Maryland State Geographic Information Committee

The Survey of Mason and Dixon

Resolving the greatest boundary dispute of them all

Presented by:

David S. Thaler, PE, LS, DFE, D.WRE, FRGS, F. ASCE, F. NSPE

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Oct 17, 2018

THE PROVINCE OF PENSYLVANIA
THE PROVINCE OF MARYLAND
THE PROVINCE OF MARYLAND
THE THREE LOWER COUNTIES

King James I of England

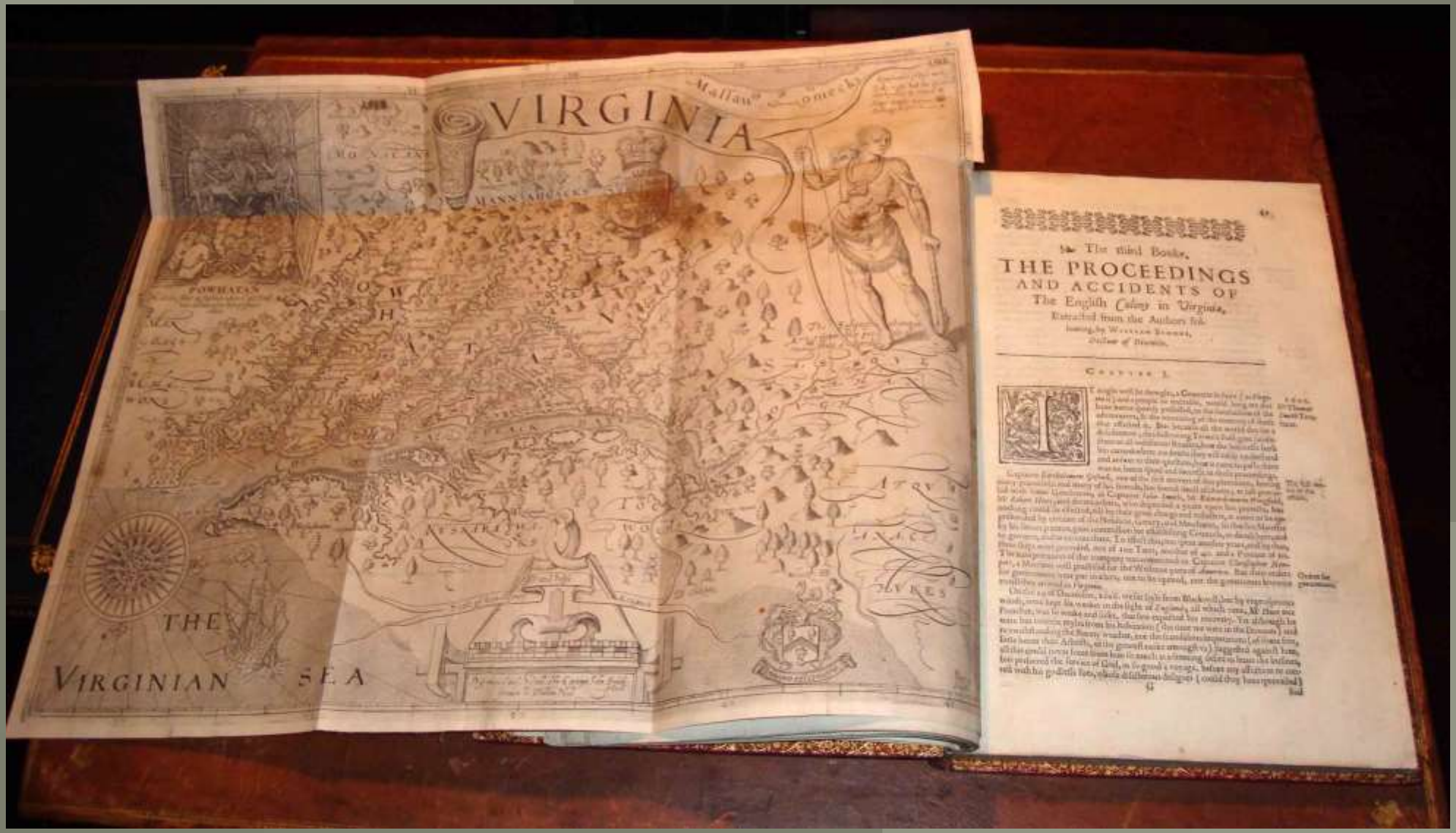
George Calvert, 1st Lord Baltimore (1580-1633)

"…unto the true meridian of the first fountain of the River Potowmack" and all land "which lieth under the **Fortieth Degree** of North latitude."

William Penn

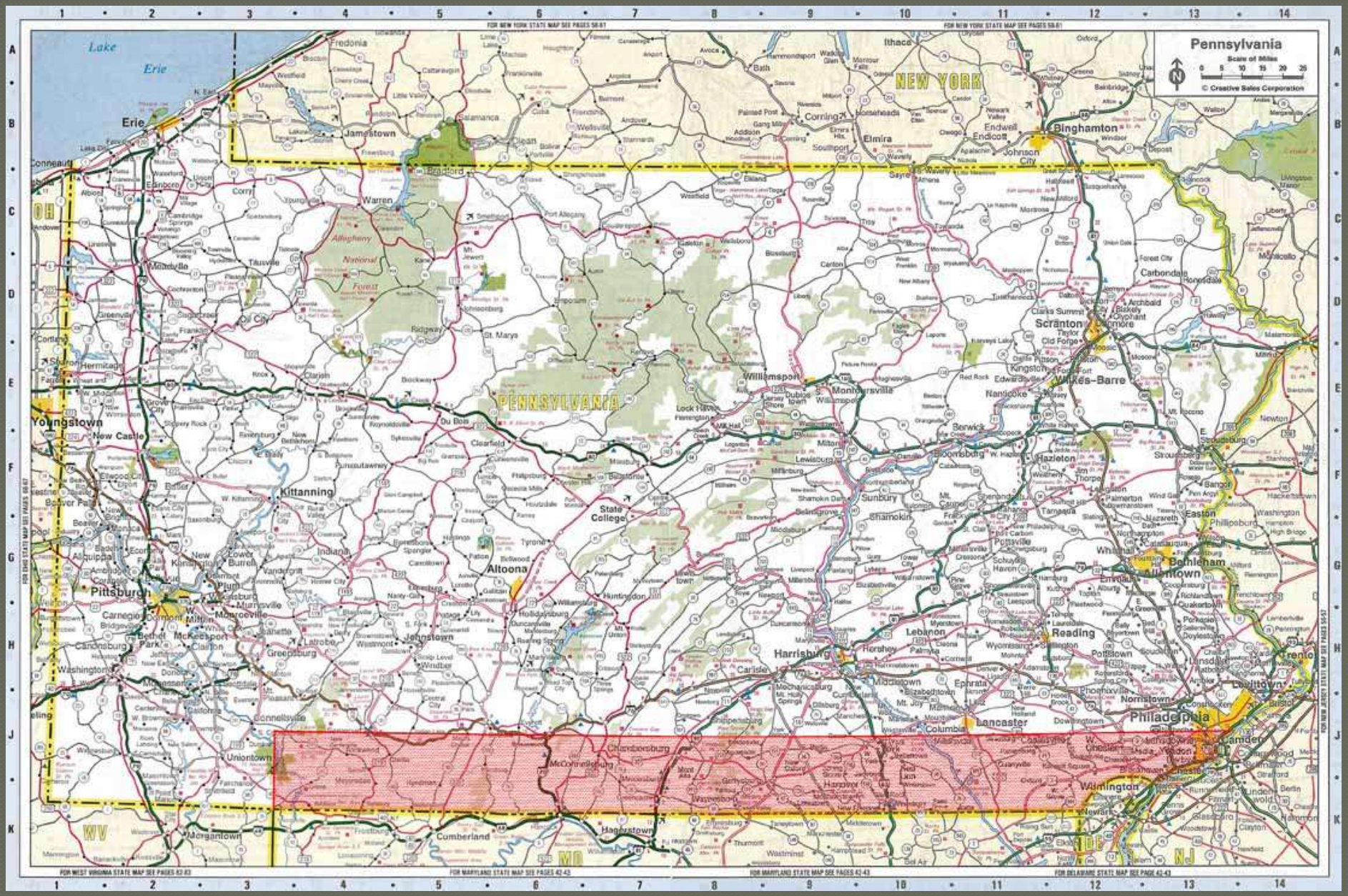

Lake Erie
42nd parallel
NEW YORK
MASS.
R.I.
CONN.
OHIO
PENNSYLVANIA
40th parallel
?
MARYLAND
NEW JERSEY
D.C.
North Atlantic Ocean
WEST VIRGINIA
DELAWARE
VIRGINIA
50
km
mi

The General Historie of Virginia



MSA SC 5666-1-1

The Disputed Territory



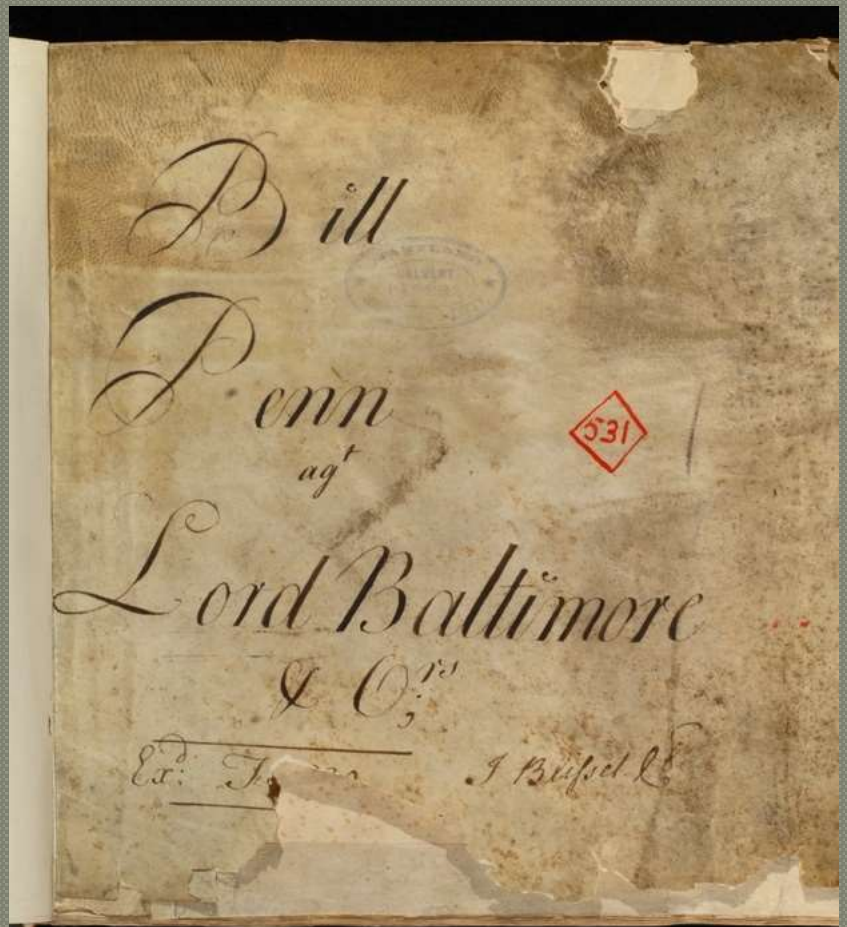
While arrested and being dragged through the streets of Philadelphia

"Damn…this is one of the prettiest towns in Maryland"

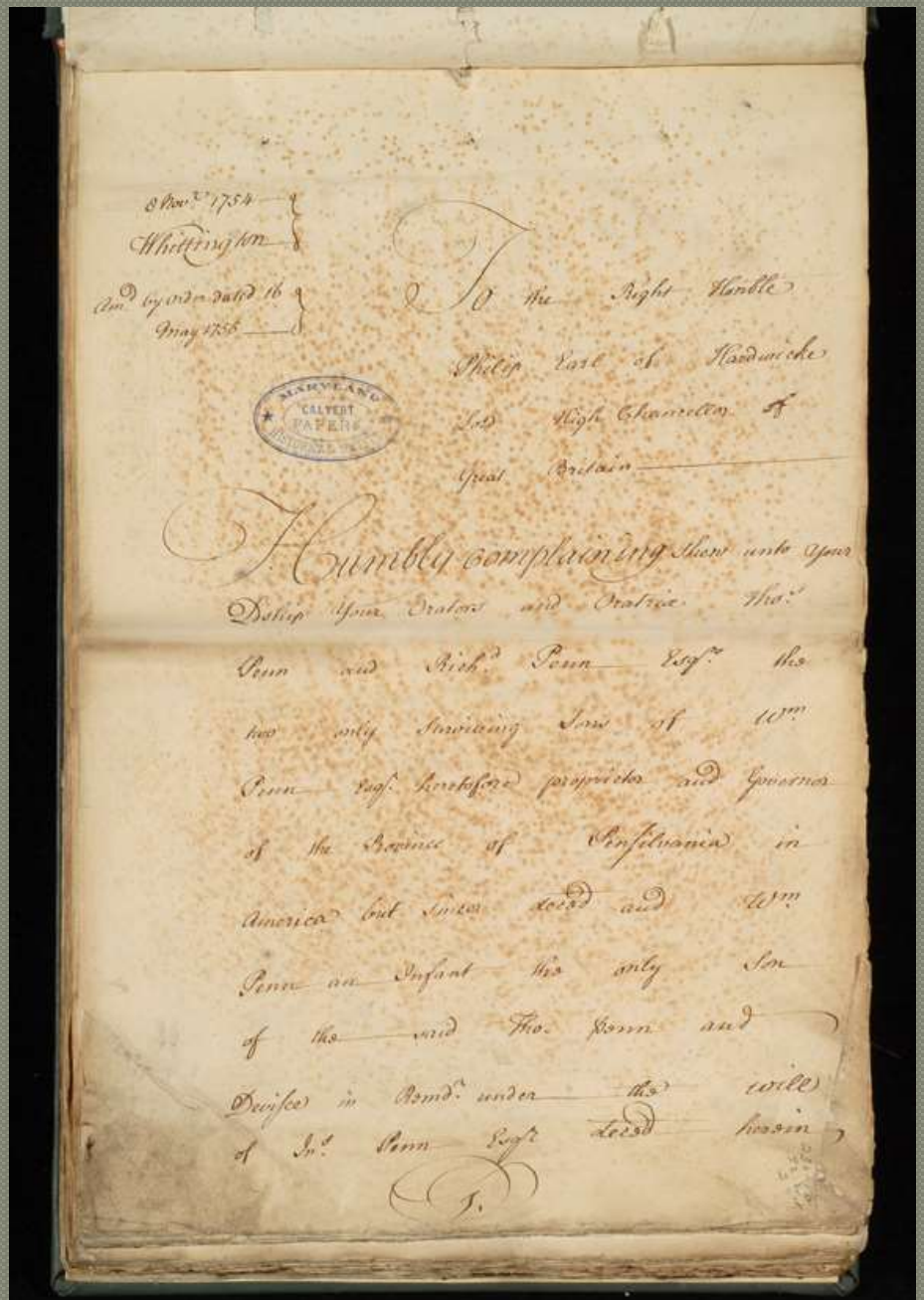
Col. Thomas Cresap


East-West Line
15 miles south of Philadelphia
Tangent Line
Transpeninsular Line
MARYLAND
PART
OF
VIRGINIA
CHESOPEAK BAY
Philadelphia
Cape May
Cape Henlopen

The Exhibit to the Agreement



MS174 Item 531 Original brief for the Chancery case



MS174 Item 531 opening page

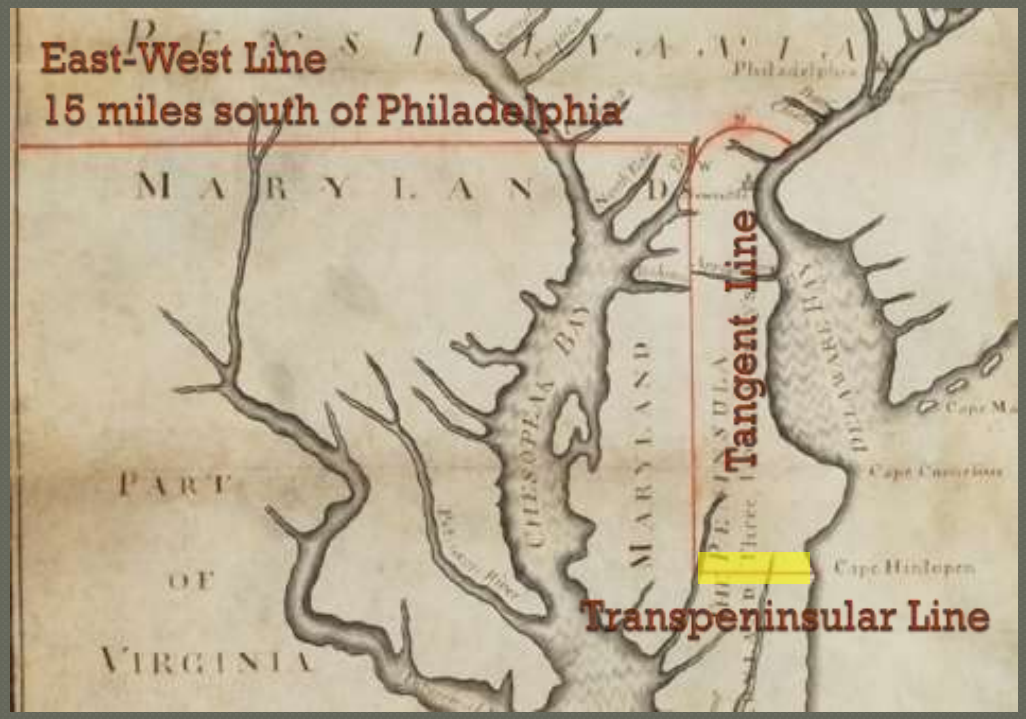
The Great Chancery Suit

Penn v. Lord Baltimore
3 Ves. Sen 194, 1735

New Castle Courthouse

Fenwick Island

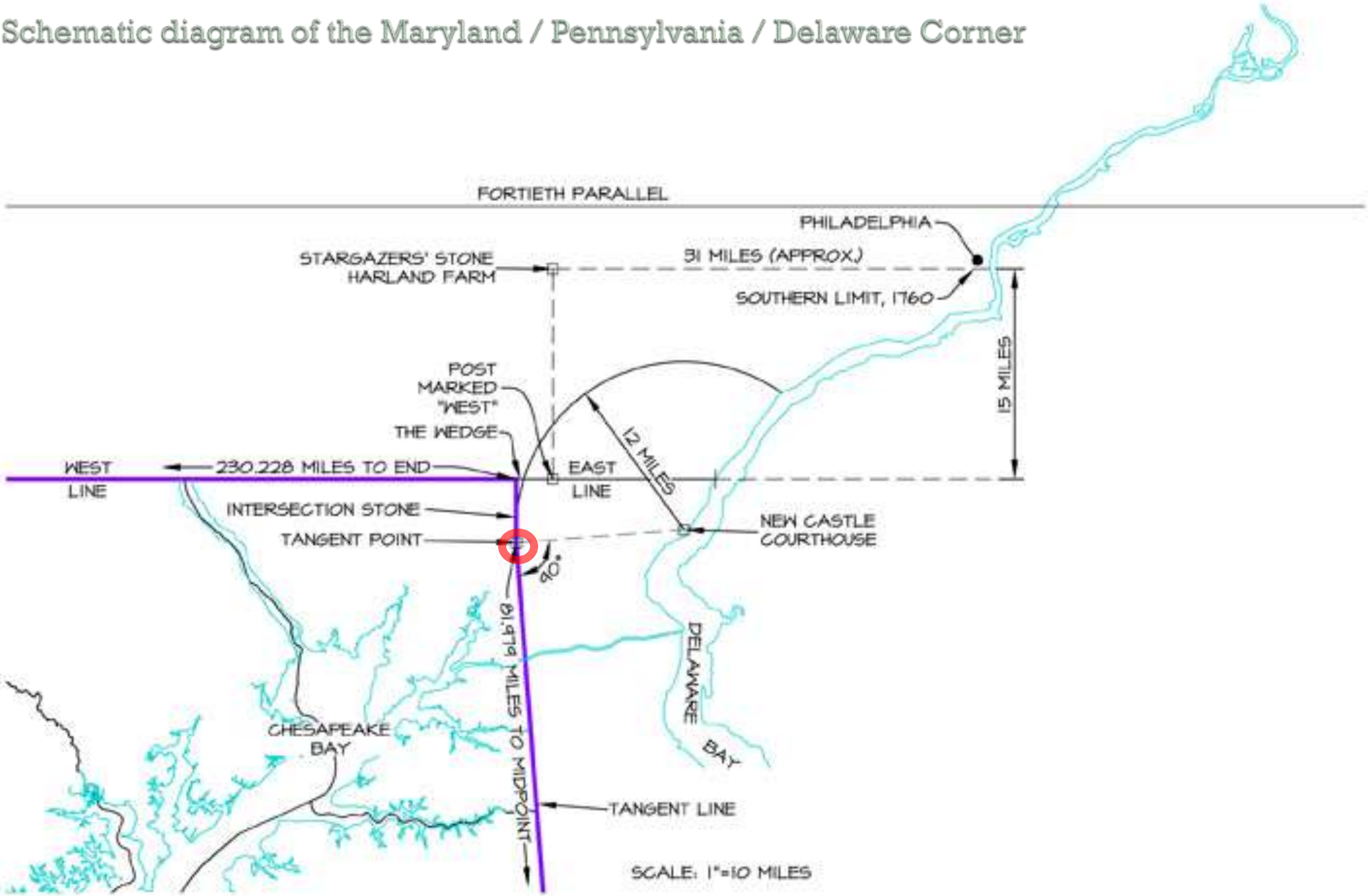
The beginning of the trans-peninsular line



The Mid-Point Stone

The southwest corner of,
what is now, Delaware
set on
April 26, 1751

Schematic diagram of the Maryland / Pennsylvania / Delaware Corner



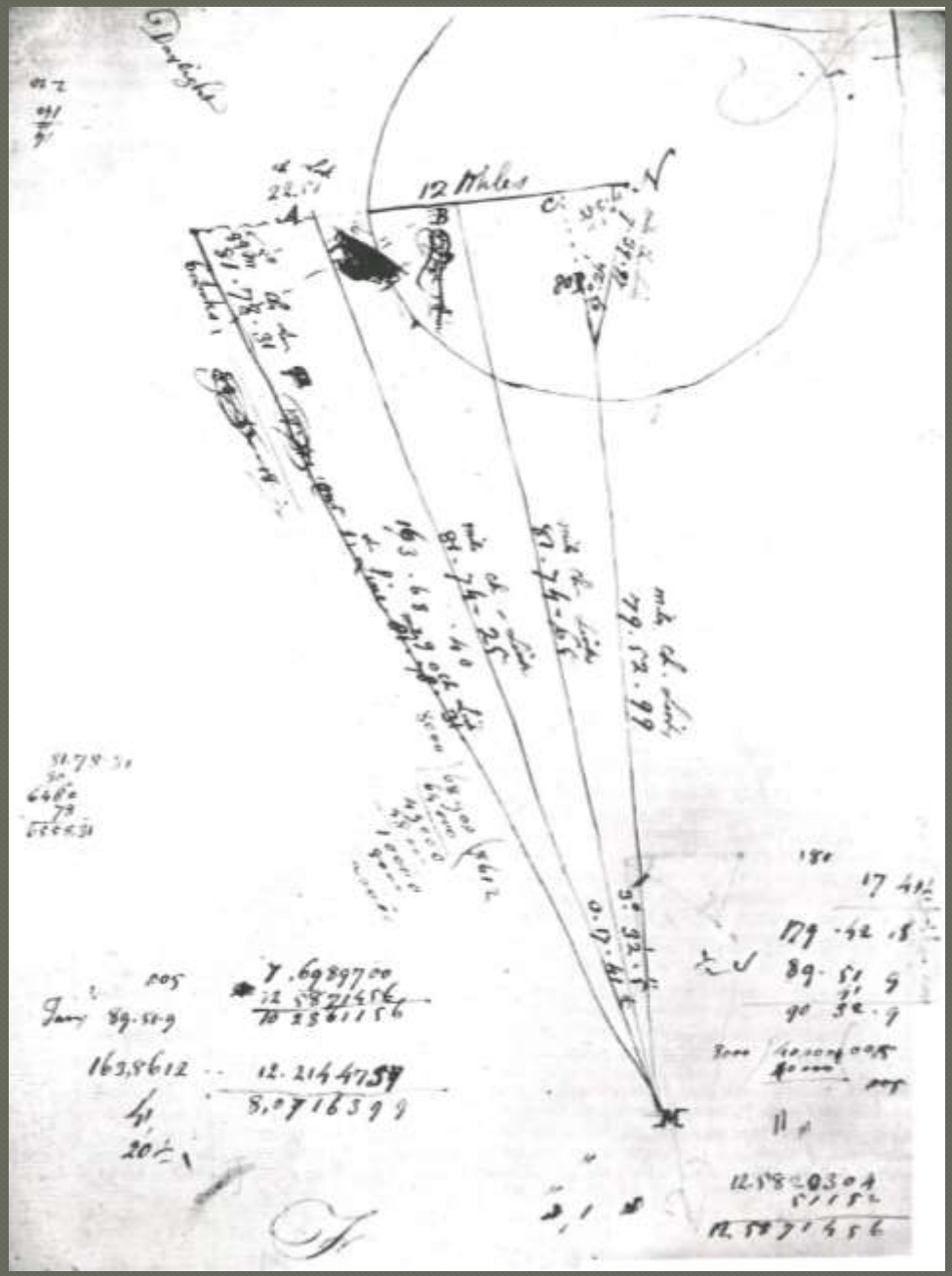


Diagram from Mason and Dixon's journal

The Contract to do the Survey

MS174 Item 166 Articles of Agreement

Signed by:

Cecilius Calvert
Richard Penn
Thomas Penn
Charles Mason
Jeremiah Dixon

Zenith Sector by John Bird, 1773,
Oxford, Museum of the History of Science.

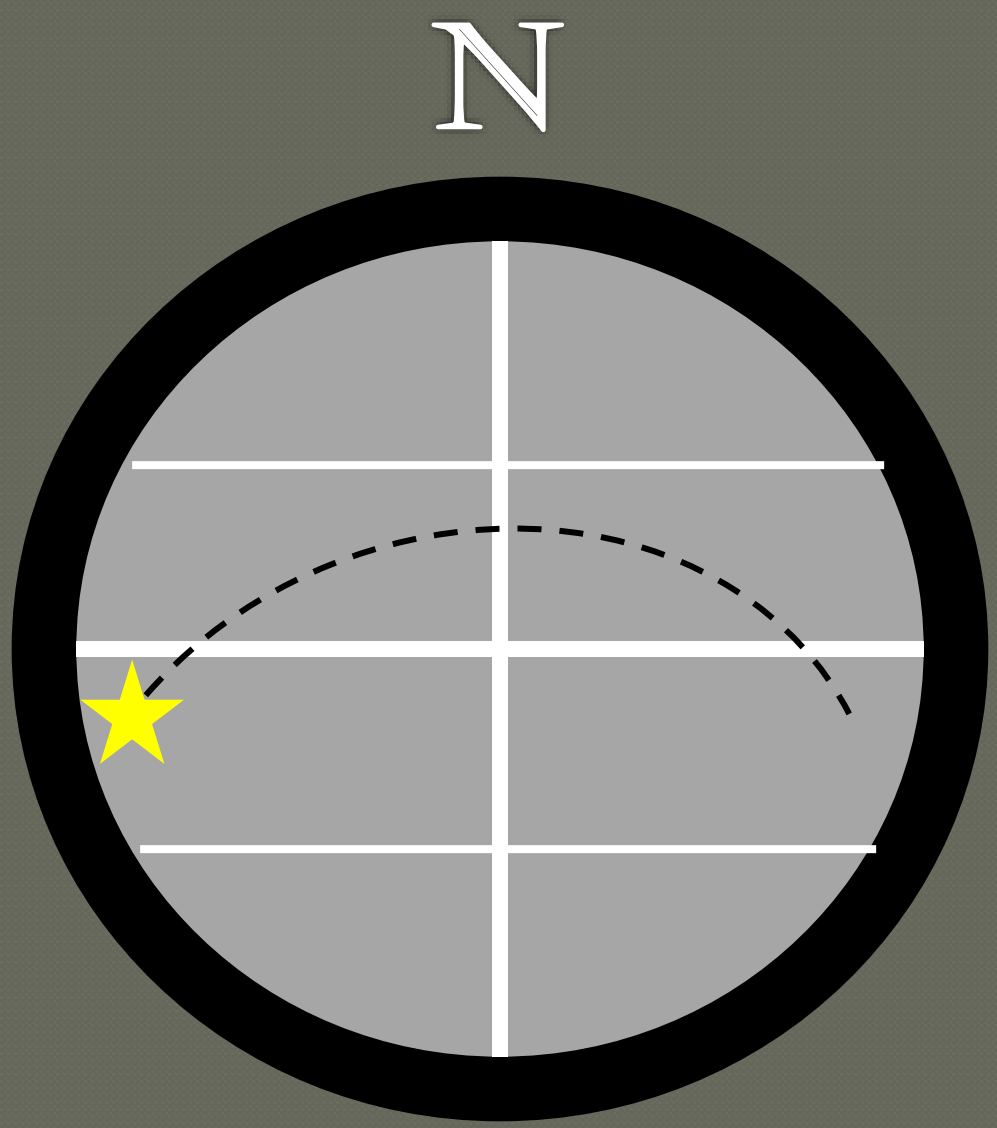
Octant or Hadley Quadrant

Invented in 1731 and used for celestial navigation. It can measure angles up to 90 degrees.

Transit and Equal Altitude Instruments
National Museum of American History

Made by Andrew Ellicott in 1789.
Modeled on the Bird instrument

Henry Voigt's instrument used in the survey of the Louisiana Purchase


N

The Transit and Equal Altitude Instrument in Independence Hall

Traughton's 10 ft Transit
Royal Observatory Greenwich
1816-1856

John Bird's engraved signature

18th Century Surveying Measurement

1 chain = 66 feet = 100 links

80 chains = 1 mile = 5280 feet

1 link = 7.92 inches

10 square chains = 1 acre

Gunter's Chain

Journal of Mason Dixon

1763

Nov. 15th Arrived at Philadelphia.

16 Attended a Meeting of the Commissioners appointed to settle the Boundary of Pensylvania.

17 Wrote to his Excellency Horatio Sharpe Esq. Governor of Maryland, signifying our Arrival at Philadelphia.

22 Landed the Instruments

23 Set up the Sector and found it had not received any damage.

23 Set up the Transit and found it had not received any damage.

Decr.

1 Attended a Meeting of the Commissioners of both Provinces.

2 Attended D.

3 Attended D.

3 Attended D. and directed a Carpenter to build an Observatory near the Pond called by the Commissioners to be D. Pond of the City of Philadelphia.

6 Set up a Sector brought from Maryland and found the Vernier would not touch the middle part of the Arch. Was sworn before the Commissioners

Charles Mason
Jeremiah Dixon

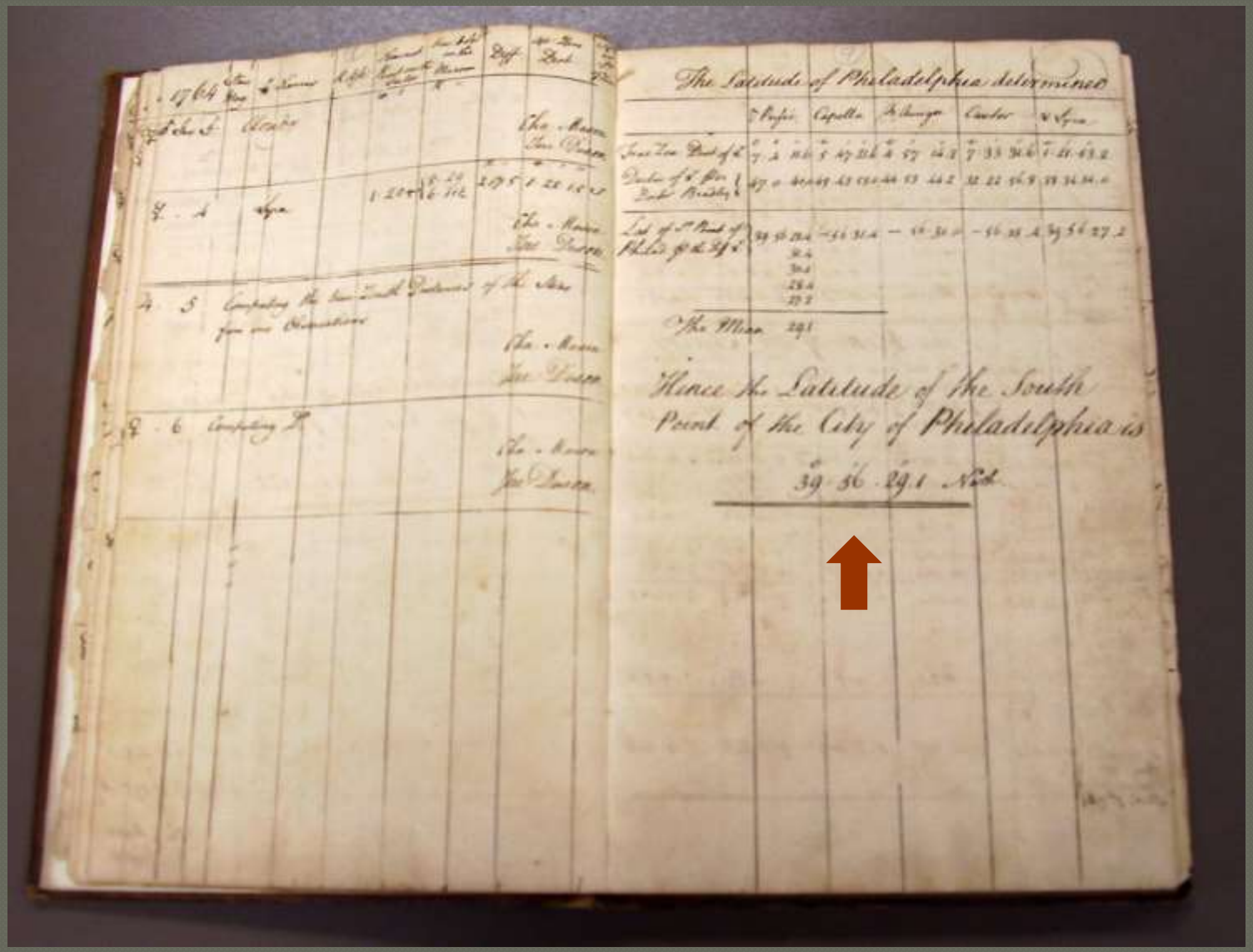
Nov15, 1763, "Arrived at Philadelphia"

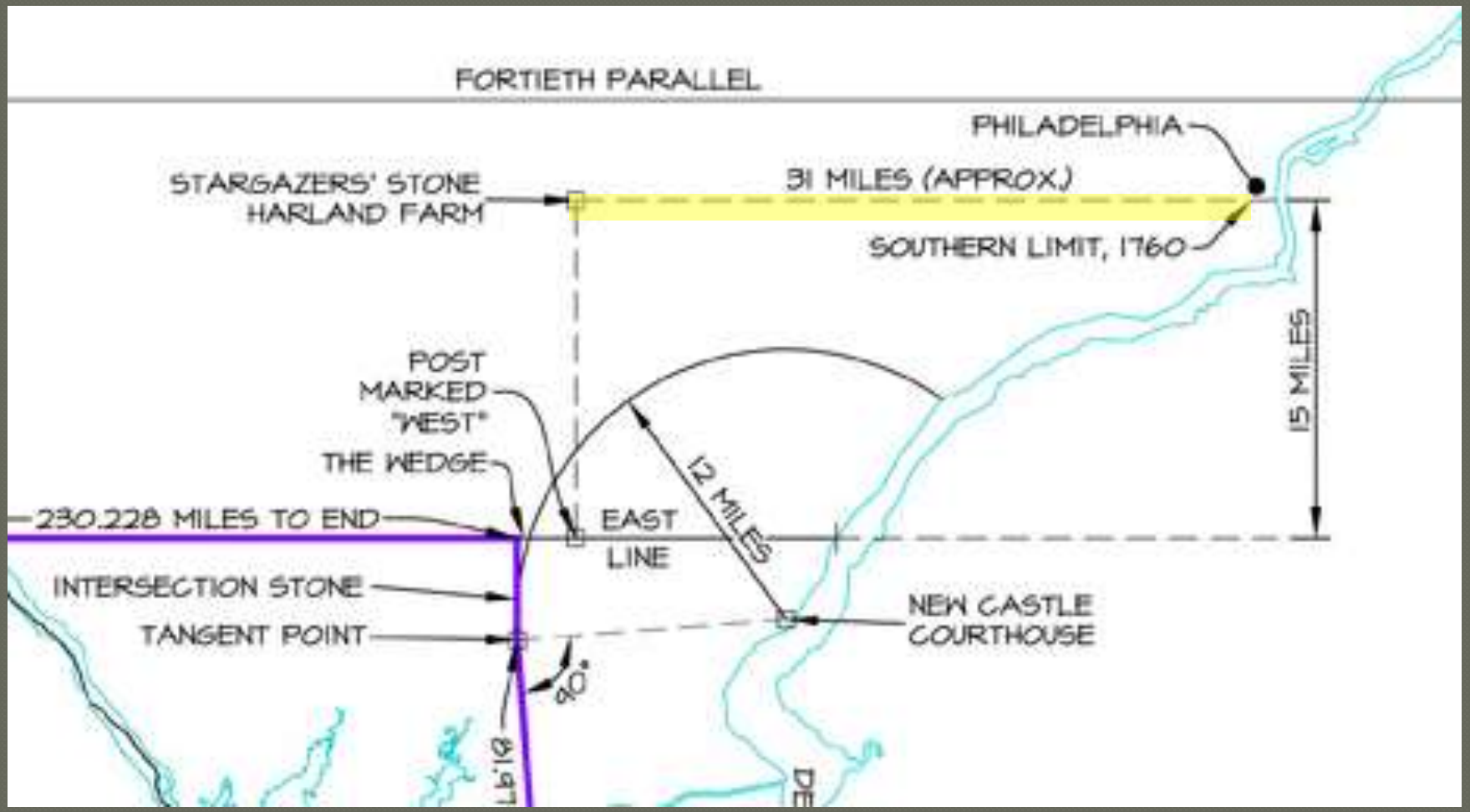

ONE WAY

Replica of Observatory from Transit of Venus Observation 1761

Latitude of Philadelphia

39° 56’ 29.1’’ North



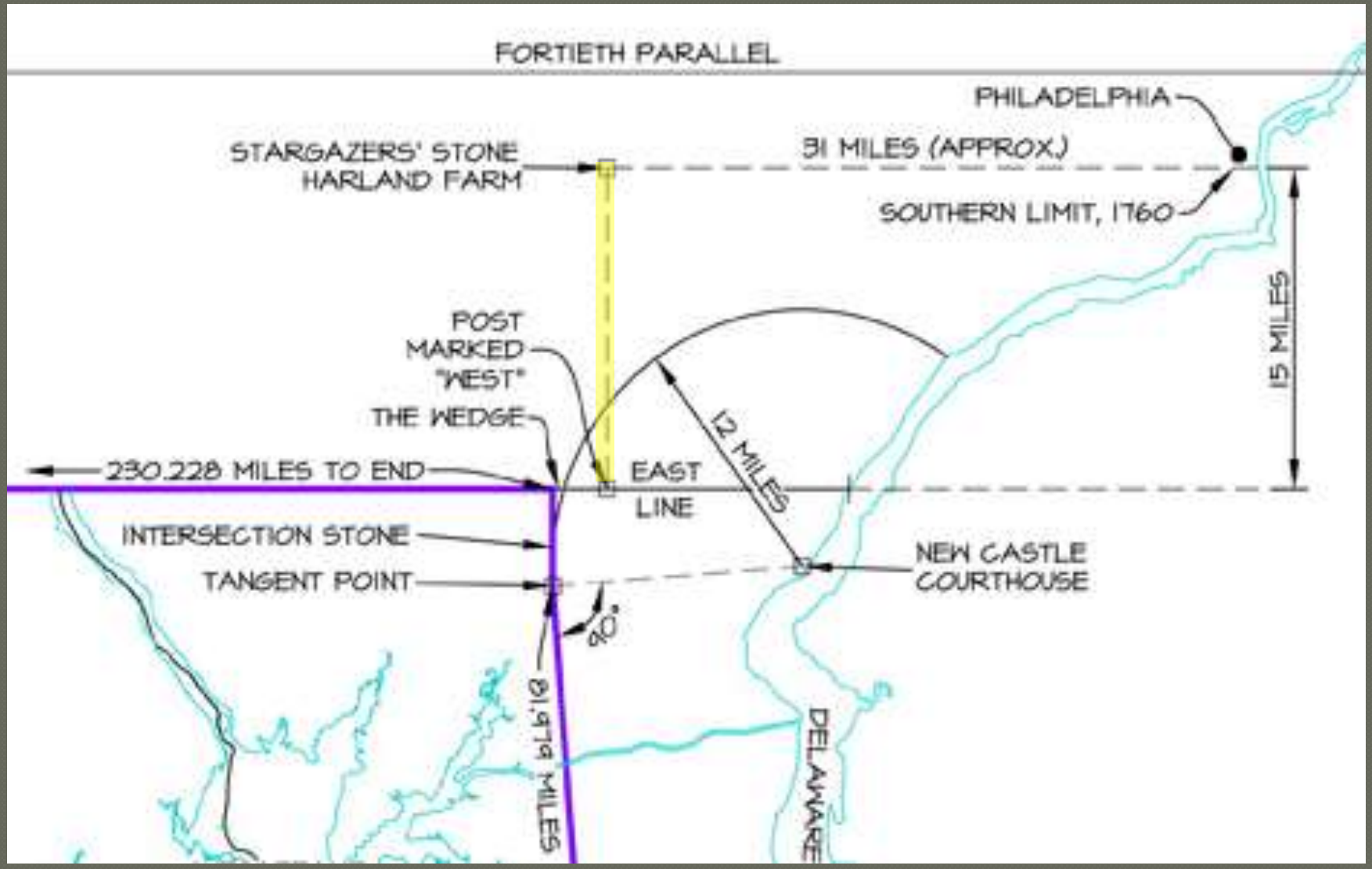

FORTIETH PARALLEL
PHILADELPHIA
STARGAZERS' STONE
HARLAND FARM
31 MILES (APPROX.)
SOUTHERN LIMIT, 1760
15 MILES
POST
MARKED
"WEST"
THE WEDGE
12 MILES
230.228 MILES TO END
EAST
LINE
INTERSECTION STONE
TANGENT POINT
NEW CASTLE
COURTHOUSE
90°

John Harland house Embreeville, Pa.

The Stargazers' Stone

Mason and Dixon at the Stargazers' Stone

as envisioned by Brian Tucker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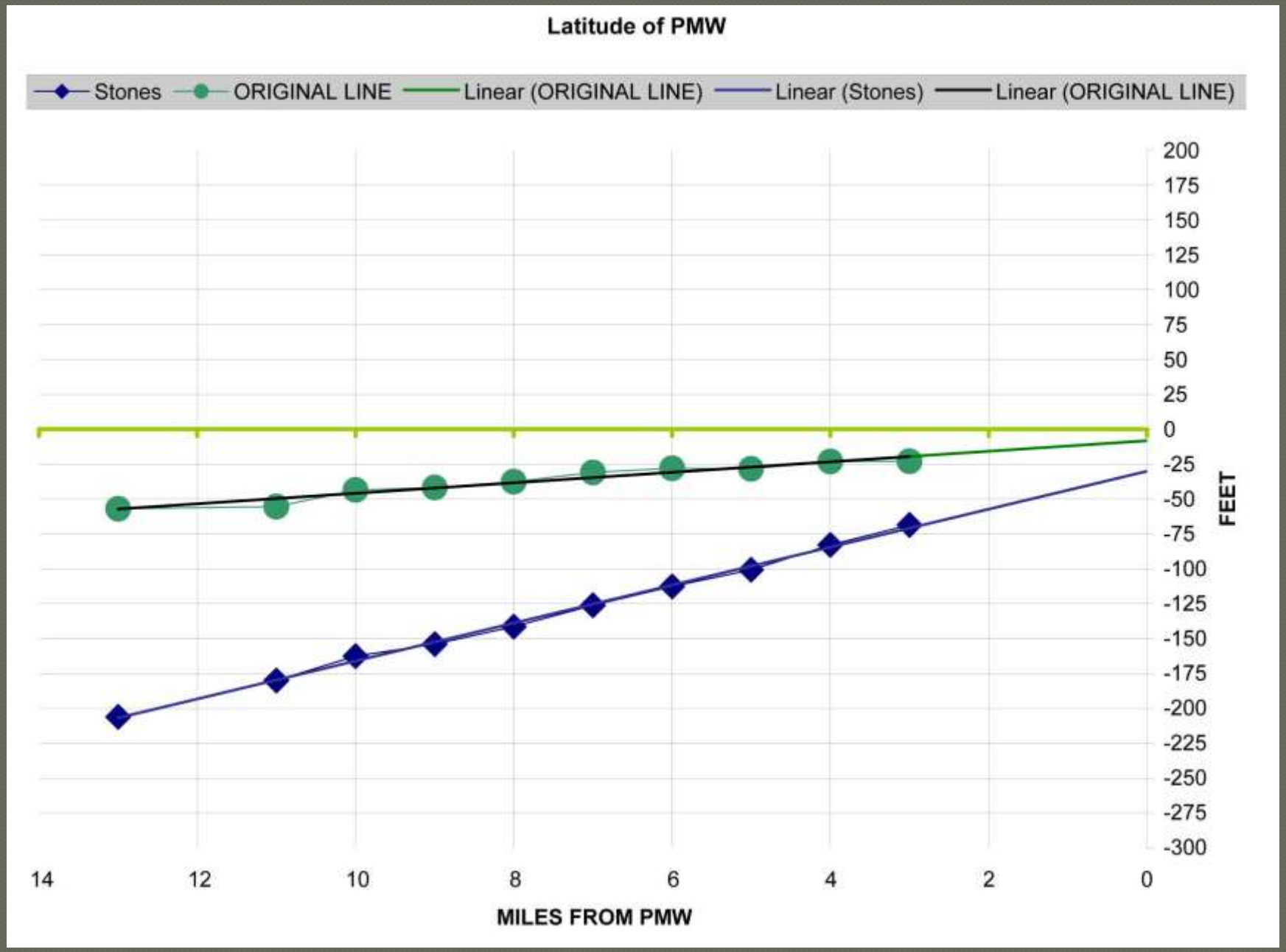
THE WEDGE
12 MILES
230.228 MILES TO END
EAST
LINE
INTERSECTION STONE
TANGENT POINT
NEW CASTLE
COURTHOUSE
90°
81.978 MILES
DELAWARE


Mr. Bryan's Field
Near Newark, Delaware

Monument
at the site of
The Post Mark'd West

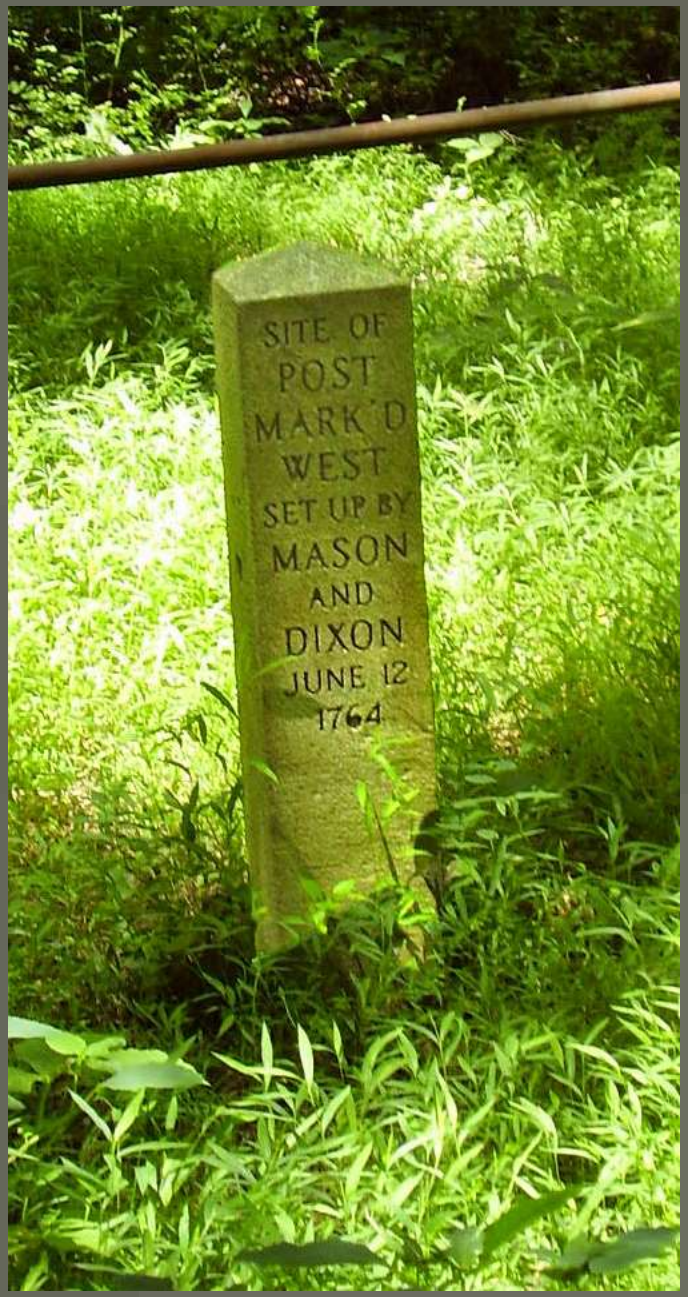

Latitude of PMW
Stones
ORIGINAL LINE
Linear (ORIGINAL LINE)
Linear (Stones)
Linear (ORIGINAL LINE)
200
175
150
125
100
75
50
25
0
-25
-50
-75
-100
-125
-150
-175
-200
-225
-250
-275
-300
FEET
14
12
10
8
6
4
2
0
MILES FROM PMW

Archaeology – looking for the actual Post Mark'd West

Supervising the Dig!

The Post Mark'd West

in Mr. Bryan's field



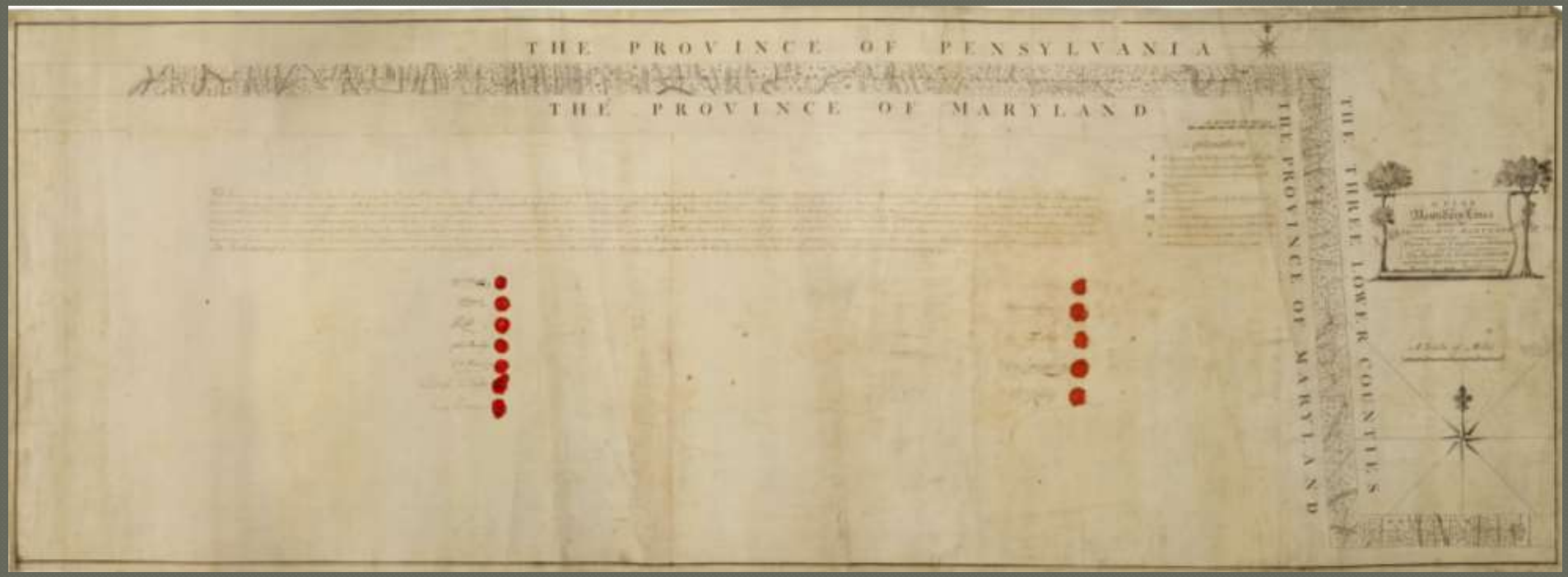
Mile Stones

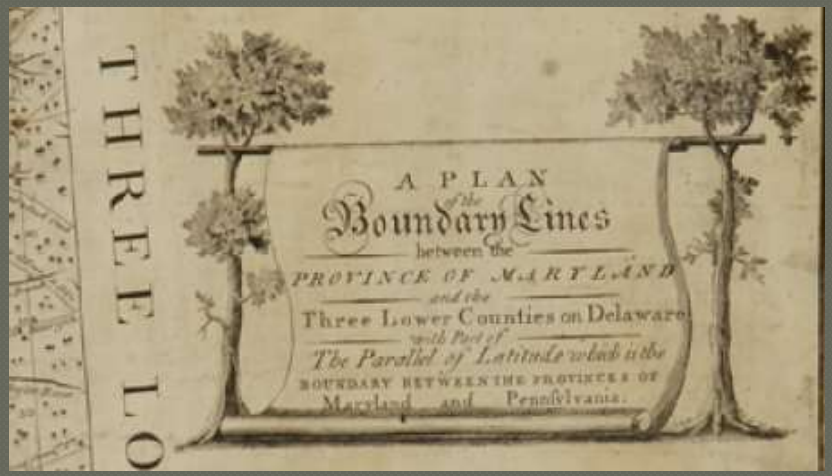
Crown Stones

Dunkard Creek

Brown's Hill - end of the line

The final map, signed and sealed by the 12 boundary Commissioners .





Mason-Dixon Line

The Bill

827

D^r: The Right Honble Lord Baltimore & the Honble Thos: Penn & Richd Penn Esq^rs ... & Contra ... C^r:

To Charles Mason & Jere Dixon for Wages from the 26th of June 1763. to Novr 15th 1763 at 10/6 ℔ Day to each of them ... 142 Days	£149 2 0	By Cash paid said Mason and Dixon before their Departure from England	£142
From the 15th of Novr 1763. to the 26 of Decr 1767. at £1 1 0 per Day to each ... 1502 Days	£1514 4 0	By Cash paid us by the Commissioners in America as Appears by Our Certificate	£928 7 7
From the 21st of June 1768. to the 21st of July 1768. at £1 1 0 ℔ Day to each ... 30 Days	£63	By Ballance	£2446 1 5
From the 21st July 1768. to the 27th of Augt 1768 at 10/6 to each ... 37 Days	£38 17 0		
From the 11th of Sep^t 1768. to the 7th of Octr 1768. at 10/6 ℔ Day to each ... 26 Days	£27 6 0		
For Our Passage to America, and Passage hence to England	£80		
Total	£3516 9 0		£3516 9 0

We Do hereby Acknowledge to have this Day Received of the Right Honble Frederick Lord Baltimore the Sum of One Thousand Two hundred and Twenty Three Pounds and Eight Pence half Penny being One Moiety of the above Ballance of Two Thousand Four Hundred and Forty six Pounds One Shilling and Five Pence Which We do hereby Acknowledge and Declare to be in full of the Share and Proportion of the said Frederick Lord Baltimore of the Ballance of the above Account and of all other Demands whatever due from him to us under and by Virtue of certain Articles of Agreement bearing date the Fourth Day of August 1763 which We have this Day Delivered up and Cancelled As Witness our hands this Twenty fourth day of February in the Year of Our Lord One thousand Seven hundred and Sixty Nine.

Witness to the Signing and Payment of the above Sum of One Thousand Two Hundred & Twenty Three Pounds & Eight Pence half Penny.

Jeremy Wilmot

Cha: Mason
Jere: Dixon

"…at 11h 30m A.M. went on Board the Halifax Packet Boat for Falmouth. **Thus ends my restless progress in America.**"

Charles Mason,
September 11, 1767

Christ Church burial ground


FRIENDS
MEETING HOUSE
This was the meeting house of the
Society of Friends (the Quakers)
where Jeremiah Dixon (1733-1779)
surveyor of the Mason-Dixon Line
in America, worshipped
and is buried.

Probable location of the Observatory behind Independence Hall

Dr. Silvio Bedini 1917-2007

Independence Hall

HISTORIC DISCOVERY MADE IN INDEPENDENCE HALL

Instrument With Which the Transit of Venus Was Observed in 1769 Accidentally Found in Tower by Curator Wlfred Jordan

By ERIC DOOLITTLE

A MOST interesting addition has been made to the many objects of priceless historical interest which are daily viewed by thousands in the rooms of old Independence Hall. This is no less than the astronomical transit employed in this city on the memorable afternoon of June 3, 1769, when the disc of the planet Venus was seen to pass across the bright face of the sun, an important phenomenon long anticipated, the full and accurate observation of which by a band of eminent men in and around Philadelphia attracted the attention of foreign societies and of learned men abroad to the spirit of scientific inquiry in this new world.

It is to the American Philosophical Society that the credit of the successful planning of these observations is due. Realizing the importance of this most unusual phenomenon, the society early appointed committees and resolved to secure as many observations at different places as was permitted by its own funds and by the public assistance which it expected. The most valuable results which were secured constitute the first great contribution of the society to exact science.

The importance of securing these observations arose from the fact that in that day a transit of Venus furnished the most accurate known means of finding the exact distance from the earth to the sun in miles, and this distance is, so to speak, the yardstick by which all other distances among the heavenly bodies are measured. Were this distance in error, not only would all other distances be similarly in error, but the computed sizes of all the planets and of the sun itself would be proportionately wrong. But the transits of Venus occur with great infrequency, and never before had observations been made with instruments of the high precision then available. At present and for several centuries they will occur in pairs, the two transits of each pair being but eight years apart, but the pairs themselves separated by a no less interval than 113 or 129 years. Thus the dates for the first transits of each pair are 1761, 1874 and 2004; those for the second are 1769, 1882 and 2012. There are very few people now living who will see the next transit of Venus, 91 years from the present time.

The whole story of the months of preparation, of the anxious waiting, of the serene and perfectly cloudless sky and of the complete success of the early observations is told in the papers published in the Transactions of the Society nearly a century and a half ago. A rainy day, or even a passing cloud, would have made all the preparatory labor useless. So great was the delight of David Rittenhouse at the entire success of the work and so great his relief from the preceding days and weeks of anxiety that, immediately after the observations were completed, he swooned away.

This work was of special value because it happened that throughout northern Europe this important day was a cloudy one. A high authority said of the results achieved here: "The first approximately accurate results in the measurement of the spheres were given to the world, not by the schooled and salaried astronomers who watched from the magnificent royal observatories of Europe, but by unpaid amateurs and devotees to the science in the youthful province of Pennsylvania."

For observing the transit, the American Philosophical Society decided to establish three stations in the vicinity of Philadelphia. The first of these was at the home of David Rittenhouse in Norriton; the second was at an observatory erected by it for the purpose in Independence Square, and the third was near the town of Lewes, Delaware. The observations were to consist in ascertaining the exact times when the planet Venus first touched the sun's edge, and also the times at which it occupied various other positions during the six hours of its transit. It was therefore necessary to have suitable telescopes for watching the sun itself and also accurate clocks and instruments for determining the errors of these timepieces.

At the Norriton observatory, Rittenhouse had an excellent transit instrument made by himself which is now preserved in the rooms of the American Philosophical Society. At the Lewes station a so-called equal altitude instrument was employed, while at the society's observatory in Independence Square there was an astronomical transit made by the well-known instrument maker, John Bird, of London. It is this last instrument which has just been recovered; that used at Lewes has probably long since disappeared.

The astronomical transit is a small telescope, very firmly attached at its centre to a rigid axis which rests upon two firm supports in such a way that the axis always extends in an east and west direction. The axis is also always kept horizontal by means of a delicate level, so that whenever the telescope is turned to different heights in the sky its centre line, which is marked by a fine spider thread, will always lie exactly in the astronomical meridian. Hence when a star, or the sun, is seen on the thread we know that this body is at that instant crossing the meridian, and as the time when this occurs is known with high accuracy the observation furnishes a most accurate means of ascertaining the error of the clock from which the observed time is taken. One thus compares his clock directly with the ever-turning celestial sphere above him, which is, in fact, infinitely the most accurate timepiece in existence.

was while having the tower of Independence Hall cleaned that Wilfred Jordan, curator of the building, made the discovery of this historic transit. The instrument was found beneath the flooring of a platform beside the old supports on which the Liberty Bell formerly hung, but how it originally got there is a mystery. It is evident that for many years it has been mounted on the heavy stone sill of the south window of the tower, in a position to take the meridian passage of the sun at noon, and from here it is very probable that the official Philadelphia time was obtained. But of its history after its use in the transit of Venus and before it was mounted in the tower of the State House nothing is at present known.

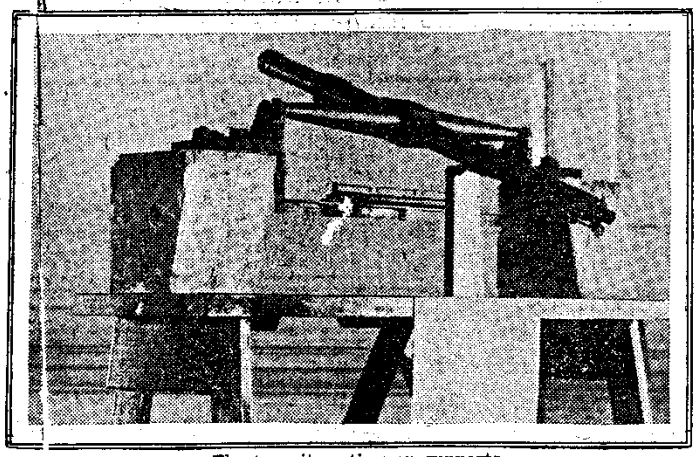
From a search of the early records, an interesting reference to the instrument is found in the account of the transit of Venus submitted to the society in 1769 by John Ewing, who had charge of the society's observatory in the State House yard. It appears that the instrument belonged to the Proprietaries of the Province, and was generously lent to the society for use on this special occasion. It is probable that very soon after the transit of Venus was over it was removed to the State House tower, where for many years it furnished time to the city of Philadelphia.

This most interesting instrument may now be seen, mounted on its original piers, in a corner of the west chamber of Independence Hall. The name of its most eminent maker, John Bird—itself a historical name, connected with the names of Bradley, Halley, Maskelyne and others—may be seen upon the tube, and within the telescope some parts of the original spider threads even yet remain.

It is indeed fortunate that this interesting and long forgotten instrument has reappeared, and that it will hereafter be preserved among the other relics of the early history of our country.

ERIC DOOLITTLE.

The Flower Observatory, Sept. 18, 1912.



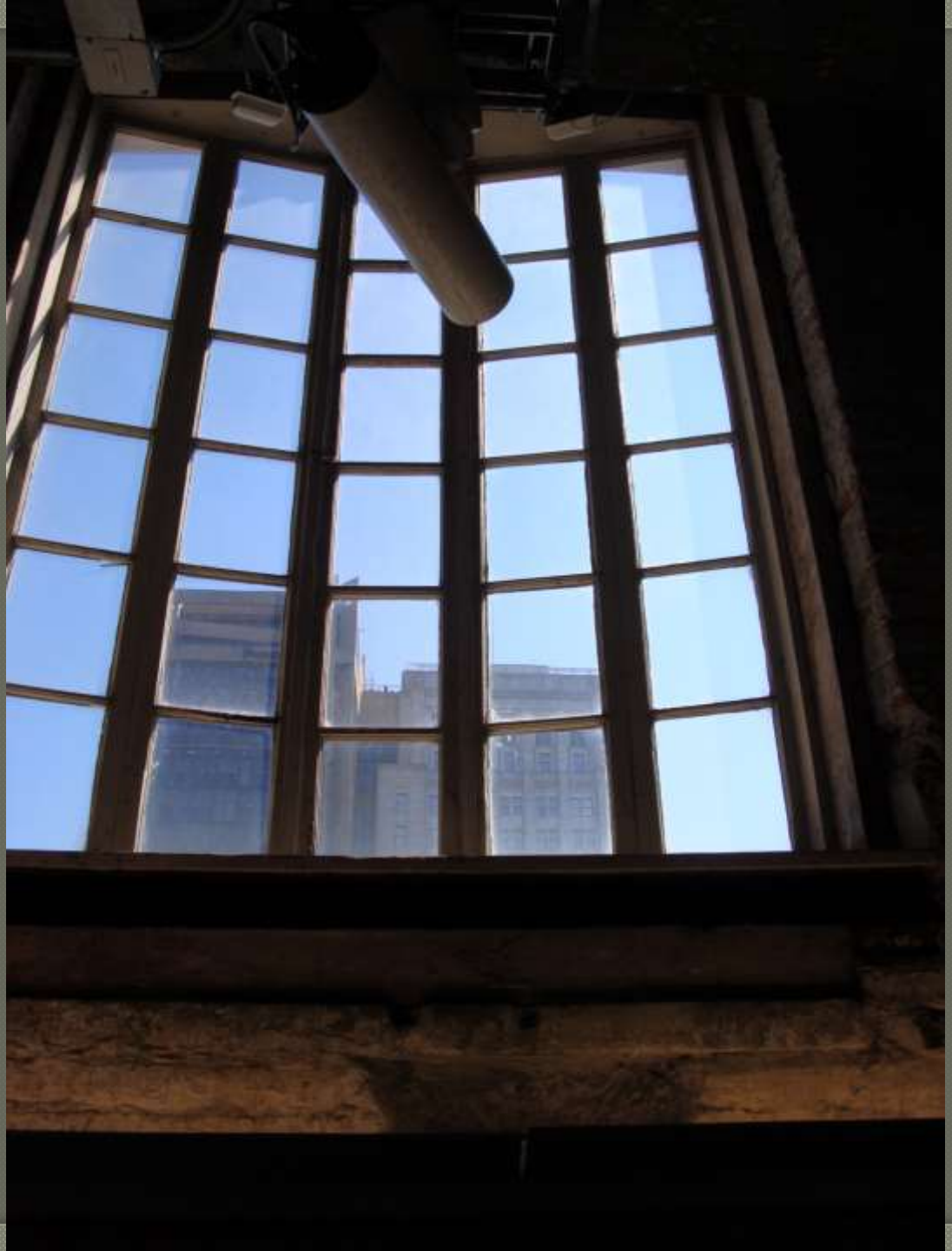
The transit resting on supports.

28,001

Instrument reported found on this level

Independence Hall


PRESENTED TO THE
CITY OF PHILADELPHIA




PLEASE
DON'T PUT ANYTHING
HERE.
MUSEUM OBJECT BELOW.
THANKS.

Before restoration

Bird Instrument
Dresden State Art Collection

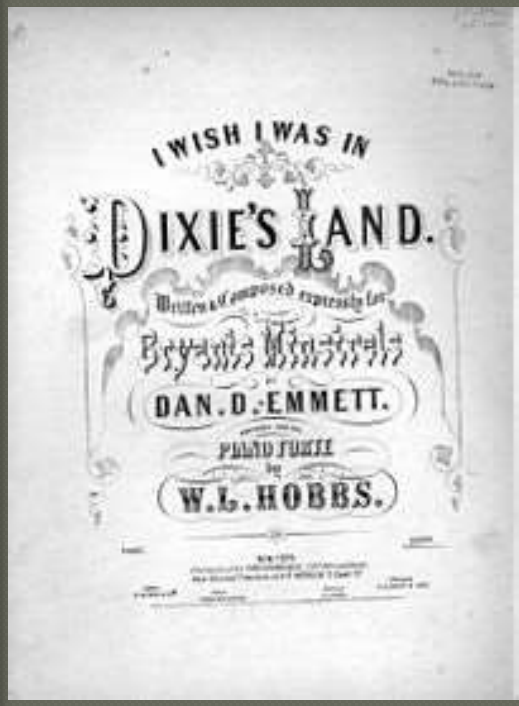
Bird Instrument Harvard University
Stolen 1979

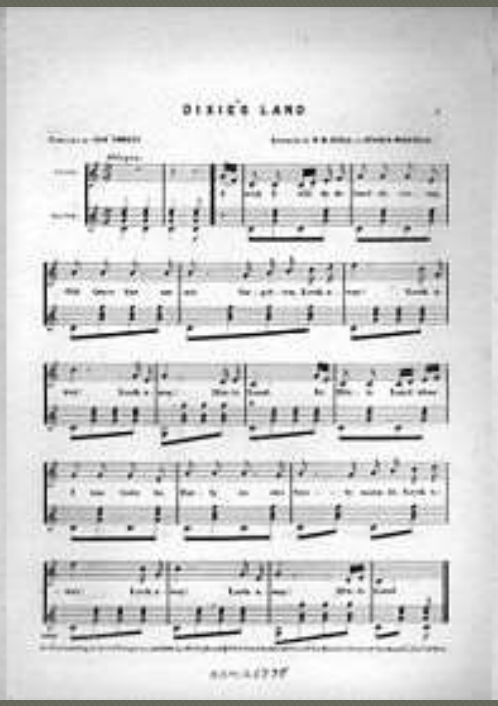
Transit and Equal Altitude Instrument
Made by Andrew Ellicott in 1789.
Modeled on the Bird instrument
National Museum of American History
Smithsonian Institute

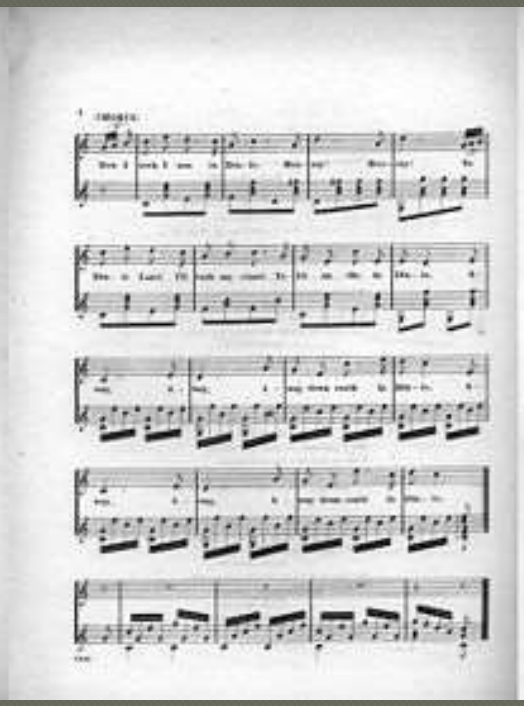
Unveiling the restored instrument
Maryland Historical Society
October 12, 2015

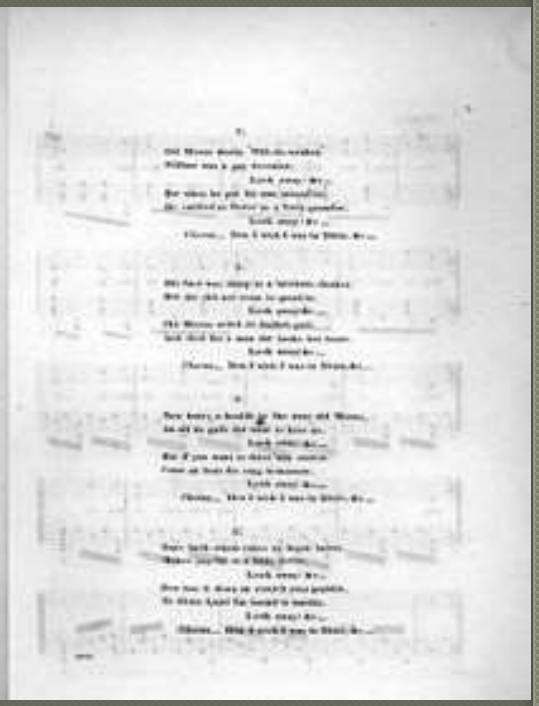
A Gift to the Nation

I Wish I was in Dixie's Land
Daniel Emmett 1859









1860

THE ORIGINAL

DIXON'S LINE

OR

DIXEY LAND

With original Words, Arranged for
THE PIANO
BY

EDGAR PORTER.

Variations

Song

Philadelphia

Published by WM. H. COULSTON 147 N.th 8th St.

1860


BANQUE DES CREOLES
DIX
DE LA LOUISIANE
NEW ORLEANS

Maryland State Geographic Information Committee

The Survey of Mason and Dixon

Resolving the greatest boundary dispute of them all

Presented by:

David S. Thaler, PE, LS, DFE, D.WRE, FRGS, F. ASCE, F. NSPE

D.S. Thaler & Associates, Inc.

Baltimore, Maryland

410-944-3647 dsthaler@dsthaler.com

Oct 17, 2018

The End


STAR GAZER RD
EMBREEVILLE RD
OVER
25 FEET
EXCEPT
LOCAL
DELIVERIES