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Lab 3: Using Hyper Terminal

1. Objectives

To download the machine code to MTS-86C by using PC.

2. Introduction

This section introduces how to convert an assembly language program to machine code. There are three steps to obtain the machine code, editing the source code ,assembling the source code and download the program by PC.

3. Procedures

3.1. Editing Source Code

This program is to add two bytes in locations 0050:0055 and 0050:0056. Store the result in location 0050:0057.

```
CODE SEGMENT
ASSUME CS:CODE,DS:CODE
ORG 0
START: MOV  AX,CS
       MOV  DS,AX
       MOV  SI,0055H
       MOV  BL,BYTE PTR[SI]
       ADD  BL,BYTE PTR[SI+1]
       MOV  BYTE PTR[SI+2],BL
CODE ENDS
      END START
```

Type this code in Notepad and save it as [a.asm], into c:\ asm.

3.2. Assembling Source Code

Step 1: Launch DOS Command Prompt
Step 2: Enter [CD\ASM] to change directory↵
Step 3: Enter [MASM a] ↵
Step 4: Enter [a] to create 3 files.
Step 5: Enter [LINK a] ↵
Step 6: Enter [a] to create 2 files.
Step 7: Enter [EXE2BIN a] ↵
Step 8: Enter [BIN2HEX] ↵
Step 9: Enter [a.bin] ↵
Step 10: Enter [0000]

3.3. Download the Program by PC

Step 1: Launch the Hyper Terminal.[start>>program>>accessories>>communication>>hyper terminal].
Step 2: Enter a name, for example mts and press OK.

Step 3: Select COM1 from Connect To window and press OK.
Step 4: In the COM1 Properties window, select the Baud Rate to [19200], Flow Control to [Xon/Xoff] and press OK
Step 5: Press [RESET] and [C] from MTS-86C keypad.
Step 6: To download machine code to the kit, input [L 0050]↵
Step 7: From the menu bar select Transfer>>send text file>>
Step 8: From c:\asm Select [a.hex].

a. Use [D] dump command to display the machine code of your program.[D 0050:0000] ↵

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b. Use [E] edit command to following data in memory locations 0050:0055= 5B, 050:0056= 52, 0050:0057=00

c. Use [G] go command to execute the program and write the result.[G=0050:0000]↵
0050:0057_____

d. Use [T] Trace command to execute the program step by step and write the result in the following table.
[T=0050:0000] ↵ to next step just enter [T]↵

```
    CODE SEGMENT
    ASSUME CS:CODE,DS:CODE
    ORG 0
    MOV  BX,CS
    MOV  DS,BX
    MOV  AL,02
NEXT: ADD  AL,AL
        JNC   NEXT
        HLT
CODE ENDS
        END START
```

STEP	IP	AL	CF	AF	ZF	SF	OF

Flag Conditions

flags	name	SET(a 1-bit)	CLEARED (a 0-bit)
Overflow	OF =	OV	NV (no over flow)
Direction	DF =	DN (decrement)	UP (increment)
Interrupt	IF =	EI (enable)	DI (disable)
Sign	SF =	NG (negative)	PI (positive)
Zero	ZF =	ZR (zero)	NZ (not zero)
Auxiliary carry	AF =	AC	NA (no AC)
Parity	PF =	PE (even)	PO (odd)
Carry	CF =	CY (carry)	NC (no carry)

4. Exercise

Analyze the results of the table showing how the values of the flags are changed in each line.