LCDs (Liquid Crystal Displays)

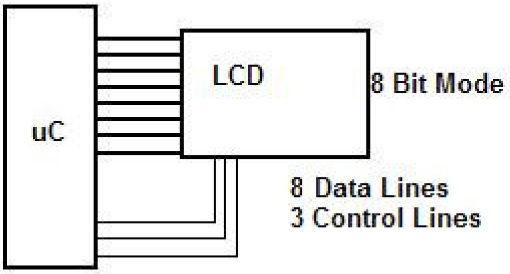
One of the best things about electronic equipment nowadays is the alphanumeric LCD displays, these are not the displays that you would find on a laptop they are simpler single, double or 4 line displays for text. These displays are becoming cheaper and cheaper in cost check out www.pmb.co.nz for great prices on them. The LCD is a great output device and with Bascom so very easy to use.

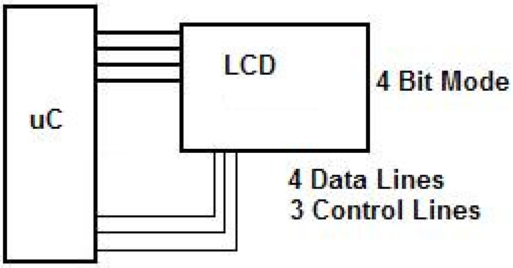
Some common commands are

- cls - clear the screen
- LCD "Hello" - will display hello on the display
- lowerline - go to the lower line
- locate y,x - line and position on the line to start text

Connecting an LCD to the microcontroller is not difficult either.
There are 14/16 pins on the LCD

1. 0V
2. +5V
3. Contrast
4. RS - register select
5. R/W - read/not write
6. E - Enable
7. D0
8. D1
9. D2
10. D3
11. D4
12. D5
13. D6
14. D7
15. Backlight +
16. Backlight 0V



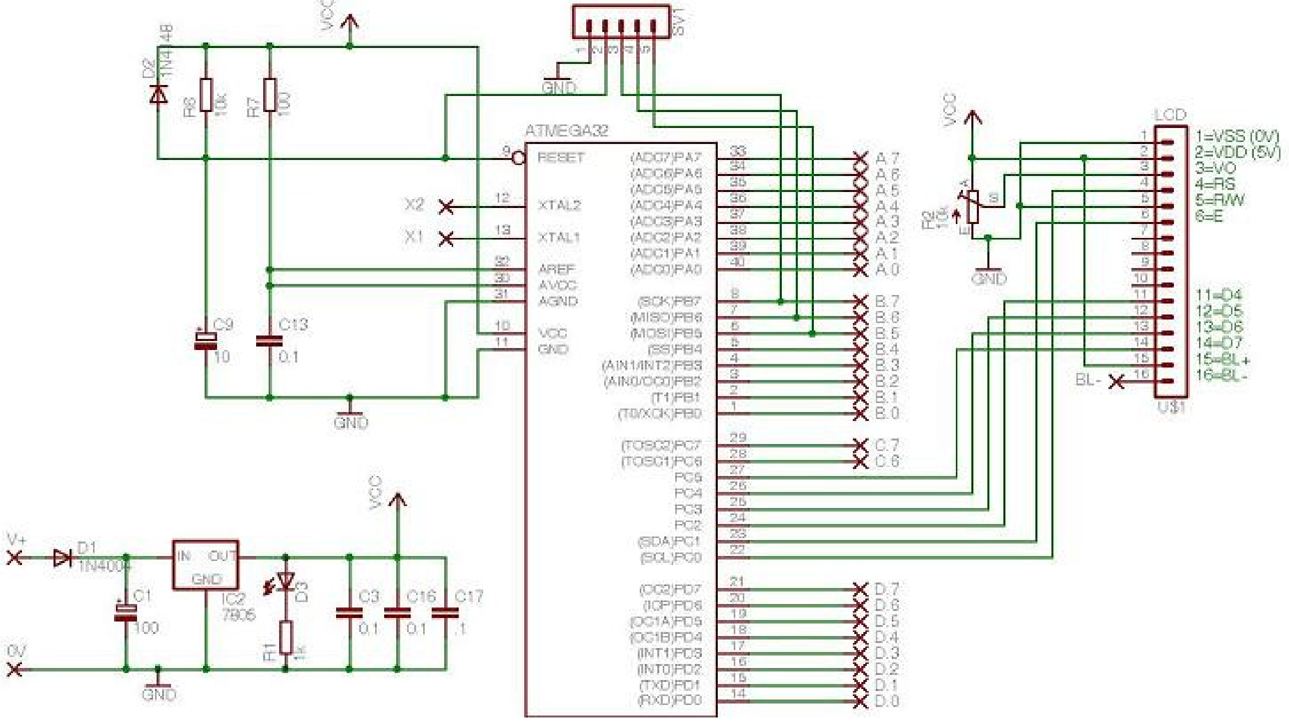


Most LCDs are set up so that they can communicate in parallel with either 4 bits or 8 bits at a time. The faster system is 8 bits as all the data or commands sent to the LCD happen at the same time, with 4 bit operation the data/command is split into 2 parts and each is sent separately. Hence it takes twice as long. The advantage of 4 bit operation is that the LCD uses 4 less lines on the micro.

Another couple of lines are necessary, these are control lines, RS , R/W, E. When using Bascom the R/W line is tied permanently to 0V, and the other two lines need to be connected to the micro.

Connecting an LCD to a 40pin AVR

This requires six I/O lines to be used on the micro.



Software to show off the display

```
'-----------------------------------------------------------------
' 1. Title Block
' Author: B.Collis
' Date: 14 Aug 2003
' Version: 1.0
' File Name: LCD_Ver1.bas
'-----------------------------------------------------------------
' 2. Program Description:
' use an LCD to display
' 3. Hardware Features:
' LCD on portc - note the use of 4 bit mode and only 2 control lines
' 4. Program Features:
' outer do-loop
' for-next control
'-----------------------------------------------------------------
' 5. Compiler Directives (these tell Bascom things about our hardware)
$crystal = 8000000              'the speed of operations inside the micro
$regfile = "m8535.dat"          ' the micro we are using
'-----------------------------------------------------------------
' 6. Hardware Setups
' setup direction of all ports
Config Porta = Output 'LEDs on portA
Config Portb = Output 'LEDs on portB
Config Portc = Output 'LEDs on portC
Config Portd = Output 'LEDs on portD
Config Lcdpin = Pin , Db4 = Portc.2 , Db5 = Portc.3 , Db6 = Portc.4 , Db7 = Portc.5 , E  =
Portc.1 , Rs = Portc.0
Config Lcd = 20 * 4        'configure lcd screen
' 7. Hardware Aliases
' 8. initialise ports so hardware starts correctly
Porta = 0
Portb = 0
Portd = 0
Cls 'clears LCD display
Cursor On  ' cursor displayed
'--------------------------------------------------------------------
' 9. Declare Constants
Const Timedelay = 150
'--------------------------------------------------------------------
' 10. Declare Variables
Dim Position As Byte
' 11. Initialise Variables
Count = 0
'--------------------------------------------------------------------
' 12. Program starts here
Locate 1,5
Lcd “watch this”
Locate 2,6
Lcd “hello”
Waitms timedelay
Locate 2,1
Lcd “      “
Waitms timedelay
Locate 3,5
Lcd "hows that!!"
End
'--------------------------------------------------------------------
' 13. Subroutines
'--------------------------------------------------------------------
' 14. Interrupts
```

FOR NEXT - Controlling the number of times something happens

If you want some text to move across the LCD.

You could do it the long way

```
Do
    Locate 2,1
    Lcd “Hello”
    Waitms timedelay
    Locate 2,1
    Lcd “     “

    Locate 2,2
    Lcd “Hello”
    Waitms timedelay
    Locate 2,2
    Lcd “     “

    Locate 2,3
    Lcd “Hello”
    Waitms timedelay
    Locate 23
    Lcd “     “
Loop
```

OR the smart way

```
Do
    For Position = 1 To 16        ‘for 20 character display
        Locate 2, position        ‘move the cursor to second row
        Lcd “Hello”               ‘display the text starting at this position
        Waitms Timedelay          'wait a bit
        Locate 2, position        ‘move cursor back to
        Lcd “     “               ‘blank over the text to delete it
    Next
    For Position = 16 To 1, step -1        ‘for 20 character display
        Locate 2, position        ‘move the cursor to second row
        Lcd “world”               ‘display the text starting at this position
        Waitms Timedelay          'wait a bit
        Locate 2, position         ‘move cursor back to
        Lcd “ ”                    ‘blank over the text to delete it
    Next
Loop
End          'end program
```