

Atanasoff-Berry Computer Users Guide

A practical guide to the operation of the
worlds first digital electronic computer



by Charles S. Shorb

Table of Contents

<i>Identification of Operational Components</i>	3
<i>ABC Front Panel Identification</i>	4
<i>Base-10 Data Input</i>	5

Identification of Operational Components

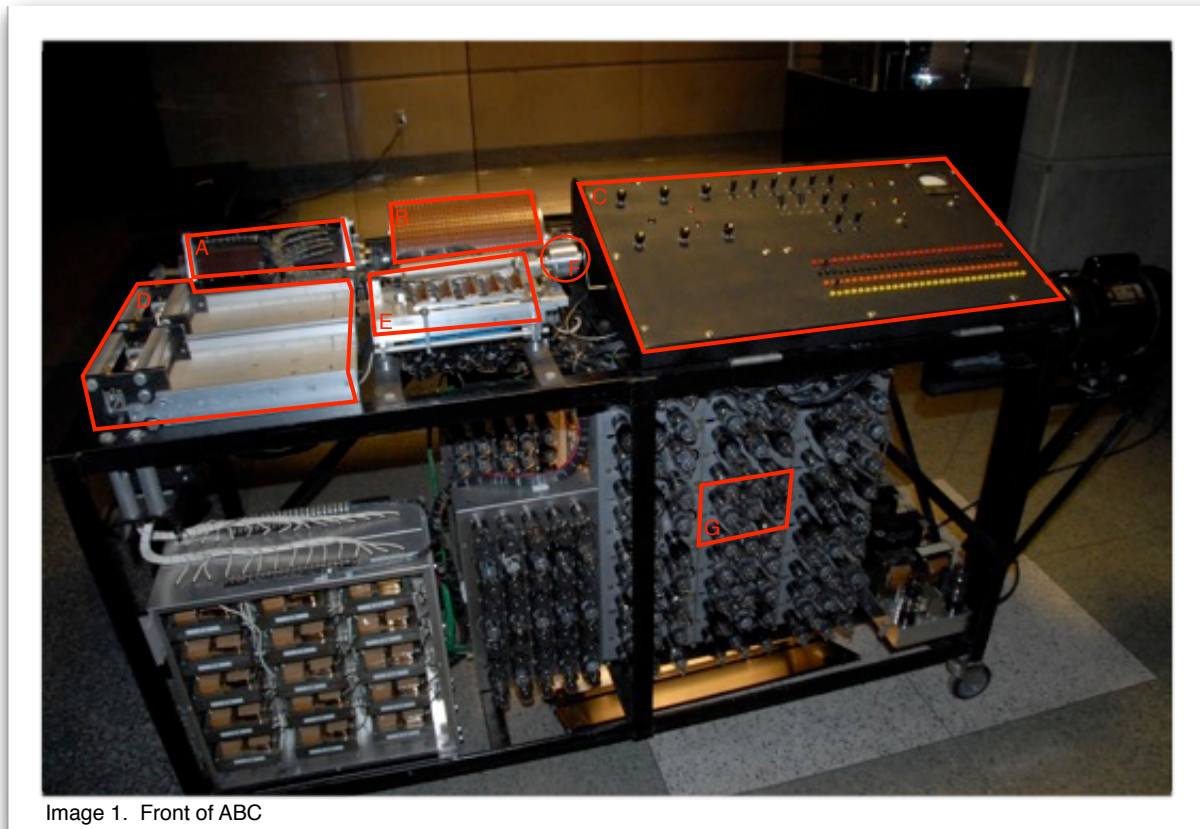


Image 1. Front of ABC

- A. Base-2 Conversion Drum (rear)
- B. KA Drum
- C. Operators Panel
- D. Base-2 Input Output trays
- E. Base-10 Card Reader
- F. Base-10 odometer
- G. Add / Subtract Module

ABC Front Panel Identification

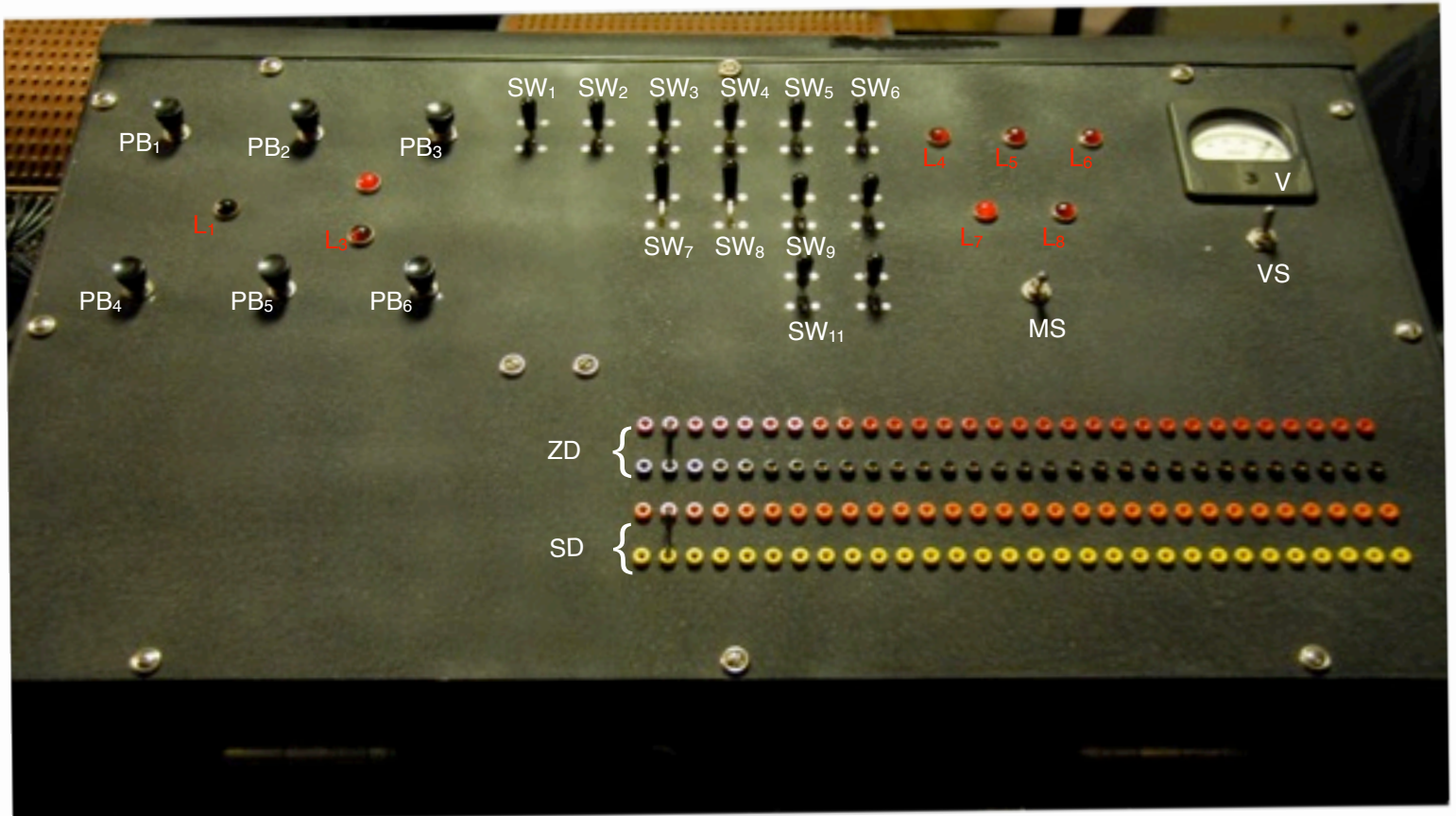


Image 2. ABC Front Panel

- | | |
|---|--|
| 1. PB₁ Add / Subtract Selection Push-Button | 17. SW₁₁ Clear-KA Switch |
| 2. PB₂ Start Base-10 Read Operation | 18. SW₁₂ Clear-CA Switch |
| 3. PB₃ Transfer CA-Drum to KA-Drum | 19. L₁ Base-2 Read Operation |
| 4. PB₄ Start Base-2 Punch | 20. L₂ Add Operation |
| 5. PB₅ Start Base-2 Read | 21. L₃ Subtract Operation |
| 6. PB₆ Start Computation | 22. L₄ Read IBM Card Operation |
| 7. SW₁ Coefficients Input Selection: 1-5 | 23. L₅ Coefficient Elimination Operation |
| 8. SW₂ Coefficients Input Selection: 6-10 | 24. L₆ Decimal Output Operation |
| 9. SW₃ Coefficients Input Selection: 11-15 | 25. L₇ Positive Number Indicator |
| 10. SW₄ Coefficients Input Selection: 16-20 | 26. L₈ Negative Number Indicator |
| 11. SW₅ Coefficients Input Selection: 21-25 | 27. V Voltmeter |
| 12. SW₆ Coefficients Input Selection: 26-30 | 28. VS Voltage Selector Switch (Pos/Neg) |
| 13. SW₇ Card Read Switch | 29. MS Motor Switch |
| 14. SW₈ IBM Card Sign Control | 30. ZD Zero Detection Coefficient Selection |
| 15. SW₉ Unused | 31. SD Sign Detection Coefficient Selection |
| 16. SW₁₀ IBM Card 1's Output Limit | |

Base-10 Data Input

Reading the base-10 data begins before the machine is even turned on. The equations must first be encoded on IBM punch cards. Each IBM card encodes up to five numbers. The ABC uses fifty bits of precision in a two's complement format. This gives us an integer range of $((2^{49}-1)$ to $(-2^{49}))$ or $((5,629,499,953,421,311)$ to $(5,629,499,953,421,312)$ (NOTE: As of the writing, the ABC can still be used for accounting on the national level). Each IBM card has eighty columns. Fifteen are used to encode the number with a blank column between each; sixteen times five equals eighty. The base-10 cards are punched in the same way that numbers are written: 1-2-3 = 123. Negative numbers are indicated with the zero hole punched for each digit.

Example:

$$-13x + 54y = -105$$

Would be encoded on the base-10 card as:

```
-----000-----000
-----13-----54-----105
```

NOTE: '-' is simply left unpunched.

Once the stack of cards have been prepared, the machine is then made ready to receive the input as follows:

1. Turn the ABC power on.
2. Check the main voltage levels. This is done by reading the voltage readout on the Voltmeter (V).
3. The Voltage Switch (VS) is used to check positive and negative levels. Each should read 120 volts.
4. The motor is then turned on (MS). DANGER: Revolving drums are hazardous!
5. Clear the CA and KA drums (SW₁₁, SW₁₂).
6. The Base-10 card is then entered into the base-10 card reader (upside down from the operator).
7. Direct the output to the desired bank of five coefficients (SW₁-SW₆).
8. Activate the card read switch (SW₇).
9. Activate the Add/Sub control from the base-10 reader (SW₈).
10. Start the card read (PB₁₀).
11. Note the base-10 read light is lit (L₄).
12. The card read process will automatically stop after the IBM card has been read.