JOHN HOLWELL, A KEY TO ARITHMETICAL DYALLING

London 1686



"CLAVIS HOROLOGIÆ OR, A KEY To the whole Art of ARITHMETICAL DYALLING" is a book in two parts with an appendix describing the famous dial in Whitehall Gardens. The chapters are:

The First Part.

CHAP. I.

Of the Making of the Fundamental Diagram.

CHAP. I I.

Containing the Distinction of Dyals; with the Manner of finding the Declination, Reclination and Inclination of all Planes whatsoever.

CHAP. III. The First Dyal. To draw the Hour-Lines in an Æquinoctial Plane.

CHAP. IV. The Second Dyal. To draw the Hour-Lines upon a Polar Plane.

CHAP. V. The Third Dyal. To draw the Hour-Lines upon a Direct East or West Plane.

CHAP. V I. The Fourth Dyal. To draw the Hour-Lines upon A Horizontal Plane.

CHAP. VII. The Fifth Dyal. To draw the Hour-line on a Direct South or North-Plane.



Diagram used for Drawing the Seventh Dial. CHAP. VIII. The Sixth Dyal. To draw the Hour-lines on a South or North-inclining or reclining Dyal.

CHAP. I X. The Seventh Dyal.

How to draw the Hour-lines upon a South or North Erect Plane Declining East or West to any Declination.

CHAP. X. The Eighth Dyal.

How to draw the Hour-Lines upon any Plane Declining far East or West, or any other in which the Hour-Lines run close together, by help of two Equinoctial lines, without respect to the Center.

CHAP. X I. The Ninth Dyal.

How to draw the Hour-Lines upon any Direct Plane Reclining or Inclining East or West.

CHAP. X I I. The Tenth Dyal.

To draw the Hour-lines upon a Declining reclining or Declining inclining Plane.

CHAP. X I I I. The 1 Ith. Dyal.

To draw the Hour-Lines upon a South reclining Plane, declining East or West, which passeth between the Zenith and the Pole.

CHAP. X I V. The 12th. Dyal.

To draw the Hour-Lines upon a South reclining Plane declining East or West, which passeth between the Pole and Horizon.

CHAP. X V. The 13th. Dyal.

To draw the Hour-Lines upon the Polar Plane Declining East or West, it being the first Variety of North declining and reclining Planes.

CHAP. X V I. The 14th. Dyal.

How to draw the Hour-Lines upon a North Reclining Plane declining East or West, which cutteth the Meridian between the Zenith and Equinoctial.

Number of Pages: 304 plus 61 in the Appendix. Illustrations: Numerous Page Size: 7⁷/8" × 5³/8"



North Declining West 60 deg. Reclining 54 deg.

CHAP. X V I I. The 15th. Dyal.

To draw the Hour-Lines upon a North Reclining Plane, Declining East or West, which cutteth the Meridian between the Equator and Horizon.

CHAP. X V I I I. The 16th. Dyal. Of the manner of cutting divers Bodies in Wood or Stone, and making Dyalls upon them.

CHAP. X I X. How the Meridian-Line is to be placed in all those Dyals that are referred to a new Latitude.

The Second Part.

C H A P. I. Of the Furniture with which Sun-Dyals may be Beautified.

> T A B L E OF THE

Sun's Altitude At the Entrance of

EACH SIGN,

And for all *HOURS* of the *DAY*. From one Degree of *Latitude* to 90.

AR

TABLE

OF Right and Contrary Shadows, TO EVERY DEGREE and Tenth MINUTE OF THE

QUADRANT.

T A B L E OF THE

Suns Azimuth

From the *East* or *West*, for each Hour of the Day, and the Beginning of each Sign, from One Degree to Ninety.

C H A P. II. Containing the Description, Construction and Vse of the foregoing Tables of Altitude.

C H A P. III. How to place the Parallels of Declination upon an Equinoctial Plane.

C H A P. IV. How to describe the Tropicks and other Circles of Declination in a Polar Plain.

C H A P. V. To describe the Parallels of the Length of the Day on a Polar or Meridian Plane.

C H A P. VI. How to draw the unequal Hours, commonly called the Planetary Hours on the Polar and Meridian Plane.

C H A P. VII. How to draw the Babylonish and the Italian Hours on the two former Planes.

C H A P. VIII. How to describe the Vertical Circles in the two former Plains.

C H A P. IX. To describe the Parallels of Altitude on the Meridian Plane.

C H A P. IX. (sic.) How no describe the Circles of Position upon an East and West Plane.

C H A P. X. How to draw the Circles of Altitude upon any Horizontal Dyal.

C H A P. XI. To describe the Parallels of Altitude on a South-plane.

C H A P. XII. To describe the Parallels of the Signs in the Horizontal-Plane. Dyal 4.

C H A P. XIII. To draw the Parallels of the Signs on any South-Plane

C H A P. XIV. Showing how to inscribe the Parallels of the Length of the Day on a Horizontal Plane.

C H A P. XV. Shewing how the Italian and Babylonish Hours may be described upon the Horizontal and South Plane.

CHAP. XVI.

Shewing how to inset the domifying Circles, commonly called the Circles of Position, on a Horizontal and South Plane.

C H A P. XVII.

Of the Meridians of other Countries, and how to insert them into any Sun-Dyal.

CHAP. XVIII.

Of the Horizon of any City or Place whose Latitude and Longitude is known, and how to insert it into a Sun-Dyal.

C H A P. XIX.

How to describe the Signs ascending or descending.

C H A P. XX.

How to place the Rising, Culminating and Setting of any Fixed Star.

CHAP. XXI.

How to describe all manner of Furniture on any upright declining, or declining reclining, or inclining declining Dyal.

C H A P. XXII.

How to draw the Hour-Line on the bottom of a Box, so that a Star or other Figure may pass over them, and shew the Hour of the Day let the Plane be never so irregular (viz.) let it be direct, horizontal, declining, reclining, or both.

CHAP. XXIII.

How to draw a Reflected Dyal on any Wall or Cieling (whereon the Glass being placed an the Transom of a Window, or some other convenient Place Horizontal) let the Cieling be never so irregular.

CHAP. XXIV.

How to draw the Equator, and Tropicks and other Circles of Declination, as also the Sign the Sun is in the Parallel of the length of the Day, and the like, on a Wall or Cieling to any Horizontal Reflecting Glass.

CHAP. XXV.

To draw the Azimuth-Lines on any Wall or Cieling to any Horizonnal Reflecting Glass.

C H A P. XXIII.

I. To draw the Reflected Horizon according to the Situation of any Reclining Glass whatsoever.

C H A P. XXVII.

II. To draw the Reflected Meridian according to the situation of any Reclining Glass whatsoever.



An East Diall with its Furniture

C H A P. XXVIII.

To draw the Reflected Hour-lines to any Reclining Glass on any Plane whatsoever, that the Sun will be reflected on, by help of an ordinary Horizontal Dyal for that Latitude.

C H A P. XXIX.

To draw the reflected Equinoctial Line, and also the Tropicks on any Wall or Cieling, to any reclining reflecting Glass.

C H A P. XXX.

II. To draw the Reflected Tropicks, or other Parallels of Declination.

C H A P. XXXI.

To draw the said reflected Tropicks, or other Parallels of Declination without any Tables calculated, only, by help of a Trigon first made on Pastebord or other Material.

C H A P. XXXII.

To draw the reflected Azimuth-lines to any reclining Glass on any Plane whatsoever that the Sun-beams will be reflected on.

C H A P. XXXIII.

To draw any reflected Line by any two Points given over any Plane whatsoever, without projecting by the Eye.

C H A P. XXXIV.

To draw the reflected Parallels of the Suns Altitude or Proportions of Shadows to any reclining Glass on any Plane whatsoever that the Sun-Beams will be reflected on.

C H A P. XXXV.

To draw the Jewish or old unequal Hour-lines to any Reclining Glass on any Plane whatsoever that the Sun-Beams will be reflected on.

C H A P. XXXVI.

To draw the Circles of Position to any Reclining Glass on any Plane whatsoever that the Sun-Beams will be reflected on.

CHAP. XXXVII.

How to draw any Circle of Position, or the Cuspis of any House on any Cieling or Wall to any Reclining Glass.

DIRECT DYALLING By a Hole or Nodus.

C H A P. XXXVIII.

To draw a Dyal under any Window that the Sun shines upon by help of a Thread fastened in any Point of the direct Axis found in the Cieling, and a Hole in any Pane of Glass, or a Knob or Nodus upon any side of the Window or Window-Post.

C H A P. XXXIX.

To find a Point in the direct Axis of the World, which will ever fall to be in the said Meridian, in which Point the end of a Thread is to be fastened.

CHAP.XL.

How to find the Hour-Points either under the Window or any other convenient Place in the Room.

C H A P. XLI.

Of Refracted Dyals.

C H A P. XLII.

How to draw the Parallels of the Signs or Declination, or Parallels of the Length of the Day, or any other Parallel that doth depend upon the Declination of the Sun, without having respect to the Hour-lines, and that three several ways Geometrically, which Ways never have been Published in any Language.

FINIS.

A N A P P E N D I X TO CLAVIS HOROLOGIÆ: OR AN E X P L I C A T I O N OF THE PYRAMIDICAL DYAL Set up In His Majesties Garden at White-Hall, Anno 1669.



The Pyramidical Dial at White-Hall.



Details of two of the Whitehall Dials A Brief Explication of the Pyramidical Dyal set up in His Majesties Private Garden at White-Hall, July 24. 1669.

C H A P. I. Of the several Parts of this Dyal; and of the Dyals described on each part in general.

C H A P. II. Of the Twenty Vertical Dyals described on the Edge of the first Piece.

C H A P. III. Of the Eight Reclining Dyals standing upon the first Piece.

C H A P. IV. Of the Four Glass Bowls standing on the Four Branches of the First Piece.

C H A P. V. Of the Four great Globes standing on the First Piece.

C H A P. VI. Of the Dyals described on the Edge of the Second Piece.

C H A P. VII. Of the Eight Reflecting Dyals placed on the Top of the Second Table.

C H A P. VIII. Of the Four Dyals supported by the Four Branches of the Second Piece.

C H A P. IX. Of the Dyals described on the great Globe which stands on the Second Table.

C H A P. X. Of the Four Glass-Bowls supported by the Four Branches of the Great Globe.

C H A P. XI. Of the Three uppermost Pieces of the Pyramis.

FINIS.

At the end of the book is a list of 48 Subscribers Names followed by a list of:

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