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BASIC COMPUTER STUDIES

计算机基础知识

清华大学外语教研组
英语读物注释小组 编

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编者的话

工程技术英语注释读物按机械、动力、电力、电子、建筑、化工、原子能等不同专业分册出版。文章大部分选自原著，对其中个别地方作了适当修改。专业内容浅近易懂。附有注释、参考译文和词汇表，便于读者自学，以培养独立阅读能力。

本书原文选自 P.J.Barker 和 W.T.Beveridge 著 *Basic Computer Studies*, 1976 年，Oliver & Boyd 版。对计算机的结构、工作原理和应用作了一般的介绍，还介绍了常用的 Algol 和 Fortran 语言。各章编有练习，书后附有答案。这是一本普及计算机知识的通俗读物，适于作为培养阅读计算机方面英语书刊能力的自学教材。

本校电子系计算机专业的教师参加译文的审校工作。

由于编者水平的限制，以及缺乏编写经验，书中肯定存在不少缺点、错误，热烈欢迎广大读者提出宝贵的批评意见，以便进一步修改。

编　者

1978 年 5 月

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1 DEVELOPMENT OF COMPUTERS

What is a computer?

There are many calculating machines① on sale today which are designed to② carry out a limited number of arithmetic tasks. In shops you will have seen cash registers which basically can only add. In offices there are slide rules③ for multiplication and division, and desk machines which can add, subtract, multiply and divide. Some of these desk models④ can perform special tricks,⑤ such as finding the square root of a number. In all of these cases the machine can only do a limited range of arithmetic, and it must be operated by hand at each stage of the calculation. Think of⑥ a shop assistant using a cash register. She usually does the following:

(a) types⑦ the first price;
(b) presses a key to clear⑧ the register;
(c) types the next price;
(d) presses a key to add this price on⑨ and clear the register.

Now she repeats steps *(c)* and *(d)* until all the prices have

---

① **calculating machine(s):** 计算机器. 而 computer 则指的是电子计算机. ② **(are) designed to** (+动词原形): 设计成能(做); 用来(做). ③ **slide rule(s):** 计算尺. ④ **model(s):** 原意 "(模)型; 原型; 样式", 这里可译 "计算机". ⑤ **trick(s):** 原意"戏法;把戏",这里可译"运算任务". ⑥ **think of:** 想一想; 想象. 是动词原形, 表示一种建议或命令. ⑦ **type(s):** 用打字机打(出), 是动词. ⑧ **clear:** 把...弄干净; 清机; 归零. 是动词. ⑨ **add ...on:** 把...加上去.

been included. She finally does one more① thing. She presses a key to make② the machine print out the total on a slip of paper. Quite often all the individual prices are given as well as③ the grand total.

These machines are not computers in the present-day sense of the word. By *computer* we now mean④ a machine which can perform any sort of calculation, and which can be given a list of instructions all at once,⑤ and will work through⑥ them by itself⑦ until the job is completed. If we employed a computer to add sums of money like a cash register, we would just need to tell* it:

(a) add the following prices;

(b) print out each separate price;

(c) print out the total;

and then we would give it the list of prices. There would be no need⑧ for us to touch the computer⑨ each time it has to add.⑩ It would do this automatically.

Exercise 1

Which device would you say⑪ you are more like, a calculating machine or a computer?

---

* How we 'tell' the computer will be discussed in chapter 2.

① **one more:** 再一个；还有一个. ② **make** (+名词) (+动词原形): 使...(做)；让...(做). ③ **as well as:** 以及；连同...一起. ④ **by (...) we mean...:** 我们说 (...) 指的是.... ⑤ **all at once:** 一次；同时；突然. ⑥ **work through:** 做完. ⑦ **by itself:** 自己；独自. ⑧ **there would be no need (to +动词原形):** 没有(做)的需要；不需要(做). ⑨ **for us to touch the computer:** 带意思上的主语 (we) 的不定式短语，作定语，说明名词 need. ⑩ **each time...add:** 当它要做每一步加法运算时. 是时间状语. ⑪ **would you say:** 你认为. 是插入语.

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Digital and analogue computers

Consider the simple abacus which consists of beads strung on wires.

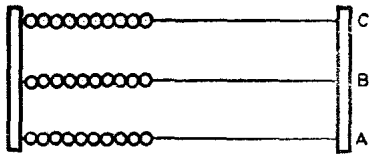

Fig. 1 An abacus.

To add two numbers, for example 2.5 and 5.4, let① wire A represent tenths, wire B units and wire C tens. Slide two beads on B and five on A over to② the right hand side. This of course represents 2.5. Now slide a further five beads on B and four on A over to the right hand side. The number now on the right hand side of the frame is the total, 7.9. In this device numbers are represented in a way which is very similar to that in which we normally write them. To increase the number of significant figures we just increase the number of wires. For example, 3171.24 needs six wires. This is called a *digital device* and computers using this principle are called digital computers.

In contrast to③ the abacus we can represent numbers by lengths on a strip of paper. To add 2.5 and 5.4, all we need④ is two such strips placed side by side⑤ as shown below.⑥

---

① **let** (+名词) (+动词原形): 让…(做); 令…(做). ② **slide** (...) **over to** ...: 把(...)滑到.... ③ ***in contrast to***: 与...对比; 与...相反; 和...大不相同. ④ **all we need** =all that we need: 我们所需要的全部东西. ⑤ **side by side**: 并排地. ⑥ **as shown below**: 如下所示.

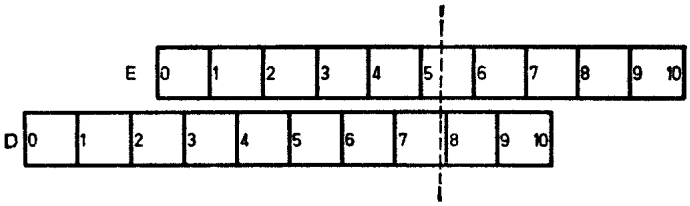

Fig. 2

Place the 0 of the strip E opposite① 2.5 of D, look along E to 5.4 and read the number on D immediately below. This is an *analogue device,* for② numbers are being represented by a physical quantity. Analogue computers represent numbers by voltages rather than③ by lengths. Setting up④ a problem and reading the result always depend on measurement, of length in the example above, and of voltage in the computer. Since measurements are always subject to⑤ error, the accuracy of results depends on how accurately we can measure the quantity representing the numbers.⑥

Analogue computers are usually cheaper than digital ones,⑦ but are not as accurate.⑧ They are often designed to deal with specific problems and are not as versatile as digital computers which can generally deal with any problem. In this book we shall consider only digital computers.

---

① **opposite:** 在...的对面. 是前置词. ② **for:** 因为. ③ **rather than:** 而不(是). ④ **set(ting) up:** 提出; 建立. ⑤ **(are) subject to:** 易遭到...; 易发生.... ⑥ **how...numbers:** 是 depends on 要求的宾语从句. ⑦ **ones:** 代替 computers. ⑧ **are not as accurate** =are not as accurate as digital computers.

Exercise 2

(a) Further examples of analogue devices are the thermometer and the slide rule. Can you name① any others?

(b) Desk calculating machines and turnstile counters are digital devices. Can you think of any others?

History of computers

Many of the famous mathematicians in history were involved in② the development of calculating devices, but the basic principles of a computer were first outlined by an English mathematician, Charles Babbage. His first designs were for a machine to calculate such things as logarithm tables, but in 1832 he began work on③ the design of a truly general purpose computer. He had no alternative to④ making a purely mechanical device using gears, rods, and wheels, but the organisation of the machine was very like that of a modern electronic computer. Unfortunately the engineers of his day were not capable of making such an elaborate machine, and Babbage died in 1871 without seeing his dream realised.⑤ (Fig. 3).

Modern computers are electronic, and it was not until the 1940's that⑥ such machines could be built. Research workers in America produced a working computer in 1945. The first models were very bulky because they depended on valves similar to those you may have seen in old radio sets. Later machines had transistors and at present they

---

① **name:** 说出；列举；叫出…的名字. 是动词. ② **(be) involved in:** 致力于. ③ **work on:** 从事；研制. ④ **had no alternative to (+动词原形):** 除(做)之外别无选择. ⑤ **see(ing) his dream realised:** 看到他的梦想实现. ⑥ **it was not until...that (...):** 直到…才(...).

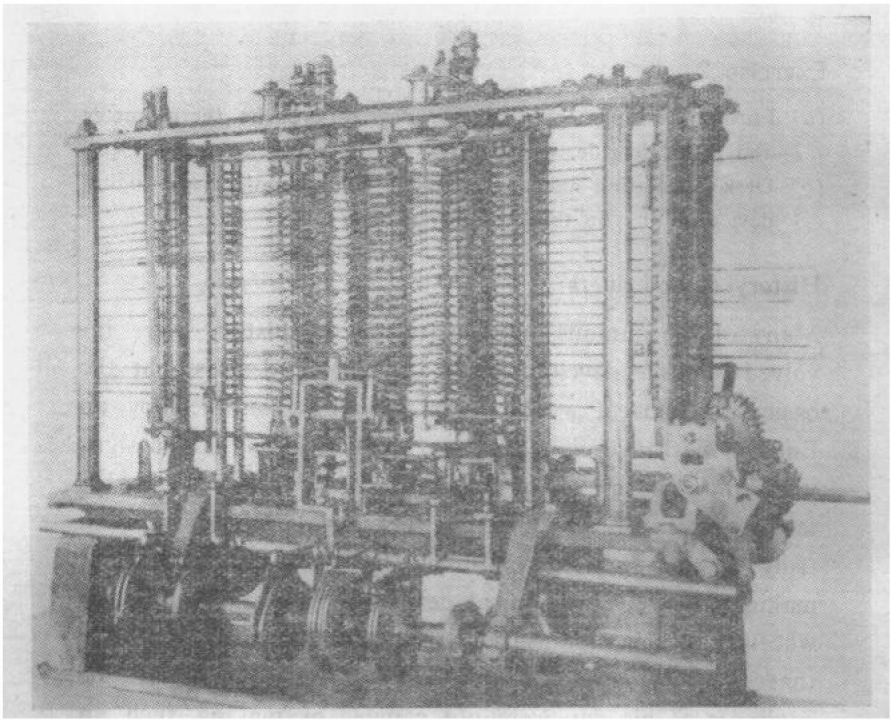

Fig. 3 Part of Babbage's computer.

use integrated circuits which take up① an incredibly small space. (Fig. 4).

The reason for the development of small computer parts is not just to save space but rather② to increase the speed of computation. Present models are several thousand times as fast as③ the 1950 machines, which could perform about 1000 simple additions per second. You should find

① **take up:** 占有; 占据. ② **not just (...) but rather ...:** 不仅(...)而且(更重要的是).... ③ **X times as fast as...:** 的速度是...的X倍; 比...快(X-1)倍.

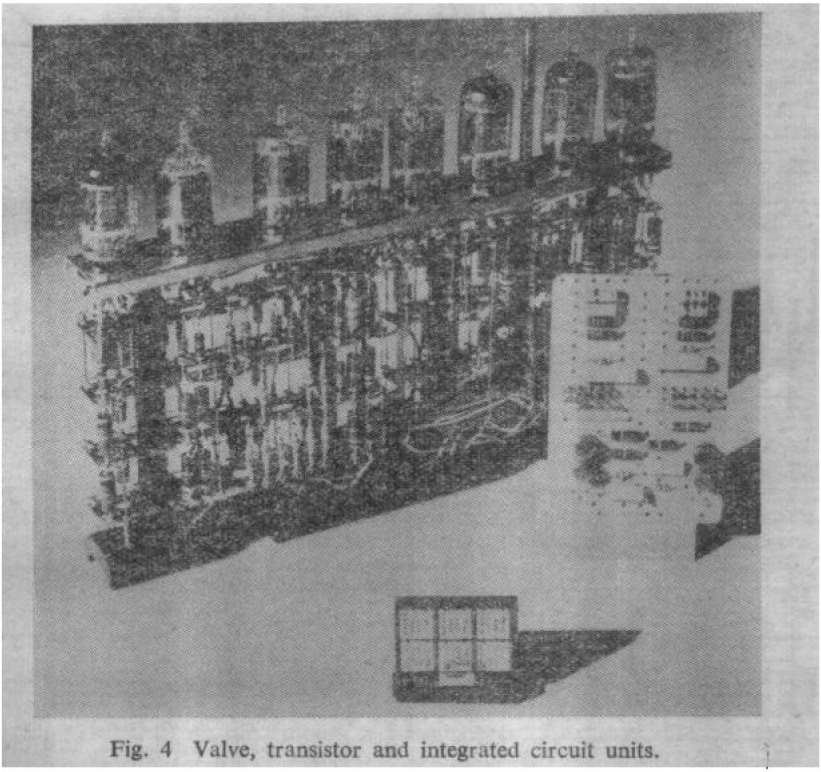

Fig. 4 Valve, transistor and integrated circuit units.

out how many you can manage① by asking your neighbour to write down ten simple addition problems and then note② how long you take to complete them③. If you do about one addition per second you are very fast but even the old computers were 1000 times faster. (Figs. 5 and 6).

The speed of the early machines (some of which had interesting names, for example MANIAC, standing for④

① **how many...manage:** 你能做多少. 是 find out 要求的宾语从句. ② **note:** 注意. 是动词. ③ **how long...them:** 你做完它们要化多少时间. 是 note 要求的宾语从句. ④ **stand(ing) for:** 代表; 意味着; 是...的缩写.

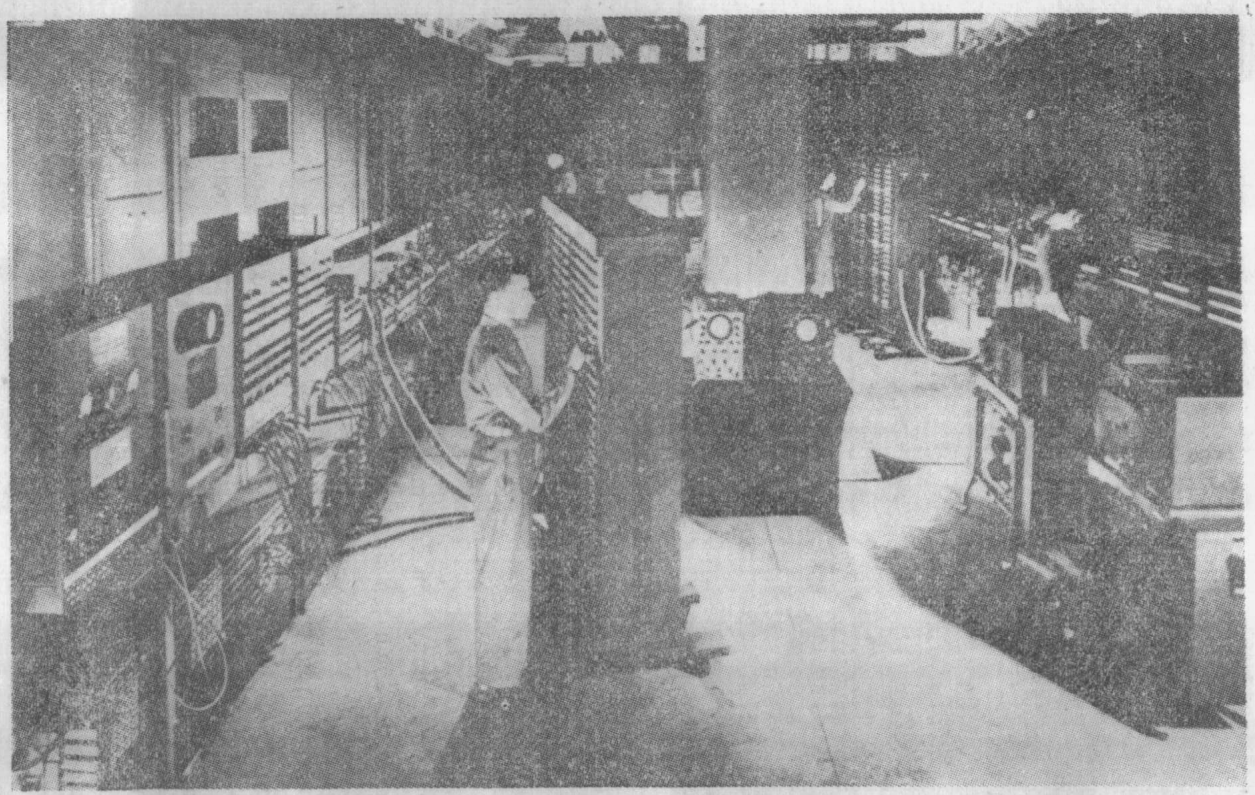

Fig. 5 An early computer called the ENIAC (Electronic Numerical Integrator and Calculator).

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