrected Plane Angle			Distance		
						Log. feet	Feet	Miles
		"	°	'	"			
21	Agoada, XIII	·73	45	3	33·40	4·9471741	88547·0	16·770
	Bori, XVII	·73	75	3	2·15	5·0822866	120861·1	22·890
	Jarma, XVIII	·73	59	53	24·45	5·0342890	108215·4	20·495
22	Bori, XVII	·46	40	36	20·97	4·8282219	67332·1	12·752
	Jarma, XVIII	·47	80	31	56·86	5·0087838	102043·2	19·326
	Darsinga, XIX	·46	58	51	42·17	4·9471741	88547·0	16·770
23	Jarma, XVIII	·43	56	20	41·37	4·9140203	82039·0	15·538
	Darsinga, XIX	·43	80	33	48·55	4·9877775	97224·9	18·414
	Bailúr, XX	·43	43	5	30·08	4·8282219	67332·1	12·752
24	Darsinga, XIX	·53	67	37	1·14	4·9783654	95140·5	18·019
	Bailúr, XX	·53	59	30	26·66	4·9477373	88662·0	16·792
	Samshergad, XXIII	·53	52	52	32·20	4·9140203	82039·0	15·538
25	Bailúr, XX	·38	47	9	51·48	4·8445727	69915·4	13·242
	Samshergad, XXIII	·38	46	34	2·93	4·8403343	69236·4	13·113
	Yalúr, XXII	·39	86	16	5·59	4·9783654	95140·5	18·019

NOTE.—Stations Yalúr, XXII and Samshergad, XXIII appertain to the Mangalore Meridional Series.

April, 1890.

W. H. COLE,

In charge of Computing Office.

SOUTH KONKAN COAST SERIES.

SECONDARY TRIANGULATION. TRIANGLES.

PRINCIPAL-AUXILIARY STATIONS AND INTERSECTED POINTS.

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

No. of Triangle	Station	Corrected Plane Angle	Distance			Theodolite used
		° ′ ″	Log. feet	Feet	Miles	Inch
26	Mira Dongar, XXXIII	24 48 40	4·626290	42295	8·010	12
	Karanja, XXXIV	57 13 51	4·928148	84752	16·051	,,
	Kankeshvar h.s.	97 57 29	4·999223	99821	18·906	,,
27	Mira Dongar, XXXIII	16 19 55	4·543162	34927	6·615	,,
	Kankeshvar h.s.	120 38 27	5·028834	106865	20·239	,,
	Kánsa Rock		4·928148	84752 (14)	16·051	
28	Mira Dongar, XXXIII	8 28 45	4·225745	16817	3·185	,,
	Karanja, XXXIV	110 26 55	5·028834	106865	20·239	,,
	Kánsa Rock		4·999223	99821	18·906	
29	Karanja, XXXIV h.s.	31 27 41	4·614286	41142	7·792	,,
	Kankeshvar	116 5 22	4·850008	70796	13·408	,,
	Khánderi Island Rock		4·626290	42295	8·010	
30	Karanja, XXXIV	20 16 31	5·085981	121894	23·086	,,
	Titvi, I	9 36 59	4·769088	58761	11·129	,,
	Parhúr Hill Peak		5·243784	175301	33·201	

No. of Triangle	Station	Corrected Plane Angle	Distance			Theodolite used
		° ′ ″	Log. feet	Feet	Miles	Inch
81	Karanja, XXXIV	5 1 42	4·231386	17037 (2)	3·227	12
	Kankeshvar h.s.	162 24 14	4·769088	58761	11·129	,,
	Parhúr Hill Peak		4·626290	42295	8·010	,,
82	Mira Dongar, XXXIII	45 35 33	4·853591	71382	13·519	,,
	Karanja, XXXIV	46 58 47	4·863645	73054	13·836	,,
	Ságargad Hill Peak		4·999223	99821 (6)	18·906	
83	Mira Dongar, XXXIII	20 46 53	4·487130	30699	5·814	,,
	Kankeshvar h.s.	57 35 54	4·863645	73054	13·836	,,
	Ságargad Hill Peak		4·928148	84752	16·051	
84	Mándvi, XXXI	69 36 1	5·102078	126504	23·958	15
	Torna, II	31 3 25	4·842764	69025	13·187	,,
	Gangad Rock		5·122651	132633	25·120	
85	Mándvi, XXXI	13 59 31	4·516231	32827	6·217	,,
	Torna, II	63 40 7	5·085227	121682	23·046	,,
	Chandúr h.s.		5·122651	132633	25·120	

NOTES.—1. Names followed by Roman numerals are those of Principal Stations.
2. The values of the side are given in the same line with the opposite angle.
3. Stations Mándvi, XXXI, Mira Dongar, XXXIII and Karanja, XXXIV appertain to the Bombay Longitudinal Series.

No. of Triangle	Station	Theodolite used	Corrected Plane Angle	Distance Log. feet	Distance Feet	Distance Miles
36	Torna, II	Inch 15	45 23 1	5·293705	196655	37·245
	Kanta, III	,,	6 49 27	4·516231	32827	6·217
	Chandúr h.s.			5·339089	218318	41·348
37	Mándvi, XXXI h.s.	,,	73 44 52	5·088341	122558	23·212
	Chandúr	,,	33 51 15	4·851970	71116	13·469
	Bhoja ,,	,,	72 23 53	5·085227	121682	23·046
38	Chandúr h.s.	,,	90 4 24	4·737291	54612	10·343
	Bhoja ,,	,,	65 55 15	5·127878	134239	25·424
	Sukili ,,			5·088341	122558	23·212
39	Mándvi, XXXI	,,	74 25 26	5·323578	210658	39·897
	Titvi, I	,,	38 3 49	5·129786	134830	25·536
	Torna Bock			5·305482	202061	38·269
40	Mándvi, XXXI		1 24 50	3·598171	3964	0·751
	Torna, II		122 56 41	5·129786	134830	25·536
	Torna Bock			5·122651	132633	25·120
41	Chandúr h.s.	,,	65 12 0	5·046504	111302	21·080
	Bhoja ,,	,,	26 27 56	4·737528	54642	10·349
	Dhanvi Hill Mark			5·088341	122558	23·212
42	Titvi, I		5 2 39	4·624457	42117	7·977
	Torna, II		21 20 15	5·241287	174296	33·011
	Lingana Fort			5·328075	212851	40·313
43	Torna, II		121 36 41	5·364707	231583	43·860
	Kanta, III		4 59 11	4·373575	23636	4·477
	Rájgad Fort House			5·339089	218318	41·348
44	Titvi, I	,,	8 59 2	4·792608	62031	11·748
	Torna, II	,,	23 24 59	5·198287	157865	29·899
	Rájgad Fort Pagoda			5·328075	212851	40·313
45	Torna, II	,,	18 5 18	5·202117	159264	30·164
	Kanta, III	,,	7 6 3	4·802154	63409	12·009
	Rájgad Fort Building			5·339089	218318	41·348
46	Chandúr h.s.	,,	54 15 51	5·016968	103984	19·694
	Sukili ,,	,,	76 47 15	5·048935	111927	21·198
	Salera ,,	,,		5·127878	134239	25·424
47	Titvi, I	Inch 12	35 4 43	4·974473	94292	17·858
	Kanta, III	,,	35 34 31	4·979785	95452	18·078
	Bálukilla h.s.	,,	109 20 46	5·189790	154807	29·319
48	Titvi, I h.s.	,,	42 27 10	4·818366	65821	12·466
	Bálukilla	,,	59 21 18	4·923745	83897	15·890
	Madgad ,,	,,	78 11 32	4·979785	95452	18·078

No. of Triangle	Station	Theodolite used	Corrected Plane Angle	Distance Log. feet	Distance Feet	Distance Miles
49	Kanta, III	Inch 12	44 7 39	4·818366	65821 [1]	12·466
	Bálukilla h.s.	,,	49 59 28	4·859794	72409	13·714
	Madgad ,,	,,	85 52 53	4·974473	94292	17·858
50	Bálukilla h.s.	,,	29 22 58	4·512535	32549	5·165
	Madgad ,,	,,	53 27 9	4·726683	53295	10·094
	Ghum Hill Tree			4·818366	65821	12·466
51	Kanta, III h.s.	,,	21 13 39	4·512535	32549	6·165
	Madgad	,,	32 25 44	4·683110	48207	9·130
	Ghum Hill Tree			4·859794	72409	13·714
52	Torna, II	15	3 4 7	4·207597	16129	3·055
	Kanta, III	,,	130 29 42	5·360063	229120	43·394
	Bánkot Building			5·339089	218318	41·348
53	Torna, II	,,	51 24 35	5·233192	171077	32·401
	Kanta, III	,,	34 30 29	5·093409	123996	23·484
	Pratápgad Hill Fort			5·339089	218318	41·348
54	Torna, II	,,	14 36 37	4·514110	32667	6·187
	Mahábnleshvar, IV	,,	73 13 37	5·093409	123996	23·484
	Pratápgad Hill Fort h.s.			5·111981	129414	24·510
55	Kanta, III	12	12 12 2	5·037934	109128	20·668
	Adhúr, V	,,	11 2 54	4·995444	98956	18·742
	Nigda h.s.	,,	156 45 4	5·309260	203826	38·603
56	Kanta, III	,,	28 18 53	4·730565	53773	10·184
	Nigda h.s.	,,	90 53 33	5·054446	113356	21·469
	Báleshvar ,,	,,	60 47 34	4·995444	98956	18·742
57	Kanta, III	,,	50 34 39	4·950728	89275	16·908
	Báleshvar h.s.	,,	28 11 42	4·737217	54603	10·341
	Jambagad Hill Peak			5·054446	113356	21·469
58	Kanta, III	,,	53 55 23	4·882038	76215	14·435
	Bálukilla h.s.	,,	35 23 0	4·737217	54603	10·341
	Jambagad Hill Peak			4·974473	94292	17·858
59	Nigda h.s.	,,	15 24 23	4·367457	23305	4·414
	Báleshvar ,,	,,	126 47 20	4·846674	70255	13·306
	Pálgad Tower			4·730565	53773	10·184
60	Kanta, III	15	27 55 43	5·373255	236186	44·732
	Kumbhárli, VI	,,	6 54 32	4·782897	60659	11·489
	Kalambat h.s.	,,		5·459492	288066	54·558
61	Mahábaleshvar, IV	,,	108 22 0	5·272672	187358 [2]	35·484
	Kumbhárli, VI	,,	1 6 28	3·581682	3817	0·723
	Mahábaleshvar Monument			5·269794	186120	35·250

NOTE.—Station Mándvi, XXXI, appertains to the Bombay Longitudinal Series.

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Upper table (Triangles 75–87)

No. of Triangle	Station		Corrected Plane Angle	Log. feet	Distance Feet	Distance Miles	Theodolite used
75	Adhúr, V			4·610776	40811	7·729	Inch 12
	Varavda		5 3 14	4·573835	37483	7·099	"
	Kateshvar Mound	h.s.	4 38 27	4·891775	78014	14·775	"
76	Mirya, VII			4·610776	40811	7·729	"
	Varavda		5 6 26	5·012107	102827	19·475	"
	Kateshvar Mound	h.s.	167 2 19	4·796906	62648	11·865	"
77	Mirya, VII			4·351960	22488	4·259	"
	Varavda		11 13 32	4·628049	42555	8·060	"
	Ganpati Temple	h.s.	21 36 56	4·796906	62648	11·865	"
78	Mirya, VII		37 58 31	5·098129	125351	23·741	"
	Ghirya, IX		33 22 14	5·049431	112055	21·223	"
	Khávdi	h.s.	108 39 15	5·285591	193015	36·556	"
79	Mirya, VII		34 24 38	4·833305	67968	12·873	"
	Khávdi	h.s.	34 17 15	4·839040	67755	12·832	"
	Tili Tek	"	111 18 7	5·049431	112055	21·223	"
80	Ghirya, IX		31 26 47	4·833305	67968	12·873	"
	Khávdi	h.s.	74 22 0	5·098513	125462	23·762	"
	Tili Tek	"	74 11 13	5·098129	125351	23·741	"
81	Mirya, VII		71 20 51	5·255164	179955	34·082	"
	Tili Tek		87 45 10	5·278262	189785	35·944	"
	Ámbághát Hill Peak	h.s.		4·839040	67755	12·832	"
82	Mirya, VII		36 56 13	5·081854	120741	22·868	"
	Khávdi		109 9 57	5·278262	189785	35·944	"
	Ámbághát Hill Peak	h.s.		5·049431	112055	21·223	"
83	Mirya, VII		32 51 52	4·887487	77177	14·617	"
	Khávdi		19 7 28	4·668336	46595	8·825	"
	Golap Hill Tree	h.s.		5·049431	112055	21·223	"
84	Khávdi		15 9 47	4·326629	21214	4·018	"
	Tili Tek	h.s.	107 54 16	4·887487	77177	14·617	"
	Golap Hill Tree	"		4·833305	67968	12·873	"
85	Ghirya, IX		14 31 39	4·688345	48792	9·241	15
	Valvan, X		60 52 16	5·230216	169909	32·180	"
	Bávda Fort			5·274682	188227	35·649	"
86	Manoli, VIII		49 18 43	5·230216	169909	32·180	"
	Ghirya, IX		37 35 27	5·135735	136690	25·888	"
	Bávda Fort			5·349758	223747	42·376	"
87	Manoli, VIII		21 36 24	4·986435	96925	18·357	"
	Ghirya, IX			5·195830	156975	29·730	"
	Kunkaun	h.s.	121 46 58	5·349758	223747	42·376	†

Lower table (Triangles 62–74½)

No. of Triangle	Station		Corrected Plane Angle	Log. feet	Distance Feet	Distance Miles	Theodolite used
62	Kanta, III		40 17 47	5·272672	187358	35·484	Inch 15
	Kumbhárli, VI		43 37 27	5·300743	199868	37·854	"
	Mahábaleshvar Monument	h.s.		5·459492	288066	54·558	"
63	Torna, II		10 42 27	4·561140	36403	6·895	"
	Mahábaleshvar, IV		127 57 15	5·188909	154493	29·260	"
	Makarandgad W. Fort			5·111981	129414	24·510	"
64	Mahábaleshvar, IV		45 44 27	5·211695	162815	30·836	"
	Kumbhárli, VI		9 12 52	4·561140	36403	6·895	"
	Makarandgad W. Fort	h.s.		5·269794	186120	35·250	"
65	Kanta, III		16 31 25	4·838715	68979	13·064	"
	Mahábaleshvar, IV		40 33 9	5·197779	157681	29·864	"
	Somargad Hill Fort			5·308735	203580	38·557	"
66	Mahábaleshvar, IV		54 40 11	5·195029	156685	29·675	"
	Kumbhárli, VI		21 2 55	4·838715	68979	13·064	"
	Somargad Hill Fort			5·269794	186120	35·250	"
67	Mahábaleshvar, IV		27 2 8	5·120807	132071	25·013	"
	Kumbhárli, VI		12 47 54	4·808645	64364	12·190	"
	Parvat Point			5·269794	186120	35·250	"
68	Adhúr, V		40 58 55	5·120807	132071	25·013	"
	Kumbhárli, VI		76 28 59	5·291822	195804	37·084	"
	Parvat Point	h.s.		5·252088	178685	33·842	"
69	Adhúr, V		24 36 42	4·877596	75439	14·288	12
	Báleshvar		25 24 19	4·890493	77713	14·718	"
	Girsia Hill Mark (heliotrope)	h.s.		5·142379	138797	26·287	"
70	Adhúr, V		96 16 29	5·416508	260920	49·417	15
	Mirya, VII		51 25 1	5·312161	205192	38·862	"
	Páli Hill	h.s.		5·147045	140296	26·571	"
71	Adhúr, V		22 50 8	4·835109	68408	12·956	12
	Mirya, VII		29 54 22	4·943914	87885	16·645	"
	Kaljhondi	h.s.	127 15 30	5·147045	140296	26·571	"
72	Adhúr, V		10 20 52	4·675368	47344	8·967	"
	Kaljhondi	h.s.	9 7 46	4·621389	41821	7·921	"
	Jaygad Hill Fort Mark (helio.)	"		4·943914	87885	16·645	"
73	Mirya, VII		25 17 26	4·465910	29235	5·537	"
	Kaljhondi	h.s.	66 16 12	4·796906	62648	11·865	"
	Varavda	"	88 26 22	4·835109	68408	12·956	"
74½	Adhúr, V		19 7 50	4·465910	29235	5·537	"
	Kaljhondi	h.s.	60 59 18	4·892175	78014	14·775	"
	Varavda	"	99 52 52	4·943914	87885	16·645	"

* Base deduced by two sides and included angle.
† Some small Theodolite reading to ¼ of a minute.

Triangles 101–113

No. of Triangle	Station	Corrected Plane Angle	Log. feet	Feet	Miles	Theodolite used
		° ′ ″		15		Inch 15
101	Parule, XI	41 8 17	5·081774	120719	22·863	15
	Chaukola, XII	72 42 23	5·243540	175202	33·182	"
	Phondághát Peak		5·224883	167835	31·787	"
102	Ghirya, IX	25 43 33	5·015416	103613	19·624	"
	Valvan, X	102 13 31	5·307899	233291	44·184	"
	Sidheshvar Hill Fort Point		5·274682	188227	35·649	
103	Ghirya, IX	31 29 20	5·064040	115888	21·949	"
	Valvan, X	90 28 31	5·346077	221859	42·019	"
	Sidheshvar Hill W. Peak		5·274682	188227	35·649	
104	Parule, XI	51 34 1	5·119001	131523	24·910	12
	Chaukola, XII	36 49 55	5·002820	100652	19·063	"
	Redi h.s.	91 36 4	5·224883	167835	31·787	"
105	Parule, XI	44 36 40	4·892197	78018	14·776	"
	Redi h.s.	70 25 37	5·019829	104672	19·824	"
	Sávantvádi Hill Peak		5·002820	100652	19·063	"
106	Parule, XI	21 10 40	5·011576	102701	19·451	"
	Chaukola, XII	15 0 22	4·866922	73607	13·941	"
	Vágheri h.s.	143 48 58	5·224883	167835	31·787	"
107	Chaukola, XII h.s.	21 49 33	4·721017	52604 (9)	9·963	"
	Redi	46 32 25	5·011576	102701	19·451	"
	Vágheri "	111 38 2	5·119001	131523	24·910	"
108	Redi h.s.	36 7 13	4·494478	31223 (1)	5·914	"
	Vágheri "	60 35 45	4·664115	46144	8·739	"
	Vengurla Signal Post		4·721017	52604	9·963	"
109	Parule, XI h.s.	22 58 11	4·494478	31223	5·914	"
	Vágheri	43 57 15	4·744552	55533	10·518	"
	Vengurla Signal Post		4·866922	73607	13·941	"
110	Parule, XI	50 21 47	5·113090	129745	24·573	15
	Chaukola, XII	34 37 59	4·981134	95749	18·134	"
	Redi Fort, N. Bastion		5·224883	167835	31·787	"
111	Redi h.s.	80 32 34	4·715284	51914	9·832	12
	Vágheri "	7 40 28	3·846852	7028	1·331	"
	Redi Rock		4·721017	52604	9·963	"
112	Chaukola, XII	19 27 39	4·715284	51914	9·832	"
	Vágheri h.s.	119 18 30	5·133144	135876	25·734	"
	Redi Rock		5·011576	102701	19·451	"
113	Salili, XIV	64 52 47	5·215334	164185	31·096	15
	Pil, XV	38 37 11	5·053773	113181	21·436	"
	Agoada Fort s.		5·240317	176326	33·395	

Triangles 88–100

No. of Triangle	Station	Corrected Plane Angle	Log. feet	Feet	Miles	Theodolite used
		° ′ ″		21		Inch 15
88	Manoli, VIII	32 20 9	4·992596	98310	18·619	15
	Valvan, X	58 39 24	5·195830	156975	29·730	"
	Kunkaun h.s.		5·264473	183769	34·805	"
89	Ghirya, IX	·6 25 13	4·340260	21891	4·146	"
	Valvan, X	99 31 56	5·285699	193063	36·565	"
	Talia Hill Peak		5·274682	188227 (9)	35·649	"
90	Ghirya, IX	69 10 43	5·351004	224390	42·498	"
	Parule, XI	53 31 59	5·285699	193063	36·565	"
	Talia Hill Peak		5·305538	201994	38·256	"
91	Ghirya, IX	23 34 19	5·003477	100804	19·092	12
	Parule, XI	29 41 8	5·096341	124836	23·643	"
	Shravan h.s.	126 44 33	5·305538	201994	38·256	"
92	Ghirya, IX h.s.	20 51 43	4·698118	49902 (2)	9·451	"
	Shravan "	42 7 16	4·973053	93984	17·800	"
	Bhutoba	117 1 1	5·096341	124836	23·643	"
93	Parule, XI h.s.	27 19 55	4·698118	49902	9·451	"
	Shravan "	84 37 17	5·034252	108206	20·494	"
	Bhutoba	68 2 48	5·003477	100804	19·092	"
94	Ghirya, IX h.s.	20 44 0	4·560177	37083 (4)	7·023	"
	Bhutoba	43 3 46	4·854444	71523	13·546	"
	Dabhola Hill Tree		4·973053	93984	17·800	"
95	Shravan h.s.	41 56 55	4·560177	37083	7·023	"
	Bhutoba "	73 57 15	4·726841	53314	10·097	"
	Dabhola Hill Tree		4·698118	49902	9·451	"
96	Shravan h.s.	27 41 27	4·434766	27212 (2)	5·154	"
	Bhutoba "	93 51 39	4·766606	58426	11·066	"
	Ilia Hill (heliotrope)		4·698118	49902	9·451	"
97	Parule, XI h.s.	23 43 31	4·766606	58426	11·066	"
	Shravan	112 18 44	5·128202	134339	25·443	"
	Ilia Hill (heliotrope)		5·003477	100804	19·092	"
98	Ghirya, IX h.s.	2 53 11	4·350275	22870	4·332	"
	Bhutoba	9 3 23	4·854443	71490	13·540	"
	Devgad Hill Peak		4·973053	93984	17·800	"
99	Parule, XI h.s.	2 27 1	4·350275	22870	4·332	"
	Bhutoba	165 52 48	5·115628	130505	24·717	"
	Devgad Hill Peak		5·034252	108206 (4)	20·494	"
100	Valvan, X	55 12 25	5·243540	175202	33·182	15
	Parule, XI	17 20 44	4·803478	63603	12·046	"
	Phondághát Peak		5·305818	203525	38·546	

Left table (Triangles 114–126)

No. of Triangle	Station		Corrected Plane Angle	Log. feet	Feet	Miles	Theodolite used
114	Chaukola, XII	s.		5·053773	113181 (4)	21·436	Inch 15
	Salili, XIV		40 20 46	5·242450	174763	33·099	,,
	Agoada Fort		91 29 34	5·114768	130247	24·668	
115	Salili, XIV			4·872851	74619	14·132	18
	Bori, XVII		52 58 15	4·928322	84786	16·058	,,
	St. Anns	h.s.	61 55 19	4·916289	82469 (24)	15·618	
116	Salili, XIV	s.		4·542263	34855	6·601	
	Agoada Fort	h.s	11 50 37	4·928322	84786	16·058	
	St. Anns		138 12 20	5·053773	113181	21·436	
117	Salili, XIV	h.s.		4·886317	76969	14·578	
	St. Anns	,,	37 37 24	4·721657	52681	9·978	
	Karpal		79 15 43	4·928322	84786 (4)	16·058	
118	Agoada Fort	s.		4·886317	76969	14·578	
	St. Anns	h.s.	100 34 56	4·954897	90136	17·071	
	Karpal	,,	22 20 27	4·542263	34855	6·601	
119	Salili, XIV	h.s.		4·997498	99426	18·831	
	St. Anns	,,	58 51 10	4·960936	91398	17·310	
	Chandel		52 33 14	4·928322	84786 (1)	16·058	
120	St. Anns	h.s.		4·594175	39280	7·439	
	Karpal	,,	21 13 46	4·997498	99426	18·831	
	Chandel	,,	113 34 24	4·886317	76969	14·578	
			45 11 50				
121	Salili, XIV	h.s.		4·836121	68568	12·986	
	Karpal	,,	32 59 59	5·027181	106459	20·163	
	Hanmantgad Fort		122 15 49	4·721657	52681 (15)	9·978	
122	Salili, XIV	h.s.		4·692707	49284	9·334	
	Chandel	·h.s.	27 31 16	5·027181	106459	20·163	
	Hanmantgad Fort		93 30 22	4·960936	91398 (1)	17·310	
123	Salili, XIV	h.s.		4·799440	63014	11·935	
	Karpal		46 38 5	4·935575	86214	16·328	
	Párgad Fort		95 56 10	4·721657	52681 (8)	9·978	
124	Salili, XIV	h.s.		4·796684	62616	11·859	
	Chandel		41 9 22	4·935575	86214	16·328	
	Párgad Fort		64 58 35	4·960936	91398	17·310	
125	St. Anns	h.s.		4·762786	57914	10·969	
	Karpal	,,	47 6 33	4·816760	65578	12·420	
	Kamorli	,,	56 3 30	4·886317	76969 (13)	14·578	
			76 49 57				
126	Agoada Fort	s.		4·816760	65578	12·420	
	St. Anns	h.s.	53 28 23	4·723148	52863	10·012	
	Kamorli	,,	31 59 40	4·542263	34855	6·601	

Right table (Triangles 127–139)

No. of Triangle	Station		Corrected Plane Angle	Log. feet	Feet	Miles	Theodolite used
127	Agoada Fort	s.		4·461765	28958	5·484	Inch 9
	Kamorli	h.s.	26 10 38	4·473582	29757	5·636	,,
	Baga	,,	128 23 57	4·723148	52863	10·012	,,
128	Kamorli	h.s.	62 48 20	4·444583	27834	5·272	,,
	Baga	,,	49 28 20	4·376321	23786	4·505	,,
	Murji	,,	67 43 20	4·461765	28958	5·484	,,
129	Kamorli	h.s.	73 50 0	4·484678	30527	5·782	,,
	Murji	,,	57 43 0	4·429272	26870	5·089	,,
	Pernem	,,	48 27 0	4·376321	23786	4·505	,,
130	Murji	h.s.	65 2 4	4·442133	27678	5·242	,,
	Pernem	,,	25 54 0	4·125020	13336	2·526	,,
	Mandrian	,,	89 3 56	4·484678	30527	5·782	,,
131	Murji	h.s.	55 11 46	4·419978	26301	4·981	,,
	Pernem	,,	52 26 10	4·404671	25390	4·809	,,
	Kari E.	,,	72 22 4	4·484678	30527 (11)	5·782	,,
132	Pernem	h.s.	26 32 10	4·095548	12461	2·360	,,
	Mandrian	,,	70 33 34	4·419978	26301	4·981	,,
	Kari E.	,,	82 54 16	4·442133	27678	5·242	,,
133	Mandrian	h.s.	17 48 46	3·761091	5769	1·093	,,
	Kari E.	,,	23 32 44	3·876993	7533	1·427	,,
	Arambol	,,	138 38 30	4·095548	12461	2·360	,,
134	Kari E.	h.s.	37 8 23	3·569426	3710	0·703	,,
	Arambol	,,	32 41 45	3·521098	3320	0·629	,,
	Kari W.	,,	110 9 52	3·761091	5769 (1)	1·093	,,
135	Mandrian	h.s.	14 57 24	3·521098	3320	0·629	,,
	Kari E.	,,	60 41 7	4·049818	11215	2·124	,,
	Kari W.	,,	104 21 29	4·095548	12461 (10)	2·360	,,
136	Kari E.	h.s.	52 23 30	3·433014	2710	0·513	,,
	Kari W.	,,	51 36 0	3·428325	2681	0·508	,,
	Terekhol Fort			3·521098	3320	0·629	,,
137	Kamorli	h.s.	34 55 2	4·159630	14442	2·735	,,
	Murji	,,	74 34 6	4·385990	24321	4·606	,,
	Chápora Fort			4·376321	23786 (1)	4·505	,,
138	Kamorli	h.s.	108 45 2	4·619486	41638	7·886	,,
	Pernem	,,	33 34 53	4·385990	24321	4·606	,,
	Chápora Fort			4·429272	26870	5·089	,,
139	Chaukola, XII	s.		4·977677	94990	17·990	15
	Salili, XIV	h.s.	41 39 29	5·134822	136402	25·834	,,
	Narvar Church	,,	72 38 36	5·114768	130247	24·668	

No. of Triangle	Station	Corrected Plane Angle		Distance Log. feet	Distance Feet	Distance Miles	Theodolite used
153	Salili, XIV	53 59 18		4·874947	74980	14·201	Inch 18
	Bori, XVII			4·917621	82722	15·667	,,
	Martkanni	62 50 0	h.s.	4·916289	82469	15·619	,,
154	Bori, XVII	62 33 43	h.s.	4·917351	82671	15·657	,,
	Markkanni	63 49 57		4·922217	83602	15·834	,,
	Batti	53 36 20	,,	4·874947	74980	14·201	,,
155	Bori, XVII	49 0 48	h.s.	4·800638	63188	11·968	,,
	Batti	38 5 46		4·713043	51647	9·782	,,
	Parvat	92 53 26	,,	4·922217	83602	15·834	,,
156	Bori, XVII	65 0 2	h.s.	4·679687	47828	9·058	,,
	Parvat	36 51 21		4·500418	31653	5·995	,,
	Rya	78 8 37	,,	4·713043	51647	9·782	,,
157	Parvat	23 36 32	h.s.	4·338926	21824	4·133	,,
	Rya	95 1 23	,,	4·734661	54283	10·281	,,
	Goa Base N. End	61 22 5	s.	4·679687	47828	9·058	,,
158	Rya	50 41 26	h.s.	4·576562	37719	7·144	,,
	Goa Base N. End	102 42 55	s.	4·677186	47554	9·006	,,
	Goa Base S. End	26 35 39	,,	4·338926	21824	4·133	,,
159	Parvat	43 49 12	h.s.	4·576562	37719	7·144	,,
	Goa Base N. End	41 20 50	s.	4·556160	35988	6·816	,,
	Goa Base S. End	94 49 58	,,	4·734661	54283	10·281	,,
160	Bori, XVII	40 10 35	h.s.	4·570658	37210	7·047	,,
	Parvat	23 23 23		4·359775	22897	4·337	,,
	Rachol College			4·713043	51647	9·782	,,
161	Bori, XVII	53 50 34	h.s.	4·670092	46783	8·861	,,
	Parvat	63 6 57		4·713330	51681	9·788	,,
	Kolua Church			4·713043	51647	9·782	,,
162	Parvat	24 12 16	h.s.	4·292469	19610	3·714	,,
	Rya	65 30 34	,,	4·638747	43526	8·244	,,
	Binauli Hill Church			4·679687	47828	9·058	,,
163	Parvat	43 13 28	h.s.	4·478762	30114	5·703	,,
	Goa Base S. End	81 50 40	s.	4·638747	43526	8·244	,,
	Binauli Hill Church			4·556160	35988	6·816	,,
164	Parvat	24 10 30	h.s.	4·294203	19688	3·729	,,
	Rya	60 0 56	,,	4·619521	41641	7·887	,,
	Binauli Village Church			4·679687	47828	9·058	,,
165	Bori, XVII	49 10 16	h.s.	4·619521	41641	7·887	,,
	Parvat	61 1 51		4·682566	48147	9·119	,,
	Binauli Village Church			4·713043	51647	9·782	,,

No. of Triangle	Station	Corrected Plane Angle		Distance Log. feet	Distance Feet	Distance Miles	Theodolite used
140	Salili, XIV	33 42 10	h.s.	4·470381	29538	5·594	Inch 9
	Karpal	64 33 0		4·681847	48067	9·104	,,
	Bicholim Mosque			4·721657	52681	9·978	
141	Salili, XIV	38 48 50	h.s.	4·821324	66271	12·551	18
	Karpal	111 18 4		4·993469	98508	18·657	,,
	Nagua Church			4·721657	52681	9·978	
142	Salili, XIV	44 17 33	h.s.	4·856676	71891	13·616	,,
	Chandel	73 6 34		4·993469	98508	18·657	,,
	Nagua Church			4·960936	91398	17·310	
143	Salili, XIV	13 24 35	h.s.	4·325343	21152	4·006	,,
	St. Anns	54 57 56		4·873200	74679	14·144	,,
	Chora Chapel			4·928322	84786	16·058	
144	Agoada Fort		h.s.	4·461048	28910	5·475	9
	St. Anns	18 21 54		4·069913	11747	2·225	
	Cabo Monastery			4·542263	34855	6·601	
145	St. Anns	33 29 0	h.s.	4·290052	19501	3·693	,,
	Cabo Monastery	54 52 27	,,	4·548175	35333	6·692	,,
	Mormugão			4·461048	28910	5·475	
146	Salili, XIV	37 50 43		4·757027	57151	10·824	18
	Bori, XVII	79 51 51		4·962359	91698	17·367	,,
	Sankravádi Church			4·916289	82469	15·619	
147	Pil, XV	115 32 47		5·293918	106751	37·264	15
	Kumbhári, XVI	35 57 24		5·107364	128045	24·251	,,
	Mormugão Point			5·017218	104044	19·705	
148	Salili, XIV	29 55 37		5·007010	101627	19·248	12
	Pil, XV	30 1 27		5·008288	101927	19·304	,,
	Ramaida Hill (heliotrope)			5·246317	176326	33·395	
149	Pil, XV	101 6 24		5·199593	158341	29·989	15
	Kumbhári, XVI	38 44 38		5·004267	100987	19·126	,,
	Ramaida Church			5·017218	104044	19·705	
150	Agoada, XIII	110 33 51		5·144739	139553	26·430	,,
	Salili, XIV.	20 2 6		4·708114	51064	9·671	,,
	St. Georges Island, W. End			5·053736	113171	21·434	
151	Agoada, XIII	34 11 19		5·098853	125560	23·780	,,
	Pil, XV	13 12 37		4·708114	51064	9·671	,,
	St. Georges Island, W. End			5·216106	164477	31·151	
152	Agoada, XIII	26 49 52		5·082472	120913	22·900	,,
	Pil, XV	11 2 50		4·710384	51331	9·722	,,
	St. Georges Island, E. End			5·216106	164477	31·151	

No. of Triangle	Station		Corrected Plane Angle	Log. feet	Feet	Miles	Theodolite used
179	Kongaon	h.s.	32 25 0	4·741077	55091	10·434	Inch 18
	Kungal	"	8 37 50	4·188126	15421	2·921	"
	Kartoli Hill Mark			4·829208	67485	12·781	"
180	Kongaon	h.s.	14 24 36	4·544164	35008	6·630	"
	Kungal	"	14 15 28	4·539648	34646	6·562	"
	Kusauli Hill Mark			4·829208	67485	12·781	"
181	Batti	h.s.	49 29 43	4·771012	59022	11·178	"
	Parvat	"	76 0 47	4·876926	75323	14·266	"
	Barsim	"	54 29 30	4·800638	63188	11·968	"
182	Batti	h.s.	63 42 50	4·895249	78569	14·880	"
	Barsim	"	57 1 11	4·866342	73509	13·922	"
	Tirval	"	59 15 59	4·876926	75323	14·266	"
183	Barsim	h.s.	40 1 56	4·704079	50592	9·582	"
	Tirval	"	52 38 10	4·795977	62514	11·840	"
	Bomgudda	"	87 19 54	4·895249	78569	14·880	"
184	Tirval	h.s.	83 46 19	4·914113	82057	15·541	"
	Bomgudda	"	37 48 0	4·847115	70326	13·319	"
	Höttegudda	"		4·704079	50592	9·582	"
185	Tirval	h.s.		4·882030	76213	14·434	15
	Höttegudda	"	65 40 15	4·900975	79611	15·078	"
	Ulvi	"	53 36 8	4·847115	70326	13·319	"
186	Salili, XIV	h.s.	11 55 52	4·679702	47830	9·059	18
	Kumbhári, XVI	"	119 51 40	5·302424	200643	38·001	"
	Bordai Hill Peak			5·236774	172494	32·669	
187	Kungal	h.s.	78 58 14	4·898809	79215	15·003	"
	Bomgudda	"	30 41 17	4·614785	41189	7·801	"
	Hunshighát	"	70 20 29	4·880824	76002	14·394	*
188	Tirval	h.s.	129 29 44	4·898809	79215	15·003	"
	Bomgudda	"	20 58 38	4·565254	36750	6·960	"
	Hunshighát	"	29 31 38	4·704079	50592	9·582	"
189	Barsim	h.s.	90 15 10	4·819626	66012	12·502	9
	Bomgudda	"	18 29 10	4·320792	20931	3·964	"
	Kanakon	"	71 15 40	4·795977	62515	11·840	"
190	Bomgudda	h.s.	32 23 2	4·590915	38987	7·384	"
	Kanakon	"	32 41 30	4·594572	39316	7·446	"
	Lolian	"	114 55 28	4·819626	66012	12·502	"
191	Barsim	h.s.	38 58 13	4·594572	39316	7·446	"
	Bomgudda	"	50 52 12	4·685681	48493	9·184	"
	Lolian	"	90 9 35	4·795977	62514	11·840	"

No. of Triangle	Station		Corrected Plane Angle	Log. feet	Feet	Miles	Theodolite used
166	Salili, XIV	h.s.	12 17 59	4·816606	65555	12·416	Inch 12
	Pil, XV	"	22 39 32	5·073910	118552	22·453	"
	Margão Hill House			5·246317	176326	33·395	
167	Parvat	h.s.	44 2 9	4·582815	38266	7·247	18
	Rya	"	16 17 5	4·188557	15437	2·924	"
	Chander Church			4·679687	47828	9·058	
168	Bori, XVII	h.s.	23 20 42	4·318164	20805	3·940	"
	Parvat	"	56 17 55	4·640269	43679	8·272	"
	Dramapur	"	100 21 23	4·713043	51647	9·782	"
169	Parvat	h.s.	45 1 30	4·529385	33836	6·408	"
	Rya	"	44 22 22	4·524389	33449	6·335	"
	Varka Church	"		4·679687	47828	9·058	
170	Parvat	h.s.	36 35 6	4·600165	39826	7·543	"
	Goa Base S. End	s.	110 49 40	4·795558	62454	11·828	"
	Cape Ramas Tower			4·556160	35988	6·816	"
171	Parvat	h.s.	80 24 18	4·878581	75610	14·320	"
	Goa Base N. End	s.	54 31 55	4·795558	62454	11·828	"
	Cape Ramas Tower			4·734661	54283	10·281	
172	Salili, XIV	h.s.	7 25 15	4·449473	28150	5·331	15
	Pil, XV	"	118 34 44	5·281932	191395	36·249	"
	Cape Ramas Highest Point			5·246317	176326	33·395	
173	Martkanni	h.s.		4·794585	62314	11·802	18
	Batti	"		4·911452	81555	15·446	
	Kongaon	"	68 39 11	4·917351	82671	15·657	
174	Batti	h.s.	50 24 22	4·829208	67485	12·781	"
	Kongaon	"	59 57 30	4·744056	55470	10·506	"
	Kungal	"		4·794585	62314	11·802	"
175	Kongaon	h.s.	50 44 13	4·854913	71600	13·561	"
	Kungal	"	82 23 51	4·962198	91664	17·361	"
	Ulvi	"	46 51 56	4·829208	67485	12·781	"
176	Kungal	h.s.	55 33 16	4·882030	76213	14·434	"
	Ulvi	"	73 39 48	4·947854	88686	16·797	"
	Höttegudda	"	50 46 56	4·854913	71600	13·561	"
177	Batti	h.s.	78 15 46	4·915240	82270	15·581	"
	Kongaon	"	41 14 25	4·966379	92551	17·529	"
	Tinai	"		4·794585	62314	11·802	"
178	Kongaon	h.s.	24 6 4	4·558039	36144	6·845	"
	Tinai	"	87 32 52	4·946610	88432	16·749	"
	Marsingal	"	68 21 4	4·915240	82270	15·581	"

* Base deduced by two sides and included angle.

No. of Triangle	Station		Corrected Plane Angle	Distance			Theodolite used
			° ′ ″	Log. feet	Feet	Miles	Inch
194	Pil, XV		72 5 50	5·136110	136808	25·911	15
	Kumbhári, XVI		61 32 34	5·101740	126398	23·939	,,
	Gudehalli E. Peak			5·017218	104044	19·705	,,
195	Pil, XV		74 33 10	5·144922	139612	26·442	,,
	Kumbhári, XVI		59 31 53	5·096361	124842	23·644	,,
	Gudehalli W Peak			5·017218	104044	19·705	,,

No. of Triangle	Station		Corrected Plane Angle	Distance			Theodolite used
			° ′ ″	Log. feet	Feet	Miles	Inch
192	Bomgudda	h.s.	68 52 20	4·586946	38632	7·317	9
	Lolian	,,	39 27 0	4·420217	26316	4·984	,,
	Sadáshivgad Fort	s.	71 40 40	4·594572	39316	7·446	,,
193	Lolian	h.s.	15 31 40	4·083322	12115	2·295	,,
	Sadáshivgad Fort	s.	43 5 0	4·490124	30912	5·855	,,
	Kúrmagad Fort			4·586946	38632	7·317	,,

W. H. COLE,
In charge of Computing Office.

May, 1890.

SOUTH KONKAN COAST 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
ADHUB, V		
Kanta, III	171 48 16·32	5
Nigda h.s.	182 51 10	55
Mahábaleshvar, IV	222 45 47·21	5
Parvat Point	228 19 26	68
Girsia Hill Mark (helio.)	228 27 38	69
Páli Hill	250 44 5	70
Kumbhárli, VI	269 18 21·18	6
Kaljhondi h.s.	324 10 26	71
Jaygad H. Fort Mark (helio).	334 31 18	72
Varuvda	343 18 16	74
Mirya, VII h.s.	347 0 33·65	8
Kateshvar Mound	348 21 30	75
AGOADA, XIII		
St. Georges Island, W. End	4 24 17	150
Parule, XI	152 13 50·05	14
Chaukola, XII	205 35 21·48	14
Jarma, XVIII	252 27 2·17	21
Salili, XIV	253 50 25·84	15
Bori, XVII	297 30 36·30	20
Kumbhári, XVI	303 54 51·34	19
Pil, XV	330 12 58·18	17
St. Georges Island, E. End	357 2 50	152

Name of station with azimuths of surrounding points	° ' "	No. of triangle giving distance
ARAMBOL h.s.		
Kari W. h.s.	166 32 37	134
Kari E. "	199 14 22	133
Mandrian "	337 52 52	133
BAGA h.s.		
Murji h.s.	165 48 14	128
Kamorli "	215 16 34	127
Agoada Fort s.	343 40 31	127
BAILUB, XX		
Darsinga, XIX	12 44 25·59	23
Jarma, XVIII	55 49 56·09	23
Yalir, XXII*	266 4 6·53	25
Samshergad, XXIII*	313 13 58·39	24
BALESHVAR h.s.		
Nigda h.s.	70 32 45	56
Kanta, III	131 20 19	56
Jambagad Hill Peak	159 32 1	57
Pálgad Tower	197 20 5	59
Girsia Hill Mark (heliotrope)	358 29 35	69

Name of station with azimuths of surrounding points	° ' "	No. of triangle giving distance
BALUKILA h.s.		
Kanta, III h.s.	26 48 5	47
Ghuan Hill Tree "	47 24 35	50
Madgad h.s.	76 47 33	48
Titvi, I	136 8 51	47
Jambagad Hill Peak	351 25 5	58
BARSTM h.s.		
Lolian h.s.	3 7 17	191
Kanakon "	54 24 14	189
Parvat "	172 36 27	181
Batti "	227 5 57	181
Tirval "	284 7 8	182
Bomgudda "	324 9 4	183
BATTI h.s.		
Barsim h.s.	47 8 24	181
Parvat "	96 38 7	155
Bori, XVII	134 43 53	154
Martkanni "	188 20 13	154
Tinai "	194 35 43	177
Kongaon "	255 5 32	173
Kungal s.	324 43 40	174
Tirval "	343 25 34	182

* Of the Mangalore Meridional Series.

Panel 1

Name of station with azimuths of surrounding points		° ′ ″	No. of triangle giving distance
BHOJA h.s.			
Sukili	h.s.	57 36 38	38
Mándvi, XXXI*		255 8 21	87
Chandúr	,,	327 32 14	37
Dhanvi Hill Mark		354 0 10	41
BHUTOBA h.s.			
Devgad Hill Peak		150 1 18	98
Ghirya, IX		159 4 41	92
Ilia Hill (heliotrope)		182 14 3	96.
Dabhola Hill Tree		202 8 27	94
Shravan	h.s.	276 5 42	92
Parule, XI		344 8 30	93
BOMGUDDA h.s.			
Sadáshivgad Fort	s.	24 26 9	192
Lolian	h.s.	93 18 29	190
Kanakon	,,	125 41 31	189
Barsim	,,	144 10 41	183
Tirval	,,	231 30 35	187
Hunshighát	,,	252 29 13	187
Höttegudda	,,	289 56 16	184
BORI, XVII			
Parvat	h.s.	3 41 58	155
Dramapur	,,	27 2 40	168
Rachol College		43 52 33	160
Binauli Village Church		52 52 14	165
Kolua Church		57 32 32	161
Rya	,,	68 42 0	156
Sankravádi Church		109 4 54	146
Agoada, XIII		117 34 57·18	20
St. Anns		123 50 19	115
Salili, XIV		188 56 44·97	20
Jarma, XVIII		192 38 0·06	21
Darsinga, XIX		233 14 21·50	22
Martkauni	,,	252 7 27	153
Batti	,,	314 41 10	154
CHANDEL h.s.			
St. Anns	h.s	3 1 12	119
Nagua Church		23 34 32	142
Hanmantgad Fort		216 57 36	122
Párgad		245 29 23	124
Salili, XIV	,,	310 27 58	119
Karpal	,,	317 49 22	120

Panel 2

Name of station with azimuths of surrounding points		° ′ ″	No. of triangle giving distance
CHANDUR h.s.			
Kanta, III		51 35 2	36
Salera	h.s.	74 38 38	46
Dhanvi Hill Mark		82 23 53	41
Sukili	,,	123 35 32	38
Bhoja	,,	147 35 53	87
Mándvi, XXXI*		181 27 8	85
Torna, II		283 47 30	85
CHAUKOLA, XII			
Agoada Fort		25 34 59	114
Agoada, XIII		25 38 50·66	14
Narvar Church		26 53 42	139
Redi	h.s.	58 54 21	104
Redi Fort N. Bastion		61 6 17	110
Redi Rock		61 16 15	112
Vágheri	,,	80 43 54	106
Parule, XI		95 44 15·69	13
Valran, X		166 14 15·76	13
Phondághát Peak		168 26 39	101
Salili, XIV		345 14 12·51	15
DARSINGA, XIX			
Bori, XVII		53 18 4·10	22
Jarma, XVIII		112 9 46·74	22
Bailúr, XX		192 43 35·72	23
Samshergad, XXIII†		260 20 37 39	24
DRAMAPUR h.s.			
Bori, XVII		207 1 52	168
Parvat	h.s.	307 23 15	168
GHIRYA, IX			
Mirya, VII		172 26 31·62	10
Tili Tek	h.s.	174 21 59	80
Khávdi		205 48 46	78
Manoli, VIII	,,	226 53 5·37	10
Kunkaun		263 29 43	87
Bávda Fort	,,	264 28 33	85
Talia Hill Peak		272 34 59	89
Valran, X		279 0 11·71	11
Sidheshvar Hill Fort Point		304 43 45	102
,, W. Peak		310 29 32	103
Shravan	,,	318 11 23	91
Dabhola Hill Tree		318 19 6	94
Bhutoba	,,	339 3 6	92
Parule, XI		341 45 41·62	12
Devgad Hill Peak		341 56 17	98

Panel 3

Name of station with azimuths of surrounding points		° ′ ″	No. of triangle giving distance
GOA BASE N. END s.			
Rya	h.s.	241 49 48	157
Parvat	,,	303 11 53	157
Goa Base S. End	s.	344 32 43	158
Cape Ramas Tower		357 43 48	171
GOA BASE S. END s.			
Cape Ramas Tower		10 12 54	170
Goa Base N. End	s.	164 33 16	158
Binauli Hill Church		177 32 34	163
Rya	h.s.	191 8 55	158
Parvat	,,	259 23 14	159
HOTTEGUDDA h.s.			
Bomgudda	h.s.	109 59 38	184
Tirval	,,	147 47 38	184
Kungal	,,	162 40 57	176
Ulvi	,,	213 27 53	176
HUNSHIGHAT h.s.			
Bomgudda	h.s.	72 32 32	187
Tirval	,,	102 4 10	188
Kungal	,,	142 53 1	187
JARMA, XVIII			
Bori, XVII		12 38 52·93	21
Agoada, XIII		72 32 18·11	21
Bailúr, XX		235 46 13·80	23
Darsinga, XIX		292 6 55·61	22
KALAMBAT h.s.			
Kanta, III		161 46 22	60
Kumbhárli, VI		306 56 7	60
KALJHONDI h.s.			
Mirya, VII		16 57 33	71
Varavda		83 13 45	73
Jaygad Hill Fort Mark (helio)	h.s.	135 5 17	72
Adhúr, V		144 13 3	71
KAMORLI h.s.			
Agoada Fort		9 6 42	126
Baga	h.s.	35 17 20	127
Chápora Fort		63 10 38	137
Murji		98 5 40	128
Perniem	,,	171 55 40	129
Karpal	,,	260 17 5	125
St. Anns	,,	337 7 2	125

Left column

Name of station with azimuths of surrounding points	° ′ ″	No. of triangle giving distance
KANAKON h.s.		
Barsim h.s.	234 23 29	189
Bomgudda „	305 39 9	189
Lolian „	338 20 39	190
KANKESHVAR h.s.		
Parhúr Hill Peak	23 49 32	81
Khánderi Island Rock	70 8 24	29
Kánsa Rock	163 32 48	27
Karanja, XXXIV*	186 11 15	26
Mira Dongar, XXXIII*	284 11 15	26
Ságargad Hill Peak	341 47 9	33
KANTA, III		
Bánkot Building h.s.	107 46 31	52
Madgad h.s.	162 38 9	49
Titvi, I	171 11 16·77	3
Ghum Hill Tree	183 51 48	51
Bálukilla „	206 45 48	47
Ráygad Fort Building	231 10 10	45
Chandúr	231 26 46	36
Torna, II	238 16 13·34	3
Rájgad Fort House h.s.	243 15 24	43
Jambagad Hill Peak	260 41 11	57
Pratápgad Hill Fort	272 46 42	53
Maháibaleshvar Monument	273 31 52	62
Maháibaleshvar, IV	273 46 45·08	4
Somargad Hill Fort	290 18 10	65
Báleshvar h.s.	311 15 50	56
Kumbhárli, VI	313 49 39·12	7
Nigda „	339 34 43	55
Kalambat „	341 45 22	60
Adhúr, V „	351 46 44·89	5
KARANJA, XXXIV*		
Kankeshvar h.s.	6 14 1	26
Parhúr Hill Peak „	11 15 43	30
Khánderi Island Rock	37 41 42	29
Kánsa Rock	59 27 5	28
Mándvi, XXXI*	291 29 6·38	1
Mira Dongar, XXXIII*	309 0 9·84	26
Titvi, I	350 59 12·08	1
Ságargad Hill Peak	355 58 57	32
KARI E. h.s.		
Arambol h.s.	19 14 27	133
Kari W. „	56 22 50	134
Terekhol Fort	108 46 20	136
Pernem „	272 47 27	131
Murji „	345 9 31	131
Mandrian „	355 41 43	132

Middle column

Name of station with azimuths of surrounding points	° ′ ″	No. of triangle giving distance
KARI W. h.s.		
Terekhol Fort	184 46 42	186
Kari E. h.s.	236 22 42	134
Mandrian „	340 44 11	135
Arambol „	346 32 34	184
KARPAL h.s.		
Bicholim Mosque h.s.	9 33 28	140
St. Anns	24 16 11	117
Agonda Fort	46 36 38	118
Nagua Church	56 18 32	141
Kamorli „	80 19 41	125
Chandel „	137 50 35	120
Hanmantgad Fort	182 44 39	121
Párgad Fort	209 4 18	123
Salli, XIV	305 0 28	117
KHAVDI h.s.		
Ghrya IX	25 51 30	78
Tili Tek h.s.	100 13 30	79
Golap Hill Tree	115 23 17	83
Mirya, VII	134 30 45	78
Ámbághát Hill Peak	243 40 42	82
KONGAON h.s.		
Kungal h.s.	24 43 51	174
Kusauli Hill Mark	39 8 27	180
Bati	75 8 13	173
Martkanni „	143 47 24	173
Tinai „	153 23 59	177
Marsingal „	177 30 3	178
Ulvi „	333 59 38	175
Kartoli Hill Mark	352 18 51	179
KUMBHÁRI, XVI		
Gudehall E. Peak	18 2 41	194
Gudehalli W. Peak	20 3 22	195
Bordai Hill Peak	34 23 56	186
Pil, XV	79 35 15·18	18
Mormugáo Point	115 32 39	147
Ramaida Church	118 19 53	149
Agoada, XIII	124 3 7·75	19
Salli, XIV	154 15 36·08	18

Right column

Name of station with azimuths of surrounding points	° ′ ″	No. of triangle giving distance
KUMBHÁRLI, VI		
Mirya, VII	46 48 28·01	8
Adhúr, V	89 27 33·21	6
Kalambat h.s.	127 5 59	60
Kanta, III	134 0 31·13	7
Somargad Hill Fort	157 41 31	66
Parvat Point	165 56 32	67
Makarandgad W. Fort	169 31 34	64
Maháibaleshvar Monument	177 37 58	61
Maháibaleshvar, IV	178 44 26·21	6
Manoli, VIII	346 55 45·65	9
KUNGAL, h.s.		
Batti h.s.	144 45 7	174
Kusauli Hill Mark	190 27 9	180
Kongnon „	204 42 37	174
Kartoli Hill Mark	213 20 27	179
Ulvi	287 6 28	175
Hunshighát „	322 51 51	187
Höttegudda „	342 39 44	176
KUNKAUN h.s.		
Ghrya, IX	83 34 24	87
Manoli, VIII	205 21 22	87
Valvan, X	294 21 49	88
LOLIAN h.s.		
Kanakon h.s.	158 21 17	190
Barsim „	183 7 10·	191
Bomgudda „	273 16 45	190
Sadáshivgad Fort s.	312 43 45	192
Kúrmagad Fort	328 15 25	198
MADGAD h.s.		
Titvi, I h.s.	178 32 34	48
Bálukilla	256 44 6	48
Ghum Hill Tree	310 11 15	50
Kanta, III	342 36 59	49
MAHABALESHVAR, IV		
Parvat Point	25 46 21	67
Adhúr, V	42 54 54·26	5
Makarandgad W. Fort	44 28 40	68
Somargad Hill Fort	53 24 24	65
Pratápgad Hill Fort	93 57 33·17	4
Maháibaleshvar Monument	99 12 19	54
Torna, II	107 6 13	61
Kumbhárli, VI	172 25 55·60	4
Kumbhárli, VI	358 44 13·36	6

* Of the Bombay Longitudinal Series.

First section

Name of station with azimuths of surrounding points		° ′ ″	No. of triangle giving distance
MANDRIAN h.s.			
Arambol	h.s.	157 53 0	183
Kari W.	”	160 44 22	135
Kari E.	”	175 41 46	132
Pernem	”	246 15 20	130
Murji	”	335 19 16	130
MANDVI, XXXI*			
Chandúr	h.s.	1 27 17	85
Gangad Rock		57 3 47	34
Titvi, I		63 18 2·54	1
Bhoja	”	75 12 9	37
Karanja, XXXIV*		111 40 40·43	1
Torna, II		347 27 46·19	2
Torna Rock		348 52 37	89
MANOLI, VIII			
Kunkaun	h.s.	25 24 45	87
Ghirya, IX		47 1 9·15	10
Mirya, VII		101 38 27·58	9
Kumbhárli, VI		166 57 50·74	9
Valvan, X		353 4 36·08	11
Bávda Fort		357 42 26	86
MARSINGAL h.s.			
Tinai	h.s.	65 50 57	178
Kongaon	”	357 29 53	178
MARTKANI h.s.			
Batti	h.s.	8 20 44	154
Bori, XVII		72 10 41	153
Salili, XIV		135 0 41	153
Kongaon	”	323 45 14	173
MIRA DONGAR, XXXIII*			
Ságargad Hill Peak		83 28 57	32
Kankeshvar	h.s.	104 15 50	26
Kánsa Rock		120 35 45	27
Karanja, XXXIV*		129 4 29·51	26
MIRYA, VII			
Kateshvar Mound		166 32 40	76
Adhúr, V		167 2 9·85	8
Varavda	h.s.	171 39 6	73
Ganpati Temple		182 52 38	77
Kaljhondi	”	196 56 32	71

Second section

Name of station with azimuths of surrounding points		° ′ ″	No. of triangle giving distance
MIRYA, VII—(Continued).			
Páli Hill		218 27 11	70
Kumbhárli, VI		226 40 57·99	8
Ámbághát Hill Peak		277 30 32	81
Manoli, VIII		281 29 0·01	9
Khávdi	h.s.	314 26 45	78
Golnp Hill Tree		347 18 37	83
Tili Tek		348 51 23	79
Ghirya, IX	”	352 25 16·15	10
MORMUGAO h.s.			
Cabo Monastery		176 55 12	145
St. Anns	h.s.	231 47 39.	145
MURJI h.s.			
Mandrian	h.s.	155 19 31	130
Kari E.	”	165 9 49	131
Pernem	”	220 21 35	129
Kamorli	”	278 4 35	128
Baga	”	345 47 55	128
Chápora Fort	”	352 38 41	137
NIGDA h.s.			
Adhúr, V		2 51 28	55
Kanta, III		159 36 32	55
Páigad Tower		235 5 42	59
Báleshvar	h.s.	250 30 5	56
PARULE, XI			
Devgad Hill Peak		161 42 55	99
Ghirya, IX		161 48 42·82	12
Bhutoba		164 9 56	93
Ilia Hill (heliotrope)		167 46 20	97
Shravan	h.s.	191 29 51	91
Talia Hill Peak	”	215 20 42	90
Valvan, X		217 7 23·97	12
Phondághát Peak		234 28 8	100
Chaukola, XII		275 36 25·29	13
Sávantvádi Hill Peak		282 33 46	105
Vágheri	h.s.	296 47 5	106
Salili, XIV		305 21 28·20	16
Vengurla Signal Post		319 45 16	109
Redi Fort N. Bastion		325 58 12	110
Redi		327 10 26	104
Agoada, XIII	”	332 9 35·36	14

Third section

Name of station with azimuths of surrounding points		° ′ ″	No. of triangle giving distance
PARVAT h.s.			
Cape Ramas Tower		42 49 43	170
Goa Base S. End	s.	79 24 49	159
Varka Church		101 49 3	169
Kolua Church		120 34 57	161
Binauli Hill Church		122 38 17	162
Binauli Village Church	h.s.	122 40 3	164
Goa Base N. End	”	123 14 1	157
Dramapur	h.s.	127 23 59	168
Rya	”	146 50 33	156
Rachol College		160 18 31	160
Bori, XVII		183 41 54	155
Chander Church		190 52 42	167
Batti	”	276 35 20	155
Barsim	”	352 36 7	181
PERNEM h.s.			
Chápora Fort	h.s.	25 30 23	138
Murji		40 22 30	129
Mandrian	”	66 16 30	130
Kari E.	”	92 48 40	131
Kamorli	”	351 55 30	129
PIL, XV			
Cape Ramas Highest Point		70 17 26	172
St. Georges Island, W. End		137 4 1	151
” E.		139 13 48	152
Mormugáo Point		143 57 56	147
Agoada Fort		150 14 59	113
Agoada, XIII		150 16 38·20	17
Ramaida Church		158 24 19	149
” Hill (helio.)		158 50 43	148
Margáo Hill House		166 12 38	166
Salili, XIV		188 52 9·83	17
Kumbhári, XVI		259 30 42·62	18
Gudehalli E. Peak		331 36 33	194
” W. Peak		334 3 53	195
REDI h.s.			
Redi Rock		111 44 4	111
Parule, XI		147 12 59	104
Vengurla Signal Post		156 9 25	108
Vágheri	h.s.	192 16 38	107
Sávantvádi Hill Peak		217 38 36	105
Chaukola, XII		238 49 3	104
BYA h.s.			
Goa Base S. End	s.	11 9 14	158

* Of the Bombay Longitudinal Series.

Panel 1

Name of station with azimuths of surrounding points	° ′ ″	No. of triangle giving distance
RYA h.s.—(Continued).		
Varka Church	11 11 39	169
Binauli Village Church	26 50 13	164
Binauli Hill Church	32 19 51	162
Goa Base N. End s.	61 50 40	157
Bori, XVII	248 40 40	156
Chander Church	310 32 12	167
Parvat h.s.	326 49 17	156
SADASHIVGAD FORT s.		
Kúrmagad Fort	89 40 0	193
Lolian h.s.	132 45 0	192
Bomgudda ”	204 25 40	192
SALERA h.s.		
Sukili h.s.	177 45 25	46
Chandúr ”	254 32 40	46
SALILI, XIV.		
Pil, XV	8 53 23.41	17
Bori, XVII	8 57 19.96	20
Cape Ramnas Highest Point	16 18 38	172
Margáo Hill House	21 11 22	166
Ramaida Hill (helio.)	38 49 0	148
Sankravádi Church	46 48 3	146
St. Georges Island, W. End h.s.	53 53 18	150
St. Anns	61 55 34	115
Agoada Fort	73 46 11	113
Agoáda, XIII	73 55 23.72	15
Chora Chapel	75 20 9	148
Nagua Church	86 13 37	141
Bicholim Mosque	91 20 17	140
Narvar Church	92 37 9	139
Karpal ”	125 2 27	117
Parule, XI	125 30 45.94	16
Chandel ”	130 31 10	119
Hanmautgad Fort	158 2 26	121
Chaukola, XII	165 15 44.70	15
Párgad Fort	171 40 32	123
Marikanni	314 58 1	153
Kumbhári, XVI ”	334 12 12.99	18
Bordai Hill Peak	346 8 5	186
SAMSHERGAD, XXIII*		
Darsinga, XIX	80 24 37.01	24
Bailár, XX	133 17 9.74	24
Yalár, XXII*	179 51 13.04	25

Panel 2

Name of station with azimuths of surrounding points	° ′ ″	No. of triangle giving distance
SHRAVAN h.s.		
Parule, XI	11 30 48	91
Bhutoba h.s.	96 8 5	92
Ilia Hill (helio.)	123 49 32	96
Dabhola Hill Tree	138 5 0	95
Ghirya, IX	138 15 21	91
ST. ANNS h.s.		
Mormugáo h.s.	51 48 55	145
Cabo Monastery	85 17 55	144
Agoada Fort	103 39 49	116
Kamorli ”	157 8 12	125
Chandel ”	183 0 59	119
Chora Chapel	186 54 13	143
Karpal ”	204 14 45	117
Salili, XIV	241 52 9	115
Bori, XVII	303 47 28	115
SUKILI h.s.		
Bhoja h.s.	237 34 6	38
Chandúr ”	303 29 21	38
Salera ”	357 45 12	46
TILI TEK h.s.		
Mirya, VII	168 52 2	79
Golap Hill Tree	172 15 53	84
Ambághát Hill Peak	256 37 12	81
Khávdi h.s.	280 10 9	79
Ghirya, IX	354 21 22	80
TIVAI h.s.		
Batti h.s.	14 36 44	177
Marsingal ”	245 49 27	178
Kongaon ”	333 22 19	177
TIRVAL h.s.		
Bomgudda h.s.	51 32 19	183
Barsim ”	104 10 29	182
Batti ”	163 26 28	182
Ulvi ”	267 2 23	185
Hunshighát ”	282 2 35	188
Höttegudda ”	327 46 0	184
TITVI, I		
Parhúr Hill Peak	161 23 44	30
Karanja, XXXIV†	171 0 43.14	1
Mándvi, XXXI†	243 8 7.53	1

Panel 3

Name of station with azimuths of surrounding points	° ′ ″	No. of triangle giving distance
TITVI, I—(Continued).		
Torna, II	280 18 22.49	2
Torna Rock h.s.	281 11 57	89
Lingana Fort	285 21 1	42
Ráygad Fort Pagoda	289 17 24	44
Bálukilla s.	316 5 17	47
Kanta, III h.s.	351 9 59.98	3
Madgad ”	358 32 27	48
TORNA, II		
Makarandgad W. Fort	3 7 28	63
Pratápgad Hill Fort	7 1 38	53
Torna Rock	44 32 40	40
Kanta, III	58 26 12.60	3
Bánkot Building	61 30 20	52
Ráygad Fort Building	76 31 31	45
” ” Pagoda	77 4 47	44
Lingana Fort	79 9 31	42
Titvi, I h.s.	100 29 45.92	2
Chandúr ”	103 49 14	35
Gangad Rock	136 25 56	84
Mándvi, XXXI†	167 29 20.77	2
Ráygad Fort House	296 49 32	43
Mahábaleshvar, IV	352 25 0.65	4
ULVI h.s.		
Höttegudda h.s.	33 29 41	176
Tirval ”	87 5 49	185
Kungal ”	107 9 29	175
Kongaon ”	154 1 25	175
VAGHERI h.s.		
Redi h.s.	12 17 9	107
Redi Rock	19 57 37	111
Vengurla Signal Post	72 52 54	108
Parule, XI	116 50 9	106
Chaukola, XII	260 39 7	106
VALVAN, X		
Sidheshvar Hill W. Peak	8 40 42	108
Parule, XI	37 13 15.96	12
Ghirya, IX	99 9 12.91	11
Kunkaun h.s.	114 26 17	88
Bávda Fort *	160 1 29	85

* Of the Mangalore Meridional Series.   † Of the Bombay Longitudinal Series.

Name of station with azimuths of surrounding points		No. of triangle giving distance
	° ′ ″	
VALVAN, X—(Continued).		
Manoli, VIII	173 5 41·37	11
Talia Hill Peak	198 41 9	89
Phonlághát Peak	342 0 41	100
Chaukola, XII	346 12 10·46	13
Sidlheshvar Hill Fort Point	356 55 42	102

Name of station with azimuths of surrounding points		No. of triangle giving distance
	° ′ ″	
VARAVDA h.s.		
Kateshvar Mound	158 40 57	75
Adhúr, V	163 19 24	74
Kaljhondi h.s.	263 12 16	73
Ganpati Temple	330 1 42	77
Mirya, VII	351 38 38	73

Name of station with azimuths of surrounding points		No. of triangle giving distance
	° ′ ″	
YALUR, XXII*		
Bailúr, XX	86 7 18·52	25
Samshergad, XXIII*	359 51 12·55	25

* Of the Mangalore Meridional Series.

August, 1890.

W. H. COLE,

In charge of Computing Office.

SOUTH KONKAN COAST SERIES.

CO-ORDINATES AND DESCRIPTIONS OF ALL STATIONS AND POINTS.

The following table gives the co-ordinates of all 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.

NOTE.—Principal stations are followed by the Roman numerals I, II, &c., secondary stations by the letters s., h.s. and t.s. Stations and points fixed by Colonel Lambton's triangulation have his nomenclature given also, in italics. The year when a station or point was originally fixed is usually given after its description.

For visited stations and for other points of superior accuracy the values of latitude and longitude are given to two places of decimals, for well determined objects to one place, and for the remaining points to the nearest second.

Trigonometrical heights always refer to the upper mark-stone let into the circular, isolated pillar when the latter is solid; and to the upper surface of the pillar, on which the theodolite stood, when the pillar is perforated or the tower is hollow. Spirit levelled heights are given to two places of decimals of a foot, and the surfaces to which they refer are indicated in footnotes to this table. In the column of heights, the upper numeral gives the height of the station above mean sea-level and the lower is that of the structure itself above ground level. In a few cases, where Trigonometrical heights do not exist, but values have been found on the Topographical Survey maps, these have been inserted and enclosed in brackets; thus [3831] after reduction to the G. T. Survey datum wherever a comparison was possible.

The numerals in the last column indicate the triangles, pages 7—_c._ to 17—_c._, by which the station or point has been fixed; when these numerals are omitted it is to be understood that no triangles are given.

Name of Station or Point	District	Description	Latitude North	Longitude East of Greenwich	Height of Station ▬ Height of Structure	No. of Triangle
			° ′ ″	° ′ ″	*feet*	
Adhúr, V	Ratnágiri	*Vide* page 4—_c._	17 24 11·50	73 12 41·55	$\frac{380}{1\cdot1}$	5
Agoada, XIII	Goa	*Vide* page 5—_c._	15 29 30·78	73 48 55·70	$\frac{261\cdot50^{*}}{\dagger}$	14
Agoada Church . ... *Agoada*	„	Turret of St. Lorenzo's Church: Portuguese territory. 1843-44.	15 29 34	73 49 24	...	...
Agoada Fort ... ... *Agoada*	„	Light-house about 305 feet S. of Agoada Principal Station: Portuguese territory. 1811-12.	15 29 27·86	73 48 56·47	...	113 114
Ámbághát Hill Peak ...	Kolhápur	About a mile N. of Ámba village: Vishálgad estate. 1865-66.	16 57 27	73 50 25	...	81,82
Arambol h. s. ... ... *Arambol*	Goa	On the heights, about a mile N.W. of Arambol village: sub-division Pernem, Portuguese territory. It is marked by a platform. 1811-12.	15 41 48·06	73 44 55·03	...	133

* This height refers to the top of the circular protecting pillar on which the levelling staff stood when determining the height.　† See description of this station.

Name of Station or Point	District	Description	Latitude North	Longitude East of Greenwich	Height of Station ——— Height of Structure	No. of Triangle
			° ′ ″	° ′ ″	feet	
Baga h. s. ... ... *Baggu*	Goa	On the heights, about a mile W. of Baga Church on hill: sub-division Barde, Portuguese territory. The station is marked by a platform. 1811-12.	15 34 11·06	73 47 30·93	...	127
Bailúr, XX	Belgaum	*Vide* page 6—c.	15 44 33·25	74 22 17·99	3405 / 5	23
Báleshvar h. s. ′... ...	Ratnágiri	On a hill so called, about 1¼ miles N.N.E. of Phurus on the high road from Khed to Dásoli, and 4¼ miles N.W. by W. of Khed: taluka Khed. The station is denoted by the usual mark engraved on the rock *in situ*. 1864-65.	17 45 9·96	73 22 22·27	938	56
Bálukilla h. s.	Kolába	On a hill of that name, about a mile E. of Sái village, 2¼ miles W.S.W. of Morba, 2¼ miles N.E. of Chándhor, and 5¼ miles W.S.W. of the taluk town of Mángaon: taluka Mángaon. The station is denoted by a mark-stone embedded in the ground. 1864-65.	18 11 26·35	73 15 1·00	1359	47
Bánkot Building	Ratnágiri	Highest building on W. face of Fort Victoria, about ¼ mile S.S.W. of the W.S.W. end of the Port of Bánkot: taluka Dápoli. 1842-44.	17 58 20·6	73 5 1·4	...	52
Barsim h. s. ... ... *Barsi H.*	Goa	On the highest point of a range, about a mile S.E. of village: Portuguese territory. 1811-12.	15 3 2·86	74 6 0·20	...	181
Batti h. s. ... ... *Batti*	„	On a conical hill, about a mile N.E. of village: Portuguese territory. 1811-12.	15 11 31·18	74 15 23·72	...	154
Bávda Fort	Kolhápur	Masjid with a dome, in the fort: Bávda estate. 1843-44.	16 32 38·9	73 51 27·1	...	85,86
Bhogtambi Hill Tree ...	Ratnágiri	About 1½ miles N.W. of Hátkamba village on the road from Charveli to Chiplún, and 1¾ miles N.E. by E. of Khedsi: taluka Ratnágiri. 1843-44.	17 1 50	73 26 37	[989]	...
Bhoja h. s.	Poona	On a peak of the Gháts, about a mile W. of the village of Saltar, 1¼ miles N. by E. of Telbaila, and 3¼ miles S.W. of Albauna close W. of a road leading to Aulas village: taluka Haveli. 1828-29.	18 34 50·66	73 22 54·02	[3322]	87
Bhutoba h. s.	Ratnágiri	On the highest part of a very conspicuous flat-topped conical shaped hill, about 1 mile E. of the coast line, and ¼ a mile S. of Suda village: taluka Devgad. The station is denoted by a pillar, 1 foot high, with mark-stones at top and bottom. A protecting pillar of masonry, 28 inches square at base, 20 inches at top, and 3½ feet in height, is built over the station, the intersection of the cross lines on its surface corresponds to the station mark below. When visited in February, 1886, the station was found in good preservation. 1865-66.	16 15 28·22	73 28 13·23	386	92,93
Bicholim Mosque ... ... *Bicholin*	Goa	On the hill close S. of fort: sub-division Bicholim, Portuguese territory. 1811-12.	15 34 53·3	73 59 16·2	...	140
Binauli Hill Church ... *Bennouli*	„	Centre of front: Portuguese territory. 1811-12.	15 16 36·1	73 58 28·2	...	162 163
Binauli Village Church ... *Bennouli*	„	Centre of front: Portuguese territory. 1811-12.	15 16 26·2	73 58 44·5	...	164 165
Bomgudda h. s. ... *Bomgooda*	North Kánara	On a hill, the highest in the neighbourhood, on the boundary between the Portuguese territory of Goa and the British district of North Kánara. The fort of Shiveshvar lies about 2 miles S.E. The station is marked by a platform. 1811-12.	14 54 40·23	74 12 13·62	...	183
Bordai Hill Peak ...	Goa	About a mile N.E. of Bordai village: Portuguese territory. 1843-44.	15 2 30	74 15 39	...	186

Name of Station or Point	District	Description	Latitude North	Longitude East of Greenwich	Height of Station — Height of Structure	No. of Triangle
			° ′ ″	° ′ ″	feet	
Bori, XVII	Goa	*Vide* page 6—c.	15 21 14·47	74 5 16·69	1344 / 4	20
Cabo Monastery ... ... Cabo	„	Belfry : Portuguese territory. 1811-12.	15 27 42·7	73 49 48·2	...	144
Cape Ramas, Highest Point ... Cabo de Rama or Cape Ramas	„	Above Cabo de Rama : Portuguese territory. 1843-44.	15 4 20·4	73 58 19·2	...	172
Cape Ramas Tower ... Cabo de Rama or Cape Ramas	„	High tower at the N.W. edge of the rock : Portuguese territory. 1811-12.	15 5 9·0	73 57 29·2	...	170 171
Chandel h. s. ... ... Chandel	„	About a mile N. of Chandel village : Portuguese territory. 1811-12.	15 44 30·93	73 55 36·44	...	119 120
Chander Church ... ... Chander	„	Centre of front : Portuguese territory. 1811-12.	15 15 13·7	74 5 12·4	...	167
Chanderi Hill Tree ...	Ratnágiri	About a mile S.W. of Harcheri village on the Kájvi river and on the road to Ratnágiri : taluka Ratnágiri. 1865-66.	16 56 5	73 28 9	[921]	...
Chandúr h. s. ...	Sátára Agency	On a hill, about ¼ mile N.E. by E. of village so called, 1¾ miles W. by N. of Gisar, and 6 miles W. by N. of Torna Fort : taluka Torna, Bhor State. 1841-43.	18 17 45·11	73 34 16·83	[3896]	35,36
Chápora Fort ... ... Chapora	Goa	A small but conspicuous stone pyramid in hill fort so called : Portuguese territory. 1811-12.	15 36 16·6	73 46 40·0	...	137 138
Chaukola, XII	Sávantvádi State	*Vide* page 5—c.	15 55 31·44	74 1 48·31	2794 / 2·1	13
Chora Chapel ... ... Chorou Circular Chapel	Goa	Cupola of circular chapel on hill : Portuguese territory. 1811-12.	15 31 34·5	73 55 8·9	...	143
Dabhola Hill Tree	Ratnágiri	About 2 miles S.E. of village : taluka Devgad. 1865-1866.	16 21 9	73 30 37	...	94,95
Darsinga, XIX	North Kánara	*Vide* page 6—c.	15 31 19·67	74 19 12·92	3363 / 0	22
Devgad Hill Peak	Ratnágiri	Close to Kalvan W. : taluka Devgad. 1865-66.	16 18 45	73 26 16	...	98,99
Devgad Point	„	The highest point of headland, about a mile S. of Kalvan W. : taluka Devgad. 1843-44.	16 17 56	73 26 32	...	...
Dhanvi Hill Mark	Kolába	On a peak of the Gháts, also called Taula hill peak, on boundary between the Mahád and Mángaon talukas, about 5 miles N.W. by W. of Ráygad Fort, ¼ mile S.E. by E. of Jor village, and 5½ miles S.E. by E. of Nizámpur. 1828-29.	18 16 33·21	73 24 54·70	[2667]	41
Dramapur h. s. ... ... Dramapoor	Goa	On the top of an isolated hill, about a mile N.E. of Dramapur village : Portuguese territory. 1811-12.	15 14 48·64	74 1 53·79	...	168
Gangad Rock	Poona	A conspicuous rock on the edge of the Gháts, about 1½ miles S.E. by S. of Gangad Fort, 3 miles E. by S. of Borap Fort, and 1½ miles S. of Bambharda village : taluka Haveli. 1841-43.	18 31 35·5	73 24 41·6	...	34
Ganja Hill	Goa	About a mile N. of Kankuli village : Portuguese territory. 1843-44.	15 28 33	74 1 31	...	...

Name of Station or Point	District	Description	Latitude North	Longitude East of Greenwich	Height of Station ⎯ Height of Structure	No. of Triangle
			° ′ ″	° ′ ″	feet	
Ganpati Temple	Ratnágiri	About ⅓ a mile S.W. by W. of village so called, and 1 mile S. by W. of Malgund: taluka Ratnágiri. 1865-66.	17 8 37·4	73 18 28·6	...	77
Ghirya, IX	„	Vide page 4—c.	16 29 58·66	73 22 28·28	332 / 0	10
Ghum Hill Tree	Kolába Agency	About 3 miles S.S.W. of Mhasla town, 2 miles W. of the village of Ghum, and 1½ miles N. of Gán: taluka Mhasla of the territory of the Nawáb of Janjira. 1864-65.	18 5 29	73 8 14	...	50,51
Girsia Hill Mark Helio: ...	Ratnágiri	About ½ a mile N.W. by W. of Bámnávli village, 1 mile S. by W. of Vághivra which is ¼ mile S. of Váshishti river: taluka Chiplún. 1864-65.	17 32 42·24	73 22 42·78	[1064]	69
Goa Base N. End s. ... N. end of the Base	Goa	About a mile S. of Majorda: Portuguese territory. 1811-12.	15 17 38·23	73 56 58·71	...	157
Goa Base S. End s. ... S. end of the Base	„	About a mile N.W. of Kavelosi village: Portuguese territory. 1811-12.	15 11 37·69	73 58 41·34	...	158 159
Golap Hill Tree	Ratnágiri	About 2 miles W. by N. of Golap village on the high road from Devgad to Ratnágiri: taluka Ratnágiri. 1865-66.	16 54 5	73 19 52	[395]	83,84
Gudehalli E. Peak	North Kánara	About 6 miles S.E. by S. of Kárwár: taluka Kárwár. 1843-44.	14 47 32	74 13 2	...	194
Gudehalli W. Peak ...	„	About 4 miles S.S.E. of Kárwár: taluka Kárwár. 1843-44.	14 47 21	74 12 6	...	195
Hanmantgad Fort ... ... Huntmunghur	Sávantvádi State	Centre of the house on the highest part of the hill fort so called, about ¾ of a mile N.N.W. of Phukeri village, and 3½ miles N. of Talgat on the road from Goa to Ambolighát. 1811-12.	15 51 1·4	74 0 40·0	...	121 122
Hŏttegudda h. s. ... ... Hottaegooda	North Kánara	About 1½ miles S. of Kodanúr village: taluka Kárwár. 1811-12.	14 50 2·34	74 25 20·12	...	176 184
Hunshighát h. s. ... ... Hunshi	„	About 3 miles S.E. of Mopi village: taluka Sirsi. 1811-12.	14 58 36·28	74 25 4·37	...	187 188
Ilia Hill Helio:	Ratnágiri	About 2 miles S.E. of village: taluka Devgad. 1865-66.	16 19 57·86	73 28 24·13	...	96,97
Jambagad Hill Peak ...	„	Tree at the northern end of the flat-topped hill, and close to the Police outpost at Mandangad Fort: taluka Dápoli. 1864-65.	17 58 59	73 16 59	...	57,58
Jarma, XVIII	Goa	Vide page 6—c.	15 35 31·32	74 8 34·85	2378 / *	21
Jaygad Hill Fort Mark Helio: ...	Ratnágiri	The fort is at the northern extremity of the large place so called which extends along the coast for about 1¼ miles: taluka Ratnágiri. 1865-66.	17 17 57·14	73 15 47·25	213	72
Jaygad Point	„	On the coast about 2 miles W. of Jaygad hill fort: taluka Ratnágiri. 1843-44.	17 17 51	73 13 52	...	...
Kalambat h. s.	„	On a hill about 1½ miles S. of village so called, 2½ miles E. by S. of Harnai town, 4½ miles N.W. of Dápoli old Cantonments, and 1 mile N. by E. of the scattered hamlet of Nirgud on the road from Sáldura to Dápoli: taluka Dápoli. 1843-44.	17 48 0·53	73 10 57·10	[999]	60

* See description of this station, page 6—c.

Name of Station or Point	District	Description	Latitude North	Longitude East of Greenwich	Height of Station — Height of Structure	No. of Triangle
			° ′ ″	° ′ ″	feet	
Kaljhondi h. s.	Ratnágiri	On the highest part of a small range of hills, about a mile E. of village so called, and 4 miles N.E. of the N.E. end of the large and scattered place of Malgund: taluka Ratnágiri. It is denoted by a perforated and isolated pillar with upper and lower mark-stones. 1865-66.	17 12 24·77	73 21 32·28	748	71
Kamorli h. s. ... ... Camorlim	Goa	On a hill about 3 miles W. of Fort de Meio: Portuguese territory. 1811-12.	15 38 5·49	73 50 22·09	...	125 126
Kanakon h. s. ... ... Canacon	„	On a large rock on the top of a hill, the eastern of a range, falling perpendicularly into the sea on the south. The chapel of Kanakon and the Commandant's house lie about 2½ miles S.E. from the station. Portuguese territory. 1811-12.	15 1 2·01	74 3 6·52	...	189
Kankeshvar h. s.	Kolába	On the eastern and highest part of hill so called from a temple which is about ⅛ of a mile to the W.; the village of Mapgaon lies about 2 miles S.W. from which a road leads up to the village of Kankeshvar, the latter is about ¼ mile E. by S. of the station: taluka Alíbág. It is denoted by a masonry pillar 1 foot high. 1864-65.	18 44 28·16	72 58 1·27	1260	26
Kánsa Rock	„	Also called Gull Island, on the larger of two small islands about ⅛ mile apart, and about 7 miles S.E. by E. of the extreme southern point of Bombay Island. 1864-65.	18 50 0·2	72 56 18·3	...	27,28
Kanta, III	Ratnágiri	Vide page 3—c.	17 57 31·75	73 7 40·54	$\frac{1134}{3\cdot5}$	3
Karanja, XXXIV	Kolába	Vide page 3—c.	18 51 24·99	72 58 49·06	$\frac{997}{*}$	1
Kari E. h. s. ... ... Karee E. Station	Goa	On the heights, about a mile S.E. of Kari village. The station is marked by a platform. Portuguese territory. 1811-12.	15 42 42·07	73 45 14·49	...	131 132
Kari W. h. s. ... ... Karee W. Station	„	On the same heights as Kari E. h.s., and about ½ a mile S.W. of it. The station is marked by a platform. Portuguese territory. 1811-12.	15 42 23·84	73 44 46·19	...	134 135
Karpal h. s. ... ... Curpal	„	About a mile N.E. of village so called: Portuguese territory. 1811-12.	15 39 42·20	74 0 6·40	...	117 118
Kartoli Hill Mark ... ... Kartoli H.	North Kánara	About ½ a mile W. of village so called: taluka Supa. 1811-12.	15 11 38·36	74 25 59·90	...	179
Kateshvar Mound	Ratnágiri	A high mound about 2 miles W. of Jaygad Fort, and ¼ mile S.W. of a temple from which a road leads to the village of Nándivda: taluka Ratnágiri. 1865-66.	17 18 7·5	73 13 59·6	...	75,76
Khánderi Island Rock ...	Kolába	About 1½ miles W. by S. of the well-known Underi (Henry) Island. The island, on which a fort and light-house are situated, is also known as Kenery Island: taluka Alíbág. 1864-65.	18 42 9·5	72 51 18·7	...	29
Khávdi h. s.	Ratnágiri	On a low hill 1 mile W. by N.W. of Khávdi village: taluka Ratnágiri. The station is denoted by a pillar 1 foot high with mark-stones at top and bottom. 1865-66.	16 48 37·42	73 31 50·22	1134	78
Kolna Church ... ... Colna	Goa	Centre of front. Portuguese territory. 1811-12.	15 16 39·3	73 57 51·1	...	161
Kongaon h. s. ... ... Kongaon	North Kánara	About 1½ miles W. of village so called: taluka Supa. 1811-12.	15 14 9·93	74 25 38·84	...	173
Kumbhári, XVI	...	Vide page 5—c.	15 9 1·80	74 20 14·38	$\frac{2898}{2\cdot5}$	18,19

* See description of this station.

Name of Station or Point	District	Description	Latitude North	Longitude East of Greenwich	Height of Station —— Height of Structure	No. of Triangle
			° ′ ″	° ′ ″	*feet*	
Kumbhárli, VI	Sátára	*Vide* page 4—*c*.	17 24 30·59	73 43 26·96	3445 / 2·5	6,7
Kuŋgal h. s. ... ... *Coomgul H.*	North Kánara	About 1¼ miles S. of Kuravali village: taluka Supa. 1811-12.	15 4 1·98	74 20 50·66	...	174
Kunkaun h. s.	Ratnágiri	On a conical hill, also called Dongar hill peak, about ½ a mile N. of Kunkaun village, and 2 miles S. of Kháre-pátan: taluka Devgad. 1843-44.	16 31 46·89	73 38 58·31	...	87,88
Kúrmagad Fort ... ... *Coormaghur*	North Kánara	The circular bastion which, as seen from Sadáshivgad Flag-staff, appears on the most N.E. point of the island so called, about 3 miles W. of Kárwár. 1811-12.	14 50 41·9	74 8 19·1	...	193
Kusauli Hill Mark... ... *Koosowli H.*	„	About a mile N.W. of village so called: taluka Supa. 1811-12.	15 9 43·41	74 21 55·52	...	180
Lingana Fort	Kolába	The highest point in the fort, about 1¼ miles E. of the village of Páni, and 1¼ miles N. by E. of Dápoli: taluka Mahád. This point is called Lingana Rock on the Topographical Map. 1841-43.	18 15 8·8	73 32 38·4	[2979]	42
Loliaŋ h. s. *Loliam*	Goa	On the highest part of the headland, close to its south-ern edge and about a mile east of its termination. Suk-kangudda village lies about 1¼ miles N.E. The station is marked by a platform. Portuguese territory. 1811-12.	14 55 2·64	74 5 33·27	...	190 191
Madgad h. s.	Kolába Agency	On the hill fort of that name, about 1¼ miles S.E. of Borlai town, and 1¼ miles N.E. by N. of the village of Dandguri: taluka Borlai of the territory of the Nawáb of Janjira. The station is denoted by a mark-stone embedded in the ground. 1864-65.	18 8 56·93	73 3 56·42	958	48,49
Mahábaleshvar, IV... ...	Sátára	*Vide* page 3—*c*.	17 55 15·55	73 42 44·59	4719 / 4·5	4
Mahábaleshvar Monument ...	„	Sir Sidney Beckwith's Monument, about ⅓ of a mile N. of Christ's Church: taluka Jávli. 1841-44.	17 55 26·68	73 42 6·81	[4566]	61,62
Makarandgad E. Fort ...	„	Centre of the eastern of two old hill forts, about 6¼ miles S. of Malcolmpeth or the Sanitarium of Mahábaleshvar, and ⅓ a mile N.W. by N. of the small village of Gan-eshpur: taluka Jávli. 1841-44.	17 50 55	73 38 47	...	...
Makarandgad W. Fort ...	„	A large bush on the western of two old hill forts, about 6¼ miles S.W. by S. of Malcolmpeth or the Sanitarium of Mahábaleshvar, and 1 mile S. by W. of Hátlot vil-lage: taluka Jávli. 1841-44.	17 50 58	73 38 21	[4061]	63,64
Mandrian h. s. ... ... *Mandrian*	Goa	On the heights, about ½ a mile N.W. of Mandrian village. The station is marked by a platform. Portuguese territory. 1811-12.	15 40 38·84	73 45 24·07	...	130
Mándvi, XXXI	Bhor State	*Vide* page 2—*c*.	18 37 51·11	73 34 48·89	4121 / 0	1
Manoli, VIII	Kolhápur State	*Vide* page 4—*c*.	16 55 13·17	73 50 30·82	3362 / 3·5	9
Margáo Hill House ...	Goa	S. of village so called: Portuguese territory. 1865-66.	15 16 26·0	74 0 10·1	...	166
Marsingal h. s. ... ... *Marsingal ·*	North Kánara	On a hill towards the W. side of the northern boundary of the Supa taluka of North Kánara district, about 6¼ miles E. by N. of Támerighát, 13¼ miles S.W. of Khánápur town of Belgaum district, and 17 miles N.W. of Supa town of North Kánara district: taluka Supa. 1811-12.	15 28 46·11	74 24 59·40	...	178

Name of Station or Point	District	Description	Latitude North	Longitude East of Greenwich	Height of Station —— Height of Structure	No. of Triangle
			° ′ ″	° ′ ″	feet	
Martkanni h. s. ... ... *Martkunni*	Goa	About 2 miles S. of Támeri village. Portuguese territory. 1811-12.	15 25 2·38	74 17 26·27	...	153
Mira Dongar, XXXIII* ...	Kolába	On the eastern end of a flattish, clean-topped hill of this name, about 2¼ miles S. of the village of Adharna, and 5¼ miles S.E. of the town of Pen on the high road from Alíbág to Kampuli. The lower part of the hill is of amygdaloid, the upper is of hard basalt, and the top for about 150 to 200 feet is covered with blocks of laterite. The station is in the lands of the village of Chandi, taluka Pen. 1839. The station consists of a square platform of stones in the middle of which the usual mark—circle and dot—is placed. When visited in 1881 the station was found to consist of a platform of stones 11½ by 14 feet and 5 feet high : "the mark-stone was found loosely set in earth which "had only a few days before been thrown on; the "platform in fact had been newly constructed, "and is stated to have been raised 3 feet higher, the "original platform having fallen away. The mark-"stone it was stated was in position on the old plat-"form, but was removed and transferred to the top of "the new platform by plumbing over the old position. "This information was received from the *patel* (head-"man) of Chandupali village on the S. side of the hill." The directions and distances of the circumjacent villages are :—Thalora E. by S., miles 1½ ; Bhormal N. by W., mile 1 ; Saimal N.E. by E., mile 1 ; and Dhangarvádi W. by S., miles 1¼.	18 41 1·68	73 12 16·06	1863 / 5	...
Mirya, VII	Ratnágiri	*Vide* page 4—c.	17 1 35·92	73 18 6·61	473 / 0	8
Mormugáo h. s. ... ... *Murmagaon*	Goa	Flag-staff on the highest part of the rock : Portuguese territory. 1811-12.	15 24 29·62	73 49 58·93	...	145
Mormugáo Point ... *Murmagaon Flag Siaff*	"	W. extremity of the headland near Mormugáo Fort : Portuguese territory. 1843-44.	15 23 1·2	73 49 59·8	...	147
Mumbri Hill Point ...	Ratnágiri	About ¼ a mile S.W. of village : taluka Devgad. 1843-44.	16 21 28·8	73 24 43·6	...	...
Munjia Palm Tree	"	About 2 miles S.W. of Áchra Port : taluka Málvan. 1865-66.	16 12 12	73 28 39	...	...
Murji h. s. ... ... *Moorjee*	Goa	On the heights, about a mile N. of Murji village. The station is marked by a platform. Portuguese territory. 1811-12.	15 38 38·67	73 46 21·06	...	128
Nagua Church ... ... *Nagoa*	"	N.W. turret, on hill : Portuguese territory. 1811-12.	15 33 37·4	73 50 42·3	...	141 142
Narvar Church	"	Portuguese territory. 1843-44.	15 35 25·8	73 51 16·9	...	139
Nigda h. s.	Ratnágiri	On a hill, about ¼ mile S.W. of the S.W. end of the scattered village so called, 1 mile W. by N. of Umbarla on the high road from the ruined city of Dábhol to Dápoli : taluka Dápoli. The station is denoted by the usual mark cut on the rock *in sitú*. 1864-65.	17 42 12·19	73 13 37·74	983	55
Páldi Hill Mark	...	On the boundary between the Portuguese territory of Goa and the British district of North Kánara, about 500 feet S. of Darsinga Principal Station. 1866-67.	15 31 14·6	74 19 11·7	...	...
Pálgad Tower	Ratnágiri	The southern tower on a hill close to a hamlet, about 1½ miles N.W. by W. of the village of Jámga, 2¼ miles N.E. by N. of Dhámni on the high road from Shirkhal to Khed, and a mile E. by S. of the southern end of Pálil village : taluka Khed. 1864-65.	17 48 50·5	73 23 34·2	[1327]	59

* Of the Bombay Longitudinal Series.
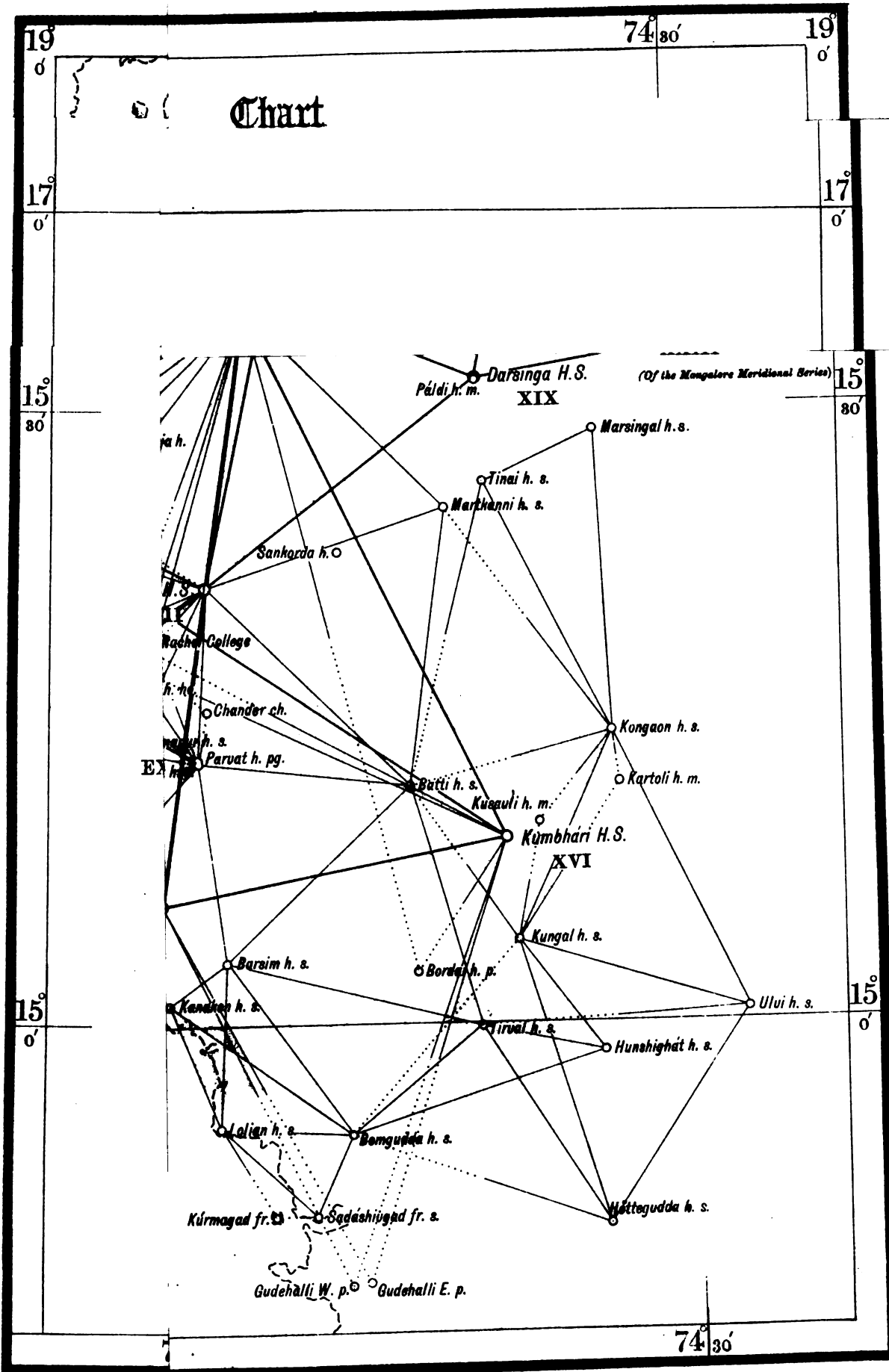
Name of Station or Point	District	Description	Latitude North	Longitude East of Greenwich	Height of Station ——— Height of Structure	No. of Triangle
			° ′ ″	° ′ ″	feet	
Páli Hill	Ratnágiri	A point on the Gháts, about 1¼ miles W.S.W. of village so called, about 2¼ miles W.N.W. of Jhungti village on the W. bank of the Koyna river, and 3¼ miles E. of Tivra: taluka Jávli. 1843-44.	17 35 20	73 46 4	...	70
Párgad Fort ... ... *Pargurd Dr.*	Sávantvádi State	A high cavalier near the S.E. extremity of hill fort so called, about 3¼ miles N. of the large village of Ghotágevádi on the right bank of the Tilári river, and 1 mile S.W. of the small village of Námkol. 1811-12.	15 48 48·3	74 5 20·1	[2419]	123 124
Parhúr Hill Peak	Kolába	Tree on a hill, about a mile W.S.W. of Parhúr village, also called Rámdurna, 1¼ miles E. by S. of the village of Vaishet on the high road from Alíbág to Revas Bandar, and 4¼ miles N.N.E. of the taluk town of Alíbág: taluka Alíbág. 1864-65.	18 41 54	72 56 50	...	30,31
Parule, XI	Ratnágiri	*Vide* Page 5—c.	15 58 15·95	73 33 16·35	522 / 0	12
Parvat Hill Pagoda ... ... *Parwut H.*	Goa	About 1¼ miles N.W. of Ambuli village: Portuguese territory. 1811-12.	15 12 53	74 4 43	...	...
Parvat Point	Sátára	At the N.W. extremity of a high flat-topped hill so called, running N.W. and S.E., about 2¼ miles E.S.E. of Astán village from which a road runs to Dápoli, and 1¼ and 2¼ miles N.W. by W. respectively, of a temple on the same hill and of the village of Parvat: taluka Jávli. 1841-44.	17 45 40·8	73 37 55·0	[3838]	67,68
Parvat h. s. ... ... *Parwut H.*	Goa	About 1¼ miles N.W. of Ambuli village, and about 333 yards S. of a pagoda on the same hill: Portuguese territory. 1811-12.	15 12 43·34	74 4 42·63	...	155
Pernem h. s. ... ... *Pirnim*	„	On the heights, the most commanding spot in the neighbourhood, about a mile S.W. of the fort of Pernem: Portuguese territory. The station is marked by a large and well built platform. 1811-12.	15 42 29·32	73 49 43·46	...	129
Phondághát Peak	Kolhápur	About 2 miles N.E. of Bhairuagad. 1843-44.	16 15 4	73 57 40	...	100 101
Pil, XV	Goa	*Vide* page 5—c.	15 5 54·64	74 2 49·74	1571·56* / 1·7	17
Pratápgad Hill Fort ...	Sátára	Large tree in fort about 300 yards N. of a temple, 5¼ miles W. by N. of Malcolmpeth or the Sanitarium of Mahábaleshvar: taluka Jávli. 1841-43.	17 56 7	73 37 11	[3551]	53,54
Rachol College ... ... *Rachol*	Goa	Centre of front: Portuguese territory. 1811-12.	15 18 30·8	74 2 34·5	...	160
Rájgad Fort House	Sátára Agency	Largest house in fort, about 4¼ miles E.S.E. of Torna Fort: taluka Rájgad, Bhor State. 1842-44.	18 14 41·7	73 43 26·6	[4514]	43
Ramaida Church ... ... *Remaida*	Goa	St. Dennis' Chapel: Portuguese territory. 1843-44.	15 21 25·8	73 56 29·9	...	149
Ramaida Hill (heliotrcpe) ...	„	On a hill a little to N.E. of Ramaida Church: Portuguese territory. 1865-66.	15 21 34·52	73 56 34·88	...	148
Ratnágiri Fort	Ratnágiri	Clump of trees towards the N. end of the fort: taluka Ratnágiri. 1843-44.	16 59 44	73 18 43	...	...
Ráygad Fort Building ...	Kolába	About 3½ miles W. of Dápoli village: taluka Mahád. 1841-44.	18 14 0·7	73 29 7·9	[2857]	45

* This height refers to the top of the rectangular protecting pillar on which the levelling staff stood when determining the height.

Name of Station or Point	District	Description	Latitude North	Longitude East of Greenwich	Height of Station — Height of Structure	No. of Triangle
			o ′ ″	o ′ ″	feet	
Ráygad Fort Pagoda ...	Kolába	About 3¼ miles W. of Dápoli village: taluka Mahád. 1841-43.	18 14 9·6	73 29 20·4	...	44
Redi Fort, N. Bastion ...	Ratnágiri	Taluka Málvan. 1843-44.	15 45 8·9	73 42 25·1	...	110
Redi h. s.	„	On a low hill about a mile S. of fort: taluka Málvan. The station is denoted by a circle and dot engraved on the rock *in sitú*. 1865-66.	15 44 17·00	73 42 35·05	...	104
Redi Rock	„	About a mile S.W. of fort: taluka Malván. 1865-66.	15 44 42·8	73 41 28·2	...	111 112
Rya h. s. ... ... *Rya H.*	Goa	About ¼ a mile S.W. of village: Portuguese territory. 1811-12.	15 19 20·38	74 0 15·31	...	156
Sadáshivgad Fort s. ... *Sadasheeghur*	North Kánara	Flag-staff in the hill fort so called. 1811-12.	14 50 42·61	74 10 22·62	...	192
Ságargad Hill Peak	Kolába	Tree on a flat-topped hill about ¼ a mile N.W. of fort of that name, 3¼ miles E. by S. of the village of Khan-dála on the high road from Alíbág to Pen, and 5¼ miles E. by N. of the taluk town of Alíbág: taluka Alíbág. 1864-65.	18 39 39	72 59 41	...	32,33
Salera h. s.	„	On a hill about 1¼ miles E.N.E. of Vivla village, 2 miles W. by N. of Morba, and 2¼ miles S.W. by S. of Kharavli: taluka Mángaon. 1828-29.	18 12 50·32	73 15 37·07	[1173]	46
Salili, XIV	Goa	*Vide* page 5—c.	15 34 42·36	74 7 27·90	2023/3	15,16
Salva Hill Fort ...	Ratnágiri	W. end: taluka Devgad. 1843-44	16 27 25	73 45 46	...	...
Samshergad, XXIII* ...	Belgaum	*Vide* page 6—c.	15 33 46·66	74 34 7·18	2999/†	24
Sankorda Hill	Goa	Conical wooded hill, about 2¼ miles S.W. of village so called: Portuguese territory. 1843-44.	15 22 59	74 11 58	...	...
Sankravádi Church ... ... *Sancoali*	„	Centre of front, on bank of river: Portuguese territory. 1811-12.	15 24 19·6	73 56 4·5	...	146
Sávantvádi Hill Peak ...	Sávantvádi	About a mile W. of Sávantvádi town. 1865-66.	15 54 29	73 50 43	...	105
Shravan h. s.	Ratnágiri	On a hill about ¼ a mile N. of that village, and 2¼ miles N.W. of Rámgad: taluka Devgad. The station is denoted by a pillar, 1 foot high, with mark-stones at top and bottom. 1865-66.	16 14 35·51	73 36 42·61	709	91
Sidheshvar Hill Fort Point ...	Kolhápur	The highest point in the eastern portion of the fort. 1843-44.	16 7 58·2	73 55 15·4	...	102
Sidheshvar Hill Fort Tree ...	„	1865-66.	16 8 0	73 54 0	...	...
Sidheshvar Hill W. Peak ...	Sávantvádi	About a mile E. of Kuagaon. 1843-44.	16 6 8·1	73 51 19·1	...	108
Somargad Hill Fort ...	Ratnágiri	The highest point, about 1¼ miles W. of Heli village, and 1¼ miles N.E. by E. of that of Vádi Jaytápur: taluka Khed. 1841-44.	17 48 27·6	73 33 11·3	...	65,66
St. Anns h. s. ... ... *St. Ann's*	Goa	About 1¼ miles S.W. by W. of village: Portuguese terri-tory. 1811-12.	15 28 6·29	73 54 42·86	...	115 116
St. Georges Island, E. End ... *St. George's Island*	„	Portuguese territory. 1843-44.	15 21 2	73 49 23	...	152

* Of the Mangalore Meridional Series.   † Not forthcoming.

Name of Station or Point	District	Description	Latitude North	Longitude East of Greenwich	Height of Station — Height of Structure	No. of Triangle
			° ′ ″	° ′ ″	*feet*	
St Georges Island, W. End ... _St. George's Island_	Goa	Portuguese territory. 1843-44.	15 21 6	73 48 16	...	150 151
Sukili h. s.	Kolába	On a hill, about 2 miles N.E. of Sukili village, 1¼ miles E.S.E. of Hedauli, and 2¼ miles S.S.W. of the large village of Páli: taluka Pen. 1828-29.	18 30 0·46	73 14 54·78	...	88
Talegad Point	Ratnágiri	The highest point of a hill, about a mile E. of Talegad village, 1 mile N.E. by N. of Kadvan, and 3¼ miles N.W. of Vinhera terminal of road from Mahád: taluka Dápoli. 1843-44.	17 57 29	73 23 31	...	...
Talia Hill Peak	Kolhápur	A conical peak about 2 miles S.E. of village so called. 1843-44.	16 28 29·8	73 55 30·5	...	89,90
Terekhol Fort ... ... _Taricol_	Ratnágiri	Flag-staff: taluka Málvan. 1811-12.	15 42 50·6	73 44 48·5	...	136
Tili Tek h. s.	,,	On the coast ridge, about a mile S.W. by S. of Rhadka village, 2¼ miles N.N.W. of Purangad Port, and 2¼ miles S.W. of the large village of Panvas on the road from Purangad to Ratnágiri: taluka Ratnágiri. The station is denoted by a pillar, 1 foot high, with mark-stones at top and bottom. 1865-66.	16 50 36·74	73 20 21·45	408	79,80
Tinai h. s. ... ... _Tini_	North Kánara	On the Gháts, about a mile S. of Karambal: taluka Supa. 1811-12.	15 26 19·38	74 19 22·18	...	177
Tirval h. s. ... ... _Tirwal_	,,	On the eastern of two high tops N.E. of village, and about 3 furlongs E. of the boundary between the Portuguese territory of Goa and the British district of North Kánara. The station is marked by a platform. 1811-12.	14 59 52·41	74 18 57·67	...	182
Titvi, I	Kolába	_Vide_ page 3—c.	18 22 48·44	73 3 34·26	1318 / 0	1
Torna, II	Sátára Agency	_Vide_ page 3—c.	18 16 27·44	73 39 47·70	4604 / 0	2
Torna Peak	,,	About a mile S.W. by W. of Torna Fort: taluka Prichandgad, Bhor State. 1841-42.	18 15 58	73 39 7	...	...
Torna Rock	,,	A conspicuous rock about ¼ of a mile S.W. of Torna Fort: taluka Prichandgad, Bhor State. 1841-42.	18 15 59·4	73 39 18·8	...	39,40
Ulvi h. s. ... ... _Woolwi_	North Kánara	Close to village of this name: taluka Supa. 1811-12.	15 0 32·79	74 32 28·96	...	175 185
Vágheri h. s.	Sávantvádi	On a high hill, about 3½ miles E. of Vengurla town. The station is denoted by a pillar, 1 foot high, with mark-stones at top and bottom. 1865-66.	15 52 46·73	73 44 29·67	...	106 107
Valaul Hill Rock	,,	The central and highest, about a mile S. of village. 1864-65.	15 59 25·6	73 38 25·6	...	...
Valvan, X	Kolhápur State	_Vide_ page 4—c.	16 25 4·15	73 54 18·42	3250 / 0	11
Valvan Mound	,,	About 100 yards N.E. of Valvan Principal station. 1843-44.	16 25 7	73 54 22	...	...
Varavda h. s.	Ratnágiri	On a hill jutting out about a mile from the coast line, ½ mile W. by S. of Bhandar hamlet of the village of Varavda, and 3 miles N.W. of the W. end of the large place of Malgund: taluka Ratnágiri. The station is denoted by a circle and dot cut on the rock *in sítú*. 1865-66.	17 11 50·53	73 16 32·77	237	73,74

Name of Station or Point	District	Description	Latitude North	Longitude East of Greenwich	Height of Station — Height of Structure	No. of Triangle
			o ′ ″	o ′ ″	feet	
Varka Church ... ... *Varia*	Goa	Spire: Portuguese territory. 1811-12.	15 13 51·2	73 59 8·2	...	169
Vengurla Burnt Island ...	Ratnágiri	Taluka Málvan. 1865-66.	15 53 18	73 30 56	...	·...
Vengurla Signal Post ...	„	Taluka Málvan. 1865-66.	15 51 15·53	73 39 23·94	...	108 109
Vishálgad Peak ...	Kolhápur	About 2 miles E. of Vishálgad Fort: Vishálgad estate. 1843-44.	16 55 9	73 49 38	...	...
Yalúr, XXII*	Southern Marátha Agency	*Vide* page 6—*c.*	15 45 20·01	74 34 5·35	$\frac{3283}{6}$	25

* Of the Mangalore Meridional Series.

Chart

74 30'

19 0'
19 0'

17 0'
17 0'

Dársinga H.S.
Páldi h. m.
XIX

(Of the Mangalore Meridional Series)

15 30'
15 80'

Marsingal h. s.

Tinai h. s.

ia h.
Marthanni h. s.

Sankorda h.

H.S.
Racher College

h. h.
Chander ch.
Kongaon h. s.

na h. s.
Kartoli h. m.

EX
Parvat h. pg.

Butti h. s.
Kusauli h. m.
Kumbhári H.S.
XVI

Kungal h. s.

Barsim h. s.
Bordai h. p.
Ului h. s.
15 0'
15 0'

Kandian h. s.
Tirual h. s.
Hunshighát h. s.

Lolian h. s.
Bemgudda h. s.

Háttegudda h. s.

Kúrmagad fr.
Sadáshiughd fr. s.

Gudehalli W. p.
Gudehalli E. p.

74 30'

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