



# Vidyavardhini's College of Engineering and Technology

Department of Artificial Intelligence & Data Science

AY: 2024-25

<b>Class:</b>	SE	<b>Semester:</b>	IV
<b>Course Code:</b>	CSL404	<b>Course Name:</b>	Microprocessor Lab

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<b>Roll No. :</b>	48
<b>Experiment No.:</b>	4
<b>Title of the Experiment:</b>	Program to display alphabets A to Z in uppercase and lowercase
<b>Date of Performance:</b>	08/02/2025
<b>Date of Submission:</b>	13/02/2025

## Evaluation

Performance Indicator	Max. Marks	Marks Obtained
Performance	5	
Understanding	5	
Journal work and timely submission	10	
Total	20	

Performance Indicator	Exceed Expectations (EE)	Meet Expectations (ME)	Below Expectations (BE)
Performance	4-5	2-3	1
Understanding	4-5	2-3	1
Journal work and timely submission	8-10	5-8	1-4

Checked by

Name of Faculty : Ms. Sweety Patil

Signature :

Date:



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**Aim:** Assembly Language Program to display character A to z in both uppercase and lowercase

### Theory:

DOS provide various interrupt services that are used by the system programmer. The most commonly used interrupt is INT 21H. It invokes inbuilt DOS functions which can be used to perform various tasks. The most common tasks are reading a user input character from the screen, displaying result on the program etc.

In this program, we display the characters A to Z on the DOS prompt. DOS interrupt function 02 displays the contents of DL (ASCII code) on the screen. By loading the ASCII code of 'A' in the DL register, loading AH register with 02h and calling INT 21h it is possible to display character from A to Z on the screen.

INT 21h/AH = 2 - write character to standard output.

Entry: DL = character to write, after execution AL = DL.

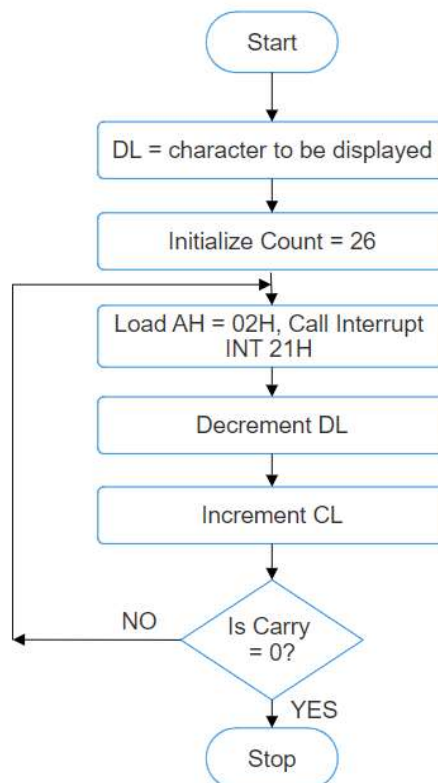
### **Example :-**

```
mov ah , 2
```

```
mov dl , 'a'
```

```
int 21h
```

### Flowchart:





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### **Algorithm:**

1. Start.
2. Initialize DL with 'A'.
3. Load CL with count = 26.
4. Load AH = 02H and call INT 21H.
5. Increment DL, to next character.
6. Decrement the count.
7. Repeat steps 4,5,6 till CL is not zero.
8. To end the program use DOS interrupt:
  - 1) Load AH = 41H.
  - 2) Call INT 21 H.
9. Stop.

### **Code:**

```
mov cx, 26
mov dl, 'A'
L1: mov ah, 02h    ; display character to standard output
    int 21h
    inc dl
    ;dec cx
    LOOP L1      ;JNZ L1  note - either use dec and jnz or just LOOP

mov dl, 0Dh      ; Carriage Return (ASCII 0Dh) to go to the beginning of the line
mov ah, 02h      ; DOS function to print a character
int 21h          ; Call DOS interrupt to print the carriage return

mov dl, 0Ah      ; Line Feed (ASCII 0Ah) to move to the next line
mov ah, 02h      ; DOS function to print a character
int 21h          ; Call DOS interrupt to print the line feed
```

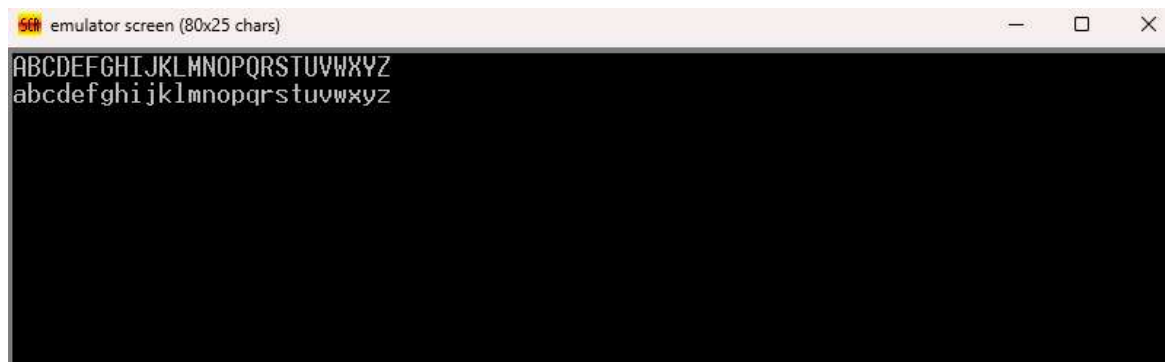
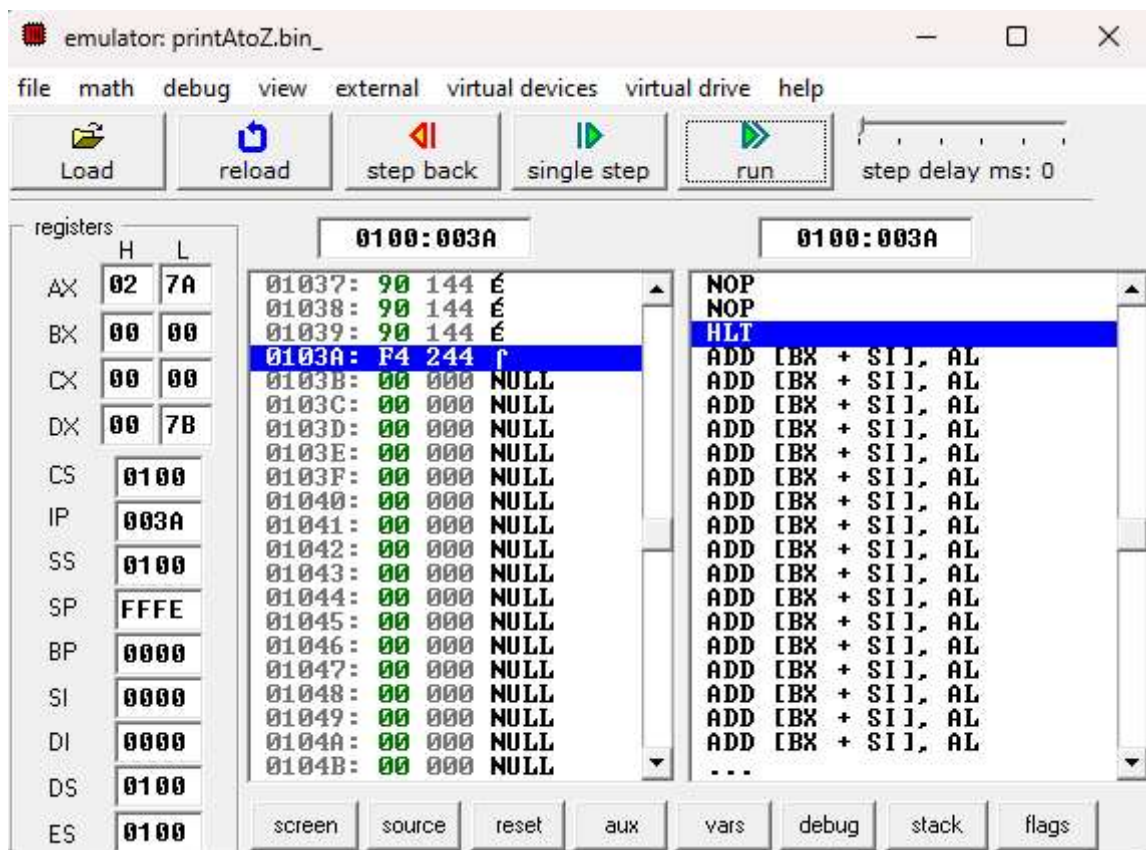


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```
mov cx, 26
mov dl, 'a'
L2: mov ah, 02h    ; display character to standard output
int 21h
inc dl
;dec cx
LOOP L2    ;JNZ L1  note - either use dec and jnz or just LOOP
```

## Output:





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### **Conclusion:**

In conclusion, the assembly language program to display characters from 'A' to 'Z' in both uppercase and lowercase demonstrates basic loop and output techniques. By manipulating the ASCII values of characters, the program prints both uppercase and lowercase letters efficiently, highlighting the use of the int 21h interrupt for output. This helps in understanding fundamental assembly operations like looping and character manipulation.

### 1. Explain INT 21H

INT 21h is a software interrupt in DOS used to access various system services, such as file management, input/output (I/O) operations, and program control. It provides multiple functions, with each function identified by the value in the AH register. Common operations include displaying characters, reading user input, handling files, and terminating programs.

### 2. Explain working of increment and decrement instructions.

In assembly language, the **increment** and **decrement** instructions are used to modify the value of a register or memory location by a fixed amount.

#### 1. **Increment (INC):**

- The **INC** instruction increases the value of a register or memory location by 1.
- **Syntax:** **INC operand**
- **Example:**  
`mov ax, 5 ; Load 5 into AX`  
`inc ax ; Increment AX by 1 (AX = 6)`

#### 2. **Decrement (DEC):**

- The **DEC** instruction decreases the value of a register or memory location by 1.
- **Syntax:** **DEC operand**
- **Example:**  
`mov ax, 5 ; Load 5 into AX`  
`dec ax ; Decrement AX by 1 (AX = 4)`

Both instructions affect the **flags** in the status register, such as the Zero Flag (ZF), Sign Flag (SF), and Overflow Flag (OF), which can be useful for control flow operations (e.g., loops).