VT100 Emulator Assembly
& Operations
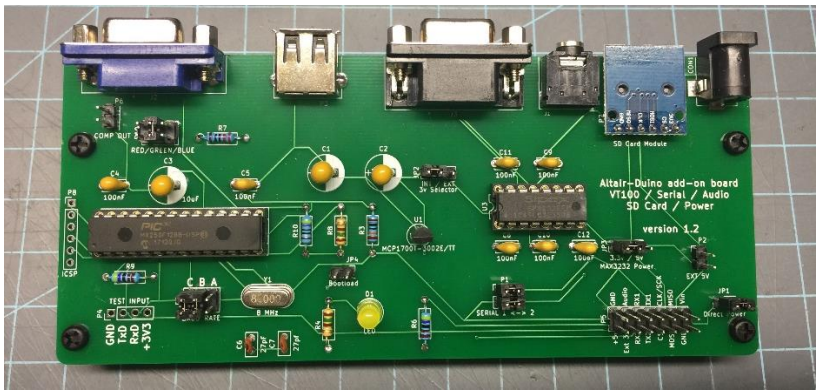
I would strongly suggest comparing the parts you received with the list below. Let me know if you are missing anything and I will send a replacement.

PARTS LIST

- 1 x PC Board
- 1 x 16 pin DIP socket
- 1 x 28 pin DIP socket
- 1 x VGA connector
- 1 x DB9 connector
- 1 x 3.5mm audio jack
- 1 x Micro SD module
- 1 x DC power jack
- 1 x USB-A connector
- 2 x 4.7kΩ resistors
- 1 x 220Ω resistor
- 2 x 150Ω resistor
- 1 x 100kΩ resistor
- 1 x 470Ω resistor
- 2 x 27pF capacitors
- 8 x 100nF capacitors
- 4 x 10uF capacitors
- 1 x 5mm LED
- 1 x 8Mhz crystal
- 1 x MCP-1700 regulator
- 1 x LM7805 regulator
- 1 x MAX3232 IC
- 1 x PIC32 IC
- 1 x Dual pin header
- 1 x Single pin header
- 8 x Jumpers
- 4 x 8mm M-F standoffs
- 4 x Nylon nuts
- 4 x 6mm nylon bolts

OTHER PARTS YOU MAY NEED

- Soldering Iron with a nice fine tip
- Good Solder (I recommend Alpha Fry Rosin Core 0.032")
- De-soldering Iron (optional)
- Phillips Screwdriver
- Needle-nose Pliers
- Side Cutters (Nippers)
- Computer

A word about soldering: Do not underestimate the need for good solder and a good soldering iron. Most problems I've seen people have with this kit are caused by cold joints or insufficient wetting. That does not necessarily mean you have to spend a lot of money. I have had good luck with $8 soldering kits from eBay (however, I do throw away the solder that comes with those…) Just make sure it has an adjustable temperature and comes with an assortment of tips. Right now, I'm using a $55 soldering station

and it works great. I strongly advise you to get quality 60/40 Rosin core .032″ diameter solder (I use Alpha Fry or Kester). The spools I buy are only $10 and well worth it. I set my iron to 400 degrees and use the fine point tip.

In your kit, you will find seven resistors to install with six different values. You will need to identify your resistors with a multimeter, or with the color codes (see resistor-calculator.com for a handy tool.) The locations for the resistors are clearly marked on the circuit board. (If you see a location marked 82Ω on your board, use a 150Ω resistor in that location.)

2 x 4.7kΩ   (Yellow – Violet – Black – Brown)
1 x 470Ω   (Yellow – Violet – Black – Black)
2 x 150Ω   (Brown – Green – Black – Black)
1 x 220Ω   (Red – Red – Black – Black)
1 x 100kΩ   (Brown – Black – Black – Orange)
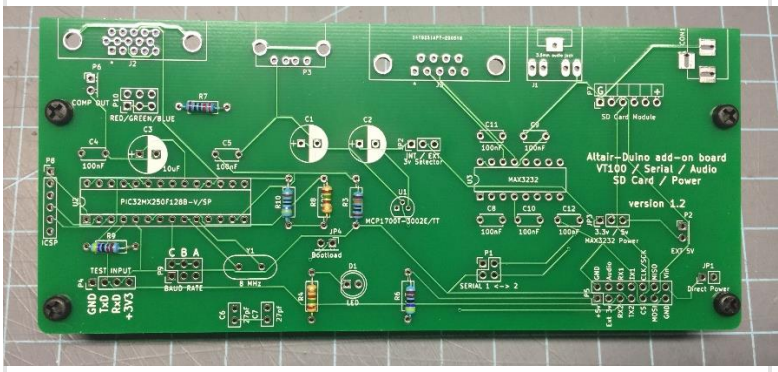
Add the capacitors and 8MHz crystal where marked.
7 x 100nF (marked "104")
2 x 27pF (marked "27")
3 x 10uF (Important: insert long lead in + hole)
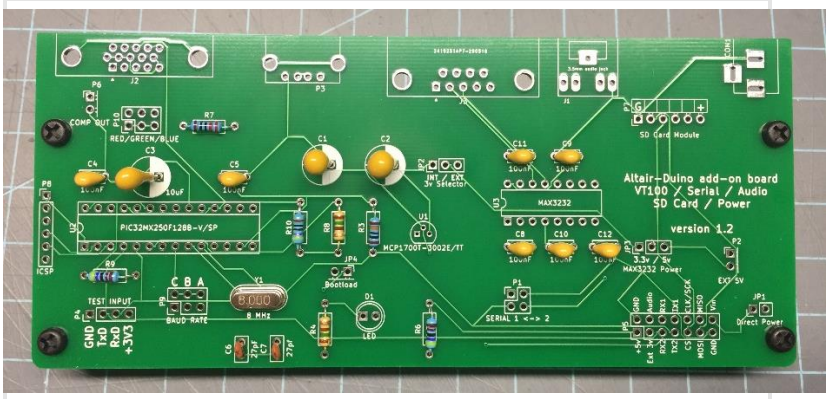
Next add the IC sockets (with the notch oriented to the left) and the single pin and double pin headers.
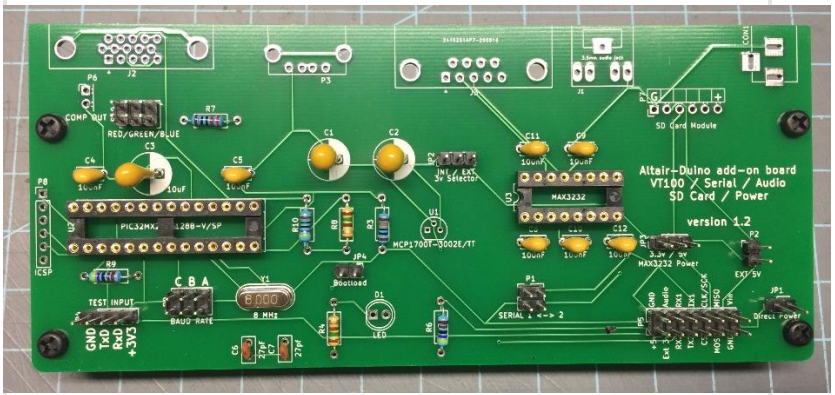
Add the LED (with long lead to the right and flat side to the left) and the MCP1700 voltage regulator with the flat side down.
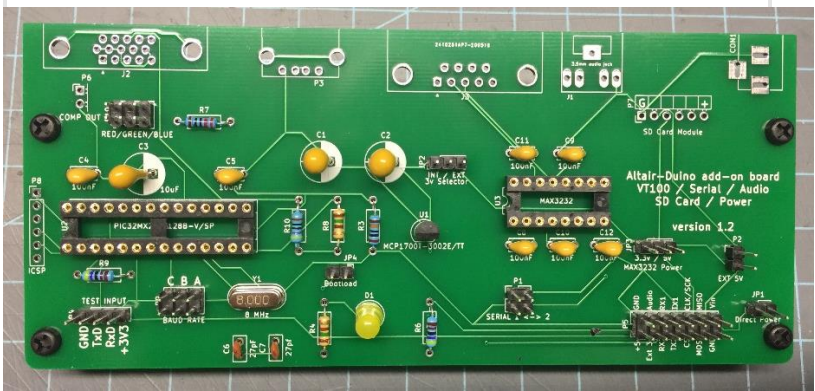
Version 1.3 of the board now includes a 5v voltage regulator (to allow use of a power adapter 9v-12v). Add the LM7805 regulator, 100nF capacitor, and 10uF capacitor to this location:
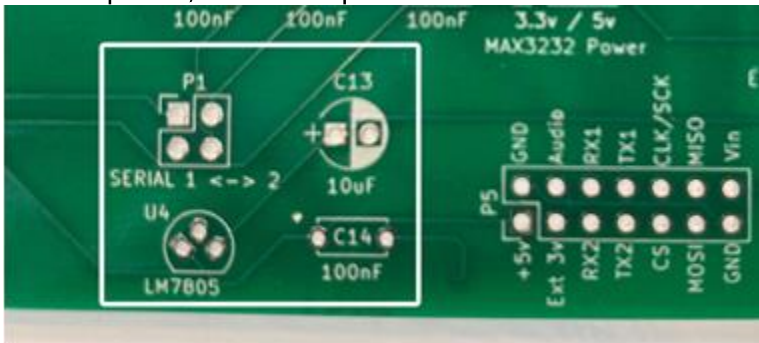
VERY IMPORTANT: If you are going to use this with an Altair-Duino kit (connected with the 14-pin ribbon cable) do not install the above capacitor and LM7805 regulator, and ABSOLUTELY DO NOT jumper JP1 ("Direct Power"). If you do, you will likely fry the board. When used in conjunction with an Altair-Duino, this receives the necessary 5v and 3.3v through the 14-pin cable.

Add the jacks and connectors.
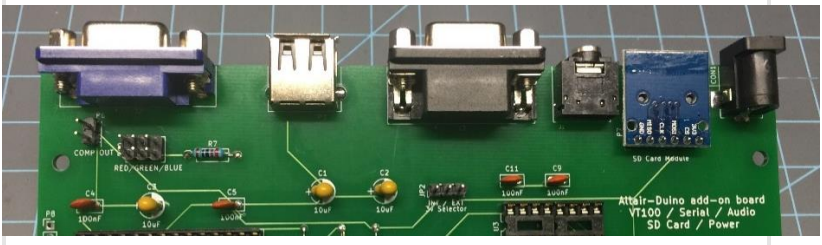
Finally, insert the MAX3232 IC and PIC32 IC with the notch facing left.

Add the required jumpers based on your desired usage.

From upper left to lower right:
Red/Green/Blue: Your choice of text color on VGA monitor, you must jumper one.

3v Selector:
Ext: use the 3.3v returned from the Arduino (when used with the Altair-Duino kit) on pin 3 on the 14-pin connector.
Int: use 3.3v from the on-board voltage regulator.

Baud Rate: Use the following table

Bootload: Jumper this when powering up to enable bootload mode (for programming PIC32.) You will probably never use this.

MAX3232 Power: Typically set to 3.3v. Some cheaper MAX32332/SP3232 chips work better with 5v.

Serial 1 <-> 2: Jumper these pins (left to right) to connect the RS232 port to the VT100 emulator to use as a stand-alone serial terminal emulator:
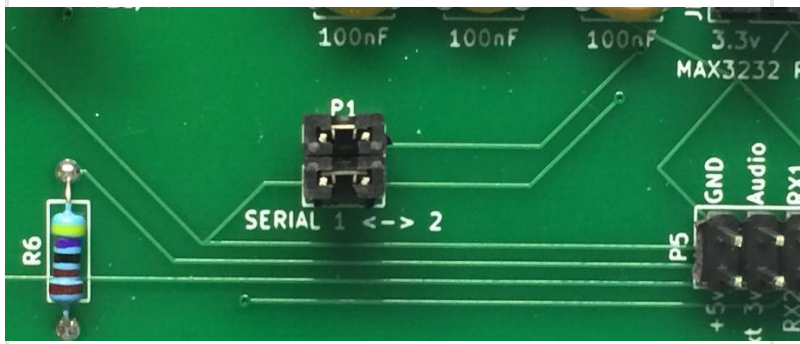
Direct Power: Jumper this to enable power to the board by a 9v-12v adapter plugged into the DC power jack. Typically used in conjunction with the above jumpers. DO NOT jumper this if connected to an Altair-Duino via the 14-pin cable.

The audio jack and SD card reader are wired directly to the 14-pin connector. They are used when connected to an Altair-Duino kit and may be of limited use when the I/O board is used alone.

Operation:

When a key is pressed on the keyboard the ASCII character is sent out on the serial interface Tx line. When a character is received from the serial interface (on the Rx line) it is displayed on the video output.

Normally the device connected to the serial interface will echo any characters received back to the terminal so you can see the character on the screen. But, if you do not have anything connected on the serial interface, nothing will be echoed. So, if you are testing the terminal place a jumper across the Tx and Rx pins (by placing a jumper vertically on the left side of the "Serial 1 <-> 2" jumper block). That way anything you type will be echoed back and you can see the result of your typing on the screen:

The ASCII Video Terminal emulates most codes recognized by the original VT100. A VT100 User Guide can easily be found on the internet.

Setup Menu:

The terminal can be configured with a number of options on the Setup menu. This menu is invoked by using SHIFT- F12 on the keyboard and the menu will be displayed on the video display.

```
                SET-UP MENU

A = Number of lines (for VGA)       (currently 24)
B = Composite output                (currently PAL)
C = Keyboard language               (currently US)

D = Number of bits and parity       (currently 8 NONE)
E = Number of stop bits             (currently ONE)
F = Invert Serial (for RS232)       (currently OFF)
G = Configurable baudrate           (currently 1200)

H = Display start up message        (currently ON)

I = Reset to the original defaults
J = Discard all changes and exit
K = Save changes and restart terminal


     Select item (enter A to K) :
```

In the Set-Up menu you can select the number of lines to display in VGA mode (24 or 36), the type of composite output (PAL or NTSC) and the type of keyboard connected (French, German, US, etc). For the serial interface you can select the number of bits, parity and the number of stop bits.

The configurable baud rate option lets you select the baud rate when there are **no jumpers** placed on the baud rate jumper block. The baud rate can be any number from 40 to 1,000,000 bits per second.

All of these options are permanently saved and recalled at start-up.

USB Keyboard Compatibility:

Any standard wired USB keyboard should work, but you need to avoid using a keyboard with a USB hub. Some keyboards have built-in USB hubs and those will not work either. If your keyboard has one or more USB sockets on it (to connect a mouse for example), or is wireless, then it likely contains a USB hub and will not work. Also, back-lit keyboards most likely will not work. It is best to use a "plain-Jane" wired USB keyboard.

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