

PI-1 X4 boards : Fix Glitch when using Boston Pinball LED Displays

!!!! READ THIS DOCUMENT ENTIRELY BEFORE BEGINNING !!!!

This document contains instructions on how to fix the problem of short bright artifacts on displays upon power-up and shutdown on Pascal Janin’s **PI-1 X4** boards. In particular, these artifacts are known to burn out the LED segments on **Boston Pinball Company** LED display kits over the long term. As they were released much later after the PI-1 X4, this unforeseen phenomenon was not known at board’s design time.

RELEVANT PI-1 X4 BOARDS VERSIONS

The fix described hereafter consists of 2 modifications (named Mod 1 and Mod 2). These 2 mods were applied successfully by Jon (the author) to the version **2.2** of the **PI-1 X4** board and have been confirmed by Pascal Janin (the original board’s designer) to work with earlier versions **2.0** and **2.1** as well.

If a change is needed but you do not feel confident enough to attempt these fixes / mods yourself, the board can be returned to Pascal for a free fix. Email Pascal beforehand at: **pascalpi1@aol.com**

Versions **2.3** and above do not need those mods, as they are already part of the hardware mods that led to version 2.3.

If you have a **PI-1 X4** board earlier than version 2.0, this fix is not applicable as-is. Don’t do it. Instead, contact Pascal by email for additional assistance on these versions.

FIX DESCRIPTION

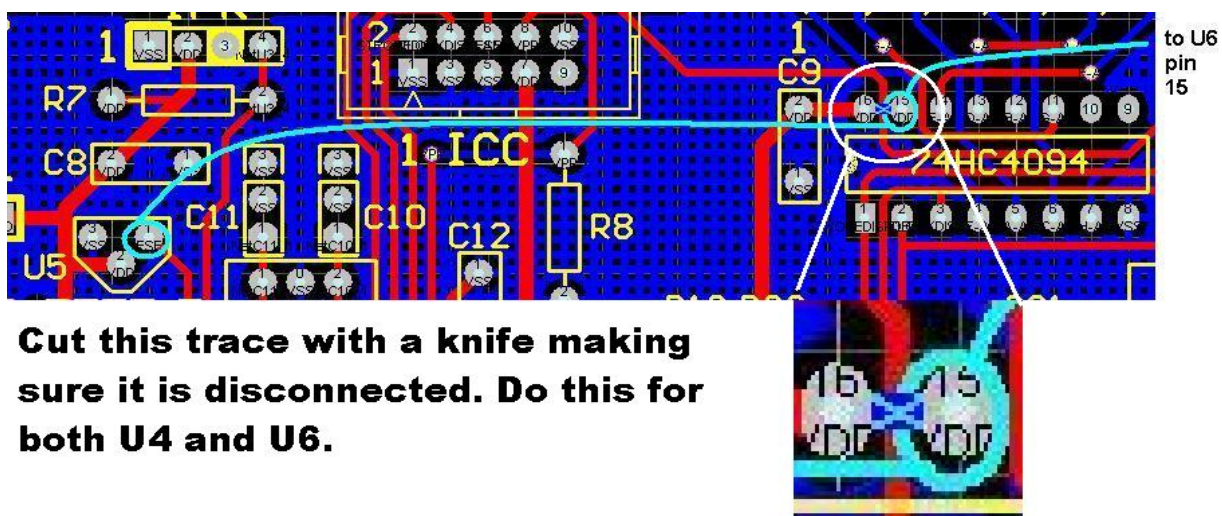
There are two separate fixes / mods to make. Both of these mods must be made on the **back** side (solder side) of the printed circuit board (see figures 1 and 2 below). Making both fixes is recommended to ensure proper functionality, but you can just skip the 2nd mod if time is of the essence.

After each step, always test it using the continuity check on a digital multimeter: it will beep if there is a connection between the two probed points. Some steps require to cut a track, some others require to solder a wire.

First of all, turn your machine off and remove the board, then proceed to fix / mod 1.

1. Fix / Mod 1

Figure 1: The wire tracks on top side of the PCB are shown in red, bottom layer in dark blue, fix / mod in cyan.



Cut this trace with a knife making sure it is disconnected. Do this for both U4 and U6.

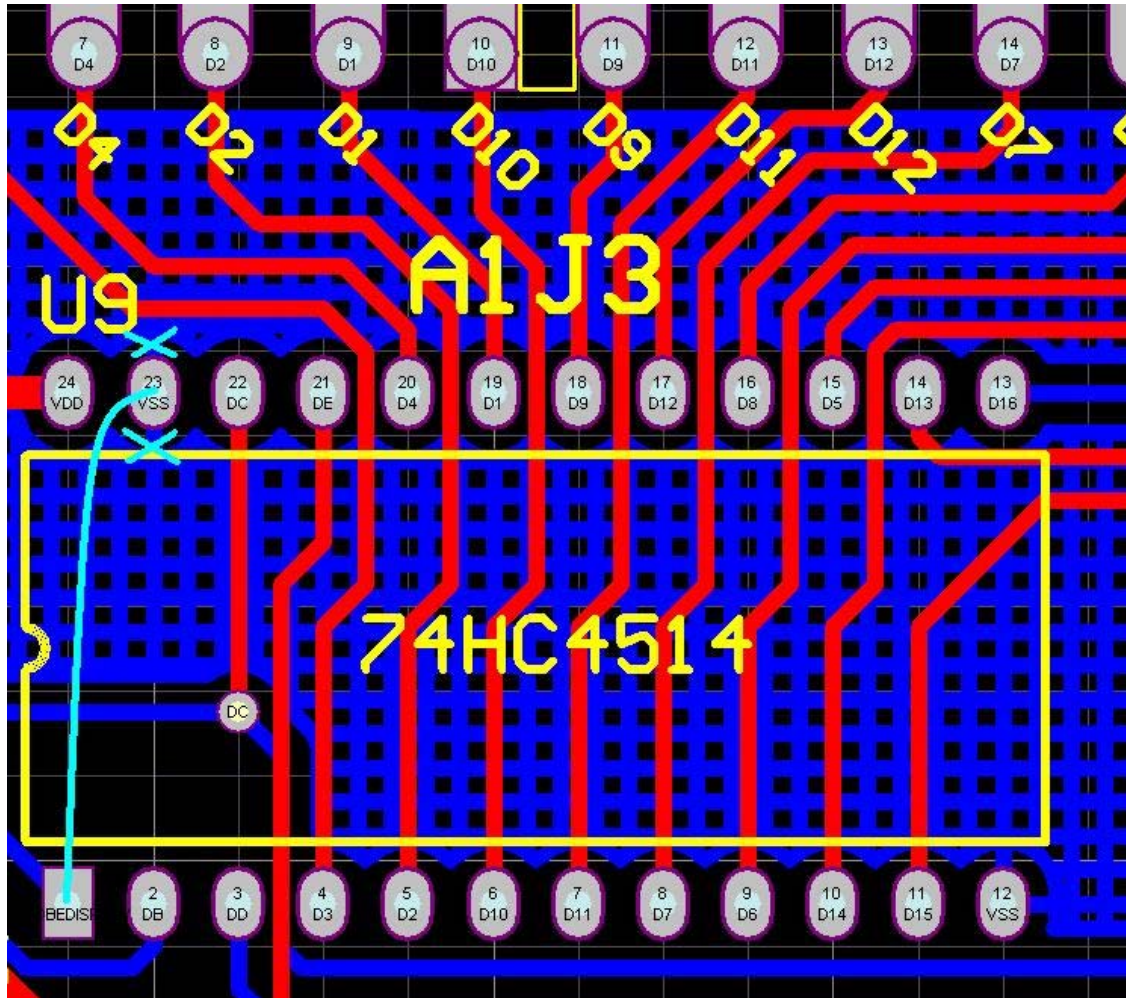
- 1) Follow the track connecting pins 15 and 16 of U4 and U6 (74HC4094, just under A1J2); for now they are connected together then to VDD (pin 16) through a track located on the bottom PCB side (in blue between pins 15 and 16,

marked with an “X” in cyan). You must **cut** this bottom track with a small sharp knife (an X-akto knife works great for this) at “X” location.

- 2) Connect pin 15 of U4 and pin 15 of U6 together, and then to U5 pin 1 (bottom right corner of A1J7) by soldering an insulated wire (single-stranded wire works best) connecting those three points together.
- 3) Proceed to Fix / Mod 2.

2. Fix / Mod 2

Figure 2: The wire tracks on top side of the PCB are shown in red, bottom layer in dark blue, fix / mod in cyan.



- 1) Cut the tracks on the bottom side of pin 23 (two blue tracks with 2 “X” in cyan) of U9 (74HC4514, the biggest chip of the board, just under A1J3) connecting pin 23 to ground, with the same sharp knife to make sure that the pin 23 is disconnected from ground.
- 2) Solder a thin piece of insulated wire (single-stranded wire works best) to connect U9 pins 23 and 1 (labelled “BEDIS” on Figure 2 above) together, on the bottom side of the PCB.

After double-checking both mods, install the **PI-1 X4** board back in the game, plug all connectors back in and turn it on: no glitch should be seen anymore.

DISCLAIMER

This document was written by Jonathan Kammüller and updated by Pascal Janin. Jon is no way affiliated with Pascal nor Boston Pinball Company. He is just a satisfied customer of Pascal Janin's **PI-1 X4** and Boston Pinball Company LED kits. The purpose of this document is to illuminate the above issue and help both of these wonderful people concentrate on other issues at hand.

Warning: Neither Jon, Pascal nor **Boston Pinball Company** will be liable for any damage that you may cause to your **PI-1 X4** board or any part(s) attached to it.

PROCEED AT YOUR OWN RISK!!!