

Flip Dot Display Build Information

These Luminator Flip Dot displays were acquired on eBay in 2023. The upper display was the first acquisition and consists of two side by side five character boards with each character having a 7 by 5 dot matrix. The lower display was acquired a few months later and consists of three 14 by 21 dot matrices. Both were used on transit busses.

There are two github repositories as the units are controlled quite differently. The first is for the lower display and is called 14x63 Luminator Flip Dot Display. The second is for the upper display and is called 10 Character 7x5 Luminator Flip Dot Display. This later repository is not quite finished and only has the software, schematics and pcb board designs.

While having different arrangements of dots, the displays use the same flip dot mechanisms and magnetic drivers. The upper display has the row drivers located on the board. The lower display has no row or column drivers on the board.



Each display has a small white motion sensor that is used to activate the display. This saves wear and tear and some power when no one is around.

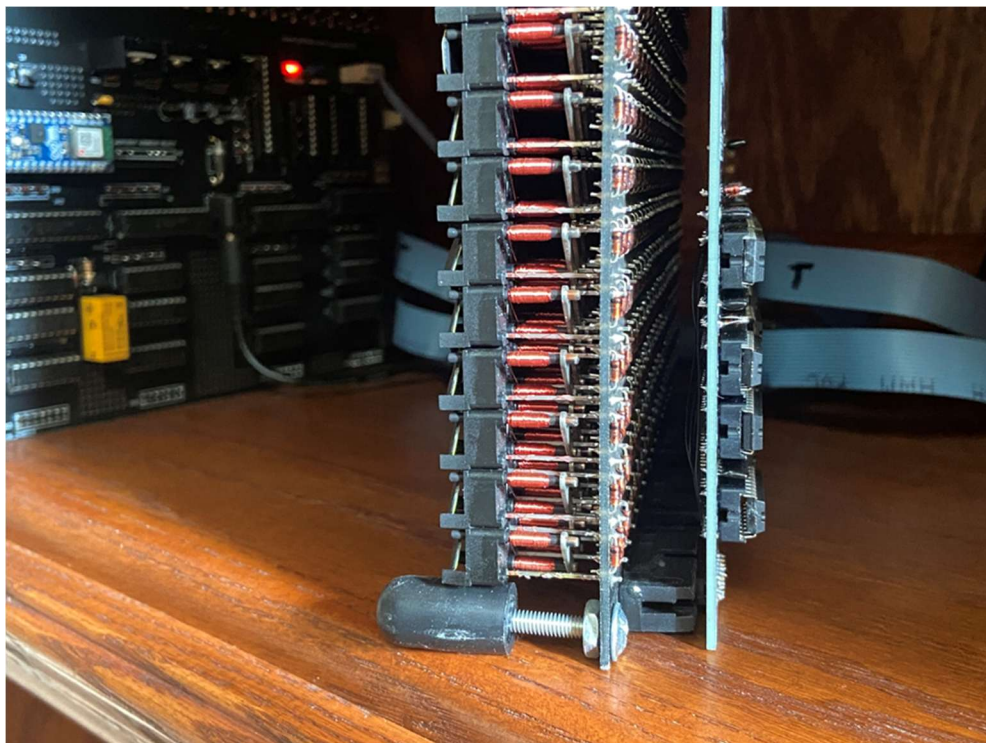
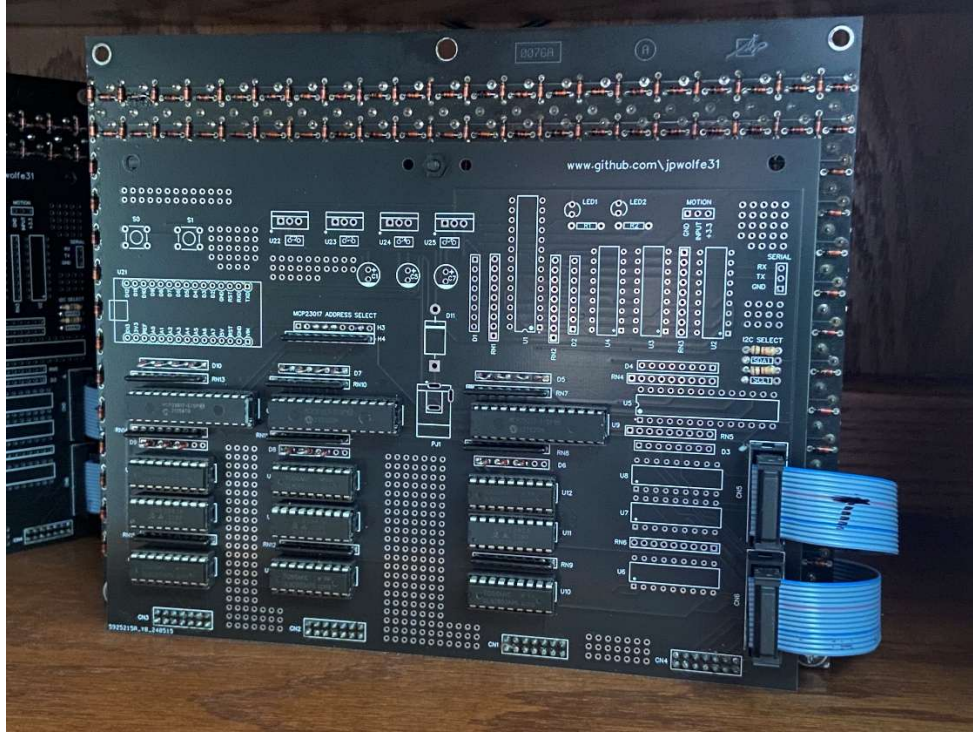
14x63 Driver Boards

The electronics used to control the display are located on the back of the display boards. All of the PC boards are the same and each is attached using the four 14 pin connectors already on the bottom of each display board. The first board has the Nano-ESP32 that controls the entire display. This first board also has both row and column drivers. These row drivers are also used by the other two boards. The second and third boards just have the column drivers for their respective board. The schematic has further details.

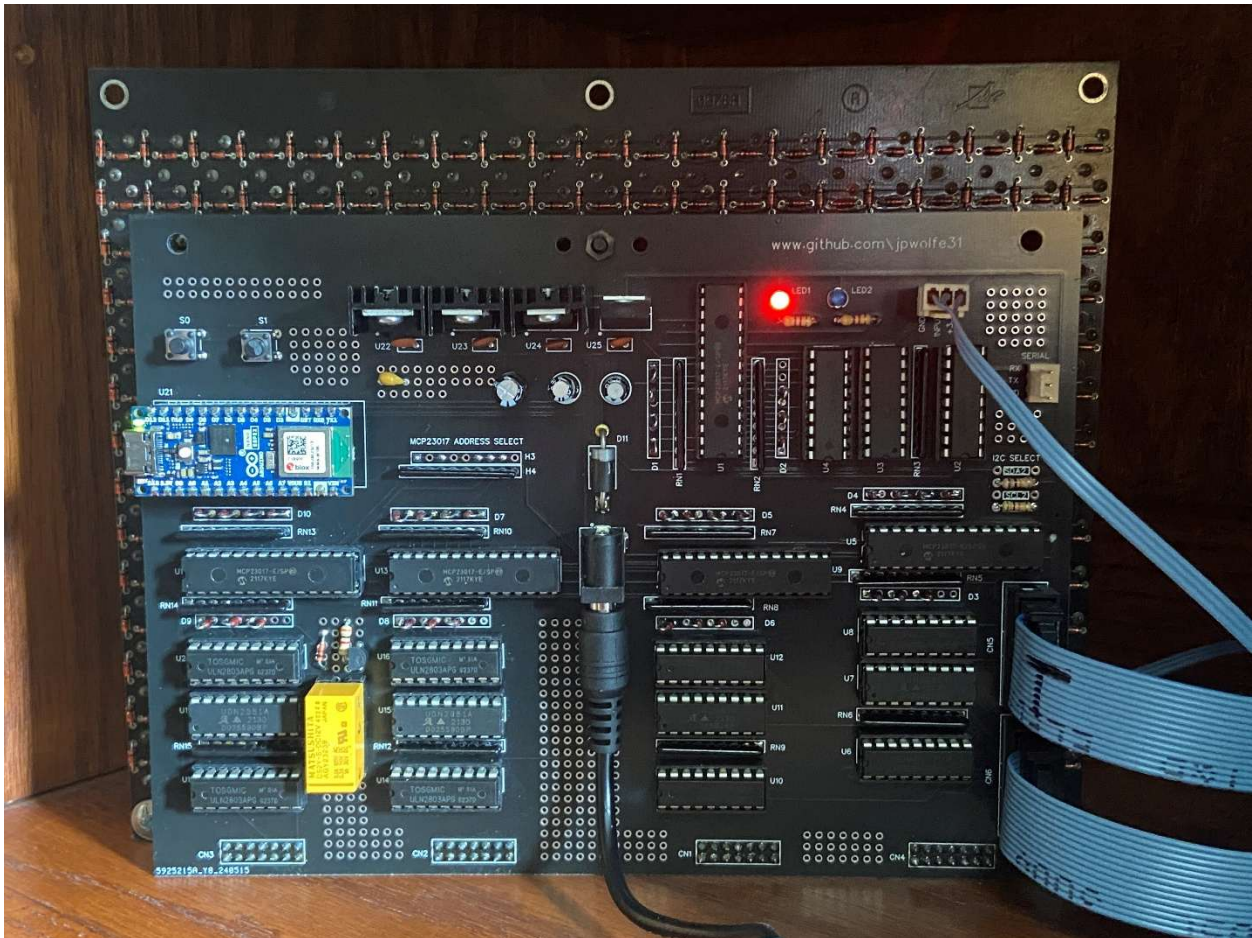
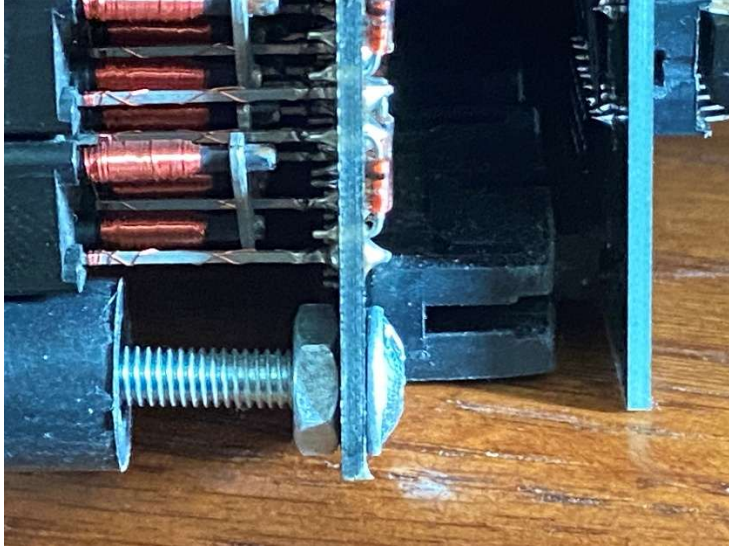


First board that is fully populated with the Nano-ESP32 controller, the voltage regulators, the relay, the row drivers and the column drivers for that board.

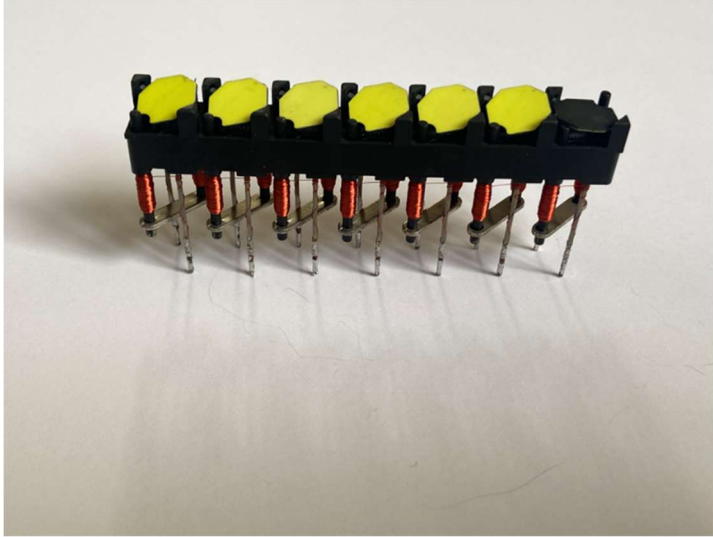
The other two boards (one shown below) just have the column drivers for their own display board.



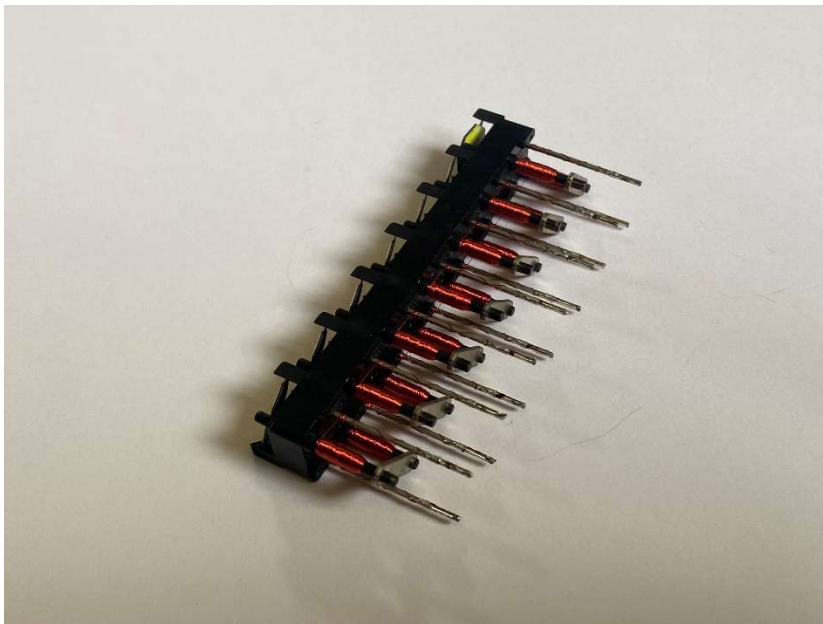
Side view of the board showing the stand created with a bolt and nut and a rubber automotive vacuum plug. The PCB is positioned flush to help prevent the display from falling backwards.



Another view of the main board fully populated. The yellow relay turns the power off to the drivers when not in use.



The flip dots of each display are composed of 7x1 modules that can be removed from the boards if you have the right desoldering equipment and skill. Lacking both, I have never attempted this.



This shows the electromagnet pairs that flip the dots. Reversing current through the two coils flips the respective dot to the other color. This display uses 15V DC at 3 amps and applies a 1 ms pulse through each coil to activate the flip. The dot completes the flip in 60 ms.

The board incorporates the same diode protection scheme used by the designers of the upper 10 character 7x5 display that prevents the board from both sourcing and sinking one side of a coil at the same time.

The boards use MCP23017 i2c output expanders configured with open collector outputs and ULN2803A and UDN2981A ICs for the drivers. The extra ULN2803A was needed to add the diode protection as described on the schematic.

The display is controlled over the internet with the Blynk app for the iPhone.

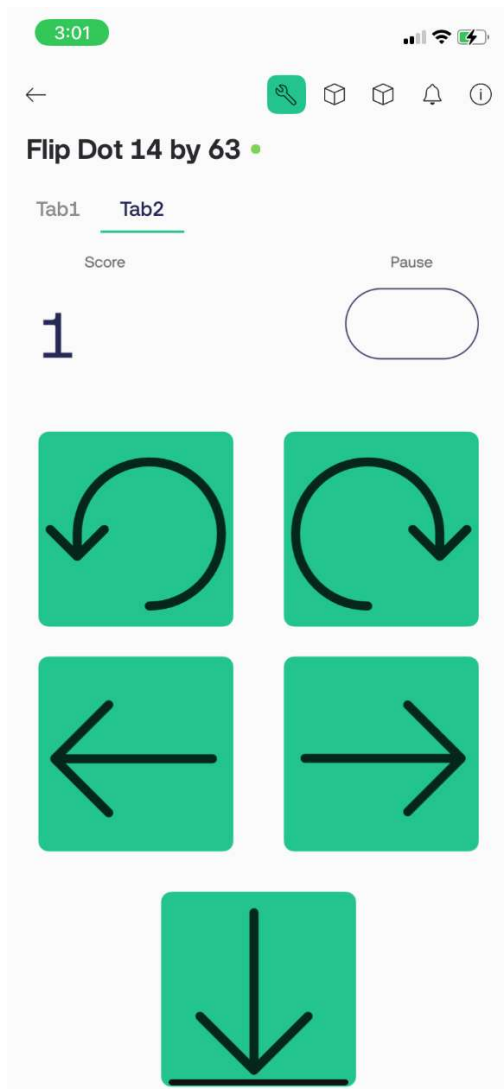


General commands for entering original text and trouble shooting. There are even more under cmdm. See the software for further info. Obviously, this is not a commercial product and the interface has much that is not needed.



Most commonly used commands are accessed with the @ sign. These are for text and graphics already loaded

Keyboard under Tab2 for playing Tetris on the display (sideways of course).



Unfortunately, Blynk is not supporting new makers on its app right now, but I believe this program could be modified to work with the Aurduino Cloud IOT and its messenger and button widgets.

Happy to answer any questions.