

MICROPROCESSOR

BCA 3RD SEMESTER 2020

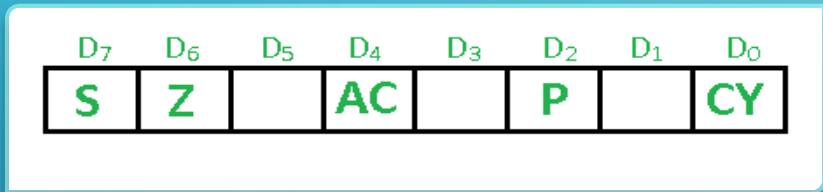
LECTURE- 4

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FLAG REGISTERS



1. Sign Flag (S)
2. Zero Flag (Z)
3. Auxiliary Carry Flag (AC)
4. Parity Flag (P)
5. Carry Flag (CY)

FLAG REGISTERS (CONT.)

1. Sign Flag (S) –

If the MSB is 0, it indicates the number is positive and the sign flag becomes reset i.e. 0.

from 00H to 7F, sign flag is 0

from 80H to FF, sign flag is 1

1- MSB is 1 (negative)

0- MSB is 0 (positive)

FLAG REGISTERS (CONT.)

2. Zero Flag (Z) –

After any arithmetical or logical operation if the result is 0 (00)H, the zero flag becomes set i.e. 1, otherwise it becomes reset i.e. 0.

00H zero flag is 1.

from 01H to FFH zero flag is 0

1 - zero result

0 - non-zero result

FLAG REGISTERS (CONT.)

3. Auxiliary Carry Flag (AC) –

If after any arithmetic or logical operation D(3) generates any carry and passes on to B(4) this flag becomes set i.e. 1, otherwise it becomes reset i.e. 0.

1- carry out from bit 3 on addition or borrow into bit 3 on subtraction

0- otherwise

FLAG REGISTERS (CONT.)

4. Parity Flag (P) –

If after any arithmetic or logical operation the result has even parity, an even number of 1 bits, the parity register becomes set i.e. 1, otherwise it becomes reset i.e. 0.

1- accumulator has even number of 1 bits

0- accumulator has odd parity

FLAG REGISTERS (CONT.)

5. Carry Flag (CY) –

During subtraction ($A-B$), if $A > B$ it becomes reset and if ($A < B$) it becomes set.

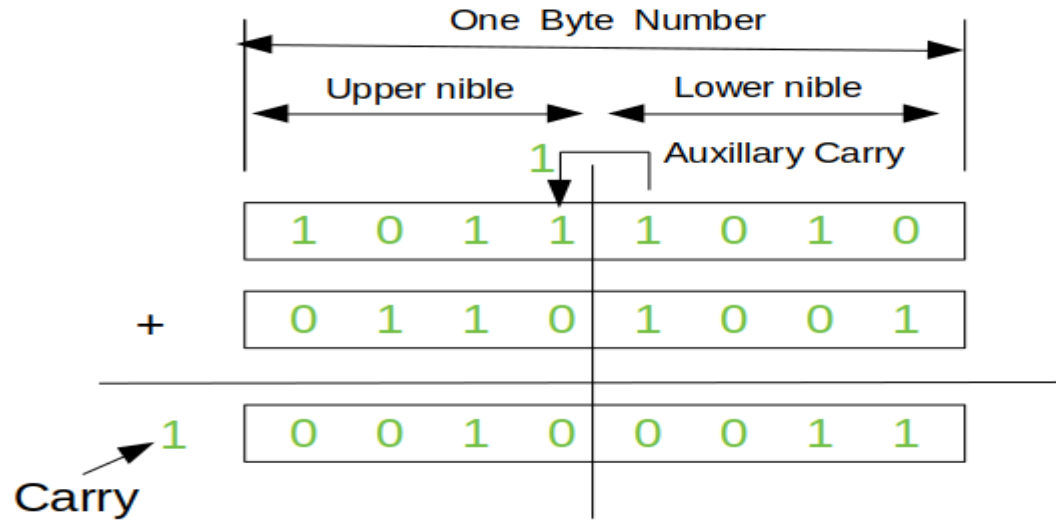
Carry flag is also called borrow flag.

1- carry out from MSB bit on addition or borrow into MSB bit on subtraction

0- no carry out or borrow into MSB bit

FLAG REGISTERS (CONT.)

EXAMPLE 1



B ₇	B ₆	B ₅	B ₄	B ₃	B ₂	B ₁	B ₀
0	0	—	1	—	0	—	1

Value of flags

FLAG REGISTERS (CONT.)

Example 2

- *What will be the status of the flag registers after performing the operation $CD + E9$?*
- *What will be the status of the flag registers after performing the operation $25 + 15$?*

FLAG REGISTERS (CONT.)

Add CB and ES

CD = 11001011

E9 = 11101001

10110100

There is a carry
CS is Set to 1
MSB of the sum is "1"
S is set to "1"

Result is non zero
Z is set to 0
There are 4 number of 1's
P is set to 1
There is a carry from 3rd
Bit to 4th bit
As is set to 1.

FLAG REGISTERS (CONT.)

Example: Let $[C] = 27H$ & $[A] = 15H$

Instruction: `ADD C`

Addition: $27H = 0010\ 0111$
 $+15H = 0001\ 0101$

 $3CH = 0011\ 1100$

$S = 0, Z = 0, Ac = 0$

$P = 1, Cy = 0$

After execution: $[A] = 3CH$ $[C] = 27$

Flag register -

0	0	-	0	-	1	-	0
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The background is a dark blue gradient. In the corners, there are decorative white and light blue circuit-like patterns consisting of lines and small circles, resembling a network or data flow diagram.

THANK YOU

End of Lecture- 4

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