计算机原理第五次实验报告

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1 实验目的

1. 理解中断控制器8259 及计数/定时器8253 的工作原理，掌握其使用方法。
2. 练习使用DOS 及BIOS 功能调用来编写I/O 程序.

2 单击测试

直接对计算机自带的8250 芯片编程，将其设置成1200 波特率、8 个数据位、1 个停止位、奇校验规则、自检方式。用DOS 功能调用(INT21H) 接收键入字符（需要回显），通过8250 以查询方式发送又自己接收并在CRT 上显示。直至键入空格(ASC 码为20H) 时退回DOS。

```
01 DATA  SEGMENT
02        MESS1  DB        'RECEIVING:','$'
03        MESS2  DB        'WRONG INPUT!',0DH,0AH,'$'
04        MESS3  DB        'HAVE DONE',0DH,0AH,'$'
05        MESS4  DB        0DH,0AH,'$'
06 DATA  ENDS
07
08        STACK  SEGMENT
09               DB        100 DUP(?)
10        STACK  ENDS
11
12         CODE  SEGMENT
13               ASSUME     CS:CODE,DS:DATA,ES:DATA,SS:STACK
14       START:
15               MOV        AX,DATA
16               MOV        DS,AX
```

```
17                  MOV         ES,AX
18                  MOV         DX,3FBH
19          MOV         AL,80H
20                  OUT         DX,AL
21                  MOV         DX,3F9H
22          MOV     AL,0
23                  OUT         DX,AL
24                  MOV         DX,3F8H
25          MOV         AX,60H
26                  OUT         DX,AL
27                  MOV         DX,3FBH
28                  MOV         AL,00001011B
29          OUT         DX,AL
30                  MOV         DX,3FCH
31          MOV         AL,13H
32                  OUT         DX,AL
33          MOV         DX,3F9H
34                  MOV         AL,0
35                  OUT         DX,AL
36      WAIT_FOR:
37                  MOV         DX,3FDH
38                  IN          AL,DX
39                  TEST        AL,00011110B
40                  JNZ         ERROR
41                  TEST        AL,1
42                  JNZ         RECEIVE
43                  TEST        AL,00100000B
44                  JZ          WAIT_FOR
45                  MOV         AH,1
46                  INT         21H
47                  CMP         AL,20H
48                  JE          STOPWORK
49                  MOV         CL,AL
50                  MOV         DX,3F8H
51                  OUT         DX,AL
52                  JMP         WAIT_FOR
```

```
53      RECEIVE:
54                  LEA       DX,MESS1
55                  MOV       AH,9
56                  INT       21H
57                  MOV       DX,3F8H
58                  IN        AL,DX
59                  MOV       DL,AL
60                  MOV       AH,02H
61                  INT       21H
62                  LEA       DX,MESS4
63                  MOV       AH,09H
64                  INT       21H
65                  JMP       WAIT_FOR
66        ERROR:
67                  LEA       DX,MESS2
68                  MOV       AH,9
69                  INT       21H
70                  JMP       WAIT_FOR
71      STOPWORK:
72                  LEA       DX,MESS3
73                  MOV       AH,9
74                  INT       21H
75                  MOV       AH,4CH
76                  INT       21H
77          CODE    ENDS
78                  END       START
```

3 计算机间通信

将上程序修改成两台计算机之间以查询方式通信，即一方键入的字符在另一个CRT 上显示，反之亦然，任何一方键入空格，双方都退出。

```
01 DATAS   SEGMENT
02 DIVID   DW     60H
03 DATAS   ENDS
04
```

```
05 STACKS  SEGMENT   STACK
06     DW     128 DUP(?)
07 STACKS  ENDS
08
09 CODES  SEGMENT
10 ASSUME     CS:CODES,DS:DATAS
11 SUB1  PROC       FAR
12
13 START:  MOV        AX,DATAS
14         MOV        DS,AX
15 ;设置波特率为1200
16         MOV        AL,80H
17         MOV        DX,3FBH
18         OUT        DX,AL
19         MOV        AX,DIVID
20         MOV        DX,3F8H
21         OUT        DX,AL
22         MOV        AL,AH
23         MOV        DX,3F9H
24         OUT        DX,AL
25         MOV        AL,00001011B
26         MOV        DX,3FBH
27         OUT        DX,AL
28         MOV        AL,00000011B
29         MOV        DX,3FCH
30         OUT        DX,AL
31         MOV        AL,0
32         MOV        DX,3F9H
33         OUT        DX,AL
34 WAIT_FOR:
35         MOV        DX,3FDH
36         IN         AL,DX
37         TEST       AL,1EH
38         JNZ        ERROR
39         TEST       AL,1
40         JNZ        RECEIVE
```

```
41          TEST    AL,20H
42          JZ      WAIT_FOR
43          MOV     AH,1
44          INT     16H
45          JZ      WAIT_FOR
46          MOV     AH,1
47          INT     21H
48          CMP     AL,0DH
49          JNZ     SENDCHAR
50          MOV     AL,0AH
51          MOV     AH,0EH
52          INT     10H
53
54 SENDCHAR:
55          MOV     DX,3F8H
56          OUT     DX,AL
57          CMP     AL,20H
58          JNZ     NO_STOP
59          MOV     AH,4CH
60          INT     21H
61 NO_STOP:
62          JMP     WAIT_FOR
63 RECEIVE:
64          MOV     DX,3F8H
65          IN      AL,DX
66          CMP     AL,20H
67          JNZ     CHAR
68          MOV     AH,4CH
69          INT     21H
70 CHAR:    PUSH    AX
71          MOV     AH,0EH
72          INT     10H
73          POP     AX
74          CMP     AL,0DH
75          JNZ     WAIT_FOR
76          MOV     AL,0AH
```

```
77          MOV       AH,0EH
78          INT       10H
79          JMP       WAIT_FOR
80 ERROR:   MOV       DX,3F8H
81          IN        AL,DX
82          MOV       AL,'?'
83          MOV       AH,14
84          INT       10H
85          JMP       WAIT_FOR
86 SUB1    ENDP
87
88 CODES   ENDS
89 END     START
```

4 选做部分

监视键盘，若键入字母键“S”则将事先存在数据区中的一个字符串串行传送给对方显示；若键入字母“R” 则将对方机器数据区中的一个字符串传送过来在CRT 上显示。两个字符串都以$ 为结束符。

```
01 DATA SEGMENT
02      DIVID DW 60
03      MY_STR DB 'gq',0DH,'$'
04
05      MESS2 DB 'PROGRAM DONE!',0DH,'$'
06      CRLF  DB 0DH,0AH,'$'
07 DATA ENDS
08 STACK1 SEGMENT PARA STACK
09       DB 100 DUP(?)
10 STACK1 ENDS
11 CODE SEGMENT
12      ASSUME CS:CODE,DS:DATA,ES:DATA,SS:STACK1
13 DOUBLE PROC
14 START:MOV AX,DATA
15       MOV DS,AX
16       MOV ES,AX
```

```
17          MOV DX,3FBH
18          MOV AL,80H
19          OUT DX,AL
20          MOV AX,DIVID
21          MOV DX,3F8H
22          OUT DX,AL
23          MOV AL,AH
24          MOV DX,3F9H
25          OUT DX,AL
26          MOV AL,0BH
27          MOV DX,3FBH
28          OUT DX,AL
29          MOV DX,3FCH
30          MOV AL,00000011B
31          OUT DX,AL
32          MOV DX,3F9H
33          MOV AL,0
34          OUT DX,AL
35
36  KEEP_TRY:MOV DX,3FDH
37              IN AL,DX
38              TEST AL,1EH
39              JNE  ERROR
40              TEST AL,1
41              JNZ  RECEIVE
42              TEST AL,20H
43              JZ KEEP_TRY
44              MOV AH,1
45              INT 16H
46              JZ KEEP_TRY
47              MOV AH,1
48              INT 21H
49              MOV DX,3F8H
50              OUT DX,AL
51              CMP AL,20H
52              JE EXIT
```

```
53          CMP AL,'S'
54          JE SEND_STR
55      CMP AL,'s'
56          JE SEND_STR
57          CMP AL,'R'
58          JE RE_STR
59          CMP AL,'r'
60          JE RE_STR
61          JMP KEEP_TRY
62
63  RECEIVE: MOV DX,3F8H
64          IN AL,DX
65          CMP AL,20H
66          JE EXIT
67          CMP AL,'S'
68          JE RE_STR
69          CMP AL,'R'
70          JE SEND_STR
71          JMP KEEP_TRY
72
73  ERROR:    MOV DX,3F8H
74          IN AL,DX
75          MOV AL,'?'
76          MOV AH,14
77          INT 10H
78          JMP KEEP_TRY
79
80  SEND_STR:CALL SEND
81          JMP KEEP_TRY
82  RE_STR:  CALL REC
83          JMP KEEP_TRY
84
85  EXIT:     LEA DX,MESS2
86          MOV AH,9
87          INT 21H
88          MOV AH,4CH
```

```
89          INT 21H
90 DOUBLE     ENDP
91
92 SEND PROC
93      LEA SI,MY_STR
94 S_WAIT:MOV DX,3F8H
95        MOV AL,[SI]
96        OUT DX,AL
97        CMP AL,'$'
98        JE S_DONE
99        INC SI
100        JMP S_WAIT
101 S_DONE:RET
102 SEND ENDP
103
104 REC PROC
105 REC_WAIT:
106     MOV DX,3FDH
107     IN AL,DX
108     TEST AL,1EH
109     JNE  ERROR
110     TEST AL,1
111     JZ REC_WAIT
112     MOV DX,3F8H
113     IN AL,DX
114     CMP AL,'$'
115     JE REC_DONE
116     MOV AH,0EH
117     INT 10H
118     JMP REC_WAIT
119 REC_DONE:
120     LEA DX,CRLF
121     MOV AH,9
122     INT 21H
123     RET
124 REC ENDP
```

```
125
126 CODE      ENDS
127 END       START
```

5 完成情况及心得体会

这次实验的主要目的是复习8250 的工作原理及其在串行通信中的应用。实验过程中需要用到连接好的电脑，所以调试也只能在实验室内完成，使得本次实验的难度又有所增加。作为本学期最后一次实验，确实花费了更多的时间，不过相较于以前更加有趣。本次实验复习了课堂知识，巩固了汇编语言的编写，收获不小。