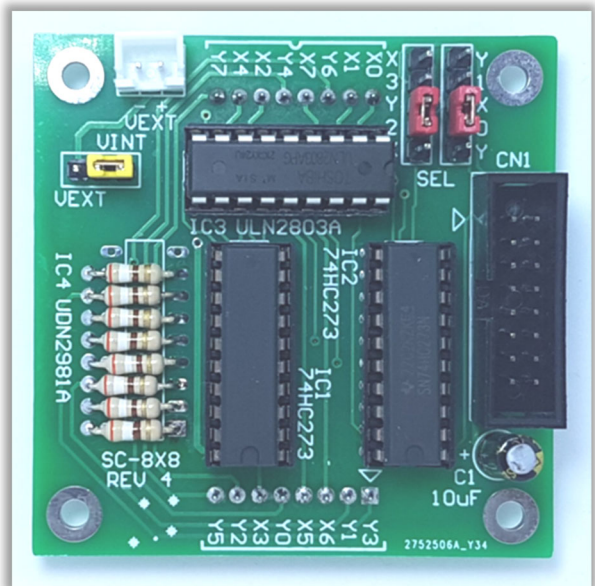# 8 x 8 LED Dot Matrix Display for the Southern Cross SBC

By Craig RS Jones
craigrsjones@gmail.com

Not exactly new, this is a remake of the 1992 version made for the Southern Cross SBC.

A popular add-on for the TEC and Southern Cross SBC (SC) was the 8x8 display, this version updates the 1992 SC design with a new double sided PTH PCB and some minor tweaks;

1. The UDN2981A Source Driver is long obsolete (but can still be found on eBay) so provision has been made to either use it or install current limit resistors or wire links in its place, driving the display directly with the outputs of the 74HC273 latch.

The original design has no current limiting resistors which meant it was possible to overheat and burn out the LEDs unless they were pulsed with a low duty waveform.

Using current limit resistors allows the display to be used statically or with a less than ideal duty cycle waveform if desired without fear of overheating and destroying the LEDs.

2. Each latch can now be connected to any of the 4 I/O select lines available from the SC IO Port via the strapping on the board. This makes selecting the IO port for the three-display hook-up easier.

3. An external voltage source can be connected to the UDN2981A source driver so you can use a greater supply voltage to drive other LED displays, perhaps using two or more LEDs in series.

Construction

Solder the components in the order listed in the Bill of Material, IC sockets are optional, but you should either solder the IC's or the sockets as one of the first steps.

The 'top' of the display is denoted by a small, moulded bump inside the frame of the display.

You can see the top indicator on the PCB silkscreen near the top row of connecting pads. The Pin 1 marker is on the bottom row of the display pads.

The Display is mounted on the Solder side of the PCB. You can just solder the display on but access to the top of the mounting screw holes is then impossible.

I have used machined pin IC socket strip to mount the display and still have access to the mounting holes, the display pins are round so the sockets seem to manage multiple insertions and removals. Put the IC socket strip on the displays to keep them in place for soldering.

Connecting and Mounting

The display is 60mm square, so the PCB is just a little smaller to allow for displays to butt up against one another. The PCB mounting holes are spaced 50mm apart and the distance between the mounting holes of adjacent boards is 10mm. To make it easier to connect boards together I have designed a a small 3D printed 'link', the STL file is provided.

The display connects to the SC IO Port at the top of the board using a 16-way IDC cable, you should try to keep the cable as short as possible, but I have used a 27cm long cable. successfully.

TEC Compatibility

The original TEC 8x8 display has the rows and columns connected with Data Bit 0 at the bottom left for both axes, the SC 8x8 display has Data bit 0 connected to the bottom for the Y axis but has Data Bit 7 of the X axis on the left to make coding bytes for display easier.

To use this SC 8x8 display on the TEC, simply rotate the display 90 degrees clockwise and swap the column/row select lines. An easy mod to the TEC board would be to add a SC style IO port to the spare connector pads on the TEC PCB so you can just plug it in.
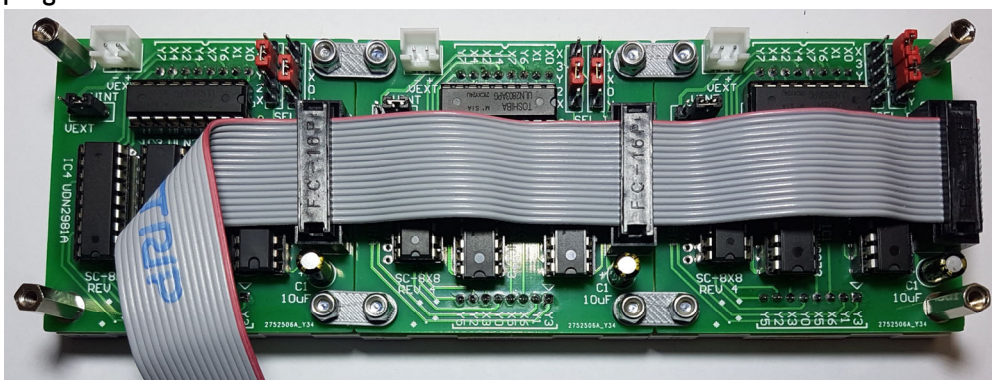
Top 'Bump'
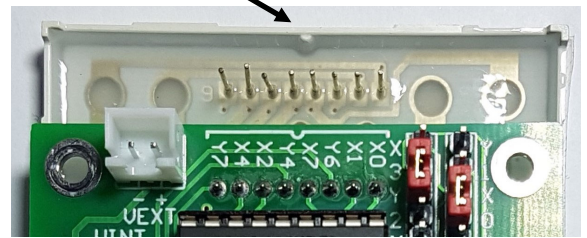
Display mounting orientation
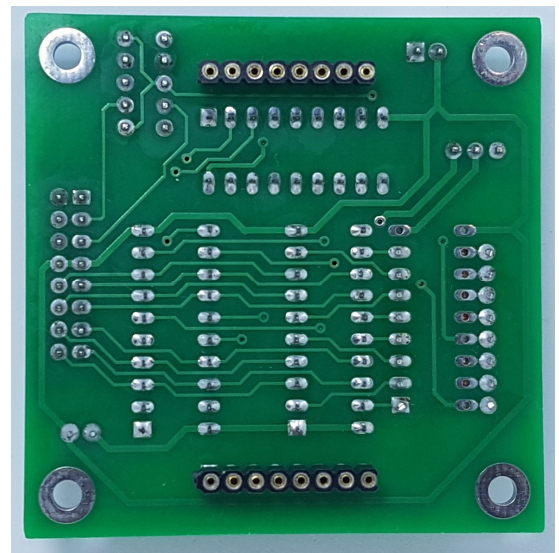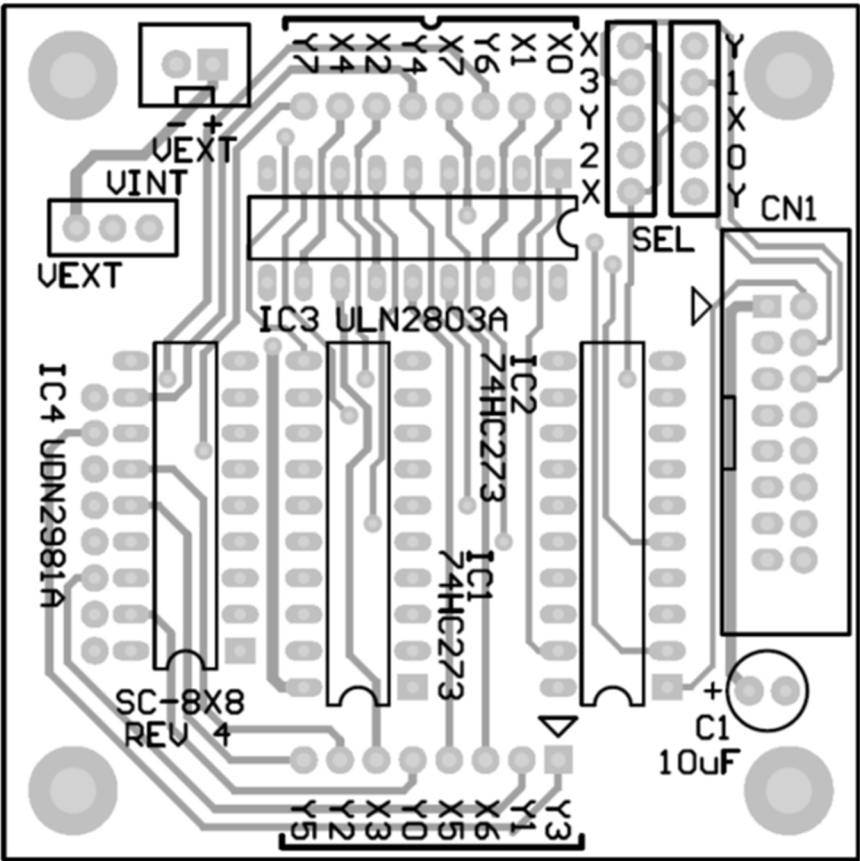

Mounted machined pin sockets

3 connected displays

SC-8X8 Source and Sink Drivers Rev 4
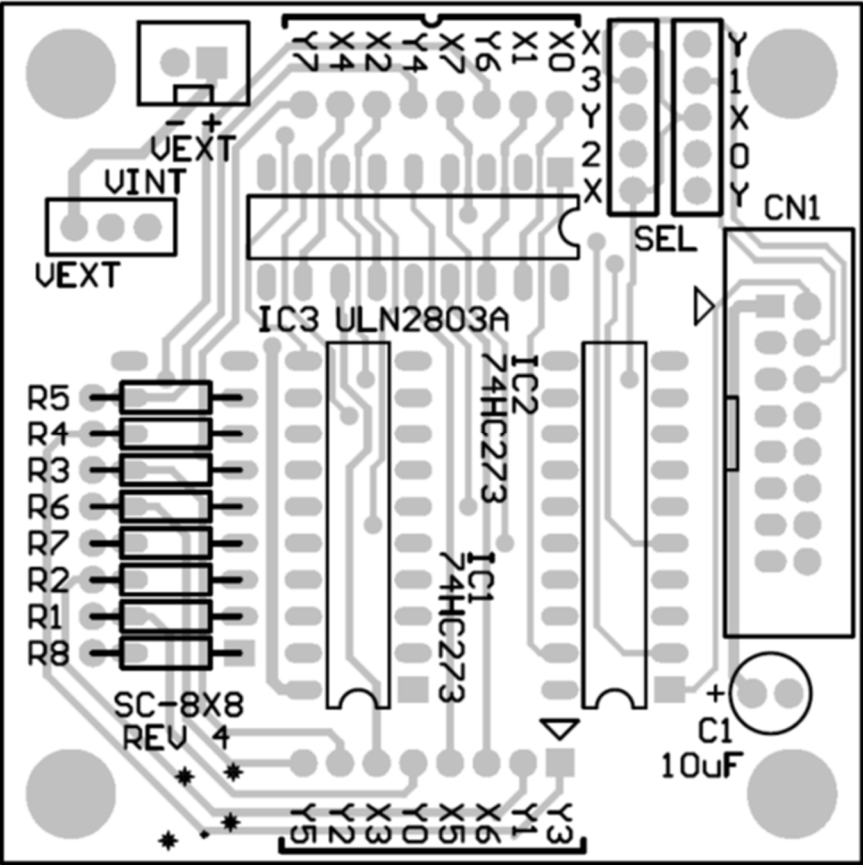
Component Overlay

Bill of Material

Qty	Designator	Description
2	IC1,IC2	20 pin Dual Wipe IC sockets (optional)
2	IC3,IC4	18 pin Dual Wipe IC sockets (optional)
1	CN1	16 way Straight IDC box header
1	'VINT/VEXT'	3 pin 0.1" pitch pin header
1	'VEXT'	Connector 2 pin 2.54mm pitch JST B2B-XH or equivalent
2	SELX,SELY	5 pin 0.1" pitch pin header
1	C1	10uF RB 16vW Electrolytic Capacitors 0.1" pitch
1	LD1	8X8 Display Module (mounted on solder side) 60mm square, 64 x 5mm RED LEDs Common Anode type '2088'
2	IC1,IC2	74HC273 20 pin DIP Octal D-Type Flip Flop
1	IC3	ULN2803A 18 PIN Darlington array
1	IC4	UDN2981A 18 PIN Source Driver
3	'VEXT/VINT', 'SELX', 'SELY'	Shunts 0.1"

SC-8X8 Source Resistors and Sink Driver Rev 4

Component Overlay

Bill of Material

Qty	Designator	Description
8	R1-R8	270R 1/4W 5% Resistor
2	IC1,IC2	20 pin Dual Wipe IC sockets (optional)
1	IC3	18 pin Dual Wipe IC socket (optional)
1	CN1	16 way Straight IDC box header
1	'VINT/VEXT'	3 pin 0.1" pitch pin header
1	'VEXT'	Connector 2 pin 2.54mm pitch JST B2B-XH or equivalent
2	SELX,SELY	5 pin 0.1" pitch pin header
1	C1	10uF RB 16vW Electrolytic Capacitors 0.1" pitch
1	LD1	8X8 Display Module (mounted on solder side) 60mm square, 64 x 5mm RED LEDs Common Anode type '2088'
2	IC1,IC2	74HC273 20 pin DIP Octal D-Type Flip Flop
1	IC3	ULN2803A 18 PIN
3	'VEXT/VINT', 'SELX', 'SELY'	Shunts 0.1"