

GENERAL INSTRUCTIONS *by the Surveyor General, to the Deputy Surveyors of the Eastern Division of New-Jersey.*

FOR avoiding Errors and Mistakes, for the easier revising and correcting of your Works, and for the greater Uniformity, I send you an Example of a Protraction annexed; and as that Example points out, you'll take Care,

I.

In your Protractions, That all Corners or Ends of Lines be numbered 1, 2, 3, 4, 5, &c. and so on, to correspond with your Field Work.

II.

Having chosen a North and South Line, as N. S. in the Example, let all Courses be set off by the Help of Parallels (to that first N. and S. Line) drawn from the End of every Line of your Work;—there be many other Ways of protracting, but by Experience I find this least liable to Mistakes.

III.

For the more Certainty of setting off the Parallels rightly, draw one East and West Line at Top, another at Bottom, as W. E. and set off upon one, or rather both of these, the Distances of the End of every Line of your Work, from your first North and South Line, and draw them in white; and thus taking your parallel Lines long, you run much the less Risque of erring.

IV.

Your Parallels thus drawn in white, point them so far as to meet the Radius of the Scale of Cords you use; and point also the Sweep of the Angle set off, and point so far as the Sweep beyond the Length of the Line set off; and thus do, thro' the whole Protraction, as in the Example; observing, that the larger your Scales, both for Cords and Lines be, the Exacter will be the Work. And I desire you would not be so saving of Paper as some are, and half a Sheet I esteem the least, that is proper for any Map with the Computations.

V.

Write the Courses and Distances as well on the several Lines of the Map, as on the Copy of your Field Work corresponding thereto, adding to the Field Work whatever Observations you think proper, as on whom bounding, Rivers, Brooks, Highways, with how many Norches or Blazes, or Letters, and what and where the Trees in your Courses are mark'd with.

VI.

In the vacant Places of your Paper, set down the Copy of your Computations of the Contents of every four-sided Figure, or three-sided Figure, as in the Example; distinguishing the Figure by the Numbers at the Ends of the Lines thereof, distinguishing the common Base by the two Numbers at the Ends of it, and distinguishing the Perpendicular by the single Number from whence it's let fall, or is taken to the Base, and dotting the Base near where the Perpendicular is let fall; as in the Example.

VII.

In some other vacant Place, collect the Contents of each of the particular Figures, in order to find the whole Content strict Measure; as in the Example.

VIII.

Forget not the Scale.

XI.

Forget not to insert the Course and Length of the last Line to the Beginning, the Neglect of it I always look upon as a Cloak for a bad Protraction, or to an Error in the Work: When an Error happens, it ought carefully to be search'd for and discovered, and not plastered over with that poor Artifice.

X.

If you bound on a River, Road, &c. be sure to send me a Copy of the Field Work, as well as your Protraction thereof, without which it's impossible that I can with Certainty examine your Works.

XI.

Measure your Chain before you begin any Work, to see that it be of a just Length; and if it happens to break during your Work, Measure it after you have mended it, to see that no Links are lost.

XII.

Whatever Survey or Resurvey you make, endeavour to find out and mention the Course and Distance that the Beginning thereof bears, from a certain Corner of some other Man's Land, the Patent or Survey whereof is upon Record; if no such be within any reasonable Distance, then fix the Course and Distance of the Beginning from the meeting of Brooks, from Rocks, or some other remarkable Thing, that there may remain the least Uncertainty that is possible of the Situation of the Tract surveyed.

XIII.

As no Survey can be right, unless the Chain-bearers be just and careful in chaining, therefore in order to induce them to be so, they are to take an Oath, or Affirmation if Quakers, before or after the Survey, To chain, or that they have chained, truly, to the best of their Judgments: Which Oath or Affirmation you have Power to administer, by Virtue of a Grant for that Purpose under the great Seal of *New-Jersey*; whereof a Copy is hereunto annexed, to save the Charge and Trouble of repairing to Magistrates for that Purpose, as heretofore. And you are to shew them, that unless they keep their Hand, which they hold the Stick in to stick in the Ground, very near to the Ground when they set a Stick, that they will be apt to err considerably, by the leaning of the Sticks backwards or forwards, which by their Oath or Affirmation they ought to avoid; and which, by their Hand being near the Ground, they can easily avoid.

XIV.

Let all your Returns of Survey be by Way of Letter to me, and, so far as Matter of Form, like to this Example.

Sir,

December 18th, 1721.

IN Pursuance of your Order to me directed, bearing Date the _____ Day of 1721, ordering me to survey for the Quantity of

Acres of Land in any Part unappropriated, in the Eastern Division of *New-Jersey*; I have surveyed all that Tract of Land lying in the County of _____ beginning [let that be well ascertained according to the 12th Instruction] and from thence running--1.--East three Chains and sixty five Links; thence--2.--South twenty nine Degrees fifteen Minutes East, two Chains eighty nine Links; thence--3.--North five Degrees and forty Minutes East, five Chains and fifty three Links; thence--4.--North sixty five Degrees thirty Minutes West, three Chains and seventy six Links; thence--5.--North sixty eight Degrees East, four Chains and thirty Links; thence--6.--North fifty Degrees and ten Minutes West, seven Chains and thirty three Links; thence--7.--South ten Degrees and forty five Minutes East, three Chains and fifteen Links; thence--8.--South thirty three Degrees West, three Chains and thirty four Links; thence--9.--South forty three Degrees East, four Chains and fifteen Links; thence--10.--South fifty Degrees West, two Chains and fifty Links, to the Beginning; containing three Acres and eighty seven Hundredths of an Acre, strict Measure: The Chain-

bearers were ----- and -----; and the Marker ----- Sworn, or affirmed, before me, I am,

To -----
Surveyor General.

XV.

As far as in you lies, for your own Satisfaction, and the Good of the Country, endeavour to make one Map of the Land appropriated in the County wherein you Survey; adding thereto, the several Tracts of Land you shall survey, with their proper Situation in respect of one another, to the best of your Judgments; let the Scale by which you do this, be one Mile, or eighty Chains to one Inch: But this will make some of the Tracts appear so small, that they will not admit of writing in them the Quantity, nor the Person to whom they were surveyed; therefore let the Tracts be numbered on the Map 1, 2, 3, 4, 5, and so on, and put a Table on the Margin of your Map: Thus, for Example

No	Quantity of Acres.	Time when surveyed.	To whom surveyed.
1	1000	1746, Aug.	Richard Roe.
2			
3			
4			
5			

And send me yearly a Copy of your Map and Table; in order for preventing the Confusion that otherwise the Country may fall into, by Surveys encroaching one upon the other.

XVI.

As the surveying Compass varies from the true North, and has a different Variation in different Parts of *New-Jersey*, inasmuch that it appears by Observations of the Variation, taken in October 1745, at the House of *Jarvis Pharo*, which is about six Miles and a half Northerly, from the South Point of the Division Line between *East* and *West-New-Jersey*, that the Variation was then there $5^{\circ} 25'$ West; and by Observations taken in October 1746, that the Variation at the North Point of the same Division Line, in the Latitude of $41^{\circ} 40'$ (which is about 146 Miles, measured from *Pharo's* nearly $N. 9^{\circ} W.$ by the Compass) was nearly one Degree and a Quarter more Westerly than at *Pharo's*; and as the Variation is not only different in the different Parts of *New-Jersey*, but in a Course of Years it becomes different in the same Place from what

it

it was before: And as all the Courses of the Boundaries of the Lands of *New-Jersey*, are named so as the *Magnetical Compass* doth point them out, the *Variation* of the *Variation* of the *Compass*, may in time occasion much Confusion of Bounds, and Contentions; to prevent which it is the Duty of Surveyors, as far as in their Power is. But the knowing the *Variation* in the Place at the Time of Survey, and the observing it afterwards when Disputes arise on that Head, the Difference of the *Variation* at those two Times will be thereby known, and may put an End to any Dispute that may arise from that Cause; wherefore I conceive it will be a publick Service, that every Surveyor do once a Year observe, what the *Variation* of the *Compass* is in the County where he Surveys. Though there be many Methods for observing the *Variation* of the *Compass*, yet I know none so easy as by the *North Star* and *Alioth*; Stars easy to be known by every one; for almost every one knows what is called *Charles's Wain*, consisting of four bright Stars, making nearly a Square, and three other bright Stars following the Square; its the first of those three (I mean that one next the Square) that is called *Alioth*. As to the *North Star* its easily distinguished, by looking North in a Line with the two foremost Stars of the Square, which point to it, (and for that Reason are called *The Pointers*.) The *North Star* is the Brightest of any that appear for twelve Degrees round it, and tho' it be two Degrees from the Pole, yet it has no perceptible Motion to the Eye out of its Place, whereas all the other Stars move round it. The most convenient Time of observing is in *October* and *November*; for *Alioth* comes on the Meridian, or is due North, about 11 o'Clock at Night in the Beginning of *October*, and about 7 at Night in the End of *November*: And as the *North Star* and *Alioth* come upon the Meridian at the same Time, within less than one Minute of a Degree, therefore *Alioth* will be then on a Perpendicular under the Pole; and to find when they are so, hang a Plummet to a white Thread, fastned to any Thing to support it, and let the Plummet hang in a Pail of Water to make the Thread steady, and to take off the Force of any Wind that would move it. Things being thus prepared, bring the Thread to the *North Star*, while *Alioth* is yet to the Westward of the Thread, and continue frequently to view when *Alioth* comes to the Thread, for then is the Moment for observing *Alioth* with your *Compass*; and as the *Compass* will then stand due North, the Degree of the *Compass*, which

the Needle thereof points to, is the *Variation*: Care should be taken that the *Compass* stand as level as possible, before the Observation; and if the Sights of the *Compass* are not high enough to view *Alioth* thro' them, (which is then between 6° and 9° high in *New-Jersey*) you may help that by making a streight thin *Ruler*, of about two Foot long, exactly of half the Breadth of your Sight, and tying it on the Sight so as one Edge of it do exactly coincide with the Slit and Hair. You should have a *Lantern* and *Candle* held by one behind you, so as to throw some Light on the Thread, and on your *Compass*; and the Thread should hang as near to the *Compass* as conveniently you can, that you may move your Eye from the Thread to the *Compass* without moving your Body out of its Place. Be pleased to send yearly in *December*, to my Office, some of the best of the Observations you made in the two Months before, with the Days when, and Name of the Place where you made them; with your Judgment how far that Place is from the Court-House of the County; and your Judgment of the Course it bears from the Court-House; which will enable me to make yearly a Certificate, how the *Variation* in the several Counties is that Year, to be put upon Record for the Use of Posterity.

XVII.

As by Reason of the *Variation* of the *Variation*, Disputes may arise on Surveys to be made, so many Disputes, Contentions and Law-Suits have actually arisen on the Bounds of Surveys heretofore made, by Reason that the *Compass* does not now keep to the same Lines, that were run and mark'd when those Surveys were made. And as the *Variation* of the *Compass*, and the *Variation* of the *Variation*, are Things but very lately thought of, in this and the neighbouring Provinces, and as yet denied by many; little or no Care has been heretofore taken to ascertain, what the *Variation* was at the Time and Place of former Surveys; many of the Surveyors of *New-Jersey* have been beforehand with those of the neighbouring Provinces, and by their own Experience in running of Lines long ago run, they have found their *Compasses* to point always to the right Hand of these Lines; and that it requires nearly one Degree Allowance to the Left for every Twenty Years since the Line was run, to keep to antient Lines, (the *Variation* at the *North Partition Point*, having in 1719, been observed to be 8° West, compared with the said Observation in 1746, nearly agrees with that Rule :) But whether this Rule be just, or should be a little more

or less, or whether it will answer so in all Places of *New-Jersey*, it's Time and Experience only that can discover; and it certainly must be a publick Benefit to discover it with Certainty; for which Purpose, I know of no better Way than that which many now do use, *viz.* where a Line has been run many Years ago and mark'd, first by boxing the Trees, to be sure that the Age of the Marks agrees with the Time of the Survey, whereof it's alledged they are mark'd Trees; and then, by running the Line as the Compass now points, and taking Off-sets to it from the mark'd Trees, and thereby the Angle of the Difference is easily found. And I know of no Method to compute that Angle so easy as by this Rule, *viz.* as three Fourths of the Distance run: is to the Off-set :: so is *Forty Three*: to the Degrees and Minutes of the Angle to be allowed for the Difference of the *Variation*, since the Line was mark'd. *Example*; suppose the Distance run to be 84 Chains, and the Off-set to a mark'd Tree at that Distance 2 Chains, then as 63 (which is $\frac{3}{4}$ of 84) is to 2 :: so is 43: to $1^{\circ} 21' \frac{1}{2}$, which comes nearest to 22', which $1^{\circ} 22'$ is the Allowance to be made to the Left, to run the Line so as to coincide with the Line as it was mark'd. You are to note, that when the Degrees are got, the Remainder must be multiplied by 60, to get the Minutes. You are also to note, that this Rule holds true within one Minute, only so far as 7° ; but errs more than a Minute when the Angle is 8° or upwards, as by comparing it with the Tables of Logarithms you may find.

When it falls in your Way to run any Lines formerly run and mark'd, I should be glad you would particularly remark the Situation of the Tract, by whom and when the Line was first run and mark'd, and the Person for whom, and what Difference you found between your *Compass* and that Line; and send me yearly a Copy of such Remarks, along with your Observations of the Variation of the *Compass*. There was a Line run by *George Keith* in the Year 1687, from *Little Egg-Harbour* to *Raritan*, being about Sixty Miles in Length; the Course he run was $N. 14^{\circ} 20' W.$ as the *Compass* then pointed; (as by the Record thereof in *Lib. O, Page 1*, at *Perth-Amboy*, may appear) but within a few Years past, sundry Surveys and Resurveys have come to my Hands bounding on that Line, and I find that one with another, they make the Course of that Line, by the *Compasses* now, to be about $N. 17^{\circ} 30' W.$ some a little more and some a little less; and as that Line was run for a Division Line between *East* and *West-Jersey*, and was esteemed such for a long Time, the Places thro' which it passes are well known: I should be particularly glad of an Account of any Surveys made on that Line, to add them to what I have already; for thereby we may in great Measure ascertain the *Variation* of the *Variation*, between 1687, and the present and future Times.

The special Instructions to particular Surveyors, and on particular Points, are to be observed as before.

EXAMPLE

EXAMPLE referred to in the preceding Instructions.

Computation of the Content of the four-sided Figure

1--2--3--4--

Base.		Perpendiculars.	
Ch. Links		Ch. Links	
4-- 2--	3, 44	1--	2, 96
$\frac{1}{2}$ Perp.	2, 74	3--	2, 52
	1376		5, 48
	2408	$\frac{1}{2}$ is	2, 74
	688		
	94256		

Computation of the Content of the four-sided Figure,

1--4--5--10--

Base.		Perpendiculars.	
Ch. Links		Ch. Links	
10-- 4--	3, 74	1--	0, 92
$\frac{1}{2}$ Pp.	1, 73	5--	2, 54
	1122		3, 46
	2618	$\frac{1}{2}$ Pp.	1, 73
	374		
	6470		

Computation of the four-sided Figure, 10--9--6--5--

Base.		Perpendiculars.	
Ch. Links		Ch. Links	
9-- 5--	3, 00	6--	1, 90
$\frac{1}{2}$ Pp.	2, 33	10--	2, 76
	699		4, 66
		$\frac{1}{2}$ Pp.	2, 33

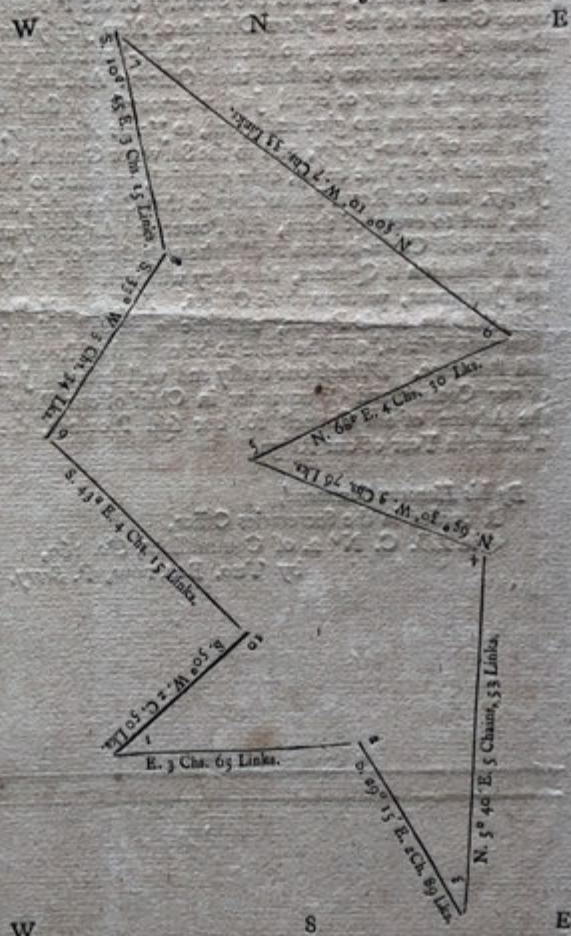
Computation of the four-sided Figure, 9--6--7--8--

Base.		Perpendiculars.	
Ch. Links		Ch. Links	
6-- 8--	5, 26	9--	3, 22
$\frac{1}{2}$ Pp.	3, 02	7--	2, 82
	1052		6, 04
	15780	$\frac{1}{2}$ Pp.	3, 02
	1, 58852		

Copy of the Field-Work.

No. of Links	Course.		Length.
1	E.		3 65
2	S. 29°	-- 15 E.	2 89
3	N. 5°	-- 40 E.	5 53
4	N. 65°	-- 30 E.	3 76
5	N. 68°	-- 00 E.	4 30
6	N. 50°	-- 10 W.	7 33
7	S. 10°	-- 45 E.	3 15
8	S. 33°	-- 00 W.	3 34
9	S. 43°	-- 00 E.	4 15
10	S. 50°	-- 00 W.	2 50

N. B. As the Printer could not represent the dotted Lines in the Example, it's referred to the Deposits severally to supply that Defect, which they can easily do from the Computations, where, on the Left, they will find the Points, thro' which the Bases were drawn in white: On the Right, they will find the Points from which the Perpendiculars were let fall to the Bases there, and where they touch the Base dot the Sweep; through each Angle let them draw a North and South Line in white, and by any Scale of Chords sweep the Angle from it to the Line, and dot both; and where Lines are shorter than the Radius of the Scale of Chords, dot them to meet the Sweep, and then the Example will be nearly such as was given to be printed.



Sums.	
Figures.	Contents
1--2--3--4	0, 942
1--4--5--10	0, 647
10--9--6--5	0, 699
9--6--7--8	1, 588
Total Content,	3, 876

Scale 2 Chains to an Inch.

1753

WILLIAM PATRICK

GEORGE the Second, by the Grace of GOD, of Great-Britain, France and Ireland, King, Defender of the Faith, &c. TO ALL to whom these Presents shall come or concern, GREETING: WHEREAS it may greatly tend, to prevent Frauds and Abuses, and to the Security of the Properties of our Subjects, that the Surveyor General of the Eastern Division of New-Jersey for the Time being, and his lawful Deputies, be impowered, to swear all Chain-bearers and Markers, by them to be employed, to the due Execution of these their Offices: And we being willing to grant, whatsoever tends to the doing of equal Justice amongst our Subjects, have given and granted, and by these Presents do give and grant, to James Alexander, Surveyor General of the Eastern Division of New-Jersey, and to the Surveyor General of the Eastern Division of New-Jersey, and our Royal Instructions in that Case made; and to his and their lawful Deputies, and to every of them, full Power and Authority at all Times hereafter, to administer, to all Chain-bearers and Markers by them or any of them to be employed, an Oath, or Affirmation if Quakers, that they will well and truly to the best of their Knowledge and Judgment, perform those Offices. In Testimony whereof we have caused these our Letters to be made Patent, and the great Seal of our Province of New-Jersey to be thereunto affixed, and the same to be entered of Record in our Secretary's Office of our said Province. Witness our trusty and well beloved JOHN HAMILTON, Esq; President of our Council and Commander in Chief of our Province of New-Jersey, by and with the Advice of our Council for our said Province, the Eleventh Day of May, in the Twentieth Year of our Reign.

By his Honours Command,
Recorded in the Secretaries Office,
in Lib. C. N^o 2. of Commissions, &c. 169,
by THO. BARTOW, P. Secry.

READ.