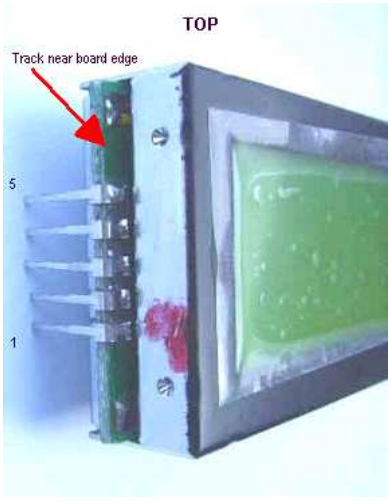
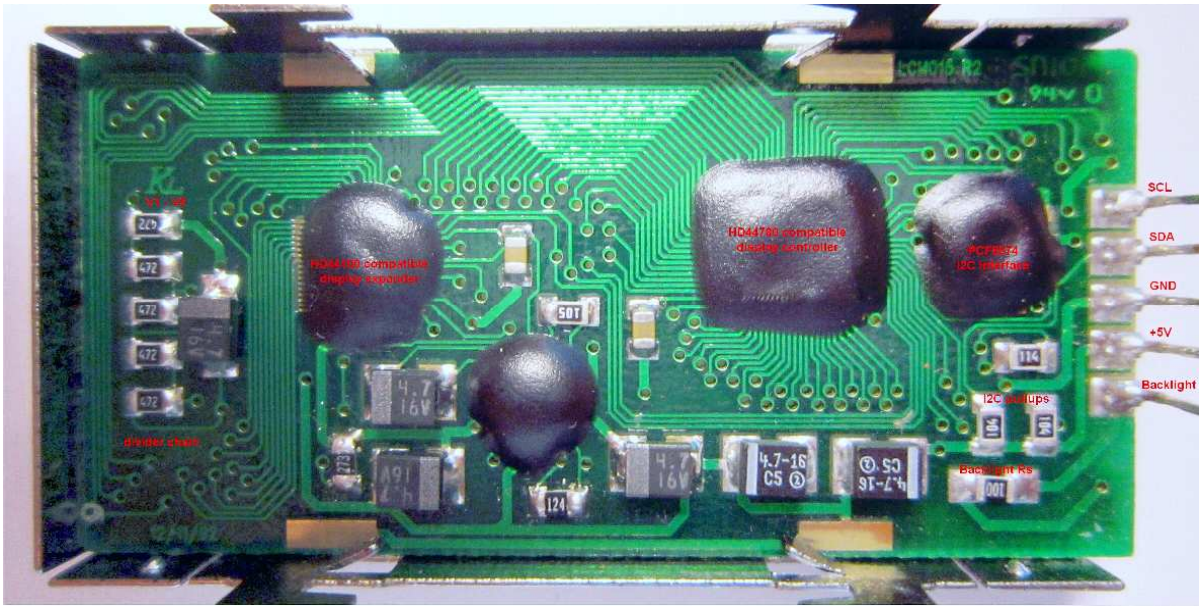
# LCM 015 - LCD module with controller PCB

- I2C interface
- Fully enclosed in tin plate housing.
- 10 column x 2 line character matrix LCD display surface 45 x 18 mm.
- Backlit
- Believed to be from DeTeWe Communications GmbH – possibly used in an older telephone.

### Appearance



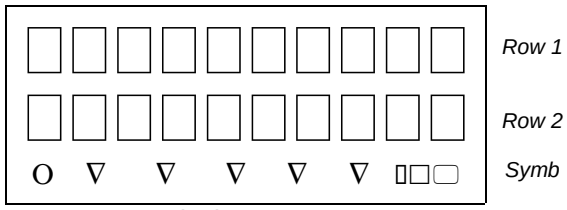



**Recognition**
See pictures above. The tin plate back is smooth and pops into the frame. The model number may be on a label on it, but it is more likely to be totally plain. The red 'blob' is not usually present. The rear has two PCB mounting lugs pointing at each other, on each long side, twist to secure. Inside, the rear of the PCB is marked 'LCM015 R2 SПIOI' along the top edge at the connector end.

**Specifications**

| Pin | Function |
|---|---|
| 1. | Backlight |
| 2. | VCC |
| 3. | GND - housing |
| 4. | SDA |
| 5. | SCL |

*Pinout (top view)*




*Display Layout*

VCC +5 V

Backlight +5 V @ 100 mA ( Vf=4.15 V, Rs=10Ω )
Green/Yellow LED edge lit from top and bottom.

SDA, SCL Standard I2C spec with internal 100K pullups.

*All supplies and signals are with respect to GND*

- The display has 2 rows of 10 dot matrix characters (5x7 font), and from left to right along the bottom edge, a dot **O**, 5 indicator arrows **∇** and a 3 segment battery indicator ▯□▢ mapped as segments in characters 11 and 12 of the first row.
- To light the backlight apply +5V to terminal 1 with respect to the ground at terminal 3.
- External pull-ups will be required for higher bus speeds.

Between the actual LCD screen, which uses a standard HD44780 LCD controller, and the module's built-in I2C interface adapter which uses a standard PCF8574 I2C I/O expander to convert the parallel bus to serial I2C, there are the following interconnections:

| **PCF8574** | <-> | **HD44780** |
|---|---|---|
| P0-P3 | : | DB4-DB7 |
| P4 | : | RS |
| P5 | : | RW |
| P6 | : | E |
| P7 | : | Not Connected |

The PCF8574 is hard wired at I2C address 0x4E.

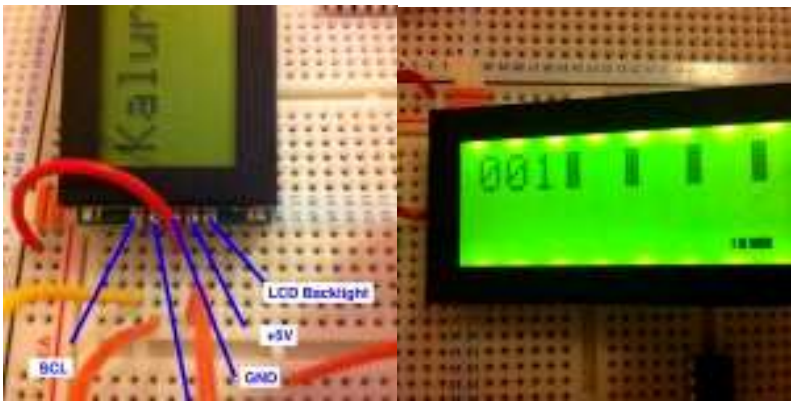
More Data for HD44780 and PCF8574 may be found at http://www.datasheetarchive.com/
You will find an introduction to the I2C bus on Wikipedia.

Note: You can send the PCF8574 a continuous sequence of many bytes prefixed by a single I2C address. Using this technique, the display may be completely rewritten in less than 10ms. You MUST set up the command or data before pulsing E (P6) high so to write one byte to the display will require a minimum of four bytes to be sent to the PCF8574: If you cannot control the delays, extra 'null' (actually repeated) bytes may be required for timing reasons depending on the I2C bus speed.

**Accuracy**
I have measured the backlight current and Vf and have successfully displayed text using the above information. The addressing of the rightmost two characters on each line needs to be determined as it is NOT contiguous with the first eight. Kaluriel's symbol info needs to be checked. *Ian.M (January 2012)*

Kaluriel Hargrove wrote at http://www.lastrayofhope.com/tag/lcm015/

**Maplin LCD with Battery Indicator**




I eventually figured out how to get the OSD elements for the Maplin LCD to appear.
I tracked down which byte needed to be set by just iterating through all 80 bytes and writing 0xFF into DDRAM. Address 10 and 11. The second byte represents a down arrow and the battery indicator.
Next I tried to figure out which bits controls which indicator. After trying every combination I found no pattern to which ones were turned on. So I tried using a custom character using CG RAM, and found the bits that needed to be set.

The first byte in the first custom character, bit 5 represents the second to the last down arrow, bit 4 represents the third from last down arrow, bit 3 is the fourth from last down arrow, etc. To turn off set the byte to 0x00.

The first byte in the second custom character, bit 2 represents the biggest part of the battery indicator, bit 3 in the medium, bit 4 the smallest, and bit 5 is the last down arrow.

For the picture in this post, I have my custom bytes set as follows:

```
0x40: 00000000
0x48: 00000111
```

**Sourcing**

Formerly sold as: OEM part number LCM 015 @ € 3.95 each
from http://www.oppermann-electronic.de (January 2008)

In 2011 it was also found in **some** Kemo S043 “approx. 10 piece LED + LCD Display assortment” grab bags, Maplin NC01CG @ £4.19 which also averaged about 50% single and two digit 7 segment LED displays + some extra ‘half’ digits with an estimated value of £2.50. The rest of the assortment were ‘bare glass’ LCDs and are of little use if they do not have pins. You may also encounter a Futaba multi character or digit Vacuum Fluorescent Display – more useful but quite difficult to drive.

The usual far east IC brokers claim to have stock . . .

***Disclaimer and Updates***

*While I have tries to be as accurate as possible, I am not responsible for any damage loss or injury you or any third party incur as a direct or indirect consequence of reading any part of this document or attempting to implement any part of it nor any advance towards the heat-death of the universe you cause!* **;-)**

*This document is a work in progress, and is currently hosted on the Microchip forums so if you found it there, bookmark it, otherwise try http://www.microchip.com/forums/fb.ashx?m=629777 “LCM015 10x2 Character I2C LCD (HD44780 compatible, PCF8574 I/F) on PIC16F887 in HiTech C” by Ian.M for updates.* ***Ian.M 27/1/2012***