Expt. No. 5.

Familiarization of 8086 trainer kit

aim

To familiarize with 8086 trainer kit

Theory

The 'STS 8086LCD' trainer is a MICROPROCESSOR trainer, which can work on 8086 CPU. This kit can be used as a developer kit for 8086 based programs and interfaces. Key features of STS8086LCD trainer are:

1. User friendly monitoring program
2. Built in Inline assembler for entering programs as mnemonics
3. Disassembler to examine the programs
4. Single stepping and Break point feature to debug program.
5. PS/2 keyboard interface
6. Contain most of the interface modules such as 8253, 8255, 8251 etc.
7. Simple menu operated commands, easy to use.
8. User friendly text editor to enter text for assembler
9. Proper error messages to identify assembling errors.
10. Commands to enable, disable and edit break points
11. Remembers starting and ending addresses of move and fill commands
12. View/modify command to edit contents of RAM location
13. Fill command to fill RAM locations with a particular data.
14. Move command to move a block of data from a location to another location.

System specifications

CPU	: 8086/88 (16 bit processor)
Clock frequency	: 6.144 MHz
Keyboard	: PS/2, IBM Compatible

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Display	: 16 * 2 LCD Module
RAM	: 64 KB (62256 * 2)
EPROM	: 64 KB (27256 * 2)
IO lines	: 48 lines (8255 * 2)
Timer / Counter	: 8253
Interrupt controller	: 8259
Interface	: UART (8251)
BUS	: Address, data and control lines (TTL compatible)
Power	: 5V 800mA
Operating temp	: 0 - 50°C

MEMORY MAPPING

Program memory

ROM : 8000 : 0000H - 8000 : FFFFH

RAM : 0000 : 0000H - 0000 : FFFFH

NOTE : User can enter their program from location 0400H to FFFFH.

Peripherals

IO MAPPING

8255 - 1 : PORTA : 40H, PORTB : 42H, PORTC : 44H, CONTROL WORD : 46H

8255 - 2 : PORTA : 60H, PORTB : 62H, PORTC : 64H, CONTROL WORD : 66H

8251 : DATA : A0H, CONTROL WORD : A2H

8253 : TIMER0 : C0H, TIMER1 : C2H, TIMER2 : C4H, CONTROL WORD : C6H

8259 : DATA WORD : E0H, CONTROL WORD : E2H

MENU COMMANDS

Command: A, B, D, E, F, G, M, R, S
, T

A - assemble (Inline assembler generates code corresponding to 8086 code set)
B - Block Move
D - Dissassemble
F - Fill data
G - Go and Execute
M - Modify / View memory
E - Edit / View memory (8 bytes at the same time)
R - Register view/edit (Values of last break of single step)
S - Single step
T - View/edit Break point (Press enter to enable break point and backspace for disable break point)
Note - "Enter" key to continue/accept the data for each command.

MENU 'A': ASSEMBLE

User can enter the assembly language directly in to the kit, assembles will assemble the 8086 instruction in machine code.
When assembler option is chosen by pressing letter 'A', on IBM keyboard, display will show like

ASSEMBLER

ENTER START ADDR: ____

After entering desired starting address press 'ENTER' key on the keyboard. The system will show a text address screen. Enter a valid assembly instruction in this window. After entry press 'ENTER' again.

G: GO/EXECUTE

This command is used to perform execution of program.

Select 'G' for execution

The display will show

Execute

Enter starting adde...

Now enter the starting address of the program and press 'ENTER' again.

The display will show:

Executing.....

MENU 'M' MODIFY/VIEW MEMORY

In this mode, user can view the memory contents directly. Select this option by pressing 'm' key, the display will show

Modify Memory

Enter Starting Adde: _____

Then Enter Starting Address and hit 'ENTER' then the screen will be:

Modify Memory

400 : 00

Enter the new HEX value using 0-9 keys for number and A-F keys for data keys. User need to enter only lower digit of the data for 1 digit/00

Press 'ENTER' to increment / accept the data and 'Backspace' to

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decrement / accept the data.
User can view contents by pressing "ENTER" for up memory address and "Backspace" for down memory address.
Press 'Esc' to exit from this mode.

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Addition of 2 16-bit numbers

Aim

To perform addition of two 16 bit numbers using 8086 trainer kit.

Program

Address	Instruction	Comment
0400	MOV [0500], 9C	move 9C to location 500
0405	MOV [0501], F3	move F3 to location 501
040A	MOV [0550], BD	move BD to location 550
040F	MOV [0551], A1	move A1 to location 551
0414	MOV BX, 0600	
0417	MOV SI, 0500	
041A	MOV DI, 0550	
041D	MOV AX, [SI]	move contents of [SI] to AX
041F	ADD AX, [DI]	add contents of [DI] to AX
0421	MOV [BX], AX	move result to [BX]
0423	MOV SI, 0000	
0426	JNC 042C	
0428	ADD SI, 01	
042C	MOV [0602], SI	store carry, if any, in 602 location
0430	HLT	

Result

Performed the addition of two 16 bit numbers using 8086 trainer kit.

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Output

Address	Data
0600	59
0601	95
0602	01

Subtraction of 2 16-bit numbers

Aim

To perform subtraction of two 16 bit numbers using 8086 Assembly language program

Program

Address	Instruction	Comment
0400	MOV [0500], 3C	move 3C to location 500
0405	MOV [0501], 8F	move 8F to location 501
040A	MOV [0550], 9A	move 9A to location 550
040F	MOV [0551], 30	move 30 to location 551
0414	MOV BX, 0600	
0417	MOV SI, 0500	
041A	MOV DI, 0550	
041D	MOV AX, [SI]	move contents of [SI] to AX
041F	SUB AX, [DI]	subtract contents of [DI] from AX
0421	JNC 0427	jump to 0427 if carry is not set
0423	MOV AX, [DI]	Else, move contents of [DI] to AX
0425	SUB AX, [SI]	subtract contents of [SI] from AX
0427	MOV [BX], AX	move result in AX to [BX]
0429	HLT	

Result

Successfully performed the subtraction of 2 16-bit numbers.

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Output

Address	Data
0600	A2
0601	5E