

## **EXPERIMENT 12**

# **Graphics in Assembly Language**

### **Objective**

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- Implementation of graphical shapes
- Working with int 10H
- Understanding the process of AH Function

### **Theory**

When an application program needs to write characters on the screen in text mode, it can choose between three types of video output:

- MS-DOS-level access: Any computer running or emulating MS-DOS can use INT 21h to write text to video display.
- BIOS-level access: Characters are output using INT 10h function, known as BIOS services. This executes more quickly than int 21h, and permits the control of text color.
- Direct video access: Characters are moved directly to video RAM (screen buffer), so the execution is instantaneous.

### **INT 10H:**

This function facilitates the use of video terminal. Inside INT 10h function there are many sub-functions which allow character posting and use of various graphic modes. For graphic modes with bigger resolutions this interrupt it's not recommended because it's slow; it is recommended to write directly into video memory. For example posting a character on screen: calling 10h interrupt implies a big amount of code to be executed (interpreting parameters transferred into registers, setting sub-function etc), while for writing directly into video memory only one MOV instruction is needed. Still, this interrupt is very practical for programs that are not posting big amount of information on screen at certain moment. By using this interrupt the programmer doesn't have to calculate video memory addresses in which to write every character. int 10h is a video service bios interrupt. It includes services like setting the video mode, character and string output, and reading and writing pixels in graphics mode. It is one of the most frequently used interrupt while coding in 8086 assembly language.

To use the bios interrupt load ah with the desired sub-function load other required parameters in other registers and make a call to int 10h.

Function Number	Description
AH=00h	Set video mode
AH=01h	Set text-mode cursor shape
AH=02h	Set cursor position
AH=03h	Get cursor position and shape
AH=04h	Read light pen position (Does not work on VGA systems)
AH=05h	Select active display page
AH=06h	Scroll up window
AH=07h	Scroll down window
AH=08h	Read character and attribute at cursor position
AH=09h	Write character and attribute at cursor position
AH=0Ah	Write character only at cursor position
AH=0Bh, BH = 00h	Set background/border color
AH=0Bh, BH = 01h	Set palette
AH=0Ch	Write graphics pixel
AH=0Dh	Read graphics pixel
AH=0Eh	Teletype output
AH=0Fh	Get current video mode
AH=11h	Change text mode character set
AH=13h	Write string (EGA , meaning PC AT minimum)
AX=4f02h	set VESA-Compliant video modes, beginning at 640 by 480 and reaching 1280 by 1024 with 256 colors

## Entering Graphics Mode

Entering graphics mode is a simple call to the BIOS. In assembly language, that call is as follows:

```
MOV AX,0013H
INT 10H
```

Interrupt 10H is the BIOS call that controls the video system. The number 00H (the value in AH) is the function number that corresponds to “Set the Video Mode”, and the number 13H (the value in AL) is the number of the desired mode