Atari 8-bit (400/800 XL) pictorial fault guide

An excellent guide found at https://8bithardware.wixsite.com/website. Please visit this site for more excellent posts on Open source hardware for Spectrum ZX, Commodore 64 and Atari 8-bit, home computers from the 80´.

When you start debugging, it is handy to have a reference of what is usually displayed on screen with most common faults. This is just a quick guide to help you start out and hopefully give you some ideas. By no means will this help solve all of your problems, but it should cover the most common ones and give you some starting points. I would suggest starting with low hanging fruits (resocket IC etc…).

Black screen

- Note that there is a difference between “no signal” and

a signal but transmitting nothing; both result in a black screen, no signal usually shows some notification on the modern TVs.

- If the board is socketed rather than soldered, you may have some “unseated” ICs. Check to see if RAM, OS Rom, Antic, MMU, PIA (even CPU also) are fully in their sockets. If there is oxidation on the chip legs, reseating (**gently lifting the chip and reinserting them to the socket**) will help make contact again. It’s worth trying multiple times and even removing the IC and cleaning the legs and socket separately, it has helped me on multiple occasions.
- if the screen is still black screen, try this (turn TV volume up):

1.) Power up holding **OPTION** key, wait five seconds, press **SELECT** key once, press **START**
Do you hear the musical notes? If yes, your computer is working
2.) Now press **HELP**, then **SELECT**, the **START**
Press different keys randomly, do you hear the keyboard BEEP?
These are good signs that your Atari is fundamentally OK.

- power supply may be a problem – it may not be supplying 5v. You’ll need to try another PSU or check voltages on your existing one with a multimeter. Check the power pinout here.
- are you using RF/monitor output?

-if RF, do you have a little channel switch next to the RF output lead? try repeatedly moving it back and forth – it can get dirt inside and cause bad contact.
-try a monitor cable – these are fairly standard these days and are monitor to scart/RCA/S-video cables

- try booting with a Star Raiders game cartridge in the cartridge slot

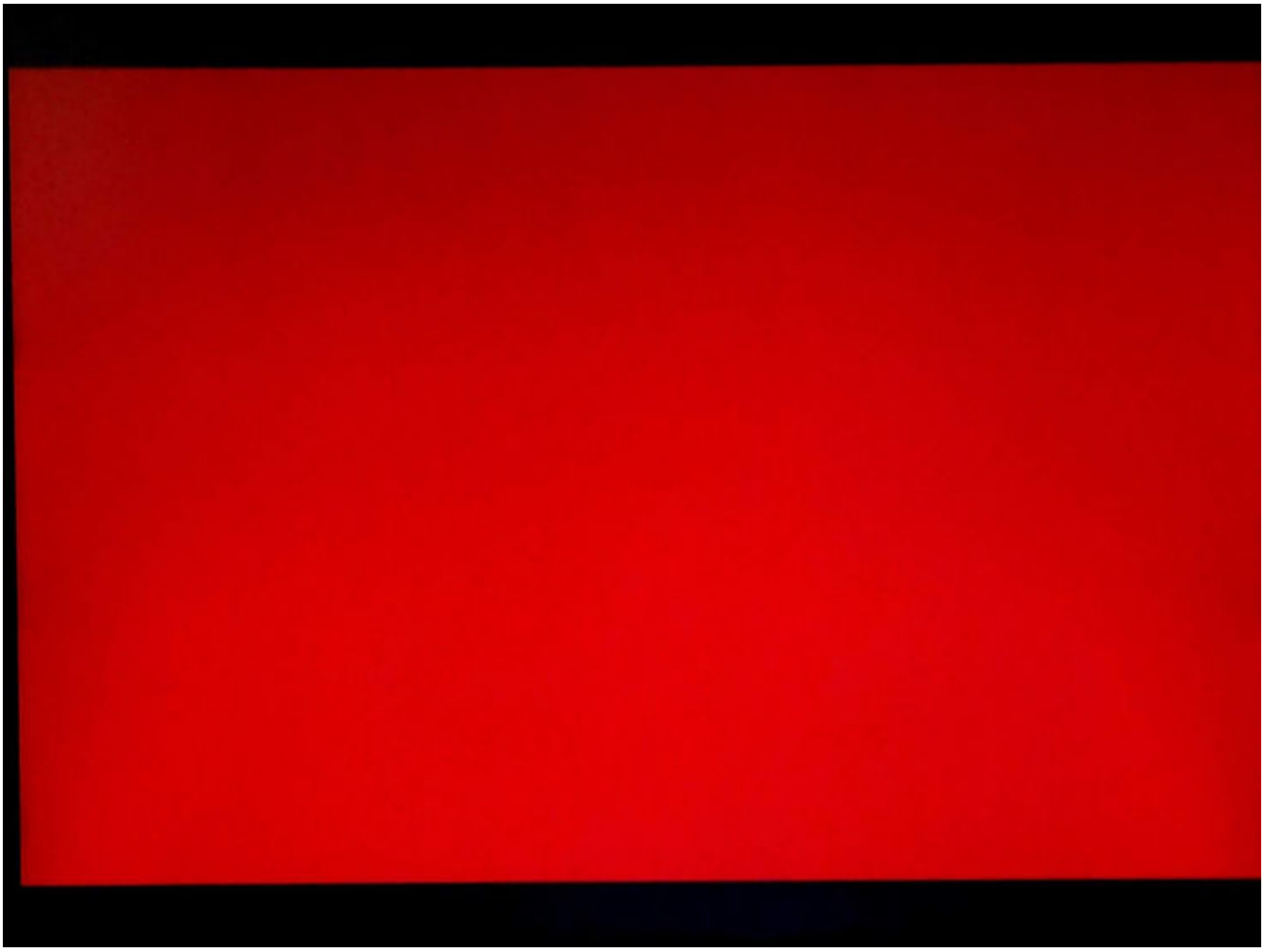
Star Raiders cart runs a diag on Antic, CPU and GTIA/CTIA so if Star Raiders works then ALL three should be good
If the game runs, it narrows your issues down to PIA, OS Rom, MMU or RAM (First 8k of RAM must be ok for this to work)

- leave machine on for ten minutes, are any ram chips “overheating”? Also check voltages on different chips. **Hot RAM chips usually mean they are defective.**

- It could also be trivial stuff like, oxidized power switch, cracked power connector and similar things that could prevent power reaching the components.

- There is a capacitor in the left-rear corner, nearest the power switch. (power filter cap) Remove this capacitor and test. If you get a working machine, replace the capacitor with one of the same value and of the same or greater voltage. IIRC it is a 470mf 16v radial lead electrolytic. (Jeffrey Worley on FB group)

Red screen



Powering up, if the screen stays a static red color, this means the OS can’t initialize and plenty of things could cause it:

- failed CPU
- bad ROM
    - Remove the BASIC ROM for testing as the machine does not need it to start up.
-bad RAM
- bad, but not compleately dead ANTIC (video coprocessor)
- MMU
- Or it could be something as simple as one of the 7400 series logic chips (on 800XL: U2-5, U18, U19, U28, U30)

If you don’t have a logic analyzer, scope or logic probe, your only real option is to swap IC chips with known good ones or try to clear the legs of any oxidation. You can also check OS and BASIC ROMs in an EPROM burner with the “Verify” feature.

For more advaced users, you can also try the bellow steps that

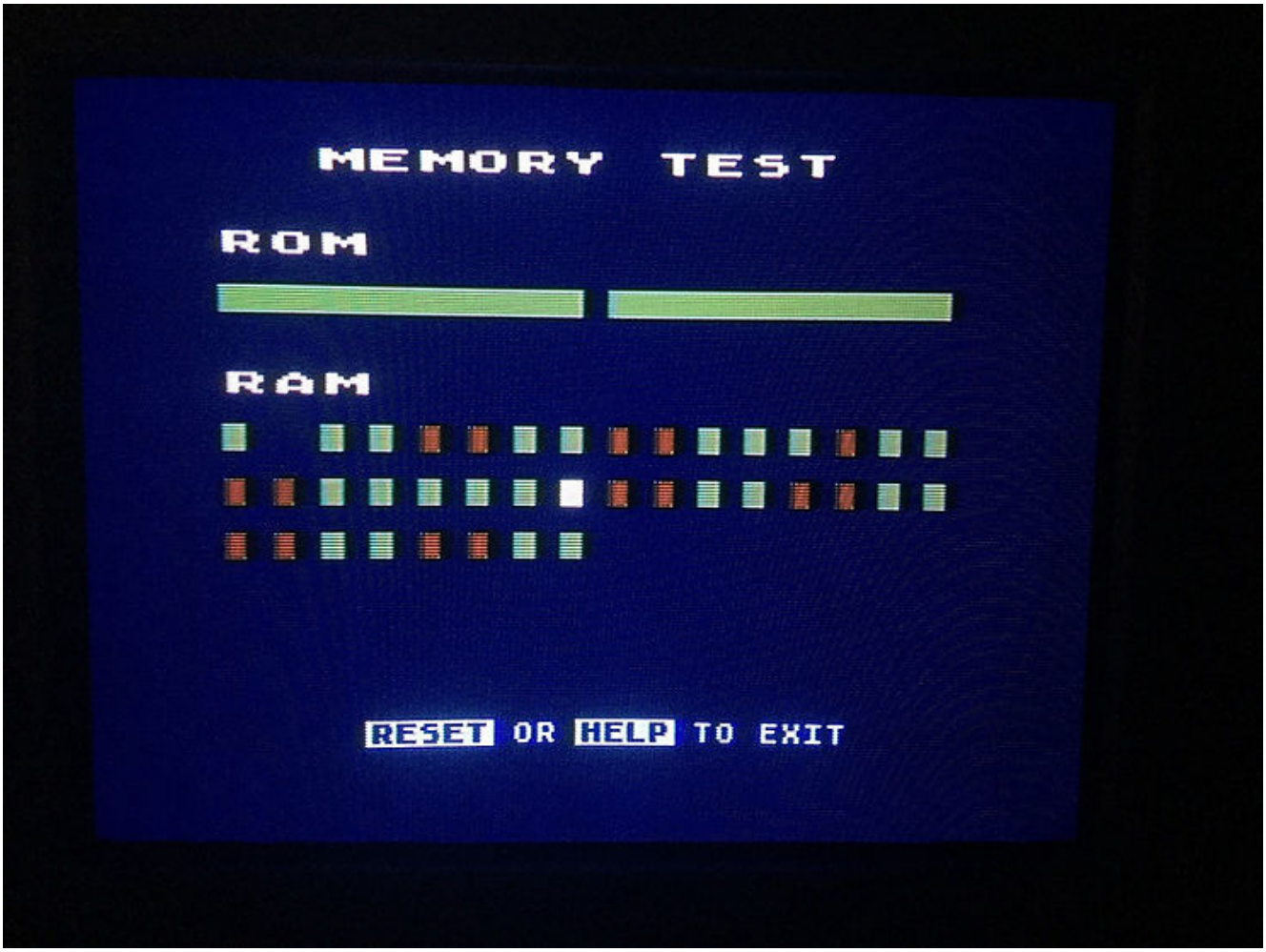
I found in a FB group:

-Bad RAM sockets can also result in red screen, Atari's used cheap single-wipe ones, pull and reseat all RAMs.
-Pull and reseat all other IC's.
-Swap RAM for known-good one
-Check POKEY and PIA, then check the 74158’s (multiplexers), 08, 137, 375, delay chip and mmu.
-A bad BASIC ROM can prevent booting to the OS. You can pull it out for testing, without any consequences to the system, it doesn't need it to boot.
-Check to see if both sides of any capacitor are grounded. One side is normal, both is a giveway.

The basic explantaion here is that ANTIC is most likely talking to GTIA, because you are getting a synced video signal through the 4050 (non-inverting buffer), probably something somewhere is preventing the OS from booting.

Boots to self test

Home screen of self test.



Go into memory test. Red squares on memory test usually indicate bad RAM chips. ***The pattern of green/red squares can't be read as to this ram chip or that one. This test just makes it look like one can. Every ram chip is holding one bit of all 64K locations so by rights when one ram chip goes south the screen should show solid red squares.***

Different tests, that you can perform from the selftest screen.

If you came to this stage, your fault most probably lies in PIA, OS Rom, BASIC Rom, MMU, bad GTIA chip (reads the console

keys), bad or poor keyboard connection or RAM.

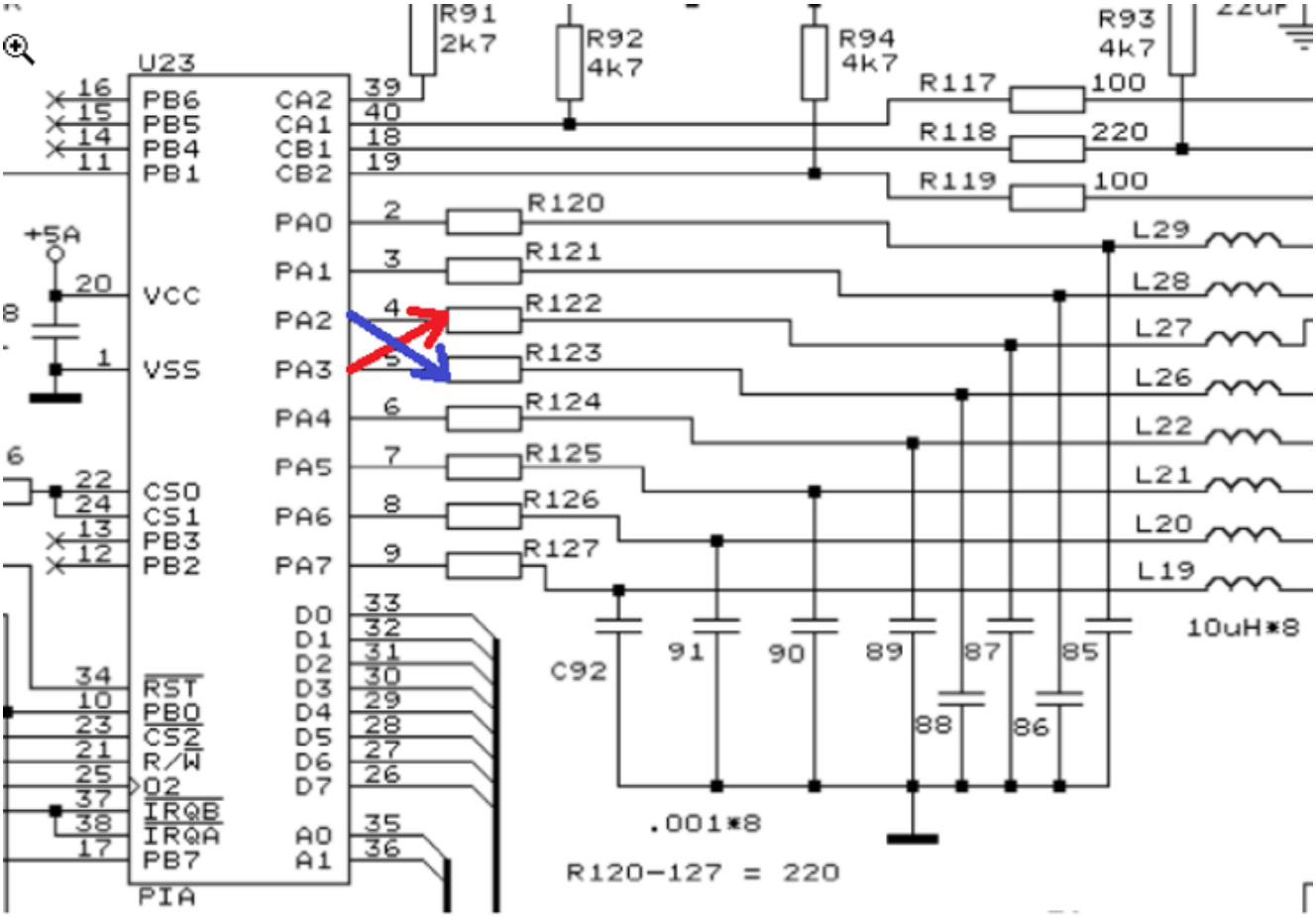
Memory test (Blue screen)
- If you're getting red squares that means something is wrong with RAM.- Star Raiders runs as a diag mode cart and gets immediate control, bypassing powerup tests. It only uses the first 8K of RAM. The game will help you confirm this theory. - PIA might be the next thing to check.

My 600XL also booted to self test, but all of the tests were OK, so I reseated all of the socketed IC again and the computer started to work! (probably the OS ROM was not making contact). So try to reseat the IC multiple times, or give each individual IC leg a good clean.

Joystick not working

If you’re joystick is not working, or it’s registering constant presses on various axes.

- Clean the joystick port with IPA
- Check resistance over filter capacitors C85-C92 (markings from 65XE, 800XL could be the same on other models), they should NOT be in short circuit.
- you may have a dead PIA (quite common issue), I’ve tested this by connecting PA2->R123 and PA3->R122, the issue remained on the same axis as before the swap, eliminating in circuit issues.



PIA replacement

Any 6520 or 6820 IC will work fine, for example MC6820 (Motorola branded one). The two are chips are pin compatible. PIA is the only generic “big and important” IC in the Atari.

Common ways custom chips fail

> *Pokey fails in interesting ways. Common pokey faults are: Keyboard operation doesn’t work but sound does; Keyboard and Sound work but SIO does not, or SIO will not work at divisor 0 (the fastest mode) but may work at divisor 4 or 6 or 8…. GTIA and Antic are pretty binary – either working or not, and Sally can have some interesting faults. A perfectly working Sally may not run Carina II, for example. Carina relies on very tight timing. I’ve had Sally fail to run the bbs but otherwise work perfectly. Carina is a great test. If it is*

stable running this bbs program then the Sally is A number 1 Perfect.

POKEY's do fail, but usually it's one sound channel or the SIO (serial I/O) that goes.

Sys-Check V2.2

There is also a diagnostic tool you can use, please check this thread for more info: https://atariage.com/forums/topic/251315-sys-check-v22-ready-to-use-batch-available/

Defective GTIA

Some GTIA chips are factory-defective, which is mainly manifested by the fact that multicolor modes are displayed incorrectly. Often found in the last series of XE computers. However your Atari should still boot up, regardless of this bug.

Incorrect color transitions, caused by the bug in the GTIA.