

Articles Relating to Linear Equation Machines

- [1] W. A. Adcock. An automatic simultaneous equation computer and its use in solving secular equations. *Review of Scientific Instruments*, 19(3):181–187, 1948. (<https://doi.org/10.1063/1.1741229>).
- [2] J. V. Atanasoff. Solution of systems of linear equations by the use of punched card equipment. Written while John V. Atanasoff was at Iowa State College where, together with Clifford E. Berry, he was working on the Atanasoff-Berry Computer. It was probably written somewhere in the period 1935 – 1937. (<http://cdm16001.contentdm.oclc.org/cdm/ref/collection/p15031coll118/id/11>), 1937?
- [3] J. V. Atanasoff. Computing machine for the solution of large systems of linear algebraic equations. In B. Randell, editor, *The Origins of Digital Computers*, Texts and Monographs in Computer Science, pages 315–335. Springer, second edition, 1982. ISBN 978-3-642-61812-3. https://doi.org/10.1007/978-3-642-61812-3_24. The original version, dating from 1940, is available at: <http://history-computer.com/Library/Computing%20machine.pdf>. This was written both to obtain funding and a patent. The latter was never filed by Iowa State College. See: <http://jva.cs.iastate.edu/operation.php>.
- [4] J. V. Atanasoff. Advent of electronic digital computing. *Annals of the History of Computing*, 6(3):229–282, 1984. Gives significant insight into the development of the Atanasoff-Berry computer. With a brief introduction by Gordon Bell.
- [5] H. P. Babbage. Remarks on a report of 1878. In *Proceedings of the British Association*, London, 1888. British Association. Paper read by Charles Babbage’s son at Bath on September 12th, concerning the report [26]. Interesting information on Babbage’s Analytical Engine. Can be found at: <https://www.fourmilab.ch/babbage/hpb.html> and is included in [6].
- [6] H. P. Babbage, editor. *Babbage’s Calculating Engines: Being a Collection of Papers Relating to Them; Their History, and Construction*. E. and F. N. Spon, 125 Strand, London, 1889. Henry Provost Babbage was Charles Babbage’s son. The collection is mainly material written by Charles Babbage, but includes the paper by Luigi Menabrea and Ada Lovelace, [25], an 1878 report on the analytical engine by the British Association, [26] and a paper by Henry Babbage presented to the British Association in 1888, [5]. A digitally printed version was produced by Cambridge University Press in 2010, ISBN: 9780511694721. (<https://doi.org/10.1017/CB09780511694721>, https://monoskop.org/images/4/40/Babbage_Charles_Calculating_Engines.pdf).
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- [8] A. R. Burks and A. W. Burks, editors. *The First Electronic Computer: The Atanasoff Story*. University of Michigan Press, Ann Arbor, USA, 1988. ISBN 0472100904. Published in paperback in 1989.
- [9] E. Cauer, W. Mathis, and R. Pauli. Life and work of Wilhelm Cauer (1900–1945). In A. E. Jai and M. Fliess, editors, *Proceedings of the Fourteenth International Symposium of*

- Mathematical Theory of Networks and Systems: MTNS 2000*, pages 227–239. University of Perpignan, 2000. (<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.114.3887&rep=rep1&type=pdf>).
- [10] J. M.. Davies. Solution of algebraic linear simultaneous equations using hollerith punched card machines. Maths Ma/23/1069, National Physical Laboratory, Teddington, Middlesex TW11 0LW, UK, 1950.
- [11] L. Fox, H. D. Huskey, and J. H. Wilkinson. The solution of algebraic linear simultaneous equations by punched card methods. Maths, National Physical Laboratory, Teddington, Middlesex TW11 0LW, UK, 1948. This report was omitted from [12] in the interests of space.
- [12] L. Fox, H. D. Huskey, and J. H. Wilkinson. Notes on the solution of algebraic linear simultaneous equations. *Q. J. Mech. appl. Math.*, 1:149–173, 1948. <https://academic.oup.com/qjmam/article/1/1/149/1883392>.
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- [14] E. A. Goldberg and G. W. Brown. An electronic simultaneous equation solver. *J. App. Phys.*, 19(4):339–345, 1948. A ten equation solver, constructed at the RCA Laboratories, is described. (<https://doi.org/10.1063/1.1715070>).
- [15] E. V. Krishnamurthy. Digito-analogue computer for solving linear simultaneous equations and related problems. *J. of Scientific Instruments*, 37(11):419–424, 1960. doi.org/10.1088/0950-7671/37/11/306.
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- [18] J. A. N. Lee. Charles Babbage. Part of [16]. (<https://history.computer.org/pioneers/babbage.html>), 1995.
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- [20] A. R. Mackintosh. Dr. Atanasoff’s computer. *Scientific American*, 259(2), August 1988. (<https://www.jstor.org/stable/24989199>).
- [21] R. R. M. Mallock. An electrical calculating machine. *Proc. Royal Soc. of London, Series A*, 140:457–483, 1933.
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- [23] W. A. McCool. DC analog solution of simultaneous linear equations: Circuit stability considerations. NRL Report 3533, Naval Research Laboratory, Washington D. C., 1949. I have not located a copy, but a review is at: <https://www.jstor.org/stable/2002503> on pages 241–242.
- [24] L. F. Menabrea. Notions sur la machine analytique de M Charles Babbage. *Bibliothèque Universelle de Genève*, Nouvelle Série 41:352–376, 1842. (<http://www.bibnum.education.fr/sites/default/files/babbage-menabrea-texte-final.pdf>). The following web page provides the article translated from French into English by Ada Augusta, Countess of Lovelace: https://en.wikisource.org/wiki/Scientific_Memoirs/3/Sketch_of_the_Analytical_Engine_invented_by_Charles_Babbage,_Esq.. As well as translating the paper, Ada Lovelace added substantial additional notes in Scientific Memoirs, see [25]. The notes are also linked to from the above url.
- [25] L. F. Menabrea and A. A. Lovelace. Sketch of the analytical engine invented by Charles Babbage. *Scientific Memoirs*, III:666–731, 1843. This is [24] as translated by Ada Lovelace and with substantial additional notes authored by her. (<http://www.fourmilab.ch/babbage/sketch.html>, <https://repository.ou.edu/uuid/6235e086-c11a-56f6-b50d-1b1f5aaa3f5e>. The notes can also be found at: https://en.wikisource.org/wiki/Scientific_Memoirs/3/Sketch_of_the_Analytical_Engine_invented_by_Charles_Babbage,_Esq./Notes_by_the_Translator).
- [26] C. W. Merrifield. Report of the Committee ... (See below). In *Proceedings of the British Association for the Advancement of Science*, London, 1878. British Association. Report of the Committee, consisting of Professor Cayley, Dr. Farr, Mr. J. W. L. Glaisher, Dr. Pole, Professor Fuller, Professor A. B. W. Kennedy, Professor Clifford, and Mr. C. W. Merrifield, appointed to consider the advisability and to estimate the expense of constructing Mr. Babbage’s Analytical Machine, and of printing Tables by its means. Drawn up by Mr. Merrifield. This has been reprinted more than once, for example: [6] and [34]. It is also at <https://www.fourmilab.ch/babbage/baas.html>.
- [27] S. K. Mitra. Electrical analog computing machine for solving linear equations and related problems. *Review of Scientific Instruments*, 26(5):453–457, 1955. (<https://doi.org/10.1063/1.1771323>).
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- London. (<http://www.artefactsconsortium.org/Publications/PDFfiles/Vol2Elect/2.03.Electronics-Petzold,CauerBWGrBlank3,4,14AWEBF.pdf>. Some of the photographs are missing in this copy).
- [33] T. Püttmann. Kelvin: A simultaneous calculator. <http://www.math-meets-machines.de/kelvin/simcalc.pdf>, 2014? A fun article describing Thomson’s linear equation machine, [37], and how to construct a machine with fischertechnik. (<http://www.ftcommunity.de/ftpedia>). (The original German version of the article is at: http://www.ftcommunity.de/ftpedia_ausgaben/ftpedia-2014-2.pdf, pages 76–88).
- [34] B. Randell, editor. *The Origins of Digital Computers*. Springer, 1973. A second edition was published 1982.
- [35] T. E. W. Schumann. The principles of a mechanical method for calculating regression equations and multiple correlation coefficients and for the solution of simultaneous linear equations. *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, 29(194):263–274, 1940. <https://doi.org/10.1080/14786444008521266>.
- [36] J. H. R. Speek. Robot mathematician solves nine simultaneous equations. University of Groningen, Faculty of Mathematics and Natural Sciences, February 2017. Bachelor’s Project Mathematics. On Wilbur’s machine: [45]. (http://fse.studenttheses.ub.rug.nl/16455/1/BSc_Mathematics_2018_Speek_JHR.pdf).
- [37] W. Thomson. On a machine for the solution of simultaneous linear equations. *Proceedings of the Royal Society of London*, 28:111–113, 1878–1879. Thomson became Lord Kelvin. See also [39, Appendix B’, II], where some diagrams of the proposed machine were included. Actual system for nine unknowns was built by Wilbur, [45]. (<https://www.jstor.org/stable/113806>, <https://doi.org/10.1098/rspl.1878.009>).
- [38] W. Thomson and P. G. Tait. *Treatise on Natural Philosophy*, volume I. Oxford University Press, Oxford, UK, 1867. Thomson later became Lord Kelvin. Four volumes had been contemplated, but the three further volumes never appeared, although a second edition had a number of additional appendices and was printed in two parts. (<https://babel.hathitrust.org/cgi/pt?id=hvd.32044014664221;view=1up;seq=9>).
- [39] W. Thomson and P. G. Tait. *Treatise on Natural Philosophy*. Cambridge University Press, Cambridge, UK, 1879. Thomson later became Lord Kelvin. Appendix B’ is titled ”Continuous Calculating Machines” and describes seven machines for problems such as tide prediction and solving linear equations. An earlier version was published by Oxford University Press in 1867, [38]. It has recently been published by Cosimo Classics, ISBN: 978-1-61640-554-0. (<https://babel.hathitrust.org/cgi/pt?id=hvd.32044014664221;view=1up;seq=9>. 1879 printing: <https://archive.org/details/treatiseonnatur01darwgoog>, 1888 printing: <https://archive.org/details/treatiseonnatur00darwgoog>, 1912 printing: <https://ia802605.us.archive.org/21/items/treatisnatphil01kelvrich/treatisnatphil01kelvrich.pdf>).
- [40] A. Tympas. *Calculation and Computation in the Pre-electronic Era*. Springer-Verlag, London, UK, 2017. ISBN 978-1-84882-741-7. <https://doi.org/10.1007/978-1-84882-742-4>.

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- [43] F. M. Verzuh. The solution of simultaneous linear equations with the aid of the 602 calculating punch. *Mathematical Tables and Other Aids to Computation*, 3(27):453–462, 1949. (<http://www.jstor.org/stable/2002451>).
- [44] R. M. Walker. An analog computer for the solution of linear simultaneous equations. *I.R.E. Proc*, 222(12):1467–1473, 1949. I have not located the paper, but a patent, with diagrams for the machine can be found at: <https://patentimages.storage.googleapis.com/83/32/8b/a3c02dd47b57e0/US2543650.pdf>. I believe that Walker worked for IBM.
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