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Cosmic_display

**A 1:3 scale real time representation
of the cosmic ray stand's activity.**

The Cosmic_display represents the cosmic ray stand 5 chambers with two layers each, on a 1:3 scale. It contains 2160 LEDs, as much as there are tubes in the test stand. Data is taken from the data acquisition system by a dedicated PC and send to the display. In this way a real time representation of the chambers' activity is observed.

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http://www.nikhef.nl/pub/departments/et/experiments/atlas/cos_disp/cos_disp.pdf

Introduction

The Cosmic_display shows the activity in the five muon chambers in the test stand at NIKHEF. The 1:3 scale leads to a display of app. 80 * 100 cm. The LEDs are placed on a 10 mm pitch (an MDT tube has a diameter of 30 mm). The display consists out of two parts: a serial interface and the display itself. The serial interface translates the data coming from the PC from RS232 into a serial stream. The start and stop bits are stripped and a shift clock is generated. This is implemented in a 10K10 Altera FPGA, which is also used for generating test patterns without the need of a PC.

The display boards are divided into 3 pcs horizontal and 5 rows vertical. Together they form one large shift register. The 2160 bits from the PC are shifted through these cascaded boards. The baudrate is set to 115.2 kb. Upon a CTS pulse from the PC this data is copied to the output drivers. This operation takes app. 30 ms, which is fast enough for an update rate of 20 Hz.

The PC runs under Linux and spies on the data in the data acquisition system of the cosmic ray set-up. The software can overlay the last 4 events for example. This way a persistence is simulated. Then a translation takes place to map the event onto the display's layout and data is send out through the serial port. To keep the display boards simple (cheap), concessions were done in the logical sequence of the shift registers. The order of the Leds in the system can be seen at page 4.

The LEDs have a wide viewing angle and are driven by 20 mA. The drivers are 32 bit shift-registers plus output-registers with a maximum output current of 125 mA (Allegro UNC5833A).

Switch settings serial interface

1	2	3	baudrate
Off	Off	On	115,200
On	Off	On	230,400
Off	On	On	460,800
Off	Off	Off	921,600

Switch 6:

On: CTS normal (cont. Strobe in test mode)

Off: CTS inverted

Switch 8:

On: normal (serial in)

Off: test mode (pattern generation)

Mechanics

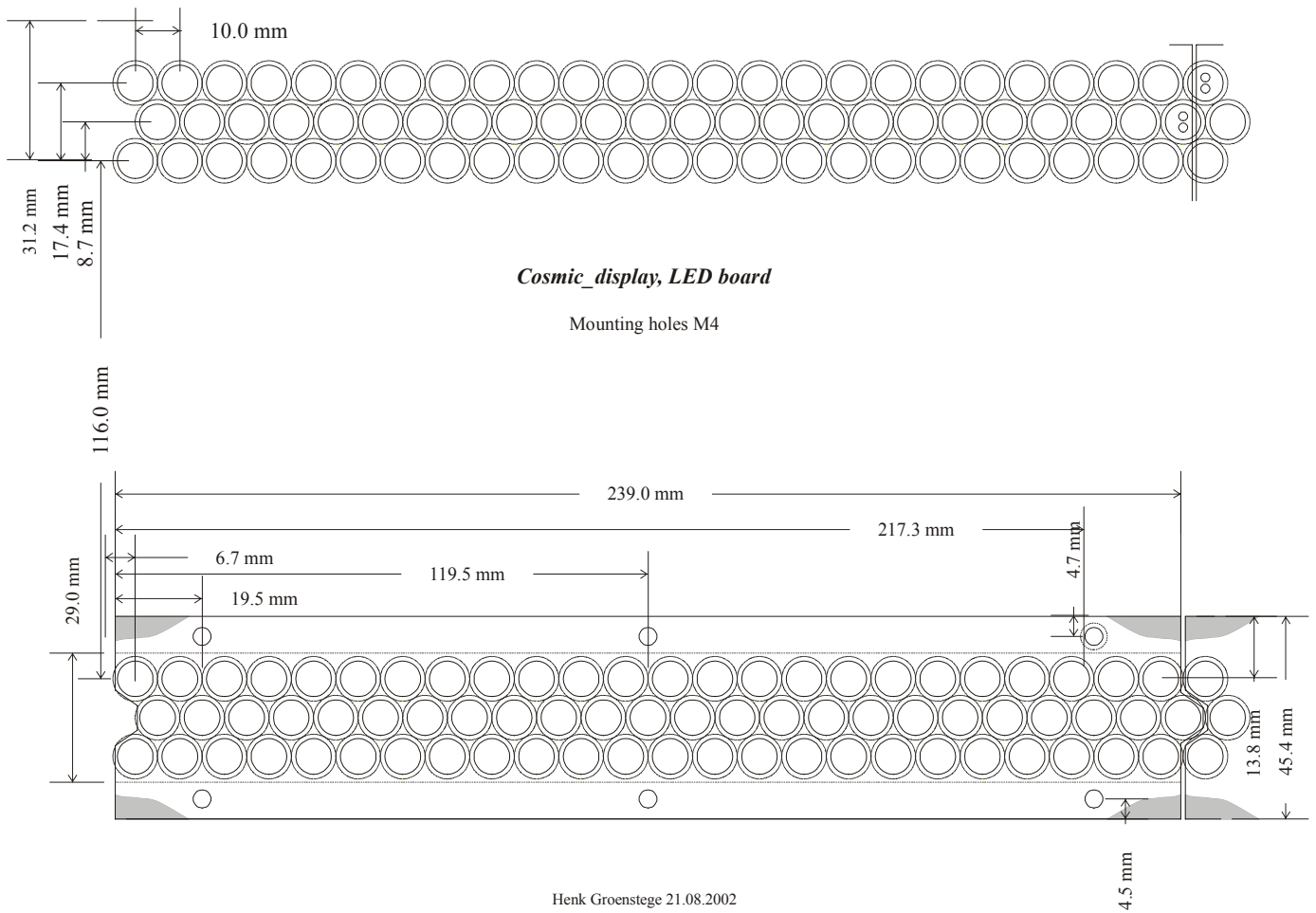


Figure 1: Mechanical dimensions

Click for larger drawing (not to scale):

http://www.nikhef.nl/pub/departments/et/experiments/atlas/cos_disp/cos_disp_drw.pdf

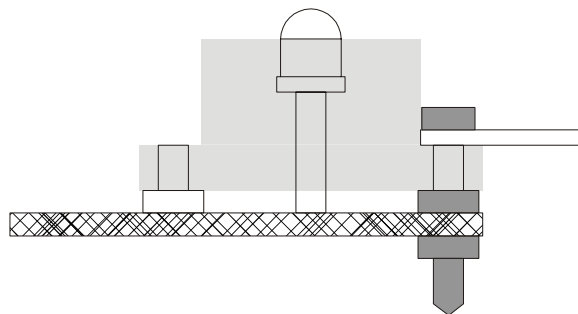


Figure 2: Construction detail 1:1

Logical layout

Viewed from the front of the display.

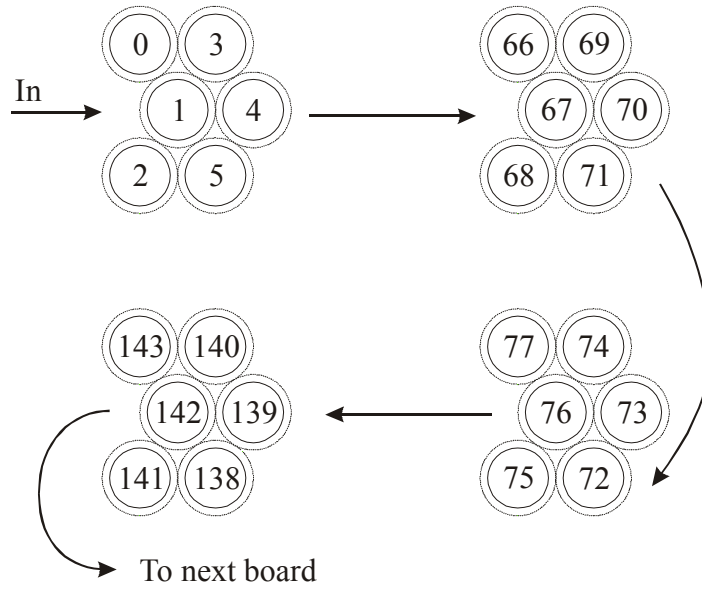


Figure 3: LED order

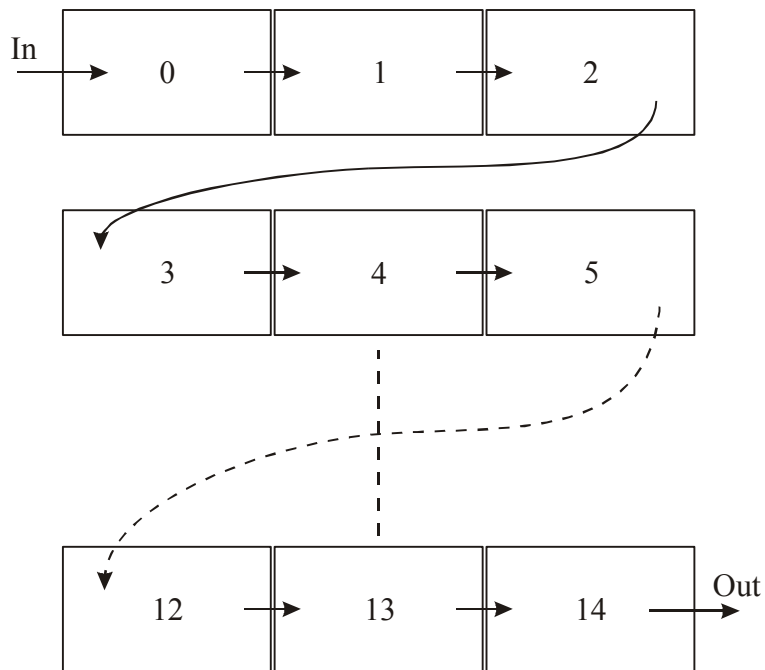


Figure 4: Board order

The output returns to the serial interface.