

## CS 322 Lab 1

**XPO 86** : It is a Micro Trainer kit for a general purpose programmable logic device.



The trainer kit will be powered up by inserting the power plug. Connect the key board. Press any key (A to Z) to get the command longform on the console display followed by '?'.

To return to the **command** mode press the Esc key. If you press the **Reset** key the content of the registers will be lost

### **Some Components:**

#### **KM62256blp- is a Static RAM**

SRAM (static RAM) is random access memory (RAM) that retains data bits in its memory as long as power is being supplied. Unlike dynamic RAM (DRAM), which stores bits in cells consisting of a capacitor and a transistor, SRAM does not have to be periodically refreshed. Static RAM provides faster access to data and is more expensive than DRAM.

#### **HD74Lso4p -Hex Inverters**

Inverting six digital signals simultaneously.

#### **D82655AC – programmable input/output devices**

Used for transferring data between the CPU and a peripheral.

#### **Programmable multi model 16 bit timers/counters:**

Count either regular clock pulses (making it a timer) or irregular event pulses (making it a counter)

**P8086-2: 16 bit microprocessor:** The 8086 Microprocessor is a 16-bit CPU available in 3 clock rates, i.e. 5, 8 and 10MHz, packaged in a 40 pin Cerdip or plastic package. The 8086 Microprocessor operates in single processor or multiprocessor configurations to achieve high performance. The pin configuration is as shown in fig1. Some of the pins serve a particular function in minimum mode (single processor mode) and others function in maximum mode (multiprocessor mode) configuration.

### **The following commands are used in XPO-86:-**

**A-Assemble:-**This command accepts 8086 mnemonics. Each line is checked for syntax error. No symbolic variables can be used. All addresses should be in hexadecimal format. Use back space to modify entries in that line. Cannot delete line only reentry is allowed.

- **A(CR):** Assembles code at the current selected code segment and address. The default segment: offset is 100:0100.
- **A SSSS: DDDD(CR):** Assembles code at the specified segment: offset.

**C-Compare Memory:-**Compares two blocks of memory.

Various forms of -C-Commands are:

- **C 1000 10FF 2000(CR)-** Will compare memory block from 1000 to 10FF with memory block from 2000 to 20FF from the currently selected data segment. The default data segment is 1000.
- **C 1000 :0100 01FF 2000:0100(CR)-** Will compare memory block from 1000:0100 to 1000:01FF.

**D-Display Memory:**Displays a dump in hexadecimal. Format of the specified memory block.

The various forms of D command are.

- **D(CR):**Displays 128 bytes from the current selected data segment and address. The default address is 1000:0100.
- **D 1000:0200(CR):** will display 128 bytes from the address 1000:0200.
- **D:000: 0200 020F(CR):** will display memory from 1000:0200 to 1000:020F.

**E-Examine/Modify Memory:** Allows the memory at the specified address to be displayed/modified.

- One byte is displayed at a time.
- To modify type the new value(hex).
- To go to next location type- space-
- To go to previous location type'-'
- To terminate the command are:

Various forms of -E-command are:

- **1000:2000(CR)-**starts display/modification of memory starting from location 1000:2000(CR).
- **E2500(CR)-**starts display/modification of memory in the current selected segment at specified offset. The default segment is 1000.

**R-Display Registers Command:** Displays the current settings of all the 8086 registers. The default setting for segment registers is 1000.

- **R(segment register)(CR):**format can be used to modify a segment register.

Example:- R DS(CR)

DS 1000

2000(CR)

Will modify DS register to 2000.

**U-Unassemble Command:-**This is reverse of –A-assemble command. Displays mnemonics of the codes residing in address range specified.

**Format: U1000:0(CR)-**Diassembles code starting from 1000:0 upto next 80 bytes in all.

**U(CR)=**Diassembles code starting from current selected segment & address.

**U1000-0 0FFF(CR):**Diassembles code in the range of address specified.

## **How to run a program on XPO 86:**

### **Step 1.(writing the program)**

Press 'E' → EXPAND?

Press "enter"

Press "A"

1000:0100 MOV AX, 5555

Press "enter"

1000:0103 MOV BX, 4444

Press "enter"

1000:0106 ADD AX, BX

Press "enter"

1000: 0108 INT A5

Press "enter"

1000:010A

Press "enter" → -

Press "Q"

Press "enter" to go to COMMAND.

### **Step 2.(executing the program)**

COMMAND=Press "G"

Press "enter" → Burst

press "enter" →SRC-SEGM → write address " 1000"

press "enter" →ADDR →write offset "0100"

press "enter" →wait →COMMAND=

### **Step 3.(Checking contents of registers)**

Press "S" →substut

press "enter" → memory → press downarrow key 2times→register

press "enter" →name →it will show its content

## **Lab Assignment**

Q1. Write a brief description of the XPO 86 ( with a block schematic) and list of components of XPO 86 kit. **(10 points)**

Q2. Write an ALP to multiply two 16 bit number and store the result in the memory.**(10 points)**

Q3. Write an ALP to add three numbers and test in the XPO 86 kit.**(10 points)**

Submission.

Submit handwritten copy of the above ( Due 3<sup>rd</sup> August 2018, 6 PM).