**LIQUID CRYSTAL DISPLAY (LCD)**

The LCD panel used in this block interfaced with micro-controller through output port. This is a 16 character × 2Line LCD module, capable of display numbers, characters, and graphics. The display contains two internal byte-wide registers, one for commands (RS=0) and the second for character to be displayed (RS=1). It also contains a user programmed Ram area (the character RAM) character that can be formed using dot matrix that can be programmed to generate any desired. Two distinguished between these areas, the hex command byte will be signify that the display RAM address 00h is chosen.

LCD can add a lot to our application in terms of providing a useful interface for the user, debugging an application or just giving it a “professional” look. The most common type of LCD controller is the Hitachi 44780 which provides a relatively simple interface between a processor and an LCD. Using this inter is often not attempted by inexperienced designers and programmers because it is difficult to find good documentation on the interface, initializing the interface can be problem and the displays themselves are expensive.

Connection to a PC parallel port is mostly simple. These displays can handle eight bit input directly. They also need two extra lines to control which kind of data has just arrived and when the data is meant to be stable. Those signals are also called RS (Register Select, instruction or data register) and EN (enable).

So it has to control ten data lines (8 bits + RS + EN) and one common ground (GND) line, which make eleven lines to the parallel port. Data read back is not supported by the driver and so it does not require extra line for this. The following table shows the needed connection.

**BLOCK DIAGRAM:**

16×2 Alphanumeric

LCD

Parallel port

Microcontroller

Fig 4.3: 16×2 LCD connection to microcontroller

The pin outs are as follows:

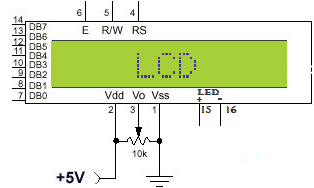


Fig 4.4: LCD Pin out.

|  |  |  |
| --- | --- | --- |
| **Pin No.** | **Name** | **Description** |
| Pin no. 1 | **VSS** | Power supply (GND) |
| Pin no. 2 | **VCC** | Power supply (+5V) |
| Pin no. 3 | **VEE** | Contrast adjust |
| Pin no. 4 | **RS** | 0 = Instruction input 1 = Data input |
| Pin no. 5 | **R/W** | 0 = Write to LCD module 1 = Read from LCD module |
| Pin no. 6 | **EN** | Enable signal |
| Pin no. 7 | **D0** | Data bus line 0 (LSB) |
| Pin no. 8 | **D1** | Data bus line 1 |
| Pin no. 9 | **D2** | Data bus line 2 |
| Pin no. 10 | **D3** | Data bus line 3 |
| Pin no. 11 | **D4** | Data bus line 4 |
| Pin no. 12 | **D5** | Data bus line 5 |
| Pin no. 13 | **D6** | Data bus line 6 |
| Pin no. 14 | **D7** | Data bus line 7 (MSB) |
| Pin no. 15 | **LED+** | Anode of LED for Backlit |
| Pin no. 16 | **LED-** | Cathode of LED for Backlit |