

Lab Report

School of Manufacturing Science and Engineering

Course Name		Microcontroller: Principles and Interfacing Technology					
Name of the Experiment		The experiment on data moving					
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1. Experimental procedure

1.1 Connect the SSD (JP3) with port 0 (P0) with wires

In order to utilize the static SSD module on the experimental toolkit, we have to use the wires to connect the SSD pins(JP3) with the port 0(P0) of the 8051 microcontroller so that the control signal sent by the microcontroller could be transmitted and activated by the SSD module. After connecting these, we saw that there are patterns displayed by this SSD.

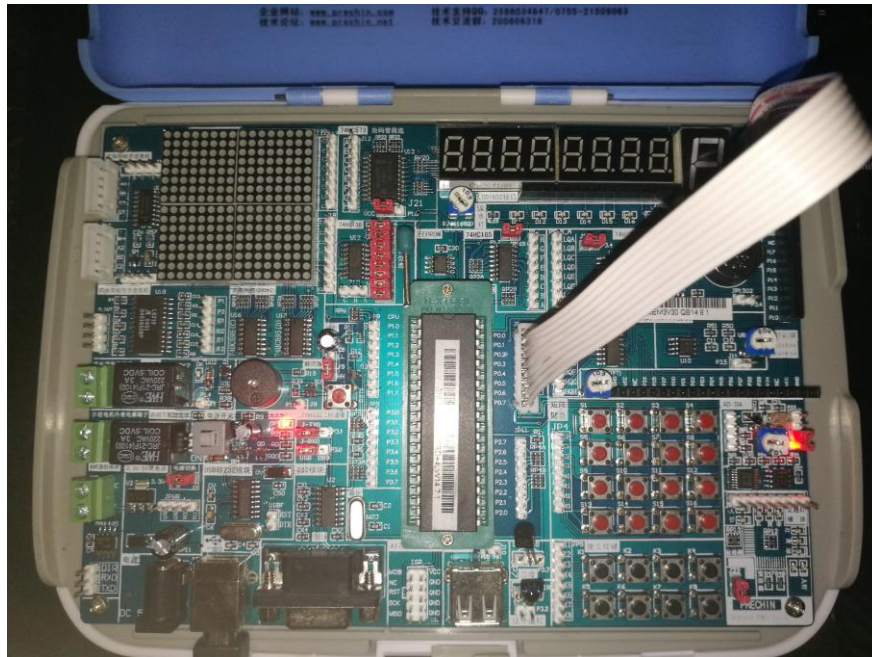


Fig.1 The connection of SSD to P0 with wires

1.2 Create a project in Keil uvision IDE

With the installed USB to SERIAL driver of STC90C516RD on our lap-top, we created the STC type project in the Keil, then we added the ASM file 'DataMoving.asm' in that project.



After searching and adding the ASM file from our CD, we can see the program on our screen. As was illustrated, the program was half-done—with blanks in the main program for us to accomplish with the knowledge about moving data section.

1.3 Write the program in the blank section in the “DataMoving.asm”

- (1) Store the student matriculation number in RAM address starting from 40H using immediate addressing mode.
- (2) Copy each digit of the matriculation number stored in RAM using register indirect addressing mode to register A.
- (3) Fetch the corresponding hexadecimal encoding stored in ROM using register indexed addressing mode and store it in register A.
- (4) Copy the fetched hexadecimal encoding to port 0 (P0).
- (5) After copying a number to P0, add an instruction “ACALL DELAY” below to pause for a moment so that we can check the result on SSD clearly.

According to the given instruction, I had to store my student matriculation number, which is 2014141441168, in RAM address first. With the immediate addressing mode, the code shall be designed as MOV 40H, #2 as the first digit, then MOV 41H, #0 as the second, MOV 42H, #1 as the third, etc. Until the last digit of the series MOV 54H, #8.

Then we used the register indirect addressing mode to copy each digit stored in RAM address 40H to 54H to register A one by one. So the corresponding code was MOV R0, #40H, MOV A, @R0 from 40H to 54H.

In the third step, to fetch the corresponding hexadecimal encoding stored in ROM, we had to use the register DPTR with register indexed addressing mode and store that in register A again so that the decimal student numbers could be turned into encoding that could be displayed by the SSD. The coding corresponding to this step was MOV DPTR, #TAB, MOVC A, @A+DPTR. (Notice: the encoding of all figures 0—f that could be displayed by the SSD was all stored in ROM and named TAB).

Then, we moved the contents of register A to the P0 of the 8051 microcontroller with immediate addressing mode so the encoded signals could be output and transmitted through the wires. The code of this step was MOV P0, A.

Finally, I added the code line ACALL DELAY so that the main function here can break into the delay program that was already give below. With this delay program, the figure displayed on the SSD can be static for a while so that the figure of each digit could be recognized by our eyes.

After compiling the project and debugging it, we created the HEX file of the project and opened our development platform box and used the experimental kit in it to connect the



hardware with our lap-top USB ports. Since we have already installed the USE to SERIAL driver, our computer can recognize this kind of connection successfully.

1.4 Download the generated binary code to the experimental toolkit using PZISP

After creating HEX file, we used PZISP to recognize the serial number port. We directed the PZISP to the path of HEX file created before and click the download button. Waited for a few seconds, we saw the static LED light displaying our student matriculation number bit by bit accordingly.



Fig. 2 Program Download Process

2. Experimental results

The student matriculation number 2014141441168 of mine was displayed digit by digit through the SSD on the experimental toolkit, with the correction of its figure and stability, the aim of this lab was accomplished.



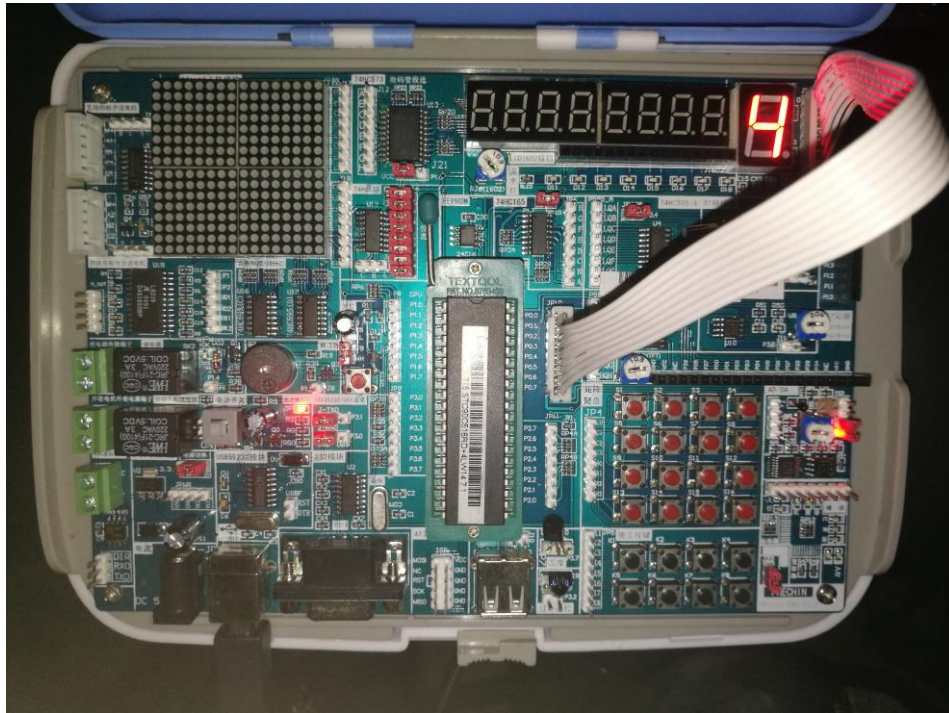


Fig.3 The experiment results of matriculation number display

3. Source code with comments(Assembly language and Chinese comments)

```

ORG 0000H           ;程序从此地址开始运行
LJMP    MAIN        ;跳转到 MAIN 程序处

ORG 030H            ;MAIN 从 030H 处开始
MAIN:
MOV     40H,#2
MOV     R0,#40H
MOV     A,@R0
MOV     DPTR,#TAB
MOVC    A,@A+DPTR
MOV     P0,A
ACALL   DELAY

MOV     41H,#0
MOV     R0,#41H
MOV     A,@R0
MOV     DPTR,#TAB
MOVC    A,@A+DPTR
MOV     P0,A
ACALL   DELAY

```



```
MOV    42H,#1
MOV    R0,#42H
MOV    A,@R0
MOV    DPTR,#TAB
MOVC   A,@A+DPTR
MOV    P0,A
ACALL  DELAY
```

```
MOV    43H,#4
MOV    R0,#43H
MOV    A,@R0
MOV    DPTR,#TAB
MOVC   A,@A+DPTR
MOV    P0,A
ACALL  DELAY
```

```
MOV    44H,#1
MOV    R0,#44H
MOV    A,@R0
MOV    DPTR,#TAB
MOVC   A,@A+DPTR
MOV    P0,A
ACALL  DELAY
```

```
MOV    45H,#4
MOV    R0,#45H
MOV    A,@R0
MOV    DPTR,#TAB
MOVC   A,@A+DPTR
MOV    P0,A
ACALL  DELAY
```

```
MOV    46H,#1
MOV    R0,#46H
MOV    A,@R0
MOV    DPTR,#TAB
MOVC   A,@A+DPTR
MOV    P0,A
ACALL  DELAY
```

```
MOV    47H,#4
MOV    R0,#47H
MOV    A,@R0
```



```
MOV    DPTR,#TAB
MOVC   A,@A+DPTR
MOV    P0,A
ACALL  DELAY
```

```
MOV    50H,#4
MOV    R0,#50H
MOV    A,@R0
MOV    DPTR,#TAB
MOVC   A,@A+DPTR
MOV    P0,A
ACALL  DELAY
```

```
MOV    51H,#1
MOV    R0,#51H
MOV    A,@R0
MOV    DPTR,#TAB
MOVC   A,@A+DPTR
MOV    P0,A
ACALL  DELAY
```

```
MOV    52H,#1
MOV    R0,#52H
MOV    A,@R0
MOV    DPTR,#TAB
MOVC   A,@A+DPTR
MOV    P0,A
ACALL  DELAY
```

```
MOV    53H,#6
MOV    R0,#53H
MOV    A,@R0
MOV    DPTR,#TAB
MOVC   A,@A+DPTR
MOV    P0,A
ACALL  DELAY
```

```
MOV    54H,#8
MOV    R0,#54H
MOV    A,@R0
MOV    DPTR,#TAB
MOVC   A,@A+DPTR
MOV    P0,A
```



```

ACALL    DELAY

AJMP     MAIN      ;跳转到主程序处

DELAY:
MOV      R5,#04H   ;将立即数传给寄存器 R5
F3:
MOV      R6,#0FFH
F2:
MOV      R7,#0FFH
F1:
DJNZ     R7,F1      ;若为 0 程序向下执行，若不为 0 程序跳转到
DJNZ     R6,F2
DJNZ     R5,F3
RET

;七段数码管显示数字编码(对应 0~F)
;TAB: DB 3Fh,06h,5Bh,4Fh,66h,6Dh,7Dh,07h,7Fh,6Fh,77h,7Ch,39h,5Eh,79h,71h ;共阴极七段数码管
TAB: DB 0C0h,0F9h,0A4h,0B0h,99h,92h,82h,0F8h,80h,90h,88h,83h,0C6h,0A1h,86h,8Eh ;共阳极七段数码管
END

```

4. Conclusions, suggestions and comments on the experiments

Through this interesting lab about Data Moving, I got much more familiar with the 8051 microcontroller. Although we can see the SSD display screens everyday in our lives, today I understood it deeply of its control. Through writing the basic assembly language codes about different kinds of data moving, I successfully controlled the SSD and displayed my own student number. The microcontroller is really significant in converting the program into the control signals to electronic devices and let them function as the designer wanted. The experiment greatly improved my programming ability and computer skills. More importantly, it greatly aroused my interest towards electronic circuits designing. I am sure I will study the course harder in order to learn the assembly language and structure of 8051 microcontroller to design the personal work of electronic circuits. I wish to accomplish more interesting and inspiring projects like this. As for the suggestions and comments on the experiments, I think we can prolong the time of experiment and test more ASM files on the CD. Also, there are many other devices including the STM32 microcontroller in the box, I hope we can learn them and grasp the ability of electronic circuit designing.

That is all the knowledge and ideas that I obtained through today's experiment, actually I can not wait for the next one. I will do more active individual learning and interdisciplinary studies based on my major afterwards with the platform and I hope I can get more interesting results. Also, I want to express my gratitude to our tutor for your patient guidance on this experiment. Thank you very much!

