

LCD Connections and Description

Contents

LCD Connections 3

LCD Controls 4

Description 5

DISPLAY DATA RAM ADDRESS MAP 6

References 6

Version History

| Version | Date released | Changes | Person |
|---------|---------------|---|-------------|
| 0.1 | 09/02/2004 | Initial version | Alex Gibson |
| 0.2 | 02/05/2004 | Corrected Pin numbers on LCD controls table | Alex Gibson |
| | | | |
| | | | |

LCD Connections

| HDR | LCD PIN | Pic Pin | Connection | Description |
|-----|---------|---------|---------------|------------------------------------|
| H18 | 16 | NC | | |
| H18 | 15 | NC | | |
| | | | | |
| | | | PORT D | All hardwired |
| H18 | 14 | 33 | RD7/PSP7 | LCD Data Line 7 hardwired |
| H18 | 13 | 32 | RD6/PSP6 | LCD Data Line 6 hardwired |
| H18 | 12 | 31 | RD5/PSP5 | LCD Data Line 5 hardwired |
| H18 | 11 | 30 | RD4/PSP4 | LCD Data Line 4 hardwired |
| H18 | 10 | 24 | RD3/PSP3 | LCD Data Line 3 hardwired |
| H18 | 9 | 23 | RD2/PSP2 | LCD Data Line 2 hardwired |
| H18 | 8 | 22 | RD1/PSP1 | LCD Data Line 1 hardwired |
| H18 | 7 | 21 | RD0/PSP0 | LCD Data Line 0 hardwired |
| | | | | |
| | | | PORTE | All hardwired |
| H18 | 6 | 11 | RE2/CS/AN7 | LCD E – Enable hardwired |
| H18 | 5 | 10 | RE1/WR/AN6 | LCD R/W – Read / Write hardwired |
| H18 | 4 | 9 | RE0/RD/AN5 | LCD RS – Register Select hardwired |
| | | | | |
| H18 | 3 | NC | Vo | Voltage For LCD (acts as contrast) |
| H18 | 2 | NC | VCC | Supply Voltage For Logic |
| H18 | 1 | NC | GND | Ground |
| | | | | |
| | | | | |

NC – Not Connected

LCD Controls

| Function | RS | R/W | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|---|----|-----|----|----|----|----|----|----|----|----|
| H18 | 4 | 5 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 |
| Clear | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Return Cursor and LCD to home position | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | X |
| Set Cursor Move Direction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | ID | S |
| Enable display or Cursor | 0 | 0 | 0 | 0 | 0 | 0 | 1 | ED | C | B |
| Move Cursor / Shift Display | 0 | 0 | 0 | 0 | 0 | 1 | SC | RL | X | X |
| Set Interface Length | 0 | 0 | 0 | 0 | 1 | DL | N | F | X | X |
| Move Cursor into CGRAM (set CG RAM address) | 0 | 0 | 0 | 1 | A | A | A | A | A | A |
| Move cursor to display position (set DD RAM address) | 0 | 0 | 1 | A | A | A | A | A | A | A |
| Poll busy flag | 0 | 1 | BF | X | X | X | X | X | X | X |
| Write character on display at current cursor position | 1 | 0 | D | D | D | D | D | D | D | D |
| Read character on display at current cursor position | 1 | 1 | D | D | D | D | D | D | D | D |

X – Don't Care

ID – Increment Cursor after each byte written to display is set.

S – Shift Display when each byte is written to display

B – Turn Blink cursor ON (1) / OFF (0)

C – Turn Cursor ON (1) / OFF (0)

ED – Enable Display ON (1) / OFF (0)

SC – Display Shift ON (1) / OFF (0)

RL – Direction of Shift Right (1) / Left (0)

F – Character Font 5- 10 (1) / 5 – 7 (0)

N – Number of display lines 2 (1) / 1 (0)

Note contrast for Display on 2004 boards is fixed to two-line mode.

DL – Set Interface Display Length 8 (1) / 4 (0)

A – Address

BF – Busy Flag – set while the LCD is processing

D – Data

CGRAM – Character Generator RAM

Description

The display on the Digital System boards has a Hitachi 44780 compatible controller. This is one of the more common small LCD controller chips.

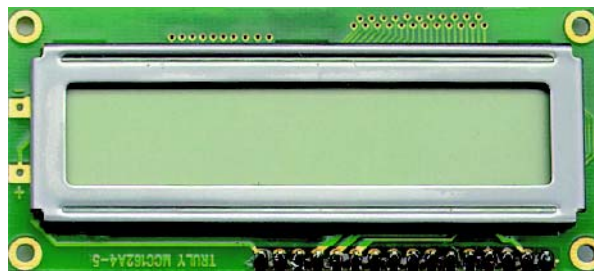
Compatible means it should be the same as the H44780. Some manufacturers may change functions or instructions slightly to avoid having to pay licensing fees, so always refer to the datasheet to avoid frustrating problems.

RS – Register Select Line. When low, data bytes transferred to the display are treated as commands and data bytes read from the display indicate its status. By setting R/S high, character data can be transferred to and from the LCD module.

R/W – Read / Write line. This line is pulled low in order to write commands or data to the module or pulled high to read character data or status information from its registers.

Enable Line – Used to initiate the actual transfer of commands or character data between the module and data lines. When writing to the display, data is transferred only on the high to low transition of this signal. However, when reading from the display, data will become available shortly after the low to high transition and remain available until the signal falls low again.

Data Lines – Pins HDR7 to 14 are the eight data bus lines (D0 to D7). Data can be transferred to and from the display, either as a single 8-bit byte or as two 4-bit nibbles. In the latter case, only the upper four data lines are used. This 4-bit mode can be beneficial when using a smaller micro controller as fewer input / output lines are required.

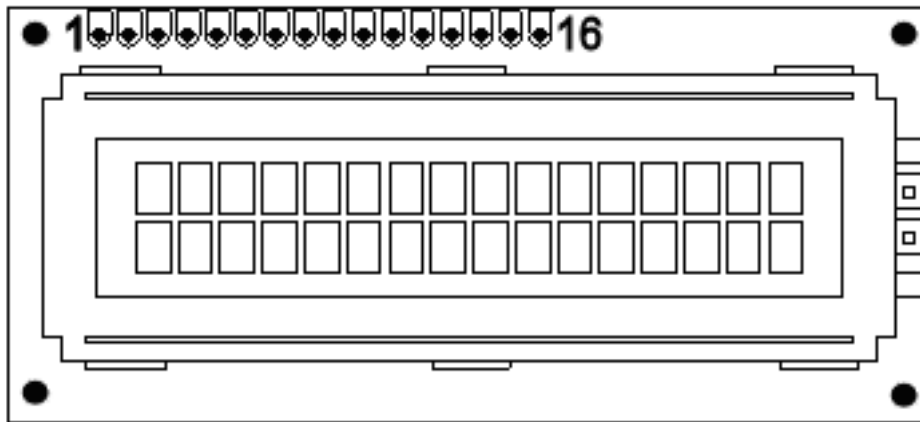


16x2 LCD Module. Front View



16x2 LCD Module back view.

Controller is under the black spot.



Mechanical Drawing.

DISPLAY DATA RAM ADDRESS MAP

| | | | | | | | | | | | | | | | | |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Characters | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| First line | 00H | 01H | 02H | 03H | 04H | 05H | 06H | 07H | 08H | 09H | 0AH | 0BH | 0CH | 0DH | 0EH | 0FH |
| Second line | 40H | 41H | 42H | 43H | 44H | 45H | 46H | 47H | 48H | 49H | 4AH | 4BH | 4CH | 4DH | 4EH | 4FH |
| Characters | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |

References

Datasheet Truly LCD MODULE MTC-C162DPRN-2N Version: 1.0 Jul 22, 1998
Downloaded from http://www.crowcroft.net/kitsrus/lcd16x2_nobl.zip on the 15.01.2004 at 15:00

Website Peer's LCD Pages
<http://home.iae.nl/users/pouwweha/lcd/lcd.shtml> downloaded on the 15.01.2004 at 15:00