

( กด S1 หลอด LED ติดตลอดเวลา )

*Objectives* To program microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to operate LED on when switch is pressed.

*Program source code :*

เตรียมการ ใส่ Jumper J23 , J27 ( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )

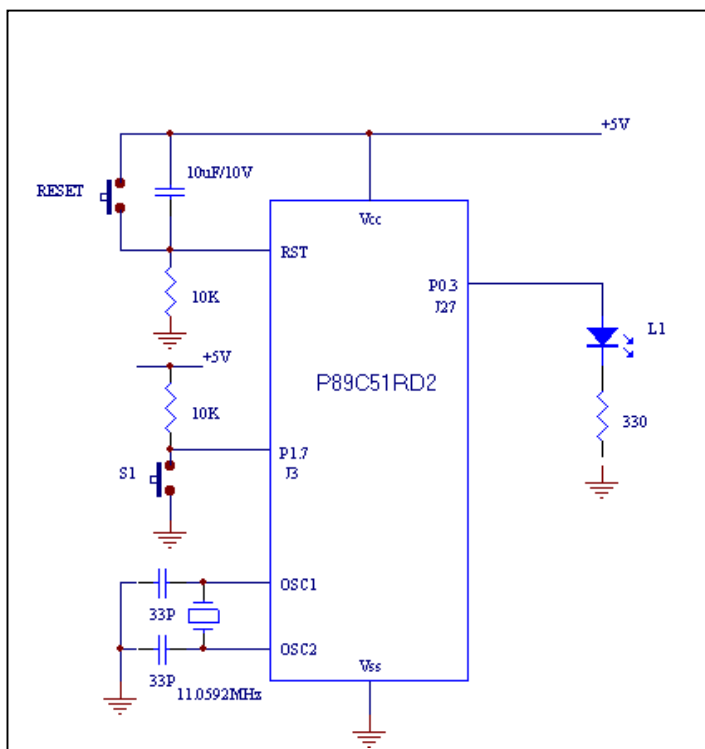
```
'Exp.1 Switch operates LED
,
'By Somboon Niamglam
'S.A.N. ELECTRONICS
'Mar 19,2003
'-----

S1 Alias P1.7
L1 Alias P0.3

L1 = 0
Loop1:

  If S1 = 1 Then Goto Loop1
  L1 = 1

End
```



**Experiment # 2** Tac switch operates as Toggle switch ( ON and OFF ) 2

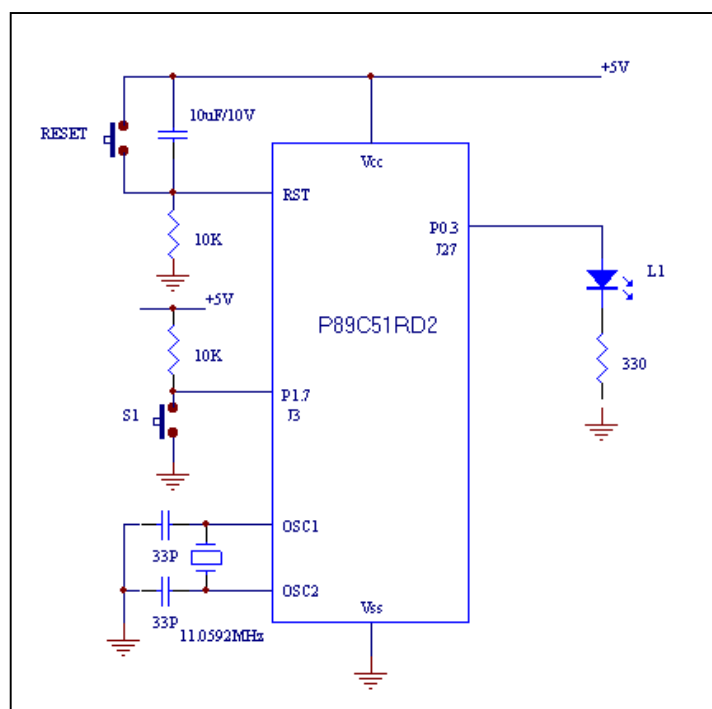
( กด S1 ครั้งแรก หลอดติด กด S1 อีกครั้งหลอดดับ สลับกันไป)

**Objectives** To program microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to operate LED ON and OFF when Tac switch pressed once, and pressed again.

**Program source code :**

**เตรียมการ** ใส่ Jumper J23 , J27( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )

```
'Exp.2 Switch operated as Toggle Switch
'
'By Somboon Niamglam
'S.A.N. ELECTRONICS
'Mar 19,2003
'-----
:
:
S1 Alias P1.7
L1 Alias P0.3
L1 = 0
Loop1:
  If S1 = 1 Then Goto Loop1
  L1 = 1
  Wait 1
Loop2:
  If S1 = 1 Then Goto Loop2
  L1 = 0
  Wait 1
  Goto Loop1
End
```



( กด S1 หลอดติด ไม่กด หลอดดับ )

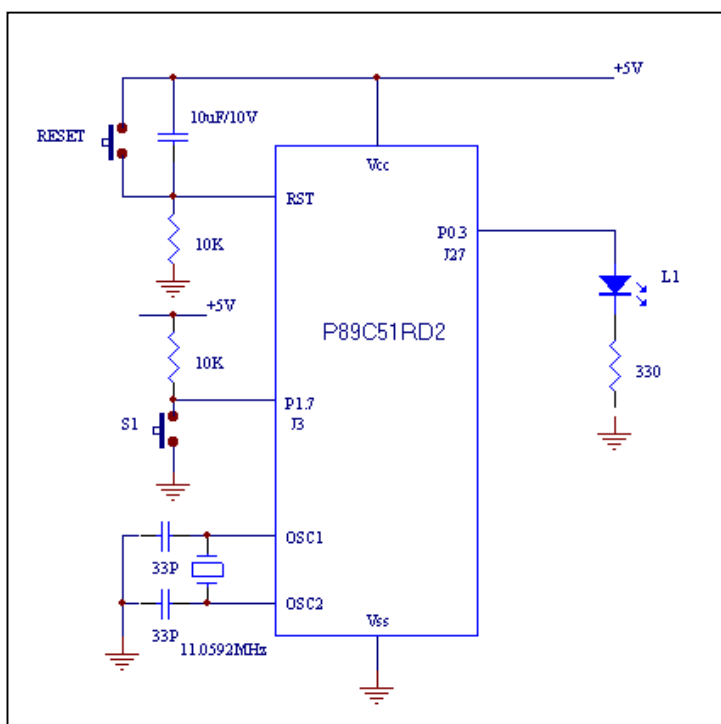
*Objectives* To program microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to operate LED ON when switch is pressed and LED OFF when switch is de-pressed.

*Program source code :*

*เตรียมการ* ใส่ Jumper J23 , J27( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )

```
'Exp.3 Switch operated
' Press ON and De-press OFF
,
'By Somboon Niamglam
'S.A.N. ELECTRONICS
'Mar 19,2003
'-----

'Dim S1 As Bit
'Dim L1 As Bit
S1 Alias P1.7
L1 Alias P0.3
L1 = 0
Loop1:
  If S1 = 1 Then
    L1 = 0
  Else
    L1 = 1
  End If
  Goto Loop1
End
```



**Experiment # 4**

Switch operates 5 times LED blinking

4

( กด S1 หลอด LED กระพริบ 5 ครั้ง )

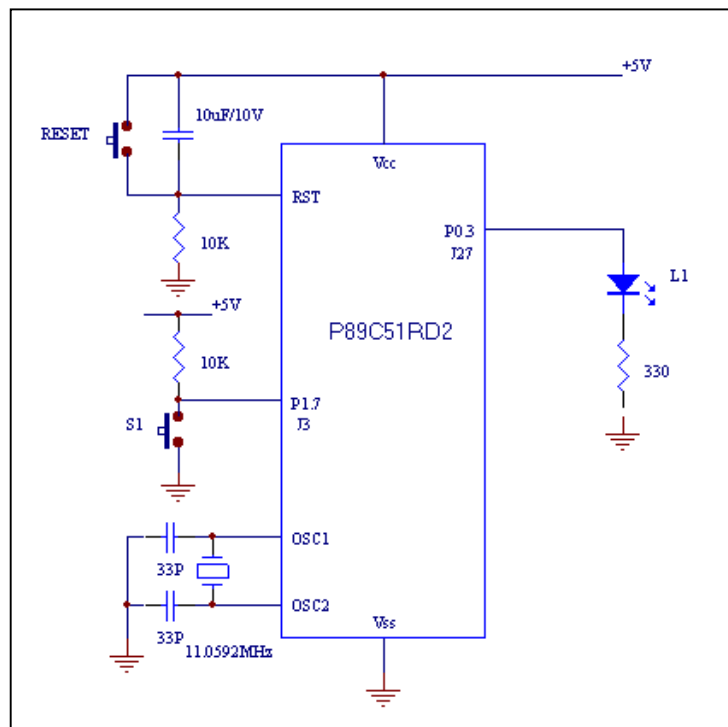
*Objectives* To program microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to operate LED five times blinking.

*Program source code :*

เตรียมการ ใส่ Jumper J23 , J27 ( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )

```
'Exp.4 Switch operated 5 times LED blinking
'
'By Somboon Niamglam
'S.A.N. ELECTRONICS
'Mar 19,2003
'-----

Dim I As Byte
S1 Alias P1.7
L1 Alias P0.3
L1 = 0
Loop1:
  If S1 = 1 Then Goto Loop1
  For I = 1 To 5
    L1 = 1
    Wait 1
    L1 = 0
    Wait 1
  Next I
  L1 = 1
  Goto Loop1
End
```



( กด S1 ควบคุมหลอดดกระพริบ เร็ว – ช้า )

*Objectives* Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to operate LED fast and slow blinking. When switch is pressed and de-pressed.

*Program source code :*

*เตรียมการ* ใส่ Jumper J23 , J27( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )

```

'Exp.5 Switch operated
'   Fast and Slow Blinking LED
'   (Fast blinking -- Press S1)
,
'By Somboon Niamglam
'S.A.N. ELECTRONICS
'Mar 19,2003
'-----

Dim I As Byte
S1 Alias P1.7
L1 Alias P0.3
L1 = 0

Loop1:
  If S1 = 1 Then
    L1 = 1
    Wait 1
    L1 = 0
    Wait 1
  Else
    L1 = 1
    Waitms 100
    L1 = 0
    Waitms 100
  End If
  Goto Loop1
End
    
```

**Experiment # 6**      Testing the Input/Output Port

6

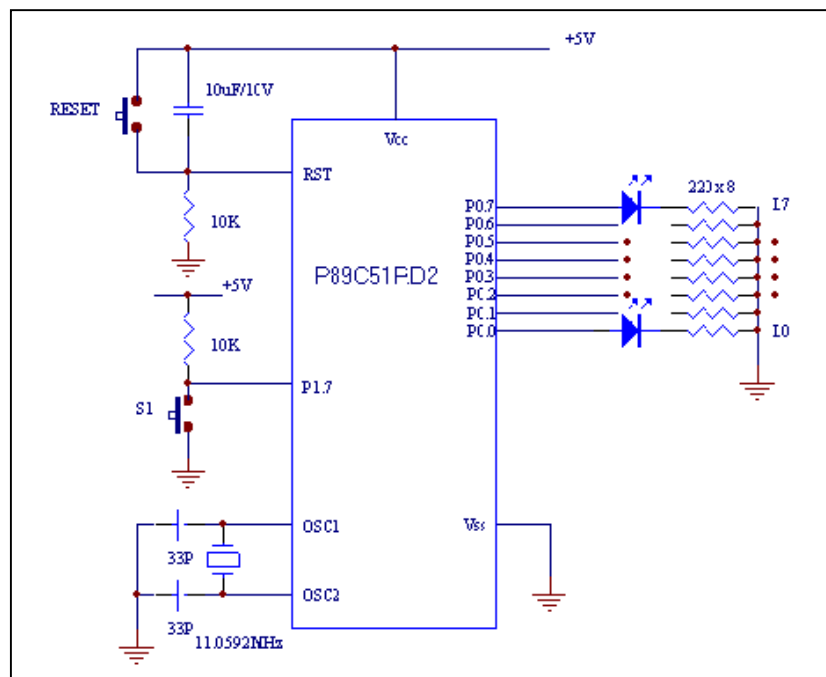
(ทดสอบการ ส่งข้อมูลออกทาง I/O Port)

*Objectives*      Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to send the logical signal to I/O port (8-bits signal).

*Program source code :*

เตรียมการ      ใส่ Jumper J23 – J30 ( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )

```
'Exp.6 Test I/O Port
'
'By Somboon Niamglam
'S.A.N. ELECTRONICS
'March 21, 2003
'-----
'
Begin:
  P0 = 0
  Wait 1
  P0 = 255
  Wait 1
  Goto Begin
End
```



(ส่งเลขรหัสไบนารี ออกทาง I/O Port นับขึ้น)

*Objectives* Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to send the binary value to I/O port (8-bits signal).

*Program source code :*

*เตรียมการ* ใส่ Jumper J23 – J30( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )

```

'Exp.7 Send the Binary value to I/O port
'
'By Somboon Niamglam
'S.A.N. ELECTRONICS
'March 21, 2003
'-----
'
Dim I As Byte

P0 = 0

Begin:
  For I = 1 To 255
    P0 = I
    Wait 1
  Next I
  P0 = 0
  Wait 1
  Goto Begin
End
    
```

(ส่งเลขรหัสไบนารีออกจากทาง I/O Port นับลง)

*Objectives* Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to send the binary value to I/O port (counting down 8-bits signal).

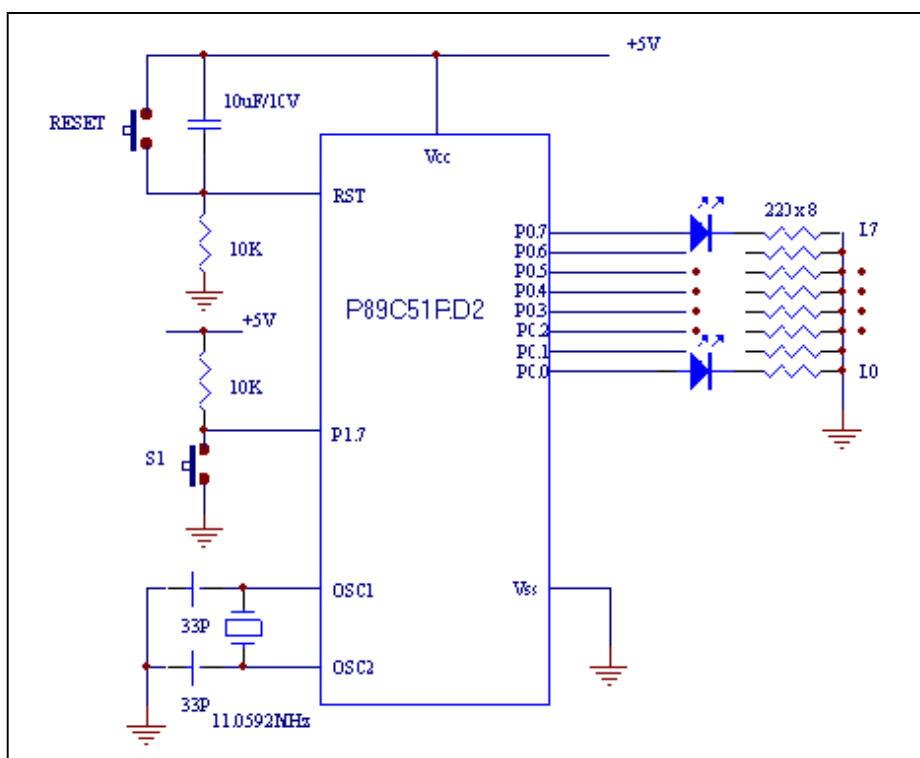
*Program source code :*

*เตรียมการ* ใส่ Jumper J23 – J30( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )

```

'Exp.8 Send the Binary value to I/O port (cont.)
'
'By Somboon Niamglam
'S.A.N. ELECTRONICS
'March 21, 2003
'-----
'
Dim I As Byte
Dim K As Byte
P0 = 0

Begin:
  For I = 255 To 1 Step -1
    P0 = I
    Wait 1
  Next I
  P0 = 0
  Wait 1
  Goto Begin
End
    
```



(ส่งเลขไบนารีออกจากทาง I/O port นับขึ้นลง ควบคุมโดย S1)

*Objectives* Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to send the binary value to I/O port and counting up and down controlled by Switch S1.

*Program source code :*

*เตรียมการ* ใส่ Jumper J23 – J30 , J3( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )

```

'Exp.9 Send the Binary value to I/O port
' and Up/Down Controlled by S1
,
'By Somboon Niamglam
'S.A.N. ELECTRONICS
'March 21, 2003
'-----
,
Dim I As Byte
S1 Alias P1.7
P0 = 0
I = 0
Begin:
  If S1 = 1 Then
    I = I + 1
    P0 = I
    If I = 255 Then I = 0
  Else
    I = I - 1
    P0 = I
    If I = 0 Then I = 255
  End If
  Wait 1
  Goto Begin
End
    
```

(เลื่อนข้อมูลในรีจิสเตอร์ ไปทางซ้าย - ขวา โดย กด S1)

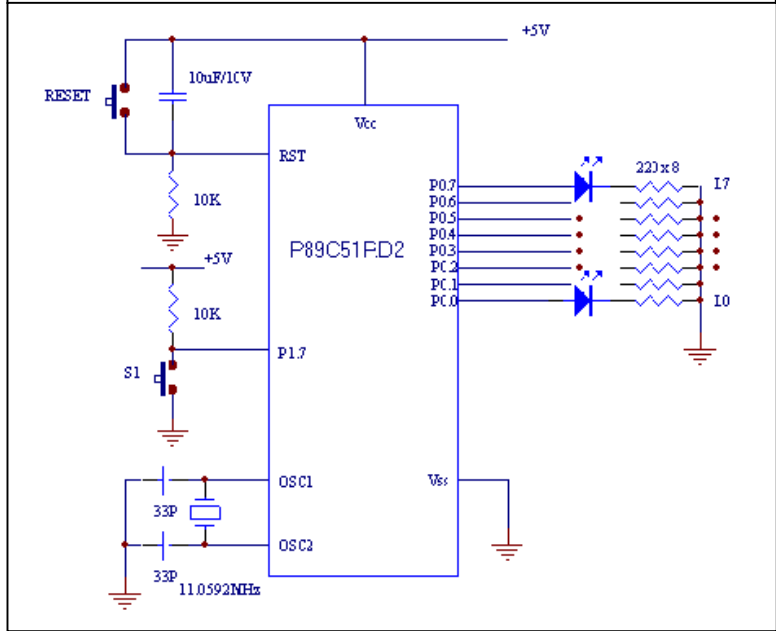
*Objectives* Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to shift the content in register and the direction of shifting is controlled by Switch S1.

*Program source code :*

*เตรียมการ* ใส่ Jumper J23 - J30 , J3( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )

```

'Exp.10 Shift the content in register
' and send it to I/O port.
' The direction of shifting
' is controlled by S1
,
'By Somboon Niamglam
'S.A.N. ELECTRONICS
'March 21, 2003
'-----
,
Dim I As Byte
S1 Alias P1.7
P0 = 0
I = &B00000001
Begin:
  If S1 = 1 Then
    Rotate I , Right , 1
    If I = &B00000000 Then I = &B10000000
    P0 = I
  Else
    Rotate I , Left , 1
    If I = &B00000000 Then I = &B00000001
    P0 = I
  End If
  Waitms 250
  Goto Begin
End
    
```



(ศึกษาการรับ – ส่ง ข้อมูลออกทางขา I/O Port)

*Objectives* Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to get data from input port, then process it, and send the results to output port.

*Program source code :*

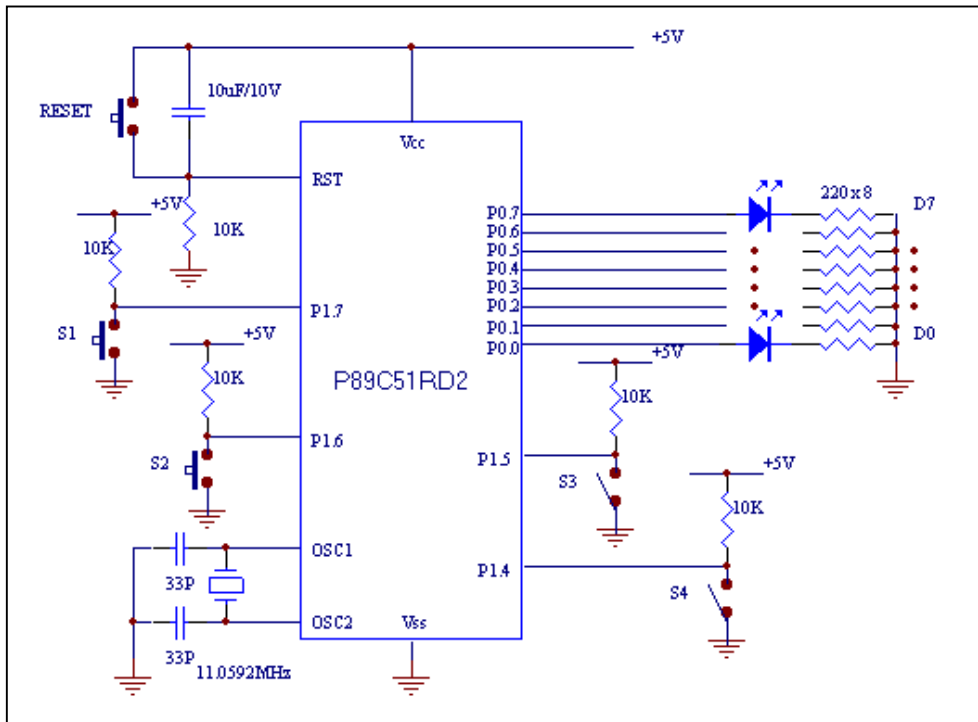
*เตรียมการ* ใส่ Jumper J23, J30 ,J3 – J6( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )

```

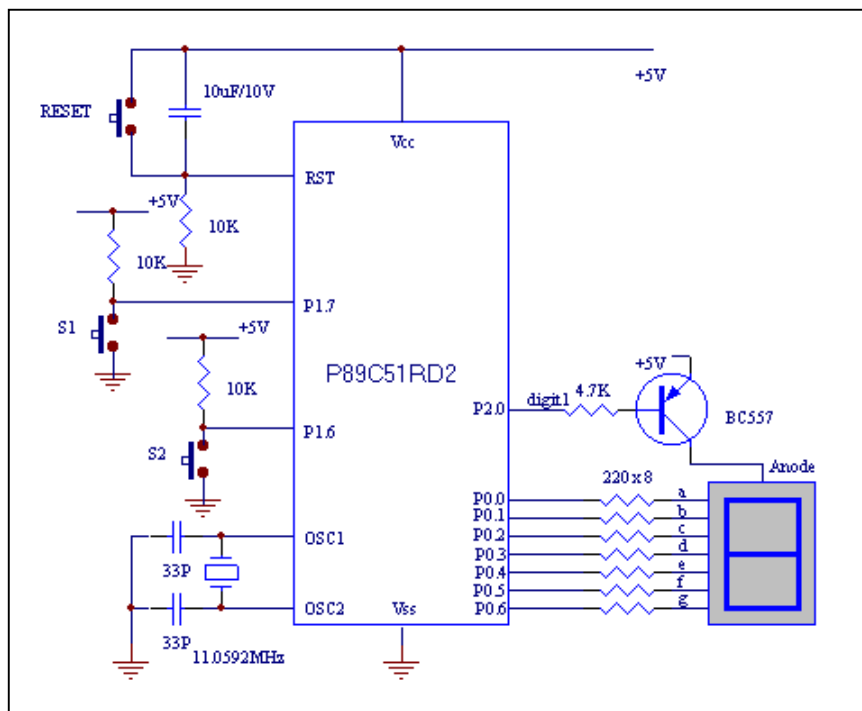
·Exp.11 Working with Input/Output Ports
· (get information from input port
· then process it, and send result
· to output port)
·By Somboon Niamglam
·S.A.N. ELECTRONICS
·March 21, 2003
·-----
·
Dim I As Byte
S1 Alias P1.7
S2 Alias P1.6
S3 Alias P1.5
S4 Alias P1.4
L1 Alias P0.7
L2 Alias P0.0
·
P0= 0
Begin:

    If S1 = 0 Then L1 = 1
    If S2 = 0 Then L1 = 0
    If S3 = 1 Then
        L2 = 1
    Else
        L2 = 0
    End If
    If S4 = 0 Then
        For I = 1 To 5
            L1 = 1
            If S3 = 0 Then
                L2 = 1
            Else
                L2 = 0
            End If
            Waitms 150
            L1 = 0
            If S3 = 1 Then
                L2 = 1
            Else
                L2 = 0
            End If
            Waitms 150
        Next I
    End If
Goto Begin
End

```



วงจรสำหรับ Experiment# 11



วงจรสำหรับ Experiment# 12

**Experiment # 12** LED 7-Segment display

*Objectives* Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to send "8" decimal number to a port which connected common anode type LED 7-Segment display.

*Program source code :*

*เตรียมการ* ใส่ Jumper J35 – J41, และ J43 ( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )

```
'Exp.12 LED 7-Segment Display
'      (Segments Blinking Test)
,
'By Somboon Niamglam
'S.A.N. ELECTRONICS
'March 22,2003
'-----
P2.0 = 1
P0   = 1
Begin:
  P0 = 0
  Wait 1
  P0 = 255
  Wait 1
  Goto Begin
End
```

Number	HEX Code
0	&H40
1	&H79
2	&H24
3	&H30
4	&H19
5	&H12
6	&H02
7	&H78
8	&H00
9	&H10

TABLE1 7-SEGMENT DISPLAY CODE

**ตาราง**

แสดงรหัสเลขฐาน 16 สำหรับ  
แสดงตัวเลข 7 ส่วน แบบ  
common anode ตาม  
โปรแกรม Exp. 13

**Experiment # 13**      0 – 9 LED 7-Segment display

*Objectives*      Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to send 0 – 9 decimal number to a port which connected common anode type LED 7-Segment display.

*Program source code :*

เตรียมการ : ใส่ Jumper J35 – J41 , และ J43( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )

```
'Exp.13 0-9 LED 7-Segment Display
,
,
'By Somboon Niamglam
'S.A.N. ELECTRONICS
'March 22,2003
'-----
Dim I As Byte
Dim Segment As Byte

P2.0 = 0
P0 = 1
Begin:
  'Forward count
  For I = 0 To 9
    Segment = Lookup(i , Dta)
    P0 = Segment
    Wait 1
  Next I
  Goto Begin
End

Dta:
Data &H40 , &H79 , &H24 , &H30 , &H19
Data &H12 , &H02 , &H78 , &H00 , &H10
```

( วงจรสำหรับต่อทดลอง ตามหน้า 12 )

**Experiment # 14** 0 – 9 LED 7-Segment display with up/down control

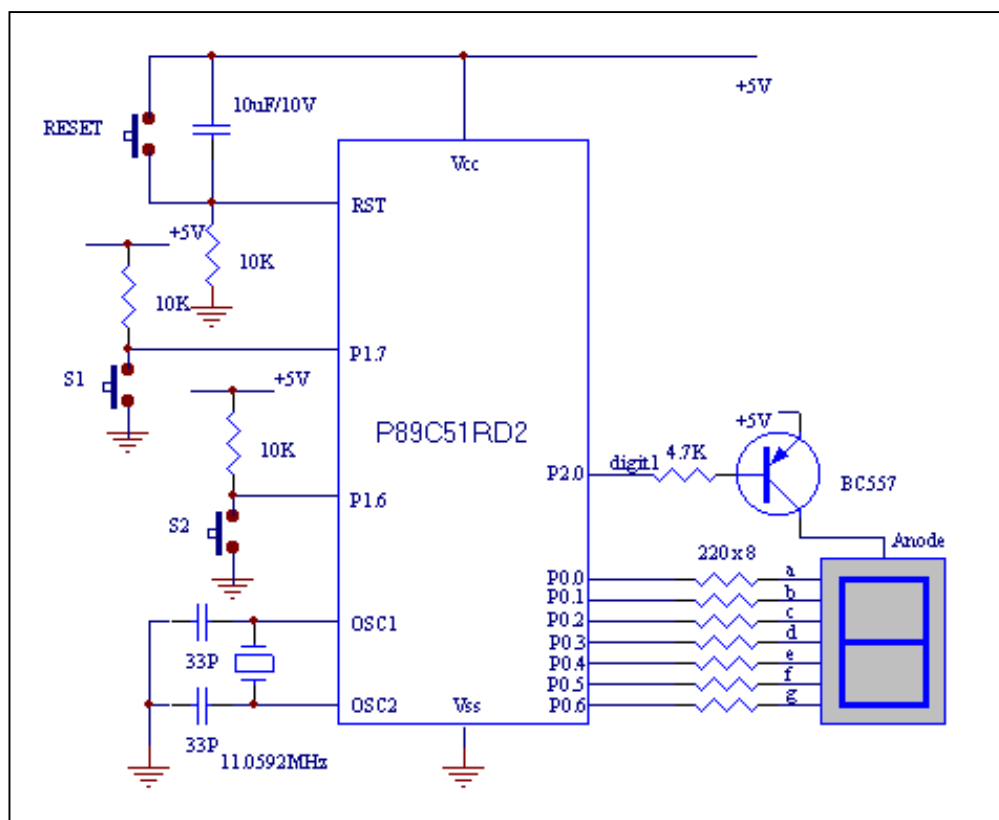
(นับ 0 – 9 ความคุมนับขึ้น / ลง ได้โดยกด S1)

*Objectives* Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to send 0 – 9 decimal number to a port which connected common anode type LED 7-Segment display and its up/down counts are controlled by switch S1 .

*Program source code :*

*เตรียมการ* :ใส่ Jumper J3, J4, J35 – J41, และ J43( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )

(โปรแกรม อยู่หน้า 16)



```
'Exp.14 Controlled 0-9 LED 7-Segment Display
' (Backward-Forward-Pause counting control.
' S1(P1.7)--Backward-Forward
' S2(P1.6)--Pause
'
```

```
'By Somboon Niamglam
'S.A.N. ELECTRONICS
'March 22,2003
'-----
```

```
Dim I As Integer
Dim Segment As Byte
S2 Alias P1.6
S1 Alias P1.7
```

```
P0 = 1
P2.0 = 0
I = 0
Segment = Lookup(i , Dta)
P0 = Segment
Begin:
If S2 = 1 Then
If S1 = 1 Then
I = I + 1
If I > 9 Then
I = 0
End If
Segment = Lookup(i , Dta)
P0 = Segment
Else
I = I - 1
If I < 0 Then
I = 9
End If
Segment = Lookup(i , Dta)
P0 = Segment
End If
Else
I = I
Segment = Lookup(i , Dta)
P0 = Segment
End If
Wait 1
Goto Begin
End
```

```
Dta:
Data &H40 , &H79 , &H24 , &H30 , &H19
Data &H12 , &H02 , &H78 , &H00 , &H10
```

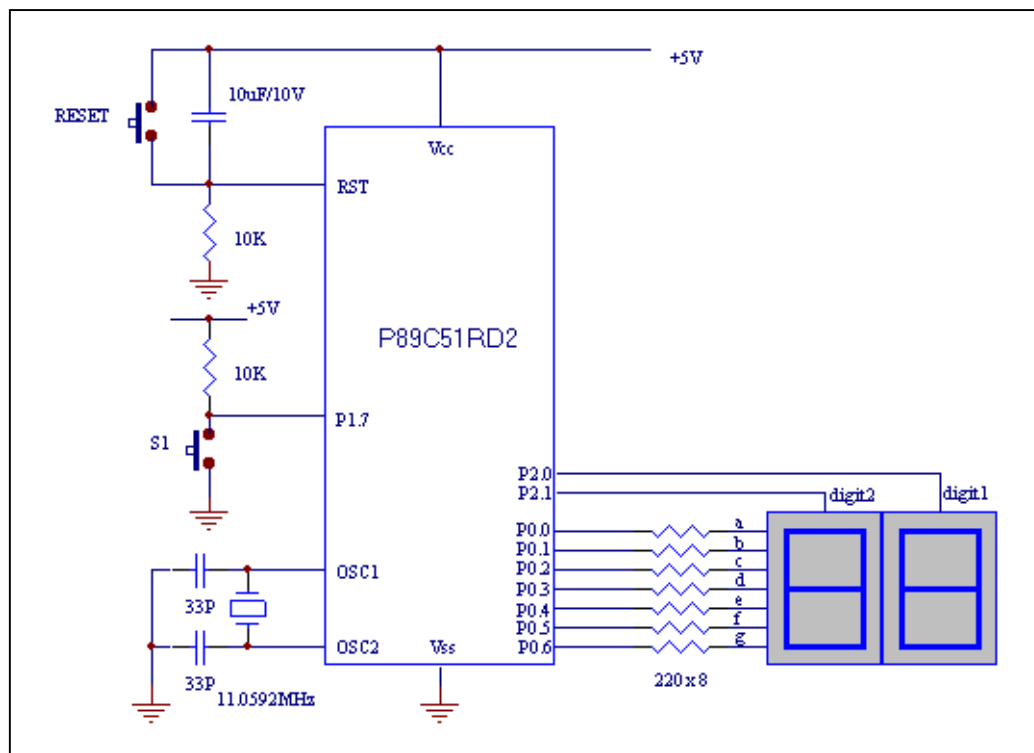
### Experiment # 15      2 - Digits LED 7-Segment display

(แสดงตัวเลข 25 คงที่)

*Objectives*      Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to send "25" three digits decimal number to a port which connected common anode type LED 7-Segment display.

*Program source code :*

เตรียมต่อวงจร : ใส่ Jumper J35 – J43 ( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )



```

'Exp.15 2 digit 7-segment display
'      (25 fixed value display)
'
'by Somboon Niamglam
'  S.A.N. ELECTRONICS
'  March 30,2003
'-----
'
'
Dim Digit As Integer
Dim Num As Byte
Dim Disp As Byte
Dim St As String * 3
Dim St1 As String * 1
Dim St2 As String * 1

Dim V As Integer
P2 = 255
Num = 25
St = Str(num)

Loop1:

'digit#1
St1 = Mid(st , 2 , 1)
Digit = Val(st1)
Disp = Lookup(digit , Dta1)
P0 = Disp
P2 = &B11111110
'

'digit#3
St2 = Mid(st , 1 , 1)
Digit = Val(st2)
Disp = Lookup(digit , Dta1)
P0 = Disp
P2 = &B11111101
'

Goto Loop1
End

Dta1:
Data &H40 , &H79 , &H24 , &H30 , &H19
Data &H12 , &H02 , &H78 , &H00 , &H10

```

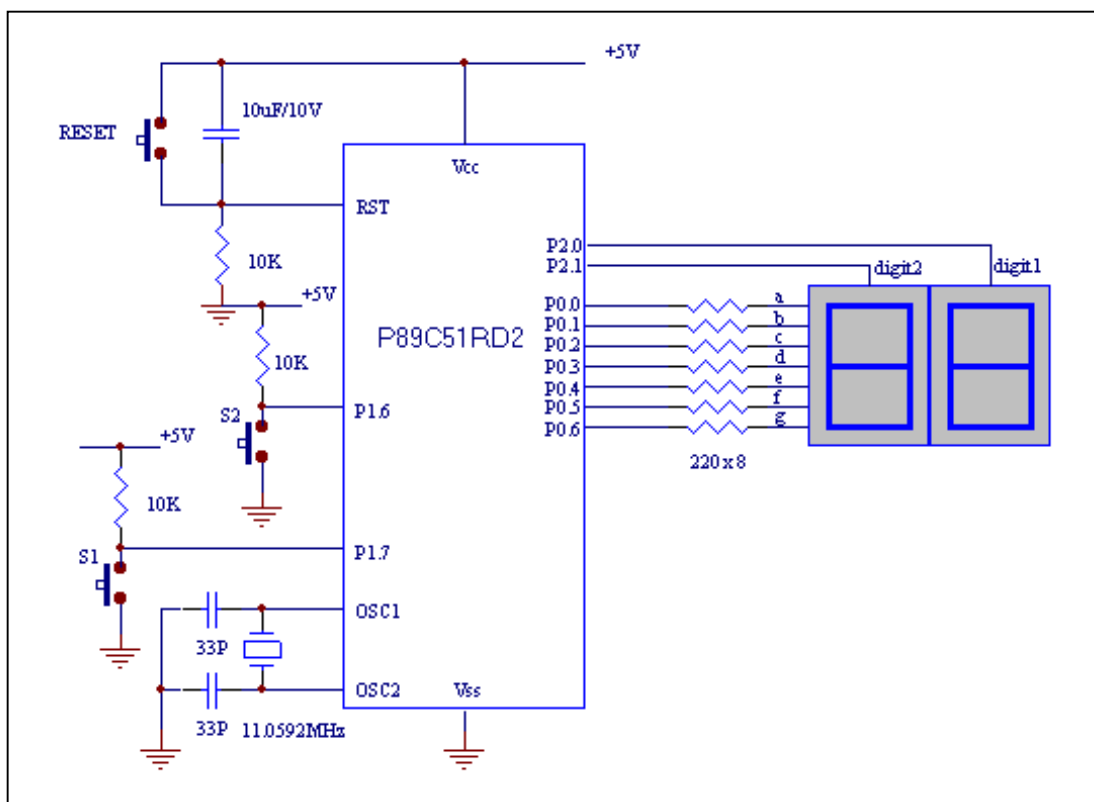
**Experiment # 16**      2 - Digits LED 7-Segment display with up / down / pause controls

(นับ 0 – 99 กด S1 นับขึ้น/ลง กด S2 หยุดนับ)

*Objectives* Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to send 0 – 99 two digits decimal number to a port which connected common anode type LED 7-Segment display with Up / Down count control by pressing S1 and Pause it by pressing S2 .

*Program source code and schematic diagram:*

เตรียมต่อวงจร : ใส่ Jumper J3 และ J35–J43 ( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )



( วงจรสำหรับ Exp. 16 )

Program source code for Exp.16 :

```
'Exp.16 2 digit 7-segment display
' (0 - 99 decimal value display)
' (Up/Down count controlled by S1)
' (and Pause controlled by S2 )
'
'
'by Somboon Niamglam
' S.A.N. ELECTRONICS
' March 30,2003
'-----
'
'
Dim Digit As Byte
Dim Num As Byte
Dim Disp As Byte
Dim Vnum As Byte
Dim St As String * 3
Dim Z As String * 3
Dim St1 As String * 1
Dim St2 As String * 1

Dim I As Integer
S1 Alias P1.7
S2 Alias P1.6

P0 = 255
P2 = 255
Num = 0

'
Loop1:

St = Str(num)

For I = 1 To 900
If Len(st) = 1 Then

'digit#2

St2 = Mid(st , 1 , 1)
Digit = Val(st2)
Disp = Lookup(digit , Dta1)

P0 = Disp
If Len(st) = 1 Then
P2 = &B11111110
Else
P2 = &B11111101
End If
Else
'digit#2

St2 = Mid(st , 1 , 1)
Digit = Val(st2)
Disp = Lookup(digit , Dta1)
```

```
P0 = Disp
P2 = &B11111101
'
'digit#1

St1 = Mid(st , 2 , 1)
Digit = Val(st1)
Disp = Lookup(digit , Dta1)
P0 = Disp
P2 = &B11111110
End If
'
Next I

If S1 = 0 Then

    If Num = 0 Then
        Num = 99
    End If
    Num = Num - 1
Else
If S2 = 0 Then
    Num = Num
Else

    If Num = 99 Then
        Num = 0
    End If
    Num = Num + 1
End If
End If
'

Goto Loop1
End

Dta1:
Data &H40 , &H79 , &H24 , &H30 , &H19
Data &H12 , &H02 , &H78 , &H00 , &H10
```

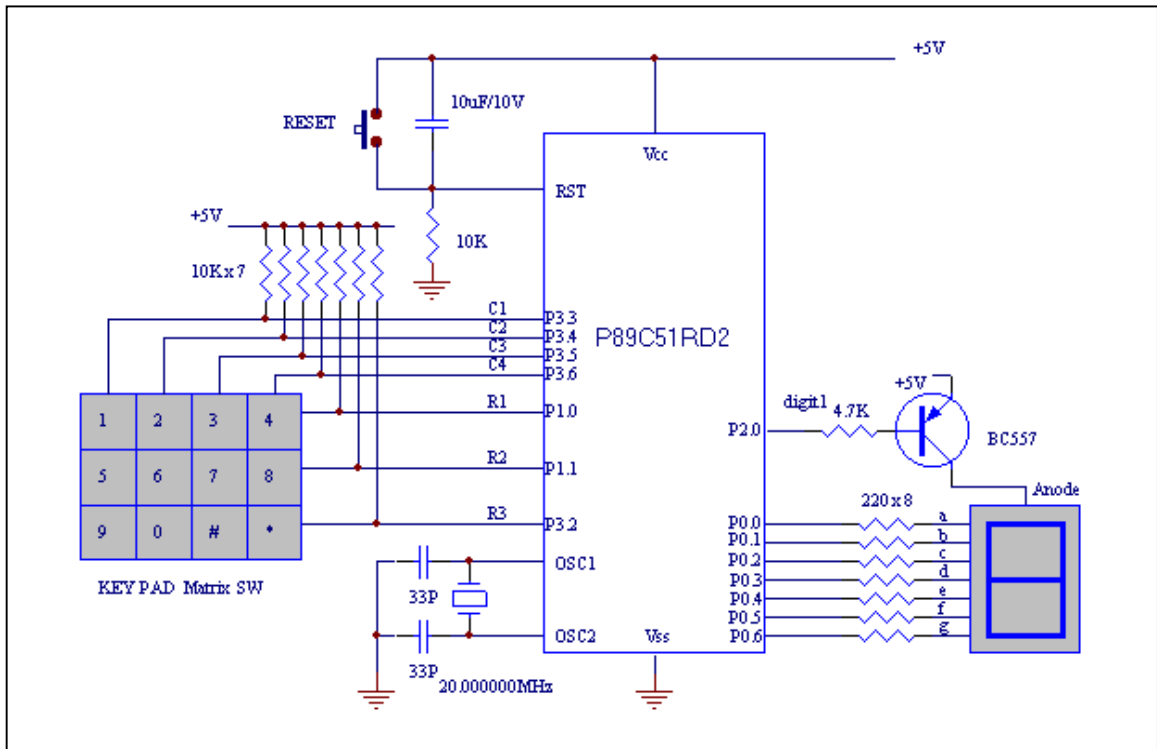
**Experiment # 17** Scan Key Pad ( 3 rows X 4 columns Matrix Switchs )

(สแกนรับการกดคีย์สวิตช์แบบเมตริกซ์ แล้วแสดงผลเป็นตัวเลข)

*Objectives* Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to get the logic status from key pad by matrix scanning and send the result to LED and 7-segment display.

*Program source code and schematic diagram:*

เตรียมต์วงจร : ใส่ J9 – J15 และ J35 – J41 และ J43( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )



( วงจรสำหรับ Experiment # 17 )

Program source code Experiment # 17:

```
'Exp.17 Scan Key Pad (3 row x 4 column)
'
'   By Somboon Niamglam
'   S.A.N. ELECTRONICS
'   April 7, 2003
'-----

R1 Alias P1.0
R2 Alias P1.1
R3 Alias P3.2
'
C1 Alias P3.3
C2 Alias P3.4
C3 Alias P3.5
C4 Alias P3.6
'

Init:
  P2.0 = 1
  P0   = 255

  R1 = 1
  R2 = 1
  R3 = 1
Begin:
Loop1:
  R1 = 0
  If C1 = 0 Then Goto Disp1
  If C2 = 0 Then Goto Disp2
  If C3 = 0 Then Goto Disp3
  If C4 = 0 Then Goto Disp4
  R1 = 1

Loop2:
  R2 = 0
  If C1 = 0 Then Goto Disp5
  If C2 = 0 Then Goto Disp6
  If C3 = 0 Then Goto Disp7
  If C4 = 0 Then Goto Disp8
  R2 = 1

Loop3:
  R3 = 0
  If C1 = 0 Then Goto Disp9
  If C2 = 0 Then Goto Disp0
  If C3 = 0 Then Goto Dispa
  If C4 = 0 Then Goto Dispb
  R3 = 1
  Waitms 100
  Goto Begin
```

( continue next page )

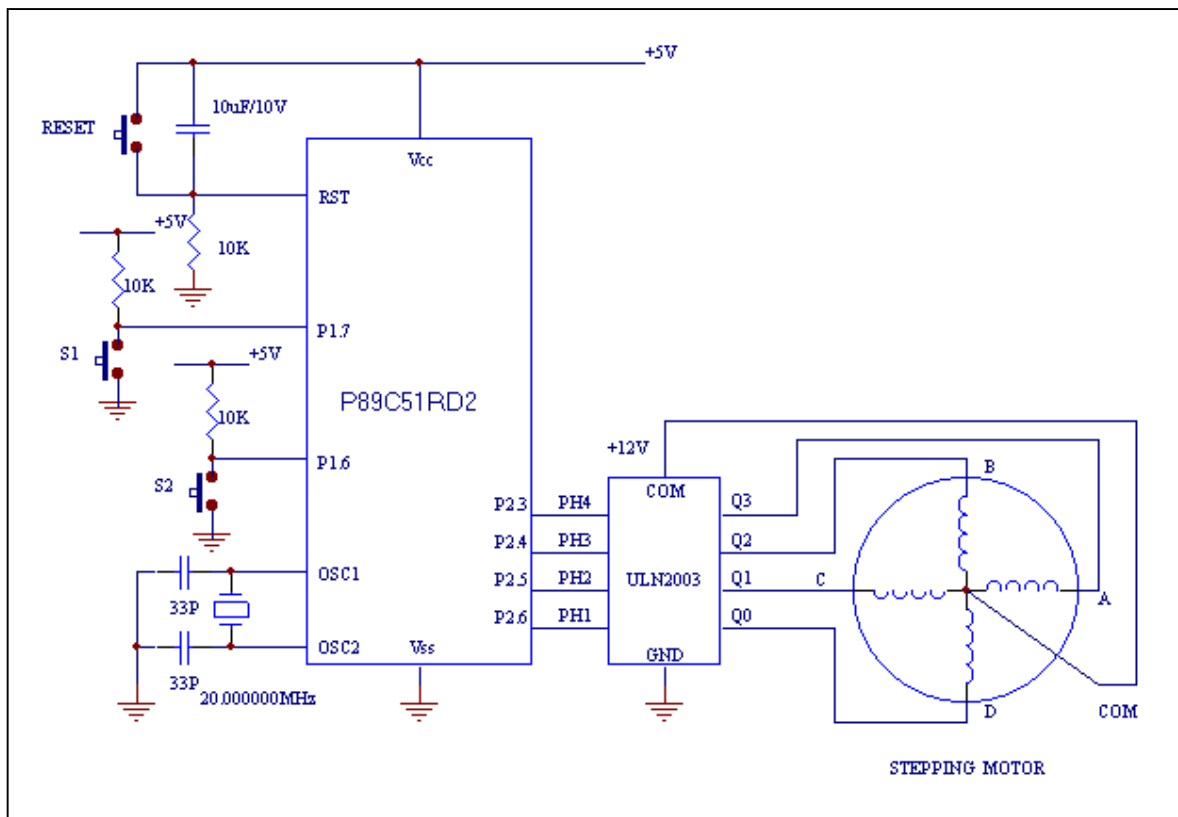
```
Disp1:
  P2.0 = 0
  P0 = &H79
  Goto Loop1
Disp2:
  P2.0 = 0
  P0 = &H24
  Goto Loop1
Disp3:
  P2.0 = 0
  P0 = &H30
  Goto Loop1
Disp4:
  P2.0 = 0
  P0 = &H19
  Goto Loop1
Disp5:
  P2.0 = 0
  P0 = &H12
  Goto Loop2
Disp6:
  P2.0 = 0
  P0 = &H02
  Goto Loop2
Disp7:
  P2.0 = 0
  P0 = &H78
  Goto Loop2
Disp8:
  P2.0 = 0
  P0 = &H00
  Goto Loop2
Disp9:
  P2.0 = 0
  P0 = &H10
  Goto Loop3
Disp0:
  P2.0 = 0
  P0 = &H40
  Goto Loop3
Dispa:
  P2.0 = 0
  P0 = &H08
  Goto Loop3
Dispb:
  P2.0 = 0
  P0 = &H03
  Goto Loop3
End
```

**Experiment # 18**      1 – Phase Stepping Motor controller  
(ขับสเต็ปป์มอเตอร์ แบบเฟสเดียว)

*Objectives*      Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to send the logic pattern of 1 – phase stepping motor drive, and CW / CCW controlled by S1 and S2.

*Program source code and schematic diagram:*

เตรียมต่อวงจร : ใส่ Jumper J3 ,J4 ,J16 –J19( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )



( วงจรสำหรับ Experiment # 18 )

*Program source code of Exp. 18*

```
'Exp.18 1- Phase Stepping Motor Controller
'
'By Somboon Niamglam
' April 8, 2001
'
'-----
'
S1 Alias P1.7
S2 Alias P1.6
Dim Delay_time As Const 155

P2 = &B00001000

Main:
If S1 = 0 Then Goto Cw
If S2 = 0 Then Goto Ccw
Goto Main

Cw:
Waitms Delay_time
If P2 = &B01000000 Then Goto Reload_cw
Rotate P2 , Left , 1
Goto Main

Reload_cw:
P2 = &B00001000
Goto Main

Ccw:
Waitms Delay_time
If P2 = &B00001000 Then Goto Reload_ccw
Rotate P2 , Right , 1
Goto Main

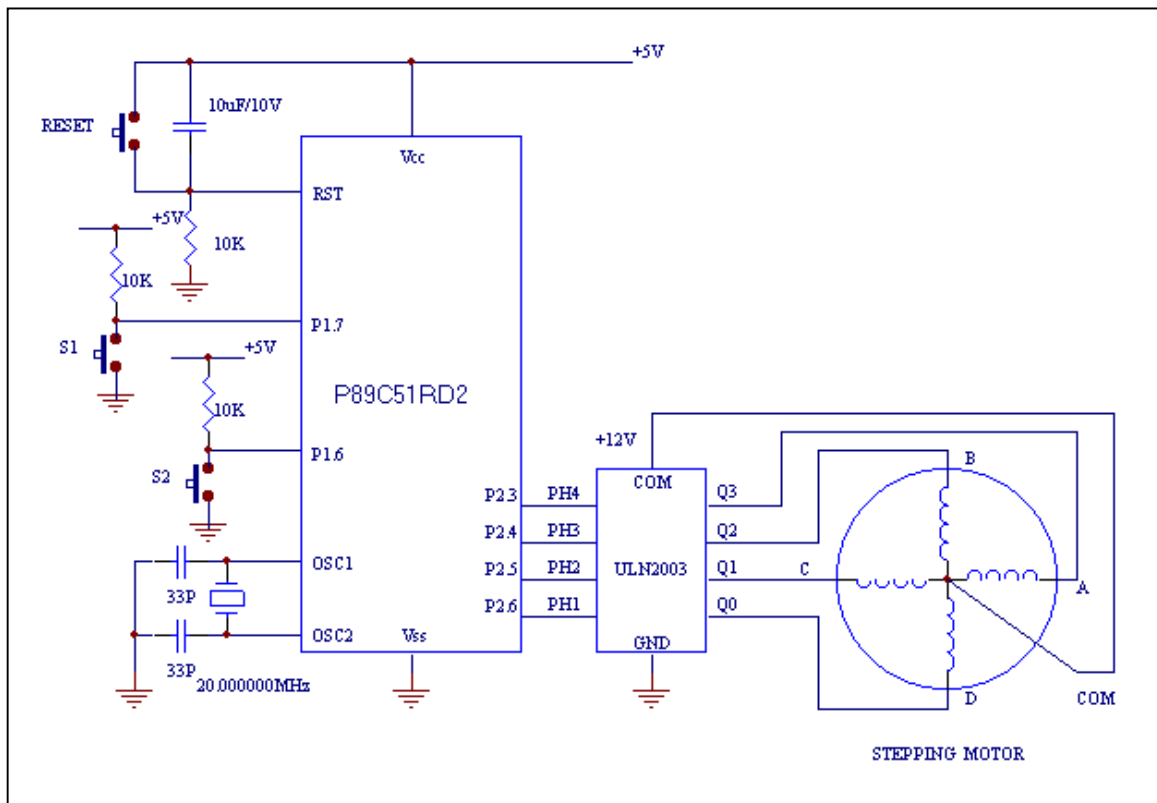
Reload_ccw:
P2 = &B01000000
Goto Main
End
```

(ขับสเต็ปมอเตอร์ แบบ 2 เฟส)

*Objectives* Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to send the logic pattern of 2 – phase stepping motor drive, and CW / CCW controlled by S1 and S2.

*Program source code and schematic diagram:*

เตรียมต่อวงจร : ใส่ Jumper J3 ,J4 ,J16 – J19( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )



( วงจรสำหรับ Experiment # 19 )

Program source code:

```
'Exp.19   2- Phase Stepping Motor Controller
'
'By Somboon Niamglam
'   April 13, 2001
'
'-----

S1  Alias P1.7
S2  Alias P1.6
Dim Stepp As Byte
Dim Pos As Byte
Dim Delay_time As Const 155

stepp = 0
GoSub drive

Main:
  If S1 = 0 Then Goto Ccw
  If S2 = 0 Then Goto Cw
  Goto Main

Cw:
  Stepp = Stepp + 1
  Pos = Stepp Mod 4
  Gosub Drive
  Goto Main

Ccw:
  Stepp = Stepp - 1
  Pos = Stepp Mod 4
  Gosub Drive
  Goto Main

Drive:
  P2 = Lookup(pos , Dta)
  Waitms Delay_time
  Return
End

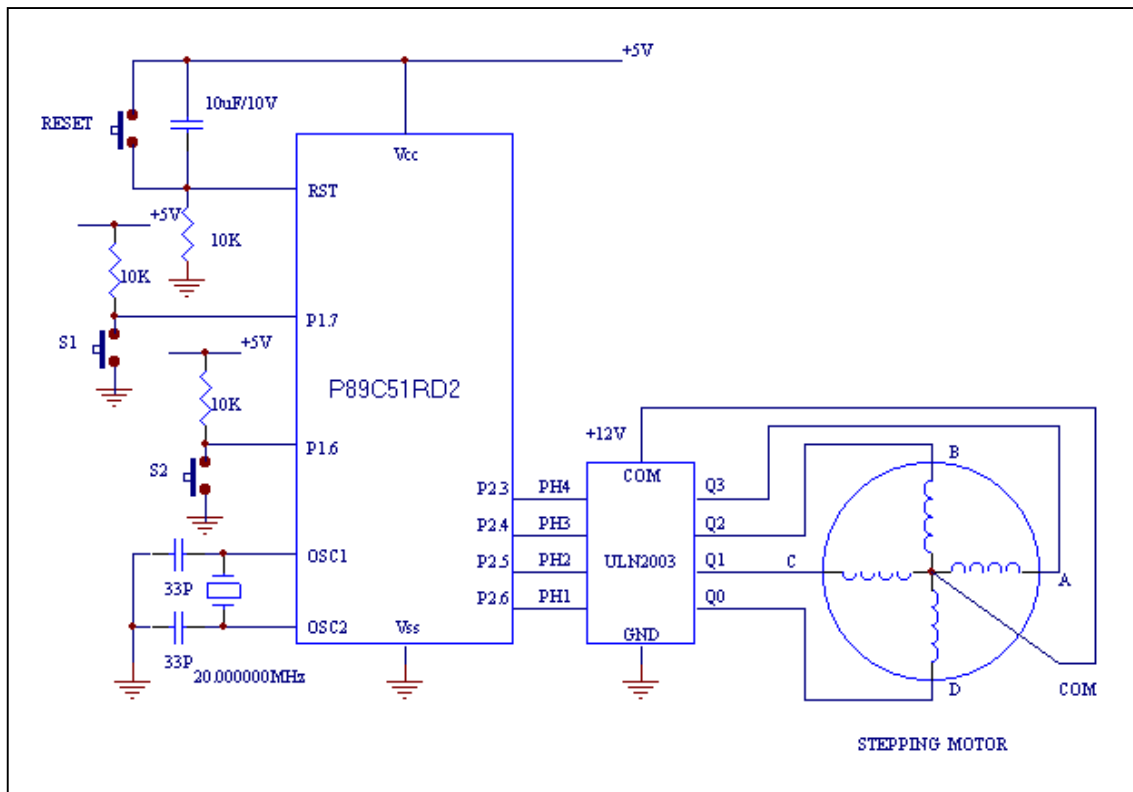
Dta:
Data &B00011000 , &B00110000 , &B01100000 , &B01001000
```

**Experiment # 20** Half-step drive : Stepping Motor controller  
(ขับสเต็ปป์มอเตอร์ แบบครึ่งสเต็ป)

**Objectives** Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to send the logic pattern of half-step : stepping motor drive, and CW / CCW controlled by S1 and S2.

*Program source code and schematic diagram:*

เตรียมต่อวงจร : ใส่ Jumper J3 ,J4 ,J16– J19( หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )



( วงจรสำหรับ Experiment # 20 )

Program source code of Exp. 20 :

```
'Exp.20 Half-step drive,
'      Stepping Motor Controller
'
'By Somboon Niamglam
' April 13, 2001
'
'-----

S1 Alias P1.7
S2 Alias P1.6
Dim Stepp As Byte
Dim Pos As Byte
Dim Delay_time As Const 155

    stepp = 0
    GoSub drive

Main:
    If S1 = 0 Then Goto Ccw
    If S2 = 0 Then Goto Cw
    Goto Main

Cw:
    Stepp = Stepp + 1
    Pos = Stepp Mod 8
    Gosub Drive
    Goto Main

Ccw:
    Stepp = Stepp - 1
    Pos = Stepp Mod 8
    Gosub Drive
    Goto Main

Drive:
    P2 = Lookup(pos , Dta)
    Waitms Delay_time
    Return
End

Dta:
Data &B00001000 , &B00011000 , &B00010000 , &B00110000
Data &B00100000 , &B01100000 , &B01000000 , &B01001000
```

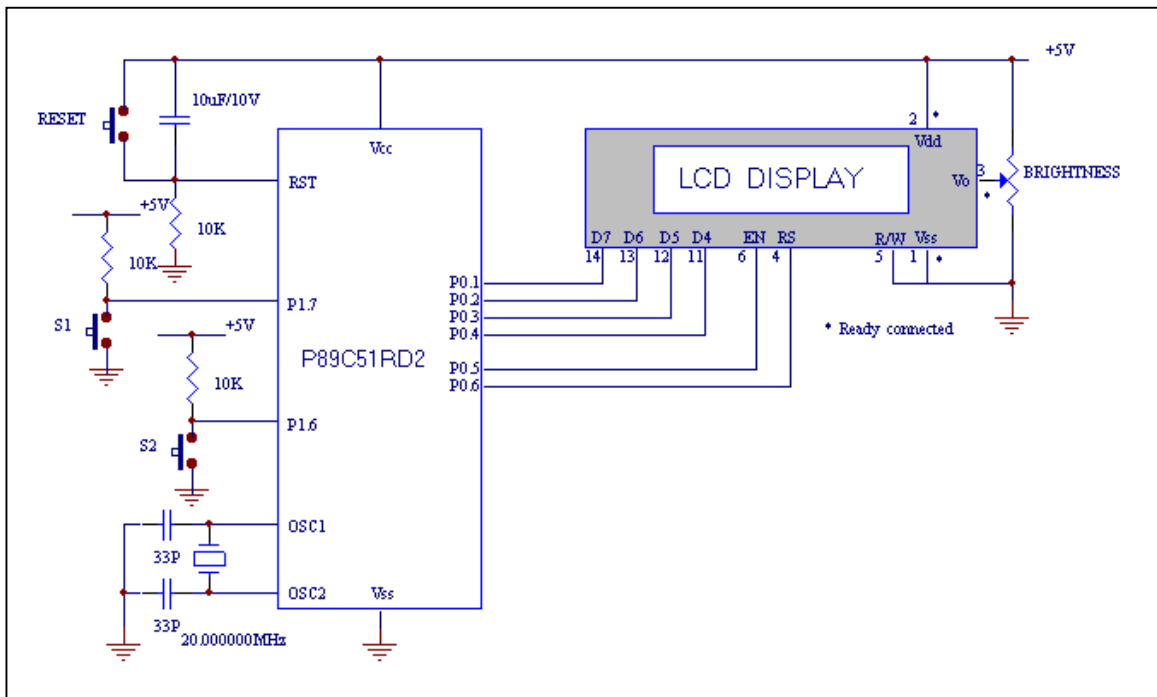
**Experiment # 21** LCD Display

(ส่งข้อความออกทางจอ LCD)

*Objectives* Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to send the messages to LCD display panel in various styles.

*Program source code and schematic diagram:*

เตรียมต่อวงจร : ใส่ Jumper J45 – J50 (หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !! )



( วงจรสำหรับ Experiment # 21 )

program source code of Exp. 21:

```
' Exp. 21  LCD  Display
'
'Somboon Niamglam
'
S.A.N. ELECTRONICS
'April 13, 2003
'-----
'
' demo: LCD, CLS, LOWERLINE, SHIFTLCD, SHIFTCURSOR, HOME
'   CURSOR, DISPLAY
'-----

Dim A As Byte
Config Lcdpin ,DB4 = P0.4, DB5 = P0.3, DB6 = P0.2, DB7 = P0.1, E = P0.5, RS = P0.6
Config Lcd = 16 * 1a           'configure lcd screen

Cls                           'clear the LCD display
Lcd " Hello world."          'display this at the top line
Wait 1
Lowerline                     'select the lower line
Wait 1
Lcd "Shift this."           'display this at the lower line
Wait 1
For A = 1 To 10
  Shiftlcd Right              'shift the text to the right
  Wait 1                      'wait a moment
Next

For A = 1 To 10
  Shiftlcd Left               'shift the text to the left
  Wait 1                      'wait a moment
Next

Locate 2 , 1                  'set cursor position
Lcd "*"                       'display this
Wait 1                       'wait a moment

Shiftcursor Right            'shift the cursor
Lcd "@"                      'display this
Wait 1                       'wait a moment

Home Upper                   'select line 1 and return home
Lcd "Replaced."              'replace the text
Wait 1                       'wait a moment

Cursor Off Noblink           'hide cursor
Wait 1                       'wait a moment
Cursor On Blink              'show cursor
Wait 1                       'wait a moment
Display Off                  'turn display off
Wait 1                       'wait a moment
Display On                   'turn display on
                              'put it on LCD

End
```

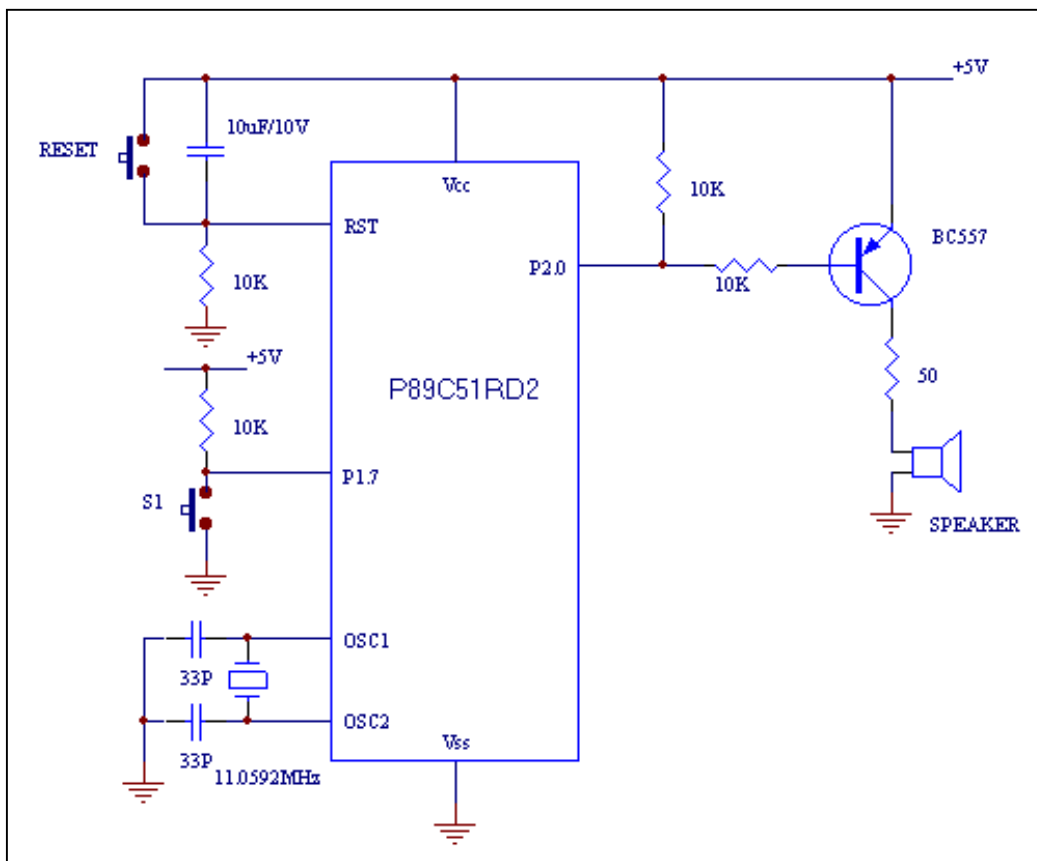
**Experiment # 22** Sending sound tone

(ส่งสัญญาณความถี่เสียงออกทาง I/O Port)

*Objectives* Program the microcontroller MCS-51 family by using Basic Compiler (BASCOM-8051) language to send the sound tone to a port pin.

*Program source code and schematic diagram:*

เตรียมต่อวงจร : ใส่ Jumper J3, J22 (หมายเหตุ ให้ใส่หลังจากโปรแกรมตัวชิพแล้ว !!)



'Exp.22 Sending sound tone

,

By Somboon Niamglam

S.A.N. ELECTRONICS

April 7, 2003

,

Sound P2.0 , 10000 , 10

End