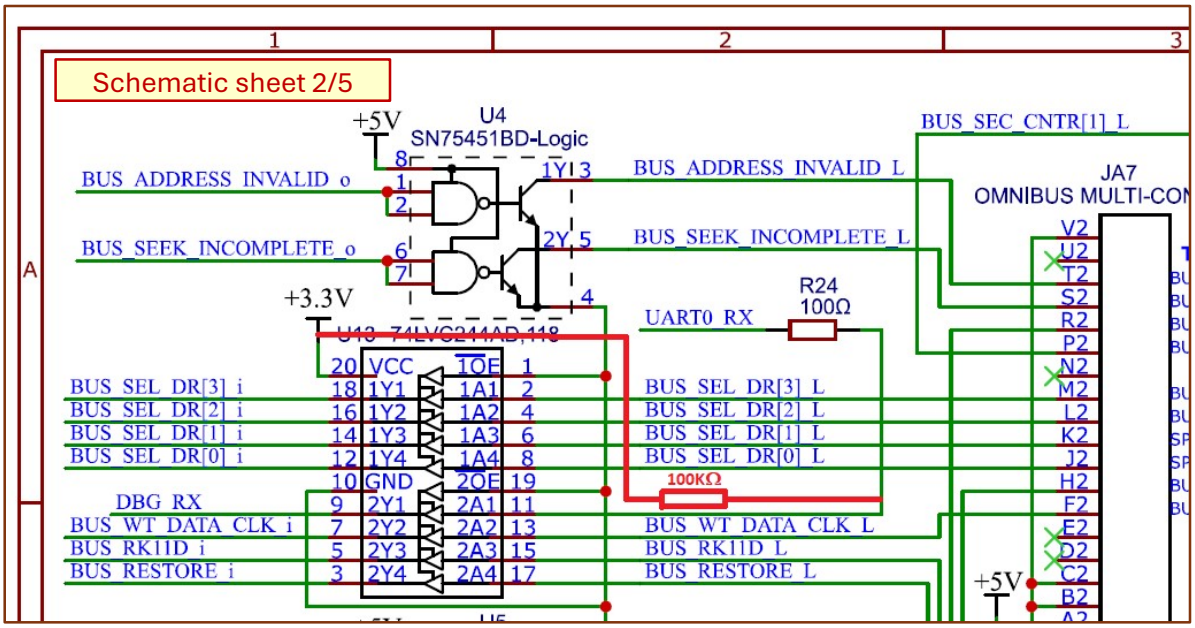
Rework to fix an intermittent boot-up problem (for board serial numbers 11 through 40)

An issue was just discovered that causes the Raspberry Pi Pico controller in the emulator to intermittently not boot up properly. The symptoms are when power is applied, some of the front panel lights are illuminated, the display is blank, and the emulator hasn't booted up fully.

This is caused by coupling of signals onto the debug port serial input which is floating and not properly pulled to a known state when a USB serial cable is not connected to the debug port. The fix is to solder a 100K Ω pullup resistor between the on-board +3.3V supply and the 74LVC244 receiver input for the serial debug port.

The following instructions describe the procedure to attach the resistor to a convenient place on the main board.

A 100K ohm resistor will be connected from U13-11 to U13-20 as shown in the schematic diagram.

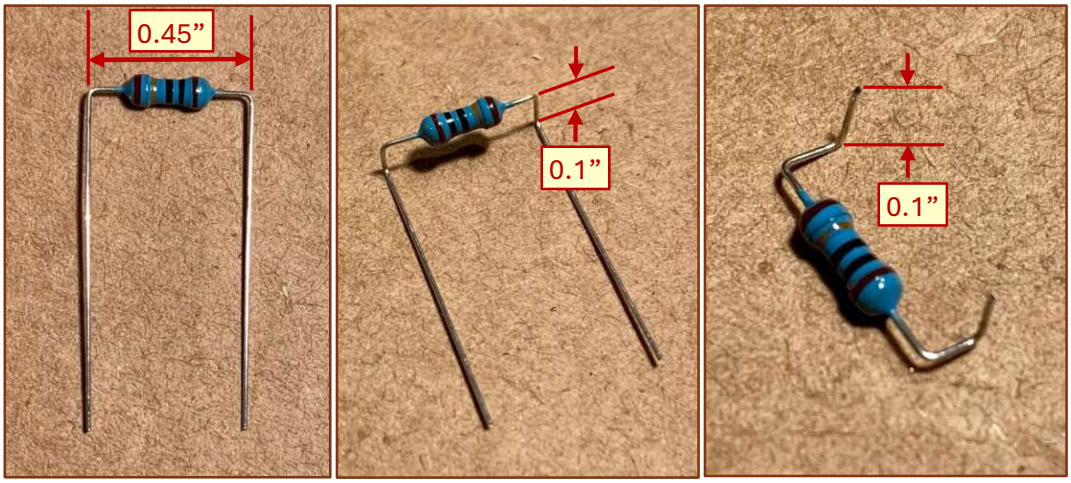


There is a software improvement that prevents the system from locking up due to activity on the serial port input during the boot-up process. It's not required but recommended to install Raspberry Pi software version 2.7 or higher in addition to the rework to add the pullup on the serial port input.

Although the use of software version 2.7 or higher will allow the system to boot properly without performing the rework, the rework is highly recommended because it prevents random characters from appearing on the serial port input during normal operation when a USB serial cable is not attached. The emulator responds to certain one-character commands during normal operation to enable debug logging modes. Inadvertent random characters on the serial input could cause the emulator to enter a logging mode which might change its operating behavior. Adding the pullup prevents this issue from happening.

Recommendation: perform the rework and use software version 2.7 or higher. Main board serial numbers 0041 or higher already have the pullup on the serial port.

Bend the leads of a 100K Ω resistor so that the bent wires are 0.45” apart. Then bend each lead once more and cut, as shown below.



In the following steps we will solder one lead of the resistor to U13 pin 11 and the other to U13 pin 20. For lead-free solder, Sn / Ag / Cu: 99% / 0.3% / 0.7%, use a small pointed soldering tip and set the temperature to about 350°C.

1. Place the 100K Ω resistor, with leads bent, on top of U13.
2. Hold the resistor in-place with tweezers. With a little melted solder on the iron tip, lightly tack one lead first to hold the resistor in place. (If you’re right-handed, it might be easier to hold the tweezers in your left hand and tack the resistor to U13 pin 20 in this step. If you prefer to hold the iron in your left hand then tack U13 pin 11 first.)
3. Next, solder the other resistor lead completely. (There’s no need to use the tweezers to hold the resistor in the step as the resistor is held in place by the action performed in step #2.)
4. Solder the first lead completely that was tacked in place in step #2.