УДК 004.7
Polina Putintseva[1], Olga Adamenko[2]
[1]student of group CST-220, National University «Zaporizhzhia Polytechnic»
[2]PhD (Philology), assistant prof. National University «Zaporizhzhia Polytechnic»

CLOCK OPERATION OF THE BASIC COMPUTER PROCESSOR BY THE EXAMPLE OF ADD INSTRUCTION

Memory

Table1 1 – Cells and content

№ cells	Content of cell (data and commands)
20	53
21	106
22	0
23	CLA
24	ADD 20
25	ADD 21
26	MOV 22
27	HLT

The program is recorded into computer memory starting from cell 23 (Table1.), and numerical data from cell 20. Cell number 22 is allocated to record the amount. To execute the program, set number 23 to the command counter and start the computer. The program will then begin by reading the contents of cell 23. The CLA command will set the battery to zero. When this command is executed, the contents

of the command counter will be increased in 1 and the next command will be read from cell 24. This command ADD 20 adds the contents to cell 20 with the contents of the battery, i.e. 53 s 0. At the end of the command execution, the battery contains number 53, and the command counter - 25 (it is again increased in 1).

The following command is read from cell 25, the contents of cell 21 and battery, i.e. 106 and 53 are summed. At the end of the command, the battery contains the sum 106 + 53 = 159, and the command counter - 26. The following command - MOV 22 forwards the contents of the battery to the cell with address 22.

Now this cell and battery contain number 159, and the command counter - 27. The HLT command is selected from cell 27, the command counter is incremented in 1 (it contains number 28), but the HLT command stops fetching commands, that is, the end of the program execution is fixed (the contents of cell 28 are not selected in the instruction register and are not interpreted as an instruction).

Let's take a closer look at the execution of one of the commands in this program, such as ADD 21.

A) Before its execution, the previous instruction (ADD 20) is stored in the instruction register, its operand address (20) is stored in the address register, the value of this operand (53) is stored in the data register and accumulator, and the address of the instruction under consideration (25) is stored in the instruction counter.

First, the command address is forwarded from the command counter to the address register. Here, it should be noted that in the base computer, all transfers between registers are performed through the ALU (if necessary, the forwarded value is inverted, a unit is added to it, etc.).

B) From the memory to the data register, the contents of the memory cell, whose address is located in the address register, are selected. The ALU then increments the contents of the command counter by one.

C) With ALU, the increased command number is transmitted to the command counter

D) Finally, the contents of the data register through the ALU are sent to the instruction register, and the control device begins to analyze the contents, that is, ADD 21 command

The above actions apply to the command Takeoff.

E) After decrypting the operation code of the command ADD 21, the control device through the ALU forwards its address part (address 21) to the address register.

The transfer is made from the data register, where a copy of the command is still saved.

F) The contents of the memory located in the address register are then read from the memory to the data register. This action is similar to the action in Figure b, but the control device will now treat the contents of the data register not as a command, but as a term.

G) This step adds up to the contents of the battery and the data register.

H) At last, the sum received in ALU is sent to the accumulator and by that "Execution of the command" comes to the end.