

Physical Device to Code

1 Electronic circuits* are used to build modern computers.

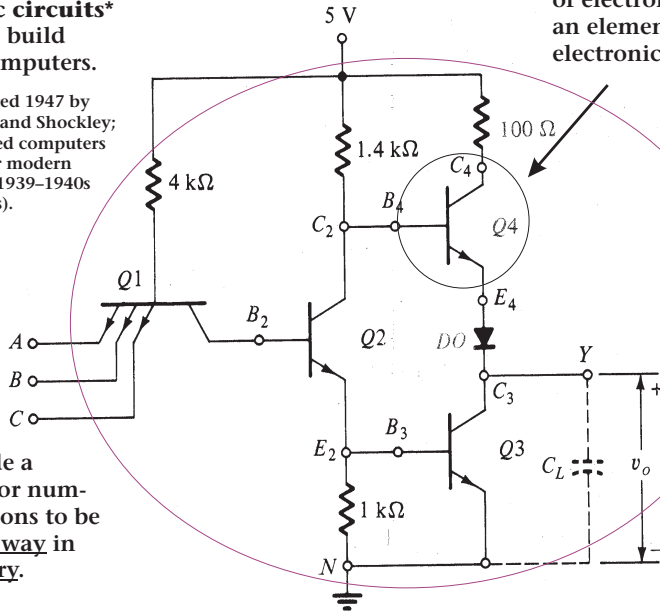
* Transistor invented 1947 by Bardeen, Brattain, and Shockley; first transistor-based computers early 1950s (earlier modern digital computers 1939–1940s used vacuum tubes).

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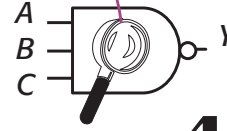
0s and 1s provide a common form for numbers and operations to be stored the same way in the same memory.

7 Resulting binary code can be interpreted as a number expressed in the binary system. The number can denote a device's operational state, a stored value, or a coding of an item such as a text character.

2 The transistor, a basic physical building block of electronic circuits, is an elementary 2-state electronic switch.



3 This electronic circuit implements a simple **digital logic** device (3-input NAND gate) using 5 electronic switches: 4 transistors (Q1–4), and a diode (simpler electric current switch). Source: Millman and Grabel, Microelectronics (2nd ed.)



4 NAND, a building block of digital logic is a **logical switch** that can only be turned OFF when all inputs are switched ON.

5 Any two symbols can **encode** the two **states** of a switch (0 and 1 useful, you will see why next).



0101010101
 bit (binary digit)

6 Sequences of 0s and 1s can encode switching states in a digital device to denote stored info or operational positions during a computation.