

Programming the Basic Computer

Lecture: 5

Input Output Programming

Users of the computer write programs with symbols that are defined by the programming language employed. The symbols are strings of characters and each character is assigned an 8-bit code so that it can be stored in computer memory.

A binary-coded character enters the computer when an INP(input) instruction is executed.

A binary-coded character is transferred to the output device when an OUT(output) instruction is executed. The output device detects the binary code and types the corresponding character.

Programs to Input and Output One Character

(a) Input a character:		
CIF,	SKI	/Check input flag
	BUN CIF	/Flag=0, branch to check again
	INP	/Flag=1, input character
	OUT	/Print character
	STA CHR	/Store character
	HLT	
CHR,	—	/Store character here
(b) Output one character:		
	LDA CHR	/Load character into AC
COF,	SKO	/Check output flag
	BUN COF	/Flag=0, branch to check again
	OUT	/Flag=1, output character
	HLT	
CHR,	HEX 0057	/Character is "W"

In table(a) above; lists the instructions needed to input a character and store it in memory:

- The SKI instruction checks the input flag to see if a character is available for transfer.
- The next instruction is skipped if the input flag bit is 1.
- The INP instruction transfers the binary-coded character into AC(0-7). The character is then printed by means of the OUT instruction.
- A terminal unit that communicates directly with a computer does not print the character when a key is depressed. To type it, it is necessary to send an OUT instruction for the printer. In this way, the user is ensured that the correct transfer has occurred.

Table(b); lists the instructions needed to print a character initially stored in memory:

- The character is first loaded into AC.
- The output flag is then checked. If it is 0, the computer remains in a two instruction loop checking the flag bit.
- When the flag changes to 1, the character is transferred from the accumulator to the printer.