

Blagrave, Mathematical jewel, 1585

B 1 **Babbage, Charles** (1791–1871)

On the action of ocean-currents in the formation of the strata of the earth (Abstract).

See any biographical dictionary for details on Babbage's life and the entry Macrosty and Bonar, Annals of the Royal Statistical Society, 1934, for a photographic portrait.

While Charles Babbage may be considered to be the grandfather of the modern computer, his work was limited to mechanical technology. Though electrical technology (particularly telegraph and relay technology) was being developed towards the end of his life, he seems not to have considered them for any of his engines. Despite this he was able to design mechanical machines that were the functional equivalent of the modern electronic computer. Today all encyclopedias will have some mention of him or his achievements—a situation that only arose after the development of the modern computer. He was essentially forgotten, or at least relegated to an obscure corner of the history of mathematics, before his involvement with calculating machines came to be appreciated. Interested in all aspects of science, he made contributions to areas as diverse as mathematics, geology, chemistry, statistics, astronomy, railroads and lighthouses. Short introductions to each of Babbage's publications can be found in *The* Works of Charles Babbage, edited by Martin Campbell-Kelly, published in London by Pickering and Chatto in 1989. Many of the remarks in the Babbage entries of this work are adapted from the introductions by Campbell-Kelly.

See entry for Works of Charles Babbage, M.A., F.R.S., &c. [A Collection of seventeen items by or about Babbage].

В2 Babbage, Charles (1791–1871)

Addition to the memoir of M. Menabrea on the

analytical engine. In The London, Edinburgh and Dublin Philosophical Magazine, and Journal of Science. Third Series. Vol. 23, No. 151, September 1843.

> Year: 1843 Place: London

Publisher: Taylor and Francis

Edition: 1st Language: English

Binding: original paper wrappers; unopened

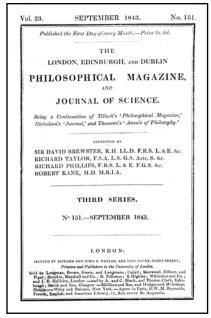
Pagination: pp. 235–239 Size: 223x140 mm

Reference: Van S CBCP, #55; Ran ODC, p. 405; MCK CBCW,

v. 3, pp. 83-88; Not in Babb CBLP

This paper was published anonymously a few weeks after the Ada Lovelace translation of the Menabrea paper on the Analytical Engine appeared (see Menabrea, Luigi Federico; translated by Byron, Augusta Ada, Lady Lovelace, Sketch of the Analytical Engine invented by Charles Babbage, Esq. ... with notes by the translator, extract from the "Scientific Memoirs" vol. III, 1843). The attribution to Babbage was by the editors of Astronomische Nachtrichen, who reprinted the paper in 1844 and learned of the author's identity through David Brewster.

In this paper Babbage presents his side of the dispute with the British government over financial support for the Difference Engine. Babbage evidently intended the paper be published as an addendum to the Lovelace translation, but both the translator and the publishers were reluctant to involve themselves in the controversy. Babbage then turned to his friend and admirer David



Journal cover, B2

Brewster, an editor of the *Philosophical Magazine*. The paper also appears in **Babbage**, **H. P.**; *Babbage's calculating engines, being a collection of papers relating to them, their history and construction*, London, 1889, under the title *Statement of the circumstances attending the invention and construction of Mr. Babbage's calculating engines*.

Illustrations available: Cover page:

B 3

Babbage, Charles (1791-1871)

An analysis of the statistics of the clearing house during the year 1839.

See **Babbage**, **Charles**; *Works of Charles Babbage*, *M.A.*, *F.R.S.*, &c. [A Collection of seventeen items by or about Babbage].

B 4

Babbage, Charles (1791–1871)

On the application of analysis to the discovery of local theorems and porisms. In Transactions of the Royal Society of Edinburgh, vol. 9.

Year: 1823 Place: Edinburgh

Publisher: Royal Society of Edinburgh

Edition: 1st (offprint) Language: English

Binding: extract; paper wrappers Pagination: pp. 337–352

Reference: Van S *CBCP*, #21; Babb *CBLP* #14; Ran *ODC*, p. 405; Dub *MWCB*, p. 231

This journal extract is a technical mathematical paper.

Illustrations available: First page:

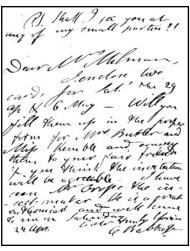
B 5

Babbage, Charles (1791–1871)

Autograph letter.

Year: 1820 or 1826 Place: London Edition: manuscript Language: English Pagination: 1 page

Dated 24 April, Babbage sends invitations to Mrs. Butler and Miss Kemble (likely the celebrated actress Fanny Kemble), via Mrs. Milman, for one of his gatherings. The text mentions Saturday, April 29, and Saturday, May 6, and these dates are a Saturday in both 1820 and



B 5

1826. Mrs. Milman was a poet and scholar, according to a notation by the seller.

Illustrations available: Letter

В 6

Babbage, Charles (1791–1871)

Autograph letter.

Year: 1838 Place: London Edition: manuscript Language: English Pagination: 2 pages

A letter from Babbage to an anonymous recipient dated 10 January 1838. Babbage says he cannot come out because he is having a hot water apparatus installed and cannot leave the workmen.

Illustrations available: Letter (2)

В7

Babbage, Charles (1791–1871)

Autograph letter.

Year: 1862 Place: London Edition: manuscript Language: English Size: 180x126 mm

A letter from Babbage to a Mrs. Robinson dated 25 August 1862. It mentions the excitement of the Exhibition and the fact that Babbage was writing a book that will gain his revenge over those who used all the small power and wit they possess to destroy the Analytical

Engine. He presumably means Passages from the life of a philosopher, which was first published in 1864.

Illustrations available: Letter (2)

В8

Babbage, Charles (1791–1871)

Carte de visite.

Year: n/d Place: London

Edition: photograph and autograph

Language: English Size: 104x62 mm

This bears a photograph of Babbage with his autograph on the verso.

Illustrations available:

Card

В9

Babbage, Charles (1791–1871)

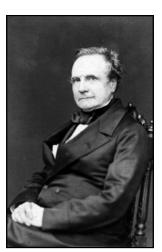
A chapter on street nuisances.

Year: 1864 Place: London Publisher: John Murray Edition: 2nd Language: English Binding: paper wrappers

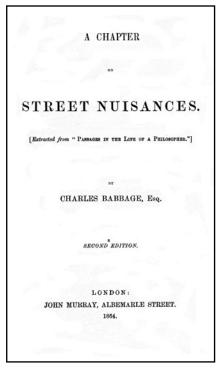
Pagination: pp. 32 Reference: Van S *CBCP*, #76; Ran *ODC*, p. 405; MCK *CBCW*, v. 11; Not in; Babb *CBLP*

This is an offprint from *Passages from the life of a philosopher* (misnoted on the title page as *Passages in the life of a philosopher*).

Illustrations available: Title page



Charles Babbage, B 8



B 9

B 10

Babbage, Charles (1791–1871)

A comparative view of the various institutions for the assurance of lives.

Year: 1826 Place: London Publisher: J. Mawman Edition: 1st

Language: English
Figures: 1 folding table

Binding: three-quarter leather over marbled boards

Pagination: pp. xxxii, 170, [28]

Collation: A–N⁸O³ Size: 214x132 mm

Reference: Van S CBCP, #26; Babb CBLP, #30; Ran ODC, p. 405; MCK CBCW, v.6

This volume is illustrative of Babbage's broad range of interests and grew out of his experience as an actuary for the Protector Life Assurance Society. The insurance business was in its infancy at the time, and many companies were being formed in England. The Protector did not, in fact, issue any policies. It was within a few days of opening its doors when, for reasons still not clear, the directors unexpectedly decided to cease business.

Rather than a book for the insurance industry, Babbage aimed this volume at the interested layman. In 1827 it was translated into German.

This book carries the signature of Henry P. Babbage (Charles' son) as well as being a presentation copy

from Richard H. Babbage (Charles' great-grandson who lived in Montreal) to Richard Bedford Bennett, a Canadian lawyer and politician. Bennett later (1930) became Prime Minister of Canada. Richard Babbage's inscription reads:

Presented to R. B. Bennett K.C. MP by Richard H. Babbage M.C. Great grandson of the Author as a small token of gratitude for many kindnesses Dec. 1919

Richard Babbage was correct in addressing Bennett as a King's Counsel (K.C.); however, Bennett was not, at the time, a Member of Parliament (MP). Bennett was an MP from 1911 until 1917, then was not elected again until 1925.

A review of this work by **David Brewster** (see entry for Babbage; Works of Charles Babbage, M.A., F.R.S., &c. [A Collection of seventeen items by or about Babbage]) is also available in the collection.

Illustrations available: Title page

Inscription

Babbage, Charles (1791–1871)

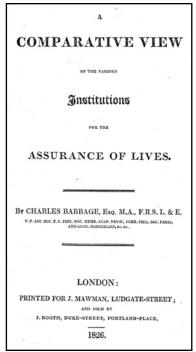
On currency, on a new system of manufacturing and on the effect of machinery on human labour. Being three chapters extracted from the third edition of "The Economy of Machinery and Manufactures."

Richard. H. Sabbage
M.C.

South franka of
the author
as a small token
of fratitude for
hany kindnesses

DEC 1919

Inscription, B 10



B 10

Year: 1833 Place: London

Publisher: Charles Knight Edition: 1st (Separate) Language: English

Binding: original paper wrappers

Pagination: pp. 31 Size: 174x109 mm

Reference: Van S CBCP, #70; Babb CBLP, #71, #73; Ran ODC, p. 405; MCK CBCW, v. 8

This is an extract from one of Babbage's most important works.

Illustrations available: Title page

B 12

Babbage, Charles (1791–1871)

Demonstration of a theorem relating to prime numbers In The Edinburgh Philosophical Journal, Vol. 1, No. 1, June 1819.

> Year: 1819 Place: Edinburgh

Publisher: Archibald Constable

Edition: 1st Language: English

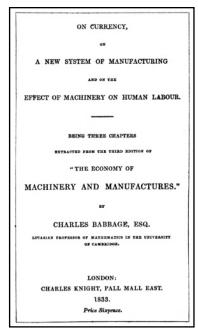
Binding: half bound over marbled boards

Pagination: pp. 46-49 Size: 207x125 mm

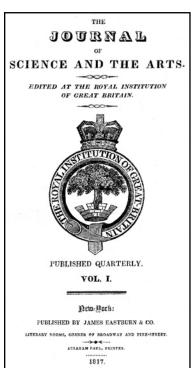
Reference: Van S CBCP, #70; Babb CBLP, #71, #73; Ran ODC, p. 405; MCK CBCW, v. 1, pp. 279-282; Dub MWCB, p. 230

This is one of Babbage's earlier mathematical papers. It is simply an extension of one relating to which mathematical forms are divisible by n when n is a prime number but not otherwise. Babbage's theorem extends the situation to include n^2 .

Illustrations available: First page



B 11



Journal cover, B 13

B 13

Babbage, Charles (1791–1871)

Demonstrations of some of Dr. Matthew Stewart's general theorems; to which is added, an account of some new properties of the circle. In the Journal of Science and the Arts Vol. I, Art II,1817.

Year: 1816 Place: New York Publisher: James Eastburn Edition: 1st (U. S.) Language: English Figures: 4 engraved plates

Binding: Cloth spine over paper boards

Pagination: pp. 6–24 Collation: $A^4B-I^8K^7L-X^8Y^4Z^2$ Size: 234x140 mm

Reference: Van S *CBCP*, #5; Babb *CBLP*, #5; MCK *CBCW*, v.1, pp. 194–212; Dub *MWCB*, p. 230

This is a prime example of Charles Babbage's early mathematical work. After graduation from Cambridge in 1814, Babbage sought to establish his career as a mathematician, a calling in which he was both talented and prolific. From 1813 to 1827, Babbage, according to his own *List of works*, wrote no less than thirty-three books and papers.

Illustrations available: Title page

B 14

Babbage, Charles (1791–1871)

On the determination of the general term of a new class of infinite series In The Philosophical Magazine and Journal, Vol. 67, No. 336, April 1826.

Year: 1826 Place: London Publisher: Richard Taylor Edition: 1st Language: English

Binding: half-bound leather over marbled paper boards

Pagination: pp. 259–265 Size: 208x125 mm

Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v.1, pp. 61–68

This is another of Babbage's early mathematical papers.

Illustrations available: None

B 15

Babbage, Charles (1791–1871)

Sulla economia delle macchine e della manifatture.

Year: 1834 Place: Florence



Publisher: Presso Guglielmo Piatti in Vacchereccia – Luigi Casini in Via Martelli e al Gabinetto Scientifico Lettrario di Vieusseux

Edition: 1st (Italian) Language: Italian

Binding: original paper wrappers; untrimmed

Pagination: pp. [8], 311, [1], [7], [1]

Collation: π^4 1–20⁸ Size: 218x145 mm

Reference: Van S $\mathit{CBCP}, \#70;$ Babb $\mathit{CBLP}, \#71, \#73;$ Ran

ODC, p. 405; MCK CBCW, v. 8

See the entry for **Babbage**, **Charles**; *On the economy of machinery and manufactures*, 1832.

Illustrations available: Title page

B 16

Babbage, Charles (1791–1871)

On the economy of machinery and manufactures.

Year: 1832 Place: London

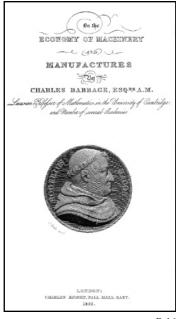
Publisher: Charles Knight

Edition: 1st Language: English

Binding: later buckram boards Pagination: pp. xvi, 320 Collation: A–X⁸ Size: 174x105 mm

Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 8

Babbage's work on his calculating engines aroused his keen interest in the workshops and factories of Great Britain and Europe. His observation and study of their



B 16

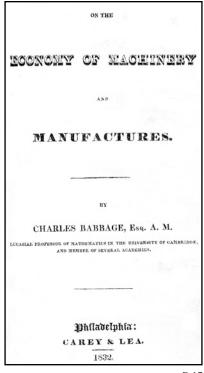
methods during his visits led him to write this classic treatise, one of his major works, and its publication established him as a major figure in the economics field. It is due to this study that Babbage is sometimes referred to as the founder of the field of Operations Research.

This remarkable work considers not only the productive function of machines and processes but also their administration and control. Babbage referred to the subject as *the domestic economy of the factory*. As was his usual predilection, Babbage sought to establish the governing general principles based on scientific analysis of the subject at hand. Hence, it is not surprising that in this work he covers a broad range of topics, including process control, production efficiency, plant location and labor incentives (profit sharing).

Many of the contents were first published in the introduction to **Peter Barlow**'s long essay on manufacturing and machinery in Great Britain (see that entry) in the *Encyclopedia Metropolitana* in 1829 and a few years later as this volume. The book went through several editions and was translated into all the major European languages. Babbage added minor items from one edition to the next, but essentially all the material is present in this first edition.

This first edition had two issues: a presentation version, of which a small number were printed in large paper format, and three thousand copies in the standard octavo size usually encountered.

Illustrations available: Title page



В 17

B 17

Babbage, Charles (1791–1871)

On the economy of machinery and manufactures.

Year: 1832
Place: Philadelphia
Publisher: Carey & Lea
Edition: 1st (U.S.)
Language: English
Binding: later leather
Pagination: pp. xx, 15–282, [36]
Collation: π⁴1–23⁶24²χ¹⁸

Size: 160x92 mm Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 8

This is the American edition of Babbage's major work, published in the same year as the British first edition.

Illustrations available: Title page

B 18

Babbage, Charles (1791–1871)

On the economy of machinery and manufactures.

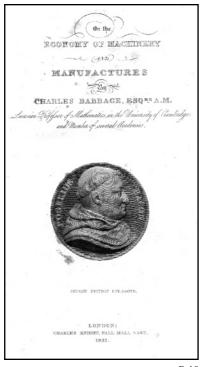
Year: 1832 Place: London

Publisher: Charles Knight

Edition: 2nd Language: English

Figures: steel engraved title page

Binding: contemporary leather; spine gilt; gilt edges



B 18

Pagination: pp. xxiv, 388 Collation: a⁸b⁴B–2B⁸2C² Size: 165x100 mm

Reference: Van S $\mathit{CBCP}, \#70;$ Babb $\mathit{CBLP}, \#71, \#73;$ Ran

ODC, p. 405; MCK CBCW, v. 8

This is the second edition of Babbage's work—published in the same year as the first.

Illustrations available: Title page

B 19

Babbage, Charles (1791–1871)

On the economy of machinery and manufactures.

Year: 1833 Place: London Publisher: Charles Knight Edition: 3rd Language: English

Figures: steel engraved title page

Binding: original moiré grained buff cloth boards; gilt spine

Pagination: pp. xxiv, 392, [4] Collation: a⁸b⁴B–2B⁸2C⁴2D² Size: 171x105 mm

Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 8

This third edition of Babbage's major work features a new preface.

Illustrations available: Title page

Babbage, Charles (1791–1871)

On the economy of machinery and manufactures.

Year: 1835 Place: London

Publisher: Charles Knight

Edition: 4th Language: English

Figures: steel engraved title page Binding: original cloth boards Pagination: pp. iii–xii, [2], xiii–xxiv, 408

Collation: a⁸b⁴B–2B⁸C–E⁴

Size: 160x95 mm

Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 8

This is the fourth edition. The work was a popular success, with four editions in a little over two years.

Illustrations available: Title page

B 21

Babbage, Charles (1791–1871)

On electrical and magnetic rotations. In Philosophical Transactions of the Royal Society for the year MDCCCXXVI.

Year: 1826 Place: London

Publisher: Royal Society of London

Edition: 1st Language: English

Figures: 19 engraved plates (5 folding)
Binding: original paper wrappers
Pagination: pp. 494 –528.
Collation: 3Sv⁴–3V⁴3Y²
Size: 295x230 mm
Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran

ODC, p. 405

This is a paper on the magnetic properties of matter. See the entry **Babbage**, **Charles**; *On a method of expressing signs*, 1826, for an illustration of the title page of this volume of the *Philosophical Transactions*.

Illustrations available: Title page (see above)

B 22

Babbage, Charles (1791–1871)

An examination of some questions connected with games of chance.

Year: 1821 Place: London

Publisher: Royal Society of Edinburgh

Edition: 1st Language: English Binding: disbound extract Pagination: pp. 153–177 Size: 272x215 mm.

Reference: Van S *CBCP*, #14; Babb *CBLP*, #12; Ran *ODC*, p. 5; MCK *CBCW*, v. 1, pp. 327–343; Dub *MWCB*, p. 231

This is an extract of one of Babbage's technical mathematical papers.

Illustrations available: First page

B 23

Babbage, Charles (1791–1871)

Examples of the solutions of functional equations.

b/w: **Herschel, J. F. W.**; A collection of examples of the applications of the calculus of finite differences.

Year: 1820 Place: Cambridge

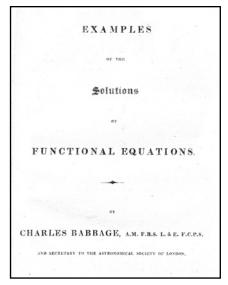
Publisher: J. Smith for J. Deighton et. al.

Edition: 1st Language: English Figures: one engraved plate Binding: green cloth boards Pagination: pp. vi, 172, [iv], 42 Collation: *a³*A-*X⁴*Y²*²A-E⁴F¹

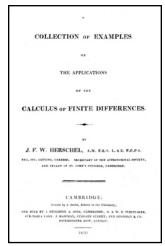
Size: 225x140 mm

Van S CBCP #70; Babb *CBLP* #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 1, pp. 283–326; Dub *MWCB*, p. 230

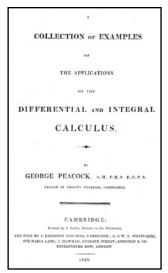
While undergraduate students at Cambridge in 1812, Charles Babbage and his two friends **George Peacock** and **John Herschel**, formed the Analytical Society to bring mathematics teaching in England up to the standards of the European continent. Their first undertaking was to translate into English a French calculus book by **Sylvestre François Lacroix** (*Traité du calcul*



Babbage title page, B 23



Herschel title page, B 23



Peacock title page, B 23

différentiel et du calcul integral, 1797–1800) (see entry for [Babbage, et al., translators] – Lacroix, Sylvestre François; An elementary treatise on the differential and integral calculus. Translated from the French with an appendix and notes, 1816).

This volume consists of a large set of examples of the applications of the calculus of differences, initially intended to accompany that translation but ultimately published separately. It contains examples (171 pp.) by **Herschel** for the calculus of finite differences and Babbage's smaller (42 pp.), eighty-three worked examples of the calculus of functions.

The printer, J. Smith, printer to the University, issued the work in two forms. One was in two volumes, the first containing the work of **Peacock** and the second containing the work of Babbage and **Herschel**. Smith also produced an issue containing the work of all three authors. A copy of this later edition is available in the collection.

Peacock (1791–1858) held the Lowndean chair of astronomy and geometry at Cambridge from 1836 to 1858 but stopped lecturing there when he became Dean of Ely Cathedral in 1839.

The translation became very popular and was used for many years as a calculus text in British universities.

Illustrations available:
 Title page of Babbage section
 Title page of Herschel section
 Title page from Peacock's section (from the second copy)

B 24 **Babbage, Charles** (1791–1871)

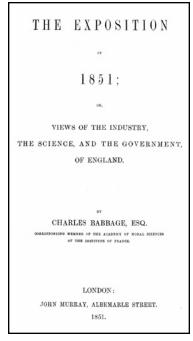
The exposition of 1851; or, views of the industry, the science, and the government of England.

Year: 1851
Place: London
Publisher: London
Edition: 1st
Language: English
Binding: original cloth boards; spine and cover gilt stamped
Pagination: pp. xvi, 290, [4], 16
Collation: $A-T^*U^3\chi^8$ Size: 226x138 mm
Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran

ODC, p. 405; MCK CBCW, v. 10

Martin Campbell-Kelly, editor of *The works of Charles Babbage* (London, 1989), describes this as a vitriolic volume. It was written after Charles Babbage was not

Babbage (London, 1989), describes this as a vitriolic volume. It was written after Charles Babbage was not invited to take part in the organization of the International Exposition of 1851. The exhibition, held to celebrate progress in arts and manufactures, was opened by Queen Victoria and took place in Hyde Park in Joseph Paxton's newly erected, eye-catching Crystal Palace. In the Dictionary of National Biography, the work is described as the diatribe of a disappointed man. Babbage had sought permission from the organizing committee to display the model of his Difference Engine and had been refused. In this polemic, Babbage not only criticized the policies of the organizers of the exhibition but also broadened his censure to include the low estate to which science in Great Britain had fallen. To remedy the Exposition Committee's failure to recognize the importance and value of the Difference Engine, Babbage included a chapter on the machine and its history (pp. 173-188) in the main body of the text. In an appendix he provided a copy of a previously published (1849) pamphlet containing articles by Charles Weld and Augustus **DeMorgan** that present Babbage and his work on the Difference Engine in an objective and factual light.



Within a few years, this work inspired a reply in defense of the British establishment written by **Richard Sheepshanks**, A letter to the Board of Visitors of the Greenwich Royal Observatory in reply to the calumnies of Mr. Babbage at their meeting in June 1853, and in his book entitled The Exposition of 1851 (London, 1854).

Illustrations available: Title page

B 25

Babbage, Charles (1791–1871)

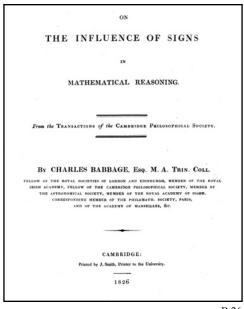
The exposition of 1851; or, views of the industry, the science, and the government of England.

Year: 1851
Place: London
Publisher: John Murray
Edition: 2nd
Language: English
Binding: original cloth boards; spine and cover gilt stamped
Pagination: pp. xvi, 290, [4], 16
Collation: A–T*U³χ*
Size: 226x138 mm
Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran

ODC, p. 405; MCK *CBCW*, v. 10

In the second edition Babbage added significant new material and incorporated the description of his Difference Engine into the main body of the work. See also the entry for the first edition (also published in 1851).

Illustrations available: Title page



B 26

R 26

Babbage, Charles (1791–1871)

On the influence of signs in mathematical reasoning. From: Transactions of the Cambridge Philosophical Society. 1826, Vol. II.

Year: 1826 Place: Cambridge

Publisher: Cambridge Philosophical Society

Edition: 1st (offprint) Language: English

Binding: yellow paper wrappers

Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 1, pp. 371–408

This is another of Babbage's mathematical papers. In this paper, Babbage turns from the advancement of mathematics to a discussion of the importance of mathematical notation and the facilitating role a good system can have in leading researchers to discoveries. He began this type of research several years earlier: see the entry for **Babbage**, *Observations on the notation employed in the calculus of functions*, 1822.

Illustrations available: Title page

B 27

Babbage, Charles (1791–1871)

An introductory view of the principles of manufactures.

b/w: **Barlow, Peter**; A treatise on the manufactures and machinery of Great Britain... To which is prefaced, an introductory view of the principles of manufactures by Charles Babbage. Forming a portion of the Encyclopaedia Metropolitana. 3 volumes.

Year: 1836 Place: London

Publisher: Baldwin and Braddock

Edition: 2nd Language: English

Figures: 87 engraved plates bound at end of v.3

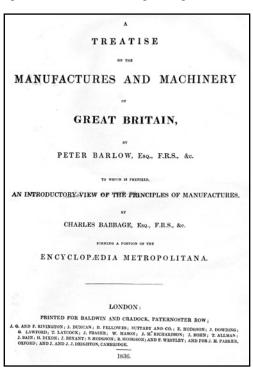
Binding: contemporary leather

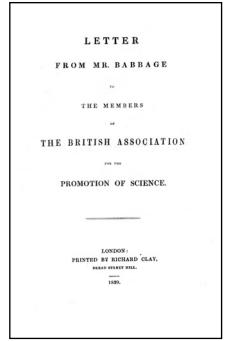
Pagination: v.1: pp. Iii–viii, 412; v.2: pp. 413–828; pp. 829-834 Collation: v.1: π^3 B–L⁴ M² N–3G⁴; v.2: 3H–5N⁴; v.3: 5O³

Size: 274x208 mm

Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 10

In 1829, Peter Barlow wrote an extensive tract on the subject of machinery as applied to manufacturing for the Encyclopedia Metropolitana, for which Charles Babbage provided the introduction. The two items were also published separately, as here (first edition in 1829, third in 1845). Babbage had a very strong interest in manufacturing techniques and the first section of his classic book On the economy of machinery and manufactures, published in 1832, was based on this introduction. He also rewrote this eighty-four page introduction substantially for each new edition. Characteristically, the treatise is thorough and comprehensive. It ranges from the gathering and regulating of power needed to properly operate machinery to a discussion of the division of labor and the needs for capital in a manufacturing enterprise, concluding





B 28

with a checklist of data to be acquired when gathering information about a factory and its production of goods.

Illustrations available: Title page

B 28 **Babbage, Charles** (1791–1871)

Letter from Mr. Babbage to the members of the British Association for the Promotion of Science.

Year: 1839
Place: London
Publisher: Richard Clay
Edition: 1st
Language: English
Binding: original paper wrappers
Pagination: pp. 15, [1]
Size: 213x135 mm
Reference: Van S CBCP, #70; Babb CBLP, #71, #73; Ran

This small pamphlet puts forth Babbage's explanation of a disagreement between himself and the other members of the Board of the British Association. He had been asked to let his name stand for president, but his friend **John Herschel** had also been asked, and this led both men to withdraw their names. Subsequent disagreements also led Babbage to resign from the board. The BAAS had been founded partly in the belief that the Royal Society had become too political—apparently the BAAS had also fallen into that state.

ODC, p. 405; MCK CBCW, v. 4, pp. 151-159

See also entry for Works of Charles Babbage, M.A., F.R.S., &c. [A Collection of seventeen items by or about Babbage].

Illustrations available: Title page

B 29

Babbage, Charles (1791–1871)

A letter to Sir Humphry Davy, Bart. President of the Royal Society, etc. etc. on the application of machinery to the purpose of calculating and printing mathematical tables from Charles Babbage, Esq. M.A.

Year: 1822
Place: London
Publisher: J. Booth
Edition: 1st
Language: English
Binding: disbound; in cloth case
Pagination: pp. 12
Collation: π¹B⁵(-B6)

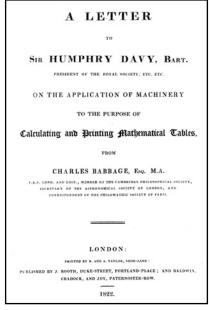
Size: 269x216 mm

Reference: Van S CBCP, #18; Babb CBLP, #19; Ran ODC, p.

405; MCK CBCW, v. 2, pp. 5–14

Babbage was only a few years out of Cambridge when he decided to devote his efforts to the production of a Difference Engine. He announced this by writing an open letter to Sir Humphry Davy, the president of the Royal Society. In it he describes the concept, his pilot project, his critical results and eventually, in the last sentence, an indirect request for financial support:

It must however be attained at a very considerable expense, which would not probably be replaced,



B 29

by the works it might produce, for a long period of time, and which is an undertaking I should feel unwilling to commence, as altogether foreign to my habits and pursuits.

The letter was widely circulated and eventually resulted in the government granting funds for the construction of Babbage's Difference Engine. Significantly, the letter also contains remarks showing that Babbage had been thinking of other forms of calculating machines.

Illustrations available: Title page

B 30

Babbage, Charles (1791–1871)

Note sur machine suédoise de MM. Scheutz pour calculer les tables mathématiques par la méthode des différences, et en imprimer la les resultats sur des planches stéréotypes. In Comptes Rendus Hebdomadaires des séances de l'Académie des Sciences, Vol. XLI, No. 15, 8 October 1855.

Year: 1855 Place: Paris

Publisher: Mallet-Bachelier

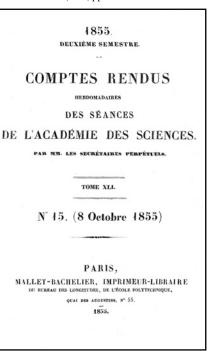
Edition: 1st Language: French

Binding: original paper wrappers

Pagination: pp. 557–560 Size: 283x226 mm

Reference: Van S *CBCP*, #70; #71, #73; Ran *ODC*, p. 405;

MCK CBCW, v. 3, pp. 233-236



Journal cover, B 30

A short communication by Babbage regarding the Scheutz Difference Engine. Babbage uses this note to bring his system of mechanical notation to the attention of the French Academy. The article mentions several graphical illustrations, evidently drawn by Charles' son **Henry P. Babbage** for the occasion, but these were not reproduced in the printed version.

An English translation of this paper is in *The works of Charles Babbage*, Martin Campbell-Kelly, ed., 1989.

Illustrations available: Cover page

B 31

Babbage, Charles (1791–1871) **[G. Friedenberg**, translator]

Ueber Maschinen und Fabrikenwesen.

Year: 1833 Place: Berlin

Publisher: Stuhrschen Buchhandlung

Edition: 1st (German) Language: German

Binding: contemporary marbled boards; rebacked

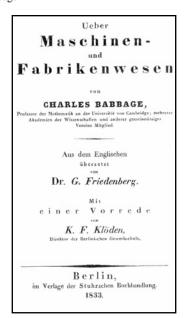
Pagination: pp. [4], lii, 462 Collation: π^2 a-b¹²c²1-19¹²20³

Size: 166x95 mm

Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 8

See entry for **Babbage**, *On the economy of machinery and manufactures*, 1832 edition—this is the German translation.

Illustrations available: Title page



B 31

B 32

Babbage, Charles (1791–1871)

Memoirs of the Astronomical Society of London.

Year: 1822–1829 Place: London

Publisher: v.1 & v.2: Baldwin, Cradock and Joy; v.3: Priestley

and Weale Edition: 1st Language: English

Figures: v.1: 6 plates (1 folding); 1 folding table; v.2: 8 plates

(1 folding)

Binding: contemporary three-quarter leather; spine gilt Pagination: v.1. pp. viii, iii–vi, 532; v.2. pp. iii–viii, iii–viii, 564, ccxxiv, [4]; v.3. pp. viii, v–viii, 432

Collation: v.1. A⁶B–2C⁴2D²2E²2F–3Y⁴3Z²; v.2. A⁶B–2R⁴2S²2T–4C⁴a–2d⁴2e⁶; v.3. A⁶B–3I⁴

Size: 267x208 mm

These three volumes, the only ones published, contain a number of papers by Babbage:

- 1. A note respecting the application of machinery to the calculation of astronomical tables
- Address of Henry Thomas Colebrooke, president of the Astronomical Society of London, on presenting the gold medal to Charles Babbage
- 3. Notice respecting some errors common to many tables of logarithms
- 4. Observations on the application of machinery to the computation of mathematical tables
- 5. On a new zenith micrometer

Each of these papers has its own entry in this catalog. Babbage was one of the founders of the Astronomical Society.

Illustrations available: Title page

B 33

Babbage, Charles (1791–1871)

On a method of expressing signs by the action of machinery. In Philosophical Transactions of the Royal Society 116, pt. 3, (1826) for the year MDCCCXXVI.

Year: 1826 Place: London

Publisher: Royal Society of London

Edition: 1st Language: English

Figures: 19 engraved plates (5 folding) Binding: original paper wrappers; unopened

Pagination: pp. 250–265 Collation: 2K³,2K⁴,2L⁴,2M¹,2M²

Size: 295x230 mm Reference: MCK *CBCW*, v. 3, pp. 209–223

Ever the generalist, this paper is Babbage's attempt to formally describe the movements of a complex piece of

machinery and to make it understandable by means of letters and signs that indicate how each piece moves and at what time in the cycle.

A second copy of this work is available in the collection.

Illustrations available: Title page

B 34

[Babbage, Charles (1791–1871)]

Mr. Babbage's Invention. Copies of the correspondence between the Lord's Commissioners of his Majesty's treasury and the President and council of the Royal Society, relative to an Invention of Mr. Babbage.

Year: 1823 Place: London

Publisher: Royal Society of London

Edition: 1st Language: English Binding: extract, disbound Size: 328x203 mm

This contains the letter that Babbage wrote to Humphry Davy indirectly asking for government support of his efforts at building a Difference Engine. The government passed the letter along to the Royal Society with a letter of their own (also printed here) asking

... that their lordships request to be favoured with the opinion of the Royal Society on the merits and utility of his invention.

The Royal Society wrote back (letter also printed here):
That it appears to the Committee, that Mr.
Babbage has displayed great talents and ingenuity in the construction of his machine for computation, which the Committee think fully adequate to the attainment of the objects proposed by the Inventor, and that they consider Mr. Babbage as highly deserving of public encouragement in the prosecution of his arduous undertaking.

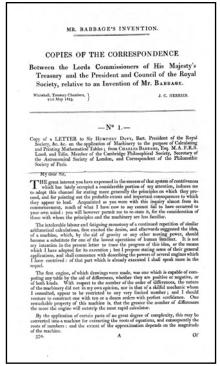
Illustrations available: First page

B 35

Babbage, Charles (1791–1871)

On some new methods of investigating the sums of several classes of infinite series. In Philosophical Transactions of the Royal Society of London, Vol. 109 (1819).

Year: 1819 Place: London



B 34

Publisher: Royal Society of London

Edition: 1st (Extract) Language: English

Binding: extract-uncut, disbound

Pagination: pp. 249–282 Size: 292x232 mm.

Reference: Van S *CBCP*, #11; Babb *CBLP*, #10; Dub *MWCB*, pp. 136–143, 230; MCK *CBCW*, v. 1, pp. 248–278

This extract from the journal is uncut and disbound. It is one of Babbage's early papers on mathematics.

Illustrations available: Title page

B 36

Babbage, Charles (1791–1871)

On a new zenith micrometer. In Memoirs of the Astronomical Society of London, Volume 2.

Year: 1826 Place: London

Publisher: Baldwin, Cradock and Joy

Edition: 1st Language: English Figures: 1

Binding: contemporary three-quarter leather; spine gilt Pagination: v.1, pp. viii, iii–vi, 530, [2]; v.2, pp. iii–viii, iii–viii,

564, ccxxviii; v.3, pp. viii, v-viii, 432 Collation: v.1, a⁴b²B-2C⁴2D-2E²2F-3Y⁴3Z²; v.2, a⁶B-

 $2R^42S^22T-4C^4a-2d^4e^6$; v.3, a^6B-3I^4

Size: 267x208 mm

Reference: Van S *CBCP*, #70; Babb CBLP, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, vol. 4, pp. 42–45

This paper is indicative of Babbage's wide range of interests and his willingness to apply his intellect to a variety of topics. It is a short description of an angle-measuring device of his invention. Previous astronomical angular measurement systems relied on a finely divided scale that could be read by the aid of a magnifying glass. Babbage proposes a system in which a telescope is attached to one arm of a parallelogram; any shift of the configuration of the parallelogram being magnified by attachments to the other arms makes it easy to determine the angle of shift. There is one small figure describing the system that is to be found as part of the plate illustrating the previous paper in the volume.

Illustrations available:

None

В 37

Babbage, Charles (1791–1871)

The ninth Bridgewater treatise, a fragment.

Year: 1837 Place: London Publisher: John Murray

Edition: 1st Language: English

Binding: original cloth boards

Pagination: pp. [4], xxii (iii misnumbered as i), 23–240, (103

misnumbered as 101),[2], 8

Collation: π^2B – $Q^8R^1\chi^4$ Size: 225x142 mm

Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 9

As modern science began to conflict with traditional religious values, in 1829 the Earl of Bridgewater (Rev. Francis Egerton, F.R.S.) left the Royal Society a bequest of £8,000 to pay for the writing of several books on the Power, Wisdom and Goodness of God, as manifested in the Creation. Eight of these treatises were produced, but none seems to have had lasting value. The most successful treatise, titled Astronomy and general physics, was written by William Whewell, a tutor of mathematics at Cambridge. In it, Whewell condemned the growing influence of scientists and mathematicians and described them as mechanical philosophers without any authority with regard to their view of the administration of the Universe. In passing, Whewell singled out mechanized analytical calculation for particular condemnation.

Babbage felt the need to respond and privately produced this unofficial Ninth treatise. The work is curious in that Babbage decided to leave large sections blank (or perhaps removed them before publication)—hence the term *fragment* in the title. Martin Campbell-Kelly (*The Works of Charles Babbage*) reports that it had been

suggested that some may have been removed after Babbage's friends, upon reading the proofs, objected to certain passages.

The work argues for example, that miracles can easily occur without divine intervention and gives examples relating to his calculating machines and mathematics in general. The appendix contains a section on the calculating engine.

For a modern discussion, see Topham, J., "Science and popular education: The role of the Bridgewater treatises," *British Journal for the History of Science*, Vol. 25, 1992, pp. 397–430.

Illustrations available: Title page

B 38

Babbage, Charles (1791–1871)

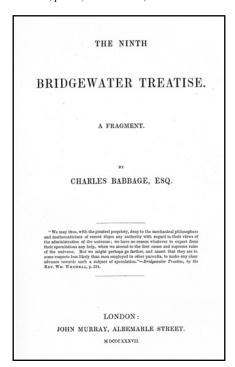
The ninth Bridgewater treatise, a fragment.

Year: 1838 Place: London Publisher: John Murray Edition: 2nd Language: English

Binding: original cloth boards Pagination: pp. viii, xxii, 23–270, [14]

Collation: A⁴B–S⁸χ⁶ Size: 223x140 mm

Reference: Van S *CBCP*, #70; Babb CBLP, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 9

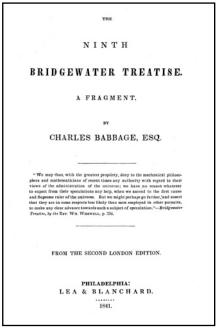


This second edition was considerably revised and enlarged with the help of Dr. W. H. Fitton, a longtime friend of Babbage's.

A second copy of this edition is available in the collection. It is a presentation copy from Babbage to W. R. Grove. William Robert Grove (1811–1896) was trained as a lawyer, but his interest was in science. He served as professor of experimental philosophy at the London Institution and was elected a fellow of the Royal Society in 1840.

Illustrations available:

Title page



B 39

B 39 **Babbage, Charles** (1791–1871)

The ninth Bridgewater treatise, a fragment.

Year: 1841 Place: Philadelphia Publisher: Lea & Blanchard Edition: 1st (U.S.) Language: English

Binding: original cloth boards; paper label on spine Pagination: pp. xii, xvii–xxxii, 33–250, [2], 3–32

Collation: $1^22-31^432^2\chi^{15}$ Size: 226x142 mm

Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 9

This first American edition was produced from the second (1838) London edition.

Illustrations available: Title page B 40

Babbage, Charles (1791–1871)

A note respecting the application of machinery to the calculation of astronomical tables. In Memoirs of the Astronomical Society of London, v.1, pt. 2.

Year: 1822 Place: London

Publisher: Baldwin, Cradock and Joy

Edition: 1st Language: English

Binding: contemporary three-quarter leather; spine gilt Pagination: v.1: pp. viii, iii–vi, 532; v.2: pp. iii–viii, iii–viii, 564, ccxxiv, [4] v.3: pp. viii, v–viii, 432

Collation: v.1: A⁶B–2C⁴2D²2E²2F–3Y⁴3Z²; v.2: A⁶B– 2R⁴2S²2T–4C⁴a–2d⁴2e⁶ v.3: A⁶B–3I⁴

Size: 267x208 mm

Reference: Van S *CBCP*, #17; Babb *CBLP*, #18; Ran *ODC*, p. 405; MCK *CBCW*, v. 2, pp. 3–4

This one page item, in a three-volume set, simply announces the fact that Babbage's small trial Difference Engine was working correctly.

Illustrations available:

None

B 41

Babbage, Charles (1791–1871)

Notice respecting some errors common to many tables of logarithms. In Memoirs of the Astronomical Society of London, Volume 3, part 1.

Year: 1829 Place: London

Publisher: Baldwin, Cradock and Joy

Edition: 1st Language: English

Binding: contemporary three-quarter leather; spine gilt Pagination: v.1: pp. viii, iii–vi, 532; v.2: pp. iii–viii, iii–viii,

564, ccxxiv, [4] v.3: pp. viii, v-viii, 432 Collation: v.1: A6B-2C42D2E2F-3Y43Z2; v.2: A6B-2R42S2T-4C4a-2d42e6 v.3: A6B-3I4

Size: 267x208 mm

Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 2, pp. 69–71; Dub *MWCB*, p. 196

This is an important paper in which Babbage points out that almost all logarithmic tables had been copied from earlier versions and consequently contained the same errors. He points out that the source of six common errors was the table produced by **Vlacq** in 1628. He also notes the same errors were found in a set of tables, in the library of the Royal Society, produced in China. This was two years after publishing his own logarithm tables.

Illustrations available:

List of the six common errors.

24,626	38,962	57,628	57,629	63,747	67,951	Natural Numbers.
39751	13420	35875	10436	97412	58424	Vlacq, fol. Gouda 1628
39751	13420	35875	10436	97412	58424	Vlacq, fol. London 1633
39	13	35	10	97	58	E. Wingate, 12mo. London 1633
397	134	359	104	974	584	Newton, fol. London 1658
40	13	36	10	97	58	Sherwin, 8vo. 1st ed. London 1726
40	13	36	10	97	58	Sherwin, 8vo. 2nd ed. London 1741
40	13	36	10	97	58	Sherwin, 8vo. 3rd ed. London 1742
40	13	36	10	97	58	Gardiner, 4to. London 1742
40	13	36	10	97	58	Sherwin, 8vo. 4th ed. London 1761
40	13	36	10	97	58	Sherwin, 8vo. 5th ed. London 1770
40	13	36	10	97	58	Gardiner, 4to. Avignon 1770
40	13	36	10	97	58	Schulze, 8vo. Berlin 1778
40	13	36	10	97	58	Gardiner, 4to. Fiorenze 1782
39	12	36	10	97	58	Taylor, 4to. London 1792
38751	12420	35475	10836	97512	58524	Vega, fol. Leipsic 1794
40	13	36	10	97	58	Callet, 8vo. Paris 1795
40	13	36	10	97	58	Delambre, Tab. Dec., 4to. Paris 1801
39	12	36	10	97	58	Hutton, 8vo. 4th ed. London 1804
39	12	36	10	97	58	Hutton, 8vo. 5th ed. London 1811
39	12	35	11	98	59	Vega, 8vo. 5th ed. Leipsic 1820
39	12	36	10	97	58	Hutton, 8vo. 6th ed. London 1822

Common errors, B 42

B 42 **Babbage, Charles** (1791–1871)

Notice respecting some errors common to many tables of logarithms. In Memoirs of the Astronomical Society of London. V. 3, pt. 1.

Year: 1829 Place: London

Publisher: Astronomical Society of London

Edition: 1st Language: English Binding: extract; disbound Pagination: pp. 65–67

Size: n/a

Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 2, pp. 69–71; Dub *MWCB*, p. 196

, I

This second copy is an extract from the journal. See also the entry for **Babbage**, **Charles**; *Notice respecting some errors common to many tables of logarithms*, 1829.

Illustrations available: First page with table of errors

[Babbage, Charles]

Obituary notice.

See **Babbage**, **Charles**; *Works of Charles Babbage*, *M.A.*, *F.R.S.*, &c. [A Collection of seventeen items by or about Babbage].

B 43

Babbage, Charles (1791–1871)

Observations addressed, at the last anniversary, of the President and Fellows of the Royal Society, after the delivery of the medals ...

Year: 1856 Place: London Publisher: John Murray Edition: 1st

Language: English Binding: original paper wrappers

Pagination: pp. 10, [2] Size: 243x155 mm

Van S *CBCP* #73; Babb *CBLP* #76; Ran *ODC*, p. 405; MCK *CBCW*, v. 2, pp. 187–193

A committee of the Royal Society decides who will be awarded various medals in any given year. At one of the medal ceremonies, Babbage observed that the **Scheutz** Difference Engine had been in the Royal Society rooms for many months, and he was distressed that, perhaps through his own oversight, the **Scheutz** team had not been nominated for one of the medals. He briefly summarizes the history of the **Scheutz** team and their Difference Engine and concludes by hoping that the committee would keep them in mind in future years. Babbage goes on to make it quite plain that he was not questioning the competency of those who were awarded the medals.

Illustrations available: Title page

Babbage, Charles (1791–1871)

Observations on the analogy which subsists between the calculus of functions and other branches of analysis. In Philosophical Transactions of the Royal Society of London, Vol. 107, Part II, 1817.

Year: 1817 Place: London

Publisher: The Royal Society

Edition: 1st Language: English

Binding: contemporary leather Pagination: pp. 197–216 Size: 269x205 mm

Van S CBCP #7; Babb CBLP #6; Dub MWCB, p. 230;

In this mathematical paper Babbage shows how one may use analogies from one branch of mathematics to find *truths* in another. He is careful, however, to point out that analogy can only be used as a guide and not as a proof.

Illustrations available: Title page

B 45

Babbage, Charles (1791–1871)

Observations on the application of machinery to the computation of mathematical tables. In Memoirs of the Astronomical Society of London. v. 1 pt. 2.

Year: 1822 Place: London

Publisher: Baldwin, Cradock and Joy

Edition: 1st Language: English

Binding: contemporary three-quarter leather; spine gilt Pagination: v.1, pp. viii, iii–vi, 532; v.2, pp. iii–viii, iii–viii, 564, ccxxiv, [4] v.3, pp. viii, v–viii, 432

Collation: v.1, A⁶B–2C⁴2D²2E²2F–3Y⁴3Z²; v.2, A⁶B–2R⁴2S²2T–4C⁴a–2d⁴2e⁶ v.3, A⁶B–3I⁴

Size: 267x208 mm

Reference: Van S *CBCP*, #19; Babb *CBLP*, #21; Ran *ODC*, p. 405; MCK *CBCW*, v. 2, pp. 33–37

Babbage was a leading figure in the formation of the Astronomical Society and read several papers there. The first volume of this three-volume set contains a paper on difference equations that was inspired by his attempt to build a Difference Engine. It also indicates that he was considering a different arrangement of the figure wheels (so that they could add to any other axle and not just to that of the immediately preceding difference). This more flexible arrangement of the organization of the system was one of the factors that eventually led to his ideas for an Analytical Engine (see illustrations). This early paper on his Difference Engine was written in the same year as his letter to Sir Humphry Davy.

Illustrations available:

Quotation regarding the rearrangement of the figure wheels.

B 46

Babbage, Charles (1791–1871)

Observations on the discovery in various localities of the remains of human art mixed with the bones of extinct races of animals.

Year: 1847 Place: London

Publisher: Taylor and Francis

Edition: 1st Language: English Binding: offprint Pagination: 16 pp. Size: 212x137 mm

Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 4, pp. 165–217

Recent discoveries in France and Sicily of human and extinct animal bones in the same deposit had led to questions concerning the antiquity of humans. Babbage points out here that one had to be cautious in assuming that they were of the same age and presents arguments as to how natural geological processes might have been responsible for commingling the remains of species from two different ages. This is a presentation copy to George Ticknor.

Illustrations available: Title page

B 47

Babbage, Charles (1791–1871)

Observations on the notation employed in the calculus of functions.

Year: 1822 Place: Cambridge

Publisher: Cambridge Philosophical Society

Edition: 1st Language: English

Binding: modern paper wrappers

Pagination: pp. 63–76 Size: 272x212 mm.

Reference: Van S *CBCP*, #19; Babb *CBLP*, #21; Ran *ODC*, p. 405; MCK *CBCW*, v. 2, pp. 33–37

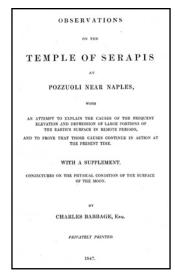
In this extract from *Transactions of the Cambridge Philosophical Society*, Babbage begins his commentary with the assertion that many mathematical discoveries are dependent on the development of a suitable mathematical notation. See also the entry for **Babbage**,

On the influence of signs in mathematical reasoning,

1826.

Illustrations available:

First page



B 48 **Babbage, Charles** (1791–1871)

Observations on the Temple of Serapis at Pozzuoli near Naples, with an attempt to explain the causes of the frequent elevation and depression of large portions of the earth's surface in remote periods, and to prove that those causes continue in action at the present time. With a supplement. Conjectures on the physical condition of the surface of the moon.

Year: 1847 Place: London

Publisher: Privately printed (for the author) by Richard and

John Taylor Edition: 1st Language: English

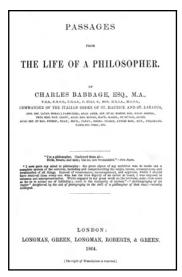
Figures: 2 double lithographed plates (1 colored) Binding: original cloth boards; gilt embossed covers

Pagination: pp. 42, [4] Collation: $A-B^8C^5\chi^2$ Size: 222x136 mm

Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 4, pp. 165–217

This small work testifies once more to Babbage's wideranging curiosity. During one of his several trips to Italy, he noted evidence of the Temple of Serapis having been submerged. In this booklet he attempts an explanation for ground movement based on information first presented as a paper in the *Proceedings of the Geological Society*, March 1834, Vol. ii, p. 72. Babbage theorized that the area had been heated and cooled by movements of the liquid core of the earth. His reasoning was that a one-mile thickness of rock would expand twenty-five feet if heated a hundred degrees Fahrenheit and thus raise or lower the ground surface above it by the same amount.

Illustrations available: Title page



B 49

B 49

Babbage, Charles (1791–1871)

Passages from the life of a philosopher.

Year: 1864 Place: London

Publisher: Longman, Green, Longman, Roberts & Green

Edition: 1st Language: English

Figures: engraved frontispiece

Binding: contemporary leather—special presentation copy inscribed by Babbage: "To her Majesty, Eugenie, Empress of the French, most respectfully presented by the author"

Pagination: pp. xii, 496 Collation: A⁶B–2I⁸ Size: 218x133 mm

Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 11

This autobiographical work notably comprises the history of both the Difference Engine and the Analytical Engine. It also treats his many other inventions and contributions including the speedometer, the cowcatcher, encoded lighthouse signaling and what is today known as operations research.

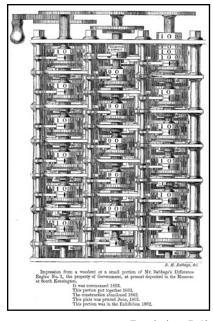
This example, in a deluxe Royal binding, with silk endpapers by Robert Rivière, is inscribed *To her Majesty, Eugenie, Empress of the French, most respectfully presented by the author.*

A second presentation copy of this work (original cloth boards, unopened) is in the collection. It is inscribed: To [Mm] M. Mignet, member of the Institute of France, from the author.

Illustrations available:

Title page Frontispiece

Design on the front and back cover of the leather binding



Frontispiece, B 49

B 50

Babbage, Charles (1791–1871)

Pensieri sui principii dell'imposta in relazione ad una tassa sulla propietà e sue eccezioni... Tradotti dall Inglese in Italiano.

Year: 1850 Place: Turin

Publisher: Cugini Pomba e C. Editori

Edition: 1st Language: Italian

Binding: contemporary roan-backed marbled boards

Pagination: pp. 40 Size: 161x97 mm

Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 5, pp. 31–56

This is the Italian translation of Babbage's *Thoughts on the principles of taxation with reference to a property tax and its exceptions* (see entry for **Babbage**, *Works of Charles Babbage*, *M.A., F.R.S.*, &c. [A Collection of seventeen items by or about Babbage bound in one volume]).

Illustrations available: Title page

B 51

Babbage, Charles (1791–1871)

Reflections on the decline of science in England, and on some of its causes.

Year: 1830 Place: London Publisher: B. Fellowes

Edition: 1st

Language: English

Binding: three-quarter leather over moirè cloth boards; red

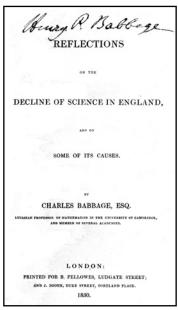
leather label Pagination: pp. xvi, 228 Collation: A–P⁸Q² Size: 216x130 mm

Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 7

Babbage was courageously outspoken all his life. This is an attack on the leadership of the Royal Society that led to the formation of the British Association for the Promotion of Science in the following year. In this work Babbage reveals his love of science and his deep understanding of the nature of scientific inquiry. This work excited a vigorous correspondence in the pages of the *Philosophical Magazine* that led to Babbage's reputation as a thorn in the side of the British scientific establishment. Nevertheless, the reforms that Babbage sought were eventually realized, not only in the Royal Society but in British science in general.

The title page has been signed by Babbage's son **Henry Babbage**.

Illustrations available: Title page



B 51

B 52

[Babbage, Charles (1791–1871)]

Report from the select committee on the laws respecting Friendly Societies [Evidence contributed to].

Year: 1827 Place: London Publisher: HMSO Edition: 1st (extract) Size: 335x200 mm

Language: English
Binding: none—extracted from a volume of parliamentary
reports
Pagination: pp. 135, [1]
Collation: A–R⁴

Babbage was interested in all aspects of the developing life insurance industry and the statistics upon which it based rates. As a director of the aborted firm of The Protector Life Insurance Co. (see Babbage, Protector Life Assurance Society. In Works of Charles Babbage, Collection of seventeen items ...), he, together with Benjamin Gompertz, was called in to give evidence to a Select Committee of the House of Commons investigating the laws governing the insurance industry. The testimony concerned the accuracy of the tables upon which the insurance rates were based. While Babbage did not, in general, think they were accurate, he often tempered his opinion. For example, when asked about death rates for higher and lower classes of society and whether differing tables should be used for each, he responded that he thought different tables should be used but that he would need to see more facts and figures to see how soundly that opinion was founded.

Illustrations available: Title page

B 53

Babbage, Charles (1791–1871) [J. E. Isoard, translator]

Science économique des manufactures, traduit de l'Anglais de Ch. Babbage, sur le troisiéme édition par M. Isoard.

Year: 1834 Place: Paris

Publisher: A la Librairie Orientale de Doney - Dupré

Edition: 2nd (French) Language: French

et des manufactures, 1833.

Binding: contemporary leather; red leather label

Pagination: pp. xxiii, [1], 392 Collation: π¹²1–24⁸25⁴ Size: 206x128 mm Reference: MCK *CBCW*, v. 8

Two translations into French of **Babbage**'s *On the economy of machinery and manufactures* appeared in Paris almost simultaneously. Both were based on the third English edition of 1833. This one by J. M. Isoard, an official at the Ministry of Commerce, covered only chapters 13 to 34 of the original. Isoard felt that Babbage's earlier chapters on machinery were too specialized for the French reader. For a complete translation, see **Babbage, Charles**; *Traité sur l'économie des machines*

Illustrations available: Title page

B 54

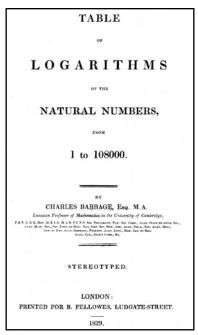
Babbage, Charles (1791–1871)

Table of logarithms of the natural numbers from 1 to 108000.

Year: 1829
Place: London
Publisher: B. Fellowes
Edition: 1st (2nd issue)
Language: English
Binding: original paper boards, printed label on spine
Pagination: pp. xx, 202, [2]
Collation: a⁸ b² B–N⁸ O⁴ P²
Size: 262x158 mm
Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405

This is the first edition of Babbage's logarithms, printed on light yellow paper.

Babbage's interest in calculating machines arose from his desire to mechanically compute complete sets of mathematical tables and thus eliminate the errors that inevitably crept into them when they were calculated and typeset by hand. He created this table of logarithms not by calculating them, but by comparing many different tables against one another. When differences were noted, he would recalculate the correct value, thus producing the first error-free table of logarithms. Not content with accuracy, he also experimented with their layout and their printing. He used variously colored papers in combination



Erwin Tomash Library

with differently colored inks. He notes in his preface (see illustration) that all his test subjects agreed that colored papers were easier to read, but subjects differed as to which color they preferred. The first edition was printed on a variety of colors: light yellow, green, etc.

Babbage also took great pains with the layout of the tables experimenting with type fonts and various columnar approaches. For example, a comparison of these tables with an earlier set (see, for example, the entry for **Hutton**, *Mathematical tables*, 1785) reveals the obvious difference in ease of use.

The only complete set of these experimental volumes extant is held in the Crawford Collection now at the Royal Observatory in Edinburgh.

Illustrations available: Title page

B 55

Babbage, Charles (1791–1871)

Table of the logarithms of the natural numbers from 1 to 108000.

Year: 1831
Place: London
Publisher: B. Fellowes
Edition: 2nd
Language: English
Binding: original paper boards rebacked
Pagination: pp. xx, 202, [2]
Collation: a8b2B–N8O4P2
Size: 262x158 mm
Reference: Van S CBCP, #70; Babb CBLP, #71, #73; Ran
ODC, p. 405; MCK CBCW, v. 2, pp. 72–107

Babbage had the proofs of the first edition of these tables checked as many as nine times; despite these efforts, nine errors were found. These were corrected in this second edition, which in this example is printed on yellow paper with gray undertones.

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Illustrations available:
Title page
Preface remark on colored papers
First page of table (color)
```

B 56

Babbage, Charles (1791–1871)

Table of the logarithms of the natural numbers from 1 to 108000.

```
Year: 1834
Place: London
Publisher: Charles Knight.
Edition: 3rd
Language: English
Binding: modern half-leather marbled boards
```

```
Pagination: pp. xx, 202, [2]
Collation: [A]<sup>8</sup>b<sup>2</sup>B–N<sup>8</sup>O<sup>4</sup>P<sup>2</sup>
Size: 241x154 mm
Reference: Van S CBCP, #70; Babb CBLP, #71, #73; Ran
ODC, p. 405; MCK CBCW, v. 2, pp. 72–107
```

This copy of the third edition is printed on light green paper. There was also a second issue of the third edition in 1838.

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Illustrations available:
Title page
Page 1 of the tables (color)
```

B 57

Babbage, Charles (1791–1871)

Year: 1841 Place: London

Table of the logarithms of the natural numbers from 1 to 108000.

```
Publisher: William Clowes and Sons
Edition: 4th
Language: English
Binding: original paper boards; red leather label
Pagination: pp. xx, 202, [2]
Collation: [A]*b²B–N*O⁴P²
Size: 236x146 mm
Reference: Van S CBCP, #70; Babb CBLP, #71, #73; Ran
ODC, p. 405; MCK CBCW, v. 2, pp. 72–107
```

This copy of the fourth edition is printed on light yellow (sienna) paper. A second copy is also available.

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Illustrations available:
Title page
Page 1 of the tables (color)
```

B 58

Babbage, Charles (1791–1871)

Year: 1844

Place: London

Table of the logarithms of the natural numbers from 1 to 108000.

```
Publisher: John Murray
Edition: 5th
Language: English
Binding: half bound leather
Pagination: pp. xx, 202
Collation: A*b*B-N*O*P¹
Size: 229x135 mm
Reference: Van S CBCP, #70; Babb CBLP, #71, #73; Ran
ODC, p. 405; MCK CBCW, v. 2, pp. 72–107
```

This copy of the fifth edition is printed on light yellow paper.

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Illustrations available:
Title page
Page 1 of tables (color)
```

Babbage, Charles (1791–1871)

On tables of the constants of nature and art. In Annual report of the Board of Regents of the Smithsonian Institution, 1857.

Year: 1857

Place: Washington, D.C. Publisher: A. O. P. Nicholson

Edition: 1st Language: English

Binding: original cloth boards Pagination: pp. 298–302 (of 468)

Collation: 1–29830² Size: 224x140 mm

Reference: Van S CBCP, #70; Babb CBLP, #71, #73; Ran ODC, p. 405; MCK CBCW, v. 5, pp. 138–154

In this paper Babbage proposes an ambitious project to tabulate all natural features (chemical properties, measurements) of all plants and animals, etc.

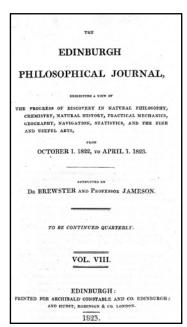
Illustrations available: Title page

B 60

[**Babbage, Charles** (1791–1871)] **– David Brewster** (1781–1868)

On the theoretical principles of the machinery for calculating tables. In a letter from Charles Babbage, Esq. F. R. S. Lond. & Edin. to Dr. Brewster. In Edinburgh Philosophical Journal Vol. VIII. No. 15, January 1823.

Year: 1823



Journal cover, B 60

Place: Edinburgh

Publisher: Archibald Constable and Co.

Edition: 1st Language: English

Binding: modern paper wrappers Pagination: pp. 122–128

Size: 207x128 mm

Reference: Van S *CBCP*, #20; Babb *CBLP*, #20; Ran *ODC*, p. 405; MCK *CBCW*, v. 2, pp. 38–43

Babbage appreciated Brewster's support and seems to have kept in touch with him. This letter describes the interesting developments that occur when the Difference Engine, rather than simply adding differences, was set to add multiples of differences. This material was also communicated to the Astronomical Society of London (Babbage, Memoirs of the Astronomical Society of London, 1822). Brewster, who had presented a paper on Babbage's Difference Engine to the Society just a few months previously, was editor of the Edinburgh Philosophical Society Journal and arranged for it to be printed it in that publication.

Illustrations available: Title page

B 61

Babbage, Charles (1791–1871)

Thoughts on the principles of taxation with reference to a property tax and its exceptions.

Year: 1851 Place: London Publisher: John Murray Edition: 2nd

Language: English Binding: new marbled paper wrappers

Danier di anno 20 [4]

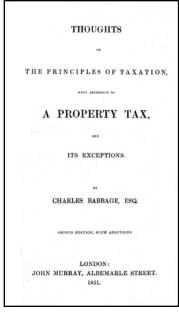
Pagination: pp. 28, [4] Size: 198x128 mm

Reference: Van S *CBCP*, #70; Babb CBLP, #71, #73; Ran *ODC*, p. 405; MCK *CBCW*, v. 5, pp. 31–56

Babbage had published this small pamphlet earlier but was impelled to produce a second edition because of a Parliamentary debate on the imposition of an income tax. In the preface, he also indicates that he was moved to reprint it ... because of the prevalence of what I conceive to be unsound principles, even in quarters where it should be the least expected. His basic political leanings are revealed when he states: I regard the large exemptions from the tax admitted in the present act as leading directly towards Socialism ...

See also the entry for **Babbage**, **Charles**; Works of Charles Babbage, M.A., F.R.S., &c. [A Collection of seventeen items by or about Babbage].

Illustrations available: Title page



B 62

Babbage, Charles (1791–1871)

Traité sur l'économie des machines et des manufactures ... Traduit de l'Anglais sur la troisieme edition, par Éd. Biot.

Year: 1833 Place: Paris Publisher: Bachelier Edition: 1st (French) Language: French

Binding: contemporary green parchment-backed marbled

boards

Pagination: pp. [4], xvi, 515, [1] Collation: $\pi^2 a^8 1 - 32^8 33^2$ Size: 208x124 mm Reference: MCK *CBCW*, v. 8

See the entry for **Babbage**, **Charles**; *On the economy of machinery and manufactures*, 1832. Unlike J. E. Isoard's translation, *Science économique des manufactures*, Paris 1834, this translation by Biot includes Babbage's work in its entirety. This is the first French translation and is based on the third English edition of 1833.

Illustrations available: Title page

B 63

Babbage, Charles (1791–1871) [**Jose Diez Imbrechts**, translator]

Tratado de mecánica práctica y economia politica que con el titulo de Economia de máquinas y manufacturas escribe in inglis, C. Babbage traducido de la 3^a edicion y ampliado con notas.

Year: 1833 Place: Madrid Publisher: [I. Sancha] Edition: 1st (Spanish) Language: Spanish

Figures: lithographed portrait frontispiece; lithographed title

page

Binding: contemporary leather Pagination: pp. xx, 356 Collation: *4*****21–44⁴45² Size: 202x135 mm

Reference: MCK CBCW, v. 8

See entry for **Babbage**, On the economy of machinery and manufactures, 1832 edition.

Illustrations available: Title page

B 64

Babbage, Charles (1791–1871)

Charles Babbage's vergleichende Darstellung der verschiedenen Lebens - Assecuranz - Gesellschaften. Aus dem Englischen.

> Year: 1827 Place: Weimar

Publisher: Landes - Industrie - Comptoirs

Edition: 1st (German) Language: German

Figures: 1 folding plate (follows p. 12)

Binding: contemporary quarter-leather marbled boards

Pagination: pp. xvi, 138, [30], 12, 8 Collation: $\pi^81-10^811^4\chi^{10}$

Size: 206x116 mm

Reference: Van S $\mathit{CBCP}, \#70;$ Babb $\mathit{CBLP}, \#71, \#73;$ Ran

ODC, p. 405; MCK CBCW, v. 6



Within a year of the publication of *A comparative view* of the various institutions for the assurance of lives, in 1826, a German translation appeared that Babbage noted with some pride in his *List of Works*, 1847 (see entry for **Babbage**, *Works of Charles Babbage*, *M.A., F.R.S.*, &c. [A Collection of seventeen items by or about Babbage]). The German edition was published for the purpose of establishing, at Gotha, a Society for the Assurance of Lives, by the Life Assurance Bank of Gotha, in 1829. According to the above-mentioned *List of Works*:

At the commencement of 1847, the number of persons whose lives had been assured, was 14,564, and the amount then assured was 23,218,700 Thlr.

Illustrations available: Title page

Babbage, Charles (1791–1871)

A word to the Wise. Observations on peerage for life.

See **Babbage, Charles**; Works of Charles Babbage, M.A., F.R.S., &c. [A Collection of seventeen items by or about Babbage].

B 65

Babbage, Charles (1791–1871)

Works of Charles Babbage, M.A., F.R.S, &c. [A Collection of seventeen items by or about Babbage bound in one volume].

Year: 1815–1864 (but 1824–1872)

Place: London Edition: 1st Language: English

Figures: engraved portrait pasted on frontispiece Binding: contemporary three-quarter leather; marbled

endpapers Size: 206x131 mm

Reference: MCK CBCW, v. 1, pp. 34-47

This is much more a Babbage miscellany than the usual sammelband (the binding together of a set of related books or papers of similar size). It would seem that this volume was being readied for publication as it has a title page and a pasted-up frontispiece complete with a portrait of Babbage, as well as typeset half-title pages preceding many of the individual articles. While the *List of Works* contains none later than 1847, an auction notice of 1872 is included, as is Charles Babbage's obituary notice of 1871. The volume was discovered with a cache of papers held by Babbage descendants in Ireland. Items 1 and 16 can only be described as ephemera while 3 and 4 are book reviews, and 2 is the well-known article by Brewster. Item 6 was written with Charles Holzappfel (1806–1847)



B 64

a skilled mechanical engineer and technical writer, who was well acquainted with workshop practice.

A brief list of the contents is as follows:

- 1. Rates of the Protector Life Assurance Society
- On Mr. Babbage's new Machine for Calculating and printing Mathematical and Astronomical Tables. *Philosophical Magazine*, May 1824
- 3. A Comparative View of the Various Institutions for the Assurance of Lives. *Quarterly Review*, Vol. xxxv, No. lxix (review)
- 4. Reflections on the Decline of Science in England. *Quarterly Review*, Vol. Xliii No. lxxxvi (review)
- 5. Letter from Mr. Babbage to the members of the British Association for the Promotion of Science, 1839
- 6. Paper on the principles of Tools for Turning and Planing Metals, 1846
- 7. Thoughts on the Principles of Taxation, third edition, 1852
- On Mechanical Notation as exemplified in the Swedish calculating machine by Henry P. Babbage (from the Report of the British Association, 1855)
- 9. Report of a Committee appointed by the Council to examine the Calculating Machine of M. Scheutz (Royal Society)
- 10. An Analysis of the Statistics of the Clearing House During the Year 1839, 1856
- On the Calculation and Printing of Mathematical Tables by Machinery; The Inventor and His Treatment by Judex Juris (a pseudonym for James Jerwood)
- 12. Observations on Peerage for Life, 1856

- 13. On the Action of Ocean Currents in the Formation of the Strata of the Earth. *Quarterly Journal of the Geological Society of London*, November 1856
- 14. Address of Dr. Farr, President of the Statistical Society, Session 1871–1872
- 15. Obituary Notice of Charles Babbage, Esq. F.R.S.: from the *Monthly Notices of the Royal Astronomical Society*
- 16. A catalogue of a collection of Engineers' Tools and Plant Used by the late Mr. Baggage (auction notice), 1872
- 17. A list of works of Charles Babbage.

Illustrations available:

Title page

Obituary Notice and Catalogue of tools



Auction notice, B 65

B 66 [**Babbage, Charles** (1791–1871)]

The Art Journal illustrated catalogue of the Industry of All Nations - 1851.

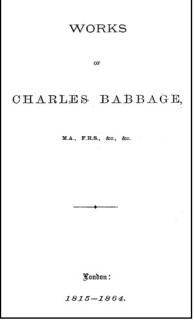
Year: 1851 Place: London

Publisher: George Virtue for the Proprietors

Edition: 1st Language: English

Figures: engraved frontispiece

Size: 327x240 mm



B 65

Babbage was incensed at the exclusion of his Difference Engine from the Great Exhibition of 1851, and his bitter feelings were compounded by his not being asked to play a leading role in its organization. The latter offense probably resulted from his not entirely undeserved reputation for refractoriness. There is nothing in this volume that directly concerns Babbage (other than the omission of his engines), but it represents a troubled era in which he wrote several diatribes against the British establishment.

Illustrations available: Title page

Babbage, Charles (1791–1871)

See American magazine of useful and entertaining knowledge; Vol. 1, pp. 88–96, *Babbage's calculating engine*

See Baily, Francis; On Mr. Babbage's new machine for calculating and printing mathematical and astronomical tables

See Bass, Michael T.; Street music in the metropolis See Brewster, David; On machinery for calculating and printing mathematical tables

See **Buxton, Leonard Halford Dudley**; Charles Babbage and his difference engines

See Colebrooke, Henry Thomas; Address of Henry Thomas Colebrooke, president of the Astronomical Society of London, on presenting the gold medal to Charles Babbage

See Dodd, George; The curiosities of industry and the

applied sciences, 1852 and 1854

See **Dodge, Nathaniel Shatswell**; Charles Babbage, 1874

See Knight's Cyclopædia, Calculating machines

See Lardner, Dionysius; Babbage's calculating engines

See Marshall, William P.; Babbage's calculating machine, 1879

See Menabrea, Luigi Federico; Sur la machine analytique de Charles Babbage

See Menabrea, Luigi Federico [Augusta Ada Lovelace, translator]; Sketch of the Analytical Engine invented by Charles Babbage, Esq... with notes by the translator

See Quetelet, Lambert Adolphe Jacques; Notice of Charles Babbage

See **Sheepshanks**, **Richard**; *Correspondence* respecting the Liverpool Observatory

See Strand Magazine - William G. Fitzgerald, The romance of the museums.

B 67

Babbage, Charles (1791–1871) and **John F. W. Herschel** (1792–1871)

Memoirs of the Analytical Society 1813.

b/w: Agnesi, Donna Maria Gaetena, [John Colson,

translator]; Analytical institutions, in four books: originally written in Italian.... Translated into English by the late Rev. John Colson...

Year: 1813 Place: Cambridge

Publisher: Printed by J. Smith

Edition: 1st

Language: English

Binding: contemporary three-quarter leather over marbled

boards

Pagination: pp. [4], xxii, [2], 114

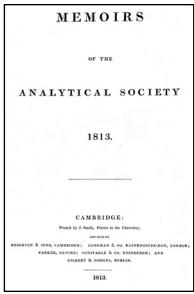
Collation: π^2 a– f^2 A– $2E^22F^1$

Size: 271x212 mm

Reference: Van S *CBCP*, #1; Babb *CBLP*, #1; Ran *ODC*, p. 405; MCK *CBCW*, v. 1, pp. 37–60; Dub *MWCB*, p. 230

Driven by their desire to modernize the teaching of mathematics at Cambridge when they were undergraduates there, Babbage, **Herschel** and **Peacock** founded the Analytical Society in 1813. The contents were of surprisingly high quality (often written by the founders and their friends). This volume contains a preface and three articles. Babbage was certainly the author of the preface and the first article, and he might well have written the second.

Illustrations available: Title page



B 67

Babbage, Charles and Charles Holtzapffel (1806–1847)
See Babbage, Charles; Works of Charles Babbage
M.A. F.R. S. &c. [A Collection of seventeen items
by or about Babbage bound in one volume] - Paper
on principles of tools, for turning and planing
metals from: Holtzapffel, Charles, Turning and
mechanical manipulation, Vol. 2, London, 1847,
pp. 984–991.

[Babbage, Charles; George Peacock and John Frederick William Herschel, translators]

See Lacroix, Sylvestre François, An elementary treatise on the differential and integral calculus. Translated from the French with an appendix and notes.

B 68

Babbage, Henry Prevost (1824–1925)

Babbage's analytical engine. In Monthly notices of the Royal Astronomical Society, v. LXX, No. 6, April 1910.

Year: 1910 Place: London

Place: London

Publisher: Royal Astronomical Society

Edition: 1st Language: English

Figures: 1 photolith plate; 1 table Binding: original paper wrappers

Pagination: pp. 517–520 Size: 225x145 mm

Reference: Ran *ODC*, p. 406; Flet *MT* vol. I, p. 121; Dub *MWCB*, p. 196

The youngest son of Charles Babbage, Henry Prevost Babbage, rose to the rank of Major-General in the British

Army. At Charles' death, he took possession of all his father's materials relating to the calculating engines and used them both to promote his father's work and to construct a portion of the analytical engine.

Henry Babbage reports that he had managed to assemble the mill (arithmetic unit) of his father's analytical engine to the point where it would do simple calculations—in this case produce multiples of π . Also, in this work Henry explains his reasons for melting down the remaining portions of his father's Difference Engine.

This copy remains uncut, rendering the introductory material on the first page difficult to read. The plate shows the mill and the table of multiples.

Illustrations available: Last two pages of text Plate of mill and table

B 69

Babbage, Henry Prevost (1824–1925)

On the mechanical arrangements of the Analytical Engine of the late Charles Babbage, F.R.S. In Report of the Fifty-Eighth Meeting of the British Association for the Advancement of Science. Held at Bath in September 1888.

Year: 1889 Place: London Publisher: John Murray

Edition: 1st Language: English

Binding: contemporary buckram Pagination: pp. 616–617 Size: 215x138 mm

Reference: Van S *CBCP*, #70; Babb *CBLP*, #71, #73; Ran *ODC*, p. 405

This is a brief report of the presentation made by Henry P. Babbage at the 1888 meeting of the British Association. The closing sentences are of interest:

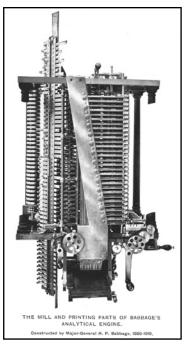
It may here be stated that a piece of machinery working to 29 places of figures, and embodying the anticipating carriage, was shown during the meeting to several who desired to see it. The anticipating carriage works perfectly, and was much admired by those who saw it.

Illustrations available: None

B 70

Babbage, Henry Prevost (1824–1925)

Memoirs and correspondence of Major-General H. P. Babbage.



The Mill, B 68

Year: 1910 Place: London Publisher: W. Clowes Edition: 1st

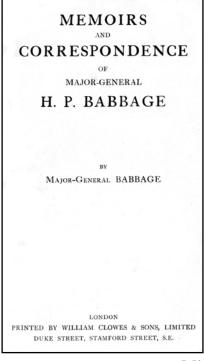
Language: English

Figures: engraved portrait frontispiece Binding: original cloth boards; gilt spine

Pagination: vii, [1], 264 Collation: A⁴B–R⁸S⁴ Size: 214x135 mm

Reference: DSB, v. 1, p. 356a

Charles Babbage's son, Henry Prevost, was his intellectual heir. Having joined the Indian army, Henry's language skills enabled him to pass examinations in some of the major Indian languages, thus securing him administrative positions, mainly in the Indian judicial system. Although many of his siblings had moved to Australia and other British colonies, Henry eventually retired to England with the rank of Major General and wrote his memoirs. His writing is not fluid, and much of the work seems to have been based upon short extracts from his diary. However, there are some well-written sections. For example, his description of service in India during the Great Indian Mutiny of 1857, notably the execution of forty men from his regiment by being blown away from guns on the parade ground at Peshawar. There is also a moving account of his father's deathbed, the dying Charles tormented by the racket from organ grinders in the street, and another of the circumstances when, after attempting to assemble his father's Difference Engine from the parts Clement had made, he finally recognized its futility and had most of the parts melted down.



Illustrations available:

Title page

Frontispiece portrait of H.P. Babbage

Babbage, Henry Prevost (1824–1925) [Charles Manby,

Scheutz' difference engine and Babbage's mechanical notation. In Minutes of Proceedings of the Institution of Civil Engineers with Abstracts of the Discussions, Vol. XV.

Year: 1856 Place: London

Publisher: Institution of Civil Engineers

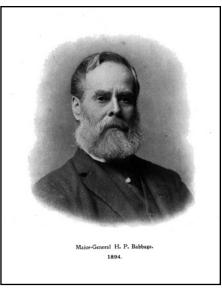
Edition: 1st Language: English

Binding: three-quarter bound over marbled paper boards; gilt spine

Pagination: pp. 497-514 Size: 207x125 mm

Reference: DSB, v. 1, p. 356a

Manby, the editor of the *Proceedings of the Institution of* Civil Engineers, reports on a presentation given at one of their meetings by Charles Babbage and his son, Henry **P. Babbage**. They first described the **Scheutz** Difference Engine, and Charles praised many aspects of the machine, noting that they differed completely from his own. This was followed by a presentation on the notation Babbage Sr. had developed for detailing movements in complex



Henry Prevost Babbage, B 70

mechanical devices, and parts of the Scheutz engine were explained using this form of notation. Unfortunately, the charts used during the presentation are not preserved as part of Manby's report.

Illustrations available: First page

Babbage, Henry Prevost (1824–1925)

See Babbage, Charles; Works of Charles Babbage M.A. F.R.S. &c [A collection of seventeen items by and about Babbage] — On mechanical notation, as exemplified in the Swedish calculating machine of Messrs. Scheütz.

B 72

Bachmann, Udalricum

Neues Creuz-Rechen-Buchlein, Dergleichen niemalen in Druck aussgegangen. In welchem unterschiedlich aussgegangne Tarriffae Rechen-Buchlein, so von Kauffen und Verkauffen, auch anderen Zinsen,

Besoldungen, und Hauss-Rechnungen handlen, um vil vermehrt, und gebessert zu finden.

> Year: 1693 Place: Augsburg

Publisher: Jacob Koppmayer

Edition: 1st Language: German

Figures: engraved frontispiece

Binding: tall, narrow, quarter-bound leather

Pagination: ff. [190] Collation:][10A-2Q42T-2Z43A4

Size: 198x80 mm Reference: Bru MLAL This unusual ready reckoner was produced for use in southern Germany. Of interest is the allegorical frontispiece depicting merchants discussing units of measure, together with a quotation from the Bible about cheating in small things leading to cheating in larger ones. It is uncommon to see all the tables presented entirely in Roman numerals, referred to here as Baurenziffer or farmer's digits. The tables present various weights and measures in terms of fractions—usually eighths, twenty-fourths, etc.

Illustrations available:
Frontispiece and title page
Dedication page
First page of tables

_		I. St	
M.	II :	23	HH h
	III		VI h
_	HIH		1+
	v	-	I+II h
	VI		I + IIII h
-	VII		I+ VIh
6	VIII	200	II+
	VIIII	-	11 + 11 h
	X	-	II + IIII h
D	XII	_	III+
	XIIII	-	III + IIII h
	XVI	II	IIII+
	XVIII		IIII+IIII h
	XX	-	V+
	XXII		V + IIII h
11	XXIIII	m	VI+
	XXVI		VI + IIII h
-	XXVIII	-	VII+
	XXX	-	VII+ HIII h
	-II	1111	VIII+
	-1111	_	. VIII + IIII h
ш	-VI	_	VIIII+
_	-x	v	X+-
ш	-XVIII	· VI	XII+
	-XX	-	XII+IIII h
	-xxvi	vii	XIIII+
v	=		XV+
	=IIIF	VIII	XVI+
	=X		XVII+IIII h
VI	=XII	vmı	XVIII+
	=XX	x	XX+
	XXVIII	XI	XXII+
	=		XXII+IIII h
VIII	≡VI	xn	XXIIII+
	С		XXV+
	CC	xxv	-xx+
xxv	CCC		I o XV+
	CCCC	-xx	10-X+
	D		II o V +
_	M	_	IIII o X +

Roman numeral table, B 72

B 73 Baehne, George Walter

Practical applications of the punch card method in colleges and universities.

Year: 1935 Place: New York

Publisher: Columbia University Press

Edition: 1st Language: English

Figures: 6 plates, figures in text Binding: original cloth boards Size: 253x174 mm

Reference: Enc Brit, v.12, p. 344



B 72



Dedication, B 72

Thanks to a 1929 grant of punched card equipment from IBM, Columbia University became a leader in the use of this equipment among colleges and universities. This volume shows that interest in the processing of punched card data in universities was not confined to Columbia.

The work, edited by Baehne, is mainly devoted to the administrative uses of punched card equipment, though it does also describe their use in psychological, medical, agricultural, scientific, legal and statistical areas. Astronomical usage for the equipment is presented by **W. J. Eckert**, who would later head up the IBM Watson Laboratory at Columbia University.

The problems faced by university registrars seem to have changed little since this volume was written—only the numbers of students and equipment available to process them have modified the situation. The methods used to process data were based on the capabilities of the equipment. For example, it was possible to sort punched cards on a single column (character) at a time. A digit was represented by a single punch in any of ten possible rows in the column, but an alphabetic character required two punches out of each column. This meant that sorting cards alphabetically required two passes through the sorter for each column of the data field. Thus alphabetizing a class list would take two passes through the sorter for each character in the student's name field—a non-trivial amount of work. The University of Oregon describes a system it adopted to break the range of possible student names into ten thousand parts and assign a four-digit code number to each - thus the list could be alphabetized by only sorting on 4 digits instead of many alphabetic columns.

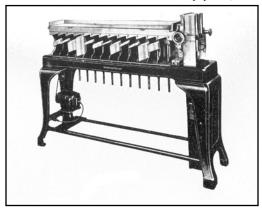
This volume is valuable in that it contains a complete description of the IBM/Hollerith equipment of the pre—World War II period. The machines are reproduced in the illustrations.

Illustrations available:

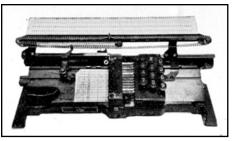
Title page Equipment essay (6 pages) University of Oregon name code



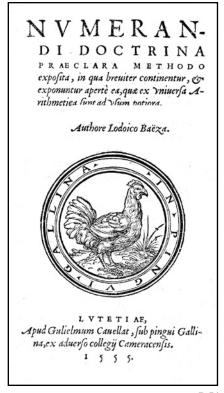
Punched card equipment, B 73



Card sorter, B 73



3 73



B 74

B 74

Baeza, Lodoico (ca.1550)

Numerandi doctrina præ clara methodo exposita, in qua breviter continentur, & exponuntur apertè ea, quæ ex universa arithmetica sunt ad usum potiora.

Year: 1555 Place: Paris

Publisher: Gulielmum Cavellat

Edition: 1st Language: Latin

Figures: 1 folding plate (f.54) Binding: contemporary paper wrappers

Pagination: ff. 67, [1] Collation: A–H⁸I⁴ Size: 161x97 mm

Reference: Smith Rara, p. 269

Lodoico Baeza is known only as a Spanish scholar from the mid-sixteenth century. This is a work on arithmetic. It begins by presenting the Hindu-Arabic numerals, addition and multiplication tables, squares, cubes and square roots—all in quite modern form. These elementary ideas occupy only the first few pages, and the text is thereafter devoted to topics such as mixed radix arithmetic (addition of days, hours, minutes, etc.), including a table that could be used to convert days to hours, etc.

The text is heavily interspersed, particularly in the first half, with Greek quotations.

Illustrations available: Title page

B 75

Bagay, Valentin (1772–1851)

Nouvelles tables astronomiques et hydrographiques, contenant un traité abrégé des cercles de la sphère; - la description des instruments a réflexion; - diverses méthodes pour obtenir les latitudes et les longitudes terrestres; - une nouvelle table des logarithmes, des sinus, cosinus, tangentes et cotangentes, de seconde en seconde, pour les quatre-vingt-dix degrés du quart du cercle.

Year: 1829 Place: Paris

Publisher: Firmin Didot Père et Fils

Edition: 1st Language: French Figures: 5 engraved plates

Binding: contemporary half-leather boards Pagination: pp. [8], lxxxvi, [iv], 125, 615 Collation: $\pi^41-11^41-15^416^31-77^4$

Size: 265x205 mm

Reference: Glais *RCMT*, p. 86; Hend *BTM*, #134.0, p. 111; Soth/Zeit *BCM*, Vol III, #875–#804, p. 65

Bagay was professor of Hydrographie at Lorient.

This very extensive set of tables for astronomy and navigation is an example of the best tabular technique in use as **Charles Babbage** began his efforts to mechanize table making. A series of introductory essays discuss topics from spherical geometry to observational instruments such as the sextant and octant. The detailed tables provide corrections for temperature and humidity. Logarithms are given for natural numbers and trigonometric functions for both decimal and sexagesimal numbers to every minute of the arc. Bagay introduced one, easily visible, typographical improvement on earlier tables to remove a potential source of error: a large black dot notes where the first figures of logarithms change.

Illustrations available:

Title page

Table page illustrating the typographical innovation

	NOUVELLES	
TABLES	S ASTRONOMIQU	ES
	ET	
HYD	ROGRAPHIQUES,	
	CONTENANT	
A RÉFLEXION; — DIVERSE TERRESTRES; — UNE NO	ERCLES DE LA SPHÉRE; — LA DESCRIPTION DES INST SS MÉTHODES POUR OBTEXIR LES LATITUDES ET LES LOS DUVELLE TABLE DES LOGARITHNES, DES SINUS, COSIN ES, DE SECONDE EN SECONDE, POUR LES QUATRE-VI ERCLE.	NGITUDE US, TAN
	PAR V. BAGAY,	
PRO	FESSEUR D'HYDROGRAPHIE.	
gravér, fond	ÉDITION STÉRÉOTYPE,	
	PARIS.	
	OT PÈRE ET FILS, IMPRIMEURS DU ROI, DE LA MARINE, LIBRAIRES POUR LES MATHÉMATIQUES, 870. RUE JACOB, Nº 24.	
	1829	

В 75

18′	19'	10'	11'
9.214	9.214	0.792	0.791
1980	9894	1835	3809
2112	@ 026	1701	3675
2244	0158	1567	3542
2376	0289	1433	3408
2508	0421	1299	3274
2640	0553	1165	3141
2772	0685	1032	3007
2904	0817	0898	2874
3036	0949	0764	2740
3168	1080	0630	2606
3300	1212	0496	2473
3432	1344	0362	2339
3564	1476	0228	2206
3696	1607	® 094	2072
3828	1739	9961	1938

Table typography, B 75

В 76

Baily, Francis (1774–1844)

Astronomical tables and formulae together with a variety of problems explanatory of their use and application. To which are prefixed the elements of the solar system.

Year: 1827 Place: London

Publisher: Richard Taylor

Edition: 1st Language: English

Binding: original morocco grained blue cloth boards; rebacked Pagination: pp. xvi, 120, 119*–120*, [2], 123–152, 153*–158*, 153–194, 193*–194*, 195–267, [3], 267–304

Collation: a-b⁴B-P⁴Q⁵R-T⁴U⁷ X-2B⁴2C⁵2D-2L⁴2M²2M-2Q⁴

Size: 208x128 mm

Reference: DSB, v. 1, pp. 402-403

Francis Baily, after whom Baily's Beads (caused by the sun shining through mountain valleys on the moon during an eclipse) are named, was a member of the Royal Society, one of the founders of the Astronomical Society, and later its president for two terms. He left England, aged twenty-one, and spent the next two years at sea and as an adventurer in America. During that time he endured two shipwrecks, a voyage in an open boat from Pittsburgh to New Orleans, and a return trip to New York over two thousand miles of wilderness. He evidently attempted to obtain American citizenship by marriage, but when that failed, he returned to England in 1798. Thereafter, he attempted to join various expeditions to Africa, but when these also fell through, he became a stockbroker. His first publications, Tables for the purchasing and renewing of leases (1802), The doctrine of interest and annuities (1808), and The doctrine of life-annuities and assurances (1810), made his reputation in the financial world. He first published on astronomy in 1811 and became one of the founders of the Royal Astronomical Society in 1820. In 1825, at the age of fifty, having made a fortune in banking, he retired to devote his life to astronomy.

These tables are a collection of items that Baily found useful in his calculations. The first 120 pages are divided equally between a description of the solar system and lists of formulae useful for astronomical calculation. The section of tables seems short, occupying only about one quarter of the volume. The last section is devoted to a brief description of the tables and a number of astronomical problems illustrating their use.

An appendix, dated January 1829, bound at the back of this volume, was written after Baily had received comments from other astronomers. He had sent a few copies for comment before it was released and then modified some of the original tables in light of the remarks. Thus the work, while dated 1827, was not available to any but a select few prior to 1829. This is copy #113, with presentation to the Royal Institution.

Illustrations available: Title page

B 77

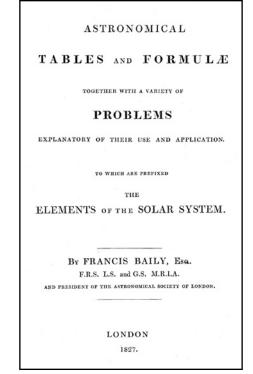
Baily, Francis (1774–1844) [H. C. Schumacher, editor]

On Mr. Babbage's new machine for calculating and printing mathematical and astronomical tables. London, November 28, 1823. In Astronomische Nachrichten No. 46, 1/2.

Year: 1824 Place: Altona

Publisher: Astronomische Nachrichten

Edition: 1st



B 76

Language: English

Binding: original marbled boards

Pagination: pp. 409-422

Size: 258x226 mm

Reference: DSB, v. 1, pp. 402–403; Ran *ODC*, p. 406; MCK

CBCW, v. 2, pp. 44-56

A report on Babbage's Difference Engine given by Francis Baily, an astronomer and friend of Babbage. For a biographical note on Baily, see **Baily**, *Astronomical tables*, 1827.

Illustrations available: None

B 78

Baker, Humphrey (fl.1557–1587) [**Henry Phillippes** (fl. 1648–77), editor]

Baker's arithmetick: teaching the perfect work and practice of arithmetick both in whole numbers & fractions. Whereunto are added many rules and tables of interest, rebate, and purchases, & c. Also, the art of decimal fractions, intermixed with common fractions, for the better understanding thereof. Newly corrected and enlarged, and made more plain and easie by Henry Phillippes.

Year: 1670 Place: London

Publisher: Edward Thomas

Edition: 1st

Language: English

Binding: contemporary leather; rebacked; red leather label Pagination: pp. [16], 128, 139–362, 367–398 (misnumbering 390 as 388, 391 as 389, 394 as 392, 395 as 393, 398 as 396)

Collation: A–2B⁸ Size: 163x106 mm Reference: Smi *Rara*, p. 327

Henry Phillippes, the editor, was a teacher of mathematics, surveying and gauging in London. He lived for most of his life in a house built on London Bridge. He took part in the Royal Society investigations of the variation of the compass and was considered an authority on the subject. He is known to have published a number of works on mathematical subjects (see entries under **Phillippes**).

A comparison with the Baker 1583 edition reveals this to be an almost completely new work. It seems likely that the publisher sought to take advantage of Baker's better-known name. It does contain many of the same tables (although they have been updated and often show different values—compare the illustration of the table for Roan here with the one in the entry for the 1583 edition—see illustrations) with the addition of tables such as ones showing the decimal equivalent of common fractions and decimal equivalents of sterling money. Baker's more difficult passages, for example, the definition of *number*, have been rewritten.

Illustrations available: Title page Roan table Decimal tables

B 79

Baker, Humphrey (fl.1557-1587)

The well spring of sciences. Which teacheth the perfect worke and practise of arithmeticke, both in whole numbers and fractions ...

Year: 1583 Place: [London]

Publisher: [Thomas Purfoot]

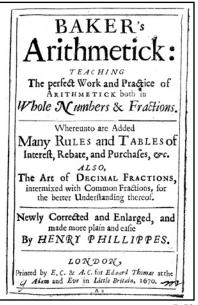
Edition: 7th Language: English

Binding: contemporary leather Pagination: ff. [8], 198, 18

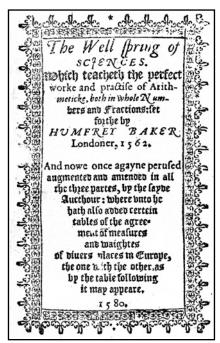
Collation: A^8 (-A1, title page replaced by title of 1580 edition) $B-V^8$ (-T2 torn away) $W-2C^8D^6a^2$ (a^2 misbound at end)

Size: 144x89 mm Reference: H&J

Humphrey Baker was a native of London, but of him little else is known other than that he translated, from the French, a book on astrology (*The rules touching the use and practice of the common almanacs*, 1587).



B 78



B 79

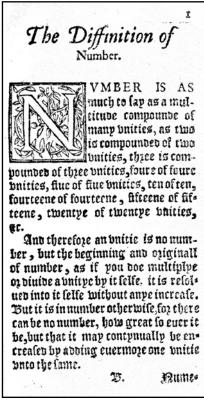
When Baker first published this small pocket arithmetic in 1562, the only other work on arithmetic in the English language was **Robert Recorde**'s *Ground of Artes*. Record's book had been criticized as weak, particularly on the continent, for it was, indeed, inferior to several works available there. This criticism prompted Baker to compose this volume, first published in 1568, which proved to be quite popular.

Baker's descriptions are lengthy and not easily understood by a modern reader because they rely on outmoded concepts. For example, when defining *number*, he used the Pythagorean approach that one (1) is not a proper number, but the progenitor of all other numbers (see the illustration of number definition page).

After discussing the simple arithmetic operations, he covers fractions and makes a few remarks on mixed-radix arithmetic (days, hours, minutes; pounds, shillings, pence) and the usual procedures for *rule of three*, etc. The last half of the book deals with problems of concern to merchants and others participating in commerce, and closes with tables giving equivalents of weights and measures in various cities.

	London	115 felles.
	Andwerpe	192 1
	Muremberg ac.	200 7
	Franckforde	240 3
	Dantzicke	1593
	Aienne	167
	Lions	117 4 aulnes.
100 aul-	Parris	1001
nesat	Liftburne	115 f bares.
Rouan do make at	Siuill	1551
	The Ifles, ac.	1191
	Clenice	207 2 braces.
	Lucques	2301
	Flozence	235 1
	Willan .	265 }
	Geanes	554 -

Sample table, B 79



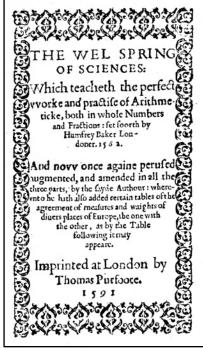
Number definition, B 79

Illustrations available:

Title page (not contemporary with this volume – see collation above)

Number definition page

Sample tables page



B 80

B 80

Baker, Humphrey (fl.1557–1587)

The wel spring of sciences. Which teacheth the perfect worke and practise of arithmeticke, both in whole numbers and fractions: set foorth by Humfrey Baker Londoner. 1562. And now once againe perused augmented, and amended in all the three parts, by the sayde authour: whereunto he hath also added certain tables of the agreement of measures and waights of diverse places of Europe, the one with the other, as by the table following it may appeare.

Year: 1591 Place: London

Publisher: Thomas Purfoote

Edition: 9th Language: English

Binding: later full red morocco leather with raised bands on spine; gilt decorations

Pagination: ff. [7], 137, 137–198 (misnumbering 196 as 198),

Collation: A8 (-A2) B-V8 W-Z8 2A-2D8 2E7

Size: 136x90 mm Reference: H&J

This is the ninth edition of Baker's *Well spring of sciences*. It is in much better condition than the copy of the seventh edition described above. A contemporary hand has made

occasional ink notations in the wide margin and another has added pencil notations. The pencil notations appear to be of two types, one working the examples to check the arithmetic and another attempting to correct misprints or clarify hard-to-read text. The pencil annotations leave the impression of someone preparing another edition.

Illustrations available: Title page Printer's mark



Colophon and printer's mark, B 80

Baldi, Bernardino, translator

See **Hero of Alexandria**; De gli automati, overo machine se moventi, libri due, tradotti dal Greco da Bernardino Baldi Abbate di Guastalla, 1589

B 81

Ball, Walter William Rouse (1850–1925) [H. M. S. Coxeter (1907–2003), editor]

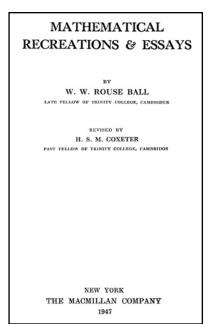
Mathematical recreations and essays.

Year: 1947 Place: New York Publisher: Macmillan Edition: late Language: English Figures: 2 photolith plates

Binding: original cloth boards; with dust jacket

Pagination: pp. xvi, 418 Size: 203x136 mm

W. W. R. Ball was a mathematician at Trinity College, Cambridge. He is well known as a writer on the history



B 81

of mathematics and on ancillary subjects such as mathematical recreations, e.g., string figures.

This is one of the more famous books on recreational mathematics. It was produced by a master in the field and has remained continuously in print from its first publication in 1892. It spans the field from simple arithmetical series to cryptography and cryptanalysis. Of particular interest is the section on calculating prodigies. The editor of this edition, H. M. S. Coxeter, a mathematician at the University of Toronto, was known for his interest in recreational mathematics as well as more traditional mathematical fields.

Illustrations available: Title page

B 82

Ball, Walter William Rouse (1850–1925)

A primer of the history of mathematics.

Year: 1914
Place: London
Publisher: Macmillan
Edition: 4th
Language: English
Binding: original cloth boards
Pagination: pp. iv, 164
Collation: π² A–K⁸ γ²
Size: 174x114 mm

Reference: Cre CL, p. 102

This highly condensed version of **Ball**'s *History of mathematics* makes no pretense to be anything except a short, popular description of the history of mathematics

and to provide a few stories about pioneers of the subject. The early editions of this work were 1895, 1903 and 1906.

Illustrations available: Title page

B 83

Ball, Walter William Rouse (1850–1925)

A short account of the history of mathematics.

Year: 1901
Place: London
Publisher: Macmillan and Co.
Edition: 3rd
Language: English
Binding: original cloth boards; gilt spine and front cover
Pagination: pp. xxiv, [2], 527, [15]
Collation: π⁴b⁹1–33⁸γ⁷
Size: 188x125 mm

Reference: Cre CL, p. 102; Pul HA, p. 117

This is a standard reference work on the history of mathematics from the time of ancient Egypt to near the end of the nineteenth century. It has been reprinted several times since its first appearance in 1888.

Illustrations available: Title page

B 84

Bamford, Philip

The practical gauger: Being a summary of what is necessary to be understood by all pretenders to that art. Wherin the nature of such superficies and solids as are usually the subject of gauging are fully discuss'd. With the method of finding their area's or solidites, either whole or in part. Performed by the pen and the sliding - rule. To which is added, many useful tables proper for such a work, never before printed.

Year: 1714 Place: London

Publisher: Richard Mount, John Sprint and Nathaniel Cliff

Edition: 1st Language: English

Binding: contemporary panelled leather; spine gilt in

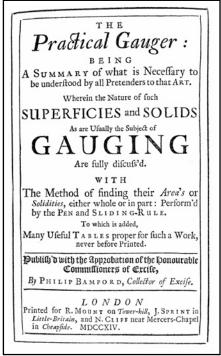
compartments; morocco label

Pagination: pp. 128 Collation: A⁴B–I⁸ Size: 184x113 mm

The introduction to this work begins by describing decimal arithmetic and its use in the rule of three and other such operations, and also contains the abbreviations used. This is followed by tables relating measures of wine and beer to cubic inches, pints, quarts, gallons, firkins and other lesser-known units of measure: the *but*

and *ton*. The remainder of the book presents the usual gauging problems but with greater clarity than most. It describes the different shapes of barrels, casks, tubs, etc. and how they should be measured. The final section contains tables of excise rates for different liquids, tables for determining the number of days between any two dates, salary tables and so forth.

Illustrations available: Title page Sample table page



B 84

B 85

Bardeen, John (1908–1991)

On the theory of the A-C. impedance of a contact rectifier. In Some contributions to transistor electronics. Monograph 1726

Year: 1949 Place: New York Publisher: American Telephone & Telegraph Company Edition: 1st Language: English

Language: English Pagination: pp. 94–100 Size: 277x213 mm

A thoughtful, respectful biography of John Bardeen is Hoddeson, Lillian, and Vicki Daitch, *True genius. The life and science of John Bardeen*, Joseph Henry Press, Washington, DC, 2002.

This is the same Bardeen paper that appeared in the *Bell Systems Technical Journal, Semiconductor issue*. See

entry for American Telephone & Telegraph Company, Some contributions to transistor electronics.

Illustrations available: None

B 86

Bardeen, John (1908–1991)

On the theory of the A-C. impedance of a contact rectifier. In Bell System Technical Journal Vol. XXVIII No. 3, July 1949.

Year: 1949 Place: New York

Publisher: American Telephone & Telegraph Company

Edition: 1st Language: English

Binding: original paper wrappers Pagination: pp. 428–434. Size: 228x152 mm

See entry for American Telephone, Bell System Technical Journal, Semiconductor issue.

Illustrations available:

None

B 87

Bardeen, John (1908–1991) and **Walter Hauser Brattain** (1902–1987)

Physical principles involved in transistor action. In Bell System Technical Journal Vol. XXVIII No. 2, April 1949.

Year: 1949 Place: New York

Publisher: American Telephone & Telegraph Company

Edition: 1st Language: English

Binding: original paper wrappers Pagination: pp. 239–277 Size: 228x152 mm

See entry for American Telephone and Telegraph, Semiconductor issue.

John Bardeen received his Ph.D. degree from Princeton University in 1936. During World War II, he served at the Naval Ordnance Laboratory. After the war, he joined Bell Telephone Laboratories, where his research was concerned with the properties of semiconductors. This work led to the invention of the transistor, for which he shared the Nobel Prize. He received a second Nobel Prize for his work on super-conductivity.

Walter Brattain obtained his doctorate in physics from the University of Minnesota. He was a gifted experimental physicist who spent the majority of his career at Bell Telephone Laboratories. Working with Bardeen and Shockley, Brattain constructed the first semiconductor amplifier.

John Bardeen, Walter Brattain and William Shockley were awarded the Nobel Prize for their invention of the transistor. This article describes the history of transistor development and the physical properties of the device. It was, other than a brief announcement by a letter to the editor, the first publication describing these devices.

Illustrations available:

None

B 88

Bardeen, John (1908–1991) and **Walter Hauser Brattain** (1902–1987)

The transistor, a semi-conductor triode. In The Physical Review, Vol. 74, No. 2, July 15 1948.

Year: 1948

Place: Lancaster, PA, and New York, NY Publisher: American Physical Society

Edition: 1st Language: English

Binding: original paper wrappers Pagination: pp. 230–231 Size: 268x200 mm

This is the original announcement of the invention of the transistor by means of a series of letters to the editor of the *Physical Review*. The authors recognized the importance of their work and used this *letter to the editor* technique to permit timely communication of their breakthrough without the delay inherent in the peer review system.

There are three letters in this series: this one announcing the device, one by Brattain and Bardeen on forward currents in germanium, and one by Shockley and Pearson on the modulation of currents in the device. All three letters are reproduced in the illustrations.

Illustrations available: Letters (4)

B 89

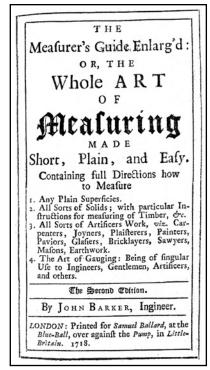
Bardeen, John (1908–1991) and **Walter Hauser Brattain** (1902–1987)

Nature of the forward current in germanium point contacts. In The Physical Review, Vol. 74, No. 2, July 15 1948.

Year: 1948

Place: Lancaster, PA, and New York, NY Publisher: American Physical Society

Edition: 1st Language: English



B 90

Binding: original paper wrappers Pagination: pp. 231–232

Size: 268x200 mm

This is a very early paper by two of the three Nobel laureates who developed the transistor. The first account of the invention of the semiconductor was by means of a letter, from the same authors, (q.v.) to this journal ("Nature of the forward current in germanium point contacts," *The Physical Review*, Vol. 74, No. 2, July 15, 1948, pp. 231–232). See also entries for **Shockley**.

Illustrations available:

None

B 90

Barker, John

The measurer's guide enlarg'd: or, the whole art of measuring made short, plain and easy. Containing full directions how to measure 1. Any plain superfices. 2. All sorts of solids; with particular instructions for measuring of timber, &c. 3. All sorts of artificers work, viz. carpenters, joyners, plaisterers, painters, paviors, glasiers, bricklayers, sawyers, masons, earthwork. 4. The art of gauging: being of singular use to ingineers, gentlemen, artificers, and others.

Year: 1718 Place: London

Publisher: Printed for Samuel Ballard

Edition: 2nd

Language: English

Binding: contemporary leather gilt; gilt compartmented spine

Pagination: pp. [12], 204 Collation: A–B⁶B–S⁶ Size: 152x87 mm

As is common in many of these books, the author indicates in the introduction that:

These sheets were composed for my own private Use, Thirty Years since, I not in the least intending to Publish them, but at the Importunities of some Friends, not without Reluctancy, I, agreed to have them Printed...

This is a general book on measurement for carpenters, masons, timber merchants, etc.

Illustrations available: Title page

B 91

Barlow, Fred (1888–1963)

Mental prodigies. An enquiry into the faculties of arithmetical, chess and musical prodigies, famous memorizers, precocious children and the like, with numerous examples of "lightning" calculations and mental magic.

Year: 1952 Place: New York

Publisher: Philosophical Library

Edition: 1st (U.S.) Language: English

Binding: original cloth boards; with dust jacket

Pagination: pp. 256 Size: 183x126 mm

MENTAL PRODIGIES

An Enquiry into the Faculties of Arithmetical, Chess and Musical Prodigies, Famous Memorizers, Precocious Children and the Like, with Numerous examples of "Lightning" Calculations and Mental Magic

by
FRED BARLOW



PHILOSOPHICAL LIBRARY
NEW YORK

B 91

For obvious reasons, calculating prodigies have always been of interest to the developers of computing machinery. This 1952 (first U.S.) edition incorporates a few corrections not present in the 1951 (first English) edition. The opening third of the work discusses famous calculating prodigies such as Zerah Colburn and describes some of the feats they could perform. The rest of the book is devoted to a discussion of these, and related, abilities. The distinction is drawn between calculating prodigies (often referred to as *idiot savants*) and people trained in mental calculation either for use in their work or as stage performers. The latter part of the book contains various algorithms used by those trained in the art.

Illustrations available: Title page

B 92

Barlow, Peter (1776–1862)

An elementary investigation of the theory of numbers, with its application to the indeterminate and Diophantine analysis, the analytical and geometrical division of the circle, and several other curious algebraical and arithmetical problems.

Year: 1811 Place: London Publisher: J. Johnson and Co. Edition: 1st

Language: English

Binding: modern leather half bound over marbled boards

Pagination: pp. xvi, 507, [3] Collation: A–2I⁸2K⁷ Size: 217x133 mm

THEORY OF NUMBERS,

WITH ITS APPLICATION TO THE INDETERMINATE AND DIOPHANTINE ANALYSIS,
THE ANALYTICAL AND GEOMETRICAL DIVISION OF THE CIRCLE,
AND SEVERAL OFFESS
CURIOUS ALGEBRAICAL AND ARITHMETICAL PROBLEMS.

BY PETER BARLOW,
OF THE BOYAL MILITARY ACADEMY.

LONDON:
PRINTED FOR J. JOHNSON AND CO.,
ST. PAUL'S CHURCE-YARD.

1811.

B 92

Barlow was a mathematician at the Royal Military Academy in England. He was self-educated and initially made his reputation through an essay concerned with timber stresses based on research he had done at the Woolwich arsenal. He is best know today for his association with a specific type of telescope eyepiece (the Barlow lens), which he designed in the late 1820s, and for his mathematical tables (*Barlow's Tables*) which remained in print until after World War II.

This volume is highly technical work on number theory. It begins with a discussion of the number philosophy of Pythagoras and proceeds to discuss primes, continued fractions, quadratic equations and other topics, often in relation to problems or theories first developed by the Greeks.

Illustrations available: Title page

B 93

Barlow, Peter (1776–1862)

A treatise on the manufactures and machinery of Great Britain ... To which is prefaced, an introductory view of the principles of manufactures by Charles Babbage. Forming a portion of the Encyclopaedia Metropolitana. 3 vols.

> Year: 1836 Place: London

Publisher: Baldwin and Braddock

Edition: 2nd Language: English

Figures: 87 engraved plates bound at end of v.3

Binding: contemporary leather

Pagination: v.1, pp. iii-viii, 412; v.2, pp. 413-828; v.3, pp.

829-834

Collation: v.1, π^3 B–L⁴ M² N–3G⁴; v.2, 3H–5N⁴; v.3, 5O³

Size: 274x208 mm

See **Babbage**, **Charles**; An introductory view of the principles of manufactures, 1836

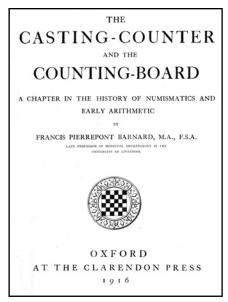
Illustrations available: None

B 94

Barnard, Francis Pierrepont (1854–1931)

The casting-counter and the counting board. A chapter in the history of numismatics and early arithmetic.

Year: 1916 Place: Oxford Publisher: Clarendon Press Edition: 1st Language: English Figures: 64 plates (numbered 1–46, 47a, 47b, 48–63)



B 94

Binding: original cloth boards; gilt-stamped spine and front cover

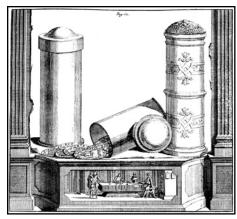
Pagination: pp. 358, [2] Collation: A–2Y⁴ Size: 283x219 mm Reference: Pul *HA*, p. 116

Barnard was professor of medieval archaeology at the University of Liverpool. At the time he began this work, there was little interest in casting counters or jettons, as they are also commonly known—from the French *jeter*, to throw. Jettons are the counters that are used on the European table abacus. Counters used on a counting board were the principal mechanical aid to calculation used in Europe during the Middle Ages. Terms such as *borrow one*, *carry two*, *lay a wager* and *over the counter* originated with the use of jettons and the counting board. Counters were known as *gettoni* in Italy, *casting counters* in England and *rechenpfennig* in Germany.

In early times the counters were simply small pebbles or similar items. About the year 1200 they began to be minted in a coin-like format, the production of which was a major industry in Nuremberg from 1525 to 1700. Jettons came in a *nest* (usually a cylindrical metal case), which was often considered a suitable New Year's gift. The



Typical jetton, B 94



Nest of jettons, B 94

image stamped into the jetton varied greatly but usually included a bust of the ruler on one side and some device (often a cross or other simple symbol on early versions) on the other (see illustration). Jettons were used up to the late 1700s, and many highly decorative examples exist for special areas or purposes—for example, the French minted special jettons for use in their North American colonies in the middle 1700s.

This work is divided into three parts. The first discusses the jetton itself and catalogs many of them by decoration and inscription. The second section deals with counting tables and cloths. The last part is concerned with the methods used for performing arithmetic (casting) as described by various authors.

This is considered the standard reference book on jettons and their use. Fox publishers reprinted it in 1981.

Illustrations available: Title page Plate 2 of jettons Reckoning cloth

B 95

Barozzi, Francesco (1537–1604)

Il nobilissimo et antiquissimo giuoco Pythagoreo nominato rythmomachia, cioè battaglia di consonantie de numeri, in lingua volgare a modo di parafresi composto.

Year: 1572 Place: Venice

Publisher: Gratioso Perchacino

Edition: 1st Language: Italian

Binding: modern paper boards

Pagination: ff. [2], 24 Collation: A–F⁴ G² Size: 196x130 mm

Reference: Rcdi *BMI*, Vol. I, p. 83; Soth/Zeit *BCM*, Vol. III, #875–#498, p. 38

Francesco Barozzi (also known as Franciscus Barocius or Barociusi) was a native of Crete who was a member of a patrician Venetian family. He studied at Padua and also lectured there c.1559. He published works on astronomy and mathematics and is known to have produced a number of translations of Greek and Latin mathematical texts, among them Proclus' commentary on the first book of Euclid. In 1587, he was charged with sorcery and brought before the Inquisition.

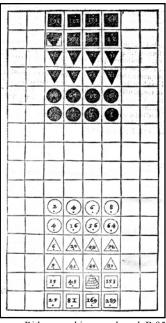
This volume is essentially a translation of Claude de Boissière's description of the number ratio game known as Rithmomachia from the Greek *rhythmos* (number) and *machia* (combat). In the title, the game is attributed to Pythagoras; however, the attribution is suspect as no known reference predates the eleventh century.

As **Smith** (*History of Mathematics*) notes, the game is difficult to describe. It is based on the Greek number philosophy of **Nicomachus** and played on an elongated chess board with 8x16 squares. It uses variously shaped counters to represent numerical ratios. The object was to move the counters so as to get four numbers in a row that were related to arithmetic, geometric and harmonic progressions—there are apparently only six winning combinations of pieces.

An introduction to the game can be found in Smith, D. E. and C. C. Eaton; "Rithmomachia, the great medieval number game," *The American Mathematical Monthly*, April 1911, pp. 73–80. For a more complete historical and bibliographical discussion, see Folkerts, Menso; *Essays on medieval mathematics*, Aldershot, Ashgate



B 95



Rithmomachia game board, B 95

Variorum, 2003. Chapter XI is titled *Rithmomachia*, a mathematical game from the middle ages.

Folkerts points out that *Rhythmos* means not *number* but *numerical relationship* and that accordingly, Rithmomachia is a game that deals not with numbers but with the ratios of numbers.

Illustrations available: Title page Game board

B 96

Barreme, François Bertrand de (1640–1704)

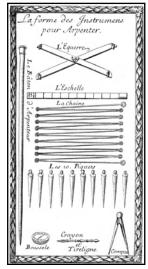
La geometrie servant a l'arpentage. Ouvrage si facile & si commode que par la seule addition on peut mesurer toute sorte de terres, bois, & batimens; et generalement toute figures & superficies pour irregulieres qu'elles puissent estre.

Year: 1672
Place: Paris
Publisher: Barreme
Edition: 1st
Language: French
Figures: engraved title page; 1 engraved plate
Binding: contemporary calf; gilt spine
Pagination: pp. [17], 5, [1], 7–17 (misnumbered 7 as 6, 8 as 6,
9 as 7, 10 as 7, 11 as 8, 12 as 8, 13 as 8, 14 as 8, 15 as
10, 16 as 11, 17 as 12), [2], ff. 13-30, pp. [72], [36], [36]
Collation: a^{6*12}C–E^{6*6}R–X⁶g–3g^{6*}-3*⁶
Size: 142x82 mm

François Barreme was a native of Lyons who founded a private commercial mathematics school in Paris. He was



B 96



Survey instruments, B 96

responsible for the publication of many different types of tables and ready-reckoners during his lifetime. The tradition was continued by his son Nicolas. The tables became so popular that their name became a synonym for ready-reckoners and numerical tables, which are known by the name *Barème* in France today. While they were both popular and produced long after Barreme died, editions predating 1700 are rare.

This first edition illustrates the beginning of the genre. The tables are difficult to use and waste space (see illustration of one page of the multiplication table). Indeed, examination of various editions of Barreme may be considered a short course in table design and typography.

This work begins with a description of some elementary survey instruments and the mathematics needed to find the areas of simple geometric figures. The remainder of the volume is composed of tables of use in surveying and commercial arithmetic.

Illustrations available:
Title page
Formulae for triangles
Survey instruments
Multiplication table

B 97

Barreme, François Bertrand de (1640–1704)

Le livre des aides, domaine, et finances. Tres -utile à toute sorte de personnes; ...

Year: 1685 Place: Paris

Publisher: Denys Thierry

Edition: 1st Language: French

Figures: engraved title frontispiece

Binding: contemporary leather; rebacked, original gilt spine

laid down; dentelle edges

Pagination: pp. [4], 64 (misnumbered 62 as 60), [4], 65–68,

[120], xv, [9] Collation: π^2 A-F⁶¶⁶-5¶⁶§-7§⁶

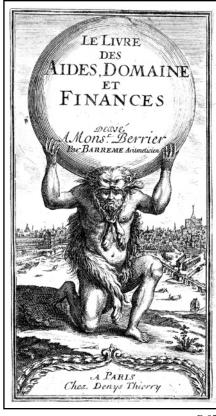
Size: 160x85 mm

This volume consists of commercial tables. Typically the tables give multiples of various monetary units or exchange rates. These are supplemented by various tables of tariffs for moving quantities of wine and other goods by both land and water transport.

Illustrations available:
Title page
Frontispiece
Page of wine tables



B 97



B 98

Barreme, François Bertrand de (1640–1704)

Le livre des comptes faits.

Year: 1673 Place: Paris Publisher: Barreme Edition: 1st Language: French

Figures: 2 engraved plates (portrait & anagram of Colbert)

Binding: contemporary leather Pagination: ff. [95]

Collation: $\pi^8A-H^{6*6}R-X^6Y^3$ Size: 151x82 mm

Reference: Kress CL, 1326

The title page states *third edition*, but no earlier one has been located. It is known that Barreme had published earlier sets of tables, and he might be simply defining these previous tables as his earlier editions. See advertisement on folio 1 in the illustrations.

This volume of tables is limited to commercial applications, in particular for finding multiples of various denominations of the French currency.

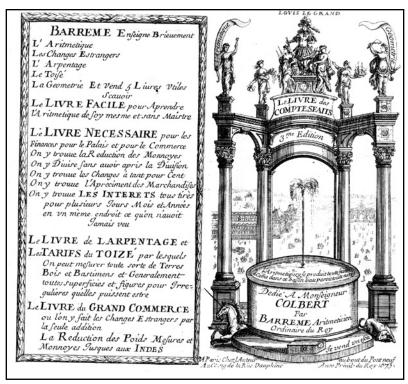
Illustrations available:

Title page and advertisement

Dedication portrait

Currency table page

B 97





Dedication portrait, B 98



Le livre facile pour aprendre l'arithmetique de soy mesme et sans maistre par des mèthodes si courtes, si claires et si bien ordonnées qu'il ne s'en est point veu de pareilles.

Year: 1672 Place: Paris Publisher: Barreme Edition: 1st Language: French

Binding: contemporary calf; gilt spine Pagination: pp. [36], 199, [9] Collation: $\pi^3(-4)\P^{11}(-\P12)^{*4}$ A-Q^{6*8}

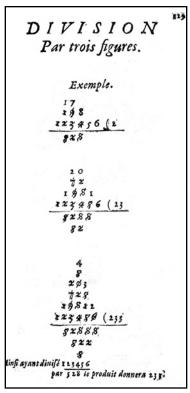
Size: 160x86 mm

Unlike most of Barreme's publications, this one volume contains only a few tables. As the title indicates, this work concentrates on teaching the basics of arithmetic with examples of all four operations. The tables included are intended to aid in the basic instruction, but there are also a few dealing with currency conversions.

Illustrations available:
Title page and advertisement
Galley division
Multiplication table
Currency conversion



В 99



Division examples, B 99

B 100

Barreme, François Bertrand de (1640–1704)

Le livre necessaire a toute sorte de conditions. Inventé de nouveau pour tirer tout d'un coup les Interets de plusieurs années, de plusieurs mois, de plusieurs jours en un moment et en un méme endroit, ce qu'on n'avoit jamais veu. On y voit aussi des tarifs bien comodes: ou sans avoir apris la division on y peut diviser jusqu'a trente mil livres. La reduction des monnoyes y'est d'une maniere particuliere. Le profit des marchands y est. Les changes y sont aussy, et les escontes a tant por cent. On y fait par la seule addition, les contributions, impositions et despartements. au sol la livre.

Year: 1671 Place: Paris Publisher: Barreme Edition: 1st Language: French

Binding: contemporary calf; gilt spine

Pagination: pp. [66], 88, [102], 199–240 (mis#199 as 200, 200 as 201), 373–396 (mis# 396 as 406), xii, 37–48 Collation: π⁴A–B^{610*7}(-*8)2A–2B⁶C–F⁶G⁸A–I⁶L–N⁶2H–2I⁶a¹²

Size: 163x85 mm Reference: Kress *CL*, 1280

This volume is a standard set of commercial tables, the majority of which are oriented towards currency conversion, but with a few dealing with the number of days between various dates.

Illustrations available: Title page and advertisement



B 100

B 101

Barreme, François Bertrand de (1640–1704)

Le livre necessaire a toute sorte de conditions. Inventé de nouveau pour tirer tout d'un coup les Interets de plusieurs années, de plusieurs mois, de plusieurs jours en un moment et en un méme endroit, ce qu'on n'avoit jamais veu. On y voit aussi des tarifs bien comodes: ou sans avoir apris la division on y peut diviser jusqu'a trente mil livres. La reduction des monnoyes y'est d'une maniere particuliere. Le profit des marchands y est. Les changes y sont aussy, et les escontes a tant por cent. On y fait par la seule addition, les contributions, impositions et déspartements au sol la livre.

Year: 1671 Place: Paris Publisher: Barreme Edition: 1st (2nd issue) Language: French

Binding: contemporary calf; gilt spine

Pagination: pp. [32], 88, [102], 200–205, 217–240; xii Collation: $\pi^{7*4*5}2A-2B^6C-F^6G^8A-I^6M-N^6a^6$

Size: 159x85 mm

This second issue appears identical to the first except for the small changes on the title page and advertisement. The dedication and dedication ode to Monseigneur de la Reynie have also been removed. Perhaps the hoped-for patronage did not materialize.

Illustrations available: Title page and advertisement

B 102

Barreme, François Bertrand de (1640–1704)

Le livre necessaire à toute sorte de conditions. Inventé de nouveau pour tirer tout d'un coup les Intérêts de plusieurs années, de plusieurs mois, & de plusieurs jours en un moment et en un méme endroit, ce qu'on n'avoit jamais veu. On y voit aussi des tarifs bien comodes: ou sans avoir apres la division on y peut diviser jusqu'a trente mil livres. La réduction des monnoyes y'est d'une maniere particuliere. Le profit des marchands y est. Les changes y sont aussy, et les escontes à tant por cent. On y fait par la seule addition, les contributions, impositions et départements. Au sol la livre. (engraved title page similar to 1671 edition without date)

(Second title) Le livre necessaire pour les comptables, avocats, notaires, procureurs, negotians, & generalement à toute sorte de conditions, inventé de nouveau, pour tirer tout d'un coup les Interests ou le produit de plusieurs années, de plusieurs mois, & de plusieurs jours ...



Frontispiece and title page, B 101

Year: 1694 Place: Paris

Publisher: Denys Thierry

Edition: 2nd Language: French

Size: 170x94 mm

Figures: engraved title frontispiece

Binding: contemporary leather; dentelle edges

Pagination: pp. [14], 296 Collation: $\ddot{a}^7A^8B^4$ – $Z^82A^42B^4$

This is another of Barreme's publications, containing the same types of commercial tables as in earlier editions. Some of the tables are identical with those from earlier editions while others are different, though similar. In the year of this publication, Barreme was appointed auditor to the Parisian Chambre des Comptes (Treasury).

Illustrations available:

Frontispiece Title page

B 103 Barreme, François Bertrand de (1640–1704)

Les tarifs et comptes fait du grand commerce ou l'on y fait les changes d'Angleterre, d'Hollande, de Flandres, d'Allemagne, de Suisse &c. Pourveu qu'on sache l'addition et en quel estat que le change soit. Les mesures et les poids des principales villes de l'Europe sont reduis aux mesures et poids des villes de France. Le pair des monnoyes y est. Les escontes y sont tous faits. Les instructions pour faire par regle les susdits changes y sont expliquées brievement.

Year: 1670 Place: Paris Publisher: Barreme Edition: 1st Language: French

Binding: contemporary calf; gilt spine

Pagination: pp. [24], 62, [2], ff. lxii–lxvii, pp. [2], 63–80, [8], 81–96, 117–300, 361–395, 408–420

Collation: $\pi^2 a^6 e^4 A - E^6 F^2 F^{10} G - H^6 I^8 L - Z^6 \&^6 2 A^6 2 G - 2 K^6$ Size: 157×84 mm

This set of Barreme's tables is devoted mainly to the conversion of weights and measures between various French regions and surrounding geographic areas.

Illustrations available:

Title page and advertisement Tables for Rouen

B 104

[Barreme, François Bertrand de (1640–1704)] – Nicholas Barreme

Traité des parties doubles ou methode aisée pour apprendre à tenir en parties doubles les livres du commerce & des finances. Avec in traité de finance ... Ce livre peut estre utile aux négocians, aux banquiers, aux financiers, & même aux magistrats.

Year: 1721 Place: Paris

Publisher: Jean-Geofroy Nyon

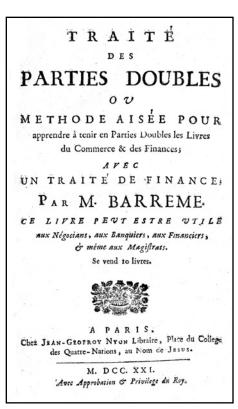
Edition: 1st

Language: French

Binding: contemporary leather; red leather label

Pagination: pp. [8], 302 Collation: $\pi^4A-2O^42P^3$ Size: 206x133 mm

Reference: Hist. HAL, p. 158; Kress CL, 3360







B 105

This is not another book of tables, but rather a volume describing double-entry bookkeeping and associated journals for commercial use. Issued in 1721, it must have been in preparation for some time because the examples are for the year 1719 with a few additions for 1720.

Illustrations available: Title page

B 105

Barreme, Gabriel (1663–1711)

Livre d'arithmetique de Monsieur G.D. Moreau secretaire de Monsieur Voisin cons.r du Roy par Moy G. Barreme arithmeticien ordinaire du Roy.

Year: 1688 Place: Paris

Edition: manuscript Language: French

Binding: contemporary leather; gilt spine and covers

Pagination: ff. 91 Size: 375x244 mm

Gabriel Barreme was the first son of François Bertrand Barreme. While the second son, Nicholas, continued his father's publishing enterprise, Gabriel became the Arithmetician to the King.

This large and elegant manuscript covers much of the same material as his father's books, i.e., the four basic operations, the rule of three, fractions, problems involving



Addition example, B 105

the calculation of interest, etc. It assumes knowledge of simple addition and begins with mixed radix addition of a column of French currency, which was then similar to the more familiar British sterling system.

Illustrations available:

Title page Addition example Division example

B 106

[Barreme, François Bertrand de (1640–1704)] – Nicholas Barreme

L'arithmetique du Sr Barreme ou le livre facile pour apprendre l'arithmetique de soi-même, & sans maître. Ouvrage tres necessaire a toute sorte de personnes: aux unes, pour apprendre l'arithmétique, & à ceux qui la sçavent, pour les aider à rappeler dans leur mémoire quantitié de regles qui s'oublient facilement, faute de pratique. Nouvelle edition, augmentée de plus 190 pages, ou regles differentes, de la géométrie, servant au mesurage & à l'arpentage, & du traité d'arithmétique nécessaire à l'arpentage & au toisé.

Year: 1736 Place: Paris

Publisher: Nyon, David, David, Didot

Edition: 3rd Language: French

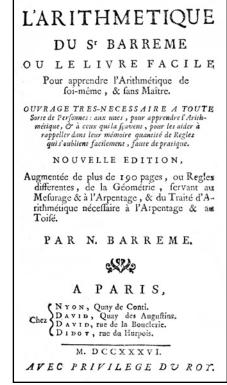
Figures: engraved frontispiece and book notice Binding: contemporary leather; spine gilt Pagination: pp. [4], [12], 492, [80]

Collation: $\pi^2 A^6 A - 3A^6 3B^4$

Size: 167x93 mm

After François Barreme died in 1704, his son Nicholas continued his father's business of publishing books of tables. This is the same work as *Le livre facile pour aprendre l'arithmetique de soy mesme et sans maistre par des methodes si courtes, si claires et si bien ordonnées qu'il ne s'en est point veu de pareilles, 1672.* Nicholas appears to have made his first additions to his father's work in 1706 but left the majority of the content unchanged (compare, for example, the illustration of the division example in the father's publication and this one).

Illustrations available: Title page Division example



B 106

Barreme, Nicholas, editor

See Barreme, François Bertrand de; Traité des parties doubles ou méthode aisée pour apprendre à tenir en parties doubles les livres du commerce & des finances.

B 107

Barrow, John (1764–1848)

A description of pocket and magazine cases of mathematical drawing instruments; in which is explained the use of each instrument, and particularly of the sector and plain scale, in the solution of a variety of problems; likewise, the description, construction, and use, of Gunter's scale.

Year: 1794 Place: London

Publisher: J. and W. Watkins

Edition: 1st Language: English

Figures: 4 engraved folding plates

Binding: modern boards Pagination: pp. viii, 128 Collation: A⁴B–I⁸ Size: 216x131 mm

Reference: Pogg Vol. I, p. 106; Hamb, DI, p. 47

Barrow is identified on the title page as a private teacher of mathematics in London, a notation that has led to E. G. R. Taylor (*Mathematical practitioners*) to ascribe the book to John Barrow (1700–c.1772), a mathematics teacher. In fact, the book was written by John Barrow, later Second Secretary of the Admiralty, who was from a poor family and was mainly self-educated. He is known to have repeated Benjamin Franklin's electrical experiments with a kite, and it is recorded that he gave a nasty electrical shock to a woman from the town who had come to see what he was doing. He was the first to ascend in a balloon in England, later travelling widely on expeditions to Greenland, China and South Africa.

This book was sponsored, as were many like it, by a commercial instrument maker to explain the elementary uses of mathematical instruments. The publisher, J. & W. Watkins, sold instruments, and the descriptions of many contain a phrase such as *On the Calipers made by Messrs. Watkins are contained the following Lines, Table, etc.* This book was his first publication, the likely result of his having used such instruments in his early surveying jobs.

The instruments described and pictured in engravings include the plane and proportional compass, protractor and plane scale, Gunter's line of numbers, the sector, Gunner's compass, etc. The engravings are very detailed except for the Gunner's compass, which, while showing a fine outline of the device, shows no detail of either the scales or the tables usually engraved on the arms.

Illustrations available:

Title page

Plate with plane scale, sector, gunner's compass etc.

Barsotti, Guiseppe, translator

See [Leibniz, Gottfried Wilhelm von] - M.

Lamprecht [Guiseppe Barsotti, translator]; Vita del Sig. Barone Goffredo Guglielmo di Leibnitz data in luce dal Signor Lamprecht in lingua Tedesca, e tradotta in lingua Italiana ..., 1787.

DESCRIPTION POCKET AND MAGAZINE CASES MATHEMATICAL DRAWING INSTRUMENTS; IN WHICH IS EXPLAINED THE USE OF EACH INSTRUMENT, AND PARTICULARLY OF THE SECTOR AND PLAIN SCALE, IN THE SOLUTION OF A VARIETY OF PROBLEMS: LIKEWISE, THE DESCRIPTION, CONSTRUCTION, AND USE, OF GUNTER'S SCALE. ILLUSTRATED WITH COPPER-PLATES. By J. BARROW. PRIVATE TRACHER OF THE MATHEMATICS. LONDON: Printed for J. and W. WATKINS, No. 5, Charing-Cross, Optical, Mathematical, and Philosophical, Inflrument Makers to their Royal Highnesses the Duke and Duchess of York, His Royal Highness the Duke of CLARENCE.

B 107

B 108

Barstow, D.

A secular diary for ascertaining any day of the week or month, in either the old or new style, commencing 1601, and continued up to the year 1900.

Year: 1836 Place: n/p Publisher: Barstow Edition: 1st Language: English

Binding: original paper boards

Pagination: broadside Size: 360x265 mm

This is a single sheet, folded into small covers 127x80 mm, giving tables to determine the day of the week or month for any given date from 1601 to 1900.

Illustrations available: Sheet (2)

B 109

Bartoli, Cosimo (1503–1572)

Del modo di misurare le distantie, le superficie, i corpi, le piante, le provincie, le prospettive & tutte le altre cose terrene, che possono occorrere a gli huomini ...



B 109



Cosimo Bartoli, B 109

Year: 1564 Place: Venice

Publisher: Francesco di Franceschi

Edition: 1st Language: Italian

Figures: two double-page figures plus many woodcuts in the

text

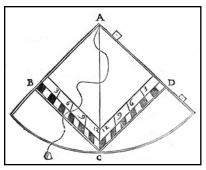
Binding: contemporary vellum; with ties renewed Pagination: ff. [4], 48, 45–48, 49–141, [3]

Collation: A⁴A-M⁴M⁴N-2N⁴ (Signature M repeated)

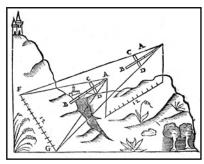
Size: 226x170 mm

Reference: Ricdi BMI I, p. 90

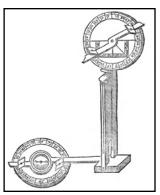
Cosimo Bartoli was an exponent of using Italian, rather than Latin, for technical writing. In this book on surveying, he essentially translates the earlier Latin works of others (e.g., **Oronce Fine**, **Alberti**, **Dürer** and **Gemma Frisius**), making them available to the average literate Italian. The border of the title page is copied from



Quadrant, B 109



Jacob's staff, B 109



Circumferentor, B 109

his 1550 translation of **Alberti**'s *De Re Aedificatoria* (not in this collection), but his portrait was done specifically for this one. The title page, portrait and all the woodcut illustrations were used for subsequent editions of this work.

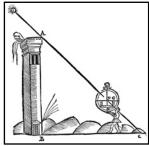
This well-known volume actually comprises six books, covering everything a surveyor should know about a variety of instruments. It begins with simple illustrations of the use of Jacob's Staff and a quadrant with shadow scales and progresses to the use of more complex instruments in a wide variety of applications. The second and third books cover practical applications of plane and solid geometry such as finding areas and volumes of irregular figures. Book 4 deals with cartography and is notable for a description of the use of the device called a *circumferentor*—an instrument combining a

compass and a sighting device for determining angles of elevation. Book 5 contains various proofs of geometric propositions that might be of use to a surveyor. The final book is a discussion of how to find square roots and a table of squares for all integers from 1 to 661.

The publisher is often known as Francesco Franseschi Sanese because he came from Siena. He is officially referred to as Francesco di Franseschi to differentiate him from Francesco Franceschi (without the *di*), who is Lucchese, from Lucca.

Illustrations available:

Title page
Portrait
Colophon
Quadrant with shadow scales
Jacob's Staff'
Astrolabe with shadow scales
Quadrant showing origins of shadow scales
Tables, page 1
Circumferentor



Astrolabe, B 109

B 110

Bartoli, Cosimo (1503–1572)

Del modo di misurare le distantie, le superficie, i corpi, le piante, le provincie, le prospettive & tutte le altre cose terrene, che possono occorrere a gli huomini.

Year: 1589 Place: Venice

Publisher: Francesco di Franceschi

Edition: 2nd Language: Italian

Figures: 2 folding plates plus many woodcuts in the text

Binding: later vellum Pagination: ff. 145, [3] Collation: A–S⁸T⁴ Size: 214x153 mm

Reference: Rcdi BMI, Vol. I, p. 90

The second edition of this early Italian work on surveying is, essentially, identical to the first edition of 1564. Two of the large folding plates appear to have been reengraved, but other illustrations are carried over from the first edition.

Illustrations available: Title page Colophon



B 110

B 111 **Barton, William J.**

Arithmeticke abreviated. Teaching the art of tennes or decimals to worke all questions in fractions as whole numbers, without reduction: An easier and plainer way than the vulgar. Shewing the use also of Napiers bones, by which multiplication and division is performed without charging the memory at all to those that will make use of them. As also the extracting of the square and cube roots, with divers applications thereof.

Year: 1634 Place: London

Publisher: James Boler and William Luggard

Edition: 1st Language: English

Binding: later half morocco over marbled paper boards

Pagination: pp. [8], 140, [2] Collation: A⁴B–K⁸(- K8 blank)

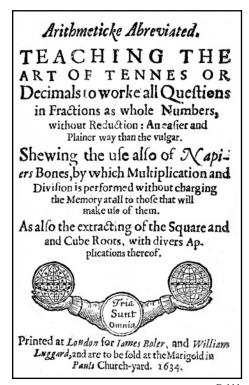
Size: 140x90 mm

This, published less than twenty years after **Napier**'s *Rhabdologia* (1617), is one of the first arithmetics to explain the use of **Napier**'s rods as a method for facilitating multiplication, division and extraction of roots. Although translations of **Napier**'s work had quickly appeared in German (1618), Italian (1623) and Dutch (1626), with the exception of a brief mention in an English almanac of 1618, the bones had only been described in English once before in J. Dansie's *A Mathematicall manuel*, London, 1627. Barton provides samples of Napier's bones and instructs his readers to either cut them out or make their

own. He indicates: if you make them in paste-board, you cannot have less than 15; that is, 3 set.

After describing the use of the bones, Barton continues with chapters on business topics such as calculating profit, loss and interest as well as how to calculate the value of a barter trade deal for each side. The final sections deal with simple estimates of the tonnage of a ship, the volume of a cask, measuring timber and an introduction to square and cube roots.

Illustrations available:
Title page
Pages describing Napier's bones



B 111

B 112

Bass, Michael T. (1799–1884)

Street music in the metropolis.

Year: 1864 Place: London Publisher: John Murray Edition: 1st

Language: English Binding: original cloth boards; spine and front cover gilt

Pagination: pp. viii, 120 Collation: A⁴B–H⁸I⁴ Size: 186x116 mm

Bass was head of Bass & Co., a brewery in Burton-on-Trent and a Member of Parliament from 1848 to his retirement in 1873. He seldom rose to speak but was

STREET MUSIC

IN THE

METROPOLIS.

CORRESPONDENCE AND OBSERVATIONS ON THE EXISTING LAW, AND PROPOSED AMENDMENTS.

BY

MICHAEL T. BASS, M.P.

LONDON:

JOHN MURRAY, ALBEMARLE STREET.

B 112

evidently very active and involved in other aspects of the job.

As **Charles Babbage** makes clear in his autobiography (**Babbage**, *Passages from the life of a philosopher*, 1864), he had little regard for street musicians. Michael Bass was the Member of Parliament who introduced a bill limiting this *nuisance* that was never adopted. This small volume is an attempt to rally support for the cause and details, among others, an incident in which Babbage was forced to bring one street musician to court.

Illustrations available: Title page

Bassentin, Jacques

See **Jacquinot, Dominique**; L'usage de l'astrolabe, avec un petit traicté de la sphere ... Plus est adiousté une amplification de l'usage de l'astrolabe, par Jacques Bassentin Escossis, 1573

B 113

Baudusson, M.

Le rapporteur exact, ou tables des cordes de chaque angle, depuis une minute jusqu'a cent quatre-vingts degrés pour un rayon de mille parties égales.

> Year: 1842 Place: Paris

Publisher: Bachelier Edition: 3rd Language: French

Figures: 1 engraved folding plate

Binding: contemporary leather; black leather label

Pagination: pp. xviii, 156, 6

Collation: 1–15⁶ Size: 136x81 mm

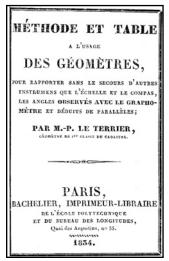
There are two works bound into this volume. The first, by Baudusson, is a trigonometric table based on the metric division of the circle—a new system that never found acceptance. The second table (from 1834) by **M. P. Le Terrier** is based on the old 360-degree division. Both men were evidently associated with the great Cadastre table project headed by **de Prony**.

Illustrations available:

Title page of Baudusson Title page of Le Terrier Sample page from Baudusson Sample page from Le Terrier



Baudusson title, B 113



Le Terrier title, B 113

B 114

Baum, Frank George (1870-)

An alternating current calculating device. For the use of electrical engineers.

Year: 1902

Place: Stanford, CA Publisher: Author Edition: 1st Language: English

Figures: with calculating device and advertising flyer Binding: original paper wrappers; front cover lacking

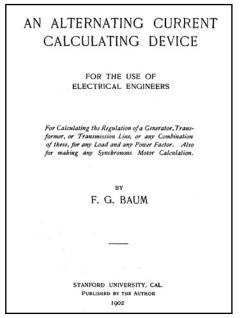
Pagination: pp. 22 Size: 173x130 mm

Rather than being a calculating device using alternating current, this is a nomogram with a plastic overlay for performing calculation on data involving alternating currents.

Illustrations available:

Title page

Nomogram (color)



B 114

B 115

Bauschinger, Julius (1860–1934) and **Johann Theodor Peters** (1869–1941)

Logarithmisch-trigonometrische Tafeln mit acht dezimalstellen enthaltend die Logarithmen aller Zahlen von 1 bis 200000 und die Logarithmen der trigonometrischen Funktionen für jede Sexagesimalsekunde des Quadranten.

Year: 1910–1911 Place: Leipzig

Publisher: Wilhelm Engelmann

Edition: 1st Language: German

Figures: v.1. 1 photographic plate

Binding: three-quarter red leather boards; gilt spine Pagination: 2 vols. v.1. pp. xx, 368; v.2. pp. 952

Collation: v.1. $\pi^{10}1-23^8$; v.2. $1-59^860^4$

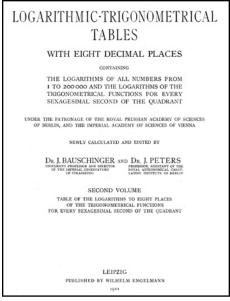
Size: 279x195 mm

Reference: Hend BTM, #197.0, p. 153; Zin GBAL, p. 87

At the time of this project, Julius Bauschinger had just left his position as Director of the Astronomical Research Institute in Berlin and had become Director of the Imperial Observatory at Strassburg. An important German astronomer, he appreciated the usefulness of logarithms to all branches of science. Johann Peters, a professor in the Royal Astronomical Calculating Institute in Berlin and an expert on methods of table production, was described by Archibald (see entry for Archibald, Mathematical Table Makers) as perhaps the greatest mathematical table maker of all time. Simultaneously with the start of hand calculation, they asked the engineer Hamann about the possibility of constructing a difference engine to help with the work. The resulting machine is illustrated in the frontispiece, and a description of its workings can be found in the first volume's preface.

These well-regarded tables were some of the first to be completely recalculated—most previously published tables having been based on those produced in the early 1600s by **Henry Briggs** and **Adriaan Vlacq**. The Royal Prussian Academy of Sciences and the Imperial Academy of Science of Vienna sponsored the work.

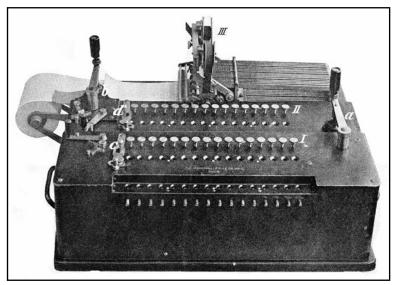
The work was published in two volumes—the first, containing logarithms of numbers, in 1910 and the second, logarithms of trigonometric functions, in 1911. The second volume, unlike the first, contains two title



Volume two title page, B 115

pages, one in German and one in English. The English title page was added to Volume 2 no doubt in order to capitalize upon the favorable reception of the first volume by extending its distribution to the British and American markets.

As can be seen in the illustrations of the tables, the authors used a typographical device similar to that of **Bagay** to indicate where the most significant digits of the logarithm changed. The mark is a small asterisk in Volume 1 but was changed to a larger one in the second volume. The change was made because the authors felt the smaller mark was not sufficiently visible (see illustrations of



Difference calculating machine, B 115

both the sample logarithm and trigonometric pages and compare this mark to the easily visible marks used by Bagay).

Illustrations available:

Title page
Calculating machine
Sample logarithm page
Sample trigonometric page
English title page in volume II

B 116

Baxandall, David (1874–1938)

Calculating machines and instruments. Catalogue of the collections in the Science Museum South Kensington with descriptive and historical notes and illustrations.

Year: 1926 Place: London Publisher: H. M. S. O. Edition: 1st

Language: English

Figures: 13 photographic plates on 11 leaves Binding: original printed paper wrappers

Pagination: pp. 85, [1] Size: 245x154 mm

Reference: Ran ODC, p. 406; Bax CMI, pp. 85

This is a catalog of the calculating machines and instruments in the London Science Museum. It covers everything from the abacus and exchequer tallies to harmonic analyzers. There is a small description of each machine and usually an indication of any significant improvements over earlier machines designed to perform the same process. The catalog was reprinted, with some minor changes to correct errors and slightly larger photographs, by the Science Museum in 1975.

Illustrations available: Title page

B 117

Baxter, James Phinney (1893–1975)

Scientists against time.

Year: 1946 Place: Boston

Publisher: Little, Brown

Edition: 1st
Language: English
Figures: 76 photolith plates

Binding: original cloth boards; with dust jacket

Pagination: pp.xvi,473, [1] Size: 213x138 mm

In 1943 **Vannevar Bush**, who wrote a foreword to this book, had asked Dr. James Baxter, president of Williams College (but the wartime deputy director of the Office

of Strategic Services) to write a history of the scientific accomplishments of the wartime scientists. This book is the result. The dust jacket describes this as

The revealing history of American scientists at war and the story of the death-dealing and lifesaving devices which they contributed to victory in World War II.

It covers everything from antibacterial drugs to guided bombs and the atomic bomb. Very little is said about calculation and, of course, nothing about code breaking.

Illustrations available:

Title page

NOUVELLE INVENTION D'ARITMETIQUE

DONT LUSAGE TRES-FACILE

fera connu à la premiere lecture de l'Infruction, & fera tout ce que l'Aritmetique vulgaire peut executer, foit Multiplications, Divilions, Reductions de Monnoye, Changes univerfels, Regles de trois, Extractions de Racines carrées, Toifez, & autres Calculs: Avea laquelle l'on peut faire en une heure de temps un Calcul qu'il feroit impossible de faire en une journée entiere par l'Aritmetique ordinaire.

Necessaire à tous Officiers d'Armées , Tresoriers , Payeurs , Financiers , Marchands, & àtoutes sories d'Ouvriers; bref , à toutes personnes.

Composée par le Sieur J. de Beaulieu l'Ancien, Mathematicien, Ingenieur & Cosmographe du Roy, & Expert Bourgeois, receu en Parlement pour la visite & estimation des Ouvrages dépendans des Bastimens; Lequel enseigne les Mathematiques ensa demeure, sur le Quay-Pelletier.



A PARIS,
Chez l'Auteur, Quay Pelleeier: Et à la Boutique de Gouet, fous le
petit CharnierS. Innocent, du coffé de la ruë S. Denis.

M. DC. LXXVII.

AVEC PRIVILEGE DV ROY.

B 118

B 118

Beaulieu, Jean de

Nouvelle invention d'arithmetique dont l'usage tres facile sera connu à la premiere lecture de l'instruction, & sera tout ce que l'aritmetique vulgaire peut executer, soit multiplications, divisions, reductions de monnoye, changes universels, regles de trois, extractions de racines carrées, toisez, & autres calculs: avec laquelle l'on peut faire en une heure de temps un calcul seroit impossible de faire en une journée entiere par l'arithmetique ordinaire. Necessaire à tous Officiers d'armées, tresoriers, payeurs, financiers, marchands, & à toutes sortes d'ouvriers; bref, à toutes personnes.

Year: 1677 Place: Paris

Publisher: Chez l'Auteur

Edition: 1st Language: French

Figures: 7 double-page engraved tables Binding: contemporary marbled paper wrappers

Pagination: pp. 8 Collation: A⁴ Size: 251x190 mm

Reference: H&J AM, Vol. II, B 13.4, p. 60

Jean de Beaulieu held the position of *Ingénieur géographe du Roi* at La Rochelle. This is a multiplication table, in several sheets, of all numbers up to 210 x 100. A final sheet gives the decimal equivalent of fractions. It is interesting that despite the fact the decimal point had been in use since the early 1600s, this decimal table still relies on the old form of notation with accents (5' corresponds to 0.5; 25" to 0.25; 6666⁴ to 0.6666, etc.)

Illustrations available:

Title page

First page of multiplication table (portion)

Decimal fraction table (portion)

TARIF des Fractions premieres jusqu							
2/	3333	6666	25"	347"	3	34	3 6
416666	₹83333 ₹83333	916666	76923	13846 13846	3 230769	307692	384615
23/294	294118	35294	411765	18 470388	17 12941	1 <u>6</u> 188236	647
35	45	35 "	265"	285	20 "	4762	27 4 9124
47826	23 5 52174	161217	608676	23 632173	23 695052	73913	78261
23 %	38462		192307	26923	26 6 346134	2 ¹¹ 6 6 423077	26 176923
507143	28 6 678471	21 28 7'	822420	28 892837	27 964286	34483	29 66
35 6333333 13	306667	966667	32258	64516	96774	3t 6 129032	316129
32 3	46875	33125	39375	33 63623	371875	78125	32 84373

Decimal fraction table, B 118

B 119 **Beausard, Pierre** (1536–1577) et al.

Annuli astronomici, instrumenti cum certissimi, tùm commodissimi, usus, ex variis authoribus, Petro Beausardo, Gemma Frisio, Joãne Dryandro, Boneto Hebraeo, Burchardo Mythobio, Orontio Finaeo, una cum meteoroscopio per Joãné Regiomontanum, & annulo non universali M.T. authore.

Year: 1558 Place: Paris

Publisher: G. Cavellat

Edition: 1st (Collected, 2nd issue)

Language: Latin Binding: modern vellum

Pagination: ff. 8, 159, [1] (i.e. ff. 103v-117)

Collation: A⁸a–v⁸ Size: 162x106 mm

Reference: H&L, #2589, p. 588; Cro CL, #62, p. 76

Beausard, the editor of this work, was a professor of medicine and mathematics at the University of Louvain.

The introduction describes elementary notions of astronomy and the shadow scales on an astrolabe. This is followed by seven different works on the *annulus*, also known as the astronomical ring. The instruments are mainly ring sundials, but some are also elementary survey instruments. Detailed descriptions of the contents of each work are given in the individual entries. Many of these items were previously published in a work by **Dryander**.

See

- Boneto, Hebræo, or Bonetus, de Latus; Annuli astronomici utilitatu[m] liber ad Alexandrum sextu[m] Po[n]tifice[m]) maximum, 1558, Paris.
- 2. **Dryander, Johann**; Annulorum trium diversi generis instrumentorum astronomicoru[m] co[m]-pone[n]di ratio usus, atque cu[m] quibusda aliis lectu iucu[m]dissimis, quoru[m] catalogum mox versa pagella indicabit, 1558, Paris.
- 3. **Fine, Oronce**; *Compendiaria tractatio de fabrica* & usu annuli astronomici, 1558, Paris.
- Gemma Frisius, Reiner; Usus annuli astronomici, 1558, Paris.
- 5. **M.T.**; Compositio alterius annuli astronomici non universalis, sed add certam polarem elevationem instructi authore, 1558, Paris.
- 6. **Mithob, Burchard**; Structura et usus annuli sphærici, 1558, Paris.
- 7. **Regiomontanus, Johannes**; Ad Bessarionem Cardinalem Nicenum ad Patriarcham Constantinopolitanum: De compositione meteoroscopi, 1558, Paris.

B 120

Becmann, Gustav Bernhard (1720–1783) and **David Heinrich Becmann**

Fratrum Becmannorum. Tractatio mathematicojuridica de interusurio ...

> Year: 1784 Place: Goettingen

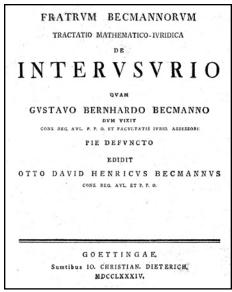
Publisher: Io. Christian Dieterich

Edition: 1st Language: Latin

Binding: modern paper boards Pagination: pp. [4], 108 Collation:)(²A–N⁴O²

Size: 211x160 mm

Gustav Becmann was a professor at Göttingen and was known for his writings on legal and financial concerns in tax and legacies. This work appeared a year after he died.



B 120

The final process of seeing it through the press was done by his younger brother.

While Becmann and his brother are known to have published other works on law, this book on the calculation and legal aspects of interest is not known in any other collection. It includes a discussion of both simple and compound interest as well as tables and formulas for calculating and the use of logarithms.

Illustrations available: Title page Interest table

B 121

Bede Venerabilis (672/3–735)

De computo per gestum digitorum. Idem de loquela. Idem de ratione unciarum.

b/w: **Probus, Marcus Valerius**; *De notis Romanor[um] ex codice manuscripto castigatior, auctiorque, quam unquam antea, factus.*

b/w: **Petrus, Deacon**; *De eadem re ad conradum primum imp. Ro[manorum]*.

b/w: **Alabaldus, Demetrius**; *De minutiis. Idem de ponderibus. Idem de mensuris.*

b/w: Leges XII tabularum, leges pontificiæ
Ro[manorum]. Variæ verborum conceptiones,
quibus antiqui cuz in rebus sacris, tum prophanis
uterentur, sub titulo de Ritibus Romanorum
collectæ. Phlegontis Trallani epistola de moribus
Ægytiorum. Aureliani Cæsaris epistola de officio
tribuni militum. Iscriptiones antiquæ variis in
locis repertæ, atq[ue] aliæ, q[uam] quae in

Romano codice continentur. Hæc omnia nunc primum edita.

Year: 1525 Place: Venice

Publisher: Joh. Tacuino Edition: 1st Language: Latin

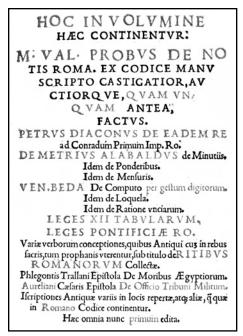
Figures: main title in red and black

Binding: stamped vellum over wooden boards

Pagination: ff. [4], XXIIII Collation: a⁴A–C⁸ Size: 218x149 mm

Reference: Ada CBCE, P2122; Smi Rara, p. 140

The Venerable Bede (Beda) was an English monk who spent his entire life (from the age of 7) in a monastery near what is now Newcastle upon Tyne. Although he never traveled more than fifty miles from his base, he became one of the great scholars of his day and wrote extensively on every major subject, even writing a tourist guide to sites in the Holy Land and other places. Bede's monastery seems to have been the gathering place for many. It attracted people from around Europe, Ireland and even North Africa, all of whom added to the rich resources available to Bede.



Volume title page, B 121

VENETIIS, IN ÆDIBVS IOANNIS

TACVINI TRIDINENSIS.

MENSE FEBRVARIO.

M. D. X X V.

REGISTRVM.

A B C D E F G H I K L

Onnersunt Quaterni, præter K, quielt

Duernus. & L Ternus.

Colophon, B 121

VENERABILIS BEDÆ PRESBYTE RITRACTATVS DE COMPVA TO, VEL LOQ VELA PER GESTVM DIGI/ TORVM.



E TEMPORVM Ratione, Do mino iuuante, dicturi necessariu3 duxi/ mus, vtiliflimā primo, pmptiffimam' q. flexus digitor paucis præmonstrare so lertiamovt, cum maximā computādi sa cultatem dederimus, tum proptiores le gentium ingenioad inuestigadam, dilu

cidandam'q, computando seriem tempose ueniamus. Neq. enim conténenda, paruipédenda quest Regula, cuius omnes pene Sacræ expolitores Scripturæ nó minus, q literare figuras monstratur amplexi. Denig & multi alii alias, & ipse Diuinæ interpres Historia Hieronymus in Euangelica tractatu sen/ tentiæ huius adiumétum disciplinæ non dubitauit assumere. Cételimus inquit, & Sexagelimus, & Trigelimus fructus, qq de vna tera, & de vna seméte nascatur, tri multum'differt in nu mero. Triginta referutur ad Nuptias, nam & ipía digitor co/ iunctio quali molli osculo coplexans se,& foederans,maritus pingit,& coniugem. Sexaginta vero ad Viduas,eo quin angu stia,& tribulatione funt positævnde & superiori digito depri muntur. Quato quaior est difficultas expertæquondamvo luptatis illecebris abitinere, tanto maius est præmium. Porro' Centesimus numerus (diligenter qualo lector attende) de siv

Computo title page, B 121

Bede documented the medieval form of hand gestures known as finger numerals, and his is the first printed record we have of them. Bede's description is short and contains no diagrams. It simply lists the finger positions used to represent integers from 1–9,999 and adds a very short remark on the Greek alphabetic number system. The work is bound with different works by Bede and others (see the title page).

For a succinct discussion of Bede finger reckoning, see Sachiko Kusukawa, A manual computer for reckoning time, In Claire Richter Sherman, Writing on hands. Memory and knowledge in early modern Europe. University of Washington Press, Seattle, 2000, pp. 28-34.

Illustrations available:

Title page of the entire volume Title page of the computo

Four pages of text of the computo (in three images)

Colophon

B 122

Bede Venerabilis (672/3-735)

De natura rerum et temporum rationes. Libri duo. Nunc recens inventi, & in lucem editi.

Year: 1529 Place: Basel

Publisher: Henricus Petrus Edition: 1st (two texts together)

Language: Latin Figures: 16 plates

BEDAE ANGLO

E natura recum, & ration temporum, duos quondam firico fermone libellos difeenibus, ut rebar, necellirios compofui:
Quos cum frantibus quibuldi dare acq exponere coupillem, dechart os breuis multos digefos effe quaim uellent, maxime libellos difeenibus. Cuius propertarionem Pafcha potus utelebar urfus findigere: Quadoleta firmi, la finis aliqua de teloporum trans, curfu, ac fine dillerere. Quibus concitus, parens, praspectis patri uenerabilum feripis, prolixisorem detemporubus librum edidi, pro ut iplo lar gice potus, qui acerus permanens, spora quando uoluit colituit, & quino utempori innessimo ipie labenatibus rempori curicula finic fum uoluenti monet. In quo utdelicet opere, ne que forte offenderet, o phebraica magis uerita suteria fini: & illam quoep per omnia quotice diferepare utdebatur inferul, sut legens temporum et quiffi finiul uturung configica, & quo quambu uolunti refuel, prace denis ferie fectus situate patria in fini: & illam quoep per omnia quotice diferepare utdebatur inferul, sut legens temporum et quiffi finiul uturung configica, & quo quambu lo prudentii redarguenda autumo, utf. V. XX. fea cutreuterendifinius estudich herbarica ventratista interpres obrecatoribus fui ope guenda.

37 rist non damno, inquit, non reprehendo L. XX., fed omnibus hija Apoftolos su pareno: la Reco cofidenter profiteor, quiam ore prehendo uteres Chrono.

38 graphos: qui translationi L. XX. interpreti modo fecuti effe, modo pro utilibustirophis un translationi L. XX. interpreti modo fecuti effe, modo pro utilibustirophis un translationi L. XX. interpreti modo fecuti effe, modo pro utilibustirophis montrabit, fed omnibus hija hebraica curiatis integri prafero purinate, quam praeminentilimi dodotoni, Hiconopumas in historia belavaria quarditioni, Augu fitnus in libro De ciutare del. Eufebus și fe Chronographus in tertio historie Eccle falficie, kibro, exuerbis folephilificrici adurtus in Apono grammatică feribentis, breuior temporuleriem qulam in L. XX. editione uulgo ferur coii neri coprobanti Necpha ne amplius equend

Bede first page, B 122

FINIS. BASILEAE EXCVDEBAT HENRICVS PETRVS, MENSE MARTIO, AN M. D. XXIX

Colophon, B 122

Binding: later quarter vellum heavy paper boards

Pagination: ff. [16], 74 Collation: å6β6ð4a-l6m8 Size: 279x194 mm

Reference: Smi Rara, p. 159; Sart Vol. I, pp. 510-11; DSB I, pp. 564-66; Smi HM II, p. 200; Zin GBAL, #1374

This volume, like the 1525 work mentioned above, is composed of a number of different works. Bede's De computu digitorum is the same, very short, work previously described. The one obvious difference is that a more complete list of the Greek alphabetic number symbols is given.

Illustrations available:

Main title page

Title page of Bede's De natura rerum

Complete text (in two images) of Computu digitorum

Colophon

B 123

Bede Venerabilis (672/3–735)

Opuscula cumplura de temporum ratione diligenter castigata: atque illustrata veteribus quibusdam annotationibus una cum scholiis in obscuriores aliquot locos, authore Johanne Noviomago.

b/w: Anselm, In omnes Pauli ...

Year: 1537 Place: Cologne

Publisher: Johannes Prael for P. Quentel

Edition: 1st (collected) Language: Latin

Binding: Flemish blindstamped over wooden boards, rolls of medallion heads and foliage forming a double panel;

clasps and catches; corner bosses

Pagination: ff. [14], 18, [6], 30 (misnumbered 19 as 21, 24 as 20), XXXI–CXXVI (misnumbered 35 as 25, 37 as 27, 38 as 138, 45 as 46, 53 as 46, 54 as 49, 60 as 54, 78 as 76). [4]

Collation: A⁴B⁶C⁴D-G⁶a-x⁶y⁴

Size: 310x200 mm

Reference: Ada *CBCE*, #A1174; Zin *GBAL*, #1657; Smi *Rara*, p. 159; Ada *CBCE*, #B448

This edition of Bede's work on finger numerals (*De computu*) is identical to that appearing in the 1529 edition. After this very short section, the rest of the volume contains works by Bede on arithmetic, astronomy, the calendar and chronology.

Illustrations available:

Title page for the volume (Anselm title page)
Title page for Bede's work
Complete text of De computu in two images
Colophon of Bede's work

Bede Venerabilis (672/3–735)

See Artabasda, Nicolaus of Smyrna; Græci

Mathematici $EK\Phi PA\Sigma IC$ numerorum notationis per gestum digitorum, 1614.



B 123



Bede title page, B 123

B 124

Bedwell, William (1561–1632), translator and editor

De numeris geometricis. Of the nature and proprieties of geometricall numbers. First written by Lazarus Schonerus, and now Englished, enlarged and illustrated with divers and sundry tables and observations concerning the measuring of plaines and solids; all teaching the fabricke, demonstration and use of a singular instrument, or rular, long since invented and perfitted by Thomas Bedwell Esquire.

b/w: **Digges, Leonard**; *Tectonicon: briefly shewing* the exact measuring, and speedy reckoning all manner of land, squares, timber, stone, steeples, pillers, globes, &c.

Year: 1614 Place: London

Publisher: Richard Field

Edition: 1st Language: English

Figures: 1 large letterpress folding table

Binding: modern vellum Pagination: pp. [viii], 82 Collation: A–L⁴M¹ Size: 179x131 mm

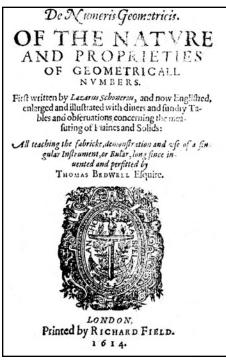
Often considered the first English translation of Lazarus Schoner's treatise on the Greek theory of numbers (first published as an appendix to his edition of **Peter Ramus**, *Arithmetices libri duo*, Frankfurt, 1586), in fact it is an enlarged, and rewritten, version of this material rather than a translation. Bedwell's motive was to provide a basis for the explanation of the use of the *trigonicum*, which was a ruler invented by his uncle, Thomas Bedwell, about forty years earlier. This ruler was similar to instruments

described by **Digges** in the other work bound in this volume. The first chapter considers geometrical numbers in general (he makes a point of not calling them *figurate* or *cossick* numbers, which would have been the more common terminology) and chapters 2 and 4 deal with square and cubic numbers. Chapters 3 and 5 are the practical application of these ideas in the measurement of cloth, painting, wainscoting, timber, etc.

In the preface Bedwell indicates that he would publish more on his uncle's ruler, a promise he kept with his *Mesolabium architectonicum* of 1631 (see Addenda).

Illustrations available:

Title page



B 124

B 125 Beebe, Levi N.

First steps among figures. A drill book in the fundamental rules of arithmetic. Teachers' edition.

b/w: **Beebe, Levi N.**; First steps among figures. A drill book in the fundamental rules of arithmetic. Pupils' edition.

Year: 1883

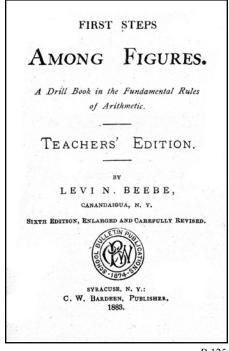
Place: Syracuse, NY Publisher: C. W. Bardeen

Edition: 6th Language: English

Binding: original cloth boards; stamped in black ink on spine and front cover; rear cover blind stamped and water stained Pagination: pp. 192, 140 Size: 162x110 mm

These two works illustrate the teaching of arithmetic in the United States during the last portion of the nineteenth century. The teacher's edition gives detailed instructions as to exactly what should be taught and suggestions (e.g., "Teach in counting that the second of two things is not itself *two*, but *one*") as to where misunderstandings might occur. The work is full of drill exercises and arithmetical word problems. The teacher's edition contains the answers to all the drill problems in the pupil's edition.

Illustrations available: Title page



B 125

B 126

Beghin, Auguste

Règle a calculs. Instruction - application numériques - tables et formules.

Year: 1904 Place: Paris

Publisher: Chez Béranger and Tavernier-Gravet

Edition: 3rd Language: French Figures: 135 in text

Binding: original paper wrappers Pagination: pp. xi, [1], 127, [1]

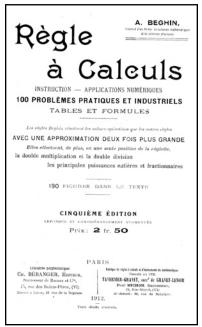
Collation: π^61-8^8 Size: 254x168 mm

Beghin is known as the person who first designed a slide rule with a displaced scale—where the indices are not

at the ends of the scale but near the middle, a situation that lessens the amount the slide has to move in many calculations.

This is a large work on the use of a special slide rule created by Auguste Beghin in 1898. The instructions are illustrated with seventy-four problems and 135 figures.

Illustrations available: Title page



B 127

B 127

Beghin, Auguste

Règle à calculs. Instruction - application numériques. 100 problèmes pratiques et industriels. Tables et formules.

Year: 1912 Place: Paris

Publisher: Chez Béranger and Tavernier-Gravet

Edition: 5th Language: French Figures: 190 in text

Binding: original paper wrappers; unopened

Pagination: pp. x, 185, [5] Collation: $\pi^51-11^812^7$ Size: 255x166 mm

An expanded edition of the instructional manual by Beghin on the use of his slide rule—this edition claims to have 190 figures, almost all of which are simple line drawings.

Illustrations available: Title page B 128

Bell, Eric Temple (1883–1960)

The development of mathematics.

Year: 1945 Place: New York Publisher: McGraw-Hill

Edition: 2nd Language: English

Binding: original cloth boards; with dust jacket

Pagination: pp. xii, 638 Size: 228x150 mm

A native of Aberdeen, Scotland, Eric Temple Bell first attended the University of London before moving to the United States, where he earned his A.B. degree in 1904 at Stanford University. He later received an A.M. degree at Washington University and a Ph.D. at Columbia. After beginning as an instructor in the mathematics department at Washington, he rose to become a full professor and then left to take a professorship at the California Institute of Technology. He was extensively involved with scientific associations, serving as president of the Mathematical Association of America and vice president of the American Association for the Advancement of Science. Well known as a writer of technical mathematical papers, he was also a successful popularizer through his writings on historical aspects of mathematics. While accessible to the interested amateur, his historical writings remain a significant source for the professional historian.

Organized by subject rather than by time, this history of mathematics begins with the concept of proof and its place in mathematics and ends with the development of statistics.

Illustrations available: Title page

B 129

Bell, Eric Temple (1883–1960)

The magic of numbers.

Year: 1946 Place: New York Publisher: McGraw-Hill Edition: 1st

Language: English

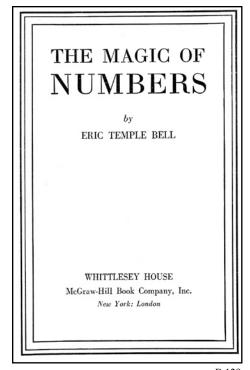
Figures: photograph frontispiece Binding: original cloth boards; with dust jacket

Pagination: pp. viii, [2], 418 Size: 202x137 mm

This volume covers the development of the concepts of numbers. Bell starts from Pythagoras and leads up to the

realm of physics via set theory and other branches of

mathematics.



B 129

Illustrations available:

Title page

B 130

Bell, Eric Temple (1883–1960)

Mathematics. Queen and servant of science.

Year: 1952 Place: London Publisher: Bell Edition: 1st (English) Language: English

Binding: original cloth boards; with dust Jacket

Pagination: pp. xx, [2], 437, [1]

Size: 202x138

A history of pure and applied mathematics.

Illustrations available: Title page

B 131

Bell, Eric Temple (1883–1960)

Men of mathematics.

Year: 1937 Place: New York

Publisher: Simon and Schuster

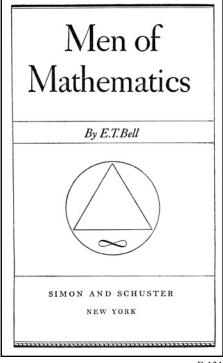
Edition: 1st

Language: English

Binding: original cloth boards; with dust jacket

Pagination: pp. xviii, 3–592, [2]

Size: 231x151 mm



B 131

This volume describes the lives of the great mathematicians. Organized chronologically, Bell begins with Zeno and ends with Cantor.

Illustrations available: Title page

B 132

Bell, John Fred (1898-)

A history of economic thought.

Year: 1953 Place: New York Publisher: Ronald Edition: 1st Language: English

Binding: original cloth boards; with dust jacket

Pagination: pp. x, 696 Size: 228x145

A history of economics from ancient times to the early twentieth century.

Illustrations available: Title page

B 133

Bell, T. F.

Jacquard weaving and designing.

Year: 1895 Place: London



B 133

Publisher: Longmans, Green and Co.

Edition: 1st Language: English

Binding: original cloth boards Pagination: pp. viii, 303, [1]

Collation: A⁴B–U⁸ Size: 213x136 mm

The design and operations of the Jacquard loom and its variants are described herein, as well as the manner in which they are set up to produce weavings of various kinds.

Joseph Marie Jacquard (1752–1834) was a mechanic in Lyons who had invented a machine for weaving fishing nets. He appears to have begun experiments on improving ordinary weaving looms about 1790—a model of a machine of this date is in the Conservatoire des Arts et Métier in Paris, but it is not a Jacquard loom as we know it today. About 1804, he was brought to Paris to repair Vaucanson's loom (an earlier punched tape version of the automatic loom), and it seems that his attention was drawn to the potential of this technology at that time. Jacquard's birth name was Joseph Marie Charles—the extended family had nicknames for each branch, and he adopted the nickname Jacquard as his formal surname.

Illustrations available: Title page

B 134

Belli, Silvio Vicentin (-1575)

Libro del misurar con la vista Nel quale s'insegna, senza trauagliar con numeri, a misurar facilissimamente le distantie, l'altezze, e le profondità con il quadrato geometrico, e con altri stromenti, de'



B 134

quali in ogni luogo quasi in un subito si puo prouedere. Si mostra ancora una bellissima uia di ritrouare la profondità di qual si uoglia mare; & un modo industrioso di misurar il circuito di tutta la terra.

> Year: 1565 Place: Venice

Publisher: Giordano Ziletti

Edition: 1st Language: Italian

Figures: 54 woodcut diagrams in text Binding: 18th-century Italian paper boards

Pagination: pp. [8], 108 Collation: *⁴A–N⁴O² Size: 194x140 mm

Reference: Rcdi BMI Vol. I, p. 107; Kie SI, p. 116

Belli taught mathematics in Vicenza and was a founding member of the Accademia Olimpica in 1555. He later became an architect, practicing in Ferrara, Modena, Rome and Venice.

His work on surveying was very popular and had at least six editions in the sixteenth century. It was later combined with another of Belli's works (*Della Proportione*, 1573) and published as *Quattro libri giometici* in 1595.

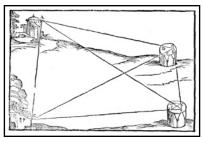
In this book Belli deals mainly with simple survey problems for which rough estimates of distances and heights suffice and describes the use of a geometrical square with a sighting vane. He gives many examples of estimating the solution to a problem by creating scale drawings on drumheads (essentially using them as a plane table), improvising survey instruments from a pair of sticks and even estimating distances using the

peak of the surveyor's cap, all methods that would have been quite useful in military campaigns or emergency situations.

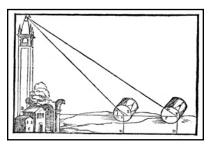
The final chapters discuss means for measuring the depths of the oceans and finding the circumference of the earth.

Illustrations available:

Title page Geometric square and sight Estimating using the peak of a cap Drumhead surveying Drumhead and geometric square surveying



Drumhead surveying, B 134



Drumhead surveying, B 134

Beman, Wooster Woodruff (1850–1922) and David Eugene Smith (1860–1944)

See Fink, Karl; A brief history of mathematics, 1910

B 135

Benese, Richard de (fl.1537–1547)

The boke of measurying of lande as well of woodland as plowland, & pasture in the feelde; & to compt the true nombre of acres of the same ...

Year: ca.1565 Place: London

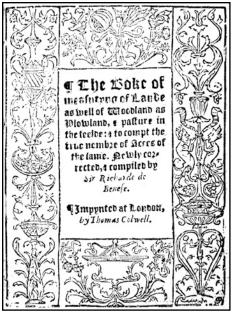
Publisher: Thomas Colwell

Edition: 4th Language: English

Binding: Straight grained green morocco by W. Pratt for F. S. Ellis; marbled end papers; gilt edges; gilt tooled spine

Pagination: ff. [56] Collation: A–G⁸ Size: 140x92 mm

Reference: Win ESTC, 1876; Hymn AC, #277; Ken, #1457



B 135

Benese (sometimes de Benese) was the author of the first book on surveying in English. He was Canon of the Augustinian priory of Merton and was forced to surrender it to Henry VIII upon the dissolution of the monasteries in 1538. Nevertheless, his career prospered, for his expertise led to his appointment as Surveyor of Works at Hampton Court and Chaplain to Henry VIII.

This very simple book on surveying practices was first published around 1537. It remained the standard work on the subject in the English language for almost forty years, this fourth edition being the last. The demise of serfdom in England, and the rise of individual land ownership, spurred interest in and the development of surveying techniques. This little work was timely and popular in its day because survey techniques were little known, and unscrupulous sellers would often overstate the amount of land being sold.

Earlier editions of this book contain tables (evidently the first ever printed in English) relating lengths in perches of the sides of rectangular fields to the area they contain in acres. This edition contains a table that relates money to area, as Benese explains:

By cause in coumptyng of money it is not muche used to compte anye summes in markes, but most comomlye in poudes. Thefore because Marks do sygnyfye acres in comptynge the measures of lande, & poundes be no lyghtly turned into Markes by them that bee not experte in reakenynge, and castyng of a compt. Therefore in these sumes folowyine ye shall se pence turned

into perches grotes turned into dayeworkes. xl.d into a roode, a noble into di. acre, a Royal into .iii. roodes: a marke into an acre, & poundes turned into Markes, the which there be name acres.

A short section at the end discusses how *To measure Tymber or Stone, in length, breadth and depthe by the foote square.*

Like many other books of this era, for example, the illustration of Ptolemy in **Gregor Reisch**'s *Margarita philosophica* (of which the woodcut in this volume is only a crude copy), this work continues the suggestion that Ptolemy was the inventor of the quadrant (see illustration of the goddess of astronomy showing Ptolemy how to use a crude quadrant). It also continues the error that Ptolemy was a king of Egypt (note the crown and royal robes). The old typeface and random spelling make this a quite interesting book.

Illustrations available:

Title page Ptolemy Table



Ptolemy, B 135

B 136

Bennett, Wendell Clark (1905–1953)

Numbers, measures, weights and calendars.

Year: 1949

Place: Washington, D.C.

Publisher: Smithsonian Institution U.S.G.P.O.

Edition: Extract Language: English

Binding: original printed paper wrappers

Pagination: pp. [2], 601–610

Size: 242x154 mm

This small extract was originally published in the *Smithsonian Institution, Bureau of American Ethnology, Bulletin 143, Handbook of South American Indians Vol. 5, pp. 601–610.* It briefly describes number systems,

weights and measures, and calendar systems of major native groups in South America.

Illustrations available: Title page

B 137

Berkeley, Edmund Callis (1909–1988)

Circuit algebra - introduction.

Year: 1952 Place: New York

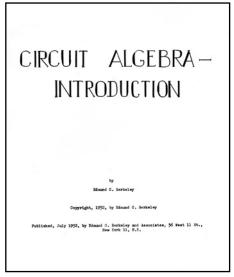
Publisher: Edmund C. Berkeley Associates

Edition: 1st

Language: English Figures: 24 figures in text Binding: original paper wrappers Pagination: pp. [1], i, 34

Size: 280x216 mm

Berkeley, a native of New York, graduated with an A.B. summa cum laude in mathematics from Harvard in 1930, entered the computer field in 1938 as an actuary using punched card machines for the Prudential Insurance Company of America, and worked with Howard Aiken during the war as an active-duty naval reserve officer. After the war, he returned briefly to Prudential, where he participated in studies that led to the purchase of a UNIVAC I. In 1947, a meeting to which he invited seven friends resulted in the establishment of the Association for Computing Machinery, better known as the ACM. Berkeley was the first member and acted as secretary until 1953. He went into business for himself as Edmund C. Berkeley and Associates in 1948 (later Berkeley Enterprises), started a publication known as Computers and Automation in 1951, consulted for industry, and



B 137

devised and sold several relay computers and small robots (Simon, Squee, Relay Moe, etc.) as educational projects in kit form.

This work covers Boolean algebra and how it can be used to describe circuits composed of tubes, relays, delay lines and other devices.

Illustrations available: Title page

B 138

[Berkeley, Edmund Callis (1909–1988)]

Geniacs: Simple electronic brain machines, and how to make them. Also: manual for Geniac electric brain construction kit No. 1.

Year: 1955 Place: New Haven Publisher: Oliver Garfield Edition: 1st Language: English Binding: original paper wrappers Pagination: pp. 64

Size: 215x140 mm

In 1950, Berkeley Associates produced a small educational computer known as Simon intended to teach the basic principles of switching circuits. Because the parts for Simon cost \$300, it was decided to market it as a kit. This report is the manual for the resulting Geniac kit, which by 1955 sold for only \$20. With it you could produce a number of ultra-simple devices ranging from a doorbell to a machine for converting from binary to decimal. The introduction states that

We have had great help from several outstanding computer men in the design of about one third of the Geniac circuits ... and regret that they feel they have to remain anonymous.

Illustrations available: Cover page

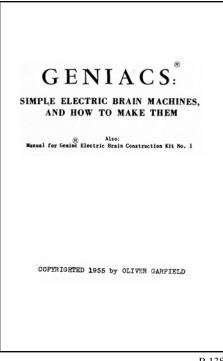
Berkeley, Edmund Callis (1909–1988)

Giant brains or machines that think.

Year: 1949 Place: New York Publisher: John Wiley Edition: 1st Language: English

Binding: original cloth boards; with dust jacket

Pagination: pp. xvi, 270 Size: 212x138 mm Reference: Ran ODC, p. 407



B 138

This volume was one of the first to popularize computers and was a major reason for the association of brain with computer. It covers all the major machines of those years (differential analyzers, punched card machines, Aiken's machines, Bell Labs machines, ENIAC, etc.) and speculates on what the future would bring. The book was overly optimistic as to exactly what computers would shortly be able to accomplish, but Berkeley insisted all his life that he was correct and that it just would take a little longer. He published fourteen other books and continued to publish his Computers and Automation (later renamed Computers and People) until his death.

In later life Berkeley became more interested in people and anti-nuclear causes. Portents of this shift in interests can be seen from the fact that the last chapters of this book are devoted to social issues. In 1972, ACM honored Berkeley as its founder at its 25th Anniversary Dinner. His acceptance speech was a direct denunciation of those in computing who worked on the killing devices used in the Vietnam war, of computing companies that built such horrors, and of ACM for ignoring this immorality. He said that it was a gross neglect of responsibility that ACM was not investigating whether computer applications were good or evil and how computers could be used to increase the good of society. Several prominent ACM members, employees of the firms and government agencies that Berkeley had identified, ostentatiously walked out of the banquet room while he was speaking. The leaders of ACM were embarrassed by their honoree, and the ACM never publicly referred to the incident in any way.

This copy is inscribed by the author to Erwin Tomash. A second copy of this work is available in the collection.

Illustrations available:

Title page Inscription

GIANT BRAINS

OR

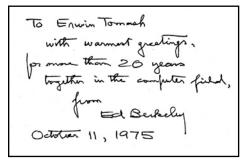
MACHINES THAT THINK

EDMUND CALLIS BERKELEY

Consultant in Modern Technology President, E. C. Berkeley and Associates

JOHN WILEY & SONS, INC., NEW YORK CHAPMAN & HALL, LIMITED, LONDON

B 139



Inscription, B 139

B 140

Bernard, **Edward** (1638–1696)

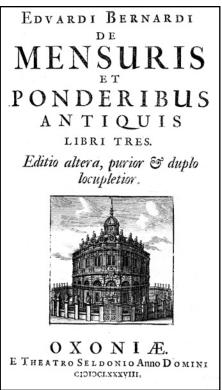
De mensuris et ponderibus antiquis libri tres. Editio altera, purior et duplo locupletior.

Year: 1688 Place: Oxford

Publisher: Sheldonian Theatre

Edition: 1st Language: Latin Figures: 3 folding plates

Binding: 18th-century olive morocco; gilt spine and edges



B 140



Numerals, B 140

Pagination: pp. [16], 261, [83] Collation: §⁴§§⁴A–Z⁴2A–2U⁴ Size: 180x110 mm

Bernard was a Fellow of St. John's College Oxford, where he had earlier been a scholarship student and an expert in weights and measures. He is known to have created star tables that were published in Hooke's *Philosophical Collections* in 1684 and was well enough thought of to be appointed as Christopher Wren's successor to the Savilian chair of astronomy in 1673. He was a keen collector of ancient manuscripts and spoke many oriental languages.

This work is an enlarged and amended version of a letter prefixed to Dr. Pocock's *Commentary on Hosea*, 1685. It discusses the numerical systems of several different civilizations, both ancient and of his own day, and it incorporates material from European, Far Eastern, Middle Eastern and African sources. The typesetting must have been problematic because of the numerous instances of Hebrew, Arabic, Greek and other alphabets.

Illustrations available:

Title page System of numerals Chinese table

ТНЕ

Birmingham Ready Calculator;

SHEWING

IN TWENTY TABLES,

THE SUMS NECESSARY, FROM ONE SHILLING TO FIFTY POUNDS,

TO PRODUCE REAL PROFITS,

From 21/2 to 50 per Cent.

ON PRIME COST;

After allowing DISCOUNTS from 2½ to 50 per Cent.

ON THE SELLING PRICES.

By C. BERNECKER.

BIRMINGHAM:

PRINTED BY PEARSON AND ROLLASON;

AND SOLD BY

R. BALDWIN, PATER - NOSTER - ROW, LONDON.

M.DCC.LXXVIII,

B 141

Bernecker, C. (1760-a.1778)

The Birmingham ready calculator; shewing in twenty tables, the sums necessary, from one shilling to fifty pounds, to produce real profits, from 2½ to 50 per cent. on prime cost; after allowing discounts from 2½ to 50 per cent. on the selling prices.

Year: 1778

Place: Birmingham

Publisher: Printed by Pearson and Rollason; and sold by R. Baldwin

Edition: 1st Language: English

Binding: contemporary marbled boards; rebacked

Pagination: pp. iv, 140 Collation: A²B–S⁴T² Size: 209x125 mm

This is a ready reckoner for financial affairs. Little seems to be known about the author.

Illustrations available:

Title page

Page from the tables

B 142

Bernegger, Matthias (1582–1640)

Manuale Mathematicum, darinn begriffen. Die Tabulae Sinuum, Tangentium, Secantium: sowol die Quadrat- und Cubictafel; sambt gründlichem unterricht wie solche nützlich zugebrauchen. Allen Baw un[d] Kriegsverständigen, Feldmessern und andern Kunstliebenden hiebevor in Teutsche Sprach an tag geben, An jetzo aber wider ubersehe[n], und auffs New in truck gegeben ...

Year: 1619

Place: Strasbourg

Publisher: Anton Bertram for Paul Ledertz

Edition: 1st (German) Language: German

Binding: contemporary vellum; title cropped at bottom with

no loss

Pagination: pp. [8], 64, [184], [94], [26]

Collation:)(⁴A–D⁸A–L⁸M⁴N–T⁸V⁴

Size: 156x94 mm

Reference: Pogg Vol. I, p. 155

Matthias Bernegger was a professor of mathematics and rhetoric at the University of Strasbourg. He is best known for his unauthorized 1612 translation of **Galileo**'s work on the sector (see entry for **Galilei**, **Galileo** [Bernegger, Matthias, translator]; *Tractatus de proportionum instrumento, quod merito compendium universæ geometriæ dixeris*, 1635), to which he added a set of notes that almost doubled the size of the text. The notes are a description of the construction of the sector,

(the lines inscribed, not the physical construction of the mechanism) and many added examples of its use.

This present volume is a set of trigonometric tables designed for use in surveying and other similar tasks. It begins with a description of elementary geometry and trigonometry, followed by a quadrant with the calculations for finding heights of towers. The majority of the work is taken up by a table of sines, tangents and secants, all done to a radius (see the sector essay) of 10,000,000. The last two sections of the work contain tables for squares and cubes of numbers.

Illustrations available:

Title page

Title page of trigonometric table

Title page of squares table

Title page of cubes table

Sample page from trigonometric table



B 142

Bernegger, Matthias (1582–1640)
See entries for [Galilei, Galileo] - Matthias
Bernegger, De proportionum instrumento, 1612
and Tractatus de proportionum instrumento, 1635.

B 143

Bernoulli, Jacob (1654–1705)

Ars conjectandi, opus posthumum, Accedit tractatus de seriebus infinitis, et epistola Gallicè scripta de Ludo Pilæ Reticularis.

Year: 1713 Place: Basel

Publisher: Thurneisen Brothers

Edition: 1st Language: Latin

Figures: 2 engraved folding charts (p. 24 & p. 172), 1 engraved

folding plate (p. 306)

Binding: original semi-stiff boards; uncut

Pagination: pp. [4], 306, [2], 36 Collation: $\pi^2A-2P^42Q^2a-d^4e^2$ Size: 212x174 mm

Reference: Horb 100, #12

Jacob Bernoulli was the first of what became a large and important family of mathematicians. The eldest of three brothers, Jacob originally studied philosophy and theology then, against his father's advice, also took up mathematics and astronomy. His youngest brother, Johann (from whom the majority of the family mathematicians are descended), was also advised against the sciences, but under Jacob's tutelage, he too became a mathematician. Despite their early collaboration, continued work on similar problems led to bitterness and a lifelong rivalry. Jacob traveled extensively and met with scientists in France, Germany, Britain and the Netherlands. He occupied the prestigious position of professor of mathematics at Basel.



B 143

While making contributions in many areas of mathematics and mechanics, this volume contains Jacob's most famous work. It is considered as the foundation of the mathematical theory of probability and, indeed, has been termed the foundation of the field of mathematical statistics. The editing of the manuscript was incomplete when Jacob died and his nephew Nicolas (the son of Jacob's brother of the same name) saw it through the press. This work, whose title means *casting*, as in the casting of dice (not counters), is divided into four parts.

The first is a discussion of Huygens' *De ratiociniis in alae ludo*, and the second deals with permutations in which Bernoulli derives a number of fundamental notions about series. The third applies the theory developed in Part II to twenty-four examples of games of chance for which Bernoulli calculates the odds. The final section is more philosophical in nature and makes reference to moral as opposed to mathematical expectation and the law of large numbers (the fundamental underpinning of most simulations). This last section also contains some comments on *jeu de paume*—a game similar to modern tennis having little to do with the major topic of the work. This is Jacob's thinly disguised satirical response to some caustic criticisms made earlier of his views on scholarly logic.

Illustrations available: Title page

B 144

Bernoulli, John III (1744–1807)

A sexcentenary table; exhibiting at sight, the result of any proportion, where the terms do not exceed 600 seconds or 10 minutes with precepts and examples.

b/w: **Taylor, Michael S**.; A sexagesimal table ..., 1780

Year: 1779 Place: London

Publisher: William Richardson

Edition: 1st Language: English

Binding: contemporary half-bound leather, marbled boards;

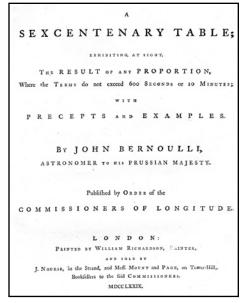
rebacked; red leather label Pagination: pp. viii, 165, [1] Collation: a-b²A-2S²T¹ Size: 284x229 mm

See the entry for **Taylor, Michael S.A.**; *A sexagesimal table...*, 1780.

John (Johann) Bernoulli, a member of the famous Swiss mathematical family—the grandson of Johann and grandnephew of **Jacob Bernoulli**, was a child prodigy, obtaining a master of jurisprudence degree at age fourteen. By the age of twenty, he was asked by Frederick

II to reorganize the observatory in Berlin. While his mathematical works are not of great importance today, he wrote many papers on diverse subjects and eventually became the trustee of the family documents.

Illustrations available: Title page



B 144

B 145

Beutel, Tobias

Neu auffgelegte Arithmetica, Oder sehr nützliche und schöne Rechen-Kunst mit kurtzen Regulen und Exemplis, Nach der Practica, welche ausführlich hierinnen beschriben ist, nebenst der Coss oder Algebra.

> Year: 1670 Place: Leipzig

Publisher: Printed by Johann Wittigau for Philip Fuhrman

Edition: 4th

Language: German Figures: engraved frontispiece; title in red and black

Binding: Contemporary vellum; with ties

Pagination: pp. [24], 502, [2] (interleaved from p. 1 to p. 475)

Collation:):(12A–X12 Size: 127x75 mm

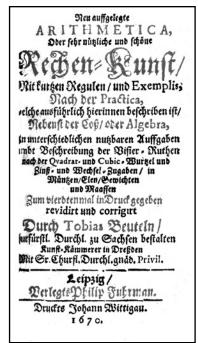
Reference: Pogg Vol. I, p. 181

This copy is interleaved with contemporary inscriptions in finely penned handwriting in brown ink.

This arithmetic book begins with numeration (including an example of Roman numerals using some of the alternate forms for "M") and continues with the four basic operations and rule of three, multiplication being illustrated with an unusual triangular table. The same material is repeated in the next section, this time dealing with fractions rather than integers. The latter sections contain a discussion of elementary algebra, and the final quarter of the book is devoted to tables dealing with money and similar practical matters.

Illustrations available:

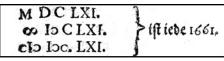
Title page (color)
Frontispiece
Roman numerals
Multiplication table
Handwritten gelosia multiplication



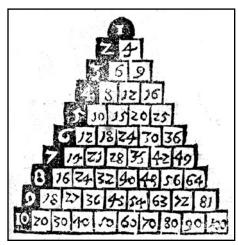
B 145



Frontispiece, B 145



Roman numeral forms, B 145



Multiplication table, B 145

B 146

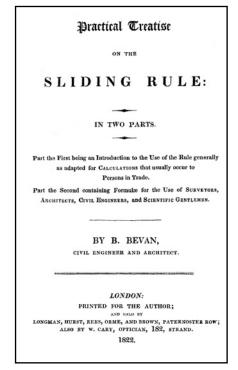
Bevan, Benjamin (fl.1804–1838)

A practical treatise on the sliding rule. In two parts. Part the first being an introduction to the use of the rule generally as adapted for calculations that usually occur to persons in trade. Part the second containing formulæ for the use of surveyors, architects, civil engineers, and scientific gentlemen.

Year: 1822 Place: London Publisher: Author Edition: 1st Language: English

Binding: original paper boards Pagination: pp. 101, [7] Collation: A–F⁴G²H–O⁴ Size: 227x138 mm Reference: Tay *MP II*, #1084

Benjamin Bevan was an engineer and architect/surveyor who lived in Bushey Heath, England. Little is known about him, but he notes in the preface that he had spent eighteen years *in very extensive public undertakings* and had taught the use of the slide rule to *a number of young persons*. He developed his new slide rule, with divisions to three places of decimal, some time about 1813. He was obviously well connected because he was able to use **Jesse Ramsden**'s dividing machine for the markings. The rule was manufactured, beginning about the time of this publication, by William O. Carey (1789–1891), whose shop was on the Strand in London. Carey advertised the rule as being for accountants and surveyors.



B 146

After a brief introduction to the slide rule, the majority of the work is taken up with examples from many different trades. Each example is shown with a clear diagram that illustrates how the slide rule should be set to accomplish the task (see illustration of simple interest calculations).

Illustrations available: Title page Interest calculation

B 147

Beveridge, William (1637–1708)

Institutionum chronologicarum libri II. Unà cum totidem arithmetices chronologicæ libellis.

Year: 1669 Place: London

Publisher: Thomas Roycraft for Walter Kettilby

Edition: 1st Language: Latin

Binding: contemporary leather Pagination: pp. [8], 259, [5]

Collation: A-2L⁴ Size: 185x142 mm

Reference: Win ESTC, B.2095

William Beveridge was a scholar at St. John's College Cambridge and an expert on oriental languages. He was ordained in 1660 and took up the post of Vicar of Ehling, which position left him enough time to follow his scholarly interests. He stayed there twelve years, and

it was during that period this book was written. In 1704, he was made Bishop of St. Asaph.

This work, on ancient number systems and the calendar, is described by **DeMorgan**, *Arithmetical books* as *learned, but not always judicious*. It is of interest from both a typographical and historical standpoint for the many different fonts of exotic character sets used to print out the tables, ranging from Hebrew and Greek to various Middle Eastern languages, including Arabic, Samaritan and Syriac. The complexity of the problem facing the printer may be seen from the table illustrated.

Illustrations available:
Title page
Numerical systems table (3)

INSTITUTIONUM CHRONOLOGICARUM LIBRI II.

Unà cum totidem

ARITHMETICES CHRONOLOGICÆ LIBELLIS.

Per Guilielm. Beveregium, M. A. E Coll. S. Job. Cant.

Πας οῖς ηδ ἀσυνάς τηθος Τοιν ἡ τ΄ χεόνων ἀναγεμφὴ , τόδις Ἱότοις ἐδὲ & τῆς ἱςορίας ἀληθεύνν δύναθας. Ταtianus τορὸς Ἑλλήνας.

LONDINI,

Typis Thomæ Roycroft, & proftant apud Gualterium
Kettilly, ad infigue Capitis Episcopi, in vico vulgò vocato
Dutkelang. M DC LX IX.

B 147

B 148

Beyer, Johann Hartmann (1563–1625)

Ein newe und schöne Art der Vollkommenen Visier - Kunst: Derengleichen hiebevor niemaln in keiner Spraach gesehen worden. Wie man nemlich vierlerlen unterschiedne Visierstäbe zurichten auch mit den selbigen allerhand regulierte hole Cörper. Sie seyen so gross oder kleyn sie immer mögen als mancherley Särcke Röhrcästen Brunnen, Fass, Bütten, Eymer, Gläser, Kugeln, & visieren und deren inhallt gantz leichtich erfündigen soll.

Year: 1603 Place: Frankfurt

Publisher: Palthenium for J. Rosen



B 148

Edition: 1st (German) Language: German

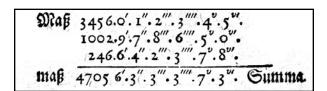
Binding: later vellum over boards Pagination: pp. [12], 68, 192, [38]

Collation:)(4)()(2A-2H42I2A-2A42A-2D42E3

Size: 196x155 mm

Reference: Pogg Vol. I, p. 183

Johann Beyer was not only a well-known Frankfurt physician and mathematician but was also a person of civic eminence due to his position as Bürgermeister. His wide contact with the scientific community is illustrated by a letter he is known to have written to **Kepler** in 1616 in which he used a combination of both the decimal point (actually a comma) and the old system of accents to represent decimal fractions. For example, Beyer wrote the number 314.15926 (100 π) as 314,1'5"9""2"""6""" (using a comma as the decimal indicator but still using the accents as well) and claimed this system of notation as his invention. This may well have been true as far as Beyer was concerned; however, Simon Stevin had used the decimal point notation years earlier. The same system of notation, this time with multiple and inconsistent uses of the decimal point and Roman numerals for the accents, can be seen in this work.



Accents denoting decimal places, B 148



B 149

This book is an early basic work on gauging, with emphasis on the calculation of the volume contained in various solid geometric figures. Beyer also discusses the extraction of cube roots, gives practical examples of gauging and includes tables for such things as the circumference and area of circles having diameters from 0.1 to 108 units in steps of 0.1 unit. Unfortunately, the value of π Beyer used appears to be 3.14172 rather than 3.14159, and this value limits their usefulness (accurate values for π had been calculated to 35 decimal places prior to the date of this publication).

Illustrations available:

Title page Decimal point example Table page

B 149

Beyer, Johann Hartmann (1563–1625)

Stereometriae inanium nova et facilis ratio, geometricis demonstrationibus confirmata & necessariis obscuriorum quorundam delineationibus illustrata: Qua corporum regularium omnium, tam rectilineorum quam curvilineorum capacitates promtissime explorantur:

Year: 1603 Place: Frankfurt

Publisher: Zacharias Palthenius for Jonas Rhodius

Edition: 1st (Latin) Language: Latin

Figures: 67 woodcut text diagrams, numerous charts Binding: contemporary vellum over boards

Pagination: pp. [12], 268, [38] Collation:)(⁴2)(²A–2K⁴L²2A–2D⁴2E³

Size: 191x151 mm Reference: Pogg Vol. I, p. 183

This is a Latin version of the work described above. While the works are similar, containing the same woodcut diagrams and tables, the examples of calculations often differ, and the accuracy of the tables suffers from the same problem as in the German version. See comments in **Beyer, Johann Hartmann**; *Ein newe und schone Art der Vollkommenen Visier-Kunst*, 1603.

Illustrations available: Title page

B 150

Bianchini, Giovanni (ca.1410–1469)

Tabulae celestium motuum eorumque canones.

Year: 1460–1470 Place: Italy Edition: manuscript Language: Latin

Figures: Manuscript tables in red and black Binding: contemporary vellum over boards

Pagination: ff. [b], [1], [2b], [16], 1-122, [2b], [4], [4b], [1],

[2b] Size: 294x220 mm

According to Thorndike's *History of magic and experimental science*, Bianchini was probably the fifteenth century's *foremost astronomer*. He lived and worked for many years in the service of three successive D'Este Dukes at Ferrara, where he was in contact with several of the greatest astronomers of the century. **Georg Peuerbach** (1423–61), the teacher of **Regiomontanus** (1436–76), lectured in Ferrara in 1450, and Rose states (*Italian Renaissance of Mathematics*, p. 14)

Regiomontanus himself visited Ferrara in the 1460's, having perhaps been lured there by the prospect of meeting Bianchini with whom he initiated a scientific correspondence.

At this time Bianchini would have been in his late forties or early fifties and as the leading figure of the last generation of astronomers would have been an impressive person to the young **Peuerbach** and his even younger student and collaborator, **Regiomontanus**. At an even earlier date than that cited by Rose, **Regiomontanus** and **Peuerbach** were both calculating ephemerides from Bianchini's tables around 1456. Of their contemporaries (Regiomontanus' & Peuerbach's), only Bianchini ... possessed a comparable proficiency and originality. (DSB Vol. 15, pp. 474–475).



B 150

In this manuscript work, Bianchini set out to reconcile the Alfonsine tables—for two centuries the standard in Europe by the time he wrote—with those of Ptolemy. He was a great admirer of Ptolemy and critical of the corrupted Ptolemaic and Alfonsine texts then in current use. Thorndike observes that historically

... many have erred by neglecting, because of their difficulty, the Alfonsine Tables for longitude and the Ptolemaic for finding the latitude of the planets. Accordingly in his *Tables* Bianchini has combined the conclusions, roots and movements of the planets by longitude of the Alfonsine Tables with the Ptolemaic for latitude, and with the rules of Ptolemy which Alfonso too had employed.

Bianchini's *Tables* must have been useful and perhaps even popular since they went through three printed editions. The text was first published in 1495 at Venice. A second edition was printed in 1526, and another appeared in Basel in 1553.

The manuscript is roughly divided into two parts: the first of fifteen leaves includes an introduction and the *Canones*, which explain how the tables were calculated and how to use them. The second comprises tables and occupy the balance of the work. Manuscript copies of the tables alone are recorded in some European libraries, but here they appear together with the *Canones*. Of additional interest is a letter from the Venetian humanist and Senator Marco Sanuto (ca.1466–1533) starting on folio 10v and 11r, running onto the lower margin of

the latter, relating to certain astronomical problems, which suggests possible avenues of inquiry relating to provenance. Sanuto was the dedicatee of **Pacioli**'s *Summa de arithmetica*.

There is a purchase inscription on the last leaf dated 1474 that reads *I bought these tables in 1474* (see illustration). Various watermarks—"R" similar to Briquet 897-0-71, scissors-Briquet 3668, crossed arrows-Briquet 6269, four flowers similar to Briquet 6689 & 6690—all indicate Italy mid-fifteenth century.

A fifteenth-century coat of arms with a rampant lion watercolor flanked by the initials B and L on the first page of the introduction is similar to the lion found in Rietstap's *Armorial General Illustre*, vol. 4, for the Loredano family of Venice (see illustration). The Loredano family provided Venice with several Doges, beginning with Leonardo Loredano (1438–1521); however, we have not been able to attach the initials B.L. to any of the descendants. The inner front cover of the binding bears the large bookplate of the sixteenth century collector Ferdinand Hoffman (1540–1607) (see illustration). This copy was dispersed along with other books from Hoffman's library in the Gilhofer & Ranschburg sale of the Bibliothek Alexander Fürst Dietrichstein, November, 1933.

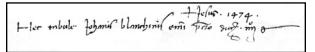
According to C. U. Faye and W.H. Bond, Supplement to the Census of Medieval and Renaissance Manuscripts in the United States and Canada, 1962, only one manuscript copy of the Tabulae was recorded in the United States, that being the Honeyman copy, which was subsequently sold when the library was dispersed in 1979.

The above material was adapted from that supplied by New York City bookseller Richard Lan of Martayan Lan.

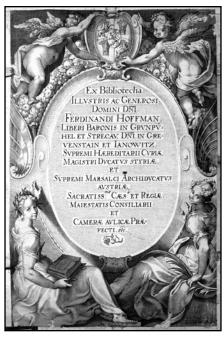
The manuscript shows a late transition phase between the Arabic forms of the numerals and the European forms after they were frozen at the invention of printing—note, in particular, the form of the figure "5."

Illustrations available:

Book plate of Ferdinand Hoffman Purchase inscription of 1474 First page of introduction with crest (color) First page of tables (color) Second last page of tables (color) Table of days of the year (color)



Purchase inscription 1474, B 150



Hoffman bookplate, B 150

B 151

Biermann, L.

Die Gottinger entwicklungen elektronischer Rechenautomaten In Probleme der Entwicklung programmgesteuerter Rechengerate und Integrieranlagen.

b/w: Cremer, Hubert (editor); Probleme der Entwicklung programmgesteuerter Rechengerate und Integrieranlagen, 1953

> Year: 1953 Place: Aachen

Publisher: Rhein-Westf. Technische Hochschule

Edition: 1st Language: German

Binding: cloth boards original paper wrappers bound in

Pagination: pp. [2], XIV, 75, [1], 10

Size: 207x145 mm

See entry for **Cremer**; *Probleme der Entwicklung programmgesteuerter Rechengerate*, 1953, where more information and illustrations may be found.

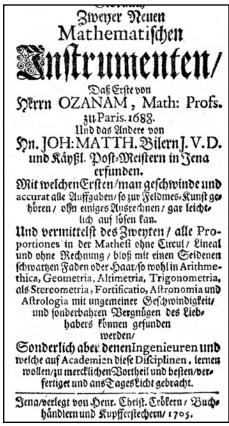
Illustrations available:

None

B 152

Biler, Johann Matthes

(Gebrauch) Zweyer Neuen Mathematischen Instrumenten. Dass Erste von Herrn Ozanam, Math: Profs. zu Paris 1688. Und das Andere von Hn. Joh: Matth. Bilern J.V.D. und Käyszl. Post-Meistern in



B 152

Jena erfunden. Mit welchen Ersten, man geschwinde und accurat alle Auffgaben, so zur Feldmes-Kunst gehören, ohn einiges Ausrechnen, gar leichtlich auf lösen kan. Und vermittelst des Zweyten, alle Proportiones in der Mathesi ohne Circul, Lineal und ohne Rechnung, bloss mit einen Seidenen schwartzen Faden oder Haar, so wohl in Arithmetica, Geometria, Altimetria, Trigonometria, als Stereometria, Fortificatio, Astronomia und Astrologia mit ungemeiner Geschwindigkeit und sonderbahren Vergnügen des Liebhabers können gefunden werden. Sonderlich aber denen Ingenieuren und welche auf Academien diese Disciplinen, lernen wollen, zu mercklichen Vortheil und besten, verfertiget und ans Tages Licht gebracht.

Year: 1705 Place: Jena

Publisher: Henrich Christoph Cröker

Edition: 2nd Language: German

Figures: 5 engraved folding plates

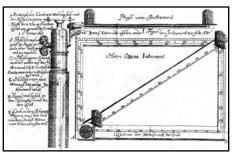
Binding: later boards Pagination: pp. 87, [1] Collation: A–E⁸F⁴ Size: 198x152 mm

In 1691, **Jacques Ozanam** published his *Dictionaire* mathématique, which contained a section on practical

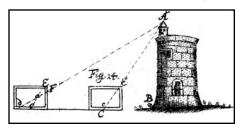
geometry (surveying). The first part of this work is actually **Ozanam**'s surveying section. The instrument (a plane table) described here was given a full-page illustration by Ozanam. The original Ozanam illustration was augmented by adding a pole stand, but it is otherwise identical. The text is a short description of its use in elementary surveying.

Bound at the end of this short Ozanam work is the one by Biler that illustrates the use of a half-circular instrument. This is identical with one that he published in 1696 (**Biler**, *Neu erfundenes instrumentum*, 1696). Leaving out some examples has shortened the text, and the illustrations are, for the most part, pasted in where they were included with the text in the earlier version. A large foldout plate, identical to that from the 1696 version except for an inscription, illustrates the instrument.

Illustrations available:
Title page
Instrument
Surveying example.



Plane table, B 152



Surveying example, B 152

B 153

Biler, Johann Matthes

Neu erfundenes instrumentum mathematicum universale vermittelst dessen alle proportiones in der Mathesi ohne Circul, Lineal und ohne Rechnung, bloss mit einen Seidenen schwartzen Faden oder Haar so wohl in Arithmetica, Geometria, Altimetria, Trigonometria, alss Stereometria, Fortificatio, Astronomia und Astrologia mit ungemeiner Geschwindigkeit und sonderbahren Vergnügen des Leibhabers können gesuchet und gefunden werden. Allen und jeden so hohen alss

niedrigen Stands-Personen so denen Mathematischen Wissenschafften beygethan, und der Rechen Kunst nicht wohlerfahren. Sonderlich aber denen Ingenieuren und welche auf Academien diese Disciplinen, lernen wollen, zu mercklichen Vortheil und besten, verfertiget und ans Tages Licht gebracht.

Year: 1696 Place: Jena

Publisher: Henrich Christoph Cröker

Edition: 1st Language: German Figures: 1 folding plate

Binding: modern heavy paper wrappers

Pagination: ff. [18] Collation: $\pi^4B-D^4E^2$ Size: 198x152 mm

See entry for **Biler**, (Gebrauch) Zwyer Neuen Mathematischen Instrumenten, 1705.

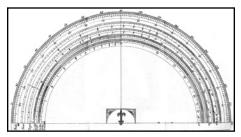
This is a short work on elementary surveying techniques. It describes a half-circular sighting instrument and illustrates its use with a few simple problems involving triangles.

Illustrations available:

Title page Instrument

Sermittelst dessen alle proportiones in der Mathes ohne Circul / Lincal und ohne Nechmung / bloß mit einen Seidenen schwerzen federars faben oder Hard werden in delt und schwenzen federars auf hiereris, affigenometria, affisiereris atteineris, affisiereris atteineris, affisiereris atteineris des in der delte delte

B 153



Biler's instrument, B 153

BINAC

See Eckert-Mauchly Computer Corporation; Binac demonstrated. New electronic brain

B 154

Binet, Alfred (1857–1911)

Psychologie des grands calculateurs et joueurs d'échecs.

Year: 1894 Place: Paris

Publisher: Librairie Hachette et Cie.

Edition: 1st Language: French

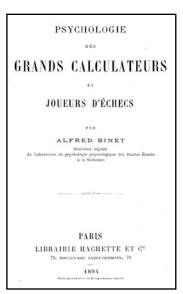
Binding: original printed paper wrappers; uncut

Pagination: pp. viii, 364, 8 Collation: $\pi^41-22^823^6c^4$ Size: 187x122 mm

Binet was the famous French psychologist after whom the Binet scale of the mental age of a child is named. He was director of the Laboratory of Physiological Psychology in Paris. In the mid 1880s, he began a long series of studies into intelligence and thought processes that culminated in his 1903 publication of *Étude experimentale de l'intelligence*, in which he reported on an in-depth study of the intellectual development of his two daughters.

This volume was part of his studies in mental processes. It examines the calculating prodigies, particularly one called Jacques Inaudi, an Italian shepherd boy who progressed to giving stage performances, and several champion chess players.

Illustrations available: Title page



B 154

B 155

Bion, Nicholas (ca.1652–1733)

Traité de la construction et des principaux usages des instrumens de mathématique.

Year: 1709 Place: Paris

Publisher: Chez La Veuve de Jean Boudot

Edition: 1st Language: French

Figures: 28 engraved plates (1 folding) Binding: contemporary leather rebacked

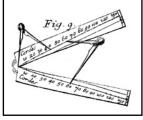
Pagination: pp. [8], 352 Collation: a⁴A–Y⁸ Size: 208x137 mm

Reference: Soth/Zeit BCM, Vol III, #875-#508, p. 39

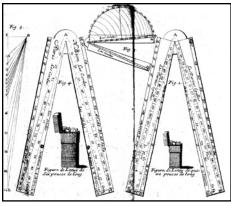
Nicholas Bion was the king's engineer for mathematical instruments. It is surprising how little is known about his life beyond the fact his workshops were in Paris. His name is very well known, but it is difficult to determine if his fame rests on the quality of his instruments or on this respected work. Only a few of his original instruments appear to have survived.



B 155



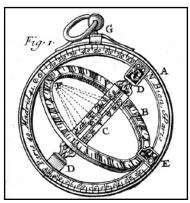
Sector measurements, B 155



Bion's sector, B 155

The work is encyclopedic and gives descriptions of the mathematical instruments commonly available at the beginning of the eighteenth century. Bion interpreted *mathematical* broadly, for the work contains information on devices used in a variety of scientific and engineering fields. It is composed of a preface giving definitions of mathematical terms, followed by eight separate books:

- 1. rulers and protractors
- the sector: containing a line of equal parts ("B" in his figure 1), line of planes ("C"), line of polygons ("D"), line of chords ("F"), line of solids ("H") and line of metals ("G").
- 3. the compass (including both proportional compass and beam compass)
- 4. surveying devices (quadrants, chords, chains and sighting devices)
- 5. water levels and gunner's instruments (gunner's compass and quadrant)
- 6. astronomical instruments (large quadrants and micrometers for measuring)
- navigational instruments, including, for example, the Jacob's staff and the mariner's quadrant, which were, by then, no longer in use
- sundials of all forms at all orientations, the nocturnal and a water clock



Folding sundial, B 155

The volume was intended for the instrument user rather than the instrument maker. The descriptions of several devices (optical and micrometer instruments in particular) are lacking in detail that might indicate that Bion was not familiar with them or, perhaps more likely, that he did not wish his rivals to be able to reproduce his instruments.

Illustrations available:

Title page

The sector

Usage of the line of lines in the sector

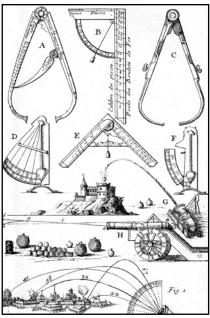
Gauging rods

Usage of the line of chords in the sector

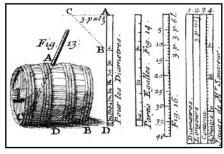
The artillery instruments

A device showing sundials on various surfaces

Colophon



Artillery instruments, B 155



Gauging rods, B 155

De l'Imprimerie de Jacques Collombat, Imprimeur ordinaire de Madame la Duchesse de Bourgogne, & des Bâtimens du Roy, rue saint Jacques, au Pelican. 1709.

Colophon, B 155

B 156

Bion, Nicholas (ca.1652–1733)

Traité de la construction et des principaux usages des instrumens de mathematique.

Year: 1716 Place: Paris

Publisher: La Veuve Boudot; et al.

Edition: 2nd Language: French

Figures: 30 engraved plates (1 folding)

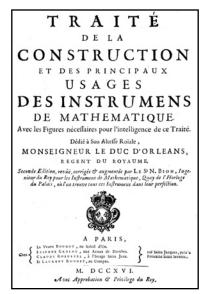
Binding: contemporary calf Pagination: pp. viii, 392 Collation: a⁴A–2A⁸2B⁴ Size: 197x133 mm

Reference: Soth/Zeit BCM, Vol. III, #875-#509, p. 39

This second edition is not quite identical to the first of 1709. Bion added an extra chapter (the eighth) to Book Four on the subject of fortifications and another (the fifth) to Book Six on the construction of a pendulum clock for astronomical observations (see the entry for the third, 1723, edition for illustrations from these sections).

Illustrations available:

Title page Colophon



B 156

B 157

Bion, Nicholas (ca.1652–1733)

Traité de la construction et des principaux usages des instrumens de mathématique.

Year: 1723 Place: The Hague

Publisher: P. Husson, T. Johnson, P. Gosse et al.

Edition: 3rd Language: French

Figures: 30 folding engraved plates; engraved frontispiece; title in red and black

Binding: contemporary mottled calf

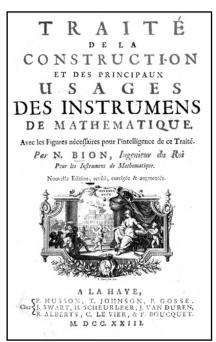
Pagination: pp. [8], 392 Collation: π^4 A–3C⁴ Size: 240x185 mm

Reference: Bru *MLAL* I, p. 950; Pogg Vol. I, pp. 194–95; Dau *HTI*, 389; DSB II, pp. 132–133

The text of this, the third edition, is identical to the second (1716), containing the same additional sections that Bion had included there. It has a new frontispiece illustrating the use of some of the simpler instruments.

Illustrations available:

Title page Frontispiece Artillery instruments Pendulum clock Fortifications



B 157

B 158

Bion, Nicholas (ca.1652–1733)

Traité de la construction et des principaux usages des instrumens de mathematique.

Year: 1752 Place: Paris

Publisher: C.A. Jombert & Nion fils.

Edition: 4th Language: French

Figures: engraved frontispiece; engraved portrait; 37 engraved

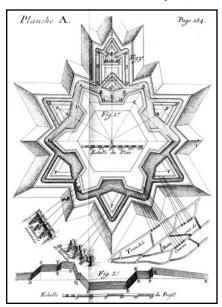
folding plates

Binding: contemporary leather; gilt spine

Pagination: pp. [8], 460 Collation: $\pi^4A-3L^43M^2$ Size: 250x192 mm



Frontispiece, B 157

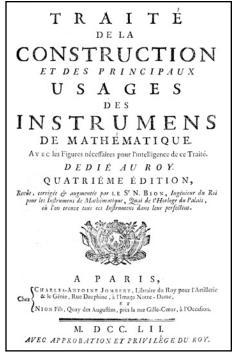


Fortifications, B 157

This fourth edition was published after Bion's death in 1733, the printing being supervised by his son. It uses the same frontispiece as the second edition (1716) but also includes an idealized engraved portrait of Bion—done posthumously (c. 1740) by De Larmessin, the King's engraver. The content of the second edition has been further augmented with an additional chapter to Book 6 on octants and other astronomical instruments; two very small additions to Book 7 (dignified by being given their own chapter); and a completely new Book 9, which describes a miscellaneous collection of devices from water pumps to burning glasses.

Illustrations available: Title page

> Colophon Portrait



B 158



Nicholas Bion, B 158

De l'Imprimerie de la Veuve L AMESLE, Rue vieille Bouclerie, à la Minerve. 1752.

Colophon, B 158

B 159

Bion, Nicholas (ca.1652–1733) [**Edmund Stone** (1700–1768), translator]

The construction and principal uses of mathematical instruments. Translated from the French of M. Bion, chief instrument-maker to the French King. To which are added, the construction and uses of such instruments as are omitted by M. Bion; particularly of those invented or improved by the English.

Year: 1723 Place: London

Publisher: Printed for H.W. by J.Senex and W. Taylor

Edition: 1st (English) Language: English

Figures: 26 engraved folding plates; title in red and black Binding: contemporary paneled leather; red leather label

Pagination: pp. viii, 264 Collation: π^2A-3X^2 Size: 342x221 mm

Reference: DSB II, p. 133; Hamb DI, p. 37

Edmund Stone, the translator of this work, was the son of a gardener to the Scottish Duke of Argyle. At the age of 8, another servant taught him to read. Shortly thereafter he noticed an architect working on the duke's house, using instruments and making calculations. Inquiring about these, he learned of the existence of arithmetic and geometry and purchased a book on the subject. When Stone was 18 and a gardener on the estate, the duke saw a copy of Newton's *Principia* in the grass. Assuming it was from his library, the duke called a servant to return it and was very surprised when the young gardener intervened, claiming it was his own. The duke became his patron (this translation is dedicated to him) and provided him with employment that allowed time for Stone to study. Stone became a Fellow of the Royal Society in 1725. The patronage continued until the duke's death in 1743. Thereafter, Stone lost his employment and was reduced to poverty (he had to resign his membership in the Royal Society because he could not afford to pay the dues) and eventually died a pauper.

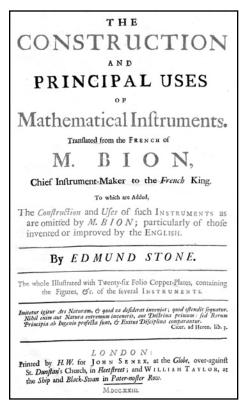
According to the translator's preface (see the illustrations), Stone had wanted to produce a work on instruments and decided that Bion's provided the best model available. Rather than writing one himself, he decided to translate the French work and add to it those English instruments that Bion had overlooked. An example of such an addition—the inclusion of the English gunner's calipers—can be seen by comparing the plate showing artillery instruments in the first (1709) edition of Bion with the present volume.

Stone also added, as an example of the power of the instruments, a short section on *The Use of the Sector in*

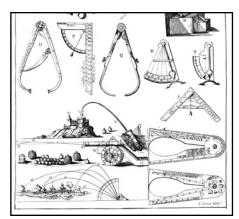
the Construction of Solar Eclipses, in which he details the path, across Europe, of the Moon's shadow for the eclipse of May 11, 1724—the year after the publication of this translation.

This work is translated from the second (1716) edition of Bion and includes the additional chapters on fortification and the pendulum clock from that edition. It appeared at the same time as Bion's third French edition.

Illustrations available:
Title page (color)
Plate of artillery instruments
Translator's preface (pages v, vi, vii)



B 159



Artillery instruments, B 159

B 160

Bion, Nicholas (ca.1652–1733) [**Edmund Stone** (1700–1768), translator]

The construction and principal uses of mathematical instruments. Translated from the French of M. Bion, chief instrument-maker to the French King. To which are added, the construction and uses of such instruments as are omitted by M. Bion; particularly of those invented or improved by the English...

Year: 1758 Place: London

Publisher: Printed for J. Richardson

Edition: 2nd (English) Language: English Figures: 30 engraved plates

Binding: contemporary leather; rebacked Pagination: pp. viii, 264; [4] 265–326

Collation: π^2 A–4N²O³ Size: 349x225 mm

Reference: DSB II. p. 133; Hambly, DI, p. 37

Stone, as he indicates in the *advertisement* to the supplement to this addition, was prevailed upon by the publishers to produce a second printing of the 1723 edition, enlarged by the addition of material on a number of new and improved instruments. While this is undoubtedly true, by this date Stone had lost his patron and being forced to live on his own resources must have contributed to his decision to produce the supplementary material. Hence the allusion to *several motives* in his explanation.

The text is identical to the first edition, and the supplement, while it may have increased sales, contains little that adds to the work (see **Taylor, E. G. R.**; *Mathematical practitioners of Hanoverian England*, pp. 25–30, for a detailed list of the contents and other relevant information). The supplement contains information on both reflecting and refracting telescopes and on the camera obscura. Most of the improvements noted in the supplement come from the *Philosophical Transactions of the Royal Society*, which are referenced frequently.

Illustrations available: Title page

B 161

Bion, Nicholas (ca.1652–1733) [**Johann Gabriel Doppelmayr** (1671–1750), translator]

Neu eröffnete Mathematische Werkschule, oder Gründliche Anweisung, wie die Mathematische Instrumenten

Year: 1712

Place: Frankfurt and Leipzig Publisher: Hofmannischen Buchladen



B 161

Edition: 1st (German) Language: German

Figures: engraved frontispiece; title in red and black; 28

engraved folding plates Binding: contemporary vellum Pagination: pp. [8], 48, 176 Collation:)(³)()(³A–3C⁴D¹

Size: 214x158 mm

This German edition of Bion's work is a translation of the first (1709) French edition. It does not contain the sections Bion added to his second French edition (1716). The frontispiece resembles (but is not identical to) that



Frontispiece, B 161

of the later 1723 French edition, perhaps because they were both printed outside of France.

Johann Gabriel Doppelmayr, the translator, studied law at Nuremberg, Altdorf and Halle, but then decided to switch to physics and mathematics. After traveling in Germany, Holland, and England, he returned to Nuremberg and was appointed professor of mathematics in 1704, a post he retained for the rest of his life. As early as 1705, he is known to have published a number of other translations as well as his own works on an eclipse, the globes and an atlas. None of his writings show much originality but were useful in transmitting scientific findings from England, France and Holland to Germany.

Illustrations available:

Title page Frontispiece

B 162

Bion, Nicholas (ca.1652–1733) [Johann Gabriel Doppelmayr (1671–1750)]

Weitere Eröffnung der neuen Mathematische Werk-Schule, Nicolai Bion.

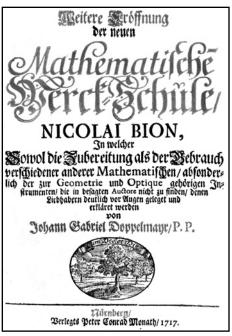
> Year: 1717 Place: Nuremberg.

Publisher: Peter Conrad Monath

Edition: 1st (German) Language: German

Figures: title in red and black; 12 engraved folding plates

Binding: contemporary vellum



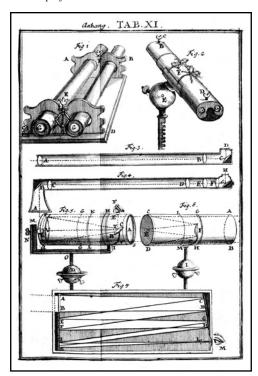
B 162

Pagination: pp. [8], 48 Collation: π^4 A–F⁴ Size: 214x158 mm

This short work is bound with the 1712 German translation of Bion. Despite the display of Bion's name on the title page, it is written by the translator Doppelmayr and illustrates a number of instruments, which, although claiming to be from Bion's workshop, do not appear in any of Bion's French editions. The most inventive are optical—binocular and reflecting telescopes (some with multiple internal reflections in order to reduce the length of the tube), a camera obscura and a lantern projector. The copper engraved plates are similar in style to those used in Bion's works.

Illustrations available:

Title page Telescopes and binoculars Camera obscura Lantern projector



Telescopes and Binoculars, B 162

B 163

Bion, Nicholas (ca.1652–1733)

L'usage des astrolabes, tant universels que particuliers. Accompagné d'un traité, qui en explique la construction par des manieres simples & faciles, avec les figures necessaires pour l'intelligence de ce traité.

Year: 1702 Place: Paris

Publisher: Chez Laurent d'Houry & Jean Boudot



B 163

Edition: 1st Language: French

Binding: contemporary leather; spine gilt decorated

Collation: a⁵A–K¹²L² Size: 162x95 mm Reference: Bud *IOS*, p. 32–36

Nicholas Bion was famous for books on mathematical and astronomical instruments. This comprehensive text on astrolabes is not as well known as his later, more ambitious work on the construction and use of all types of instruments. This is the last book entirely about astrolabes to be published in the French language.

The planispheric astrolabe was a relatively well-documented device when Bion wrote this treatise. It is essentially a map of the heavens superimposed on a map of the earth (or at least significant features of the earth such as the observer's horizon, zenith, tropics, equator, etc.) with a movable rete representing the position of the stars and sun. Its major shortcoming is that it is limited to use at only one latitude. To overcome this handicap, larger astrolabes often were fitted with exchangeable plates for different latitudes.

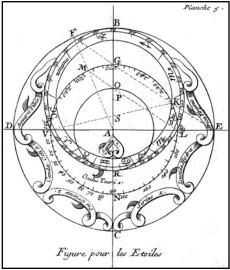
By the time Bion composed this work, a large number of variations and modifications had been made, resulting in a so-called universal astrolabe. See the Appendix essay on the astrolabe for more information.

The first chapter covers the commonly found planispheric astrolabe and describes the improvements due to **Gemma**

Frisius and Juan de Rojas Sarmiento. The new form of universal astrolabe due to Philippe de La Hire is then described. La Hire was a well-known astronomer and a professor of mathematics who, perhaps not incidentally, wrote a one-page endorsement for this volume.

Illustrations available: Title page Colophon

Rete diagram of astrolabe



Astrolabe rete, B 163

B 164

Bion, [Nicholas] Nicolaus (ca.1652–1733) [Johann Gabriel Doppelmayr (1671–1750), translator

Zwote Eröfnung der neuen mathematischen Werkschule Nicolaus Bions in welcher sowohl die Zubereitung als der Gebrauch verschiedener anderer mathematischen absonderlich der zur Geometrie und Optik gehörigen Instrumenten die im besagten Autor nicht zu finden denen Liebhabern deutlich vor Augen geleget und erkläret werden

Year: 1765 Place: Nürnberg

Publisher: George Peter Monath

Edition: 2nd (German) Language: German

Figures: 20 engraved folding plates

Binding: contemporary three-quarter bound leather over boards

Pagination: pp. [8], 48, [12], 176 Collation: (4A-F4)(4)()(2A-Y4)

Size: 209x166 mm

Doppelmayr was the translator of the first edition of Bion's work on mathematical instruments into German (see the entry for Bion, Nicholas; Neu eröffnete Mathematische Werkschule, oder gründliche Anweisung, wie die Mathematische Instrumenten, 1712), and he also



B 164

added several of his own descriptions to the translation. He continues that practice here, claiming the instruments to be from the workshop of Bion. No description of them is found in the French editions of Bion's work, although some similar ones appear in an addenda to the second edition of the English translation (see the entry for Bion, Nicholas [Edmund Stone, translator]; The construction and principle uses of mathematical instruments, 1758, London).

This posthumous edition is devoted to surveying (usually sighting devices) and also includes some of the optical instruments (telescopes and binoculars) that are found in his earlier work.

Illustrations available: Title page

B 165

Bion, [Nicholas] Nicolaus (ca.1652–1733) [Johann Gabriel Doppelmayr (1671–1750), translator

Dritte Eröfnung der neuen mathematischen Werkschule Nicolaus Bions in welcher die Zubereitung und der Gebrauch verschiedener astronomischen Instrumenten bescrieben wird

b/w: Bion, Nicholas; Zwote Eröfnung der neuen mathematischen Werkschule Nicolaus Bions in welcher sowohl die Zubereitung als der Gebrauch verschiedener anderer mathematischen absonderlich der zur Geometrie und Optik gehörigen Instrumenten die im besagten Autor

nicht zu finden denen Liebhabern deutlich vor Augen geleget und erklaret werden

Year: 1765 Place: Nürnberg

Publisher: George Peter Monath

Edition: 2nd (German) Language: German

Figures: 20 engraved folding plates

Binding: contemporary bound three-quarter bound leather

Pagination: pp. [8], 48, 176 Collation:)(⁴A–F⁴)(⁴)()(²A–Y⁴ Size: 209x166 mm

Reference: Bud IOS, pp. 32-36

This posthumous edition, like the one bound with it, continues Doppelmayr's practice of adding his own descriptions to the original work. He claims the instruments are from the workshop of Bion, however, with a few exceptions (such as the pendulum clock), no description of them is found in the French editions of Bion. This edition is devoted to astronomical devices and draws on Doppelmayr's early work on globes. It also illustrates devices such as large astronomical quadrants and transit sighting instruments.

Illustrations available: Title page



B 165

B 166

Biot, Edouard Constant (1803–1850)

Table génerale d'un ouvrage Chinois intitulé [title in Chinese] souan-fa-tong-tsong ou collection des régles du calcul. Extract from Journal Asiatique. VIII, 1839.

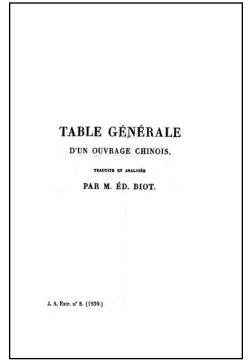
Year: 1839 Place: Paris Publisher: Imprimerie Royale Edition: offprint Language: French Binding: original paper wrappers

Pagination: pp. 27, [1] Size: 220x140 mm

Presentation copy: Offers à Monsieur Boner[?] de la par de l'auteur. E Biot

This is a short note commenting on elementary Chinese mathematics that Biot found in a book from the Royal Library.

Illustrations available: Title page



B 166

Biot, Edouard Constant, translator See **Babbage, Charles**; *Traité sur l'économie des machines et des manufactures*, 1833.

B 167

Bird, John (1709–1776)

The method of constructing mural quadrants. Exemplified by a description of the brass mural quadrant in the Royal Observatory at Greenwich.

> Year: 1768 Place: London

Publisher: W. Richardson and S. Clark

Edition: 1st Language: English

Figures: 3 folding engraved plates separately housed in a cloth

folder

Binding: later paper wrappers

Pagination: pp. 28 Collation: A–C⁴E² Size: 258x201 mm

Reference: Pogg Vol. I, p. 200; Gun AOW II, 319

See also the entry for **Bird**, **John**; *The method of dividing astronomical instruments*, 1767, London.

This volume is the second half of Bird's commitment to produce a full description of how he created the 8-foot mural quadrant. It is interesting in that Bird describes not only the details of his successful construction of the quadrant but also his failures (such as an attempt to create the telescope without bracing).

Illustrations available: Title page

B 168

Bird, John (1709–1776)

The method of dividing astronomical instruments.

Year: 1767 Place: London

Publisher: J. Nourse; and Mess. Mount and Page

Edition: 1st Language: English

Figures: 1 large engraved folding plate

Binding: later paper wrappers Pagination: pp. vi, 14 Collation: A–E² Size: 258x201 mm

John Bird was a major instrument maker in London. He began his career as a weaver but soon developed a part-time business helping watch face makers. He later worked for an instrument maker named Graham before opening his own instrument shop. He was commissioned to construct a large (8-foot radius) mural quadrant at the Royal Observatory at Greenwich (completed in 1749) when the earlier one done by Graham began to deform under its own weight. The Commissioners of Longitude (and, in particular, the Astronomer Royal, Neville Maskelyne) were responsible for the quadrant's construction and wanted to ensure that the methods used by Bird (then in business for some thirty-four years) would be available to his successors. In return for a sum of £500 (plus an additional £60 for engraved plates), Bird agreed to take an apprentice and instruct him for seven years and to present to the commissioners a full and complete description of how the quadrant scales were divided. This volume is the fulfillment of the written part of that commitment. The quadrant had actually been constructed seventeen years earlier, and one can presume that the commissioners were anxious to have all the plans and descriptions finished.

THE \mathbf{M} \mathbf{E} H D О OF Dividing ASTRONOMICAL INSTRUMENTS. By Mr. JOHN BIRD, MATHEMATICAL INSTRUMENT-MAKER, in the STRAND. Published by ORDER of the COMMISSIONERS of LONGITUDE. LONDON. Sold by John Nourse, in the Strand; and Meff. Mount and PAGE, Tower-Hill. MDCCLXVII.

B 168

Great care was obviously taken with the division of the scales. Bird describes how the brass quadrant scales and the pine beam compasses were left in a locked room over night so that they might stabilize to the same temperature. He also sketches out a method of dividing a scale by establishing a few elementary basic measurements and then using repeated bisections to create the other marks.

The one diagram is marked *Plate iv* because it is the fourth plate from his engraved plates of the quadrant (see entry for **Bird, John**; *The method of constructing mural quadrants. Exemplified by a description of the brass mural quadrant in the Royal Observatory at Greenwich*, 1768, for the other three).

Illustrations available: Title page

3 169

Birkhoff, Garrett (1911–); K. O. Friedrichs and T. E. Sterne, editors

Transactions of the symposium on fluid mechanics and computing held at New York University, April 23–24, 1953. The first symposium on applied mathematics sponsored by the American Mathematical Society and Office of Ordnance Research, U. S. Army

Year: 1954 Place: New York

Publisher: Interscience Publishers

Erwin Tomash Library

Edition: 1st Language: English

Binding: original cloth boards Pagination: pp. [iv], 243, [1] Size: 253x171 mm

Fluid flow is of interest to both the physics and military communities. In particular, the military applications are in the areas of airflow around planes and projectiles, through jet engines and in the behavior of explosives. Thus it was appropriate for both the academic and military groups to sponsor such a meeting.

This volume includes the papers presented at the 1953 meeting (with the exception of a talk given by John von Neumann on the *Role of Computing Machines*, but one can speculate that it was similar to a number of such talks he gave around this time in which fluid dynamics played a prominent role). The papers that are produced here deal with the theoretical aspects of problems, and there are few detailed references to any military applications.

Illustrations available: Title page

PRACTICAL USE OF THE SLIDE RULE

 $\mathbf{B}\mathbf{y}$

CALVIN C. BISHOP, E.E. Technical High School Buffalo, N. Y.

Edited By

PETER GREENLEAF, M.A.

Chairman, Science Department Eron Preparatory School Technical Editor

Current Publishing Co.

B 170

B 170

Bishop, Calvin Collier (1882–)

Practical use of the slide rule

Year: 1944 Place: New York Publisher: Current Publishing

Edition: 1st Language: English

Binding: original printed paper wrappers

Pagination: pp. 63 Size: 212x132 mm

Bishop was a teacher in the Technical High School in Buffalo, New York.

This is a generic text on the use of the slide rule. It contains a series of problems for the student, with answers, at the end.

Illustrations available: Title page

B 171

Bishop, Calvin Collier (1882–)

[Slide rule]

b/w: **Keuffel & Esser Company**; *Elementary instructions for operating the slide rule.*

b/w: Harris, Charles O.; Slide rule

Year: n/d

Place: Tehran, Shāh' Ābād Publisher: Kit-abfurūshī-i-Zavvār

Edition: 1st Language: Farsi

Binding: original printed paper wrappers

Pagination: pp. [4], 106 Size: 215x138 mm

This is a Farsi edition of this classic work on the slide rule. First published as *Practical use of the Slide rule*, 1944.

Illustrations available: Title page

B 172

Blachman, Nelson Meri (1923-)

A survey of automatic digital computers

Year: 1953

Place: Washington, D.C.

Publisher: Office of Naval Research

Edition: 1st Language: English

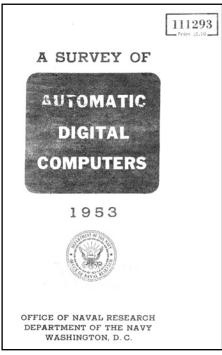
Binding: original cardboard wrappers

Pagination: pp. vi, 109, [1] Size: 267x184 mm

Blachman worked for the Office of Naval Research in Washington, D.C. Earlier surveys of computers had been done, but the rapid development of the technology had made them out of date. Blachman, with help from the others acknowledged in the Preface, undertook to bring the survey up to date. The work is useful because

it covers not only electronic stored program computers but also machines such as those constructed at Harvard by Aiken, relay computers built in Tokyo, British and European machines, and little-known projects such as the University of Toronto UTEC computer. No mention is made of the Zuse machines. Each entry gives technical details of the machine and short remarks that do not fit into any of the pre-assigned entry categories.

Illustrations available: Title page ERA 101 page



B 172

B 173

Blackburn, John E.

Components handbook

Year: 1949 Place: New York

Publisher: McGraw-Hill Book Company

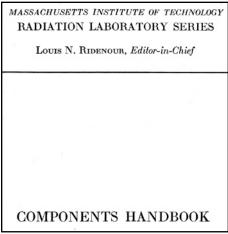
Edition: 1st Language: English

Binding: original cloth boards Pagination: pp. xviii, 626 Size: 230x145 mm

This is No. 17 in the Radiation Laboratory Series publications. It was intended as a reference work to accompany volumes 18–23 of the series. The volume was intended to be a broad survey of the field of electrical, mechanical and electronic components that were used by the Radiation Laboratory, but because of the decision to shut the Office of Publications, several chapters were

omitted. It represents a state-of-the-art survey of the technology in use at the time and includes everything from simple cables to elementary electronic devices, instrument motors, relays and vacuum tubes. It is heavily illustrated with photographs and diagrams of the devices as well as numerous tables giving characteristics and test results as determined by the Radiation Laboratory.

Illustrations available: Title page



B 173

B 174 **Blagrave, John** (1558?–1612)

The mathematical jewel. Shewing the making, and most excellent use of a singuler instrument so called: in that it performeth with wonderfull dexteritie, whatsoever is to be done, either by quadrant, ship, circle, cylinder, ring, dyall, horoscope, astrolabe, sphere, globe, or any such like heretofore devised: yea, or by most tables commonly extant: and that generally to all places from pole to pole.

Year: 1585 Place: London Publisher: Walter Venge Edition: 1st Language: English

Figures: 3 engraved frontispiece plates; 2 engraved full-page tables

Binding: contemporary limp vellum

Pagination: pp. [16], 124 Collation: $\P^4 \P^2 A - P^4 Q^2$ Size: 268x182 mm

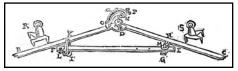
Blagrave was a mathematician, surveyor and instrument maker from Reading. Educated at St. John's College, Oxford, he never took a degree but returned to Reading, where he lived off the legacy of land left to him by his father. He left a legacy to the town of Reading (the sum of 20 *nobles* annually) to be competed for by three maid

servants selected by town parishes who were to cast lots for their prize money each Good Friday.

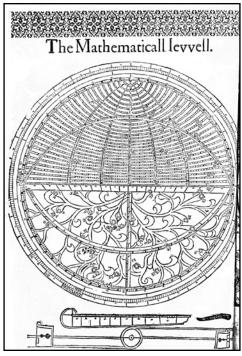
The instrument described is a planispheric astrolabe that had a universal projection modified from the Catholicon of Gemma Frisius—a description of which can be found in the second booke. Blagrave added a movable rete (often found on standard astrolabes but not on the Catholicon), which simplified its use for astronomical calculations. This astrolabe was universal in the sense that it did not require a number of different plates or maters to be used at different latitudes. The instrument is illustrated in a number of full-page engravings serving as frontispieces to the work—engraved by the author according to the title page. This was an expensive instrument to build and consequently was not much used. While this is the only edition of this work, the Jewel was described ten years later in a work by **Thomas Blundeville** (*Exercises*, 1622), and instruction in its use was also offered by Robert Hartwell, a London teacher of mathematics, in 1623 (see Waters, David Watkin; Art of navigation, 1958, p. 570).



B 174



Arc drawing instrument, B 174



Mathematical jewel, B 174

The work is divided into six *bookes*. The first deals with elementary concepts of astronomy; the second with the design and manufacturing of the jewel; the third with the use of the instrument for both navigation and astronomical calculations; the fourth considers the same material as the third, but the examples and methods of working come from Blagrave's own research; the fifth is a treatise on spherical triangles; and the last is a work on the use of the *jewel* in creating sundials of all types. For such a small volume, it is remarkably complete and would have made a very useful reference work even if one did not have a jewel to use. In the fourth book, Blagrave mentions that he had made a jewel two feet in diameter and that he had problems drawing all the arcs on it. He then illustrates a drawing instrument that would suffice in such a situation.

Blagrave is known to have made other instruments, in particular a *familiar staff*, which may have been an instrument for artillerymen.

The work contains a handwritten note which reads:

Here stands Mr. Gray master of this house
And his poor catt playing with a mouse.
John Balgrave marred this Grayes widdow (She was a
Hungerford) this John was symple had yssue by the widdowe
1 Anthony who marryed Jane Borlafs. 2 John the author of
the booke. 3 Alexander the excellent chess player in England.
Anthony had Sir John Blagrave knight who caused his teeth to
be all drawn out and after had a sett of ivory teeth in agayne.

Illustrations available:

Title page

Instrument plate 1

Instrument plate 2

Instrument plate 3

Arc drawing instrument

Inscription

B 175

Blaine, Robert Gordon

Quick and easy methods of calculating. A simple explanation of the theory and use of the slide rule, logarithms, &c. With numerous examples worked out.

Year: 1898

Place: London

Publisher: E. & F.N. Spon

Edition: 1st

Language: English Figures: 1 folding plate

Binding: original cloth boards

Pagination: pp. xii, 144, 2 Collation: A6B-K8

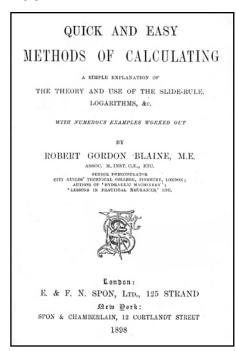
Size: 161x100 mm

Blaine was lecturer at the City and Guilds' Technical College in Finsbury.

This is a work on the slide rule containing an introduction to logarithms and using examples from mechanical and hydraulic engineering. The explanations are rather pedantic with few illustrations.

Illustrations available:

Title page



B 175

B 176

Blaine, Robert Gordon

Some quick and easy methods of calculating. A simple explanation of the theory and use of the slide rule, logarithms, etc. With numerous examples worked out.

Year: 1912.

Place: London

Publisher: E. & F.N. Spon

Edition: 4th

Language: English

Figures: 1 folding plate Binding: original cloth boards

Pagination: pp. xii, 152

Collation: A⁶B-K⁸L⁴

Size: 161x100 mm

Note the addition of *Some* to the title between the first edition and the fourth of 1912.

Illustrations available:

Title page

B 177

Blanquart de Sept-Fontaines, L. M.

Les intérêts des comptes courans tout calculés, quels qu'en soient et le taux et le capital, ou tables qui, pour le calcul de ces intérêts, soit qu'on les arrête une fois l'an seulemant, ou de six en six mois, soit encore qu'il s'agisse de négociations d'effets ou de prêt d'argent pour un nombre de jours quelqonque, n'exigent que la simple ouverture d'une page, et le secours de l'addition substituée aux longues opérations employées jusqu'à présent. Ces tables accommodées également aux deux styles français et grégorien, le dernier en faveur des lieux où l'on suit l'ere ancienne.

Year: 1802

Place: Paris

Publisher: Henri Agasse

Edition: 1st

Language: French

Binding: contemporary leather, tree grained; spine gilt; red

leather label

Pagination: pp. xvi, 378

Collation: a-b4A-3A43B1

Size: 252x185 mm

The most fascinating aspect of this work is that these interest tables were produced for use with both the old Gregorian and the new French calendar. The introduction states that Sept-Fontaines was attempting to produce a set of tables for commercial activity that would be as useful as those available to mathematicians.

Illustrations available:

Title page

Page of tables

LES INTÉRÊTS DES COMPTES COURANS TOUT CALCULÉS, QUELS QU'EN SOIENT ET LE TAUX ET LE CAPITAL, OU Tables qui, pour le calcul de ces Intérêts, soit qu'on les arrête une fois l'an seulement, ou de six en six mois, soit encore qu'il s'agisse de négociations d'Effets ou de Prêt d'argent pour un nombre de jours quelconque, n'exigent que la simple ouverture d'une page, et le secours de l'Addition substituée aux longues opérations employées jusqu'à présent. Ces Tables accommodées également aux deux Styles français et grégorien, le dernier en faveur des lieux où l'on suit l'ère ancienne; Par L. M. Blanquart Sept-fontaines. Ounce serpetiones utilitatem ad camque rapinur. Cicke. 3 Offic.

CHEZ HENRI AGASSE, IMPRIMEUR-LIBRAIRE, RUE DES POITEVINS, Nº. 18.

AN X. - 1802.

B 177

B 178 **Blaschke, Ernst** (1856–1926)

Vorlesungen über Mathematische Statistik. (Die lehre von den Statistischen Masszhalen)

Year: 1906

Place: Leipzig and Berlin Publisher: B. G. Teubner

Edition: 1st Language: German

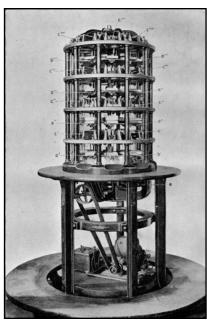
Figures: 5 photographic plates Binding: original cloth boards Pagination: pp. viii, 268 Collation: a⁴1–16⁸17⁶ Size: 223x151 mm

Ernst Blaschke was a professor at the Technischen Hochschule in Vienna.

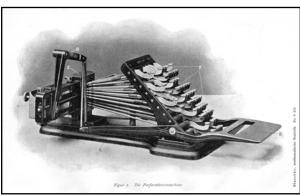
This volume is not directly concerned with calculating machinery until the last chapter, when the author describes some of the new punched card machinery. In particular, he briefly describes the **Hollerith** machines used for the U.S. census and also equipment developed specifically for the insurance industry by John K. Gore, an actuary at the Prudential Life Insurance Company. Gore's little-known system is illustrated with his card punch and sorting machine.

Illustrations available:

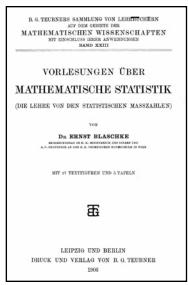
Title page Gore's card punch Gore's sorting machine



Gore's card sorter, B 178



Gore's card punch, B 178



B 178

Bloch, Richard Milton (1901–2000) See Mathematical tables and other aids to computation (MTAC)

Blom, Frans Ferdinand (1893–1963)

Commerce, trade and monetary units of the Maya

Year: 1935

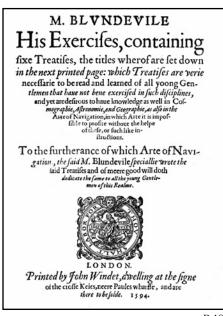
Place: Washington, D.C. Publisher: Smithsonian Edition: Extract Language: English Binding: wrappers, uncut Pagination: pp. 423-440 Size: 243x157 mm

This is an extract from the Smithsonian report for 1934, pp. 423-440. It is uncut.

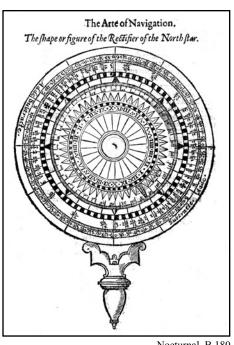
Illustrations available: Title page

Blount, Thomas (1857–1911)

See Addenda entry: Estienne, Henri; The art of making devises: treating of hieroglyphicks, symbols, emblemes, ænigma's, sentences, parables, reverses of medalls, armes, blazons, cimiers, cyphres and rebus. Fisrt written in French by Henry Estienne ... Translated into English, and embelished with divers brasse figures by T[homas] B[lount]. Whereunto is added, a catalogue of coronetdevises, both on the Kings and the Parliaments side, in the late warres. Paris, 1894.



B 180



Nocturnal, B 180

B 180

Blundeville, Thomas (fl.1560–1602)

His exercises, containing sixe treatises, the titles whereof are set down in the next printed page: which treatises are verie necessarie to be read and learned of all young gentlemen that have not bene exercised in such disciplines, and yet are desirous to have knowledge as well in cosmographie, astronomie, and geographie, as also in the arte of navigation, in which arte it is impossible to profite without the helpe of these, or such like instructions. To the furtherance of which arte of navigation, the said M. Blundevile speciallie wrote the said treatises and of meere good will doth dedicate the same to all young gentlemen of this realme.

> Year: 1594 Place: London Publisher: John Windet

Edition: 1st Language: English

Figures: 4 woodcuts with volvelles (3 original moving parts, one replacement), 1 folding plate, 2 folding tables

Binding: contemporary vellum

Pagination: ff. [7], 350 (misnumbered ff. 151 as 149)

Collation: A7B-2X82Y6 Size: 197x147 mm Reference: Cro CL, #90

Thomas Blundeville was educated at Cambridge, where he almost certainly met Edward Wright, who was to play a major role in the reform of navigation in England. After leaving Cambridge, he resided near Norwich, where he taught mathematics to the sons of the nobility. He is known as the author of a number of works, mostly dealing with horsemanship; however, some were about maps, globes and the use of instruments in navigation. He was well connected to the scientific establishment of his day, for among his friends were such notables as **Henry Briggs, Edward Wright, William Gilbert**, etc.

This is an important book in the history of navigation. Here for the first time the modern forms of the trigonometric functions of sine, tangent and secant were published in English (see essay on the sector for a description of the old forms based on a circle of given radius). These new tables, first suggested by **Peuerbach** and Regiomontanus about a hundred years earlier, had been long known to astronomers and mathematicians but had seldom been considered in the context of navigation. It is also the first description of navigation based on Mercator's projection (as revised by **Edward Wright**) to be available in English and also included the latest navigational techniques of continental European authors. Blundeville occasionally added his own observations on minor points (such as noting that large astrolabes are more accurate, but they have a tendency to blow in the wind, and thus the smaller, heavier Spanish astrolabes are more practical for use on a ship).

The work begins with the elements of arithmetic, including fractions and square roots. The necessity for knowing of square roots is justified by the strange example, occasionally seen in other works from this era, of a sergeant needing to arrange his men in square formation on the battlefield. The arithmetic proceeds with a discussion of sexagesimal numbers (degrees, minutes and seconds) and how they are manipulated and included is a large foldout multiplication table for sexagesimal numbers.

The second major section contains the tables of sines, tangents and secants. In his introduction he credits **Peuerbach** and **Regiomontanus** with the concept and indicates that the tables he is reproducing were first done by **Regiomontanus** in folio and recently corrected by **Clavius**. The values given for sine range between 4 and 7 places of decimals, depending on their position in the table. Tangent values range from 4 to 11 decimal digits while secants are between 8 and 11 digits.

The third book describes spherical trigonometry and the calculations necessary for navigation. It presents a graphical process (using only a protractor and straight edge) for determining the distances between any two points when knowing only their longitude and latitude. A treatise on the use of the terrestrial and celestial globes then follows.

The next section discusses the map, not shown, created by Petrus Plancius in 1592. Not only does Blundeville describe the areas shown on the map, but he also covers the people, rulers and climates of each location. The descriptions are often remarkably detailed. For example, the city of *Catan* (Canton?) in China is noted as being surrounded by walls that extend for twelve Italian miles and three hundred fifty paces and *which is more than foure houres journey, not reckoning the suburbs, which are very large and full of people.* He also mentions the Great Wall (*which hath in length 400 Spanish Leagues*) and explains why it was constructed. Some of these facts so impressed an earlier owner that they are pointed out in marginal inscriptions. The facts about the Great Wall have been recopied onto the blank first leaf.

Pages 280 to 303 contain a description of the *mathematical jewel* or astrolabe of **Blagrave**. While the instrument is not illustrated, each of its component parts is described in some detail. Blundeville does not present **Blagrave**'s entire text but limits himself to the subject of navigation. For example, he does not describe, as did Blagrave, the use of the instrument in creating sundials. It seems clear that if a *jewel* were at hand, Blundeville's text would be sufficient for use by a navigator.

The last section of the book is entitled *A new and necessaire Treatise of Navigation*, a title that gives only a general indication of its wide-ranging content. The section begins with a description of the cross-staff (Jacob's staff), the mariner's astrolabe (mariner's ring) and the magnetic compass. Notable is a description of a nocturnal or *Rectifier of the North Star* (one of the few instruments illustrated). There is also a section on calendar computation, in particular the calculation of Easter and other movable festivals. This latter can be considered an example of finger reckoning in that the calculation of calendar items such as the Epact are accomplished by counting off various spaces on the left thumb.

It was in this last section on navigation that Blundeville (p. 326) indicates that (see illustration)

... Mercator hath in his universal carde or Mappe made the spaces of the Parallels of latitude to be wider euveie one than other from the Equinoctiall towards either of the Poles, by what rule I knowe not, unlesse it be by such a Table, as my friend E. Wright of Cais colledge in Cambridge at my request sent me (I thanke him) not long since for that purpose...

There was a second edition in 1597 and a seventh in 1636.

Illustrations available:

Title page

Sexagesimal multiplication table

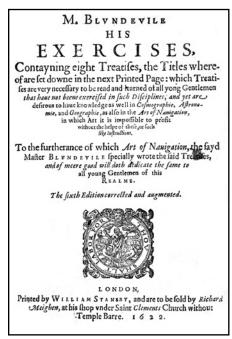
Sine table

Tangent table

Secant table

Nocturnal

Wright's table



B 181

B 181

Blundeville, Thomas (fl. 1560-1602)

His exercises, contayning eight treatises, the titles whereof are set downe in the next printed page: which treatises are very necessary to be read and learned of all yong gentlemen that have not beene exercised in such disciplines, and yet are desirous to have knowledge as well in cosmographie, astronomie, and geographie, as also in the art of navigation, in which art it is impossible to profit without the helpe of these, or such like instructions. To the furtherance of which art of navigation, the sayd Master Blundevile specially wrote the said treatises, and of meere good will doth dedicate the same to all young gentlemen of this realme.

Year: 1622 Place: London

Publisher: William Stansby for Richard Meighen

Edition: 6th Language: English

Figures: 2 folding plates [pp. 72, 695], 3 folding plates [pp. 786 (2), 798]; 4 volvelles [pp. 315, 660, 720, 744]

Binding: modern three-quarter bound morocco

Pagination: pp. [16], 799, [1]

Collation: A-3E⁸ Size: 200x143 mm

Reference: Tay MP1, #27; Ken, #1499

Although this edition is *corrected and augmented* according to the title page, it is substantially identical to the first edition. Included are **Blagrave**'s *Mathematicall Jewel* (1585), Molyneaux's globes (1592), **Hood**'s cross-staff (1590) and **Gemma Frisius**' *quadratum nauticum* and accounts of a number of explorations, including the voyages of Drake and Cavendish. The closing section entitled *A brief description of universall maps and cards* contains several references to America.

Illustrations available:

Title page

OTTO BOEHN

VON GEHEIMNISVOLLEN MASSEN, ZAHLEN UND ZEICHEN

MIT 1 TITELBILD, 18 KUNSTDRUCK-BLÄTTERN UND 24 TEXTABBILDUNGEN



VERLAG BERNHARD SPORN, ZEULENRODA LEIPZIG

B 182

B 182

Boehn, Otto

Von geheimnisvollen Massen, Zahlen und Zeichen

Year: 1929 Place: Leipzig

Publisher: Bernhard Sporn

Edition: 1st Language: German

Binding: original cloth boards

Pagination: pp. 118 Collation: 1–7⁸8³ Size: 187x123 mm

This is a work describing mathematical ideas in architecture. The examples are drawn mainly from churches in Austria and Germany. It includes a short discussion of π and its calculation.

Illustrations available:

Title page



B 183

B 183

Boesel, Rudolf

Die Lochkarte im Fabrikbetrieb. Rationalisierung des industriellen Rechnungswesen mit Hilfe des Lochkartenverfahrens.

> Year: 1930 Place: Berlin

Publisher: Carl Heymann Edition: unknown, likely 1st Language: German

Figures: 6 photographic plates Binding: original paper wrappers

Pagination: pp. [2],100 Collation: π^1 1–68 72 Size: 296x201 mm

This is a tutorial on the use of the Powers punched card tabulating equipment in industrial accounting. In



Powers tabulating machine, B 183

general, the Powers equipment is similar in function to the punched card tabulating equipment produced by IBM but differs in that while the IBM equipment transmits its signals via electrical connections, the Powers equipment performs the same job mechanically via moving wires.

Illustrations available:

Title page

Powers tabulating machine

Boethius, Anicius Manlius Severinus (ca.480-524/525)

Arithmetica Boetij

Year: 1488 Place: Augsburg

Publisher: Erhard Ratdolt

Edition: 1st Language: Latin

Figures: 7 pp. of ms. notes and figures at end

Binding: modern brown morocco

Pagination: ff. 48 Collation: a-f8 Size: 195x147 mm

Reference: Smi Rara, p. 25; Goff IAL, B828; Rcrdi BMI I, p.

From a distinguished patrician family, Boethius has been described as the last Roman and the first scholastic philosopher. While little is known of his early life and how he obtained his formidable Greek education, it is speculated that he studied in either Athens or Alexandria. Boethius's abilities secured him one of the highest positions in the Ostrogothic kingdom, but the Arian king Theodoric, apparently suspecting a plot with the Byzantine emperor Justin I, had him arrested and executed. While awaiting execution, he wrote his famous philosophical work Consolatione Philosophiae.

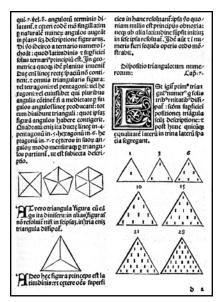


First page, B 184

This Arithmetic, dedicated to Boethius's father-in-law, Aurelius Memmius Symmachus, was part of a project to produce a text for each of the four mathematically oriented disciplines: arithmetic, music, geometry and astronomy. He termed these four subjects the quadrivium, a term that was in use in European schools until well after the Middle Ages. There is no indication he ever managed to complete this project—as only his works on arithmetic and music survive. In this volume, Boethius adheres to the early Greek idea of arithmetic as something more akin to modern number theory than anything of a practical nature (the Greeks would have termed the process of doing arithmetical operations as logistic rather than arithmetic).

This work is loosely based on the Greek *Arithmetica Eisagoge* of **Nicomachus of Gerasa** (fl.100AD). It contains little or nothing original to Boethius, but it was presented in Latin in such a way that it appealed to the medieval scholar and became the standard work from which such subjects were taught for almost 1,000 years. The subject matter originated with Pythagoras (ca. 540 BC) and his followers, who developed a philosophy based on numbers and their symbolism. Nicomachus was a Pythagorean, and we can easily trace the origins of most of this work back to Pythagoras himself (or at least to his era).

The work is heavily concerned with sequences and ratios between values—something that stemmed from the Greek difficulty with fractions and fractional notation. A large, well-laid-out multiplication table is the same as in earlier manuscript copies with the exception that here, and in the rest of the text, the newer Hindu-Arabic



Triangular numbers, B 184

numerals are used rather than the original Roman variety. Another major topic, again stemming from Pythagoras, is figurative numbers (those that can be arranged into geometric shapes such as triangles, squares, cubes, etc).

This copy ends with seven pages of early (contemporary?) manuscript notes and diagrams relating to the movements of Saturn, Jupiter, Mars, Venus, Mercury, the sun and the moon.

Illustrations available:

Diagram with sequences

First page

Multiplication table

Page with triangular numbers

Venus manuscript diagram and notes

Colophon

B 185

Boethius, Anicius Manlius Severinus (ca.480–524/525)

Arithmetica, duobus discreta libris; adiecto commentario, mysticam numerorum applicationem perstríngente, declarata.

Year: 1521 Place: Paris

Publisher: Simon Colines [Colinaeus]

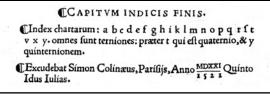
Edition: 16th Language: Latin

Binding: contemporary vellum

Pagination: ff. 138 Collation: a–s⁶t⁸v–x⁶y¹⁰ Size: 275x200 mm

Reference: Rcrdi I, 140; DeMorgan, p. 13

This is the first edition of Boethius' Arithmetica with the addition of the commentary by Girardus Ruffus (Gérard Roussel). Smith (Rara) indicates that This commentary greatly exceeds the text in extent, and as to ponderosity it leaves little to be desired. As a piece of typography, however, this is one of the best editions of Boethius. To a great extent, the commentary by Ruffus seems to rely on the work of Nicolaus Cusanus. For what little is known of the commentator, see the listing in this catalog for Roussel, Gérard. The work includes several diagrams, which help in the explanation. In particular, there is a large circular diagram that relates the Greek alphabetical number system to the Hindu-Arabic (on the innermost circles of the illustration) and indicates some of the properties of each value.



Colophon, B 185

Illustrations available:

Title page Circular diagram relating numbers Page with figurative numbers Page with numerical sequences Colophon



B 185

In hoc libro contenta. Epitome compendio ag introductio in libros Arithmeticos diui Seuerini Boetij adiecto familiari commentario dilucidata. praxis numerandi certis quibuldam regulis confiricta. Introductio in Geometriam breuiulculis an notationibus explanata lex libris diffincta, primus de magnitudinibus et earú circultantiis. Scdus de colequetibus/cotiguis/& cotinuis. Tertius de punctis. Quartus de lineis. Quintus de fuperficiebus. Sextus de corporibus. Liber de quadratura circuli.

B 186

B 186

Boethius, Anicius Manlius Severinus (ca.480–524); [Faber Stapulensis (1455–1536) and Clichtove, Josse (1472–1543), editors]

perspectiua introductio.

Insuper Astronomicon.

In hoc libro contenta. Epitome compendiosaque introductio in libros arithmeticos divi Severini Boëtii: adjecto familiari commentario dilucidata. Praxis numerandi certis quibusdam regulis constricta. Introductio in geometriam breviusculis annotationibus explanata sex libris distincta. Primus de magnitudinibus et earum circumstantiis. Secundus de consequentibus contiguis & continuis. Tertius de

punctis. Quartus de lineis. Quintus de superficiebus. Sextus de corporibus. Liber de quadratura circuli. Liber de cubicatione sphere. Perspectiva introductio. Insuper astronomicon.

Reference: Smi *Rara*, pp. 29, 80–81; Ada *CBCE*, F17 Ren, p. 1; Rcrdi *BMI* I, p. 142–143; DeM *AB*, p. 3

Jodocus Clichtoveus was born Josse Clichtove in Nieuport, Belgium but spent most of his life in France editing early books in mathematics. See the entry for **Jordanus**, 1514, for remarks on Faber Stapulensis.

As **Smith** (*Rara*, p. 30) points out, the various early editions of Boethius' *Arithmetic* differ only in the combination of works they contain. In this edition Clichtoveus and **Faber Stapulensis** added material that would have fitted neatly into the curriculum of the quadrivium, namely works on the basic arithmetical operations, geometry and astronomy. The work on geometry is richly illustrated with marginal diagrams.

Illustrations available:
Title page
Geometry page
Astronomy colophon

Id opus impresserūt Volphgangus
hopisius et Henricus stephanus
ea in arte socii in Almo pari=
storumstudio Anno Chri
sti Celorum totius
nature coditoris.
1503. Dievice
simalepti=
ma Iu=
nii.

Astronomy colophon, B 186

B 187

[Boethius, Anicius Manlius Severinus (ca. 480–524)]; Jacobus Faber Stapulensis (1455–1536) and Johann Jacobi Scheubel

Fabri Stapulensis in arithmetica Boëthi epitome, unà cum difficiliorum locorum explicationibus & figuris (quibus antea carebat) nunc per Joannem Scheubelium adornatis & adjectis. Accessit Christierni Morsiani arithmetica practica, in quinqe partes digesta: quarum I. est de numeris integris. II. de fractionibus vulgaribus & physicis. III. de regulis quibusdam.

IIII. de progressione & radicum extractione. V. de proportionibus.

Year: 1553 Place: Basel

Publisher: Henricus Petrus

Edition: 10th Language: Latin Binding: paper wrappers Pagination: pp. 144 Collation: A–I⁸ Size: 161x102 mm

Reference: Smi Rara, p. 522; Rcrdi BMI II, p. 165

This edition of Boethius' *Arithmetic*, with comments by **Faber Stapulensis**, was produced by **Johann Scheubel** (1494–1570), who was a professor of mathematics at Tubingen. See the entry for **Jordanus**, 1514, for comments on Faber Stapulensis.

Illustrations available: Title page Colophon

[Boethius, Anicius Manlius Severinus]

See **Jordanus de Nemore**; In hoc opere contenta arithmetica decem libris demonstrata, 1514.

B 188

Boffito, Giuseppe (1869–1944)

Gli strumenti della scienza e la scienza degli strumenti. Con l'illustrazione della tribuna di Galileo

Year: 1929 Place: Florence Publisher: Seeber Edition: 1st Language: Italian

Figures: 136 lithograph plates Binding: original paper wrappers Pagination: pp. xvi, 217, [3] Collation: $\pi^81-13^814^6$ Size: 250x177 mm

Reference: Not in Rcdi BMI

The prolific Barnabite priest and bibliographer Boffito, is noted not only for his exegesis of Dante's *Divine Comedy*, but also for initiating the *Bibliografia Galileiana*.



Galileo sector, B 188



B 188

The present work, which discusses a collection of scientific instruments, emphasizing those associated with Galileo, was issued in an edition of three hundred, only a hundred and eighty being offered for sale. The others were apparently distributed to scholars—this is the copy owned by Henry Guerlac. The first part of the text discusses the origins and evolution of scientific instruments, including other European and Arabic devices, and the second part discusses the origin of museums devoted to them.

The plates illustrate scientific instruments from all fields, mainly as shown in early printed books but occasionally as photographs. The plates also include a copy of the eleven-page manuscript of the first inventory of the Collezione Medicea agle Uffizi, 1654.

Illustrations available:

Front cover

Title page

Photo of Galileo sector

B 180

Boisseau, Jean (fl.1637–1658)

Methode tres facile pour se servir de sinopse ou tableau circulaire tres utile et necessaire pour toutes sortes de personnes, & principalement ceux qui se plaisent à la science d'arithmetique avec une declaration de la valeur des poids & measures

Year: 1637 Place: Paris

Publisher: Jean Boisseau Edition: Broadside Language: French Figures: broadside Binding: none

Pagination: two sheets joined together.

Size: 550x403 mm

Jean Boisseau was a French geographer and genealogist who had an appointment as *Enlumineur du Roi*.

This is a multiplication table in the form of a large circular volvelle (lacking the movable pointer). The device consists of thirty-seven concentric circles containing multiples of numbers found in the innermost circle. To multiply, one found the number (or one of its components, as after 10, only multiples of 10, 100, or 1000 are shown) in the innermost circle, then moved the pointer (which evidently had the same markings as the sector with the multiples of 1 inscribed in it) to that sector. The product could be found by inspecting the value in the outer circle corresponding to the multiplier (or one of its components).

The conversion table on the second sheet gives various systems of weights and measures for different goods: cloth of various kinds and origins, grains, wine, gold, time and distance, with the factors for converting them to the French systems.

This device was known to **Harsdörffer** (see entry for **Schwenter**, **Daniel** and **Harsdörffer**, **Georg Phillip**; *Deliciae physico-mathematicae*, 1651), who reproduced a modified version. **Leupold** (*Theatrum*, 1727) also reproduced a version but had to rely on **Schwenter**'s example as he could not find an original. No other original example of this work is known.

Illustrations available:

Several scans, each showing a portion of the large instrument.

B 190

Boissière, Claude de (1554–1608)

L'art d'arythmetique contenant toute dimention, tres singulier et commode, tant pour l'art militaire, que autres calculations

Year: 1554 Place: Paris

Publisher: Annet Briere

Edition: 1st Language: French

Binding: modern leather; covers gilt embossed; gilt spine

Pagination: ff. 72 Collation: A–I⁸ Size: 170x105 mm

Reference: Smi Rara, pp 260-262

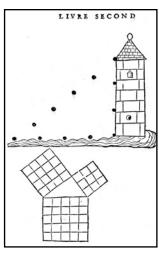
Claude de Boissière was a philosopher, astronomer, mathematician and musician born near Grenoble.

This arithmetic book is considered by some to have been written for students at the University of Paris. **Smith** (*History of mathematics*) prefers to classify Boissière as a dilettante of mathematics.

The text is a combination of an elementary practical arithmetic and a discussion of theoretical aspects much like those treated by **Boethius**. It not only begins with simple numeration but carries this to the extreme. It mentions the usual orders such as units, tens, hundreds, etc. but also extends the system to *Mille de Quintillions* (thousands of quintillions). It is interesting that this section gives names for orders such as *bimillions* (a million million), *trimillions* (a million million million), *quadrimillion*, etc. but then indicates that it is suitable to shorten these names to *billion* or *trillion* to avoid confusion.



B 190



Pythagorean example, B 190

After treating the four standard arithmetical operations (the only interesting variant is that he does subtraction very differently from the way it is done today—see illustration), he proceeds to a second book, in which he treats the more theoretical subjects. He considers not only the usual Boethian type of figurative numbers but

also regular solids as well and some elementary survey problems illustrated with a diagram of the Pythagorean theorem. The work concludes with an interesting multiplication table that shows the names of relations between various numbers.

Illustrations available:

Title page Subtraction Figures with regular faces Pythagorean example Multiplication table Colophon

De subfraction. Sybltraction est, substraire yn nombre & yne quatité d'yne somme pour auoir notoire le le reste. En laquelle sont troys quantitez à considerer, c'estascauoir la somme, le nombre à substraire & le reste que les marchandz difent debte, paye, reste. Lesquelles troys quatitez sont designées par lexéple suyuant en ces trois lettres A B C. Reste 939973901C. Debte ou somme 184006503A. Paye ou à Substraire 900032602B. Et es soit estrange si vay mis le reste de ce ste Substraction au dessus, contre la coufiume des autres, carcen est no plus que

Subtraction example, B 190

B 191

Boissière, Claude de (1554–1608)

L'art d'arithmetique, contenant toute dimension: tres singulier & commode, tant pour l'art militaire, que pour la geometrie, & autres calculations ... Reveu & augmenté par Lucas Tremblay ...

Year: 1563 Place: Paris

Publisher: Guillaume Cavellat

Edition: 2nd Language: French

Binding: contemporary vellum

Pagination: ff. 72 Collation: A–I⁸ Size: 170x105 mm

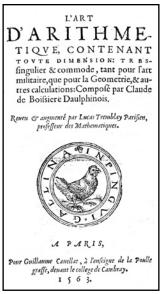
Reference: Smi Rara, pp. 260-262

This is the second edition of *Nobilissimus et antiquissimus ludus Pythagoreus*. Other than obvious typographic changes that have taken place (non now replaces $n\tilde{o}$, etc.) the content of this edition is unchanged from that of the first.

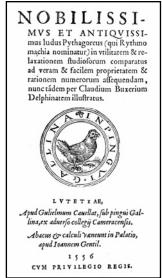
Illustrations available: Title page



Gaming pieces, B 192



B 191



B 192

B 192

Boissière, Claude de (1554–1608)

Nobilissimus et antiquissimus ludus Pythagoreus (qui Rythmomachia nominatur) in utilitatem & relaxationem studiosorum comparatus ad veram & facilem proprietatem & rationem numerorum assequendam ...

Year: 1556 Place: Paris

Publisher: Guillaume Cavellat

Edition: 1st Latin Language: Latin

Binding: contemporary blind stamped leather; vellum end

papers Pagination: ff. 52 Collation: A–F⁸G⁴ Size: 170x110 mm Originally published in French in 1554, this Latin edition followed two years later. Boissière considered himself a mathematics teacher and used the game of Rythmomachia as a vehicle for teaching arithmetic.

Smith (*History of Mathematics*) indicates that *Of the three standard treatises on the ancient number game of Rythmomachia ... this is the clearest*. All three are represented in this collection (see entries for **Barozzi**, 1572, and **Jordanus**, 1514), and the other entries should be consulted for details. It is perhaps the clearest because it is, by far, the longest of the three and thus contains more detailed explanations of everything from the shape of the game board to the shapes of the pieces. According to Folkerts, Boissière's history of the game is faulty.

An English translation of this work is in J. F. C. Richards, "Boissière's Pythagorean game," *Scripta Mathematica*, vol. 12 (1946) pp. 177–217.

Illustrations available: Title page

Some of the gaming pieces



B 193

Bolaffio, Jozé Vita

Numeros certos para formar as combinaçõens de cambio entre a Praça de Lisboa e diversas outras Praças da Europa que tem cambio estabelecido com a mesma.

Year: 1803 Place: Vienna

Publisher: Mathias André Schmidt

Edition: 1st

Language: Portuguese

Figures: printed engraved table Binding: contemporary paper wrappers Pagination: pp. [14], [2]

Size: 191x152 mm

This set of tables relates the currency of Lisbon to that of several major European trading centers.

Illustrations available: Title page

B 194

Bolle, Georges, editor

Conférence sur les applications des machines statistiques au P. -L.- M.

Year: 1930 Place: Nancy

Publisher: Imprimerie Berger-Levrault

Edition: 1st Language: French

Figures: 2 photographic plates Binding: original paper wrappers Pagination: pp. 22, [10]

Size: 270x180 mm

These are the proceedings of a conference on punched card tabulating machines held in Paris. There is little technical detail, but several interesting photographs show the participants at the conference banquet or watching demonstrations of the equipment in use.

Illustrations available: Front cover

Bond, Henry (ca.1600–1678)

See **Phillippes**, **Henry**; *The sea-mans kalendar: or, an ephemerides of the sun, moon, and certain of the most notable fixed stars*, 1674.

B 195

Bonelli, Maria Luisa Righini

Catalogo degli strumenti del Museo di Storia della Scienza

> Year: 1954 Place: Florence Publisher: Olschki Edition: 1st Language: Italian

Figures: 16 photographic plates (1 folding)

Binding: contemporary quarter leather boards; spine gilt

Pagination: pp. viii, 394, [2] Size: 234x162 mm

Reference: Not in Redi BMI

This is a catalog of the scientific instruments in the collection housed in the Museo di Storia della Scienza in Florence. The section on mathematical instruments

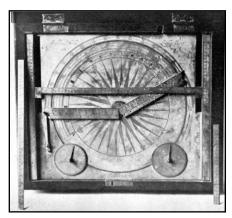
is significant as it contains an entry for and photograph of the mechanical geared sector invented by **Samuel Morland**.

Illustrations available:

Title page

Samuel Morland's mechanical sector

Catalogue entry for Morland's mechanical sector



Morland's sector, B 195



B 196

B 196

Bonet de Lates (Boneto, Hebræo) (? –1514 or 1515)

Annuli astronomici utilitatu[m] liber ad Alexandrum sextu[m] Po[n]tifice[m] maximum

Year: 1558 Place: Paris Publisher: G. Cavellat

Edition: 1st (Collected, 2nd issue)

Language: Latin Binding: modern vellum

Pagination: ff. 8, 159, [1] (i.e. ff. 103v-117)

Collation: A⁸a–v⁸ Size: 162x106 mm

Reference: H&L, #2589, p. 588

Bonetus Hebraeus, as he is sometimes known, was a physician and astrologer to Pope Alexander VI. This work deals with a design for an astrolabe that could be made into a ring for his Pope. The device is completely impractical because of its small size but would have made a very impressive bit of jewelry.

Illustrations available:

Title page with ring illustration

Bonnycastle, John, editor

See **Bossut, Charles**; A general history of mathematics from the earliest times, to the middle of the eighteenth century, 1803



B 197

B 197

Bonocchi, Giovanni Battista

Breve, et universale risolutione d'aritmetica, con la quale facilmente ogn'uno potrà rittouar, qual si voglia sorte di misura di terra all'uso del stato di Milano, & in ogni parte, doue si và à pertica.

Year: 1617 Place: Lodi

Publisher: Paolo Bertoetti

Edition: 2nd Language: Italian Binding: original paper wrappers Pagination: pp. [4], 72

Collation: *2A–I⁴ Size: 261x191 mm

Reference: Smi Rara, p. 347; Rcdi BMI, Vol. I, p. 154

This is a set of tables for converting units of measurement used in and around Milan. The first two pages provide a very short explanation, and the rest of the work is made up of the tables.

Illustrations available: Title page Page of tables

B 198

Boole, George (1815–1864)

An investigation of the laws of thought on which are founded the mathematical theories of logic and probabilities

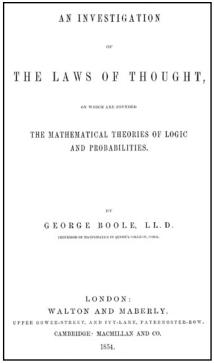
Year: 1854 Place: London Publisher: Macmillan Edition: 1st Language: English

Binding: modern leather; gilt spine; red leather label

Pagination: pp. [12], 426, 6 Collation: *6B–2E⁸ Size: 224x138 mm

The son of a Lincolnshire cobbler who was also an amateur mathematician and lens grinder, George Boole was a promising student, but his family circumstances prevented him from obtaining more than an ordinary school education. After leaving school at age 15, he found work as an assistant teacher in the area and, with his father's encouragement, set up his own school. In his spare time he mastered Latin, Greek and several European languages, as well as mathematics.

He found ample opportunity to satisfy his wide-ranging intellectual curiosity when, in 1834, the Mechanics Institution was founded in Lincoln, and Boole was hired to be in charge of the reading room. His first mathematical paper appeared in 1840, when he was 25 years old, and in 1844 his seminal paper, "On a general method of analysis," appeared in the *Philosophical Transactions of the Royal Society*, which resulted in his receiving the first Royal Society Gold Medal for Mathematics. His most famous work, which established the principles of symbolic logic, is *The mathematical analysis of logic, being an essay towards a calculus of deductive reasoning*, published in 1847.



B 198

In 1849, he was appointed to the professorship of mathematics at Queen's College, Cork, despite his lack of formal qualifications. He made many contributions to mathematics, but his most significant work was the creation of mathematical logic. Several people, most notably **Leibniz** and **DeMorgan**, had attempted some type of algebraic treatment of logic prior to Boole, but none had managed to overcome the difficulties that arose when considering anything beyond the most trivial situations.

Boole's entry into this field was due to a simple argument between **DeMorgan** and the Scottish philosopher W. Hamilton. Hamilton had derided some of **DeMorgan**'s attempts to introduce the systems of algebra into logic, asserting that logic was the realm of the philosopher and that mathematics was dangerous and useless. Boole, using Hamilton's own arguments, showed that logic was not part of philosophy. He then proceeded to examine whether logic, like geometry, might be founded on a group of axioms (see entry for Boole, *The mathematical analysis of logic*, 1847).

In recent times, Boolean logic has found widespread use in the design of digital computers and communications systems.

In the present book, Boole applied algebraic methods to logic and initiated a revolution in mathematics, to say nothing of philosophy and linguistics. While his earlier publications presented preliminary results, this volume provided a complete exposition of Boole's system, which was, indeed, the description of an entirely new form of algebra.

The work is dedicated to John Ryall, Professor of Greek in Queen's College, a personal friend and uncle to Boole's wife.

Illustrations available:

Title page

THE MATHEMATICAL ANALYSIS

OF LOGIC,

BEING AN ESSAY TOWARDS A CALCULUS OF DEDUCTIVE REASONING.

BY GEORGE BOOLE.

'Επικοινωνοῦσι δὶ πάσαι αὶ ἐπιστῆμαι ἀλλιβλαιε κατὰ τὰ κοινά. Κοινὰ δὰ Μέγω, οἰς χρώνται ἀκ ἐκ τούτων ἀποδεικνύστεν ἀλλ' οἰ περὶ ὧν δεικνύονσιν, οἰδε δ δεικνύονσι.

ΑΒΙΝΤΟΤΙΕ, Απαί. Ροεί., lib. 1. cap. ΧΙ.

CAMBRIDGE:

MACMILLAN, BARCLAY, & MACMILLAN;
LONDON: GEORGE BELL.

1847

B 199

B 199

Boole, George (1815–1864)

Size: 205x128 mm

The mathematical analysis of logic, being an essay towards a calculus of deductive reasoning.

Year: 1847
Place: Cambridge
Publisher: Macmillan, Barclay & Macmillan
Edition: 1st
Language: English
Binding: modern paper boards
Pagination: pp. [2], 82
Collation: π²B–F⁸

This is Boole's first work on logic, in the introduction to which he first refuted W. Hamilton's claim that logic was a part of philosophy and that no mathematician could possibly contribute anything to this field (see remarks in

the first entry for **Boole** and entries for **DeMorgan**). It was this volume that began the revolution that led to the development of mathematical logic.

Illustrations available: Title page

B 200

Boole, George (1815–1864)

Studies in logic and probability

Year: 1952 Place: La Salle, IL

Publisher: Open Court Publishing

Edition: 1st Language: English Figures: portrait frontispiece

Binding: original cloth boards; with dust jacket

Pagination: pp. 500 Collation: A–2G⁸2H¹⁰ Size: 210x137 mm

This is volume 1 of Boole's papers, edited by R. Rhees. In addition to the original works (from the 1847 *Mathematical analysis of logic* to an 1862 work, *On the theory of Probabilities*) and editorial notes, it contains Boole's own annotations and revisions that he may have made in subsequent years.

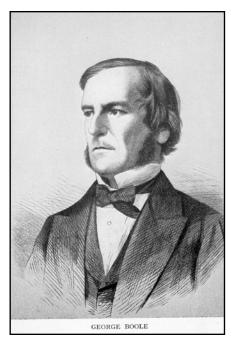
Illustrations available:

Title page with frontispiece of Boole's portrait.

Studies in Logic and Probability

GEORGE BOOLE

THE OPEN COURT PUBLISHING COMPANY
LA SALLE, ILLINOIS



George Boole, B 200

B 201

Boole, George (1815–1864)

A treatise on the calculus of finite differences.

Year: 1860 Place: Cambridge Publisher: Macmillan Edition: 1st Language: English

Binding: original cloth boards Pagination: pp. [viii], 248 Collation: $\pi^41-15^816^4$ Size: 190x126 mm

This work contains material for which George Boole was well known in his lifetime but which is now so completely overshadowed by his contributions to mathematical logic as to be almost forgotten.

Illustrations available: Title page

B 202

Booth, Andrew Donald (1918-)

Numerical methods

Year: 1955 Place: London

Publisher: Butterworths Scientific Publications

Edition: 1st Language: English

Binding: original cloth boards Pagination: pp. viii, 196 Size: 218x136 mm A TREATISE

ON THE

CALCULUS OF FINITE DIFFERENCES.

BY

GEORGE BOOLE, D.C.L.

HONORARY MERINER OF THE CAMBRIDGE PHILASOPHICAL SOCIETY: PROPERSOR OF MATHEMATICS IN THE QUEEN'S UNIVERSITY, IMPLAND.

Cambridge:

MACMILLAN AND CO.

AND 23, HENRIETTA STREET, GOVENT GARDEN,

Hondon.

1860.

(The right of Translation is reserved.)

B 201

Booth was a member of staff at Birkbeck College in London. He became interested in computation early in his career. Immediately after World War II, he had an opportunity to visit the United States and see computer developments there. In particular, he spent some time at the Institute for Advanced Study. Upon his return to England, he commenced the construction of a small relay-based computer (he was unable to afford electronic components, and, more importantly, the infrastructure that would be required to both experiment with and construct the final circuits). He was aided in this project by his father, a fine mechanical engineer, and Miss Kathleen Britten, who later became his wife. These projects are described in the works noted in other entries.

Booth was known for the creation of a number of computing machines all based upon the same basic design. He and his father eventually went into business as Wharf Engineering and produced magnetic drums that were widely used on early computers. In the early 1960s, Booth again visited the U.S., then moved to Canada as dean of engineering at the University of Saskatchewan, where he continued to make small transistor computers for experimental use. He later became president of Lakehead University in Canada.

This work on numerical methods was published just as the computer revolution was beginning and was one of the first books to be oriented towards this new technology. The students who used this text at Birkbeck College were introduced to the world of computers much earlier than others studying numerical methods and, as a consequence, were often subjected to much less of the drudgery of hand computation than their contemporaries.

Illustrations available: Title page

NUMERICAL METHODS

Bv

ANDREW D. BOOTH, D.Sc.

Reader in Computational Methods, University of London

BUTTERWORTHS SCIENTIFIC PUBLICATIONS 1955

B 202

B 203

Booth, Andrew Donald (1918-)

Two calculating machines for X-ray crystal structure analysis In Journal of Applied Physics, Volume 18, No. 7, July 1947.

Year: 1947

Place: Lancaster, PA

Publisher: American Institute of Physics

Edition: 1st Language: English

Binding: original paper wrappers Pagination: pp. 664–666

Size: 269x201 mm

This short paper describes two analog machines of use in the analysis of crystal structures. The first is rather specialized, but the second is a simple device for summing cosines.

Illustrations available:

None

AUTOMATIC DIGITAL CALCULATORS

By
ANDREW D. BOOTH,
D.Sc., Ph.D., F.Inst.P.

and

KATHLEEN H. V. BOOTH, B.Sc., Ph.D.

LONDON
BUTTERWORTHS SCIENTIFIC PUBLICATIONS
1953

B 204

B 204

Booth, Andrew Donald (1918–) and Kathleen H. V. Booth

Automatic digital calculators

Year: 1953

Place: London

Publisher: Butterworths Scientific Publications

Edition: 1st Language: English

Figures: 4 photographic plates Binding: original boards Pagination: pp. viii, 232 Size: 216x137 mm Reference: Ran *ODC*, p. 408

This is a very early work on electronic computers. After an simple introduction to mechanical calculating machines and a description of their electronic equivalents, it discusses the design of a computer and how it might be implemented using electronics. By this time the Booths had acquired considerable experience with the creation of different types of memory devices. This experience is shown in the very well-developed section on computer memories, ranging from mechanical devices invented by the Booths (see illustration), through magnetic drums, to delay line and electrostatic memory devices. They even have a small section on magnetic core memory and an aside that implies that they had been thinking about thinfilm plated memory. The book finishes with a discussion

of programming, the use of subroutines and some examples such as X-ray crystal structure analysis—a subject in which the Booths had previous experience.

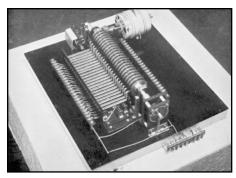
This book, which has the feel of being written by someone who actually knows the material very well and can explain it in a way that is easily understood, was a success in Britain but, while known and appreciated by some in America, did not receive the same acknowledgement here

Illustrations available:

Title page A.P.E.(R)C. machine Disk/pin mechanical memory



A.P.E.(R)C. machine, B 204



Disk/pin mechanical memory, B 204

B 205

Booth, Andrew Donald (1918–) and Kathleen H. V. Booth

Automatic digital calculators

Year: 1956 Place: London

Publisher: Butterworths Scientific Publications

Edition: 2nd Language: English

Figures: 4 photographic plates

Binding: original cloth boards; with dust jacket

Pagination: pp. xii, 262 Size: 216x138 mm

This second edition has been extended by the new discoveries of the Booths and others. Although the same material is covered as in the first edition, there is, for example, a more detailed treatment of magnetic core memory.

A third edition (also in the collection) was published in 1965 after the Booths had moved from Britain to Canada. While they provided a major revision for this later edition, it soon became clear that this book was not appropriate for the middle of the 1960s. Some of the material, for example, the mechanical memory and relay—based circuits, was simply out-of-date, and readers were in search of programming descriptions more applicable to individual machines. The frontispiece was changed to show a new M3 computer that the Booths had developed at the University of Saskatchewan.

Illustrations available: Title page

B206.

Booth, Andrew Donald (1918–) and Kathleen H.V. Britten

Principles and progress in the construction of highspeed digital computers. In Quarterly Journal of Mechanics and Applied Mathematics, Vol. II, Pt 2, June 1949.

> Year: 1949 Place: Oxford

Publisher: Clarendon Press

Edition: 1st Language: English

Binding: original paper wrappers

Pagination: pp. 182–197 Collation: K–R⁸ Size: 233x155 mm

At this time Kathleen Britten was an assistant to A. D. Booth at Birkbeck College and was shortly to become Mrs. Booth.

This is a very early discussion of the principles of the stored program computer as they were understood in 1947, when the paper was first written. After a brief discussion of digital versus analog computers, the basic structure of the stored program computer is explained. The paper finishes with a discussion of the state of computer projects in the United States (A. D. Booth having just returned from a trip there), including those of Aiken's Mark II, the Bell Model V, the EDVAC and von Neumann's IAS machine. Several noteworthy items appear in this paper, including the distinction between

serial and parallel machine architecture and a description of the operation code for the Booth ARC (Automatic Relay Computer).

It should be noted that this paper was written (but not published) before an operating stored program computer existed.

Illustrations available: ARC instruction set.

B 207

Borda, Jean Charles de (1733-1799)

Tables trigonométriques décimales, ou table des logarithmes des sinus, sécantes et tangentes, suivant la division du quart de cercle en 100 degrés, du degré en 100 minutes, et de la minute en 100 secondes. Précédées de la table des logarithmes des nombres depuis dix mille jusqu'à cent mille, et de plusiers tables subsidiares.

Year: 1801 Place: Paris

Publisher: Imprimerie de la République

Edition: 1st Language: French

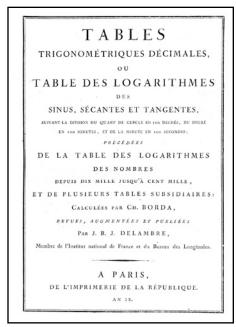
Binding: quarter bound leather, marbled boards

Pagination: pp. [4],120, [510] Collation: π^2 a- p^4 a-2d⁴2e²A-2N⁴2O¹

Size: 237x187 mm

Reference: Glais RCMT, pp. 88-89; Kno NTMV, p. 71

Borda was a major figure in the French Navy who participated in several scientific voyages and in the American Revolution. He was a member of the group



B 207

responsible for measuring the length of the meridional arc from the North Pole to the equator and thus was active in establishing the metric system. He attained the rank of *Capitaine de Vaisseau* and was appointed as inspector of the French naval academy in 1784. Borda was taken prisoner by the British during a naval action in the Antilles in 1782; thereafter his health suffered to the point where he was unable to take up his former sea duties. His main contributions were to the design of ships and in studies showing Newton was incorrect in his theory of fluid flow. He invented a surveying instrument (*circle de réflexion*), and these tables may well have begun as an adjunct to its use.

This is the first publication of a table of logarithms of trigonometric functions calculated according to the one hundred-degree division of the quadrant that was initially proposed for the metric system. The tables have entries for each degree, minute and second of this division scheme. It contains two prefaces, the first of 38 pages by Borda and the second of 76 pages by **Delambre**, who saw the work through the press after Borda died.

Illustrations available: Title page Tape of the tables

B 208

Borghi, Pietro (-1494)

Qui comenza la nobel opera de arithmethica ne la qual se tracta tute cosse amercantia pertinente facta e compilata p[er] Piero Borgi da veniesia.

First page: SDSU Chi d'arte mathematice ha paicere ... [17 line sonnet]

Year: 1484 Place: Venice

Publisher: Erhard Ratdolt

Edition: 1st Language: Italian Binding: later limp vellum

Pagination: ff. [1], 116, [1] (misnumbered 22 as 32, 23 as 32,

102 as 103) Collation: $\pi^8b-o^8p^6$ Size: 202x152 mm

Reference: Smi Rara, pp. 16-18

Pietro Borghi (Piero Borgi) was a Venetian who died sometime after 1494, but nothing more is known of his life.

This is an important book in the history of arithmetic. It is the second arithmetic book printed in Italy (after the Treviso arithmetic). The description done by **Smith** (*Rara*) cannot be bettered, and what follows is drawn freely from that source.

Qui comenza la nobel opera de arithmethica ne la qual fe tracta tute cosse amercantia pertinente facta z compilata p Piero bozgi va venielia



En che numero di maifiri affai fufficienti firittorium o tra di meno copia de excellè infirmi auricoria pi quali obiara e triffato incretta quali con a tra di meno copia de excellè infirmi auricoria pi quali obiara e triffato incretta quali con a tra di mene di quali obiara e triffato incretta quali per incretta di monte di quali o mene fignoti merchadanti venero di ma memota e peudentia conaro distritti in fa comodo di ori il intarrate fino di fun ma menota e peudentia conaro distritti con a tra di pri fori di controli di ma memota e peudentia conaro distritti con a tra di pri fori di controli di ma memota di più facilità na marrate fi posti. Concre cuero più più fo cidinare la pionte coga in laquale particularme fi coltifignera tutti modi oportuna a la introductione de qualdigi giouenetto ocdire da marreb dandita. E piana bimoniferando che chofi fi a numerorequal fi anno li indei inecellari il appopificio cor e traina el modo ol proceideri nelle, sa il arithmetichali chomo e numerarimo lipitichariparari; tumari e corrar a gonisendo a diffinare quali capita il copia di controli di

B 208

The first and last folios contain poems headed by the initials SDSU (some read it as SHSU), about which there has been much speculation. Smith seems to think that the letters S H S U which appear twice are thought to stand for JHSU, Jesus, possibly changed on account of some conjectured pronunciation.

This work is more elaborate than the Treviso arithmetic and had far greater influence on education. More than any other book, it set a standard for the arithmetics of the succeeding century. Borghi first treats notation, carrying his numbers as high as 1 numero de million de million de million and making no mention whatever of the Roman numerals. In the same spirit, he eliminates all of the medieval theory of numbers, asserting that he does this because he is preparing a practical book for the use of merchants.

The sequence of material is unusual because multiplication is the first operation Borda considers. This is followed by division, despite the fact that both of these use addition and subtraction. The multiplication table (see illustration) gives the products of all pairs of numbers from 1 - 10 but also includes the products of 12, 16, 20, 24, 32, 36 because they were useful factors for the currency then in use. The author gives the method of checking by casting out 7s and 9s. Multiplication per colonna (i.e., by reference to the columns of the table) follows, with its checks by 7 and 9, and per crocetta (cross multiplication), showing that these methods were in common use in Venice of the day. Division is then explained by the galley form; our present method, then known as the method of giving, a danda, was not mentioned. Then follow addition, subtraction, denominate numbers, common fractions (also beginning with multiplication), rule of three, partnership, barter, alligation and false position. The examples are generally practical, and they reveal much information concerning business customs at the close of the fifteenth century.

Illustrations available:

First folio with "SDSU" poem

First page

Multiplication table

Galley division

Last folio with "SDSU" poem and colophon

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telo che sono. 460. e fane
once moltiplichado p.12.
pche (312. fa vna lira: 7 a-
rai (35520e queste parti i
1037. che mo pridoz rin-
nra ③ s. anika. $3.0 ciql

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Division examples, B 208

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Multiplication table, B 208



B 209

Borgnis, Giuseppe Antonio (ca.1781–)

Traité complet de mécanique appliquée aux arts, contenant l'exposition méthodique des théories et des expériences les plus utiles pour diriger le choix, l'invention, la construction et l'emploi de toutes les espèces de machines ... Des machines imitatives et des machines théâtrales

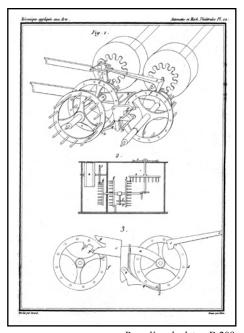
Year: 1820 Place: Paris Publisher: Bachelier Edition: 1st Language: French

Figures: 27 engraved folding plates

Binding: half-bound over marbled paper boards

Pagination: pp. [4], viii, [4], 298 Collation: π^2 a² b⁴ 1–37⁴ 38¹ Size: 249x198 mm

This is volume 8 of an eight-volume set of books in which Borgnis attempted to refine the empirical tradition of mechanical engineering into a more scientifically based approach. His first volume analyzed the elementary mechanisms such as the lever, and subsequent volumes dealt in depth with machinery from different application areas. This eighth volume was devoted to automata, calculating and measuring machines, telegraph systems and the machinery used in the theatre. The section on calculating machines includes linear and circular slide rules, Pascal's machine and various devices for drawing curves or producing correct perspective. The illustration



Pascal's calculator, B 209

of the internal workings of Pascal's machine is taken from the **Diderot** encyclopedia.

Illustrations available:

Title page

Slide rules and top of Pascal's machine Internal workings of Pascal's machine

B 210

Borough, William (1537–1599)

A discourse of the variation of the compasse, or magneticall needle. Wherin is mathematically shewed, the manner of the observation effects, and application therof, made by W. B. And is to be annexed to the new attractive of R. N.

b/w: **Norman, Robert**; The new attractive, 1592

Year: 1592 Place: London

Publisher: Edward Allde for Hugh Astley

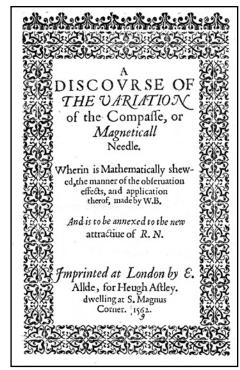
Edition: 3rd Language: English

Binding: contemporary half-bound leather over marbled

boards; spine gilt Pagination: ff. [30] Collation: A–G⁴H² Size: 191x137 mm

Reference: STC, 18649; Tay MP I, #26 #58

While most of the items in this collection are directly related to the history of computation, there are a few, like this one, relating to magnetism.



Borough, who was a comptroller of the British Navy, began his naval career, aged 16, by sailing to Russia in 1553. He continued in maritime trade for the next ten years and spent most of his life connected either with trade or the Navy.

This work on the variation of the compass was not in the 1581 first edition of **Norman**. It was added in the 1585 second edition. Borough edited later editions of this work, including this one, and added additional material of interest to navigators, such as a table of star positions. Some book dealers have claimed that this editing did not begin until the fourth edition in 1596, but that is likely in error - see entry for **Norman**, 1592, where it is clearly stated on the title page that it has been *Newly corrected and amended by M.W.B.*

The original work by **Norman** (1592) was dedicated to Borough.

The date has been incorrectly printed as 1562 on the title page.

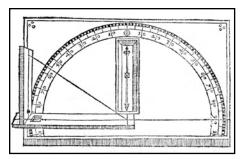
Illustrations available:

Borough's title page

Illustration of an instrument for noting variation in the compass

Borrel, Jean (ca.1492–ca.1564/1572)

See **Buteo**, **Johannes**; *De quadratura circoli libri duo*, *ubi multorum quadraturæ confutantur*, 1559



Compas variation instrument, B 210

B 211

Böschenstein, Johann (1472–1540)

Ain New geordnet Rechen biechlin mit den zyffern den angenden schülern zu nutz. Inhaltêt die Siben species Algorithmi mit sampt der Regel de Try. Und sechs regeln d[er] prüch. Un[d] der regel susti mit vil andern güten fragen den kündern zum anfang nützbarlich ...

Year: 1514 Place: Augsburg Publisher: Erhart Oeglin

Edition: 1st Language: German

Figures: woodcut on title page

Binding: later dark blue morocco; raised bands

Pagination: ff. [24] Collation: A⁶B⁴C⁶D–E⁴ Size: 199x142 mm Reference: Smi *Rara*, p. 100

Böschenstein was a professor of Hebrew at Ingolstadt and Heidelberg and also taught for a time at Antwerp and Nürnberg. He is chiefly remembered for the fact that both Luther and Melanchthon were his students.

It is interesting that in the same year that **Köbel** published his arithmetic (*Ain new geordnet rechen biechlin*) devoted to teaching the subject only by use of the table abacus, Böschenstein should publish this similar work, which is completely oriented toward the use of algorism. Even the two title pages have a strong similarity—both with woodcuts, one showing the abacus and the other algorism on a slate. **Smith** (*Rara*) describes this work as ... *mercantile in character and presents in condensed form the essentials of business arithmetic*. Böschenstein first starts with consideration of the seven basic operations (numeration, addition, subtraction, mediation, duplation, multiplication and division) and includes illustrations involving fractions as well as integers. He then continues with examples of the rule of three, etc.

Illustrations available:

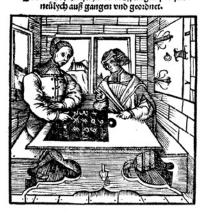
Title page

Division with fractions

Colophon

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mi mit sampt der Regel de Try/ond seche regeln d prück/on der regel Justi mit vil andern güten fragen den kundern zum anfang nündarlich durch Joann 25 sichensteyn von Efflingen priester



B 211

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Į,		ťn .	7 3	wirt	2	36
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erst ist \(\frac{2}{3} \) in \(\frac{2}{3} \) Elin solun vissen in sunderhayt das du
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Division examples, B 211

Getruckt in der Rayserlichen stat Augspurg durch Erhart öglin Anno 1514 Jan

Colophon, B 211

Bosmans, H., editor

See **Stevin, Simon**; La "Thiende de Simon Stevin," 1924

B 212

Bossut, Charles (1730–1814)

Essai sur l'histoire génerale des mathematiques.

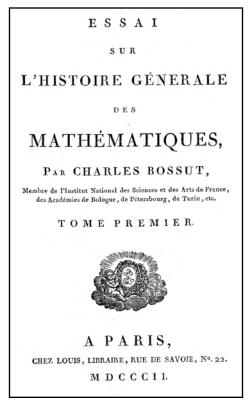
Year: 1802 Place: Paris Publisher: Louis Edition: 1st Language: French

Figures: engraved portrait frontispiece Binding: original red cloth boards; spine gilt Pagination: v.1: pp. xii, 394, 2; v.2: pp. [4], 426 Collation: v.1: $\pi^61-24^825^6$; v.2: $\pi^21-26^827^5(-276)$

Size: 220x132 mm Reference: Cre *CL*, p. 103

Bossut was raised by a paternal uncle after his father died. He began his study of mathematics at the Jesuit Collège de Lyon, at the age of 14, as a student of Père Béraud, who also taught **Jean Etienne Montucla** and **Joseph Lalande**. He was a professor at several notable universities in France, is known to have authored several textbooks, and is remembered for his contributions to mathematical education rather than for his own mathematical studies. He edited an edition of the work of **Blaise Pascal** and contributed to the editing of **Denis Diderot**'s encyclopedia.

In this two-volume history of mathematics, Bossut laments the lack of a decent history of the subject.



B 212

Montucla had written one previously, but Bossut considered it

... inelegant, and too much embarrassed with repetitions; and in his account of some modern discoveries, he displays a spirit of nationality, which ought never to be found in a strict and impartial historian (see 1803 edition).

The history is of interest mainly because Bossut was a contemporary of most of the people mentioned in the second volume and was well acquainted with them and their work. According to the *Biographie Générale*, these people were not pleased with his biographies, and their recriminations may have contributed to his death in 1814. His translator (see entry for 1803 edition) notes in a preface:

... it remains only to observe that he (Bossut) alone must be considered as responsible for the opinions he maintains, with respect to certain discoveries, and other points, which, involving some of the highest claims of genius and invention, have given occasion to many violent disputes, both of a personal and even of a national cast.

The first volume treats the history of mathematics from ancient times to the beginnings of the calculus, while the second consists of a history to Bossut's day.

The printing is unusual in that the text only occupies the top ¾ of each page. The frontispiece is a fine engraved portrait of Bossut.

Illustrations available: Title page Frontispiece



Frontispiece, B 212

B 213

Bossut, Charles (1730–1814) – [John Bonnycastle (1750?–1821), editor and **T. O. Churchill**, translator]

A general history of mathematics from the earliest times, to the middle of the eighteenth century.

Year: 1803 Place: London Publisher: J. Johnson Edition: 1st Language: English

Binding: later half-bound leather over marbled boards, black

leather label Pagination: pp. xxvi, 540, [4] Collation: A⁸a⁴b¹B–2M⁸ Size: 210x128 mm

Bonnycastle, in his earlier publications, described himself as a teacher of mathematics. From 1782 to 1785, he was a professor at the Royal Military Academy in Woolwich, England. Leigh Hunt describes him as having thought a little more highly of his talents than the amount of them strictly warranted (Leigh Hunt, Lord Byron and his contemporaries).

This is an English translation of Bossut's history of mathematics. Bonnycastle appends a list of *the most eminent mathematicians of ancient and modern times* but does not list any alive at the time, perhaps because he did not want to be subject to the same problems Bossut encountered with his contemporaries (see entry for **Bossut**, 1802).

Although the translation is rather good, Bonnycastle did manage to get the author's name wrong. On the title page it is given as *John Bossut* when it was actually *Charles*.

Illustrations available: Title page

Bossut, Charles, editor (1730–1814) See **Pascal, Blaise**; *Oeuvres de Blaise Pascal*

B 214

Bowden, Bertram Vivian (1910–1989)

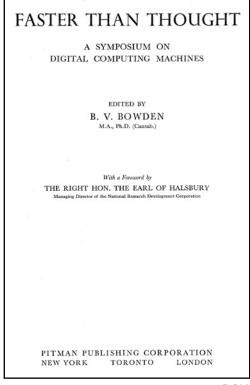
Faster than thought. A symposium on digital computing machines

Year: 1953 Place: London Publisher: Pitman Edition: 1st Language: English

Figures: 19 photo plates incl. frontispiece; 2 folding plates

Binding: original boards Pagination: pp. xx, 416 Size: 228x150 mm

Reference: Ran ODC, p. 408; Dub MWCB, p. 4



Lord Vivian Bowden was an employee of Ferranti Ltd., the manufacturer of the Ferranti Mark I originally designed at Manchester University. The Ferranti Mark I was the first electronic digital computer to be delivered to a commercial customer (despite the claims of UNIVAC). Ferranti's first machine was delivered to Manchester University. Essentially a highly placed representative of Ferranti, Bowden was assigned to publicize their machines and, it was hoped, sell several. This book was an effort to raise the awareness of this new technology in the hopes of kindling interest that would result in sales. Lord Bowden told the amusing story of, when he was on a trans-Atlantic voyage, meeting a man who was a lighthouse salesman and recounting that they spent some time debating which of them had the more secure job.

This is, by far, the best anthology on computing from the 1950s. The contributors are a *Who's Who* of British computing in that era. Chief among them were the computer designers **T. Kilburn, F. Williams, M. Wilkes** and **A. Turing**, but the other names listed all made significant contributions to the development of computers, software, or education. All the names are well known today (perhaps with the exception of Audrey Bates, who changed her name to Sharp when she married Ian Sharp).



Frontispiece, B 214

After a brief history of computing machines, the contents are divided into theory (today we would term this *computer architecture*), reports of British computer projects, a very short summary of those in America, and applications. The last section contains *Digital Computer Applied to Games* by Alan Turing—a very early description of programming a computer to play games.

An appendix contains a reprint of Lovelace's paper on Babbage's Analytical Engine (see **Menabrea**, **Luigi**). A number of photographic plates illustrate computers or their components of the era, and the frontispiece is a portrait of Ada Augusta, Countess of Lovelace.

The book remained in print until the late 1960s but was by then out of date. A second copy of this volume (with dust jacket) is available in the collection.

Illustrations available:

Title page

Frontispiece (Countess of Lovelace)

B 215

Bowditch, Charles Pickering (1842–1921)

The numeration, calendar systems and astronomical knowledge of the Mayas

Year: 1910

Place: Cambridge

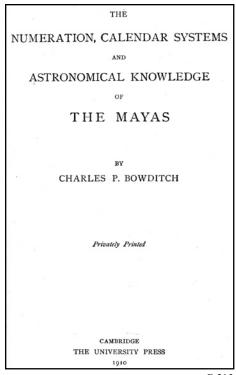
Publisher: Cambridge University Press

Edition: 1st

Language: English

Figures: 23 engraved plates (19 double-page)

Binding: original cloth boards Pagination: pp. xviii, 346, [38]



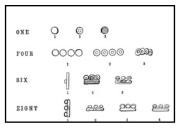
Collation: $\pi^9(-\pi 10)1-20^821^622^7(-22_8)[23]^{19}(-23_{20})$

Size: 253x165 mm

Charles P. Bowditch was the man who founded the Maya collections of the Peabody Museum at Harvard University and the person after whom their Bowditch professorship is named.

The system of numeration used by a civilization is not a machine, but it certainly is machinery. Without it very little could be accomplished in the way of numeration or, especially, arithmetic; because of this, works on numeration are of particular interest to this collection. This work was one of the first attempts to systematically set forth the numeration and calendar systems of the Maya. It not only explains them but also examines all extant Maya material for examples of the glyphs used and their interpretation.

Illustrations available:
Title page
Examples of Maya numeration



Maya numeration, B 215

B 216

Bowditch, Nathaniel (1773–1838)

The new American practical navigator

Year: 1802

Place: Newburyport, MA

Publisher: Edmund M. Blount for Brown & Stansbury, New

York Edition: 1st Language: English

Figures: 1 engraved folding frontispiece chart, 7 engraved

plates (1 tinted)

Binding: contemporary leather; rebacked; red leather label

Pagination: pp. 246, [274], 533–589, [15] Collation: A–2H⁴A–B⁴(A)–(2S)⁴

Size: 224x133 mm

Reference: Glais RCMT, p. 89; not in Karp MWPA

Nathaniel Bowditch was a self-educated seaman and mathematician who had only three years of schooling when he began working in his father's cooper's shop at the age of ten. Later he was apprenticed to a firm of ship's chandlers who encouraged his mathematical interests. At the age of twenty-two he became a seaman and spent the next nine years aboard ship, sailing on long voyages to the Caribbean, Portugal and the East Indies.

In the course of these voyages, Bowditch became celebrated as a skilled navigator and found himself spending long hours correcting the navigational tables then in use. He then turned his attention to the standard navigational text of his time, John Hamilton Moore's The practical navigator and seaman's new daily assistant, London, 1772. He completely reworked and extended Moore's book and decided to publish his revised version as The new American practical navigator, a title clearly reflecting its heritage. This work is much more than an improved set of navigational tables, for it also contains useful sections ranging from a short dictionary of sea terms to explanations of the parts of a ship (see the illustration of the colored plate and its text). Also included are standard forms for various contracts for freight and charters and other financial and legal documents.

Bowditch found and corrected some eight thousand errors in the Moore version of the tables. Most were of little consequence, but some were quite significant. For example, Moore's incorrect identification of 1800 as a leap year introduced a twenty-three mile error in some results and caused the loss of both ships and men.

Bowditch's reputation as a legendary navigator was reinforced when Harvard University awarded him an honorary M.A. degree. He knew nothing of this honor, but being stranded in the port of Boston by adverse winds, he serendipitously decided to visit Harvard. Finding its graduation ceremonies in progress, he sat in the audience

and, to his astonishment, heard his name being called out as a recipient of an honorary degree.

In mid-career, Bowditch left the sea to become an insurance company executive. He maintained a scholarly interest in mathematics for the rest of his life and eventually translated **Pierre Simon Laplace**'s *Mécanique céleste* into English.

Navigational tables are still often referred to as *Bowditch's Tables*, whether or not they stem from this original publication.

Illustrations available: Title page Colored plate of ships Colored plate text

> THE NEW AMERICAN PRACTICAL NAVIGATOR; EPITOME OF NAVIGATION; CONTAINING ALL THE TABLES NECESSARY TO BE USED WITH THE NAUTICAL ALMANAC, IN DETERMINING THE LATITUDE; LONGITUDE BY LUNAR OBSERVATIONS; KEEPING A COMPLETE RECKONING AT SEA: PROPER RULES AND EXAMPLES: JOURNAL, BOSTON TO MADEIRA, IN WHICH ALL THE RULES OF NAVIGATION ARE INTRODUCED:
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> Chamabulus of the soft of the last of Transporters to With many of the Trablems in Massacries, Separated Contains of Add Salmay of the Transporters to With many of the Trablems in Massacries, Separated Contains (Add Salmay of the Transporters to With many of the Trablems in Massacries, Separated Contains (Add Salmay of the Transporters to With many of the Trablems in Massacries, Separated Contains (Add Salmay of the Transporters to With many of the Trablems in Massacries, Separated Contains (Add Salmay of the Transporters to With many of the Trablems in Massacries, Separated Contains (Add Salmay of the Trablems of the Massacries) and the Salmay of the Trablems of the Salmay of the Salm FROM THE BEST AUTHORITIES. NEW TABLES, WITH ORIGINAL IMPROVEMENTS AND ADDITIONS, AND A LARCE
> VARIETY OF NEW AND IMPORTANT MATTER: MANY THOUSAND ERRORS ARE CORRECTED, BY NATHANIEL BOWDITCH, ILLUSTRATED WITH COPPERPLATES. Rieft Chitian. PRINTED AT NEWBURYPORT, (Mass.) 1801, EDMUND M. BLUNT, (Proprietor) FOR BROWN & STANSBURY, NEW YORK SOLD BY EVERY DOCUMENTED, INTERCHANCER, AND MATHEMATICANS IN THE UNITED STATES AND WEST MINES.

> > B 216

B 217

Bowman, Elias W. and William Shakespeare, Jr.

"Quick" interest calculator. Time and maturity tables.

Year: 1939

Place: Indianapolis, IN

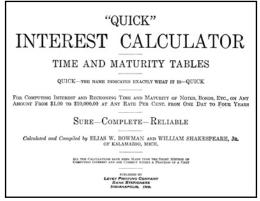
Publisher: Levey Printing Company

Edition: 1st Language: English

Binding: original cloth boards

Pagination: ff. [100] Size: 163x250 mm This is a ready reckoner for interest on any amount from \$1.00 to \$10,000.00 for periods from one day to four years.

Illustrations available: Title page Sample table page.



B 217

B 218

Bowring, John (1792–1872)

The decimal system in numbers, coins and accounts: especially with reference to the decimalisation of the currency and accountancy of the United Kingdom.

Year: 1854 Place: London

Publisher: Nathaniel Cooke

Edition: 1st Language: English

Figures: engraved portrait frontispiece; 21 engraved plates (p. 22, 60, 68, 72, 76, 92, 100, 102, 178, 180, 208, 210,

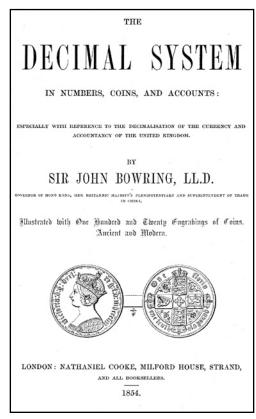
212)

Binding: original cloth boards Pagination: pp. [4], 246 Collation: A²B–I⁸J⁸K–P⁸O³

Size: 189x124 mm

John Bowring was a linguist fluent in at least fifteen languages, including most of the European ones as well as Chinese and Arabic. He traveled the world on both commercial ventures and as a representative of the British government. At the time of writing, he had just been appointed General Consul in Canton (he was later Governor of Hong Kong), and he indicates in his foreword that he is much rushed by the impossibility of delaying his departure for the scene of his duties in a distant land.

Bowring, with support from Prince Albert, Queen Victoria's husband, was responsible for the introduction of the 2 Shilling coin, usually called a *florin*. This was the first step in the decimalization of British currency (2 shillings were one tenth of a Pound). After this step,



the process was abandoned until 1968–1971, when a complete decimalization occurred, and 2 Shillings was equated to 10 new pence (1 Pound = 100 new pence)

After his success in establishing the florin, Bowring published this work. It is an investigation of decimal systems in numbers, coins and accounts from various parts of the world. It contains examples of decimal coins; the uses of decimal numbers in societies from China, Egypt and Greece; and reports from Members of Parliament. The difficulty of working in a non-decimal system is illustrated with problems involving calculating the worth of an impure bar of gold. The arithmetic is pedantically set down, and after two pages of work, the much simpler decimal solution of the problem is shown.

In the discussion of decimal numbers, he refers to the work *Arithmetic* by **George Peacock**, then Dean of Ely Cathedral and life-long friend of **Charles Babbage**. The discussion is illustrated with examples from Peacock's book and a portrait of Peacock, the only one known to have been published (another hangs in Ely Cathedral). The work also contains similar portraits of other Babbage friends and associates, namely **Herschel**, **DeMorgan**, Airy (with whom Babbage disagreed) and others. The frontispiece illustrates Bowring himself.

Illustrations available:
Title page
Portrait of Peacock
Portrait of DeMorgan
Portrait of Herschel

First step in solving a non-decimal problem





Peacock, B 218

DeMorgan, B 218



Herschel, B 218

B 219

Boyer, Jacques (1869-)

Histoire des mathematiques

Year: 1900 Place: Paris

Publisher: Gauthier-Villars

Edition: 1st Language: French

Figures: 26 engraved plates

Binding: contemporary three-quarter bound cloth boards;

original paper wrappers mounted

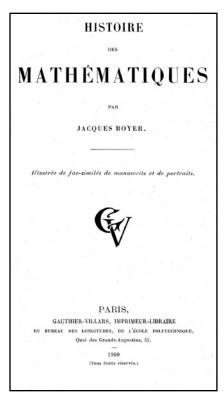
Pagination: pp. xii, 260 Collation: $\pi^61-16^817^2$ Size: 219x134 mm

Jacques Boyer should not be confused with Charles B. Boyer, who also wrote a history of mathematics in 1968. Jacques' history of mathematics is noteworthy for its description of French mathematics and mathematicians in the nineteenth century. It contains a number of portraits

of mathematicians, mainly French, and a frontispiece reproducing a seventeenth-century engraving showing the construction and use of mathematical instruments. Boyer does not indicate the source of the frontispiece, but it is the same as that published in later editions of **Bion**, and the work does contain reproductions of mathematical instruments from **Bion**.

Illustrations available:

Title page Frontispiece



B 219

B 220

Boys, Charles Vernon (1855–1944)

Calculating machines. In Journal of the Society of Arts Vol. XXXVI, No. 1737, March 3, 1886

Year: 1886 Place: London

Publisher: George Bell and Sons

Edition: 1st Language: English

Binding: half-bound marbled boards

Pagination: pp. 376–389 Size: 250x165 mm

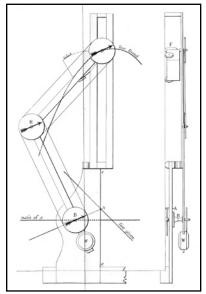
Sir Charles Boys was born in Leicestershire and became a well-known physicist and designer of scientific instruments. He is best remembered for his radiomicrometer, improvements to the torsion balance, a calorimeter and a special camera with movable lens.

Boys presented this paper in conjunction with an exhibit of calculating machines at the London International Inventions Exhibition. While Boys clearly knew a lot about calculating machines, judging from his answers to questions after the presentation, his time was obviously limited. The paper itself only mentions the well-known machines such as those of **Thomas**, Edmondson and Tate, with a few short references to items such as log tables, ready reckoners and **Napier**'s bones.

At the end of the paper are indicated the machines exhibited and their owners. Prominent among the names is *General Babbage*, **Henry P. Babbage**, the son of **Charles Babbage**. After Charles' death in 1871, Henry Babbage became his father's champion. Evidently, the machines collected by Charles during his lifetime, (Morland, Stanhope, etc.) were now owned by Henry.

Illustrations available:

none



Integrating instrument, B 221

B 22

Boys, Charles Vernon (1855–1944)

An integrating machine. In The London, Edinburgh and Dublin Philosophical Magazine, and Journal of Science. Fifth Series. No. 69, May 1881

Year: 1881 Place: London

Publisher: Taylor and Francis

Edition: 1st Language: English Binding: original paper wrappers Pagination: pp. 342–348 Size: 225x142 mm

In this paper, Boys proposes and describes a new type of integrating mechanism in contrast with existing integrating machines such as **Amsler**'s planimeter, where rolling mechanisms were employed to form the integral of the area being traced by a pointer. At the time this paper was written, Boys had built only a feasibility model. A few years later, **Bruno Abdank-Abakanowicz** described in great detail a complete design using the same principle. The Abakanowicz book acknowledges the fact that Boys had presented this same approach at the meetings of the British Association in 1882.

Illustrations available:
Plate showing instrument.

B 222

Bradbury, Fred

Jacquard mechanism and harness mounting

Year: 1912
Place: (Halifax)
Publisher: Author
Edition: 1st
Language: English
Figures: 1 photolith plate
Binding: original cloth boards
Pagination: pp. 355, xii, [1]
Collation: A–Y⁸(+W⁸)
Size: 210x135 mm

Bradbury was known for his books on various industrial subjects. He had already produced similar works on *Carpet manufacture* and *Calculations in Yarns and Fabrics*, and this book has advertisements and testimonials for both.

After an introduction to the history of pattern weaving, this work deals with the Jacquard loom in all its forms, including a discussion of the creation of Jacquard cards. The book is well illustrated with technical drawings of the various devices.

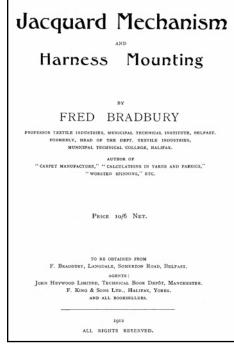
Illustrations available: Title page

B 223

Brahe, Tycho (1546–1601)

Astronomiæ instauratæ mechanica

Year: 1602 Place: Nürnberg Publisher: Levinus Hulsius Edition: 2nd Language: Latin



B 222

Figures: engraved portrait of Brahe on title, 25 illustrations (7 engraved, 18 woodcut), 4 smaller illustrations in text

Binding: contemporary vellum

Pagination: ff. [54]

Collation:)::(4A-E6F4G-H6I4

Size: 314x207 mm

Reference: Gin HLB, Vol. XIX, #2, p. 129; Cro CL, #104

Tycho Brahe, one the greatest and most celebrated astronomers in history, was born in Knudstrup, Denmark (present-day Sweden), into a noble family. His Danish given name was *Tyge*, and he adopted the Latinized version (Tycho) when he was fifteen years old. From the age of two, Tycho lived with and was reared by his paternal uncle, Jörgen Brahe. Jörgen saw to it that he was tutored in Latin and Greek and otherwise prepared for university studies. As befitted a person of his rank and position, he studied law at the University of Copenhagen and later at the University of Leipzig. His interest in astronomy was aroused by attending lectures on the subject, but his uncle strongly discouraged further studies, and he was reduced to learning the subject in secret.

The conjunction of Saturn and Jupiter in August 1563 seems to have been a seminal event for Tycho. He followed it meticulously and recorded his observation of the time of closest approach. When he computed this same time using both the Alphonsine tables and the Prutenic tables, the discrepancy between the observed and calculated results was striking. In fact, the Alphonsine tables were off by nearly a month and the Prutenic tables by a few



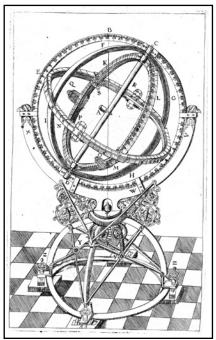
B 223

days, and this discrepancy forced him to conclude that the tables were seriously flawed.

Brahe understood that it would require an extended program of observations, made with the best instruments available, to correct the tables. It took more than a decade for him to obtain the necessary facilities and financial support, but in early 1576, King Frederick II offered Brahe the life-long use of the island of Hven in the Danish Sound for the erection of an observatory there to be fitted with the most accurate instruments to be had. The offer brought with it sources of income, which, when added to Brahe's not inconsiderable means, meant that Brahe could build the finest observatory in the world.



Uraniborg, B 223

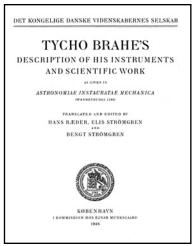


Armillary sphere, B 223

This book describes Brahe's observatory, Uraniborg, on the island of Hven and gives a catalog of the instruments he used to obtain the precise measurements that allowed Kepler to determine planetary orbits. The work also contains Brahe's autobiography and a description of how he divided his scales with transverse lines in order to make more accurate observations. Brahe was the last of the great observational astronomers before the invention of the telescope, although others after him also used nakedeye sights on their instruments. Although dated after Brahe's death, this work was first published privately in 1598 in a very limited edition of about forty copies. This 1602 edition was the first sold commercially and is today the only one generally available. The engraving of the equatorial armillary sphere on C6 appears for the first time in this edition, replacing a woodcut, and the title page has an engraved portrait of Brahe, also replacing a woodcut.

The instruments described here are unlike those shown in most other instrument volumes of this period. These are precision instruments of the highest caliber, whereas many of the other works of the time describe instruments that could be obtained by amateur gentlemen interested in astronomy.

Illustrations available:
Title page (portrait of Brahe)
Diagonally divided scale
Armillary sphere
Uraniborg – Brahe's "heavenly castle" observatory
Large quadrant



B 224

Brahe, Tycho (1546–1601) [Hans Henning Ræder; Elis Strömgren and Bengt Strömgren, translators]

Tycho Brahe's description of his instruments and scientific work as given in Astronomiæ Instauratæ Mechanica, Wandesburgi, 1598.

Year: 1946 Place: Cambridge

Publisher: I Kommission Hos Ejnar Munksgaard

Edition: 1st (?) Language: English

Binding: original paper wrappers; uncut

Pagination: pp. 144 Collation: 1–16⁴ 17² 18⁶ Size: 270x210 mm

Brahe had published a description of his instruments in *Astronomiae Instauratae Mechanica* in 1598. At the time he had left his observatory in Denmark but had not yet gone to Prague. The Royal Danish Academy of Science and Letters decided that there should be Danish and

English versions of this important work and, to celebrate the quadricentennial of Brahe's birth, commissioned this translation. The original Latin was first translated into Danish by H. Raeder, and then, after consultation with astronomers, the English text was produced. The volume includes reproductions of the original 1598 illustrations.

Illustrations available: Title page

B 225

Brainerd, John Grist (1904–1988) and **T. Kite Sharpless** (1913–1967)

The ENIAC. In Electrical Engineering, Vol. 67, No. 2, February 1948

Year: 1948 Place: New York

Publisher: American Institute of Electrical Engineers

Edition: 1st Language: English

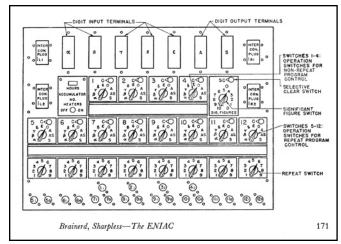
Binding: original paper wrappers

Pagination: pp. 163–172 Size: 296x219 mm

Reference: Ran ODC, p. 409

The ENIAC (Electronic Numerical Integrator and Computer) was the first large-scale, electronic, general purpose, digital calculating machine. This paper, while not the first to mention it in print, is an early description of the device.

Brainerd, while technically in charge of the Moore School of Electrical Engineering, had little to do with the actual creation of the ENIAC. His role was very much as an administrator; however, he and Sharpless would have been the only ones from the original ENIAC team left in the Moore School when this paper was written. Sharpless was a graduate of the Moore School and a skilled

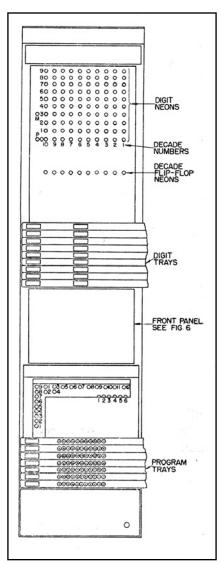


Accumulator panel, B 225

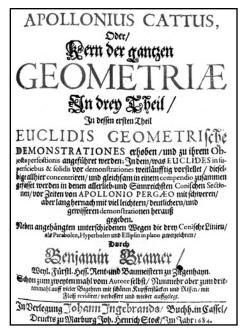
engineer on the project. After the ENIAC team broke up in 1945, he remained on staff as chief engineer for the EDVAC project. He left in 1947 to become one of the founding partners of Technitrol Engineering Company which, among other things, manufactured components for many of the first-generation computer projects.

While considerable portions of the paper are taken up with a discussion of basic concepts such as electronic versus mechanical, this paper does provide some items that are otherwise difficult to find. Diagrams are given for the exact layout of the ENIAC and for the front control panels of the accumulators.

Illustrations available: Layout of ENIAC Accumulator control panel Accumulator front panel



Accumulator, B 225



B 226

B 226

Bramer, Benjamin (ca.1588–1650)

Apolonius Cattus, oder, Kern der gantzen Geometriæ in drei Theil. In dessen ersten Theil Euclidis Geometrische demonstrationes erhoben, und zu ihrem Objecto perfectionis angefüret werden... Apolonius Catti, oder, Kerns der gantzen Geometriæ in ander Theil. De sectione cylindri ... Dritter Theil oder Anhang eines Berichts von M. Johsten Burgi. Geometrischen triangular Instrument, zu gar leicht kurtzen, und doch gewissen Land und Feldmessen. Wie auch andere höhen, tieffen, längen und breiten zuermessen dienlich

b/w: **Kohlhans, Johann Christoph**; Neu-erfundene Mathematische und Optische Cüriositaten, bestehend So wohl in einem sattsamen Unterricht, zum Feldmessen und itzt üblichen Fortification.

> Year: 1684 Place: Kassel Publisher: Ingebrands Edition: 2nd Language: German

Figures: engraved portrait (Burgi) frontispiece; title in red and black; 51 copper plates (23 double page, 26 single page, 2 folding)

Binding: contemporary vellum

Pagination: pp. [14], 102, [2], 61, [1], [8], 22, [2] Collation:):(3):():(4A-N4A-G4H3A-D4

Size: 196x133 mm

Reference: Pogg Vol. I, p. 274

After the death of his father in 1591, Benjamin Bramer was taken care of by his sister, who was married to the



Joost Bürgi, B 226

clock and instrument maker **Joost (Jobst) Bürgi**. He spent five years with Bürgi at the imperial court in Prague, returning to Kassel in 1604. In 1612, he was appointed master builder in the court at Marburg. He is known for earlier publications on mathematics and surveying instruments that are almost unique in that he credits his predecessors (including **Bürgi**) with the ideas he expands upon—this in an era in which most instruments makers were very secretive about their sources and techniques.

In this work Bramer continues his unusual acknowledgement of the work of his predecessors, particularly **Bürgi**, whose portrait appears in the frontispiece. Leone Battista Alberti (1435), **Albrecht Dürer** (1525) and **Joost Bürgi** (1604) had each investigated the problem of how to create an instrument that would allow one to produce accurate geometric perspective drawings. Bramer continued this tradition

by developing his own set of instruments, particularly one to draw conic sections. The device was evidently an improvement on one devised by **Christoph Scheiner**.

After describing conic curves and instruments for drawing ellipses, Bramer introduces his universal conic instrument and then illustrates its use. The latter part of the book is mainly concerned with the production of sundials on all orientations of surfaces—a process that makes use of many conic section curves.

Illustrations available:
Title page – color
Frontispiece – Joost Bürgi portrait
Conic instrument

B 227

Bramer, Benjamin (ca. 1588–1650)

Bericht und gebrauch Eines Proportional Linials: Neben kurtzem Underricht Eines Parallel Instruments

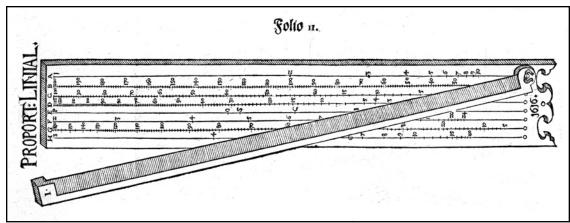
Year: 1617 Place: Marburg Publisher: Paul Egenolff Edition: 1st Language: German

Figures: 3 engraved plates, (2 folding) Binding: modern full morocco

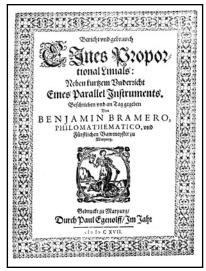
Pagination: pp. 58
Collation: A–G⁴ H¹

Size: 189x149 mm Reference: Cro *CL*, #133

Bramer's sector, one of the three main instruments described in this work, is interesting for its use of a removable arm, hinged with a pin through a hole at the end of each scale, which avoids the problem of making a complex hinge. This innovation also allowed him to construct each scale on an individual line, thus avoiding the problem of interfering scale graduations near the hinge (where all scales come together at a point in the



Hingeless sector, B 227



B 227

usual form of the instrument). The sector was equipped with scales for arithmetic (usually termed a *line of lines*), a line of circles, a geometric line (for working with triangles), a line of planes (for manipulating areas) and a line of solids (for volumes) as well as others for gnomic calculations. This instrument is notable for the early date, just eleven years after **Galileo** published his *Le operazioni del compasso geometrico* in 1606.

The second device was simply a parallel frame with pointers, of use in drawing figures or etching lines. The third instrument, a combination of plumb bob and angle measuring device, was of use in architectural situations.

Illustrations available:

Title page

Portrait of Bramer

Bramer sector

Triangulation instrument

B 228

Bramer, Benjamin (ca.1588-1650)

Beschreibunge und Underricht Eines Neuwen leicht und sehr bequemen Instruments zum Grundtlegen und Theylung der Circkel Linien.

Year: 1616

Place: Marburg

Publisher: Paul Egenolff

Edition: 1st

Language: German

Figures: Figures of protractor and sighting instruments in text

Binding: later vellum Pagination: pp. 32 Collation: A–D⁴ Size: 190x150 mm

Reference: Pogg Vol. I, p. 274

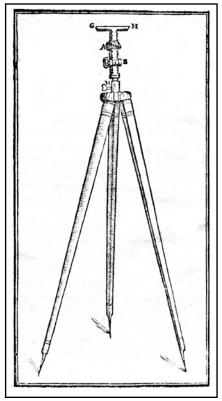


Benjamin Bramer, B 227

This small volume is a description of a simple sighting instrument and a protractor-like device, both for use by surveyors.

Illustrations available:

Title page Protractor Sighting instrument



Sighting instrument, B 228



B 229 **Bramer, Benjamin** (ca.1588–1650)

Dritter Theil oder anhang eines berichts von M. Johsten Burgi. Geometrischen Triangular Instrument, Zu gar leicht kurtzen, und doch gewissen Land und Feldmessen, wie auch andere Höhen, Tieffen, Längen und Breiten zuermessen dienlich

b/w: **Kohlhans, Johann Christoph**; Neu-erfundene Mathematische und Optische Cüriositaten, bestehend So wohl in einem sattsamen Unterricht, zum Feldmessen und isstüblichen Fortification.

b/w: **Bramer, Benjamin**; *Appolonius Cattus, Oder, Kern der gantzen Geometriæ In Drei Theil.*

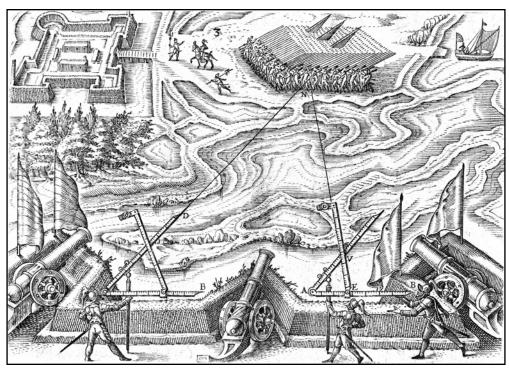
Year: 1684 Place: Kassel Publisher: Ingebrands Edition: 2nd Language: German

Figures: engraved portrait (Burgi) frontispiece; 21 engraved copperplates

Binding: contemporary vellum Pagination: pp. [8], 22, [2] Collation: A–D⁴

Collation: A–D⁴ Size: 196x133 mm

Bramer credits the instrument described here to his brother-in-law, **Joost (Jobst) Bürgi**. **Bürgi** is most famous for his independent invention of logarithms. However, he did not publish until 1620, about six years after **John Napier** had produced his work. A fine instrument maker and mathematician, **Bürgi** was responsible for the design of several different sectors and other instruments. Little is known of his early life, but from 1579 on, he was a watch and instrument maker at the court of Duke Wilhelm IV. The instruments he made there brought him to the notice of Emperor Rudolf II, and **Bürgi** moved to his court at Prague about 1603. While



Survey instrument in use, B 229

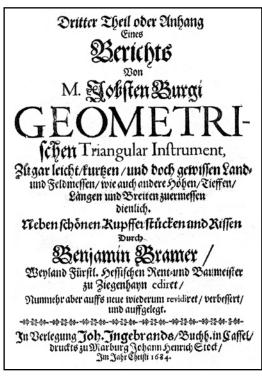
there he worked as an assistant to **Kepler**, mainly doing calculations. See **Bramer**, 1684 (*Apolonius Cattus*), for a portrait of **Joost Bürgi**.

This volume is a description of a simple triangular instrument used for surveying tasks. Its use is illustrated with many examples taken from civilian and military life. One of the most interesting is the description of the instrument being used underground in a mine.

Illustrations available:

Title page

Triangular instrument in use.



B 229

B 230

Bramer, Benjamin (ca.1588–1650)

Trigonometria planorum mechanica. Oder Unterricht unnd Beschreibung eines neuwen und sehr bequemen Geometrischen Instruments zu allerhand Abmessung und Solvirung der Planischen Triangel derogleichen bisshero nicht gesehen geworden

Year: 1617 Place: Marburg Publisher: Paul Egenolff

Edition: 1st Language: German

Figures: 3 engraved folding plates, Binding: modern vellum

Pagination: pp. 101, [1] Collation: A–M⁴N³ Size: 119x152 mm

Reference: Pogg Vol. I, p. 274



B 230

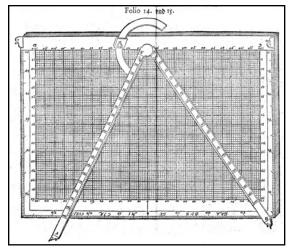
This small work describes a plane table (see **Ceneri**, **Angelo Maria**; *L'uso dello strumento geometrico detto la tavoletta pretoriana*, 1728, and the Appendix essay on surveying instruments) that is slightly different from others in that the table is marked with angles and divided to resemble squared graph paper to make it easier to read distances from scaled drawings.

Bramer wrote at least three of these small volumes in the 1616–1617 period, and the publisher used the same title page format on this volume as on the 1616 work (*Beschreibunge und Utterricht*).

Illustrations available:

Title page

Plane table



Plane table, B 230

Brander, George Friedrich (1713-1783)

Arithmetica binaria sive dyadica, das ist Die Kunst nur mit zwey Zahlen in allen vorkommenden Fällen sicher und leicht zu rechnen

Year: 1769 Place: Augsburg

Publisher: Widow of Eberhard Kletts

Edition: 2nd Language: German

Figures: 1 engraved folding table Binding: contemporary marbled boards

Pagination: pp. 40 Collation: A–B⁸C⁴ Size: 185x110 mm

Reference: Pogg Vol. I, p. 277

An instrument maker in Augsburg, Brander was known as one of the finest workmen of his day, and many of his instruments are in museums today. He is known to have had almost a hundred different instruments of his own design for sale and is also known to have written several books on these instruments and their use (see Brander, *Beschreibung und Gebrauch ...*, 1780).

This work on binary numbers was a very early explanation of the system. In the introduction he credits **Leibniz** with earlier work. The slim volume starts with an explanation of the system; proceeds to describe addition, subtraction, multiplication, division and the extraction of roots; then concludes with a table of the binary equivalents of numbers from 0 to 500,000.

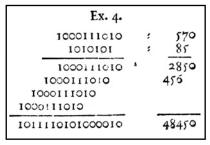
Illustrations available:
Title page
Binary multiplication examples
Binary table



B 231

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Binary table, B 231



Binary multiplication, B 231

B 232

Brander, George Friedrich (1713–1783)

Beschreibung und Gebrauch eines geometrischen Instruments in Gestalt eines Proportionalzirkels, welches in allen praktischen Fällen der Feldmesskunst leicht und gut zu gebrauchen; auch zu astronomischen Vergnügen dienet, und auf Reisen sehr bequem mit sich geführet werden kann: nebst angehängter Beschreibung eines Systems von Maassstäben zu Zeichnungen

Year: 1780 Place: Augsburg Publisher: Eberhard Kletts Edition: 1st Language: German

Figures: 2 engraved folding plates

Binding: paper boards Pagination: pp. 64 Collation: A–D⁸ Size: 170x101 mm

Reference: Pogg Vol. I, p. 277

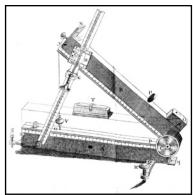
This work describes a sighting instrument that could be used for general survey work. It is constructed much like a sector with sights, but some care has been taken in the mechanical arrangements with various locking devices and finely graduated scales. There is also a description of other simple instruments, such a plane scale. An interesting item is a list, produced by **Johann Gabriel Doppelmayer**, of temperature variation around Nurnberg throughout the year.

Illustrations available:

Title page Sighting instrument Temperature variations



B 232



Sighting instrument, B 232



B 233

B 233

Brasser, Franciscus

Ein Newe Rechens-Buch Auff alle Kauffmans-Handlunge für die anfangende Schülers ... Nun aber durch einem Liebhaber der Kunst auffs new mit fleisse corrigiret und auf begehren mit vielen nützlichen Exempeln vermehret

Year: 1658
Place: Lübeck
Publisher: Schmalhertz?
Edition: late
Language: German
Binding: later blue paper boards
Pagination: ff. [76]
Collation: A—I⁸K⁴

Size: 162x91 mm

Reference: Smith Rara, p. 393; H&J AM, Vol. I, B23.17, p. 53

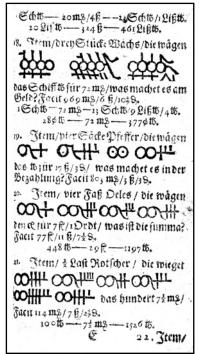
Little is known about the author, but **DeMorgan** (Arithmetical books) indicates that Brasser seems to have been a celebrated teacher.

The work begins with a short description of the traditional table abacus and the balance based on the use of algorism. It deals with the elementary arithmetical operations, including very short mentions of duplation and mediation, then repeats the same material when dealing with fractions. The rest of the work is concerned with examples of various types of commercial arithmetic, including a table of various conversion factors at the end of the book. At one point he uses a strange set of symbols, the origin and uses of which are obscure (see illustration).

Although printed a hundred years after **Adam Riese**'s, the book is reminiscent of his publications, with a title page portrait of Brasser that is similar to the one used by Riese in 1550.

Illustrations available:

Title page Table abacus Conversion table Numerical symbols



Numeral symbols, B 233

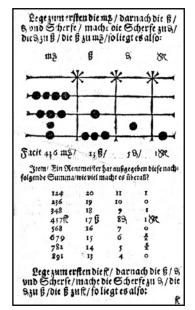


Table abacus, B 233

B 234

Brearley, Harry C.

Time telling through the ages

Year: 1919 Place: New York

Publisher: Doubleday, Page & Co. for Robert H. Ingersoll &

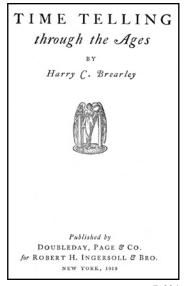
Bro. Edition: 1st Language: English Figures: 24 photolith plates

Binding: original cloth boards

Pagination: pp. 294 Size: 235x160 mm

This is a history of clock and watch making from the earliest times to the beginning of the twentieth century. A series of appendices describe how a modern watch movement operates and provide a list of manufacturers and an *Encyclopedic Dictionary* of names and terms associated with the subject. Examples of timekeeping and mechanisms are provided on the photolith plates.

Illustrations available: Title page



B 234

B 235

Breckenridge, William Edwin (1869-)

The log log duplex slide rule. A self teaching manual with tables of settings, equivalents and gauge points.

Year: 1926 Place: Hoboken

Publisher: Keuffel & Esser

Edition: 1st Language: English

Binding: original printed stiff paper wrappers

Pagination: pp. [2], 138, [2]

Size: 201x133 mm

Breckenridge was with the Mathematics Department at Columbia University in New York City.

This instruction manual illustrates the use of the Keuffel & Esser model N4092-3 rule.

Illustrations available:

Title page



B 235

B 236

Breckenridge, William Edwin (1869–)

The Mannheim slide rule. A self teaching manual with tables of settings, equivalents and gauge points.

Year: 1924 Place: Hoboken

Publisher: Keuffel & Esser

Edition: 1st

Language: English

Binding: original printed stiff paper wrappers

Pagination: pp. [2], 72, [2] Size: 202x134 mm

This instruction manual contains advertisements that illustrate some of the types of slide rule that were being produced by the Keuffel & Esser Co. They include Mannheim, Polyphase, Duplex, Stadia, Roylance Electrical, Surveyor's, Merchant's and Chemist's Slide Rule.

Illustrations available:

Title page Slide rules

B 237

Breckenridge, William Edwin (1869–)

The Mannheim slide rule. A self teaching manual with tables of settings, equivalents and gauge points.

Year: 1927

Place: Hoboken

Publisher: Keuffel & Esser Edition: unknown

Language: English

Binding: original printed stiff paper wrappers

Pagination: pp. [2], 74, [3] Size: 202x134 mm

This edition of the Breckenridge instructional manual for the Mannheim rule is essentially identical to that produced in 1924 (see that entry).

Illustrations available:

None

B 238

Breckenridge, William Edwin (1869–)

The Mannheim slide rule Nos. 4031S, N4035S, N4041 and 4051. A self teaching manual with tables of settings, equivalents and gauge points.

Year: 1938 Place: Hoboken

Publisher: Keuffel & Esser

Edition: unknown Language: English

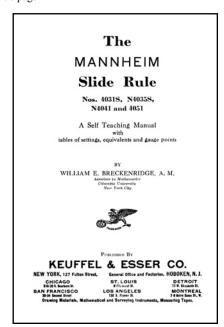
Binding: original printed stiff paper wrappers

Pagination: pp. [2], 75, [2] Size: 200x132 mm

The contents of this are almost identical to 1927 edition, but the title page has been changed slightly.

Illustrations available:

Title page



B 238

Breckenridge, William Edwin (1869-)

The polyphase duplex slide rule. A self teaching manual with tables of settings, equivalents and gauge points.

Year: 1924 Place: Hoboken Publisher: Keuffel & Esser Edition: 1st Language: English

Binding: original printed stiff paper wrappers; split

Pagination: pp. [2], 88, [2] Size: 200x137 mm

This is another of Breckenridge's variations on his instruction manual. A second copy of this is in the collection.

Illustrations available:

Title page

The Polyphase Duplex Slide Rule A Self Teaching Manual with tables of settings, equivalents and gauge points By William E. Breckenridge, A. M. Associate in Mathematics Columbia University New York City Published by KEUFFEL & ESSER CO. NEW YORK, 127 Falton Street, CHICAGO ST. LOUIS BUZOS. Desires St. 87 T LOUIS BUZOS. DESIRES ST. BUZOS. MONTREAL BUZOS. DESIRES ST. BUZOS. MONTREAL BUZOS. DESIRES ST. BUZOS. BUZOS

B 239

B 240

Breckenridge, William Edwin (1869-)

The polyphase duplex slide rule No. 4088. A self teaching manual with tables of settings, equivalents and gauge points.

Year: 1938 Place: Hoboken

Publisher: Keuffel & Esser

Edition: late Language: English

Binding: original printed stiff paper wrappers; split

Pagination: pp. [2], 88, [2] Size: 200x137 mm

A later edition of the instruction manual that is essentially identical to the 1924 version.

Illustrations available: Title page

B 241

Breckenridge, William Edwin (1869-)

The polyphase slide rule. A self teaching manual with tables of settings, equivalents and gauge points.

Year: 1925 Place: Hoboken Publisher: Keuffel & Esser Edition: 1st Language: English Binding: original printed stiff paper wrappers; split Pagination: pp. [2], 83, [3]

Another variation on Breckenridge's manuals. A second copy of this is in the collection.

Illustrations available: Title page

Size: 200x133 mm

B 242

Breckenridge, William Edwin (1869-)

The polyphase slide rule. No. N4053. A self teaching manual with tables of settings, equivalents and gauge points.

Year: 1938 Place: Hoboken Publisher: Keuffel & Esser Edition: 1st

Language: English Binding: original printed stiff paper wrappers

Pagination: pp. [2], 85 Size: 196x130 mm

A later version, essentially identical to the 1925 edition.

Illustrations available: Title page

B 243

Brentel, Georg (fl.1610) – [**Galgemair, Georg** (1495–1552)]

Herrn Georgij Galgemairs Kurtzer gründlicher gebesserter unnd vermehrter underricht, zubereitung und gebrauch, Der hochnutzlichen mathematischen Instrumenten, Proportional Schregmäss und Circkels, benebens dem fundament dess visierens. Allen Künstliebenden zu sonderen Ehren unnd wolgefallen.

> Year: 1615 Place: Ulm



Publisher: Johann Meder

Edition: 2nd Language: German

Figures: 1 large folding plates Binding: contemporary vellum

Pagination: pp. [8], 48, 47–130 (misnumbered 47 as 45, 110 as 100), [2]

Collation: A–R⁴S³ Size: 191x153 mm

Reference: Zin *GBAL*, p. 61, 271, 318, 324, 330, 339, 347, 353, 362, 364, 367, 371, 384, 395; Not in Pogg Vol. I

Georg Brentel was a painter and engraver who published plans for sundials (the paper could be glued to boards to make a dial). Little is known about him other than that he was a pupil of Philipp Apian (the son of the famous mathematician and instrument maker **Peter Apian**). See **Galgemair, Georg**, in the Addenda.

FUNDAMENTALIS LINEA

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Presentate autonoc lines circulate institution.

Presentate autonoc

Proportional compass, B 243

This expanded version of Brentel's 1610 publication treats the same basic instruments (sector and proportional compass) but includes many examples of finding volumes, gauging, weights and measures, etc.

The illustration of the sector has been redone and much improved from the earlier work, but the one for the proportional compass was little changed. **Gaspar Schott** (*Mathesis Caesarea*, 1662) used this same illustration in his description of the sector in 1662. An unusual printer's device occupies the final page.

Illustrations available:

Title page

Sector illustration

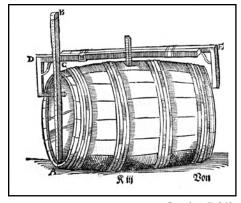
Proportional compass illustration

Gauging example

Printer's mark and colophon



Printer's device and colophon, B 243



Gauging, B 243

Brentel, Georg (fl.1610)

Quadrantis astronomici et geometrici utilitates. Ein Tractat vom Astronomischen und Geometrischen Quadranten, auss welchem dess Tags oder dess Nachts, durch die Sonn, Mond und andere Planeten oder Firstern die Stunden mögen gefünden: dess gleichen allerley höhe, länge, tieffe ohn oder durch Rechnung künstlich und gewiss abgemessen werden...

b/w: Hulsius, Ocularis ..., 1596

Year: 1611 Place: Nürnberg Publisher: Jacob Winter Edition: 1st

Language: German
Figures: title enclosed by 4-piece woodcut border, each page of
text enclosed by borders of type ornaments, 3 woodcuts

in text

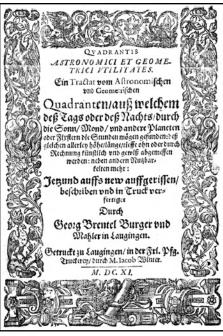
Binding: contemporary red stained vellum.

Pagination: pp. [8], 62 Collation: A–H⁴I³ Size: 183x141 mm

Reference: Zin GBAL, #4302

Brentel's other work in this collection (Georgii Galgemaris Kurtzer unnd gründtlicher underricht, wie der Künstliche Proportional-Circul ausszutheilen und ausszuzeichnensen auff etlicher begern, 1610) is remarkable for including fine full-sized diagrams of his instruments. In contrast, this work is lacking in illustrations, showing only two crude diagrams of a quadrant in use for surveying related to aqueducts. In the text he notes surveying applications of a quadrant and provides tables listing the positions of major stars and other markings on a quadrant for both astronomical and survey uses.

Illustrations available:
Title page
Aqueduct survey problem



B 244

B 245

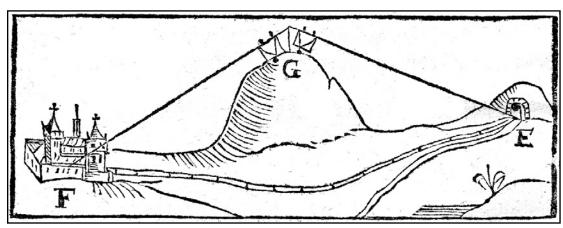
Brentel Georg (fl.1610) [Galgemair, Georg (1495–1552)]

Georgij Galgemaris Kurtzer unnd gründtlicher Underricht, wie der Künstliche Proportional-Circul ausszutheilen und auffzuzeichnen sey. Auff etlicher begern. Allen denen so sich dess Circuls gebrauchen, zu sonderlichem Nutz und vilfeitigem Vortheil in Truck gegeben durch Georgen Brentel...

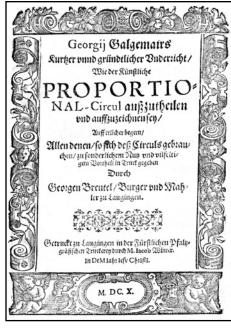
separate title page (ff. E1r):

Fundament der Proportional-Circul ... was ober dem mond, ewig bsteht. Was unter dem mond, bald vergeht

Year: 1610 Place: Lauingen Publisher: Jacob Winter



Aqueduct survey, B 244



Edition: 1st Language: German Figures: 2 folding plates Binding: modern marbled boards

Pagination: pp. 40 Collation: A–C⁴D⁸ Size: 194x146 mm

In these two works Brentel has used information given to him by **Georg Galgemair** (see Addenda entry for Galgemair) to write about both the proportional compass and the sector, which he called *Schregmess*. The dates for Galgemair are uncertain. Following Brental's practice of producing full-size broadsheets for sundials, he includes

full-sized plans for both instruments in this work. He also includes tables giving the positions at which each scale should be marked. Any instrument maker possessing this work could easily have reproduced each device.

Illustrations available:

Title page

Proportional compass

Sector

B 246

Brerewood, Edward (1565–1613)

De ponderibus, et pretiis veterum nummorum, eorumque; cum recentioribus collatione, liber unus.

Year: 1614 Place: London

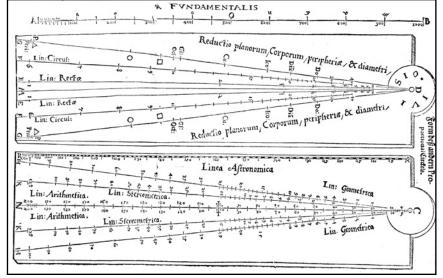
Publisher: Joannem Billium (John Bill)

Edition: 1st Language: Latin

Binding: contemporary vellum

Pagination: pp. [8], 56 Collation: A–H⁴ Size: 191x142 mm Reference: STC, 3612

Brerewood was born and educated in Chester. At the age of fifteen, he enrolled in Oxford. In 1590, after graduating with an M.A., he applied for a fellowship there, but lacking the right connections, he was not given the position. However, Oxford did recommend him for the job as the first professor of astronomy at Gresham College. **Ward** describes him (*Lives of the Professors of Gresham College*, 1740) as very communicative, and ready to impart what he knew to others, either in conversation, or by writing, but he never published anything during his lifetime. A nephew, Robert

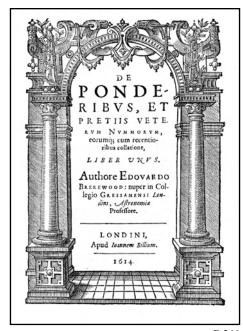


Sector, B 245

Brerewood, saw this (and nine other works) through the press after his uncle died of a sudden fever.

This is a treatise on the weights and values of Greek, Roman and other ancient coins. The book is set up in three columns. References are given in the left column, with monetary values or weights in the right-hand column.

Illustrations available: Title page



B 246

B 247 **Bressieu, Maurice** (a.1608)

Astronomical libri quatuor hæc maximam partem nova est rerum astronomicarum & geographicarum per plana sphericáque triangula dimensionis ratio, veteríque impendiò expeditior & compendiosior.

> Year: 1581 Place: Paris

Publisher: Ægidius Gorbinus

Edition: 1st Language: English

Figures: 1 large folding plate Binding: contemporary vellum Pagination: pp. [8], 40, 84

Collation: $a^4b^6c^4c^8e^2A - B^6C^4D^6E^4F^4G - H^6$ (e1 signed C1)

Size: 334x225 mm

Bressieu, a native of Grenoble, held the chair of mathematics at the University of Paris from 1576 until his death in 1608. Pierre de la Ramée, who is mentioned in the colophon, endowed this chair before his death in 1572. The colophon also mentions the hospitality of Ronsard, a poet.

This is a treatise on spherical geometry as used in astronomical calculations. It contains a number of tables, one being printed in red and black to differentiate different columns of entries.

Illustrations available: Title page Sample table page (color)



B 247

B 248

Brewster, David (1781–1868)

Letters on natural magic, addressed to Sir Walter Scott, Bart.

Year: 1832
Place: London
Publisher: John Murray
Edition: 1st
Language: English
Binding: contemporary leather
Pagination: pp. xii, 352
Collation: π⁶A–Y⁸

Reference: Ran ODC, p. 409

Size: 144x91 mm

Best remembered for his work on optics and polarization of light, the Scottish physicist David Brewster displayed his scientific abilities early. He had made a telescope by the age of ten and started at Edinburgh University at the age of twelve. After abandoning a wish to become

LETTERS

ON

NATURAL MAGIC,

ADDRESSED TO

SIR WALTER SCOTT, BART.

 $\mathbf{B}\mathbf{Y}$

SIR DAVID BREWSTER, K. H.

LL.D. F.R.S. V.P.R.S.E. &c. &c.

LONDON:

JOHN MURRAY, ALBEMARLE STREET.

MDCCCXXXII.

B 248

a clergyman because of extreme nervousness in public speaking, he became a private tutor. He then edited the *Edinburgh Encyclopedia* for twenty-two years before becoming principal of Edinburgh University (1859–1868)—an institution that had earlier refused him the chair of mathematics.

The term *natural magic* in the title arises from *natural philosophy*, a term used in Scotland up until the 1970s—it was, for example, only then that the University of Glasgow changed the name of their department from *Natural Philosophy* to *Physics*. He was an admirer of **Charles Babbage** and strongly supported his attempts to construct a Difference Engine. This work describes optical and aural illusions, mechanical automata, chemistry, secret writing, etc. He mentions **Babbage**'s engine on pp. 291–296.

Illustrations available:

Title page

B 249

Brewster, David (1781–1868)

On machinery for calculating and printing mathematical tables. In Edinburgh Philosophical Journal Vol. VII

Year: 1822 Place: Edinburgh

Publisher: Archibald Constable and Co.

Edition: 1st Language: English

Binding: modern paper wrappers

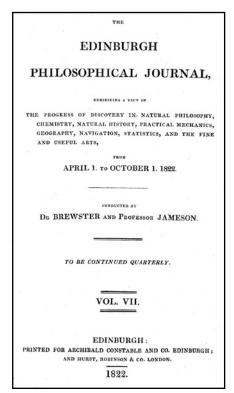
Pagination: pp. 274–281 Size: 211x132 mm

Reference: Van S *CBCP*, #70; Babb *CBLP* #71, #73; Ran

ODC, p. 405

Brewster presented this paper in Edinburgh as part of a concerted effort to obtain funding for development of the Difference Engine. Brewster indicates that his material was drawn mainly from *Mr. Babbage's printed letter on the subject* (see **Babbage, Charles**; *A letter to Sir Humphrey Davy*, 1822). After explaining the concept of the difference engine, he describes the proposed implementation and concludes with a plea for financial support for Babbage.

Illustrations available: Title page



Journal cover, B 249

Brewster, David, editor

See **Babbage**, Charles; On the theoretical principles of the machinery for calculating tables, 1823.

See **Babbage**, **Charles**; Works of Charles Babbage M.A. F.R.S. &c. [A Collection of seventeen items by and about Babbage].

Briggs, Henry (1561–1631)

Arithmetica logarithmica sive logarithmorum chiliades triginta, pro numeris naturali serie crescentibus ab unitate ad 20,000: et a 90,000 ad 100,000.

Year: 1624 Place: London Publisher: W. Jones Edition: 1st Language: Latin

Binding: contemporary reverse leather; rebacked; brown

leather label

Pagination: pp. [8], 88, [300] Collation: $a-m^4A-Q^6R^44H^84I-4O^{6*6}$

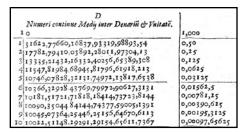
Size: 324x199 mm

Reference: Pogg Vol. I, p. 298; DSB II, p. 462; Hend *BTM*, #18, p. 40; Horb *CC*, #38, pp. 33; Car *PMM*, #116, pp.

69-70

Henry Briggs graduated from Oxford with an M.A. in 1585 and remained there as a junior academic. He was elected as a Fellow of St. John's College in 1589. In 1596, he was invited to be the founding professor of geometry at the newly created Gresham College in London, where he worked lecturing and creating navigational tables. Shortly after **Napier** published his *Mirifici logarithmorum canonis descriptio* in 1614, Briggs obtained a copy and immediately recognized their value for navigation and other computations. He began to teach them to his students and soon saw that they would be easier to use if the base was changed to 10. Briggs visited with Napier





Briggs' logarithms, B 250

in the summer of 1615 and again in 1616, and after the two men had agreed on the proposed changes, Briggs began calculating the new base 10 logarithms. Napier took no part in this work as he was not well and died the following year. In 1617, Briggs supervised the printing of a translation of Napier's work produced by **Edward Wright**, who had also died shortly after finishing it. In a preface to this translation, he justifies the change to base 10 and includes a small table of logarithms of numbers from 1 to 1000 (the first *chiliad*).

This volume contains logarithms for numbers from 1 to 20,000 and from 90,000 to 100,000. It took until 1624 to produce the table in this volume. Briggs did not start calculating logarithms in succession, but he used a number of critical logarithms (see illustrations) for 0, 10^{1/2}, 10^{3/4}, etc. to calculate the others. Briggs wrote a preface in which he explained how to use logarithms and gave a plan for calculating the missing 70,000 numbers—even offering to supply special paper divided into columns for anyone willing to help. He provided the difference between each adjacent value (see illustrations) and a method of calculating logarithms by interpolation from differences. The missing seventy chiliads were included in the second edition of this work published by Adrian **Vlacq** in 1628, although Briggs had, by this time, nearly completed the calculations himself. It was in the preface to this work that Briggs coined the terms characteristic and mantissa for the two portions (on either side of the decimal point) of a logarithmic number.

Some copies of this work have an additional six pages containing the logarithms for 100,001 to 101,000 and a table of square roots from 1 to 200. This volume does not contain these extra pages, but they are to be found in another issue in this collection (see entry for **Briggs**, **Henry**; *Arithmetica Logarithmica*, 1624—another issue).

These logarithms, together with those of **Adriaan Vlacq** mentioned above, form the basis from which almost all other logarithm tables were produced. At the end of the eighteenth century, the French produced the *Tables du Cadastre*, which are only available in manuscript form (see entry for **Prony**). Towards the end of the nineteenth century, Edward Sang (1805–1890) published a seven-

figure table of logarithms for numbers up to 200,000, the last half of which had been newly calculated. With these two exceptions, all other pre-twentieth century tables were simply edited copies of the original Briggs and Vlacq computations (see the entry for Babbage, **Charles**: Notice respecting some errors common to many tables of logarithms, 1829).

Illustrations available: Title page Critical logarithms First page of log table

B 251

Briggs, Henry (1561–1631)

Arithmetica logarithmica sive logarithmorum chiliades triginta, pro numeris naturali serie crescentibus ab unitate ad 20,000: et a 90,000 ad 100,000. Ouorum ope multa perficiuntur arithmetica problemata et geometrica.

Year: 1624 Place: London Publisher: W. Jones Edition: 1st (another issue) Language: Latin Binding: contemporary leather; gilt embossed covers Pagination: pp. [8], 88, [300], [12] Collation: a-m4A-Q6R44H84I-4O6*6¶6 Size: 324x215 mm Reference: Pogg Vol. I, p. 298; DSB II, p. 462; Hend BTM, #18, p. 40; Horb CC, #38, pp. 33; Car PMM, #116, pp. 69 - 70

This is another issue of the first edition of Briggs' logarithms. It is identical to the first issue with the exception that it contains six additional pages with the logarithms for number from 100,001 to 101,000 and a table of square roots for the numbers from 1 to 100. These six additional sheets are pasted in.

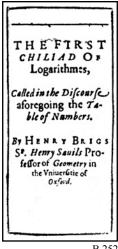
Illustrations available: Title page Square root table

B 252

Briggs, Henry (1561–1631)

The first chiliad of logarithmes, called in the discourse aforegoing the table of numbers.

b/w: Gunter, Edmund; Canon triangulorum, or a logarithmeticall table: wherein are set downe logarithmes of the sines, & tangents of all the degrees, & minutes of the quadrant. The logarithme of the radius, or semy-diameter beeing 100000000, 1626



B 252

Year: 1626 Place: Oxford Publisher: n/p Edition: 1st (English) Language: English

Binding: contemporary leather; red leather label

Pagination: ff. [109] Collation: A8B4-R8S4T1 Size: 106x50 mm

Reference: STC, 3742; Kno NTMV, p. 222

This is a very small set of logarithmic tables for values between 1 and 1,000. The logarithms are to eight decimal digits, and the differences between each logarithm are noted (differences are useful for interpolating between values). There is no explanation of any kind, the only text being the title page. This was not the first time Briggsian logarithms had been printed, but it is the first in such a portable format and the first in English (if you count an English title page). The Briggs tables occupy the first 22 leaves and Gunter's the rest of the volume.

Illustrations available: Title page Sample table page

B 253

Briggs, Henry (1561–1631)

Logarithmicall arithmeticke. Or tables of logarithmes for absolute numbers from an unite to 100000, as also for sines, tangentes and secantes for every minute of a quadrant, with a plaine description of their use in arithmetike, geometrie, geographie, astronomie, navigation, &c

b/w: de Decker, Ezechiel; Tweede deel van de nievwe tel-konst ofte wonderliicke konstighe tafel, inhoudende de logarithmi, voor de getallen van 1 af tot 100000 toe. Eerst ghevonden van Iohanne Nepero, ...

Year: 1631 Place: London

Publisher: George Miller

Edition: 1st Language: English

Binding: 18th-century half-bound leather; red leather label, red

edges

Pagination: pp. [2], 54, 8 Collation: A–H⁴

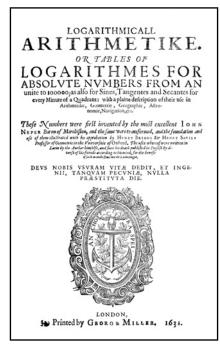
Collation: A–H^{*} Size: 300x185 mm

Reference: Pogg Vol. I, p. 298; Hend BTM, #26.0, p. 58

This work is bound with the very rare work by **Ezechiel de Decker**. The tables themselves are not present in this copy. When **Vlacq** issued his *Arithmetica Logarithmica*, Gouda, 1628, he printed more copies than were needed. After the death of **Briggs**, Miller bought up copies of the tables and issued them with a new title page and introduction in English.

Illustrations available:

Title page



B 253

B 254

Briggs, Henry (1561–1631)

Table des logarithmes, pour les nombres d'un, à 10000

b/w: Wells, John; Sciographia, or the art of shadowes. Plainly demonstrating, out of the sphere, how to project both great and small circles, upon any plane whatsoever: with a new conceit of reflecting the sunne beames upon a diall, contrived on a plane, which the direct beames can never shine upon ...

Year: 1626 Place: Gouda

Publisher: Pierre Rammasein

Edition: 1st Language: French

Binding: contemporary leather rebacked

Pagination: pp. [264] Collation: A–K⁸L⁴M²A–E⁸F⁶

Size: 190x115 mm

Reference: Hend BTM, #24.0, p. 56

These tables were published by Rammasein prior to his publishing the famous tables by Vlacq in 1628. See entry for **Wells, John**; *Sciographia*, ..., 1635.

Illustrations available:

Title page in entry for Wells, John: Sciographia ..., 1635

B 255

[**Briggs, Henry** (1561–1631)] – **Thomas Smith** (1638–1710)

Vitæ quorundam eruditissimorum et illustrium virorum. Quorum nomina exstant in pagina sequenti.

Year: 1707 Place: London

Publisher: David Mortier

Edition: 1st Language: Latin

Figures: engraved frontispiece

Binding: contemporary leather; gilt spine

Pagination: pp. [2], xvi, [2], 148, [2], 62, [2], 16, 16, 38, 34,

48, 102, [2]

Collation: *3**4***3A-2G42H33A-3P44A-4N4

Size: 200x150 mm

See entry for **Smith, Thomas**, 1707, where illustrations may also be found.

Illustrations available:

None

B 256

Briggs, Henry (1561–1631) and **Henry Gellibrand** (1597–1636/7)

Trigonometria Britannica: sive de doctrina triangulorum libri duo. Quorum prior continet constructionem canonis sinuum tangentium & secantium, unà cum logarithmis sinuum & tangentium ad gradus & graduum centesimas & ad minuta & secunda centesimis respondentia: A clarrissimo doctissimo integerrimoque Viro Henrico Briggio...

Posterior verò usum sive applicationem canonis in resolutione triangulorum tam planorum quam sphæricorum e geometricis fundamentis petitâ, calculo facillimo, eximiisque compendiis exhibet: Ab Henrico Gellibrand...

Year: 1633

Place: Gouda

Size: 350x215 mm

Publisher: Peter Rammesein

Edition: 1st Language: Latin Binding: modern leather Pagination: pp. [8], 112, [272] Collation: π⁴A-O⁴a-y⁶z⁴

After completing his calculation (see Briggs, 1624) of logarithms of the natural numbers, Henry Briggs began the immense task of creating a table of sines, tangents, secants, logarithms of sines and logarithms of tangents. He completed the calculations but was not able to finish an introduction before his death. His friend Henry Gellibrand, a professor of astronomy at Gresham College in London, took on the task of finishing the preface (explaining the tables and their application to plane and spherical trigonometry) and seeing the work through the press. Adrian Vlacq arranged for the work to be printed in Gouda by Peter Rammesein.

Like Briggs' logarithms of numbers, this table contains the differences between each entry, allowing the user to interpolate if necessary. It was seldom necessary because these tables contained an entry for each one hundredth of a degree (with the equivalent minutes and seconds being shown in the rightmost column of each page – see illustrations). This move to having an entry for every hundredth of a degree was copied by Nathaniel Roe (1633), William Oughtred (1657) and John Newton (1658), but the tables of Vlacq, based on the old sexagesimal division of a degree, were so popular that this change was ignored by others.

Illustrations available: Title page Page from the tables

Briggs, Henry (1600–1666)

See Vlacq, Adriaan; Arithmetica logarithmica, 1628. See Faulhaber, Johann; Zehntausent logarithmi, der absolut oder ledigen zahlen von 1. biss auff 10000,1631

B 257

Brink, Raymond Woodward (1890–)

Logarithmic and trigonometric tables.

Year: 1928 Place: New York

Publisher: D. Appleton-Century Company

Edition: 1st Language: English

Binding: original cloth boards Pagination: pp. [6], 110 Size: 197x135 mm



A small book of logarithms and other useful tables, suitable for student use.

Illustrations available: Title page

B 258

British Association for the Advancement of Science

Report of the Fifty-Eighth Meeting of the British Association for the Advancement of Science. Held at Bath in September 1888

> Year: 1889 Place: London Publisher: John Murray

Edition: 1st Language: English

Binding: contemporary buckram Pagination: pp. xcvi, 988, 116, 32 Collation: A8a-e8B-3Q83R43S2A-G8H2B-C8

Size: 215x138 mm

This contains a very short item reporting on a presentation by Henry Babbage, the son of Charles Babbage, about his father's Analytical Engine. It mentions that a section, working to twenty-nine digits, including the anticipatory carry device, was shown to those at the meeting.

Illustrations available: Entire item.

British Calculators, Ltd.

The Bri-Cal adding: machines

Year: ca.1912

Place: Stoke Newington

Publisher: British Calculators, Ltd.

Edition: 1st Language: English

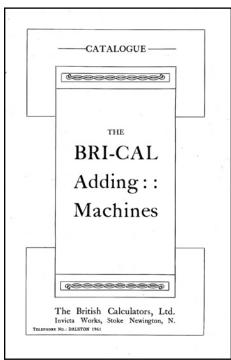
Binding: original printed paper wrappers

Pagination: pp. 20 Size: 217x140 mm

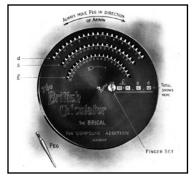
The Bri-Cal was a circular, stylus-driven adding machine. This is a price list and description for its various models A, B, F, U, D, W and R.

Illustrations available:

Title page Bri-Cal model A



B 259



BRI-CAL adding machine, B 259

B 260

Brodetsky, Selig (1888–1954)

A first course in nomography

Year: 1925 Place: London

Publisher: G. Bell and Sons

Edition: 2nd Language: English

Binding: original cloth boards; gilt spine

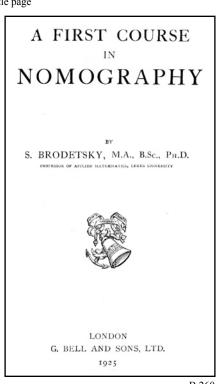
Pagination: pp. xii; 160 Collation: π^6 A–K⁸ Size: 204x138 mm

Brodetsky was a mathematician and Zionist leader. Born in the Ukraine, he moved with his family to London in 1893. He placed first (for all England) in the Cambridge local examinations in 1905 and won a scholarship to Trinity College. He obtained a Ph.D. in astronomy from Leipzig and, in 1914, became a lecturer at Bristol University, becoming chair of mathematics in Leeds in 1924. In 1949, he moved to Israel, where he became president of the Hebrew University in Jerusalem.

See the Appendix essay on nomography for details about the subject. Brodetsky provides a short history of nomography, and the rest of the work teaches various aspects of the topic.

Illustrations available:

Title page



B 260

Brooker, Ralph Anthony (1925 –)

The solution of algebraic equations on the EDSAC. In Proceedings of the Cambridge Philosophical Society, Vol. 48, Part 2, April 1952, pp. 255–270

Year: 1952 Place: Cambridge

Publisher: Cambridge University Press

Edition: 1st Language: English

Binding: original paper wrappers Pagination: pp. 255–270

Size: 257x182 mm

Ralph Anthony (Tony) Brooker began his career in Cambridge but later moved to the University of Manchester, where he became very influential in the development of software in Britain. He was responsible for the Autocode compilers for Manchester's Ferranti Mark I and Mercury. Along with Derrick Morris, he devised the concept of the Compiler Compiler—a program that, given the syntactic and semantic description of a programming language, would create a compiler for it.

This is an early paper describing a mathematical application for EDSAC. It discusses three different methods of solving for the roots of polynomial equations and then gives results from EDSAC.

Illustrations available: None

B 262

Brooks, Edward (1831–1912)

Key to the new normal mental arithmetic: And methods of teaching mental arithmetic, containing, also, methods for arithmetical contractions, and a collection of problems of an interesting and amusing character, for class exercises.

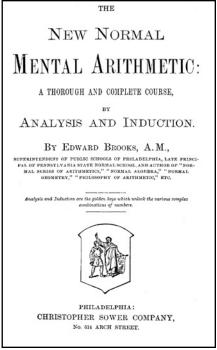
Year: 1873 Place: Philadelphia Publisher: Christopher Sower

Edition: 1st Language: English

Binding: original printed cloth boards

Pagination: pp. 160 Collation: 1–13⁶14² Size: 167x106 mm

Brooks was the superintendent of public schools in Philadelphia and had previously been the principal of the Pennsylvania State Normal School. He was known for his books on arithmetic, geometry, trigonometry, algebra, etc., all of which were used as teaching aids.



B 263

This work, designed for the teacher of arithmetic, provides a number of instructional hints and games that may be played with students. The majority of the work consists of the answers to hundreds of drill problems that appeared in the student's text (see another entry for Brooks, *The new normal mental arithmetic*, 1873).

Illustrations available: Title page

B 263

Brooks, Edward (1831–1912)

The new normal mental arithmetic: A thorough and complete course by analysis and induction.

Year: 1873 Place: Philadelphia

Publisher: Christopher Sower Company

Edition: unknown Language: English

Binding: original embossed cloth boards

Pagination: pp. 176, [4] Collation: 1–11⁸ Size: 167x107 mm

A student textbook on elementary arithmetic, the vast majority of the work is a collection of drill problems. The preface makes reference to **Recorde**'s *Whetsone of Wit*.

Illustrations available: Title page

Brooks, Edward (1831–1912)

The new normal primary arithmetic designed as an introduction to a thorough and complete course in mental and written arithmetic.

Year: 1893 Place: Philadelphia

Publisher: Christopher Sower

Edition: revised Language: English

Binding: original printed cloth boards

Pagination: pp. vi, 7–112 Collation: 1–7⁸ Size: 168x107 mm

A revised version of Brooks' earlier work. Brooks had, in the meantime, apparently earned a Ph.D. that was not noted in his earlier publications.

Illustrations available: Title page

B 265

Brooks, Edward (1831–1912)

The normal mental arithmetic. A thorough and complete course by analysis and induction. Revised edition with a treatise on mental algebra

Year: 1863 Place: Philadelphia

Publisher: Sower, Potts & Co.

Edition: revised Language: English

Binding: original paper wrappers Pagination: pp. [2], viii, 7–168

Collation: 1–14⁶15² Size: 150x98 mm

See earlier entries for Edward Brooks.

Illustrations available: Title page

B 266

Brooks, Edward (1831–1912)

The normal union arithmetic, graded course. Part II

Year: 1877 Place: Philadelphia

Publisher: Sower, Potts & Co.

Edition: unknown Language: English

Binding: original printed cloth boards

Pagination: pp. 230 Collation: 1–9¹²10⁷ Size: 185x116 mm

This volume is more advanced than Brooks' other *mental arithmetic* publications. After a much shorter introduction

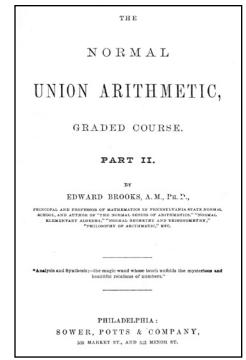
to the standard arithmetical operations, there are sections on fractions, factoring, mixed radix numbers (lengths, weights, etc.), and calendar and business problems. An interesting paragraph in the section on numeration lists, after Roman numerals, the *lumbermen's notation*.

The *union* in the title refers to his *union of mental and* written arithmetic in one volume and has nothing to do with trade unions.

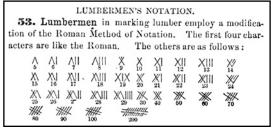
Illustrations available:

Title page

Lumberman's notation



B 266



Notation system, B 266

B 267

Brooks, Edward (1831–1912)

The normal union arithmetic, graded course. Part III

Year: 1877

Place: Philadelphia Publisher: Sower, Potts & Co.

rubhsher. Sower, Pous & Co.

Edition: unknown Language: English Binding: original printed cloth boards Pagination: pp. viii, 231–429, [1] Collation: A–H¹²1⁸ Size: 184x114 mm

This is Part III of Brooks' advanced treatment of arithmetic. This volume contains sections on business problems such as percentages on bonds and investments, ratios, arithmetic and geometric series, and menstruation of surfaces and volumes. An appendix contains problems on the metric system and insurance of various kinds.

Illustrations available: Title page

B 268

Brooks, Edward (1831–1912)

The normal written arithmetic, by analysis and synthesis. Designed for common schools, normal schools, high schools, academies, etc.

Year: 1869 Place: Philadelphia Publisher: Sower Potts

Publisher: Sower, Potts & Co.

Edition: 2nd (?) Language: English

Binding: original printed cloth boards Pagination: pp. vi, 9–337, [1]

Collation: 1–28⁶ Size: 184x108 mm

This is a more advanced work than Brooks' *mental* arithmetic series. It treats the same elementary numeration and arithmetic operations, but then deals with decimal fractions and many of the same types of advanced problems that were repeated in the *union* publications.

Illustrations available: Title page

B 269

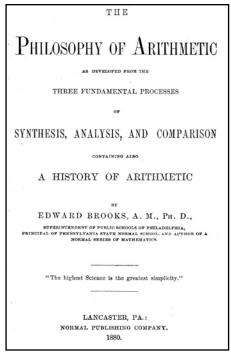
Brooks, Edward (1831–1912)

The philosophy of arithmetic as developed from the three fundamental processes of synthesis, analysis, and comparison containing also a history of arithmetic.

Year: 1880 Place: Lancaster, PA Publisher: Normal Publishing Edition: 2nd Language: English Binding: original cloth boards Pagination: pp. x, 11–570, 2

Collation: 1–358366 Size: 222x144 mm

This is by far the most significant of Brooks' publications, although perhaps the least popular. It begins with a



B 269

history and comments on the origins and old names for arithmetical processes, particularly the old Latin and Italian names for the various methods used for division. The chapter on Arithmetical Language includes the erroneous speculations on the shapes of the digits arising from the number of straight lines or angles contained in the character but also includes, without illustration, the more plausible theory of their origin from Sanskrit characters. A section of different number bases discusses the origin of the binary system, which, he indicates, was communicated to Leibniz by Bouvet, a Jesuit missionary in China. An extensive description of the base 12 scale is complete with a proposed set of names and characters for the digits as well as an addition and multiplication table. The last half of the book tends to treat the same topics as were in his union series of arithmetic books, but from a much more academic standpoint. In his discussion of decimal fractions, he points out that they were first used by Simon Stevin and that the first English work to use them with regularity was by Richard Witt in 1613, although Stevin's Disme was translated into English by Richard Norton in 1608.

Despite the inclusion of several speculations, this work has much to recommend it as a study of early arithmetic.

Illustrations available:

Title page

Origin of numeral shapes

Description of the creation of decimal fractions



B 270

Brown, George (1650–1730)

Arithmetica infinita or the accurate accomptant's best companion contriv'd and calculated ...

Year: 1717/1718 Julian/Gregorian

Place: [Edinburgh] Publisher: Brown Edition: 1st Language: English

Figures: engraved portrait frontispiece Binding: contemporary panelled leather

Pagination: pp. [4], 14, 126, 10 Collation: $\pi^2 a^7 A - H^8 I^4$

Size: 95x120 mm

George Brown was a Scottish minister who apparently graduated from the University of Aberdeen in 1675 (another account has him graduating from Edinburgh University in 1664, but he would only have been 14 at that time – not impossible for the time, but unusual). He apparently served in various parishes in Scotland, but after the revolution of 1688, he lost his license to practice. He created a device known as a *Rotula*, a circular instrument for performing elementary arithmetic operations, and published works on arithmetic and tables for the conversion of English to Scots currency. For information on the Rotula, see Duncan Wilson, "The Rotula, a seventeenth century calculating device," *The Scottish Educational Journal*, April 14, 1933, pp. 432–433.

Brown's last publication, this small book of tables was engraved, excepting one typeset page bearing a letter from the astronomer John Keill recommending the use of the tables. The two tables are each concerned with interest and do not use a decimal point but rather a small \bot symbol. A manuscript page, pasted into the front, explains that the tables are *artificial numbers*, *adopted to our English money: If or twenty shillings sterling being the Integer* (see illustration).

Illustrations available:
Title page
Frontispiece of Brown

Sample table page Manuscript page of explanation



George Brown, B 270

P1	N	An Intrast Table at any rate pro cont	$\frac{1}{4}d$
	1	002739726	00010416
	2	005479452	0,0020833
	3	008219178	00031250
		1010958904	
-	5	1013698630	06052083
		1016438356	
	2	019178082	0,0072918
		021917808	
	9	124657534	
	\mathcal{Y}		013802083
	\mathcal{N}	1 d	$1\frac{1}{4}d$
	7	00041666	00052083
		00083333	
	3	00125000	00156250

Table, B 270

B 271

Brown, George (1650–1730)

A compendious, but a compleat system of decimal arithmetick, containing more exact rules for ordering infinites, than any hitherto extant.

Year: 1701 Place: Edinburgh Publisher: Brown Edition: 1st Language: English

Binding: contemporary leather

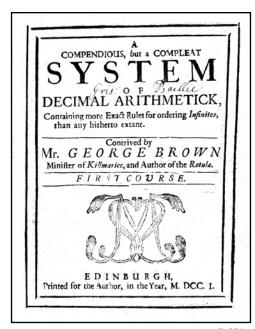
Pagination: pp. 68

Collation: A–E⁴F–G²H–I⁴K²

Size: 175x142 mm

This is an elementary arithmetic beginning with a description of the four basic operations. The last half presents the rule of three and a few simple business problems. The final section on compound interest illustrates the process with logarithms but does not include a table.

Illustrations available: Title page



B 272

Brown, Gordon Stanley (1907–) and Donald Pierce Campbell

Principles of servomechanisms. Dynamics and synthesis of closed-loop control systems

Year: 1948 Place: New York Publisher: John Wiley Edition: 1st Language: English

Binding: original cloth boards Pagination: pp. xiv, 400 Size: 230x147 mm

Brown was the director of the MIT Servomechanisms Laboratory, the organization that was responsible for the development of the Whirlwind computer. Campbell was a professor of electrical engineering at MIT. This book is not about the Whirlwind but about the closed loop control equipment that was a mainstay of industrial machinery. It was the failure of this type of control system as applied to aircraft trainers that led them to investigate the electronic digital systems that eventually resulted in Whirlwind.

This highly technical description of control systems was produced at the end of the era of mechanical/hydraulic systems, when they were about to be replaced by their electronic equivalents.

Illustrations available: Title page

B 273

Brown, John (fl.1648–1695)

The description and use of the carpenter's-rule: Together with the use of the line of numbers commonly call'd Gunter's-line. Applyed to the measuring of all superficies and solids, as board, glass, plaistering, wainscot, tyling, paving, flooring &c. Timber, stone, square or round, gauging of vessels, &c. Also military orders, simple and compound interest, and tables of reduction, with the way of working by arithmetick, in the most of them. Together with the use of the glasiers and Mr. White's sliding rules. Rendered plain and easie for ordinary capacities.

Year: 1704 Place: London

Publisher: Printed for R. Mount

Edition: 4th Language: English

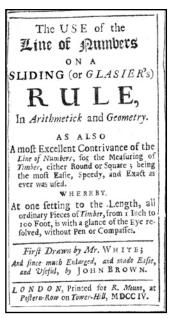
Figures: 1 engraved plate (follows p. 6) Binding: contemporary leather rebacked

Pagination: pp. 190 Collation: A–G¹²H¹¹ Size: 133x72 mm

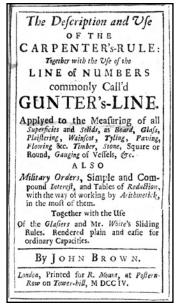
Reference: Tay MP I, p. 418

This work examines the use of Gunter's line of numbers—a logarithmic scale first proposed by **Edmund Gunter**; later, by incorporating two such scales, **Oughtred** created the slide rule. Initially, Gunter's line was to be used by measuring distances with a pair of dividers.

After explaining the use of the rule for simple arithmetic, this work illustrates its use by various problems from the domestic purchase of coal to interpretation of surveys



White's title, B 273



Brown's title, B 273

ΑT	able of the Cubique	Square and Roots.
Koots.	Square.	Cubi
1	I	I
2	4	8
3	9	27
5	16	64
5	25	125
	36	216
7	.49	343
8	64	512
9	81	729
10	100	1000
12	144	1728
26	676	17576
56	3136	175616
204	41616	8489664
439	192721	84604519
947	896809	849278123
000	1000000	1000000000

Table of roots, B 273

and currency exchange. A small table of squares and cubes appears, at first glance, to be for arbitrary values but in fact demonstrates that to use the logarithmic scale to find roots requires the user to appreciate the number of digits being used (e.g., the cube root of 1728, 17576 and 175616 are easily confused).

Brown's revision of White's *Use of the line of numbers* on a sliding (or Glasier's) rule has its own separate title page, but with continuous pagination.

Illustrations available: Brown's title page White's title page Table of roots

B 274

Brown, John (fl.1648–95)

Horologiographia: or the art of dyalling, being the second book of the use of the trianguler-quadrant. Shewing the natural, artificial, and instrumental way, of making of sun dials, on any flat superficies: with plain and easie directions, to discover their nature and affections, by the horizontal projection. With the way of drawing the usual ornaments on any plain: also, a familiar easie way to draw those lines on the ceiling of a room, by the trianguler quadrant. Also the use of the same instrument in navigation; both for observation, and operation. Performing the use of several seainstruments still in use.

Year: 1671 Place: London

Publisher: Printed by John Darby for John Wingfield, also by

John Brown and John Seller

Edition: 1st Language: English

Figures: 25 engraved plates pasted to text leaves

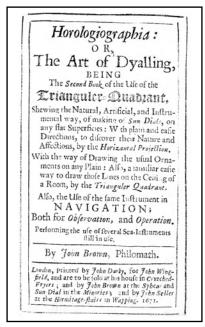
Binding: contemporary leather; spine gilt in compartments

Pagination: pp. 305, [7] Collation: A–T⁸V⁴ Size: 1413x90 mm

This is a very nice book on dialing. It manages to cover almost every possible aspect of the subject and discusses dials on all surfaces. Brown has added an appendix *On the use of the Triangular Quadrant in Navigation*.

Illustrations available:

Title page



Brown, John and John Wallace

Mathematical tables, containing the logarithms of numbers, logarithmic sines, tangents, and secants, and a traverse table; to which are prefixed, logarithmical arithmetic, and plane trigonometry; also examples on the mensuration of heights and distances. For the use of schools.

Year: 1808 Place: Edinburgh

Publisher: Peter Hill and Longman [et al.]

Edition: 2nd Language: English

Binding: contemporary leather; red leather label

Pagination: pp. [4], 72, [86], 8 Collation: $\pi^2A-I^42a-2r^22s^42t-2u^22x^5$

Size: 204x117 mm

Reference: Hend BTM, #120.0, pp. 104-105

Nothing is known about Brown other than the fact he calls himself a mathematician on the title page. The name of the Rev. John Wallace, although not on the title page, comes from the initials *J.W.*, which appear on an *advertisement* prior to the table of contents.

This table of logarithms begins with an introduction including the use of the tables for both scientific and business calculations. The table itself would have been particularly difficult to use as it is set in small type with few breaks in the layout to guide the eye (see illustration).

On the front fly leaf is penciled in a contemporary hand:

May angles help my lovely favir impowered by heaven above come & g[?] yee power vouchsafe you to gauird the maid I love. The author Jane Thoms, Chesninton by Dundee NB

Illustrations available: Title page

N.	0	1	2	3	4_	_5_	Ī
100	000000	000434	000868	001301	001734	002166	O
101	004321	004751	005181	005609	006088	006466	00
102	008600	00902€	009451	009876	010300	010724	0
103	012837	013259	013680	014100	014521	014940	0
		017451					
105	021189	021603	022016	022428	022841	023252	05
		025715					
		029789					
		033826					
109	037426	037825	038223	038620	039017	039414	0.
110	041393	041787	042182	042576	042969	043362	0
111	045323	045714	046105	046495	046885	047275	0
112	049218	049606	049993	050380	050766	051153	0
113	053078	053463	053846	054230	054613	054996	0
114	056905	057286	057666	058046	058426	058805	0
115	060698	061075	061452	061829	062206	062582	0
116	064458	064832	065206	065580	065959	066326	10
		068557					
		072250					
1110	1075547	1075012	076976	076640	1077004	077368	10

Log table typography, B 275

MATHEMATICAL TABLES,

CONTAINING THE

LOGARITHMS OF NUMBERS, LOGARITHMIC SINES, TANGENTS, AND SECANTS,

AND A

TRAVERSE TABLE;

TO WHICH ARE PREFIXED,

LOGARITHMICAL ARITHMETIC, AND PLANE TRIGONOMETRY:

ALSO EVAMPLES ON THE

MENSURATION OF HEIGHTS AND DISTANCES.

For the Use of Schools.

BY J. BROWN, MATHEMATICIAN.

THE SECOND EDITION,

CORRECTED, IMPROVED, AND ENLARGED, WITH THE FOLLOWING ADDITIONS,

AN ACCOUNT OF THE NATURE AND CALCULATION OF LOCARITHMS, AND OF SINES, TANGENTS, AND SECANTS; ANSWERS TO THE EXAMPLES ON THE MESSURATION OF REGISTS AND DISTANCES, AND SOLUTIONS OF THE MOST DIFFICULT GIVEN IN NOTES; RULES FOR THE COMPUTATION OF INTEREST AND AMBUTTES, WITH TABLES OF COMPOUND INTEREST, PROBABILITIES OF LIFE, AND ANNUITIES FOR YEARS AND LIVES;

AN APPENDIX,

EXPLAINING THE APPLICATION OF LOGARITHMS TO THE

MENSURATION OF HEIGHT'S BY THE BAROMETER,

EDINBURGH:

PRINTED FOR PETER HILL,

Printer to the Charch of Scaland;

AND LONGMAN, HURST, REES, & ORME, LONDON,
1808.

B 275

Table page Fly leaf notation

B 276

Brown, Richard (1856–1918)

A history of accounting and accountants

Year: 1905 Place: Edinburgh Publisher: T. C. & E. C. Jack

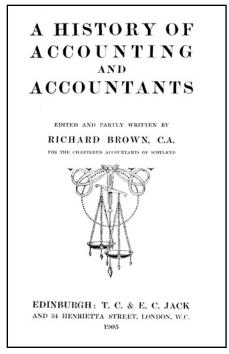
Edition: 1st

Edition, 1st

Language: English

Figures: 25 photolith plates Binding: half bound; uncut Pagination: pp. xvi, 459, [1] Collation: π^8 A–2E⁸ 2F⁶ Size: 259x193 mm

On the fiftieth anniversary of the incorporation of accountants in Scotland (the first country in which Chartered Accountants were created), it was decided to produce a volume about the history of the organization. This plan soon grew to include a history of accounting itself. While not ready in time for the actual anniversary, this is a comprehensive work beginning with the development of numerical notation in ancient Greece, showing early forms of accounts from Egypt and elsewhere and culminating with the creation of the accounting profession in Britain, Europe, America, Japan, South America and a few other places.



This is number 57 of a deluxe limited edition of 250 signed copies.

Illustrations available: Title page

B 277

Brozek, Jan (1585–1652)

Arithmetica integrorum edita.

Year: 1620 Place: Cracow

Publisher: Matthiæ Andreoviensis (Maciej Andrzejowczyk)

Edition: 1st Language: Latin

Figures: 1 large folding plate Binding: later paper boards Pagination: pp. [16], 252, [4] Collation: A⁸A–Q⁸

Size: 143x95 mm Reference: DSB, v2, p. 526

Jan Brozek is acknowledged as the best Polish mathematician of his day. He held a number of different positions at Polish universities and eventually became Rector of the University of Krakow. He published in excess of thirty works, some on mathematical topics but also many to do with religious controversies.

The *DSB* indicates that this book introduced logarithms into Polish schools. Although Brozek was clearly familiar with **Napier**, there is no obvious mention of logarithms in this work and certainly no tables or instruction on how

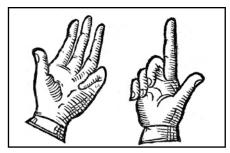
they were to be used. It would appear that the author of the *DSB* biography has mistaken references to **Napier**'s bones for logarithms.

This arithmetic begins with numeration and then treats the fundamental operations, including mediation and duplation. This section is illustrated with an example of finger numerals that differ from the usual ones of **Bede** and **Pacioli**. A very large gelosia diagram illustrates multiplication along with another in which Brozek first calculates all nine multiples of the multiplicand—a technique also used in his illustration of division. After discussion of arithmetic and geometric progressions, he deals with squares and cubes.

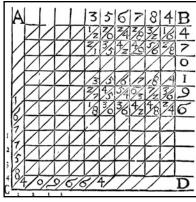
The most interesting section deals with **John Napier** and his *Rabdologiae* (1617) and appears a mere three years after Napier's own publication. He not only includes the usual Napier's Bones but also prefaces it with a lengthy description of Napier's binary (chessboard) abacus, which Brozek refers to as *abaco Scacchiae*. This is one of the few published references in the contemporary literature to this device.



B 277



Finger numerals, B 277



Gelosia multiplication, B 277

Illustrations available:

Title page

Finger numerals for a problem of 8 times 6

Gelosia multiplication Multiples of the multiplicand Napier's chessboard abacus

B 278

Bruno, Giordano (1548–1600)

De lampade combinatria Lulliana

b/w: Bruno, Giordano; De specierum scrutinio b/w: **Bruno**, **Giordano**; *De progressu* & *lampade* venatoria logicorum

b/w: Agrippa, Heinrich Cornelius von Nettesheim;

Commentaria Agrippae in artem brevem Lullian

b/w: Lull, Ramon; Opera ea quæ ad adinventam ab ipso artem universalem, scientiarum artiumque omnium brevi compendio, firmaque memoria apprehendendarum, locupletissmaque vel oratione ex tempore pertractandarum, pertinent. Ut et in eandem quorundam interpretum scripti commentarij: quae omnia sequens indicatbit pagina: & hoc demùn tempore coniunction emendatiora locupletioraq[ue] non nihil edita sunt. Accessit index cum capitum, tum rerum ac verborum ac verborum locupletissimus.

Year: 1598 Place: Strasbourg Publisher: Lazar Zetzner Edition: 1st Language: Latin Figures: 3 folding plates

Binding: contemporary vellum; red edges Pagination: pp. [24], 992, [32] (mis# 80 as 34)

Collation: (?)4):(8a-z8A-2S8 Size: 179x106 mm

See entry for Lull, Ramon; Opera, 1598

Illustrations available:

None

B 279

Bruno, Giordano (1548–1600)

De progressu & lampade venatoria logicorum

b/w: Bruno, Giordano; De specierum scrutinio b/w: Bruno, Giordano; De lampade combinatria Lulliana

b/w: Agrippa, Heinrich Cornelius von Nettesheim; Commentaria Agrippae in artem brevem Lullian

b/w: Lull, Ramon; Opera ea quæ ad adinventam ab ipso artem universalem, scientiarum artiumque omnium brevi compendio, firmaque memoria apprehendendarum, locupletissimaque vel oratione extempore pertractandarum, pertinent. *Ut et in eandem quorundam interpretum scripti* commentarij: quae omnia sequens indicabit pagina: & hoc demùn tempore coniunctim emendatiora locupletioraq[ue] non nihil edita sunt. Accessit index cum capitum, tùm rerum ac verborum ac verborum locupletissimus.

> Year: 1598 Place: Strasbourg Publisher: Lazar Zetzner

> Edition: 1st Language: Latin Figures: 3 folding plates

Binding: contemporary vellum; red edges Pagination: pp. [24], 992, [32] (mis# 80 as 34)

Collation: (?)4):(8a-z8A-2S8 Size: 179x106 mm

See entry for Lull, Ramon; Opera, 1598

Illustrations available:

None

B 280

Bruno, Giordano (1548–1600)

De specierum scrutinio

b/w: Bruno, Giordano; De lampade combinatria Lulliana

b/w: **Bruno**, **Giordano**; *De progressu* & *lampade* venatoria logicorum

b/w: Agrippa, Heinrich Cornelius von Nettesheim; Commentaria Agrippae in artem brevem Lullian

b/w: Lull, Ramon; Opera ea quæ ad adinventam ab ipso artem universalem, scientiarum artiumque omnium brevi compendio, firmaque memoria apprehendendarum, locupletissimaque vel oratione extempore pertractandarum, pertinent. *Ut et in eandem quorundam interpretum scripti* commentarij: quae omnia sequens indicabit pagina: & hoc demùn tempore coniunctim emendatiora locupletioraq[ue] non nihil edita

sunt. Accessit index cum capitum, tùm rerum ac verborum ac verborum locupletissimus.

Year: 1598 Place: Strasbourg Publisher: Lazar Zetzner Edition: 1st Language: Latin Figures: 3 folding plates

Binding: contemporary vellum; red edges

Pagination: pp. [24], 992, [32] (misnumbered 80 as 34)

Collation: (?)⁴):(⁸a–z⁸A–2S⁸ Size: 179x106 mm

See entry for Lull, Ramon; Opera, 1598

Illustrations available:

None

B 281

Bruns, Robert A. and Robert M. Saunders

Analysis of feedback control systems. Servomechanisms and automatic regulators

Year: 1955 Place: New York Publisher: McGraw-Hill Edition: 1st

Binding: original cloth boards Pagination: pp. xvi, 383, [1]

Size: 229x148 mm

Language: English

Bruns and Saunders were professors at the University of California at Berkeley, but at the time this book was written, Bruns had moved to take a position at the Jet Propulsion Laboratory.

This is a highly technical account of both the theory and practice of servomechanisms. The theoretical part is



B 281



B 282

balanced by some very practical considerations, e.g., the explanation of how to eliminate backlash in spur gears.

Illustrations available: Title page

B 282

Bubnov, Nikolai Mikhailovitch (1858–); [Joseph Lezius (1860 –), translator]

Arithmetische Selbständigkeit der europäischen Kultur. Ein Betrag zur Kulturgeschichte.

Year: 1914 Place: Berlin

Publisher: R. Friedländer & Sohn

Edition: 1st (German) Language: German

Binding: three-quarter leather over marbled boards

Pagination: pp. viii, 285, [1] Collation: $\pi^41-17^818^7$ Size: 225x149 mm

This is a history of arithmetic in Europe, originally written in Russian by a professor at Kiev and translated by a professor at the same institution. It contains a lengthy section on the use of the European table abacus. Unfortunately, it is not illustrated.

This copy ex-libris Otto Neugebauer.

Illustrations available: Title page

Buchholz, Werner, editor

The computer issue. In Proceedings of the I. R. E., Vol. 41, No. 10, October 1953.

Year: 1953 Place: New York

Publisher: Institute of Radio Engineers

Edition: 1st Language: English

Binding: original paper wrappers Pagination: pp. 1219–1554 Size: 280x215 mm

This special issue of the Proceedings of the IRE was created by the IRE Professional Group on Electronic Computers (PGEC). PGEC was founded two years previously and had grown to over two thousand members. Like the AFIPS volume (see AFIPS, *Proceedings of the Joint AIEE-IRE Computer Conference. Review of electronic digital computers*, 1952) of the preceding year, this issue dramatically illustrates the growth of interest, and advances made, in the early days of computers.

The volume contains forty-one papers, of which a number are of secondary interest. The following are the major papers (the paper's title is usually a very clear indicator of its contents):

Buchholz, Werner

The system design of the IBM Type 701 computer, pp. 1262–1275

Buchholz was a major designer of IBM computers. He worked on the IBM 701 and the IBM 7030 (Stretch).

Burks, Arthur Walter (1915–) and Jesse B. Wright

Theory of logical nets, pp. 1357–1365

Arthur Burks was a member of the ENIAC team and later a professor at the University of Michigan. See the entry for **Burks**, *Theory of logical nets*, 1953.

Crosman, Loring P.

The Remington Rand Type 409-2 Electronic, pp. 1332–1340

Crossman was an engineer with Remington Rand, Laboratory of Advanced Research, South Norwalk, Connecticut.

Eckert, John Adam Presper, Jr. (1919–1995)

A survey of digital computer memory systems, pp. 1393–1406

Eckert, one of the principle designers of ENIAC and the UNIVAC I, was one of the foremost engineers in this field. He was always concerned with memory systems and recognized them as the key to computer design. This is one of the best survey papers on early computer memory systems.

Elbourn, Robert D. and Richard P. Witt.

Dynamic circuit techniques used in SEAC and DYSEAC, pp. 1380–1387

Both authors were with the National Bureau of Standards and were part of the group that designed the SEAC and DYSEAC circuits.

Erickson, Robert S.

The Logistics Computer, pp. 1325–1332

Erickson was an engineer with Engineering Research Associates (ERA), which by this time had become a division of Remington Rand. He later joined Control Data Corporation (CDC).

Frizzell, Clarence E.

Engineering description of the IBM Type 701 computer, pp. 1275–1287

Frizzell was an engineer with IBM's Engineering Laboratory in Poughkeepsie, NY.

Gluck, S. E.; H. J. Gray Jr.; C.T. Leondes; and Morris Rubinoff

The design of logical OR-AND-OR pyramids for digital computers, pp. 1388–1392

All the authors were with the Moore School of Electrical Engineering of the University of Pennsylvania.

Greenwald, Sidney; R. C. Haueter and Samuel Nathan Alexander (1910–1967)

SEAC, pp. 1300-1313

The authors were with the National Bureau of Standards, where they were instrumental in the design and construction of SEAC.

Hopper, Grace Brewster Murray (1906–1992) and John William Mauchly (1907–1980)

Influence of programming techniques on the design of computers, pp. 1250–1254

Grace Hopper began her computer career with Howard Aiken at Harvard, but by this time she was a member of the staff of the UNIVAC Division of Remington Rand. Mauchly was one of the principle designers of ENIAC and UNIVAC I.

Huskey, Harry Douglas (1916–); R. Thorenson; B. F. Ambrosio; and E. C. Yowell

The SWAC - Design features and operating experience, pp. 1294–1299

The authors were the principal figures in the creation of SWAC, the National Bureau of Standards computer at UCLA, their Los Angeles site. By this time, Huskey, who had started his career as a member of the ENIAC team and had worked at the National Physical Laboratory with Alan Turing for a year, was on the staff of Wayne University, Detroit.

King, Gilbert W.; George W. Brown and Louis Nicot Ridenour, Jr. (1911–1959)

Photographic techniques for information storage, pp. 1421–1428

The authors were on staff of the International Telemeter Corporation in Los Angeles, the parent firm of Telemeter Magnetics, an early supplier of magnetic core memories. All the authors had distinguished careers: King became Director of Research at IBM, Brown was a professor at UCLA and UC Irvine, and Ridenour, who had edited the MIT Radiation Laboratory series of books after the war, became the chief scientist for the Air Force.

Lewis, W. D.

Electronic computers and telephone switching, pp. 1242–1244

Lewis was an engineer with Bell Telephone Laboratories.

Palevsky, Max

The design of the Bendix Digital Differential Analyzer, pp. 1352–1356

Palevsky joined Bendix Aviation's Computer Division in 1952. He later founded Scientific Data Systems (SDS), which produced the *Sigma* line of computers (later purchased by Xerox to form XDS).

Rajchman, Jan A. (1911–1989)

A myriabit magnetic-core matrix memory, pp. 1407–1421

Rajchman was a pioneer research engineer with RCA Laboratories. He was very interested in memory systems and designed the Selectron memory tubes used on the Johnniac computer.

Ross, Harold D., Jr.

The arithmetic element of the IBM Type 701 computer, pp. 1287–1294

Ross was a member of the staff at the IBM Engineering Laboratory in Poughkeepsie, NY.

Rubinoff, Morris

Analogue vs. digital computers - A comparison, pp. 1254–1262

Rubinoff was an engineer with the Moore School of Electrical Engineering at the University of Pennsylvania and later a faculty member.

Samuel, Arthur Lee (1901–1990)

Computing bit by bit or digital computers made easy, pp. 1223–1230

After an early career at MIT and the University of Illinois, Samuel moved to IBM in 1949,

where he remained until retiring in 1966 to take a post at Stanford University. He is best known for his early work in artificial intelligence, particularly the creation of an early checkersplaying computer program.

Serrell, Robert

Elements of Boolean algebra for the study of information-handling systems, pp. 1366–1380

Serrell was an engineer with the RCA David Sarnoff Research Center in Princeton.

Shannon, Claude Elwood (1916–2001)

Computers and Automata, pp. 1234–1241

Shannon was a member of the technical staff at Bell Telephone Laboratories. He is best remembered for his groundbreaking theoretical work on coding and information transmission.

Shannon, Claude Elwood (1916–2001) and Edward F. Moore

Machine aid for switching circuit design, pp. 1348–1351

Both authors were with Bell Telephone Laboratories in Murray Hill, NJ.

Sherertz, Paul C.

Electronic circuits of the NAREC computer, pp. 1313–1320

NAREC, the Naval Research (Laboratory) Computer, was just being put into operation at the Naval Research Laboratory when this paper was written. Sherertz was an engineer on the project.

Thomas, Walker H.

Fundamentals of digital computer programming, pp. 1245–1249

Walker, from IBM's Engineering Laboratory in Poughkeepsie, NY, presented a short tutorial on how to program a simple, hypothetical computer.



B 283

Ware, Willis Howard (1920–)

The logical principles of a new kind of binary counter, pp. 1429–1437

Ware, an engineer with the Rand Corporation, was one of the principal designers of the Johnniac computer. Here he is reporting on work that had been done for the von Neumann computer project at the Institute for Advanced Study, Princeton.

Wheeler, David J. (1927–2004) and James E. Robertson

Diagnostic programs for the Illiac, pp. 1320–1325

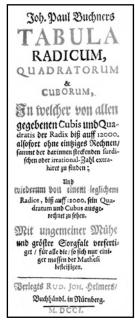
Wheeler, working as a graduate student under Maurice Wilkes, was a designer of the EDSAC computer in Cambridge. He is responsible for, among other things, the concept of the subroutine jump instruction (initially known as the *Wheeler Jump*). He spent his entire career at the University of Cambridge, but at the time of this paper, he was on leave working at the University of Illinois ILLIAC project.

Wilkes, Maurice Vincent (1913-)

Can machines think?, pp. 1230-1234

This is a repeat of a paper by Wilkes that was originally published in the May 1953 issue of *Discovery* in London.

Illustrations available: Cover page



B 284



Frontispiece, B 284

B 284

Buchner, Johann Paul

Tabula radicum, quadratorum & cuborum, In Welcher von allen gegebenen Cubis und Quadratis der Radix bis auf 12000 alsofort ohne eintziges Rechnensammt der darinnen steckenden surdischen oder irrational-Zahl extrahiret zu finden: ...

Year: 1701 Place: Nürnberg

Publisher: Johann Helmers

Edition: 1st Language: German

Figures: engraved frontispiece; title in red and black

Binding: contemporary leather Pagination: pp. [14], 252 Collation: A⁷B–Q⁸R⁶ Size: 185x78 mm Reference: Not in NUC

This is a set of tables of squares and cubes of all integers from 2 to 12,000. A short introduction provides a few examples of the use of the tables. The frontispiece is a nicely engraved scene with a cupid figure, indicating that the volume of a cubic stone can be determined by reference to this book. Although there is a short errata at the end of the volume, the tables are replete with other errors. Many corrections have been manually entered in the tables, sometimes as many as seventeen per page.

Illustrations available:
Title page (color)
Frontispiece
Table page with corrections



B 285

B 285

Buckley, Arabella Burton (1840–1929)

A short history of natural science

Year: 1879 Place: London

Publisher: Edward Stanford

Edition: 2nd Language: English

Binding: contemporary buckram leather Pagination: pp. xxix, [1], 505, [3]

Collation: $\pi^{15}B-2I^82K^6$ Size: 183x119 mm This is a history of science for use in schools. It is written in a simple style matching its intended audience but also simplifies some matters more than is, perhaps, justified.

Illustrations available: Title page

B 286

Buckner, Hans

Uber die Entwicklung des Integromat. In Probleme der Entwicklung programmgesteuerter rechengeräte und Integrieranlagen

Year: 1953 Place: Aachen

Publisher: Rhein-Westf. Technische Hochschule

Edition: 1st Language: German

Binding: cloth boards; original paper wrappers bound in

Pagination: pp. [2], XIV, 75, [1], 10

Size: 207x145 mm

See entry for **Cremer**; *Probleme der Entwicklung* programmgesteuerte Rechengeräte ..., 1953.

Illustrations available:

None

B 287

Budelius, Renerus (16th Century)

De monetis, et re numaria, libri duo

Year: 1591 Place: Cologne

Publisher: Johann Gymnich

Edition: 1st Language: Latin

Binding: contemporary limp vellum; boxed

Pagination: pp. [76], 236, 239–269, [2], 353–614, 619–798 Collation: ...⁶.....⁴.......⁴à⁴è⁴)⁴ò⁴ù⁴&⁴A-T⁴V²a-o⁴2A-4I⁴4K²

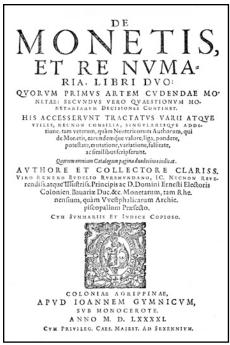
Size: 238x170 mm

Reference: Smi Rara, p. 396; Ada CBCE, #B-3153

Reiner Budel was director of the Bavarian mint.

This is the first edition of a well-known massive work in the history of economics with particular emphasis on the history of money and coinage. It consists of two significant chapters written by Budelius followed by chapters written by Albertus Brunus, Johannes Aquila, Bilibaldus Pirkheymer, Martinus Laudensis and several others. The work is difficult to understand and illustrations are few. There is a striking bookplate in the front cover from Arthur Hugh Smith Barry (with a label of Marbury Library at the Barry estates near Cheshire, England) and the book label of Robert Honeyman.

Illustrations available: Title page



B 287

Bull, Ludlow, editor

See Chace, Arnold Buffum; The Rhind mathematical papyrus, 1929.



Bullet, Pierre (1639–1716)

Traite de l'usage du pantometre, instrument geometrique, propre à prendre toutes sortes d'angles, mezurer les distances accessibles & inaccessibles, arpenter & diviser toutes sortes de figures, & c.

Year: 1675 Place: Paris

Publisher: André Pralard

Edition: 1st Language: French

Figures: engraved half title; woodcut device on title; woodcut initials and headpieces; engraved coat of arms printed on verso of title; 25 full-page engraved illustrations printed in text.

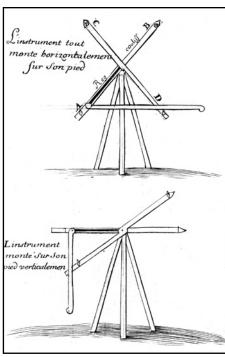
Binding: contemporary sprinkled leather; gilt spine with raised bands

Pagination: pp. [xxii], 26,187, [5] Collation: a⁸e⁴i⁸o⁴AB–PQ^{8,4}

Size: 157x185 mm

Pierre Bullet was a prominent architect and engineer. He was responsible for a number of works in Paris, including the rebuilding of the Quay le Peletier in 1673. In 1676, he published, with Nicolas-François Blondel, a plan of Paris showing all of its buildings.

It seems likely that during his survey of Paris, Bullet created the *pantometre* instrument described in this work. It was not unlike many such devices of its day—basically three rods hinged together or, like this one, one rod capable of sliding on another (see entries for



Pantometre, B 288

Danfree, 1597, and **Bürgi**, 1684). Bullet indicates that this version could be purchased from the stock of the instrument maker Lemaire in Paris. The work is well illustrated, showing the instrument in use for the usual types of problems: finding heights of towers, depths of wells, breadths of rivers, etc.

The unusual collation results from the original printed sheets having been cut in two unequal portions that were separately signed before being bound.

Illustrations available:
Title page
Pantometre instrument
Instrument in use

[Burgi, Joost (1552–1632)]

See **Bramer, Benjamin**; *Dritter Theil oder Anhang eines Berichts von M. Johsten Burgi*, 1684.



Journal cover, B 289

B 289

Burkhardt, Heinrich Friedrich Karl Ludwig (1861–1914)

Wie man vor Zeiten rechnete

Year: 1905 Place: Leipzig Publisher: B. G. Teubner Edition: offprint Language: German

Binding: original paper wrappers

Pagination: pp. 9–20 Size: 247x162 mm

Burkhardt was a major figure in the manufacture of mechanical calculating machines. His factory in

Erwin Tomash Library

Glashütte was a major supplier of calculating machines worldwide.

This paper describing the early history of calculating does not go into any depth but does give examples of Greek, Chinese and other numerals as well as illustrating a few methods of calculating.

A four-page 1893 manuscript letter by Burkhardt is laid

Illustrations available: Front cover

B 290

Burks, Arthur Walter (1915-)

Electronic computing circuits of the ENIAC. In Proceedings of the I.R.E., vol. 35, #8, August 1947.

> Year: 1947 Place: New York Publisher: Institute of Radio Engineers Edition: 1st Language: English Binding: original journal paper wrappers Pagination: pp. 756-767

Size: 278x217 mm Reference: Ran ODC, p. 409

Burks was a member of the ENIAC computer team. After the war, he joined John von Neumann at the Institute for Advanced Study, then became a professor, and later chairman, of the Department of Computer and Communication Sciences at the University of Michigan. He is also known for his work in logic and the philosophy of science.

This paper describes the circuit elements of the ENIAC. It indicates that the rate of circuit failure has only been about two or three per week, usually resulting from a failure of the heaters in the vacuum tubes. With an operator thoroughly familiar with all the details of ENIAC design and with the particular problem being solved ... only a few hours per week are lost on account of failures.

Illustrations available:

None

B 291

Burks, Arthur Walter (1915-) and Jesse B. Wright

Theory of logical nets. In Proceedings of the I.R.E., vol. 41, #10, October 1953

Year: 1953 Place: New York

Publisher: Institute of Radio Engineers

Edition: offprint

Language: English Binding: unbound

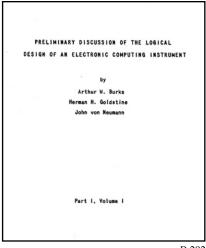
Pagination: pp. 1357-1365, [3]

Size: 278x217 mm

This is an extract from the *Proceedings of the I.R.E.* It is a technical paper on the design of computer circuits using the concept of logical nets. It requires some mathematical sophistication to follow the development of the theorems.

Illustrations available:

First page



B 292

Burks, Arthur Walter (1915–); Herman Heine Goldstine (1913–) and John Von Neumann (1903–1957)

Preliminary discussion of the logical design of an electronic computing instrument. Part I, Volume I

> Year: 1947 Place: Princeton

Publisher: Institute for Advanced Study

Edition: 2nd

Language: English

Binding: original printed paper wrappers; back wrapper torn

Pagination: ff. [6], 42 Size: 279x213 mm

Reference: Ran ODC, p. 409

This series of reports prepared by Burks, Goldstine and von Neumann were some of the most detailed available on the construction of a stored program computer and were widely circulated among the early computing community. This report discusses the general nature of the IAS computer; it is divided into sections discussing the memory, control, and arithmetic organs of the machine. At this time they were still planning to use the RCA Selectron memory tube (with 4,000 40-bit words of memory); that idea ultimately proved impractical, and they switched to the use of a Williams' tube memory.

Illustrations available: Title page

B 293

Burks, Arthur Walter (1915–); Don B. Warren and Jesse B. Wright

An analysis of a logical machine using parenthesis-free notation. In MTAC, April 1954, vol. VIII, No. 46

Year: 1954 Place: Lancaster, PA

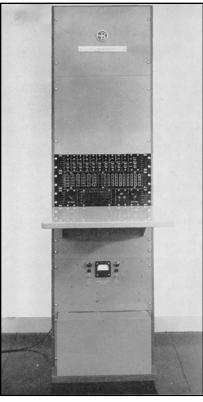
Publisher: National Research Council

Edition: 1st Language: English Binding: library buckram Pagination: pp. 53–58 Size: 227x149 mm

In this paper Burks and his co-authors report on the use of Lukasiewicz notation (a notation that allows the writing of mathematical and logical formulas without the use of brackets – often called *Polish notation*) to use as input to a machine for calculating truth values. The machine, built by Burroughs, is reported as constructed from relays and copes with formulas of ten variables. The machine is illustrated by a photograph.

Illustrations available:

Photograph of the Burroughs machine



Burroughs logic machine, B 293

B 294

Burroughs Adding Machine Company

Instructions for operating the Burroughs calculator

Year: 1941 Place: Detroit Publisher: Burroughs Edition: 1st Language: English

Binding: original paper wrappers

Pagination: pp. 35 Size: 277x214 mm

This instruction book gives tips on how to make more efficient use of the Burroughs calculating machines.

Illustrations available: Title page

B 295

Burroughs Adding Machine Company

The story of figures

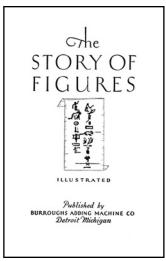
Year: 1950 Place: Detroit Publisher: Burroughs Edition: 3rd Language: English

Binding: original paper wrappers

Pagination: pp. 36 Size: 191x138 mm

This is a short history of the development of numbers and mechanical machines to process them. It begins with early systems of numeration, continues through individuals such as **Blaise Pascal** and **Charles Babbage**, and ends, not surprisingly, with several sections on Mr. Burroughs and company he founded.

Illustrations available: Title page



B 295

Bush, Vannevar E. (1890–1974)

As we may think. In Atlantic Monthly vol. 176, no. 1, July 1945

Year: 1945 Place: Boston

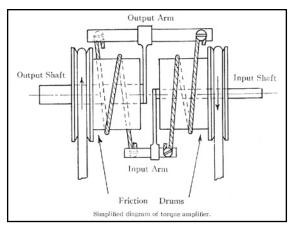
Publisher: The Atlantic Monthly Co.

Edition: 1st Language: English Binding: library buckram Pagination: pp. 101–108 Size: 297x182 mm

Vannevar Bush was one of the most important scientists of World War II. He began his career as a professor at MIT and eventually became president of that institution. While still a professor, he developed the Bush Differential Analyzer and was later responsible for the creation of the Rockefeller Differential Analyzer (RDA-2). During Word War II, he was called upon to head the Office of Scientific Research and Development. He was responsible for the coordination of over 6,000 scientists on war-related projects.

At the end of the war, with electronic computers and other such devices on the horizon, Bush wrote this article on the relationship of technology to human activity. It was one of the most farsighted statements of what wartime developments might bring. In it he proposes a device he calls a *memex*, which would be much like a desk with attached information storage and retrieval equipment. Initially, Bush suggests that it might be based on a library of microfilm, but his vision quickly expands to include the indexing of information that could be retrieved at the touch of a button. He concludes:

Wholly new forms of encyclopedias will appear, ready-made with a mesh of associative trails running through them, ready to be dropped into the memex and there amplified.



Torque amplifier, B 297

This statement, and others like it, reveal that he was thinking of things like modern hypertext documents with the links that are so common on personal computers today.

Douglas Engelbert, the inventor of the mouse and modern graphical interface to computers, has said that Bush's article inspired him and that it was this publication that shaped the rest of his life.

Illustrations available: Start of section 8

B 297

Bush, Vannevar E. (1890–1974)

The differential analyzer. In Journal of the Franklin Institute, Philadelphia, PA., vol. 212, No. 4, October 1931

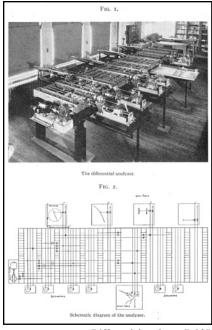
Year: 1931 Place: Philadelphia Publisher: Franklin Institute Edition: 1st

Language: English

Binding: contemporary black buckram

Pagination: pp. 447–488 Size: 234x150 mm

While still a professor at MIT, Bush was responsible for the development of the torque amplifier, the mechanism that made it possible to construct an accurate differential analyzer. His machine was ready for use in 1931, and this paper not only gives construction details but also shows how it might be set up to solve differential equations.



Differential analyzer, B 297

The Bush differential analyzer (in particular the torque amplifier) was copied in many places before World War II. The electronic ENIAC was designed as a replacement machine when mechanical differential analyzers proved too slow to speedily produce ballistic tables for the U.S. Army.

Illustrations available:

Diagram of torque amplifier
Photograph of torque amplifier.

Photograph and diagram of the differential analyzer

B 298

Bush, Vannevar E. (1890–1974)

Instrumental analysis. In Bulletin of the American Mathematical Society Vol. XLII, No. 10, October 1936

Year: 1936 Place: Menasha, WI

Publisher: American Mathematical Society

Edition: 1st Language: English

Binding: original gray paper wrappers

Pagination: pp. 649–669 Size: 239x146 mm Reference: Ran *ODC*, p. 409

This is the text of the twelfth Josiah Willard Gibbs Lecture of the American Mathematical Association, which Bush was invited to give. He describes various tools for calculation, a majority being analog instruments such as the harmonic analyzer and optical masks for integrating. He begins, however, with a description of punched card machinery and the possibilities for calculating using tabulating equipment.

Illustrations available: Cover page

B 299

Bush, Vannevar E. (1890–1974)

Operational circuit analysis

Year: 1929 Place: New York

Publisher: John Wiley & Sons

Edition: 1st Language: English Binding: original cloth boards

Pagination: pp. x, 392 Size: 195x131 mm

This is a highly technical book on the analysis of electrical circuits. The material is not only applicable to electrical circuits but also, by analogy, to acoustics, mechanics, hydraulics, etc.

This work includes an appendix by Norbert Wiener (who was then an assistant professor at MIT) on

OPERATIONAL CIRCUIT ANALYSIS

BY
VANNEVAR BUSH, Eng. D.
Professor of Electric Power Transmission, Massachusetts
Institute of Technology

WITH AN APPENDIX BY
NORBERT WIENER, Ph. D.
Assistant Professor of Mathematics, Massachusetts
Institute of Technology

NEW YORK
JOHN WILEY & SONS, INC.
LONDON: CHAPMAN & HALL, LIMITED
1929

B 299

Fourier analysis—a system that can be used to break down a complex curve into its simple trigonometric components.

Illustrations available: Title page

B 300

Bush, Vannevar E. (1890–1974)

Recent progress in analysing machines. In Proceedings of the Fourth International Congress for Applied Mechanics, Cambridge, England, July 3rd–9th, 1934

Year: 1935 Place: Cambridge

Publisher: Cambridge University Press

Edition: 1st Language: English

Binding: original cloth boards Pagination: pp. xx, 282, [2] Collation: $\pi^{10}1-17^818^6$ Size: 266x187 mm

By 1935, Bush was well known for his differential analyzer and a recognized expert on machines for solving complex mathematical systems. In this lecture Bush surveys machines used for producing specific types of mathematical results. While mentioning mechanical calculation, the main topic is really the machines used for solving differential equations and other similar systems.

Erwin Tomash Library

Bush covers mechanical (including his own differential analyzer), electrical and optical devices.

Illustrations available:

None

B 301

Bush, Vannevar E. (1890–1974)

Science. The endless frontier. A report to the President

Year: 1945

Place: Washington, D.C. Publisher: USGPO Edition: 1st

Language: English

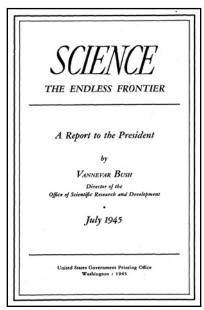
Binding: original paper wrappers

Pagination: pp. x, 184 Size: 230x150 mm

This report was produced by Vannevar Bush, director of the Office of Scientific Research and Development, at the end of the war. World War II had stimulated a huge leap forward in science and technology, and President Roosevelt had asked Bush to prepare a report on how best to release scientific information developed as part of secret military programs. In addition, he was to make recommendations about medical research, how to further research in the private sector, and how to develop a program to find and train the best scientific talent among American youth. One of Bush's most influential recommendations was to establish a National Research Foundation to fund research in American universities and other institutions.

Illustrations available:

Title page



B 301

[Bush, Vannevar E.]

See **Zernike**, **F**.; De differentiaal-analysator als vorbeeld van een continue machine, 1949.

B 302

Bush, Vannevar E. (1890–1974) and **Harold Locke Hazen** (1901–1980)

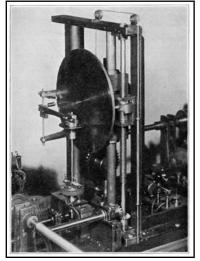
Integraph solution of differential equations. In Journal of the Franklin Institute, Vol. 204, No. 5, November 1927

Year: 1927 Place: Philadelphia Publisher: Franklin Institute

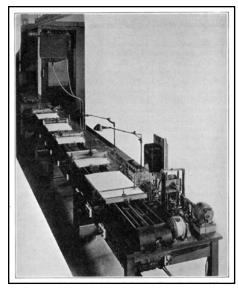
Edition: 1st Language: English Binding: entire volume Pagination: pp. 575–615 Size: 234x156 mm

The Bush integraph was the precursor to his much more famous differential analyzer, announced in the pages of this same journal in 1931 (see entry for **Bush**, *The differential analyzer*, 1931). This integraph contained two stages of integration, allowing the solution of second-order differential equations: the first integrator is a Thompson direct-current integrating watt-hour meter; the second the more familiar Kelvin, wheel-disk, mechanical integrating device. Having not yet developed his torque amplifier (used in the Differential Analyzer), Bush used servo-motors controlled by relays actuated by contacts on the integrators to power the rest of the system.

Illustrations available:
First page
General view of the integraph
Disk-Wheel integrator



Disk-wheel integrator, B 302



Integraph, B 302

Bush, Vannevar E. (1890–1974); F. D. Gage and H. R. Stewart

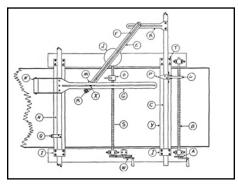
A continuous integraph. In Journal of the Franklin Institute, Vol. 203, No. 1, January 1927

Year: 1927 Place: Philadelphia Publisher: Franklin Institute

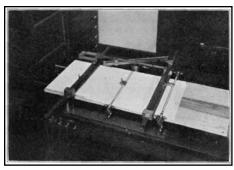
Edition: 1st Language: English

Binding: black library buckram Pagination: pp. 63–84 Size: 234x156 mm

This integrating machine was Bush's first effort at producing what would become his Differential Analyzer (see **Bush**, *Integraph solution of differential equations*, 1927, and **Bush**, *The differential analyzer*, 1931). It used a Thompson integrating watt-hour meter as the integrating device and had a mechanical multiplier as part of the system.



Mechanical multiplier, B 303



Mechanical multiplier, B 303

Illustrations available:

First page

Mechanical multiplier photograph Mechanical multiplier diagram

B 304

Buteo, Jean (1492-ca.1564-1572)

De quadratura circuli libri duo, ubi multorum quadraturæ confutantur, & ab omniium impugnatione defenditur Archimedes. Eiusdem, annotationum opuscula in errores Campani, Zamberti, Orontij, Peletarij, Io. Penæ interpretum Euclidis.

Year: 1559 Place: Lyon

Publisher: Gulielmum Rouillium

Edition: 1st Language: Latin Binding: modern leather Pagination: pp. 284 Collation: a-r⁸s⁶ Size: 165x107 mm

Reference: Ada CBCE, 3358; DSB II, p. 618

Buteo (also known as Borrel, Boteo, Butéon, or Bateon) was a French monk whose main interest was in mathematics and languages. Before he was twenty, he was able to read and understand Euclid in the original Greek. After studying in Paris under **Oronce Fine**, he returned to the Abbey at St. Antoine, where he wrote on scientific subjects but, as far as is known, never took pupils. He reputedly calculated, then disputed, the ability of Noah's ark to hold all the animals and stores that would have been required.

In this, an account of the quadrature of the circle, Buteo criticizes those who believed that they had found a solution, even having harsh words for his teacher, **Oronce Fine**. In the second half, he pointed out errors in earlier translations of the works of Euclid and argued that it was Euclid himself, and not Theon, who created the proofs.

Illustrations available: Title page



B 305

Butte, Wilhelm

Grundlinien der Arithmetik des menschlichen Lebens, nebst Winken für deren Anwendung auf Geographie, Staats - und Natur - Wissenschaft

> Year: 1811 Place: Landshut Publisher: Philipp Krüll

Edition: 1st Language: German Figures: 9 folding plates

Binding: half bound, marbled paper boards

Pagination: pp. xxxiv, [4], 420 Collation: *8 *** *** (-***4) 1–268 272

Size: 201x123 mm

Butte was the professor of economics at the Ludwig Maximilians University in Landshut, Bavaria. He begins by acknowledging earlier authors such as **Graunt**, **Malthus**, **Kersseboom** and others, but then claims that he is the first to really apply arithmetic and mathematics to the study of human life. The work is divided into two sections: the first theoretical, the second practical. In the first he creates a typology of human development (different for males and females), and in the second he attempts to apply this to support practical policy proposals. He attempts to develop a correlation between different world areas, climates, and peoples and proposes correct ages for voting, majority, schooling, etc.

Illustrations available: Title page



B 305

B 306

Butterworth, Edmond (ca.1755–1819)

Butterworth's young arithmeticians instructor containing specimens of writing. With directions for attaining in the shortest time a current-hand. Designed for the use of schools & private families.

Year: 1815 Place: Edinburgh Publisher: Oliver & Boyd

Edition: 2nd Language: English

Figures: engraved plates, 2 folding

Binding: contemporary marbled paper boards; recently

recornered and rebacked

Pagination: pp. 52, [52] Collation: $1-6^47^2\gamma^{26}$ Size: 258x210 mm

There were two Edmond Butterworths, a father and son. They are difficult to separate, but one or the other (perhaps both) was a writing master at Dumfrees Academy and Edinburgh High School. It is likely they both participated in the production of this work because the title page mentions *the authors*.

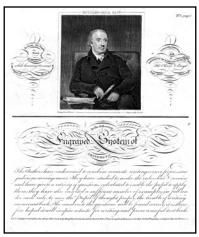
This is a fully engraved textbook on arithmetic and commercial practice. It teaches penmanship at the same time as arithmetic with examples of simple and compound arithmetic, English and Scottish weights and measures, and bookkeeping.

The title shown above is actually from page three, while page one states:

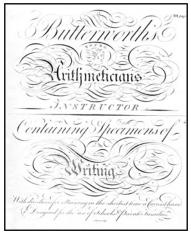
In the following engraved system of arithmetic the authors have endeavour'd to combine accurate writing, correct figures, and judiscious arrangements. They have studied to make the rules clear & concise and have given a variety of questions calculated to enable the pupil to apply them; they have also inserted a sufficient number of examples in full under each rule, to save the pupil, if thought proper, the trouble of writing an account book. The answers to the questions will be found correct, it is therefore hoped it will inspire a taste for writing, and prove a useful text book.

Illustrations available:

Title page 1 Title page 2 Weights and measures Compound addition Writing practice Business documents



Title 1, B 306



Title 2, B 306

B 307

Buxton, Leonard Halford Dudley (1889–1939)

Charles Babbage and his difference engines. In Transactions of the Newcomen Society, Vol XIV, 1933– 1934

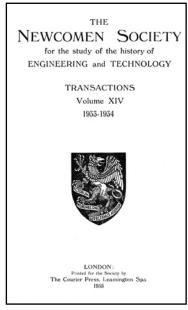
Year: 1933 Place: London Publisher: Newcomen Edition: 1st Language: English

Binding: original printed gray wrappers

Pagination: pp. 43–65 Size: 247x195 mm Reference: Ran *ODC*, p. 410

Buxton's grandfather, Harry Wilmot Buxton, had been a friend of Charles Babbage. Late in life Babbage had entrusted H. W. Buxton with the job of writing his biography, and Buxton had accumulated a number of papers and artifacts with that end in mind. L. H. Dudley Buxton, a reader in physical anthropology at Oxford, had inherited those papers and used them to prepare this talk to the Newcomen Society. In the course of the talk, he mentioned that his grandfather had actually written the requested biography of Babbage but that it had never been published and that the manuscript was still in the old cowhide trunk with all the other papers. It was another fifty years before this manuscript was published as Memoir of the life and labours of the late Charles Babbage Esq. F.R.S., Volume 13 in the Charles Babbage Institute Reprint Series for the History of Computing.

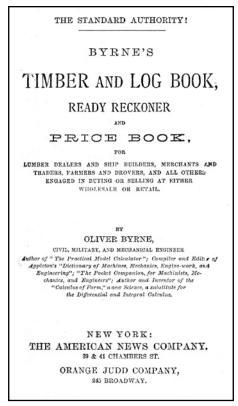
This talk to the Newcomen Society describes Babbage's work on the Difference Engine, with an occasional



Journal cover, B 307

mention of the Analytical Engine. Leslie Comrie was in the audience and remarked that it was now possible to obtain commercial machines that would do the job of Babbage's Difference Engine. He had recently ordered a National Cash Register Company *National* accounting machine that could be used in that manner. Comrie was to use that machine to produce and check many different sets of tables.

Illustrations available: First page



B 308

B 308

Byrne, Oliver (1810–1880)

Byrne's timber and log book, ready reckoner and price book, for lumber dealers and ship builders, merchants and traders, farmers and drovers, and all others engaged in buying or selling at either wholesale or retail.

Year: 1878 Place: New York

Publisher: The American News Company, Orange Judd Company

Edition: 1st Language: English

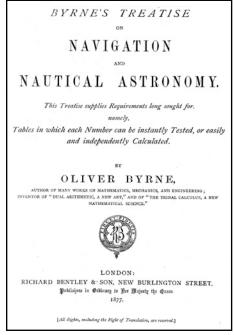
Binding: printed paper boards Pagination: pp. [5], 5–178, [1]

Size: 153x93 mm

Little factual information seems to be available on Oliver Byrne's life, though he published more than twenty volumes and is described variously in them. According to one or another of his publications, Byrne was Surveyor-General of the Falkland Islands, Professor of Mathematics in the College for Civil Engineers, Consulting Actuary to the Philanthropic Life Assurance Society etc. etc. DeMorgan (A Budget of Paradoxes, 1872, pp. 199–200) is scathing about an item written by Byrne in which he attempts to use mathematical symbols to prove statements in the creed of St. Athanasius.

This volume, unlike several of Byrne's other works, has nothing to do with dual arithmetic but is a standard ready reckoner for the timber trade. One unusual item, not encountered in other ready reckoners, is a table listing the statutes of limitations for assaults, slanders, judgements, etc. for each state in the U.S. and for Ontario and Quebec in Canada. Perhaps, given his somewhat checkered career, Byrne had experience in such matters.

Illustrations available: Title page



B 309

B 309

Byrne, Oliver (1810–1880)

Byrne's treatise on navigation and nautical astronomy

Year: 1877 Place: London

Publisher: Richard Bentley & Son

Edition: 2nd

Language: English

Binding: original cloth boards

Pagination: pp. Iii-xvi, iii-vi, 5-218, 464, [4 adverts]

Collation: $\pi^9 A - L^4 a - p^4 q^3 A - Z^8 2A - 2F^8 \gamma^2$

Size: 248x172 mm

Reference: Hend BTM, #209.3, p. 188

In this volume Byrne continues to stress his *dual arithmetic* system (see **Byrne**; *Dual Arithmetic*, 1867), but this time it is couched in terms of navigation. The first half of the text presents his dual arithmetic, while the second is an elementary work on navigation showing the examples demonstrating its use. He includes two large tables of *Byrne's Numbers* as well as several other trigonometric tables.

Illustrations available:

Title page



B 310

B 310

Byrne, Oliver (1810–1880)

Dual arithmetic. A new art.

Year: 1863 Place: London

Publisher: Bell and Daldy

Edition: 1st Language: English

Binding: original cloth boards, faded

Pagination: pp. xl, 246 (misnumbered 246 as 244), 22

Size: 215x135 mm

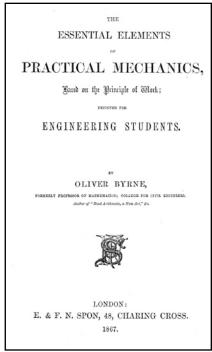
Collation: $\pi^4 a^2 b - d^4 e^2 B - 2 H^4 2 I^3 A^{11}$

In this work, Byrne proposes a new method of performing mental arithmetic that involves breaking numbers down into the form $a1.1^b1.01^c1.001^d$...and then operating on the quantities a, b, c, d, etc. to find the answer. **DeMorgan** is anything but complimentary in his judgment of the

dual arithmetic proposal. It does, however, indicate the lengths to which some practitioners will go in attempting to ease the labor inherent in doing arithmetic.

Illustrations available:

Title page



B 311

B 311

Byrne, Oliver (1810–1880)

The essential elements of practical mechanics, based on the principle of work; designed for engineering students..

Year: 1867

Place: London

Publisher: E. & F. N. Spon

Edition: 1st Language: English

Binding: original cloth boards Pagination: pp.xii, 360 Collation: $\pi^4 a^2 B - Z^8 2 A^4$ Size: 183x120 mm

While this work does deal with mechanics, it is little more than a tract promoting Byrne's dual arithmetic.

Illustrations available: Title page

B 312

Byrne, Oliver (1810–1880)

The geometry of compasses or problems resolved by

the mere description of circles, and the use of coloured diagrams and symbols..

Year: 1877 Place: London

Publisher: Crosby, Lockwood, and Co.

Edition: 1st Language: English

Size: 186x123 mm

Figures: frontispiece figure in red and black, 36 full-page

figures (19 in color) Binding: original cloth boards Pagination: pp. iv, [74] Collation: A-D8E7

In this work Byrne demonstrates the solution of several geometric problems by the use of the compass. Of major interest is the use of color to illustrate the different compass radii and movements. This may be regarded as an extension of Byrne's most successful book, The first six books of the elements of Euclid, in which colored diagrams and symbols are used instead of letters for the greater ease of learners. London, 1847 (not in the collection).

Illustrations available:

Title page Frontispiece

GEOMETRY OF COMPASSES OR PROBLEMS RESOLVED BY THE MERE DESCRIPTION OF CIRCLES, AND THE USE OF COLOURED DIAGRAMS AND SYMBOLS. BY OLIVER BYRNE, AUTHOR OF "THE ELEMENTS OF EUCLID BY COLOURS."

THE



LONDON: CROSBY, LOCKWOOD, AND CO., 7. STATIONERS' HALL COURT, LUDGATE HILL.

1877.

B 313

Byrne, Oliver (1810–1880)

Mechanics: Their principles and practical applications

Place: New York

Publisher: De Witt & Davenport

Edition: 1st Language: English

Binding: original gilt-pictorial cloth boards; gilt spine faded

Pagination: pp. 182

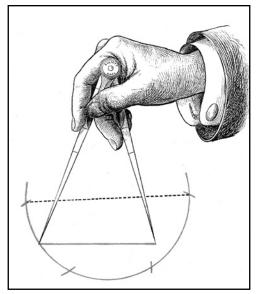
Collation: 14 1*8 -74 7*8 84 8*3

Size: 185x122 mm

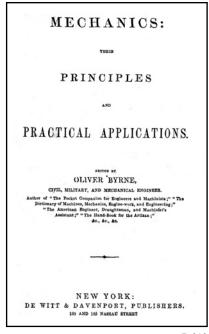
In this work Byrne describes himself as a *civil, military*, and mechanical engineer. He points out that there are already a great many books describing mechanical devices; his has the advantage that it stands in the same relation to the execution of works, and the construction of machines, as Descriptive Geometry stands to the drawing of machines. Once the reader has attempted to digest that boast, he or she is treated to a complex jumble of physical principles in the rest of the volume. While Byrne certainly does describe simple mechanical devices such as the lever, pulley and gears, the examples given are seldom the practical applications of the title. They often refer to hypothetical falling balls, balancing of eggs, etc. When Byrne does consider more practical problems, he assumes idealized conditions. For example, he notes that the inclined plane must be considered to be a perfectly hard, smooth, inflexible surface ... and other such less than realistic considerations.

Illustrations available: Title page

Book binding, front gilt



Frontispiece, B 312



B 314

Byrne, Oliver (1810–1880)

The pocket companion for machinists, mechanics, and engineers.

Year: 1851 Place: New York

Publisher: Dewitt & Davenport

Edition: 1st Language: English

Figures: 2 large folding tables; 3 engraved folding plates Binding: contemporary morocco leather wallet with inscribed

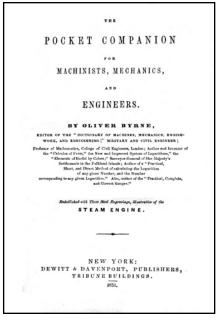
flap; gilt edges; marbled endpapers

Pagination: pp. 144 Collation: 1⁴ 1*8 -6⁴ 6*8 Size: 150 x 98 mm

Oliver Byrne was certainly an unusual personality. It is of interest to note the different ways he describes himself on the title pages of his books. In this one he lists himself as *Professor of Mathematics, College of Civil Engineers, London, Surveyor-General of Her Majesty's Settlements in the Falkland Islands* and the author of several books.

This pocket companion appears to be another of Byrne's eclectic collections of information. It contains items such as a description of what a plus sign indicates, the values of various Roman numerals, the first five hundred prime numbers, weights of malleable iron, tables of expansion of liquids at various temperatures and the dimensions of the rings of Saturn.

Illustrations available: Title page



B 314

B 315

Byrne, Oliver (1810–1880)

The practical model calculator, for the engineer, mechanic, machinist, manufacturer of engine-work, naval architect, miner, and millwright.

Year: 1866

Place: Philadelphia

Publisher: Henry Carey Baird

Edition: 1st Language: English

Binding: original cloth boards; gilt spine

Pagination: pp. 3-494, 85, [1], 583-591, [3], 24 pp. catalogue

Collation: A⁶ (-A6) B-V⁶ W⁶ X-Z⁶ 2A-2G⁶ 25-37⁸

Size: 228x140 mm

Reference: Hend BTM, #152.0, p. 121

This is Byrne's largest collection of miscellaneous tables of information. He had been developing tables of this nature for nearly forty years. There is no table of contents, but the work does have an index through which one could access the hundreds of different tables and formulae it contains. There is also a very large section on the steam engine and another on ship building and naval architecture.

Illustrations available: Title page

B 316

Byrne, Oliver (1810–1880)

Practical, short, and direct method of calculating the logarithm of any number, and the number corresponding to any given logarithm. Year: 1849 Place: New York

Publisher: D. Appleton & Co

Edition: 1st Language: English

Binding: original cloth boards; embossed cover; gilt spine

Pagination: pp. xxiv, 13-82, [2]

Size: 186x120 mm

Collation: [A]12B4B*8-D4D*8

Like other publications by Byrne, this is a work carried to the extreme. In it he shows a method of calculating any logarithm for any number. While Byrne's innovation is correct, the approach is completely impractical, particularly when a standard table of logarithms is so easy to use. In the introduction Byrne points out, as a curiosity, eight numbers that have the same digits as their logarithms.

A second copy of this item is available in the collection.

Illustrations available:

Title page

8 numbers and their logarithms

PRACTICAL, SHORT, AND DIRECT

METHOD OF CALCULATING

THE LOGARITHM

OF ANY

GIVEN NUMBER,
AND THE

NUMBER CORRESPONDING

TO ANY

GIVEN LOGARITHM.

DISCOVERED BY

OLIVER BYRNE,
Author and facused af fine "Charles of Flow," a substitute for the Billion and a finegon Colleged and Flower County of the Charles of Flow," a substitute for the Billion and a finegon Colleged Togowner County of the Charles of Flow, "A substitute for the Billion and a finegon Colleged Togowner County of the Charles of the Charles of the State of the Longith of a Degree on the Earth's Bufface, with the Administration of Reliability." The Proctical Complete, "The Earth of a Degree on the Earth's Bufface, with the Administration of Reliability."

NEW-YORK:
D. APPLETON & COMPANY, 200 BROADWAY.

FILLADELPHIA:
GEO. S. AFFLETON, 164 CHENUT-ST.
M. DOCCALLE.

B 316

the logarithms of which are composed of the same digits, or log. $1\cdot371288574238542 = 0\cdot1371288574238542$ log. $237\cdot5812087593221 = 2\cdot375812987593221$ log. $3550\cdot260181586591 = 3\cdot550260181586581$ log. $46692\cdot45832877758 = 4\cdot669246832877758$ log. $576045\cdot6934135527 = 5\cdot760455934135527$ log. $6834720\cdot776754857 = 6\cdot834720\cdot776754357$ log. $78974899.31399144 = 7\cdot897400031388144$ log. $895171599\cdot8267852 = 8\cdot951915988257839$

Logarithm table, B 316

B 317

Byrne, Oliver (1810–1880)

Tables of dual logarithms, dual numbers, and corresponding natural numbers; with proportional parts of differences for single digits and eight places of decimals. Tables of angular magnitudes, trigonometrical lines, and differences graded to the hundredth part of a second for single digits.

Year: 1867 Place: London

Publisher: Bell and Daldy

Edition: 1st Language: English

Figures: ff.1-54 printed in red

Binding: contemporary green crushed morocco; blind and gilt fillets round sides and in spine compartments; gilt

edges; marbled end papers

Pagination: pp. vi, 7–40, [2], 74, [2], 38, [2], 90 Collation: $A-D^4E^5B-K^4L^11-5^4a^1b-m^4n^1$

Size: 241x179 mm

These tables were designed to accompany Byrne's system of Dual Arithmetic (see entry for Byrne, 1863). An unusual characteristic of the tables (other than their odd, impractical, nature) is that some tables have been printed in red to ensure that the user will consult the correct one.

Illustrations available: Title page Red table page

TABLES OF DUAL LOGARITHMS, DUAL NUMBERS, AND CORRESPONDING NATURAL NUMBERS; WITH PROPORTIONAL PLANTS OF DIFFERENCES FOR SINGLE DIGITS AND EIGHT PLACES OF DECLEALS. TABLES OF ANGULAR MAGNITUDES, TRIGONOMETRICAL LINES, AND DIFFERENCES GRADED TO THE HUNDREDTH PART OF A SECOND FOR SINGLE DIGITS. BY OLIVER BYRNE, POINTERN THEOREMS OF MATHEMATICA, COLLEGE FOR CITTLE SECRETARY OF THEM, ANTERO OF THE AMERICAN OF THE AMERICAN OF THE CHECKETS OF THEM, ANTERO OF "BYSA ARITHMETIC, A NEW ARE" "THE VOLTO DEAL ARITHMETICIAL," LONDON: BELL AND DALDY, 18G, FLEET STREET. 1867. [All rights secret.]

B 317

Byrne, Oliver (1810–1880)

The young dual arithmetician: Or, dual arithmetic. A new art, designed for elementary instruction and the use of schools. To which are added, tables of ascending and descending dual logarithms, dual numbers and corresponding natural numbers.

Year: 1871 Place: London

Publisher: E. & F. N. Spon

Edition: 2nd Language: English

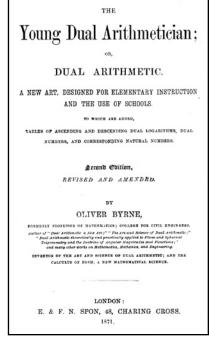
Binding: original cloth boards; silt stamped front cover Pagination: pp. [iii–xii], 144, [2], 32, [2], [33–58]

Collation: π^5 B–H¹² I⁶ c¹² Size: 185x106 mm

Reference: Hend BTM, #209, p. 187

See entry for **Byrne**, *Dual arithmetic*, 1863. In the preface, Byrne immodestly describes his system of dual arithmetic as a branch of greater importance has not been contributed to mathematical science. This work, a promotional item for dual arithmetic, would have been most difficult for anyone to use, let alone the *young students of different capacities* to which this book was addressed. A table of ascending and descending dual logarithms is printed at the end of the work—ascending logarithms in black and descending ones in red.

Illustrations available: Title page



B 318

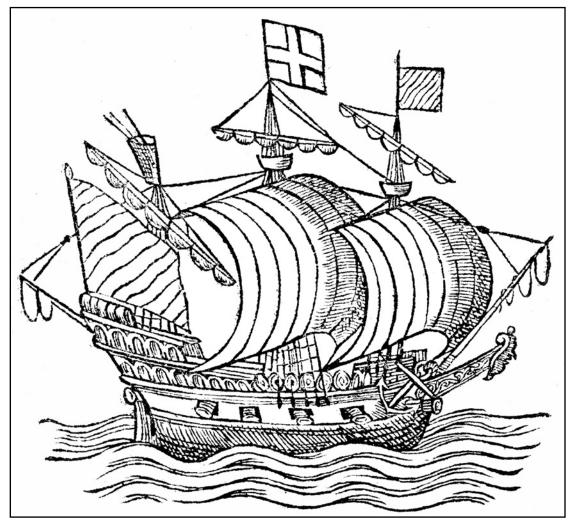
Byron, Augusta Ada, Lady Lovelace (1815–1852), translator

See Menabrea, Luigi Federico; Sketch of the Analytical Engine invented by Charles Babbage, Esq. ... with notes by the translator. Extract from the 'Scientific Memoirs' vol. iii



From Boissiere; L'art d'arythmetique, 1554

Erwin Tomash Library



Blundeville; Exercises, 1594