XX. *An Account of the Trigonometrical Survey, carried on in the Years* 1795, *and* 1796, *by Order of the Marquis* Cornwallis, *Master General of the Ordnance. By Colonel* Edward Williams, *Captain* William Mudge, *and Mr.* Isaac Dalby. *Communicated by the Duke of* Richmond, *F.R.S.*

Read May 11, 1797.

PART FIRST.

PREAMBLE.

According to the resolution expressed in the account of the Trigonometrical Survey, printed in the Philosophical Transactions for the year 1795, we now communicate to the public, through the same channel, a farther relation of its progress.

On referring to the above paper, it will be found that, for the prosecution of this undertaking, a design was formed of proceeding to the westward, with a series of triangles, for the survey of the coast. This intention has been carried into effect; and as the small theodolite, or circular instrument, announced in our former communication as then in the hands of Mr. Ramsden, was finished early in the summer of 1795, we are enabled to give a series of triangles, extending, in conjunction with those before given, from the Isle of Thanet, in Kent, to the Land's End.

In the composition of the following account, we have adhered to the plan adopted in the last, of giving the angles of

the great triangles, with their variations; and we have, with as much brevity as possible, inserted a narrative of each year's operations. This will be found, however, to extend only to the First Part, or that containing the particulars of the survey in which the great instrument alone was used. The remaining contents of this portion of the work, are necessarily confined to the angles of the principal, and secondary triangles, with the calculations of their sides, in feet; and likewise such *data* as have no connection with the computations of latitudes and longitudes.

Part the Second contains an account of a survey carried on in Kent, in the years 1795 and 1796, with the small instrument, by order of the Master General, for completing a map of the eastern and southern parts of that county, for the use of the Board of Ordnance, and the military commanders on the coast.

In Part the First will be found an article, for which we are indebted to Dr. MASKELYNE, the Astronomer Royal. It contains his demonstration of M. DE LAMBRE's formula, in the *Connoissance des Temps* of 1793, for reducing a distance on the sphere to any great circle near it, or the contrary. The *practical rule* thence derived, for reducing the angles in the plane of the horizon, to those formed by the chords, is very useful, and will considerably abridge the trouble which must necessarily arise in computing the chord corrections by any former method.

SECTION FIRST.

ARTICLE I. *Of Particulars relating to the Operations of the Year* 1795.

In an early part of this season, from the necessity which existed of completing the map of Kent, mentioned in the preamble, we had conceived that our former intentions, of continuing the survey towards the west, would for the present be relinquished; as it was not imagined that the telescope of the small circular instrument, then in the hands of Mr. RAMSDEN, could be applied, with good effect, in observing staffs erected on very distant stations.

From the obvious importance, however, of adhering to the first resolution, it was determined that a trial should be made of the excellence of this instrument, in the construction of which extraordinary pains had been taken, by operating with it in Kent, and using it for those purposes to which, if the object before spoken of had not been in view, the great theodolite would have been necessarily applied.

This smaller theodolite, therefore, as a substitute, was in May taken into Kent by Mr. DALBY, and Mr. GARDNER, chief draughtsman in the Tower; the assistance of the former being necessary, as the stations in the series of 1787 were for the most part unknown to the latter gentleman.

As the former paper, relating to the trigonometrical survey, could not be presented to the Royal Society before the 4th of June, the business did not commence till the 12th of the same month. The party then left London, and the instrument was taken to Bull Barrow, in Dorsetshire.

On a reference to the account of 1795, it will be seen, that a station was chosen near Lulworth, and observed both from Nine Barrow Down and Black Down. It was also intended to be observed from Bull Barrow; by which means the great triangle, formed by the stations Black Down, Nine Barrow Down, and Bull Barrow, would be divided into, and made to consist of, two smaller triangles. This, however, it was now found could not be done, as a signal house had been erected near the station at Lulworth, subsequent to the operations in 1794, which prevented that spot from being afterwards seen at Bull Barrow: but no consequences very injurious can have arisen from the impracticability of making use of this station in the manner originally proposed, since the stations formerly chosen in Portland, with which that of Lulworth was also intended to connect, have not been visited with the instrument. The stations in that island were selected with a view of observing from them, and Charton Common, some point in the vicinity of Torbay, which might be a proper station in the series intended to be carried along the coast. Such a situation, however, could not be conveniently found, as the view of Devonshire from Charton Common is much interrupted by trees and other obstacles; and it would have been highly improper to shorten the side between Pilsden Hill and the coast, by choosing a station more remote from the latter than Charton Common.

As from an inspection of the plan of the triangles annexed to this account, a doubt may be entertained as to the propriety of carrying on so very extensive a series from the short side connecting the stations on Black Down and Mintern Hill; it must be observed that, admitting the necessity of adopting Bull Barrow for a station, those on Pilsden and Mintern Hills were

naturally chosen; the first, because it connected with Dumpdon (a station that could not be dispensed with); and the second, because it was the point most remote from Black Down, being on the brow of the high land overlooking the general surface of Somersetshire.

To connect with the station formerly chosen near Maiden Bradley, two others were selected whilst the party were at Bull Barrow; one on Ash Beacon, near Sherborne, and the other on the Quantock Hills. Both these have very commanding views, and will hereafter easily unite with any stations which may be chosen to the northward.

From Bull Barrow, the instrument was successively taken to the following stations, before any other new ones were chosen, *vi.* Mintern, Pilsden, and Charton Common; and whilst the party were at the latter, nearly all the stations were selected in Devonshire. In the choice of these, much difficulty occurred, as the face of this county is particularly unfavourable for operations of this kind. Around Honiton and Chard, there are several small ranges of hills, nearly of an equal height, running in parallel directions. Near the former are three, thus circumstanced; *viz.* Hembury Fort, Combe Raleigh, and Dumpdon. From the first and second of these, the station on Charton Common is not visible; and it is from the last only, that both Pilsden and the Quantock Hills can be seen. This station, however, has a disadvantage: Combe Raleigh, which is to the west of it, takes off all view round Tiverton and Silferton; so that it became indispensably necessary to select a spot on the northern extremity of Dartmoor, called Cawsand Beacon.

To those who are acquainted with the interior of Dartmoor,

it will be unnecessary to assign the reason for not having chosen any station towards its centre. It may be sufficient to observe, that two spots were found on its circumference, which render the want of it trifling in its consequences.

Independent of the stations to which, as we have before observed, the instrument was taken this year, the following were visited, *viz.* Dumpdon, Little Haldon, Furland, and Butterton. From the latter, the party returned to London in the month of October.

ART. II. *Angles taken in the Year* 1795.

At Bull Barrow.

Between	°	′	″	Mean.
Mintern Hill and Black Down -	46	54	33	″
			34,75	34
			34	
Black Down and Nine Barrow Down	84	31	22,25	23,25
			24	
Nine Barrow Down and Wingreen	93	33	0,5	0,25
		32	59,75	

At Mintern Hill.

Bull Barrow and Black Down -	101	39	30	30,5
			31,25	
Black Down and Pilsden - -	68	30	45,75	46,5
			47	

On Charton Common.

Little Haldon and Dumpdon -	68	12	49,75	51,25
			51,25	
			52,75	
Dumpdon and Pilsden - -	93	54	36,25	37,25
			37,5	
			38	

Between	°	′	″	Mean.
Pilsden and Black Down - -	47	39	17,5 19,25	18,5
On Pilsden Hill.				
Mintern and Black Down -	44	37	51,5 52,5 53 54,25 55,5	53,25
Black Down and Charton Common	105	5	25,75 26 26	26
Charton Common and Dumpdon	47	32	0,25 1,25 2,5	1,25
At Dumpdon.				
Charton Common and Little Haldon	86	39	7 7,25 8,5 8,75 9,25	8,25
Little Haldon and Cawsand Beacon	35	7	6,5 6,75 8,25	7,25
Pilsden and Charton Common -	38	33	22 22,25 22,25 23 23,5 23,5	22,75
At Little Haldon.				
Furland and Rippin Tor - -	84	58	42 43	42,5

Between	°	′	″	Mean.
Rippin Tor and Cawsand Beacon	29	30	9,25 11 11	″ 10,5
Dumpdon and Charton Common	25	8	0,75 2	1,25
Dumpdon and Furland -	143	52	32,75 33 34	33,25
At Furland.				
The Bolt Head and Butterton -	53	15	34,25 35,75	35
Butterton and Rippin Tor -	43	38	4 5,25	4,5
Rippin Tor and Little Haldon -	39	24	36,75 37,75	37,25
At Butterton.				
Rippin Tor and Furland - -	74	21	56 56,5 57,25 58 58,5	57,25
Furland and the Bolt Head -	63	47	50,75 50,75	50,75
The Bolt Head and Kit Hill -	127	37	36,5 36,75	36,5
Maker Heights and Kit Hill -	42	11	38,75 38,75	38,75
Maker Heights and Carraton Hill	35	30	28 28,75 29,75	28,75

ART. III. *Of Particulars relating to the Operations of the Year 1796.*

In the account of this Survey, published in the Philosophical Transactions for 1795, page 473, it is stated, that large stones were sunk in the ground at the extremities of the base of verification on Salisbury Plain. To render these points permanent, two iron cannon (selected from among the unserviceable ordnance in Woolwich Warren) were, towards the end of February, sent to Salisbury, and in the beginning of March inserted at the ends of the base. The same methods were adopted, for the purpose of fixing these cannon in their proper positions, as those made use of when similar *termini* were sunk in the ground on Hounslow Heath. This operation having been completed on the 10th of March, the instrument was shortly after carried to Kit Hill, in Cornwall; a station, like that on Bindown, chosen rather for the purpose of a secondary, than a principal place of observation.

It would be tedious, and perhaps unnecessary, to enumerate the names of all the stations selected this year, as many of them do not form any part of the series now given to the public. We shall, therefore, confine ourselves to such remarks on the subject as may serve to abridge this article.

We have before stated, that a station was chosen on Cawsand Beacon, the northern extremity of Dartmoor, for the purpose of connecting with Dumpdon. It should have been observed, that to the westward of the former eminence, and near it, there is a hill considerably higher, which in point of situation has many advantages, but which cannot be made

use of on account of the ruggedness of its surface, which seems to render the carrying of the instrument to its top almost impossible. From this circumstance, and similar impediments, which the high lands remote from the circumference of Dartmoor offer to our operations, it results, that the body of this moor cannot have any great triangles carried over it: such stations were therefore selected this year as may serve, in conjunction with others, to include this tract of country in a polygon of a small number of sides.

To make observations for the purpose of hereafter determining the longitude and latitude of the Lizard, was a principal object in this year's operations; and as this headland seems to offer itself as very convenient for a station, it will be right to assign our reasons for not having chosen one upon it.

As no other spot but Hensbarrow Beacon could be found in that part of Cornwall proper for a station, it became necessary to fix on the Deadman, or Dodman, for another point in the series. From this place no part of the land within four miles of the Lizard can be seen, as the high ground about Black Head, which is to the eastward of the latter, is nearly in a line between them, and is also much higher than both. It will be perceived, however, that no evil can result from the want of such a station, as the light-houses and the naval-signal-staff at the Lizard, have been intersected from several stations. The precise spot on which Mr. BRADLEY made his observations in the year 1769, for ascertaining the longitude and latitude of this headland, was pointed out by the person having the care of the light-houses, who well remembered the common particulars relating to his operations: such measurements were made from the light-houses to this spot, as may enable us, at a future

period, to compare the results from the *data* afforded by the trigonometrical operation, with those deduced from the astronomical observations made by the above gentleman. It may be also mentioned, that angles were at the same time taken at the western light-house and signal-staff, for the purpose of finding the situation of the Lizard Point.

We are now to speak of the most important business performed this year; that of making observations to determine the distance of the Scilly Isles from the Land's End.

To do this as accurately as possible, it became necessary to find stations affording the longest *base*. The hill near *Rosemergy*, called the *Watch*, and the station near St. Buryan, are certainly the most advantageous places, because all the islands can be seen from both; but we could not avail ourselves of the former, as difficulties almost insuperable would have attended an attempt to get the instrument upon it. Another station was therefore selected, on Karnminnis, near *St. Ives;* a spot as well situated as the place spoken of, provided all the islands could be seen: this, however, does not prove to be the case, *St. Martin's Day-Mark* being the only object in the Scilly Islands visible from Karnminnis.

From the stations near the Land's End (Sennen and Pertinney), as well as that above mentioned (St. Buryan), St. Agnes' Light-house, and two objects in St. Mary's, were observed; and as the means by which all their distances are determined, except those of the Day-Mark, from the shortness of the bases (which were, however, the longest that could be found) are exceptionable, it will be right to mention, that while we were engaged in that part of the operation now spoken of, the air was so unusually clear, that we could sometimes, with the

telescope of the great theodolite, discover the soldiers at exercise in St. Mary's island.

Under this article, it will be convenient to state, that we have endeavoured to find some spot to the westward, on which a base might be measured. Had we been fortunate in this respect, it undoubtedly would be eminently advantageous; as those triangles, now extended to the Land's End, would, in that case, be verified in some part of the new series. In Devonshire and Cornwall, however, no place has been discovered by any means fit for the purpose; so that our communicating this work, under the circumstances attending it, is a matter of necessity.

In the present and former seasons, such stations were selected and observed, as were judged to be proper for the future use of the small instrument; and as we had experienced, in the early stage of this Survey, much delay and disappointment from the white lights not being always seen when fired on distant stations, we have since substituted lamps and staffs in their stead. The operations of the present year were continued till October, when the party returned to London.

ART. IV. *Angles taken in the Year* 1796.

At Kit Hill.

Between		°	′	″	Mean.
Butterton and Maker Heights	-	48	36	45	46″,5
				47,75	
Maker Heights and Bindown	-	53	21	13,75	
Carraton Hill and Bindown	-	50	45	31	

On Maker Heights.

Between	°	′	″	Mean.
Lansallos and Carraton Hill -	48	39	54,75 54,75	54,75
Carraton and Butterton -	112	18	7,75 9,75	8,75
Butterton and the Bolt Head -	45	54	35,75 38,5	37
Bindown and Carraton Hill -	28	22	50,75	
Bindown and Kit Hill - -	51	29	20,5 24,5	22,5
Kit Hill and Butterton - -	89	11	33,25 36	34,75

At the Bolt Head.

Maker Heights and Butterton -	48	39	24,5 24,75	24,75
Butterton and Furland - -	62	56	36,5	

At Rippin Tor.

Cawsand Beacon and Little Haldon	124	59	12,75 13,5	13
Little Haldon and Furland -	55	36	39 41,75	40,5
Furland and Butterton - -	61	59	59,25 59,5	59,5

On Cawsand Beacon.

Dumpdon and Little Haldon -	43	14	20 22,5	21,25
Little Haldon and Rippin Tor -	25	30	39,5 40,25	39,75

On Carraton Hill.

Between	°	′	″	Mean. ″
Maker Heights and Lansallos -	67	12	20,25 23,5	21,75
Lansallos and Bodmin Down -	56	21	16,75 17	17
Lansallos and Hensbarrow Beacon	37	28	57,75 58	58
Butterton and Maker Heights -	32	11	22,5 23,5	23
Kit Hill and Bindown - -	91	45	22,5	
Maker Heights and Bindown -	38	58	38,5	

On Bindown.

Lansallos and Carraton Hill -	119	9	36,25
Carraton Hill and Kit Hill -	37	29	5,75
Kit Hill and Maker Heights -	75	9	24,5

At Lansallos, or Polvinton Farm.

Deadman and Hensbarrow Beacon	52	34	2 2,5 5	3
Hensbarrow Beacon and Bodmin Down	45	1	10,75 12,75	11,75
Bodmin Down and Carraton Hill	54	57	43,25 44,75	44
Carraton Hill and Bindown -	32	36	43,25	
Carraton Hill and Maker Heights	64	7	43,5 43,75 45,75	44,25

On Bodmin Down.

Carraton Hill and Lansallos -	68	40	57,75 41 0,75 40 58,5	59

Between	°	′	″	Mean. ″
Lansallos and Hensbarrow Beacon	67	59	27,5 28	27,75
On Hensbarrow Beacon.				
Carraton Hill and Lansallos -	42	32	8,5	
Bodmin Down and Lansallos -	66	59	21,75 25	23,25
Lansallos and Deadman - -	71	13	35 35,25 35,5	35,25
Deadman and St. Agnes' Beacon	77	20	28,5 28,75 31,5	29,5
On St. Agnes' Beacon.				
Hensbarrow Beacon and Deadman	34	31	17 21 23	20,25
Deadman and Karnbonellis -	75	51	53 53,75	53,25
Karnbonellis and Karnminnis -	57	46	31 31,5	31,25
On Karnminnis.				
St. Agnes' Beacon and Karnbonellis	32	30	0,25 02,5	0,25
Karnbonellis and St. Buryan -	111	53	15,5 16,5	16
St. Buryan and Pertinney -	13	48	16,75 17 20,75	18
At St. Buryan.				
Karnminnis and Karnbonellis -	41	43	45,25 45,5 45	45,25

Between	°	′	″	Mean. ″
Pertinney and Karnminnis -	52	31	27,5 27,5	27,5
Sennen and Pertinney - -	75	36	11 11,75 12	11,5
At Sennen.				
Pertinney and St. Buryan -	36	39	18,5 19,25	18,75
On Pertinney.				
Karnminnis and St. Buryan -	113	40	15,25 16	15,5
St. Buryan and Sennen - -	67	44	30,5 31,25	31
At Karnbonellis.				
St. Buryan and Karnminnis -	26	22	59,25 59,5	59,25
Karnminnis and St. Agnes' Beacon	89	43	27,25 28,75 31,25	29
St. Agnes' Beacon and the Deadman	78	16	39,75 40,5 43	41
On the Deadman, or Dodman Point.				
Karnbonellis and St. Agnes' Beacon	25	51	24,5 24,75	24,75
St. Agnes' Beacon and Hensbarrow Beacon	68	8	12,5 13,75	13
Hensbarrow Beacon and Lansallos	56	12	22,5 22,75	22,75

ART. V. *Situations of the Stations.*

Mintern, or *Revel's Hill.* This station is in Dorsetshire, and situated on Revel's Hill, which is not far from Mintern. It is 17 feet N. E. from the corner of the hedge.

Pilsden. This station is also in Dorsetshire, and near Broadwindsor. The point is on the S. E. corner of the old parapet.

Charton Common. The station is in the field adjoining to, and also to the westward of, the Common, and is about two miles from Lyme: it is 50 yards from the eastern hedge, and may be easily found, as Black Down is only visible from that spot, being seen between two trees.

Dumpdon; about three miles N. E. of Honiton. The station is 10 feet northward of the hedge of the plantation, and nearly on the highest part of the hill.

Little Haldon; near Teignmouth, in Devonshire. The station is 80 yards from the *Direction Post*, and in a line with it and the Obelisk on *Great Haldon.*

Cawsand Beacon; near South Zeal. The station is about 200 feet north of the Karn, or great heap of stones.

Rippin Tor. This station is also on Dartmoor, and about 5 miles from Ashburton. The point is mid-way between the two heaps of stones.

Furland; a field near the turnpike-gate between Brixen and Dartmouth. The station is near the stone, erected in the middle of the field.

Butterton. The station is 45 feet S. W. of the Karn, on the hill called by this name, and about 1 mile from Ivy Bridge.

The Bolt Head. The station is on the spot called *White Soar*, above the Bolt; it is 95 feet in the line produced, north-

ward, from the west side of the signal-house, and about 90 feet from the nearest corner of it.

Maker Heights. This spot is near Cawsand, and the station is 45 feet from the great flag-staff, in the line produced from Statten Battery passing by the side of the staff.

Kit Hill, near Callington. The station is on the S. W. bastion of a work, similar to an Indian fortification.

Carraton Hill. This station is about 4 miles north of Liskeard; and the point 150 yards south of the highest Karn on the top of the hill.

Bindown, near Looe. The station is 50 yards eastward of the barrow on this hill.

Lansallos. The station is in a field belonging to *Polvinton Farm*, which is near that town. The point is 159 feet from the western bank, and 90½ from the southern one.

On Bodmin Down. The station 120 yards south of the high road, and about a quarter of a mile east of the turnpike gate. The point is in the centre of a remarkable ring.

Hensbarrow Beacon, near St. Roach. The station is on the top of the barrow.

The Deadman, or *Dodman Head.* The station is about 40 feet south of the bank, and nearly 100 yards to the east of the entrance into the inclosure.

St. Agnes' Beacon. The station is on the southern brow of the beacon, and about 80 yards from the tower.

Karnbonellis. The station is 90 yards south of the northern Karn, or heap of stones. The hill called *Karnbonellis* is near *Porcillis.*

Pertinney. The station is in the middle of the ring on its top. This hill is about 2 miles eastward of *St. Just.*

Sennen. This station is in the north-west corner of a field belonging to Mr. WILLIAMS. The field may be easily found, as there is no other spot near the town of *Sennen*, from which the Longship's Light-house, Pertinney, and St. Buryan, can be seen.

Karnminnis, near St. Ives. The station on the top of this hill, may be found from the following measurements:

	Feet.	In.		
The station from 3 large moor-stones, south of the hedge.	8	8	from the south	stones.
	11	0	—— north	
	14	1	—— west	

St. Buryan. The station is in a field adjoining the town, and by the side of the *Penzance* road. It is $84\frac{1}{2}$ feet from the stile, and 48 feet from a large stone in the northern hedge. This stone is 81 feet from the stile; the station, this stone, and Chapel Karnbury, being in a right line.

ART. VI. *Demonstration of M.* de Lambre's *Formula in the Connoissance des Temps of* 1793, *for reducing a Distance on the Sphere to any great Circle near it, or the contrary. By* Nevil Maskelyne, *D. D. F. R. S. and Astronomer Royal.*

Put A = angle subtended by two terrestrial objects; a = the same reduced to the horizon; H, h the two apparent altitudes: if either is a depression, it must be taken negative.

By spherics, $c, \mathrm{A} = c, a \,.\, c, \mathrm{H} \,.\, c, h + s, \mathrm{H} \,.\, s, h$.

Put $\mathrm{A} = a + d\,a$, where $d\,a$ signifies $\mathrm{A} - a$, and not their differential.

By trigonometry $c, \mathrm{A} = c, a \,.\, c, d\,a - s, a \,.\, s, d\,a = c, a \times \overline{1 - vs, d\,a} - s, a \,.\, s, d\,a = c, a - c, a \times 2\,s^2, \frac{1}{2}\,d\,a - s, a \,.\, s, d\,a$ (by theo-

rem above) $= c, a . c, \mathrm{H} . c, b + s, \mathrm{H} . s, b \because s, d a + 2 s^2, \frac{1}{2} d a . 't, a = 't, a - 't, a . c, \mathrm{H} . c, b - s, \mathrm{H} . s, b \times$ cosec. a $= t', a - 't, a \times \overline{\frac{1}{2} c, \overline{\mathrm{H} - b} + \frac{1}{2} c, \overline{\mathrm{H} + b}}$ — cosec. a $\times \overline{\frac{1}{2} c, \overline{\mathrm{H} - b} - \frac{1}{2} c, \overline{\mathrm{H} + b}}$ (because $t', a = \frac{1}{2} 't, \frac{1}{2} a - \frac{1}{2} t, \frac{1}{2} a$; and cosec. $a = \frac{1}{2} 't \frac{1}{2} a + \frac{1}{2} t, \frac{1}{2} a) = \overline{\frac{1}{2} t', \frac{1}{2} a - \frac{1}{2} t, \frac{1}{2} a} \times \overline{1 - \frac{1}{2} c, \overline{\mathrm{H} - b} - \frac{1}{2} c, \overline{\mathrm{H} + b}} - \overline{\frac{1}{2} 't, \frac{1}{2} a + \frac{1}{2} t, \frac{1}{2} a} \times \overline{\frac{1}{2} c, \overline{\mathrm{H} - b} - \frac{1}{2} c, \overline{\mathrm{H} + b}} = \frac{1}{2} 't, \frac{1}{2} a \times \overline{1 - c, \overline{\mathrm{H} - b}} - \frac{1}{2} t, \frac{1}{2} a \times \overline{1 - c, \overline{\mathrm{H} + b}} = \frac{1}{2} 't, \frac{1}{2} a \times vs, \overline{\mathrm{H} - b} - \frac{1}{2} t, \frac{1}{2} a \times vs, \overline{\mathrm{H} + b} = 't, \frac{1}{2} a . s^2, \frac{1}{2} \overline{\mathrm{H} - b} - t, \frac{1}{2} a . s^2, \frac{1}{2} \overline{\mathrm{H} + b}$.

Put $n = 't, \frac{1}{2} a . s^2, \frac{1}{2} (\mathrm{H} - b) - t, \frac{1}{2} a . s^2, \frac{1}{2} (\mathrm{H} + b)$,

We shall have

$s, d a + 2 s^2, \frac{1}{2} d a . 't, a = n$;

and $s, d a = n - 2 s^2, \frac{1}{2} d a . t', a$.

But $s, d a = 2 s, \frac{1}{2} d a . c, \frac{1}{2} d a$

$\because s, \frac{1}{2} d a = \frac{s, d a}{2 c, \frac{1}{2} d a} = \frac{n - 2 s^2, \frac{1}{2} d a . 't, a}{2 c, \frac{1}{2} d a}$,

and $s, d a = n - 2 s^2, \frac{1}{2} d a . t', a = n - 2 t', a \left(\frac{n - 2 s^2, \frac{1}{2} d a . 't, a}{2 c, \frac{1}{2} d a}\right)^2$,

because $\overline{\frac{n - 2 s^2, \frac{1}{2} d a . t a}{2 c, \frac{1}{2} d a}}\Big|^2 = \frac{n - 4 n . s^2, \frac{1}{2} d a . t', a + 4 s^4, \frac{1}{2} d a . 't^2, a}{4 \times \overline{1 - s^2, \frac{1}{2} d a}}$

$= \frac{n^2}{4} + \frac{n^2 s^2, \frac{1}{2} d a .}{4} - n . s^2, \frac{1}{2} d a . 't, a - n . s^4, \frac{1}{2} d a . 't, a$ $+ s^4, \frac{1}{2} d a . 't^2, a) = n - \frac{1}{2} n^2 . t', a - \frac{1}{2} n^2 . 't, a . s^2, \frac{1}{2} d a$ $+ 2 n . 't^2, a . s^2, \frac{1}{2} d a + 2 n 't^2, a . s^4, \frac{1}{2} d a - 2 't^3, a . s^4 + \frac{1}{2} d a$, by substituting for $s, \frac{1}{2} d a$ its near value n,

$= n - \frac{1}{2} n^2 t', a - \frac{n^4 t', a}{8} + \frac{1}{2} n^3 t^2, a + \frac{1}{8} n^5 't^2, a - \frac{1}{8} n^4 't^3, a$,

where the last term but one containing the 5th power of n may be rejected, as it has been omitted by M. DE LAMBRE.

As $d a$ is always very small, the arc $d a$ in parts of the radius, unity, $= s, d a$ in parts of the same radius, therefore

$s, 1'' : 1'' :: s, d\,a$ (in parts of radius unity) : $\frac{1}{s,\,1''} \times s$, $d\,a = d\,a$ in seconds,

$= \frac{1''}{s,\,1''} \times \overline{n - 2\,s^2, \frac{1}{2}\,d\,a\,.\,'t, a} = \frac{1''}{s,\,1''} \times \overline{n - da\,.\,s, \frac{1}{2}da\,.'t, a} = \frac{1'' \times n}{s,\,1''}$

$- \frac{1'' \times d\,a\,.\,s, \frac{1}{2}\,d\,a\,.'t, a}{s,\,1''}$ ∴ if we put $n = \frac{1''}{s,\,1''} \times t', \frac{1}{2}\,a\,.\,s, \frac{1}{2}\,(\mathrm{H} - h)$ $- t, \frac{1}{2}\,a\,.\,s^2, \frac{1}{2}\,(\mathrm{H} + h)$, and $d\,a$ = a number of seconds, we shall have

$d\,a = n - d\,a\,.\,s, \frac{1}{2}\,d\,a\,.'t, a$; and, for the most part, without any sensible error, $d\,a = n - n\,.\,s, \frac{1}{2}\,n\,.'t, a$.

Table I. contains $\frac{1'' \times t, \frac{1}{2}\,a}{10000}$, and $\frac{1'' \times 't, \frac{1}{2}\,a}{10000}$; Table II. contains $10000 \times s^2, \frac{1}{2}\,(\mathrm{H} \mp h)$. Table III. contains the term $- n\,.\,s$, $\frac{1}{2}\,n\,.'t, a$. The argument on the side is a, and that on the top is n or the result found by the help of the two first tables. If this correction should be considerable, with the value of $d\,a$, found after this correction has been applied, enter Table III. again at the top, and with a on the side as before; the number now found subtracted from n will give the correct value of $d\,a$.

By the investigation,

$d\,a = \frac{1}{2}\,'t, \frac{1}{2}\,a\,.\,vs\,\overline{\mathrm{H} \simeq h} - \frac{1}{2}\,t, \frac{1}{2}\,a\,.\,vs, \overline{\mathrm{H} \pm h} - vs, d\,a\,.\,'t\,a$,

where the upper or lower signs are to be used, according as the objects are on the same, or on contrary sides of the great circle to which they are referred; the third term will be negative or positive, according as a is less or more than 90°.* If $d\,a$ should come out negative, A will be less than a, or a greater than A. In the case of reducing a spheric angle to the angle

* Compute the two, which will give the approximate value of $d\,a$, and make use of them in computing the third term; and join the three terms together according to their signs, which will give $d\,a$ still nearer; and, if this should prove considerable, compute the third term a second time with the new value of $d\,a$.

between the chords, the spheric angle will be represented by a, and the angle between the chords by $A = a + da$; and $da = \frac{1}{2}'t, \frac{1}{2}a \,.\, vs, \overline{H \sim b} - \frac{1}{2}t, \frac{1}{2}a \,.\, vs, \overline{H + b} - vs, da \,.\, 't, a$ (if D, d represent the arcs to the chords) $= \frac{1}{2}'t, \frac{1}{2}a \,.\, vs, \frac{1}{2}(D \sim d) - \frac{1}{2}t, \frac{1}{2}a \,.\, vs, \frac{1}{2}(D + d) - vs, da \,.\, 't, a$;

$A = a - (\frac{1}{2}t, \frac{1}{2}a \,.\, vs, \frac{1}{2}\overline{D + d} - \frac{1}{2}'t, \frac{1}{2}a \,.\, vs\, \frac{1}{2}D \sim d) - vs, da \,.\, 't, a$; where the last term will change its sign to affirmative, if a is greater than 90°. If the answer is required in seconds, the correction must be multiplied by 206265, the number of seconds in an arc = radius. The calculation will be easily made by logarithms.

Practical Rule.

The practical rule deduced from the above conclusions is the following, and given in the words of the Astronomer Royal.

"To the constant logarithm 5,0134 add L . t, $\frac{1}{2}a$ and L . "$vs\,\overline{D + d}$; the sum diminished by 20 in the index is the "logarithm of the first part of the value of da in seconds, "which is always negative. To the constant logarithm 5,0134 "add L . t', $\frac{1}{2}a$, and L . vs, $\frac{1}{2}\overline{D \sim d}$, the sum diminished by 20 "in the index, is the logarithm of the second part in seconds, "which is always affirmative. These two joined together, ac- "cording to their proper signs, will give the approximate value "of da. To its logarithmic versed sine, add L . t', a and con- "stant logarithm 5,3144, the sum, diminished by 20 in the "index, will be the logarithm of the third part in seconds, "which will be negative or affirmative, according as a is less "or more than 90°. This applied according to its sign, to the

" approximate value of $d\,a$, will give the correct value of $d\,a$.
" If the third part comes out considerable, it should be com-
" puted anew with the last value of $d\,a$. The value of $d\,a$,
" finally corrected, applied to a, will give A, the angle between
" the chords."

In the application of the above rule, to the computation of such corrections as may be applied to the angles of any triangles in this survey, it is manifest that the last step may be entirely neglected on account of the smallness of the *approximate* value of $d\,a$, whose versed sine is one of the arguments. Being, therefore, confined to the use of the two first steps, the operation is very short. An example is here given in the computation of the correction for reducing the angle at Chanctonbury Ring in the 39th triangle, given in the last account (see Phil. Trans. for 1795, p. 492), to that formed by the chords.

EXAMPLE.

Constant logarithm - -	5,0134	- - - - -	5,0134
Log. tang. $\frac{1}{2}\,a = 78^\circ\ 56'$ -	10,7112	Log. co. tang. $\frac{1}{2}\,a$ - -	9,2887
Log. $vs.\ \frac{1}{2}.\overline{H+b} = 19'\ 53'',5$	5,2237	Log. $vs.\ \frac{1}{2}\overline{H-b} = 5'\ 53'',5$	4,1669
	0,9483 + .8″,88		— 2,4690 + 0″,03

1st correction — 8 ,88
2d correction + 0,03

— 8,85 the correction required.

SECTION SECOND.

Calculation of the Sides of the great Triangles, carried on from the Termination of the Series, published in the Philosophical Transactions of the Year 1795, along the Coasts of Dorsetshire, Devonshire, and Cornwall, to the Land's End.

Distance from Wingreen to Nine Barrow Down, 130224,5 Feet (see Phil. Trans. for 1795).

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		° ′ ″	″	″	″	° ′ ″	Feet.
XLIII.	Wingreen -	54 29 36,5	—0,4			54 29 36	
	Bull Barrow -	93 33 0,25	—0,91			93 32 59	
	Nine Barrow Down	31 57 25,5	—0,4			31 57 25	
		180 0 2,25		1,72	+0,53		
	Bull Barrow from { Wingreen - -						69058
	Bull Barrow from { Nine Barrow Down -						106213
XLIV.	Black Down -	56 30 18,75	—0,53			56 30 18,5	
	Nine Barrow Down	38 58 19,25	—0,89			38 58 19	
	Bull Barrow -	84 31 23,25	—0,57			84 31 22,5	
		180 0 1,25		1,99	—0,74		
	Black Down from { Nine Barrow Down -						126782
	Black Down from { Bull Barrow - -						80103,8
XLV.	Mintern -	101 39 30,5	—0,36			101 39 30	
	Bull Barrow -	46 54 34	—0,09			46 54 33,5	
	Black Down -	31 25 57,5	—0,11			31 25 56,5	
		180 0 2		0,59	+1,41		
	Mintern from { Bull Barrow - -						42653,4
	Mintern from { Black Down - -						59730

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		° ′ ″	″	″	″	° ′ ″	Feet.
XLVI.	Pilsden - -	44 37 53,25	—0,29			44 37 53	
	Mintern Hill -	68 30 46,5	—0,36			68 30 46	
	Black Down -	66 51 21,25	—0,36			66 51 21	
		180 0 1		1	—0,02		
	Pilsden from { Mintern Hill - -						78177
	Pilsden from { Black Down - -						79110,7
XLVII.	Charton Common	47 39 18,5	—0,10			47 39 18,5	
	Black Down -	27 15 14	—0,21			27 15 16	
	Pilsden - -	105 5 26	—0,60			105 5 25,5	
		179 59 58,5		0,88	—2,38		
	Charton Common from { Black Down -						103345
	Charton Common from { Pilsden - -						49106,3
XLVIII.	Dumpdon -	38 33 22,75	—0,12			38 33 22,25	
	Pilsden - -	47 32 1,25	—0,14			47 32 1	
	Charton Common	93 54 37,25	—0,36			93 54 36,75	
		180 0 1,25		0,66	+0,59		
	Charton Common from { Dumpdon - -						49016,3
	Charton Common from { Pilsden - -						78459,8
XLIX.	Little Haldon -	25 8 1,25	—0,45			25 8 1	
	Charton Common	68 12 51,25	—0,48			68 12 51	
	Dumpdon -	86 39 8,5	—0,78			86 39 8	
		180 0 1		0,66	+0,34		
	Little Haldon from { Charton Common -						136353
	Little Haldon from { Dumpdon - -						126831

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		° ′ ″	″	″	″	° ′ ″	Feet.
L.	Cawsand Beacon	43 14 21,25	−0,57			43 14 20	
	Dumpdon -	35 7 7,25	−0,64			35 7 7	
	Little Haldon -	101 38 33,75	−1,93			101 38 33	
		180 0 2,25		3,12	−0,87		
	Cawsand Beacon from { Dumpdon - -						181334
	Cawsand Beacon from { Little Haldon -						106508
LI.	Rippin Tor -	124 59 13	−0,08			124 59 11,75	
	Cawsand Beacon	25 30 39,75	+0,01			25 30 38,75	
	Little Haldon -	29 30 10,5	+0,05			29 30 9,5	
		180 0 3,25		0,69	+2,56		
	Rippin Tor from { Cawsand Beacon -						64020,5
	Rippin Tor from { Little Haldon - -						55988,7
LII.	Furland - -	39 24 37,25	−0,26			39 24 37	
	Little Haldon -	84 58 43	−0,44			84 58 42,75	
	Rippin Tor -	55 36 40,5	−0,25			55 36 40,25	
		180 0 0,75		0,96	−0,21		
	Furland from { Little Haldon - -						72776
	Furland from { Rippin Tor - -						87851
LIII.	Furland -	43 38 4,5	−0,32			43 38 4	
	Rippin Tor -	61 59 59,5	−0,38			61 59 59,25	
	Butterton -	74 21 57,25	−0,44			74 21 56,75	
		180 0 1,25		1,15	+0,1		
	Butterton from { Rippin Tor - -						62951
	Butterton from { Furland - -						80547,8

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		° ′ ″	″	″	″	° ′ ″	Feet.
LIV.	Bolt Head -	62 56 36,5	—0,41			62 56 35,25	
	Furland - -	53 15 35	—0,38			53 15 34,75	
	Butterton -	63 47 50,75	—0,43			63 47 50	
		180 0 2,25		1,23	+ 1,02		
	Bolt Head from { Furland - -						81152
	Bolt Head from { Butterton - -						72479,8
LV.	Maker Heights	45 54 37	—0,42			45 54 37,5	
	Bolt Head -	48 39 24,5	—0,33			48 39 24,5	
	Butterton -	85 25 58	—0,59			85 25 58	
		179 59 59,5		1,29	— 1,79		
	Maker Heights from { Bolt Head - -						100591
	Maker Heights from { Butterton - -						75760,8
LVI.	Maker Heights	112 18 8,75	— 1,09			112 18 8	
	Butterton -	35 30 28,75	— 0,17			35 30 29	
	Carraton Hill -	32 11 23	— 0,10			32 11 23	
		180 0 0,5		1,36	— 0,86		
	Carraton Hill from { Butterton - -						131576
	Carraton Hill from { Maker Heights -						82600,3
LVII.	Lansallos -	64 7 44,25	— 0,44			64 7 44	
	Maker Heights	48 39 54,75	— 0,36			48 39 54,5	
	Carraton Hill -	67 12 21,75	— 0,43			67 12 21,5	
		180 0 0,75		1,24	— 0,49		
	Lansallos from { Maker Heights - -						84631,4
	Lansallos from { Carraton Hill - - -						68929,7

By the latter triangle we get the distance from Lansallos to Carraton Hill 68929,7 feet; which being obtained from the least number of triangles, we shall make use of in the calculations of the sides farther to the westward. The same conclusion, however, is nearly obtained by making the computations pass through the triangles connected with Kit Hill and the station on Bindown.

Distance from Butterton to Maker Heights 75760,8 feet.

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		° ′ ″	″	″	″	° ′ ″	Feet.
LVIII.	Kit Hill - -	48 36 46,75	— 0,26			48 36 46,75	
	Butterton -	42 11 38,75	— 0,20			42 11 38,75	
	Maker Heights	89 11 34,5	— 0,75			89 11 34,5	
		180 0 0		1,21	— 1,21		
		Kit Hill from { Butterton - - -					100969
		Kit Hill from { Maker Heights - -					67822,3
LIX.	Bindown -	75 9 24,5	— 0,28			75 9 24,25	
	Maker Heights	51 29 22,5	— 0,17			51 29 22,25	
	Kit Hill - -	53 21 13,75	— 0,22			53 21 13,5	
		180 0 0,75		0,70	+ 0,05		
		Bindown from { Maker Heights - -					56294,8
		Bindown from { Kit Hill - - - -					54902,7
LX.	Carraton Hill	91 45 22,5				91 45 23	
	Kit Hill -	50 45 31				50 45 31	
	Bindown - -	37 29 5,75				37 29 6	
		179 59 59,25		0,42	— 1,17		
		Carraton Hill from { Kit Hill - - -					33427
		Carraton Hill from { Bindown - -					42541,4
LXI.	Lansallos -	32 36 43,25				32 36 42,25	
	Bindown - -	119 9 36,25				119 9 35,25	
	Carraton Hill	28 13 43,25				28 13 42,5	
		180 0 2,75		0,33	+ 2,42		
		Lansallos from Bindown - - -					37335,3

By the last triangle we get the distance from Lansallos to Carraton 68931 feet. We shall, however, as before observed, use the distance between those stations as derived from the LVII. triangle.

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		° ′ ″	″	″	″	° ′ ″	Feet.
LXII.	Lansallos -	54 57 44	— 0.26			54 57 44	
	Carraton Hill	56 21 17	— 0,27			56 21 17	
	Bodmin Down	68 40 59	— 0,30			68 40 59	
		180 0 0		0,82	— 0,82		
		Bodmin Down from { Carraton Hill - -					60582,7
		Bodmin Down from { Lansallos - - -					61597,1
LXIII.	Hensbarrow Beacon	66 59 23,25	— 0,23			66 59 22,25	
	Bodmin Down	67 59 27,75	— 0,21			67 59 26,75	
	Lansallos -	45 1 11,75	— 0,19			45 1 11	
		180 0 2,75		0,63	+ 2,12		
		Hensbarrow Beacon from Bodmin Down -					47337,2

By this last triangle, the distance from Hensbarrow Beacon to Lansallos is found to be 62044,8 feet, and by the following triangle

LXIV.	Hensbarrow Beacon	42 32 8,5	— 0,20			42 32 8	
	Carraton Hill	37 28 58	— 0,18			37 28 57,5	
	Lansallos -	99 58 55,75	— 0,59			99 58 54,5	
		180 0 2,25		0,99	+ 1,26		
		Hensbarrow Beacon from Carraton Hill					100416

we get 62044,7 feet for the same distance.

LXV.	Deadman -	56 12 22,75	— 0,25			56 12 22,5	
	Lansallos - -	52 34 3	— 0,24			52 34 2,5	
	Hensbarrow Beacon	71 13 35,25	— 0,35			71 13 35	
		180 0 1		0,82	+ 0,18		
		Deadman from { Lansallos - -					70686,8
		Deadman from { Hensbarrow Beacon -					59284,2

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		° ′ ″	″	″	″	° ′ ″	Feet.
LXVI.	St. Agnes' Beacon	34 31 20,25	—0,31			34 31 19,25	
	Hensbarrow Beacon	77 20 29,5	—0,54			77 20 28,75	
	Deadman -	68 8 13	—0,63			68 8 12	
		180 0 2,75		1,32	+1,43		
	St. Agnes' Beacon from { Hensbarrow Beacon -						97084,8
	St. Agnes' Beacon from { Deadman - -						102066
LXVII.	St. Agnes' Beacon	75 51 53,75	—0,40			75 51 53,5	
	Deadman -	25 51 24,75	—0,30			25 51 25,25	
	Karnbonellis -	78 16 41	—0,40			78 16 41,25	
		179 59 59,5		1,06	—1,56		
	Karnbonellis from { Deadman - - -						101084
	Karnbonellis from { St. Agnes' Beacon -						45461,9
LXVIII.	Karnminnis -	32 30 0,25	—0,22			32 30 0,25	
	St. Agnes' Beacon	57 46 31,25	—0,35			57 46 31	
	Karnbonellis -	89 43 29	—0,53			89 43 28,75	
		180 0 0,5		0,77	—0,27		
	Karnminnis from { St. Agnes' Beacon -						84610,6
	Karnminnis from { Karnbonellis - -						71578,3
LXIX.	St. Buryan -	41 43 45,5	—0,03			41 43 45,25	
	Karnbonellis -	26 22 59,25	—0,09			26 22 59,25	
	Karnminnis -	111 53 16	—0,65			111 53 15,5	
		180 0 0,75		0,75	0,0		
	St. Buryan from { Karnbonellis - - -						99786
	St. Buryan from { Karnminnis - - -						47786,7

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		° ′ ″	″	″	″	° ′ ″	Feet.
LXX.	Pertinney -	113 40 15,5				113 40 15	
	Karnminnis -	13 48 18				13 48 18	
	St. Buryan -	52 31 27,5				52 31 27	
		180 0 1		0,16	+0,84		
						Pertinney from { Karnminnis - -	41407,7
						{ St. Buryan - -	12450,2
LXXI.	Sennen - -	36 39 18,75				36 39 18,25	
	St. Buryan -	75 36 11,5				75 36 11	
	Pertinney - -	67 44 31				67 44 30,75	
		180 0 1,25		0,08	+1,17		
						Sennen from { St. Buryan - - -	19300,8
						{ Pertinney - - -	20199,9

The angles in the above series of triangles, are those arising from taking the means of the several observations: and the same rules have been adopted for their corrections, which were laid down in the account of the trigonometrical operation, published in the *Philosophical Transactions* for 1795. The angle at Blackdown in the XLVII. triangle (for the triangles of the present series are numbered in order from those of the former), is considered to be nearly 2″ in defect, and has been augmented for calculation accordingly: the angle at that station was observed under circumstances less favourable, than those which attended the observations made on Pilsden, and Charton Common.

SECTION THIRD.

Heights of the Stations. Terrestrial Refractions.

ART. I. *Elevations and Depressions.*

At Wingreen.

The ground at Bull Barrow - -	*depressed*	6′	3″

At Nine Barrow Down.

The ground at Black Down - -	*depr.*	3	29
at Bull Barrow - -	*elevated*	1	25

At Black Down.

The ground at Nine Barrow Down -	*depr.*	13	26
at Charton Common -	*depr.*	15	11
at Mintern Hill - -		0	0
at Bull Barrow - -	*depr.*	1	16
at Pilsden - - -	*depr.*	0	50

At Pilsden Hill.

The ground at Black Down - -	*depr.*	11	0
at Charton Common -	*depr.*	28	39
The horizon of the sea on the 6th of June, at 6 P. M. in a S. E. direction, nearly,	*depr.*	29	23

At Bull Barrow.

The ground at Wingreen - -	*depr.*	4	53
at Mintern - - -	*depr.*	6	5
at Black Down - -	*depr.*	10	39

On Charton Common.

		°	′	″
The ground at Black Down				
at Pilsden	*elev.*	20	37	
at Haldon	*depr.*	3	33	

At Dumpdon.

		°	′	″
The ground at Pilsden	*depr.*	3	45	
at Charton	*depr.*	22	12	
The bottom of the Karn, or heap of stones, (nearly on a level with the axis of the telescope) on Cawsand Beacon	*elev.*	4	42	

At Haldon.

		°	′	″
The ground at Charton	*depr.*	15	59	
at Cawsand Beacon	*elev.*	24	3	
at Rippin Tor	*elev.*	40	49	
at Furland	*depr.*	16	6	
The horizon of the sea on the 27th of July, at 6 P. M. in a S. W. direction, nearly,	*depr.*	27	24	

On Cawsand Beacon.

		°	′	″
The ground at Rippin Tor	*depr.*	17	42	
at Haldon	*depr.*	38	57	
The lamp at Dumpdon	*depr.*	29	36	

N. B. The lamp was about $5\frac{1}{2}$ feet from the ground.

On Rippin Tor.

		°	′	″
The ground at Butterton	*depr.*	23	38	
at Cawsand Beacon	*elev.*	8	3	
at Haldon	*depr.*	49	31	

At Furland.

The ground at Haldon	- -	*elev.*	5′	27″
at Butterton	- -	*elev.*	20	15

At Butterton.

The ground at Kit Hill - - -	*depr.*	10	49
at Carraton - -	*depr.*	9	0
at Maker Heights - -	*depr.*	41	48
at the Bolt Head - -	*depr.*	41	48
at Furland - - -	*depr.*	32	18
at Rippin Tor - -	*elev.*	13	54

On Maker Heights.

The ground at Lansallos - -	*depr.*	1	27
at Bindown - - -	*elev.*	11	32
at Carraton Hill - -	*elev.*	27	36
at Kit Hill - - -	*elev.*	29	45
at Butterton - -	*elev.*	30	45
at the Bolt Head - -	*depr.*	5	47

At the Bolt Head.

The ground at Maker - - -	*depr.*	7	42
at Butterton - - -	*elev.*	31	6

At Kit Hill.

The ground at Butterton - - -	*depr.*	1	42
at Maker Heights - -	*depr.*	37	38
at Bindown - - -	*depr.*	31	0
at Carraton Hill - -	*elev.*	9	38

On Carraton Hill.

The ground at Lansallos	-	-	-	*depr.*	41′ 18″
at Hensbarrow	-	-		*depr.*	13 27
at Maker Heights	-	-		*depr.*	39 30
at Bindown	-	-	-	*depr.*	47 48
at Butterton	-	-	-	*depr.*	9 48
at Kit Hill	-	-		*depr.*	15 19

On Bindown.

The ground at Maker Heights	-	-		*depr.*	19 41
at Carraton Hill	-	-		*elev.*	41 20
at Lansallos	-	-		*depr.*	16 24
at Hensbarrow	-	-		*elev.*	7 10
at Kit Hill	-	-	-	*elev.*	22 51

At Lansallos.

The ground at Carraton Hill	-	-		*elev.*	30 18
at Bindown	-	-	-	*elev.*	10 46
at Kit Hill	-	-	-	*elev.*	15 27
at Bodmin Down	-	-		*elev.*	2 56
at Hensbarrow	-	-		*elev.*	23 57
at the Deadman	-	-		*depr.*	11 39
at Maker Heights	-	-		*depr.*	10 30

On Bodmin Down.

The ground at Hensbarrow	-	-		*elev.*	24 3
at Lansallos	-	-	-	*depr.*	12 9

On Hensbarrow Beacon.

The ground at Carraton	- -	*depr.*	° ′ ″ 0 36
at Lansallos	- -	*depr.*	33 23
at the Deadman	- -	*depr.*	42 8
at St. Agnes' Beacon	-	*depr.*	21 53
at Bodmin Down	- -	*depr.*	31 21

At the Deadman.

The ground at Karnbonellis	- -	*elev.*	7 51
at St. Agnes' Beacon	-	*elev.*	0 19
at Hensbarrow	- -	*elev.*	33 30
at Lansallos	- - -	*elev.*	1 30

At St. Agnes' Beacon.

The ground at Karnminnis	- -	*elev.*	2 11
at Karnbonellis	- -	*elev.*	12 45
at Hensbarrow	- -	*elev.*	8 8
at the Deadman	- -	*depr.*	14 15

On Karnbonellis.

The ground at St. Agnes' Beacon	-	*depr.*	19 51
at Karnminnis	- -	*depr.*	5 51
at St. Buryan	- -	*depr.*	20 56
at the Deadman	- -	*depr.*	22 18

On Karnminnis.

The ground at St Buryan	- -	*depr.*	32 9
at Karnbonellis	- -	*depr.*	4 30
at St. Agnes' Beacon	-	*depr.*	14 12
at Pertinney Hill	- -	*depr.*	9 14

At St. Buryan.

The ground at Karnminnis	- -	*elev.* 24′ 32″
at Karnbonellis	- -	*elev.* 6 50

N. B. 6″ must be subtracted from the elevations, and added to the depressions, on account of the error in the parallelism of the line of collimation of the telescope, and the rod attached to its side, upon which the level is hung.

The axis of the telescope was about $5\frac{1}{2}$ feet from the ground at all the above stations.

ART. II. *Terrestrial Refractions.*

Between	Mean Refraction.
Maker and Kit Hill - -	$\frac{1}{7}$ of the contained arc.
Butterton and Kit Hill -	$\frac{1}{8}$
Bindown and Lansallos -	$\frac{1}{9}$
Nine Barrow Down and Black Down	$\frac{1}{10}$
Maker and Lansallos -	$\frac{1}{10}$
Maker and the Bolt Head -	$\frac{1}{10}$
Carraton Hill and Bindown -	$\frac{1}{11}$
Karnbonellis and St Buryan	$\frac{1}{11}$
Maker and Bindown - -	$\frac{1}{12}$
Hensbarrow and the Deadman	$\frac{1}{12}$
St. Agnes' Beacon and the Deadman	$\frac{1}{12}$
St. Agnes' Beacon and Karnminnis	$\frac{1}{12}$
Dumpdon and Cawsand Beacon	$\frac{1}{13}$
Haldon and Cawsand Beacon	$\frac{1}{13}$
Kit Hill and Bindown -	$\frac{1}{13}$
Carraton Hill and Hensbarrow	$\frac{1}{13}$

Between	Mean Refraction.
Lansallos and the Deadman -	$\frac{1}{13}$ of the contained arc.
Hensbarrow and St. Agnes' Beacon	$\frac{1}{13}$
Karnbonellis and Karnminnis	$\frac{1}{14}$
Furland and Haldon - -	$\frac{1}{15}$
Butterton and Maker -	$\frac{1}{15}$
Butterton and Carraton Hill -	$\frac{1}{15}$
Maker and Carraton Hill -	$\frac{1}{15}$
Karnbonellis and the Deadman	$\frac{1}{15}$
Karnbonellis and St. Agnes' Beacon	$\frac{1}{15}$
Karnminnis and St. Buryan -	$\frac{1}{15}$
Hensbarrow and Bodmin Down	$\frac{1}{15}$
Lansallos and Bodmin -	$\frac{1}{15}$
Butterton and the Bolt Head -	$\frac{1}{15}$
Haldon and Charton Common	$\frac{1}{17}$
Rippin Tor and Cawsand Beacon	$\frac{1}{17}$
Black Down and Bull Barrow	$\frac{1}{18}$
Black Down and Pilsden Hill	$\frac{1}{18}$
Black Down and Charton Common	$\frac{1}{18}$
Lansallos and Hensbarrow -	$\frac{1}{18}$
Rippin Tor and Haldon -	$\frac{1}{19}$
Butterton and Furland -	$\frac{1}{19}$
Butterton and Rippin Tor -	$\frac{1}{21}$
Kit Hill and Carraton -	$\frac{1}{26}$
Pilsden Hill and Charton Common	$\frac{1}{28}$
Wingreen and Bull Barrow -	$\frac{1}{31}$
Lansallos and Carraton Hill -	$\frac{1}{34}$
Haldon and the Horizon of the Sea	$\frac{1}{11}$
Pilsden Hill and the Horizon of the Sea	$\frac{1}{11}$

The mean refractions were found by the following rules.

1. Reduce the elevations, or depressions, to the place of the axis of the telescope at each station, by adding, or subtracting, as the case may require, the angle at the place of observation, subtended by the vertical height between the object, whose elevation or depression was observed, and the axis of the telescope when at that station.*

2. Then, if both are depressions, subtract their sum from the contained arc, and half the remainder is the mean refraction.

3. If one is a depression and the other an elevation, take their difference. Then, if the depression is greater than the elevation, subtract the difference from the contained arc, and half the remainder is the mean refraction. But if the elevation is greatest, add the difference to the contained arc, and half the sum is the mean refraction.

ART. III. *Table containing the Heights of the Stations.*

Stations.	Heights.
Black Down	817 feet.
Charton Common	582
Little Haldon	818
Rippin Tor	1549
Furland	589

* For example. At the station on Hensbarrow, the ground at Bodmin Down was depressed 31′ 27″: the distance of those stations is 47337 feet; and the axis of the telescope was $5\frac{1}{2}$ feet above the ground: therefore, as 47337 : *radius* :: $5\frac{1}{2}$ feet : *tang.* 24″ the angle subtended by $5\frac{1}{2}$ feet at that distance; which, taken from 31′ 27″, gives 31′ 3″ for the depression of the place of the axis, instead of the ground. Again, at Bodmin Down, the ground at Hensbarrow was elevated 23′ 57″, to which adding 24″, we have 24′ 21″ for the elevation of the place of the axis.

Stations.	Heights.
Butterton - -	1203 feet.
Maker Heights - -	402
Bull Barrow - -	927
Mintern Hill - -	891
Pilsden Hill - -	934
Dumpdon - -	879
Cawsand Beacon -	1792
Bolt Head - -	430
Kit Hill - -	1067
Bindown - -	658
Carraton Hill - -	1208
Lansallos - -	514
Bodmin Down - -	649
Hensbarrow Beacon -	1026
The Deadman - -	379
St. Agnes' Beacon -	599
Karnbonellis - -	822
Karnminnis - -	805
St. Buryan - -	415

ART. IV. *Remarks, &c. on the foregoing Table.*

The height of the ground at the station on Maker Heights, 402 feet, was determined by levelling down to low-water mark, near the passage house, below Mount Edgcumbe, on April 15, 1796. This, however, had been done several years before, by some officers of the Royal Engineers, who found it to be 401 feet. The height of the station near Dunnose, in the Isle of Wight, was also found by levelling; of which an account is given in the Philosophical Transactions for 1795. It therefore

may be considered as the least exceptionable mode of procedure, to deduce the intermediate heights from both those stations; for which purpose, the following comparison was made, exhibiting the height of the station on Charton Common, both ways.

	Feet.
Height of Nine Barrow Down (Phil. Trans. 1795, p. 582)	642
of Black Down - - -	825
of Charton Common, *deduced from the height of* Dunnose - - - -	597
Height of Butterton - - - - -	1201
of Rippin Tor - - - -	1545
of Furland - - - -	585
of Haldon - - - - -	811
of Charton Common, *deduced from the height of* Maker - - - -	568
from that of Dunnose	597
difference	29

Those are the heights resulting directly from the observations. Now, supposing the difference, or the errors, to arise from the mean refractions, and those errors to be nearly the same between every two stations, we shall obtain the corrected heights in the following manner:

			Feet.	
Nine Barrow Down	642	— 4 =	638	
Black Down	825	— 8 =	817	
Charton Common	597	— 15 =	582	
Butterton -	1201	+ 2 =	1203	as in the table.
Rippin Tor	1545	+ 4 =	1549	
Haldon -	811	+ 7 =	818	
Charton Common	568	+ 14 =	582	

From those corrected heights, the others to the northward have been deduced. The heights to the westward of Butterton were determined from that of Maker. A mean of two or three results, by using $\frac{1}{15}$ of the contained arcs for refraction, is taken for the height of the station on Mintern Hill.

We subjoin the following elevations and depressions, for the use of those who may wish to examine the tables of heights and refractions, in the Philosophical Transactions for 1795. And here it is to be noted, that the axis of the telescope was always about $5\frac{1}{2}$ feet from the ground, unless the contrary is specified.

At Hanger Hill.

		′	″
The ground at St. Ann's Hill	*depr.*	4	36
at Banstead	*elev.*	10	39

At St. Ann's Hill.

The ground at Bagshot Heath	*elev.*	11	23	Instrument on the half scaffold: the axis of the telescope $20\frac{1}{2}$ feet high.
at Banstead	*elev.*	10	2	
at Hanger Hill	*depr.*	6	13	
The top of the flagstaff near Hampton Poor House	*depr.*	12	54	

N. B. The flagstaff was about 41 feet high.

Near Hampton Poor House.

The ground at St. Ann's Hill	*elev.*	8	17	Instrument on the whole scaffold: the axis about $36\frac{1}{2}$ feet high.

At Banstead.

		′	″	
The ground at Leith Hill	*elev.*	17	29	
at Shooter's Hill	*depr.*	11	7	
at St. Ann's Hill	*depr.*	22	9	On the half scaffold: the axis 20½ feet high.
at Hanger Hill	*depr.*	22	35	
The top of the flagstaff at Botley Hill - -	*elev.*	18	0	The staff about 29 feet high.

At Leith Hill.

The top of the flagstaff at Banstead -	*depr.*	25	57	The staff about 27½ feet high.
of the flagst. at Botley Hill	*depr.*	8	46	
The ground at Hind Head	*depr.*	8	28	
at Crowborough Beacon	*depr.*	13	48	
at Ditchling Beacon	*depr.*	12	34	
at Chanctonbury Ring	*depr.*	13	10	
The top of Severndroog Castle	*depr.*	22	9	

N. B. The axis of the telescope when at Shooter's Hill, was about 29½ feet lower than the top of the Castle.

At Shooter's Hill.

The ground at Leith Hill	*elev.*	2	35
at Banstead	*elev.*	0	15

On Bagshot Heath.

The ground at Hind Head	*elev.*	10	37
at St. Ann's Hill	*depr.*	12	30

At Hind Head.

The ground at Leith Hill	*depr.*	2	59
at Chanctonbury Ring	*depr.*	11	11

The ground at Rook's Hill	*depr.*	14′	51″	
at Butser Hill	*depr.*	5	54	
at Bagshot Heath	*depr.*	23	12	
at Highclere	*depr.*	10	42	

On Rook's Hill.

The ground at Hind Head	*elev.*	3	9	
at Chanctonbury Ring	*depr.*	1	35	
at Bow Hill -	*depr.*	1	5	
at Portsdown -	*depr.*	16	22	

At Butser Hill.

The ground at Highclere	*depr.*	9	29	
at Hind Head -	*depr.*	4	44	
at Motteston Down	*depr.*	15	27	

At Chanctonbury Ring.

The ground at Rook's Hill	*depr.*	10	46	
at Hind Head	*depr.*	4	20	
at Leith Hill	*depr.*	1	13	
at Beachy Head	*depr.*	16	27	On the half scaffold: the axis 20½ feet high.

At Dunnose.

The ground at Nine Barrow Down - -	*depr.*	15	37	
at Dean Hill	*depr.*	17	24	

On Ditchling Beacon.

The ground at Leith Hill	*depr.*	4	36	

On Fairlight Down.

The ground at Beachy Head	*depr.*	7	45	
at Brightling Windmill	*depr.*	0	49	The ground at the Windmill is about 4 feet higher than the axis of the telescope when at Brightling.

On Brightling Down.

The ground at Fairlight Down	*depr.*	7	56
at Beachy Head -	*depr.*	8	44
at Crowborough Beacon	*elev.*	3	54

At Crowborough Beacon.

The ground at Leith Hill	*depr.*	4	8
at Brightling Windmill	*depr.*	12	21
at Botley Hill -	*depr.*	3	5

At Beachy Head.

The ground at Fairlight Down	*depr.*	5	17
at Brightling Windmill	*depr.*	1	48
at Chanctonbury Ring	*depr.*	5	6

At Dean Hill.

The ground at Highclere	*elev.*	0	46
at Beacon Hill	*elev.*	4	47
at Wingreen	*elev.*	5	5
at Dunnose	*depr.*	7	56

At Beacon Hill.

The ground at Highclere	*depr.*	0	1	5
at Wingreen	*depr.*	0	34	
at Dean Hill	*depr.*	13	13	

At Highclere.

The ground at Hind Head	*depr.*	10	42	
at Butser Hill	*depr.*	9	26	
at Dean Hill	*depr.*	18	12	
at Beacon Hill	*depr.*	13	15	

On Nine Barrow Down.

The ground at Wingreen	*depr.*	1	20	
at Dunnose	*depr.*	10	8	

At Wingreen.

The ground at Beacon Hill	*depr.*	15	30	
at Nine Barrow Down	*depr.*	17	40	
at Dean Hill -	*depr.*	20	19	

SECTION FOURTH.

Containing the secondary Triangles, in which two Angles only have been observed. The first three intersected Places are intended for the small Instrument, on Account of their commanding Situations.

ART. I. *Triangles.*

Distance from Pilsden Hill to Charton Common 49016,3 Feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
		° ′ ″		Feet.
157	Pilsden -	44 6 35	} Golden Cape {	29848
	Charton Common	36 59 6		34533
	Golden Cape			

Distance from Rippin Tor to Cawsand Beacon 64020,5 feet.

158	Rippin Tor -	88 2 28	} Great Haldon - {	54789
	Cawsand Beacon	41 22 57		82829
	Great Haldon			

Distance from the Bolt Head to Maker Heights 100591 feet.

159	Bolt Head -	29 15 10	} Hemmerdon Ball {	82239
	Maker Heights -	54 20 9		49464
	Hemmerdon Ball			

Distance from Bull Barrow to Wingreen 69058 feet.

160	Bull Barrow -	109 12 12	} Noil Windmill {	63692
	Wingreen -	33 45 11		108255
	Noil Windmill			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
161	Bull Barrow -	° ′ ″ 22 4 38	Noil Steeple -	88420
	Wingreen -	111 10 59		35641
	Noil Steeple			
162	Bull Barrow -	18 16 15	H. Trinity Steeple,	63275
	Wingreen -	65 39 45	Shaftesbury	21772
	Holy Trinity Steeple, Shaftesbury			
163	Bull Barrow -	15 45 15	St. Rumbold's Stee-	56778
	Wingreen -	46 55 34	ple, Shaftesbury	21104
	St. Rumbold's Steeple, Shaftesbury			
164	Bull Barrow -	129 15 18	MaypowderSteeple	24199
	Wingreen -	12 31 19		86426
	Maypowder Steeple			
165	Bull Barrow -	44 25 52	Stourhead House	94319
	Wingreen -	88 31 14		66050
	Stourhead House			

Distance from Bull Barrow to Nine Barrow Down 106213 feet.

166	Bull Barrow -	32 25 49	Mr. Frampton's	56980
	Nine Barrow Down	27 44 1	Obelisk -	65662
	Mr. Frampton's Obelisk			

Bull Barrow from Mintern, or Revel's Hill, 42653,4 feet.

167	Bull Barrow -	97 43 51	Mere Steeple -	88095
	Mintern -	58 1 14		102912
	Mere Steeple			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
168	Bull Barrow -	68° 44′ 5″	Mrs. Thornhill's	34902
	Mintern -	47 19 3	Obelisk -	44245
	Mrs. Thornhill's Obelisk			
169	Bull Barrow -	20 37 56	Odcombe Steeple	94589
	Mintern -	143 59 47		56700
	Odcombe Steeple			
170	Bull Barrow -	52 41 35	Milborne-port	54038
D	Mintern -	77 1 36	Steeple -	44107
	Milborne-port Steeple			
171	Bull Barrow -	7 39 0	Warren House	8829
D	Mintern -	132 19 30		49035
	Lord Poulett's, Warren House			

Distance from Black Down to Pilsden 79110,7 feet.

172	Black Down -	143 32 28	Light-House -	63749
	Pilsden - -	16 12 4		135775
	Portland Light-house			
173	Black Down -	32 55 8	Signal-staff at	25615
	Pilsden - -	13 35 5	Puncknoll -	59266
	Naval-Signal-staff on Puncknoll			
174	Black Down -	9 2 48	Lambert's Castle	74048
	Pilsden - -	62 47 53		13091
	House in Lambert's Castle			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
175	Black Down -	° ′ ″ 26 6 41	Lyme Cobb -	90349
	Pilsden - -	92 54 15		39815
	Lyme Cobb			

Distance from Pilsden to Mintern 78177 feet.

176	Pilsden - -	64 47 55	Glastonbury Tor	127174
	Mintern -	78 12 22		117551
	Glastonbury Tor			

Distance from Pilsden to Charton Common 49016,3 feet.

177	Pilsden - -	40 30 43	Bridport Beacon	44332
	Charton Common	62 0 1		32616
	Bridport Beacon, a Sea-mark			
178	Pilsden - -	15 44 0	Barn on Sidmouth Hill - -	39824
	Charton Common	45 18 13		15191
	Barn on the high land near Sidmouth			

Distance from Dumpdon to Pilsden 78459 feet.

179	Dumpdon -	50 52 11	Signal-staff on Whitlands -	50832
	Pilsden - -	40 22 12		60876
	Naval-Signal-staff on Whitlands			
180	Dumpdon -	93 52 54	Catherstone Lodge	64521
	Pilsden - -	37 51 16		104901
	Catherstone Lodge, Quantock Hills			

Distance from Charton Common to Dumpdon 58012,4 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
181	Charton Common Dumpdon - *Lord Lisburne's Obelisk on Haldon*	61° 11′ 28″ 91 51 33	Lord Lisburne's Obelisk	127936 112161

Distance from Dumpdon to Cawsand Beacon 181334 feet.

182	Dumpdon - Cawsand Beacon *Sir J. de la Pole's Flagstaff, near Shute House*	128 45 59 13 59 24	Sir J. de la Pole's Flagstaff	72435 233619
183	Dumpdon - Cawsand Beacon *Honiton Steeple*	64 18 8 4 0 39	Honiton Steeple	13650 175852
184	Dumpdon - Cawsand Beacon *St. Mary Ottery Steeple*	34 20 21 12 27 16	St. Mary Ottery Steeple -	53653 140335

Distance from Little Haldon to Dumpdon 126831 feet.

185	Dumpdon - Little Haldon - *Funnel on Sir R. Palk's Tower, Haldon*	17 20 53 63 7 37	Sir R. Palk's Tower	114716 38347

Distance from Cawsand Beacon to Little Haldon 106508 feet.

186 D	Cawsand Beacon Little Haldon - *North Bovey Steeple*	7 9 50 10 38 19	North Bovey Steeple - -	64313 43444

Distance from Little Haldon to Rippin Tor 55988,7 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
187	Little Haldon - Rippin Tor - *Eastern Karn, or heap of stones, on the high ground near Moreton Hampstead*	° ′ ″ 34 8 22 66 14 23	Eastern Karn, near Moreton Hampstead -	52099 31944
188	Little Haldon - Rippin Tor - *Western Karn, near Moreton Hampstead*	37 24 5 69 24 30	Western Karn near Moreton Hampstead -	54751 35525
189	Little Haldon - Rippin Tor - *Naval-Signal-staff at West Down Beacon*	154 35 29 11 28 37	Naval-Signal-staff, West Down Beacon - -	46268 99715
190	Little Haldon - Rippin Tor - *Mr. Woodley's Summer House*	5 43 59 81 44 20	Summer House	55462 5598
191	Little Haldon Rippin Tor - *Naval-Signal-staff, Berry Head, Torbay*	99 46 2 42 35 24	Signal-staff on Berry Head	62040 90345
192	Little Haldon Rippin Tor - *Brixen Steeple*	91 52 49 48 37 47	Brixen Steeple	66070 87993

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
193	Little Haldon Rippin Tor - *Ipplepen Steeple*	67 8 45 44 56 5	Ipplepen Steeple	42675 55677
194	Little Haldon Rippin Tor - *Three Barrow Tor, Dartmoor*	20 40 42 125 6 32	Three Barrow Tor	81460 35163

Distance from Furland to Little Haldon 72776 feet.

195	Furland - - Little Haldon *Brent Tor*	71 56 33 51 46 15	Brent Tor -	68727 83180

Distance from Butterton to Rippin Tor 62951 feet.

196	Butterton - Rippin Tor - *Chudleigh Steeple*	17 4 21 136 27 46	Chudleigh Steeple	97302 41471

Distance from Butterton to Furland 80547,8 feet.

197	Butterton - Furland - - *Naval-Signal-Staff at Coleton, near Froward Point*	3 37 11 140 5 47	Naval-Signal-staff at Coleton	87314 8593
198	Butterton - Furland - - *Naval-Signal-staff, Start Point*	39 15 6 78 26 47	Naval-Signal-staff, Start Point	89129 57561

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
199	Butterton - Furland - - *Marlborough Steeple*	° ′ ″ 61 55 7 48 18 25	Marlborough Steeple - -	64099 75736
200	Butterton - Furland - - *Naval-Signal-staff, near the Bolt Head*	63 40 32 53 24 17	Naval-Signal-staff on the Bolt Head	72632 81084

Distance from Butterton to Maker Heights 75760,8 feet.

201	Butterton - Maker - - *Highest Part of the Mewstone*	18 0 46 50 17 40	Mewstone -	62728 25213
202	Butterton - Maker Heights *Cupola of the Royal Hospital, Plymouth*	6 11 21 44 49 37	Cupola of the Royal Hospital	68709 10508
203	Butterton - Maker Heights *St. John's Steeple*	8 58 35 122 49 11	St. John's Steeple	85401 15856
204	Butterton - Maker Heights *Saltash Steeple*	19 46 39 75 36 25	Saltash Steeple	73708 25749
205	Butterton - Maker Heights *Penlee Beacon*	5 36 20 96 23 55	Penlee Beacon	76972 7566

Distance from Butterton to Kit Hill 10969 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
206	Butterton -	° ′ ″ 39 1 33	Plymstock Steeple	51259
	Kit Hill - -	27 49 38		69143
	Plymstock Steeple			
207	Butterton -	48 3 55	Statten Barn	58906
	Kit Hill - -	35 25 31		75599
	Statten Barn			
208	Butterton -	41 56 57	Mount Batton	62087
	Kit Hill - -	37 8 33		68738
	Mount Batton			
209	Butterton -	39 56 31	Flagstaff, Plymouth Garrison	59673
	Kit Hill - -	34 45 12		67207
	Flagstaff in Plymouth Garrison			
210	Butterton -	37 21 59	New Church Steeple - -	58399
	Kit Hill - -	33 0 38		65058
	New Church Steeple at Plymouth			
211	Butterton -	37 45 52	Old Church Steeple - -	59524
	Kit Hill - -	34 3 52		65081
	Old Church Steeple at Plymouth			
212	Butterton -	37 5 33	Governor's House, Plymouth Dock	66558
	Kit Hill - -	39 58 36		62479
	West Chimney of the Governor's House, Plymouth Dock			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
213	Butterton - Kit Hill - - *Flagstaff in the Fort on Mount Wise*	° ′ ″ 37 6 53 40 42 48	Flagstaff on Mount Wise -	67374 62327
214	Butterton - Kit Hill - - *Steeple of the Chapel, Plymouth Dock*	35 14 20 41 25 1	The Chapel, Plymouth Dock	68653 59874
215	Butterton - Kit Hill - - *Flagstaff in St. Nicholas' Island*	41 40 8 38 38 52	Flagstaff in St. Nicholas' Island	63970 68097
216	Butterton - Kit Hill - - *Obelisk at Crimhill Passage*	38 40 39 42 48 20	Obelisk at Crimhill Passage	69376 63803
217	Butterton - Kit Hill - - *East Pinnacle on Mount Edgcumbe House*	40 29 28 42 49 3	Mount Edgcumbe House -	69096 66012
218	Butterton - Kit Hill - - *Flagstaff on Maker Tower*	41 54 7 45 25 27	Maker Tower	72001 67507
219	Butterton - Kit Hill - - *Naval-Signal-staff, near Maker Tower*	41 53 45 45 35 55	Naval-Signal-staff near Maker Tower	72207 67490

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
220	Butterton -	° ′ ″ 12 40 29	Chestow Steeple	138522
	Kit Hill - -	138 21 13		45738
	Chestow Steeple			

Distance from Butterton to Carraton Hill 131576 feet.

221	Butterton -	40 34 1	Stonehouse Steeple	58310
	Carraton Hill -	23 29 2		95162
	Stonehouse Steeple			
222	Butterton -	60 48 52	Obelisk at Puslinch	38700
	Carraton Hill -	16 41 16		117659
	Obelisk at Puslinch			
223	Butterton -	41 2 54	Rame Head -	84846
	Carraton Hill -	39 30 40		87594
	Rame Head			

Distance from Kit Hill to Maker Heights 67822,3 feet.

224	Kit Hill - -	116 24 26	Brent Tor -	43421
	Maker Heights -	24 3 10		95419
	Brent Tor, near Lidford			
225	Kit Hill - -	11 30 56	Block House -	57984
	Maker Heights -	46 26 51		15972
	Flag-staff of the Block House, near Dock			
226	Kit Hill - -	4 3 42	Rame Steeple -	74547
	Maker Heights -	141 4 23		8403
	Rame Steeple			

Distance from Carraton Hill to Maker Heights 82600,3 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
				Feet.
227	Carraton Hill -	° ′ ″ 7 28 15	Dock-yard Chapel	78468
	Maker Heights -	64 48 50		11274
	Steeple of the Chapel in the Yard, Plymouth Dock			
228	Carraton Hill -	7 34 6	Windmill at Plymouth Dock	79778
	Maker Heights -	71 29 35		11080
	Windmill at Plymouth Dock			
229	Carraton Hill -	7 31 7	Statten Battery	97488
	Maker Heights -	133 32 55		17199
	Battery on Statten Heights			

Distance from Kit Hill to Carraton Hill 33427 feet.

230	Kit Hill - -	105 0 39	St. Stephen's Steeple - -	44659
	Carraton Hill -	43 47 30		62330
	St. Stephen's Steeple			
231	Kit Hill - -	29 11 14	St. Ive Steeple	25390
	Carraton Hill -	47 42 54		16736
	St. Ive Steeple			
232	Kit Hill - -	42 31 4	Callington Steeple	7532
	Carraton -	10 20 54		28336
	Callington Steeple			
233	Kit Hill - -	25 20 11	LinkinhornSteeple	19621
	Carraton Hill -	28 8 55		17798
	Linkinhorn Steeple			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
				Feet.
234 D	Kit Hill - -	° ′ ″ 121 48 23	St. Dominic Steeple	7776
	Carraton Hill -	9 59 38		38097
	St. Dominic Steeple			
235 D	Kit Hill - -	60 22 24	South Petherwin Steeple -	39475
	Carraton Hill -	67 55 47		37027
	South Petherwin Steeple			
236	Kit Hill - -	19 31 2	South Hill Steeple	15493
	Carraton Hill -	15 22 32		19522
	South Hill Steeple			
237	Kit Hill - -	108 14 2	House at Empercombe -	64348
	Carraton Hill -	48 46 11		81266
	Lord Mount Edgcumbe's House, at Empercombe			
238	Kit Hill - -	59 59 7	Sea-mark on the Hoe - -	66387
	Carraton Hill -	42 59 43		87011
	Northern Sea-mark on the Hoe			

Distance from Kit Hill to Bindown 54902,7 feet.

239	Kit Hill - -	39 56 21	St. Cleer Steeple	42931
	Bindown -	51 25 10		35256
	St. Cleer Steeple			

Distance from Carraton Hill to Bindown 42541,4 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
240	Carraton Hill -	° ′ ″ 130 14 2	Brownwilly -	48221
	Bindown - -	26 32 44		82371
	The highest part of Brownwilly			
241	Carraton Hill -	138 42 49	Cheese Rings -	9773
	Bindown - -	7 21 53		50300
	Cheese Rings			
242	Carraton Hill -	18 2 57	Liskeard Steeple	21739
	Bindown - -	17 6 59		22885
	Liskeard Steeple			
243	Carraton Hill -	18 6 21	Duloe Steeple -	43403
	Bindown - -	84 32 47		13550
	Duloe Steeple			
244	Carraton Hill -	9 16 26	Menheniot Steeple	21502
	Bindown - -	14 32 34		13806
	Menheniot Steeple			
245	Carraton Hill -	43 17 44	Landrake Steeple	47177
	Bindown - -	75 46 11		33376
	Landrake Steeple			
246	Carraton Hill -	22 51 23	Signal-staff at Nea-	36203
	Bindown - -	129 59 13	land -	71413
	Naval-Signal-staff at Nealand, near Polparrow			

Distance from Lansallos to Carraton Hill 68929,7 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
		° ′ ″		Feet.
247	Carraton Hill -	25 5 53	Boconnock Steeple	46079
	Lansallos - -	35 41 57		33495
	Boconnock Steeple			
248	Carraton Hill -	24 4 10	Obelisk at Bocon-	50139
	Lansallos - -	41 27 47	nock -	30886
	Obelisk at Boconnock, (Lord Camelford's)			
249	Carraton Hill -	41 29 10	Roach Rock -	99410
	Lansallos - -	94 48 32		66086
	Roach Rock			
250	Carraton Hill -	42 1 28	Roach Steeple	100214
	Lansallos - -	94 41 58		67314
	Roach Steeple			

Distance from Lansallos to Hensbarrow Beacon 62044,8 feet.

251	Lansallos -	21 34 34	Helmen Tor -	48412
	Hensbarrow Beacon	46 16 45		24633
	Helmen Tor			
252	Lansallos -	37 8 29	Summer House	61105
	Hensbarrow Beacon	70 7 42		39231
	Mr. Tremaine's Summer House			
253	Lansallos -	45 34 10	Gorran Steeple	66624
	Hensbarrow Beacon	72 3 29		50008
	Gorran Steeple			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
254	Lansallos - - Hensbarrow Beacon *Naval-Signal-staff on the Deadman*	° ′ ″ 52 43 25 71 28 51	Naval-Signal-staff at the Deadman	71136 59696
255	Lansallos - - Hensbarrow Beacon *Gwineas Rocks*	51 21 9 60 17 27	Gwineas Rocks, off Mevagissy	57977 52133
	Distance from Bodmin Down to Hensbarrow Beacon 47337,2 feet.			
256	Bodmin Down Hensbarrow Beacon *Hendellion Steeple*	97 21 30 39 57 45	Hendellion Steeple	44851 69255
257	Bodmin Down Hensbarrow Beacon *The high Stone on St. Braeg Down*	48 38 46 55 1 58	The high Stone on St. Braeg Down	39924 36571
258	Bodmin Down Hensbarrow Beacon *St. Dennis Steeple*	13 28 31 120 37 11	St. Dennis Steeple	56722 15359
259 D	Bodmin Down Hensbarrow Beacon *Lansallos Steeple*	64 55 8 68 45 47	Lansallos Steeple	61011 59285
	Deadman Head from Lansallos 70686,8 feet.			
260 D	Deadman - Lansallos - - *St. Veep Steeple*	12 51 38 73 45 53	St. Veep Steeple	67986 15761

Lansallos from Bodmin Down 61597,1 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
		° ′ ″		Feet.
261	Lansallos - -	26 19 35	Lanlivery Steeple	39552
D	Bodmin Down	33 51 19		31486
	Lanlivery Steeple			

Hensbarrow Beacon from Deadman Head 59284,2 feet.

262	Hensbarrow Beacon	30 50 7	Gerrans Steeple	83901
D	Deadman -	106 31 21		44858
	Gerrans Steeple			
263	Hensbarrow Beacon	13 56 6	St. Michael Carhayes Steeple	48309
D	Deadman -	43 10 53		17001
	St. Michael Carhayes Steeple			
264	Hensbarrow Beacon	31 22 22	St. Kivern Steeple	136676
	Deadman -	128 53 52		91426
	St. Kivern Steeple			
265	Hensbarrow Beacon	29 6 51	Signal-staff at Black Head	146770
	Deadman -	133 59 31		99260
	Naval-Signal-staff at Black Head			
266	Hensbarrow Beacon	62 46 29	Fowey Windmill	45036
	Deadman -	45 59 37		55677
	Windmill near Fowey			
267	Hensbarrow Beacon	56 10 33	Menabilly House	35221
	Deadman -	36 24 22		49300
	Menabilly House			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
				Feet.
268	Hensbarrow Beacon	60 28 23	Old Tower at Polruan	47561
	Deadman -	49 6 10		54749
	Old Tower at Polruan			
269	Hensbarrow Beacon	30 52 0	Signal-staff, St. Anthony's Head	98759
	Deadman -	116 42 13		56717
	Naval-Signal-staff at St. Anthony's Head			

Distance from Hensbarrow Beacon to St. Agnes' Beacon 97084,8 feet.

270	Hensbarrow Beacon	31 37 12	St. Columb Minor Steeple -	53942
D	St. Agnes' Beacon	28 56 16		58448
	St. Columb Minor Steeple			
271	Hensbarrow Beacon	11 43 0	Peranzabulo Steeple - -	73829
D	St. Agnes' Beacon	31 9 39		28975
	Peranzabulo Steeple			
272	Hensbarrow Beacon	57 24 41	St. Eval Steeple	56011
	St. Agnes' Beacon	35 11 34		81884
	St. Eval Steeple			
273	Hensbarrow Beacon	15 2 26	Cubert Steeple	69141
	St. Agnes' Beacon	30 37 20		35224
	Cubert Steeple			
274	Hensbarrow Beacon	41 44 14	Pendennis Castle	101687
	St. Agnes' Beacon	72 36 24		70938
	Flagstaff in Pendennis Castle			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
275	Hensbarrow Beacon St. Agnes' Beacon *Windmill near St. Mawes*	° ′ ″ 42 11 25 61 3 38	Windmill near St. Mawes -	87286 66985

Distance from St. Agnes' Beacon to Karnminnis 84610,6 feet.

276	St. Agnes' Beacon Karnminnis *Karnbre Castle*	49 20 11 20 23 49	Karnbre Castle	31435 68417
277	St. Agnes' Beacon Karnminnis *Cupola of the Market House in Redruth*	55 59 58 17 46 35	Cupola in Redruth	26903 73054
278	St. Agnes' Beacon Karnminnis *Camborn Steeple*	30 57 7 21 45 40	Camborn Steeple	39427 54696
279	St. Agnes' Beacon Karnminnis *Illugan Steeple*	31 12 56 10 49 6	Illugan Steeple	23718 65490
280	St. Agnes' Beacon Karnminnis *St. Paul Steeple*	40 52 42 117 47 27	St. Paul Steeple	110564 81794
281	St. Agnes' Beacon Karnminnis *Lord de Dunstanville's House*	20 40 33 10 47 12	Lord de Dunstanville's House	30339 57237

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
282 D	St. Agnes' Beacon Karnminnis *Gwinear Steeple*	° ′ ″ 21 40 24 40 30 44	Gwinear Steeple	62144 35330
283	St. Agnes' Beacon Karnminnis *Mr. Kneil's Obelisk, near St. Ives*	53 24 45 88 37 42	Mr. Kneil's Obelisk	73889 59346
284	St. Agnes' Beacon Karnminnis *Highest of the Rocks called the Cow and Calf*	141 53 34 20 9 34	Cow and Calf Rocks -	94650 169450

Distance from St. Agnes' Beacon to Karnbonellis 45461,9 feet.

285	St. Agnes' Beacon Karnbonellis *St. Erme Steeple*	94 43 5 42 10 34	St. Erme Steeple	44668 66303
286	St. Agnes' Beacon Karnbonellis *St. Allen Steeple*	98 13 52 35 41 11	St. Allen Steeple	36816 62462
287	St. Agnes' Beacon Karnbonellis *Ludgvan Steeple*	44 12 31 105 49 41	Ludgvan Steeple	87573 63469

Distance from Karnminnis to Karnbonellis 71578,3 feet.

288	Karnminnis Karnbonellis *Windmill near the Lizard*	41 26 59 95 31 22	Lizard Windmill	104413 69440

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
		° ′ ″		Feet.
289	Karnminnis	40 7 0	Grade Steeple	110762
	Karnbonellis	100 25 15		72566
	Grade Steeple			
290	Karnminnis	38 32 27	Ruan Major Steeple - -	102243
	Karnbonellis	97 30 19		64256
	Ruan Major Steeple			
291	Karnminnis	39 52 32	St. Hilary Steeple	33808
	Karnbonellis	25 24 25		50519
	St. Hilary Steeple			
292	Karnminnis	10 0 52	Castle Dennis	69233
	Karnbonellis	74 13 53		15749
	Castle Dennis (Mr. Rogers's Tower)			

Distance from Karnbonellis to St. Buryan 99786 feet.

293	Karnbonellis	9 32 41	Madern Steeple	80908
	St. Buryan	33 51 25		24081
	Madern Steeple			
294 D	Karnbonellis	60 38 57	Perranuthno Steeple - -	38552
	St. Buryan	49 18 46		44315
	Perranuthno Steeple			
295 D	Karnbonellis	76 57 1	Girnhove Steeple	46355
	St. Buryan	50 25 43		58583
	Girnhove Steeple			
296	Karnbonellis	60 25 48	Signal-staff -	66344
	St. Buryan	40 43 1		88458
	Naval-Signal-staff, Park Loughs			

Distance from Pertinney to Karnminnis 41407,7 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
297	Pertinney	° ′ ″ 116 12 46	St. Buryan Steeple	12751
	Karnminnis	13 40 7		48411
	St. Buryan Steeple			

Distance from St. Buryan to Pertinney 12450,2 feet.

298	St. Buryan	23 28 57	Chapel Karnbury	10728
	Pertinney	58 34 54		5009
	Chapel Karnbury			
299	St. Buryan	75 36 7	Signal-staff, St. Leven's Point	20094
	Pertinney	67 31 4		19169
	Naval-Signal-staff, St. Leven's Point			
300	St. Buryan	69 21 10	Sennen Steeple	17475
	Pertinney	68 58 0		17520
	Sennen Steeple			

Distance from Sennen to Pertinney 20199,9 feet.

301	Sennen	106 43 44	Stone near the Land's End	2791
	Pertinney	7 15 12		21173
	Stone near the Land's End			
302	Sennen	126 1 11	Longship's Light-house -	10717
	Pertinney	18 6 39		27883
	Longship's Light-house			

The above triangles, and those which follow in this section, are numbered in order from the secondary series, given in the Philosophical Transactions for 1795.

ART. II. *Triangles for ascertaining the Distances of the Eddystone Light-house, from the Flagstaff of Plymouth Garrison, and the Rame-head.*

The ball on the lantern of the Light-house was observed from the stations on Butterton, Kit Hill, and Carraton Hill; and as much uncertainty has heretofore existed, with respect to a knowledge of its true distance from any point in the neighbourhood of Plymouth, observations were made on various arcs of the circle of the instrument, at the two first stations.

The triangles are the following.

Distance from Butterton to Kit Hill 100969 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
				Feet.
303	Butterton - -	66° 46′ 21″	Eddystone Light-house - -	121159
	Kit Hill - -	64 27 46		123399
	Eddystone Light-house			

Distance from Butterton to Carraton Hill 131576 feet.

304	Butterton - -	60 5 31	Eddystone Light-house - -	121158
	Carraton Hill -	55 52 41		126863
	Eddystone Light-house			

With the distance of the Eddystone Light-house from Kit Hill, and also that of the Flagstaff in Plymouth garrison from the same station, we find the distance from the Light-house to the Flagstaff = 73061 feet;* the observed angle being 29° 42′ 34″: and, computing with the *data* obtained from the last triangle, and the 223d,

* On referring to the late Mr. SMEATON's Narrative of the Building of the Eddystone Light-house, it will be found, that, from a trigonometrical process, founded on two bases measured on the Hoe, among other deductions, he concluded the distance between the above objects was 73464 feet; being 403 greater than the distance found by the above computation.

with the observed angle at Carraton Hill = 16° 22′ 1″, we get 49435 feet for the distance of the Eddystone Light-house from the building on Rame-head. It may be proper to observe, that the Eddystone Light-house is nearer to the Rame-head than to any other point on the coast.

ART. III. *Triangles for ascertaining the Situations of the Lizard Light-houses; and the Lizard Point.*

Distance from Karnbonellis to Pertinney 101474 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
305	Karnbonellis -	78° 49′ 28″	Eastern Light-	81323
	Pertinney - -	42 56 51	house - -	117097
	Eastern Light-house			
306	Karnbonellis -	78 40 5	Western Light-	81348
	Pertinney - -	43 0 53	house - -	116921
	Western Light-house			
307	Karnbonellis -	78 8 57	Signal-staff -	79635
	Pertinney - -	42 28 45		115408
	Naval-Signal-staff			

Distance from Karnbonellis to St. Buryan 99786 feet.

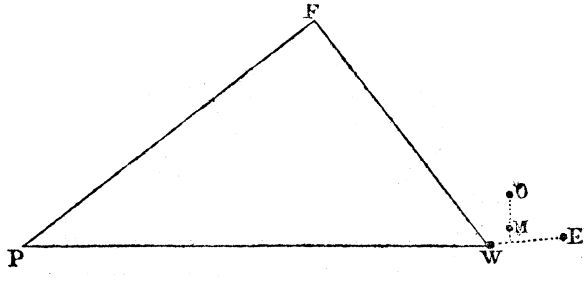
308	Karnbonellis -	71 7 19	Signal-staff -	79645
	St. Buryan - -	45 30 56		105873
	Naval-Signal-staff			

From the two last triangles we obtain 79640 feet for the mean distance between the Lizard Signal-staff and the station on Karnbonellis. Computing with this distance, and also that from the Western Light-house to the same station, with the observed angle 0° 31′ 8″, we get 1857 feet for the distance between those objects.

For the purpose of ascertaining the situation of the Lizard Point, two angles in the following triangle were observed with a sextant, *viz.*

		°	′
Naval-Signal-staff	-	77	4
Western Light-house	-	60	50
Lizard Point			

These, with the computed distance from the Signal-staff to the Light-house, give the distance of the Lizard Point from the $\left\{\begin{matrix}\text{Signal-staff} & 2419 \\ \text{Light-house} & 2700\end{matrix}\right\}$ feet. Hence, the distance of the point from the station on Karnbonellis is 81085 feet, the angle at that station, between the Lizard Point and Western Light-house, being $1^\circ\, 53'\, 47''$. With respect to the means by which the situation of the spot, on which Mr. BRADLEY erected his observatory in 1769, may hereafter be determined, it will be readily understood from the following diagram; where E is the Eastern Light-house, W the Western Light-house, F the Signal-staff, P the Lizard Point, and O the place of the Observatory. The distance between the spot O, and M,* the place where his meridian mark was fixed, we measured and found = 800 feet; M being 24 feet north of the line joining the centres of the Light-houses.



* The person spoken of in Sect. 1. Art. 3. as having the care of the Light-houses, pointed out this spot.

ART. IV. *Triangles for finding the Distances of the Day-Mark, St. Agnes' Light-house, and other Objects in the Scilly Isles, from particular Stations in the West of Cornwall.*

Observations made at Karnminnis.

Between	°	′	″	Mean.
The station at St. Buryan and the Day-Mark	39	3	$22\frac{3}{4}$ $22\frac{3}{4}$ $23\frac{3}{4}$	″ 23
At St. Buryan.				
Karnminnis and the Day-Mark -	129	52	22 $22\frac{1}{4}$	22
Pertinney and St. Agnes' Light-house -	83	59	$51\frac{3}{4}$ 50	51
Flagstaff of the fort in St. Mary's and Karnminnis - - - - -	134	39	$45\frac{3}{4}$ 45	$45\frac{1}{2}$
Windmill in St. Mary's and Pertinney -	84	23	$53\frac{1}{2}$ 53	$53\frac{1}{4}$
At Pertinney.				
St. Agnes' Light-house and Karnminnis	92	6	20 $21\frac{1}{4}$ $21\frac{1}{2}$ $23\frac{1}{2}$	$21\frac{3}{4}$
Day-Mark and Karnminnis - -	148	11	$8\frac{1}{2}$ $10\frac{1}{4}$	$9\frac{1}{4}$
Flagstaff in St. Mary's and St. Buryan	93	47	18	
Windmill in St. Mary's and St. Buryan	92	26	33	
At Sennen.				
Day-Mark and Pertinney - -	145	20	$8\frac{1}{2}$ 10	$9\frac{1}{4}$
St. Agnes' Light-house and Pertinney -	152	43	24 $24\frac{1}{2}$	$24\frac{1}{4}$

From those observations, result the following triangles, when the necessary corrections are applied for reducing the observed angles to those formed by the chords, *viz.*

Distance from Karnminnis to St. Buryan 47786,7 feet.

No.	Triangles.	Observed angles cor.	Distances of the stations from the intersected objects.	Feet.
309	Karnminnis -	° ′ ″ 39 3 24	Day-Mark -	190985
	St. Buryan - -	129 52 19		156796
	Day-Mark			

Distance from Karnminnis to Pertinney 41407,7 feet.

310	Karnminnis -	25 15 8	Day-Mark -	190989
	Pertinney - -	148 11 5		154551
	Day-Mark			

Distance from Sennen to Pertinney 20199,9 feet.

311	Sennen - -	145 20 7	Day-Mark -	137526
	Pertinney - -	30 24 7		154568
	Day-Mark			
312	Sennen - -	152 43 20	St. Agnes' Light-house -	164010
	Pertinney - -	24 21 55		182199
	St. Agnes' or the Scilly Light-house			

Distance from St. Buryan to Pertinney 12450,2 feet.

313	St. Buryan - -	83 59 51	St. Agnes' Light-house - -	183096
	Pertinney - -	92 6 22		182215
	St. Agnes' Light-house			

No.	Triangles.	Observed angles cor.	Distances of the stations from the intersected objects.	Feet.
314	St. Buryan - - Pertinney - - *Windmill in St. Mary's*	83° 24′ 53″ 92 26 33	Windmill in St. Mary's -	172183 171203
315	St. Buryan - - Pertinney - - *Flagstaff of the fort in St. Mary's*	82 8 18 93 47 18	Flagstaff in St. Mary's -	174890 173626

The distance from the Day-Mark to Karnminnis, as obtained from the 309th triangle, is 190985 feet, and by the 310th, 190989 feet, which differs only 4 feet from the former; and by the 310th and 311th triangles, the difference of the distances from the same object, to the station on Pertinney, is 17 feet; which, allowing for the shortness of the bases, must be considered as trifling. We may presume, therefore, that had not the Day-Mark been seen from Karnminnis, but from Sennen and Pertinney alone, the observations from which the angles of the 311th triangle are derived, would have afforded the means of computing the distance with sufficient precision. In like manner the 312th and 313th triangles seem to prove, that the observations made to St. Agnes' Light-house were sufficiently accurate, as there is a difference only of 16 feet between the distances of the Light-house from Pertinney. The ball on the top of the Light-house was the object always observed; and the Day-Mark being pyramidical, we had the means of making the observations at the different stations to the same point of this building.

ART. V. *Of the Distances of the Objects in the Scilly Isles, (intersected from the Stations in the West of Cornwall) from Sennen Steeple; the Stone near the Land's End; and the Longship's Light-house.*

As the observations made to the Day Mark, and St. Agnes' Light-house, may be supposed sufficiently accurate; and the ball on the top of the Longship's Light-house was also observed under favourable circumstances, it will be proper to apply the corrections to the horizontal angles, in order to obtain those formed by the chords. Taking, therefore, Pertinney as the angular point, and computing with the following *data, viz.*

Station on Pertinney from - { Day-Mark - - = 154551; St. Agnes' Light-house = 182207; Longship's Light-house = 27883 } Feet. And

the angle at Pertinney, augmented for calculation, between the Longship's Light-house and { the Day-Matk = 12° 17′ 30″; St. Agnes' Light-house = 6 15 25 } We get the distance of

the Longship's Light-house from - { the Day-Mark - = 127446 feet = 24,14; St. Agnes' Light-house = 154519 feet = 29,06 } Miles.

Calculating also, with the distances of the two other objects in the Scilly Isles, and likewise those of Sennen Steeple, and the Stone near the Land's End from Pertinney, with the included angles at the same station, we get

		Feet.	Miles.
Sennen Steeple from -	Day Mark - -	= 139521	= 26,43
	St. Agnes' Light-house	= 166255	= 31,49
	Flagstaff in St. Mary's	= 157912	= 29,95
	Windmill in St. Mary's	= 155299	= 29,41
Stone near the Land's End from -	Day Mark - -	= 135343	= 25,63
	St. Agnes' Light-house	= 162100	= 30,7
	Flagstaff in St. Mary's	= 153744	= 29,11
	Windmill in St. Mary's	= 151138	= 28,63

Of the Scilly Isles, Menawthen is the nearest to the Land's End, being about $1\frac{9}{10}$ miles eastward of the Day-Mark; and the cluster of rocks, called the Bishop and his Clerks, the most remote, being $3\frac{1}{3}$ miles west of St. Agnes' Light-house. Combining, therefore, the above particulars with those distances, we may conclude, that the nearest part of the Scilly Isles is about 24,7 miles from the Land's End, and the farthest nearly 34.

PART SECOND.

SECTION I.

Account of a Trigonometrical Survey carried on in Kent, in the Years 1795, and 1796, with the small circular Instrument.

ARTICLE I. *Particulars respecting the Instrument.*

The instrument used in this survey was announced in the Philosophical Transactions for 1795, p. 590. It was made by Mr. RAMSDEN; and is about half the size of his large theodolite, or circular instrument, with which we take the horizontal angles, but nearly similar to it in all its parts; consequently a very brief description will be sufficient.

The most material variations in the construction are,

1. The levelling or feet screws. These are below that horizontal movement which serves to direct the lower telescope to any particular object. By this position of the screws, the horizontal circle being once made level, the whole instrument may be moved round without disturbing its horizontality; the levelling screws remaining stationary during that operation,

which cannot be done in the large instrument, because the screws are carried round with it.

2. The diameter of the horizontal circle being only half that of the larger one, it follows, that the space between any two dots on the limb, gives double the number of minutes that are contained in the same space on the greater circle: on this account, each revolution in the micrometer screw in the microscope answers to 2′; and the circle on the microscopic micrometer being divided into 60 parts, each division becomes equal to 2″, but for the conveniency of notation, they are numbered at every 5th, with 10, 20, &c. to 50, the 60th being marked 1, to denote 1′: the number of seconds then commencing as before, the whole revolution becomes 2′. The revolutions are counted by means of notches on one side of the field in the microscope, in the same manner as in those of the large instrument.

3. This instrument not being intended for determining the direction of the meridian, a vertical semicircle for directing the telescope to the pole star became unnecessary; yet some apparatus was required, whereby small elevations or depressions from the horizon might be ascertained with a tolerable degree of precision. For this purpose, a moveable index, of about four inches long, is made to turn on the horizontal axis of the upper telescope, and so constructed, that by means of a finger screw, it can be fixed firmly in any position. The lower end of this index is furnished with a steel micrometer screw, having a circle on its head, divided into 100 parts, for shewing the fractional parts of a revolution, while other divisions, on a chamfered edge of the index which marks the fractional parts, give the number of revolutions made by the micrometer screw.

The method of finding the value of a revolution of the micrometer head in parts of a degree, &c. was as follows:

A rod, 14 or 16 feet long, was placed horizontally about three quarters of a mile off, and the angle subtended by its ends measured with the instrument in the usual way: the rod was then set up perpendicular at the same place, and the cross wires in the telescope directed to one of its extremities: the telescope was then moved in the vertical plane, by means of the micrometer screw, till the cross wires coincided with the other extremity. In this manner, by counting the number of revolutions, &c. necessary to move the telescope from one position to the other, an angle was measured vertically with the micrometer screw, equal to the former horizontal angle. From repeated trials, the value of a revolution was found equal to 10′ 27″.

This instrument, on account of its portable size, may very readily be taken to the tops of steeples, towers, &c. and is, therefore, extremely well adapted to the uses for which it was intended.

ART. II. *Situations of the Stations on which Observations were made with the small circular Instrument, in the Summer of the Year* 1795.

Folkstone Turnpike, the station made use of by General Roy in 1787.

Hawkinge, about three quarters of a mile from Folkstone Turnpike. This station was chosen for the purpose of having a view of the Belvidere in Waldershare Park, which cannot be seen from the station of 1787.

Dover Castle.

Paddlesworth; about 400 feet from the station of 1787. This new spot was selected, because Hardres Steeple is not visible from the old station.

Waldershare; on the Belvidere in the Earl of Guilford's Park.

On *Ringswold Steeple.*

On a sand hill near the sea shore, between Deal and Ramsgate: this station is denominated *Shore.*

Near *Mount Pleasant House,* Isle of Thanet.

On a rising ground near *Wingham.*

On *Chislet* Steeple.

In *Beverley Park,* near Canterbury.

On Upper *Hardres* Steeple.

ART. III. *Triangles for determining the Distances of the Stations.*

As the station on the Keep of Dover Castle, in 1787, was directly over the steps of the Turret, a new point was chosen about $6\frac{1}{2}$ feet from the former, where the instrument could stand conveniently: this new point is about 2,8 feet farther from Folkstone Turnpike, and 1 foot farther from Paddlesworth, than the point marking the old station.

From General Roy's Account of the Trigonometrical Survey in 1787, we have

Dover Castle from FolkstoneTurnpike 31554,6
from Paddlesworth 42561,2 } feet.

Now, augmenting those distances in the proportion of 141747 to 141753 (see Phil. Trans. Vol. LXXX, p. 595, and the Vol.

for 1795, p. 508), we get 31556, and 42563 feet; to which adding 2,8, and 1, respectively, we have

The new point on Dover Castle from Folkstone Turnpike - - - - - 31558,8
from Paddlesworth 42564 } feet.

In order to obtain the distance between Waldershare and Dover Castle from those new sides, or distances, the three angles of the following triangle were very carefully taken.

1	Dover Castle -	3	49	16	3	49	15	} for computation.
	Folkstone Turnpike	36	6	31	36	6	30	
	Hawkinge -	140	4	16	140	4	15	

The third angles of the two next triangles were not observed:

2	Hawkinge - - -	44	23	30
	Dover Castle - -	73	53	44
	Waldershare - - -	61	42	46
3	Dover Castle - - -	62	24	7
	Paddlesworth (the station of 1787)	32	36	9
	Waldershare - - -	84	59	44.

By the two first triangles, Dover Castle from Waldershare 23019,4 } 23020,5 mean distance.
From the latter - - 23021,5 }

And *Hawkinge* from { Dover Castle 28976 / Waldershare 31616

N. B. The angles at the stations, or objects, denoted in *italics*, are supplemental, or were not observed. And it is also to be remarked, that whenever Paddlesworth is mentioned hereafter, the *new station* is to be understood.

No.	Names of stations.	Observed angles.	Distances.	Feet.
4	Waldershare Paddlesworth *Dover* -	° ′ ″ 85 2 25 32 53 10 62 4 25	Paddlesw. from {Dover Waldershare	42239 37460
5	Waldershare Paddlesworth *Hardres*	57 1 15 69 21 59 53 36 46	Hardres {Waldershare Paddlesworth	43548 39035
6	Dover Waldershare Ringswold	66 46 45 57 57 24 55 15 51 180 0 0	Ringswold {Dover Waldershare	23745 25743
7	Waldershare Ringswold *Shore* -	45 43 8 97 38 32 36 38 20	Shore {Waldershare Ringswold	42755 30883
8	Mount Pleasant *Shore* - *Waldershare*	40 53 17 111 8 27 27 58 16	Mt. Pleasant {Shore Waldershare	30635 60920
9	Mount Pleasant Chislet - Wingham	38 32 17 79 25 36—35 62 2 8 180 0 1	Chislet {Mount Pleasant Wingham	30062 21206
10	Hardres Wingham *Waldershare*	52 46 14 69 29 1 57 44 55	Hardres from Wingham	39322
11	Wingham Beverley Park Hardres	50 4 0 75 0 0 54 56 4—0 180 0 4	Beverley Park {Wingham Hardres	33320 31215

ART. IV. *Secondary Triangles.*

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
				Feet.
12	Paddlesworth -	38° 28′ 36″	Windmill -	37283
	Waldershare -	70 22 24		24628
	Barham Windmill			
13	Dover - -	51 40 11	St. Radigund's Abbey - -	16196
	Waldershare	44 23 40		18160
	St. Radigund's Abbey			
14	Dover - -	75 15 45	Hougham Steeple	16614
	Waldershare -	40 31 40		24726
	Hougham Steeple			
15	Dover - -	32 41 51	Gunston Steeple	9111
	Waldershare -	17 46 31		16123
	Gunston Steeple			
16	Dover - -	88 19 36	St. Margaret's Steeple -	14444
	Waldershare -	32 34 23		26817
	St. Margaret's Steeple			
17	Hawkinge -	84 50 30	Elham Windmill	8335
	Waldershare -	15 3 14		31963
	Elham Windmill			
18	Dover - -	39 48 39	South Foreland Light-house	12081
	Ringswold -	28 8 7		16403
	South Foreland Light-house			
19	Waldershare -	17 10 7	Upper Deal Windmill - -	28870
	Ringswold -	102 11 7		8718
	Upper Deal Windmill			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
		° ′ ″		Feet.
20	Waldershare -	22 20 10	Upper Deal Chapel	30160
	Ringswold -	100 38 27		11663
	Upper Deal Chapel			
21	Waldershare -	19 1 31	Lower Deal Windmill -	31226
	Ringswold -	110 21 19		10857
	Lower Deal Windmill			
22	Waldershare -	19 28 27	Deal Castle	34689
	Ringswold -	121 2 45		13498
	Deal Castle			
23	Waldershare -	42 26 26	Norbourn Windmill -	22102
	Ringswold -	57 41 19		17648
	Norbourn Windmill			
24	Waldershare -	9 19 40	Watch-house	31317
	Ringswold -	135 28 3		7238
	Watch-house near the Sea shore			
25	Waldershare -	29 45 47	Sandown Castle	38185
	Ringswold -	111 20 13		20351
	Sandown Castle			
26	Waldershare -	12 29 13	Walmer Steeple	29491
	Ringswold -	115 33 51		7069
	Walmer Steeple			
27	Waldershare -	15 35 53	Ripple Steeple	24209
	Ringswold -	69 33 23		6947
	Ripple Steeple			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
28	Waldershare Ringswold - *Waldershare Steeple*	° ′ ″ 20 45 23 5 35 50	Waldershare Steeple -	5656 20552
29	Waldershare Shore - - *Eastry Steeple*	16 23 49 21 57 46	Eastry Steeple	25766 19448
30	Waldershare Shore - - *Ash Steeple*	35 10 6 56 41 26	Ash Steeple -	35750 24639
31	Waldershare Shore - - *Minster Steeple*	28 29 39 103 15 30	Minster Steeple	55782 27341
32	Waldershare - Shore - - *Woard Steeple*	5 43 2 19 37 24	Woard Steeple	33548 9951
33	Waldershare - Shore - - *Sandwich, highest Steeple*	13 35 31 59 30 36	Sandwich Steeple	38505 10501
34	Ringswold - Shore - - *Mongeham Steeple*	24 46 49 13 3 56	Mongeham Steeple	11379 21098
35	Ringswold - Shore - - *Norbourn Steeple*	35 9 0 25 59 2	Norbourn Steeple	15450 20303

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
		° ′ ″		Feet.
36	Ringswold -	33 7 44	Woodnessborough Steeple -	32320
	Shore - -	77 48 16		18071
	Woodnessborough Steeple			
37	Shore - -	41 10 35	Ramsgate Windmill -	22695
	Mount Pleasant	47 47 27		20173
	Ramsgate Windmill			
38	Shore - -	36 26 58	St. Lawrence Steeple -	25064
	Mount Pleasant	54 52 36		18205
	St. Lawrence Steeple			
39	Waldershare -	32 2 55	Wingham Steeple	35214
	Mount Pleasant	31 1 14		36259
	Wingham Steeple			
40	Waldershare -	31 12 40	Goodneston Steeple -	24841
	Mount Pleasant	17 58 32		41711
	Goodneston Steeple			
41	Mount Pleasant	77 19 0	Birchington Steeple -	11500
	Chislet - -	22 10 4		29735
	Birchington Steeple			
42	Mount Pleasant	19 36 3	St. Nicholas Steeple - -	16690
	Chislet - -	21 19 41		15394
	St. Nicholas Steeple			
43	Mount Pleasant	16 56 56	Stormouth Steeple -	21519
	Chislet - -	33 29 54		11366
	Stormouth Steeple			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
44	Mount Pleasant Chislet - - *Reculver Windmill*	° ′ ″ 22 14 40 81 14 59	Reculver Windmill	30556 11703
45	Mount Pleasant Wingham - *South Reculver*	69 57 57 51 54 46	South Reculver	31012 37017
46	Mount Pleasant Wingham - *Hearne Windmill*	50 51 41 78 50 42	Hearne Windmill	42669 33732
47	Wingham - Waldershare - *Littlebourn Steeple*	102 34 17 11 3 35	Littlebourn Steeple -	7752 39442
48	Wingham - Chislet - - *Blean Steeple*	58 30 34 88 52 9	Blean Steeple	39329 33544
49	Wingham - Chislet - - *Wickham Steeple*	59 11 7 24 25 37	Wickham Steeple	8824 18326
50	Wingham - Chislet - - *Ickham Steeple*	72 3 26 22 6 13	Ickham Steeple	8001 20228
51	Wingham - Beverley Park - *Bridge Windmill*	47 35 34 44 59 50	Bridge Windmill	23584 24628

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
		° ′ ″		Feet.
52	Wingham -	33 27 20	Nackington Steeple -	31688
	Beverley Park -	68 29 54		18776
	Nackington Steeple			
53	Wingham -	80 53 7	Chillendon Windmill -	15031
	Hardres - -	21 53 16		39811
	Chillendon Windmill			
54	Wingham -	122 1 10	Preston Steeple	7220
	Hardres - -	8 3 28		43572
	Preston Steeple			
55	Wingham -	30 49 24	Shottenden Windmill -	67736
	Hardres - -	118 30 8		39494
	Shottenden Windmill			
56	Hardres - -	11 35 23	St. Martin's Windmill -	22943
	Beverley Park -	27 48 16		9881
	St. Martin's Windmill			
57	Hardres - -	12 11 37	Harbledown Steeple - -	25289
	Beverley Park -	39 25 30		8411
	Harbledown Steeple			
58	Hardres - -	17 29 59	Sturry Steeple	31691
	Beverley Park -	84 3 53		9581
	Sturry Steeple			
59	Waldershare -	24 29 21	Canterbury Cathedral -	54827
	Hardres - -	105 36 14		23597
	Canterbury Cathedral			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
		° ′ ″		Feet.
60	Hardres Paddlesworth *West-Stone-Street Windmill*	40 45 34 27 23 18	West-Stone-Street Windmill	19347 27458
61	Hardres Paddlesworth *Stelling Windmill*	31 0 20 15 3 20	Stelling Windmill	14081 27924

ART. V. *Triangles carried over another Part of Kent in* 1795; *with Remarks.*

On account of the high woody lands to the westward of Hardres and Paddlesworth, the triangles could not be extended in that direction, and therefore the following may be considered as a detached part of the Survey this year.

The Stations were,

Westwell Down,
Wye Down,
Brabourn Down,
Allington, or *Aldington Knoll*, the station of 1787.

Allington Knoll from Tenterden, according to General Roy's account, is 61775,3 feet, which increased in the proportion of 141747 to 141753 becomes 61778 feet. The centre of the top of Tenterden Steeple is about 4 or $4\frac{1}{2}$ feet farther from Allington Knoll than the point marking the station in 1787; therefore the distance of the centre from Allington Knoll will be 61782 feet, which is used in the following computations; because, as a flagstaff of moderate height

cannot be easily distinguished among the pinnacles at any considerable distance, it was thought it might be sufficiently accurate for the present purpose, to intersect the steeple itself.

Triangles for determining the Distances of the Stations.

No.	Stations.	Observed angles.	Distances.		Feet.
62	Allington Knoll Westwell Down *Tenterden*	61° 37′ 46″ 68 0 16 50 21 58	Westwell D. from	Tenterden Allington K.	58629 51316
63	Allington Knoll Westwell Down Wye Down	34 37 37 45 54 19 99 28 5 — 4 180 0 1	Wye Down	Allington K. Westwell D.	37363 29562
64	Allington Knoll Wye Down *Tenterden*	96 15 23 54 19 24 29 25 13	Wye Down	Allington Tenterden	37360 75603
65	Wye Down Westwell Down *Tenterden*	45 8 41 113 54 35 20 56 44	Westwell D. from Wye D.		29566
66	Allington Knoll Brabourn Down *Tenterden*	116 49 40 45 25 31 17 44 49	Brabourn D.	Allington K. Tenterden	26437 77397
67	Allington Knoll Brabourn Down *Westwell Down*	55 11 54 93 52 23 30 55 43	Brabourn D.	Westwell D. Allington K.	42233 26435

ART. VI. *Secondary Triangles.*

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
68	Wye Down -	° ′ ″ 42 20 58	Ashford Steeple	23922
	Westwell Down	53 35 53		20023
	Ashford Steeple			
69	Wye Down -	86 44 28	Brook Steeple	7983
	Westwell Down	15 18 43		30181
	Brook Steeple			
70	Wye Down -	60 6 18	Willsborough Steeple -	21881
	Westwell Down	45 28 29		26607
	Willsborough Steeple			
71	Wye Down -	58 2 28	Willsborough Windmill	19916
	Westwell Down	41 37 0		25443
	Willsborough Windmill			
72	Wye Down -	58 20 46	KingsnorthSteeple	32498
	Westwell Down	65 40 7		30360
	Kingsnorth Steeple			
73	Wye Down -	52 13 44	Shadoxhurst Steeple - -	44118
	Westwell Down	85 50 2		34966
	Shadoxhurst Steeple			
74	Wye Down -	26 38 18	Kennington Steeple - -	16989
	Westwell Down	27 54 54		16271
	Kennington Steeple			
75	Wye Down -	62 23 7	Great Chart Steeple - -	34029
	Allington Knoll	54 24 4		37083
	Great Chart Steeple			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
76	Wye Down Allington Knoll *Westwell Steeple*	° ′ ″ 96 45 26 33 49 30	Westwell Steeple	27384 48851
77	Westwell Down Allington Knoll *Pluckley Steeple*	97 22 43 20 53 1	Pluckley Steeple	20768 57778
78	Westwell Down Allington Knoll *Eastwell Steeple*	37 55 0 7 17 0	Eastwell Steeple	9168 44441
79	Westwell Down Allington Knoll *Charing Steeple*	146 22 23 5 24 0	Charing Steeple	10211 60085
80	Westwell Down Allington Knoll *Allington Steeple*	3 15 4 57 34 51	Allington Steeple	49609 3333
81	Brabourn Steeple Allington Knoll *Lymne Steeple*	34 50 49 75 59 12	Lymne Steeple	27443 16161
82	Brabourn Down Allington Knoll *Mersham Steeple*	33 12 51 45 9 19	Mersham Steeple	19136 14784
83	Brabourn Down Allington Knoll *Monks Horton Steeple*	67 22 25 23 46 14	Monks Horton Steeple	10657 24405

The bearings, and distances of the stations and intersected objects, together with their latitudes and longitudes, are given in the following Section.

SECTION II.

Operations in 1796, with the small circular Instrument.

ART. I. *Situations of the Stations.*

Lydd
Allington Knoll
High Nook
Fairlight Down
Goudhurst
Tenterden
} Stations in the Survey of 1787.

Westwell Down Station, used in 1795. See Art. v. Section I. Part Second.

Silver Hill, near Robertsbridge. The station is 22 yards S.W. of the Windmill.

Boughton Malherb Steeple.

ART. II. *Triangles for finding the Distances of the Stations.*

From the 5th Article in the last Section, we get the distance from Westwell Down to the *new* station on Tenterden Steeple = 58629,4 feet. This used in the following triangle,

		°	′	″
84	Boughton Malherb	81	55	9
	Westwell Down	63	44	8
	Tenterden -	34	20	43

gives the distance from Boughton Malherb to Westwell Down 33409 feet. Also in the following triangle, using 54376,9 feet for the distance from Tenterden to Goudhurst,

		°	′	″
85	Goudhurst -	52	5	44
	Boughton Malherb	53	54	20
	Tenterden -	75	59	56

we get 33404,5 feet for the distance between the same stations: hence the mean, 33406,8 feet, may be taken for the true distance between Boughton Malherb and Westwell Down. From this latter triangle also, we obtain the distance from Boughton Malherb to Tenterden 53097,6 feet.

No.	Triangles.	Observed angles.	Distances.	
		° ′ ″		Feet.
86	Goudhurst	65 29 7		
	Silver Hill	70 32 26	Silver Hill from Goudhurst	40043,1
	Tenterden	43 58 27		

Fairlight Down from Tenterden 71637,7 feet.

87	Fairlight Down	46 34 5		
	Silver Hill	82 25 8	Silver Hill from Fairlight D.	56174,2
	Tenterden	51 0 47		

By the two last triangles, we get 52472,4 and 52481,4 feet for the distances of Tenterden from Silver Hill; the mean of which, 52476,9, we shall hereafter use in determining the distances of the objects, intersected from those stations.

The distance of Goudhurst from Tenterden, and that of Tenterden from Fairlight Down, are derived from those given by General Roy, in the Philosophical Transactions, Vol. LXXX. augmented in the proportion of 141747 to 141753. The distances also, hereafter made use of, between Lydd, and the stations on Fairlight Down, Tenterden Steeple, Allington Knoll, and High Nook, together with that of High Nook from Allington Knoll, are obtained by increasing the distances, found in the same work, in the above proportion. It is proper to

remark, that it has not been thought necessary to reduce the distance between the station on Westwell Down, and the new station on Tenterden Steeple, to that between the former, and the old point at Tenterden, from the trifling difference of those distances.

During the operation of this year, the instrument was also taken to the following stations, *viz.*

Bidenden Steeple,
Hartridge,
Warehorn Steeple,
Stone Crouch,
Iden Steeple.

To determine the distances between these objects, and the stations from whence they were observed, we have the following triangles.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
88	Goudhurst -	18° 16′ 4″	Bidenden Steeple	41100
	Tenterden -	40 0 12		20040
	Bidenden Steeple			
89	Goudhurst -	27 21 34	Hartridge	19134
	Tenterden -	13 14 13		38404
	Hartridge			
90	Allington Knoll	44 16 25	Stone Crouch	51569
	Lydd - -	73 7 50		37627
	Stone Crouch			
91	Allington Knoll	15 46 51	Warehorn -	28100
	Stone Crouch	17 18 22		25690
	Warehorn			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
92	Tenterden - Fairlight Down - *Iden Steeple*	28° 55′ 46″ 20 42 7	Iden Steeple -	33239 45483

ART. III. *Secondary Triangles.*

93	Goudhurst - Tenterden - *Ulcomb Steeple*	59 47 4 61 44 12	Ulcomb Steeple	56184 55123
94	Goudhurst - Tenterden - *Sutton Windmill*	65 36 50 52 13 42	Sutton Windmill	48610 56009
95	Goudhurst - Tenterden - *Chart Sutton Steeple*	70 48 44 48 11 12	Chart Sutton Steeple - -	46338 58717
96	Goudhurst - Tenterden - *Linton Steeple*	91 32 50 36 54 6	Linton Steeple	41690 69407
97	Goudhurst - Tenterden - *Headcorn Windmill*	49 11 14 47 51 2	Headcorn Windmill -	40621 41468
98	Goudhurst - Hartridge *Cranbrook Steeple*	29 8 0 70 10 0	Cranbrook Steeple	18239 9439
99	Tenterden - Boughton Malherb *Benenden Steeple*	94 50 33 24 7 11	Benenden Steeple	24799 60471

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
		° ′ ″		Feet.
100	Bidenden -	37 0 0	Staplehurst Steeple	25514
	Goudhurst -	38 47 0		26555
	Staplehurst Steeple			
101	Bidenden -	33 30 0	Marden Steeple	40015
	Goudhurst -	70 42 33		23399
	Marden Steeple			
102	Boughton Malherb	14 39 40	Frittenden Steeple	36203
	Goudhurst -	17 10 0		31405
	Frittenden Steeple			
103	Tenterden -	20 46 0	Brasses Windmill	51527
	Silver Hill -	76 45 52		18768
	Brasses Windmill			
104	Tenterden -	11 2 0	Hawkhurst Steeple	44028
	Silver Hill -	42 17 30		12522
	Hawkhurst Steeple			
105	Silver Hill -	72 5 37	Sandhurst Steeple	16448
	Fairlight Down	17 1 25		53460
	Sandhurst Steeple			
106	Silver Hill -	58 27 19	Whittersham Steeple - -	50861
	Fairlight Down	55 42 10		52469
	Whittersham Steeple			
107	Silver Hill -	38 49 4	Peasemarsh Steeple - -	49016
	Fairlight Down	59 39 33		35602
	Peasemarsh Steeple			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
				Feet.
108	Silver Hill -	82 8 4	Rolvenden Steeple	38028
	Fairlight Down	36 28 0		63380
	Rolvenden Steeple			
109	Silver Hill -	42 30 35	Beckley Steeple	33419
	Fairlight Down	35 36 7		38790
	Beckley Steeple			
110	Allington Knoll	46 3 7	New Church Steeple - -	13967
	High Nook -	36 41 43		16828
	New Church Steeple			
111	Allington Knoll	52 3 53	Ivy Church Steeple	28621
	High Nook -	76 5 26		23256
	Ivy Church Steeple			
112	Allington Knoll	27 21 0	St. Mary's Steeple	23939
	High Nook -	80 5 0		11165
	St. Mary's Steeple			
113	Tenterden -	34 33 5	Playden Steeple	40204
	Lydd - -	34 35 48		40158
	Playden Steeple			
114	Iden - -	21 57 0	Winchelsea Steeple - -	21224
	Fairlight Down	17 5 40		26990
	Winchelsea Steeple			
115	Winchelsea -	48 6 0	Brede Steeple	26373
	Fairlight Down	67 26 0		21755
	Brede Steeple			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
		° ′ ″		Feet.
116	Brede Steeple -	56 0 0	Icklesham Steeple	19091
	Fairlight Down	55 1 0		19313
	Icklesham Steeple			
117	Stone Crouch -	55 9 34	Woodchurch Steeple -	28098
	Allington Knoll	32 59 15		42357
	Woodchurch Steeple			
118	Stone Crouch -	41 36 38	Old Romney Steeple -	31037
	Allington Knoll	35 59 39		35070
	Old Romney Steeple			
119	Stone Crouch -	41 54 7	New Romney Steeple -	40957
	Allington Knoll	52 11 33		34544
	New Romney Steeple			
120	Stone Crouch -	40 47 1	Brookland Steeple	15919
	Allington Knoll	14 44 21		40872
	Brookland Steeple			
121	Stone Crouch -	20 16 5	Orleston Steeple	33421
	Allington Knoll	29 46 58		23308
	Orleston Steeple			
122	Stone Crouch -	67 14 56	East Guilford Steeple -	15782
	Lydd - -	24 46 59		34721
	East Guilford Steeple			
123	Stone Crouch -	53 4 1	Snargate Steeple	17900
	Lydd - -	28 2 7		30443
	Snargate Steeple			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
		° ′ ″		Feet.
124	Stone Crouch -	25 37 0	Snave Steeple -	26667
	Warehorn Steeple	81 34 0		11629
	Snave Steeple			
125	Stone Crouch -	9 11 12	Appledore Steeple	11016
	Warehorn -	6 46 0		14925
	Appledore Steeple			
126	Warehorn -	91 6 0	Brenzet Steeple	16476
D	Allington Knoll	30 5 41		32852
	Brenzet Steeple			
127	Allington Knoll -	36 36 26	Bethersden Steeple	49701
	Westwell Down	68 55 44		31762
	Bethersden Steeple			
128	Allington Knoll	49 12 12	High Halden Steeple -	55827
	Westwell Down	70 39 8		44793
	High Halden Steeple			
129	Westwell Down	17 24 40	Lenham Steeple	30424
	Boughton Malherb	64 19 30		10101
	Lenham Steeple			
130	Westwell Down	12 31 21	Egerton Steeple	24722
	Boughton Malherb	30 1 45		10711
	Egerton Steeple			
131	Westwell Down	42 50 41	Turret on Romden Stables -	34586
	Boughton Malherb	71 6 34		24858
	Turret on Romden Stables			

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.		
		° ′ ″			Feet.
132	Westwell Down -	49 12 12	Smarden Steeple	{	39106
	Boughton Malherb	70 39 8			23850
	Smarden Steeple				

SECTION III.

Containing the Distances of the Objects intersected in the Survey with the small circular Instrument, from the Meridian of Greenwich, and from the Perpendicular to that Meridian. Also their Latitudes and Longitudes.

ART. I. *Bearings and Distances, 1795.*

At Folkstone turnpike, the bearing of the station on Dover Castle in 1787, from the parallel to the meridian of Greenwich is 65° 52′ 46″ N E (See Phil. Trans. Vol. LXXX, page 603). The new point on the Keep is 6½ feet north-eastward from the old one, which will subtend an angle at Folkstone turnpike of about 38″; therefore the new station bears 65° 52′ 8″ N E. The bearing of the centre of Tenterden Steeple from Allington Knoll, is nearly the same as that of the station in 1787, or 85° 47′ 25″ S W.: but the distances of those stations (Folkstone turnpike and Allington Knoll, see page 232 of the same Volume), from the meridian of Greenwich, and its perpendicular, are augmented in the proportion of 141747 to 141753, for obtaining the distances in the 3d and 4th columns of the following table: Folkstone turnpike being 274979 and 137220; and Allington Knoll 219935 and 144038 feet, respectively, from the meridian, and its perpendicular.

Bearings and Distances of the Stations.

Bearings from the Parallels to the Meridian of Greenwich.		Distances from merid.	Distances from perp.
	° ′ ″	Feet.	Feet.
At Folkstone Turnpike.			
Dover	65 52 8 NE	303780	124318
Hawkinge	29 45 38 NE	276605	134376
At Dover.			
Paddlesworth	81 30 42 SW	262004	130553
Waldershare	36 24 53 NW	290114	105792
Ringswold	30 21 52 NE	315783	103830
At Waldershare.			
Shore	39 54 35 NE	317545	72997
Mount Pleasant	11 56 19 NE	302716	46190
Wingham	16 36 24 NW	279533	70315
Hardres	74 21 9 NW	248180	94046
Hawkinge	25 17 53 SW		
Ringswold	85 37 43 NE		
Near the Shore.			
Ringswold	3 16 15 SW		
Mount Pleasant	28 56 58 NW		
At Mount Pleasant.			
Wingham	43 51 31 SW		
Chislet	82 23 48 SW	272918	50168
At Wingham.			
Chislet	18 10 37 NW		
Hardres	52 52 37 SW		
Beverley Park	77 3 23 NW	247060	62852
At Beverley Park.			
Hardres	2 3 23 SE		
At Allington Knoll.			
Tenterden	85 47 25 SW		
Westwell Down	32 34 49 NW	192302	100797
Wye Down	2 2 48 NE	221269	106701
Brabourn Down	22 37 5 NE	230102	119636

Interior Objects.

At Dover.			
St. Radigund's Abbey	88 5 4 NW	287597	123777
Hougham Steeple	68 19 22 SW	288341	130455
Gunston Steeple	3 43 2 NW	303189	115226

Bearings from the Parallels to the Meridian of Greenwich.					Distances from merid.	Distances from perp.
	°	′	″		Feet.	Feet.
St. Margaret's Steeple	51	54	43	N E	315148	115408
South Foreland Light-House	70	10	31	N E	315145	120721
At Waldershare.						
Barham Windmill	61	0	4	N W	278573	93852
Elham Windmill	10	14	39	S W	284430	137246
Upper Deal Chapel	63	17	33	N E	317056	92237
Deal Castle	66	9	16	N E	321842	91768
Watch-house near the Shore	85	2	37	S E	321314	108498
Sandown Castle	55	51	56	N E	321721	84365
Walmer Steeple	73	8	30	N E	318338	97239
Ripple Steeple	70	1	50	N E	302867	97534
Waldershare Steeple	64	52	20	N E	295235	103390
Eastry Steeple	23	30	46	N E	300393	82166
Ash Steeple	4	44	29	N E	293069	70165
Minster Steeple	11	24	56	N E	301155	51113
Woard Steeple	34	11	33	N E	308967	78042
Sandwich highest Steeple	26	19	14	N E	307187	71279
Wingham Steeple	20	6	36	N W	278007	72725
Goodneston Steeple	19	16	21	N W	281915	82343
Littlebourn Steeple	27	39	59	N W	278100	70860
Canterbury Cathedral	49	51	48	N W	248198	60458
At Ringswold.						
Mongeham Steeple	21	30	34	N W	311611	93243
Norbourn Steeple	31	52	45	N W	307623	90710
Woodnesborough Steeple	29	51	29	N W	299693	75800
Near the Shore.						
Ramsgate Windmill	12	13	43	N E	321363	50817
St. Lawrence Steeple	7	30	6	N E	320817	48148
At Mount Pleasant.						
Birchington Steeple	20	17	12	N W	298729	35403
St. Nicholas Steeple	78	0	9	N W	286391	42721
Stormouth Steeple	65	26	52	S W	283143	55132
At Wingham.						
The South Reculver	8	3	15	N W	274346	33663
Hearne Windmill	34	59	11	N W	260191	42679
Blean Steeple	76	41	11	N W	241261	61259
Wickham Steeple	77	21	44	N W	270923	68384
Bridge Windmill	55	21	3	S W	260132	83723
Nackington Steeple	69	29	17	S W	249854	81418
Chillingdon Windmill	28	0	30	S E	286591	83586
Preston Steeple	5	6	13	N W	278891	63124
Shottenden Windmill	83	42	1	S W	212206	77748
Ickham Steeple	89	45	57	S W	271533	70348

Bearings from the Parallels to the Meridian of Greenwich.					Distances from merid.	Distances from perp.
	°	′	″		Feet.	Feet.
At Hardres.						
Harbledown Steeple	14	15	0	N W	241955	69535
Sturry Steeple	15	26	36	N E	256619	63499
West Stone-street Windmill	35	46	24	S W	236870	109743
Stelling Windmill	26	1	10	S W	242003	106700
On Westwell Down.						
Ashford Steeple	24	53	15	S E	200728	118961
Brook Steeple	63	10	25	S E	219234	114417
Willsborough Steeple	33	0	39	S E	206797	123109
Kingsnorth Steeple	12	49	1	S E	199037	130400
Shadoxhurst Steeple	7	20	54	S W	187830	135476
Kennington Steeple	50	34	14	S E	204869	111131
At Allington Knoll.						
Great Chart Steeple	52	21	16	N W	190572	121389
Westwell Steeple	31	46	42	N W	194208	102510
Pluckley Steeple	53	27	50	N W	173511	109641
Eastwell Steeple	25	17	49	N W	200945	103951
Charing Steeple	37	58	49	N W	182959	96677
Allington Steeple	25	0	2	N E	221344	141017
Lymne Steeple	81	23	44	S E	235914	146456
Mersham Steeple	22	32	14	N W	214269	130383
Monks-Horton Steeple	46	23	19	N E	237605	127204

ART. II. *Bearings and Distances of the Stations, and Interior Objects, intersected in* 1796.

At Goudhurst.						
Boughton Malherb	54	59	23	N E	159324	95480
Bidenden	88	49	3	N E	147431	131744
Hartridge	79	43	33	N E		
At Fairlight Down.						
Silver Hill	34	28	24	N W		
Iden Steeple	33	33	48	N E	168454	180711
Brede Steeple	13	48	32	N W	138116	197485
At Allington Knoll.						
Stone Crouch	57	3	23	S W	176642	172082
Warehorn Steeple	72	50	14	S W	193071	152324

Interior Objects.

Bearings from the Parallels to the Meridian of Greenwich.					Distances from merid.	Distances from perp.
	°	′	″		Feet.	Feet.
At Goudhurst.						
Frittenden Steeple	72	9	23	N E	135894	123079
Linton Steeple	15	32	17	N E	117510	92425
Chart Sutton Steeple	36	16	23	N E	133757	95234
Sutton Windmill	41	28	17	N E	138534	96169
Ulcomb Steeple	47	18	3	N E	147633	94491
Headcorn Windmill	57	54	53	N E	140758	111015
Staplehurst	51	49	3	N E	127216	116176
Cranbrook Steeple	71	8	27	S E	123602	138488
At Fairlight Down.						
Rolvenden Steeple	1	59	36	N E	145513	155271
Beckley Steeple	1	7	43	N E	144072	179830
Peasemarsh Steeple	25	11	9	N E	158458	186395
Whittersham Steeple	21	13	46	N E	162307	169704
Sandhurst Steeple	17	26	59	N W	127277	167613
Winchelsea Steeple	50	39	28	N E	164181	201501
Icklesham Steeple	41	12	28	N W	156031	204073
At Allington Knoll.						
Bethersden	69	11	15	N W	173469	126373
High Halden	81	47	1	N W	164672	136054
Orleston Steeple	86	50	21	S W	196655	145317
Woodchurch Steeple	89	57	22	N W	177569	144000
Warehorn Steeple	72	50	14	S W	193071	152324
Brookland Steeple	42	19	2	S W	192410	174253
Old Romney Steeple	21	3	44	S W	207322	176759
New Romney Steeple	4	41	50	S W	217098	178460
At Boughton Malherb.						
Benenden Steeple	25	12	54	S W	129542	150187
At Silver Hill.						
Brasses Windmill	40	7	4	S E	123521	187554
At High Nook.						
New Church Steeple	57	43	31	N W	214018	156687
Ivy Church Steeple	82	52	46	S W	205170	168562
St. Mary's Steeple	78	53	12	S W	204756	170287
At Lydd.						
Playden Steeple	85	1	0	N W	169333	187207

Bearings from the Parallels to the Meridian of Greenwich.					Distances from merid.	Distances from perp.
	°	′	″		Feet.	Feet.
At Westwell.						
Lenham Steeple	63	25	45	NW	165089	87178
Egerton Steeple	86	38	14	SW	167621	102243
Smarden Steeple	61	47	14	SW	157842	119273
Turret on Romden Stables	56	18	54	SW	163521	119970
At Stone Crouch.						
Appledore Steeple	30	33	49	NE	182243	162595
Snave Steeple	65	22	1	NE	200828	160993
Snargate Steeple	66	35	7	NE	193068	164969
East Guilford Steeple	6	54	4	SW	174746	187750

ART. III. *Latitudes and Longitudes of Objects intersected in 1795.*

Names of Objects.	Latitude.			Longitude east from Greenwich. In degrees.			In time.	
	°	′	″	°	′	″	m.	s.
The Belvidere in Waldershare Park	51	11	13	1	15	39	5	2,6
Ringswold, or Kingswold Steeple	51	11	8	1	22	20	5	29,3
Upper Hardres Steeple	51	13	1	1	4	45	4	19
Chislet Steeple	51	20	4	1	11	24	4	45,6
St. Radigund's Abbey	51	7	56	1	14	44	4	58,9
Hougham Steeple	51	6	50	1	15	4	5	0,3
Gunston Steeple	51	9	18	1	19	0	5	16
St. Margaret's Steeple	51	9	14	1	22	7	5	28,5
South Foreland Light-House	51	8	21	1	22	6	5	28,4
Barham Windmill	51	12	52	1	12	41	4	50,7
Elham Windmill	51	5	44	1	14	1	4	56,1
Upper Deal Chapel	51	13	2	1	22	44	5	30,9
Deal Castle	51	13	5	1	23	59	5	35,9
Watch-house near the sea shore	51	10	21	1	23	46	5	35,1
Sandown Castle	51	14	18	1	23	59	5	35,9
Walmer Steeple	51	15	29	1	23	8	5	32,5
Ripple Steeple	51	12	12	1	19	0	5	16
Waldershare Steeple	51	11	15	1	16	59	5	7,9
Eastry Steeple	51	14	44	1	18	26	5	13,7
Ash Steeple	51	16	44	1	16	34	5	6,3
Minster Steeple	51	19	50	1	18	46	5	15,1
Woard Steeple	51	15	23	1	20	41	5	22,7
Sandwich highest Steeple	51	16	30	1	20	15	5	21
Wingham Steeple	51	16	21	1	12	38	4	50,5
Goodneston Steeple	51	14	45	1	13	26	4	53,7
Littlebourn Steeple	51	16	40	1	11	1	4	44,1
Canterbury Cathedral	51	18	26	1	4	53	4	19,5

Names of objects.	Latitude.	Longitude east from Greenwich. In degrees.	In time.
	° ′ ″	° ′ ″	m. s.
Mongeham Steeple	51 12 53	1 21 18	5 25,2
Norbourn, or Northbourn Steeple	51 13 18	1 20 17	5 21,1
Woodnessborough, or Woodnesbor. Steeple	51 14 47	1 18 16	5 13,1
Ramsgate Windmill	51 19 49	1 24 4	5 36,3
St. Lawrence Steeple	51 20 16	1 23 56	5 43,7
Birchington Steeple	51 22 25	1 16 13	5 4,8
St. Nicholas Steeple	51 21 15	1 14 57	4 59,8
Stourmouth, or Stormouth Steeple	51 19 8	1 14 3	4 56,2
The South Reculver	51 22 47	1 11 50	4 47,3
Hearne Windmill	51 21 20	1 8 6	4 32,4
Blean Steeple	51 18 19	1 3 4	4 12,3
Wickham Steeple	51 17 5	1 10 48	4 43,2
Ickham Steeple	51 17 47	1 10 7	4 40,5
Bridge Windmill	51 14 35	1 7 55	4 31,7
Nackington Steeple	51 14 59	1 5 14	4 20,9
Chillingdon Windmill	51 14 30	1 14 49	4 59,3
Preston Steeple	51 17 55	1 12 54	4 51,6
Shottenden Windmill	51 15 41	0 55 25	3 41,7
Harbledown Steeple	51 16 58	1 3 13	4 12,9
Sturry Steeple	51 17 55	1 7 5	4 28,3
West-Stone-street Windmill	51 10 22	1 1 45	4 7
Stelling Windmill	51 10 51	1 3 6	4 12,4
Ashford Steeple	51 8 56	0 52 18	3 29,2
Brook Steeple	51 9 38	0 57 8	3 48,5
Willsborough Steeple	51 8 14	0 53 52	3 35,5
Kingsnorth Steeple	51 7 3	0 51 49	3 27,3
Shadoxhurst Steeple	51 6 14	0 48 53	3 15,5
Kennington Steeple	51 10 12	0 53 17	3 33,2
Great Chart Steeple	51 8 33	0 49 39	3 18,6
Westwell Steeple	51 11 39	0 50 39	3 22,6
Pluckley Steeple	51 10 30	0 45 14	3 0,9
Eastwell Steeple	51 11 23	0 52 24	3 29,6
Charing Steeple	51 12 37	0 47 44	3 10,9
Allington, or Aldington Steeple	51 5 16	0 57 36	3 50,4
Lymne Steeple	51 4 20	1 1 22	4 5,5
Mersham Steeple	51 7 1	0 55 47	3 43,1
Monks Horton Steeple	51 7 30	1 1 53	4 7,5

Latitudes and Longitudes of Objects intersected in 1796.

Names of objects.	Latitude.	Longitude east from Greenwich. In degrees.	In time.
	° ′ ″	° ′ ″	m. s.
Linton Steeple	51 13 24	0 30 40	2 2,7
Sutton Windmill	51 12 46	0 36 9	2 24,6
Chart Sutton Steeple	51 12 56	0 34 54	2 19,6
Lenham Steeple	51 14 13	0 43 6	2 52,4
Romden Stables	51 8 49	0 42 36	2 50,4
Smarden Steeple	51 8 57	0 41 8	2 44,5
Bethersden Steeple	51 7 45	0 45 10	3 0,7
Rolvenden Steeple	51 3 3	0 37 50	2 31,3
Beckley Steeple	50 59 1	0 37 24	2 29,6
Bidenden Steeple	51 7 3	0 38 23	2 33,5
Headcorn Windmill	51 10 21	0 36 41	2 26,7
Ulcomb Steeple	51 13 1	0 38 31	2 33
Staplehurst Steeple	51 9 30	0 33 9	2 12,6
Cranbrook Steeple	51 5 50	0 32 10	2 8,7
Egerton Steeple	51 11 44	0 43 43	2 54,9
Frittenden Steeple	51 8 20	0 35 24	2 21,6
Snargate Steeple	51 1 23	0 50 10	3 20,7
Snave Steeple	51 2 1	0 52 12	3 28,8
Warehorn Steeple	51 3 27	0 50 13	3 20,9
Orleston Steeple	51 4 36	0 51 10	3 24,7
Winchelsea Steeple	50 55 26	0 43 34	2 54,3
Sandhurst Steeple	51 1 3	0 33 4	2 12,3
Whittersham Steeple	51 0 39	0 42 10	2 48,7
New Church Steeple	51 2 42	0 55 38	3 42,5
Ivy Church Steeple	51 0 45	0 53 18	3 33,2
St. Mary's Steeple	51 0 29	0 53 11	3 32,7
East Guilford Steeple	50 57 50	0 45 21	3 1,4
Appledore Steeple	51 1 47	0 47 22	3 9,5
Old Romney Steeple	50 59 25	0 53 50	3 35,3
New Romney Steeple	50 59 7	0 56 22	3 45,5
Playden Steeple	50 57 46	0 43 56	2 55,7
Brookland Steeple	50 59 51	0 49 58	3 19,9
Iden Steeple	50 58 50	0 43 43	2 54,9
Brede Steeple	50 56 7	0 35 49	2 23,3
Benenden Steeple	51 3 54	0 33 41	2 14,8
Brasses Windmill	50 57 46	0 32 3	2 8,2
Icklesham Steeple	50 55 1	0 40 29	2 42
Boughton Malherb Steeple	51 12 51	0 41 34	2 46,3
Peasemarsh Steeple	50 57 54	0 41 7	2 44,5
Woodchurch Steeple	51 4 51	0 46 12	3 4,8
High Halden Steeple	51 6 11	0 42 52	2 51,5

CONCLUSION.

THE account contained in the foregoing pages is presented in its present form, agreeable to the resolution expressed in our last communication. It is there stated, or rather implied, that, as materials are collected, details will meet the public eye through the medium of the Philosophical Transactions. The publishing of these particulars at periods not very remote from each other, will prove convenient, as we shall be enabled to communicate many *data*, which would be necessarily withheld, were these disclosures less frequent. It is on this account, that the particulars in *Part the First* do not contain the latitudes and longitudes of the stations, and objects intersected, as sufficient *data* have not yet been obtained for making the computations in an unexceptionable manner: but the contents of the *Second Part* are more complete, that Survey having been carried on in a country sufficiently near the meridian of Greenwich to give the necessary arguments with precision.

It is perhaps scarcely necessary to observe, that the design intended to be answered by an admission of the plans of the triangles annexed to this account, is to enable the reader to comprehend with ease the state of the operation, and to apply, without difficulty, the materials found in the body of the work to future Surveys. We have therefore, not attempted to delineate any varieties of ground in the plan of the western triangles (Tab. XI.): and it may, in this place, be proper to mention,

that the ranges of hills expressed in the plan found in our last account, were copied from authorities of the late Major General Roy. The map now given, of the operations performed in Kent (Tab. XII.), has the ground depicted in as accurate a manner as the scale will admit of, Mr. Gardner, from the minuteness of this Survey, being enabled to do it with accuracy.

On adverting to a principal object of this undertaking, that of preparing materials for correcting the geography of the country, it may be expected something should be said, respecting the accuracy of the maps of those counties in which our operations have been carried on. It is almost unnecessary to observe, that great correctness cannot result from the methods commonly taken in large surveys, which are usually made with an apparatus altogether unfit for measuring angles or bases with a sufficient degree of accuracy: and it will evidently appear, on applying the distances given in this, and our former paper, to those maps, that they are, generally, very defective. We must, however, observe, that Linley's and Crossley's Map of Surry, and Gardner's Map of Sussex, are the best which have yet fallen under our notice: the first is, in some measure, indebted for its excellence to the Trigonometrical Operation in 1787; and the latter to our own; as the distances between many stations, and the situations of many churches, in the southern, and western parts of Sussex, were given to Mr. Gardner prior to the publication of our last account. The geography of Devonshire and Dorsetshire is found particularly erroneous, as may be easily discovered by an application of our distances to the best maps of those counties.

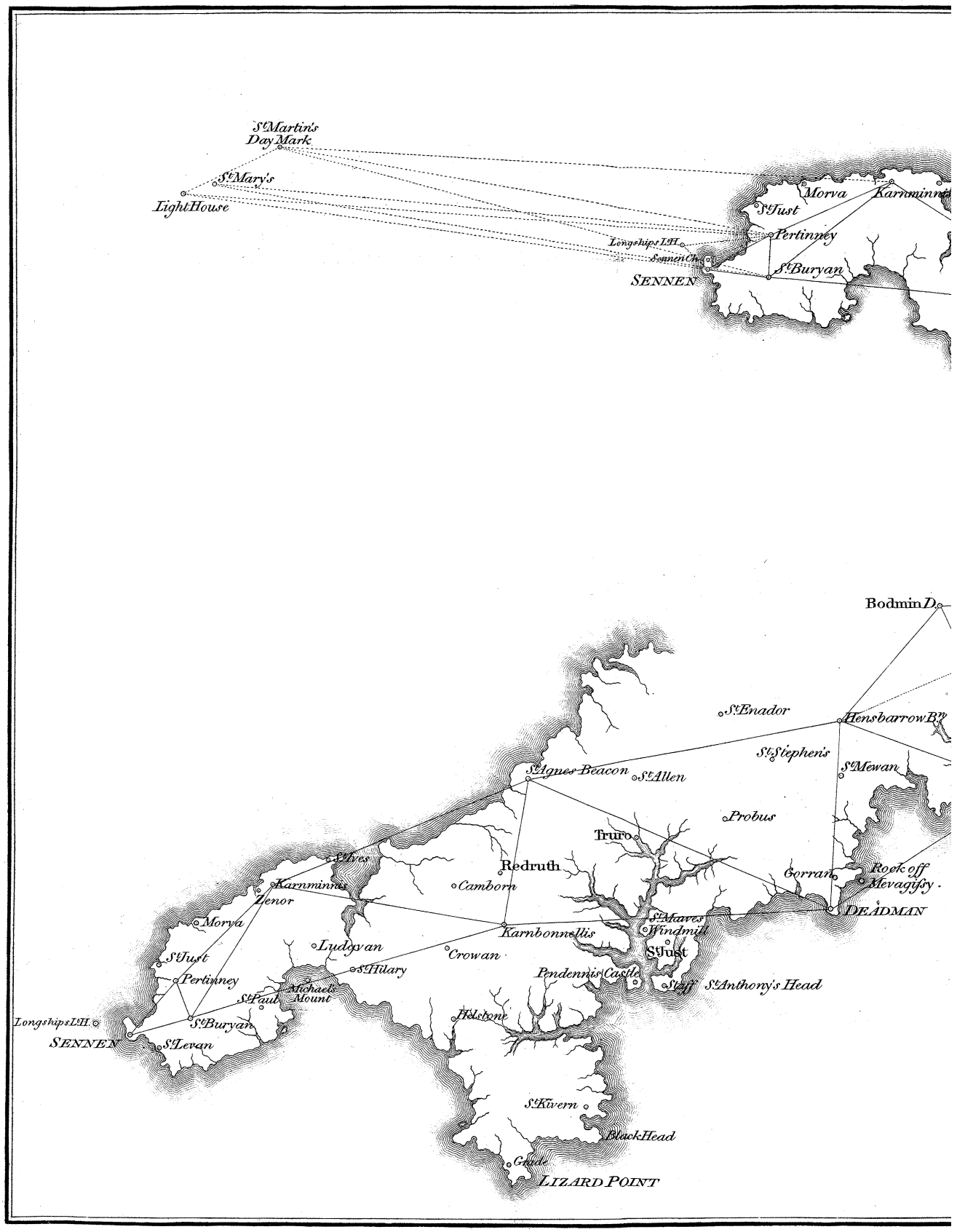
N. B. In Tab. XI. the triangles connecting the three principal objects in the Scilly Isles, and the stations from whence they were intersected, are laid down in that detached position to shorten the plan.

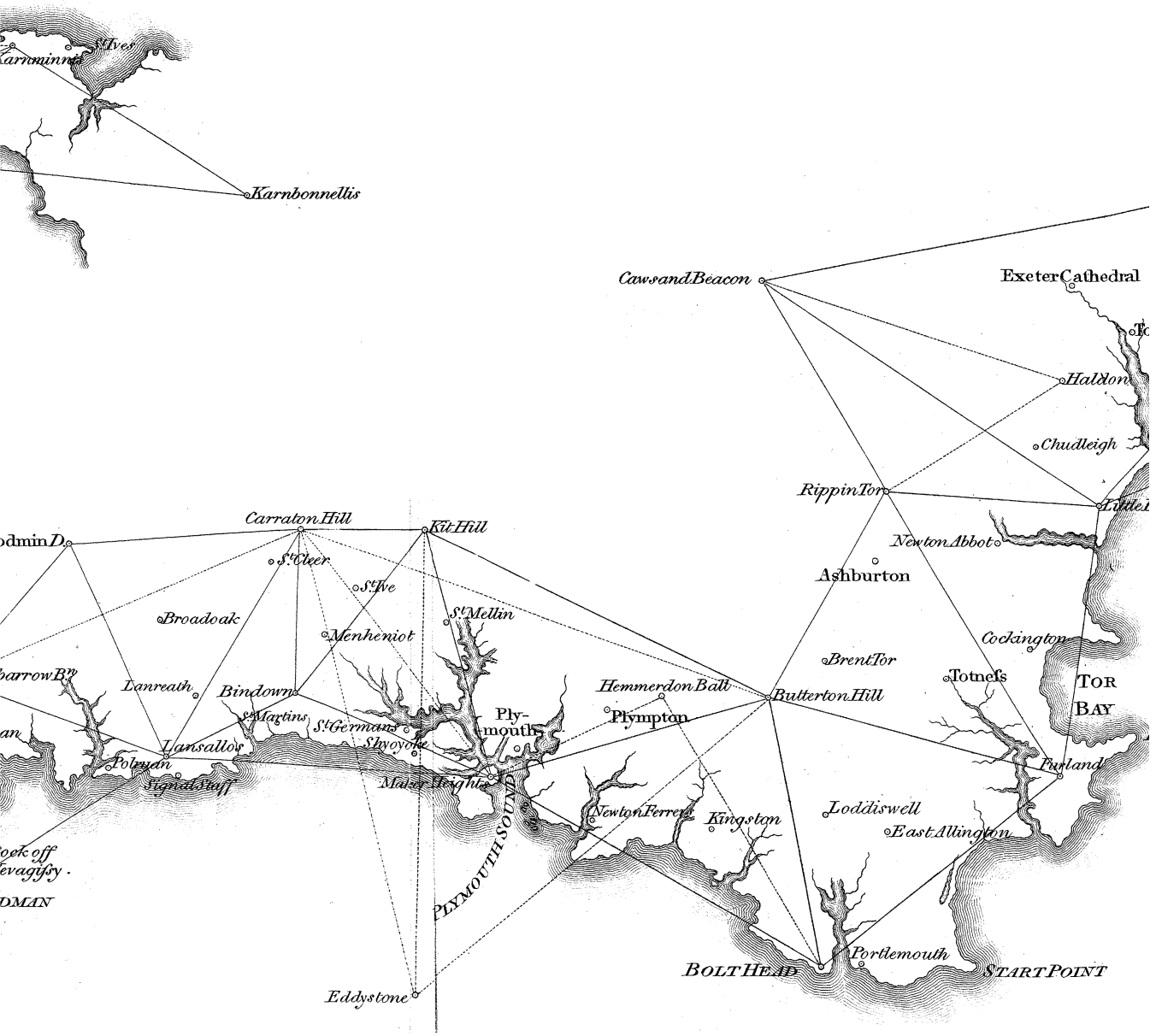
Errata in the Account of the Survey, *Philos. Trans.* 1795.

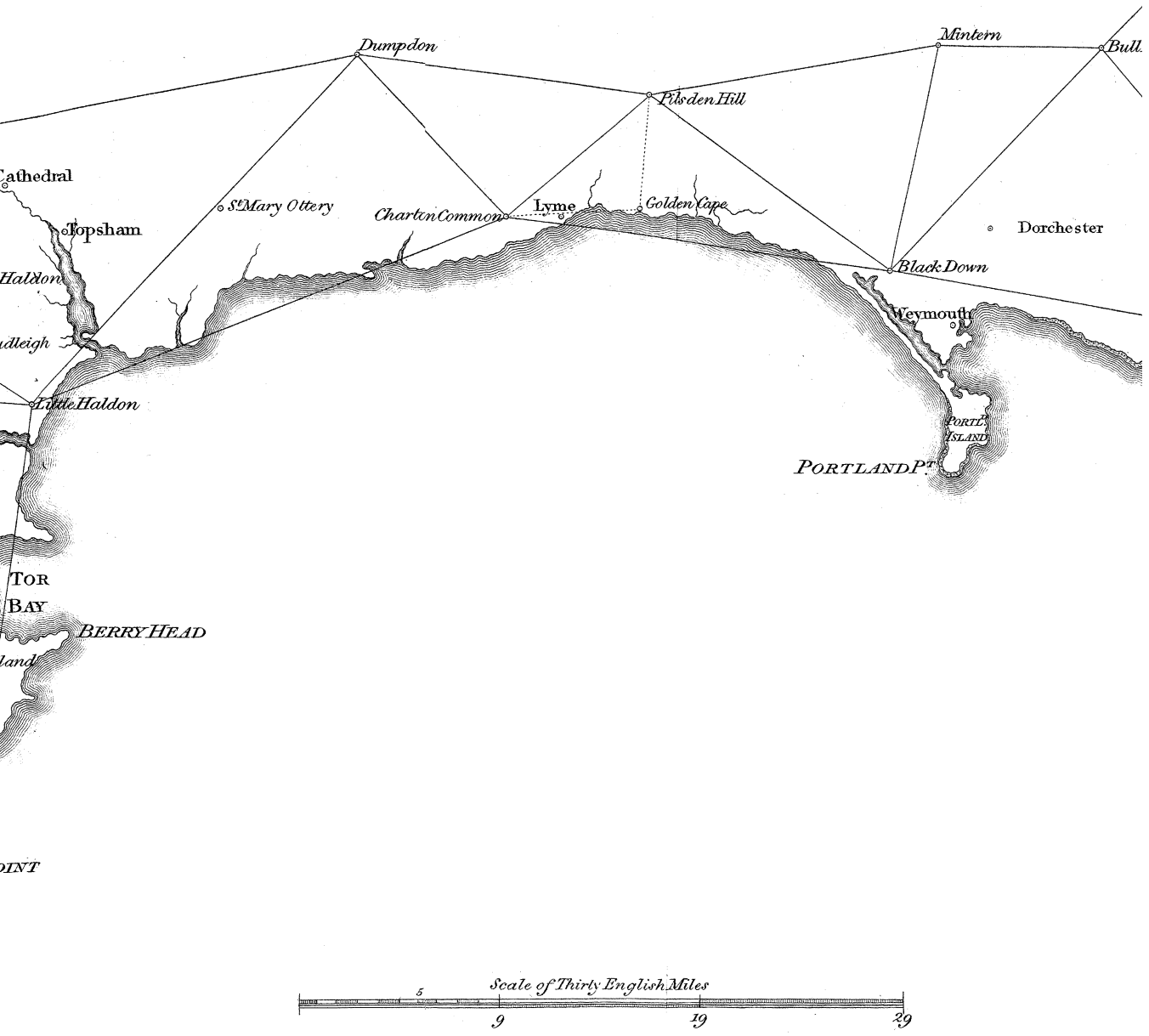
Page 469, line 4, *for* 124 *read* 125.
507, line 18, *for* 258 *read* 285.
527, in the table, *for* 51° and 60° *read* 50° and 66°.
ib. *ib.* col. 4, *for* 30 *read* 33.
554, against Southwick Church, *for* 57710 *read* 5771.
558 *et alibi*, *for* Mitford *read* Milford.
559 *et alibi*, *for* Funtingdon *read* Fordington.
580, line 10 from bottom, *for* 39″ *read* 47″.
584, lines 2 and 3, *for* $\frac{1}{15}$ *read* $\frac{1}{13}$.

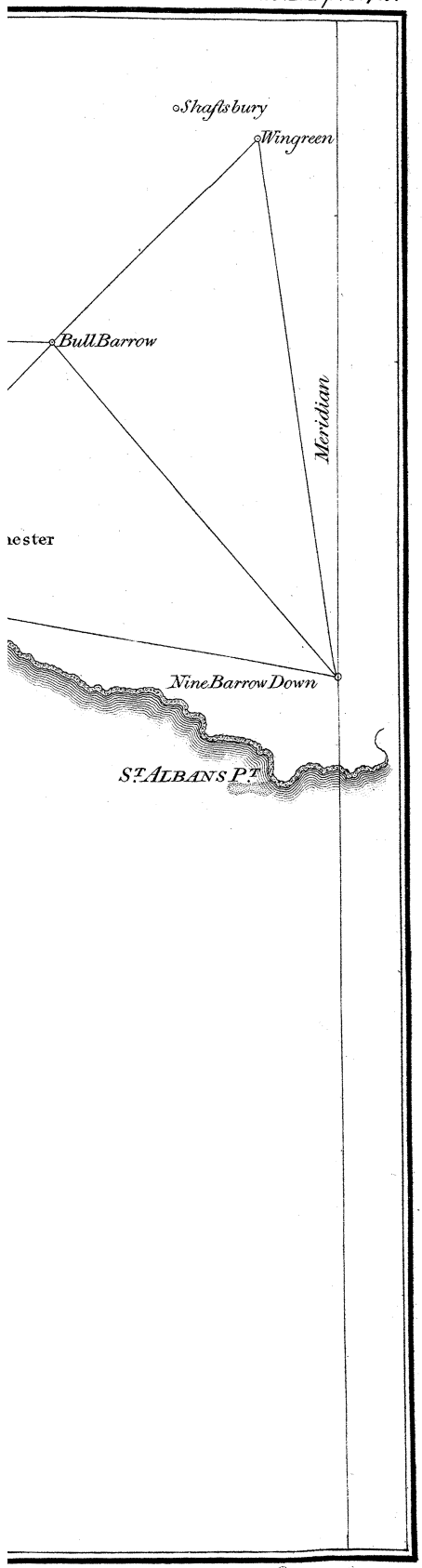
The triangles numbered 84, 100, 105, *are doubtful, and consequently the results depending on them are uncertain.*

PLAN *of the*

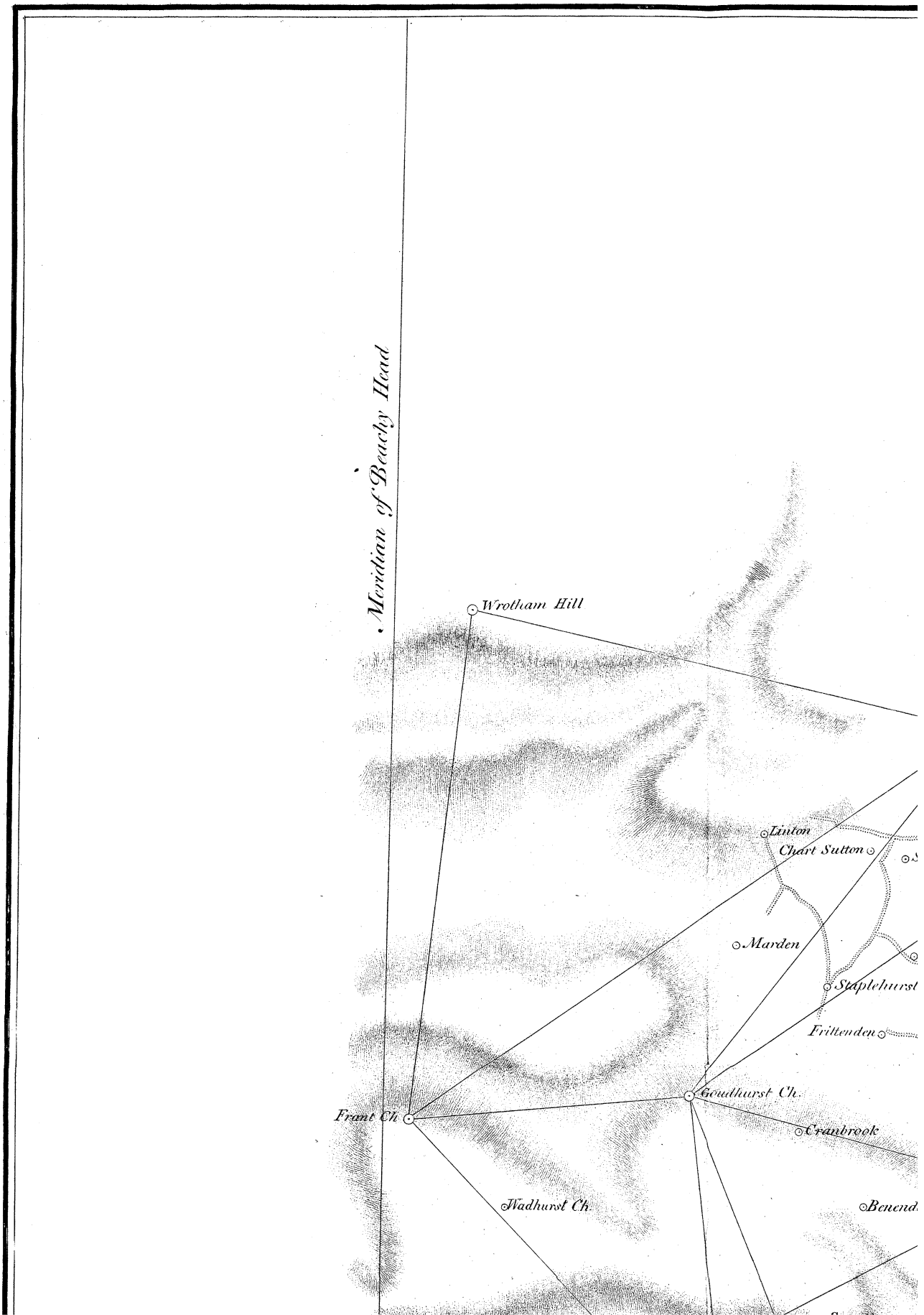

St Martin's Day Mark
St Mary's
Light House
Morva
St Just
Pertinney
Longships Lt H.
Sennen Ch.
St Buryan
SENNEN
Bodmin D.
St Enador
Hensbarrow Bp
St Stephen's
St Mewan
St Agnes Beacon
St Allen
Probus
Truro
St Ives
Redruth
Karnminnis
Zenor
Camborn
Gorran
Roek off
Mevagissy
DEADMAN
Morva
Karnbonnellis
St Maves
Windmill
St Just
Ludgvan
Crowan
St Hilary
Pertinney
Pendennis Castle
St Anthony's Head
St Paul
Michaels Mount
Helstone
Longships Lt H.
St Buryan
SENNEN
St Levan
St Kivern
Black Head
Gurnard
LIZARD POINT


St Ives
Karnminnis
Karnbonnellis
Caws and Beacon
Exeter Cathedral
Haldon
Chudleigh
Rippin Tor
Newton Abbot
Ashburton
Carraton Hill
Kit Hill
St Cleer
St Ive
St Mellin
Broadoak
Menheniot
Cockington
Brent Tor
Totnes
TOR BAY
Lanreath
Bindown
St Martins
St Germans
Hemmerdon Ball
Butterton Hill
Plympton
Ply-mouth
Shyoyoke
Polruan
Signalstuff
Maker Heights
Furland
Newton Ferrers
Kingston
Loddiswell
East Allington
PLYMOUTH SOUND
Portlemouth
BOLT HEAD
START POINT
Eddystone

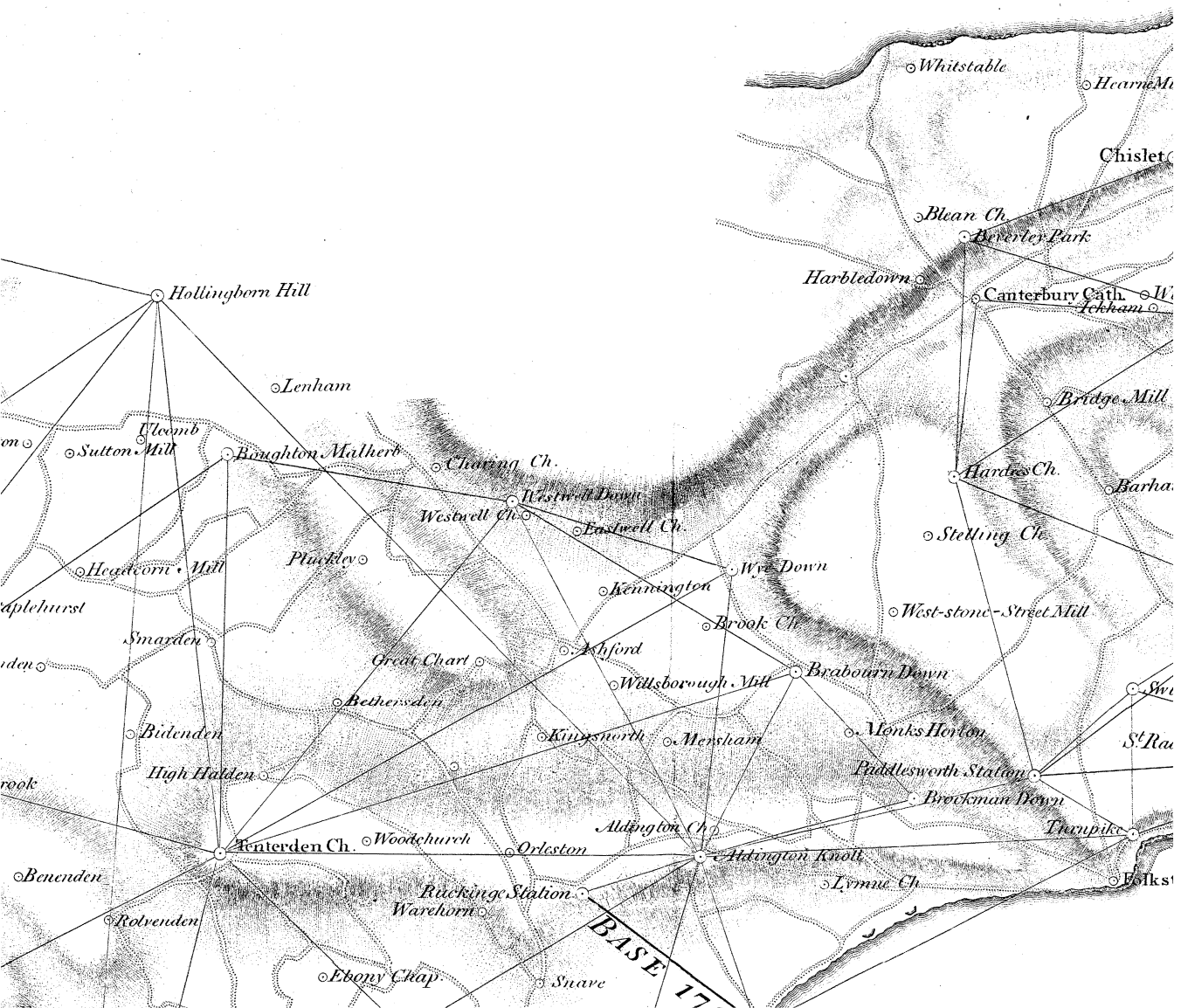

Dumpdon
Pilsden Hill
Mintern
Bull
Cathedral
Topsham
St Mary Ottery
Charton Common
Lyme
Golden Cape
Dorchester
Haldon
Black Down
Weymouth
Little Haldon
PORTL.
ISLAND
PORTLAND Pt.
TOR
BAY
BERRY HEAD
land
OINT
Scale of Thirty English Miles
5
9
19
29


Shaftsbury
Wingreen
Bull Barrow
Meridian
ıester
Nine Barrow Down
St. Albans Pt.

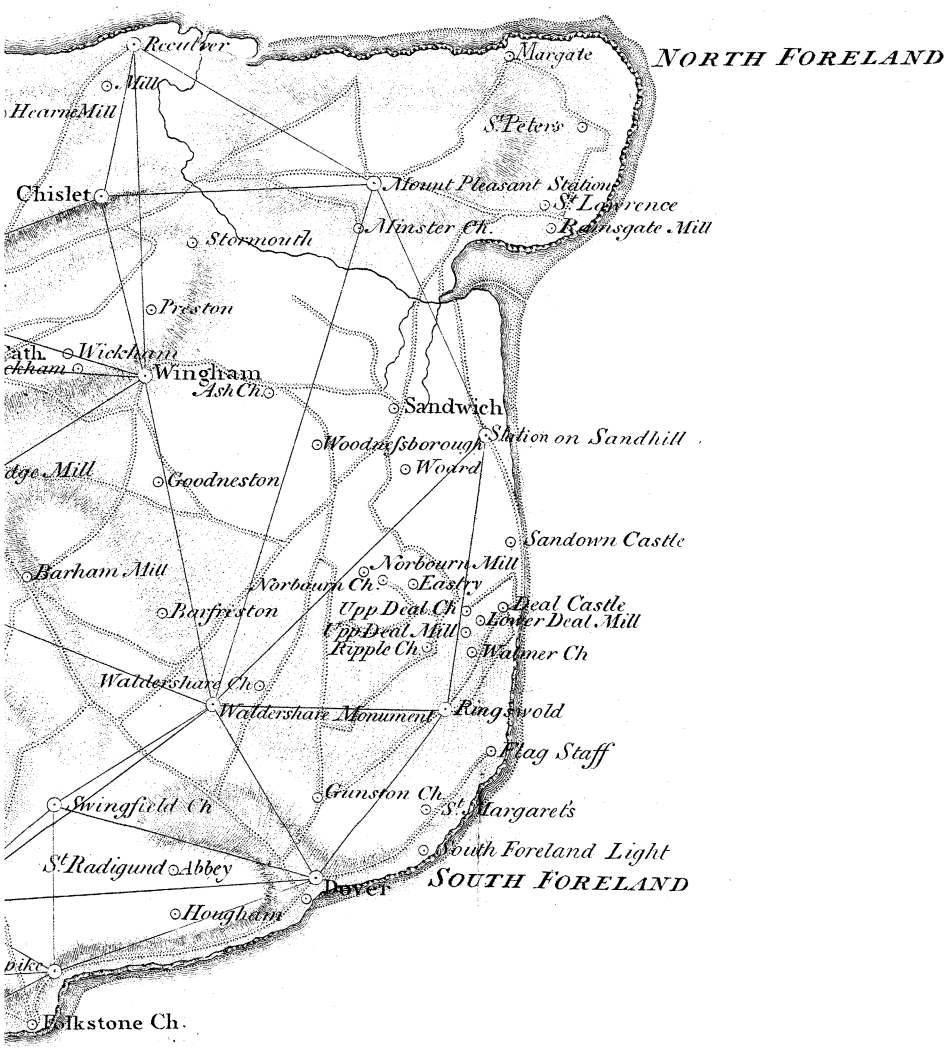
Basire Sc.

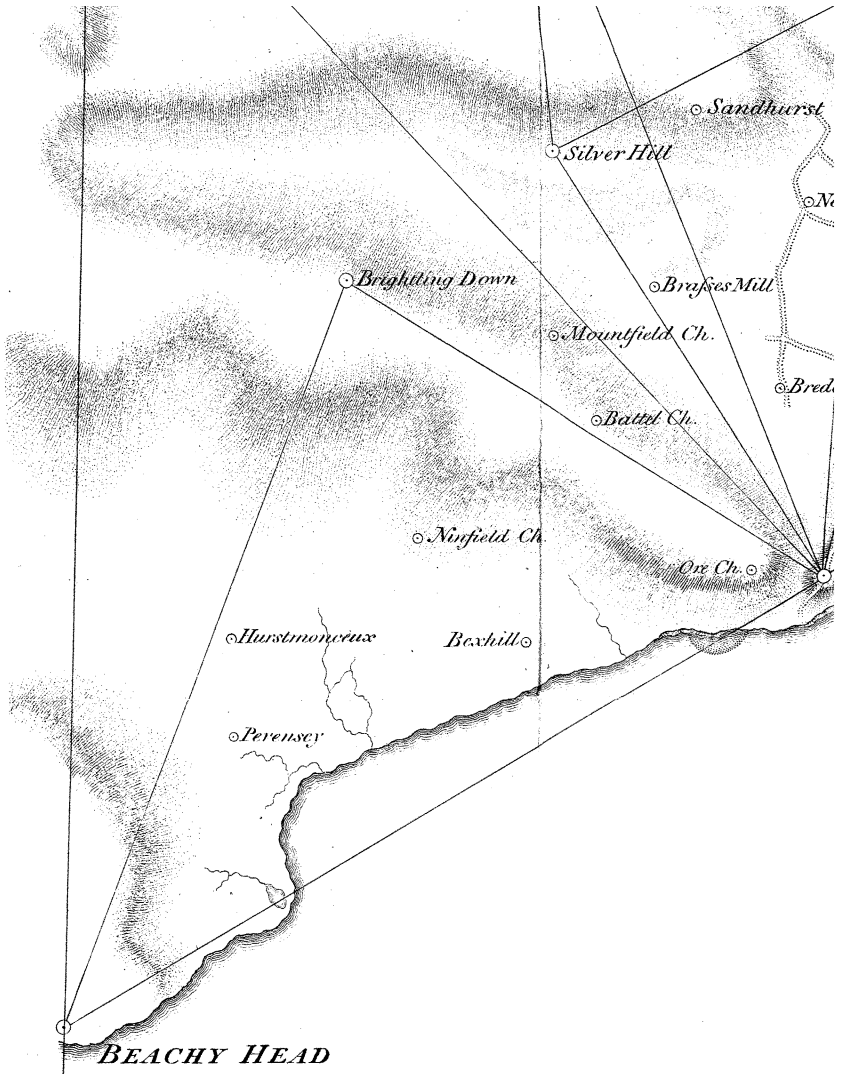

Meridian of Beachy Head
Wrotham Hill
Linton
Chart Sutton
Marden
Staplehurst
Frittenden
Goudhurst Ch.
Front Ch.
Cranbrook
Wadhurst Ch.

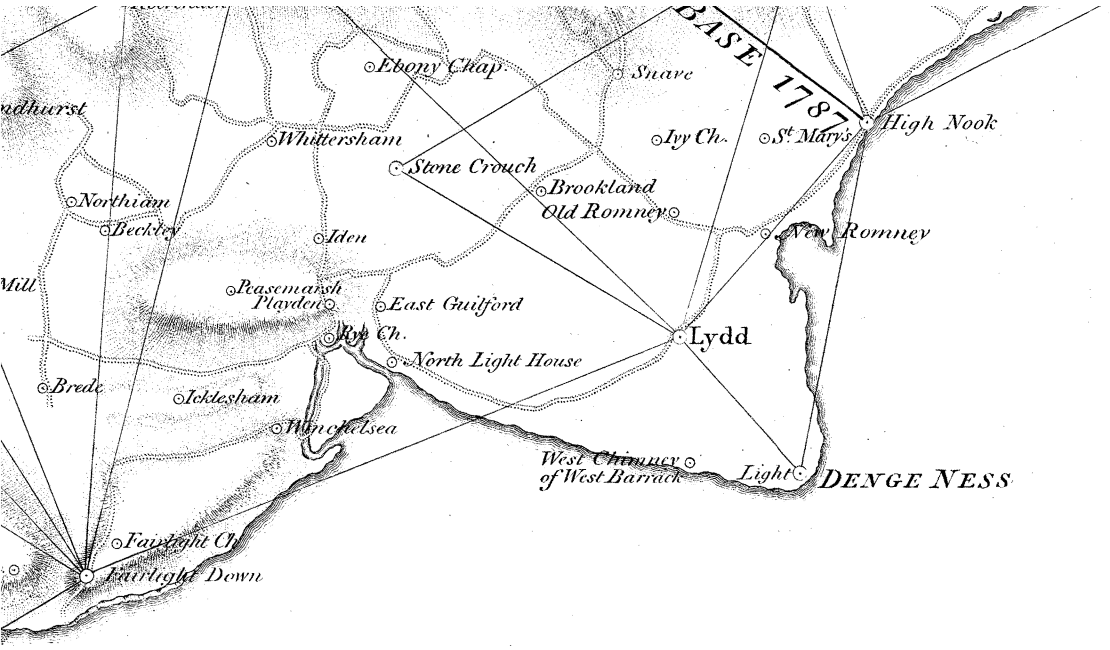
d SUSSEX laid down from a TRIGONOMETRICAL Su



Philos. Trans. MDCCXCVII. *Tab.* XII. *p.* 542.




Sandhurst
Silver Hill
Brightling Down
Brasses Mill
Mountfield Ch.
Battel Ch.
Ninfield Ch.
Ore Ch.
Hurstmonceux
Boxhill
Pevensey
BEACHY HEAD

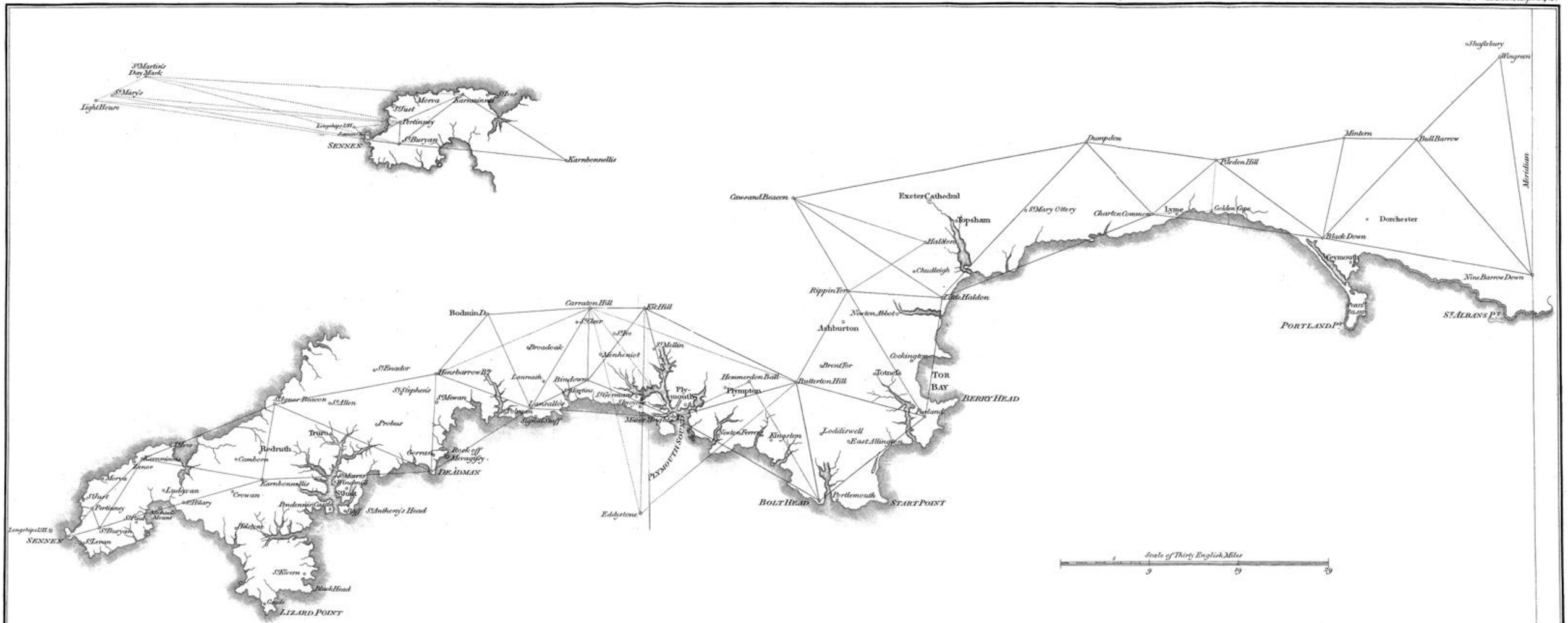


Scale of Twenty English Miles

1 12 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

PLAN *of the* PRINCIPAL TRIANGLES *in the* TRIGONOMETRICAL SURVEY, 1795-1796.

Philos. Trans. MDCCXCVII. *Tab.* XI. *p.* 542.



Part of KENT *and* SUSSEX *laid down from a* TRIGONOMETRICAL SURVEY *in 1795–1796.*

Philos. Trans. MDCCXCVII. *Tab.* XII. *p.* 542.