

XX. *An Account of the Trigonometrical Survey, carried on in the Years 1797, 1798, and 1799, by Order of Marquis Cornwallis, Master-General of the Ordnance. By Captain William Mudge, of the Royal Artillery, F. R. S. Communicated by his Grace the Duke of Richmond, F. R. S.*

Read July 3, 1800.

INTRODUCTION.

HAVING interspersed in the following Paper, with as much attention to brevity as the subject admits, every intelligence relating to the Trigonometrical Survey, I think it unnecessary to swell the bulk of the communication, by giving a long prefatory account of its progress since the year 1796.

The contents of the work now meeting the public eye, are important and numerous: I have divided it into sections. The first contains the calculations of the sides of the principal and secondary triangles extended over the country in 1797, 1798, and 1799; together with an account of the measurement of a new base line on Sedgemoor, and a short historical narrative of each year's operation. The second section contains the computed latitudes and longitudes of those places, on the western coast, intersected in 1795 and 1796, and also such others, since determined, as lie conveniently situated to the newly-observed meridians. This section also contains the directions of those meridians; one on Black Down, in Dorsetshire; another on Butterton Hill, in Devonshire; and another on St. Agnes Beacon,

in Cornwall. Among the contents are likewise to be numbered the bearings, distances, &c. of the stations and intersected objects, from the parallels and meridians.

The third and last section contains the triangles which have been carried over Essex, the western part of Kent, and portions of the counties joining the former, Suffolk and Hertfordshire. It is with satisfaction I am enabled to state, that Mr. GARDNER, the chief Draftsman, with his assistants, has almost completed the Survey of this extensive tract, which, no doubt, like the map of Kent, will be given to the public: the materials for these different surveys are ample, and will be found in this section, which concludes with the altitudes of the stations and mean refractions.

Before I had advanced far in my work, I entertained ideas of condensing all the *data* in my possession, and distributing them in it; but, when I found my paper would, in that case, be too large for the Philosophical Transactions, I desisted, contenting myself with presenting little more than a moiety: it is, even now, of inconvenient magnitude, but I could not, with propriety, still farther abridge it, for I have, in several instances, rejected important matter. I shall, therefore, take an early opportunity of compiling a fourth account, in which will be given the latitudes and longitudes of those places, in Essex, Kent, &c. found in the last section.

It is right I should observe that, knowing from experience, how liable surveyors are to mistake the names of places, and also, how utterly impracticable it is to detect errors, till the interiors of the great triangles have been *filled up*, I have been cautious to give only the distances of such objects as could not be easily mistaken. I do not mean to insinuate that, among

the great number now published, instances may not be found of misnomers, or even wrong bearings; but I rely with great confidence on their general accuracy, and particularly on those constituting the surveys of Essex and the northern shore of the Thames, as the whole of them have been *verified* by Mr. GARDNER. Indeed this is to be understood as holding good throughout the last section, in which are 375 triangles. In our former accounts of this survey, we were particularly guarded in not intermixing their contents with distances determined from numerous doubtful intersections; and experience has hitherto not detected above three or four errors arising from wrong bearings or misnomers. Previously, indeed, to the compilation of them, a great part of the objects in Sussex, Hampshire, and the Isle of Wight, were verified by Mr. GARDNER, in process of an extensive survey, carried on by the order, and performed for the service, of the Board of Ordnance. This gentleman will also have it in his power to detect any errors, if such exist, in the names of places to the westward; as the Master General has been pleased to issue his directions for the survey of Devonshire, and as much of Somersetshire and Cornwall as will *square* the work.

I have mentioned, in the body of the account, that the President and Council of the Royal Society, were pleased to accede to the request made by the Honorable Board of Ordnance, to entrust to my care, the circular instrument used by the late Major General ROY, in his well known operation. It has already been found highly useful, and will shortly prove to be still more so, as one theodolite will be employed in carrying the above orders of Marquis CORNWALLIS into effect, while the other is used in carrying a meridional line through the country; an undertaking begun, and partly executed.

Before I close this Introduction, I am to announce, that Mr. ISAAC DALBY, no longer able to endure the fatigues incident to the service, has retired from it; and it would be a matter of injustice, if I were not to acknowledge the extent of his services, his unremitted labour, and attention. But, whilst I lament the loss of a man so perfectly calculated to assist me in this arduous undertaking, I derive every consolation from a knowledge, founded on experience, of the talents and abilities of Mr. SIMON WOOLCOT, his successor.

SECTION FIRST.

1. *Particulars relating to the Operations of the Year 1797.*

The principal object proposed to be accomplished this year, was the determination of the directions of meridians at proper stations, in order to afford the necessary *data* for computing the latitudes and longitudes of places intersected in the surveys of 1795 and 1796.

From errors which are the result of computations made on the supposition of the earth's surface being a plane, it is expedient that new directions of meridians should be observed, when the operations are extended, in eastern or western directions, over spaces of sixty miles from fixed meridians. The distance from Dover to the Land's End being upwards of 300 miles, it becomes necessary, on this principle, that four directions of meridians should be observed; which, with that of Greenwich, amounts to five, dividing this space into six nearly equal parts.

Whatever be the stations farther to the westward, which offer

themselves as fit places for these observations, Dunnose in the Isle of Wight presents itself as highly eligible, not only because it is removed the necessary distance from the meridian of Greenwich, but also because it commands a most extensive view of the western coast : therefore, as the direction of the meridian was observed on this station in 1793, (see *Philosophical Transactions* for 1795, p. 517.) it became necessary to fix on three places only.

In the selection of these stations, it was our wish to have found such as should lie nearly in the same parallel, each intermediate one being visible from those east and west of it; by which means, the differences of latitude between their respective parallels would be accurately determined.

When the party was at Dunnose, in the year 1793, a hill at a very considerable distance, in a direction very nearly west, was seen just rising out of the horizon. It then occurred to us that this spot would, at some future period, be a very proper one for a station whereon a new direction of the meridian might be observed. Experience, in the Survey of 1795, led us to believe this hill was actually Black Down in Dorsetshire; therefore it was determined that our operations should commence at that station, and the event verified the truth of our suppositions.

The party took the field early in April, as observations on the Pole Star, for the purpose in question, are made with superior advantage at this season of the year, because the star comes to its greatest elongations from the meridian at those times, when the sun produces little tremor in the air, by which means, the staff to which the Pole Star is referred, in good weather, is easily perceived.

As the high land in the vicinity of Teignmouth, in Devonshire,

cuts off all view of the southern extremity of Dartmoor from Black Down, the necessary alternative was, the firing of lights on some remote station, communicating with Butters-ton. Rippin Tor was quickly discovered to be the most proper spot; and that eminence would, in every point of view, be a most eligible one for a new direction of the meridian, if the hills in the middle of the moor were not considerably higher. It was, therefore, chosen only with a view of being subservient to the purpose of finding the latitude of Butters-ton.

In making observations on the Pole Star, the same precautions were taken to ensure accuracy, as were observed at Dunnose and Beachy Head in the year 1793; (see *Phil. Trans.* for 1795, p. 460.) I shall, therefore, not enumerate them, but content myself with observing, that no pains were spared in this performance.

From Black Down, the party removed to Butters-ton; at which place but few observations were made, the weather being either tempestuous or hazy, during the greatest part of the time we were at that station: they were, however, made under favourable circumstances, in other respects, and are therefore likely to afford accurate results.

As in the case of Rippin Tor, with respect to Black Down, so Hensbarrow, in Cornwall, was selected as the spot for connecting St. Agnes Beacon with the station on Butters-ton; for these latter are not visible from each other, the high land about St. Austle, on the northern part of which is situated Hens or Hengist barrow, being higher and intermediate. The staff to which the lights and star were referred, was placed on a hill called Hemmerdon Ball, a secondary station in the series of 1795.

On the 1st of May, the party proceeded to St. Agnes Beacon; at

which place the observations were completed on the 8th. The staff for connecting the observations made on the Pole Star with those made on the lights fired at Hensbarrow, was placed near Peranzabulo; which spot is laid down in the plan, Pl. XXVII.

After these directions of meridians were determined, we proceeded with the survey, and from St. Agnes Beacon repaired to Trevose Head, a promontory on the northern coast of Cornwall. The ascent from the sea to the station on this headland being very gradual and unobstructed, we took the opportunity of finding its altitude by means of the transit instrument. The levelling was begun on the 30th of May, and finished the following day; from which operation, it was found that the height of the station above low water-mark was 274,2 feet; which is, probably, within six inches of the truth. This base of altitude, will afford the means of computing the heights of the stations in the north of Devon, and also of verifying those in the western part of Cornwall. (See Phil. Trans. for 1797, p. 471.)

In giving an account of this and similar articles, it is my intention merely to set forth the order in which the different parts of the survey have been performed. It would be prolix, and perhaps, unnecessary, to assign the reasons for the choice of each station. In the present instance, however, it may not be improper to observe, that a station called Black Down, near Lydford, was selected for the purpose of carrying distances into the north of Devon, by means of the side formed by that station and Carraton Hill. The difficulty of running up the series of triangles from the west, (and it might have been also added, towards the north,) is mentioned in the account of 1797. A tract of country exists in Cornwall, possessing the same characteristic features with Dartmoor, and has thrown in our

way equal embarrassments. The station called Carraton Hill, is situated on its southern extremity, from which no part of the north of Cornwall can be seen : it, therefore, became expedient to erect a staff on the top of the rugged hill Brown Willy, (a spot not accessible to the instrument,) and afterwards to content ourselves with *surveying round it*. This resolution became the more necessary, as by means of it, the triangles in the west of Devon will be hereafter connected with those in the north of Cornwall, in a shorter and more direct way than from the sides in the more southern country. In order, therefore, to observe the staff erected on this station, the instrument was taken a second time to Bodmin Down. The station named Cadon Barrow, near Camelford, and those on St. Stephen's Down, near Launceston, were also visited ; at which time it was judged expedient to discontinue the operations in Devonshire.

In proceeding along the southern coast, in the years 1795 and 1796, with a single chain of triangles, we acted in conformity with our instructions. It was, in many points of view, the most eligible mode of proceeding ; and particularly in that which regarded an early determination of the latitudes and longitudes of the great head-lands in the channel, and also of the Scilly Isles.

When the operations above spoken of were completed, and those instructions carried into full execution, (ample materials being provided for ascertaining the situations of every remarkable point on the English side of the channel,) the want of a spot in the southern part of Cornwall, for the measurement of a base, was felt and regretted ; we were, therefore, unwilling to introduce errors, if any should exist, from the sides in Cornwall, into the north of Devon : our operations were consequently discontinued.

From Devonshire we proceeded to the eastward, for the purpose of carrying on a second series of triangles. These were necessarily intended to originate from the side which connects the station on Beacon Hill, near Amesbury, with that on Wingreen Hill, near Shaftesbury.

In the month of July, the observations were completed at the station on the Mendip Hills, after which the instrument was taken to Bradley Knoll; Dundry Beacon, near Bristol; Lansdown and Farley Down; the station on Lansdown being chosen rather for a secondary than a principal place of observation.

From Bradley Knoll, to which place the instrument was carried from Farley Down, we proceeded to Westbury Down, and from thence to Beacon Hill, near Amesbury; because it was necessary that a new point on the range near Marlborough, commonly named St. Ann's Hills, should be observed. The station formerly chosen at the eastern extremity of this range, and observed in 1794, (see *Phil. Trans.* 1795, p. 471.) was this year found to be useless, as the high land, on the same range, prevented it from being seen at Lansdown: two others were, therefore, selected to the westward of the former, and observed from Beacon Hill; one for the purpose of connecting with Lansdown, and a station near Symmond's Hall, in Gloucestershire; and the other with Inkipin Beacon. The particular circumstances of this range, both as to situation and height, have thrown great impediments in the way of the survey, and are the means of cutting off, in a considerable degree, the connection between the southern triangles and those which have been since carried on in the midland of the kingdom. From Amesbury the party proceeded to Inkipin Beacon, near Hungerford, where the operations terminated.

The stations chosen and observed this year, but not visited with the instrument, were Monymoor, near Penhow; the mountain Twymbawlin, near Newport; and Scilly Point, in Glamorganshire. These stations in South Wales will connect with three in Somersetshire, also selected this season; one on Bleak Down, which is situated on the western extremity of the Mendip range; a second on Brent Beacon; and a third on the Quantock Hills.

Subsequent to the operations on Salisbury Plain, enquiries had been often made after a spot on which a third base might be measured. Experience had almost convinced us that, if Sedgemoor were excepted, the southern part of England did not contain one of sufficient extent for a base of three miles. Aware, therefore, of the imperfect state in which our work must rest, without a fresh base, Mr. DALBY and myself passed over into South Wales, and examined the extensive level between the new Passage House and Cardigan. After, however, a very diligent search, we could not find any spot, four miles in length, sufficiently unobstructed. The advantages which the situation itself holds out, are so great, that we should not have scrupled to dispense with a desideratum, heretofore required, of the base being one continued line. So much, however, is this flat cut up with *rhynd* and ditches, that we were not able to find any point from which two right lines might be measured, and so inclined to each other as to afford, by means of an including angle, a third side of five miles in length: necessity, therefore, compelled us to think of measuring a base on Sedgemoor, which we immediately examined. That which relates to this situation, will be found in an ensuing article: it is now only necessary to observe, that we concluded the operations of 1797, after the practicability of measuring a base upon it had been decided in the affirmative.

ART. II. *Angles taken in the Year 1797.*

At Black Down.

Between				Mean.
Dunnose and Abbotsbury staff	-	-	-	164 26 33,75 } 35,25
Rippin Tor and Abbotsbury staff	-	-	-	3 8 51,75 } 52,5
Pilsden and Abbotsbury staff	-	-	-	45 16 15 } 14, but 13
				13 } preferred.
Pole star and Abbotsbury staff, April 17, morning	-			104 19 26,75
18, morning	-			104 19 19,25
19, morning	-			104 19 33
19, afternoon	-			98 42 47
20, morning	-			104 19 25,25
20, afternoon	-			98 42 35,5

At Butterton.

Hemmerdon Ball and Rippin Tor	-	-	-	121 17 7,25 } 7,75
				8,5 }
Hemmerdon Ball and Hensbarrow	-	-	-	1 52 2,75 } 4,5
				6,25 }
Pole star and staff on Hemmerdon Ball, May 6, afternoon	-			91 29 13,75
7, morning	-			97 4 14
7, afternoon	-			91 29 12

On St. Agnes Beacon.

Hensbarrow and Trevoze Head	-	-	-	47 10 0,75
Hensbarrow and Peranzabulo staff	-	-	-	31 50 55,5 } 56, but
				56,25 } 55,5 pref.
Pole star and Peranzabulo staff, May 20, afternoon	-			44 0 45,75
21, afternoon	-			44 0 44,75
22, morning	-			38 26 1,5
22, afternoon	-			44 0 33,25
23, morning	-			38 26 9

At Trevoze Head.

St. Agnes Beacon and Hensbarrow	-	-		65 43 43,75 } 47
				47 }
				50 }

The Account of a

Between				o	,	"	Mean
Hensbarrow and Bodmin Down	-	-	-	34	17	45 46	} 45,5
Bodmin Down and Cadon Barrow	-	-	-	42	33	43 46,5	} rejected.
						51,75 52,75	} 52

At Hensbarrow.

St. Agnes Beacon and Trevoise Head	-	-	-	67	6	13,25 13,25	} 13,25
Bodmin Down and Trevoise Head	-	-	-	77	20	17,75 19,25	} 18,5

At Bodmin Down.

Hensbarrow and Trevoise Head	-	-	-	68	21	57,25 59,5	} 58,25
Trevoise Head and Cadon Barrow	-	-	-	71	55	26,75 27	} 27
Carraton Hill and staff on Brown Willy	-	-	-	52	3	59,5 4 1,25 4,5	} 1,75
Carraton Hill and picket on Brown Willy	-	-	-	51	36	11 11	} 11
Cadon Barrow and staff on Brown Willy	-	-	-	30	58	13 13	} 13
Cadon Barrow and picket on Brown Willy	-	-	-	31	26	0,25 1,25 3,25	} 1,75

On Cadon Barrow.

Trevoise Head and direction post on Bodmin Down	-			68	7	53,75 54 54,25 54,75	} 54,25
Direction post on Bodmin Down and staff on Brown Willy	-			41	12	37,5 39 41	} 39,25
Direction post on Bodmin Down and picket on Brown Willy	-			40	40	34 36,75	} 35,25
Tresparrot Down and staff on Brown Willy	-	-		100	20	52,25 55 57	} 54,75
Tresparrot Down and picket on Brown Willy	-	-		100	53	1 1	} 1

At St. Stephen's Down.

Staff on Brown Willy and Warbstow	-	-	-	41	18	24,25 25,5	} 25
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Between				°	'	"	Mean.
Warbstow Beacon and Brendon Moor	-	-	-	39	41	18,5 18,75 19	} 18,75
Brendon Moor and Broadbury Down	-	-	-	90	0	40,75 41	} 41
Broadbury Down and Black Down	-	-	-	45	34	36 D 41,75 43	} 42,25
Black Down and Carraton Hill	-	-	-	91	18	12,25 13,5	} 12,75
Carraton Hill and Kit Hill	-	-	-	37	1	56	
Black Down and Kit Hill	-	-	-	54	16	13	

At Maker.

Carraton Hill and Black Down	-	-	-	53	4	28 30,5	} 29,25
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At Carraton Hill.

Black Down and Maker Heights	-	-	-	74	5	22,5 22,75	} 22,5
Trevoze Head and Bodmin Down	-	-	-	77	20	17,75 19,25	} 18,5

At Black Down.

Maker Heights and Carraton Hill	-	-	-	52	50	7,75 11,75	} 9,75
Carraton Hill and St. Stephen's Down	-	-	-	39	44	37,25 40,75	} 39
St. Stephen's Down and Broadbury Down	-	-	-	66	49	57,5 58,25	} 58
Carraton Hill and Kit Hill	-	-	-	13	12	58	

On the Mendip Hills.

Dundon Beacon and Bleak Down	-	-	-	85	15	59,25 59,75 1,5 4,5	} 1,25
Bleak Down and Brent Knoll	-	-	-	29	11	35,75 38 41,25 41,75	} 39,25
Bleak Down and Dundry Beacon	-	-	-	33	39	30,5 30,5	} 30,5

Between				o	,	"	Mean.
Dundry Beacon and Lansdown	-	-	-	41	3	58,5 58,75	} 58,5
Lansdown and Farley Down	-	-	-	19	32	16,5 17	} 16,75
Farley Down and Westbury Down	-	-	-	38	55	17 18,25	} 17,5
Westbury Down and Bradley Knoll	-	-	-	37	47	57 57,75 58,75 59	} 58,5
Farley Down and Dundry Beacon	-	-	-	60	36	15 15,75	} 15,5
Farley Down and Bradley Knoll	-	-	-	76	43	14 18,5 21	} 19,75

At Dundry Beacon.

Tickenham Down and Grey Hill	-	-	-	37	44	2,25 3 6,25	} 3,75
Tickenham Down and Kingsweston	-	-	-	60	3	27,25 30	} 28,75
Kingsweston and Grey Hill	-	-	-	22	19	23,5 27,75	} 25,75
Bleak Down and Grey Hill	-	-	-	120	0	23 24 28	} 25
Lansdown and station on the Mendip Hills	-	-	-	83	34	16,25 19,75	} 18
Farley Down and Mendip Hills	-	-	-	69	52	21 23	} 22
Mendip and Bleak Down	-	-	-	54	34	24 25,75	} 25,5

At Lansdown.

Kingsweston and Dundry	-	-	-	36	38	29	
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On Farley Down.

St. Ann's Hill and Westbury Down	-	-	-	51	44	10,75 11 11,25 13,75	} 11,75
Westbury Down and Bradley Knoll	-	-	-	37	5	30,75 31 34 34,25	} 32,5

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Between				o	'	"	Mean.
Westbury Down and Mendip Hills	-	-	-	77	21	51,75 55,75	} 53,75
Bradley Knoll and Mendip Hills	-	-	-	40	16	23 23,75	} 23,5
Mendip Hills and Dundry Beacon	-	-	-	49	31	15,25 21,5 23 23,75	} rejected. } 23,5

On Bradley Knoll.

Mendip Hills and Westbury Down	-	-	-	101	23	56,5 57,75 24 1,75	} 59
Westbury Down and Beacon Hill	-	-	-	42	43	29,25 30,5	} 29,75
St. Ann's Hill and Westbury Down	-	-	-	7	28	44 45,25 46,5	} 45
Westbury Down and Milk Hill	-	-	-	10	12	49,5 53,25	} 51,5
Beacon Hill and Wingreen	-	-	-	57	50	38,25	
Beacon Hill and Bull Barrow	-	-	-	98	34	31 33,5 34	} 32,5
Wingreen and Bull Barrow	-	-	-	40	43	51,25 52,75	} 52
Bull Barrow and Ash Beacon	-	-	-	45	43	3,25 3,75	} 3,5
Ash Beacon and Mendip Hills	-	-	-	71	34	54,75 55,25	} 55
Mendip Hills and Farley Down	-	-	-	63	0	21,5 D	

At Bull Barrow.

Ash Beacon and Mintern	-	-	-	51	26	41 41,75 43	} 42
Bradley Knoll and Wingreen	-	-	-	42	55	32,75	

At Pilsden Hill.

Mintern and Ash Beacon	-	-	-	35	2	59 3 3,25	} 1
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*The Account of a**At Mintern.*

Between

Pilsden and Ash Beacon

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	o	i	u	Mean.
Pilsden and Ash Beacon	95	35	21,25	} 22
			22,5	
Ash Beacon and Bull Barrow	94	14	22	} 23
			24	

On Westbury Down.

Beacon Hill and Bradley Knoll

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Beacon Hill and Bradley Knoll	114	12	18,25	} 18,5
			18,5	
			18,75	

Bradley Knoll and Mendip Hills

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Bradley Knoll and Mendip Hills	40	48	1	} 1,75
			1,75	
			1,75	

Mendip Hills and Farley Down

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Mendip Hills and Farley Down	63	42	50,5	} 51,25
			52	

Farley Down and St. Ann's Hill

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Farley Down and St. Ann's Hill	88	50	1	} 2,75
			3	
			4 $\frac{1}{4}$	

St. Ann's Hill and Beacon Hill

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St. Ann's Hill and Beacon Hill	52	26	42,25	} 42,75
			43,25	

Beacon Hill and Milk Hill

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-

Beacon Hill and Milk Hill	48	7	31	} 33,5
			36	

Beacon Hill (Amesbury.)

Bradley Knoll and Westbury Down

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Bradley Knoll and Westbury Down	23	4	15
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Inkpin Down and Milk Hill

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Inkpin Down and Milk Hill	66	14	58
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Inkpin Down and St. Ann's Hill

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Inkpin Down and St. Ann's Hill	70	51	57,5	} 57,75
			57,75	

Westbury Down and Milk Hill

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Westbury Down and Milk Hill	51	11	9
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Westbury Down and St. Ann's Hill

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Westbury Down and St. Ann's Hill	46	34	6	} 7,75
			9,25	

On Inkpin Down.

White Horse Hill and Highclere

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White Horse Hill and Highclere	133	27	57,25	} 57,5
			57,5	

Highclere and Beacon Hill

-

-

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Highclere and Beacon Hill	106	16	52,25	} 53,25
			54,25	

Beacon Hill and Hewish

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Beacon Hill and Hewish	51	53	31,25	} 33,25
			33,5	
			35	

ART. III. *Particulars relating to the Operations of the Year 1798.*

The object first attained this year, consisted in a trigonometrical survey of the counties adjacent to the northern and southern shores of the Thames.

In the last communication it will be seen, that the survey of Kent had been carried on from the sea-coast, till it reached the range which runs eastward from Wrotham through Hollingbourn, and there terminated. The country to the northward could not be surveyed, because the view from General Roy's station at Wrotham is almost entirely cut off, in that direction. In order, therefore, to obtain a base for the purpose, when the party arrived at Wrotham, a new station was chosen, to the eastward of the former one, and the distance between them accurately measured; by which means, together with the included angle at the old station, and the distance of it from Severndroog Tower, on Shooter's Hill, a new distance was found, which became a base for the survey proposed.

The chief draftsmen and surveyors belonging to the Drawing-room in the Tower, attended our operations in this county, and also those afterwards carried on in Essex. It was, indeed, for their immediate service, that we renewed the survey in this quarter, as the Master-General had given directions to prepare ample materials for completing the map which meets the public eye with this article.

The stations in Kent, besides that of Wrotham, were Gravesend, Gad's Hill, and the Isle of Sheppey; those in Essex were Hadleigh, South End, and Prittlewell. Observations made from these places afforded *data* for the proposed survey: after they were completed, the small circular instrument supplied the

place of the great one, and was used, with good effect, in carrying on the subsequent operations in this quarter.

In our Paper published in the Philosophical Transactions for 1795, an observation is made, of the necessity then existing for the measurement of a base on Salisbury Plain, in consequence of resolutions taken to inclose Sedgemoor: an act for which purpose was passed a few years ago, and partly carried into execution in 1797. At this time, however, King's Sedgemoor was only set out into parochial allotments, as exhibited in Plate XXVIII. accompanying this Account. The ditches, represented by lines on this plan, were generally ten feet broad, and five feet deep; but the principal and secondary drains were much wider, the first being thirty, and the last twenty-five, feet in breadth. The subdivisions on the Moor, or the individual allotments of it, were not traced out in the Somerton quarter, at this time, the task being deferred till the latter part of the following year. The measurement, therefore, of this base, in an early part of the season, became necessary, because fewer obstacles were then expected to present themselves.

As it appeared that many instances would probably occur, in which a chain of 50 feet in length would be useful, if not absolutely necessary, one was provided by Mr. RAMSDEN, in the winter; its make and form being precisely similar to those of the larger chains, used in the measurement of our former bases. Such a chain did, indeed, prove highly serviceable in the subsequent operation; as the handles of the 100-feet chain would very often have had their places in ditches, or been so situated on their banks, as to leave imperfect means of correctly placing the register heads under the handles.

The apparatus for the measurement, consisting of the tressels

belonging to the Royal Society, pickets, iron heads, and a new set of coffers, were sent to Somerton, after Mr. GARDNER had been furnished with the means of proceeding with the survey before spoken of.

The measurement was begun in July, and finished in August; in the course of which, very little interruption arose from any inclemency of weather. It is unnecessary to enter minutely into a description of the difficulties which arose from the frequent intervention of ditches; let it suffice to observe, that, possessed of the 50-feet chain, these were rendered less material than they would otherwise have been.

When we arrived at that point which ends with the 114th chain, an *offset* was taken, and 19 chains measured, in a direction perfectly parallel to that of the base, at the extremity of which we returned into the base itself, and continued the measurement. This interruption proceeded from an accidental and unforeseen circumstance; a great ditch having been excavated in a direction coincident with that of the base, while the measurement was going on at the upper end of it. This, however, cannot be the means of introducing any sensible inaccuracy; for, to proceed in this matter correctly, when it became necessary to take an offset, a silver wire was let fall from the register head, having a plummet, under the point of which a small dot was made, on a stake driven firmly into the ground. *The great theodolite* was then placed over the stake, *and the instrument accurately adjusted over the dot*. A diaphragm, whose aperture was $\frac{1}{2}$ an inch, was then put over the object-glass of the transit telescope, which was afterwards directed towards the staff at Lugshorn Corner, and then moved round, till it exactly made a right angle with the base. The telescope being sufficiently

depressed, a peg was driven into the ground, with its centre nearly under the cross wires; after which, a pin was moved on the surface of the peg, as directed by a person looking through the telescope, till it came to that point at which it bisected the angle formed by the cross wires. The measurement was then carried on, in this new direction, a space of 19 chains, at the end of which, the same operations were repeated, and the old direction pursued. It does not seem probable, that an error amounting to more than $\frac{2}{10}$ of an inch, can have resulted from this procedure.

King's Sedgemoor being sufficiently level, the base was measured horizontally; an advantageous circumstance; but, from the soft texture of the soil, the pickets could not be driven into the ground so firmly as to be without some small degree of motion, in case a person stood close to them. Therefore, those who attended the handles of the chains, either used long stools, or placed themselves so as to divide the pressure arising from the weights of their bodies equally on each side of the pickets. The disturbances to which the register-heads were liable, did not discover themselves till a mile of the base had been measured; and, although it became probable that small errors only had resulted from the want of those precautions we afterwards followed, yet we considered what we had done as erroneous, and recommenced the measurement, with the advantage of experience. At present, I shall content myself with observing, that due attention was paid to all necessary minutiae in this measurement, and refer those who are desirous of being more particularly informed, to the Philosophical Transactions for 1795, as the mode of proceeding on the present occasion was perfectly similar to that on Hounslow Heath.

After the conclusion of this operation, we proceeded to select such stations in the neighbourhood of the base, as might afford means of connecting it with the triangles carried on in the preceding year. The two chosen for this purpose, were Dundon Beacon, and a spot near the village of Moor Lynch; both nearer to their respective ends of the base than we wished to have found them; yet, as small rods of only an inch in diameter were placed on those stations, when they were observed from Dundon Beacon and Moor Lynch, and the same erected at the ends of the base, when they were observed from those stations, it becomes probable that very trifling errors resulted from this proceeding.

The station at Ash Beacon was visited subsequent to these just spoken of, and afterwards that on the Mendip Hills, for the purpose of taking the angle between Moor Lynch and Dundon Beacon. The operations of 1798 then terminated with a diligent search after some spot in Cornwall, for a base of only two or three miles in length: this search, however, was fruitless, as in fact we had reason to imagine it would prove to be; but we were not willing to relinquish the hope, that a piece of ground might be discovered proper for so confined a purpose. The contrary, however, being the case, the party returned to London in October.

ART. IV. *Angles taken in the Year 1798.*

At Wrotham. Station of 1787.

Between		o	,	"	Mean.
New Station and staff on Severndroog Tower	-	94	19	30	.

Station of 1798.

Severndroog Tower and Gravesend	-	-	62	54	36,5	} 38
					38,5	
					39,5	

At Gravesend.

Between				Mean.
Severndroog Tower and Wrotham	-	-	82 39 21 21	} 21
Severndroog Tower and Langdon Hill	-	-	95 53 56 59,25 54 1,25	} 59
Langdon Hill and Hadleigh	-	-	34 31 49,5 52,5 54 57,5	} 53
Halstow and Hadleigh	-	-	30 24 17 19,75 20,5	} 19
Halstow and Gad's Hill	-	-	31 38 19,75 22,25	} 21
Severndroog Tower and Hadleigh	-	-	130 25 50 51,5	} 50,75

Isle of Sheppey.

Gad's Hill and Halstow	-	-	18 18 1,5 3 3,5	} 3
Halstow and Hadleigh	-	-	31 28 23 24,5 25	} 24,25
Langdon Hill and Hadleigh	-	-	16 26 30	
Langdon Hill and Rayleigh	-	-	27 4 46	

At Halstow.

Gad's Hill and Gravesend	-	-	24 18 21,25 21,25	} 21,25
Gravesend and Hadleigh	-	-	107 49 5,25 5,25	} 5,25
Hadleigh and Sheppey	-	-	99 18 4 7,5	} 6
Gravesend and centre of Rayleigh Tower	-	-	111 20 14	
Sheppey and Rayleigh Tower	-	-	95 46 57	

At Hadleigh.

Sheppey and South End	-	-	38 43 29	
Sheppey and Halstow	-	-	49 13 33,5	
Gravesend and Halstow	-	-	41 46 32	
Langdon Hill and Gravesend	-	-	43 11 51	

Between			°	'	"	Mean.
Gravesend and Severndroog Tower	-	-	26	16	56,75	} 57,25
Langdon Hill and Sheppey	-	-	134	11	55	

At South End.

Sheppey and Hadleigh	-	-	119	20	5
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At Langdon Hill.

Gravesend and Severndroog	-	-	53	47	25
Centre of Rayleigh Tower and Gravesend	-		122	2	46
Station on Rayleigh Tower and centre of the same Tower	-		0	0	27
Station on Rayleigh Tower and Danbury Spire	-		43	18	2
Severndroog Tower and Frierning	-	-	95	25	0
Frierning Tower and Station on Rayleigh Tower	-		88	44	19
Frierning and Danbury Spire	-	-	45	26	17
Severndroog Tower and Brentwood Spire	-	-	66	26	39

At Triptree Heath. 1st Station.

Tillingham Tower and Station on Rayleigh Tower	-		68	28	58
Tillingham and Danbury Spire	-	-	100	28	21
Station on Rayleigh Tower and Langdon Hill	-		21	25	14
Station on Rayleigh Tower and Frierning Tower	-		47	8	50

At Lugsborn Corner.

Greylock's Foss and Dundon Beacon	-	-	107	44	30,75	} 31
					31,25	
Greylock's Foss and Moor Lynch	-	-	15	51	58,5	} 59
					59	
					59,75	
Moor Lynch and Dundon Beacon	-	-	93	52	33,75	

At Greylock's Foss.

Moor Lynch and Lugsborn Corner	-	-	114	9	58,25	} 59
					59,75	
Lugsborn Corner and Dundon Beacon	-	-	8	29	59,75	} 0
					30 0,5	
Dundon Beacon and Moor Lynch	-	-	105	40	0	} 0,25
					0,5	

Near Moor Lynch Windmill.

Between							Mean.
Greylock's Foss and Dundon Beacon	-	-	-	59	58	12,5	
Greylock's Foss and Lugshorn Corner	-	-	-	51	58	2,25 4,25	3,25
Lugshorn Corner and Dundon Beacon	-	-	-	8	0	10 10,25	10,25
Dundon Beacon and Mendip Hills	-	-	-	54	38	50 50	50
Mendip Hills and Ash Beacon	-	-	-	54	3	20 23,5 23,75	22,5
Ash Beacon and Pilsden Hill	-	-	-	57	19	2,5 3,75 4,5	3,5
Dundon Beacon and Pilsden Hill	-	-	-	56	43	36,25 36,5 37,25	36,75
Pilsden and Quantock Hills	-	-	-	87	15	6 7	6,5
Quantock Hills and Brent Knoll	-	-	-	71	38	57,75 58,5 58,5	58,25
Brent Knoll and Bleak Down	-	-	-	46	1	32,75 35,25 39	35,75
Bleak Down and Mendip Hills	-	-	-	43	41	43,5 45 45,25 46,75	45,25
Brent Knoll and Mendip Hills	-	-	-	89	43	19,5 20,5 24	21,25

On Dundon Beacon.

Lugshorn Corner and Moor Lynch	-	-	-	78	7	14,75 14,5	14,5
Lugshorn Corner and Greylock's Foss	-	-	-	63	45	28,5 29,5	29
Greylock's Foss and Moor Lynch	-	-	-	108	1	51,25 53	52,25
Moor Lynch and Bleak Down	-	-	-	58	42	10 10,25	10,25
Moor Lynch and Mendip Hills	-	-	-	101	22	54,25 55	54,5

At Ash Beacon.

Between				°	'	"	Mean.
Moor Lynch and Mendip Hills	-	-	-	56	29	50	} 51,5
						52,25	
						52,25	
Mendip Hills and Bradley Knoll	-	-	-	50	8	45,25	} 45,5
						45,75	
Bradley Knoll and Bull Barrow	-	-	-	93	38	10,5	} 12,5
						13	
						14	
Bull Barrow and Pilsden	-	-	-	83	40	33,5	} 34,5
						35,5	
Mintern Hill and Pilsden	-	-	-	49	21	35,75	} 38,25
						39,75	
						39,75	
Pilsden and Quantock Hills	-	-	-	59	34	40,5	} 41,5
						42,25	
Quantock Hills and Mendip Hills	-	-	-	72	57	49,75	

On the Mendip Hills.

Bradley Knoll and Ash Beacon	-	-	-	58	16	20	} 22
						21,5	
						24,25	
Ash Beacon and Moor Lynch	-	-	-	69	26	46,5	} 48,25
						49	
						49,25	
Dundon Beacon and Moor Lynch	-	-	-	23	58	16,5	} 17
						17,75	

ART. V. *Particulars relating to the Operations of the Year 1799.*

I have shewn in the preceding articles, that sufficient materials are now in my possession, for calculating the latitudes and longitudes of those places whose bearings and distances from given stations are found in the Account of 1797. I have also pointed out the direction which the survey has subsequently taken; and given a short account of the measurement of a new base in Somersetshire. The operations of 1799 now remain to be spoken of.

In very early stages of the work, I had frequent opportunities of observing, that eminent advantages would accrue to the service, were the survey prosecuted on a more extensive scale. The consideration of a grand instrument being laid up in the apartments of the Royal Society, suggested the propriety of obtaining it; therefore, when my appointment to my present situation gave me the means of effecting former ideas, I lost no time in applying to the President and Council, for the loan of their large theodolite, the excellence of which had been incontestibly demonstrated by the late Major General ROY. The distinguished services which the Royal Society have rendered this branch of the public service, leave it almost unnecessary for me to observe how readily they granted my request. The instrument was, accordingly, put into the hands of Mr. RAMSDEN, early in the month of January, for the purpose of being examined, and also of having new microscopes fixed to it; the former ones being much inferior, in construction, to those attached to the instrument belonging to Government.

To carry on so extensive a survey as that which is now the subject of this Paper, much consideration is necessary. I have endeavoured to give it the best effect, both as to design, and celerity of execution. What degree of success has attended my endeavours, the public, in possession of this Paper, can readily determine. In the present stage of the survey, I have been sufficiently impressed with just ideas, as to the importance of the task, and responsibility of my situation. The difficulties which start up, in prosecuting a survey of this kind, become more numerous as it becomes more extensive. In the earliest part of it, when few objects only were in view, speedy execution followed the design; but, circumstances now require every

exertion, as the triangles are branched out into several parts of the kingdom.

Were the length of a degree of the meridian, in these latitudes, accurately known, the most eligible method of carrying on the survey would be, that of working between any two determined parallels of latitude, till the space between them was completed. Yet this mode would manifestly be subject to some slight innovations, from the necessity of measuring bases in certain stages of the work : it would be right, however, to adopt the principle for general practice. Under this idea, it would have been proper to have commenced the operations of this year in Somersetshire, and to have carried on the triangles from the neighbourhood of the new base into the north of Devon.

It is mentioned in one of the former Accounts, that a zenith sector was formerly bespoken of Mr. RAMSDEN, by his Grace the Duke of RICHMOND, for the purpose of aiding the design of measuring the length of a degree of latitude in this country. The pressure of other business caused Mr. RAMSDEN to lay aside this instrument, after he had considerably advanced in its construction. The real necessity, however, for our being supplied with an instrument of this description being made known to him, he resolved to take it in hand again, and complete it. Relying on the strength of his assurances to this effect, I determined to relinquish the intention of proceeding to the westward ; and resolved to commence this year's operations, with running up a series of triangles along the meridian of Blenheim. As it is probable my next communication will contain the result of this interesting part of the survey, I shall now confine myself to such particulars as relate to the subject under consideration.

In a former article, I have observed, that the chief Draftsman,

Mr. GARDNER, has been furnished with materials for surveying the northern shore of the Thames, and the north of Kent : these proved ample, as the map, thence compiled, will sufficiently demonstrate. As the Master-General issued directions, at this time, to survey Essex, and parts of the adjoining counties, in the same manner, and for the same purpose, as Kent has been, I was obliged to suspend, for a short time, my intention of proceeding with the measurement of a meridional degree, and to devise the best means for carrying his Lordship's instructions into execution.

For this purpose, therefore, before any stations were chosen in Essex, the county was very minutely examined ; when it appeared, that insuperable difficulties would occur, if the survey were prosecuted with the large theodolite only. The range commencing at Havering Bower, and running to Gallywide Common, cuts off a regular communication between the stations subsequently chosen in the southern and northern parts of Essex. The difficulty resulting from this circumstance, was made still greater, from the want of success in our endeavours to find one spot on this range, proper for a station. The eastern part was, in some degree, found more favourable ; but it was discovered that, even here, the small instrument must frequently be used as a substitute for the large one. Under these disadvantages, the survey commenced in March ; the large theodolite being taken to a station on Hampstead Heath.

The base chosen for carrying on the distances towards the north, was that constituted by Severndroog Tower on Shooter's Hill and the new station on Hampstead Heath ; which distance, although it has not, perhaps, been obtained so correctly as many others, yet is determined with sufficient accuracy for the matter

in hand. When the observations were made on Severndroog Tower, in the year 1787, the angle between Hanger Hill Tower and the cross on the dome of St. Paul's was taken: this was now made use of, in order to get the angle between Hanger Hill Tower and Hampstead Heath; because the former station could not be discovered, on account of the wind blowing the thick and darkened atmosphere of London between the stations, when the instrument this year was carried to Shooter's Hill.

For the purpose of connecting the eastern and western triangles with each other, a station was chosen on Southweald Tower, accessible only to the small instrument. Brentwood Spire was also found to be conveniently situated for carrying on the distances: this will be readily perceived by the plan. Langdon Hill was also selected; which, with the former station at Gravesend, were to become the means of connecting the triangles. A station on Epping Forest was judged necessary; but no spot could be found fit for general purposes, the view towards the north being confined. One was, however, fixed on, called Highbeech, from which a high building near Berkhamstead was found to be visible, by means of which, the distances in the north of Essex could be verified, as the station on the top of it would connect with Bushy Heath, near Watford, and a point on the elevated range near Dunstable.

From Hampstead, the instrument and portable scaffold were carried to Langdon Hill, and from thence to Triptree Heath, near Malden; from whence the party repaired to Highbeech, leaving the remainder of the county to be surveyed with the small circular instrument; which seems to have been done with considerable accuracy.

After the necessary observations were made at Highbeech, I

proceeded to Shotover Hill, in Oxfordshire; and, before May elapsed, had reconnoitred the country. As the distance between Inkpin Hill and Highclere, appeared to be shorter than was necessary for a base on which the northern triangles were to rest, it became certain, that their sides would depend on the base on Hounslow Heath. The only means by which the series now proposed to be carried westwards, (for the double purpose of forwarding the survey, and also of finding a portion of the meridional arc,) could be properly connected with the triangles in the neighbourhood of Salisbury Plain, was the side just spoken of; for the high land in the vicinity of Calne, intercepted the view of the stations on the Marlborough range, from White Horse Hill. In order, however, to make a connection, although imperfect, an intermediate station was chosen on this high intercepting land.

When the ground about Nettlebed was formerly examined by us, it appeared difficult to carry on the triangles from Bagshot Heath towards the northward; because no spot could be found near the former, from which the Chiltern range could be seen. I now, therefore, departed from the usual practice of choosing stations on the ground, and selected Pen Church Tower; by means of which, I found a connection might be made between the triangles carried round the Chiltern range, from White Horse Hill and Nuffield, with those in Hertfordshire.

At Shotover Hill the party separated, each having its instrument. I shall close this article, without entering minutely into the reasons which operated with me for the choice of all the stations selected this year. I shall content myself with enumerating the names of the stations visited and observed, and mentioning that Shotover Hill and Cumner Hill, in Oxfordshire, were selected principally with a view of ascertaining the situations of the

observatories at Oxford and Blenheim. The names of the stations were, Nuffield, White Horse Hill, and Scutchamfly, in Berkshire. Shotover Hill, Cumner Hill, Whiteham Hill, Crouch Hill, and Epwell Hill, all in Oxfordshire. Those in Gloucestershire were, Pen, Cleave, Broadway Beacon, and the Malvern Hills. The Lecky Hills, in Worcestershire. Corley and Nuneaton, in Warwickshire. Bardon Hill, Naseby Field and Barrow Hill, in Leicestershire. Arbury Hill, and Souldrop, in Northamptonshire. Quainton, Brill, Wendover, and Bow Brickhill, in Buckinghamshire. Woburn Park, and Lidlington, in Bedfordshire. Kinsworth, Lillyhoe, Berkhamstead, Tharfield, and Bushy Heath, in Hertfordshire. From the last mentioned station, the party returned to London, in October.

ART. VI. *Angles taken in the Year 1799.*

On Hampstead Heath.

Between			Mean.
Hanger Hill Tower and Stanmore	-	50 52 15,75 17	} 16,25
Highbeece and Shooter's Hill	-	70 6 35,5 34,5	} 35
Highbeece and St. Paul's, London	-	83 1 17,25 22,75	} 20
Severndroog Tower on Shooter's Hill, and Hanger Hill Tower	-	117 22 13 11	} 12

At Langdon Hill.

Gravesend and Severndroog Tower	-	53 47 25
Centre of Rayleigh Steeple and Gravesend	-	122 2 46
Station on Rayleigh Steeple and centre of the same	-	0 0 27
Station on Rayleigh Steeple and Danbury Spire	-	43 18 2
Severndroog Tower and Frierning Steeple	-	95 25 0
Frierning Steeple and Station on Rayleigh Steeple	-	88 14 19
Frierning Steeple and Danbury Spire	-	45 26 17
Severndroog Tower and Brentwood Spire	-	66 26 39

At Triptree Heath.

Between		•	'	"	Mean.
Tillingham Steeple and Station on Rayleigh Steeple	-	68	28	58	"
Tillingham Steeple and Danbury Spire	-	100	28	21	
Station on Rayleigh Tower and Langdon Hill	-	21	25	14	
Station on Rayleigh Tower and Frierning Steeple	-	47	8	50	

At Highbeeceh.

Severndroog Tower and Brentwood Spire	-	71	16	43	} 44
				45	
Severndroog Tower and Southweald	-	44	34	27	} 28
				29	
Severndroog Tower and Hampstead	-	58	28	18	} 18
				18	
Cross on the Dome of St. Paul's and Hampstead	-	83	1	11	
Berkhamstead Gazebo and Hampstead	-	138	29	57	} 58,5
			30	0	

At Shotover Hill.

Nuffield and White Horse Hill	-	81	53	27,75	} 28,75
				29,75	
Scutchamfly Barrow and White Horse Hill	-	26	8	7,75	} 8
				7,75	
				8,25	
White Horse Hill and Whiteham Hill	-	48	5	31,25	} 32,75
				32,75	
				33,75	
Wendover and Scutchamfly Barrow	-	117	30	55	} 56
				57,25	

On Whiteham Hill.

Shotover Hill and White Horse Hill	-	114	54	34,75	} 34,75
				34,75	
Shotover Hill and Cumner Hill	-	55	52	34,5	} 35
				35,5	
Staff over the Quadrant at Blenheim and White Horse Hill	-	131	25	34,5	} 36,5
				38,5	

On Cumner Hill.

Whiteham Hill and Shotover Hill	-	99	29	47	} 48,5
				49,5	
Shotover Hill and Atlas on the Top of the Observatory at Oxford	} -	29	23	34	} 34
				34	

On White Horse Hill.

Between			°	'	"	Mean.
Nuffield and Shotover Hill	-	-	35	34	22,25 23,75	} 23,25
Nuffield and Brill	-	-	38	48	11,5 15,25	} 13,25
Scutchamfly Barrow and Shotover Hill	-	-	111	47	50	
Whiteham Hill and Staff on Blenheim Observatory	-	-	10	30	43,5 43,5	} 43,5
Brill and Stow on the Wold	-	-	64	45	42,75 44,75	} 43,75
Station near Calne and Inkpin	-	-	67	10	28,5 32,5	} 30,5
Highclere and Inkpin	-	-	12	4	11,25 11,5	} 11,5
Highclere and Nuffield	-	-	63	7	53,25 53,5	} 53,25

At Nuffield.

Bagshot Heath and Highclere	-	-	78	17	16,5 17,75 18,75 19,75	} 18,25
Highclere and White Horse Hill	-	-	53	33	49,5 49,75	} 49,5
White Horse Hill and Shotover Hill	-	-	62	32	3,5 4,5 6,5 7	} 5,25
White Horse Hill and Brill	-	-	86	4	15,75 16 17	} 16,25

On Scutchamfly Barrow.

White Horse Hill and Shotover Hill	-	-	111	47	50	
Shotover Hill and Wendover	-	-	34	26	50 50,75 52,75 54,5	} 52

At Stow on the Wold.

Cleave and Broadway Beacon	-	-	54	44	54,5 54,5 57 57	} 55,75
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Between				°	'	"	Mean.
Broadway Beacon and Epwell	-	-	-	72	38	48,5	} 49,5
						49	
						50,5	
Epwell and Brill	-	-	-	60	56	6	} 6,25
						6,5	
White Horse Hill and Cleave	-	-	-	109	40	36,25	} 37
						36,75	
						37	
						37,75	

At Broadway Beacon.

Epwell and Stow	-	-	-	69	10	30,75	} 31,75
						31,5	
						32,75	
Stow and Cleave	-	-	-	78	53	6	} 7,75
						8	
						9,5	
Cleave and Malvern Hills	-	-	-	60	28	12,5	} 16
						17,75	
						18	
Malvern and Lecky Hills	-	-	-	53	53	19 $\frac{1}{4}$	} 19,75
						20	

At Epwell.

Stow and Broadway Beacon	-	-	-	38	10	43,25	} 44
						43,5	
						44	
						44,25	
						44,5	
Stow and Brill	-	-	-	86	29	13	} 13,5
						13,5	
						13,75	
Brill and Arbury Hill	-	-	-	85	0	16,5	} 18,5
						20,5	
Arbury Hill and Corley	-	-	-	54	55	17,5	} 18,75
						19	
						20,25	

At Corley.

Bardon Hill and Nuneaton Common	-	-	-	49	54	50,75	} 51,75
						53	
Nuneaton and Arbury Hill	-	-	-	110	20	52	} 52,75
						52,5	
						52,75	
						53	

Between				Mean
Arbury Hill and Epwell	-	-	-	35 17 34,75 } "
				35,75 } 36,75
				36,25 }
				36,75 }
				38 }
				39,25 }
Epwell and Broadway Beacon	-	-	-	28 2 46,75 } 49,75
				50 }
				53 }
Nuneaton and Lecky Hills	-	-	-	133 25 11,5 } 11,5
				11,5 }
Nuneaton and Station near Birmingham	-	-	-	49 54 50,75 } 52
				53 }

At Arbury Hill.

Quainton and Brill	-	-	-	16 12 37,25 } 40
				37,5 }
				40,5 }
				42,5 }
				42,75 }
Brill and Epwell	-	-	-	60 35 43 } 45,5
				43,25 }
				44,5 }
				45 }
				46,5 }
				48,5 }
				48,5 }

Near Brill on the Hill.

White Horse Hill and Stow	-	-	-	50 14 44 } 44,5
				44,5 }
				44,75 }
Nuffield and White Horse Hill	-	-	-	55 7 33 } 33,5
				34 }
Stow and Epwell	-	-	-	32 34 42,5 } 43
				43,5 }
				43 }
				43,25 }
Epwell and Arbury Hill	-	-	-	34 23 58,5 } 58,5
				58,75 }
Arbury Hill and Bow Brickhill	-	-	-	68 20 7,75 }
Bow Brickhill and Wendover	-	-	-	57 25 1 } 1,5
				2 }
Wendover and Shotover Hill	-	-	-	108 5 22 } 22,75
				23,5 }
Quainton and Wendover	-	-	-	51 34 33,25 } 33
				32,75 }

Near Wendover.

Scutchamfly Barrow and Shotover Hill	-	-	-	28 2 12,75 }
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Between					°	'	"	Mean.
Brill and Quainton	-	-	-	-	33	26	48	} 48"
							48	
							48,25	
Brill and Bow Brickhill	-	-	-	-	80	11	8,25	} 9,25
							10,25	
Brill and Shotover Hill	-	-	-	-	23	23	56,25	} 57,5
							58,75	
Bow Brickhill and Stanmore	-	-	-	-	102	22	29	
Pen Tower and Stanmore	-	-	-	-	38	13	16,25	} 18
							19,75	

Near Quainton.

Bow Brickhill and Wendover	-	-	-	-	94	23	49,25	} 50,25
							51,25	
Wendover and Brill	-	-	-	-	94	58	36	} 37
							38	

At Bow Brickhill.

Brill and Arbury Hill	-	-	-	-	68	22	55,5	} 56,75
							55,75	
							57,5	
							58,75	
Brill and Wendover	-	-	-	-	42	23	50,5	} 50,75
							51	
Wendover and Kinsworth	-	-	-	-	46	18	4,25	} 8,25
							5,75	
							9,25	
							14	
Kinsworth and Quainton	-	-	-	-	85	9	51,75	} 52,75
							53,75	
Kinsworth and Lillyhoe	-	-	-	-	42	10	33,25	} 36,75
							38,5	
							39	
Kinsworth and Lidlington	-	-	-	-	80	39	37,25	
Trusler Hill and Lillyhoe	-	-	-	-	14	54	38,75	} 42,5
							43,5	
							45,5	
Trusler Hill and Arbury Hill	-	-	-	-	45	49	41,75	} 43
							44	

At Kinsworth.

Brill and Bow Brickhill	-	-	-	-	62	55	35,25	} 38,75
							38,5	
							39	
							42	
Quainton and Bow Brickhill	-	-	-	-	52	17	56,25	} 56,75
							57,25	
							57	

Trigonometrical Survey.

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Between			°	'	"	Mean.
Bow Brickhill and Lillyhoe	-	-	82	50	26	} 30,5
					30	
					35	
Lillyhoe and Tharfield Tower	-	-	12	12	39,75	} 40,75
					42	
Tharfield and Station on Gazebo at Berkhamstead	-	-	50	2	55,5	} 53,25
					56	
				3	0,5	
					1	} 57,25
Stanmore and Berkhamstead	-	-	41	15	56,5	
					57,75	
Bow Brickhill and Stanmore	-	-	173	37	43	} 44
					45	

Near Lillyhoe.

Bow Brickhill and Kinsworth	-	-	54	58	52,5	} 53
					52,5	
					52,5	
					53,75	
Lidlington and Bow Brickhill	-	-	23	59	30	} 31
					32	
Bow Brickhill and Trusler Hill	-	-	5	52	11,5	} 46,25
Station on the Ground near Tharfield Tower and Kinsworth	-	-	166	4	44,5	
					48	

At Lidlington.

Kinsworth and Bow Brickhill	-	-	68	16	19	} 22,25
					22,75	
					25,25	

At Crouch Hill.

Brill and Epwell	-	-	145	23	25,75	} 26,25
					27	

At Stanmore.

Wendover and Kinsworth	-	-	37	41	39,25	} 41
					43	
Pen Tower and Wendover	-	-	23	4	47,5	} 48,5
					47,5	
					47,75	
					49,25	
					49,25	} 54
Bagshot and Pen Tower	-	-	49	32	29,5	
Bagshot Heath and Hanger Hill Tower	-	-	59	55	54,25	
					53,75	

Between				Mean.
Hampstead Heath and Hanger Hill Tower	-	-	45 25 51	} 51,75
			51,5	
			51,5	
			52,75	

On Busby Heath.

Wendover and Kinsworth	-	-	-	38 22 5	} 6,75
				8,5	

On Bagsbot Heath. Station of 1794.

Highclere and Nuffield	-	-	-	55 32 25,5	} 26
				25,75	
				26,75	
Nuffield and Pen Tower	-	-	-	48 47 11	} 12,5
				12,75	
				12,75	
Pen Tower and St. Ann's Hill	-	-	-	70 30 37,25	} 39,25
				39	
				40	

ART. 7. *Situations of the Stations.*

Trevoze Head. The station on this point of land, which is about four miles from Padstow, in Cornwall, is situated on the southern part of it, and is about forty feet from the declivity. The ground seems a little higher than any other part of the Head.

Cadon Barrow. The station is on the centre of the Barrow; which is a very remarkable one, and well known about the country. It is about two miles from Tintagel, being in a field lying south of the road leading from that town to Camelford.

Brown Willy. The staff is erected on the highest part of this mountain, which is about nine miles southward of Camelford.

St. Stephen's Down. The station is about 150 feet from the eastern part of the building erected on this Down. It lies southwest from the corner of it, and about twenty feet from the road.

Mendip. The station is in a field on the top of the down, being about two miles north of *Shepton Mallet*. The field is next to the road leading from that place to Bristol, and lies west of it: it is also north of the road which goes from Wells to Frome.

This road crosses the former at right angles. The station is 20 feet north of the southern hedge, and about 200 from the eastern one. The ground round the station is rather higher than any other part of the field.

Dundry. The station is on the down, close to, but west of, the town so called. The down is full of holes and pits, from which stones have been taken for the purposes of building. The station, however, may easily be found, as it is situated on a rising which has the appearance of having been a barrow.

Lansdown. This place is well known; and near Bath. The station is on the highest part of the broken ground called CROMWELL'S Camp, which is near Mr. GRANVILLE'S monument.

Farley Down. The station on this Down is 5 feet north of the stone wall, and about 150 feet eastward of the plantation.

Bradley Knoll. This is a remarkable hill, very near Maiden Bradley. The highest part of the hill is towards the west, on which there is a small ring, exhibiting an appearance of a ruined plantation. The station is a few feet to the northward of this ring.

Westbury Down. There are no objects on this Down, of any kind; therefore, the station cannot be found from measurements. It is, however, just above the *White horse* cut out in the side of the hill.

Asb Beacon. This eminence is about four miles north of Sherborne: on the top of it there is a small plantation, round which is a circular wall. The station is 85 feet east of it.

Dundon Beacon. This is an insulated hill, at the eastern extremity of King's Sedgemoor; upon it are the remains of a barrow, probably the site of the ancient beacon. The station is about 4 feet eastward of the small cavity in the centre of it.

Lugshorn Corner, the eastern extremity of King's Sedgemoor. There is a small rivulet, which separates the moor from the cultivated ground on the Somerton side, and, close to a particular part of it, is a passage called *Somerton Gate*. About a quarter of a mile eastward of this entrance, and in the second field, north of the stream, is the station called *Lugshorn Corner*, one of the ends of the base. The spot is 5 feet from the ditch, and 19 from the gateway. There were but three fields in this part of the moor, at the time the base was measured.

Greylock's Foss. This is towards the western extremity of the moor: a causeway leads from *Middlezoy* to *Greinton*, over it. In the second field from the bridge, near the latter, is the other extremity of the base. The station is about 10 feet from the ditch, running parallel to the Foss, and is in the angle formed by the ditch contiguous to the road and the second ditch north of the drain.

Nuffield. The station is in the field opposite to the church: it is in the south-west corner of it, 14 feet from the *stile*, and 10 feet from the hedge.

Scutchamfly. A very remarkable Barrow, on the Berkshire downs, situated near Little Hendred. The station is on the south-west part of it, and can easily be found.

White Horse Hill. This is a well known eminence in Berkshire. The station is on the eastern side of the Saxon work, and on the top of the small parapet surrounding the ditch.

Shotover Hill, near Oxford. The station is 150 feet from the hedge eastward of it, and 60 feet from that southward of it; but, when the traces of our former operations are obliterated, it will be difficult to recover this station.

Stow on the Wold. The station bearing this name, is in a

field 2 miles eastward of the town: it lies on the north side of the road leading from Stow to Burford, and may be easily distinguished, being that particular field which affords the most commanding view. The station is 32 feet west of the corner of the hedge which forms a right angle with another abruptly running out: it is also 279 feet from the ridge which divides the field.

Broadway Beacon. This is a very high and remarkable spot, near the village of Broadway, in Gloucestershire. The station is about 20 feet south-east of the foundation of a building proposed to be erected by the Earl of COVENTRY.

Corley, a village in Warwickshire. The station is in the second field eastward of the church, being 180 feet from the eastern hedge, and 230 feet from the stile in the corner of it.

Epwell, a village in Oxfordshire. The station is on the apex of the hill, and may easily be found, by measuring 17 feet from the stile, and 14 feet from the hedge which runs across the hill. N. B. The station is west of the hedge.

Brill on the Hill, Buckinghamshire. The station is on *Muzzle Hill*, near the town. There is but one field on this hill: it is on the highest part of it. The station is situated in the centre of the field, and in the middle of a rising, once the site of a windmill.

Arbury Hill. This hill is still surrounded with the remains of an ancient fortification. The station is on the north-west corner of it, and near the brow, but cannot be easily found, from the want of proper objects to which measurements may be made.

Wendover, Buckinghamshire. The station is on the down south of the town, and contiguous to the village of Ellesborough. A road from Wendover, to Sir JOHN RUSSELL's seat, Checquers, runs over the down: but, as there are no marks on it, its pre-

cise situation cannot be easily pointed out by measurement. It may, however, be observed, that it is 14 feet southwards, from the decayed parapet on the top of the hill.

Quainton, Buckinghamshire. The station is on the high ground, north of this town. It cannot very easily be found, because the hill is destitute of objects; yet it may, probably, be discovered, by looking for it on the *green ridge* which divides the land: it is in the middle of that boundary, and about 200 feet westward of the pathway.

Kinsworth, a village near Dunstable. The station is on the summit of a hill, about half a mile north of the village. A hedge runs across the hill, from which the station is 40 feet north-west: it is likewise *close* to the road.

Lillyboe, Hertfordshire. The station is on a commanding eminence, having the *Icknield way* at the foot of it. There are no objects on this hill, therefore the precise situation cannot be pointed out by means of measurement: it is towards the north-west corner of the hill.

Stanmore. This station is on the southern extremity of the range above the town: it is near the trees; and a little to the westward of the broken ground.

Busby Heath, near Stanmore, The station cannot be easily found: it is about 1000 feet from the road, but there are no objects near enough to determine it by measurement.

Wrotham. This station is $205\frac{1}{2}$ feet north-east of the old station: it may be easily found, with the assistance of a theodolite, Severndroog Tower making an angle of $94^{\circ} 19'$ with the new station.

Gravesend. The station is on Windmill Hill, and on the western side of it: it is about 50 feet south of the stile, and near the brow.

Gad's Hill, Kent. The station is very easily found, being in the middle of the *tumulus*.

Sheppey, Isle of. The station is on the bare hill, westward of, and contiguous to, the high range: it cannot be found through means of measurement.

Hampstead. The station is on the heath, but cannot easily be found, on account of the rugged and broken ground which surrounds it: it is situated 40 feet from the road, and among the sand holes.

Langdon Hill, Essex. The station is in the middle of the field on the top of this hill: it is about 400 feet from either of the stiles.

Hadleigh. The station is on a remarkable hill, in shape very like a barrow, and is about a mile south-west of the town.

Southend. The station is in the second field westward from the terrace: it cannot be easily found.

Interior Stations.

Hope's Nose, the north projecting point of Torbay. The only spot fit for a station in this part is the one chosen: it can easily be found, for it is the high and bare rising, just above the Nose.

Ball's Obelisk. This object is on the eastern part of Great Haldon, in Devonshire. The station can be easily found, for it is close to the gate of the inclosure, and on the only spot not covered with heath.

Evercrutch, in Somersetshire. The hill on which the station is, commands an extensive view, and is not far from the town of Evercrutch. Bruton is also near it. The station is in the middle of the flat place on the top of the hill.

Crouch Hill, near Banbury, in Oxfordshire. The hill is well

known, and the station easily found; for the apex of the hill appears as if it were truncated, and in the middle of the smooth part is the station.

Cumner Hill, near Oxford. The station is about 130 feet westward from the centre of the clump of trees.

Whiteham Hill, Oxfordshire. There are a few trees contiguous to the station, which bear eastward from it, and are about 80 feet distant. The station is on the highest and smoothest part of the hill.

Lidlington, a village near Ampthill in Bedfordshire. This station can easily be found, for a tumulus, whose centre is the station, has been erected, to render it conspicuous.

Trusler Hill, in Woburn Park. The station is on a tumulus likewise; and can be found without any difficulty.

Stations in Essex, Suffolk, and Hertfordshire.

Prittlewell Steeple.

Rayleigh Steeple. The station is in the north-east corner, 20 inches from the north parapet, and $\frac{1}{4}$ feet from the eastern one.

Danbury Steeple. The instrument was placed in the four angles of the Steeple, as circumstances rendered it necessary. The points are readily found, as there is scarcely room in the corners to place an instrument. Stations were also selected on the following Steeples, &c.

Canewden Steeple.	West Mersea St.	Little Bentley St.
Frierning St.	Colchester, St. Mary's Staircase.	Woodbridge St.
Tillingham St.	Tattingstone St.	Butely St.
Thorp St.	Rushmere St.	Otley St.
Stoke St.	Great Tey St.	Henley St.
Dover Court St.	St. Osyth Priory, Flagstaff.	Falkenham St.
Peldon St.	Shoebury Ness, Staff.	Copdock St.

Naughton St.	Beauchamp Roding St.	Westham St.
Lavenham St.	Hornchurch St.	Barking, Staircase.
Bulmer St.	Naseing St.	Berkhampstead, Ga-
Glemsford St.	Henham on the Mount St.	zebo.
Toppesfield St.	Thorley St.	Gallywood Common.
Twinestead St.	Albury St.	Purfleet Cliff.
Southweald St.	Elmdon St.	Babraham Mount.
Pleshley St.	Rickling St.	Epping Mill, Base.
High Easter St.	Thaxted St.	Brentwood Spire, sur-
Hatfield Broad Oak St.	Balsham St.	veyed round.

Stations in Kent.

Frant Steeple. Station of 1787.	Seal Chart.	Ash St.
Botley Hill. Do.	Tunbridge St.	North Fleet St.
Chiddingstone St.	Oxford Mount.	Stockbury St.
Mount Sion.	Silverden Farm.	Hernhill St.
East Peckham St.	Well Hill.	
Tudely St.	Crayford St.	

The stations chosen for the survey of Essex, and parts of the adjoining counties, as also for completing the survey of Kent, are mostly towers, as may be seen from the above. When the tops of the towers have been smooth and even, the stations were always in the centres of them; but, when they were covered with roofs, or had spires upon them, stations were chosen in the most convenient places, and staffs always erected. I have omitted giving the measurements by which the stations may be exactly found, Rayleigh and Prittlewell excepted, in order to avoid swelling this article to an inconvenient length.

ART. VIII. *Particulars relating to the Base on King's Sedgemoor, and the Reduction of that Base. Plate XXVIII.*

Comparisons of the Chains.

As the chains, after the measurement on Salisbury Plain, were oiled, and laid up in the Tower, no apprehensions were entertained that either of them was elongated by the rusting of the joints. It was, however, our wish to have compared them with each other, previous to the commencement of this operation, and attempts were made, but rendered unsatisfactory, from the want of sufficient firmness in the soil. It was not till we arrived at the 70th chain, that a good opportunity presented itself: the measuring chain A, was then compared with the standard B, and found to be thirteen divisions of the micrometer head, attached to the brass scale, in excess. In these trials, the temperature remained constant; the mercury in FAHRENHEIT'S thermometer being at $66\frac{1}{2}^{\circ}$.

The 50-feet chain, spoken of in a former article, came from the hands of Mr. RAMSDEN without being very accurately measured; therefore it now became proper to ascertain its length, by means of the standard chain. This was accordingly done at the present time; when B was found to exceed twice the length of the 50-feet chain, by 14 divisions of the micrometer screw; the thermometer, at the time of trial, standing at $69\frac{1}{2}^{\circ}$.

At the conclusion of the measurement, the chains were again compared, when the working chain A, was found to exceed the standard, $17\frac{1}{4}$ divisions on the micrometer head: this was after 273 chains were measured. Now, when 70 chains only had been measured, the difference between A and B was 13 of those

divisions; consequently $17\frac{1}{4} - 13 = 4\frac{1}{4}$ divisions, was the wear of B, in measuring 203 chains. Therefore, the whole wear is found by this proportion, *viz.* $203 : 4\frac{1}{4} :: 273 : 5,223$ divisions, $= \frac{2}{100}$ of an inch; which very inconsiderable quantity, like the wear on Salisbury Plain, no doubt, arose from the pivots and pivot holes of the joints being polished by continual use. This supposition seems just; as the wear of the chain, after the measurement on Hounslow Heath, was found to be much greater.

The length of the chain A, as well as that of the standard B, was accurately ascertained by Mr. RAMSDEN, in the year 1793, as particularly shewn in the Philosophical Transactions for 1795. In the temperature of 54° , A was found to exceed 100 feet, $\frac{1.1425}{100000}$ of an inch; therefore, adding the wear which took place on Salisbury Plain, *viz.* $\frac{1}{200}$ part of an inch, we get the length of A at the commencement of the measurement on Sedgemoor = 100,01009 feet.

From repeated trials, as before observed, the standard B was found to exceed the length of twice that of the new fifty-foot chain, 14 divisions of the micrometer head; and, *after* the measurement, the same chain fell short of A, $17\frac{1}{4}$ of those divisions: hence, A exceeds twice the length of the 50-foot chain, $31\frac{1}{4}$ divisions. Therefore the length of the short chain, in the temperature of 54° , may be taken at 50,00075 feet.

**ART. IX. Table of the Measurement of the Base of Verification
on King's Sedgemoor.**

Days.	Spaces measured. Yards.	Mean temp. by 15 therm.	Days.	Spaces measured. Yards.	Mean temp. by 15 therm.	Days.	Spaces measured. Yards.	Mean temp. by 15 therm.
July	100	69,7		3200	79,27	6	6300	92,26
	200	65,56		3300	79,96		6400	86,73
11	300	62,73	25	3400	62,06		6500	68,30
	400	67,40		3500	65,90	7	6600	82,06
	500	64,10	26	3600	67,63		6700	91,06
12	600	65,30		3700	65,83		6800	89,76
	700	73,40	27	3800	67,72		6900	93,43
	800	69,36		3900	75,53	8	7000	75,94
	900	68,06		4000	71,40		7100	81,57
13	1000	66,05		4100	71,23		7200	81,93
	1100	70,30		4200	67,14		7300	79,36
	1200	69,33	31	4300	66,56		7400	68,20
	1300	62,83	Aug. 1	4400	71,16	9	7500	78,18
14	1400	63,93	2	4500	64,60		7600	76,50
	1500	61,40		4600	65,16		7700	71,26
	1600	57,03		4700	68,16		7800	72,13
16	1700	66,36		4800	70,16		7900	70,8
	1800	65,80		4900	76,23	13	8000	71,5
	1900	71,03		5000	70,66		8100	8,4
17	2000	75,70		5100	64,23		8200	84,53
	2100	80,43	3	5200	64,46		8300	76,13
	2200	77,53		5300	63,96		8400	69,56
18	2300	65,96		5400	63,86		8500	66,63
	2400	69,79		5500	67,13	14	8600	85,53
	2500	69,56	4	5600	78,53		8700	83,73
	2600	68,16		5700	73,84		8800	85,87
19	2700	68,19		5800	69,83		8900	78,46
	2800	72,66		5900	65,86		9000	78,36
	2900	69,23		6000	61,50	15	9100	73,77
21	3000	70,76		6100	76,46	16	9225,4943	63,00
	3100	79,68		6200	84,26			

ART. X. *Reduction of the Base.*

The overplus of the 273d chain was measured by Mr. RAMSDEN, and found to be 23,517 feet; wherefore, the apparent length of the base was - 27676,4830

Feet.

From the measurement in the Riding-house of his Grace the Duke of MARLBOROUGH, the chain A was found to exceed 100 feet, in the temperature of 54° , 0,11425 parts of an inch; to which, adding the wear by the measurement on Salisbury Plain, *viz.* $\frac{1}{260}$, and also *half* the wear by the measurement of this base, *viz.* $\frac{1}{100}$ part of an inch, we get $\frac{0,1191}{12}$ for the excess of the chain's length

above 100 feet; therefore, $\frac{0,1191}{12} \times 272,8 = 2,7075$ feet; which add - - - - - +2,7075

The sum of all the degrees shewn by the thermometer was 98511; wherefore, $\frac{98511}{5} - 54^{\circ} \times 272,8 \times \frac{0,0075}{12} = 3,1069$ feet; which also add - +3,1069

Again, from the comparison of the 50-feet chain with the standard B, it appeared that the excess above 50 feet, in the temperature of 54° , was 0,09075 parts of an inch; therefore, $\frac{0,09075}{12} \times 8 = 0,0605$ parts of a foot. This likewise add - +0,0605

The sum of all the degrees shewn by the thermometers placed by the sides of the 50-feet chain, was 1372; therefore $\frac{1372}{5} - 54^{\circ} \times 4 \times \frac{0,0075}{12} = 0,0365$ parts of a foot: and this add - - +0,0365
27682,3944

27682,3944

And, for the reduction of the base to the temperature of 62° , viz. for 8° on the brass scale, we have

$$\frac{0,01237 \times 272,8 \times 8^{\circ}}{12} = 2,2497 \text{ feet ; which subtract } \underline{\underline{-2,2497}}$$

Therefore, the length of the base is - - - feet 27680,1447 which, neglecting decimals, may be taken at 27680 feet.

As to the probable error of the above conclusion, I know not how to form a just opinion. On ground sufficiently hard, and otherwise favourable, I think a base of 5 miles might be measured so accurately, as to afford a result not differing from the truth more than three inches : but, on this occasion, I should not suppose the error can be less than six, nor more than nine inches. Motives for adopting this supposition, have been related in a foregoing article.

ART. XI. *Calculation of the Sides of certain principal Triangles in Cornwall and Devonshire.* Plate XXVII.

Distance from Hensbarrow to St. Agnes Beacon, 97084,8 Feet. Phil. Trans. 1797. p. 461.

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.	
							Feet.	
1.	St. Agnes Beacon	47° 10' 0,75"	−0,15	"	"	47° 10' 3,25"		
	Hensbarrow - -	67° 6' 13,25"	−0,58			67° 6' 13"		
	Trevoze Head -	65° 43' 47"	−0,57			65° 43' 43,75"		
		180° 0' 1"				1,31		−0,31
		Trevoze Head from { St. Agnes Beacon - - 98108,1 Hensbarrow - - 78099,9						

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		$\begin{smallmatrix} ^{\circ} & ' & '' \\ 48 & 57 & 8,25 \end{smallmatrix}$	$-0,24$	"	"	$\begin{smallmatrix} ^{\circ} & ' & '' \\ 48 & 57 & 9,25 \end{smallmatrix}$	Feet.
VI.	Carraton Hill - -	$\begin{smallmatrix} ^{\circ} & ' & '' \\ 39 & 44 & 39 \end{smallmatrix}$	$-0,22$			$\begin{smallmatrix} ^{\circ} & ' & '' \\ 39 & 44 & 38,5 \end{smallmatrix}$	
	Black Down - -	$\begin{smallmatrix} ^{\circ} & ' & '' \\ 91 & 18 & 12,75 \end{smallmatrix}$				$\begin{smallmatrix} ^{\circ} & ' & '' \\ 91 & 18 & 12,25 \end{smallmatrix}$	
	St. Stephen's Down	$\begin{smallmatrix} ^{\circ} & ' & '' \\ 180 & 0 & 0 \end{smallmatrix}$		0,89	$-0,89$		
	St. Stephen's Down from { Carraton Hill - - -						52991,3
	Black Down - - -						62506,7

Distance from Carraton Hill to Kit Hill, 33427 feet. Phil. Trans. 1797. p. 459.

VII.	Carraton Hill - -	$\begin{smallmatrix} ^{\circ} & ' & '' \\ 70 & 15 & 32 \end{smallmatrix}$	$-0,14$			$\begin{smallmatrix} ^{\circ} & ' & '' \\ 70 & 15 & 32,25 \end{smallmatrix}$	
	St. Stephen's Down	$\begin{smallmatrix} ^{\circ} & ' & '' \\ 37 & 1 & 56 \end{smallmatrix}$	$-0,11$			$\begin{smallmatrix} ^{\circ} & ' & '' \\ 37 & 1 & 55,75 \end{smallmatrix}$	
	Kit Hill - -	$\begin{smallmatrix} ^{\circ} & ' & '' \\ . & . & . \end{smallmatrix}$				$\begin{smallmatrix} ^{\circ} & ' & '' \\ 72 & 42 & 32 \end{smallmatrix}$	
	St. Stephen's Down from { Carraton Hill - - -						52994
	Kit Hill - - -						52540,4

Mean distance from St. Stephen's Down to Carraton Hill, 52292,7 feet.

VIII.	St. Stephen's Down	$\begin{smallmatrix} ^{\circ} & ' & '' \\ 54 & 16 & 13 \end{smallmatrix}$	$-0,19$			$\begin{smallmatrix} ^{\circ} & ' & '' \\ 54 & 16 & 12,5 \end{smallmatrix}$	
	Black Down - -	$\begin{smallmatrix} ^{\circ} & ' & '' \\ 52 & 57 & 37 \end{smallmatrix}$	$-0,19$			$\begin{smallmatrix} ^{\circ} & ' & '' \\ 52 & 57 & 36,5 \end{smallmatrix}$	
	Kit Hill - -	$\begin{smallmatrix} ^{\circ} & ' & '' \\ . & . & . \end{smallmatrix}$				$\begin{smallmatrix} ^{\circ} & ' & '' \\ 72 & 46 & 11 \end{smallmatrix}$	
	Black Down from { Kit Hill - - -						53128
	St. Stephen's Down - - -						62509,2

Hence the mean distance from Black Down to St. Stephen's Down, is 62508 feet.

In the third triangle, the angle at Cadon Barrow is supplementary. When the observations were made at that station, a direction-post at Bodmin Down was mistaken for the staff, (to which it was similar in shape,) erected at no great distance from it. This error was not detected till long after : and, although it has been a maxim to which we have generally adhered, of observing all the angles of

each triangle, yet, for the reasons assigned in the preface, I have chosen to depart from it on the present occasion. In another principal triangle, the angle at Brown Willy is also supplementary : it has already been mentioned, that an instrument cannot be got on the top of it. As to the angles at Kit Hill, in the two last triangles, being inferred ones, it may be proper to mention, that Black Down was chosen for a station, after the observations were made at the former. To have visited Kit Hill a second time would have been unnecessary, because there are not any distances, except to interior objects, which depend upon those triangles.

ART. XII. *Calculation of the Sides of a Set of principal Triangles, carried on from the Side which joins the Stations on Beacon Hill, near Amesbury, and Wingreen Hill, near Shaftsbury, towards the Base of Verification on King's Sedgemoor. Plate XXIX.*

Distance from Beacon Hill to Wingreen Hill, 114522,4 Feet. Phil. Trans. 1795. p. 501.

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
							Feet.
IX.	Wingreen Hill -	89 57 37,75	—0,97	"	"	89 57 37	
	Beacon Hill -	32 11 43,25	—0,48			32 11 43	
	Bradley Knoll	57 50 38,25	—0,48			57 50 40	
		179 59 59,25		1,93	—2,68		
	Bradley Knoll from { Wingreen - - - Beacon Hill - - -						72074 135272,3
X.	Bradley Knoll -	40 43 52	—0,26			40 43 51,5	
	Wingreen -	96 20 37	—0,65			96 20 36,25	
	Bull Barrow -	42 55 32,75	—0,25			42 55 32,25	
		180 0 1,75		1,16	+0,55		
	Bull Barrow from { Bradley Knoll - - - Wingreen - - -						105180 69053,6

In the Philosophical Transactions for 1797, p. 455, the distance from Bull Barrow to Wingreen is said to be 69058, being $4\frac{1}{2}$ feet greater than the above conclusion.

No of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances, Feet.
x i.	Bull Barrow - Bradley Knoll Ash Beacon -	$\begin{array}{r} 0 \quad 38 \quad 47,75 \\ 40 \quad 38 \quad 47,75 \\ 45 \quad 43 \quad 3,5 \\ 93 \quad 38 \quad 12,5 \end{array}$	$\begin{array}{r} -0,28 \\ -0,28 \\ -0,65 \end{array}$	"	"	$\begin{array}{r} 0 \quad 38 \quad 47,75 \\ 40 \quad 38 \quad 47,75 \\ 45 \quad 43 \quad 3,25 \\ 93 \quad 38 \quad 11,5 \end{array}$	<p>Ash Beacon from { Bradley Knoll - Bull Barrow -</p> <p>68650,6 75451</p>
x ii.	Beacon Hill - Bradley Knoll Westbury Down	$\begin{array}{r} 23 \quad 4 \quad 15 \\ 42 \quad 43 \quad 29,75 \\ 114 \quad 12 \quad 18,5 \end{array}$	$\begin{array}{r} -0,08 \\ +0,07 \\ -0,97 \end{array}$			$\begin{array}{r} 23 \quad 4 \quad 14,75 \\ 42 \quad 43 \quad 28,25 \\ 114 \quad 12 \quad 17 \end{array}$	<p>Westbury Down from { Beacon Hill - Bradley Knoll -</p> <p>100625,1 58118,2</p>
x iii.	Westbury Down Bradley Knoll - Mendip Hills -	$\begin{array}{r} 40 \quad 48 \quad 1,75 \\ 101 \quad 23 \quad 59 \\ 37 \quad 47 \quad 58,5 \end{array}$	$\begin{array}{r} -0,12 \\ -0,48 \\ -0,16 \end{array}$			$\begin{array}{r} 40 \quad 48 \quad 1,75 \\ 101 \quad 23 \quad 59,75 \\ 37 \quad 47 \quad 58,5 \end{array}$	<p>Mendip Hills from { Westbury Down - Bradley Knoll -</p> <p>92954,0 61961,1</p>
<i>Base of verification.</i> —Greylock's Foss to Lugshorn Corner, 27680 feet.							
x iv.	Lugshorn Corner Greylock's Foss - Dundon Beacon -	$\begin{array}{r} 107 \quad 44 \quad 31 \\ 8 \quad 30 \quad 0 \\ 63 \quad 45 \quad 29 \end{array}$				$\begin{array}{r} 107 \quad 44 \quad 31 \\ 8 \quad 30 \quad 0 \\ 63 \quad 45 \quad 29 \end{array}$	<p>Dundon Beacon from { Lugshorn Corner Greylock's Foss</p> <p>4561,5 29393</p>

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		^o ['] ["]	["]	["]	["]	^o ['] ["]	Feet.
xix.	Moor Lynch -	54 3 22,5	-0,42			54 3 22	
	Mendip Hills -	69 26 48,25	-0,49			69 26 47	
	Ash Beacon -	56 29 51,5	-0,42			56 29 51	
		180 0 2,25		1,33	+0,92		
	Ash Beacon from { Moor Lynch - - - Mendip Hills - - -						88571 76851
xx.	Mendip Hills -	58 16 22	-0,30			58 16 21,5	
	Ash Beacon -	50 8 45,5	-0,28			50 8 45,25	
	Bradley Knoll -	71 34 55	-0,36			71 34 54,25	
		180 0 2,5		0,95	+1,55		
	Bradley Knoll from { Mendip Hills - - - Ash Beacon - - -						61963,5 68653,6

The distance from Bradley Knoll to the station on Mendip Hills, and also to that on Ash Beacon, is given in the preceding triangles, independent of the above values. The first is 61961,1, and the second 68650,6 feet: these distances have their origin in the base on Salisbury Plain. The other distances are 61963,5, and 68653,6 feet; and these depend on the base of verification on King's Sedgemoor. There is, therefore, a difference of $2\frac{4}{10}$ feet between the values of one distance, (12 miles nearly,) and 3 feet between those of the other, which is about 13 miles in length. If the computations had been carried on from one base to another, the difference between the measured base on Sedgemoor and the computed base, would have appeared to be *one foot nearly*. I have already delivered it as my opinion, that an error of nine inches may exist in the new base: therefore, these results must be considered as satisfactory enough. A different correction of the observed angles, or another selection of

the angles themselves, might afford a closer agreement; but I can see no just reason for making any alterations in one or the other. I shall now take the means of the distances, as derived from both bases, and consider 68652,2 feet as the true distance from Ash Beacon to Bradley Knoll; and 61962,3 feet for that between Bradley Knoll and the station on Mendip Hills.

In one of the foregoing triangles, (Bull Barrow, Bradley Knoll, and Ash Beacon,) the distance between Ash Beacon and Bull Barrow is found to be 75451 feet. If the *mean distance* between Bradley Knoll and Ash Beacon, *viz.* 61962,3 feet, be now used, 75452,7 feet becomes the distance between those stations; and this I shall use, in computing the sides of the two triangles which immediately follow.

No. of triangles	Names of stations;	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		^o ['] ["]	["]	["]	["]	^o ['] ["]	Feet.
xxi.	Ash Beacon -	34 18 56,25	-0,14	"	"	34 18 55,75	
	Bull Barrow -	51 26 42	-0,13			51 26 41,75	
	Mintern -	94 14 23	-0,32			94 14 22,5	
		180 0 1,25		0,59	+0,66		
	Mintern from { Ash Beacon - - - Bull Barrow. - - -						59166,6 42653,7
xxii.	Pilsden - -	35 3 1	-0,24			35 3 0,75	
	Ash Beacon -	49 21 38,25	-0,24			49 21 38	
	Mintern -	95 35 22	-0,60			95 35 21,25	
		180 0 1,25		1,08	+0,17		
	Pilsden from { Ash Beacon - - - Mintern - - -						102535 78177,6

In our last account, (see Phil. Trans. 1797. p. 455 and 456,) the distance from Bull Barrow to Mintern was found to be 42653,4 feet; and the distance from Pilsden to Mintern 78177 feet. The distances derived from the above triangles are very nearly the same; a difference of a few inches only existing between them.

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		° ' "	" "	"	"	° ' "	Feet.
xxiii.	Moor Lynch -	57 19 3,5	-0,64			57 19 2,5	
	Ash Beacon -	76 2 36,5	-0,39			76 2 36	
	Pilsden -	. . .				46 38 21,5	
	Pilsden from Moor Lynch - - -						118230

But Pilsden was also observed from Dundon Beacon ; from which, and the angle observed at Moor Lynch, between Dundon Beacon and Pilsden, results the following triangle.

xxiv.	Moor Lynch -	56 43 36,75	+0,03			56 43 36,5	
	Dundon Beacon -	108 1 52	-0,64			108 1 51,75	
	Pilsden -	. . .				15 14 31,75	
	Pilsden from Moor Lynch - - -						118233,6

Hence, the mean distance from Moor Lynch to Pilsden is 118231,8 feet; and this is the side from which the series about to be carried on, for the survey of the north of Devonshire, is to originate.

In the triangle formed by the stations on Mendip Hills, Bradley Knoll, and Westbury Down, the distance between the first and last is 92954,0 feet; but, computing with the mean distance from Mendip to Bradley Knoll, (61962,3 feet,) as found from both bases, the distance from Mendip to Westbury Down proves to be 92955,9 feet; which distance is used in the remaining principal triangles in this quarter.

xxv.	Farley Down -	77 21 53,75	-0,44			77 21 52,75	
	Westbury Down -	63 42 51,25	-0,34			63 42 49,75	
	Mendip Hills -	38 55 17,5	-0,30			38 55 17,5	
		180 0 2,5		1,10	+1,40		
	Mendip from { Farley Down - - -						85412,2
	{ Westbury Down - - -						92955,9

No. of triangles.	Names of stations.	Observed angles	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		[°] ['] ["]	["]	["]	["]	[°] ['] ["]	Fect.
xxvi.	Mendip - -	60 36 15,5	-0,40	"	"	60 36 15	
	Dundry - -	69 52 22	-0,44			69 52 22	
	Farley Down -	49 31 23,5	-0,37			49 31 23	
		180 0 1		1,21	-0,21		
	Dundry from { Farley Down - - - -						79255,3
	{ Mendip - - - -						69196
xxvii.	Mendip - -	41 3 58,5	-0,25			41 3 58,25	
	Dundry - -	83 34 18	-0,40			83 34 17,5	
	Lansdown - -	. . .				55 21 44,25	
	Lansdown from { Mendip - - - -						83573,2
	{ Dundry - - - -						55249,2
xxviii.	Dundry - -	13 41 56,25	-0,09			13 41 56	
	Farley Down -	27 5 27,5	-0,11			27 5 27,25	
	Lansdown - -	. . .				139 12 36,75	
	Lansdown from { Farley Down - - - -						28730,4
	{ Dundry - - - -						55248,7

Wherefore, the mean distance from Dundry to Lansdown is 52248,9 feet.

ART. XIII. *Calculation of the sides of certain principal Triangles, carried on from the side Bagshot Heath and Highclere, towards the north. Plate XXXI.*

Distance from Bagshot Heath to Highclere, 142952,6 feet. Phil. Trans. 1795. p. 496.

xxix.	Bagshot Heath -	55 32 26	-0,89			55 32 25,25	
	Highclere -	46 10 18,25	-0,83			46 10 17,75	
	Nuffield - -	78 17 18,25	-1,20			78 17 17	
		180 0 2,5		2,94	-0,43		
	Nuffield from { Bagshot Heath - - -						105321,2
	{ Highclere - - -						120374

No. of triangles.	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
xxx.	White Horse Hill	63° 7' 53,25	-0,94	"	"	63° 7' 53,5	Feet.
	Highclere - -	63 18 16,75	-0,94			63 18 17	
	Nuffield - -	53 33 49,5	-0,86			63 33 49,5	
		179 59 59,5		2,74	-3,24		
	White Horse Hill from { Nuffield - - -						120557,7
	{ Highclere - - -						108563,1

Distance from Beacon Hill to Highclere, 98694,4 feet. Phil. Trans. 1795. p. 497.

xxx i.	Beacon Hill - -	17 42 38,5	-0,12			17 42 38,25	
	Highclere - -	56 0 29,75	+0,08			56 0 29,25	
	Inkpin Hill - -	106 16 53,25	-0,47			106 16 52,5	
		180 0 1,5		0,50	+1,0		
	Inkpin Hill from { Highclere - - -						31278,8
	{ Beacon Hill - - -						85247,9
xxx ii.	Highclere - -	34 27 50,75	+0,38			34 27 50,75	
	Inkpin Hill -	133 27 57,5	-0,91			133 27 58	
	White Horse Hill	12 4 11,5	+0,04			12 4 11,25	
		179 59 59,75		0,49	-1,24		
	White Horse Hill from { Highclere - - -						108565,5
	{ Inkpin - - -						84647,1

In the following computations, I shall use 120557,7 feet for the distance between White Horse Hill and Nuffield: this is derived from the base on Hounslow Heath. By the last triangle, White Horse Hill, from Highclere, is distant 108565,5 feet; which is computed from the base on Salisbury Plain. The distance between those stations, found by the second of the above triangles, is 108563,1 feet. Therefore, whether the distance between White Horse Hill and Nuffield be founded on the base measured on Salisbury Plain, or Hounslow Heath, nearly the same conclusion is derived: the difference will

No. of triangles.	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
xxxvii.	Broadway Beacon Epwell - Corley - -	$\begin{array}{r} 56^{\circ} 32' 45'' \\ 95 \quad 34 \quad 25,25 \\ 27 \quad 52 \quad 49,75 \\ \hline 180 \quad 0 \quad 0 \end{array}$	$\begin{array}{r} -0,34 \\ -1,62 \\ -0,61 \end{array}$	$\begin{array}{r} '' \\ '' \\ '' \\ \hline 1,58 \end{array}$	$\begin{array}{r} '' \\ '' \\ '' \\ \hline -1,58 \end{array}$	$\begin{array}{r} 56^{\circ} 32' 44,75'' \\ 95 \quad 34 \quad 24,75'' \\ 27 \quad 52 \quad 50,5'' \\ \hline \end{array}$	Feet. Corley from Broadway Beacon - - 171568
xxxviii.	Brill - - Epwell - Arbury Hill -	$\begin{array}{r} 34 \quad 23 \quad 58,5 \\ 85 \quad 0 \quad 18,5 \\ 60 \quad 35 \quad 45,5 \\ \hline 180 \quad 0 \quad 2,5 \end{array}$	$\begin{array}{r} -0,65 \\ -1,10 \\ -0,70 \end{array}$	$\begin{array}{r} \\ \\ \\ \hline 2,46 \end{array}$	$\begin{array}{r} \\ \\ \\ \hline -0,04 \end{array}$	$\begin{array}{r} 34 \quad 23 \quad 57,5 \\ 85 \quad 0 \quad 17,5 \\ 60 \quad 35 \quad 57,5 \\ \hline \end{array}$	Arbury Hill from { Epwell - - 83098,4 Brill - - 146530
xxxix.	Arbury Hill - Epwell - Corley -	$\begin{array}{r} 89 \quad 57 \quad 4,5 \\ 54 \quad 45 \quad 18,75 \\ 35 \quad 17 \quad 36,75 \\ \hline 180 \quad 0 \quad 0 \end{array}$	$\begin{array}{r} -1,14 \\ -0,57 \\ -0,57 \end{array}$	$\begin{array}{r} \\ \\ \\ \hline 2,29 \end{array}$	$\begin{array}{r} \\ \\ \\ \hline -2,29 \end{array}$	$\begin{array}{r} 89 \quad 57 \quad 5,5 \\ 54 \quad 45 \quad 18,25 \\ 35 \quad 17 \quad 36,25 \\ \hline \end{array}$	Corley from { Arbury Hill - - 117463 Epwell - - 143827,8

By the triangle Broadway Beacon, Epwell, Corley, (see the above) the distance from Corley to Broadway Beacon is the only distance computed; and this has been obtained through the means of two observed angles only. When the observations were made at Broadway Beacon, it was not imagined Corley could be seen; and the contrary was not known till the party arrived at the latter place. In so large a triangle, it would certainly be right to observe all the angles: but I have given the angles as they now stand, because the distance from Epwell to Corley comes out 143831 feet, which determination differs only three feet from the same distance found by the last triangle.

xl.	Bow Brickhill - Arbury Hill - Brill - -	$\begin{array}{r} 68 \quad 22 \quad 56,75 \\ 43 \quad 16 \quad 55,5 \\ 68 \quad 20 \quad 7,75 \\ \hline 180 \quad 0 \quad 0 \end{array}$	$\begin{array}{r} -1,21 \\ -0,99 \\ -1,22 \end{array}$	$\begin{array}{r} \\ \\ \\ \hline 3,43 \end{array}$	$\begin{array}{r} \\ \\ \\ \hline -3,43 \end{array}$	$\begin{array}{r} 68 \quad 22 \quad 59 \\ 43 \quad 16 \quad 54,5 \\ 68 \quad 20 \quad 6,5 \\ \hline \end{array}$	Bow Brickhill from { Arbury Hill - - 146481 Brill - - 108058,9
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It will now be expedient to compute the distance from Bow Brickhill to Brill, by means of another set of triangles. And it was for the express purpose of verifying this distance found by the last triangle, that Scutchamfly Barrow, in Berkshire, and the station above Wendover, were chosen. The base on which these triangles are to rest, is the distance between Nuffield and White Horse Hill, *viz.* 120557,7 feet.

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
XLI.	Nuffield -	62° 32' 5,25	—0,53	"	"	62° 32' 6	Feet. 108050,2 70842,1
	White Horse Hill	35 34 23,25	—0,47			35 34 24	
	Shotover Hill -	81 53 29,75	—0,74			81 53 30	
		179 59 58,25		1,75	—3,5		
	Shotover Hill from { White Horse Hill - Nuffield - -						
XLII.	Shotover Hill -	26 8 8	—0,12			26 8 8	51261,9 77968,3
	White Horse Hill	42 4 2	—0,04			42 4 2	
	Scutchanfly Barrow	111 47 50	—0,70			111 47 50	
		180 0 0		0,86	—0,86		
	Scutchanfly Barrow from { White Horse Hill - Shotover Hill - -						
XLIII.	Shotover Hill -	117 30 56	—1,41			117 30 55,25	147113,3 93828,6
	Scutchanfly Barrow	34 26 52	—0,01			34 26 52	
	Wendover -	28 2 12,75	—0,09			28 2 12,75	
		180 0 0,75		1,52	—0,77		
	Wendover from { Scutchanfly Barrow - Shotover - -						

No. of triangles	Names of Stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		° ' "	"	"	"	° ' "	Feet.
XLIV.	Wendover -	23 23 57,5	0,11	"	"	23 23 57,25	
	Shotover Hill -	48 30 39,75	0,04			48 30 40,5	
	Brill -	. . .				108 5 22,25	
				1,21			
Brill from { Wendover - - - { Shotover Hill - - -							73940,3 39200,2
XLV.	Wendover -	80 11 9,25	-0,67			80 11 8,5	
	Brill -	57 25 1,5	-0,47			57 25 0,75	
	Bow Brickhill -	42 23 50,75	-0,44			42 23 50,75	
		180 0 1,51		1,58	-0,07		
Bow Brickhill from { Wendover - - - { Brill - - -							92400,7 108055
According to the first determination, the distance from Bow Brickhill to Brill is 108058,9 feet, and by the last, 108855 feet. There is, therefore, a difference of 4 feet nearly; a quantity which must be deemed inconsiderable; hence, 108056,9 feet may be taken for the true distance.							
XLVI.	Kinsworth -	62 55 38,75				62 55 38,5	
	Bow Brickhill -	88 42 0				88 41 59,25	
	Brill -	. . .				28 22 22,25	
Kinsworth from { Brill - - - { Bow Brickhill - - -							121322,5 57668
XLVII.	Wendover -	33 26 48				33 26 49	
	Quainton -	94 58 37				94 58 38	
	Brill -	51 34 33				51 34 33	
		179 59 58		0,55	-2,55		
Quainton from { Brill - - - { Wendover - - -							40908 58146,4

No. of triangles	Names of Stations.	Angles observed.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		$\begin{smallmatrix} ^{\circ} & ' & '' \\ 38 & 51 & 40,75 \\ 46 & 44 & 29,5 \\ 94 & 23 & 50,25 \end{smallmatrix}$	"	"	"	$\begin{smallmatrix} ^{\circ} & ' & '' \\ 38 & 51 & 40,75 \\ 46 & 44 & 29,25 \\ 94 & 23 & 50 \end{smallmatrix}$	Fect.
XLVIII	Bow Brickhill - Wendover - - Quainton -	$\begin{smallmatrix} 180 & 0 & 1,25 \end{smallmatrix}$		0,83	+0,42		
	Quainton from	{ Wendover - - Bow Brickhill - -					58146,9 67491,3

In the above triangle, I have computed the distances of Wendover and Bow Brickhill from Quainton with 92400,7 feet, the side Wendover and Bow Brickhill, as determined in a former triangle.

XLIX.	Bow Brickhill - Kinsworth - - Quainton - -	$\begin{smallmatrix} 85 & 9 & 52,75 \\ 52 & 17 & 56,75 \\ . & . & . \end{smallmatrix}$				$\begin{smallmatrix} 85 & 9 & 52 \\ 52 & 17 & 56 \\ 42 & 32 & 12 \end{smallmatrix}$	
	Quainton from	{ Kinsworth - - Bow Brickhill - -					84997 67490,3

Therefore, 67490 may be considered as nearly the true distance, in feet, between Quainton and Bow Brickhill.

L.	Bow Brickhill - Kinsworth - - Lillyhoe - -	$\begin{smallmatrix} 42 & 10 & 36,75 \\ 82 & 50 & 30,5 \\ 54 & 38 & 53 \end{smallmatrix}$				$\begin{smallmatrix} 42 & 10 & 36,5 \\ 82 & 50 & 30 \\ 54 & 38 & 53,5 \end{smallmatrix}$	
		$\begin{smallmatrix} 180 & 0 & 0,25 \end{smallmatrix}$		1,26	-1,50		
	Lillyhoe from	{ Kinsworth - - Bow Brickhill - -					47278,7 69867

As the stations Lidlington, Trusler Hill, together with Crouch Hill, Cumner Hill, and Whiteham Hill, have been used for purposes of greater importance than secondary ones have been generally applied to, I shall insert the triangles formed by their intersections in this article.

[illegible]

L.II.	Lillyhoe	- -	78 58 26				78 58 26	
	Kinsworth	-	51 46 22				51 46 22	
	Lidlington	-	. . .				49 15 12	
			Lillyhoe from { Kinsworth { Lidlington	- - -			47280 49025	

The distance from Lillyhoe to Kinsworth, as found in a former triangle, is 47278.1 feet, and by the last 47280 feet ; therefore, 47279.3 may be taken for the true distance in feet.

LIII.	Bow Brickhill	-							38 28 56	
	Lillyhoe	- -							23 59 3 ⁱ	
	Lidington	-							. . .	
									117 3 ⁱ 33	

Lillyhoe from { Lidington - - 49027.3
Bow Brickhill - - 69869

And this triangle, with that preceding it, gives the mean distance between Lillyhoe and Lidlington = 49026.1 feet; and, with the triangle Lillyhoe, Kinsworth, and Bow Brickhill, it assigns 69868 feet for the mean distance between Lillyhoe and Bow Brickhill.

LIV.	Lillyhoe -	5 52 11,5			5 52 11,5
	Bow Brickhill -	14 54 42,75			14 54 42,75
	Trusler Hill -	. . .			159 13 5,75
	Trusler Hill from { Bow Brickhill "				20138,7
	{ Lillyhoe -				50673,6

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
LIV.	Crouch Hill - Epwell - Brill -	$\begin{array}{ccc} 0 & ' & '' \\ 145 & 23 & 26,25 \\ 27 & 3 & 10 \\ . & . & . \end{array}$	"	"	"	$\begin{array}{ccc} 0 & ' & '' \\ 145 & 23 & 26 \\ 27 & 3 & 10 \\ 7 & 33 & 24 \end{array}$	Fect. Crouch Hill from { Brill - Epwell -
							102608 29668,8

Distance from White Horse Hill to Shotover Hill 108050,2 feet.

L.V.	Shotover Hill - White Horse - Whiteham Hill -	$\begin{array}{ccc} 48 & 5 & 32,75 \\ 16 & 59 & 53,75 \\ 114 & 54 & 34,75 \\ 180 & 0 & 1,25 \end{array}$				$\begin{array}{ccc} 48 & 5 & 32,25 \\ 16 & 59 & 53,25 \\ 114 & 54 & 34,5 \end{array}$	
	Whiteham Hill from {	White Horse Hill - Shotover Hill -					88662,2 34827,4

LVI.	Whiteham Hill - Shotover Hill - Cumner Hill -	$\begin{array}{ccc} 55 & 52 & 35 \\ 24 & 37 & 36 \\ 99 & 29 & 48,5 \\ 179 & 59 & 59,5 \end{array}$				$\begin{array}{ccc} 55 & 52 & 36 \\ 24 & 37 & 37 \\ 99 & 29 & 47 \end{array}$	
	Cumner Hill from {	Shotover Hill - Whiteham Hill -					29231,5 14714,3

And, because the Observatory of his Grace the Duke of MARLBOROUGH, at Blenheim, together with that at Oxford, have been observed with the same care and attention as the principal stations, and also because precise determinations of the situations are of great importance, I shall here insert the triangles formed by their intersections.

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		° ' "	"	"	"	° ' "	Feet.
LVII.	Shotover Hill - -	23 11 5				23 11 5	
	Cumner Hill - -	29 23 33				29 23 33	
	The Atlas on the top of the Observatory at Oxford	. . .				127 25 22	
	Oxford Observatory from { Cumner Hill - - - Shotover Hill - - -						14492 18065,1
LVIII.	Whiteham Hill -	131 25 36,5				131 25 35,5	
	White Horse Hill -	10 30 43,5				10 30 43,75	
	Blenheim Observatory	. . .				38 3 40,75	
	Blenheim Observatory from { White Horse Hill - - - Whiteham Hill - - -						107831,9 26237,6

ART. XIV. *Triangles for connecting the Series carried on from Scutchamfly Barrow and White Horse Hill, in Berkshire, into Buckinghamshire and Bedfordshire, with the Series carried on for the Survey of Essex.*

The angle at St. Ann's Hill, between the station on Hanger Hill Tower and Hampton Poor House, inferred from General Roy's Account, is $25^{\circ} 33' 58'',5$. In 1793, the angle between the staff on Pen Church Tower and Hampton Poor House was taken, and found $= 95^{\circ} 57' 34'',5$; therefore, the angle between Pen Tower and Hanger Hill is $70^{\circ} 23' 36''$.

The distance from St. Ann's Hill to Pen is determined by

the following triangle, in which the distance between St. Ann's Hill and Bagshot Heath, *viz.* 46955,3 feet, (see Phil. Trans. for 1795, p. 496,) is used for the base.

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		° ' "	"	"	"	° ' "	Fect.
LIX.	St. Ann's Hill	80 43 48				80 43 48	
	Bagshot - -	70 30 37				70 30 37	
	Pen Tower -	. . .				28 45 35	
Pen Tower from {		St. Ann's Hill - -					92000,5
		Bagshot Heath - -					96318

The distance from St. Ann's Hill to Hanger Hill Tower is 68895,8 feet: this is derived from the *mean* length of the base on Hounslow Heath. This side, together with St. Ann's Hill and Pen, using the included angle at St. Ann's Hill, as found above, give 94640,5 feet, for the distance between Pen and Hanger Hill Towers.

The angle at St. Ann's Hill, between Bagshot Heath and Hanger Hill Tower, is $151^{\circ} 7' 24'',25$: this, with the sides Bagshot Heath and St. Ann's, St. Ann's and Hanger Hill, give $17^{\circ} 13' 48''$, for the angle at Bagshot Heath, between Hanger Hill Tower and St. Ann's Hill: hence we have the following triangle.

Bagshot Heath - - $16^{\circ} 45' 43''$
Hanger Hill - - $103 \ 18 \ 23$
Stanmore - - $59 \ 55 \ 54$

Which triangle gives 37431 feet, for the distance between Stanmore and Hanger Hill Tower.

The angle at the station on Bow Brickhill, (see the preceding article,) between Wendover and Kinsworth, is $46^{\circ} 18' 8'',5$; and the distances from it to these stations are 92402,2 feet, and 57668 feet respectively: these give the following triangle.

Bow Brickhill	-	$46^{\circ} 18' 8'',5$
Wendover	-	$38 25 21,25$
Kinsworth	-	$95 16 30,25$

From which the distance between Wendover and Kinsworth is found = 67090,7 feet. The observed angle at Wendover, between Bow Brickhill and Stanmore, is $102^{\circ} 22' 29''$; from which, subtracting $38^{\circ} 25' 21'',25$, the angle between Bow Brickhill and Kinsworth, we get $63^{\circ} 57' 7'',75$, for the angle between Kinsworth and Stanmore. Again, the observed angle at Kinsworth, between Bow Brickhill and Stanmore, is $173^{\circ} 37' 44''$; from which, subtracting the angle between Bow Brickhill and Wendover, we get $78^{\circ} 21' 13'',75$, for the angle between Stanmore and Wendover. If these *computed* angles are actually such as might be observed, were Kinsworth and Wendover visible from each other, the angle at Stanmore between those stations ought to be $37^{\circ} 41' 39''$, nearly: but the observed angle was $37^{\circ} 41' 41'',75$; which is so nearly the computed one, as to leave little doubt of the accuracy of those *data* from which the angles are derived. The distance from Wendover to Kinsworth is 67090,7 feet.

Wendover	-	$63 57 7,75$	} which, corrected for calculation, becomes,
Kinsworth	-	$78 21 13,75$	
Stanmore	-	$37 41 41,75$	
		$180 0 3,25$	

Wendover	-	63° 57' 7"	
Kinsworth	-	78° 21' 12"	
Stanmore	-	37° 41' 41"	which triangle gives

the distance of Stanmore from $\left\{ \begin{array}{l} \text{Wendover} = 107464,1 \\ \text{Kinsworth} = 98577,5 \end{array} \right\}$ feet.

In consequence of Bushy Heath intercepting the view towards the east from Stanmore, it became necessary to choose a station on the former. To determine the distance, the angles at the two stations were taken very accurately; they were as follows,

Stanmore	-	42° 11' 21,5"	
Bushy Heath	-	135° 35' 40,5"	
Kinsworth,	.	.	which gives 5483,3 feet for the required distance.

To determine the distance of the station on Pen Church Tower, we have two angles in the following triangle, *viz.*

Wendover	-	38° 13' 18"	} which, corrected for calculation, becomes,
Stanmore	-	23° 44' 48"	
Pen Tower	-	118° 1' 54"	
Wendover	-	38° 13' 18,25"	
Stanmore	-	23° 44' 48,25"	
Pen Tower	-	118° 1' 54,5"	which triangle gives

the distance of Pen from $\left\{ \begin{array}{l} \text{Wendover} = 49027 \\ \text{Stanmore} = 75325,4 \end{array} \right\}$ feet.

With this distance of Stanmore from Pen, found from the last triangle, and also that between Stanmore and Hanger Hill, derived from the triangle, Bagshot Heath, Hanger Hill, and Stanmore, together with the included angle at Stanmore, *viz.* 109° 28' 22",5, we get the distance of Pen to Hanger Hill Tower = 94631,8 feet. The same distance has been found before, in a shorter and more direct way, being 94640,5 feet: the difference is only 8,7 feet; a sufficient proof that the distances given for the survey of this intricate and woody country, are

sufficiently correct. It will be more convenient to show how these triangles are connected with those to the eastward, when I arrive at that part of the work which treats of the survey of Essex, than at present. I shall, therefore, proceed to the following article, after observing, that by the help of Harrow Spire, (the situation of which has been determined by General ROY,) and by observations hereafter to be made with the small instrument on Pen Tower, less difficulty will occur in the interior survey than was at first expected.

ART. XV. *Triangles formed by the intersections of Churches, Windmills, and other Objects.*

Triangles.	Angles observed.	Distances of the Stations from the intersected Objects.	
Little Haldon - - -	° 23 54 50	} Great Haldon - {	Feet. 18974
Ball's Obelisk - - -	132 41 8		19366
<i>Great Haldon, secondary station</i>			
Great Haldon from Ball's Obelisk 19366 feet.			
Great Haldon - - -	68 ° 35	} Topsham Steeple - {	28316
Ball's Obelisk - - -	71 32 30		27679
<i>Topsham Steeple</i>			
Little Haldon from Furland 72776 feet.			
Little Haldon - - -	18 2 2	} Hope's Nose - {	37656
Furland - - -	18 42 53		39028
<i>Hope's Nose, secondary station</i>			
Bodmin from Trevose 81967,6 feet.			
Bodmin - - -	15 48 43	} St. Minvern Steeple {	45936
Trevose - - -	21 28 36		36866
<i>St. Minvern Steeple</i>			
Bodmin - - -	12 5 33	} St. Minvern Windmill {	34852
Trevose - - -	8 46 51		48478
<i>St. Minvern Windmill</i>			

Trevose from Cadon Barrow 85624.8 feet.

Triangles.	Angles observed.	Distances of the stations from the intersected objects.	
Trevose - - -	$\begin{smallmatrix} 0 & 38 & 59 \\ 55 & 19 & 48 \end{smallmatrix}$	} St. Isey Steeple - {	29256
Cadon Barrow - - -			73216
<i>St. Isey Steeple</i>			
Trevose - - -	$\begin{smallmatrix} 58 & 41 & 39 \\ 6 & 38 & 22 \end{smallmatrix}$	} St. Merian Steeple - {	10894
Cadon Barrow - - -			80504
<i>St. Merian Steeple</i>			

Black Down from St. Stephen's 62506.7 feet.

Black Down - - -	$\begin{smallmatrix} 4 & 46 & 37 \\ 74 & 20 & 14 \end{smallmatrix}$	} Werrington Steeple - {	61289
St. Stephen's Down - - -			5301
<i>Werrington Steeple</i>			
Black Down - - -	$\begin{smallmatrix} 15 & 18 & 49 \\ 104 & 53 & 9 \end{smallmatrix}$	} Boyton Steeple - {	69897
St. Stephen's - - -			19101
<i>Boyton Steeple</i>			
Black Down - - -	$\begin{smallmatrix} 1 & 8 & 22 \\ 30 & 7 & 22 \end{smallmatrix}$	} St. Stephen's Steeple {	60448
St. Stephen's - - -			2395
<i>St. Stephen's Steeple</i>			
Black Down - - -	$\begin{smallmatrix} 5 & 31 & 36 \\ 153 & 13 & 23 \end{smallmatrix}$	} North Petherwin Steeple {	77698
St. Stephen's - - -			16610
<i>North Petherwin Steeple</i>			

Carraton from St. Stephen's 52994 feet.

Carraton - - -	$\begin{smallmatrix} 50 & 40 & 15 \\ 38 & 21 & 4 \end{smallmatrix}$	} Stokeclimsland Steeple {	32886
St. Stephen's - - -			40997
<i>Stokeclimsland Steeple</i>			
Carraton - - -	$\begin{smallmatrix} 6 & 11 & 7 \\ 55 & 32 & 16 \end{smallmatrix}$	} Launceston Steeple {	49613
St. Stephen's - - -			6483
<i>Launceston Steeple</i>			
Carraton - - -	$\begin{smallmatrix} 5 & 58 & 26 \\ 53 & 7 & 35 \end{smallmatrix}$	} Launceston Chapel - {	49404
St. Stephen's - - -			6427
<i>Launceston Chapel</i>			

Long Knoll from Westbury 58118.2 feet.

Long Knoll - - -	$\begin{smallmatrix} 45 & 5 & 0 \\ 34 & 53 & 50 \end{smallmatrix}$	} Frome Steeple - {	33765
Westbury - - -			41793
<i>Frome Steeple</i>			

Lansdown from Farley Down 28730.4 feet.

Triangles.	Angles observed.	Distances of the stations from the intersected objects.	
Lansdown - - -	$\begin{smallmatrix} 0 & 1 & 2 \\ 56 & 43 & 16 \\ 28 & 2 & 35 \end{smallmatrix}$	} Cold Aston -	Feet, 13563
Farley Down - - -			24120
Cold Aston			

Moor Lynch from Dundon 32688.8 feet.

Moor Lynch - - -	$\begin{smallmatrix} 15 & 54 & 56 \\ 23 & 11 & 6 \end{smallmatrix}$	} Walton Windmill -	20406
Dundon - - -			14213
Walton Windmill			
Moor Lynch - - -	$\begin{smallmatrix} 123 & 0 & 11 \\ 19 & 18 & 55 \end{smallmatrix}$	} Westonzoyland Steeple	17688
Dundon - - -			44848
Westonzoyland Steeple			
Moor Lynch - - -	$\begin{smallmatrix} 91 & 5 & 56 \\ 25 & 26 & 0 \end{smallmatrix}$	} Middlezoy Steeple -	15691
Dundon - - -			36530
Middlezoy Steeple			
Moor Lynch - - -	$\begin{smallmatrix} 153 & 58 & 50 \\ 9 & 39 & 13 \end{smallmatrix}$	} Chedzoy Steeple -	19454
Dundon - - -			29556
Chedzoy Steeple			
Moor Lynch - - -	$\begin{smallmatrix} 29 & 20 & 18 \\ 46 & 30 & 22 \end{smallmatrix}$	} Highham Windmill	24457
Dundon - - -			16518
Highham Windmill			
Moor Lynch - - -	$\begin{smallmatrix} 36 & 25 & 56 \\ 39 & 51 & 57 \end{smallmatrix}$	} Highham Steeple -	21567
Dundon - - -			19982
Highham Steeple			
Moor Lynch - - -	$\begin{smallmatrix} 147 & 57 & 0 \\ 16 & 15 & 14 \end{smallmatrix}$	} Bridgewater Spire -	33656
Dundon - - -			63768
Bridgewater Spire			
Moor Lynch - - -	$\begin{smallmatrix} 69 & 52 & 39 \\ 63 & 18 & 59 \end{smallmatrix}$	} Burton Pynsent Obelisk	40063
Dundon - - -			42101
Burton Pynsent Obelisk			
Moor Lynch - - -	$\begin{smallmatrix} 12 & 12 & 41 \\ 129 & 45 & 57 \end{smallmatrix}$	} Somerton Steeple -	40792
Dundon - - -			11221
Somerton Steeple			

Dundry from Lansdown 55248.9 feet.

Triangles.	Angles observed.	Distances of the stations from the intersected objects.	
Dundry - - - -	$\begin{smallmatrix} 22 & 7 & 16 \\ 85 & 25 & 0 \end{smallmatrix}$	} Puckle Church Steeple {	Feet. 57757
Lansdown - - - -			21819
<i>Puckle Church Steeple</i>			
Dundry - - - -	$\begin{smallmatrix} 30 & 37 & 18 \\ 86 & 18 & 39 \end{smallmatrix}$	} Westleigh Steeple - {	61842
Lansdown - - - -			31566
<i>Westleigh Steeple</i>			
Dundry - - - -	$\begin{smallmatrix} 51 & 19 & 11 \\ 22 & 23 & 3 \end{smallmatrix}$	} Bristol Cathedral - {	21920
Lansdown - - - -			44935
<i>Bristol Cathedral</i>			
Dundry - - - -	$\begin{smallmatrix} 44 & 18 & 9 \\ 21 & 22 & 24 \end{smallmatrix}$	} Redcliff Steeple - {	22096
Lansdown - - - -			42346
<i>Redcliff Steeple</i>			
Dundry - - - -	$\begin{smallmatrix} 78 & 18 & 19 \\ 14 & 32 & 8 \end{smallmatrix}$	} Long Aston Steeple - {	13883
Lansdown - - - -			54168
<i>Long Aston Steeple</i>			
Dundry - - - -	$\begin{smallmatrix} 67 & 33 & 51 \\ 13 & 17 & 8 \end{smallmatrix}$	} Clifden Windmill - {	12860
Lansdown - - - -			51725
<i>Clifden Windmill</i>			
Dundry - - - -	$\begin{smallmatrix} 75 & 37 & 25 \\ 39 & 7 & 35 \end{smallmatrix}$	} Blaze Castle - {	38391
Lansdown - - - -			58932
<i>Blaze Castle</i>			
Dundry - - - -	$\begin{smallmatrix} 89 & 10 & 18 \\ 32 & 52 & 56 \end{smallmatrix}$	} Penpole Park Gazebo {	35391
Lansdown - - - -			65180
<i>Penpole Park Gazebo</i>			
Dundry - - - -	$\begin{smallmatrix} 32 & 16 & 31 \\ 31 & 49 & 52 \end{smallmatrix}$	} St. George's Steeple - {	32391
Lansdown - - - -			32795
<i>St. George's Steeple</i>			
Dundry - - - -	$\begin{smallmatrix} 44 & 54 & 50 \\ 48 & 5 & 1 \end{smallmatrix}$	} Duke of Beaufort's House {	41168
Lansdown - - - -			39064
<i>Duke of Beaufort's House, Stoke</i>			
Dundry - - - -	$\begin{smallmatrix} 57 & 15 & 32 \\ 39 & 14 & 57 \end{smallmatrix}$	} Harfield Steeple - {	35182
Lansdown - - - -			46773
<i>Harfield Steeple</i>			

Triangles.	Angles observed.	Distances of the Stations from the intersected Objects.	
Dundry - - - -	$\begin{smallmatrix} 0 \\ 13 \end{smallmatrix} \begin{smallmatrix} 58 \\ 8 \end{smallmatrix} \begin{smallmatrix} 8 \\ 3 \end{smallmatrix}$	} Durham Steeple - {	Feet. 66541
Lansdown - - - -	120 8 3		18573
<i>Durham Steeple</i>			
Dundry - - - -	$\begin{smallmatrix} 63 \\ 59 \end{smallmatrix} \begin{smallmatrix} 45 \\ 9 \end{smallmatrix} \begin{smallmatrix} 11 \\ 55 \end{smallmatrix}$	} Knowle Steeple - {	56512
Lansdown - - - -			59030
<i>Knowle Steeple</i>			
Dundry - - - -	$\begin{smallmatrix} 29 \\ 59 \end{smallmatrix} \begin{smallmatrix} 42 \\ 59 \end{smallmatrix} \begin{smallmatrix} 10 \\ 41 \end{smallmatrix}$	} Mangotsfield Steeple - {	47845
Lansdown - - - -			27376
<i>Mangotsfield Steeple</i>			
Dundry - - - -	$\begin{smallmatrix} 46 \\ 66 \end{smallmatrix} \begin{smallmatrix} 12 \\ 38 \end{smallmatrix} \begin{smallmatrix} 31 \\ 49 \end{smallmatrix}$	} Winterbourn Steeple - {	55045
Lansdown - - - -			43280
<i>Winterbourn Steeple</i>			

Mendip from Dundry 69196 feet.

Dundry - - - -	$\begin{smallmatrix} 15 \\ 104 \end{smallmatrix} \begin{smallmatrix} 0 \\ 10 \end{smallmatrix} \begin{smallmatrix} 54 \\ 15 \end{smallmatrix}$	} Leigh Steeple on Mendip {	76847
Mendip - - - -			20533
<i>Leigh Steeple on Mendip</i>			
Dundry - - - -	$\begin{smallmatrix} 90 \\ 1 \end{smallmatrix} \begin{smallmatrix} 22 \\ 10 \end{smallmatrix} \begin{smallmatrix} 22 \\ 22 \end{smallmatrix}$	} Dundry Steeple - {	1417
Mendip - - - -			69221
<i>Dundry Steeple</i>			

Mendip from Long Knoll 61962,3 feet,

Long Knoll - - - -	$\begin{smallmatrix} 7 \\ 25 \end{smallmatrix} \begin{smallmatrix} 20 \\ 42 \end{smallmatrix} \begin{smallmatrix} 24 \\ 22 \end{smallmatrix}$	} Doulling Spire - {	49286
Mendip - - - -			14517
<i>Doulling Spire</i>			

Farley Down from Westbury 59849,5 feet,

Westbury - - - -	$\begin{smallmatrix} 81 \\ 44 \end{smallmatrix} \begin{smallmatrix} 25 \\ 6 \end{smallmatrix} \begin{smallmatrix} 20 \\ 53 \end{smallmatrix}$	} Devizes Steeple - {	51197
Farley Down - - - -			72726
<i>Devizes Steeple</i>			

Whitehorse from Scutchamfly 51261,9 feet.

Whitehorse - - - -	$\begin{smallmatrix} 32 \\ 104 \end{smallmatrix} \begin{smallmatrix} 55 \\ 3 \end{smallmatrix} \begin{smallmatrix} 51 \\ 27 \end{smallmatrix}$	} Abingdon Spire - {	72898
Scutchamfly - - - -			40852
<i>Abingdon Spire</i>			

Triangles.	Angles observed.	Distances of the Stations from the intersected Objects.	
Whitehorse - - - - Scutchamfly - - - - <i>Wallingford Steeple</i>	° ' " 10 39 30 158 52 26	} Wallingford Steeple -	{ Feet. 101693 52185
Whitehorse - - - - Scutchamfly - - - - <i>Great Coxwell Windmill</i>	121 19 20 21 7 0	} Great Coxwell Windmill	{ 30295 71834
Whitehorse - - - - Scutchamfly - - - - <i>Highworth Steeple</i>	153 24 7 11 21 56	} Highworth Steeple -	{ 38449 87355
Whitehorse - - - - Scutchamfly - - - - <i>Drayton Steeple</i>	28 6 9 99 45 35	} Drayton Steeple -	{ 63991 30586
Whitehorse - - - - Scutchamfly - - - - <i>Radley Steeple</i>	34 8 57 109 33 56	} Radley Steeple -	{ 81618 48624
Whitehorse - - - - Scutchamfly - - - - <i>Buckland Steeple</i>	75 25 57 44 15 50	} Buckland Steeple -	{ 41189 57115
Whitehorse - - - - Scutchamfly - - - - <i>Witney Steeple</i>	81 19 12 62 34 49	} Witney Steeple -	{ 57229 86007
Whitehorse - - - - Scutchamfly - - - - <i>Bampton Steeple</i>	90 57 40 48 27 50	} Bampton Steeple -	{ 58992 78799

Whiteham from Brill 62066,1 feet.

Whiteham - - - - Brill - - - - <i>Islip Steeple</i>	19 47 5 14 55 46	} Islip Steeple - -	{ 28983 38073
Whiteham - - - - Brill - - - - <i>Woodstock Steeple</i>	78 47 7 25 3 58	} Woodstock Steeple -	{ 27956 64725
Whiteham - - - - Brill - - - - <i>Kidlington Spire</i>	38 39 25 18 59 22	} Kidlington Spire -	{ 24677 47373

Whitehorse from Brill 14660 $\frac{1}{2}$ feet,

Triangles.	Angles observed.	Distances of the Stations from the intersected Objects.	
Whitehorse - - - -	46° 10' 15"	} Witchwood Forest Beacon {	Feet. 95439
Brill - - - - -	40 32 9		105936
Witchwood Forest Beacon			

Broadway from Epwell 80611 $\frac{1}{4}$ feet.

Broadway - - - -	46 51 21	} Warwick Steeple - {	109337
Epwell - - - - -	85 48 34		79992
Warwick Steeple			
Broadway - - - -	49 43 19	} St. Martin's, Coventry - {	158205
Epwell - - - - -	100 10 39		122627
St. Martin's Spire, Coventry			
Broadway - - - -	71 52 32	} Soleyhull Spire - {	142027
Epwell - - - - -	74 53 55		139806
Soleyhull Spire			

Corley from Arbury Hill 117463 feet.

Corley - - - - -	10 17 47	} Dun Church Windmill {	70621
Arbury - - - - -	18 1 45		44249
Dun Church Windmill			
Corley - - - - -	107 11 9	} Gazebo on Bardon Hill {	106471
Arbury - - - - -	34 20 2		180344
Gazebo on Bardon Hill, Leicestershire			
Corley - - - - -	100 41 54	} Markfield Windmill - {	103373
Arbury - - - - -	36 37 26		170270
Markfield Windmill			
Corley - - - - -	2 45 41	} Newnham Windmill - {	118771
Arbury - - - - -	101 33 35		5845
Newnham Windmill			

Corley from Broadway 171570 feet.

Broadway - - - -	96 31 27	} Building on Breadon Hill {	46201
Corley - - - - -	14 33 9		182682
Building on Breadon Hill			

Epwell from Crouch Hill 29668,8 feet,

Triangles.	Angles observed.	Distances of the Stations from the intersected Objects.	
Epwell - - - - - Crouch Hill - - - - - <i>Deddington Steeple</i>	$\begin{smallmatrix} 24 & 43 & 28 \\ 124 & 8 & 31 \end{smallmatrix}$	} Deddington Steeple - {	$\begin{smallmatrix} \text{Feet.} \\ 47493 \\ 24000 \end{smallmatrix}$
Epwell - - - - - Crouch Hill - - - - - <i>Bloxham Spire</i>	$\begin{smallmatrix} 22 & 2 & 57 \\ 89 & 27 & 20 \end{smallmatrix}$	} Bloxham Spire - {	$\begin{smallmatrix} 31887 \\ 11971 \end{smallmatrix}$
Epwell - - - - - Crouch Hill - - - - - <i>Aynoe Steeple</i>	$\begin{smallmatrix} 12 & 41 & 39 \\ 155 & 28 & 33 \end{smallmatrix}$	} Aynoe Steeple - {	$\begin{smallmatrix} 60070 \\ 31802 \end{smallmatrix}$
Epwell - - - - - Crouch Hill - - - - - <i>Adderbury Spire</i>	$\begin{smallmatrix} 12 & 45 & 23 \\ 143 & 29 & 30 \end{smallmatrix}$	} Adderbury Spire - {	$\begin{smallmatrix} 43823 \\ 16265 \end{smallmatrix}$
Epwell - - - - - Crouch Hill - - - - - <i>Farthingo Steeple</i>	$\begin{smallmatrix} 9 & 33 & 29 \\ 162 & 29 & 20 \end{smallmatrix}$	} Farthingo Steeple - {	$\begin{smallmatrix} 64520 \\ 35605 \end{smallmatrix}$

Epwell from Arbury Hill 83098,4 feet.

Epwell - - - - - Arbury Hill - - - - - <i>Round House, Edge Hills</i>	$\begin{smallmatrix} 27 & 30 & 1 \\ 8 & 9 & 42 \end{smallmatrix}$	{ Round House, Edge Hills {	$\begin{smallmatrix} 20235 \\ 65816 \end{smallmatrix}$
Epwell - - - - - Arbury Hill - - - - - <i>St. Martin's, Coventry</i>	$\begin{smallmatrix} 50 & 9 & 8 \\ 87 & 15 & 6 \end{smallmatrix}$	} St. Martin's, Coventry {	$\begin{smallmatrix} 122636 \\ 94262 \end{smallmatrix}$
Epwell - - - - - Arbury Hill - - - - - <i>Round House Windmill, Edge Hills</i>	$\begin{smallmatrix} 28 & 31 & 46 \\ 7 & 34 & 6 \end{smallmatrix}$	} Round House Windmill {	$\begin{smallmatrix} 18576 \\ 67364 \end{smallmatrix}$

Brill from Quainton 40908,6 feet.

Brill - - - - - Quainton - - - - - <i>Wingrove Steeple</i>	$\begin{smallmatrix} 19 & 36 & 52 \\ 140 & 7 & 47 \end{smallmatrix}$	} Wingrove Steeple - {	$\begin{smallmatrix} 75747 \\ 39665 \end{smallmatrix}$
Brill - - - - - Quainton - - - - - <i>Hardwick Steeple</i>	$\begin{smallmatrix} 16 & 25 & 48 \\ 128 & 12 & 5 \end{smallmatrix}$	} Hardwick Steeple - {	$\begin{smallmatrix} 55539 \\ 19989 \end{smallmatrix}$

Triangles.	Angles observed.	Distances of the Stations from the intersected Objects.	
Brill - - - - - Quainton - - - - - <i>Luggersal Steeple</i>	$\begin{smallmatrix} 16^{\circ} & 42' & 12'' \\ 4 & 24 & 16 \end{smallmatrix}$	$\left. \begin{array}{l} \text{Luggersal Steeple} - \end{array} \right\}$	$\left. \begin{array}{l} \text{Feet.} \\ 8710 \\ 32664 \end{array} \right\}$
Brill - - - - - Quainton - - - - - <i>Granborough Steeple</i>	$\begin{smallmatrix} 8 & 30 & 43 \\ 144 & 20 & 22 \end{smallmatrix}$	$\left. \begin{array}{l} \text{Granborough Steeple} - \end{array} \right\}$	$\left. \begin{array}{l} 52266 \\ 13270 \end{array} \right\}$
Brill - - - - - Quainton - - - - - <i>Bicester Steeple</i>	$\begin{smallmatrix} 105 & 7 & 30 \\ 32 & 10 & 53 \end{smallmatrix}$	$\left. \begin{array}{l} \text{Bicester Steeple} - \end{array} \right\}$	$\left. \begin{array}{l} 32132 \\ 58210 \end{array} \right\}$
Brill - - - - - Quainton - - - - - <i>Centre of the Great House at Wooton</i>	$\begin{smallmatrix} 17 & 37 & 12 \\ 9 & 28 & 57 \end{smallmatrix}$	$\left. \begin{array}{l} \text{House at Wooton} - \end{array} \right\}$	$\left. \begin{array}{l} 14793 \\ 27181 \end{array} \right\}$

Stow from Broadway 52203,2 feet.

Stow - - - - - Broadway - - - - - <i>Sarsden Chapel</i>	$\begin{smallmatrix} 123 & 23 & 50 \\ 19 & 25 & 13 \end{smallmatrix}$	$\left. \begin{array}{l} \text{Sarsden Chapel} - \end{array} \right\}$	$\left. \begin{array}{l} 28720 \\ 72115 \end{array} \right\}$
Stow - - - - - Broadway - - - - - <i>Walford Spire</i>	$\begin{smallmatrix} 56 & 10 & 42 \\ 49 & 34 & 47 \end{smallmatrix}$	$\left. \begin{array}{l} \text{Walford Spire} - \end{array} \right\}$	$\left. \begin{array}{l} 41295 \\ 45063 \end{array} \right\}$
Stow - - - - - Broadway - - - - - <i>Bourton Chapel</i>	$\begin{smallmatrix} 14 & 3 & 44 \\ 21 & 32 & 40 \end{smallmatrix}$	$\left. \begin{array}{l} \text{Bourton Chapel} - \end{array} \right\}$	$\left. \begin{array}{l} 32926 \\ 21786 \end{array} \right\}$

Stow from Epwell 78938,2 feet.

Stow - - - - - Epwell - - - - - <i>Stow on the Wold Steeple</i>	$\begin{smallmatrix} 60 & 30 & 20 \\ 6 & 37 & 9 \end{smallmatrix}$	$\left. \begin{array}{l} \text{Stow on the Wold} - \end{array} \right\}$	$\left. \begin{array}{l} 9876 \\ 74573 \end{array} \right\}$
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Wendover from Brill 92400,7 feet.

Brill - - - - - Wendover - - - - - <i>Pitchcot Windmill</i>	$\begin{smallmatrix} 43 & 30 & 12 \\ 46 & 37 & 4 \end{smallmatrix}$	$\left. \begin{array}{l} \text{Pitchcot Windmill} - \end{array} \right\}$	$\left. \begin{array}{l} 53739 \\ 50901 \end{array} \right\}$
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Triangles.	Angles observed.	Distances of the Stations from the intersected Objects.	
Brill - - - -	$\begin{smallmatrix} 0 \\ 24 & 15 & 12 \end{smallmatrix}$	} Ivinghoe Spire - {	Feet. 98663
Wendover - - - -	$\begin{smallmatrix} 111 & 33 & 40 \end{smallmatrix}$		43577
<i>Ivinghoe Spire</i>			
Brill - - - -	$\begin{smallmatrix} 66 & 36 & 4 \\ 46 & 32 & 33 \end{smallmatrix}$	} Padbury Steeple - {	72943
Wendover - - - -			92401
<i>Padbury Steeple</i> (doubtful)			
Brill - - - -	$\begin{smallmatrix} 46 & 40 & 52 \\ 31 & 1 & 48 \end{smallmatrix}$	} Quainton Steeple - {	39009
Wendover - - - -			55056
<i>Quainton Steeple</i>			

Wendover from Quainton 72889,4 feet.

Wendover - - - -	34 46 37	} Wing Steeple - {	52487
Quainton - - - -	45 9 20		42230
<i>Wing Steeple</i>			
Wendover - - - -	44 58 11	} Crindon Windmill - {	66472
Quainton - - - -	61 9 59		53626
<i>Crindon Windmill</i>			

Quainton from Bow Brickhill 67490,6 feet.

Quainton - - -	75 15 34	} Southern Obelisk - {	58876
Bow Brickhill - - -	47 19 1		77449
<i>Southern Obelisk, Stow Park, Bucks</i>			
Quainton - - -	75 4 46	} Northern Obelisk - {	61881
Bow Brickhill - - -	49 13 49		78942
<i>Northern Obelisk, Stow Park</i>			

Wendover from Kinsworth 84462 feet.

Kinsworth	-	-	-	69	56	52	} Leighton Buzzard	-	{	35317
Wendover	-	-	-	31	6	26		64215		
<i>Leighton Buzzard Spire</i>										

Kinsworth from Quainton 84996,3 feet.

Kinsworth	-	-	-	17	49	12	} Aylesbury Steeple	{	70886
Quainton	-	-	-	51	5	23			27879
<i>Aylesbury Steeple</i>									

Bow Brickhill from Lidlington 32035.6 feet.

Triangles.	Angles observed.	Distances of the Stations from the intersected Objects.	
Bow Brickhill - - - -	$\begin{smallmatrix} 0 & ' & '' \\ 57 & 43 & 21 \\ 65 & 40 & 39 \end{smallmatrix}$	} North Crawley Spire - {	Feet. 34968
Lidlington - - - -			32444
<i>North Crawley Spire</i>			
Bow Brickhill - - - -	$\begin{smallmatrix} 45 & 8 & 47 \\ 112 & 13 & 11 \end{smallmatrix}$	} Pavenham Spire - {	77064
Lidlington - - - -			59014
<i>Pavenham Spire</i>			
Bow Brickhill - - - -	$\begin{smallmatrix} 24 & 15 & 25 \\ 137 & 19 & 21 \end{smallmatrix}$	} St. Paul's, Bedford - {	68727
Lidlington - - - -			41652
<i>St. Paul's Spire, Bedford</i>			
Bow Brickhill - - - -	$\begin{smallmatrix} 48 & 2 & 42 \\ 111 & 8 & 15 \end{smallmatrix}$	} Sharnbrook Spire - {	84080
Lidlington - - - -			67038
<i>Sharnbrook Spire</i>			
Bow Brickhill - - - -	$\begin{smallmatrix} 38 & 42 & 47 \\ 19 & 39 & 20 \end{smallmatrix}$	} Woburn Market House {	12656
Lidlington - - - -			23533
<i>Woburn Market House</i>			
Bow Brickhill - - - -	$\begin{smallmatrix} 5 & 3 & 35 \\ 10 & 6 & 1 \end{smallmatrix}$	} Ridgemont Station - {	21484
Lidlington - - - -			10804
<i>Ridgemont Station</i>			
Bow Brickhill - - - -	$\begin{smallmatrix} 25 & 51 & 29 \\ 116 & 31 & 15 \end{smallmatrix}$	} Wootton Spire - {	46959
Lidlington - - - -			22889
<i>Wootton Spire</i>			
Bow Brickhill - - - -	$\begin{smallmatrix} 36 & 40 & 14 \\ 64 & 51 & 26 \end{smallmatrix}$	} Cranfield Spire - {	29599
Lidlington - - - -			19526
<i>Cranfield Spire</i>			

Lillyhoe from Lidlington 49026.1 feet.

Lillyhoe - - - -	$\begin{smallmatrix} 3 & 1 & 25 \\ 3 & 2 & 16 \end{smallmatrix}$	} Pollux Hill Spire - {	24604
Lidlington - - - -			24489
<i>Pollux Hill Spire</i>			
Lillyhoe - - - -	$\begin{smallmatrix} 23 & 13 & 23 \\ 119 & 15 & 11 \end{smallmatrix}$	} Bow Brickhill Steeple {	70224
Lidlington - - - -			31738
<i>Bow Brickhill Steeple</i>			
Lillyhoe - - - -	$\begin{smallmatrix} 49 & 54 & 3 \\ 100 & 30 & 33 \end{smallmatrix}$	} Colmworth Spire - {	97617
Lidlington - - - -			75944
<i>Colmworth Spire</i>			

Triangles.	Angles observed.	Distances of the stations from the intersected objects.	
Lillyhoe - - - -	$\begin{smallmatrix} 0 & ' & '' \\ 23 & 57 & 30 \\ 22 & 4 & 36 \end{smallmatrix}$	} Silsoe Spire - {	Feet. 25599 27658
Lidlington - - - -			
<i>Silsoe Spire</i>			
Lillyhoe - - - -	$\begin{smallmatrix} 11 & 46 & 23 \\ 17 & 18 & 29 \end{smallmatrix}$	} Flitton Steeple - {	30008 20580
Lidlington - - - -			
<i>Flitton Steeple</i>			
Lillyhoe - - - -	$\begin{smallmatrix} 57 & 56 & 38 \\ 19 & 37 & 7 \end{smallmatrix}$	} Shillington Steeple {	16857 42549
Lidlington - - - -			
<i>Shillington Steeple</i>			
Lillyhoe - - - -	$\begin{smallmatrix} 14 & 35 & 24 \\ 24 & 29 & 56 \end{smallmatrix}$	} Westoning Steeple - {	32242 19586
Lidlington - - - -			
<i>Westoning Steeple</i>			
Lillyhoe - - - -	$\begin{smallmatrix} 23 & 40 & 47 \\ 19 & 18 & 12 \end{smallmatrix}$	} Wrest Garden Obelisk {	23770 28880
Lidlington - - - -			
<i>Wrest Garden Obelisk</i>			
Lillyhoe - - - -	$\begin{smallmatrix} 63 & 39 & 11 \\ 88 & 31 & 51 \end{smallmatrix}$	} St. Neot's Steeple - {	105026 94147
Lidlington - - - -			
<i>St. Neot's Steeple</i>			

Kinsworth from Lidlington 61255.3 feet.

Kinsworth - - - -	$\begin{smallmatrix} 17 & 4 & 20 \\ 23 & 39 & 1 \end{smallmatrix}$	} Harlington Steeple - {	37666 27565
Lidlington - - - -			
<i>Harlington Steeple</i>			
Kinsworth - - - -	$\begin{smallmatrix} 17 & 22 & 11 \\ 87 & 3 & 13 \end{smallmatrix}$	} Maulden Steeple - {	63165 18882
Lidlington - - - -			
<i>Maulden Steeple</i>			
Kinsworth - - - -	$\begin{smallmatrix} 3 & 53 & 24 \\ 73 & 16 & 9 \end{smallmatrix}$	} Millbrook Steeple - {	60167 42622
Lidlington - - - -			
<i>Millbrook Steeple</i>			
Kinsworth - - - -	$\begin{smallmatrix} 36 & 15 & 30 \\ 33 & 41 & 7 \end{smallmatrix}$	} Streatly Steeple - {	36167 38567
Lidlington - - - -			
<i>Streatly Steeple</i>			
Kinsworth - - - -	$\begin{smallmatrix} 34 & 29 & 11 \\ 166 & 4 & 4 \end{smallmatrix}$	} Hanslop Spire - {	111928 70552
Lidlington - - - -			
<i>Hanslop Spire</i>			

Kinsworth from Bow Brickhill 57668 feet.

Triangles.	Angles observed.	Distances of the Stations from the intersected Objects.	
Bow Brickhill - - -	° / "	} Souldrope Spire - {	Feet.
Kinsworth - - -	131 31 20		93229
Souldrope Spire	30 17 44		138367
Bow Brickhill - - -	91 22 55	} Sauldon Windmill - {	31623
Kinsworth - - -	28 24 55		66434
Sauldon Windmill			
Bow Brickhill - - -	70 9 33	} Stewkley Windmill - {	32706
Kinsworth - - -	33 27 4		55812
Stewkley Windmill			
Bow Brickhill - - -	61 57 57	} Tharfield Windmill - {	139157
Kinsworth - - -	93 36 13		123073
Tharfield Windmill			
Bow Brickhill - - -	4 13 44	} Tottenhoe Station - {	43177
Kinsworth - - -	14 47 27		13049
Tottenhoe Station			
Bow Brickhill - - -	21 55 14	} Chalgrave Steeple - {	43590
Kinsworth - - -	43 21 54		23699
Chalgrave Steeple			
Bow Brickhill - - -	85 34 3	} Lidlington Windmill - {	28814
Kinsworth - - -	27 23 29		62442
Lidlington Windmill			
Bow Brickhill - - -	116 46 10	} Keysoe Spire - {	107275
Kinsworth - - -	42 6 4		142850
Keysoe Spire			

Lillyhoe from Trusler Hill 50673,6 feet.

Lillyhoe - - -	51 56 21	} Knotting Green Elm Tree {	118536
Trusler Hill - - -	103 29 55		95981
Knotting Green Elm Tree			
Lillyhoe - - -	36 45 37	} Sundon Windmill - {	25692
Trusler Hill - - -	27 4 1		33790
Sundon Windmill			

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Bow Brickhill from Trusler Hill 20138.7 feet.

Triangles.	Angles observed.	Distances of the stations from the intersected objects.	
Bow Brickhill - - -	$\begin{smallmatrix} 0 & ' & '' \\ 25 & 13 & 54 \\ 50 & 16 & 22 \end{smallmatrix}$	} Crawley Steeple - {	15998
Trusler Hill - - -			8867
<i>Crawley Steeple</i>			
Bow Brickhill - - -	$\begin{smallmatrix} 93 & 18 & 15 \\ 49 & 17 & 46 \end{smallmatrix}$	} Moulshoe Steeple - {	25136
Trusler Hill - - -			33101
<i>Moulshoe Steeple</i>			
Bow Brickhill - - -	$\begin{smallmatrix} 13 & 27 & 17 \\ 19 & 46 & 14 \end{smallmatrix}$	} Woburn Steeple - {	12432
Trusler Hill - - -			8552
<i>Woburn Steeple</i>			

Bow Brickhill from Lillyhoe 69867 feet.

Bow Brickhill - - -	$\begin{smallmatrix} 60 & 57 & 17 \\ 68 & 43 & 59 \end{smallmatrix}$	} Renhold Steeple - {	84608
Lillyhoe - - -			79373
<i>Renhold Steeple</i>			
Bow Brickhill - - -	$\begin{smallmatrix} 64 & 55 & 32 \\ 66 & 41 & 24 \end{smallmatrix}$	} Ravensden Steeple - {	85825
Lillyhoe - - -			84646
<i>Ravensden Steeple</i>			

Kinsworth from Lillyhoe 47278.7 feet.

Kinsworth - - -	$\begin{smallmatrix} 43 & 44 & 48 \\ 71 & 53 & 53 \end{smallmatrix}$	} Flitwick Steeple - {	49849
Lillyhoe - - -			36264
<i>Flitwick Steeple</i>			

SECTION SECOND.

Determination of the Latitudes and Longitudes of the Stations on Black Down, in Dorsetshire, Butterson, in Devonshire, and St. Agnes Beacon, in Cornwall.

ART. XVI.—*Calculation of the Distance between Black Down and Dunnose in the Isle of Wight.*

To complete this distance, I shall have recourse to the xxvith and xxviii triangles, published in the Philosophical Transactions of 1795, and LIId and LIVth of the Trans. for 1797, together with the observations made at Black Down, in the latter year. (See also Pl. XXX. Fig. 1.).

The most eligible method of calculating with these *data*, seems to be that of first finding the *cross-distance* between Black Down and Dean Hill. To do this, we have the angle at Nine Barrow Down, between Black Down and Dean Hill, and the respective distances from the first to the latter stations, together with the newly observed angle between Dunnose and Nine Barrow Down; from which we obtain the angles of a triangle, constituted by Dunnose, Nine Barrow Down, and Black Down.

The distance from Nine Barrow Down to Dean Hill is 166497 feet, and, from the same station to Black Down, the distance is 126782 feet, (see Phil. Trans. for 1795, p. 502, and for 1797, p. 455,) and the angle comprehended by those distances = $110^{\circ} 30' 13''$, 25. The difference between the horizontal angle and that formed by the chords is $3''$, 25, which, substracted from $110^{\circ} 30' 13''$, 25, leaves $110^{\circ} 30' 10''$: computing with this

angle and the sides spoken of, there results the following triangle, viz.

Nine Barrow Down	-	110° 30' 10"
Black Down	-	4° 6' 54,75
Dean Hill	-	29 22 55,75

This, using the side Nine Barrow and Dean Hill, (166497 feet,) gives 240236,7 feet, for the distance between Black Down and Dean Hill.

The angle at Dean Hill, between Nine Barrow Down and Dunnose, is $64^{\circ} 50' 19''$, (see Phil. Trans. for 1795. p. 501,) and the angle between Black Down and Nine Barrow, as just found, is $29^{\circ} 22' 55'',75$, which, increased by the proper correction for the difference between the chord and horizontal angles, becomes $29^{\circ} 22' 57'',5$. The sum of these angles, $94^{\circ} 13' 16'',5$, is the horizontal angle between Black Down and Dunnose.

The angle at Black Down, between Dunnose and Nine Barrow Down, deduced from observations made in 1797, is found to be $4^{\circ} 30' 25'',75$: this, subtracted from the angle between Dean Hill and Dunnose, leaves $35^{\circ} 36' 29''$, for the angle at Black Down; which, corrected for the purpose of reduction to their respective chord angles, become $94^{\circ} 13' 11'',5$, and $35^{\circ} 36' 25'',75$, from whence we get the angle at Dunnose = $50^{\circ} 10' 22'',75$. We have, therefore, the following triangle, viz.

Dean Hill	-	94° 13' 11,5"
Black Down	-	35 36 25,75
Dunnose	-	50 10 22,75

The distance between Dean Hill and Dunnose is 183496,2 feet, (Phil. Trans. for 1795, p. 501,) and that between Black Down and Dean Hill, according to the foregoing computation, is 240236,7 feet: these, applied to the angles of the above triangle,

give 314309,6, and 314305,4 feet, respectively, for the distance between Black Down and Dunnose: wherefore, the mean 314307,5 feet, = 59,528 miles, may be considered as the true distance between those stations.

Direction of the Meridian at Black Down.

On the 18th of April, in the forenoon, the angle between the Pole Star, when at its greatest apparent elongation from the meridian, was observed, and found to be

104° 19' 19",25

And on the 19th, in the afternoon

- 98 42 47

Half their sum is the angle between the meridian and Abbotsbury staff

- - 101 31 3

On the 20th of April, in the forenoon, the angle between the Pole Star, when at its greatest apparent elongation from the meridian, was observed, and found to be

- 104 19 25,25

And on the 19th, in the afternoon

- 98 42 35,5

Half their sum is the angle between the meridian and Abbotsbury staff

- - 101 31 0,5

Therefore, 101° 31' 2" may be taken for the angle between the meridian and Abbotsbury staff.

ART. XVII.—Latitude and Longitude of Black Down.

The angle between Dunnose and the Abbotsbury Staff was observed, and found = 164° 26' 35",25; and the angle between the meridian and the same staff, by double azimuths of the Pole Star, 101° 31' 2". Wherefore their sum, subtracted from 360°, leaves 94° 2' 22",75, the angle which Dunnose makes with the meridian.

In Fig. 4. Plate XXX. let Z be the zenith, B the station on Black Down, and ZBA its meridian; also, let D be Dunnose, and ZD its meridian; likewise, suppose BC to be an arc of a great circle, perpendicular to the meridian at B , and DA another arc of a great circle, perpendicular to the meridian at D , BF and ED being the parallels of latitude at Black Down and Dunnose.

In the spherical triangle BZD , the angles at B and D are given, the first being $94^{\circ} 2' 22'',75$, and the second $84^{\circ} 54' 53''$; therefore, in the triangle ABD the angle at B is $85^{\circ} 57' 36'',75$, and, in the triangle BDC , the angle at $D = 84^{\circ} 54' 53''$: hence, the angles of these triangles, when reduced to those formed by the chords, are as follows:

$$\text{In the triangle } BDC \left\{ \begin{array}{l} DDC = 84^{\circ} 54' 52,5'' \\ CDB = 91 \quad 2 \quad 44,75 \\ CBD = 4 \quad 2 \quad 22,75 \end{array} \right.$$

$$\text{And in the triangle } ABD \left\{ \begin{array}{l} ABD = 85 \quad 57 \quad 36,75 \\ BAD = 88 \quad 57 \quad 16,25 \\ BDA = 5 \quad 5 \quad 7 \end{array} \right.$$

Now the distance between Black Down and Dunnose, BD , has been already found to be 314307,5 feet; therefore, using the above angles with that distance, (after the proper corrections are applied for reducing the horizontal angles to those formed by the chords,) we get,

$$\text{In the triangle } BCD \left\{ \begin{array}{l} BC = 313128 \\ CD = 21146,9 \end{array} \right\} \text{feet.}$$

$$\text{And in the triangle } ABD \left\{ \begin{array}{l} AD = 313581,2 \\ AB = 27864,5 \end{array} \right\} \text{feet.}$$

Again, in the two small triangles formed by the parallels BF and ED , the perpendiculars BC and DA , and the small arcs CF and AE , we have the angles at C and A given, the

first being $91^{\circ} 2' 45'',75$, and the last $88^{\circ} 57' 15''$; which angles, however, are augmented by the addition of the differences between the horizontal angles and those formed by the chords, We have therefore,

$$\text{In the triangle BCF} \begin{cases} \text{BCF} = 91^{\circ} 2' 45,75'' \\ \text{BFC} = 88^{\circ} 25' 51,5'' \\ \text{FBC} = 0^{\circ} 31' 22,75'' \end{cases}$$

$$\text{And in the triangle AED} \begin{cases} \text{EAD} = 88^{\circ} 57' 17'' \\ \text{AED} = 90^{\circ} 31' 21,5'' \\ \text{ADE} = 0^{\circ} 31' 21,5'' \end{cases}$$

And, using BC and AD, as found above, we get

$$\left. \begin{array}{l} \text{CF} = 2859,1 \\ \text{And EA} = 2859,8 \end{array} \right\} \text{feet.}$$

Therefore $\text{FD} = \text{DC} + \text{CF} = 22146,9 + 2859,1 = 25006$ feet. And $\text{BE} = \text{BA} - \text{EA} = 27864,5 - 2859,8 = 25004,7$ feet. The mean, $25005,3$ feet, may be considered as very nearly the true distance between the parallels of Black Down and Dunnose. This method is the same as that made use of in the *Phil. Trans.* for 1795, p. 521, and affords the means of very accurately determining the distance between the parallels of latitude of the two stations, when the angles were observed with precision, and the direction in which the stations lie, is not much removed from east and west.

This small space, $25004,7$ feet, corresponds to $4' 6'',5$, in which I use 60851 fathoms for the length of a degree of the meridian in $50^{\circ} 41'$. See *Phil. Trans.* for 1795, p. 537.

Now the latitude of Dunnose is $50^{\circ} 37' 7'',3$, and its longitude $1^{\circ} 11' 36''$; (*Phil. Trans.* for 1795, p. 536;) therefore, $50^{\circ} 37' 7'',3 + 4' 6'',5 = 50^{\circ} 41' 13'',8$, is the latitude of Black Down.

This method of finding the latitude seems to be more correct than by spherical computation; yet, by this latter, nearly the

same conclusion is derived; for, the bearing of Black Down west of Dunnose being $84^{\circ} 54' 52''.5$, we get the distance of that station from the meridian of the latter = 313072 feet, and from the perpendicular, 27861 feet; which, converted into parts of an arch, according to the lengths of their respective degrees, gives $50^{\circ} 41' 14''$ for the latitude, and $1^{\circ} 20' 46''.4$ for the longitude west of Dunnose. According to the troublesome yet ingenious method recommended by M. SEJOUR, in his *Traité Analytique des Mouvements apparens des Corps Célestes*, the latitude of Black Down comes out $50^{\circ} 41' 13''.9$, and the longitude $1^{\circ} 20' 45''.75$. We may, therefore, admitting the supposition of Dunnose being situated in $50^{\circ} 37' 7''.3$, safely take $50^{\circ} 41' 13''.8$ for the latitude, and $2^{\circ} 32' 22''.4$ for the longitude, of Black Down; that of Dunnose being $1^{\circ} 11' 36''$ west of the meridian of Greenwich.

ART. XVIII. *Calculation of the Distance between the Stations on Black Down, in Dorsetshire, and Rippin Tor, in Devonshire.*

For the calculation of this distance, we must have recourse to the XLVIITH, XLVIIITH, XLIXTH, and LTH triangles. (See Philosophical Transactions for 1797, and Plate XXX, Fig. 1 of this Volume.) In the two first, we have the whole angle at Pilsden, between Dumpdon and Black Down = $152^{\circ} 37' 27''.25$, which, reduced to the angle formed by the chords, becomes $152^{\circ} 37' 24''.25$. The sides forming this angle, are Dumpdon and Pilsden, Pilsden and Black Down: the distance between the two first stations being 78459,3 feet, and between the two last 79110,7 feet. From these *data*, the distance between Dumpdon and Black Down is found to be 153095,7 feet, the triangle for computation being,

Pilsden - - - $152^{\circ} 37' 24'',25$

Black Down - - $13 37 50 ,5$

Dumpdon . - - $13 44 45 ,25$

But this side may be also found, by computing with the whole angle at Charton Common, which angle, when reduced to the plane of the chords, becomes $141^{\circ} 33' 53'',75$. The two sides are 581012,5 feet, and 103345 feet; which *data* give the following triangle :

Charton - - - $141^{\circ} 33' 53'',5$

Dumpdon - - $24 48 39 ,25$

Black Down - $13 37 27 ,25$; from whence we find the distance from Dumpdon to Black Down = 153094,6 feet. Wherefore, the mean, 153095,2 feet, may be considered to be very nearly the true distance.

In the Lth triangle, (Cawsand Beacon, Dumpdon, and Little Haldon) the angle at Cawsand Beacon is $43^{\circ} 14' 21'',25$; and in the LIST, (Rippin Tor, Cawsand Beacon, and Little Haldon) the angle at the same station is $25^{\circ} 30' 39'',75$; their sum is $68^{\circ} 45' 1''$, and, adding $1''$ for the necessary correction, it becomes $68^{\circ} 45' 2''$. Computing with this angle, and the including sides, (64020,5 and 18334 feet,) we obtain the following triangle :

Rippin Tor - - - $90^{\circ} 34' 35''$

Cawsand Beacon - $68 45 2$

Dumpdon - - - $20 40 23$, which gives the distance from Dumpdon to Cawsand Beacon = 169014 feet.

In the XLIXth triangle, the observed angle at Dumpdon is found to be $86^{\circ} 39' 8'',5$, and, by adding to it the horizontal angle at Dumpdon, between Rippin Tor and Little Haldon, and also that between Black Down and Charton Common, we get $125^{\circ} 54' 30'',5$, for the horizontal angle between Rippin

Tor and Cawsand Beacon. To reduce this angle to that formed by the chords, 6" must be subtracted; therefore, $125^{\circ} 54' 24''.5$ is the angle for computation. The sides Dumpdon and Rippin Tor, Dumpdon and Black Down, (169014 and 153095,2 feet,) with this angle, give the following triangle:

Rippin Tor - - - $25^{\circ} 36' 4''.5$

Dumpdon - - - $125^{\circ} 54' 24''.5$

Black Down - - - $28^{\circ} 29' 31''$, which gives the

distance from Rippin Tor to Black Down = 286973,3 feet.

On referring to the observations made in 1797, on Black Down, it will be seen that the angle between Rippin Tor and the staff erected near Abbotsbury, was $3^{\circ} 8' 52''.5$, and the angle between Pilsden and the same staff $45^{\circ} 16' 13''$; their difference, $42^{\circ} 7' 20''.5$, is the angle between Rippin Tor and Pilsden. Now, if the angles of the triangles, five in number, used in finding the distance between Rippin Tor and Black Down have been observed correctly, and the calculations properly made, the computed angle at Blackdown, between those stations, should be, of course, the same; but the angle formed by the chords of the arcs between Blackdown and Pilsden and Dumpdon, has been found = $13^{\circ} 37' 50''.5$, (which is very nearly the same as the horizontal one,) and the angle between Dumpdon and Rippin Tor = $28^{\circ} 29' 31''$, which it is also unnecessary to correct: their sum is $42^{\circ} 7' 21''.5$, the very angle observed. It is not, perhaps, proper to dismiss this consideration, without observing that this agreement affords a strong proof of the excellence of our instrument, as the triangles, from their magnitude and nature, are not so disposed as to favour the comparison.

ART. XIX. Latitude and Longitude of Rippin Tor.

The angle at Blackdown, between the staff at Abbotsbury and the meridian, has been found $= 101^{\circ} 31' 1''.5$, nearly, and that between Rippin Tor and the same staff $= 3^{\circ} 8' 52''.5$; therefore, $98^{\circ} 22' 8''$ is the angle which Rippin Tor makes with the meridian, and this, taken from 180° , leaves $81^{\circ} 37' 52''$, the bearing of Rippin Tor SW from Black Down.

This angle, with the distance found above, gives 28585.3 feet, for the distance of Rippin Tor from the meridian of Black Down, and 56086.0 feet, for that from its perpendicular; therefore, the latitude is $50^{\circ} 33' 59''.1$, and the longitude west from Black Down, $1^{\circ} 13' 3''.8$; consequently, its longitude west of Greenwich is $3^{\circ} 45' 26''.2$.

Direction of the Meridian at Butterson Hill.

On the 6th of May, in the afternoon, the angle between the Pole Star, when at its greatest apparent elongation from the meridian, and the staff on Hemmerdon Ball was observed, and found to be

- - - - - $91^{\circ} 29' 13''.75$

And on the 7th, in the afternoon - - - $97 \quad 4 \quad 14$

Half their sum is the angle between the meridian and the staff on Hemmerdon Ball

- $94 \quad 16 \quad 44$

Again, on the 7th, in the afternoon, the angle between the Pole Star, when at its greatest apparent elongation from the meridian, and the staff on Hemmerdon Ball was observed, and found to be

- - - - - $91 \quad 29 \quad 12$

Half the sum of this, and the angle observed

in the forenoon of the same day, ($97^{\circ} 4' 14''$)

is - - - - - $94^{\circ} 16' 43''$

Hence, $94^{\circ} 16' 44''$ may be considered as the true angle between the meridian and the staff on Hemmerdon Ball.

The angle between the station on Rippin Tor and Hemmerdon Ball, is $121^{\circ} 17' 7'',75$; therefore, $121^{\circ} 17' 7'',75 - 94^{\circ} 16' 44'' = 27^{\circ} 0' 23'',75$, is the bearing of Rippin Tor, north-east of Butterson. This angle, with 62951 feet, gives 28585,2 feet, and 56086,6 feet, for the distance of Rippin Tor from the meridian and perpendicular; which, using 61182 and 60847 fathoms, for the lengths of degrees on the meridian and perpendicular, respectively become $4' 40'',3$, and $9' 13''$. Therefore, in the right angled spherical triangle BPT, (Plate XXX, Fig. 2,) in which B is Butterson, P the pole, T Rippin Tor, and R the point where the parallel to the perpendicular cuts the meridian, we have the co-latitude of T, or Rippin Tor, = $39^{\circ} 26' 0'',9$, and $RT = 4' 40'',3$. We have, consequently, cosine $4' 40'',3$: radius :: cosine $39^{\circ} 26' 0'',9$: cosine $39^{\circ} 26' 0'',7$, the co-latitude of the point R. So $PB = PR + RT = 39^{\circ} 26' 0'',7 + 9' 13'' = 39^{\circ} 35' 13'',7$; therefore, the latitude of Butterson is $50^{\circ} 24' 46'',3$, and its longitude west from Greenwich, $3^{\circ} 52' 47'',5$.

ART. XX. *Calculation of the Distance between Hensbarrow and Butterson.*

The most convenient, as well as the most accurate means of computing this distance, will be by referring to the LVth, LVIIth, and LXIVth triangles, in the series of 1796, where the sum of the observed angles at Carraton Hill is $136^{\circ} 52' 43''$. The correction for reducing this angle to that formed by the chords, is $4''$; therefore, $136^{\circ} 52' 39''$ is the proper angle for computation.

The distance from Hensbarrow to Carraton Hill, is 100416 feet, and from Butterton to that station 131576 feet. (See Phil. Trans. for 1797, p. 458, 460.) These *data* give the following triangle, viz.

Carraton Hill	- -	136° 52' 39"
Hensbarrow	- -	24 35 57,5
Butterton	- -	18 31 23,5, which gives

21602 feet, for the distance between Hensbarrow and Butterton Hill.

The angle between Carraton Hill and Rippin Tor was observed in 1796, and found = $101^{\circ} 3' 44'',25$. (See Phil. Trans. 1797.) The angle between Hensbarrow and Rippin Tor is $119^{\circ} 35' 3'',25$; therefore, $18^{\circ} 31' 19''$ is the angle between Hensbarrow and Carraton. The difference between the horizontal and chord angle is $0'',25$ nearly; this, added to $18^{\circ} 31' 23'',5$, gives $18^{\circ} 31' 23'',75$, which is nearly the same as the observed angle. This agreement proves, that the angles of the triangles connecting Butterton and Hensbarrow have been observed correctly.

ART. XXI. *Latitude and Longitude of Hensbarrow.*

The angle between Hensbarrow and Hemmerdon, (see Observations made at Butterton,) was $1^{\circ} 52' 4'',5$; therefore, as the angle between the latter and the meridian = $94^{\circ} 16' 44''$, we get $92^{\circ} 24' 39'',5$, for the angle which Hensbarrow makes with the same meridian. The distance from Hensbarrow to Butterton, as found above, is 21602 feet; this, with the angle $92^{\circ} 24' 39'',5$, gives the distance of Hensbarrow from the meridian = 215871 feet, and from the perpendicular 9089 feet; these, converted into parts of degrees, become $35' 17'',1$, and $1' 29'',62$. There-

fore, the latitude of Hensbarrow is $50^{\circ} 23' 3'',3$, and its longitude, west of Butterson, $55' 20'',2$; consequently, its longitude, west of Greenwich, is $3^{\circ} 52' 47'',5 + 55' 20'',2 = 4^{\circ} 48' 7'',7$.

ART XXII. *Direction of the Meridian at St. Agnes Beacon.*

On the 22d of May, in the forenoon, the angle between the Pole Star, when at its greatest elongation from the meridian, and the staff near Peranzabulo, was observed, and found to be

$38^{\circ} 26' 1'',5$

And on the 22d, in the afternoon

$44^{\circ} 0' 33'',25$

Half their sum is the angle between the meridian and staff

$41^{\circ} 13' 17'',5$

The angle between the staff at Peranzabulo and the station Hensbarrow, was also observed at the same station, and found to be $31^{\circ} 50' 55'',5$; wherefore, $41^{\circ} 13' 17'',5 + 31^{\circ} 50' 55'',5 = 73^{\circ} 4' 13''$, is the angle between Hensbarrow and St. Agnes Beacon.

ART. XXIII. *To find the Latitude and Longitude of St. Agnes Beacon.*

In Plate XXX. Fig. 3. Let A be the station at St. Agnes, P the pole, H Hensbarrow, and B the point where the parallel to the meridian of St. Agnes cuts that meridian, BHP being a right angled spherical triangle on the earth's surface.

PH has been already found $= 39^{\circ} 36' 56'',7$; and, as BH, the distance of Hensbarrow from the meridian, $= 92878$, and AB, the distance from the perpendicular, $= 28271$, we get $BH = 15' 10'',9$, and $AB = 4' 38'',8$; which arcs are found by using 61182 and 60845 fathoms, for the length of their respective

degrees. From these *data*, the latitude of the point B is easily derived; for cosine $15^{\circ} 10'',9$: radius :: cosine $39^{\circ} 36' 56'',7$: cosine $39^{\circ} 36' 54'',2$, the co-latitude of B; hence $39^{\circ} 36' 54'',2 + 4' 38'',8 = 39^{\circ} 41' 33'',0$ the co-latitude of A; hence $50^{\circ} 18' 27''$ is the latitude of St. Agnes. Its longitude, west from Hensbarrow, is also found by a simple proportion; sine $39^{\circ} 36' 54'',2$: radius :: sine $15^{\circ} 10'',9$: sine $0^{\circ} 23' 48''$; therefore, $4^{\circ} 48' 7'',7 + 0^{\circ} 23' 48'' = 5^{\circ} 11' 55'',7$, is the longitude of St. Agnes, west of Greenwich.

ART. XXIV.—*Remarks.*

I have shewn, with attention to minuteness, the manner in which the latitudes and longitudes of the stations on which directions of meridians have been observed are determined. It now remains to be considered, how far the uncertain state in which we remain, with respect to the figure of the earth, may affect the accuracy of those conclusions.

If the earth were homogeneous, it would necessarily be an ellipsoid; and, were its diameters known, the longitudes and latitudes of places on its surface might be accurately computed, provided their geodetical situations were correctly ascertained, and the latitude of one station in the series of triangles truly determined.

As there is, however, great reason to suppose that the earth is not any regular geometrical figure, from the impossibility of reconciling the results of the various measurements for ascertaining the lengths of degrees of latitude, some uncertainty must remain with respect to our deductions; but there seems to be reasons for supposing the errors, thence resulting, are confined within moderate limits.

In making computations on a given hypothesis of the earth's figure, the truth of the conclusions, as well as the ease with which they are found, materially depends on the distances of the objects from their respective fixed meridians.

If the difference of longitude approaches nearly to, or exceeds 3° , to compute that longitude, and also the latitude, it is necessary the precise figure should be understood; because the analogy does not hold good, in that case, between the equality of the sums of the angles of spherical and spheroidical triangles on the earth's surface. With regard to latitudes, more particularly when the distances are diminished by means of frequent new directions of meridians, a knowledge of the exact length of a degree of a great circle is not necessary; because the determination of those latitudes, by means of spherical computation, being true as to sense, the cosines of those small arcs will remain the same.

As there cannot be a doubt justly entertained of the latitude of Greenwich being very accurately determined, as particularly set forth by the Astronomer Royal in his reply to M. CASSINI, it is reasonable to suppose, that if any errors do exist in the latitudes of those stations, they can only have arisen from the computations being made with erroneous lengths of degrees on the meridian.

In our former Papers on this subject, we have taken it for granted, that the length of a degree of the meridian at the middle point between Greenwich and Paris, ($50^{\circ} 10'$), is 60842 fathoms, (which supposition may be considered just, provided the latitude of Paris, $48^{\circ} 50' 14''$, be as near the truth as $51^{\circ} 28' 40''$ is to that of Greenwich,) and afterwards added 9 fathoms,

making it 60851, in order to get the length of the degree in $50^{\circ} 41'$; (see Phil. Trans. 1795, p. 537;) these 9 fathoms, however, were not arbitrarily assumed, but computed. If the latitude of Paris be $48^{\circ} 50' 15''$, (*Conn. des Tems*, 1797-98, p. 373,) the length of the degree will be about 7 fathoms greater, which will make the degree in $50^{\circ} 41'$, 60849 instead of 60842 fathoms.

The latitude of the station on Beachy Head, $50^{\circ} 44' 23''.7$, was found by using 60861 fathoms for the length of a degree on the meridian in $51^{\circ} 6'$; but, if it be true that $48^{\circ} 50' 15''$ is the latitude of Paris, the latitude of Beachy Head will be about one-third of a second greater. This seems to be the limit of the probable error in the computed latitude of this station; since its proximity to the meridian of Greenwich, obviates any doubt of the conclusions being affected by any uncertainty respecting the length of the degree of the great circle perpendicular to the meridian.

The latitude of Dunnose was determined by computing the distance between the parallels of that station and Beachy Head; (see Phil. Trans. for 1795, p. 522;) which method is very exact, and preferable to any other, since the small space between the parallels was determined with great accuracy, leaving not a doubt of a greater error than 3 feet, a quantity corresponding to about $\frac{1}{33}$ d part of a second. And, since the same method has been adopted to find the difference of latitude between Black Down and Dunnose, it is highly probable that the latitude of the former station is not removed more than $\frac{3}{10}$ ths of a second from the true one, that of Beachy Head being supposed $= 50^{\circ} 44' 23''.7$.

It would have been fortunate, had the difference of latitude between Black Down and Butterton, and Butterton and St. Agnes Beacon, been determined in the same manner, since the latitudes of all these important stations would, in that case, have been found with evident accuracy ; but, whoever has leisure and inclination to go through these calculations, will find that, by means of the directions of meridians at Butterton and St. Agnes Beacon, the latitudes of those stations may be found to within half a second. By this I mean, that, allowing the latitude of Black Down to be $50^{\circ} 41' 13''.8$, the latitude of Butterton, $50^{\circ} 24' 46''.3$, will not deviate more than half a second from the truth ; and the same may be said with respect to the latitude of St. Agnes, that of Butterton being admitted as correct. Supposing, therefore, the latitude of Greenwich to be $51^{\circ} 28' 40''$, we may rely on the assurance of the latitude of St. Agnes Beacon being determined within $1\frac{1}{2}''$ of the truth.

With respect to the longitudes of these stations, their accuracy entirely depends on the observations made at Dunnose and Beachy Head, for determining the length of a degree of a great circle perpendicular to the meridian. The truth of the deduction drawn from those observations rests on their accuracy ; and it can scarcely be deemed presumptuous to assert, that an error of more than $1''$ cannot have existed in either of the angles. On this account, therefore, I should suppose, that the difference of longitude between those stations, has been found so nearly as to leave no greater error than $1''$. The whole of the operation to which I now allude, was performed with great care ; the directions of the meridians having been determined by means of double azimuths of the Pole Star, confirmed by computed azimuths. In returning to the consideration of this sub-

ject, I do not perceive any source of error likely to affect the conclusions, unless it be that to which all astronomical observations, made with instruments adjusted by plumb-lines or levels, are liable. In determining differences of longitude through these means, the direction in which any lateral attraction must act, to produce a *maximum* of error, is at right angles to the meridian. If the attraction be *in the plane of it*, it is obvious the double azimuth, although the telescope of the theodolite does not move in a vertical, will nevertheless give, almost exactly, the true direction of the meridian.

The high lands about St. Catherine's Light-House, in the Isle of Wight, are about six miles from Dunnose, and nearly west of it; but it does not appear that the effect of their lateral attraction can have produced any sensible error; since it may be shewn, that the plumb-line of the sector at Schehallien would have deviated only a small part of a second from the true vertical, had the sector itself been placed at that distance from the hill. Beachy Head is situated at the eastern extremity of the South Downs; a *defect* of matter towards the east immediately taking place. This circumstance renders the observations liable to some small errors, on account of the superior lateral attraction in the opposite direction; but, notwithstanding it is very probable that an error induced by either of these attractions, is so very small as to render the subject scarcely worth consideration, yet, as both lie *the same way*, it is satisfactory to consider that they mutually tend to correct the errors which may result from either; we may, therefore, safely conclude, that $1^{\circ} 11' 36''$ is very nearly the true longitude between the station on Beachy Head and that on Dunnose. Under this persuasion, I consider it probable that the longitude of Black

Down cannot err in excess or defect more than 3"; that of But-
terton 5"; and that of St. Agnes Beacon 6".

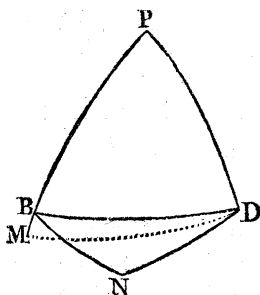
The latitudes and longitudes of these important stations,
brought under one point of view, will be as follows :

	Latitude.	Longitude west from Greenwich.	
		In degrees.	In time.
Black Down -	50° 41' 13",8	2° 32' 22",4	10' 9",5
Butterton Hill -	50 24 46,3	3 52 47,5	15 31,2
St. Agnes Beacon	50 18 27	5 11 55,7	20 47,7

Note. It may probably be expected, that I should determine the directions of the meridians at Black Down, Butterton Hill, and St. Agnes Beacon, by calculation, and afterwards compare them with the observed ones. I have desisted from the measure in the body of the work, and reserved the little I have to say for this note.

If the earth were a perfect sphere, or an ellipsoid of known diameters, the direction of the meridian, at any station not very remotely situated from the parallel of another, might be determined, provided the direction of the meridian at that station were observed, and the value of the arc subtended by the space between them pretty accurately ascertained, and also the latitude of the station, at which the angle is given, nearly obtained.

Thus, if it be required to find the angle at Dunnose, between Beachy Head and the meridian, from the observed angle at the latter station, and the arc between them, we shall have 39° 15' 36",3, the co-latitude of Beachy Head, and 55' 28",7 for the oblique arc. These *data* (two sides and an included angle) give 1° 26' 48",4, for the difference of longitude between Beachy Head and Dunnose, and 81° 56' 52",6, for the angle which the meridian at the latter makes with the former station. The difference of longitude found in a rather more correct way, has been heretofore shewn to be 1° 26' 47",93, (see *Philos. Trans.* 1795. p. 523,) and the angle at Dunnose was also shewn to be 81° 56' 53", from observation, which may be considered the same with that found by this mode of computation. In all cases in which the *data* were equally correct, no doubt the direction of meridians might be computed, without fear of the results deviating much from the truth; but, if it be required to find the angle at Black Down, from the observed direction of the meridian at Dunnose, a different method must be used. It is, however, less accurate than the former one, and it has been expressly for this reason, that I have not introduced this subject into the account,



In the adjoining diagram, suppose B, Black Down; D, Dunnose; and, N, Nine Barrow Down: also, let PB, the meridian of Black Down, be prolonged to M, and DM be drawn, PM being = PD. Then we shall have three spherical triangles BPD, BND, and BMD. Now, the angle NBD was found from observations to be $4^{\circ} 30' 28''$, and BND $172^{\circ} 27' 33''.5$; these give the angle BDN = $3^{\circ} 1' 59''.5$, nearly, because the excess of the three angles above 180° is $1''$. The observed angle at D, Dunnose, between Nine Barrow Down

and the meridian DP, or PDN, was $87^{\circ} 56' 53''$; therefore, $87^{\circ} 56' 53'' - 3^{\circ} 1' 59''.5 = 84^{\circ} 54' 53''.5$, is the angle at D, between the meridian and the station on Black Down.

Now, the difference of longitude between B and D, or the angle at P, has been already found = $1^{\circ} 20' 46''.4$; and, since BP is very nearly = PD, and BD is small, we shall have rad. : tang. $\frac{1}{2}P :: \cosine DP : \cosine BMD = 89^{\circ} 28' 47''$. But the angle PDB has been found = $84^{\circ} 54' 53''.5$; therefore, $89^{\circ} 28' 47'' - 84^{\circ} 54' 53''.5 = 4^{\circ} 33' 53''.5$, the angle BDM; hence, $180^{\circ} 0' 2'' - 94^{\circ} 2' 40''.5 = 85^{\circ} 57' 21''.5$, or MBM; therefore, $94^{\circ} 2' 38''.5$, or DBP, is the angle at Black Down obtained in this way, which differs nearly $16''$ from the observed one, viz. $94^{\circ} 2' 22''.75$. It is probable, some portion of this arises from defects in the observation made at Dunnose, on the lights fired at Nine Barrow Down: only two lights were seen; and, as the observations differed $5''$ from each other, some degree of doubt exists, as to the accuracy of the angle. The angle at Nine Barrow Down, between Black Down and Dunnose, is not absolutely to be depended on for purposes of this kind, although there can be no doubt of its being sufficiently near the truth, for that to which it has been before applied. In the correction of the angles at that station, in our former accounts, we proceeded on the supposition of their being less satisfactory than the other angles of the triangles to which Nine Barrow Down is a common station. For these reasons, I am of opinion the computed angle cannot be applied as a test to the observed one; and it also appears to me, that greater objections lie against similar comparisons between the computed and observed angles at Buttern and St. Agnes; as those stations could not be seen from each other, nor the latter from Black Down. Although the computed directions of the meridians differ some seconds from the observed ones, I am by no means doubtful of the truth of the latter; as the double azimuths of the Pole Star, found from computation, agree very satisfactorily with those which have been used in obtaining the directions of the several meridians.—In finding the value of the oblique arc, or the line which joins Black Down and Dunnose, as used in the first method of computation, I have had recourse to the following *correct* expression, viz.

$$d = \frac{p \cdot m}{p + m - p \cdot s^2}$$
; where d is the length of the required degree, p that of the great circle perpendicular to the meridian, m that of a degree of the meridian itself, and s the sine of the angle constituted by the oblique arc and the meridian.

ART. XXV. *Bearings of the Stations in the Series of 1795 and 1796, from the Parallels to the Meridians of Black Down, Butterson Hill, and St. Agnes Beacon; likewise their Distances from those Meridians, and from their Perpendiculars.*

Meridian of Black Down.

Bearings from the Parallel to the Meridian.				Distances from merid.	Distances from perp.
				Feet.	Feet.
Bull Barrow	-	Black Down	42 2 30 NE	53643,2	59489,7
Mintern	-	-	10 36 33 NE	10996,8	58709
Pilsden	-	-	56 14 48 NW	65775,6	43955,4
Charton Common	-	-	83 30 3 NW	102681	11697,5
Dumpdon	-	Charton Common	45 4 0 NW	143749	52670,9
Rippin Tor	-	-	81 37 52 SW		

Meridian of Butterson.

Rippin Tor	-	Butterson	27 0 23 NE	28585,3	56086,6
Furland	-	-	78 37 39 SE	78966,3	15883
Bolt Head	-	-	14 49 48 SE	18551,3	70065,4
Maker Heights	-	-	70 36 9 SW	71467,9	25164,3
Kit Hill	-	-	67 12 12 NW	93081,9	39121,7
Carraton Hill	-	-	73 53 22 NW	126408,9	36511,3
Cawsand Beacon	-	Rippin Tor	35 35 29 NW	86744,4	108147,5
Little Haldon	-	Furland	4 25 2 NE	84571,4	56676,8
Bindown	-	Maker	70 4 48 NW	52926,6	19180,1
Hensbarrow	-	-	87 35 18 SW	92878,0	28271,0

Meridian of St. Agnes Beacon.

Hensbarrow	-	St. Agnes Beacon	73 4 13 NE	92877,4	28279,9
Deadman	-	-	72 24 27 SE	97292,5	30849
Karnbonellis	-	-	3 27 27 SW	2741,7	45379,2
Karnminnis	-	-	61 13 58 SW	74168,1	40719
Bodmin	}	Hensbarrow	37 30 45 NE	121703,2	65825,8
Lansallos			75 29 51 SE	152945,3	12733,5
St. Burian	-	Karnbonellis	67 20 59 SW	94831,5	83807,3
Pertinney	-	Karnminnis	39 25 32 SW	100465,1	72704,4
Sennen	-	Pertinney	40 50 18 SW	113674,4	879868

**ART. XXVI. Latitudes and Longitudes of the Stations in the Series
of 1795 and 1796.**

Meridian of Black Down.

Names of Stations.	Latitude.	Longitude from Black Down.	Longitude west of Greenwich.	
			In degrees.	In time.
			° ' "	m. s.
Bull Barrow - - -	50 50 59,5	0 13 53,2 E	2 18 29,2	9 14
Mintern - - -	50 50 52,8	0 2 50,8 E	2 29 31,6	9 58,1
Pilsden - - -	50 48 26,9	0 17 0,7 W	2 49 23,1	11 17,5
Charton - - -	50 43 6,1	0 26 30,5 W	2 58 52,9	11 55,5
Dumpdon - - -	50 49 47,2	0 37 12,1 W	3 39 34,5	14 38,3
Rippin Tor - - -	50 33 59,1	1 13 3,8 W	3 45 26,2	15 1,7
<i>Meridian of Butterson Hill.</i>		From merid. of Butterson.		
Furland - - -	50 22 7,8	0 23 13,2 E	3 32 34,3	14 10,3
Little Haldon - - -	50 34 3,0	0 21 45,6 E	3 31 1,9	14 4,1
Cawsand Beacon - - -	50 42 31,14	0 2 14,3 W	3 55 1,8	15 40,1
Bolt Head - - -	50 13 15,2	0 4 44,5 E	3 48 3,1	15 12,2
Maker - - -	50 20 36,56	0 18 18,2 W	4 11 5,7	16 44,3
Kit Hill - - -	50 31 9,4	0 23 55,7 W	4 16 43,2	17 6,9
Carraton Hill - - -	50 30 41,6	0 32 29,5 W	4 25 17,0	17 41,1
Bindown - - -	50 23 32,9	0 31 53,5 W	4 24 41,0	17 38,7
Hensbarrow - - -	50 23 3,3	0 55 20,2 W	4 48 7,7	19 12,5
<i>Meridian of St. Agnes.</i>		From merid. of St. Agnes.		
Lansallos - - -	50 20 25,7	0 39 10,3 E	4 32 45,7	18 11,0
Bodmin Down - - -	50 29 11,6	0 31 15,9 E	4 40 39,8	18 42,6
Deadman - - -	50 13 20,0	0 24 51,3 E	4 47 4,4	19 8,3
Karnbonellis - - -	50 10 59,4	0 0 42,0 W	5 12 37,7	20 50,5
Karnminnis - - -	50 11 43,8	0 18 56,2 W	5 30 51,9	22 3,5
St. Burian - - -	50 4 37,9	0 24 9,2 W	5 36 4,9	22 24,3
Pertinney - - -	50 6 27,0	0 25 36,2 W	5 37 31,9	22 30,1
Sennen - - -	50 3 55,6	0 28 56,7 W	5 40 52,4	22 43,5

ART. XXVII. *Bearings of the intersected Objects, from the Stations in the Series of 1795 and 1796, from the Parallels to the Meridians of Black Down, Butterton Hill, and St. Agnes Beacon; and likewise their Distances from these Meridians.*

Meridian of Black Down.

Bearings from the Parallels to the Meridian.		Distances from merid.	Distances from perp.
		Feet.	Feet.
<i>At Bull Barrow.</i>			
<i>Portland Light House</i>	19 47 16 SE	21581	59985
Noil Windmill	10 12 56 NE	72842	166029
Noil Steeple	21 53 29 NE	86610	141534
Holy Trinity, Shaftsbury	25 41 52 NE	81081	116506
St. Rumbold's Steeple, Ditto	28 12 51 NE	80486	109522
Maypowder Steeple	85 17 11 NW	29526	61479
Stourhead House	0 27 46 NW	52881	153806
Mr. Frampton's Obelisk	10 3 4 SE	63588	3384
Mere Steeple	6 40 55 NE	63893	146984
Mrs. Thornhill's Obelisk	22 18 51 NW	40391	91778
Odcomb Spire	70 25 0 NW	35474	91194
Milborne Port	38 21 20 NW	20110	101865
<i>At Black Down.</i>			
<i>Puncknoll Flagstaff</i>	89 9 57 NW	25612	373
Lambert's Castle	65 17 36 NW	67269	30950
Lyne Cobb	82 21 29 NW	89547	12015
<i>At Pilsden.</i>			
<i>Golâen Cape</i>	4 44 3 SW	68239	14209
Glastonbury Tor	14 19 23 NE	34314	167176
Bridport Beacon	8 19 55 SW	72199	91
Lord Rolle's Barn, near Sidmouth	64 34 38 SW	101743	26859
<i>At Dumptdon.</i>			
<i>Naval Flagstaff, Whitlands</i>	32 45 10 SE	116249	9920
Catherstone Lodge	2 29 45 NE	140940	117131
Lord Lisburne's Obelisk	46 47 34 SW	225502	24119
Sir J. de la Pole's Flagstaff	52 3 42 SE	86622	8137
Honiton Steeple	12 24 9 SW	146681	39339
St. Mary Ottery Steeple	42 21 56 SW	179904	13028
Sir Robert Palk's Tower	58 56 2 SW	242012	6526

Meridian of Butterson.

Bearings from the Parallels to the Meridian.				Distances from merid.	Distance from per.
<i>At Little Haldon.</i>				Feet.	Feet.
North Bovey	-	-	71 44 23 N W	43315	70289
Eastern Karn	-	-	56 27 52 N W	41145	85459
Western Karn	-	-	53 12 10 N W	40730	89472
West Down Beacon	-	-	63 59 14 N E	126152	76968
Woodley's Summer House	-	-	83 39 47 S W	29448	50555
Berry Head Flagstaff	-	-	10 22 16 S E	95740	4350
Brixen Steeple	-	-	2 29 4 S E	87435	9331
Ippepen Steeple	-	-	22 15 0 S W	68413	17180
Three Barrow Tor	-	-	68 43 3 S W	8667	27109
Brent Beacon	-	-	56 11 17 S W	15460	10390
<i>At Butterson.</i>					
Chudleigh Steeple	-	-	44 4 44 N E	67688	69900
Froward Flagstaff	-	-	75 0 28 S E	84342	22587
Start Point Flagstaff	-	-	39 22 33 S E	56544	68897
Marlborough Steeple	-	-	16 42 32 S E	18429	61393
Bolt Head Flagstaff	-	-	14 57 7 S E	18739	70173
Mewstone, highest point	-	-	52 35 23 S W	49825	38108
Cupola, Hospital, Plymouth	-	-	76 47 30 S W	66891	15699
St. John's Steeple	-	-	79 34 44 S W	83991	15447
Saltash Steeple	-	-	89 37 12 S W	73707	489
Penlee Beacon	-	-	64 59 49 S W	69758	32532
Plymstock Steeple	-	-	73 46 15 S W	49217	14326
Statten Barn	-	-	64 43 53 S W	53270	25145
Mount Batton	-	-	70 50 51 S W	58651	20370
Flagstaff, Plymouth Garrison	-	-	72 51 17 S W	57021	17591
New Church, Plymouth	-	-	75 25 49 S W	56521	14691
Old Church, Plymouth	-	-	75 1 56 S W	57505	15374
West Chimney, Governor's House	-	-	75 42 15 S W	64497	16435
Flagstaff on Mount Wise	-	-	75 40 55 S W	65281	16662
Chapel, Plymouth Dock	-	-	77 33 28 S W	67040	14792
Obelisk, Crimhill Passage, Plymouth	-	-	74 7 9 S W	66728	18984
Mount Edgcombe House	-	-	72 18 23 S W	65827	21001
Flagstaff, Maker Tower	-	-	70 53 41 S W	68224	23632
Naval Signal Staff, Maker Tower	-	-	70 54 3 S W	68232	23626
Eddystone Light House	-	-	46 1 27 S W	87190	84127
<i>At Butterson.</i>					
Stonehouse Steeple	-	-	65 32 37 S W	53078	24140
Puslinch Obelisk	-	-	45 17 46 S W	27480	27223
Flagstaff, Rame Head	-	-	65 3 44 S W	76935	35774
<i>At Rippin Tor.</i>					
Great Haldon	-	-	52 27 0 N E	72023	89479

Bearings from the Parallels to the Meridian.				Distances from merid.	Distances from perp.
<i>At Maker.</i>				Feet.	Feet.
Hemmerdon Ball	-	-	62 10 37 NE	27722	2077
Brent Tor	-	-	5 27 45 NE	62385	69820
Blockhouse Flagstaff	-	-	27 51 26 NE	64005	11043
Rame Steeple	-	-	20 20 12 SW	74388	33043
Chapel, Dockyard	-	-	23 6 50 NE	67042	14795
Flagstaff, Statten Battery	-	-	88 9 5 SE	54278	25719
Windmill, Plymouth Dock	-	-	29 47 35 NE	65963	15549
<i>At Kit Hill.</i>					
St. Stephen's Steeple	-	-	19 29 31 SE	78182	2979
St. Ive Steeple	-	-	56 20 4 SW	114213	25047
Callington Steeple	-	-	43 0 14 SW	98219	33613
Linkinghorn Steeple	-	-	69 8 31 NW	111417	46108
St. Dominic Steeple	-	-	27 19 41 NE	89512	46030
South Petherwin Steeple	-	-	34 6 18 NW	115216	71807
South Hill	-	-	74 57 40 NW	108044	43142
St. Cleer Steeple	-	-	74 42 9 SW	133492	27795
<i>At Carraton Hill.</i>					
Cheese Rings	-	-	44 0 29 NW	133198	43540
Liskeard Steeple	-	-	15 19 39 SW	132155	15546
Landrake Steeple	-	-	46 1 2 SE	92463	3750
Duloe Steeple	-	-	15 23 3 SW	137923	5336
Menheniot Steeple	-	-	11 59 44 SE	121941	15479
Polparrow Flagstaff	-	-	20 8 5 SW	138871	2521
Lord Camelford's Obelisk	-	-	48 33 15 SW	163992	3324
Boconnock Steeple	-	-	44 34 58 SW	158753	3692
Roach Steeple	-	-	66 30 33 SW	218318	3434
Roach Rock	-	-	65 58 15 SW	217204	3969

Meridian of St. Agnes.

<i>At Lansallos.</i>					
Lanlivery Steeple	-	-	56 48 14 NW	119848	34388
Helmen Tor	-	-	53 55 17 NW	113818	41243
Mr. Tremaine's Summer House	-	-	67 21 40 SW	96548	10787
Gorran Steeple	-	-	58 55 59 SW	95877	21647
Flagstaff, Deadman	-	-	51 46 44 SW	97059	31278
Gwineas Rocks	-	-	53 9 0 SW	106551	22037
<i>At Hensbarrow.</i>					
Hendellion Steeple	-	-	2 26 59 NW	89918	97463
Stone, St. Braeg's Down	-	-	17 31 12 NW	81868	63145
St. Dennis Steeple	-	-	83 6 25 NW	77630	30114
Lansallos Steeple	-	-	73 43 28 SE	149787	11656
Gerrans Steeple	-	-	26 33 53 SW	55357	46773
St. Michael Carhayes Steeple	-	-	9 39 51 SW	84768	19353

Bearings from the Parallels to the Meridian.		Distances from merid.	Distances from perp.
St. Kivern Steeple - - -	27 6 7 SW	30611	93398
Flagstaff, Blackbead - - -	24 50 36 SW	31214	104917
Windmill, near Fowey - - -	67 2 44 SE	134347	10707
Menabilly House - - -	60 26 48 SE	123516	10899
Old Tower at Polruan - - -	64 44 37 SE	35892	7978
Flagstaff, St. Anthony's Head (D.)*	26 35 45 SW	48664	60038
<i>At the Deadman.</i>			
St. Veep's Steeple - - -	39 4 29 NE	140146	21930
<i>At St. Agnes.</i>			
St. Columb Minor Steeple - - -	44 7 57 NE	40698	41950
Peranzabulo - - -	41 54 34 NE	19354	21563
St. Eval Steeple - - -	37 52 39 NE	50275	64632
Cubert Steeple - - -	42 26 53 NE	23773	25991
Flagstaff, Pendennis Castle - - -	34 19 23 SE	39999	58586
Windmill, St. Mawe's - - -	45 52 9 SE	48079	46642
Karnbre Castle - - -	11 53 47 SW	6480	30760
Illugan Steeple - - -	30 1 2 SW	11865	20537
St. Paul's Steeple - - -	20 21 16 SW	38457	103660
Lord Dunstanville's House - - -	40 33 25 SW	19726	23050
Gwinear Steeple - - -	39 33 34 SW	39578	47911
Cow and Calf - - -	23 7 32 NE	37174	87044
Camborn Steeple - - -	30 16 51 SW	19881	34048
St. Erme Steeple - - -	88 42 22 NE	44657	1009
St. Allen Steeple - - -	85 13 35 NE	36688	3064
Ludgvan Steeple - - -	47 39 58 SW	64737	58976
<i>At Karnbonellis.</i>			
Lizard Windmill - - -	1 47 24 SE	573	114785
Grade Steeple - - -	6 41 17 SE	5710	117451
Ruan Major Steeple - - -	3 46 21 SE	1486	109496
St. Hilary Steeple - - -	66 19 33 SW	49009	65664
Mr. Rogers's Tower, near St. Ives - - -	83 43 6 SW	18396	47102
Madern Steeple - - -	76 53 40 SW	81542	63725
Parklough Flagstaff - - -	6 55 11 SW	10735	111240
<i>At Karnminnis.</i>			
St. Buryan Steeple - - -	25 45 25 SW	95205	84320
<i>At St. Buryan.</i>			
Chapel Karnbury - - -	3 25 16 NW	95472	73098
Flagstaff, St. Leven's Point - - -	77 29 40 SW	114449	88158
Sennen Steeple - - -	83 44 37 SW	112202	85712
<i>At Pertinney.</i>			
Stone, LAND'S END - - -	48 5 30 SW	116222	86847

* The letter D is added (as in the former accounts) to those places respecting which any doubts are entertained.

ART. XXVIII. *Latitudes and Longitudes of such intersected Objects, in the Series of 1795 and 1796, as have been referred to the Meridians of Black Down, Butterson Hill, and St. Agnes.*

Names of Objects.	Latitude	Longitude from Black Down.	Longitude west of Greenwich.	
			In degrees.	In time.
	° ' "	° ' "	° ' "	m. s.
<i>Portland Light House</i> -	50 31 22,2	0 5 32,9 E	2 26 49,5	9 47,3
<i>Noil Windmill</i> -	51 8 29,3	0 18 58,7 E	2 13 23,7	8 53,6
<i>Noil Steeple</i> -	51 4 27,1	0 22 31,8 E	2 19 50,6	9 19,3
<i>Holy Trinity, - Shaftsbury</i>	51 0 20,7	0 21 3,6 E	2 11 18,8	8 45,3
<i>St. Rumbold's Steeple, Ditto</i>	50 59 11,8	0 20 53,9 E	2 11 28,5	8 45,8
<i>Maypowder Steeple</i> -	50 51 19,7	0 7 38,6 E	2 24 43,8	9 38,9
<i>Stourhead House</i> -	51 6 29,5	0 13 46,0 E	2 18 36,4	9 14,4
<i>Mr. Frampton's Obelisk</i> -	50 41 46,0	0 16 24,5 E	2 15 57,9	9 3,8
<i>Mere Steeple</i> -	51 5 21,7	0 16 37,6 E	2 15 44,8	9 2,9
<i>Mrs. Thornhill's Obelisk</i> -	50 56 17,5	0 10 28,6 E	2 21 53,8	9 27,6
<i>Odcomb Spire</i> -	50 56 12,6	0 9 12,1 W	2 41 34,4	10 46,3
<i>Milborne Port</i> -	50 57 58,0	0 5 13,1 E	2 27 9,3	9 48,6
<i>Puncknoll Flagstaff</i> -	50 41 17,3	0 6 36,4 W	2 38 58,8	10 35,9
<i>Lambert's Castle</i> -	50 46 17,7	0 17 23,1 W	2 49 45,5	11 19
<i>Lyme Cobb</i> -	50 43 10,0	0 23 7, W	2 55 29,4	11 41,9
<i>Golden Cape</i> -	50 43 32,5	0 17 37,2 W	2 49 59,6	11 20
<i>Glastonbury Tor</i> -	51 8 47,7	0 8 56,4 W	2 41 18,8	10 45,2
<i>Bridport Beacon</i> -	50 41 13,2	0 18 37,6 W	2 50 59,9	11 24
<i>Ld. Rolle's Barn, near Sidmouth</i>	50 45 35,6	0 26 17,2 W	2 58 39,6	11 54,6
<i>Naval Flagstaff, Whitlands</i>	50 42 47,7	0 30 0,4 W	3 2 22,8	12 9,5
<i>Catherstone Lodge</i> -	51 0 23,0	0 36 36,6 W	3 8 59,0	12 35,9
<i>Lord Lisburne's Obelisk</i> -	50 37 1,3	0 58 5,6 W	3 30 28,1	14 1,9
<i>Sir J. de la Pole's Flagstaff</i> -	50 42 31,9	0 22 21,4 W	2 54 43,8	11 38,9
<i>Honiton Steeple</i> -	50 47 35,5	0 37 55,7 W	3 10 18,1	12 41,2
<i>St. Mary Ottery Steeple</i> -	50 43 12,9	0 46 26,8 W	3 18 49,2	13 15,3
<i>Sir Robert Palk's Tower</i> -	50 39 52,5	1 2 24,6 W	3 34 47,	14 19,1

Meridian of Butterson Hill.

Names of Objects.	Latitude.	Longitude from Butterson Hill.	Longitude west of Greenwich	
			In degrees.	In time.
	° ' "	° ' " E	° ' "	m. s.
North Bovey Steeple (D.) -	50 36 18,7	0 11 9,3 E	3 41 38,2	14 46,5
Eastern Karn -	50 38 48,4	0 10 36,3 E	3 42 11,2	14 48,7
Western Karn -	50 39 27,9	0 10 30,1 E	3 42 17,4	14 49,1
West Down Beacon -	50 37 20,5	0 32 30,0 E	3 20 17,5	13 21,1
Woodley's Summer House	50 33 4,5	0 7 34,5 E	3 45 13	15 0,9
Flagstaff, Berry Head, Torbay	50 24 0,7	0 24 33,1 E	3 28 14,4	13 52,9
Brixen Steeple -	50 23 12	0 22 24,8 E	3 30 22,7	14 1,5
Ipplepen Steeple -	50 27 34,2	0 17 33,8 E	3 35 13,7	14 20,9
Three Barrow Tor -	50 29 13,5	0 2 13,5 E	3 50 34	15 22,3
Brent Beacon, near Ashburton	50 26 28,6	0 3 58,1 E	3 48 49,4	15 15,3
Chudleigh Steeple -	50 36 14,1	0 17 25,9 E	3 35 21,6	14 21,4
Froward Flagstaff -	50 21 1,4	0 21 36,3 E	3 31 11,2	14 4,7
Flagstaff, Start Point -	50 13 25,9	0 14 26,7 E	3 38 20,8	14 33,4
Marlborough Steeple -	50 14 40,7	0 4 42,5 E	3 48 5,0	15 12,3
Flagstaff, Bolt Head -	50 13 14,1	0 4 47,2 E	3 48 0,3	15 12
Mewstone, highest point -	50 18 29,7	0 12 45,1 W	4 5 32,6	16 22,1
Cupola of Plymouth Hospital	50 22 10,1	0 17 8,5 W	4 9 56,1	16 39,7
St. John's Steeple (D.) -	50 22 11,8	0 21 31,4 W	4 14 18,9	16 57,2
Saltash Steeple -	50 24 39,8	0 18 54,3 W	4 11 41,8	16 42,8
Penlee Beacon -	50 19 24	0 17 52,6 W	4 10 40,1	16 42,7
Plymstock Steeple -	50 22 24,2	0 12 36,8 W	4 5 24,3	16 21,6
Statten Barn -	50 20 37,4	0 13 38,6 W	4 6 26,1	16 25,7
Mount Batten -	50 21 24,3	0 15 1,6 W	4 7 49,1	16 31,2
Flagstaff, Plymouth Garrison	50 21 21,8	0 14 36,5 W	4 7 24,0	16 29,6
New Church, Plymouth -	50 22 20,4	0 14 29,0 W	4 7 16,5	16 29,1
Old Church, Plymouth -	50 22 13,6	0 14 44,1 W	4 7 31,6	16 30,1
Eddystone Light House -	50 10 54,5	0 22 15,4 W	4 15 2,9	17 0,3
West Chimney, Governor's House, Plymouth Dock -	50 22 2,9	0 16 31,6 W	4 9 19,1	16 37,2
Flagstaff, Mount Wise -	50 22 0,7	0 16 43,7 W	4 9 31,2	16 38,1
Chapel, Plymouth Dock -	50 22 19	0 17 10,8 W	4 9 58,3	16 39,9
Obelisk, Crimhill Passage	50 21 37,7	0 17 5,8 W	4 9 53,3	16 39,5
Mount Edgcombe House	50 21 17,9	0 16 51,8 W	4 9 39,3	16 38,6
Flagstaff, Maker Tower	50 20 51,8	0 17 28,5 W	4 10 16,0	16 41,1
Naval Flagst. near Maker Tow.	50 20 51,9	0 17 28,6 W	4 10 16,1	16 41,1
Stonehouse Steeple -	50 20 47,4	0 13 35,7 W	4 6 23,2	16 25,5
Puslinch Obelisk -	50 20 17,5	0 7 2,6 W	3 59 50,1	15 59,5
Rame Head -	50 18 51,7	0 19 41,5 W	4 12 29,0	16 49,9
Great Haldon -	50 39 27	0 18 34,2 W	3 34 13,3	14 16,9
Hemmerdon Ball -	50 21 21,2	0 7 6,5 W	3 59 53,6	15 59,5
Brent Tor -	50 36 13,4	0 16 33,9 W	4 9 21,4	16 37,4
Flagstaff, Blockhouse, Plymouth	50 22 56,4	0 16 24,4 W	4 9 11,8	16 36,8

Names of Objects.	Latitude.	Longitude from Butterton Hill.	Longitude west of Greenwich.	
			In degrees.	In time.
				m. s.
<i>Rame Steeple</i> - -	50 19 18,7	0 37 59,8 W	4 30 47,3	18 3,1
<i>Flagstaff, Statten Battery</i>	50 20 31,8	0 13 54,1 W	4 6 41,6	16 26,8
Windmill, Plymouth Dock	50 22 11,6	0 16 54,2 W	4 9 41,7	16 38,8
St. Stephen's Steeple -	50 24 15,1	0 20 3,0 W	4 12 50,5	16 51,3
St. Ive Steeple - -	50 28 49	0 29 20,2 W	4 22 7,7	17 28,5
Linkinghorn Steeple -	50 32 17,3	0 28 39,2 W	4 21 26,7	17 25,8
St. Dominic Steeple (D.) -	50 32 17,8	0 23 1,2 W	4 15 48,7	17 3,2
South Petherwin Steeple -	50 36 30,4	0 29 40,4 W	4 22 27,5	17 29,8
South Hill Steeple - -	50 31 48,3	0 27 46,9 W	4 20 34,4	17 22,3
St. Cleer Steeple - -	50 29 15	0 34 33,1 W	4 27 20,6	17 49,4
Callington Steeple - -	50 30 14,9	0 25 14,4 W	4 18 1,9	17 12,1
Cheese Rings - -	50 31 50,5	0 34 14,9 W	4 27 2,4	17 48,1
Liskeard Steeple - -	50 27 14,4	0 33 55,5 W	4 26 43,0	17 46,8
Landrake Steeple - -	50 25 20,7	0 23 43,3 W	4 16 30,8	17 6
Duloe Steeple - -	50 23 48,0	0 35 21,9 W	4 28 9,4	17 52,6
Menheniot Steeple - -	50 27 14,5	0 31 18,3 W	4 24 5,8	17 30,4
<i>Polparrow Flagstaff</i> -	50 25 5,5	0 35 37,4 W	4 28 24,9	17 53,6
Lord Camelford's Obelisk	50 25 11,1	0 42 4,2 W	4 34 51,7	18 19,4
Boconnock Steeple -	50 25 15,3	0 40 43,7 W	4 33 31,2	18 14,1
Roach Rock - -	50 23 53,4	0 55 41,8 W	4 48 29,4	19 13,9
Roach Steeple - -	50 23 58,7	0 55 59,1 W	4 48 46,6	19 15,1

Meridian of St. Agnes.

Names of Objects.	Latitude.	Longitude from St. Agnes Beacon.	Longitude west of Greenwich.	
			In degrees.	In time.
				m. s.
Lanlivery Steeple -	50 24 1,9	0 30 44,0 E	4 41 11,7	18 44,8
Helmen Tor - -	50 25 9,9	0 29 11,9 E	4 42 43,8	18 50,9
Mr. Tremaine's Summer House	50 16 37,8	0 24 41,6 E	4 47 14,1	19 8,9
Gorran Steeple - -	50 14 50,8	0 24 30,4 E	4 47 25,3	19 9,6
<i>Flagstaff, Deadman</i> -	50 13 15,8	0 24 47,7 E	4 47 8,0	19 8,5
<i>Gwineas Rocks</i> - -	50 14 46,3	0 27 14,1 E	4 44 41,6	18 58,8
Hendellion Steeple -	50 34 25,6	0 23 8,5 E	4 48 47,2	19 15,1
Stone, St. Braeg's Down -	50 28 47,6	0 21 1,7 E	4 50 54,0	19 23,6
St. Dennis Steeple -	50 23 22,1	0 19 54,1 E	4 52 1,6	19 28,1
St. Michael Carhayes Steeple	50 15 14,0	0 21 40,2 E	4 50 15,5	19 21
St. Kivern Steeple -	50 3 5,6	0 7 47,5 E	5 4 8,2	20 16,5
<i>Flagstaff, Blackhead</i> -	50 1 12,1	0 7 56,4 E	5 3 59,3	20 15,9
<i>Windmill, near Fowey</i> -	50 20 7,2	0 34 24,2 E	4 37 31,5	18 30,1
Menabilly House - -	50 20 9,9	0 31 37,8 E	4 40 17,9	18 4,11
<i>Old Tower at Polruan</i> -	50 19 40,2	0 34 47,7 E	4 37 8,0	18 28,5
<i>Flagstaff, St. Anthony's Head</i>	50 8 34,2	0 12 24,7 E	4 59 31,0	19 58,1
St. Veep's Steeple -	50 21 57,5	0 35 54,7 E	4 36 1,0	18 24,1
St. Columb Minor Steeple	50 25 20,1	0 10 26,4 E	5 1 29,3	20 5,9
<i>Peranzabulo</i> - -	50 21 59,4	0 4 57,6 E	5 6 58,2	20 27,9

Names of Objects.	Latitude.	Longitude from St. Agnes Beacon.	Longitude west of Greenwich.	
			In degrees.	In time.
	° ' "	° ' " E	° ' "	m. s.
St. Eval Steeple - -	50 29 3,5	0 12 54,9 E	4 59 0,8	19 56
Cubert Steeple - -	50 22 43,0	0 6 5,6 E	5 5 50,1	20 23,3
<i>Flagstaff, Pendennis Castle</i>	50 8 48,7	0 10 12,1 E	5 1 43,6	20 6,9
Windmill, St. Mawes -	50 10 46,3	0 12 16,3 E	4 59 39,4	19 58,6
Karnbre Castle - -	50 13 23,6	0 1 39,3 W	5 13 35,0	20 54,3
Illugan Steeple - -	50 15 4,4	0 3 1,9 W	5 14 57,6	20 59,8
St. Paul's Steeple - -	50 1 24,3	0 9 47,0 W	5 21 42,7	21 26,8
Lord Dunstanville's House	50 14 39,4	0 5 2,5 W	5 16 58,2	21 7,8
Lansallos Steeple - -	50 20 15,3	0 38 16,2 E	4 33 39,5	18 14,6
Gerrans Steeple - -	50 10 44,8	0 14 7,7 E	4 57 48,0	19 51,2
Gwinear Steeple - - -	50 10 34,	0 10 6,0 W	5 22 1,7	21 28,1
<i>Cow and Calf</i> - - -	50 32 44,8	0 9 33,7 E	5 2 22,0	20 9,5
Camborn Steeple - -	50 12 51,0	0 5 4,7 W	5 17 0,4	21 8
St. Erme Steeple - -	50 18 36,3	0 11 25,7 E	5 0 30,0	20 2
St. Allen Steeple - - -	50 18 56,8	0 9 23,6 E	5 2 32,1	20 10,1
Ludgvan Steeple - -	50 8 44,1	0 16 30,7 W	5 28 26,4	21 53,8
<i>Windmill, Lizard</i> - -	49 59 35,1	0 0 8,7 E	5 12 4,4	20 48,3
Grade Steeple - - -	49 59 8,8	0 1 27,1 E	5 10 28,6	20 41,9
Ruan Major Steeple - -	50 0 27,2	0 0 22,6 E	5 11 29,1	20 45,9
St. Hilary Steeple - -	50 7 38,7	0 12 29,7 W	5 24 25,4	21 37,7
Mr. Rogers's Tower - -	50 10 42,4	0 4 41,7 W	5 16 37,4	21 6,5
Madern Steeple - - -	50 7 56,6	0 20 47,5 W	5 32 43,2	22 10,9
<i>Park Lough Flagstaff</i>	50 0 9,9	0 2 43,8 W	5 14 39,5	20 58,6
<i>Lizard Flagstaff</i> - -	49 57 55,8	0 0 38,1 E	5 11 17,7	20 45,2
St. Buryan Steeple - -	50 4 32,8	0 24 14,8 W	5 36 10,5	22 24,7
Karnbury Chapel - -	50 6 23,5	0 24 19,8 W	5 36 15,5	22 25
<i>St. Leven's Point, Flagstaff</i>	50 3 53,8	0 29 8,5 W	5 41 4,2	22 44,3
Sennen Steeple - - -	50 4 18,0	0 28 36,6 W	5 40 29,9	22 41,9
<i>Stone, LAND'S END</i> - -	50 4 6,6	0 29 35,8 W	5 41 31,5	22 46,1

Notwithstanding almost the whole of the above latitudes and longitudes belong to objects near the sea coast, yet I have distinguished those which are actually upon it, from those more remotely situated, by *Italics*.

ART. XXIX. *Bearings of the Stations in the Series of 1797 and 1798, from the Parallels to the Meridians of Black Down, But-
terton Hill, and St. Agnes Beacon; and likewise their Distances
from those Meridians*

Meridian of Black Down.

Names of the Stations.		Bearings.	Distances from merid.	Distances from perp.
		° ' "	Feet.	Feet
Pilsden -	Moor Lynch -	2 33 59 NW	71070	162067
Ash Beacon -		59 52 59 NW		
Mintern -	Ash Beacon -	5 17 18 NW	5544	117624
Moor Lynch -		59 53 1 SE		
Bull Barrow -	Long Knoll -	1 2 34 NE	55557	164653
Ash Beacon -		46 45 33 NE		
Pilsden -	Dundon -	12 40 33 NE	42964	145377
Moor Lynch -		59 17 35 SE		
Moor Lynch -	Mendip -	66 3 36 NE	1021	194072
Ash Beacon -		3 23 8 NW		
Long Knoll -	Beacon Hill -	82 28 4 NE	189665	182386
Wingreen -		50 16 22 NW		
Long Knoll -	Westbury -	39 44 34 NE	92715	209344
Mendip -		80 32 31 NE		
Westbury -	Farley Down	35 44 37 NW	57752	257920
Dundry -		88 51 23 SE		
Mendip -	Dundry -	18 59 1 NW	21488	259503
Farley Down -		88 51 22 NW		
Mendip -	Lansdown -	22 4 57 NE	32440	271514
Dundry -		77 26 41 NE		

Meridian of Butterson Hill.

Carraton Hill -	St. Stephen's -	15 15 47 NE	112457	87635
Kit Hill -		21 46 9 NW		
Carraton Hill -	Black Down -	64 12 55 NE	51797	72555
St. Stephen's -		76 2 26 SE		

Meridian of St. Agnes Beacon.

St. Agnes Beacon	Trevose Head	25 54 12 NE	42858	88250
Hensbarrow -		39 49 34 NW		
Trevose Head -	Cadon Barrow	63 18 48 NE	119364	126702
Bodmin Down -		2 11 52 NW		
Bodmin Down -	Brown Willy -	28 46 20 NE	142745	104145
Cadon Barrow -		46 1 42 SE		

ART. XXX. *Bearings of the Stations in the Series of 1799, from the Parallels to the Meridians of Dunnose and Greenwich; and likewise their Distances from those Meridians.*

Meridian of Dunnose.

Names of the Stations.		Bearings.	Distances from merid.	Distances from perp.
		° ' " NE	Feet.	Feet.
Highclere -	{ Bagshot Heath -	81 40 58 NE	108275	274173
	{ Nuffield -	35 30 40 NE	36747	351480
	{ White Horse Hill -	27 47 37 NW	83796	349533
White Horse Hill	{ Stow on the Wold	14 29 27 NW	114915	469942
	{ Brill -	50 16 17 NE	28955	443235
	{ Shotover Hill -	53 30 7 NE	3063	413801
	{ Scutchamfly -	84 25 51 SE	32776	344558
	{ Whiteham Hill -	36 30 13 NE	31054	420801
Stow on the Wold	{ Broadway -	33 3 55 NW	143396	513693
	{ Epwell -	39 34 55 NE	64617	530781
Shotover Hill -	{ Cumner Hill -	76 58 3 SW	25416	407209
Epwell -	{ Corley Hill -	6 39 56 NW	81312	673637
	{ Arbury Hill -	48 5 23 NE	2776	586288
Brill -	{ Crouch Hill -	39 20 49 NW	36102	522584
	{ Quainton -	61 40 13 NE	64963	462648

Meridian of Greenwich.

Nuffield -	{	Wendover -	{	44 48 19 NE	} 174338	100986
Brill -	{		{	65 49 3 SE		
Brill -	{	Bow Brickhill	{	56 46 9 NE	} 151413	190493
Arbury Hill -	{		{	54 50 52 SE		
Brill -	{	Kinsworth -	{	85 8 30 NE	} 120910	141562
Bow Brickhill -	{		{	31 55 51 SE		
Bow Brickhill -	{	Lillyhoe -	{	74 6 27 SE	} 84215	171367
Kinsworth -	{		{	50 54 40 NE		
Bow Brickhill -	{	Lidlington -	{	67 24 37 NE	} 121834	202802
Lillyhoe -	{		{	50 6 55 NW		
Bow Brickhill -	{	Trusler Hill -	{	89 1 15 SE	} 131278	190151
Lillyhoe -	{		{	68 14 71 NW		

ART. XXXI. *Latitudes and Longitudes of the Stations in the Series of 1797 and 1798, referred to the Meridians of Black Down, Butterson Hill, and St. Agnes Beacon.*

Meridian of Black Down.

Names of the Stations.	Latitude.	Longitude from Black Down.	Longitude west of Greenwich.	
			In degrees.	In time.
				m. s.
Moor Lynch - -	51° 7' 50,2"	0° 18' 30,6" W	2° 50' 53"	11 23,5
Ash Beacon - -	51° 0' 33,5"	0° 1' 26,4" E	2° 30' 56"	10 3,7
Long Knoll - -	51° 8' 16,2"	0° 14' 28,3" E	2° 17' 54,1"	9 11,6
Dundon - - -	51° 5' 6,5"	0° 11' 10,7" W	2° 43' 33,1"	10 54,2
Mendip - - -	51° 13' 7,2"	0° 0' 15,9" E	2° 32' 6,5"	10 8,4
Beacon Hill - -	51° 11' 1,6"	0° 49' 20,6" E	1° 43' 1,8"	6 52,1
Westbury - -	51° 15' 35,3"	0° 24' 13" E	2° 8' 9,4"	8 32,6
Farley Down - -	51° 23' 35,7"	0° 15' 7,6" E	2° 17' 14,8"	9 8,9
Dundry - - -	51° 23' 52,2"	0° 5' 37,7" W	2° 38' 0,1"	10 32,0
Lansdown - -	51° 27' 50,4"	0° 8' 30,6" E	2° 23' 51,8"	9 35,4

Meridian of Butterson Hill.

Names of the Stations.	Latitude.	Longitude from Butterson Hill.	Longitude west of Greenwich.	
			In degrees.	In time.
				m. s.
St. Stephen's - -	50° 39' 6,7"	0° 28' 59,6" W	4° 21' 47,1"	17 27,1
Black Down - -	50° 36' 40,9"	0° 13' 20,5" W	4° 6' 8,0"	16 24,5

Meridian of St. Agnes Beacon.

Names of the Stations.	Latitude.	Longitude from St. Agnes Beacon.	Longitude west of Greenwich.	
			In degrees.	In time.
				m. s.
Trevoze Head - -	50° 32' 56,5"	0° 11' 1,5" E	5° 0' 54,2"	20 3,6
Cadon Barrow - -	50° 39' 12,1"	0° 30' 46,5" E	4° 41' 9,2"	18 44,6
Brown Willy - -	50° 35' 27,9"	0° 36' 45,3" E	4° 35' 10,4"	18 20,6

ART. XXXII. *Latitudes and Longitudes of the Stations in the Series of 1799, referred to the Meridians of Dunnose and Greenwich.*

Meridian of Dunnose.

Names of the Stations.	Latitude.	Longitude from Dunnose.	Longitude west of Greenwich.	
			In degrees.	In time.
				m. s.
Nuffield - - -	51 34 52,2	0 9 39,9 E	1 1 56,1	4 7,7
White Horse Hill - -	51 34 31,6	0 22 1,7 W	1 33 37,7	6 14,5
Stow on the Wold - - -	51 54 16,3	0 30 26,7 W	1 42 2,4	6 48,1
Broadway - - -	52 1 25,6	0 38 5,3 W	1 49 41,3	7 18,7
Brill - - -	51 49 56,6	0 7 39,4 E	1 3 56,6	4 15,7
Scutchamfly - - -	51 33 44,1	0 8 37 W	1 20 13,0	5 20,8
Shotover Hill - - -	51 45 6,7	0 0 48,5 E	1 10 47,5	4 43,1
Whiteham Hill - - -	51 46 15,4	0 8 12,1 W	1 19 48,1	5 19,2
Cumner Hill - - -	51 44 1,5	0 6 42,4 W	1 18 18,4	5 13,2
Epwell - - -	52 4 19,8	0 17 10,8 W	1 28 46,8	5 55,1
Corley Hill - - -	51 50 28,3	0 9 39,9 W	1 21 15,9	5 25,0
Arbury Hill - - -	52 13 26,6	0 0 44,4 W	1 12 20,4	4 49,3
Crouch Hill - - -	52 2 58,7	0 9 35,6 W	1 21 11,6	5 24,7
Quainton - - -	51 53 7,2	0 17 12,1 E	0 54 23,9	3 37,6

Meridian of Greenwich.

Names of the Stations.	Latitude.	Longitude west of Greenwich.	
		In degrees.	In time.
			m. s.
Wendover - - -	51 45 6,4	0 46 1,4	3 4,1
Bow Brickhill - - -	51 59 50,5	0 40 1,2	2 44,1
Kinsworth - - -	51 51 50,8	0 31 59,9	2 7,9
Lillyhoe - - -	51 56 46,5	0 22 19,5	1 29,3
Lidlington - - -	52 1 54,0	0 32 21,7	2 9,4
Trusler Hill - - -	51 59 48,0	0 34 50,5	2 19,3

ART. XXXIII. *Bearings of intersected Objects, from the Stations in the Series of 1797 and 1798, from the Parallels to the Meridians of Black Down, Butterson Hill, and St. Agnes Beacon; and likewise their Distances from those Meridians.*

Meridian of Black Down.

Bearings from the Parallels to the Meridian.				Distances from merid.	Distances from perp.
				Feet.	Feet.
<i>At Moor Lynch.</i>					
Walton Windmill	-	-	75 12 31 S E	51340	156858
Westonzoyland Steeple	-	-	63 42 36 S W	46928	154235
Middlezoy Steeple	-	-	31 48 21 S W	79339	148733
Chedzoy Steeple	-	-	85 18 45 N W	90459	163658
Higham Windmill	-	-	29 57 17 S E	58858	140880
Higham Steeple	-	-	22 51 39 S E	62601	142196
Bridgewater Spire	-	-	88 39 25 S W	104717	161280
Somerton Steeple	-	-	47 4 54 S E	41197	134292
Burton Pynsent Obelisk	-	-	10 35 4 S W	78428	122688
<i>At Dundry.</i>					
Puckle Steeple	-	-	55 19 25 N E	26010	292363
Westleigh Steeple	-	-	46 49 23 N E	23610	301818
Bristol Cathedral	-	-	26 7 30 N E	11836	279184
Redcliff Steeple	-	-	33 8 32 N E	9407	278007
Long Aston	-	-	0 51 38 N W	21696	273385
Clifden Windmill	-	-	9 52 50 N E	19281	272172
Blaze Castle	-	-	1 49 16 N E	20268	297874
Penpole Park Gazebo	-	-	11 43 37 N W	28680	294155
Duke of Beaufort's House, Stoke	-	-	32 31 51 N E	651	294212
Durham Steeple	-	-	63 28 33 N E	38049	289219
Knowle Steeple	-	-	13 41 30 N E	8112	314410
Mangotsfield Steeple	-	-	47 44 31 N E	13923	291677
Winterbown Steeple	-	-	31 14 10 N E	7056	306569
Harfield Steeple	-	-	20 11 9 N E	93478	292526
Leigh on Mendip	-	-	33 59 55 S E	21483	195794
Dundry Steeple	-	-	71 23 20 S W	22831	259052
<i>At Long Knoll.</i>					
Doultling Spire	-	-	68 59 51 N W	9544	182322
Frome Steeple	-	-	5 20 25 N W	52415	198272
<i>At Farley Down.</i>					
Devizes Steeple	-	-	79 51 30 S E	129342	245113
Cold Aston Steeple	-	-	33 43 21 N W	44362	277983

Meridian of Butterson Hill.

Bearings from the Parallels to the Meridian.			Distances from merid.	Distances from perp.
<i>At Furland.</i>			Feet.	Feet.
Hope's Nose - - -	23° 7' 55" NE		93759	18745
<i>At St. Stephen's.</i>				
Werrington Steeple - - -	29 37 23 NE		109839	92242
Boyton Steeple - - -	0 55 35 NW		112767	106733
St. Stephen's Steeple - - -	45 55 4 SE		110738	85968
North Petherwin Steeple - - -	49 15 49 NW		125044	98473
<i>At Carraton Hill.</i>				
Stokeclimsland Steeple - - -	65 56 2 NE		96381	49922
Launceston Steeple - - -	21 26 54 NE		108267	82689
Launceston Chapel - - -	21 14 13 NE		108513	82561

Meridian of St. Agnes Beacon.

<i>At Bodmin.</i>				
St. Minvern Steeple - - -	58 18 36 NW		79549	91845
St. Minvern Windmill - - -	61 51 46 NW		90966	82269
<i>At Trevoze Head.</i>				
St. Isey Steeple - - -	61 2 12 SE		68456	74082
St. Merian Steeple - - -	57 59 32 SE		52096	82476

ART. XXXIV. *Bearings of intersected Objects, from the Stations in the Series of 1799, from the Parallels to the Meridians of Dunnose and Greenwich; and likewise their Distances from those Meridians.*

Meridian of Dunnose.

<i>At Epwell.</i>				
Warwick Steeple - - -	16 25 48 NW		87242	607508
St. Martin's, Coventry - - -	2 3 42 NW		69028	653327
Soleyhul Spire - - -	31 8 35 NW		128826	654971
<i>At Arbury Hill.</i>				
Dunchurch Windmill - - -	23 55 48 NW		20724	626734
Breadon Hill, Summer House - - -	7 37 31 NW		26706	765038

Bearings from the Parallels to the Meridian.		Distances from merid.	Distances from perp.
	° ' " NW	Feet.	Feet.
Markfield Windmill - - -	5 20 7 NW	18608	755819
Newnham Windmill - - -	59 36 2 NE	2261	589244
<i>At Corley Hill.</i>			
Gazebo, Breadon Hill - -	35 45 58 SW	188086	525408
<i>At Crouch Hill.</i>			
Deddington Steeple - - -	18 6 0 SE	28646	499771
Bloxham Spire - - -	16 35 11 SW	39519	511110
Aynoe Steeple - - -	49 26 2 SE	11944	501902
Adderbury Spire - - -	37 26 59 SE	26213	509671
Farthingo Steeple - - -	56 26 49 SE	6431	502904
<i>At Arbury Hill.</i>			
Round House, Edge Hills -	56 15 5 SW	57501	549724
Windmill, near the Round House	55 39 29 SW	58398	548286
<i>At Brill.</i>			
Wingrove Steeple - - -	81 17 5 NE	103826	454713
Hardwick Steeple - - -	78 6 1 NE	83299	454687
Luggersal Steeple - - -	44 56 1 NE	35106	419401
Granborough Steeple - - -	53 9 30 NE	70782	474574
Bicester Steeple - - -	43 27 16 NW	6854	466560
Marq. Buckingham's House, Wooton	79 17 25 NE	43490	445984
Islip Steeple - - -	84 26 3 SW	8944	439540
Woodstock Steeple - - -	85 25 45 NW	35563	448393
Kidlington Spire - - -	88 29 39 SW	18401	441989
Witchwood Beacon - - -	89 11 34 SW	76971	444726
<i>At Whitehorse Hill.</i>			
Abingdon Spire - - -	62 38 18 NE	19054	383037
Wallingford Steeple - - -	84 54 39 NE	17497	358560
Great Coxwell Windmill - - -	25 45 11 NW	96959	376819
Drayton Steeple - - -	67 28 0 NE	24691	374055
Highworth Steeple - - -	57 49 58 NW	116343	370003
Witney Spire - - -	14 14 57 NE	64787	424386
Bampton Steeple - - -	4 36 29 NE	79056	408334
Radley Steeple - - -	61 25 12 NE	12123	388578
Buckland Steeple - - -	20 8 12 NE	69616	388204
<i>At Stow.</i>			
Stow on the Wold Steeple -	20 55 25 NW	118442	479166
<i>At Broadway.</i>			
Sarsden Chapel - - -	52 29 8 SE	86195	469777
Bourton Chapel - - -	54 36 35 SE	125636	501076
Walford Spire - - -	82 38 42 SE	98704	507924

Meridian of Greenwich.

Bearings from the Parallels to the Meridian.			Distances from merid.	Distances from perp.
			Feet.	Feet.
<i>At Wendover.</i>				
Pitchcot Windmill	-	19 11 59 NW	191077	149055
Ivinghoe Spire	-	45 44 37 NE	143127	131397
Quainton Steeple	-	34 47 15 NW	205750	146203
Leighton Buzzard Spire	-	21 41 12 NE	150616	160663
<i>At Quainton.</i>				
Southern Obelisk, Stow Park	-	22 1 36 NW	227554	204673
Northern Obelisk, ditto	-	21 50 48 NW	228505	207532
<i>At Kinsworth.</i>				
Aylesbury Spire	-	77 56 58 SW	190234	126763
Maulden Steeple	-	16 30 28 NE	102962	202124
Harlington Steeple	-	16 12 37 NE	110395	177730
Millbrook Steeple	-	3 1 41 NE	117732	201645
Stretley Steeple	-	35 23 47 NE	99961	171044
Sauldon Windmill	-	60 20 46 NW	178643	174431
<i>At Bow Brickhill.</i>				
Hanslope Spire	-	38 58 48 NW	185668	232843
North Crawley Steeple	-	9 41 15 NE	145529	224961
Pavenham Spire	-	22 15 49 NE	122215	261812
St. Paul's Spire, Bedford	-	43 9 11 NE	104408	240631
Sharnbrook Spire	-	19 21 54 NE	123533	269816
Woburn Market-House	-	73 52 37 SE	139255	186978
Ridgmont Station	-	72 28 11 NE	130927	196964
Wootton Spire	-	41 33 7 NE	120265	225635
Cranfield Spire	-	30 44 22 NE	136284	215933
Husborne Crawley Steeple	-	65 44 51 NE	136827	197064
Woburn Steeple	-	75 33 58 SE	139373	187394
Souldrop Steeple	-	16 32 49 NE	124861	279861
Windmill near Tharfield	-	86 6 12 NE	12577	199950
Tottenhoe Station	-	27 42 7 SE	130412	150494
Chalgrave Steeple	-	53 51 5 SE	116215	164780
Keysoe Spire	-	31 17 59 NE	95682	282155
Moulshoe Steeple	-	2 19 30 NW	152432	215608
Renhold Spire	-	44 56 16 NE	91651	250385
Lidlington Windmill	-	62 30 6 NE	125855	203797
<i>At Lillyboe.</i>				
Knotting-Green Elm Tree	-	16 17 56 NW	117482	285139
Ravensden Steeple	-	7 25 2 NW	95142	255304
Bow Brickhill Steeple	-	73 20 18 NW	151490	191501

Bearings from the Parallels to the Meridian.				Distances from merid.	Distances from perp.
				Fect.	Fect.
Colmworth Spire	-	-	0 12 52 N W	84580	268984
Sundon Windmill	-	-	75 0 6 S W	109032	164718
Silsoe Steeple	-	-	26 9 25 N W	95501	194345
Flitton Steeple	-	-	38 20 32 N W	102831	194903
Shillington Steeple	-	-	7 49 43 N E	81919	188066
Westoning Steeple	-	-	64 42 19 N W	113366	185143
Wrest-Garden Obelisk	-	-	26 26 8 N W	94797	192652
Flitwick Steeple	-	-	57 11 27 N W	114694	191016
Amphill Steeple	-	-	39 6 3 N W	109957	203041
St. Neot's Steeple	-	-	13 32 16 N E	59630	273475
Pollux Hill Steeple	-	-	47 5 30 N W	102236	188118

ART. XXXV. *Latitudes and Longitudes of such Places, in the Series of 1797 and 1798, as have been referred to the Meridians of Black Down, Butterson Hill, and St. Agnes Beacon.*

Meridian of Black Down.

Names of the Objects.	Latitude.	Longitude from Black Down.	Longitude west of Greenwich.	
			In degrees.	In time.
	° ' "	° ' " W	° ' "	m. s.
Walton Windmill	51 6 59.5	0 13 22.1 W	2 45 44.5	11 2.9
Westonzoyland Steeple	51 6 33.8	0 12 12.9 W	2 44 35.3	10 58.3
Middlezoy Steeple	51 5 38.3	0 20 38.8 W	2 53 1.2	11 32.1
Chedzoy Steeple	51 8 5.1	0 23 33.7 W	2 55 56.1	11 43.7
Higham Windmill	51 4 21.8	0 15 18.6 W	2 47 41.0	11 10.7
Higham Steeple	51 4 34.6	0 16 18.5 W	2 48 40.9	11 14.7
Bridgewater Spire	51 7 40.7	0 27 16.3 W	2 59 38.7	11 58.6
Somerton Steeple	51 3 17.3	0 10 42.7 W	2 43 5.1	10 52.3
Burton Pynsent Obelisk	51 1 21.6	0 20 22.7 W	2 52 45.1	11 31
Westleigh Steeple	51 30 49.4	0 6 12.0 E	2 26 10.4	9 44.7
Bristol Cathedral	51 27 6.3	0 3 6.2 W	2 35 28.6	10 21.9
Redcliff Steeple	51 26 54.8	0 2 28.0 W	2 34 50.4	10 19.3
Long Aston	51 26 9.1	0 5 41.3 W	2 38 3.7	10 32.2
Clifden Windmill	51 25 57.2	0 5 3.3 W	2 37 25.7	10 29.7
Blaze Castle	51 30 10.4	0 5 19.3 W	2 37 41.7	10 30.8
Penpole Gazebo	51 29 33.7	0 7 31.7 W	2 39 54.1	10 39.6
Duke of Beaufort's House, Stoke	51 29 34.5	0 0 10.2 E	2 32 12.2	10 8.8
Durham Steeple	51 28 44.8	0 9 59.0 E	2 22 23.4	9 29.5
Knowle Steeple	51 32 53.7	0 2 7.9 W	2 34 30.3	10 18
Mangotsfield Steeple	51 29 9.5	0 3 39.2 E	2 28 43.2	9 54.8
Winterbown Steeple	51 31 36.4	0 1 51.2 E	2 30 31.2	10 2.1
Harfield Steeple	51 29 15.3	0 24 32.2 W	2 56 54.6	11 47.6
Leigh Steeple on Mendip	51 13 24.	0 5 36.3 E	2 26 46.1	9 47.1
Dundry Steeple	51 23 47.7	0 5 58.8 W	2 38 21.2	10 33.4

Names of the Objects.	Latitude.	Longitude from Black Down.	Longitude west of Greenwich.	
			In degrees.	In time.
Doulting Spire - -	51 11 11,4	0 2 29,3 E	2 29 53,1	m. s. 9 59,5
Devizes Steeple - -	51 21 25,5	0 33 51,2 E	2 58 31,2	11 54,1
Frome Steeple - -	51 13 47,9	0 13 40,8 E	2 18 41,6	9 14,7
Cold Aston - -	51 26 53,9	0 11 38,0 E	2 20 44,4	9 24,9
Puckle Steeple - -	51 29 16,2	0 6 49,6 E	2 25 32,8	9 42,2

Meridian of Buttern Hill.

Names of Objects.	Latitude.	Longitude from Buttern Hill.	Longitude west of Greenwich.	
			In degrees.	In time.
Hope's Nose, Torbay -	50 27 48,5	0 26 4,4 E	3 26 43,1	m. s. 13 46,9
Werrington Steeple -	50 39 52,2	0 28 19,4 W	4 21 6,9	17 24,4
Boyton Steeple - -	50 42 14,9	0 29 6,1 W	4 21 53,6	17 27,5
North Petherwin - -	50 40 52,5	0 32 15,3 W	4 25 2,8	17 40,2
St. Stephen's Steeple -	50 38 50,3	0 28 32,6 W	4 21 20,1	17 25,3
Stokeclimsland Steeple -	50 32 55,8	0 24 47,5 W	4 17 35,0	17 10,3
Launceston Steeple -	50 38 18,1	0 27 54,1 W	4 20 41,6	17 22,7
Launceston Castle -	50 38 16,8	0 27 57,9 W	4 20 45,4	17 23

Meridian of St. Agnes Beacon.

Names of Objects.	Latitude.	Longitude from St. Agnes Beacon.	Longitude west of Greenwich.	
			In degrees.	In time.
St. Minvern Steeple -	50 33 30,6	0 20 28,1 E	4 51 27,6	m. s. 19 25,8
St. Minvern Windmill -	50 31 55,5	0 23 23,5 E	4 48 32,2	19 14,1
St. Isey Steeple - -	50 30 36,0	0 17 36,6 E	4 54 20,1	19 37,3
St. Merian Steeple -	50 31 59,3	0 13 23,8 E	4 58 31,9	19 54,1

ART. XXXVI. *Latitudes and Longitudes of such Places, in the Series of 1799, as have been referred to the Meridians of Dunnose and Greenwich.*

Meridian of Dunnose.

Names of Objects.	Latitude.	Longitude from Dunnose.	Longitude west of Greenwich.	
			In degrees.	In time.
Warwick Steeple -	52 16 53,0	0 23 18,3 W	1 34 54,3	m. s. 6 19,6
St. Martin's Spire, Coventry	52 24 25,4	0 18 29,5 W	1 30 5,5	6 0,3
Soleyhull Spire - -	52 2 30,4	0 34 13,8 W	1 45 49,3	9 3,3
Dunchurch Windmill -	52 20 4,6	0 5 32,5 W	1 17 8,5	5 8,6

Names of Objects.	Latitude.	Longitude from Dunnose.	Longitude west of Greenwich.	
			In degrees.	In time.
	° ' "	° ' "	° ' "	m. s.
Gazebo, Bardon Hill *	52 42 47,6	0 7 12,2 W	1 18 48,2	5 15,2
Markfield Windmill -	52 41 16,8	0 5 1,0 W	1 16 37,0	5 6,5
Breadon Hill Building †	52 3 16,7	0 49 59,7 W	2 1 35,7	8 6,4
Newnham Windmill -	52 13 55,7	0 0 36,2 E	1 10 59,8	4 43,9
Deddington Steeple -	51 59 13,9	0 7 36,1 W	1 19 12,1	5 16,8
Bloxham Spire -	52 1 5,6	0 10 29,7 W	1 22 5,7	5 28,4
Aynoe Steeple -	51 59 35,2	0 3 10,2 W	1 14 46,2	4 59,1
Adderbury Spire -	52 0 51,6	0 6 3,7 W	1 17 39,7	5 10,6
Farthingo Steeple -	51 59 45,1	0 1 42,4 W	1 13 18,4	4 53,2
Round House, Edge Hills	52 7 25,6	0 15 18,4 W	1 26 54,4	5 47,6
Round House Windmill -	52 7 11,4	0 15 32,6 W	1 27 8,6	5 48,6
Wingrove Steeple -	51 51 46,8	0 27 28,7 E	0 44 7,3	2 56,5
Hardwick Steeple -	51 51 47,8	0 22 2,6 E	0 49 33,4	3 18,2
Luggersal Steeple, Bucks	51 50 57,3	0 9 17,2 E	1 2 18,8	4 9,2
Granborough Steeple -	51 55 4,3	0 18 45,2 E	0 52 50,8	3 31,4
Bicester Steeple -	51 53 46,8	0 1 48,9 E	1 9 47,1	4 39,1
Abingdon Spire -	51 40 3,8	0 5 1,2 W	1 16 37,2	5 6,5
Wallingford Steeple -	51 36 2,4	0 4 36,2 E	1 6 59,8	4 27,9
Great Coxwell Windmill	51 38 59,8	0 25 32,4 W	1 37 8,4	6 28,5
Drayton Steeple -	51 38 35	0 6 30,1 W	1 18 6,1	5 12,4
Highworth Steeple -	51 37 51,4	0 30 38,1 W	1 42 14,1	6 48,9
Witney Spire -	51 46 49,9	0 17 6,9 W	1 28 42,9	5 54,8
Bampton Steeple -	51 44 11,2	0 20 51,9 W	1 32 27,9	6 9,8
Radley Steeple -	51 40 58,3	0 31 57,4 W	1 43 33,4	6 54,2
Buckland Steeple -	51 40 53,3	0 18 21,1 W	1 29 57,1	5 59,8
Witchwood Beacon -	51 50 9,8	0 20 21,6 W	1 31 57,6	6 7,8
Stow on the Wold -	51 55 46,9	0 31 23,6 W	1 42 59,6	6 51,9
Sarsden Chapel -	51 54 16,4	0 22 49,9 W	1 34 25,9	6 17,7
Bourton Chapel -	51 59 22,5	0 33 20,7 W	1 44 56,7	6 59,8
Walford Spire -	52 0 31,6	0 26 12,5 W	1 37 48,5	6 31,2
Islip Steeple -	51 49 20,7	0 2 21,9 W	1 13 57,9	4 55,8
Woodstock Steeple -	51 50 47,4	0 9 24,5 W	1 21 0	5 24
Kidlington Spire -	51 49 44,6	0 4 51,9 W	1 16 27,9	5 5,8

Meridian of Greenwich.

Names of Objects.	Latitude.	Longitude west of Greenwich.	
		In degrees.	In time.
	° ' "	° ' "	m. s.
Pitchcot Windmill -	51 52 58,5	0 50 35,5	3 22,3
Ivinghoe Spire -	51 50 9,1	0 37 51,3	2 31,4
Quainton Steeple -	51 52 28,7	0 54 28,0	3 37,8
Southern Obelisk, Stow Park	52 2 2,2	1 0 27,1	4 1,8
Northern Obelisk, ditto -	50 2 30,2	1 0 42,9	4 2,8

* In page 658, this is, by mistake, called Breadon Hill Summer House.

† In page 659, this building is called Gazebo.

Names of Objects.	Latitude.	Longitude west of Greenwich.	
		In degrees.	In time.
	° ' "	° ' "	m. s.
Leighton Buzzard Spire	51 54 56,5	0 39 54,4	2 39,6
Aylesbury Spire -	51 49 18,9	0 50 18	3 21,2
Hanslope Spire -	52 6 45,2	0 49 17,8	3 17,2
North Crawley Spire -		0 38 38,4	2 34,5
Pavenham Spire -	52 11 36,3	0 32 27,0	2 9,8
St. Paul's Spire, Bedford	52 8 8,8	0 27 43,3	1 50,9
Sharnbrook Spire -	52 12 55,1	0 32 48,0	2 11,2
Woburn Market-House -	51 59 17,4	0 36 58,5	2 27,9
Woburn Steeple -	51 59 21,8	0 37 0,3	2 28
Ridgemont Station -	52 0 56,4	0 34 45,7	2 19
Wootton Steeple -	52 5 39,2	0 31 55,7	2 7,7
Cranfield Spire -	52 4 3,1	0 36 11,1	2 24,7
Husborne Crawley Steeple	52 0 57,0	0 36 19,8	2 25,3
Souldrope Spire -	52 14 38,6	0 33 9,1	2 12,6
Windmill near Tharfield	52 1 30,9	0 3 20,4	0 13,3
Tottenham Station -	51 53 18,9	0 34 37,5	2 18,5
Chalgrave Steeple -	51 55 40,2	0 30 51,4	2 3,4
Keysoe Spire -	52 14 58,5	0 25 24,3	1 41,6
Moulshoe Steeple -	52 2 59,0	0 40 39,6	2 42,6
Renhold Spire -	52 9 41,5	0 24 20,1	1 37,3
Lidlington Windmill -	52 2 4,2	0 33 25,0	2 13,7
Maulden Steeple -	52 1 52,2	0 27 20,2	1 49,3
Harlington Steeple -	51 57 48,4	0 29 18,6	1 57,2
Millbrook Steeple -	52 1 43,6	0 31 15,5	2 5
Stretley Steeple -	51 56 42,8	0 26 12,4	1 44,8
Sauldon Windmill -	51 57 9,7	0 47 26,9	3 9,8
Knotting-Green Elm Tree	52 15 26,6	0 31 11,5	2 4,7
Ravensden Steeple -	52 10 33,9	0 25 15,7	1 41
Bow Brickhill Steeple -	52 0 1,1	0 40 13,4	2 40,9
Colmworth Spire -	52 12 49,3	0 22 27,0	1 28,5
Sundon Windmill -	51 57 52,2	0 28 57,0	1 55,8
Silsoe Steeple -	52 0 33,0	0 25 21,4	1 41,4
Flitton Steeple -	52 0 42,1	0 27 14,4	1 48,9
Shillington Steeple -	51 59 31,7	0 21 45,0	1 27
Westoning Steeple -	51 59 2,7		2 0,4
Wrest-Garden Obelisk -	52 0 16,2	0 25 10,7	1 40,7
Flitwick Steeple -	51 59 58,6	0 30 27,1	2 1,8
Amptill Steeple -	52 1 57,8	0 29 11,7	1 56,7
St. Neot's Steeple -	52 13 34,7	0 15 49,9	1 3,3
Pollux Hill Steeple -	51 59 31,2	0 27 8,7	1 48,6

ART. XXXVII. *Latitudes and Longitudes of some remarkable Places, not contained in the preceding Tables.*

St. Nicholas's or Drake's Island, in Plymouth Sound.

The bearing of Kit Hill, from the meridian of Butterson, is $67^{\circ} 12' 12''$, and the angle between it and the flagstaff on Drake's Island, $41^{\circ} 40' 8''$; therefore, the bearing of the latter from the meridian is $71^{\circ} 7' 40''$; consequently, its distance from the meridian is 60531 feet, and from the perpendicular 20692 feet, which respectively subtend $9' 53'' 6$, and $3' 24'' 5$. These, with the latitude and longitude of Butterson, $50^{\circ} 24' 46'' 3$ and $3^{\circ} 52' 47'' 5$, give $50^{\circ} 21' 21'' 1$ for the latitude, and $4^{\circ} 8' 17'' 9$ for the longitude, of the flagstaff on Drake's Island.

The latitude and longitude of this spot was determined by Mr. BAYLEY, in the year 1792. The observations for the former were as follows :

$50^{\circ} 21' 20''$ \odot 's LL.

$50 21 30,5$ ditto.

$50 21 31$ ditto.

$50 21 29$ α Aquilæ.

$50 21 26,5$ α Ophiuchi.

$50 21 55$ \odot 's LL. The mean of these is $50^{\circ} 21' 28'' 5$.

The place chosen by Mr. BAYLEY, as I have been lately informed, was a few feet northward of the staff; therefore, $7'' 4$ may be taken for the true difference between our determinations.

The longitude of Mr. BAYLEY's station, found by the *moon's transit*, was $4^{\circ} 18' 52''$; but the longitude deduced from the recent operations, is $4^{\circ} 8' 17'' 9$; there is, therefore, a difference of $10' 34'' 1$ between the two determinations.

St. Andrew's or the Old Church, at Plymouth.

The angle at Butterson, between the Old Church tower and Kit Hill, is $37^{\circ} 45' 5''$,₂; its bearing, therefore, south-west from the meridian, is $75^{\circ} 1' 56''$; consequently, its distance from the meridian is 57505 feet, and from the perpendicular 15374 feet. These respectively subtend $9' 24''$, and $2' 32''$,₁: hence, its latitude becomes $50^{\circ} 22' 13''$,₆, and longitude $4^{\circ} 7' 31''$,₆ = $16^m 30^s$,₁ in time, west of Greenwich.

As it is of very great importance that the truths of the conclusions given in this Work should receive support, wherever I can find it, I think it right to mention the result of his Excellency the Count de BRUHL's endeavours to ascertain the longitude of Plymouth, by means of chronometers. The following is a copy of his communication, made in the year 1795.

*Journey from Plymouth to London.**Green Timekeeper.*

June 8th,	{ Mr. MUDGE's clock* at Plymouth, fast for mean time	$0^m 32^s,15$
1783.	{ Timekeeper faster than Mr. MUDGE's clock	- 0 25,6
	{ Timekeeper slower than London clock	- 14 29,4
14th.	{ London clock slow for mean time	- 0 36,5
Difference of longitude		- 16 3,65

Blue Timekeeper.

June 8th,	{ Mr. MUDGE's clock at Plymouth, fast for mean time	$0^m 32^s,15$
	{ Timekeeper faster than Mr. MUDGE's clock	- 0 37,4
	{ Timekeeper slower than London clock	- 14 17,2
14th.	{ London clock slow for mean time	- 0 36,5
Difference of longitude		- 16 3,25
Mean difference		- 16 3,55

The longitude of St. Paul's, west of Greenwich, is $23^s,1$ in

* It is, perhaps, right to observe, that Mr. T. MUDGE's transit, at Plymouth, was made by the late Mr. BIRD, and properly set up between stone pillars. The clock, the entire work of his own hands, was a most excellent one.

time; and Mr. DUTTON's house in Fleet-street is about 2^s west of St. Paul's;* wherefore, its longitude west of Greenwich is 25^s : consequently, $16^m 3^s,55 + 25^s = 16^m 28^s,55$, is the difference of longitude between Greenwich and Plymouth, as shewn by the timekeepers.

Now the meridian of Mr. MUDGE's transit-room, at Plymouth, passed only 35 feet to the eastward of the centre of St. Andrew's Tower, his northern meridian mark being on the church itself; therefore, the longitude of the church and transit-room may be considered the same. From the survey, we find it to be $16^m 30^s,1$; and, from Count BRUHL's determination, making a just allowance for the difference of longitude between the late Mr. DUTTON's house and Greenwich, $16^m 28^s,5$.

It is left for the public, and this learned Society in particular, to determine how far the near agreement of these several methods, tends to corroborate the assertion I have advanced, of the dependence which may be placed on the deductions drawn from the observations made at Beachy Head and Dunnose. If there had been only one watch employed on the occasion, the result would not have been so satisfactory as the circumstance of two being used seems to make it. As the occasion calls for the remark, before I dismiss this article, I must observe, that the highest advantages would accrue to geography, were the ideas of the Astronomer Royal carried into execution, (and which I shall endeavour to do at some future period,) respecting the discovery of the difference of longitude between Greenwich and some very remote point on the western side of the island, (St. David's Head for instance,) by means of timekeepers,

* According to HORWOOD's Map of London, the distance from the centre of St. Paul's to Bolt Court, at the corner of which Mr. DUTTON's house is situated, is 31 chains.

carried backwards and forwards in the mail coaches. If this excellent scheme were executed, and the watches employed equal to the best now made, it is probable that the true difference of longitude would shortly be determined. The geodetical situation of St. David's Head will, ere long, be ascertained from a prosecution of the survey: a knowledge, therefore, of its true longitude would be attended with eminent advantages.

Lizard Light-Houses.

The light-houses on this head-land were observed from Pertinney and Karnbonellis. At the latter, Pertinney bears $74^{\circ} 22' 41''$ south-west, from the parallel to the meridian of St. Agnes; and, as the angle between the western light-house and Pertinney is $78^{\circ} 40' 5''$, it follows, that the bearing of the light-house from the said parallel is $4^{\circ} 17' 24''$ south-east. Computing with this angle and the distance from Karnbonellis to the light-house, we get 3344 feet, and 126499 feet, for the distances of that object from the meridian and perpendicular of St. Agnes: therefore, admitting the length of the degree in the meridian, in the middle point between St. Agnes and the light-house, to be 60850 fathoms, and 61182 for the length of a degree of a great circle perpendicular to it, we get $20' 47''.4$, and $32''.8$, for the small arcs which those spaces respectively subtend. These *data*, with the latitude and longitude of St. Agnes, $50^{\circ} 18' 27''$, and $5^{\circ} 11' 55''.7$, give the latitude of the light-house = $49^{\circ} 57' 44''$, and longitude west of Greenwich $5^{\circ} 11' 4''.8$, in time, $20^m 44^s.3$.

This light-house was also observed from the station on Karnminnis. The triangle resulting from that observation, together with the angle at Karnbonellis, is

Karnminnis - 44° 9' 46"

Karnbonellis - 98 1 30

Western Light-house 37 48 44; which gives 81342 feet, for the distance between the station Karnbonellis and the Light-house. This distance is said, in the Philosophical Transactions for 1797, p. 501, to be 81348 feet, which differs only 6 feet from the above determination; but it is probable the distance first given is most correct, as the two light-houses appearing nearly in the same line at Karnminnis, was the means of preventing us from clearly distinguishing the apex of either, and it was principally on this account that we preferred the observation made at Pertinney. The agreement however proves, that no inconsistency can be found to obtain with respect to the *data* before given, for settling the situation of this important headland.

In the Philosophical Transactions for 1797, page 502, it is mentioned, that the distance from the spot where the late Mr. BRADLEY made his observations, to the place where his meridian mark was fixed, was 800 feet. But there appears to be some inconsistency in this particular; as Mr. BRADLEY's own words, in an extract of a letter now before me, are, *it was just 480 feet*. Adding to this, 24 feet, the distance between the place of the meridian mark and the line joining the centre of the light-houses, we get the distance of the point O, or the place of the Observatory, (see Phil. Trans. 1797, p. 502,) from the line joining the light-houses W, E, = 504 feet; a space corresponding to 5" of latitude, nearly; therefore, from the trigonometrical operations, we get,

49° 57' 44" for the latitude } of Mr. BRADLEY's station.
and 5 11 4,8 for the longitude }

Mr. BRADLEY's observations for finding the latitude, were made with a quadrant of one foot radius, the workmanship of Mr. BIRD; they were as follows.

Nine meridional altitudes of the sun's limb, the extreme results of which were $49^{\circ} 57' 27''.5$ and $49^{\circ} 57' 44''$, gave for the latitude of the Observatory - - - - $49^{\circ} 57' 35''$

Six meridional observations of the Pole Star below the Pole, the extreme results of which were $49^{\circ} 57' 35''$ and $49^{\circ} 57' 20''.4$, gave for the latitude - - - - $49^{\circ} 57' 23''.2$

Thirteen observations of Arcturus, α Coronæ Borealis, and α Serpentis, the extreme results of which were $49^{\circ} 57' 54''.7$ and $49^{\circ} 57' 2''.7$, gave for the latitude - - - - $49^{\circ} 57' 29''$

Fifteen observations of α , β , γ Draconis, the extreme results of which were $49^{\circ} 57' 22''.2$ and $49^{\circ} 57' 2''.7$, gave for the latitude - $49^{\circ} 57' 33''$

The mean of which is - $49^{\circ} 57' 30''$

According to the trigonometrical operations, the latitude is $49^{\circ} 57' 44''$; there is, therefore, a difference of $14''$ between the results; a quantity so large as justly to excite surprise, if it were not generally understood, that much dependance cannot be placed on observations made with an astronomical quadrant precisely similar to that made use of by Mr. BRADLEY. The *extreme* results in the above, differ so widely as to authorise the truth of the supposition on this occasion.

The longitude of the Lizard was determined by the transit of Venus, Sun's eclipse, transit of the Moon, and two emersions

of Jupiter's first satellite, as particularly set forth in the Preface to the Nautical Ephemeris of 1791. The conclusions were as follows.

Four transits of the Moon, calculated by Mr. WALES,

gave for the longitude - - - 20^m 30^s ,6

Two emersions of Jupiter's first satellite, calculated

by ditto - - - - - 21 14 ,5

Transit of Venus, calculated by { Doctor MASKELYNE 20 57 ,0
Mr. WITCHELL - 20 56 ,5
Mr. WALES - 20 57 ,0

Sun's eclipse, calculated by { Mr. WITCHELL - 20 44 ,5
Mr. SEJOUR - 20 45 ,1
Mr. EULER - 20 59 ,0
Mr. LEXEL - 20 51 ,0

Mean of the whole - 20 52 ,12

From the trigonometrical operations, we find the longitude in time to be 20^m 44^s ,3; there is, therefore, a difference of 7^s ,82 between these different determinations: this is, probably, as near as we could have expected to find it; yet it can scarcely be supposed, that of this difference, more than 2^s can be laid to the account of the survey.

In the Philosophical Transactions for 1797, p. 502, it is observed, that angles were taken at the Lizard Light-house and Naval Signal-Staff, to determine the situation of the *Point* itself. This Point, marked P in the diagram, makes an angle of 2° 23' 16" S W, with the parallel to the meridian of St. Agnes at the station on Karnbonellis, and is therefore 636,6 feet from that meridian, and 126394 feet from the perpendicular; therefore 49° 57' 40" ,6 is the latitude } of the Lizard Point.
and 5 11 46 the longitude }

Scilly Islands.

To determine the distances of the objects in these islands, from the stations near the Land's End, with sufficient accuracy, proper corrections were made for reducing the horizontal angles to those formed by the chords. On the present occasion, it will be right to use the horizontal, and not the chord angles; the distances from the meridians, and from their perpendiculars, being computed on the supposition of the earth's surface being a plane, which, within the limits of our fixed meridians, may be considered as true.

The angles for finding the distances of these objects are given in the Philosophical Transactions for 1797, p. 503; from whence, and the *data* contained in this Work, we get the bearing of

the <i>Day-mark</i> in the Island of	{	St. Buryan	75° 44' 52" S W
St. Martin's from		Pertinney	71 14 22 S W
-		Sennen	- 75 30 9 S W

which, combined with the distances of the stations from the meridian of St. Agnes, give

246801	}	feet, for the distance of the <i>Day-mark</i> from the
246804		
246821		

meridian of St. Agnes;

and 122409	}	feet, for the distance of it from the perpendicular.
122410		
122414		

The mean of the first is 246809 feet, and the mean of the last 122411 feet; but the latter becomes 122419, because a line drawn from the *Day-mark*, perpendicular to the meridian of St. Agnes, cuts that meridian eight feet *below* the parallel. Again, we get the bearing of

the Windmill	- - -	} in the Island of St.	{	Pertinney	-	65° 32' 30" S W
the Flagstaff of the Fort	- - -			Mary, from	Pertinney	-

from whence, after a similar correction with that just made, we find the distance of

the Windmill 256304 } feet from the { 143597 } feet from the perpendicular of
the Flagstaff 260152 } meridian, and { 140876 } St. Agnes.

From the same page, and the *data* furnished in this work, we also find the bearing of

St. Agnes Light- { Sennen - $68^{\circ} 6' 54''$ S W
House from { St. Buryan $69^{\circ} 5' 56''$ S W; which gives

265865 } feet, for the distance from the meridian, and
 265879 }

149121 } feet, for the distance from the perpendicular of St. Agnes.
 149128 }

The mean of the first is 265872 feet, and the mean of the last, when corrected, 149133 feet.

With the above data, and also the latitude and longitude of St. Agnes, we get

the latitude of	{ Day-mark in St. Martin's - $49^{\circ} 58' 2''.9$	
	{ Windmill, St. Mary's - - $49^{\circ} 54' 32''.7$	
	{ Flagstaff, ditto - - $49^{\circ} 54' 59''.1$	
	{ St. Agnes Light-House* - - $49^{\circ} 53' 36''.8$	
and longitude west from St. Agnes.	{ Day-mark $1^{\circ} 2' 43''.1$	
	{ Windmill $1^{\circ} 5' 3''.2$	
	{ Flagstaff $1^{\circ} 6' 2''.7$	
	{ Light House $1^{\circ} 7' 27''.7$	
{ from the meri- dian of Green- wich.		{ $6^{\circ} 14' 38''.8$ $6^{\circ} 16' 58''.7$ $6^{\circ} 17' 57''.4$ $6^{\circ} 19' 23''.4$
		In Time.
		$24^m 58^s.6$
		$25^m 7^s.5$
		$25^m 11^s.5$
		$25^m 21^s.5$

* In the *Requisite Tables*, published by order of the Board of Longitude, the latitude of the Scilly Lights is said to be $49^{\circ} 56' 0''$, and longitude $6^{\circ} 46' 0''$. The latitude, according to the survey, is $49^{\circ} 53' 36''.8$, and longitude $6^{\circ} 19' 23''.4$. An error of $2' 23''$ in the latitude, may not perhaps be considered extraordinary; but how, in a maritime country, like our own, where chronometers are in such constant use, so great an error as $26' 37''$ ($1^m 46^s \frac{1}{2}$ in time) in the longitude, should have remained undetected, excepting by one person, is surprising. J. HUDDART, Esq. visited the Scilly Isles, having with him a watch made by ARNOLD, and obtained his time at that spot in the island of St. Mary where the body of Sir CLOUDSLEY SHOVEL is said to have been thrown ashore, by means of equal altitudes of the Sun's limb; he then found, comparing his time with that shewn by the watch, that $0^h 25^m 18^s$ was the difference between the meridians of Greenwich and this spot in St. Mary's. Now St. Agnes Light-house is about $2'$ of a degree west of the place to which Mr. HUDDART alludes; therefore, $25^m 18^s + 8^s = 25^m 26^s$ is the longitude of St. Agnes, through these means; which differs only $4^s.5$ in time from that found by the survey.

*The Observatory of his Grace the Duke of MARLBOROUGH, at
Blenheim.*

The staff erected over the quadrant, was observed from White Horse Hill and Whiteham Hill. At the former station, the latter makes an angle of $36^{\circ} 30' 13'',5$, with the parallel to the meridian of *Dunnose*. The staff, therefore, bears from the parallel $25^{\circ} 59' 29'',75$ N E.; consequently, its distance from the meridian of *Dunnose* is 36540 feet, and from the perpendicular 446458 feet. These respectively subtend $5' 58'',3$, and $1^{\circ} 13' 21'',4$; therefore, the latitude of the Observatory is $51^{\circ} 50' 28'',3$, and its longitude $9' 39'',9$ from *Dunnose*: but $1^{\circ} 11' 36''$ is the longitude of that station; therefore, $1^{\circ} 21' 15'',9$, or $5' 25'',2$ in time, is the longitude of the Observatory west from Greenwich.

As the meridian of *Dunnose* passes at no great distance from that of *Blenheim*, I have deduced the latitude and longitude from the former, to avoid the errors which creep in, when computations are carried on from remote meridians. It may be worth while, however, to show that the extent of those errors would not be great, were the meridian of *Dunnose* neglected, and the Observatory at *Blenheim* referred to the meridian of Greenwich.

The distance of White Horse Hill from the meridian of Greenwich is found to be 356050 feet, and from its perpendicular 39425 feet; the bearing of Nuffield, from the parallel at that station, being $89^{\circ} 59' 27''$ S E. *Blenheim* will, therefore, be found to bear $26^{\circ} 55' 25''$ N E from the parallel at White Horse Hill; consequently, its distance from the meridian of Greenwich is 307224 feet, and from its perpendicular 135569 feet. These give the arcs $50' 12'',4$, and $22' 16'',1$; from whence we get $51^{\circ} 50' 28'',1$ for the latitude, and $1^{\circ} 21' 16''$ for the longitude,

of the Observatory west of Greenwich. Either of these determinations may be taken for the true result, but I shall prefer the first.

Being favoured by his Grace with the latitude and longitude derived from astronomical observations, we have the following comparisons :

Latitude			Longitude west from Greenwich.	Degrees.	Time.
Latitude	observed	$51^{\circ} 50' 24'',9$	Longitude west from Greenwich.	$1^{\circ} 21' 6'',0$	$5^m 24^s,4$
	computed	$51^{\circ} 50' 28'',1$		$1^{\circ} 21' 15'',9$	$5^m 25^s,1$

Observatory at Oxford.

The angle at the station on Shotover, between the Atlas on the top of the Observatory and the parallel to the meridian of Dunnose, is $79^{\circ} 50' 51'',75$ N W: therefore, its distance from the meridian is 14719 feet, and from the perpendicular 416985 feet. The figure representing Atlas is $33\frac{3}{4}$ feet *due east* of the Quadrant Room; consequently, no correction will be required in the computed latitude. The space 14719 feet subtends an arc $= 2' 24'',3$, and 416985 feet an arc of $1^{\circ} 8' 30'',8$. These *data*, with the latitude and longitude of Dunnose, give $51^{\circ} 45' 38''$ for the latitude, and $1^{\circ} 15' 29'',2$ for the longitude, of the Observatory. As in the former case, with respect to Blenheim, so in the present instance, it is immaterial whether the calculations be carried on from the meridian of Greenwich or that of Dunnose, as differences of only $0'',1$ in both the latitude and longitude are found in the results.

The latitude and longitude of this Observatory are given in the *Requisite Tables*; the first is $51^{\circ} 45' 38''$, and the last $1^{\circ} 15' 30''$, or $5^m 2^s$ in time. Doctor HORNSBY, however, has furnished me with what he conceives to be more accurate

determinations ; from which, and the above, we have the following comparisons :

Latitude	{	observed	51° 45' 39",5	Longitude west from Greenwich.	{	Degrees.	Time.
						1° 15' 22",5 1 15 29,2	5 ^m 1 ^s ,5 5 1,9
		computed	51 45 38,0				

I conclude this article with expressing an opinion, that the coincidence between the computed and, no doubt, accurately observed longitude of this Observatory, affords strong reason for supposing, that the operations at Beachy Head and Dunnose, in 1794, for finding the length of a degree of a great circle perpendicular to the meridian on the earth's surface, were made with the required accuracy.

SECTION THIRD.

Trigonometrical Surveys of the Northern and Western Parts of Kent, the County of Essex, and Parts of the adjoining Counties, Suffolk and Hertford, executed in the Years 1798 and 1799. (See Plate XXXII.)

It will be convenient to treat of the operations carried on in the north of Kent and Essex, before we speak of those executed in the western parts of the former county.

In a former article I have observed, that from the old station at Wrotham, (General Roy's,) the view towards the north is obstructed, and also that it became necessary to select a new one: this station was found to be 205,5 feet from the other; the distance was accurately measured, and afterwards the angle taken at the *old* station, between the staff on Severndroog Tower,

Shooters Hill, and the one newly chosen; this angle subtended $94^{\circ} 19' 0'' \cdot 5$.

The distance from Severndroog Tower to the old station at Wrotham, is 79960 feet. But, it must be observed, this distance is not precisely the same as that given by General Roy, because an allowance is made for the error in the reduction of the bases, in the surveys of 1787 and 1788.

With the distances 79960 feet and 205,5 feet, and the included angle, $94^{\circ} 19' 0'' \cdot 5$, we find the distance of the Flag-staff on Severndroog Tower, from the new station = 79944 feet; with this distance, a part of the following triangles have their sides computed.

ART. XXXVIII. *Principal Triangles.*

Names of stations.	Observed angles.	Distances of the stations.	
Wrotham - - -	$62^{\circ} 54' 38''$	} Gravesend - {	Fect. 45578
Gravesend - - -	$82^{\circ} 39' 21''$		71762
Severndroog Tower			
Gravesend - - -	$95^{\circ} 53' 59''$	} Langdon Hill - {	44886
Langdon Hill - - -	$53^{\circ} 47' 25''$		88470
Severndroog Tower			
Gravesend - - -	$34^{\circ} 31' 53''$	} Hadleigh Steeple - {	64076
Hadleigh Steeple - - -	$43^{\circ} 11' 51''$		37171
Langdon Hill - - -			
Gravesend - - -	$30^{\circ} 24' 19'' - 21''$	} Halstow Steeple - {	44839
Hadleigh - - -	$41^{\circ} 46' 32'' - 33''$		34064
Halstow - - -	$107^{\circ} 49' 5'' - 6''$		
	$179^{\circ} 59' 57''$		
Gravesend - - -	$31^{\circ} 38' 21''$	} Gadshill - - - {	22277
Halstow - - -	$24^{\circ} 18' 21''$		28390
Gadshill			
Halstow - - -	$59^{\circ} 18' 6'' - 5''$	} Sheppey - - - {	49409
Hadleigh Steeple - - -	$49^{\circ} 13' 33\frac{1}{2}'' - 32''$		64387
Sheppey Isle - - -	$31^{\circ} 28' 24'' - 23''$		
	$180^{\circ} 0' 3 \cdot 5$		

The distances of Gadshill from Halstow, and from Halstow to the Isle of Sheppey, in the following triangle, viz.

Halstow 128 34 28

Sheppey 18 18 3

Gadshill give the distances between Gadshill and the station in the Isle of Sheppey 70687 and 70685 feet: the mean, 70686 feet, may be taken for the true distance.

Names of stations.			Observed angles.	Distances.		
Hadleigh	-	-	$\begin{smallmatrix} 38 & 43 & 29 \\ 119 & 20 & 5 \end{smallmatrix}$	} Southend	-	- { $\begin{smallmatrix} 27596 \\ 46204 \end{smallmatrix}$
Southend	-	-				
Sheppey	-	-				

To find the distance between Langdon Hill and the spindle of the weather-cock on Rayleigh Steeple, we have the following quadrilateral.

Langdon Hill 122° 2' 46"

Gravesend - 64 56 14

Halstow - 111 20 14

Rayleigh - 61 40 46

360 0 0, which gives the distance from the centre of Rayleigh Steeple to the staff on Langdon Hill = 44131 feet; but the point on the top of Rayleigh Tower, over which the instrument was placed, was just 7 feet farther from Langdon Hill than the spindle; therefore, 44131 + 7 = 44138 feet, is the distance between Langdon Hill and the station on the steeple.—The angles in the following triangles,

Hadleigh - 134° 11' 55"

Sheppey - 16 26 30

Langdon Hill

Langdon Hill 49 8 5

Sheppey - 27 4 46

Rayleigh

give the distance of

the *Spindle* on Rayleigh Tower from $\begin{cases} \text{Langdon Hill} = 44131 \\ \text{Hadleigh} = 15554 \end{cases}$ Feet.

From the preceding quadrilateral, the distance between the spindle on Rayleigh Tower and the station on Langdon Hill, was found = 44131 feet, which is the same as the other determination.

Names of stations.	Observed angles.	Distances.	
Halstow - - -	$\begin{smallmatrix} 0 & 46 & 57 \\ 95 & 46 & 57 \\ 42 & 6 & 39 \end{smallmatrix}$	} Spindle - -	$\begin{smallmatrix} \text{Feet.} \\ 49413 \\ 73313 \end{smallmatrix}$
Sheppey - - -			
Rayleigh Tower Spindle			
Halstow - - -	$\begin{smallmatrix} 35 & 1 & 8 \\ 99 & 3 & 3 \end{smallmatrix}$	} Prittlewell - -	$\begin{smallmatrix} 46820 \\ 27206 \end{smallmatrix}$
Hadleigh - - -			
Prittlewell Steeple			
Halstow - - -	$\begin{smallmatrix} 64 & 16 & 58 \\ 55 & 24 & 34 \end{smallmatrix}$	} Prittlewell - -	$\begin{smallmatrix} 46823 \\ 51243 \end{smallmatrix}$
Sheppey - - -			
Prittlewell			
Halstow - - -	$\begin{smallmatrix} 73 & 45 & 42 \\ 66 & 39 & 49 \end{smallmatrix}$	} Canewden - -	$\begin{smallmatrix} 71211 \\ 74461 \end{smallmatrix}$
Sheppey - - -			
Canewden Steeple - -			
Rayleigh - - -	$\begin{smallmatrix} 53 & 5 & 0 \\ 73 & 41 & 30 \end{smallmatrix}$	} Canewden - -	$\begin{smallmatrix} 31438 \\ 26189 \end{smallmatrix}$
Prittlewell - - -			
Canewden			
Hadleigh - - -	$\begin{smallmatrix} 52 & 52 & 24 \\ 86 & 10 & 13 \end{smallmatrix}$	} Flagstaff - -	$\begin{smallmatrix} 51846 \\ 34060 \end{smallmatrix}$
Halstow - - -			
Flagstaff of the Garrison, Sheerness			
Severndroog Tower - -	$\begin{smallmatrix} 17 & 48 & 23 \\ 20 & 22 & 40 \\ 141 & 48 & 57 \end{smallmatrix}$	} Purfleet Cliff - -	$\begin{smallmatrix} 40423 \\ 35498 \end{smallmatrix}$
Gravesend - - -			
Purfleet Cliff - - -			
	$\begin{smallmatrix} 180 & 0 & 0 \end{smallmatrix}$		
Rayleigh - - -	$\begin{smallmatrix} 97 & 7 & 27 \\ 43 & 18 & 2 \end{smallmatrix}$	} Danbury - -	$\begin{smallmatrix} 47514 \\ 68746 \end{smallmatrix}$
Langdon Hill - - -			
Danbury Spire			
Severndroog Tower - -	$\begin{smallmatrix} 26 & 24 & 33 \\ 95 & 25 & 0 \\ 58 & 10 & 27 \end{smallmatrix}$	} Frierning - -	$\begin{smallmatrix} 103659 \\ 46312 \end{smallmatrix}$
Langdon Hill - - -			
Frierning Steeple - -			
Langdon Hill - - -	$\begin{smallmatrix} 88 & 14 & 19 \\ 44 & 13 & 19 \end{smallmatrix}$	} Frierning - -	$\begin{smallmatrix} 46314 \\ 63270 \end{smallmatrix}$
Frierning - - -			
Rayleigh			

Mean distance from Langdon Hill to Frierning Steeple 46313 feet.

Names of Stations.	Observed angles.	Distances.	
Frierning - - - -	$\begin{smallmatrix} 0 & 1 & '' \\ 92 & 15 & 6 \end{smallmatrix}$	} Danbury - - - {	Feet.
Langdon Hill - - - -	$\begin{smallmatrix} 45 & 26 & 17 \end{smallmatrix}$		49020
Danbury Steeple			68748
Langdon Hill - - - -	$\begin{smallmatrix} 24 & 27 & 23 \\ 132 & 52 & 23 \end{smallmatrix}$	} Signal Staff - - - {	83902
Rayleigh - - - -			47408
Signal Staff, Shoebury-ness			
Triptree, old station - - -	$\begin{smallmatrix} 47 & 8 & 50 \\ 73 & 45 & 24 \end{smallmatrix}$		
Rayleigh - - - -			
Frierning			
Triptree, old station, from		{ Rayleigh Tower - - -	74052
		{ Frierning - - -	82860
Triptree - - - -	$\begin{smallmatrix} 31 & 59 & 21 \\ 124 & 20 & 48 \end{smallmatrix}$		
Danbury - - - -			
Rayleigh			
Danbury Spire from Triptree Heath - - -			36000
Triptree, old station - - -	$\begin{smallmatrix} 100 & 28 & 19 \\ 30 & 14 & 40 \end{smallmatrix}$		
Tillingham Steeple - - -			
Danbury Spire			
Tillingham from		{ Triptree - - - -	54172
		{ Danbury - - - -	70281
Tillingham - - - -	$\begin{smallmatrix} 84 & 52 & 34 \\ 62 & 39 & 36 \end{smallmatrix}$	} Peldon - - - - {	42469
Peldon - - - -			78803
Danbury - - - -			
Tillingham - - - -	$\begin{smallmatrix} 48 & 58 & 50 \\ 83 & 42 & 46 \end{smallmatrix}$	} Flagstaff - - - - {	57433
Peldon - - - -			43595
Flagstaff on St. Osyth Priory			
Peldon - - - -	$\begin{smallmatrix} 20 & 49 & 10 \\ 32 & 47 & 18 \end{smallmatrix}$	} Thorp - - - - {	64802
Thorp - - - -			28612
Flagstaff, St. Osyth Priory -			
Peldon - - - -	$\begin{smallmatrix} 74 & 46 & 5 \\ 52 & 6 & 31 \end{smallmatrix}$	} Stoke - - - - {	63931*
Thorp - - - -			78171
Stoke Steeple			
Peldon - - - -	$\begin{smallmatrix} 71 & 48 & 20 \\ 75 & 51 & 12 \end{smallmatrix}$	} Great Tey - - - - {	43475
Great Tey - - - -			77204
Danbury - - - -			

Names of the Stations.	Observed angles.	Distances.	
Peldon - - - -	° 46 14 2	} Stoke - - -	Fect. 63941*
Great Tey - - - -	90 56 9		46182
Stoke			

From a former triangle, the distance between Peldon and Stoke Steeple was found to be 63931 feet; wherefore, 63936 feet, the mean, may be taken for the true distance.

Thorp - - - -	98 52 20	} Little Bentley -	20481
Little Bentley - - - -	53 2 30		
Dover Court - - - -			42981

Thorp - - - -	41 12 53	} Little Bentley -	20481
Little Bentley - - - -	123 30 18		
Peldon - - - -			51205

Tillingham - - - -	96 57 20	} West Mersea -	28924
Danbury Spire - - - -	61 46 57		79173
West Mersea			

Rayleigh - - - -	54 27 44	} West Mersea -	96701
West Mersea - - - -	29 13 0		
Danbury - - - -			79170

Great Tey - - - -	52 11 44		
Stoke - - - -	45 12 57		
Staircase, St. Mary's Steeple, Colchester			

St. Mary's Steeple from Stoke - - - 36796

Little Bromley - - - -	54 11 22	} Little Bromley -	44356
Stoke - - - -	47 58 26		
St. Mary's, Colchester -			33706

Dover Court - - - -	18 58 19	} Tattingstone -	38946
Stoke - - - -	14 53 50		49250
Tattingstone			

Thorp - - - -	37 52 49	} Tattingstone -	50690
Stoke - - - -	39 12 4		49245
Tattingstone			

Dover Court - - - -	50 26 54	} Falkenham -	31651
Rushmere - - - -	38 25 50		39270
Falkenham Steeple			

The distance from Dover Court Steeple to Stoke Steeple is 84425 feet, and from Rushmere Steeple to Stoke Steeple 75955 feet; the included angle at Dover Court Steeple is 62° 38' 20". These give the distance of Dover Court Steeple from Rushmere, 50921 feet.

Names of Stations.	Observed angles.	Distances.	
Dover Court - - -	$\begin{smallmatrix} 43 & 40 & 51 \\ 49 & 46 & 9 \end{smallmatrix}$	} Tattingstone - {	Feet. 38946 35232
Rushmere - - -			
<i>Tattingstone</i>			
Dover Court - - -	$\begin{smallmatrix} 25 & 55 & 13 \\ 96 & 25 & 30 \\ 57 & 39 & 17 \end{smallmatrix}$	} Woodbridge - {	59894 26346*
Rushmere - - -			
Woodbridge Steeple - -			
	180 0 0		
Falkenham - - -	$\begin{smallmatrix} 41 & 25 & 50 \\ 58 & 0 & 10 \end{smallmatrix}$	} Woodbridge - {	33761 26342*
Rushmere - - -			
<i>Woodbridge</i>			
Falkenham - - -	$\begin{smallmatrix} 48 & 42 & 0 \\ 83 & 10 & 0 \end{smallmatrix}$	} Butley - - {	45013 34058
Woodbridge - - -			
<i>Butley Steeple</i>			
Falkenham - - -	$\begin{smallmatrix} 21 & 58 & 1 \\ 116 & 14 & 59 \end{smallmatrix}$	} Orford Light House - {	60589 25207
Butley - - -			
<i>Orford Light House</i>			
Rushmere - - -	$\begin{smallmatrix} 62 & 45 & 1-0 \\ 63 & 30 & 1-0 \\ 53 & 45 & 0 \end{smallmatrix}$	} Otley - - {	29238 29044
Woodbridge - - -			
Otley Steeple - - -			
	180 0 2		
Rushmere - - -	$\begin{smallmatrix} 40 & 25 & 30 \\ 46 & 25 & 0 \\ 93 & 9 & 30 \end{smallmatrix}$	} Henley - - {	21211 18988
Otley - - -			
Henley Steeple - - -			
	180 0 0		
Dover Court - - -	$\begin{smallmatrix} 12 & 43 & 40 \\ 13 & 22 & 10 \end{smallmatrix}$	} Obelisk - - {	26766 25503
Rushmere - - -			
<i>Obelisk, Woolverstone Park</i>			
Rushmere - - -	$\begin{smallmatrix} 61 & 35 & 58 \\ 53 & 5 & 10 \end{smallmatrix}$	} Copdock - - {	28984 28057
Copdock Steeple - - -			
<i>Obelisk</i>			
Rushmere - - -	$\begin{smallmatrix} 85 & 25 & 0 \\ 37 & 46 & 0 \\ 56 & 49 & 0 \end{smallmatrix}$	} Henley - - {	21209 34520
Copdock - - -			
Henley - - -			
	180 0 0		

Names of Stations.	Observed angles.	Distances.	
Henley - - -	$\begin{smallmatrix} 0 \\ 58 \end{smallmatrix} \begin{smallmatrix} ' \\ 32 \end{smallmatrix} \begin{smallmatrix} '' \\ 42 \end{smallmatrix} - 40$	} Naughton - - {	Feet. 45518
Copdock - - -	$74 \ 30 \ 11 - 10$		40294
Naughton Steeple - -	$46 \ 57 \ 11 - 10$		
Naughton - - -	$74 \ 24 \ 2$	} Lavenham - {	35867
Stoke - - -	$45 \ 58 \ 58$		48039
Lavenham Steeple -	$59 \ 37 \ 0$		
Lavenham - - -	$67 \ 48 \ 30$	} Bulmer - {	36837
Stoke - - -	$44 \ 59 \ 10$		48248
Bulmer Steeple - -	$67 \ 12 \ 20$		
Lavenham - - -	$47 \ 34 \ 25$	} Glemsford - {	25746
Bulmer - - -	$44 \ 18 \ 40$		27086
Glemsford Steeple			
Lavenham - - -	$18 \ 22 \ 0$	} Topplesfield - {	67962
Bulmer - - -	$142 \ 15 \ 20$		34983
Topplesfield			
Lavenham - - -	$51 \ 36 \ 40$	} Twinstead - {	43349
Stoke - - -	$58 \ 8 \ 10$		40006*
Twinstead Steeple			
Stoke - - -	$50 \ 4 \ 48$	} Twinstead - {	40006*
Great Tey - - -	$56 \ 15 \ 56$		36895
Twinstead			
Frierning - - -	$156 \ 42 \ 10$	} Southweald - {	30138
Danbury - - -	$8 \ 50 \ 0$		77622
Southweald Steeple			
Danbury - - -	$151 \ 18 \ 36$	} Gallywood - {	26097
Triptree, old Station - -	$12 \ 0 \ 34$		60211
Gallywood Common			
Triptree, old Station - -	$37 \ 41 \ 44$	} Pleshley - {	63213
Gallywood - - -	$75 \ 13 \ 56$		39973
Pleshley Steeple			
Danbury - - -	$55 \ 31 \ 11$	} Pleshley - {	48455
Gallywood - - -	$91 \ 54 \ 46$		39964
Pleshley			
Gallywood - - -	$15 \ 45 \ 30$	} High Easter - - {	47767
Pleshley - - -	$114 \ 49 \ 0$		14293
High Easter Steeple			

Names of stations.	Observed angles.	Distances.	
Danbury - - -	$\begin{smallmatrix} 0 & ' & '' \\ 12 & 4 & 30 \end{smallmatrix}$	} Hatfield Broad Oak - {	Feet. 85096 39058
Pleshley - - -	$\begin{smallmatrix} 152 & 53 & 10 \end{smallmatrix}$		
Hatfield Broad Oak Steeple			
Danbury - - -	$\begin{smallmatrix} 25 & 45 & 6 \\ 29 & 43 & 54 \end{smallmatrix}$	} Thaxted - - {	101330 53429
High Easter - - -			
Thaxted Spire			
Hatfield Broad Oak -	$\begin{smallmatrix} 54 & 20 & 51 \\ 39 & 25 & 0 \end{smallmatrix}$	} Beauchamp Roding - {	24853 31806
Pleshley - - -			
Beauchamp Roding Spire			

The angle observed from the station on Danbury Steeple, between Hatfield Broad Oak and Thaxted, was $30^{\circ} 33' 40''$; this, with the including sides, 85094 and 101330 feet, gives the following triangle:

Danbury - $30^{\circ} 33' 40''$

Hatfield Broad Oak 92 24 0

Thaxted - 57 2 20, which gives the distance between Thaxted and Hatfield Broad Oak = 51566 feet.

Danbury - - -	$\begin{smallmatrix} 27 & 24 & 19 \\ 118 & 2 & 28 \end{smallmatrix}$	} Stoke - - {	122630 63951
Peldon - - -			
Stoke			

Again, the angle observed at Danbury, between Thaxted and Stoke was $66^{\circ} 43' 8''$; this, with the sides which form it, Danbury and Thaxted, Danbury and Stoke, gives the following triangle:

Danbury - $66^{\circ} 43' 8''$

Stoke - - 48 25 16

Thaxted - 64 51 36, from which we find 124430 feet, for the distance from Thaxted to Stoke.

The angle at Lavenham Steeple, between Stoke and Thaxted, was likewise observed, and found to be $89^{\circ} 10' 30''$, which, with the distances of these latter stations from Lavenham, 48039 and 124430 feet, gives

Lavenham - $89^{\circ} 10' 30''$

Stoke - - 68 7 0

Thaxted - 22 42 30, from which we find 115480 feet to be the distance from Thaxted Spire to Lavenham Steeple.

The angle at Danbury, between Southweald and Hatfield Broad Oak, was found to be $54^{\circ} 44' 30''$. The distances from Danbury to Southweald and Hatfield Broad Oak have been already found, the former being 77622 feet, and the latter 85096 feet; from these we get the triangle,

Danbury - $54^{\circ} 44' 30''$

Southweald - $67^{\circ} 42' 5''$

Hatfield Broad Oak $57^{\circ} 33' 25''$, which gives 75104 feet, for the distance between Hatfield Broad Oak and Southweald Steeples.

In order to connect the preceding triangles with those carried on for the survey of the south-western part of Essex, and of Hertfordshire, stations were selected on Hampstead Heath, and on Highbeech in Epping Forest, to which the great theodolite was taken, as related in the article detailing the particulars of the operations in 1799. The triangles making this connection are the following. The first, namely,

Severndroog Tower $28^{\circ} 58' 10''$

Southweald - $94^{\circ} 49' 5''$

Langdon Hill - $56^{\circ} 12' 45''$, is had from the included angle at Severndroog Tower, $28^{\circ} 58' 10''$, and the sides Severndroog Tower and Southweald, Severndroog Tower and Langdon Hill: the first is 73787 feet, and the second 88470 feet. From these *data*, we obtain the distance between the station on Langdon Hill and that on Southweald Steeple = 43001 feet.

Names of Stations.		Observed angles.	Distances.	
Severndroog Tower	-	$\begin{smallmatrix} 24 & 24 & 35 \\ 62 & 26 & 39 \end{smallmatrix}$	} Brentwood -	{ Feet. 78553* 36616
Langdon Hill	-			
<i>Brentwood Steeple</i>				
Severndroog Tower	-	$\begin{smallmatrix} 4 & 33 & 29 \\ 125 & 53 & 12 \end{smallmatrix}$	} Brentwood -	{ 78553* 7706
Southweald	-			
<i>Brentwood</i>				

Foot of the cross on the dome of St. Paul's from the station on Severndroog Tower 39962*.

Phil. Trans. for 1787. p. 250.

Severndroog Tower	-	$\begin{smallmatrix} 33 & 53 & 4 \\ 51 & 24 & 12 \end{smallmatrix}$	} Highbeech -	{ 71534 61919
St. Paul's	-			
<i>Highbeech</i>				
Severndroog Tower	-	$\begin{smallmatrix} 44 & 34 & 28 \\ 69 & 53 & 13 \end{smallmatrix}$	} Southweald -	{ 73795* 55156
Highbeech	-			
<i>Southweald</i>				

From the last triangle, we find the distance from Severndroog Tower to the station on Southweald Steeple to be 73795 feet; this, it will be perceived, is deduced from the distance between the cross on the dome of St. Paul's and Severndroog Tower; but 73791 feet has been found by the triangle, which is derived from the distance between the latter station and Wrotham. A difference of 4 feet on such a distance, all things considered, is not a large quantity.

Names of Stations.	Observed Angles.	Distances.	
Severndroog Tower - - -	$\begin{smallmatrix} 0 & 8 & 1 \\ 49 & & \end{smallmatrix}$	} Brentwood - {	Feet. 78558*
Highbeechee - - -	$\begin{smallmatrix} & 16 & 44 \\ 71 & & \end{smallmatrix}$		62727
<i>Brentwood Spire</i>			
Severndroog Tower - - -	$\begin{smallmatrix} 51 & 24 & 12 \\ 58 & 29 & 19 \end{smallmatrix}$	} Hampstead Heath - {	64855
Highbeechee - - -			59455
<i>Hampstead Heath</i>			
Highbeechee - - - - -	$\begin{smallmatrix} 24 & 36 & 5 \\ 83 & 1 & 11 \end{smallmatrix}$	} St. Paul's - - - {	61919
Hampstead - - - - -			25966
<i>St. Paul's</i>			

As it became necessary to ascertain the situation of a high building near Berkhamstead, which, for distinction sake, I shall style the Gazebo, the instrument was removed from the station on Highbeechee, to another farther west of it, as some trees obstructed the view of this object from the former. To get the distance from St. Paul's to this new station, the distance between it and the old one was measured, and found = 460 feet: the angles in the following triangle were also observed.

Highbeechee, old station $66^{\circ} 32' 47''$

Highbeechee, new station $113^{\circ} 3' 46''$

St. Paul's

which gives the distance from

St. Paul's to the new station 61738 feet.

Highbeechee, new station -	$\begin{smallmatrix} 105 & 21 & 44 \\ 41 & 55 & 23 \end{smallmatrix}$	} Gazebo - - - {	49631
Berkhamstead Gazebo -			88872
<i>St. Paul's</i> - - -			
Southweald - - - - -	$\begin{smallmatrix} 16 & 46 & 15 \\ 52 & 16 & 51 \end{smallmatrix}$	} Epping Windmill - {	46717
Highbeechee, old station -			17042*
<i>Stand of Epping Windmill</i>			
Severndroog Tower - - -	$\begin{smallmatrix} 10 & 8 & 44 \\ 122 & 10 & 45 \end{smallmatrix}$	} Epping Windmill - {	81891
Highbeechee - - - - -			17043*
<i>Stand of Epping Windmill</i>			

Names of Stations.	Observed angles.	Distances.	
Highbeech, old station -	99 19 16	} Epping Windmill - {	Feet.
Berkhamstead Gazebo -	17 41 25		17049
Stand of Epping Windmill			55567

At the new station on Highbeech, the angle between the staff on the Gazebo at Berkhamstead and the old station was observed, and found to be $141^{\circ} 45' 50''$. This angle, with the measured distance between the stations, and also the distance from the Gazebo to the new station, which are respectively 460 and 49628 feet, gives 49987 feet, for the distance between the new station on Highbeech and Berkhamstead Gazebo.

Hatfield Broad Oak Steeple -	59 1 0	} Hatfield Broad Oak - {	87140
Berkhamstead Gazebo -	43 12 50		60219
Epping Windmill -			
Berkhamstead Gazebo -	24 9 55	} Naseing - - {	39173
Hatfield Broad Oak - -	17 19 38		53844
Naseing Steeple			
Hatfield Broad Oak -	107 39 57	} Henham on the Mount {	39265
Berkhamstead Gazebo -	20 41 30		105890
Henham on the Mount Steeple			
Hatfield Broad Oak -	71 28 54	} Thorley - - {	24275
Henham on the Mount -	36 6 30		39058
Thorley Steeple			
Henham on the Mount -	35 25 0	} Atterbury - - {	37882
Thorley Steeple - -	69 33 0		23430
Atterbury Steeple			
Henham on the Mount -	87 20 0	} Rickling - - {	17816
Thorley - - -	24 57 50		42169
Rickling Steeple			
Henham on the Mount -	20 54 0	} Elmdon - - {	45275
Rickling - - -	146 35 0		29327
Elmdon Steeple			

The angle between Albury and Elmdon Steeples was observed, at Henham on the Mount, and found to be $72^{\circ} 47' 38''$. The distances from the former stations to the latter are 37882 and 45275 feet, which give the following triangle :

Henham - $72^{\circ} 47' 38''$

Albury - $60^{\circ} 28' 27''$

Elmdon - - $46^{\circ} 43' 35''$, from whence we get the distance between Albury and Elmdon = 49701 feet.

Names of Stations.	Observed angles.	Distances.	
Henham on the Mount - - - -	$106^{\circ} 30' 50''$	} Thaxted - - - {	Feet.
Elmdon - - - -	$23^{\circ} 2' 40''$		22988
<i>Thaxted Steeple</i>			56302
Elmdon - - - -	$71^{\circ} 54' 10''$	} Balsham - - - {	55262
Thaxted - - - -	$53^{\circ} 18' 44''$		65504
<i>Balsham Steeple</i>			
Elmdon - - - -	$23^{\circ} 38' 46''$	} Babraham Mount - {	43559
Balsham - - - -	$48^{\circ} 40' 38''$		23251
<i>Babraham Mount Station</i>			
Elmdon - - - -	$29^{\circ} 46' 30''$	} Triplow - - - {	24806
Babraham Mount - - - -	$32^{\circ} 56' 30''$		29185
<i>Triplow Steeple</i>			

The angle at Henham on the Mount, between Hatfield Broad Oak and Thaxted Steeples, is $109^{\circ} 10' 44''$; and the distances of the latter stations from the former one are 39266 and 22988 feet; from these data we have the triangle,

Henham - - - $109^{\circ} 10' 44''$

Thaxted - - - $45^{\circ} 56' 29''$

Hatfield Broad Oak - $24^{\circ} 52' 47''$, which gives 51608 feet for the distance of Thaxted from Hatfield Broad Oak.

Hatfield Broad Oak - - -	$51^{\circ} 9' 50''$	} High Easter - - {	24858
Beauchamp Roding - - -	$64^{\circ} 26' 10''$		21460
<i>High Easter Steeple</i>			
Severndroog Tower - - -	$21^{\circ} 6' 9''$	} Hornchurch - - - {	50989
Langdon Hill - - -	$24^{\circ} 10' 20''$		44832*
<i>Hornchurch Steeple</i>			
Langdon Hill - - -	$77^{\circ} 57' 33''$	} Hornchurch - - - {	44837*
Gravesend - - -	$50^{\circ} 59' 0''$		56438
<i>Hornchurch Steeple</i>			

Names of Stations.	Observed angles.	Distances.	
Gravesend - - -	24 32 30	} Purfleet Cliff -	{ Feet. 35517 28282
Hornchurch - - -	31 26 22		
<i>Purfleet Cliff Station</i>			
Severndroog Tower - -	39 44 2	} Barking - -	{ 25383 35404
Hornchurch - - -	27 16 44		
<i>Staircase of Barking Steeple</i>			
Severndroog Tower - -	39 41 6	} Westham -	{ 28046 25662
St. Paul's - - -	44 15 27		
<i>Westham Steeple</i>			

ART. XXXIX. *Secondary Triangles.*

St. Paul's from Severndroog Tower 39962 feet.

Severndroog Tower - - -	13 1 7	} Limehouse -	{ 26371 15456
St. Paul's - - -	22 36 13		
<i>Limehouse Steeple</i>			
Severndroog Tower - - -	9 15 30	} Chigwell - -	{ 57757 17242
Highbeech - - -	32 36 38		
<i>Chigwell Steeple</i>			
Severndroog Tower - - -	11 57 6	} Billericay - -	{ 100110 21506
Frierning - - -	74 34 30		
<i>Billericay Chapel</i>			
Westham Steeple - - -	45 58 0	} Station - - -	{ 15640 12077
Staircase of Barking Steeple -	68 35 0		
<i>Station on Bank of the Thames</i>			
Station on Bank of the Thames	41 21 0	} Perry's Mast House	{ 13120 10424
Westham Steeple - - -	56 15 0		
<i>Perry's Mast House</i>			
Hornchurch - - -	14 31 20	} Chimney - - -	{ 33236 9005
Staircase of Barking Steeple	68 52 0		
<i>Chimney of Public House at Barking Creek</i>			
Purfleet Cliff - - -	54 57 0	} Guzzard - - -	{ 21002 23638
Hornchurch - - -	46 40 0		
<i>Guzzard Station</i>			

Names of Stations.	Observed angles.	Distances.	
Purfleet Cliff - - - -	34 11 30	} Rainham - - - {	Feet. 16387
Hornchurch - - - -	32 1 0		17370
<i>Rainham Steeple</i>			
Purfleet Cliff - - - -	81 9 0	} Belvidere - - - {	16212
Hornchurch - - - -	31 50 50		30369
<i>Lord Eardley's, Belvidere</i>			
Purfleet Cliff - - - -	42 18 30	} Cold Harbour - - - {	10971
Rainham - - - -	41 45 0		11090
<i>Station at Cold Harbour</i>			
Guzzard - - - -	56 8 20	} Aveley Mill - - - {	21436
Hornchurch - - - -	56 43 20		21302
<i>Aveley Mill</i>			
Purfleet Cliff - - - -	34 2 40	} Valence Tree - - - {	36305
Hornchurch - - - -	95 3 40		20404
<i>Valence Tree</i>			
Gravesend - - - -	79 39 30	} Chadwell - - - {	17008
Severndroog Tower - - - -	13 41 10		70717
<i>Chadwell Steeple</i>			
Gravesend - - - -	35 39 0	} Greys - - - - {	18479
Chadwell Steeple - - - -	79 31 20		10953
<i>Greys Steeple</i>			
Gravesend - - - -	37 46 0	} Flagstaff - - - - {	22880
Chadwell Steeple - - - -	94 24 0		14054
<i>Flagstaff on Mr. Button's House</i>			
Gravesend - - - -	51 43 0	} West Thurrock - - - {	22457
Chadwell Steeple - - - -	80 2 30		17897
<i>West Thurrock Steeple</i>			
Gravesend - - - -	49 8 30	} Horndon - - - - {	33382
Hornchurch - - - -	36 7 5		42833
<i>Horndon Spire</i>			
Gravesend - - - -	18 52 0	} West Tilbury - - - {	5617
Chadwell - - - -	59 26 30		14956
<i>West Tilbury Steeple</i>			
Gravesend - - - -	69 31 27	} Northfleet - - - - {	8755
Chadwell - - - -	30 27 42		16179
<i>Northfleet Steeple</i>			

Names of Stations.	Observed angles.	Distances.	
Gravesend - - -	57° 16' 0"	} East Tilbury - - - {	Feet 16328
Chadwell - - -	59 13 30		15987
<i>East Tilbury Flagstaff</i>			
Chadwell - - -	51 23 0	} Station - - - {	25526
Mr. Button's Flagstaff -	95 22 30		20031
<i>Station near Ockendon</i>			
Mr. Button's Flagstaff -	54 20 30	} Orset - - - {	17360
Station near Ockendon -	54 54 30		17240
<i>Orset Steeple</i>			
Gravesend - - -	45 9 13	} Fobbing - - - {	41433
Halstow - - -	62 0 10		33270
<i>Fobbing Steeple</i>			
Hadleigh Station -	65 31 12	} Fobbing - - - {	26221
Halstow - - -	45 48 50		33279
<i>Fobbing Steeple</i>			
Halstow - - -	101 39 27	} Thundersley - - - {	41342
Gravesend - - -	37 16 40		
<i>Thundersley Steeple</i>			
Halstow - - -	7 53 10	} Hadleigh - - - {	5713
Hadleigh - - -	117 13 23		37028
<i>Hadleigh Spire</i>			
Hadleigh - - -	89 20 40	} Leigh - - - {	15735
Halstow - - -	24 54 27		37357
<i>Leigh Steeple Staircase</i>			
Halstow - - -	74 23 21	} Leigh - - - {	37359
Sheppey Station -	42 26 8		53325
<i>Leigh Steeple Staircase</i>			
Halstow - - -	13 17 45	} Sheerness - - - {	41434
Sheppey - - -	46 5 47		13063
<i>Sheerness Fort Flagstaff</i>			
Hadleigh - - -	38 43 20	} South Church - - - {	71211
Sheppey - - -	21 56 26		74461
<i>South Church Steeple</i>			
Hadleigh - - -	11 6 2	} Prittlewell - - - {	27208
Sheppey Station -	80 16 46		5314
<i>Prittlewell Steeple</i>			

Names of Stations.	Observed angles.	Distances.	
Canewden Steeple - Prittlewell - <i>Little Wakering Steeple</i>	$\begin{smallmatrix} 0 \\ 45\ 50\ 0 \\ 60\ 46\ 30 \end{smallmatrix}$	} Little Wakering - {	$\begin{smallmatrix} \text{Feet.} \\ 23850 \\ 19603 \end{smallmatrix}$
Canewden - - - Prittlewell - - - <i>Bank Flagstaff</i>	$\begin{smallmatrix} 64\ 27\ 0 \\ 67\ 46\ 30 \end{smallmatrix}$	} Bank - - - {	$\begin{smallmatrix} 32739 \\ 31908 \end{smallmatrix}$
Prittlewell - - - Station on Bank - - - <i>Shoebury-ness</i>	$\begin{smallmatrix} 33\ 10\ 0 \\ 39\ 20\ 30 \end{smallmatrix}$	} Shoebury-ness - {	$\begin{smallmatrix} 21208 \\ 18302 \end{smallmatrix}$
Canewden - - - Bank Flagstaff - - - <i>Foul-ness Chapel</i>	$\begin{smallmatrix} 32\ 51\ 30 \\ 81\ 20\ 0 \end{smallmatrix}$	} Foul-ness - - {	$\begin{smallmatrix} 35481 \\ 19473 \end{smallmatrix}$
Rayleigh - - - Peldon - - - <i>Foul-ness Signal Staff</i>	$\begin{smallmatrix} 47\ 28\ 6 \\ 43\ 45\ 33 \end{smallmatrix}$	} Signal Staff - - {	$\begin{smallmatrix} 71622 \\ 76311 \end{smallmatrix}$
Tillingham Steeple - Peldon - - - <i>Signal Staff, Tillingham Grange</i>	$\begin{smallmatrix} 139\ 21\ 10 \\ 9\ 44\ 29 \end{smallmatrix}$	} Signal Staff - {	$\begin{smallmatrix} 13990 \\ 53860 \end{smallmatrix}$
Tillingham - - - Peldon - - - <i>Signal Staff, Bradwell Point</i>	$\begin{smallmatrix} 43\ 27\ 58 \\ 24\ 10\ 18 \end{smallmatrix}$	} Signal Staff - {	$\begin{smallmatrix} 18802 \\ 31591 \end{smallmatrix}$
Tillingham - - - Peldon - - - <i>Brightlingsea Steeple</i>	$\begin{smallmatrix} 31\ 2\ 40 \\ 100\ 56\ 20 \end{smallmatrix}$	} Brightlingsea - {	$\begin{smallmatrix} 56094 \\ 29463 \end{smallmatrix}$
Tillingham - - - West Mersey Steeple - <i>Tolesbury Steeple</i>	$\begin{smallmatrix} 39\ 48\ 40 \\ 57\ 33\ 13 \end{smallmatrix}$	} Tolesbury - {	$\begin{smallmatrix} 24611 \\ 18673 \end{smallmatrix}$
Tillingham - - - Triptree, old Station - <i>Althorn Church</i>	$\begin{smallmatrix} 63\ 55\ 6 \\ 35\ 34\ 3 \end{smallmatrix}$	} Althorn - - {	$\begin{smallmatrix} 31946 \\ 49330 \end{smallmatrix}$
Tillingham - - - Althorn - - - <i>Burnham Steeple</i>	$\begin{smallmatrix} 26\ 32\ 10 \\ 55\ 49\ 0 \end{smallmatrix}$	} Burnham - - {	$\begin{smallmatrix} 26664 \\ 14400 \end{smallmatrix}$
Tillingham - - - Peldon - - - <i>Tolesbunt Major Steeple</i>	$\begin{smallmatrix} 47\ 33\ 35 \\ 56\ 33\ 25 \end{smallmatrix}$	} Tolesbunt - {	$\begin{smallmatrix} 36541 \\ 32317 \end{smallmatrix}$

Names of stations.	Observed angles.	Distances.	
Prittlewell Steeple - - - Bank Flagstaff - - - <i>Signal Staff, Shoebury-ness</i>	$\begin{smallmatrix} 33^{\circ} & 10' & 0'' \\ 39 & 20 & 30 \end{smallmatrix}$	} Signal Staff - - -	$\begin{smallmatrix} \text{Feet.} \\ 21208 \\ 18302 \end{smallmatrix}$
Triptree, new Station - - Danbury - - - <i>Maldon Spire</i>	$\begin{smallmatrix} 38 & 5 & 18 \\ 30 & 11 & 27 \end{smallmatrix}$	} Maldon - - -	$\begin{smallmatrix} 19425 \\ 23829 \end{smallmatrix}$
Triptree, new Station - - Danbury - - - <i>Purleigh Steeple</i>	$\begin{smallmatrix} 36 & 48 & 30 \\ 72 & 9 & 0 \end{smallmatrix}$	} Purleigh - - -	$\begin{smallmatrix} 36118 \\ 22734 \end{smallmatrix}$
Danbury - - - Purleigh Steeple - - - <i>Steeple Steeple</i>	$\begin{smallmatrix} 17 & 47 & 32 \\ 148 & 16 & 30 \end{smallmatrix}$	} Steeple - - -	$\begin{smallmatrix} 49647 \\ 28850 \end{smallmatrix}$
Danbury - - - Canewden - - - <i>Hockley Steeple</i>	$\begin{smallmatrix} 26 & 17 & 40 \\ 51 & 8 & 0 \end{smallmatrix}$	} Hockley - - -	$\begin{smallmatrix} 41401 \\ 23555 \end{smallmatrix}$
Danbury - - - Rettenden - - - <i>Hockley Steeple</i>	$\begin{smallmatrix} 27 & 21 & 50 \\ 109 & 22 & 0 \end{smallmatrix}$	} Hockley - - -	$\begin{smallmatrix} 41400 \\ 20170 \end{smallmatrix}$
Danbury - - - Canewden - - - <i>Rettenden Steeple</i>	$\begin{smallmatrix} 53 & 39 & 40 \\ 35 & 25 & 0 \end{smallmatrix}$	} Rettenden - - -	$\begin{smallmatrix} 30079 \\ 41810 \end{smallmatrix}$
Rettenden - - - Canewden - - - <i>Stow, St. Mary's Steeple</i>	$\begin{smallmatrix} 34 & 41 & 0 \\ 30 & 53 & 0 \end{smallmatrix}$	} Stow, St. Mary's - -	$\begin{smallmatrix} 23571 \\ 26131 \end{smallmatrix}$
Rayleigh - - - Langdon Station - - - <i>Rettenden Steeple</i>	$\begin{smallmatrix} 71 & 51 & 18 \\ 27 & 38 & 45 \end{smallmatrix}$	} Rettenden - - -	$\begin{smallmatrix} 20760 \\ 42526 \end{smallmatrix}$
Rayleigh - - - Langdon - - - <i>Runwell Steeple</i>	$\begin{smallmatrix} 51 & 8 & 10 \\ 28 & 10 & 20 \end{smallmatrix}$	} Runwell - - -	$\begin{smallmatrix} 21207 \\ 34975 \end{smallmatrix}$
Danbury - - - Rayleigh - - - <i>Great Burghstead Steeple</i>	$\begin{smallmatrix} 48 & 57 & 22 \\ 72 & 39 & 17 \end{smallmatrix}$	} Burghstead - - -	$\begin{smallmatrix} 53254 \\ 42079 \end{smallmatrix}$
Danbury - - - Gallywood Station - - - <i>East Hanningfield Steeple</i>	$\begin{smallmatrix} 59 & 11 & 7 \\ 41 & 40 & 10 \end{smallmatrix}$	} Hanningfield - - -	$\begin{smallmatrix} 17666 \\ 22822 \end{smallmatrix}$

Names of stations.	Observed angles.	Distances.		
Frierning Steeple - -	36' 7" 48	} Stock	- -	Feet. 16826
Danbury - - -	15 38 36			36793
<i>Stock Steeple</i>				
Triptree, old Station -	18 38 11	} Southminster	-	55075
Tillingham Steeple -	83 33 14			17711
<i>Southminster Steeple</i>				
Peldon Steeple - -	97 35 31	} Layer Marney	-	20180
Tillingham - - -	23 54 4			49369
<i>Layer Marney Steeple</i>				
Peldon - - - -	80 20 6	} Signal Staff	-	60701
Tillingham - - -	61 39 24			67990
<i>Signal Staff, St. Osyth Point</i>				
Thorp Steeple - - -	143 7 36	} Signal Staff	-	21517
Little Bentley - - -	18 54 29			39844
<i>Great Clackton Signal Staff</i>				
Thorp - - - -	71 35 55	} Great Clackton	-	18920
Peldon - - - -	16 58 13			61508
<i>Great Clackton Steeple</i>				
Dover Court Steeple -	24 36 48	} Finton	- -	38998
Thorp - - - -	92 26 41			16257
<i>Finton Steeple</i>				
Dover Court - - -	39 16 34	} Signal Staff	- -	34686
Thorp - - - -	70 11 16			23340
<i>Finton Signal Staff</i>				
Dover Court - - -	53 15 26	} Walton	- -	26275
Thorp - - - -	47 52 22			28389
<i>Walton Tower or Sea-mark</i>				
Dover Court - - -	133 57 30	} Cupola	- - -	15085
Thorp - - - -	13 29 57			46517
<i>Cupola, Landguard Fort</i>				
Thorp - - - -	46 16 17	} Ardleigh	- -	47494
Peldon - - - -	47 1 34			46901
<i>Ardleigh Steeple</i>				
Peldon - - - -	106 10 16	} Frating	- -	35433
Great Tey Steeple -	32 32 11			63274
<i>Frating Steeple</i>				

Names of Stations.	Observed angles.	Distances.	
Thorp - - - Little Bentley Steeple - <i>Thorrington Steeple</i>	$\begin{smallmatrix} 30 & 17 & 55 \\ 90 & 41 & 23 \end{smallmatrix}$	} Thorrington - }	Feet. 23890 12053
Dover Court - - - Thorp - - - <i>Kirby Steeple</i>	$\begin{smallmatrix} 22 & 10 & 12 \\ 59 & 48 & 37 \end{smallmatrix}$	} Kirby - - }	30343 13247
Dover Court - - - Kirby Steeple - - <i>Little Oakley Steeple</i>	$\begin{smallmatrix} 33 & 8 & 12 \\ 18 & 22 & 0 \end{smallmatrix}$	} Little Oakley - }	12216 21193
Tillingham - - - Layer de la Hay Steeple - <i>Tolesbunt Major Steeple</i>	$\begin{smallmatrix} 38 & 45 & 0 \\ 45 & 28 & 0 \end{smallmatrix}$	} Toleshunt Major - }	36541 32082
Dover Court - - - Tattingstone Steeple - - <i>Brantbam Steeple</i>	$\begin{smallmatrix} 16 & 48 & 13 \\ 98 & 26 & 0 \end{smallmatrix}$	} Brantham - - }	42590 12447
Dover Court - - - Rushmere Steeple - - - <i>Harkstead Steeple</i>	$\begin{smallmatrix} 30 & 52 & 58 \\ 16 & 51 & 2 \end{smallmatrix}$	} Harkstead - }	19946 35319
Dover Court - - - Tattingstone - - - <i>Arwarton Steeple</i>	$\begin{smallmatrix} 33 & 17 & 30 \\ 14 & 20 & 0 \end{smallmatrix}$	} Arwarton - - }	13053 28941
Tattingstone - - - Arwarton Steeple - - - <i>Bradfield Steeple</i>	$\begin{smallmatrix} 66 & 10 & 0 \\ 43 & 12 & 0 \end{smallmatrix}$	} Bradfield - - }	20998 28059
Dover Court - - - Rushmere - - - <i>Harwich Spire</i>	$\begin{smallmatrix} 72 & 48 & 50 \\ 9 & 58 & 0 \end{smallmatrix}$	} Harwich - - }	8881 49036
Dover Court - - - Rushmere - - - <i>Hollesley Steeple</i>	$\begin{smallmatrix} 56 & 48 & 20 \\ 67 & 58 & 30 \end{smallmatrix}$	} Hollesley - - }	57475 51881
Dover Court - - - Rushmere - - - <i>Shottisham Steeple</i>	$\begin{smallmatrix} 47 & 7 & 40 \\ 68 & 4 & 20 \end{smallmatrix}$	} Shottisham - }	52205 41224
Dover Court - - - Rushmere - - - <i>Bawdsey Steeple</i>	$\begin{smallmatrix} 65 & 59 & 15 \\ 52 & 42 & 10 \end{smallmatrix}$	} Bawdsey - - }	46177 53024

Names of Stations.	Observed angles.	Distances.	
Dover Court - - - Woodbridge Steeple - - <i>Felixstow Signal Staff</i>	$\begin{smallmatrix} 52^{\circ} 48' 11'' \\ 28 \quad 31 \quad 0 \end{smallmatrix}$	} Felixstow - - {	$\begin{smallmatrix} \text{Feet.} \\ 28926 \\ 48262 \end{smallmatrix}$
Dover Court - - - Woodbridge - - - <i>Bawdsey Signal Staff</i>	$\begin{smallmatrix} 45 \quad 12 \quad 55 \\ 44 \quad 53 \quad 0 \end{smallmatrix}$	} Bawdsey - - {	$\begin{smallmatrix} 42265 \\ 42510 \end{smallmatrix}$
Rushmere - - - Falkenham Steeple - - <i>Orford Steeple</i>	$\begin{smallmatrix} 45 \quad 41 \quad 10 \\ 103 \quad 52 \quad 0 \end{smallmatrix}$	} Orford - - {	$\begin{smallmatrix} 75267 \\ 55472 \end{smallmatrix}$
Woodbridge - - - Butely Steeple - - - <i>Rendlesham Steeple</i>	$\begin{smallmatrix} 28 \quad 28 \quad 0 \\ 34 \quad 37 \quad 0 \end{smallmatrix}$	} Rendlesham - {	$\begin{smallmatrix} 21686 \\ 18204 \end{smallmatrix}$
Butely - - - Rendlesham - - - <i>Orford Steeple</i>	$\begin{smallmatrix} 153 \quad 23 \quad 0 \\ 12 \quad 20 \quad 0 \end{smallmatrix}$	} Orford - - {	$\begin{smallmatrix} 15762 \\ 33057 \end{smallmatrix}$
Dover Court - - - Rushmere - - - <i>Kesgrave Steeple</i>	$\begin{smallmatrix} 8 \quad 2 \quad 6 \\ 66 \quad 54 \quad 0 \end{smallmatrix}$	} Kesgrave - - {	$\begin{smallmatrix} 7371 \\ 48505 \end{smallmatrix}$
Dover Court - - - Rushmere - - - <i>Waldringfield Steeple</i>	$\begin{smallmatrix} 34 \quad 14 \quad 16 \\ 62 \quad 15 \quad 50 \end{smallmatrix}$	} Waldringfield - {	$\begin{smallmatrix} 45360 \\ 28841 \end{smallmatrix}$
Dover Court - - - Kesgrave Steeple - - <i>Whertstead Steeple</i>	$\begin{smallmatrix} 30 \quad 58 \quad 10 \\ 56 \quad 8 \quad 30 \end{smallmatrix}$	} Whertstead - - {	$\begin{smallmatrix} 40331 \\ 24993 \end{smallmatrix}$
Falkenham - - - Rushmere - - - <i>Nacton Steeple</i>	$\begin{smallmatrix} 30 \quad 59 \quad 0 \\ 36 \quad 2 \quad 50 \end{smallmatrix}$	} Nacton - - {	$\begin{smallmatrix} 25098 \\ 21959 \end{smallmatrix}$
Dover Court - - - Stoke - - - <i>Capel Steeple</i>	$\begin{smallmatrix} 13 \quad 29 \quad 58 \\ 22 \quad 45 \quad 20 \end{smallmatrix}$	} Capel - - {	$\begin{smallmatrix} 55220 \\ 33325 \end{smallmatrix}$
Stoke - - - Capel Steeple - - - <i>Hintlesham Steeple</i>	$\begin{smallmatrix} 24 \quad 14 \quad 18 \\ 103 \quad 0 \quad 34 \end{smallmatrix}$	} Hintlesham - - {	$\begin{smallmatrix} 40790 \\ 17186 \end{smallmatrix}$
Stoke - - - Lavenham Steeple - - <i>Bildestone Steeple</i>	$\begin{smallmatrix} 29 \quad 43 \quad 10 \\ 61 \quad 31 \quad 40 \end{smallmatrix}$	} Bildestone - - {	$\begin{smallmatrix} 42238 \\ 23821 \end{smallmatrix}$

Names of Stations.	Observed angles.	Distances.	
Stoke - - - -	$\begin{smallmatrix} 0 \\ 33 & 53 & 40 \\ 48 & 50 & 10 \end{smallmatrix}$	} Aldham - - }	Feet. 32055 23746
Bildestone Steeple - - -			
Aldbam Steeple			
Lavenham - - - -	$\begin{smallmatrix} 29 & 39 & 50 \\ 93 & 17 & 20 \end{smallmatrix}$	} Hadleigh - - }	42673 21154
Naughton - - - -			
Hadleigh Spire			
Lavenham - - - -	$\begin{smallmatrix} 31 & 40 & 10 \\ 42 & 21 & 50 \end{smallmatrix}$	} Lindsey - - }	25138 19587
Naughton Steeple - - -			
Lindsey Steeple			
Stoke - - - -	$\begin{smallmatrix} 23 & 7 & 30 \\ 24 & 48 & 40 \end{smallmatrix}$	} Newton - - }	27153 25413
Lavenham - - - -			
Newton Steeple			
Stoke - - - -	$\begin{smallmatrix} 27 & 1 & 0 \\ 42 & 49 & 0 \end{smallmatrix}$	} Grotton - - }	19660 13140
Newton - - - -			
Grotton Steeple			
Bulmer Steeple - - -	$\begin{smallmatrix} 67 & 27 & 40 \\ 53 & 37 & 50 \end{smallmatrix}$	} Waldingfield - }	25637 29407
Glemsford Steeple - - -			
Waldingfield Steeple			
Lavenham - - - -	$\begin{smallmatrix} 56 & 59 & 0 \\ 33 & 6 & 50 \end{smallmatrix}$	} Acton - - }	14065 21097
Glemsford - - - -			
Acton Steeple			
Lavenham - - - -	$\begin{smallmatrix} 26 & 13 & 10 \\ 91 & 21 & 20 \end{smallmatrix}$	} Beauchamp - }	41546 18360
Bulmer - - - -			
Beauchamp Church, St. Paul's			
Lavenham - - - -	$\begin{smallmatrix} 12 & 31 & 50 \\ 52 & 7 & 20 \end{smallmatrix}$	} Hedingham Castle }	59359 16316
Topplesfield Steeple - - -			
High western part of Hedingham Castle			
Lavenham - - - -	$\begin{smallmatrix} 26 & 57 & 0 \\ 123 & 32 & 0 \end{smallmatrix}$	} Ridgewell - - }	62325 33886
Bulmer - - - -			
Ridgewell Steeple			
Stoke Steeple - - -	$\begin{smallmatrix} 101 & 57 & 15 \\ 20 & 32 & 45 \end{smallmatrix}$	} Langham - - }	17904 49907
Naughton Steeple - - -			
Langham Steeple			
Stoke Steeple - - -	$\begin{smallmatrix} 21 & 17 & 20 \\ 8 & 23 & 40 \end{smallmatrix}$	} Great Horksley - }	13615 33859
Great Tey Steeple - - -			
Great Horksley Steeple			

Names of Stations.	Observed angles.	Distances.	
Stoke - - - Twinstead Steeple - - <i>Great Horksley Steeple</i>	$\begin{smallmatrix} 71^{\circ} & 21' & 0'' \\ 19 & 53 & 0 \end{smallmatrix}$	} Great Horksley -	$\left\{ \begin{array}{l} \text{Feet.} \\ 13615 \\ 37819 \end{array} \right.$
Stoke - - - Great Horksley - - - <i>Mount Bures Steeple</i>	$\begin{smallmatrix} 44 & 24 & 0 \\ 109 & 43 & 0 \end{smallmatrix}$	} Mount Bures -	$\left\{ \begin{array}{l} 29360 \\ 21821 \end{array} \right.$
Stoke - - - St. Mary's, Colchester - - <i>Earles Colne Steeple</i>	$\begin{smallmatrix} 62 & 30 & 40 \\ 70 & 48 & 0 \end{smallmatrix}$	} Earles Colne -	$\left\{ \begin{array}{l} 47756 \\ 44860 \end{array} \right.$
Great Tey - - - St. Mary's Colchester - - <i>West Bergholt Steeple</i>	$\begin{smallmatrix} 24 & 47 & 20 \\ 33 & 14 & 0 \end{smallmatrix}$	} West Bergholt -	$\left\{ \begin{array}{l} 21357 \\ 16339 \end{array} \right.$
Danbury - - - Great Tey - - - <i>Braxted Steeple</i>	$\begin{smallmatrix} 6 & 6 & 0 \\ 6 & 56 & 40 \end{smallmatrix}$	} Braxted - -	$\left\{ \begin{array}{l} 41358 \\ 36349 \end{array} \right.$
Great Tey - - - Braxted Steeple - - - <i>Kelvedon Steeple</i>	$\begin{smallmatrix} 4 & 37 & 24 \\ 11 & 43 & 36 \end{smallmatrix}$	} Kelvedon - -	$\left\{ \begin{array}{l} 36349 \\ 10407 \end{array} \right.$
Great Tey - - - Kelvedon - - - <i>Messing Steeple</i>	$\begin{smallmatrix} 30 & 14 & 50 \\ 58 & 32 & 0 \end{smallmatrix}$	} Messing - -	$\left\{ \begin{array}{l} 22390 \\ 13223 \end{array} \right.$
Great Tey - - - Kelvedon - - - <i>East Thorp Steeple</i>	$\begin{smallmatrix} 51 & 43 & 10 \\ 36 & 4 & 0 \end{smallmatrix}$	} East Thorp -	$\left\{ \begin{array}{l} 15462 \\ 20616 \end{array} \right.$
Danbury - - - Triptree, new station - - <i>Black Notley Steeple</i>	$\begin{smallmatrix} 50 & 48 & 0 \\ 85 & 12 & 30 \end{smallmatrix}$	} Black Notley -	$\left\{ \begin{array}{l} 51487 \\ 40039 \end{array} \right.$
Danbury - - - Triptree, old station - - <i>Witham Steeple</i>	$\begin{smallmatrix} 23 & 51 & 34 \\ 77 & 29 & 26 \end{smallmatrix}$	} Witham - -	$\left\{ \begin{array}{l} 35850 \\ 14852 \end{array} \right.$
Danbury - - - Triptree, old station - - <i>Tarling Spire</i>	$\begin{smallmatrix} 47 & 47 & 25 \\ 58 & 17 & 35 \end{smallmatrix}$	} Tarling - -	$\left\{ \begin{array}{l} 31874 \\ 27751 \end{array} \right.$
Danbury - - - Triptree, old station - - <i>Braintree Steeple</i>	$\begin{smallmatrix} 51 & 43 & 0 \\ 90 & 45 & 50 \end{smallmatrix}$	} Braintree - -	$\left\{ \begin{array}{l} 58918 \\ 46252 \end{array} \right.$

Names of Stations.	Observed angles.	Distances.	
Triptree, new station - - -	$\begin{smallmatrix} 0 & ' & '' \\ 56 & 13 & 54 \end{smallmatrix}$	} Feltstead - - {	Feet. 63574
Gallywood station - - -	$\begin{smallmatrix} 64 & 47 & 51 \end{smallmatrix}$		58409
<i>Feltstead Steeple</i>			
Danbury - - - -	$\begin{smallmatrix} 26 & 31 & 30 \\ 73 & 49 & 10 \end{smallmatrix}$	} Braintree - - {	58918
Feltstead Steeple - - -			27392
<i>Braintree Steeple</i>			
Danbury - - - -	$\begin{smallmatrix} 17 & 39 & 30 \\ 116 & 15 & 43 \end{smallmatrix}$	} Feltstead - - {	60336
Pleshley Steeple - - -			20409
<i>Feltstead Steeple</i>			
Triptree, new station - -	$\begin{smallmatrix} 27 & 23 & 20 \\ 27 & 35 & 30 \end{smallmatrix}$	} Hatfield Peverel - - {	20267
Danbury - - - -			20132
<i>S. Spire of Hatfield Peverel Abbey</i>			
Pleshley - - - -	$\begin{smallmatrix} 68 & 3 & 0 \\ 64 & 21 & 0 \end{smallmatrix}$	} Great Leigh - - {	24915
Feltstead - - - -			25635
<i>Great Leigh Steeple</i>			
Danbury - - - -	$\begin{smallmatrix} 41 & 29 & 44 \\ 16 & 39 & 0 \end{smallmatrix}$	} Great Baddow - - {	16345
Pleshley - - - -			37796
<i>Great Baddow Steeple</i>			
Danbury - - - -	$\begin{smallmatrix} 23 & 59 & 8 \\ 20 & 21 & 0 \end{smallmatrix}$	} Chelmsford - - {	24110
Pleshley - - - -			28186
<i>Chelmsford Spire</i>			
Danbury - - - -	$\begin{smallmatrix} 32 & 38 & 36 \\ 41 & 51 & 20 \end{smallmatrix}$	} Whittle - - - {	33552
Pleshley - - - -			27122
<i>Whittle Steeple</i>			
Danbury - - - -	$\begin{smallmatrix} 19 & 16 & 20 \\ 35 & 29 & 15 \end{smallmatrix}$	} Willingale Spain - - {	60488
Hatfield Broad Oak - - -			34390
<i>Willingale Spain Steeple</i>			
Pleshley - - - -	$\begin{smallmatrix} 36 & 12 & 0 \\ 26 & 14 & 36 \end{smallmatrix}$	} Roxwell - - - {	19937
Gallywood station - - -			26630
<i>Roxwell Steeple</i>			
Pleshley - - - -	$\begin{smallmatrix} 103 & 44 & 45 \\ 34 & 9 & 50 \end{smallmatrix}$	} White Roding - - {	33489
Gallywood station - - -			57926
<i>White Roding Steeple</i>			
Southweald Steeple - - -	$\begin{smallmatrix} 27 & 51 & 51 \\ 30 & 14 & 50 \end{smallmatrix}$	} Doddinghurst - - {	17880
Frierning Steeple - - -			16590
<i>Doddinghurst Steeple</i>			

Names of stations.	Observed angles.	Distances.	
Southweald - - -	0 49 0	} Theydon - - - }	Fect. 31098
Epping Windmill -	7 31 0		15824
Theydon Mount Steeple			
Southweald - - -	49 13 0	} Navestock - - - }	9656
Theydon Mount Steeple -	16 26 0		25846
Navestock new Windmill			
Southweald - - -	5 18 0	} Theydon Garnon - - }	37107
Theydon Mount - - -	149 43 0		6797
Theydon Garnon Steeple			
Theydon Mount - - -	111 19 30	} Havering - - - }	21090
Theydon Garnon - - -	53 38 0		24397
Havering Steeple			
Severndroog Tower -	5 40 20	} Cupola - - - }	52260
Highbeech Station -	14 49 4		20197
Cupola of a house at Woodford			
Southweald - - -	36 20 20	} Ruins - - - }	51340
Highbeech - - -	65 36 20		33405
Ruins near Ilford			
Highbeech - - -	102 38 0	} Cheshunt - - - }	34702
St. Paul's - - -	26 2 0		77151
Cheshunt Station			
Berkhamstead Gazebo -	25 59 0	} Hunsdon - - - }	43157
Naseing Steeple - -	88 51 24		18911
Hunsdon Steeple			
Naseing - - -	94 35 0	} Broxbourn - - - }	13899
Hunsdon Steeple - -	34 41 0		24348
Broxbourn Steeple			
Berkhamstead Gazebo -	8 33 28	} Harlow Steeple - - }	62528
Hatfield Broad Oak Steeple	20 11 11		26964
Harlow Steeple			
Hatfield Broad Oak - -	19 44 10	} Sabridgeworth - - }	21054
Naseing - - -	11 48 5		34763
Sabridgeworth Steeple			
Thorley Steeple - - -	45 17 0	} Great Hadham - - }	15253
Albury Steeple - - -	40 29 0		16995
Great Hadham Steeple			

Names of stations.	Observed angles.	Distances.	
Henham on the Mount Steeple Albury Steeple - - <i>Bishop Stortford Steeple</i>	$\begin{smallmatrix} 31^{\circ} & 43' & 34'' \\ 53 & 24 & 6 \end{smallmatrix}$	} Bishop Stortford -	{ $\begin{smallmatrix} 39524 \\ 19993 \end{smallmatrix}$
Henham on the Mount - Albury - - - <i>Stanstead Mountfitchet Steeple</i>	$\begin{smallmatrix} 42^{\circ} & 32' & 24'' \\ 23 & 35 & 3 \end{smallmatrix}$	} Stanstead Mountfitchet	{ $\begin{smallmatrix} 16575 \\ 28009 \end{smallmatrix}$
Henham on the Mount - Stanstead Mountfitchet - <i>Farnham Steeple</i>	$\begin{smallmatrix} 31^{\circ} & 3' & 0'' \\ 109 & 2 & 0 \end{smallmatrix}$	} Farnham - -	{ $\begin{smallmatrix} 24419 \\ 13323 \end{smallmatrix}$
Henham on the Mount - Albury - - - <i>Meesdon Windmill</i>	$\begin{smallmatrix} 38^{\circ} & 33' & 0'' \\ 73 & 13 & 10 \end{smallmatrix}$	} Meesdon - -	{ $\begin{smallmatrix} 39054 \\ 25421 \end{smallmatrix}$
Henham on the Mount - Elmdon Steeple - - <i>Chimney on an octagon Lodge</i>	$\begin{smallmatrix} 40^{\circ} & 10' & 40'' \\ 25 & 58 & 10 \end{smallmatrix}$	} Octagon Lodge -	{ $\begin{smallmatrix} 21677 \\ 31938 \end{smallmatrix}$
Balsham Steeple - - Elmdon - - - <i>Shady Camps Steeple</i>	$\begin{smallmatrix} 75^{\circ} & 15' & 8'' \\ 25 & 0 & 22 \end{smallmatrix}$	} Shady Camps -	{ $\begin{smallmatrix} 23740 \\ 53410 \end{smallmatrix}$
Balsham - - - Shady Camps - - - <i>Ashdon Steeple</i>	$\begin{smallmatrix} 31^{\circ} & 7' & 10'' \\ 99 & 19 & 0 \end{smallmatrix}$	} Ashdon - -	{ $\begin{smallmatrix} 30778 \\ 16120 \end{smallmatrix}$
Danbury - - - Thaxted Spire - - - <i>Little Saling Steeple</i>	$\begin{smallmatrix} 9^{\circ} & 35' & 0'' \\ 26 & 0 & 9 \end{smallmatrix}$	} Little Saling -	{ $\begin{smallmatrix} 76469 \\ 28886 \end{smallmatrix}$
Elmdon - - - Rickling Steeple - - - <i>Newport Steeple</i>	$\begin{smallmatrix} 22^{\circ} & 27' & 0'' \\ 64 & 25 & 0 \end{smallmatrix}$	} Newport - -	{ $\begin{smallmatrix} 26492 \\ 11216 \end{smallmatrix}$
Danbury - - - Little Saling Steeple - - - <i>Stebbing Steeple</i>	$\begin{smallmatrix} 7^{\circ} & 53' & 6'' \\ 61 & 38 & 0 \end{smallmatrix}$	} Stebbing - -	{ $\begin{smallmatrix} 71826 \\ 11198 \end{smallmatrix}$

ART. XL. *Principal Triangles for the Survey of the Western Part of Kent. Plate XXXIII.*

Frant Steeple from Botley Hill 90362.4 feet.

Names of stations.	Observed angles.	Distances.	
Frant Steeple - -	$\begin{smallmatrix} 0 & 1 & 0 \\ 22 & 17 & 10 \end{smallmatrix}$	} Sevenoaks - - {	Fect. 58492
Botley Hill - -	$\begin{smallmatrix} 32 & 52 & 47 \end{smallmatrix}$		44032
Sevenoaks old Windmill			
Frant - - -	$\begin{smallmatrix} 22 & 17 & 10 \\ 40 & 52 & 50 \end{smallmatrix}$	} Chiddingstone - {	42875
Sevenoaks Windmill -			24858
Chiddingstone Steeple -			
Frant - - -	$\begin{smallmatrix} 35 & 2 & 17 \\ 97 & 43 & 43 \end{smallmatrix}$	} Mount Sion - - {	57874
Chiddingstone - -			33532
Mount Sion Station			
Frant - - -	$\begin{smallmatrix} 31 & 28 & 30 \\ 76 & 9 & 30 \end{smallmatrix}$	} East Peckham - {	58964
Mount Sion - -			31707
East Peckham Steeple			
Mount Sion - - -	$\begin{smallmatrix} 48 & 14 & 0 \\ 65 & 11 & 0 \end{smallmatrix}$	} Tudely Steeple - - {	31363
East Peckham - -			25772
Tudely Steeple			
Botley Hill - - -	$\begin{smallmatrix} 11 & 1 & 48 \\ 141 & 42 & 12 \end{smallmatrix}$	} Seal Chart - - {	59563
Sevenoaks Windmill -			18388
Seal Chart Station			
Seal Chart - - -	$\begin{smallmatrix} 74 & 10 & 0 \\ 66 & 49 & 0 \end{smallmatrix}$	} Tunbridge - - - {	26851
Sevenoaks Windmill -			28101
Tunbridge Steeple			
Seal Chart - - -	$\begin{smallmatrix} 78 & 1 & 0 \\ 54 & 39 & 0 \end{smallmatrix}$	} Otford Mount - {	20397
Sevenoaks Windmill -			24462
Station on Otford Mount			
Sevenoaks Windmill - - -	$\begin{smallmatrix} 69 & 27 & 0 \\ 61 & 24 & 0 \end{smallmatrix}$	} Silverden Farm - {	28395
Otford Mount - -			30284
Silverden Farm Station			

Norwood from Severndroog Tower 39155 feet.

Norwood - -	$\begin{smallmatrix} 53 & 7 & 40 \\ 84 & 8 & 0 \end{smallmatrix}$	} Well Hill - - {	57393
Severndroog Tower -			46155
Well Hill Station			

Names of stations.	Observed angles.	Distances.	
Severndroog Tower - - - Well Hill - - - <i>Crayford Steeple</i>	$\begin{smallmatrix} 0 & ' & '' \\ 55 & 4 & 14 \\ 35 & 0 & 32 \end{smallmatrix}$	} Crayford - - -	$\begin{smallmatrix} \text{Feet.} \\ 26479 \\ 37840 \end{smallmatrix}$
Well Hill - - - - - Crayford - - - - - <i>Ash Steeple</i>	$\begin{smallmatrix} 77 & 37 & 40 \\ 48 & 8 & 40 \end{smallmatrix}$	} Ash - - -	$\begin{smallmatrix} 34738 \\ 45555 \end{smallmatrix}$
Ash - - - - - Crayford - - - - - <i>Northfleet Steeple</i>	$\begin{smallmatrix} 53 & 7 & 10 \\ 44 & 32 & 4 \end{smallmatrix}$	} Northfleet - - -	$\begin{smallmatrix} 32237 \\ 36767 \end{smallmatrix}$
Ash - - - - - Northfleet - - - - - <i>Gravesend Station</i>	$\begin{smallmatrix} 15 & 30 & 4 \\ 85 & 1 & 8 \end{smallmatrix}$	} Gravesend - - -	$\begin{smallmatrix} 32664 \\ 8762 \end{smallmatrix}$
Ash - - - - - Northfleet - - - - - <i>Lord Eardley's, Belvidere</i>	$\begin{smallmatrix} 47 & 33 & 30 \\ 97 & 53 & 40 \end{smallmatrix}$	} Belvidere - - -	$\begin{smallmatrix} 56308 \\ 41951 \end{smallmatrix}$

Gravesend from Halstow 44836 feet.

Gravesend - - - - - Halstow - - - - - <i>Gadshill Station</i>	$\begin{smallmatrix} 31 & 38 & 20 \\ 24 & 18 & 20 \end{smallmatrix}$	} Gadshill - - -	$\begin{smallmatrix} 22275 \\ 28388 \end{smallmatrix}$
Halstow - - - - - Sheppey - - - - - <i>Gadshill</i>	$\begin{smallmatrix} 128 & 34 & 28 \\ 18 & 18 & 3 \end{smallmatrix}$	Sheppey from Gadshill	70686
Sheppey - - - - - Hernhill Steeple - - - <i>Stockbury Steeple</i>	$\begin{smallmatrix} 88 & 18 & 0 \\ 37 & 2 & 0 \end{smallmatrix}$	} Stockbury - - -	$\begin{smallmatrix} 43144 \\ 71603 \end{smallmatrix}$
Frinstead Steeple - - - Sheppey - - - - - <i>Hernhill Steeple</i>	$\begin{smallmatrix} 65 & 27 & 18 \\ 64 & 9 & 24 \end{smallmatrix}$	} Hernhill - - -	$\begin{smallmatrix} 57820 \\ 58439 \end{smallmatrix}$

ART. XLI. Secondary Triangles.

Frant Steeple - - - Botley Hill Station - - <i>Bidborough Steeple</i>	$\begin{smallmatrix} 26 & 37 & 20 \\ 9 & 52 & 49 \end{smallmatrix}$	} Bidborough - - -	$\begin{smallmatrix} 26666 \\ 68071 \end{smallmatrix}$
Frant - - - - - Chiddingstone Steeple - <i>Station near Bidborough Church</i>	$\begin{smallmatrix} 20 & 52 & 0 \\ 29 & 5 & 0 \end{smallmatrix}$	} Station - - -	$\begin{smallmatrix} 27227 \\ 19951 \end{smallmatrix}$

Names of stations.	Observed angles.	Distances.	
Frant - - -	104 24 36	} Remarkable Tree - {	Feet. 24226
Botley Hill - - -	13 40 51		99201
<i>Remarkable Tree near Kibben's Cross</i>			
Frant - - -	46 32 0	} Cowden - - - {	41943
Station near Bidborough Church	93 3 30		30485
<i>Cowden Steeple</i>			
Station near Bidborough Church	76 2 0	} Mount Sion - - - {	32194
Chiddingstone Steeple -	68 42 0		35532
<i>Mount Sion Station</i>			
Station near Bidborough Church	20 37 0	} Leigh - - - {	11241
Mount Sion - - -	10 21 0		22031
<i>Leigh Steeple</i>			
Frant - - -	10 5 30	} Ide Hill - - - {	62547
Chiddingstone - - -	149 38 30		21689
<i>Ide Hill Station</i>			
Chiddingstone - - -	67 42 0	} Edenbridge - - - {	18639
Ide Hill - - -	49 43 0		22606
<i>Edenbridge Steeple</i>			
Seal Church Steeple -	57 45 0	} Sevenoaks - - - {	15132
Otford Mount - - -	46 5 0		17766
<i>Sevenoaks Steeple</i>			
Mount Sion Station - - -	20 36 0	} Hadlow - - - {	25291
Peckham Steeple - - -	47 56 0		11987
<i>Hadlow Steeple</i>			
Seal Chart Station - - -	50 45 0	} Sundrich - - - {	29804
Otford Mount - - -	86 11 0		23131
<i>Sundrich Steeple</i>			
Otford Mount - - -	94 17 0	} Seal - - - {	9705
Silverden Station - - -	17 20 0		32484
<i>Seal Steeple</i>			
Well Hill Station - - -	17 40 40	} Ketson Common Windmill {	26538
Norwood - - -	14 5 22		33103
<i>Windmill, Ketson Common</i>			
Well Hill - - -	56 39 0	} Flagstaff - - - {	28273
Severndroog Tower - - -	37 39 0		38664
<i>Flagstaff on Hayes Common</i>			

Norwood from Severndroog Tower 32155 feet. Between the triangles

Names of Stations.	Observed angles.	Distances.	
Norwood - - -	65° 53' 30"	} Flagstaff - - {	Feet.
Severndroog Tower - -	46° 30' 0"		30718
Hayes Common			38654*
Norwood - - -	34° 27' 30"	} Flagstaff - - {	20391
Hayes Common - -	39° 41' 0"		18068
Flagstaff on Addington Common			
Well Hill - - -	56° 11' 40"	} Cudham - - {	20860
Norwood - - -	22° 44' 5"		48958
Cudham Steeple			

Well Hill from Otford Mount 19206 feet.

Otford Mount - - -	52° 11' 0"	} Knockholt Beeches - {	22860
Well Hill - - -	73° 58' 0"		18790
Knockholt Beeches, East End			
Well Hill - - -	22° 22' 46"	} Race House - {	27859
Crayford Steeple - -	41° 17' 10"		16075
Dome of a Race House			
Well Hill - - -	70° 25' 40"	} Windmill - - {	57560
Norwood - - -	39° 36' 24"		38945
Windmill, Bromley Common			
Well Hill - - -	59° 1' 0"	} Farnborough - {	11650
Severndroog Tower - -	13° 58' 0"		41381
Farnborough Station			
Well Hill - - -	58° 52' 0"	} St. Mary's Cray - {	17255
Farnborough - - -	79° 32' 0"		15019
St. Mary's Cray Steeple			
Well Hill - - -	79° 42' 26"	} Halstead - - {	8653
Norwood - - -	8° 40' 4"		56492
Halstead Steeple			
Norwood - - -	36° 36' 40"	} Bromley - - {	22696
Severndroog Tower - -	32° 52' 50"		24932
Bromley Steeple			
Well Hill - - -	32° 29' 0"	} Bromley - - {	36198
Severndroog Tower - -	51° 13' 0"		22938
Bromley Steeple			

Names of Stations.	Observed angles.	Distances.	
Well Hill - - - -	0 19 0	} Hayes - - - {	Eet. 31069
Bromley - - - -	51 35 0		9805
Hayes Steeple			
Bromley - - - -	45 18 0	} Lewisham - - - {	19640
Severndroog Tower - -	51 28 0		17846
Lewisham Steeple			
Severndroog Tower from Chiselhurst Steeple, 36778.			
Severndroog Tower - - -	100 42 0	} New Cross - - - {	23529
Chiselhurst Steeple - -	42 22 0		34309
New Cross Station			
Severndroog Tower - -	38 0 0	} Eastcombe Point - - {	18014
New Cross - - - -	49 55 0		14496
Eastcombe Point Station			
Severndroog Tower - -	49 39 0	} Woolwich - - - {	9628
Eastcombe Point - - -	31 55 0		13879
Woolwich Steeple			
Severndroog Tower - -	15 1 30	} Bexley - - - {	23453
Crayford - - - -	57 48 20		7185
Bexley Steeple			
Well Hill - - - -	61 48 0	} Charlton - - - {	22835
Crayford - - - -	36 39 0		33714
Charlton Farm			
Crayford - - - -	23 17 10	} Darent - - - {	20374
Charlton Farm - - - -	28 14 0		17026
Darent Steeple			
Ash Steeple - - - -	12 56 49	} Dartford Brent - - {	33636
Crayford - - - -	30 32 18		14830
Dartford Brent Mill			
Crayford - - - -	16 16 18	} Stone - - - {	21153
Stone Steeple - - - -	31 0 0		8069
Dartford Brent			
Ash - - - -	15 42 50	} Hartley - - - {	7869
Northfleet Steeple - - -	4 56 20		24750
Hartley Steeple			
Northfleet - - - -	8 40 40	} Ridley - - - {	33675
Ash - - - -	101 42 0		5189
Ridley Steeple			

Names of Stations.	Observed angles.	Distances.	
Northfleet - - - Gravesend Station - <i>Southfleet Steeple</i>	$\begin{smallmatrix} 90 & 15 & 30 \\ 49 & 26 & 6 \end{smallmatrix}$	} Southfleet - - {	Feet. 10290 13545
Gadshill - - - Sheppey Isle - - <i>Shottenden Windmill</i>	$\begin{smallmatrix} 28 & 8 & 54 \\ 121 & 36 & 55 \end{smallmatrix}$	} Shottenden Mill - {	119539 66221
Gravesend Station - - - Gadshill - - - <i>Cliff Steeple</i>	$\begin{smallmatrix} 40 & 46 & 7 \\ 92 & 28 & 1 \end{smallmatrix}$	} Cliff - - {	30549 19967
Gravesend Station - - - Gadshill - - - <i>Higbam Steeple</i>	$\begin{smallmatrix} 35 & 48 & 14 \\ 76 & 47 & 15 \end{smallmatrix}$	} Higbam - - {	14115 23489
Gravesend Station - - - Halstow Station - - - <i>Gravesend Steeple</i>	$\begin{smallmatrix} 86 & 16 & 16 \\ 4 & 18 & 19 \end{smallmatrix}$	} Gravesend - {	3373 44747
Gravesend - - - Halstow - - - <i>Chalk Steeple</i>	$\begin{smallmatrix} 25 & 8 & 43 \\ 8 & 11 & 44 \end{smallmatrix}$	} Chalk - - {	11621 34673
Gravesend - - - Gadshill - - - <i>Lower Hope Point, Chimney of the Guard Room</i>	$\begin{smallmatrix} 59 & 21 & 48 \\ 72 & 5 & 57 \end{smallmatrix}$	} Lower Hope Point - {	28287 25577
Gravesend - - - Gadshill - - - <i>Flagstaff, Tilbury Fort</i>	$\begin{smallmatrix} 99 & 28 & 57 \\ 15 & 26 & 18 \end{smallmatrix}$	} Tilbury Fort - {	6539 24228
Gadshill - - - Sheppey - - - <i>Rainham Steeple</i>	$\begin{smallmatrix} 28 & 52 & 26 \\ 26 & 24 & 22 \end{smallmatrix}$	} Rainham - - {	38245 41527
Gadshill - - - Halstow - - - <i>Swanscombe Spire</i>	$\begin{smallmatrix} 128 & 37 & 56 \\ 29 & 12 & 53 \end{smallmatrix}$	} Swanscombe - - {	36747 58814
Gadshill - - - Halstow - - - <i>Northfleet Steeple</i>	$\begin{smallmatrix} 124 & 43 & 26 \\ 28 & 58 & 21 \end{smallmatrix}$	} Northfleet - {	31034 52658
Halstow - - - Gravesend - - - <i>Southfleet Steeple</i>	$\begin{smallmatrix} 4 & 37 & 23 \\ 159 & 53 & 20 \end{smallmatrix}$	} Southfleet - {	57736 13534

Names of Stations.				Observed angles.	Distances.			
Gravesend	-	-	-	38° 36' 50"	} Shorn Mill	-	{	Feet. 14947
Halstow	-	-	-	15 44 0				34435
<i>Sborn Mill</i>								
Sheppey	-	-	-	39 22 14	} Gillingham	-	{	48453*
Stockbury	-	-	-	79 31 3				31257
<i>Gillingham Steeple</i>								
Sheppey	-	-	-	63 7 52	} St. James's Church	-	{	20164
Gillingham	-	-	-	24 34 17				43257
<i>St. James's Church, Isle of Grain</i>								
Halstow	-	-	-	73 41 28	} Gillingham	-	{	23822
Sheppey	-	-	-	28 9 15				48453*
<i>Gillingham Steeple</i>								
Gadshill	-	-	-	23 35 24	} Friendsbury	-	{	11049
Sheppey	-	-	-	4 10 33				60721
<i>Friendsbury Steeple</i>								
Halstow	-	-	-	73 39 6	} Star Inn	-	{	30617
Sheppey	-	-	-	35 45 47				50270
<i>Chimney of the Star Inn</i>								
Halstow	-	-	-	88 11 56	} Bell Inn	-	{	47500
Sheppey	-	-	-	44 45 13				67466
<i>High Staff at the Upper Bell Inn</i>								
Sheppey	-	-	-	75 21 37	} Hove	-	{	59215
Twinstead	-	-	-	50 40 20				4732
<i>Hove Steeple</i>								
Gadshill	-	-	-	17 43 23	} Upchurch	-	{	44466
Sheppey	-	-	-	25 36 26				31395
<i>Upchurch Spire</i>								
Gadshill	-	-	-	21 19 45	} Bobbing	-	{	60739
Sheppey	-	-	-	57 26 29				26212
<i>Bobbing Spire</i>								
Sheppey	-	-	-	46 5 47	} Flagstaff	-	{	13063
Halstow	-	-	-	13 7 45				41434
<i>Flagstaff, Sheerness Garrison</i>								
Sheppey	-	-	-	17 13 51	} Hucking	-	{	52765
Frinstead	-	-	-	93 18 29				15656
<i>Hucking Spire</i>								

Names of Stations.	Observed Angles.	Distances:	
Sheppey - - - - - East Church Station - - - <i>Hernhill Steeple</i>	$\begin{matrix} 0 \\ 29\ 27\ 6 \\ 136\ 15\ 56 \end{matrix}$	} Hernhill - - - {	$\begin{matrix} \text{Feet.} \\ 58439 \\ 41564 \end{matrix}$
East Church - - - - - Sheppey - - - - - <i>Milton Steeple</i>	$\begin{matrix} 44\ 20\ 17 \\ 95\ 42\ 22 \end{matrix}$	} Milton - - - {	$\begin{matrix} 32313 \\ 22696 \end{matrix}$
Sheppey - - - - - Milton - - - - - <i>Iwade Steeple</i>	$\begin{matrix} 36\ 56\ 30 \\ 32\ 24\ 0 \end{matrix}$	} Iwade - - - {	$\begin{matrix} 12997 \\ 14544 \end{matrix}$
Hernhill - - - - - Frinstead - - - - - <i>Witchling Steeple</i>	$\begin{matrix} 7\ 28\ 0 \\ 45\ 6\ 35 \end{matrix}$	} Witchling - - - {	$\begin{matrix} 51579 \\ 9461 \end{matrix}$
Hernhill - - - - - Sheppey - - - - - <i>Tenham Steeple</i>	$\begin{matrix} 25\ 1\ 0 \\ 25\ 51\ 16 \end{matrix}$	} Tenham - - - {	$\begin{matrix} 33833 \\ 30336 \end{matrix}$
Tenham - - - - - Sheppey - - - - - <i>Bapchild Spire</i>	$\begin{matrix} 75\ 31\ 0 \\ 24\ 42\ 40 \end{matrix}$	} Bapchild - - - {	$\begin{matrix} 29846 \\ 12886 \end{matrix}$
Sheppey - - - - - Hernhill - - - - - <i>Sheldwich Steeple</i>	$\begin{matrix} 21\ 32\ 42 \\ 75\ 8\ 0 \end{matrix}$	} Sheldwich - - - {	$\begin{matrix} 56869 \\ 21581 \end{matrix}$
Sheldwich - - - - - Sheppey - - - - - <i>Queenborough Steeple</i>	$\begin{matrix} 4\ 41\ 0 \\ 126\ 20\ 44 \end{matrix}$	} Queenborough - - - {	$\begin{matrix} 60719 \\ 6156 \end{matrix}$
Hadleigh - - - - - Sheppey - - - - - <i>Minster Steeple</i>	$\begin{matrix} 21\ 19\ 45 \\ 114\ 38\ 31 \end{matrix}$	} Minster - - - {	$\begin{matrix} 69035 \\ 9771 \end{matrix}$
Halstow - - - - - Hadleigh - - - - - <i>St. Mary's Steeple</i>	$\begin{matrix} 70\ 9\ 25 \\ 11\ 54\ 16 \end{matrix}$	} St. Mary's - - - {	$\begin{matrix} 7095 \\ 32352 \end{matrix}$
Hernhill - - - - - Sheppey - - - - - <i>Feversham Spire</i>	$\begin{matrix} 29\ 11\ 0 \\ 9\ 39\ 22 \end{matrix}$	} Feversham - - - {	$\begin{matrix} 15630 \\ 44537 \end{matrix}$
Tenham - - - - - Hernhill - - - - - <i>Hartey Steeple</i>	$\begin{matrix} 41\ 29\ 0 \\ 36\ 36\ 0 \end{matrix}$	} Hartey - - - {	$\begin{matrix} 20617 \\ 22906 \end{matrix}$

Names of Stations.	Observed Angles.	Distances.	
Hernhill - - - -	85° 12' 0"	} Sea Salter - - - {	Fect. 17031
East Church - - - -	22 15 10		43580
<i>Sea Salter Steeple</i>			
Tenham - - - - -	105 2 0	} Whitstable - - - {	50935
Sheppey - - - - -	48 28 58		65697
<i>Whitstable Steeple</i>			

SECTION FOURTH.

Determination of the Altitudes of the Stations above the Level of the Sea; and the mean Refractions deduced from observed Angles of elevation and depression.

ART. XLII. *Elevations and Depressions.**At Trevoze Head.*

The ground at Cadon Barrow - - - -	<i>elevated</i> 39' 24"
Bodmin Down - - - - -	<i>elev.</i> 10 48
St. Agnes - - - - -	<i>depressed</i> 6 39
Hensbarrow - - - - -	<i>elev.</i> 29 2

At Bodmin Down.

The ground at Carraton Hill - - - -	<i>elev.</i> 27 49
Trevoze Head - - - - -	<i>depr.</i> 22 33
Cadon Barrow - - - - -	<i>elev.</i> 16 0
Brown Willy - - - - -	<i>elev.</i> 54 24

Cadon Barrow.

The ground at Trevoze Head - - - -	<i>depr.</i> 36 49
Brown Willy - - - - -	<i>elev.</i> 36 3
The horizon of the sea in the direction of Trevoze Head	<i>depr.</i> 30 56
Ditto in the direction north - - - -	<i>depr.</i> 31 12

St. Stephen's Down.

The ground at Black Down - - - -	<i>elev.</i> 25 21
Carraton Hill - - - - -	<i>elev.</i> 35 18
Brown Willy - - - - -	<i>elev.</i> 42 9

Black Down, near Lydford.

The ground at Maker Heights	-	-	-	depr. 32' 8"
Carraton Hill	-	-	-	depr. 3 46
St. Stephen's Down	-	-	-	depr. 35 18

Mendip Hills.

The ground at Bradley Knoll	-	-	-	depr. 6 12
Westbury Down	-	-	-	depr. 14 59
Farley Down	-	-	-	depr. 18 21
Lansdown	-	-	-	depr. 14 4
Moor Lynch	-	-	-	depr. 34 53
Dundry	-	-	-	depr. 15 45
Dundon Beacon	-	-	-	depr. 38 24
Ash Beacon	-	-	-	depr. 20 45

Dundry.

The ground at Mendip	-	-	-	elev. 5 8
Farley Down	-	-	-	depr. 10 1
Lansdown	-	-	-	depr. 3 19

Lansdown.

The ground at Dundry	-	-	-	depr. 5 44
Mendip	-	-	-	depr. 1 39

Farley Down.

The ground at Westbury	-	-	-	depr. 0 12
Mendip	-	-	-	elev. 5 51
Dundry	-	-	-	depr. 1 46

Bradley Knoll.

The ground at Bull Barrow	-	-	-	depr. 8 59
Ash Beacon	-	-	-	depr. 20 18
Westbury	-	-	-	depr. 4 36

Westbury Down.

The ground at Beacon Hill, Amesbury	-	-	-	depr. 10 9
Bradley Knoll	-	-	-	elev. 7 1
Mendip	-	-	-	elev. 1 28
Farley Down	-	-	-	depr. 9 9

*The Account of a**Dundon Beacon.*

The ground at Moor Lynch	-	-	-	-	depr.	° 6' 8"
Lugshorn Corner	-	-	-	-	depr.	3 56 13
Mendip	-	-	-	-	elev.	28 18
Pilsden	-	-	-	-	elev.	8 38

Moor Lynch.

The ground at Greylock's Foss-way	-	-	-	-	depr.	1 59 14
Lugshorn Corner	-	-	-	-	depr.	32 45
Dundon Beacon	-	-	-	-	elev.	0 9
Mendip	-	-	-	-	elev.	23 11
Pilsden	-	-	-	-	elev.	9 2
Ash Beacon	-	-	-	-	elev.	6 57

Greylock's Foss-way.

The ground at Moor Lynch	-	-	-	-	elev.	1 53 56
Dundon Beacon	-	-	-	-	elev.	34 48
Top of the staff (20 feet high) at Greylock's Foss-way	-	-	-	-	elev.	0 34

Lugshorn Corner.

The ground at Moor Lynch	-	-	-	-	elev.	27 21
Dundon Beacon	-	-	-	-	elev.	1 20 58
Top of the staff (20 feet high) at the west end of the base	-	-	-	-	depr.	1 9

Beacon Hill, Amesbury.

The ground at Westbury	-	-	-	-	depr.	4 36
Inkpin	-	-	-	-	elev.	6 22

Inkpin Hill.

The ground at White Horse Hill	-	-	-	-	depr.	10 54
Highclere	-	-	-	-	depr.	15 0
Beacon Hill, Amesbury	-	-	-	-		18 24

White Horse Hill.

The ground at Highclere	-	-	-	-	depr.	7 39
Nuffield	-	-	-	-	depr.	12 6
Shotover Hill	-	-	-	-	depr.	17 6

Scutchamfly Barrow.

The ground at Wendover	-	-	-	-	depr.	5' 36"
Whiteham Hill	-	-	-	-	depr.	11 20

At Shotover Hill.

The ground at Scutchamfly Barrow	-	-	-	-	elev.	0 20
Nuffield	-	-	-	-	elev.	1 27
Wendover	-	-	-	-	elev.	2 58
White Horse Hill	-	-	-	-	elev.	1 36

Brill on the Hill.

The ground at Nuffield	-	-	-	-	depr.	4 48
Wendover	-	-	-	-	elev.	3 55
Bow Brickhill	-	-	-	-	depr.	10 44
Epwell	-	-	-	-	depr.	6 57
Stow	-	-	-	-	depr.	7 6
White Horse Hill	-	-	-	-	depr.	5 45

Nuffield.

The ground at White Horse Hill	-	-	-	-	depr.	4 45
Top of the Staff at Brill on the Hill. Staff $13\frac{1}{2}$ feet high	-	-	-	-	depr.	6 2
Bagshot	-	-	-	-	depr.	6 43
Highclere	-	-	-	-	depr.	4 12

N. B. The half stage belonging to the Royal Society was used at this station.

Wendover.

The ground at Brill on the Hill	-	-	-	-	depr.	14 59
Shotover Hill	-	-	-	-	depr.	17 21
Bow Brickhill	-	-	-	-	depr.	17 28
Stanmore	-	-	-	-	depr.	19 57

Stow on the Wold.

The ground at Shotover	-	-	-	-	depr.	13 48
White Horse Hill	-	-	-	-	depr.	7 30
Broadway Beacon	-	-	-	-	elev.	11 29
Brill on the Hill	-	-	-	-	depr.	14 45
Epwell	-	-	-	-	depr.	8 0

Broadway Beacon.

The ground at Stow	-	-	-	-	depr.	19 0
Epwell	-	-	-	-	depr.	17 25

*The Account of a**Epwell.*

The ground at Stow	-	-	-	-	depr.	3' 53"
Arbury Hill	-	-	-	-	depr.	6 39
Brill on the Hill	-	-	-	-	depr.	11 51
Corley	-	-	-	-	depr.	20 8
Broadway Beacon	-	-	-	-	elev.	8 31

Arbury Hill.

The ground at Epwell	-	-	-	-	depr.	14 25
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Bow Brickhill.

The ground at Wendover	-	-	-	-	elev.	3 59
Kinsworth	-	-	-	-	elev.	5 35
Brill on the Hill	-	-	-	-	depr.	5 28

Kinsworth.

The ground at Brill on the Hill	-	-	-	-	depr.	12 37
Bow Brickhill	-	-	-	-	depr.	17 25
Arbury Hill	-	-	-	-	depr.	13 44
Stanmore	-	-	-	-	depr.	17 4
Lillyhoe	-	-	-	-	depr.	23 44

Bagshot Heath.

The ground at Nuffield	-	-	-	-	elev.	1 29
Stanmore	-	-	-	-	depr.	7 28

Stanmore.

The ground at Bagshot Heath	-	-	-	-	depr.	9 34
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ART. XLIII. Heights of the Stations.

Stations.	Ground above low water mark.					Fect.
Trevoze Head	-	-	-	-	-	274
St. Agnes Beacon	-	-	-	-	-	621
Hensbarrow	-	-	-	-	-	1034
Bodmin Down	-	-	-	-	-	645
Black Down	-	-	-	-	-	1160
St. Stephen's Down	-	-	-	-	-	605
Bradley Knoll	-	-	-	-	-	973

Stations.	Ground above low water mark.
	Feet.
Mendip - - - - -	999
Westbury Down - - - - -	775
Dundry - - - - -	790
Lansdown - - - - -	813
Farley Down - - - - -	700
Moor Lynch - - - - -	330
Dundon Beacon - - - - -	360
Lugshorn Corner - - - - -	49
Greylock's Foss-way - - - - -	42
Ash Beacon - - - - -	655
Cadon Barrow - - - - -	1011
Brown Willy - - - - -	1368
Inkpin - - - - -	1011
Nuffield - - - - -	757
White Horse Hill - - - - -	893
Shotover Hill - - - - -	599
Muzzle Hill, (Brill station) - - - - -	744
Whiteham Hill - - - - -	576
Wendover, ground above - - - - -	905
Bow Brickhill - - - - -	683
Kinsworth - - - - -	904
Lillyhoe - - - - -	664
Stow on the Wold - - - - -	883
Epwell Hill - - - - -	836
Broadway Beacon - - - - -	1086
Arbury Hill - - - - -	804

ART. XLIV. Mean Terrestrial Refractions.

Between	Mean Refractions.
Bodmin Down and Cadon Barrow - - - - -	$\frac{1}{5}$
Bradley Knoll and Westbury Down - - - - -	$\frac{1}{6}$
Maker Heights and Black Down - - - - -	$\frac{1}{6}$
Highclere and Inkpin - - - - -	$\frac{1}{8}$
St. Agnes Beacon and Trevoise Head - - - - -	$\frac{1}{9}$
Moor Lynch and Lugshorn Corner - - - - -	$\frac{1}{11}$
Hensbarrow and Trevoise Head - - - - -	$\frac{1}{12}$

Wingreen and Bradley Knoll	-	-	-	$\frac{1}{13}$
Bodmin Down and Trevoze Head	-	-	-	$\frac{1}{13}$
Carraton Hill and Black Down	-	-	-	$\frac{1}{13}$
Westbury Down and Mendip	-	-	-	$\frac{1}{13}$
Carraton Hill and St. Stephen's Down	-	-	-	$\frac{1}{13}$
Farley Down and Mendip	-	-	-	$\frac{1}{16}$
Beacon Hill and Westbury Down	-	-	-	$\frac{1}{16}$
Dundry and Farley Down	-	-	-	$\frac{1}{16}$
Dundon Beacon and Mendip	-	-	-	$\frac{1}{17}$
Bradley Knoll and Mendip	-	-	-	$\frac{1}{18}$
Lansdown and Mendip	-	-	-	$\frac{1}{19}$
Moor Lynch and Dundon Beacon	-	-	-	$\frac{1}{20}$
Dundry and Mendip	-	-	-	$\frac{1}{20}$
Westbury Down and Farley Down	-	-	-	$\frac{1}{21}$
St. Stephen's Down and Black Down	-	-	-	$\frac{1}{24}$
Moor Lynch and Dundon Beacon	-	-	-	$\frac{1}{27}$
Dundon and Lugshorn Corner	-	-	-	$\frac{1}{3}$
Moor Lynch and Greylock's Foss-way	-	-	-	$\frac{1}{6}$
Lugshorn Corner and Greylock's Foss-way	-	-	-	0
Cadon Barrow and horizon of the sea in the direction of				
Trevoze Head	-	-	-	$\frac{1}{13}$
Ditto in a northern direction	-	-	-	$\frac{1}{12}$
Brill and Nuffield	-	-	-	$\frac{1}{8}$
Broadway and Stow	-	-	-	$\frac{1}{10}$
Epwell and Broadway	-	-	-	$\frac{1}{11}$
Highclere and White Horse Hill	-	-	-	$\frac{1}{13}$
Nuffield and White Horse Hill	-	-	-	$\frac{1}{14}$
Nuffield and Bagshot	-	-	-	$\frac{1}{17}$
Epwell and Stow	-	-	-	$\frac{1}{17}$
Brill and Stow on the Wold	-	-	-	$\frac{1}{19}$
Wendover and Bow Brickhill	-	-	-	$\frac{1}{19}$
Kinsworth and Bow Brickhill	-	-	-	$\frac{1}{18}$
Shotover and White Horse Hill	-	-	-	$\frac{1}{18}$
Epwell and Brill	-	-	-	$\frac{1}{22}$
Bow Brickhill and Brill	-	-	-	$\frac{1}{24}$

ART. XLV. *Particulars respecting the Altitudes of the Stations.*

The height of the station on Trevoſe Head, above the ſurface of the ſea at low water, was determined in 1797, by levelling. The tranſit inſtrument was uſed for the purpoſe; and there is reaſon to believe the reſult, $274\frac{3}{10}$ feet, is within a very few inches of the truth.

In the Philoſophical Tranſactions for 1797, p. 471, the height of the ſtation on Maker Heights is ſaid to be 402 feet; this was alſo found by levelling. The altitude of St. Agnes Beacon, determined from that ſtation, is 599 feet; (ſee the ſame volume and page;) but, if the calculation be made from the baſe of altitude at Trevoſe Head, the height of that ſtation, above the level of the ſea, will be 621 feet, which gives a difference of 22 feet. It muſt be recollected, however, that in the firſt reſult, the computation was carried through two intermediate ſtations, which gave three arcs, and as many mean refractions; and, conſidering the extreme variableneſs to which refractions are liable, we are aſſuredly not to conſider 22 feet deviation from the truth as a large quantity.

Besides St. Agnes Beacon, the altitudes of Cadon Barrow, Brown Willy, Hensbarrow, and Bodmin Down, have been determined from that of Trevoſe Head. Of the remaining ſtations, ſome are derived from Maker Heights, others from Dunnose: moſt of them are mean reſults, that is, each ſtation has generally been found two ways; and, as it will ſerve to ſhew what errors proceed from irregularity of refraction, and imperfection of obſervation, I ſhall exhibit a few particulars in relation to them.

Height of	deduced from	Feet.	Mean.
Black Down	{ Maker Heights -	1169	1160
	{ Carraton Hill - -	1152	
St. Stephen's Down	{ Black Down -	609	605
	{ Carraton Hill -	600	
Westbury Down	{ Bradley Knoll -	779	775
	{ Beacon Hill - -	771	
Farley Down	{ Mendip Hills -	703	700
	{ Westbury Down -	696	
Moor Lynch	{ Mendip Hills - -	335	330
	{ Ash Beacon -	325	
Lugshorn Corner	{ Dundon Beacon -	46	49
	{ Greylock's Foss-way	52	
Inkpin Beacon	{ Highclere - -	1014	1011
	{ Beacon Hill -	1009	
Ash Beacon	{ Bull Barrow - -	653	655
	{ Bradley Knoll -	657	

The above will sufficiently shew, what dependence is to be placed on the heights deduced from observed angles of elevation or depression; the results are, indeed, often less consistent, and frequently unsatisfactory; but, generally, they run on a parallel with these. The *data* from which all the heights have been computed, accompany this article.

The measurement of the base on Sedgemoor, shewed a fall of about 7 feet, from Lugshorn Corner to Greylock's Foss-way:

therefore, supposing that fall to be gradual and constant, all the way from the latter station to the surface of the sea at Bridgewater Bay, we shall get 24 feet, for the height of Lugshorn Corner from the surface of the sea. The altitude of this station, deduced from that of Trevoise Head, is 49 feet; and, subtracting 3 feet from it, (the height of the bank on which the instrument stood above the moor,) we get 46 feet for the height of the moor at Lugshorn Corner, above the level of the sea at Bridgewater Bay. But this height, *supposing the fall regular*, is proved to be 24 feet. There is, therefore, a difference of 22 feet, granting the whole of this to be an error on the side of the survey: but, as the general surface of the moor at Bridgewater Bay is several feet above the surface of the sea, we may take a moiety of 24 feet, for the error of the computed height of the station at Lugshorn Corner.

ART. XLVI. *Matters relating to Refraction.*

The refractions contained in this account, like those in our former Papers, tend to prove, that when rays of light pass horizontally, and considerably distant from the surface of the earth, they are less bent or refracted from their rectilinear courses, than theory and opinion have laid down as fact. It is very certain, however, that objection lies against particular conclusions drawn from such *data* as we possess; because the angles of elevation and depression of corresponding stations are observed *at different times*, and almost always, therefore, under different circumstances; but, with the experience and continual practice of thus obtaining means of computing these refractions, although we may not be able to determine the refracting power of the air under given circumstances, yet, as the causes which render

it variable, are as likely to predominate when the angles of depression or elevation are observed from low stations as when observed from high ones, we may be enabled to make some general deductions.*

When the instrument formerly made use of by General Roy was intrusted to my care, I possessed the means of determining, in a more accurate manner than had yet been done, the refractive power of the air near the horizon. To devote much time to it, has not, as yet, been in my power; because a more rapid extension of the survey was an object of greater

* As many instances of strong atmospherical refraction have been related, and ingeniously accounted for, in some of the late publications of the Royal Society, I think it right to mention, by way of note, a very extraordinary instance of its variability.

In the month of June, 1795, when the instrument and party were stationed at Pilsden Hill, in Dorsetshire, on a particular day, at about the hour of four, I employed myself in observing the angles of depression or elevation of the surrounding hills. After I had done all that was necessary in this matter, I turned the telescope to *Glastonbury Tor*, and observed the depression of it. The air was so unusually clear, that, desirous of proving to a gentleman then with me in the observatory tent, the excellence of the telescope, I desired him to apply his eye to it: this he did, and, agreeably to a desire he expressed, I again took the depression of the upper part of the old building, which I was enabled to do with great accuracy, and found it 2" different; the first being 30', 0", and the last 30', 2". The unusual distinctness of this object, led me to keep my eye a long time at the telescope; and, whilst my attention was engaged, I perceived the top of the building *gradually rise* above the micrometer wire, and so continue to do, till it was elevated 10', 45" above its first apparent situation; it then remained stationary, and as night drew on, the object became indistinct. The following evening, I observed the depression again, and found it 29', 50". To what cause this extraordinary change in the refraction could be owing, I am at a loss to conjecture. The former part of the day had been warm, with little wind, and cloudy. The thermometer, at the time of observation, was 65°, and continued stationary for a considerable time. The sky was cloudy, but yet, as I have before observed, the air was remarkably clear. The top of *Glastonbury Tor*, I suppose, is about 200 feet from the surface of Sedgemoor, over a considerable tract of which, the line joining Pilsden with that object passes. The gentleman of whom I speak, as being with me in the tent, was Captain DARCY, of the Royal Engineers, who, no doubt, well remembers the circumstance.

importance. I did not, however, lose any opportunity which the subsequent season offered; the first was, when the instruments were at White Horse Hill and Whiteham Hill; the second, when one was stationed at Brill and the other at Arbury Hill; and the third opportunity offered itself, when one party was stationed at the latter place and the other at Wendover.

On these occasions, the instructions which I communicated to Mr. WOOLCOT, and by which I governed myself, were to observe the elevation or depression of the corresponding station at the expiration of every hour, beginning at six A. M. and to have the watch well regulated from observed altitudes of the sun's limb. I requested him also to be very minute in entering on his book the state of the weather; to keep the instrument properly sheltered from the wind; to be always cautious to adjust his level; and also to insert the state of the air, as to temperature and density, by noting the thermometer and barometer.

During the time we were at the two first stations, White Horse and Whiteham Hills, there was only one day when the air was sufficiently clear for the purpose; this was the 6th of June. On that day, the following observations were made *at the same time as shewn by signal.*

Whiteham Hill. June 6th, 1799.

Hours.	Wh. Horse H. Elevated.	Baromet- ter.	Thermo- meter.	Remarks.
		In. pts.	Degrees.	
3	6 4	29,730	60,3	Light airs at SW. Sun not shining; remarkably clear.
4	6 24	29,724	62,5	Ditto. Ditto ditto.
5	6 14	29,728	58,7	Ditto. Ditto ditto.
6	6 10	29,732	58,5	Ditto. Ditto ditto.
7	6 11	29,728	57,5	Ditto. Ditto ditto.
8	6 21	29,732	57	Very calm, and cloudy, but clear.
* 9	5 37	29,736	55,7	Ditto. Lamp at Shotover very bright. Dew falling.
* 10	5 39	29,740	55,5	Ditto. Ditto.

White Horse Hill. June 6th.

Hours.	Whiteham H. Depressed.	Barome- ter.	Thermo- meter.	Remarks.
	' "	In. pts.	Degrees.	
3	18 21	29,412	57,7	Light airs at SW. Sun not shining; very clear.
4	18 16	29,408	59,5	Ditto. Ditto ditto.
5	18 24	29,410	57,6	Ditto. Sun shining a little; not so clear.
6	18 20	29,412	55,5	More wind. Sun not shining, and darker.
7	18 25	29,412	55,5	Calm and cloudy.
8	18 15	29,438	54,2	Quite calm, and a little dew falling.
* 9	18 10	29,438	53,4	Ditto. Fine night. Lamp at Whiteham very distinct.
* 10	18 25	29,438	53,2	Ditto, but lamp rather indistinct.

Similar observations were also made when the instruments were at Brill and Arbury Hill: they were as follows.

Arbury Hill. July 11th, 1799. Watch regulated.

Hours.	Brill. Depressed.	Barome- ter.	Thermo- meter.	Remarks.
	' "	In. pts.	Degrees.	
9 A.M.	11 15	29,180	65,5	Light airs at SW. Cloudy, but sun shining now and then.
10	11 15	29,200	70,0	Ditto. Cloudy.
11	11 15	29,200	70,7	Ditto. Ditto.
12	11 6	29,199	70,2	Ditto. Ditto.
3 P.M.	11 6	29,162	68,0	Ditto. Ditto. Very clear.
4	10 5	29,168	72,5	Ditto. Sun shining a little, yet free from any tremor.
* 9	10 30	29,132	63,0	Ditto. Lamp at Brill perfectly distinct.

Brill on the Hill. July 11th, 1799. Watch regulated.

Hours.	Arbury H. Depressed.	Barome- ter.	Thermo- meter.	Remarks.
	' "	In. pts.	Degrees.	
9 A.M.	8 40	29,100	61,0	Light airs at SW. Appearances of rain from SW. Cloudy.
10	8 36	29,210	67,5	Ditto. Clearer, but cloudy. Arbury Hill very distinct.
11	8 36	29,210	67,5	Ditto. More cloudy and equally clear. [round.
12	8 36	29,210	65,0	The air remarkably clear and free from tremor. Cloudy all
3 P.M.	8 36	29,210	71,0	Ditto ditto. More cloudy.
4	8 46	29,250	71,5	Ditto ditto. Not so cloudy.
* 9	8 48	29,200	61,75	The lamp at Arbury H. very bright. A very fine quiet night.

The next opportunity which offered, was at the former station and Wendover: the observations were as follows.

Arbury Hill. July 27th, 1799. Watch regulated.

Hours.	Wendover. Depressed.	Barome- ter.	Thermo- meter.	Remarks.
	' "	In. pts.	Degrees.	
12	12 8	28,728	62 ,0	Fresh wind from SW. Rather dark weather, sun shining here [and there.
1	12 3	28,734	64 ,2	Ditto. Air tremulous, ditto.
2	12 11	28,740	64 ,0	Ditto. Ditto, ditto.
3	12 10	28,738	63 ,5	Ditto. Air more steady, ditto. Clearer.
4	12 22	28,740	64 ,0	Ditto. Very steady. Sun shining a little.
5	11 50	28,740	64 ,2	Ditto. Ditto. Ditto.
6	12 17	28,740	61 ,0	Less wind, and the air very clear. Wendover perfectly distinct.

Wendover. July 27th, 1799. Watch regulated.

Hours.	Arbury H. Depressed.	Barome- ter.	Thermo- meter.	Remarks.
	' "	In. pts.	Degrees.	
5 A. M.	16 12	29,030	53 ,2	Wind at SW, rather fresh; sun shining, and air very clear.
6	16 12	29,030	53 ,0	Ditto, ditto.
7	15 26	29,030	54 ,5	Less wind, and the air very steady. Arbury Hill very distinct.
8	14 44	29,100	54 ,0	Little wind. Dew falling very fast. Ditto.

Another opportunity for making contemporary observations occurred, when the parties were on Broadway Beacon and Epwell: I place them last, because I think them inferior to the others.

Epwell. June 26th, 1799. Watch regulated.

Hours.	Broadway B. Elevated.	Barome- ter.	Thermo- meter.	Remarks.
	' "	In. pts.	Degrees.	
12	6 6	29,100	60,5	Wind SW. Cloudy. Much rain preceding night.
1 P.M.	6 8	29,100	63,2	Ditto, but calmer; sun not shining at Broadway.
2	6 12	29,208	60,7	Very calm, and cloudy all round.
3	6 20	29,100	59,0	Ditto. Appearances of rain in SW quarter.
4	8 32	29,100	57,5	Foggy, but easily perceive the tent at Broadway Beacon.

Broadway Beacon. June 26th, 1799. Watch regulated.

Hours.	Epwell. Depressed.	Thermo- meter.	Remarks.
	' "	Degrees.	
2	19 0	57,5	Light airs from SW. Inclunable to rain.
3	19 2	57,5	Ditto. Still more so.
4	19 3	57,5	Ditto, but misty. Barometer tube broken.

To determine the refractions on the first arc, White Horse and Whiteham Hills, we have the distance between those stations = 88662.2 feet, which subtends an arc of 14' 32" nearly.

To determine those on the second, we have the distance between Brill and Arbury Hill = 146530 feet, subtending an arc of 24' 3", 9: those on the third, Wendover and Arbury Hill, 210628 feet = 34' 35"; and, for finding the refractions from the two last tables, we have the distance from Broadway Beacon to Epwell = 80611.4 feet, which subtends an arc of 13' 11" nearly.

The depressions and elevations were all taken to the ground, excepting those which are marked with asterisks. At White Horse Hill and Whiteham Hill, lamps were used at the hours of 9 and 10: they were also made use of at Arbury Hill and Brill at 9 o'clock. In the first instances, the lamps were placed (the centres of them) $1\frac{1}{2}$ feet from the bottoms of the respective instruments; and in the last $2\frac{1}{2}$ feet.

The height of the transit telescope above the ground was always $5\frac{1}{2}$ feet; therefore, an allowance must be made, at each station, for the angle which that space subtends at its corresponding one; this premised, the refraction will be found from one of the two following rules, *viz.* if A be the contained arc, and D *d* the observed depressions, the quantity answering to the refraction, R, will be expressed by $\frac{A - D - d}{2}$; or, if one of the angles should be an elevation, *e*, then $R = \frac{A + e - d}{2}$: these rules give the refractions in the following table.

Refractions found from the preceding Angles of Elevation and Depression.

1. Arc. White Horse Hill & Whiteham Hill.				2. Arc. Brill and Arbury Hill.				3. Arc. Arbury Hill and Wendover.				4. Arc. Broadway Beacon and Epwell.			
Hours.	Refraction. pts. cont. arc.	Barom.	Therm.	Hours.	Refraction. pts. cont. arc.	Barom.	Therm.	Hours.	Refraction. pts. cont. arc.	Barom.	Therm.	Hours.	Refraction. pts. cont. arc.	Barom.	Therm.
3 P. M.	$\frac{1}{10,8}$	in. pts. 29,5	° 58,0	9 A. M.	$\frac{1}{10,9}$	in. pts. 29,1	° 63,2	5	$\frac{1}{10,8}$	in. pts. 28,8	° 54,6	2	$\frac{1}{35,1}$	in. pts. 29,2	° 54,1
4	$\frac{1}{9,4}$	29,5	61,0	10	$\frac{1}{10,7}$	29,2	68,7	6	$\frac{1}{11,5}$	28,8	61,5	3	$\frac{1}{31,0}$	57,5	58,2
5	$\frac{1}{10,4}$	29,5	58,1	11	$\frac{1}{10,7}$	29,2	68,1					4	$\frac{1}{8,6}$	29,1	57,5
6	$\frac{1}{10,4}$	29,5	57,0	12	$\frac{1}{10,4}$	29,2	67,6								
7	$\frac{1}{10,0}$	29,5	57,0	3 P. M.	$\frac{1}{10,4}$	29,2	72,5								
8	$\frac{1}{9,5}$	29,6	55,6	4	$\frac{1}{7,4}$	29,2	72,0								
9	$\frac{1}{12,6}$	29,6	54,5	9	$\frac{1}{9,8}$	29,2	62,3								
10	$\frac{1}{14,0}$	29,5	54,3												

On examining the refractions obtained on the first arc, we perceive them to have been tolerably regular from 3 o'clock till 8; the mean being $\frac{1}{10.1}$ part of the contained arc. The height of Whiteham Hill is 576 feet, and that of White Horse Hill 893 feet, above the level of the sea : the ray passes, therefore, through a tract of air considerably elevated, as the country between the stations is, for the most part, flat and low.

The air is not often clear enough, or sufficiently free from tremulous motions, for these delicate observations. On the present occasion, however, the state of it was highly fit for the purpose; and, as care was taken, I am of opinion an error of more than 3'', taking that of the arch of altitude into the account, cannot have obtained in any of the angles. The refractions at 9 and 10 o'clock are less than at the preceding hours; but this does not appear to have been owing to any change in the refractive power of the air throughout the whole extent of the ray, because the depression of Whiteham Hill, from the other station, varied little at those hours. These changes in the observed angles of elevation at Whiteham, (44'' and 42'' being the differences,) *without* corresponding ones at White Horse Hill, prove that some *partial* alteration, from floating strata, had taken place in the refraction near the former station. Whoever considers the matter, must perceive a case may be constructed in which this will take place, causing a great variation in one of the angles, whilst the other *apparently* remains the same: and this suggested the idea, that to afford any accurate conclusions in this way, a long series of observations would be necessary. It furthermore appears, that dew could not have caused these differences at Whiteham Hill, since the same cause would equally operate to vary the observed angles at White Horse Hill; but those remained nearly the same.

The refractions on the second and third arcs, I consider as most accurate, on account of the great distance between the stations ; and also as more to be depended on, from the circumstance of the ray generally passing 300 feet above the ground.

The fourth arc affords another instance of the refraction varying at one station, and remaining constant at the other. This, no doubt, was owing to the intervention of some partial stratum of air, nearer to Epwell than Broadway Beacon. The refractions, deduced from these contemporary observations are certainly inconclusive. The mean refractions, (neglecting the fourth arc) brought under one point of view, will be as follows.

Arcs.	Mean height of ray above the sea.	Refraction. Propl. pt.	Barom.	Therm.
	Feet.		in. pts.	
1. White Horse Hill and Whiteham	734	$\frac{1}{10,9}$	29,5	57,8
2. Arbury H. and Brill, 5 first refracs.	774	$\frac{1}{10,6}$	29,2	67,8
3. Arbury Hill and Wendover -	854	$\frac{1}{11,2}$	28,8	58,1

If the air had been in a quiescent state, previous to and also at the times when these observations were made, it might be expected that the differences of altitudes in the stations would be obtained, tolerably near the truth, *barometrically*. The remarks in the tables appertaining to the first and second arcs, shew that such opportunities offered ; but those which belong to the third, prove the wind to have been fresh ; and, as the space between the stations which constitute the extremities of that arc is 34 miles, nearly, it is not to be expected that a true result should be obtained. The differences of altitudes of the stations constituting the extremities of the two first arcs, obtained by means of the observed angles of elevation and depression, as well

as from the heights of the mercury in the barometer, will be as follows.

Arcs.	Obs. Ang.	Barom.	Diff.
1	317	282	35
2	60	15	45

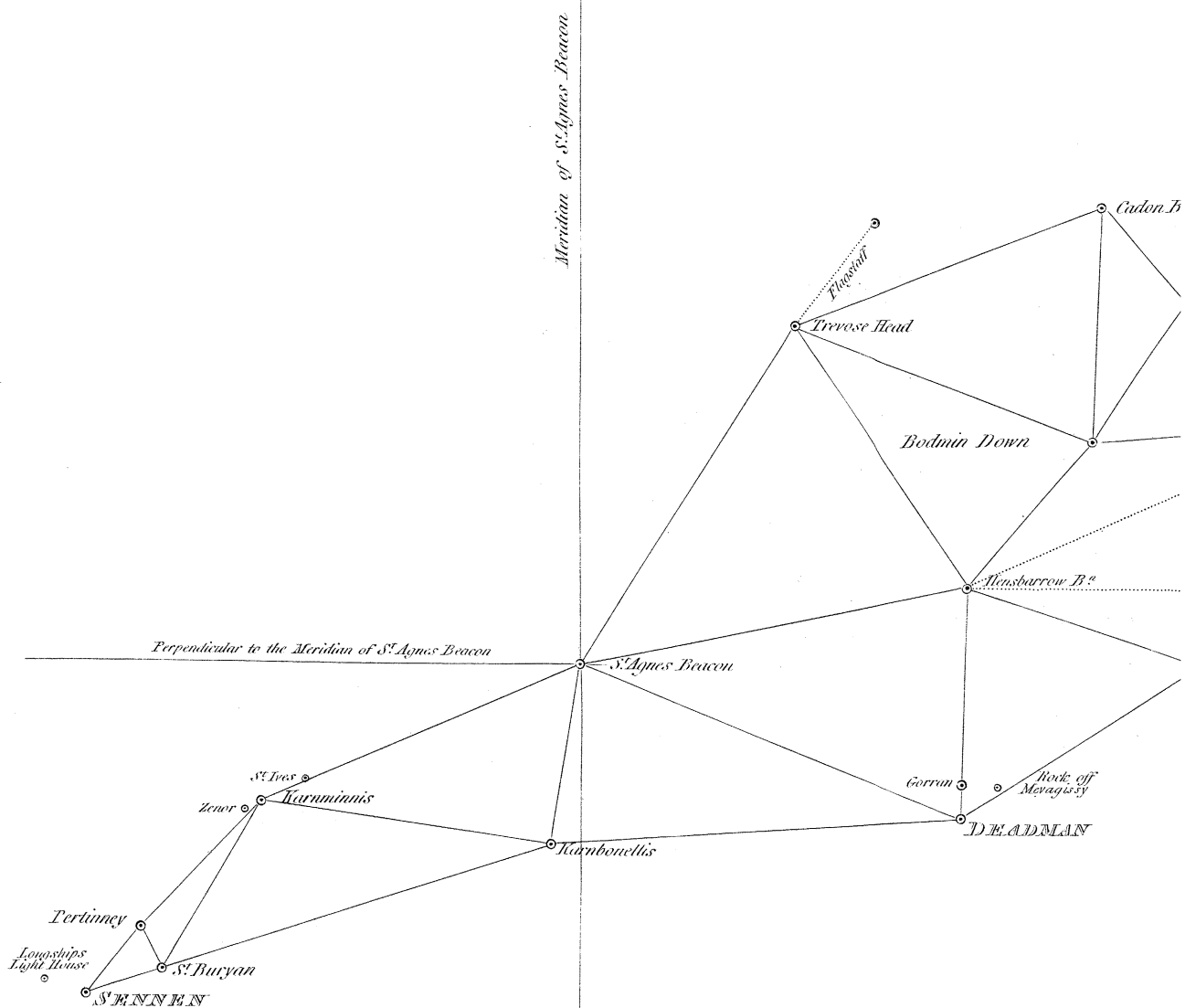
The little done on this subject, points out the necessity of doing more; it therefore remains with me to observe, that I shall lose no opportunity of employing the apparatus committed to my charge in the best and most diligent manner, both as relating to matters of refraction, and to all others connected with the Trigonometrical Survey.

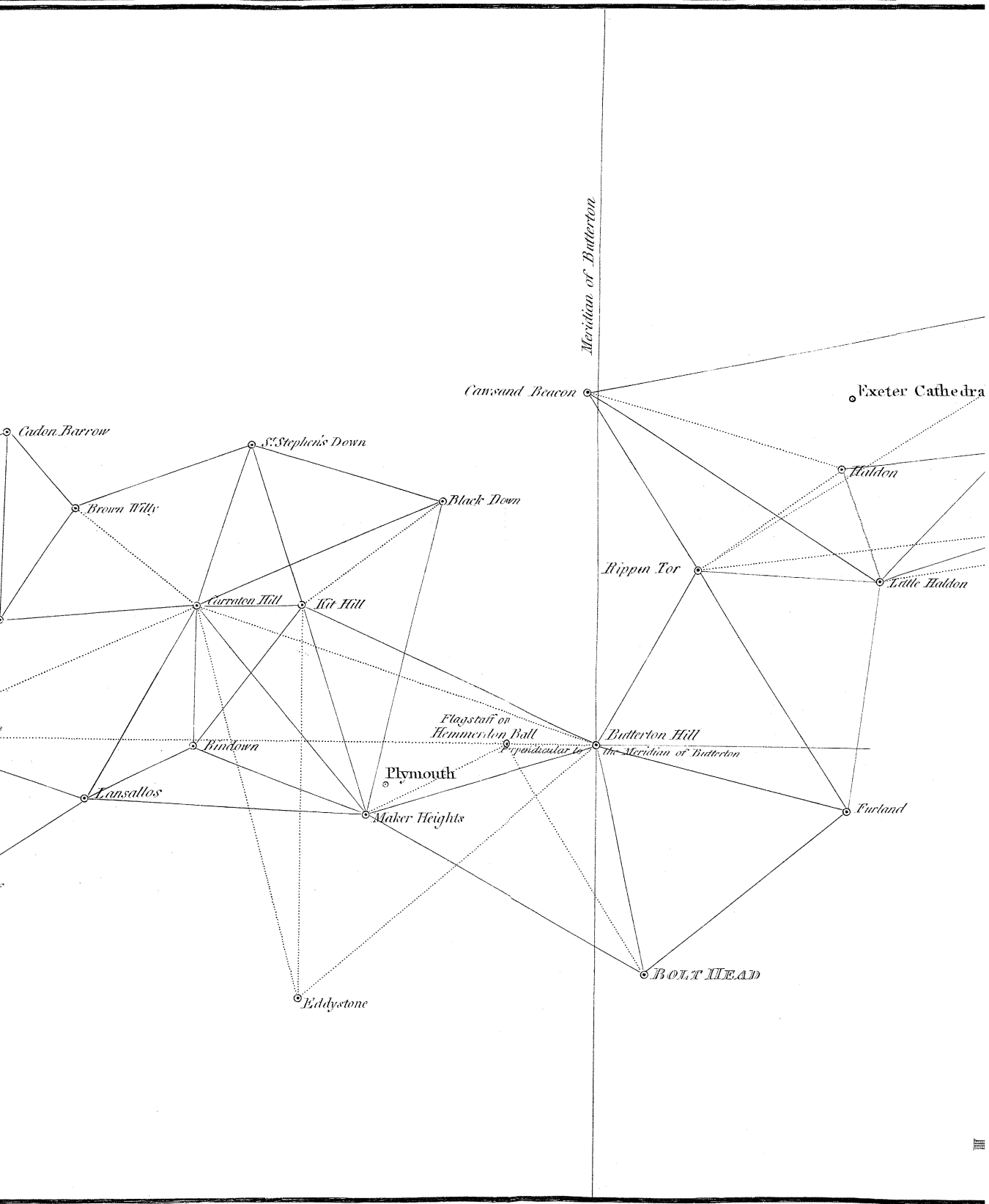
In the Introduction, page 540, it is stated that this Account would be comprized in three Sections, but it was afterwards thought more convenient to divide it into four.

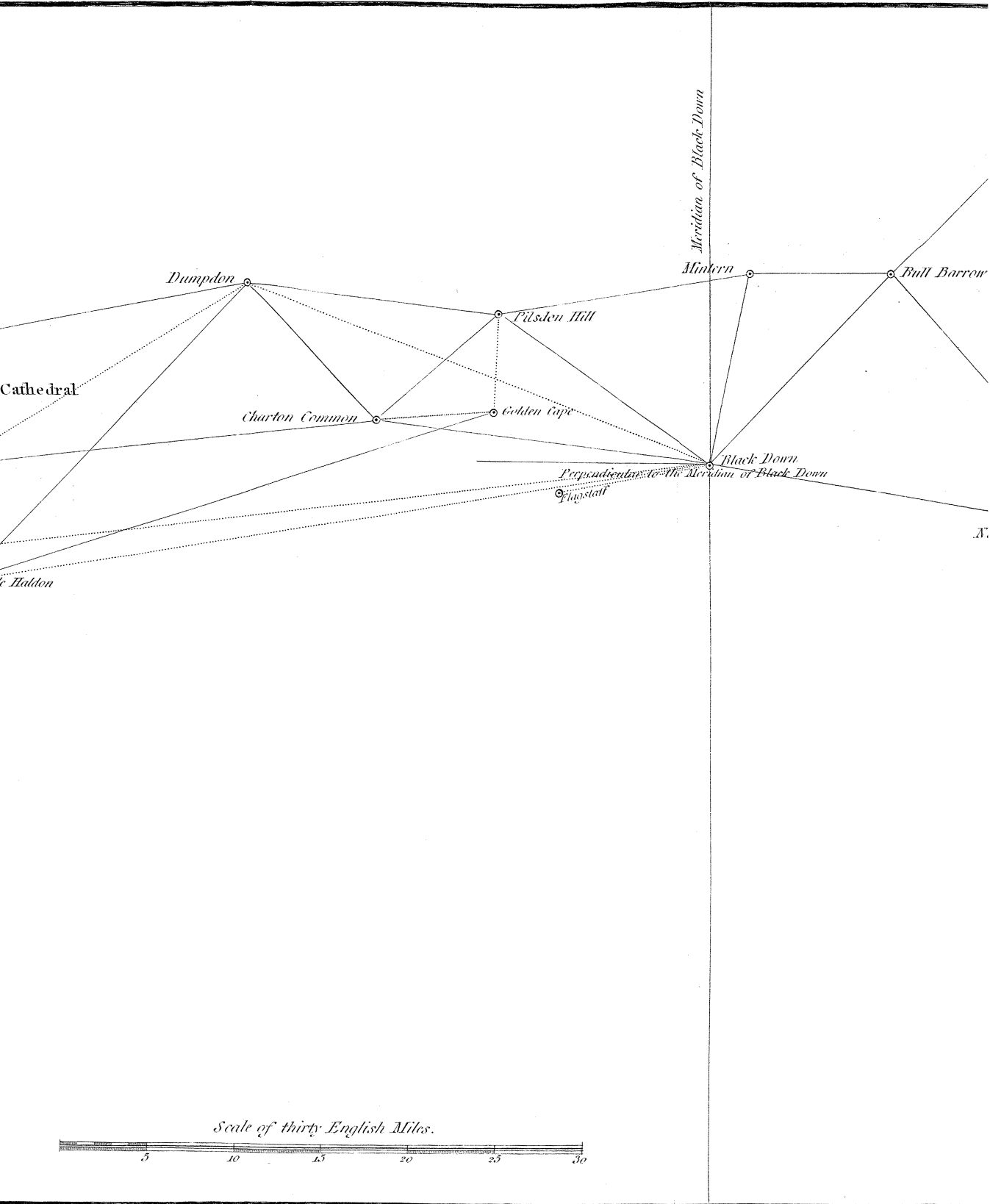
In Page 583, line penult. *dele* and Prittlewell.

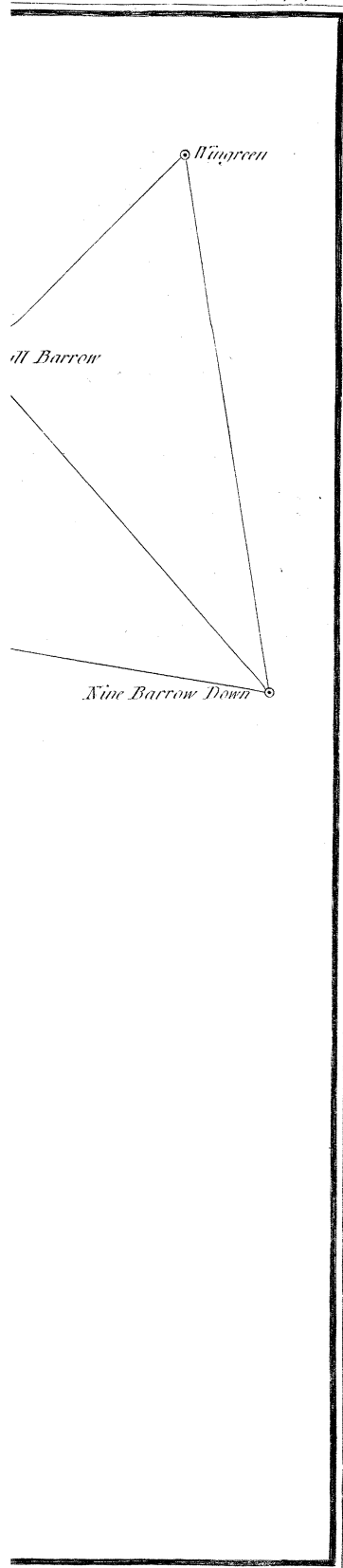
— 665, — 14, for 1792, read 1772.

PLAN of the PRINCIPAL TRIANGLES in the TRIGON



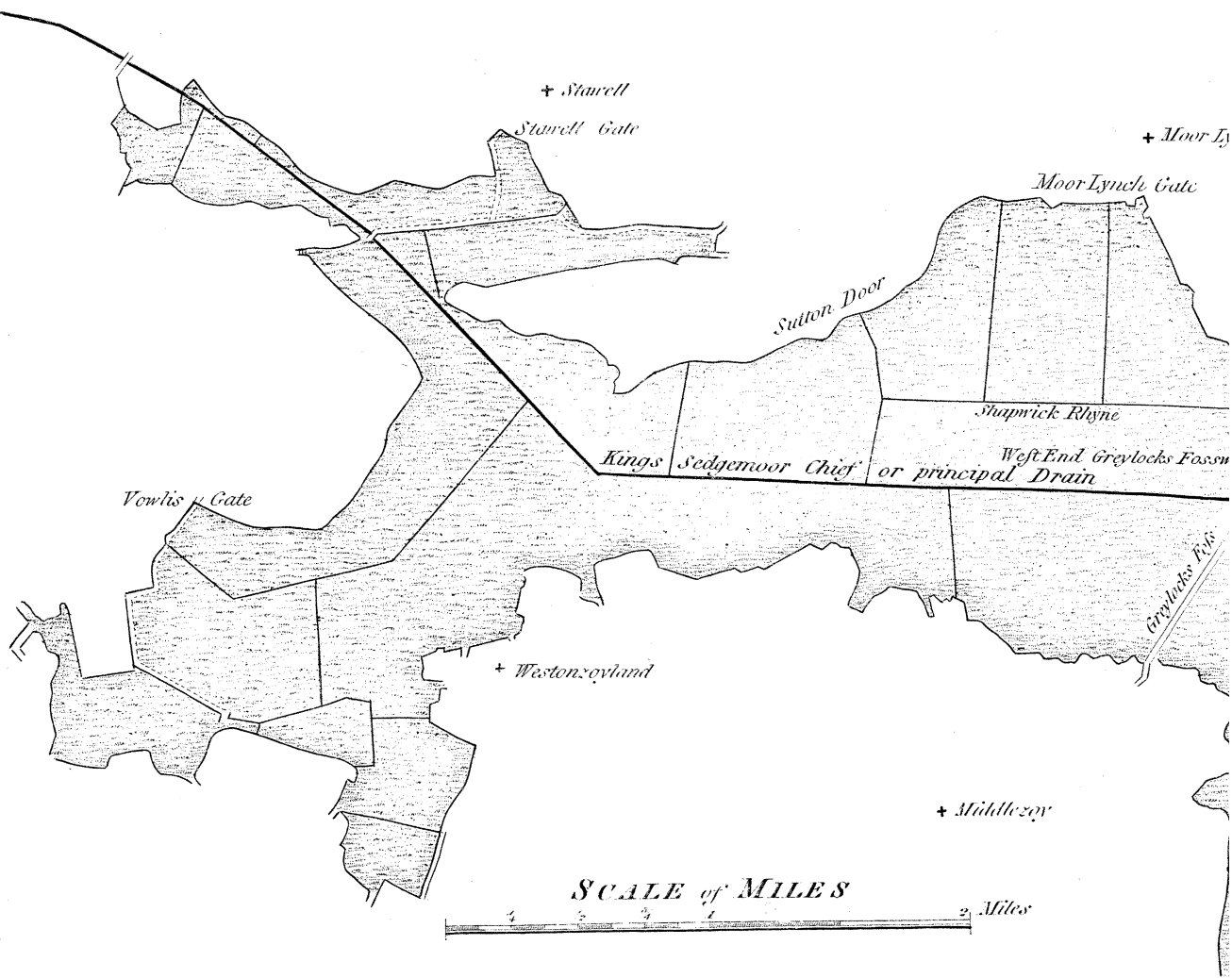






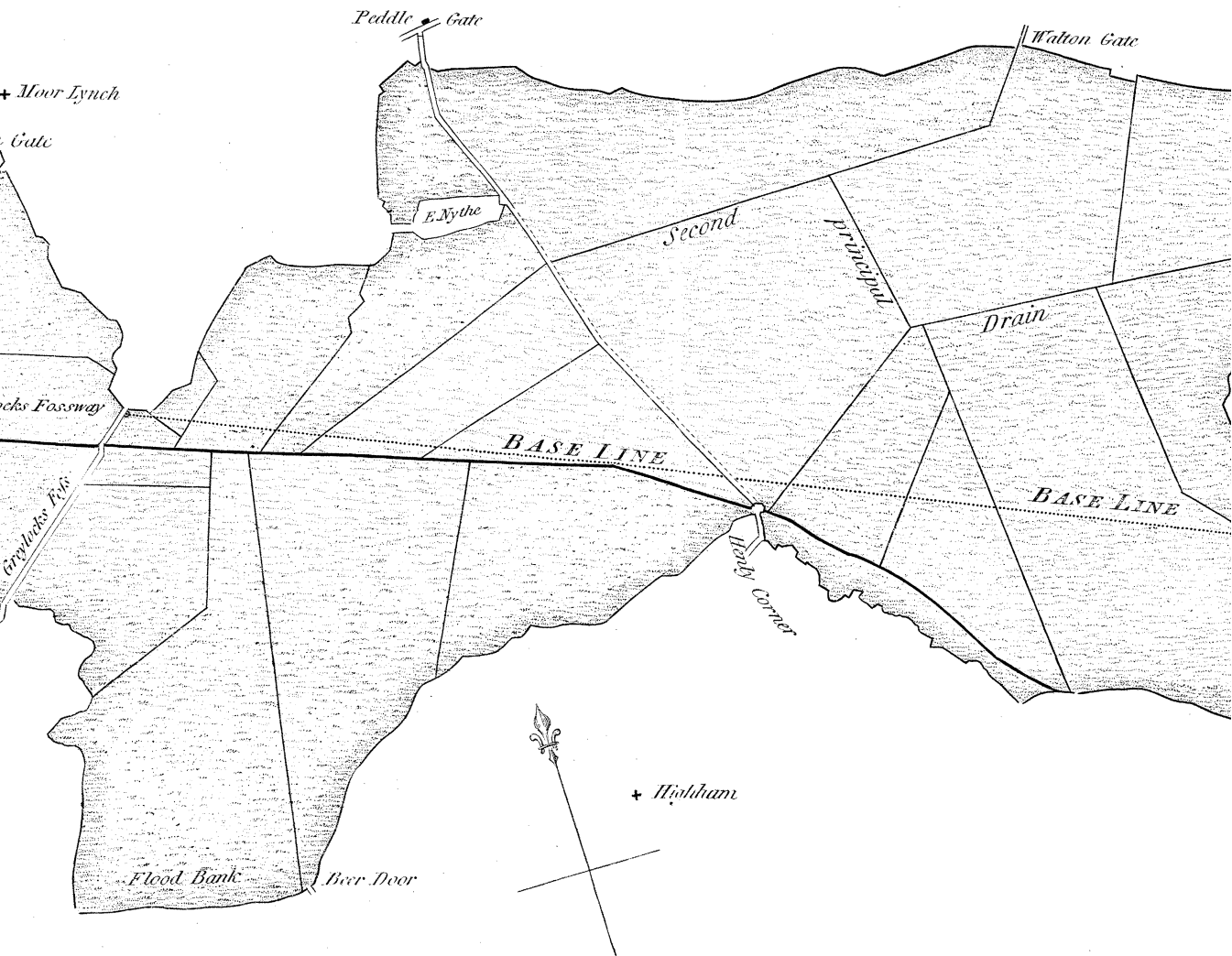


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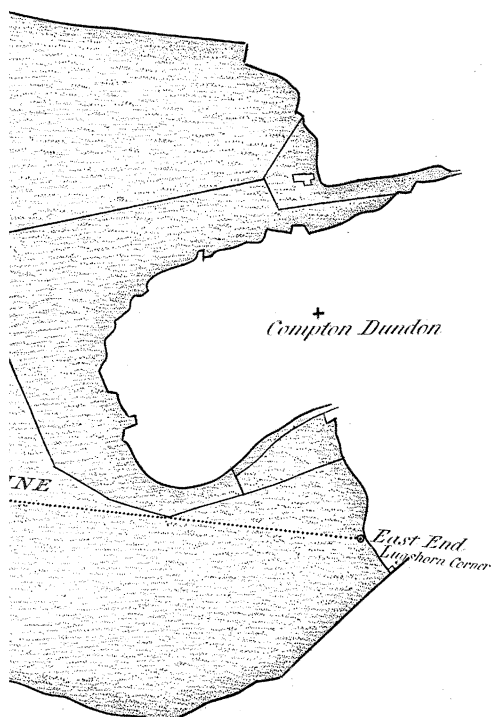




MOOR with the *BASE LINE* measured thereon.

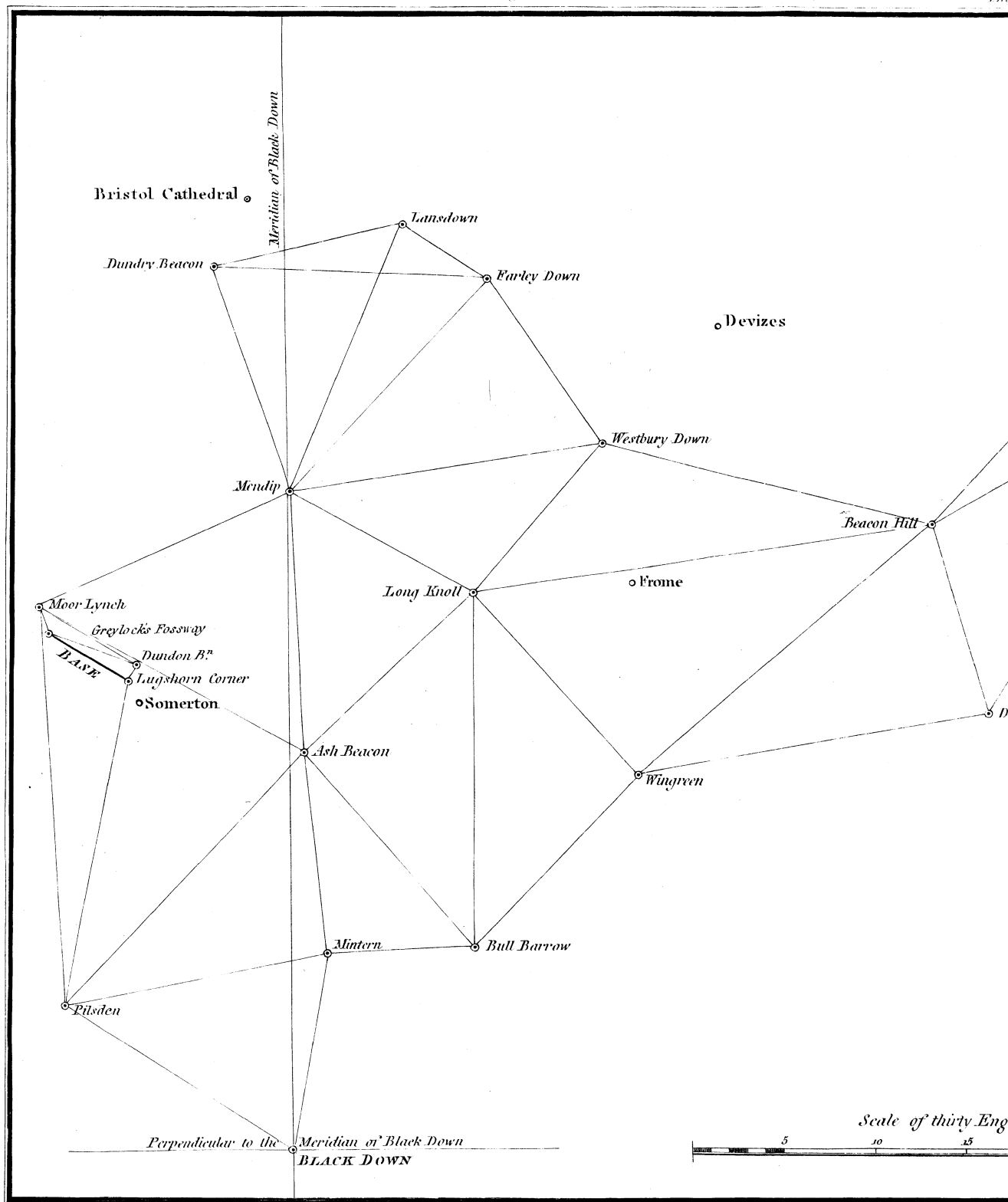


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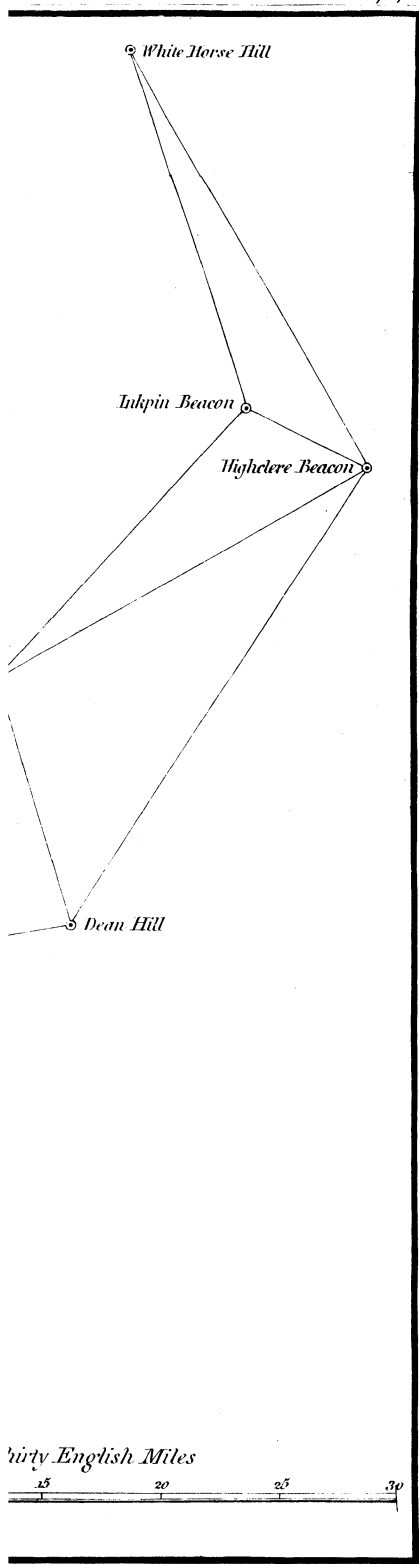
PLAN of the Principal Triangles in the TRIGONOMETRICAL SURVEY

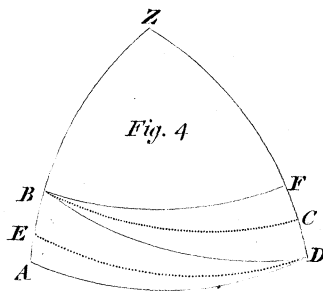
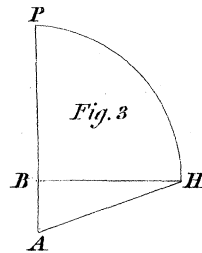
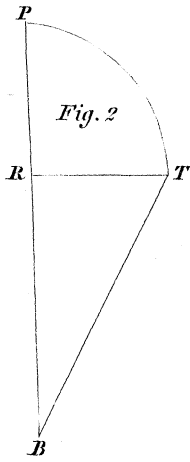
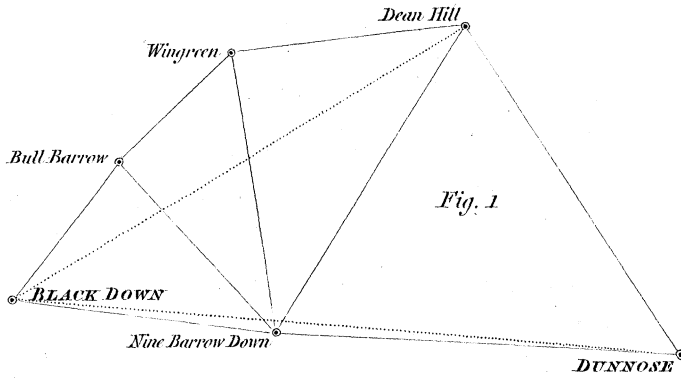
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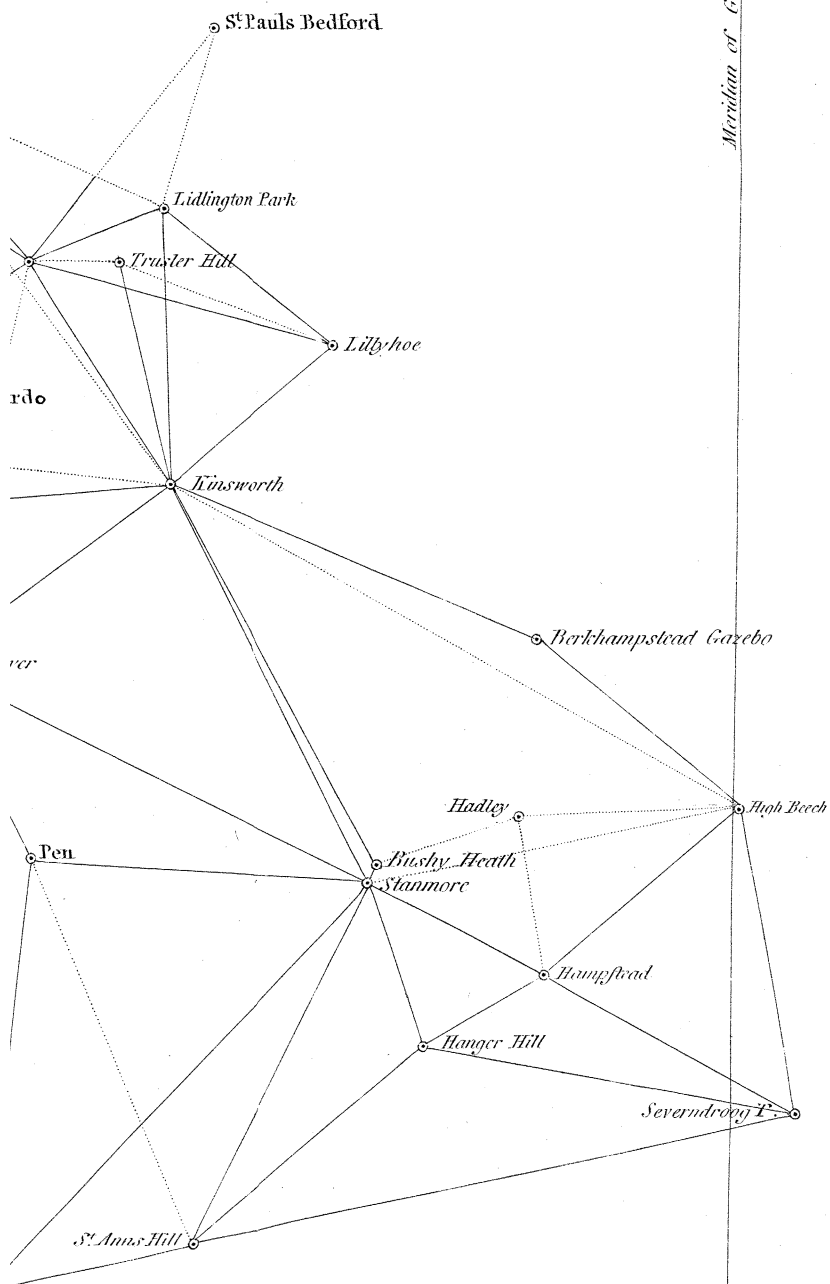
SURVEY, 1798.

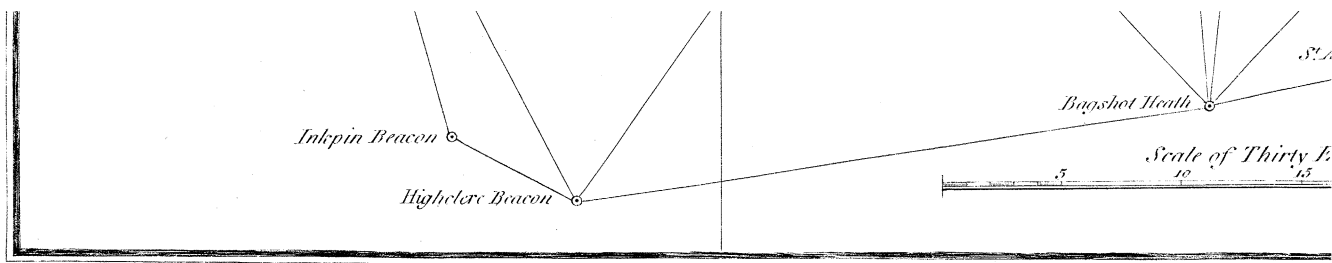
Philos. Trans. MDCCC. Plate XXIX. p. 728.

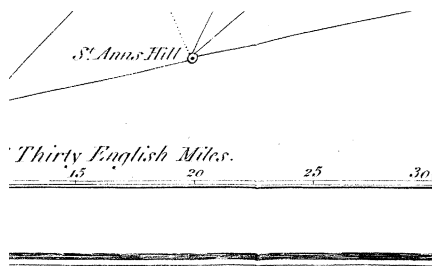


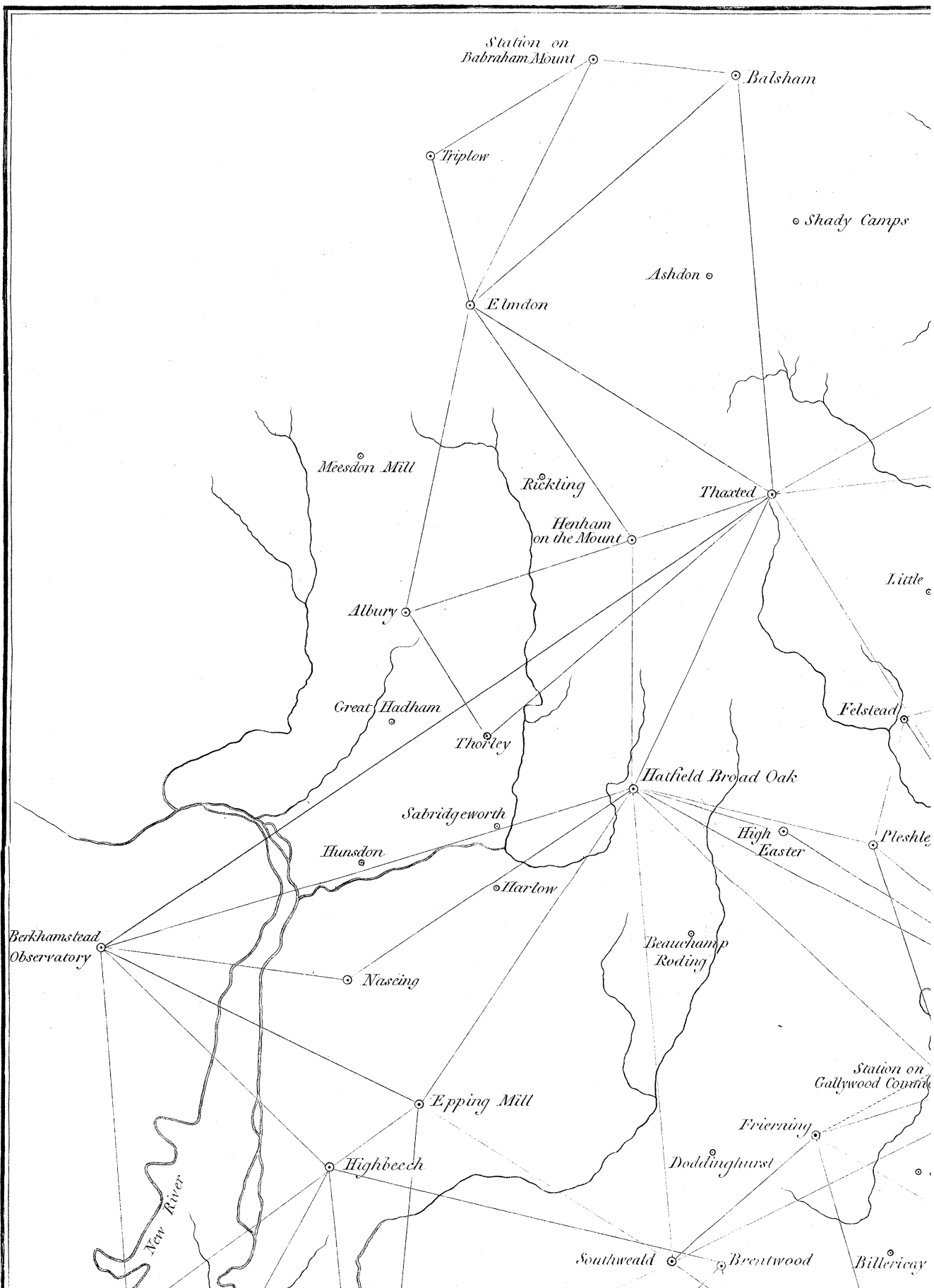


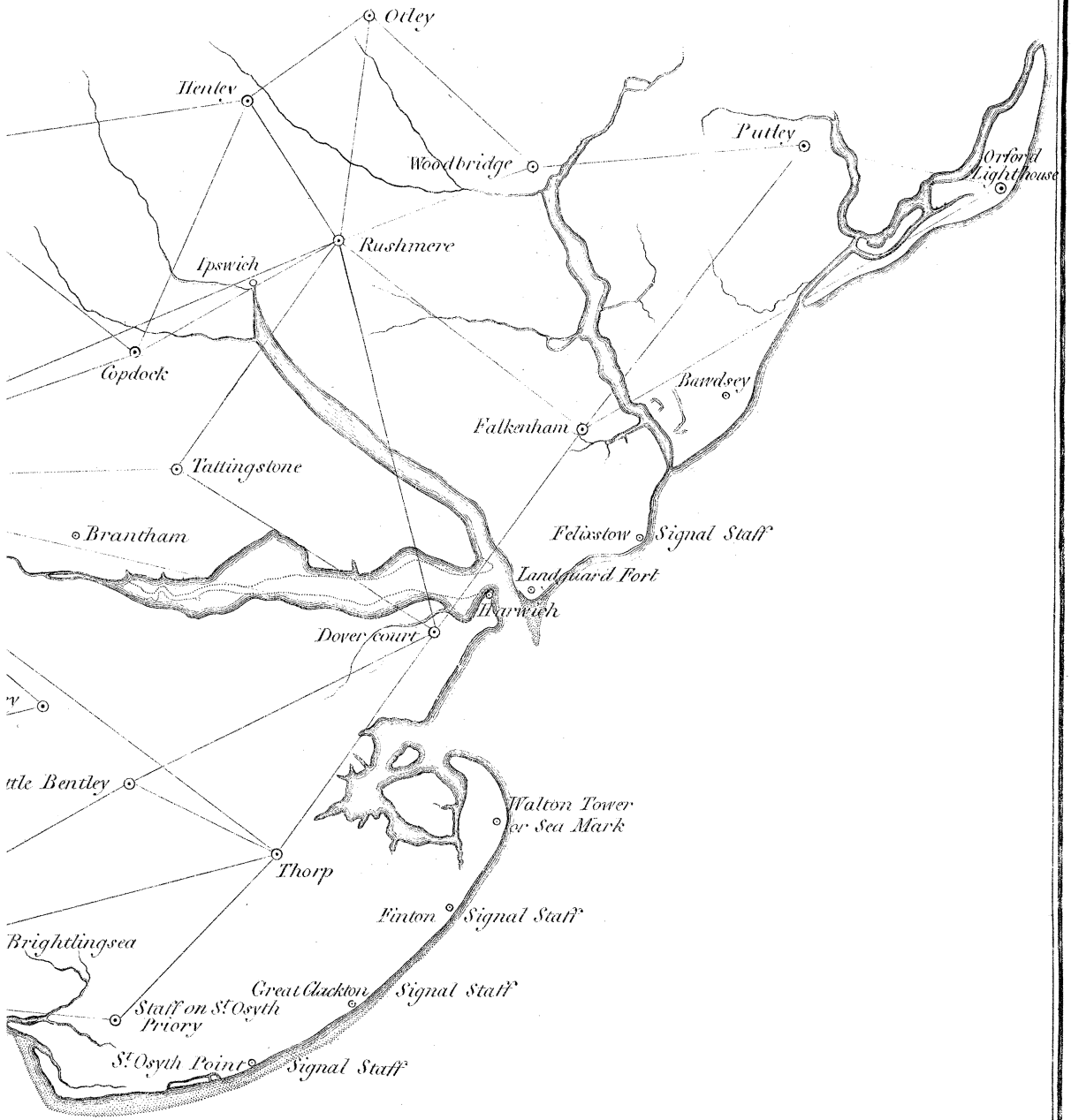


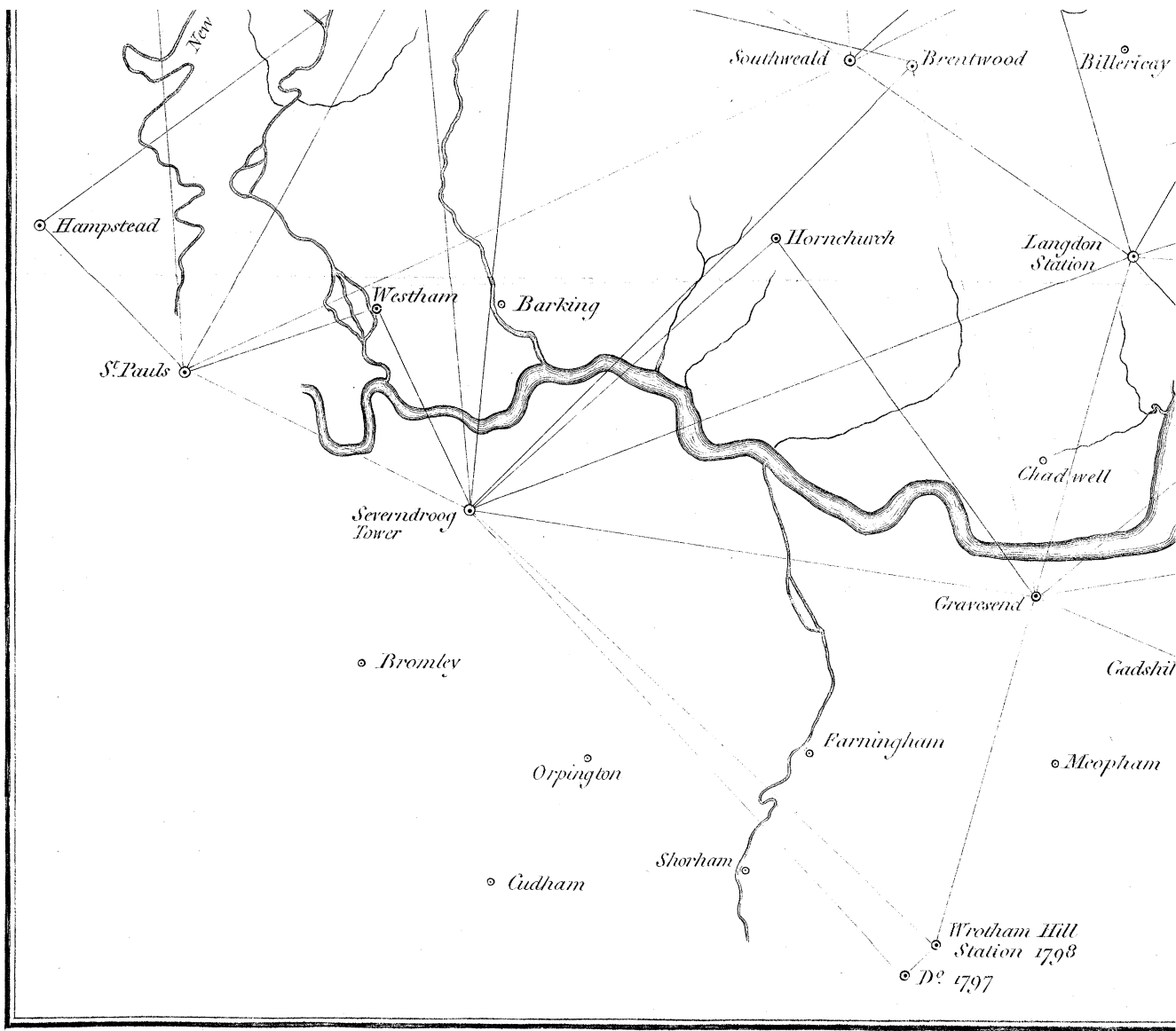


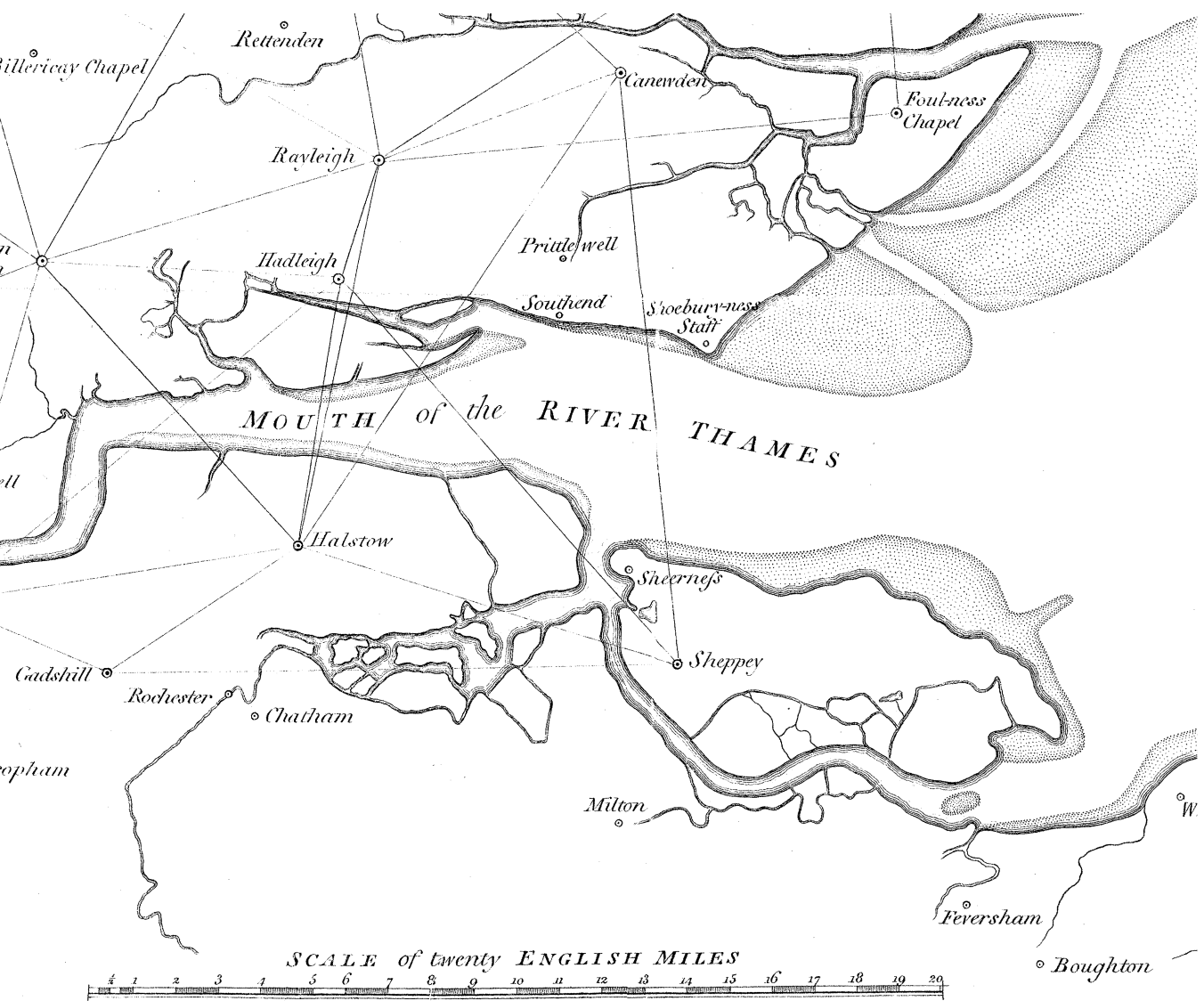


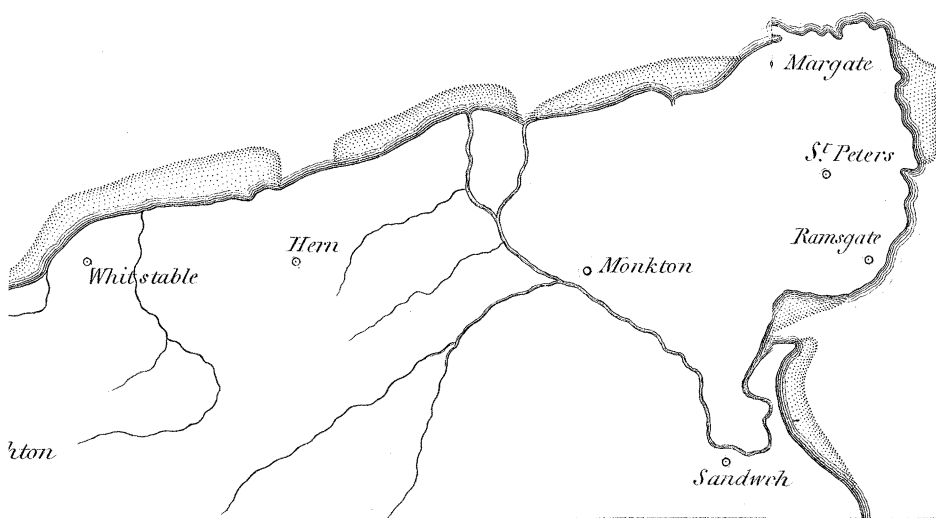
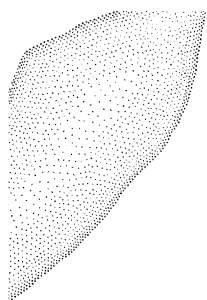




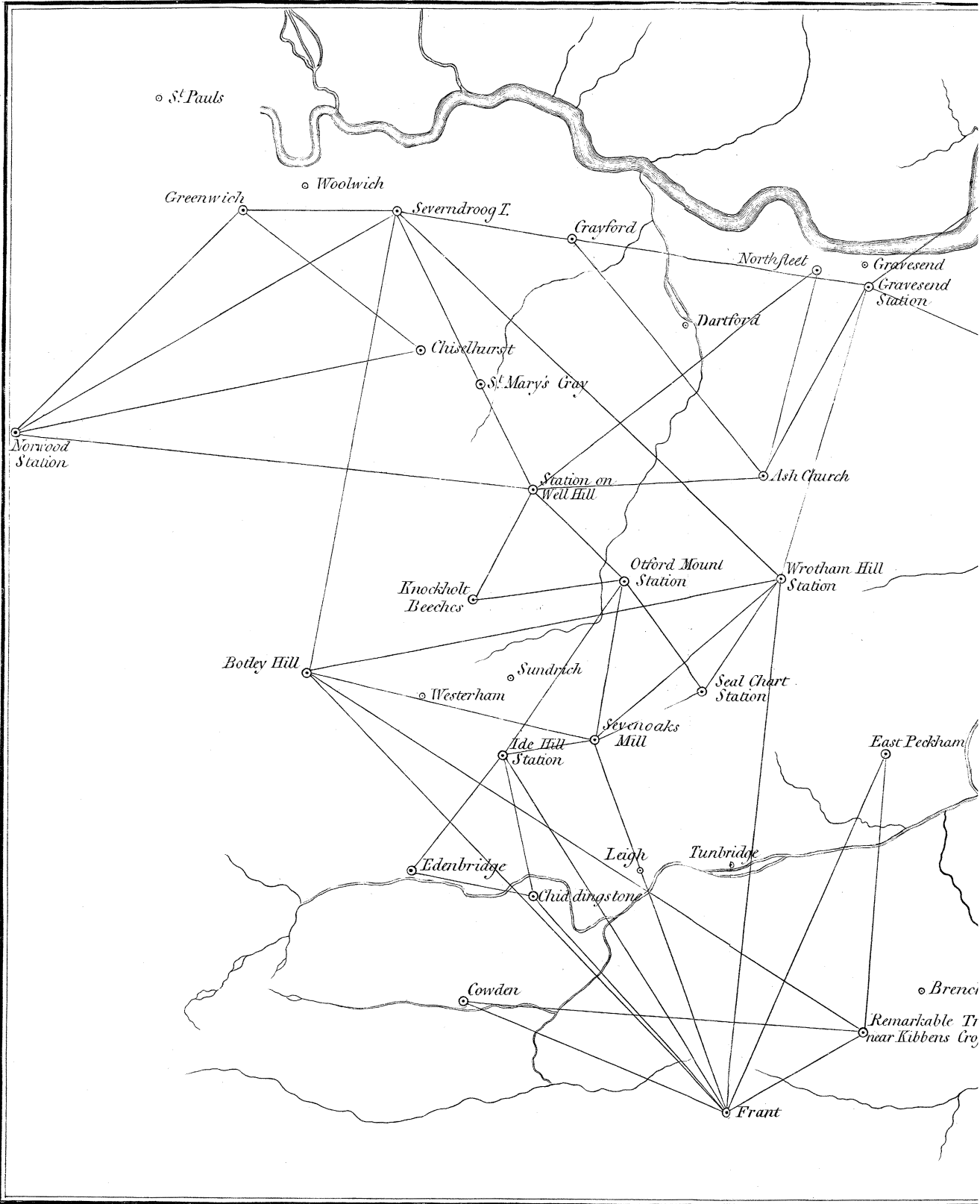




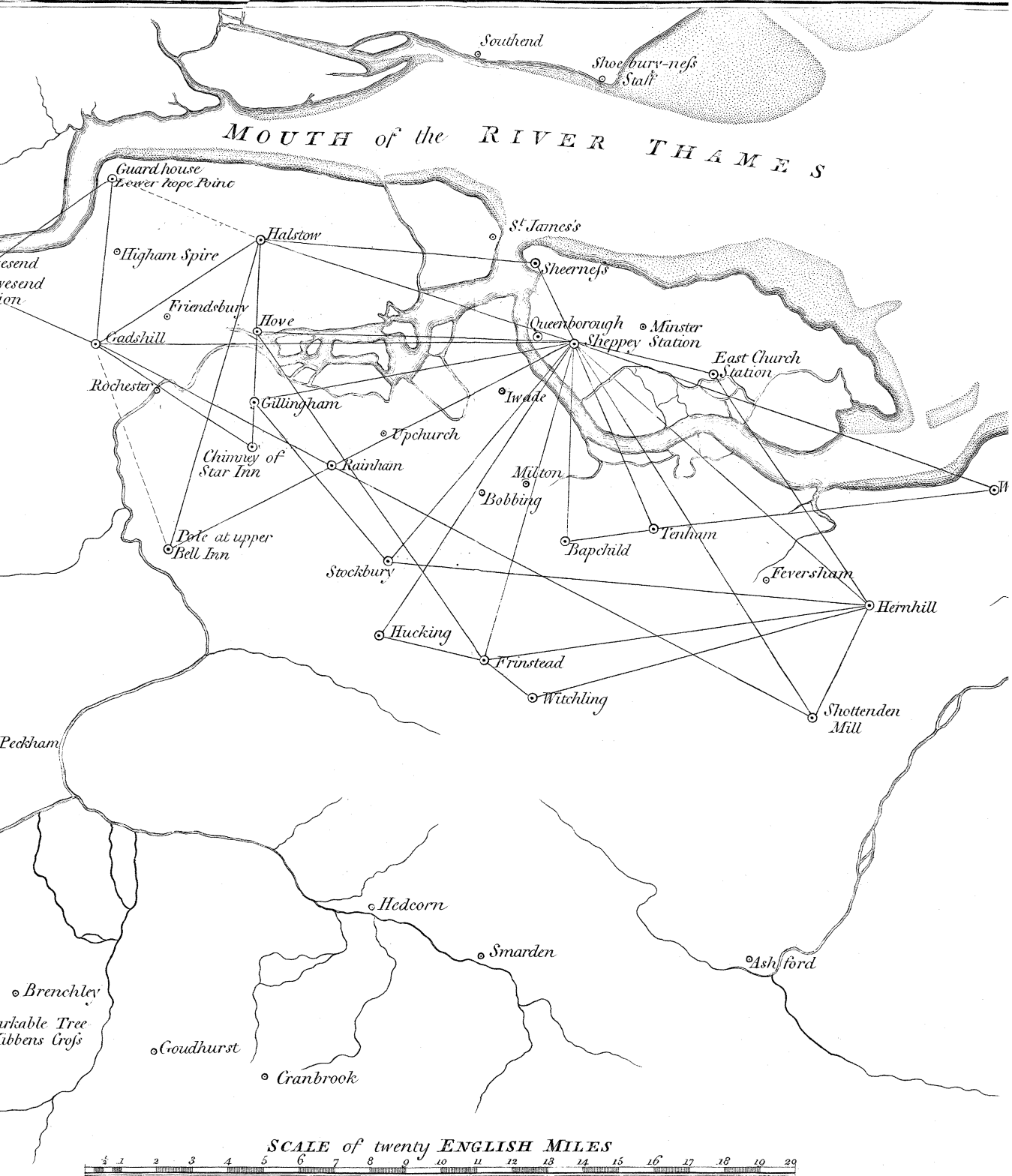


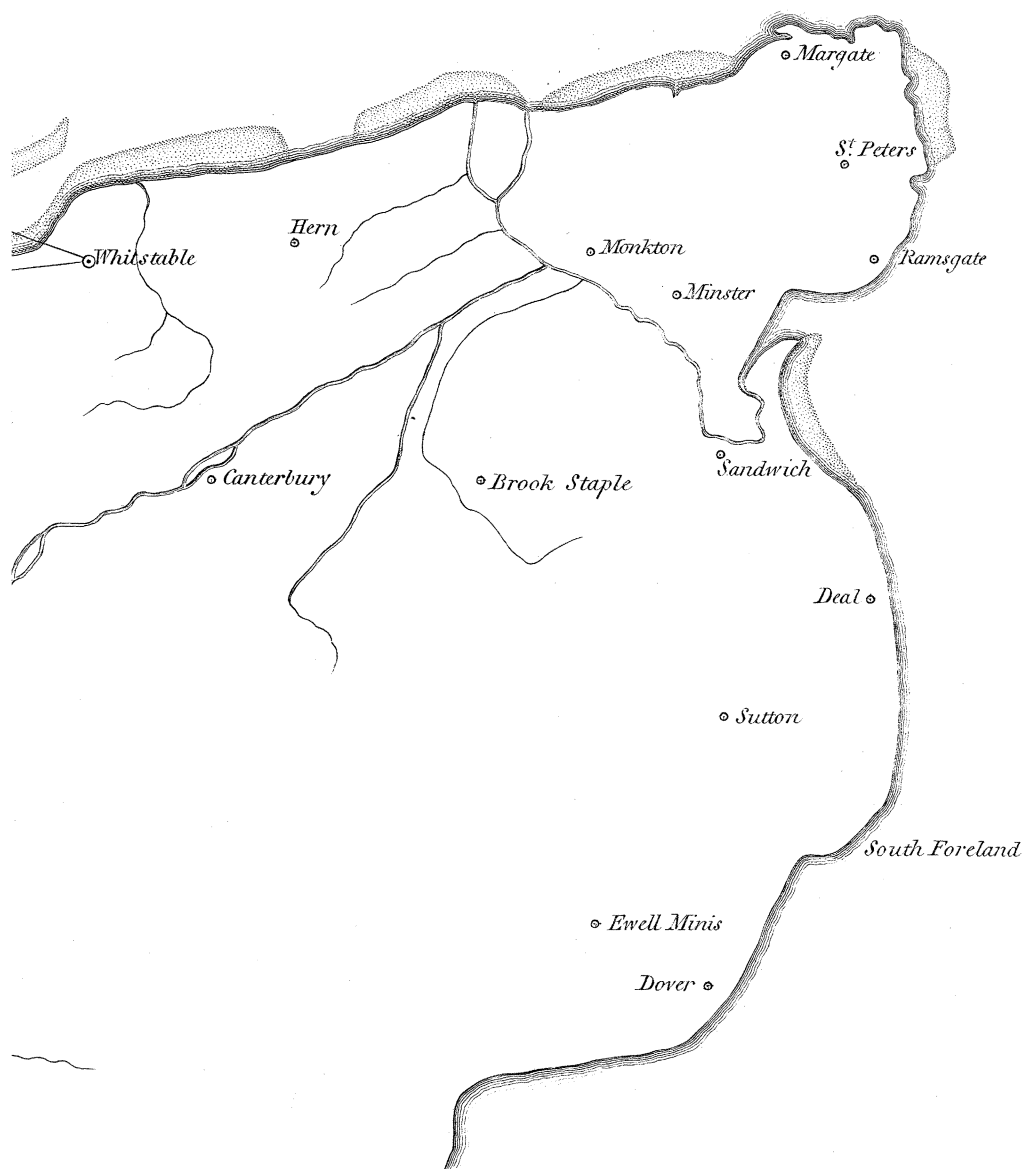


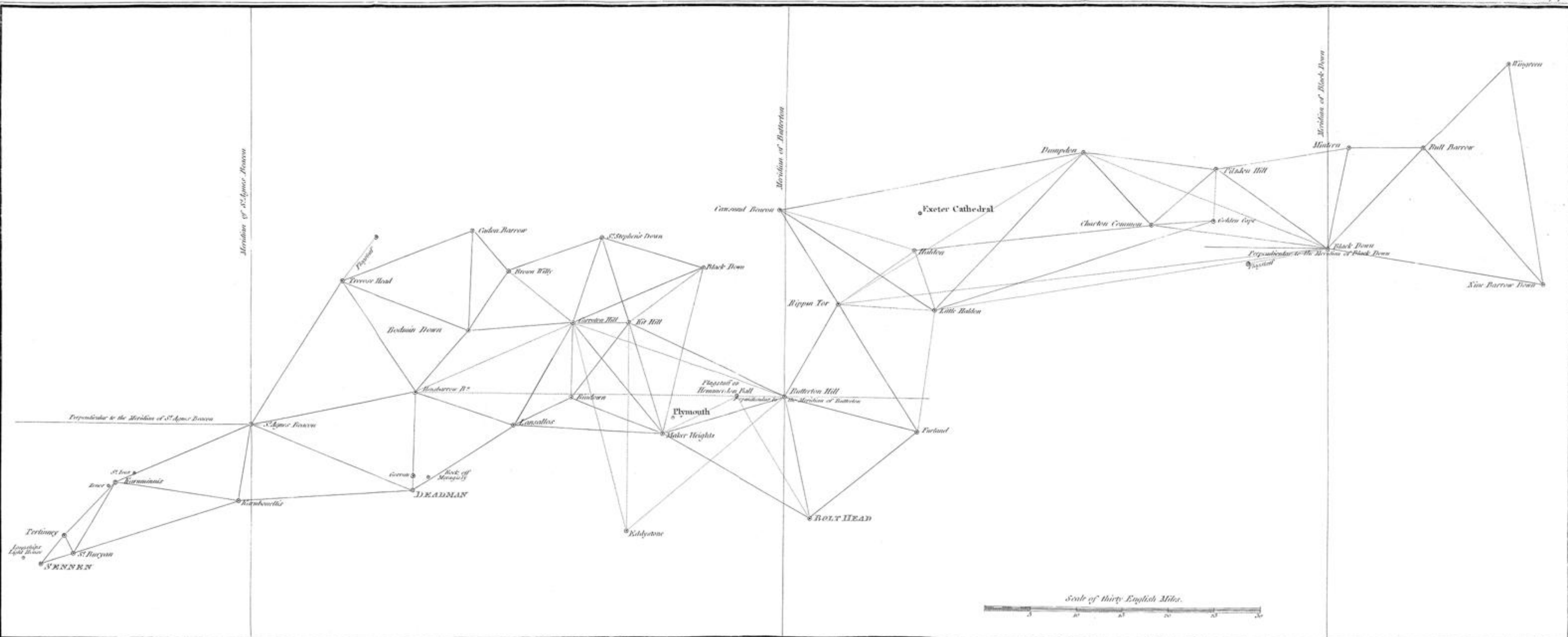
TRIANGLE



GLEES for the Survey of the Northern & Western parts of KEN

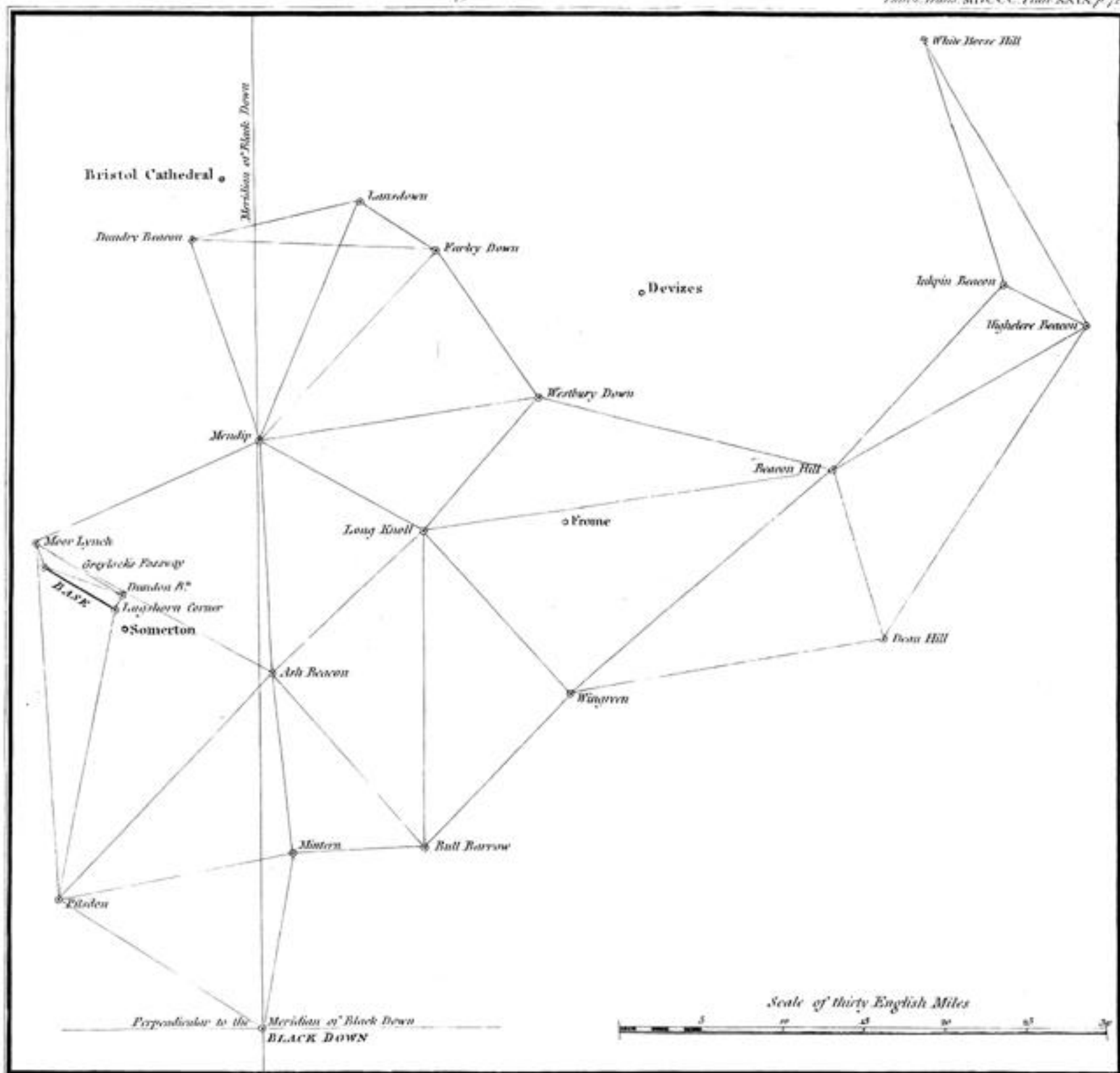


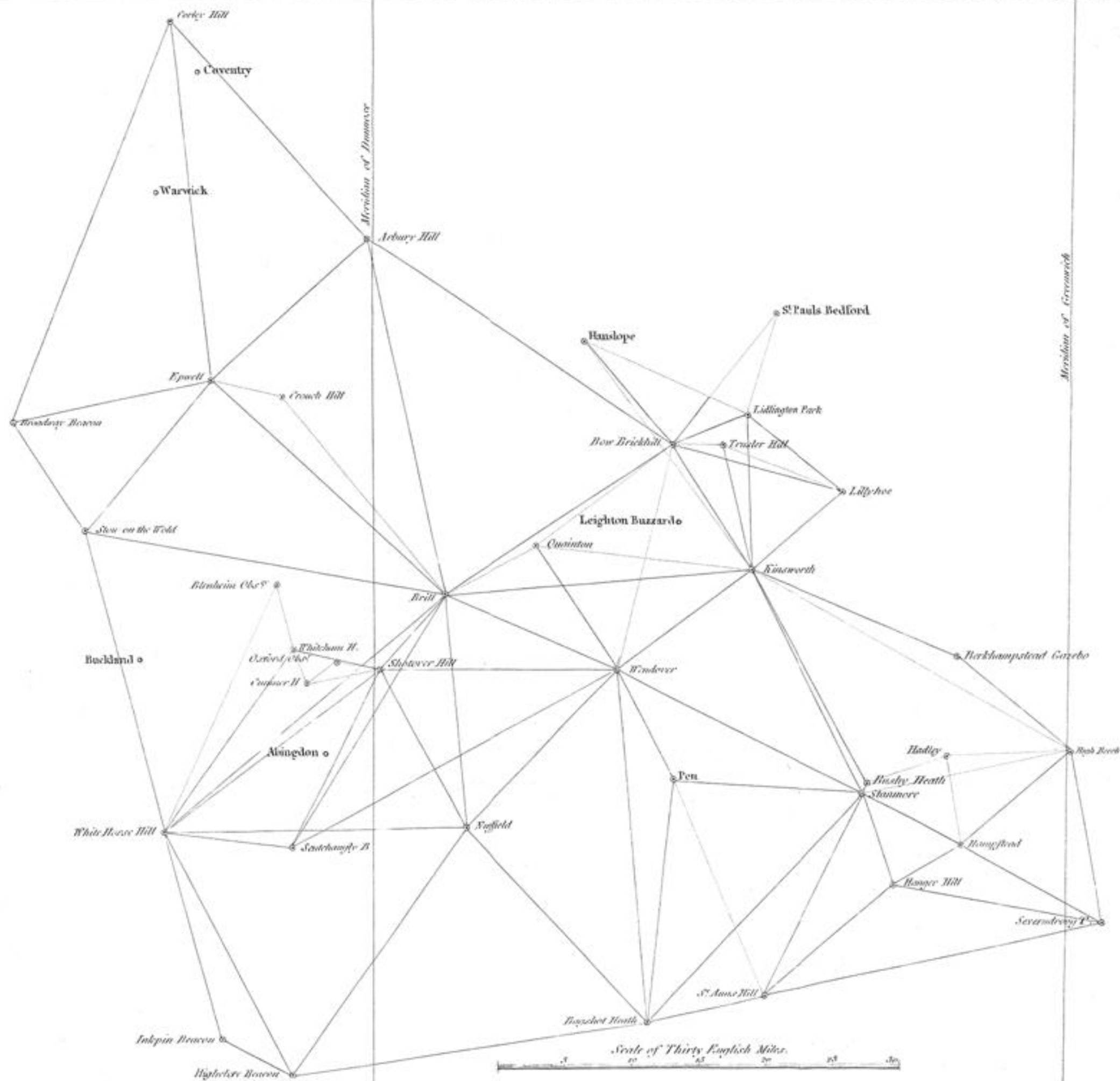




PLAN of the Principal Triangles in the TRIGONOMETRICAL SURVEY, 1798.

Philos. Trans. MDCCC. Plate XXIX. p. 725.





TRIANGLES for the Survey of the Northern & Western parts of KENT, 1799.

Philos. Trans. MDCCCLXXXIII. p. 728.

