# WILLIAM LEYBOURN, THE ART OF DIALLING 

London 1690, Third Edition. (Other Editions were in 1669, 1681 and 1700)

# The $A R T$ of <br> DIALLING, Performed <br> GEOMETRICALLY, By Scalk and Compafes, Two feveral ways. <br> ARITHMETICALLY, <br> By the Canons of Signs and Tangents: <br> INSTRUMENTALLY, <br> By a Trizonal Imframent, Accommodated with Lines for that purpofe: <br> The Geometrical Pars whereof is performed by Projelting of the Sphere in Plano, upon tho Plain it felf, whereby not only the Making, but the Reafon of Dials alfo is difcovcr'd. 

## IIbe IIbiru Coition, ©enlargeo.

With a Supplement, Thewing how Geomerrically and Mecbanically to infere into all forts of Sun-Dials, fuch Cireles of the Sun's Courie as gives the Hour and Length of the Day, according to the account of feveral Councries, \&c. And to Projettand Reflet Hour-Lines upon all forts of Superficies, Plain or Curved, without any regard had to their flanding, either in reficet of Decirnation, or Inclination.

By WILLIAM LETBOURN, Philomath.
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Leybourn's "The A R T of DIALLING" was published in several editions. It first appeared in 1669, so it predates his later book entitled DIALING. It commences with 29 pages of:

## A

CONNEXTURE
OF
GEOMETRICAL PROBLEMES, AND
ASTRONOMICAL ELEMENTS.
This is then followed by:
The ART of

## DIALLING

Geometrically performed,
By Projecting of the Circles of the Sphere upon the Plain it self.

The First Part.
CHAP. I.
Of the several sorts of Plains upon which D I A L S are usually made.


A Direct Polar Dial South
C H A P. II.
How to find the Reclination and Declination of any Plain.

## I. Of the Vertical Dialling. CHAP. III.

How to draw the Hour-lines upon a Vertical (commonly called Horizontal) Plain.

## I I. Of Upright or Erect Plains.

 C H A P. IV.I. Of Upright, or Erect Direct Plains. CHAP. V.
How to draw the Hour-lines upon a Direct South Plain.
C H A P. VI.
How to draw the Hour-lines upon an Erect, Direct, East, or West Plain.

## I I. Of Upright Declining Plains. C H A P. VII.

How to draw the Hour-lines upon a South of North Erect Plain, Declining either East or West.

## C H A P. VIII.

How to draw the Hour-lines upon Upright far Declining Plains, which by reason of the small Elevation, which the Pole hath over such Plains, the Hours (if they be drawn from a Centre) cannot be of any competent distance one from another.

## I I I. Of Reclining Plains. <br> CHAP. IX.

## Of Direct Reclining Plains \&c.

I. Of East and West Recliners.

C HAP. X.
How to draw the Hour-lines upon a Direct East or West Reclining or Inclining Plain.

## I I. Of South Recliners.

## CHAP. XI.

How to draw the Hour-lines upon Direct South Reclining or Inclining Plains.


North Declining West $60^{\circ}$, Reclining $32^{\circ} 11^{\prime}$.

## The First Variety.

C H A P. XII.
How to draw the Hour-lines upon an Æquinoctial Plain, Reclining just to the Pole.

## The Second Variety.

CHAP. XII.
How to draw the Hour-lines upon a Direct South Reclining Plain, which falls between the Zenith and the Pole.

## The Third Variety. <br> CHAP. XIV.

How to draw the Hour-lines upon a Direct South Reclining Plain, which passeth between the Pole and the Horizon.

## I I I. Of North Direct Recliners.

CHAP. XV.
How to draw the Hour-lines upon a Direct North Reclining Inclining Plain.

## The First Variety.

CHAP. XVI.
How to draw the Hour-lines upon a Direct Polar Plain, which Reclineth just to the Æquinoctial.

## The Second Variety. C H A P. XVII.

How to draw the Hour-lines upon a North Reclining Plain which intersects the Meridian between the Zenith and the $\not Æ q u i n o c t i a l$.

## The Third Variety. <br> C H A P. XVIII.

How to draw the Hour-lines upon a Direct North Reclining Plain, which intersects the Meridian between the Æquinoctial and the Horizon.

## IV. Of Declining Reclining Plains. CHAP. XIX.

## I. Of South Recliners.

The First Variety.
CHAP. XX.
How to draw the Hour-lines upon a South Reclining Declining Plain, which cutteth the Meridian in the Pole Point.

## The Second Variety. CHAP. XXI.

How to draw the Hour-lines upon a South Reclining Plain, Declining East or West, which passeth between the Zenith and the Pole.

## The Third Variety.

C H A P. XXII.
How to draw the Hour-lines upon a South Reclining Plain, Declining East or West, which intersects the Meridian between the Pole or the Horizon.

## II. Of North Recliners.

The First Variety.
C H A P. XXIII.
How to draw the Hour-lines upon a North Reclining Plain, Declining East or West, which cutteth the Meridian at the Intersection thereof with the Æquinoctial.

## The Second Variety. <br> C H AP. XXIV.

How to draw the Hour-lines upon a North Reclining Plain, Declining East or West, the Plain passing through the Meridian, between the Zenith and the Æquinoctial.

## The Third Variety.

CHAP. XXV.
How to draw the Hour-lines upon a North Reclining, or Inclining Plain, Declining East or West, which intersects the Meridian between the Æquinoctial and the Horizon.

PROPOSITION
A Circle being described, representing a Declining Reclining Dial-Plain; how thereon to place the Meridian, Horizon,


South Declining West

Æquinoctial, Pole, Zenith \&c. with all other Requisites belonging to such a Dial. And also, to project the Meridians of the Sphere it self upon the Plain, and from thence to draw the Hour-lines upon the Dial-plain, according to their true Situation.

## CHAP. XXVII.

Concerning Inclining Plains, both Direct and Declining.
C H A P. XXVIII.
A General Rule to know which Pole, whether the North or the South is to be elevated over any Plain.

## A <br> Second Way <br> OF <br> DIALLING,

GEOMETRICALLY Performed.

## PART II.

Section I.
How to draw Hour-lines upon an Upright South Plain Declining from the South towards the West 20 deg. in the Latitude of London 51 deg. 32 min .

## Section II.

How to describe Hour-lines upon the Horizontal Full South, North, East and West Erect or Reclining Plains.

## The ART of <br> DIALLING,

## INSTRUMENTALLY <br> PERFORMED:

By a Plain, Cheap, and Portable Instrument, accomodated with Lines necessary for that purpose.

PART. III.
CHAP. I.
A Description of the Instrument.
CHAP.II.
How to draw the Hour-lines upon all sorts of Direct Plains, by help of the Horological Trigon.

## Section I.

How to draw the Hour-lines upon a Vertical or Horizontal Plain, as also upon any direct North or South Plain in any Latitude, whether Erect or Reclining.

## Section II.

How to draw the Hour-lines upon the Direct East West uprights and Æquinoctial Reclining Plains, by help of the Trigon.

> СНАР. III.

How to draw the Hour-lines upon any Erect Plain, Declining East or West, by help of the Horological Trigon.

## Section I.

How to describe the Hour-lines upon an Erect or Upright Plain, Declining from the South Eastward 30 deg. in the Latititude of 51 deg .30 min .


South Reclining, North Inclining
Section II.
PROP.
To draw an Upright Declining Dial in such a Latitude, where the Pole hath butsmall Elevation.

## PROP. II.

How to draw an Upright Declining Dial in such a Latitude where the Pole hath great Elevation.

CHAP. IV.
The Declination and Reclination of a Plain in a known Latitude being given, to find in what Latitude the said Reclining Declining Plain shall be an Upright Plain, and also, what Declination the same shall have in that New Latitude, and how much the Meridian ascends above, or descends below the Horizontal Line of the Plain, and which ways.

Section I.
To find the New Latitude.
Section I I.
To find the New Declinations.
Section III.
To find the Angle that the Meridian makes with the Horizontal Line of the Plain.

CHAP. V.
Sewing whether the Meridian Line of the Plain ascends above, or descends below the Horizontal Line of the Plain, and towords what Coast.

CHAP. VI.
How to deal with East and West Reclining and Inclining Plains.
CHAP. VII.
Of North and South Reclining and Inclining Plains.

## The ART of DIALLING,

 arithmeticallyPERFORMED
By the CANONS (or TABLES) of Artificial Sines and Tangents.
P A R T IV.
The Argument.
Section I.
Of (Vertical or) Horizontal Plains.
Section I I.
Of North and South Erect Direct Plains.
Section I I I.
Of North and South Erect Declining Plains.
Section I V.
Of South Direct Reclining Plains.
Section V.
Of North Direct Reclining Plains.
Section VI.
Of East and West Direct Reclining Plans.
Section VII.
Of South and North Declining Reclining Plains.
Section VIII.
Of the Hour Distances upon the Plains.
Section IX.
Followed by:
A D V ERTISEMENT.
D I A L L I N G, Plain, Concave, Convex, Projective, Reflective, Refractive ; And how to Adorn them with all Useful F U R N I T U R E.

## A

## SUPPLEMENT

TO
Geometrical Dialling, \&c.
C H A P. I.
Of such Circles of the Sphere, as are described upon Sun-Dials.
C H A P. II.
How to describe the Equinoctial, the two Tropicks, and other intermediate Parallels of Declination, upon any Dial Plain.


South Declining East $30^{\circ}$, Reclining $20^{\circ}$
C H A P. III.
How the Hours from the Sun's Rising and Setting are to be inscribed into all sorts of Dial-Plains. C H A P. IV.
Of the Jewish, or Old Unequal, of Planitary-hours, and how they may be inscribed upon any Dial-Plain.

C H A P. V.
How the Azimuths, or Vertical Circles, are to be inscribed upon Dial Plains.

S E C T. I.
On an Horizontal Plain.
S E C T. II.
Upon an Erect, Direct East, or West Plain, Figure I.
S E C T. III.
Upon a direct South upright Plain, Figure III.
S E C T. IV.
Upon a South Declining Plain. Fig. VI.
C H A P. VI.
How to inscribe the Circles of the Sun's Altitude into Dial-Plains.

C H A P. VII.
A General and Easie way to project Hour-lines upon all kind of Superfices, without any regard had to their standing, either in respect of Declination, Reclination, or Inclination.

## C H A P. VIII.

How from a Glass, Horizontally placed, to Reflect-hours upon any Superfices Flat or Curved, one or more.

FINIS.

