

# 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

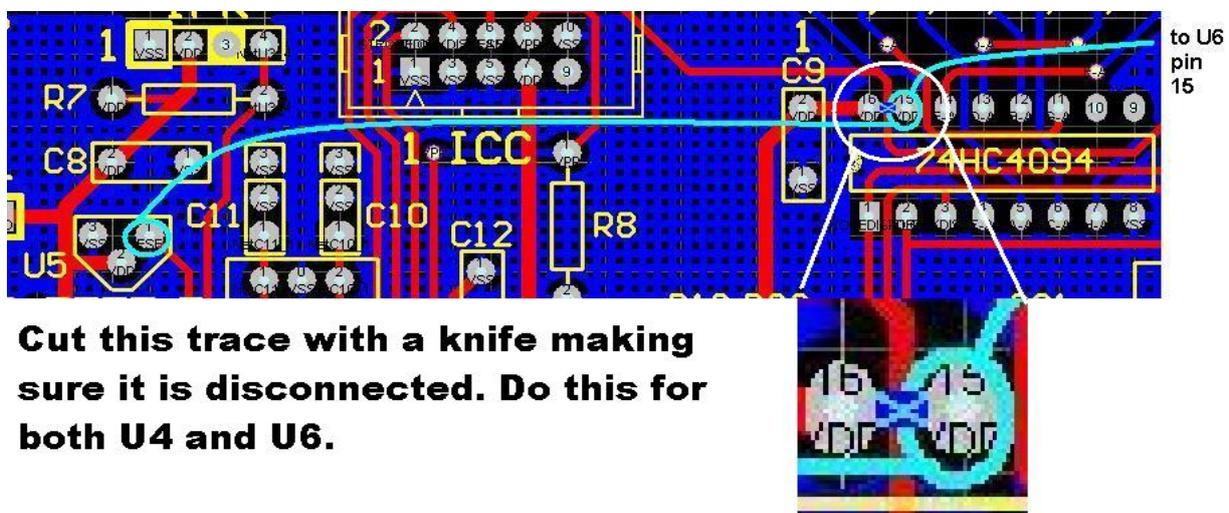
There are two separate fixes / mods to make. Both of these mods must be made on the **back** side (solder side) of the printed circuit board (see figures 1 and 2 below). Making both fixes is recommended to ensure proper functionality, but you can just skip the 2<sup>nd</sup> mod if time is of the essence.

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.



- 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,

