

The Horizontal Sundial at the Mordecai Lincoln Homestead and Mill Complex

Report by

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Figure 1 Top view of sundial inscribed on slab.



Figure 2 Overall view of the sundial sitting on the courses of fieldstone.

Horizontal Sundial

Unknown Local Massachusetts Maker

Mordecai Lincoln Homestead, Scituate, Massachusetts

19th century

Slab: 10 cm x 42 cm x 53 cm (H x W x D)

Overall height: 61 cm at southeast corner, 41 cm at northwest corner

Sandstone, iron, fieldstone (granite)

The Mordecai Lincoln Homestead and Mill Complex were constructed in 1690-1695 in the town of Scituate, Massachusetts. Mordecai Lincoln (1657-1727) was the great, great, great grandfather of President Abraham Lincoln. He was born in Hingham and settled along Bound Brook in Cohasset, where he first worked as a blacksmith. He ventured to neighboring Scituate in search of water power and bog iron. This led him to construct three mills along Bound Brook, two in Cohasset and one in Scituate, as well as a second homestead near the latter. The Scituate mill was a sawmill and gristmill. It was the lowest of the three mills along the brook. He would run water through the furthest mill for two days, collect it in a dammed mill pond, then release it to the second mill for two days, and after collecting this water, release it to the third mill.¹

This horizontal sundial (*Figs. 1-2*) is set in the back of the Scituate homestead at some distance, on the northern side. It sits in the middle of a field that was once pasture and is now a wildflower meadow. It is constructed from a slab of sandstone, which is sitting on top of three courses of granite fieldstone.² The dressed fieldstones are similar to those currently surrounding a well head in front of the house (*Fig. 3-5, Map*). It is possible that the fieldstones underneath the sundial may have protected a smaller well used to water livestock, and that the maker positioned the sundial on top when the well was no longer in use.



Figure 3 Front of homestead with well head.

¹ Mordecai Lincoln Homestead and Mill Complex at 62-68 Mordecai Lincoln Road, Massachusetts Historical Commission, SCI.116 and SCI.117. <https://mhc-macris.net/details?mhcid=SCI.116>.

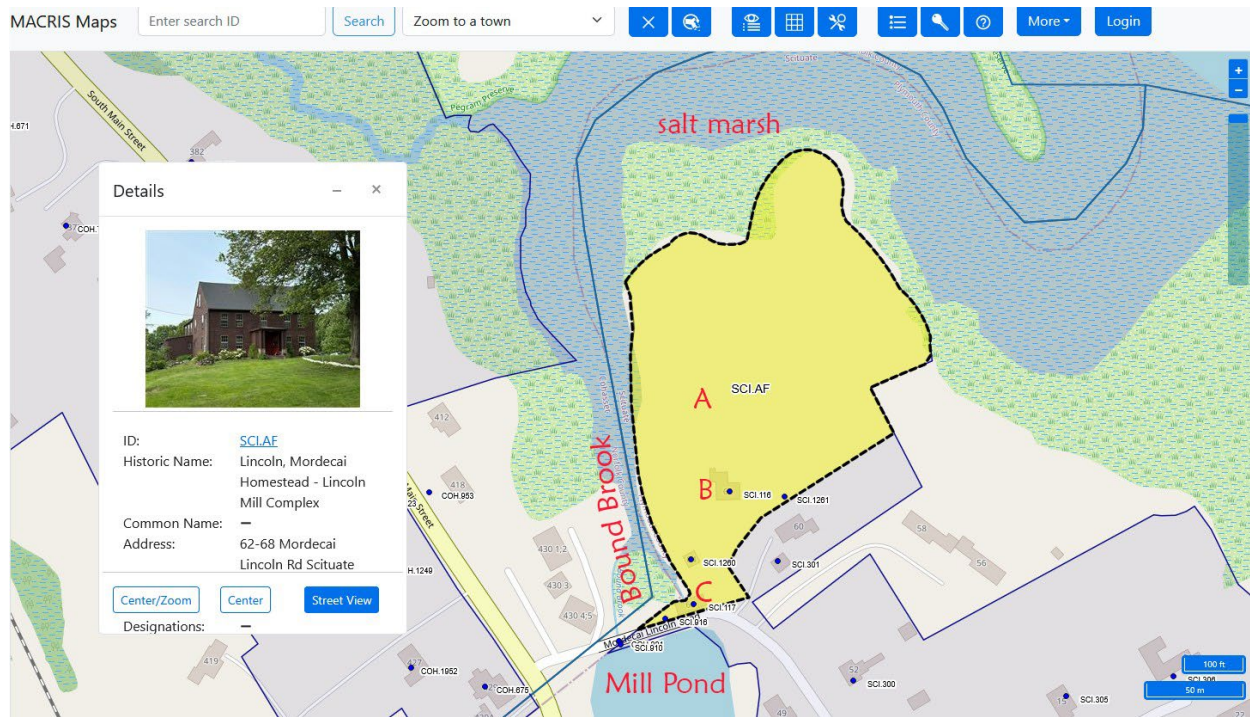
² The stone material was identified using rock identifier software with AI working from uploaded photographs. These included Identify Rock, <https://www.identifyrock.net/>; and Rock Identifier: Stone ID for Apple iPhone.



Figure 4 Rear of homestead (with additions). Arrow pointing towards North.



Figure 5 Rear of homestead looking out onto the field showing sundial's current location. Bound Brook runs behind the trees on the left side into a salt marsh that can be seen in the photograph towards the north.



MAP. The Mordecai Lincoln Homestead and Mill Complex is the yellow area of this map. Courtesy of MACRIS Maps, the GIS website of the Massachusetts Historical Commission (MHC), <https://maps.mhc-macris.net/>. Annotations added by author to screenshot taken 16 June 2026.

Key

A sundial

B homestead (1695, with later additions)

C saw and grist mill (circa 1690)

The slab is roughly shaped into a rectangle and appears to be made of surplus sandstone material, for instance from the fabrication of grave markers. The sides vary in thickness from 7.5 to 10 cm. The western side edge is planed (and possibly sawn). It has a flat, smooth finish, while the southern edge has not been planed as much and is more coarsely dressed. The northern and eastern sides are shaped jaggedly by chipping and chiseling in the manner of stones split for construction. (*Figs. 6-10*)



Figure 6 West-facing side edge showing flatness of finish.



Figure 7 South-facing side edge of slab sitting atop fieldstone courses, showing the finish and slope.



Figure 8 East-facing side edge of slab showing the rough-hewn dressing and the slope of the courses of fieldstones underneath it.



Figure 9 North-facing side edge showing the slope.



Figure 10 North-facing side edge detail.

The sandstone is weathered and covered with crustose lichen. The southeastern corner has split off from the rest of the slab, probably due to the expansion and contraction of the iron gnomon (now broken). (*Fig. 1*)

The slab and the sundial are currently not aligned with the north-south meridian. It deviates 36°W . It is also inclined by about 22° (*Appendix 1*). It was at some time attached to the course of fieldstones by concrete.

The sundial was intended for latitude 42°N , which is the local latitude, as demonstrated through mathematical measurements of the placement of the hour lines and curve fitting (*Appendix 2*).

The sundial was inscribed using a straight edge and sharp tool on the top surface of the sandstone slab. The hours are divided every hour and marked in Roman numerals V-XII-VII. The numeral for four is IV and not IIII; the latter was preferred on sundials in the colonial period and early 19th century. The lettering is crudely done (see *Figs. 1, 11*) with elongated serifs, coarsely filled downstrokes, and very fine upstrokes. The hours are labeled so as to be read from the north side of the dial, rather than from the south side, which is the more common orientation.



Figure 11 Sample of numerals for hours. Clockwise from upper left: III, IV, V, VII.

Hour lines are curiously indicated by double lines, but the “working line” (i.e., the line that would match the shadow of the gnomon’s polar-aligned style) is the one of the pair further away from the meridian (indicated by the twelve o’clock hour line). The non-working member of the pair does not trace back to the sundial projection’s origin (where the six o’clock and twelve o’clock lines cross), and it stops about 9 cm away.

The gnomon is now broken off due to corrosion, but was originally an angled iron rod with no secondary supporting structure. It must have become loose over time, because remnants of what appears to be old window putty are jammed around it in the hole, which is at the fracture point in

the stone slab. The maker's use of an angled rod may have prompted his drawing of the hour lines as double lines.

Idiosyncrasies in this sundial show that it was a do-it-yourself project of someone local and not made by a professional instrument maker or stone carver. Books such as Charles Leadbetter's *Mechanick Dialling* were available in many editions, and taught readers a method by which "any person with a pair of compasses and common ruler only, may make a dial upon plane for any place in the world" without recourse to mathematics.³ A local school teacher or college student could have readily produced it.

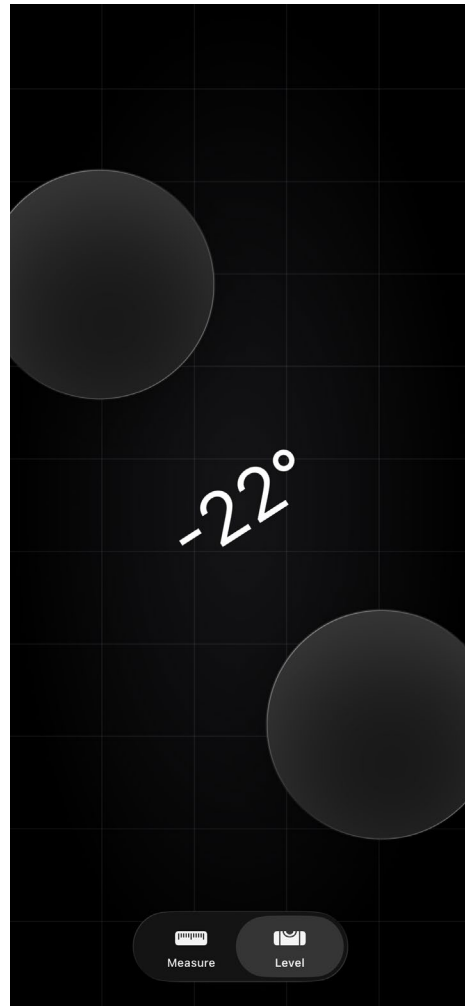
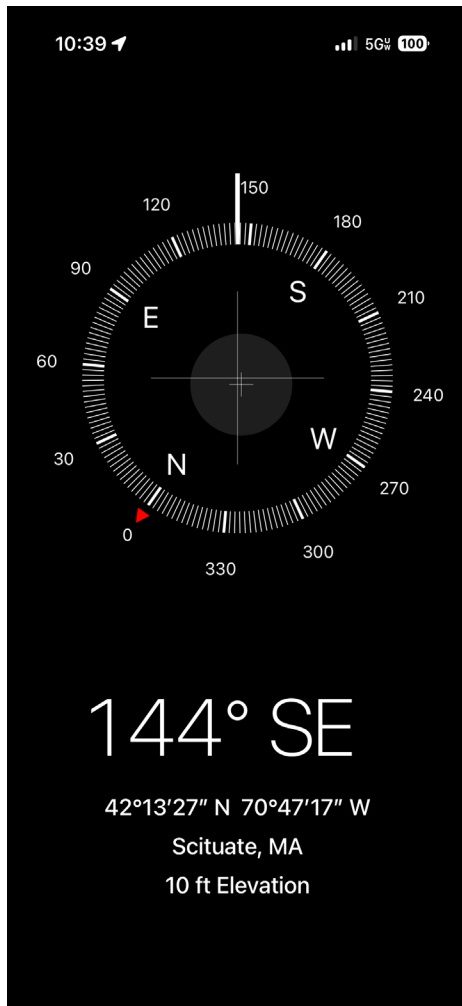
The sundial has age, but it is hard to date. The use of an angled iron rod for a gnomon rather than a triangular piece of brass, and the use of IV instead of IIII on the hour scale, might suggest a 19th century date rather than late 18th century.

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³ Charles Leadbetter, *Mechanick Dialling: Or, the New Art of Shadows, Freed from the Many Obscurities, Superfluities and Errors of Former Writers upon This Subject. The Whole Laid down after so Plain a Method That Any Person (Tho's a Stranger to the Art) With a Pair of Compasses and Common Ruler Only, May Make a Dial upon Any Plane for Any Place in the World, as Well as Those Who Have Attained to the Greatest Knowledge and Perfection in the Mathematics. ... A Work Not Only Useful for Artificers, but Very Entertaining for Gentlemen, and Those Students at the Universities, That Would Understand Dialling, without the Fatigue of Going through a Course of Mathematics*, new revised edition (London, 1769).

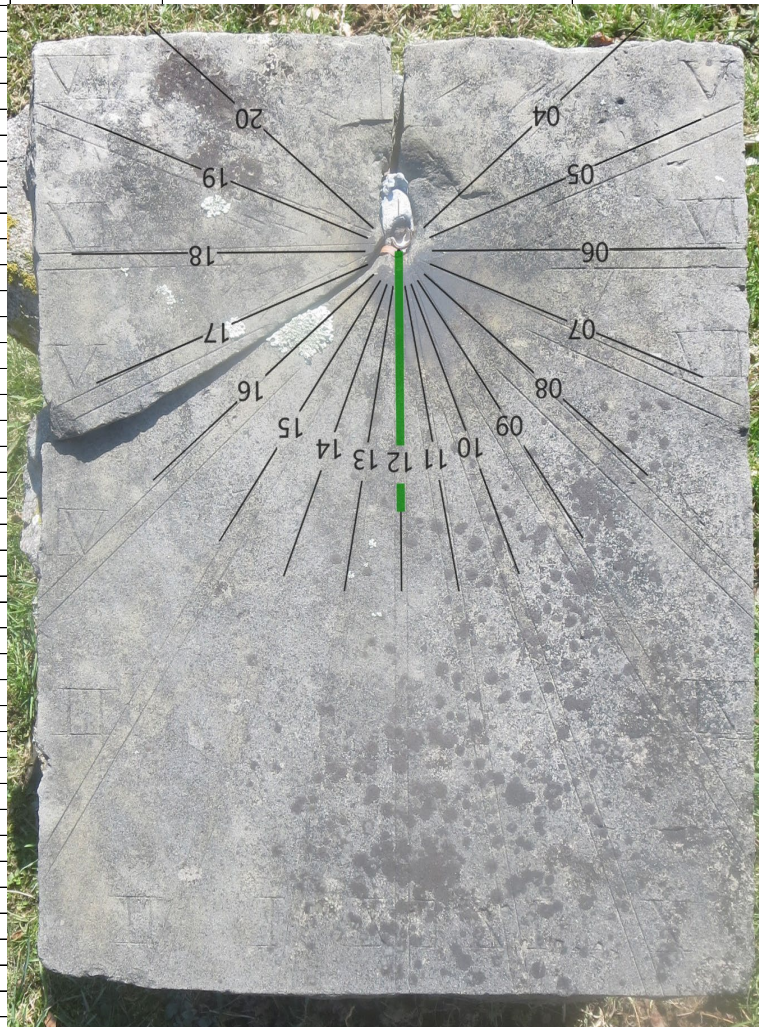
Appendix 1



Readings from Apple iPhone compass tool and level when set on top of the sundial and aligned with its 12 o'clock line.

Horizontal Sundial Latitude Calculator		$\tan(\theta) = \tan(HA) \times \sin(lat)$		$\sin(lat) = \tan(\theta) / \tan(HA)$
Local Time	Hours from Noon	HA Hour Angle	θ Angle between hour line and noon line (-) degrees in morning / (+) degrees in afternoon	lat latitude
5:00 AM	-7	-105	-112	41.54419246
6:00 AM	-6	-90	-90	
7:00 AM	-5	-75	-67	39.14231243
8:00 AM	-4	-60	-48	39.8822872
9:00 AM	-3	-45	-34	42.41599534
10:00 AM	-2	-30	-21	41.67250724
11:00 AM	-1	-15	-12	52.49233446
12:00 PM	0	0	0	
1:00 PM	1	15	10	41.15217984
2:00 PM	2	30	21	41.67250724
3:00 PM	3	45	33	40.49695182
4:00 PM	4	60	47	38.2528027
5:00 PM	5	75	68	41.54419246
6:00 PM	6	90	90	
7:00 PM	7	105	113	39.14231243
		roughly measured with straight edge and protractor		

Deviation from intended 42° is expected and reasonable given the error of the measuring tools and the handcrafted work of the artisan



Overlay of 42° sundial on top of dial at Mordecai Lincoln Homestead