

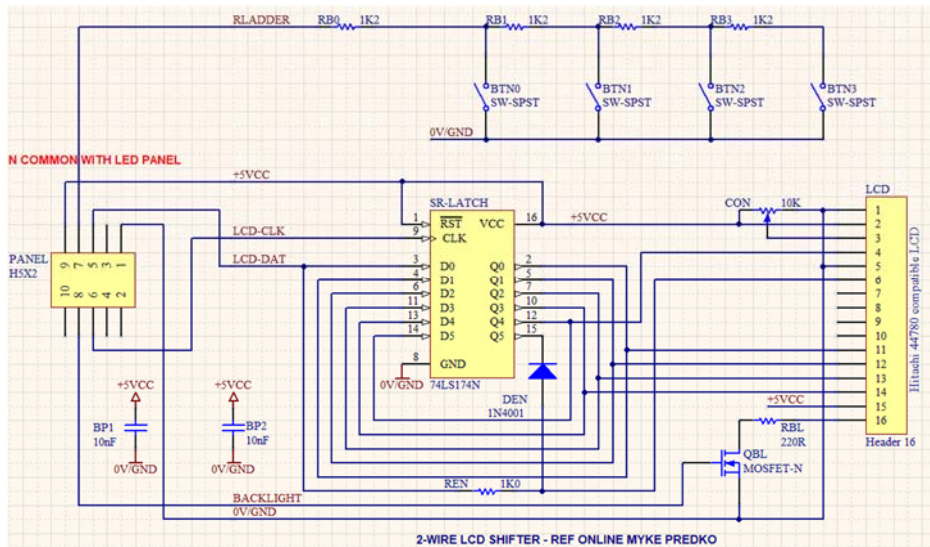
## PART 5 – Adding an LCD/ Button panel-

Two of the nodes require a character LCD and push button panel – which I already have several on PCB etc - from another project I built several years ago



The LCD uses a custom 2-wire serial shift interface, the backlight one more conductor, and the buttons use a fifth. The button stalks are the correct height for plastic caps to protrude through the front panel, and the LCD panel sits just behind.

The *original* LCD-Button PCB schematic is shown below – with the R2R button ladder at the top... the interface connector at the left, and the 20x4 LCD connector on the right.



[Myke Predko's 2-wire LCD serial-latch protocol](https://www.abcelectronique.com/annuaire/montages/cache/2731/liaison-16c84-lcd-a-2-fils.html)<sup>1</sup> is clever. It uses the LCD in 4-bit mode, but the magic is in the recirculating 74LS174 latch – used as a shift register. A *flag*-bit is shifted-in *before* the 4 data bits... when that ripples through to Q5 – it strobbs the next four control & data bits into the LCD.

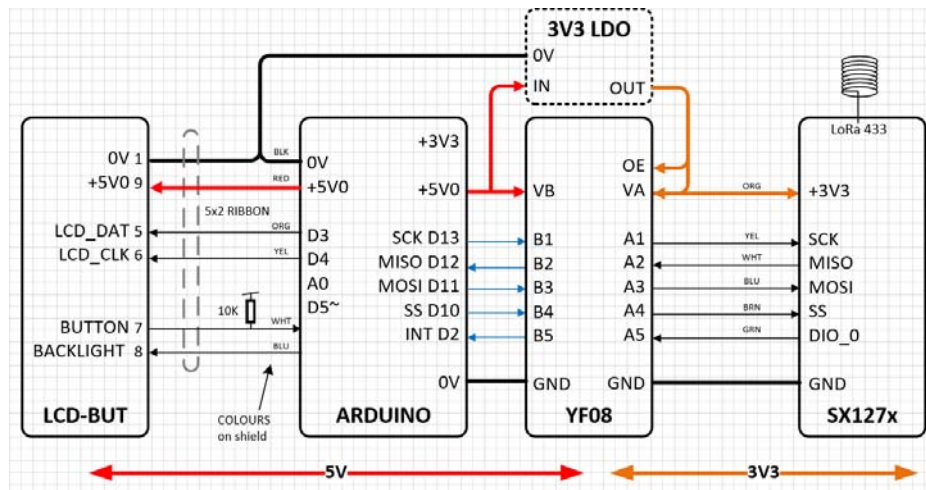
Our interface requires 2-pins for the LCD, the backlight PWM, +5V and ground, plus an ADC *input* for the R2R button ladder. Six wires in total across a ribbon connector for the LCD/buttons<sup>2</sup>.

The R2R button ladder requires a 10K resistor added as a pull-up to the 5V rail on the input pin – this is a fall-back to the design of the original LCD project.

<sup>1</sup> <https://www.abcelectronique.com/annuaire/montages/cache/2731/liaison-16c84-lcd-a-2-fils.html>

<sup>2</sup> To avoid a chance that similar connectors on different devices can't be mis-connected – ensure damaging voltages are presented on 'harmless' pins, or the connectors are pin-blocked/polarised to eliminate accidents.

**(INITIAL wire-up diagram for the 20x4 LCD node)**



***Added the LCD-Button panel at left...***

Yes – it worked first time, but as I was expecting - the UNO started to run out of RAM, so the next effort will be moving the server node in particular - across to an Arduino MEGA.

This has been added to the 'server / payment node to facilitate software development and testing