

AccessionIndex: TCD-SCSS-V.20121208.866
 Accession Date: 8-Dec-2012
 Accession By: Prof.J.G.Byrne
 Object name: About a dozen typed captions, all mounted on black cardboard, relating to Charles Babbage
 Vintage: c.1986
 Synopsis: Dept.Computer Science, Trinity College Dublin.

Description:

Professor John Gabriel Byrne collected works by Babbage and about him, see elsewhere in this catalog. This set of typed captions, all mounted on black cardboard, is from an exhibition *Charles Babbage's Computing Engines*, part of a larger exhibition created by Prof.J.G.Byrne that was entitled *Computing through the Ages* and held in the Long Room of the Old Library in Trinity College Dublin from September, 1986, which amongst other exhibits also included an exhibition on *Computation in the era of Queen Elizabeth I (1533-1603)*, also see elsewhere in this catalog. This large exhibition was timed to coincide with a conference of the International Federation of Information Processing (IFIP) held in Trinity College Dublin in September, 1986.

These exhibition materials were re-used as part of the *Treasures of the Mind* exhibition held in the Colonnades Gallery of the Old Library for the TCD Quatercentenary in 1992.

The homepage for this catalog is at: <https://www.scss.tcd.ie/SCSSTreasuresCatalog/>
 Click 'Accession Index' (1st column listed) for related folder, or 'About' for further guidance. Some of the items below may be more properly part of other categories of this catalog, but are listed here for convenience.

| Accession Index | Object with Identification |
|---|---|
| TCD-SCSS-V.20121208.866 | About a dozen typed captions, all mounted on black cardboard, relating to Charles Babbage, c.1986, literature: Dept.Computer Science, Trinity College Dublin. [<i>Prof.J.G.Byrne's IFIP-1986 and 1992 TCD Quatercentenary exhibits</i>] |
| TCD-SCSS-X.20121208.001 | Charles Babbage's Engines, Irish interactions with Charles Babbage regarding his Difference Engines and Analytical Engine, c.1843. |
| | |

References:

1. Wikipedia, *Charles_Babbage*, see: https://en.wikipedia.org/wiki/Charles_Babbage
 Last viewed 21-Apr-2016.



THE LATE MR. BABBAGE.

Charles Babbage
(Illustrated London News 1871)

Figure 1: Charles Babbage

Charles Babbage
(1791-1871)

- 1791 Born 26th December in Walworth , Surrey
- 1810 Went up to Trinity College Cambridge and studied mainly mathematics
- 1814 Married Georgiana Whitmore in Teignmouth, Devon and took his B.A.
- 1816 Elected a Fellow of the Royal Society
- 1820 Helped to found the Astronomical Society
- 1822 A model of a difference engine with six figure-wheels was announced in an open letter to Sir Humphry Davy, President of the Royal Society
- 1823 [1] Following Government funding Difference Engine No. 1 with six orders of differences and 20 digits and a printing apparatus was started.
- 1827 [15] Published a Table of Logarithms of numbers from 1 to 108,000, principally for Thomas Colby, who was in charge of the Irish Ordnance Survey.
- 1828 Elected to the Lucasian Chair of Mathematics at Cambridge which he held until 1839
- 1829 A Committee appointed by the Royal Society reported favourably on Babbage's difference engine.
- 1832 Published *On the economy of Machinery and Manufactures* —the first textbook on OR
- 1833 A small portion of the Difference Engine was completed but work stopped mainly due to a row with Joseph Clement, the engineer.
First meeting with Ada, daughter of Lord Byron
- 1834 [19] Babbage had the idea for the Analytical Engine, the forerunner of the Computer
- 1835 [22] Visited Dublin for the meeting of the British Association for the Advancement of Science and stayed in TCD
- 1841 [20] Visited Turin with James MacCullagh and explained the Analytical Engine to a group of Italian scientists including L.F. Menabrea
- 1843 [21] Ada, Lady Lovelace, translated Menabrea's article on the Analytical Engine and published it in Taylor's Scientific Memoirs, Vol iii
- 1847 Work on the Analytical Engine virtually ceased
- 1851 Developed a new signalling system for lighthouses which was first used in the USA
- 1852 [9] The Earl of Rosse, as President of the Royal Society, made a last attempt to get Government funding for Difference Engine No. 2
- 1854 Per George Scheutz and his son Edvard mad a successful small difference engine in Sweden
- 1864 [24] *Passages from the Life of a Philosopher* published
- 1871 Death of Babbage

The numbers in [] refer to items on display

Figure 2: Significant events in the life of Charles Babbage

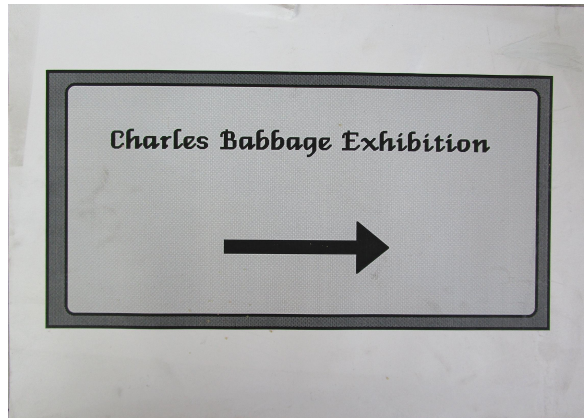


Figure 3: Sign from Prof.J.G.Byrne's IFIP-1986 exhibit on Charles Babbage

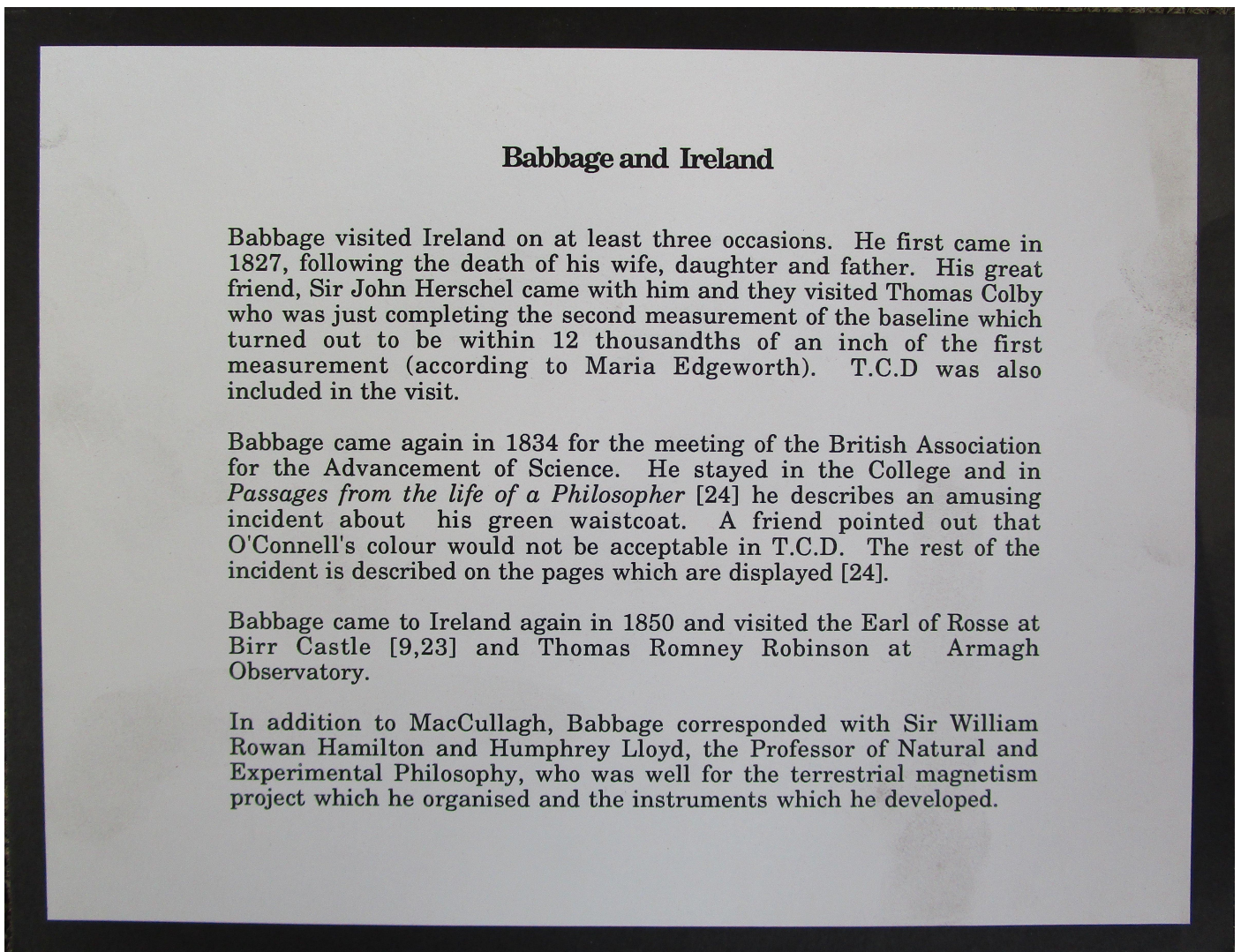


Figure 4: Charles Babbage and Ireland
It is likely that 'who was well' should be 'who was well known'

**The Dublin Philosophical Journal
and
Scientific Review**

Vol. II Feb-Nov 1826

No III

TCD 200. S. 6, 7

1. *Babbage's Calculating Machinery* :- A machine is now being constructed on an extensive scale by Mr. Babbage, capable of computing any species of numerical table, trigonometrical, logarithmic & c. This machine derives its principle from that property of differences by which a difference of a certain order of every function is, *quam proximè*, constant, and in numerical results extending to a determinate number of decimal places is actually constant. The present machine computes through six orders of differences, the sixth difference being taken as a constant.

Attached to the computing machinery is a printing apparatus, deriving its motion from the computing machine. By this the types of the successive digits of each number to be tabulated are successively introduced over a plate of copper, on which each letter is punched in its proper place, and thus a copper plate of each page of the tables is obtained. All this is effected by ten types, viz. of zero and the nine significant digits! The only attention required is an adjustment in the first instance suitable to the nature of the table to be computed, and after such a number of turns has been obtained that the constant difference necessarily suffers a change, a trifling adjustment puts it into a state to compute as many more turns. This last adjustment however, can scarcely be required where six orders of differences are used.

*The earliest known Irish reference to the first
Difference Engine
(Dublin Philosophical Journal and Scientific Review-
1827)*

*Figure 5: The earliest known Irish reference to Difference Engine No.1
(Dublin Philosophical Journal and Scientific Review, 1827)*

Difference Engine No. 1

About 1812 or 1813 Babbage was looking at a set of logarithm tables in the rooms of the Analytical Society at Cambridge, when a nother member came in and said "Well, Babbage, what are you dreaming about?", to which Babbage replied "I am thinking that all these tables might be calculated by machinery".

This thought was to remain with Babbage all his life. In 1820 he started to construct a small model of an engine based on the principle of differences[4]. This was finished in 1822. As a result Babbage obtained funding from the Government to construct a large engine. It is described succinctly in the extract from the Dublin Philosophical Journal and Scientific Review [3], the first known description in an Irish journal.

Figure 6: Charles Babbage's Difference Engine No.1

Principle of Differences

Babbage used the example $f(x) = x^2 + x + 41$ when illustrating the principle of differences.

Consider the following table:

| x | f(x) | First difference | Second difference |
|---|------|------------------|-------------------|
| 0 | 41 | | |
| 1 | 43 | 2 | |
| 2 | 47 | 4 | 2 |
| 3 | 53 | 6 | 2 |
| 4 | 61 | 8 | 2 |
| 5 | 71 | 10 | 2 |
| 6 | 83 | 12 | |

The second difference (analogous to the second derivative) is constant for a quadratic function. The rest of the table can be built up using addition only. The 2 is added to 10 to get 12, the first difference, and 12 is added to 71 to get 83, the value of $f(6)$, and so on.

For logarithms higher order differences such as the sixth will be constant over a reasonably large range of the argument and hence a table can be built, the highest order difference being adjusted as required.

Figure 7: The Principle of Differences

CHARLES BABBAGE'S DIFFERENCE
ENGINE NO. 1 – PORTION, 1832

This portion of the engine, assembled by Joseph Clement in 1832, is the first known automatic calculator. It represents about one seventh of the calculating mechanism of the full size engine which was not completed. The portion shown has nearly 2,000 individual parts, and is one of the finest examples of precision engineering of the time. Size: 72×59×61 cm.

1862-89

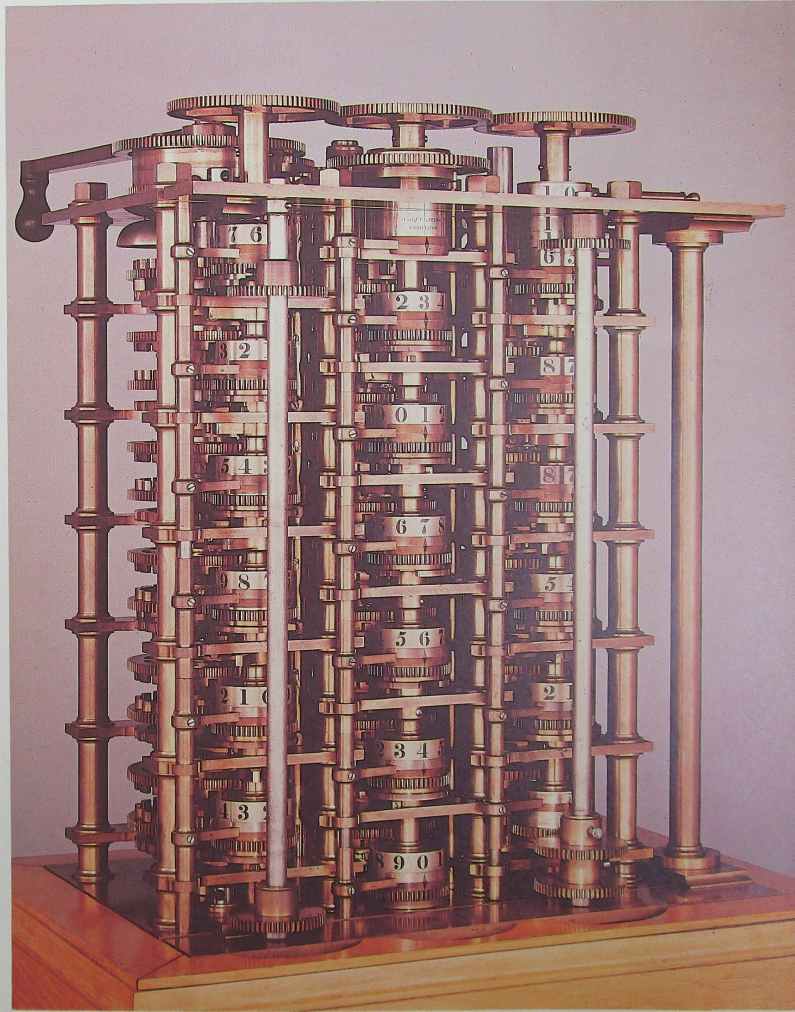


Figure 8: Portion of Charles Babbage's Difference Engine No.1 constructed by 1832 (it was this that was demonstrated to Ada Lovelace)

CHARLES BABBAGE'S DIFFERENCE
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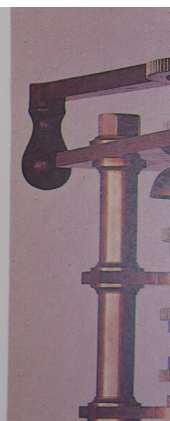


Figure 9: enlarged text from Fig.15 of Charles Babbage's Difference Engine No.1

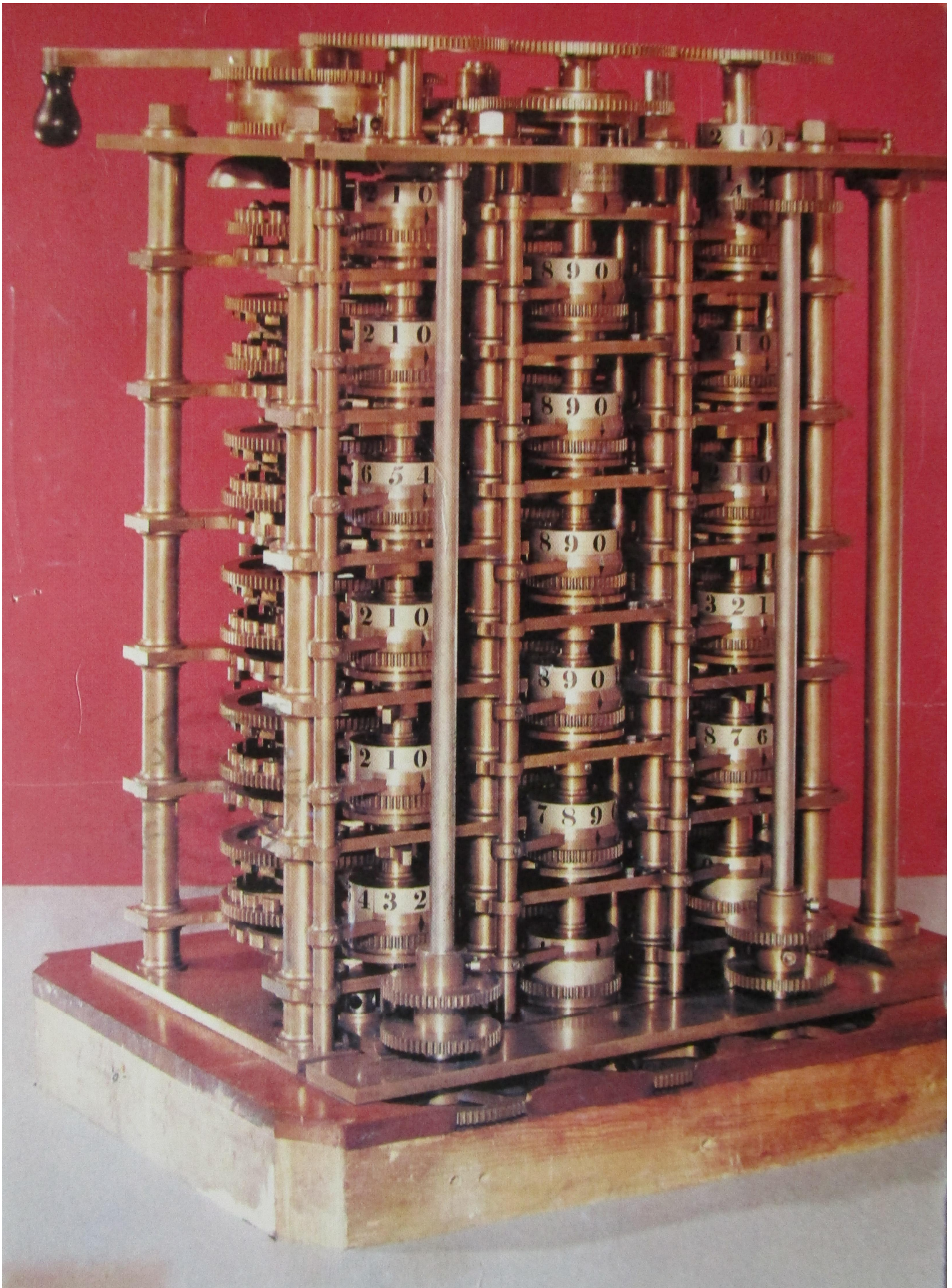
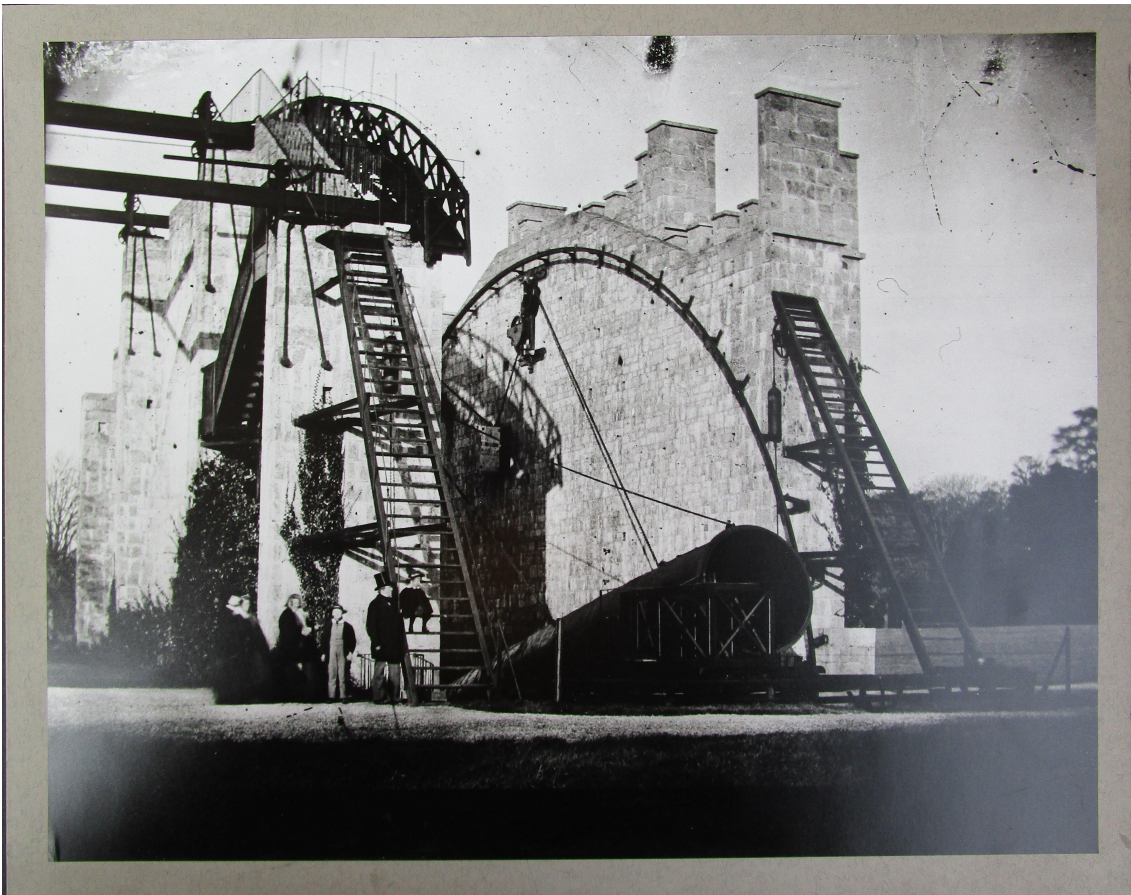


Figure 10: Portion of Charles Babbage's Difference Engine No.1 constructed by 1832

The Earl of Rosse and Difference Engine No. 2

The third Earl of Rosse, William Parsons, was famous for his 72 inch reflecting telescope which he built at Birr Castle[8]. From 1849 to 1854 he was President of the Royal Society, the leading Scientific institution in Britain, then and now. Babbage was a fellow and was interested in astronomy, being one of the founder members of the [Royal] Astronomical Society. He visited Birr Castle in 1850 and was the first to sign the Visitors Book[22], which has been kindly loaned by the present Earl of Rosse. Babbage had drawn up a specification and plans for a new difference engine, No. 2, and he asked the Earl of Ross to present his case to the Government. The Earl wrote to Lord Derby, the Prime Minister, on the 20th July 1852 [11]. Lord Derby passed the papers to the Chancellor of the Exchequer, Benjamin Disraeli (originator of the phrase "lies, damn lies and statistics") and added his opinion " that Mr. Babbage's ideas appear to be so indefinitely expensive, the ultimate success so problematical and the expenditure so large and so wholly incapable of being calculated that the Government ought not to take upon itself any further liability". It is hardly surprising that Disraeli rejected the proposal. Babbage was incensed and wrote a long reply to Lord Rosse [10].

Figure 11: The Earl of Rosse and Babbage's Difference Engine No.2



*Figure 12: The 3rd Earl of Rosse's "Leviathan" telescope at Birr Castle, Ireland (the largest telescope in the world from 1845 to 1917)
Charles Babbage was the first to sign the Visitor's Book*



William Parsons, third Earl of Rosse
President of the Royal Society
1849-1855

Figure 13: The 3rd Earl of Rosse, William Parsons

Castle Parsonstown
July 20th 1852

Dear Lord Derby,

Mr. Babbage, a fellow of the Royal Society, has requested me as President to lay before Government his letters and papers relating to the calculating engine. As you may feel disposed to when at leisure to make some enquiry on the subject I enclose copies of letters from Mr. Adams, and Professor Stokes of Cambridge, also from Sir J. Herschel. Professor Stokes and Mr. Adams, are pre-eminent for their skill in applied mathematics and I am persuaded there are no two men more competent to rightly estimate the value of the results which would be obtained from such a machine if completed, or whose opinions would carry with them greater weight. Sir John Herschel I need hardly say is a very eminent man in many ways; but I wrote to him on receiving Mr. Babbage's letter, especially because he was one of those who originally took an active part in recommending Government to undertake the construction of the engine. On one point I differ with Sir John Herschel. I think he has taken a very narrow view of the financial part of the question. From what I have learned from eminent mechanical engineers I have no doubt that this country has received an equivalent many times over from the expenditure on the calculating engine, in the improvement in tools and machinery directly traceable to the attempt to make it. That for instance is very much the opinion of Mr. Nasmyth. I agree however most fully with Sir J. Herschel that if the engine is to be completed it is desirable that there should be a contract for a specific sum. Tools and machinery are now in so advanced a state compared to what they were when the machine was commenced that it is probable that some mechanical engineer would be found to undertake the work by contract. Should the Government be disposed to take the matter up probably the better course would be to call upon Mr. Rendell as President of the Institution of Civil Engineers for his opinion: that would not bind Government in any way. Mr. Rendell with the advice of Mechanical Engineers and Scientific Men would be enabled to say whether the machine could be completed by contract, and if so for what sum, and in what time.

Believe me to be my dear Lord
faithfully yours
Rosse

Letter from the Earl of Rosse
requesting funds for
Difference Engine No. 2

Figure 14: Letter from the 3rd Earl of Rosse requesting funding for Difference Engine No.2

My Dear Lord Rosse,

I have received your two letters, the latter announcing that my papers were in Lord Derby's hands.

Whatever may be his decision about the Difference Engine I shall always look back with gratification on the active measures you have taken in the question.

If a complete acquaintance with both branches of the subject, backed by your position and supported by the warmth of private friendship fail to ensure success there can be little hope for the future.

I have never entertained much and now feel a kind of relief in being no longer obliged to think upon a painful subject.

I have been trying to exclude the idea by the enquiry into the great law of matter but I have worked so much at that subject lately that I am obliged for a time to vary my occupation and am now buried with the automation player at Tit-tat-to.

Perhaps if I were to make that toy my countrymen might think there was some merit in that Analytical Engine.

I am my Dear Lord Rosse
Everytruly Yours

C. Babbage

Dorset Street
Manchester Square - 26 July 1852

Figure 15: Charles Babbage's letter to the 3rd Earl of Rosse on reading that the request for funding for Difference Engine No.2 had been sent to the Prime Minister, Lord Derby

My dear Lord Rosse

The state of painful suffering in which Lady Lovelace remains at present has delayed my thanking you for your letter and its enclosure from Lord Derby. A few days will probably terminate the suffering of my poor friend.

My first impression on reading L^d D's letter was that I ought to make no further attempt to force a generous offer on a reluctant country, in fact it appears that I have thrown pearls before swine.

With regard to J. Hume he is honest but not qualified for such a subject: besides I have always felt and acted upon the feeling that the subject is above all political movements. It has in former times been more than once suggested to me that O'Connell would be willing to take up the Engine, and you know what his influence has been over my whig friends. I have always replied that I would rather give up all hope of ever seeing the engine made than that the shadow of so dishonest a man should pass across it.

On consulting Hawes who shares with you fully in the perception of the vast importance of the substitution of mechanical for mental labour, he pointed out yet another course which from his official experience deserves attention. He remarks that L^d D's decision rests upon the grounds of unlimited expense but that two propositions are entirely passed by

1st The offer of the Diff. Eng. N^o 2

2nd The proposal to refer the question of cost to the Instⁿ. of

Civil Engineers

Hawes notion is first to ascertain whether it would be agreeable to your views to address another letter to L^d. D. on the subject. In case it should Hawes could embody his notions in a draft of such a letter to L^d. D. for your consideration.

His argument would be that none but professional Engineers who had examined minutely the drawings could be accepted as judges by the public and that the question of the cost of making the engine should be referred to the Instⁿ. of Civil Engineers for their opinion. It being understood that whatever might be the nature of that decision it should not be considered as pledging the Gov^t. to construct the Engine.

I feel that I have very imperfectly expressed Hawes' views which appeared to me at the time to be quite sound.

My own personal objections to moving in the question are in some measure removed by this course being taken by my friends. There is however another reason in its favour which makes it fit that I should not object to it.

The flippant term of "Mr. B's projects" applied by the Chanc^r. of the Exch^r. to the offer of my drawings of Diff. Eng. N^o. 2 which have not been arrived at under an expense of £10,000 I can afford to smile at and forgive. But I am convinced that if L^d Derby's letter were known it would be most injurious to the reputation of the Chanc^r. of the Exch^r. both for prudence and for sagacity. He assigns to L^d. D. four reasons for refusing

1st Indefinite expense

3rd

Expenditure certainly so large

2nd Problematic success

4th

D itto utterly incapable of being calculated

These bold assertions are made by an unprofessional man about a machine the drawings of which no professional person would venture to give an opinion without having first seen and fully studied them. Any conjectured estimate of its cost of construction derived from that of a different and more complicated engine made about twenty years ago when the science of mechanical construction was far less advanced would be simply ridiculous.

Looking at the question in this light I think I think if Hawes were to prepare for your consideration the draft of a letter embodying his views, that L^d. D. and his Chanc^r. of Exch^r. would then have a chance of setting themselves right: otherwise they are in my opinion in a considerable mess.

It is the principle of giving them fair play and the chance of getting results rather than any feelings of my own which reconciles me to the proposed course.

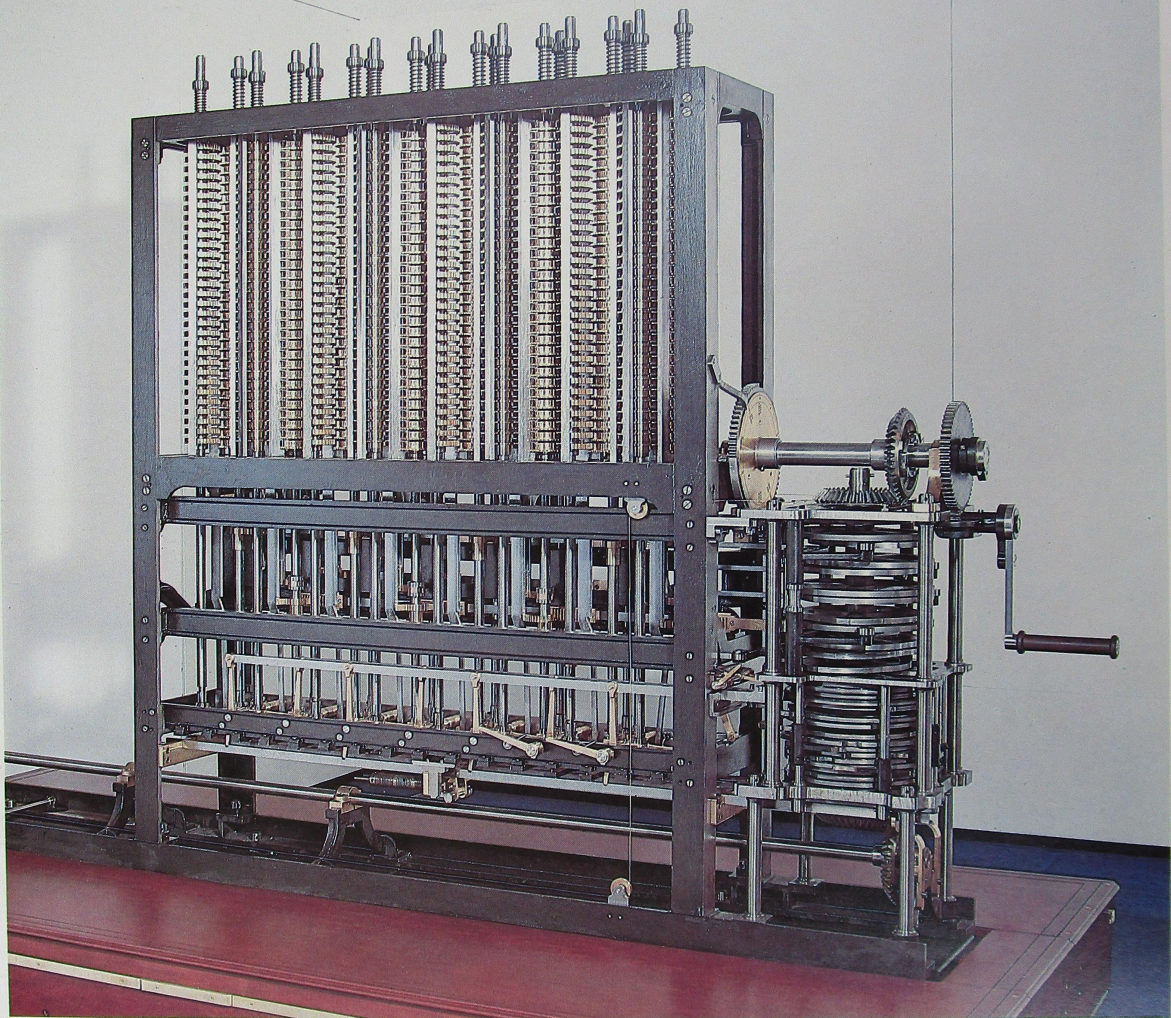
It would be desirable if you should concur in this view that Hawes should have a copy of your letter to L^d. D. before him when he prepares the draft of the proposed letter.

Dorset St.
Manch^r. Sq
27 Aug. 1852

I am My dear Lord Rosse
ever truly yours
C. Babbage

Babbage's letter to Lord Rosse on reading
Lord Derby's negative reply to the Earl's
request for funds for constructing
Difference Engine No. 2

Figure 16: Charles Babbage's letter to the 3rd Earl of Rosse on reading Lord Derby's rejection of the request for funding for Difference Engine No.2



23 'Glory and Failure'

*Figure 17: Charles Babbage's Difference Engine No.2 in the Science Museum, London
Completed in 2002 [11], with 8,000 parts, 11 feet long, and weighing five tons*

Babbage's Table of Logarithms

Lt. Col. Thomas Colby was in charge of the great Irish Ordnance Survey and he wanted a compact set of tables which could be used in the field. Many of the existing ones were too large and contained errors. Babbage set about preparing a table, not by computing logarithms but by reading many printed tables and Prony's unpublished tables in Paris. During this process he found that the same six errors occurred in many tables[17], the errors originating in Vlacq's tables of 1628. Even a set of Chinese tables contained the same errors!. Colby did much of the proof reading, some of it being done in tent on top of Slieve Donard.

Babbage took a great deal of trouble over the layout of the tables and the colour of the paper used. He used yellow paper for the first edition in 1827 and green for the third edition in 1834. This was prepared for the Hungarian Academy of Sciences. Babbage presented a copy to the Library [15]. The tables on display are the fourth impression printed in 1844 [25].

Figure 18: Charles Babbage's Table of Logarithms

NEXT PAGE

*Figure 19: Charles Babbage's Tables of Logarithms, 3rd Edition, 1834
(1st Edition was published in 1827)*

**This edition of the Tables of Logarithms
was printed on green paper. The handwriting is
Babbage's.**

*To the Library of
Trinity College Dublin
from the Author*

Collection

TABLE
OF THE
LOGARITHMS

OF THE
NATURAL NUMBERS,

FROM
· 1 to 108000.

BY
CHARLES BABBAGE, Esq., M.A.,
Lucasian Professor of Mathematics in the University of Cambridge,
F. R. S. L. AND E. HON. M. R. I. A. F. R. A. S. F. C. P. S.
SOC. PHILOMATH. PAR. SOC. CORR., ACAD. DJON SOC., ACAD. MARS.
ET ACAD. BRUX. SOC. CORR., SOC. PHYS. ET HIST. NAT. GEN. SOC. HON., IMP. ET REG. ACAD. MOD.,
IMP. ET REG. ACAD. GEORGOP. FIORENT., ACAD. LYON. ROM., IMP. ET REG. ACAD. PAD.
ET REG. ACAD. NEAP. SOC. CORR., REG. ACAD. HAPNIE. SOC.,
ET REG. ACAD. MONAC. SOCIUS CORR., &C.

STEREOTYPED. — THIRD EDITION.

LONDON :
PRINTED FOR THE HUNGARIAN ACADEMY OF SCIENCES.

1834.

PUBLISHED BY CHARLES KNIGHT, LUDGATE STREET.

IV. Notice respecting some Errors common to many Tables of Logarithms.
 By CHARLES BABBAGE, Esq., Foreign Secretary of the Astronomical
 Society.

Read March 9, 1827.

HAVING lately printed a stereotype table of the logarithms of natural numbers, for the use of the Survey of Ireland, I observed among the errors detected in various tables during the eight readings to which it was subjected, several which appeared common to many of them. This circumstance induced me to examine some other tables at the same numbers; and I find that there are six errors which are common to almost all tables: those of VEGA, the recent impressions of CALLET and my own, are the only ones entirely exempt. The following table shows the sixth and seventh figures, and in a few cases also the eighth, ninth and tenth figures, of the logarithms in the respective tables: the erroneous figures being indicated by a bar placed above them.

| 24,626 | 38,962 | 57,628 | 57,629 | 63,747 | 67,951 | Natural Numbers. |
|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------------------------|
| $\overline{39}751$ | $\overline{13}420$ | $\overline{35}875$ | $\overline{10}436$ | $\overline{97}412$ | $\overline{58}424$ | Vlacq, fol. Gouda 1628 |
| $\overline{39}751$ | $\overline{13}420$ | $\overline{35}875$ | $\overline{10}436$ | $\overline{97}412$ | $\overline{58}424$ | Vlacq, fol. London 1633 |
| 39 | 13 | 35 | 10 | 97 | 58 | E. Wingate, 12mo. London .. 1633 |
| $\overline{39}7$ | $\overline{13}4$ | $\overline{35}9$ | $\overline{10}4$ | $\overline{97}4$ | $\overline{58}4$ | Newton, fol. London 1658 |
| $\overline{40}$ | $\overline{13}$ | $\overline{36}$ | $\overline{10}$ | $\overline{97}$ | $\overline{58}$ | Sherwin, 8vo. 1st ed. London .. 1726 |
| $\overline{40}$ | $\overline{13}$ | $\overline{36}$ | $\overline{10}$ | $\overline{97}$ | $\overline{58}$ | Sherwin, 8vo. 2nd ed. London .. 1741 |
| $\overline{40}$ | $\overline{13}$ | $\overline{36}$ | $\overline{10}$ | $\overline{97}$ | $\overline{58}$ | Sherwin, 8vo. 3rd ed. London .. 1742 |
| $\overline{40}$ | $\overline{13}$ | 36 | $\overline{10}$ | $\overline{97}$ | $\overline{58}$ | Gardiner, 4to. London 1742 |
| $\overline{40}$ | $\overline{13}$ | 36 | $\overline{10}$ | $\overline{97}$ | $\overline{58}$ | Sherwin, 8vo. 4th ed. London .. 1761 |
| $\overline{40}$ | $\overline{13}$ | 36 | $\overline{10}$ | $\overline{97}$ | $\overline{58}$ | Sherwin, 8vo. 5th ed. London .. 1770 |
| $\overline{40}$ | $\overline{13}$ | 36 | $\overline{10}$ | $\overline{97}$ | $\overline{58}$ | Gardiner, 4to. Avignon 1770 |
| $\overline{40}$ | $\overline{13}$ | 36 | $\overline{10}$ | $\overline{97}$ | $\overline{58}$ | Schulze, 8vo. Berlin 1778 |
| $\overline{40}$ | $\overline{13}$ | 36 | $\overline{10}$ | $\overline{97}$ | $\overline{58}$ | Gardiner, 4to. Fiorenze 1782 |
| 39 | 12 | 36 | $\overline{10}$ | $\overline{97}$ | $\overline{58}$ | Taylor, 4to. London 1792 |
| $\overline{38}751$ | $\overline{12}420$ | $\overline{35}475$ | $\overline{10}836$ | $\overline{97}512$ | $\overline{58}524$ | Vega, fol. Leipsic 1794 |
| $\overline{40}$ | $\overline{13}$ | 36 | $\overline{10}$ | $\overline{97}$ | $\overline{58}$ | Callet, 8vo. Paris 1795 |
| $\overline{40}$ | $\overline{13}$ | 36 | $\overline{10}$ | $\overline{97}$ | $\overline{58}$ | Delambre, Tab. Dec., 4to. Paris 1801 |
| 39 | 12 | 36 | $\overline{10}$ | $\overline{97}$ | $\overline{58}$ | Hutton, 8vo. 4th ed. London ... 1804 |
| 39 | 12 | 36 | $\overline{10}$ | $\overline{97}$ | $\overline{58}$ | Hutton, 8vo. 5th ed. London .. 1811 |
| 39 | 12 | 35 | 11 | 98 | 59 | Vega, 8vo. 5th ed. Leipsic 1820 |
| 39 | 12 | 36 | $\overline{10}$ | $\overline{97}$ | $\overline{58}$ | Hutton, 8vo. 6th ed. London .. 1822 |
| 39 | 12 | 35 | 11 | 98 | 59 | Babbage, 8vo. London 1826 |

Figure 20: Charles Babbage's Notice on Tables of Logarithms, from Memoirs of the Astronomical Society of London, Volume 3, part 1, 1827

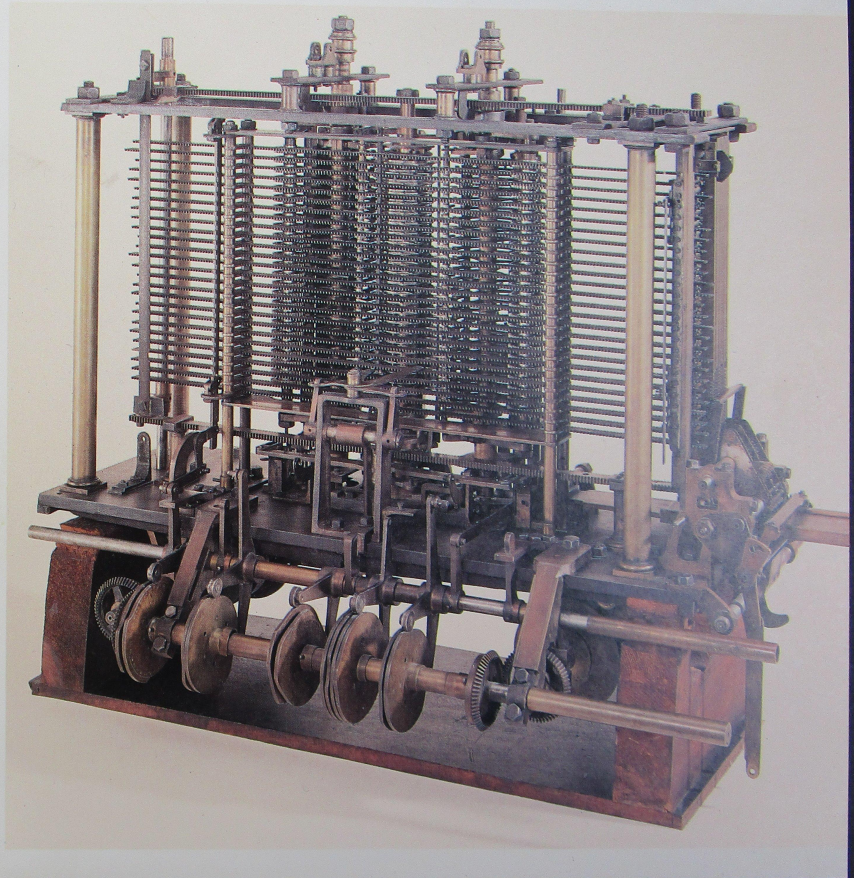
ANALYTICAL ENGINE, 1871

Portion of the mill of the Analytical Engine with printing mechanism, under construction at the time of Babbage's death. The horizontal racks transfer numbers between the two columns of number wheels in the centre and to the printing mechanism on the right.

1878-3

"The marvellous pulp and fibre of a brain had been substituted by brass and iron, he had taught wheelwork to think."

H W Buxton, 1870s



ANALYTICAL ENGINE, 1871

Portion of the mill of the Analytical Engine with printing mechanism, under construction at the time of Babbage's death. The horizontal racks transfer numbers between the two columns of number wheels in the centre and to the printing mechanism on the right.

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H W Buxton, 1870s

Mill of Babbage's Analytical Engine

Figure 21: Mill of Babbage's Analytical Engine

Babbage, MacCullagh and the Analytical Engine

In 1841 James MacCullagh, a very distinguished Professor of Mathematics in Trinity College, visited Turin with Babbage, who brought drawings of his Analytical Engine, a mechanical engine which contained the principal concepts of the digital computer. He explained his engine to a group of Italian scientists including L.F. Menabrea. From the letter [26] which MacCullagh wrote to Babbage in 1842, it is clear that Menabrea had agreed to write a paper on the Analytical Engine. This he duly did, in French, in the *Bibliothèque Universelle de Genève* in October 1842. It was translated into English by Babbage's friend, Ada, Countess of Lovelace [25] and only daughter of Lord Byron. She added extensive notes which are longer than Menabrea's paper. A sample program for computing Bernoulli numbers was included [21]. Ada has been called the first programmer and the language is called after her.

Figure 22: Charles Babbage, James MacCullagh and the Analytical Engine

Trin:Coll:Dublin
Feb 25 1842

My dear Babbage,

You have probably heard from Sir James South that I have been elected a member of the Athenaeum. He tells me that I have reason to be proud of the letters which he was able to produce in my favour. One of them was from you. I suppose I ought to thank you in due form for what you were pleased to say of me --- at the risk too of drawing upon yourself an additional visit every year --- for no doubt I shall be disposed --- for a time at least --- to spend more of my vacations in London.

I suppose you are going on pretty much as usual --- devoting your mornings to hard work (I wish it were not thankless) --- and your evenings to Society. It is a good mixture, I am sure, and the one gives a relish to the other. But when shall we have something *in print* about the Machine. For you know, *that* has always been the burden of my song. Has Menabrea published anything yet? I live quite out of the world here, and never hear a word of news --- scientific or political.

To talk of myself --- I have grown very stupid of late, and regularly fail in everything I attempt. What the reason may be I cannot tell. But I begin to be of Newton's opinion, that after a *certain* age, a man may as well give up mathematics. Perhaps it would be better --- at least for one's own happiness --- to have some occupation or profession which should connect one immediately with his fellow men, and to make the pursuit of science a collateral object, rather than a direct one.

Believe me always, my dear Babbage,
Yours faithfully,
J. MacCullagh

Figure 23: A letter from James MacCullagh's to Charles Babbage
This explicitly urges publication of Menabrea's description of the Analytical Engine,
which was then famously translated and extended by Ada Lovelace