The Work of Charles Mason and Jeremiah Dixon

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Key words: Mason, Charles; Dixon, Jeremiah; Mason-Dixon Line; Pre-revolutionary History; Surveying; Geodesy; US History; Pennsylvania; Maryland.

ABSTRACT

The geodetic activities of Charles Mason and Jeremiah Dixon in America between 1763-68 were, for the period, without precedent. Their famous boundary dividing Maryland from Pennsylvania, the Mason-Dixon Line, today remains a fitting monument to these two brave, resourceful and extremely talented scientists.

Tutored by Astronomer Royal Dr James Bradley, Charles Mason was aware of the contemporary theories and experiments to establish the true shape of the Earth. He was also cognisant of what was being termed "the attraction of mountains" (deviation of the vertical). However, at the time it was no more than a theory, a possibility, and it was by no means certain whether the Earth was solid or hollow.

The Mason-Dixon Line, a line of constant latitude fifteen miles south of Philadelphia, although the most arduous of their tasks, was only part of their work for the proprietors of Maryland and Pennsylvania. For the Royal Society of London, they also measured the first degree of latitude in America.

In recent years, the Mason-Dixon Line Preservation Partnership has located many of the original markers and surveyed them using GPS. The paper reviews the work of Mason and Dixon covering the period 1756-1786. In particular, their methods and results for the American boundary lines are discussed together with comments on the accuracy they achieved compared with GPS observations.

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1. INTRODUCTION TO A FAMOUS PARTNERSHIP

Had it not been for a curious astronomical event and a last minute change in plans by the Royal Society of London, the famous Mason Dixon partnership might never have come to pass.

The event was the 1761 Transit of Venus, which it was hoped would solve the vexatious question of the solar parallax. Edmund Halley, who predicted the event, left instructions how the observations could be accomplished. Unfortunately, when the time approached Britain was in the middle of the Seven Years' War. This, coupled with some dalliance on the part of the Royal Society, meant that plans to despatch overseas observing expeditions were left to the last minute. It was decided to send Reverend Nevil Maskelyne, a young Cambridge Fellow, to the southern Atlantic island of Saint Helena. The Astronomer Royal, Dr James Bradley suggested that Charles Mason, his observatory assistant, should assist Maskelyne.

Charles Mason (1728-1786) was the son of a Gloucestershire baker and miller. He attended Tetbury Grammar School and, by all accounts, was an accomplished mathematician. In 1756 Dr Bradley offered him the assistant's job (or labourer as it was called) at the Royal Observatory, Greenwich. Mason's job was to assist with the nightly observations and to compile and reduce the results for the observatory's star catalogue.

In the late summer of 1760, the Royal Society decided to send another team to Sumatra, but it was not until September that Mason was officially given the job. To assist him, the London instrument-maker John Bird recommended Jeremiah Dixon, the son of a Quaker acquaintance. Jeremiah was a land surveyor, although it is not known how he acquired his skills, he was also a keen astronomer. Dixon's competence was examined at the Royal Military College after which he declared his willingness to place himself under Mason's direction.

The two men shared a number of adventures together during the Transit of Venus campaign including a sea fight with a French warship. Despite having to divert to Cape Town, their work was a total success and seafarers would use their primary latitude and longitude for the Cape for many years to come. By the time they returned to London, in early 1762, their exploits and achievements were well known.

2. AMERICA

By chance, Mason and Dixon's return to London coincided with the search then being conducted by Thomas Penn and Cecilius Calvert (uncle of Lord Baltimore of Maryland) for surveying instruments and expertise to establish the boundaries of their American provinces. For some eighty years, the border between Pennsylvania and Maryland had been the subject

of bitter dispute and hostilities. In 1750, Lord Harwicke, presiding over the Court of Chancery, had ruled on the issues and set down certain procedures. American surveyors were engaged to survey the borders and, for a while, work progressed. However, one particular boundary, the so-called Tangent Line, proved intractable. The provincial governors sent to their proprietors requesting better instruments and experts to use them.

Learning of Mason and Dixon's accomplishments, Penn and Calvert made arrangements to meet them, probably through the offices of John Bird or James Bradley. Discussions and examinations led to their eventual appointment. John Bird built the special surveying instruments for the project including a six-foot tall zenith sector for measuring the latitude, a transit and equal altitude instrument for astronomical observations and running directions, an 18-inch Hadley pattern quadrant and a brass standard.

Mason and Dixon arrived in Philadelphia on 15 November 1763. Although the war in America had concluded some two years earlier, there remained considerable tension between the settlers and their native neighbours. Chief Pontiac had roused the tribes along the western marches and there were rumours of all sorts of atrocities. It was in this atmosphere of tension and civil unrest, that Mason and Dixon met with the Commissioners appointed to run the lines, to discuss the operations and check the instruments. To John Bird's collection of optical instruments was added an astronomical regulator, a special long-case pendulum clock for timing astronomical observations made in Philadelphia by a Mr Jackson. Mason and Dixon were furnished with the latest almanacs from the Royal Observatory containing stars listed by declination and right ascension. Adjustments for aberration, nutation, precession and refraction were applied individually. Calculations were performed using seven-figure logarithms. Throughout the survey, every occasion of an eclipse of the sun, moon or primary star, was observed and the location noted in their journal. Mason knew that the same would be observed in London and Paris, from whose observatories he received regular updates.

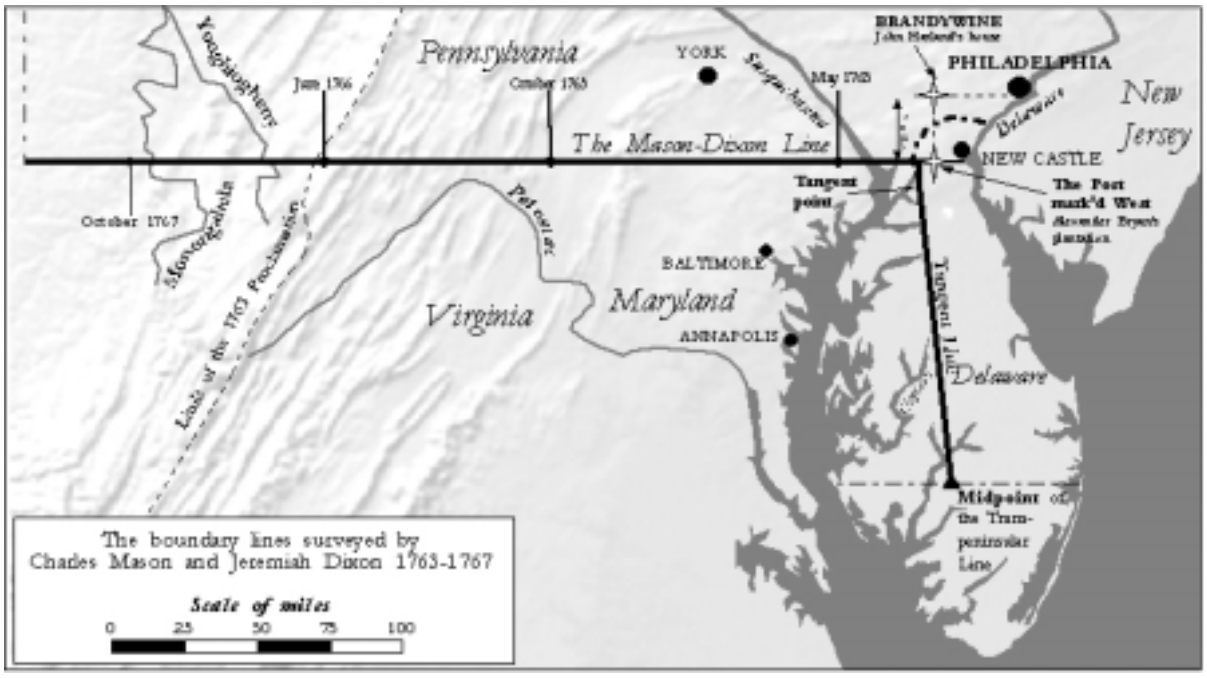


Figure 1: The borderlines surveyed by Charles Mason and Jeremiah Dixon

Mason and Dixon's first task was to establish the latitude of "the southernmost point of the city of Philadelphia" as physically represented by the front wall of the Plumstead and Huddle house in Cedar Street (South Street). According to Hardwicke's ruling, the boundary dividing Pennsylvania from Maryland had to lie exactly fifteen miles south of this point. It required more than a month in the winter cold for Mason and Dixon to complete the latitude measurement.

All latitudes measured in America were by zenith sector. Sadly, no contemporary images of this particular instrument survive. However, similar instruments by Bird and one fashioned by David Rittenhouse, reputedly based on Mason and Dixon's instrument, show that the observer had to lay prone upon the ground to peer through the telescope. The arc of the instrument extended no more than 10º either side of the vertical; measurements were enhanced with a tangent micrometer screw (invented by Bird) that allowed measurements to the nearest half second of arc. Bird estimated the instrument's precision to be about two seconds. It is clear from Mason's observations that one revolution of the tangent screw did not equal a whole minute; a reference in *Philosophical Transactions* in 1768 gave one revolution as being equal to 54 seconds although this is by no means certain. The instrument was set in the plane of the meridian by observing the differences of stars as they crossed the cruciform cross hairs, or reticule, of the eyepiece. The instrument was turned 180º at least twice to mean out alignment errors. The reticule of the instrument, probably spider web, was illuminated by a candle or spirit lamp through a small hole in the slide of the eyepiece. In all likelihood, it required at least three men to make an observation.

It required 134 observations of just five stars to determined the latitude of the southernmost point of Philadelphia as 39º 56' 29". 1 N. Mason and Dixon's next task was to find a point, about 31 miles west, having this same latitude. The two English surveyors, together with their American colleague, Joel Bailey, arrived at the farm of John Harlan on the banks of the Brandywine River where temporary boundary marks established in 1736 still stood.

Latitude observations began immediately, first from a temporary tent erected in the garden, then from their portable wooden observatory. The latitude was compared with that observed in Philadelphia and the difference found to be 10.5" less. Mason calculated this was equivalent to 16.23 chains (326.5m) based on information provided him in London by Dr John Bevis. Bevis used a figure of 69.5 miles to one degree based on the work of the French Académie Royale de Sciences. Mason made a note that, should his own measurement differ, the error would be proportioned accordingly.

Figure 2: 5½ foot tall zenith sector by David Rittenhouse. Courtesy National Museum of American History, Washington DC.

Next, they observed a meridian by equal altitudes of Cappella using the transit instrument and timed with a simple watch and Mr Jackson's clock. In this instant, the meridian was determined by a simple upper transit of Polaris. One of the marks of this meridian still exists and is known as the Stargazer's Stone; it is a protected state monument.

The linear measure of fifteen miles began from the Harlan house on 2 April 1764, using 22-foot long 'levels' constructed by their carpenter, John Loxley. These levels, later described by Mason in the pages of the Royal Society's *Philosophical Transactions*, were large heavy wooden frames designed to support precision made brass-tipped fir measuring rods. The quality of Loxley's levels didn't please Mason so he reverted to using the lighter 'one-rod' levels they had brought from England. Where the ground was flat, recourse was made to their 66-foot Gunter chain, checked daily against Bird's brass standard.
Seventeen days later they arrived in a field belonging to Alexander Bryan. The latitude was measured with the zenith sector and Mason was able to determine the preliminary length of a degree as 1.28 miles less than Dr Bevis's estimate. To check the measurement, the entire distance was repeated, bay for bay, all the way back to the Brandywine. The final spot deemed to be exactly 15 miles south of Philadelphia was marked by a white painted oak 'Post mark'd West' at latitude of 39° 56' 18". 9 N.

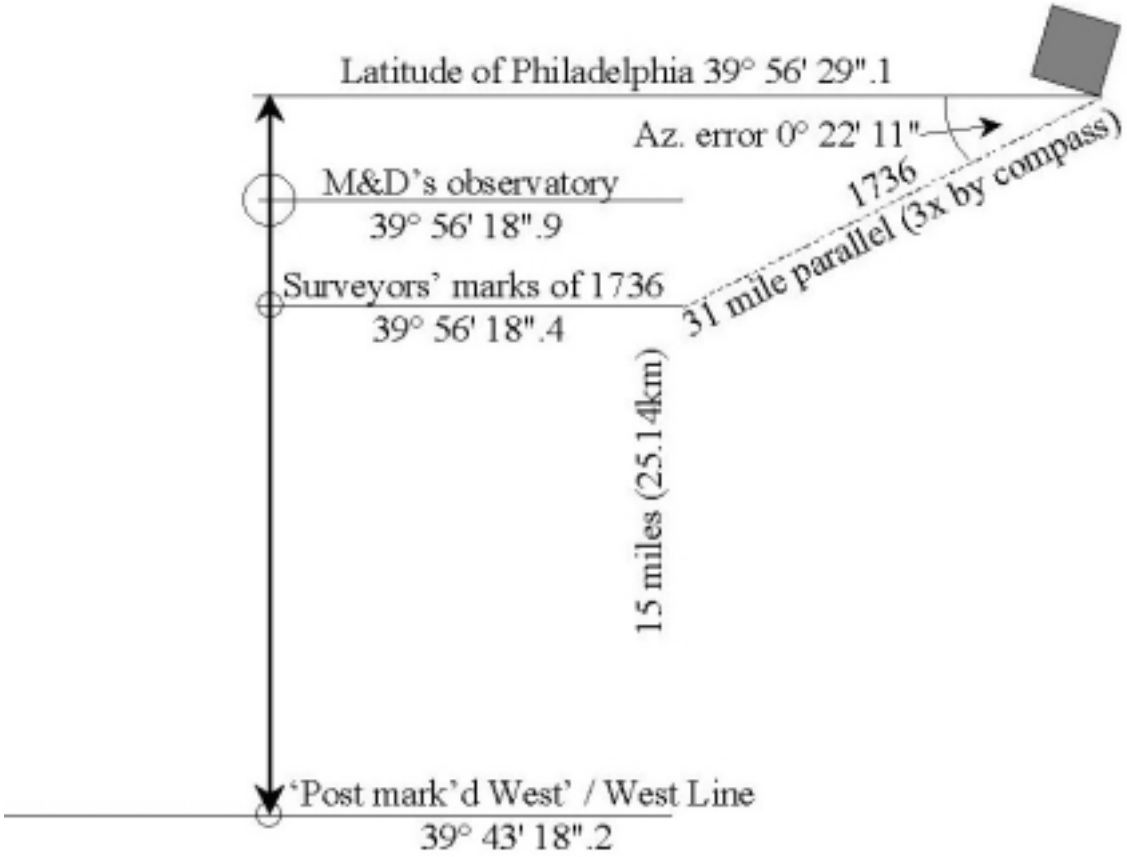


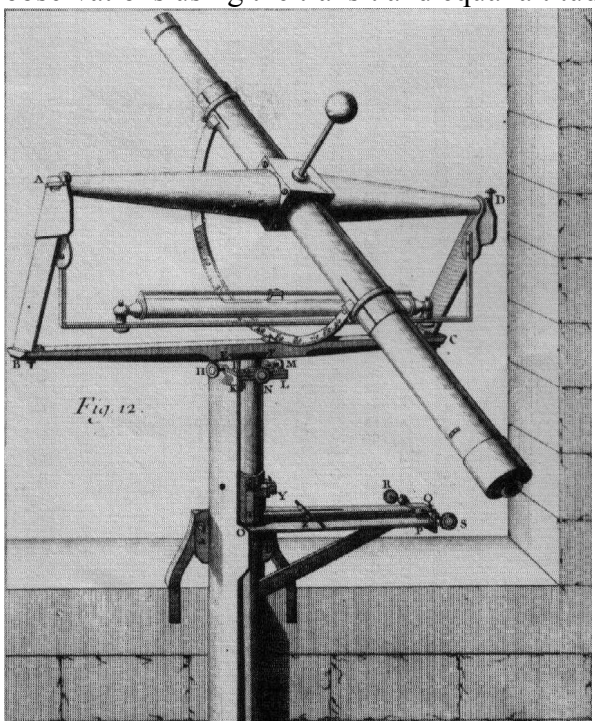
Figure 3: Key latitudes observed

2.1 The Tangent Line

The "Post mark'd West" was the starting point for the West Line (now known as the Mason-Dixon Line); however, the next priority was Lord Baltimore's eastern boundary. Lord Hardwicke in his judgement had ruled that the border in the vicinity of New Castle, Pa, should be a circle of twelve miles radius. Some eighty miles south, the east-west trans-peninsular line divided the Three Lower Counties (Delaware) from Maryland, and its Middle Point, half way between the Atlantic and Chesapeake Bay, was already established (1755). Lord Baltimore's eastern boundary was required to run from Middle Point slightly west of north until it grazed the New Castle circle as a tangent; hence the line became known as the Tangent Line.

Between 1761 and 1763, American surveyors had run several lines, relying upon trigonometry and angular measurements, but which missed the tangent point. More seriously, the lines were not particularly straight. However, their survey marks remained on the ground and of this Mason and Dixon took advantage. Mason was an astronomer and deemed the most important thing was to run a dead straight line – that it would miss the tangent by some 450m was of little concern. His solution was to choose δ Ursa Minor, a small star in the tail of the Little Bear, as his guide. Using the American markers as a preliminary guideline,

Mason observed when the star transited this line and noted the sidereal time. They worked exclusively in sidereal time determined daily, and nightly, from equal altitude meridian observations using the transit and equal altitude instrument.



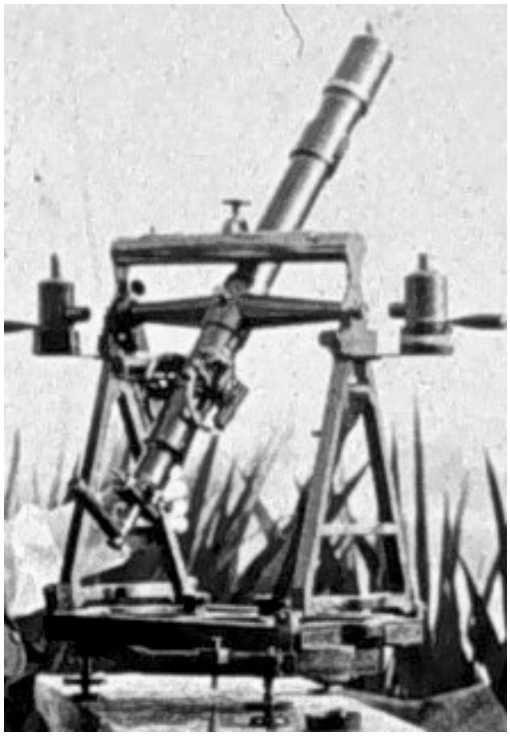


Figure 4: Transit and equal altitude instrument.
Left: George Graham's design. Right: lighting system for an 1870 Davidson-Mead astronomical transit.

For 60 days the survey team chained northwards, measuring offsets to the American line as they went, until they reached the vicinity of the Tangent Point. Their assistants measured the distance to the point, previously established by the earlier colonial surveyors, and this distance was proportioned back along the way. The measured offsets were then added (or subtracted) to derive how much to move each marker to bring it into its proper position. To check the result, Mason and Dixon ran another dead straight line and measured the new offsets. The greatest error was about 3.5 feet. Mason then checked the angle at the tangent with their Hadley quadrant – if the line was correct then it should make an angle of 90º with the courthouse belfry in New Castle. Mason wrote "it was so near a right angle, that, on a mean from our Lines, the … Post is the true tangent point".

Before retiring for the harsh winter, they had an appointment with the Commissioners where it was agreed that the West Line was the next priority and should be run as far as the Susquehanna River. That winter, Mason took himself off alone to explore the countryside as far as New York.

2.2 The West Line

The first stage of the West Line, the famous Mason-Dixon Line, was begun on 5 April 1765. The line was to be of constant latitude and from the outset Mason determined to reduce all his latitude observations to those measured at the "Post mark'd West", the datum point as it were. At the time, the only latitude known to the world was what we today refer to as astronomical latitude; in the 1760's any other definition would have been quite meaningless.
As it would have been impossible to trace a line of constant latitude, Mason resolved instead to set out sections of a great circle, each 10 minutes of arc long, at the termini of which he would observe the latitude. Any error could then be adjusted and the offsets from the great circle to the true latitude calculated at mile intervals. The astronomical method he chose to establish his initial direction was the so-called secant method that gave 89º 55' 51" west of north as the required azimuth. To find this direction, they first established a meridian by equal altitudes with the transit instrument to determine local sidereal time and to determine the rate of their watch. Observing their chosen easterly or westerly stars at the appropriate moment, they set out a series of marks about half a mile distant. This was done by means of candle lanterns set behind pieces of wood manoeuvred to and fro by one of the assistants. The mean of the cluster of marks, seldom more than 12 inches (30cm) across, was the direction to be maintained for the next 11 miles. It is probable that the transit instrument was the chief means of keeping on line although it is thought that Dixon had his own circumferential 'theodolite' with him and this may have been used on occasion.

After eight days, the survey party arrived at the end of the first section. The zenith sector was set up and the latitude observed; they were 43 yards (39m) too far north. Adjustments were made and offset tables prepared before moving off on the next leg. The offset to the 'true latitude' was determined for each milepost and corrected by the closing error proportionately.

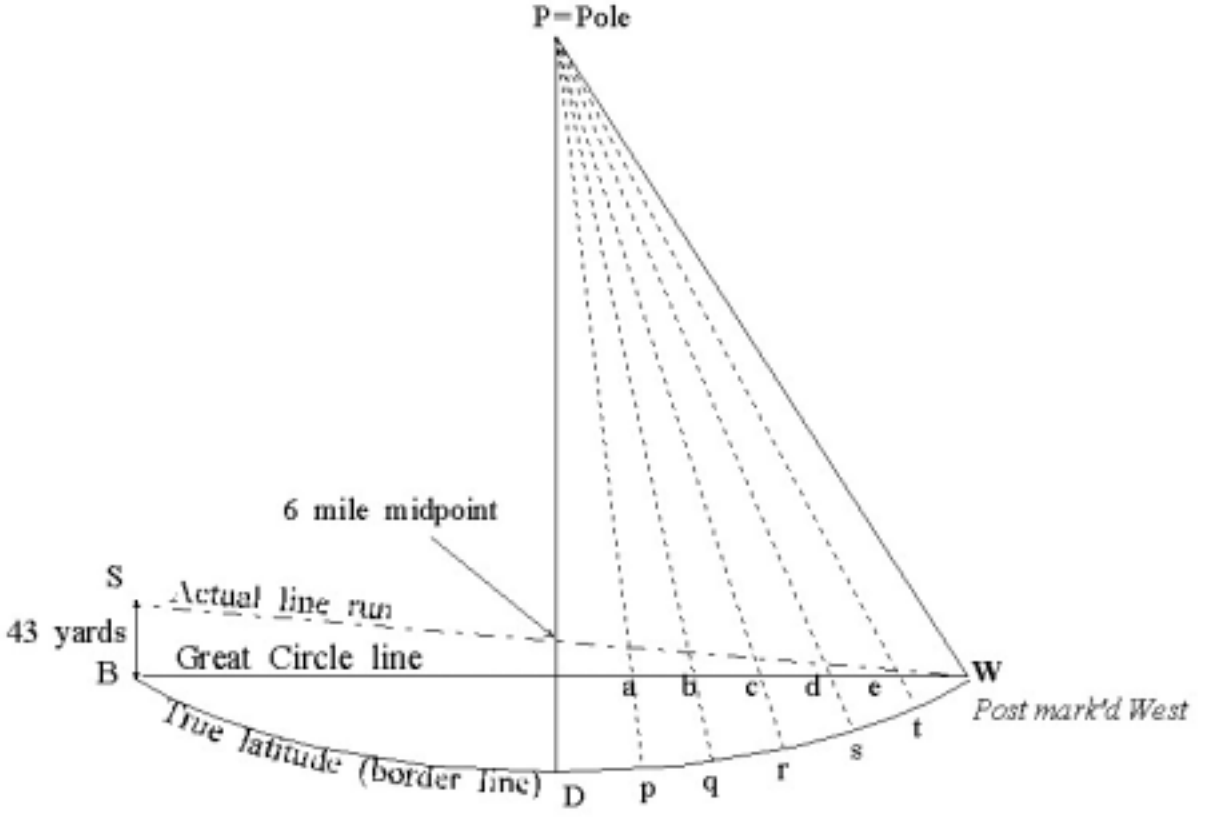


Figure 5: Mason's method for determining the offsets from the great circle to the true latitude and adjusting any closing error.

On 12 May they arrived at the Susquehanna River, which marked the limit of their commission. The latitude was measured and the width of the river established using a baseline on the far bank and measuring the horizontal angles with their Hadley pattern quadrant. Returning eastwards, the offset tables from the great circle lines to the required latitude were set out from the lines actually run and each point marked with a post. Later, these marks would be replaced with permanent stones.

Mason and Dixon's next task was to complete Baltimore's eastern boundary from the Tangent Point north to the West Line; this they began on 1 June. The boundary was a meridian line, known as the North Line, and its first section crossed the New Castle circle as a simple chord. A few miles later they arrived at the West Line, which completed this easy job.

It had been agreed with the Commissioners that Mason and Dixon should continue the West Line; however, politics intervened. In late 1763, partly to appease the restless Native Americans, King George III had issued a proclamation that prohibited settlement beyond the Allegheny mountain divide. This enactment cast doubts on just how far west the survey could proceed. In the event, the surveyors' instructions were "to continue … as far as the country is inhabited, etc". On 21 June the, by now large, survey team assembled on the banks of the Susquehanna. Mason had devised a method for speeding up the work; instead of measuring the latitude at the end of each great circle segment, which consumed a week or more, he decided to extend this to every second segment. In between he determined to set out a long, thin triangle on the ground comprising the line of approach as one of its sides. About a mile along this line he set out a short right-angled offset to give him the required deflection angle of 0º 04' 09" north of west. The transit instrument was aligned on this point to give the survey party its direction.

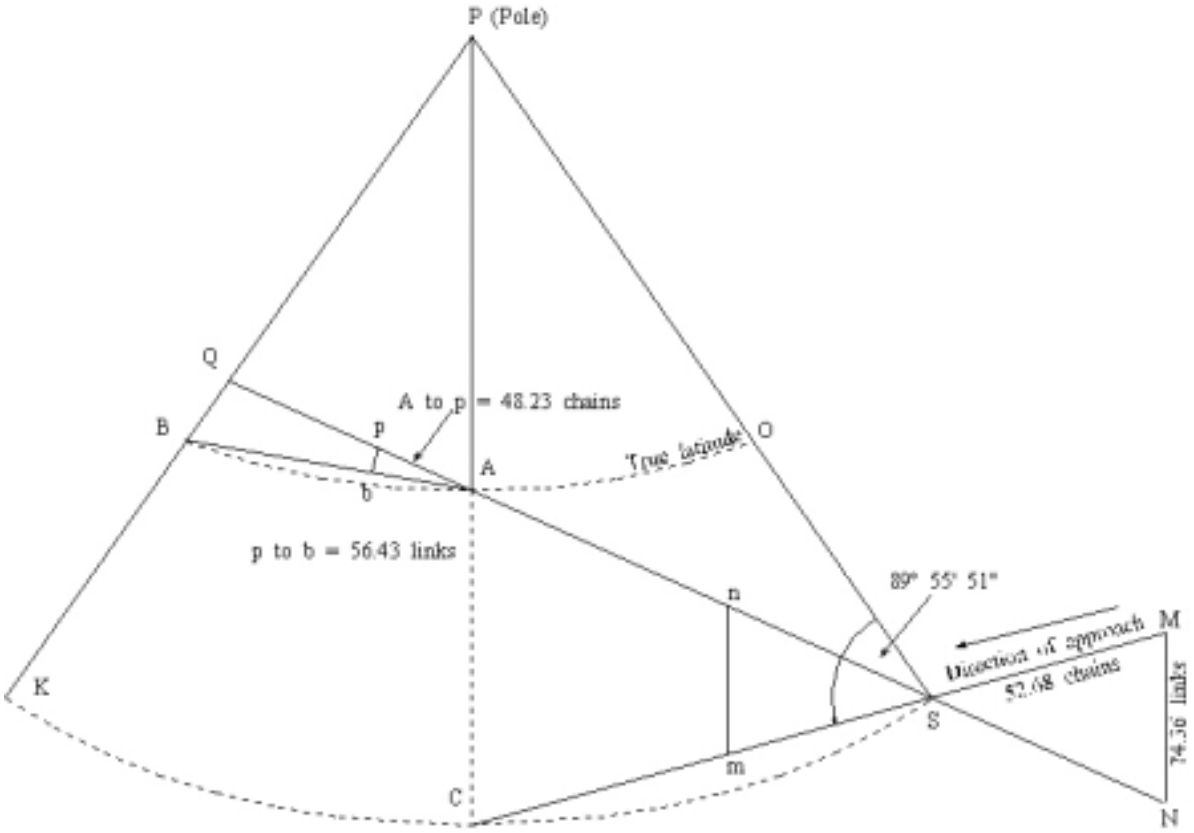


Figure 6: Mason's method for changing direction.

The first veracity check for this expeditious method came on 12 July at the end of the second 10 minute great circle segment. When the latitude was measured they discovered they were just 56 feet (17m) too far south. The next opportunity was 7 August when they discovered their error was 6.96 chains (140m) too far north. On each occasion a meridian was also observed using the transit instrument and pocket watches.

By the beginning of September they had reached South Mountain marking the start of the hill sections. On the steepest slopes, to preserve accuracy, the survey resorted to its one-rod levels rather than the chain. The limit of their instructions was reached on 6 October. When they measured the latitude they found themselves 12.84 chains (260m) too far south.
Before returning east to set out the offsets, Mason needed to check a vital detail. Although the official map showing the legal boundaries gave the Potomac River crossing north into Pennsylvania, it was a well known fact that it turned to the south-west. If the West Line crossed this bend in the river, then Maryland would become divided and the political consequences could be dire. Accompanied by Captain Evan Shelby, the local magistrate, Mason, Dixon and some of the other surveyors climbed to the top of North Mountain. Perhaps using Jeremiah's theodolite, they were relieved to see, ten miles distant, the bend in the river lying about a mile or so to the south.

That winter the two Englishmen spent some time in Philadelphia. Towards the end of February, Mason took himself off on another jaunt around the colonies, south to Williamsburg, Va. Stopping off to visit Governor Horatio Sharpe in Annapolis, Ma, Mason learned that a meeting of the Commissioners had been scheduled. In the event, Dixon attended this meeting alone where he received instructions to proceed with the survey as far as the Allegheny divide; the limit set by the royal proclamation of 1763.

The survey crew assembled on 1 April 1766 and from this point on Mason began noting the location of the nearest British forts; they were heading into dangerous wilderness. The Potomac River passed by, a safe mile and a half south, before they reached the steep slopes of the mountains. Some 140 miles west of Bryan's field they checked the latitude and were just twenty feet too far south.

At Town Hill, while setting out a distant post atop a hill to the east as an RO, Mason demonstrated the transiting ability of John Bird's transit and equal altitude instrument. The telescope of the instrument was too long to swing through its arc so it was lifted off the trunnion axis and turned to face the opposite direct. The telescope was then inverted, and the same procedure adopted. Perhaps this is the first description of such a procedure and it is most appropriate that American theodolites are still known as transits.

The east side of Savage Mountain marked the western extent of 'habitation', sparse though it was. It also marked the limit of that year's work because, just ahead of them, was the ridge that marked the line of the 1763 royal proclamation. The zenith sector was erected and it took just seven days to measure the latitude – they were 241 feet (73m) south.

Returning to the St. Patrick's tavern in Newark, they found letters waiting, the most important of which was a reply from the Royal Society to a proposal by Mason and Dixon for measuring the length of a degree of latitude.

2.3 Degree of Latitude

As they had reached a lull in their work for the proprietors, they decided to begin work immediately on the first British, and first on American soil, measurement of a degree of latitude. The lines chosen were Brandywine to the West Line, the North Line and the Tangent Line. The first task was to re-observe the latitude at the Middle Point. Operations began on 8 October using the zenith sector in the same way as for the borderlines. Alongside, the transit instrument was used for equal altitudes to determine sidereal time. Meridian transits of the moon provided relative longitude. The first stage of the degree of latitude came to an end on 28 October when they had to attend a meeting of the Commissioners.

The last task before the winter break was to measure the distance from the "Post mark'd West" to the Delaware River. According to Pennsylvania's charter, the western extremity of the province was to lay 5ºW of the river, hence it was necessary to determine the distance from the post. The Commissioners also considered the next phase of the West Line survey; to cross the Allegheny divide into the territory allotted to the native population by royal

proclamation meant the permission of the Six Nation Confederation was needed and the assistance was sought of His Majesty's Agent, General Sir William Johnson.

That winter, the measure to the Delaware complete, Mason and Dixon dedicated their energies to the work of the Royal Society. For gravity measurements and time keeping, Nevil Maskelyne had sent them the same John Shelton clock they used on St. Helena. This clock, now preserved in Edinburgh, Scotland, was already well travelled having gone with Maskelyne to Barbados on the trial of Harrison's chronometer. It was destined for yet more travel and adventures. Shelton's clock was set along side Jackson's, together with the zenith sector, in the observing tent in Harlan's back yard. By Christmas the latitude was re-measured and the clocks calibrated. Equal altitudes were observed for sidereal time and to improve the meridian line, and transits of Jupiter's moons were observed for longitude.

Twice a day, everyday, until late March 1767, the rates of the clocks were noted and the temperature inside and outside the tent recorded – at one point it plummeted to –22ºF (-30ºC). While they waited for General Johnson's negotiations with the Indians, Mason and Dixon calculated their first estimate for the length of a degree of latitude as being 68.73 miles (110.6 km).

2.4 Completing the West Line

The Six Nations gave their consent for the survey to proceed in early June 1767 and appointed 'deputies' to accompany the survey team. The Commissioners' instructions to Mason and Dixon contained a dire warning for "the public Peace and your own Security"; the lands they were about to enter were very dangerous for natives and Europeans alike.

The survey team assembled at Fort Cumberland in July and the final stage of the work began. A few weeks later the Native American deputies arrived, accompanied by Captain Hugh Crawford. At first all went well but the increasing number of abandoned farmsteads forebode the dangers ahead. Mason and Dixon decided to use their triangle-and-offset method to twice change direction before halting for the tedious latitude observation. A few miles beyond the Youghiogheny River, 200 miles west of Bryan's field, they set up the zenith sector and found they were 300 feet (91m) too far north. While they were observing, the first of several encounters with Native tribesmen occurred when a band of Delaware marched into camp; this was one of the tribes who fought with the French during the recent war (French and Indian War 1755-1761).

Entering the Laurel Mountains, the steep slopes and sudden bottoms forced the use of levels rather than the chain. The Cheat River was reached on 12 September and some of the deputies argued this marked the limit of work. After some discussion the survey was allowed to proceed. At 221 miles west, on a bluff overlooking the Monongahela River, the sector was set up for the latitude. The men were all extremely nervous of hostile Natives prowling the forest so Crawford and Mason decided to keep them occupied by having them build a 'store' cabin, in fact a defensive blockhouse, in a narrow angle of land where the Cheat and Monongahela converged.

The latitude showed they were 5.41 chains (108m) too far south, which was excellent given their expeditious methods. What was not excellent was the desertion of half the survey crew, terrified of the unseen Indians lurking among the trees. Nevertheless, the party pressed on west beyond the Monongahela (where Mason discovered seams of coal) visited occasionally by bands of Native warriors. On 9 October, they reached a warpath running beside Dunkard Creek, abandoned since 1755 when its inhabitants were slaughtered. This time the chief deputy was emphatic – he "would not proceed one step further Westwards". Mason and Dixon had reached the end of the line, at least as far as they would get. They were 231 miles 20 chains (370.6 km) west of the "Post mark'd West". The latitude was measured, adjustments made and a tall post set in the ground surrounded by a cairn of earth and stone. This is the spot now marked by a monument atop Brown's Hill. All that remained was to cut the vista and set out the mileposts all the way back to Savage Mountain.

Returning to Harlan's farm, Mason and Dixon learned that they were required to draft a map of the Lines. This they completed and handed it to the Commissioners at which time they were given leave to complete the measurement of the Royal Society's degree of latitude.

2.5 Completing the degree of Latitude

New softwood 'levels', to carry the special rods sent by the Royal Society, were built by Joel Bailey and he and Mason spent two weeks calibrating them in varying degrees of temperature and humidity against Bird's brass standard. Special tripods were built to keep the levels horizontal and their ends in contact. Measuring began on 22 February; twice a day the rods were compared with the brass standard and the temperature recorded. They next measured down the North Line to the Tangent Point and then along the Tangent Line itself. The weather was atrocious; the swamps and ponds filled up with water through which the survey team had to wade. The last measurements were completed on 6 June. The hands were paid off for the last time at Newark where Mason and Dixon learned that their map had to be engraved and printed. Philadelphia engraver Henry Dawkins was engaged but after completing less that half the work he gave up and the work was completed by James Smither. Two hundred copies of the maps were printed and delivered to the Commissioners at their last meeting on 25 August. After a short break in Philadelphia, Mason and Dixon headed for New York and the Falmouth packet ship to England.

2.6 Accuracy of the work

In recent years, the Mason-Dixon Line Preservation Partnership has relocated and positioned many of the original marker stones using differential GPS techniques. These observations have helped in assessing the accuracy of Mason and Dixon's famous line. From these observations, it appears that the units of measure used by Mason and Dixon gave ground distances that are between 0.15% and 0.19% longer than their modern equivalents which might suggest that John Bird's five foot brass standard was 2mm to 3mm too short. However, this standard had been calibrated against one that Bird had made when apprenticed to Jonathan Sisson, the very standard that General William Roy later acquired for his fledgling Ordnance Survey of Great Britain.

Similarly, the 15 miles measurement to establish the beginning of the West Line appears, in modern terms using Clark's spheroid, to be about 820 feet (250m) too great. Perhaps as much as half this error could be attributable to gravity anomalies and errors in their measuring units. The remainder may therefore be attributed to the inherent accuracy of Bird's zenith sector and, most probably, to an insufficient allowance for slope corrections.

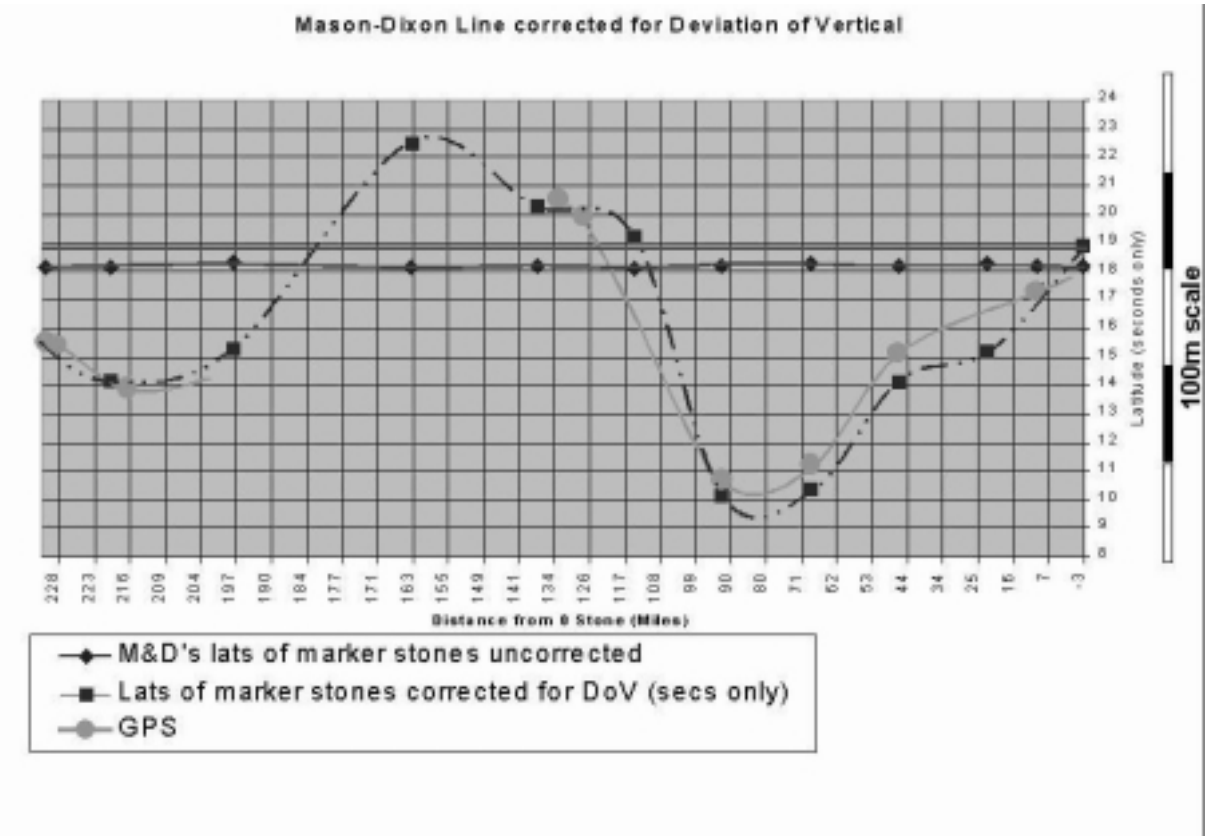


Figure 7: Mason-Dixon Line - original observations adjusted for deviation of the vertical compared with modern RTK GPS observations.

The effect of deviation caused by gravity anomalies (of which Mason and Dixon were unaware) is well illustrated when comparing the Mason and Dixon latitudes of existing West Line monuments against differential GPS observations (Babcock 1996). The greatest error is in the order of 800 feet. However, when the original latitudes are compensated for deviation of the vertical, then the maximum difference on GPS is about 100 feet (30m), which by any standard, is remarkable, attesting to the superb craftsmanship and scientific exactitude these two men possessed.

3. POST-AMERICA

Mason and Dixon returned to England in time to join the expeditions being despatched to observe the 1769 Transit of Venus, the last for more than a hundred years. James Cook and Mason's astronomical colleague Charles Green were already on their way to Tahiti aboard the *Endeavour*, and William Wales and Joseph Dymond had left for Hudson's Bay.

Mason was given the task of observing in Cavan, Ireland, while Dixon was teamed with astronomer William Bayley to go to the North Cape of Norway. As a side job, they were asked to survey the northern archipelago. In America, the astronomers and scientists of the American Philosophical Society led by David Rittenhouse stepped upon the stage of international science.

After this last Transit of Venus, Jeremiah Dixon retired 'a gentleman' to his home in County Durham where he continued to practice on and off as a land surveyor; he died in 1779.
Mason continued to work for the Astronomer Royal (Maskelyne had succeeded to the post) and the Board of Longitude compiling, updating and continually improving Mayer's lunar tables for the Nautical Almanac. In 1771, Nevil Maskelyne suggested that the phenomenon known as "the attraction of Mountains" (deviation to the vertical) could be measured by astronomical observation. In 1773, Charles Mason was asked to search for a suitable mountain; he lighted on Schiehallion, in the Scottish Highlands of Perthshire, as the ideal spot. Mason was invited to conduct the famous experiment himself but declined. The money offered was trivial, he was not in the best of health and his wife Mary was expecting another child. Instead, Nevil Maskelyne aided by land surveyor Rueben Burrows, performed the experiment and was awarded the Royal Society's Copley Medal.

About 1780, Mason applied to the Board of Longitude for the new £5,000 longitude prize, for his pioneering work and improvement on Mayer's lunar tables, which he and the French astronomer Jerome Lalande considered to be Mason's by right. Maskelyne did not lend his support and the Board awarded him a paltry £1,317. In 1786, middle-aged and disillusioned, Mason decided to return to America. Never a good sailor, the voyage aggravated his illness and, just a month after arriving in Philadelphia, he died.

The only peer recognition Mason and Dixon received was their election to the prestigious American Philosophical Society. Neither Charles Mason nor Jeremiah Dixon was awarded with the Fellowship of the Royal Society they so justly deserved. But perhaps, after all, their best and lasting memorial are the marker stones of the Mason-Dixon Line itself.

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BIOGRAPHICAL NOTES

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