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APPLICATION NOTE

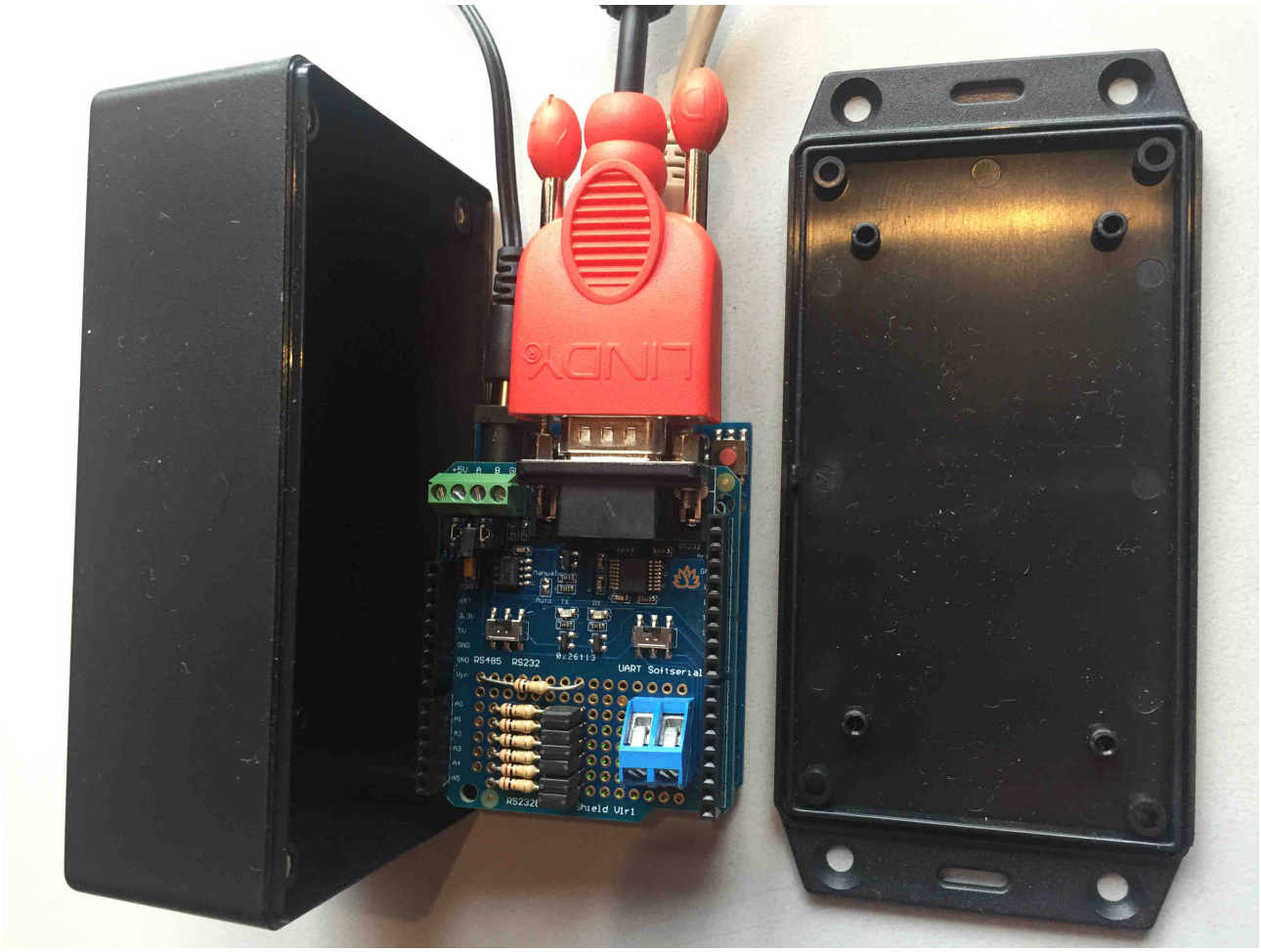
AN-59

OVERVIEW of the EASYdisplay LTD 4 - 20

This note describes the operation of the EASYdisplay ELTD technology operating in the large format, trending data mode to generate a high visibility intelligent display.

The LTD 4 - 20 device is a 1 metre long strip of 30 individually addressable full colour LEDs that display the data from a 4 -20 ma current loop as received.

Each unit has an alarm output, solid state relay that is triggered by user set PCB links for high and/or low set points, and device operation and status is echoed via a USB port for remote monitoring and data logging.



SAME ENCLOSURE AS OUR EASYswitch ES 240-110 and EASYcomms EC-3

CONFIGURATION

The high set point is determined by shorting links labelled A2 – A5 for a range of 0 – F hexadecimal to select one of the top 16 LEDs from LED #30 to LED #15.

The low set point is determined by shorting links labelled D2 – D5 for a range of 0 – F hexadecimal to select one of the bottom 16 LEDs from LED #16 to LED #1.

Fitting a link sets a bit and removing a link is a zero bit, so all links in is address F hexadecimal (decimal 16 – sets LED # 30 for high or # 16 for low) and all links out is address 0 hexadecimal (decimal 0 – sets LED #15for high or #1 for low).

CONNECTIONS

LTD 4 - 20 connections can be made by removing the enclosure lid with a Philips head screwdriver with internal wiring requiring a 3 mm flat screwdriver.

The solid state, normally open relay output is accessed from the 2 pin blue terminal post and when a set point is detected provides a voltage free contact closure..

The 4 – 20 ma connections are to the green 2 way terminal labelled A, B.

USB access is via the USB type B socket on the lower PCB and reports are sent with a serial data protocol of 9600 baud, data bits, no parity and 1 stop bit.

Power is supplied from the DC socket, on the upper PCB, from a 5 VDC 4A *regulated* supply with a *centre positive* 2.1 mm connector.

INITIALISE

Once connections are made, and set points selected by the links, power can be applied and the following sequences will occur.

Reports

If the USB port has been connected to a RS232 terminal handler like CoolTerm, then the following descriptions and status reports will be displayed:

On Power Up

Welcome to the Boolean Engineering EASYdisplay LTD 4 - 20 rev: 27/06/2017
Confirmation that the LTD 4 - 20 is on and the serial connection is operational.
Initialise
Set up and testing of the LTD 4 - 20 begins.

Confirm Model

Number of LEDS = xx
The LED display strip can be various lengths (1 metre standard) and LED densities.
e.g. LTD 4 – 20/30 is a 1 metre long display strip with 30 LED density etc.

Test LEDs

Pixel Colour Test
Test LEDs for operation of the used colours Red, Green, Blue, White and blank.

Setpoints
Read the High set point links
SETpointHIGH = aa
Allocate High set point to the selected LED and colour it White.

Read the Low set point links
SETpointLOW = bb
Allocate Low set point to the selected LED and colour it White.

PROCESSING

Read loop
Once the initialise phase is completed and reported, data display and logging can proceed.
As each value of the 4 – 20 ma loop current is read it is reported for logging as:
LOOPval = cc
If this value is different it is converted to a LED value and displayed and reported as:
PIXval = dd

Display Protocol
Loop data is displayed as follows:
RED for values above the High set point.
BLUE for values below the Low set point.
GREEN for values between the High and Low set points.
WHITE for set points
YELLOW for Loop Fail
BLANK for null values.

Loop Integrity
If the value read from the 4 – 20 ma loop input is less than 4 ma then report:
**********LOOP FAIL***********
Display all LEDs as YELLOW.
Set the ALARM output relay on

Upon detection of a functional loop in the range 4 – 20 ma then report:
**********LOOP O.K.**********"*
Display LEDs as per the normal Protocol.
Turn off alarm output relay.

Set points
If the incoming data value exceeds the High set point selected, the LEDs above that set point will be RED, will flash, and the alarm relay output set to on and reported as:
**********UPPER SET POINT ALARM***********
When incoming data values fall below the High set point selected, the LEDs display as per the Colour Protocol.

If the incoming data value is below the Low set point selected, the LEDs below that set point will be BLUE, will flash, and the alarm relay output set to on and reported as:
**********LOWER SET POINT ALARM***********
When incoming data values exceed the Low set point selected, the LEDs display as per the Colour Protocol.

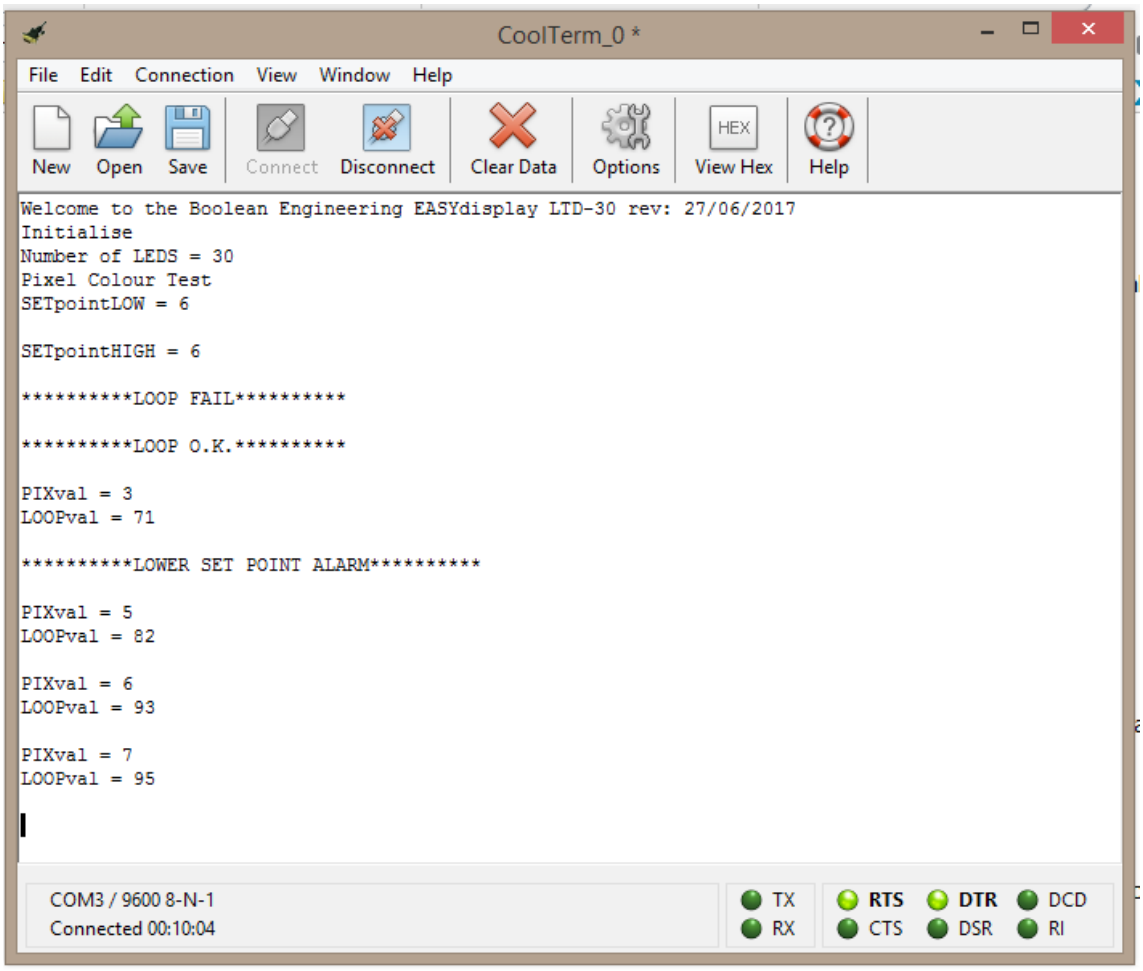
Example
Displaying 1 metre long strip with (left to right) High set point exceeded in Red and flashing, High set point in White,mid range values in Green, Low set point in White and Low range values in Blue.

Screenshot
From a RS232 terminal handler (CoolTerm) showing the commencement of activity monitoring of an LTD 4 – 20 module of 30 LED capacity.

High and Low set points are read from the user selected links and a reading of < 4 ma on the current loop generates LOOP FAIL. After continuous loop monitoring loop current > 4 ma is detected to generate LOOP O.K

First loop reading value of LED # 3 is < Low wet point of 6 so generate LOWER SET POINT ALARM.

Monitoring trending data continuous as long as loop current remains > 4 ma.



RELAY

The on board user controlled, solid state relay has Form A, Normally Open voltage free contacts that are accessed by the blue 2 terminal screw connector.
The contacts are rated as follows:

Peak Load Voltage = 350 volt AC/DC
Continuous Load Current = 100 ma.
Typical ON Resistance = 17 ohm
Typical Maximum Switching Speed = 0.2 ms.