

System Introduction

* Introduction:

- (i) ET-8085 is a microprocessor training cum development kit designed around 8085 processor
- (ii) It is the most popular and very versatile processor.
- (iii) It is easy to understand its architecture and assembly language programming.
- (iv) ET-8085 processor communicates with outside world through 28-keys keyboard and 6 seven segment displays.
- (v) System can also interact with user through its CRT terminal or PC/XT/AT computer I/F.
- (vi) The monitor of ET-8085 is very powerful and provides various software commands like INSERT, DELETE, BLOCK, MOVE etc.

→ System / Hardware specifications:

- (i) CPU - 8 bit 8085 microprocessor.
- (ii) XTAL frequency - 6.144 MHz.
- (iii) RAM - 8 K bytes with provision of expansion.
- (iv) ROM - 32 K bytes of EPROM with provision of expansion.
- (v) Memory - total on board capacity of 64 K bytes
(through 2 additional memory sockets)
- (vi) Timer - 3 bit programmable timer/ counters using 8253.

- (vii) I/O lines :- 24 I/O lines using 8255 expandable to 46 I/O lines using one 8155.
- (viii) Keyboard - 28 keys keyword: 10 keys for command entry, 16 keys for hexadecimal data entry, 1 key for vector interrupt, 1 key for reset each.
- (ix) LED display: 6 seven segment display: 4 for address field and 2 for data field
- (x) BUS : All data, address and control signals (TTL) combinable available at FRc connector.
- (xi) Power supply requirement - +5V, 1.5A for kit [optional]
- (xii) Operating temperature: 0 to 50°C

* System software specification:

- ET- 8085 provides various software commands to achieve the following.
- (a) Keyboard Mode:
- i) Examine the content of any memory location
 - ii) Examine /modify the contents of any of its internal register.
 - iii) modify the contents of any RAM location
 - iv) move a block of data from one location to another location.
 - v) insert one or more instruction in the user program.
 - vi) delete one ore more instruction from the user program.

- (vii) Relocate program written for some memory area to some other memory
- (viii) find out a string of data lying at a particular address
- (ix) fill a particular memory location with a constant.
- (x) compare 2 blocks of memory.
- (xi) insert one or more data bytes in user's program / data area.
- (xii) delete one or more data bytes from user's program / data area.
- (xiii) execute the program at full clock speed.
- (xiv) execute a program in single stop i.e., instruction by instruction.

(b) Serial mode :

Most of the above mentioned commands can be used serial mode.

* Instruction to Hardware :

- ~~(a) General :- The system has got 8085 as CPU. the clock frequency for system is 3.07 MHz and is generated from a crystal of 6.144 MHz. 8085 has got 8 data lines and 16 address lines. The lower 8 address lines and 8 bit data lines are multiplexed. As the lower 8 address bit appear on the bus during the first clock cycle of a machine cycle.~~

and the data appear on bus during 2nd and 3rd clock wise, it become necessary to latch the lower 8 address bits during the first clock cycle so that 16 bits address remains available in subsequent cycles.

(b) Memory: ET-8085 provides 2K/8K bytes of RAM using 6116 / 6264 chip and 1K/8K bytes of EPROM for monitor using 2764. These are two memory shares provided on ET-8085 for expansion. These shares can be define any address slot from 4000 - ffff depending upon the size of memory chip to be used.

(c) I/O devices: ET-8085 uses 8279, 8253, 8255 and 8155 peripheral chips.

(i) 8279 (key board and display controlled): It is a general purpose programmable key board and display I/O interface device designed for use with 8085 mp. It provides a scanned interface device designed for use has got 16x8 displays RAM which can be loaded or interrogate by CPU. 8279 also refreshes the display RAM automatically.

(ii) 8255 (Programmable peripheral interface): It is a PPI designed to use with 8085 microprocessor. It acts as general purpose I/O devices to interface peripheral equipments to the system bus. It is not necessary to have an external logic to interface with peripheral devices as the function configuration of 8255 is programmed by the system software.

(iii) 8253 (Programmable interval timer): This chip is a programmable interval timer counts and can be used for generation of accurate time counter and can be used for generation of accurate time delays under software control. Various other functions that can be implemented with this chip are programmable rate generator, event counter, memory rate multiplier, real timer clock etc. The first counter is being used for simple stop operation. However, its connections are also brought at connector pin J3. for SSO, ~~clock~~ signal of Counter 0 is getting a clock frequency of 1535 MHz. Counter -1 and 2 are free for user clock for CLK1 and CLK2 is to be given externally.

(iv) 8155 (I/O, RAM, timer)-It provides 22 I/O lines in form of 3 ports.

The chip also has on-chip also has on-chip 14-bit timer/counter and 256 bytes of on-chip RAM. The 3 ports can be configuration as input and output.

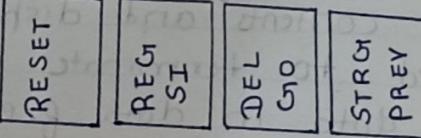
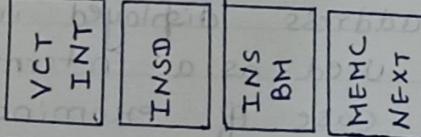
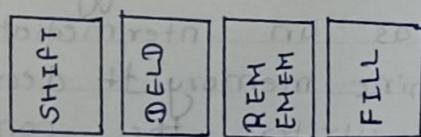
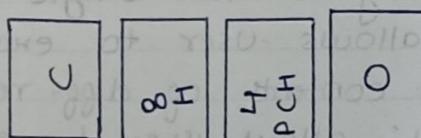
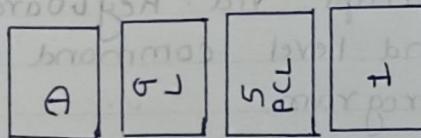
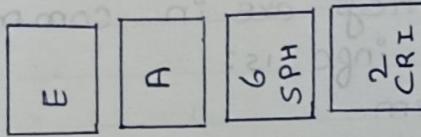
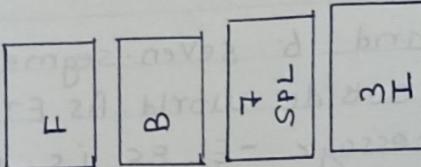
(d) display: ET- 8085 provides 6 seven-segment display 4-digit displays the any location or more of any register whereas rest of two digits are meant for displaying the contents of memory location/register. All 6 digits of display are in a hexadecimal notations

Command description

* Keyboard description:

- ET-8085 , has 28 keys and 6 seven-segment display to communicate with outside world. As ET-8085 is switched on, a message -EL 85 is displayed on display and all keys are in command mode. Key and their info is:
 - Reset :- reset the system.
 - VCT INT :- hardware interrupt via Keyboard RST 7's
 - SHIFT:- Provides a second level command to all keys
 - GO :- to execute the program.
 - SI :- to execute the program in single step mode
 - REGI:- examine register ; allows user to examine and modify the contents of diff. register
 - FMEM :- examine memory: allow user to examine any memory location and modify any RAM located
 - PRE: Provides is used as an intermediate terminate in case of examining memory. It decrements the PC contents and writers the content of data field to the address displayed in address
 - NEXT:- Increment is used as a intermediate terminate in case of examining memory, it decrements the PC contents and displayed location
 - - terminate is used to terminate the command and write the data in data field at location displayed in field.

+ Segment
display



Keyboard of ET-8085

- DEL - delete the part of program / data with relocation by one or more bytes
- INS - insert the part of program / data with relocation by one or more bytes.
- BLOCK MOVE :- allows user to move a block of memory to any RAM area.
- FILL :- allows user to fill RAM area with a constant.
- RELOC :- relocate a program written for some memory area and to be transferred to other memory area.
- INSD :- insert one or more data bytes in user's program / data area.
- DELD :- deletes one or more data bytes from user's program / data area.
- STRG :- finds out the string of data lying to a particular address.
- MEMC :- memory compare : compare 2 blocks of memory for equality.
- OFF :- hexa decimal keys
- All elements are followed by a set of numeric parameters separated by PREV, NEXT & ":" (execute) to work as delimiters.
- A '-' on MSD of address displays indicates the system is waiting for a command, if instead of a valid command the user gives a data, the system display - Error' A dot on LSD of address field indicates that the system expects an address whenever.

ET-8085 acceptable data and address from (in hexadecimal):

Hexadecimal	Decimal	Binary	LED display
0	0	0000	0
1	1	0001	1
2	2	0010	2
3	3	0011	3
4	4	0100	4
5	5	0101	5
6	6	0110	6
7	7	0111	7
8	8	1000	8
9	9	1001	9
A	10	1010	A
B	11	1011	B
C	12	1100	C
D	13	1101	D
E	14	1110	E
F	15	1111	F

Expt. No. _____

Date _____

Page No. 9

the data of any memory location is changed
a dot is displayed on the LSD of data field

→ List of commands:

- (i) Reset
- (ii) EXAMINE / MODIFY MEMORY REGISTER.
- (iii) EXAMINE / MODIFY MEMORY.
- (iv) GTO
- (v) SINGLE INSTRUCTION
- (vi) BLOCK MOVE
- (vii) DELETE.
- (viii) INSERT
- (ix) RELOCATE.
- (x) FILL
- (xi) STRING
- (xii) MEMORY COMPARE
- (xiii) INSERT DATA
- (xiv) DELETE DATA.

Teacher's Signature _____