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### **How To Convert A Classic Arcade Video Game From A CRT To An LCD Monitor**



Hi! If you own a classic arcade video game, such as a Ms. Pac-Man, Galaga, or whatever, you should strongly consider replacing its 30 year old CRT (cathode ray tube) monitor with a new LCD (liquid crystal display) monitor.

But, I assume you do not need any convincing. You are probably reading this page because you have already come to that same conclusion.

Just in case, though, you can [click this link](#) to read my detailed discussion of the merits of replacing a CRT with an LCD monitor. And, you can [click this link](#) to read my instructions for replacing a CRT with an LCD monitor in a multcade.

At this page, we will talk about how to replace the CRT monitor in a classic game cabinet, such as in a Ms. Pac-Man (rather than in a multcade).

Send me an email if you have any questions: [gamerroomdude@yahoo.com](mailto:gamerroomdude@yahoo.com)

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**How To Convert A Classic Arcade Video Game From A CRT To An LCD Monitor**

## **Introduction:**

**We will use the Ms. Pac-Man cabinet as an example because it is a commonly owned game, because its CRT monitor is 30 years old and in need of replacement, and because the project presents some unique issues.**

**The distinguishing characteristic about this upgrade is that a classic game was designed to work with a standard resolution RGB CRT CGA monitor. And, not with any other monitor.**

**And, definitely not with a high resolution LCD VGA monitor. Indeed, even the video connectors of a classic game pcb (printed circuit board) and an LCD monitor do not match (CGA vs. VGA).**

**So, the first step is to enable the classic game board to send a video signal that the modern LCD monitor will display correctly,**

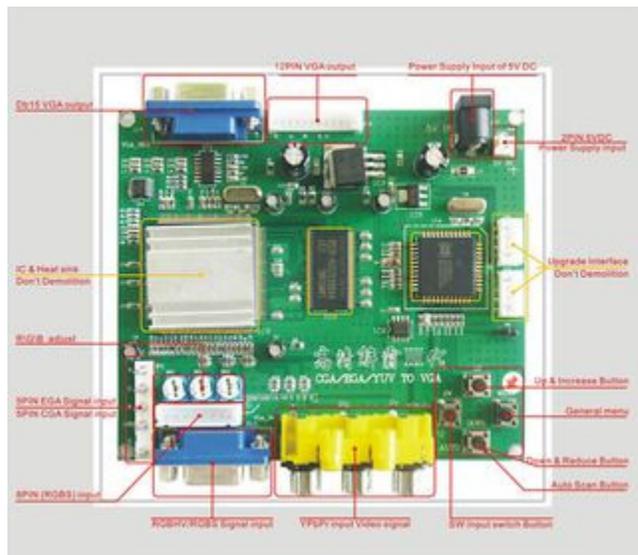
### **1. Converting CGA To VGA.**

**A CGA (technical acronym that describes a CRT monitor's video processing format) to VGA (technical acronym that describes an LCD monitor's video processing format) converter is required to enable the classic game board to communicate correctly with an LCD monitor.**

**Shown in this photo is the CGA to VGA converter that I use and offer for sale. You can click the image for a larger view.**

**The name of this converter -**

**GBS 8200 V4.0, CGA/EGA/YUV To VGA, dated 11-25-2011.**



**This converter comes with two cables - one for +5 VDC power, and the other for CGA video signal input (both are explained below).**

**You can buy the converter directly from me for \$45, which includes shipping.**

**Your converter will be shipped within 2 business days by USPS Priority Mail (2 to 3 day delivery).**

**The converter carries a full 90-day warranty. If there are any problems, just mail it back to me within 90-days for a warranty replacement.**

**You may buy one to five converters by using PayPal - just click the Buy Now button.**

**CGA to VGA Converter, free Priority Mail shipping, 2-day handling, 90-day warranty, free email support, \$45.**

**Buy Now**



## **2. Powering the CGA to VGA Converter.**

**Provided with the converter is a VDC power cable consisting of a small 2-pin connector with two wires - one red and the other black (shown in photo to right).**

**The red wire is to be connected to a +5 VDC power source. And, the black wire is connected to the VDC Common (not the same as VAC Field Ground).**



**For most classic games, finding the +5 VDC is fairly easy. If the game uses an arcade switching power supply (like photo to left), just tap onto the +5 VDC terminal of the power supply. Click link above if you need to order an arcade switching power supply.**

**And, for the black wire, tap onto one of the Common (aka Ground) terminals (there are usually two adjacent to the +5 VDC terminal).**

**But, for a Ms. Pac-Man, finding +5 VDC is not so easy. Because, the +5 VDC is generated on the game's circuit board.**

**Since it is not a good idea to tap power from the circuit board (and because it likely would not generate the minimum 2 amps to power the converter, anyway), you will have to install an arcade switching power supply to power the converter.**

**In the Ms. Pac-Man cabinet, finding a place to tap for VAC is not easy, either. You will need to find a suitable tap located on the output side of the line fuse, and in an on-off switch operated circuit.**

**You do not want to tap VAC at a place where the power supply will always be on when there is VAC power to the cabinet.**

**A suitable tap would be the bottom two VAC input lugs of the isolation transformer. The VAC leads to the input lugs will be available, since you will be removing the isolation transformer (it is not required for an LCD monitor). You will also be tapping those same leads to supply VAC to power the LCD monitor.**

**The connection point for the VDC power cable is located at the top right corner of the converter.**

**The connection point is marked "Power Supply Input" on the photo above, and P9 on the converter.**

**When the VDC power cable is connected properly to the converter, the top wire will be black.**



## A word of caution:

**P9, on the converter board, is marked "DC 5V-12V IN." I have not yet determined why +12 VDC would be needed. In the meantime, I would not recommend using +12 VDC instead of +5 VDC.**

**Your warranty would not cover any board damage caused by using +12 VDC.**

## 3. CGA Video Input.

In the process of removing the old CRT monitor from your classic cabinet, you will have disconnected the video input connector from the CRT monitor's deflection board. The connector will look something like the one pictured at the top of this photo.

You will need to replace the original connector with the new one pictured at the bottom of the photo. The new one is provided with the converter (and is standard with a new JAMMA wiring harness). This connector is sometimes also called the RGB video cable.

Splice the original connector wires, leading from the game's circuit board, to the new connector in the same order as they appear in the photo. Be sure to splice the wires in their same top to bottom order, not by trying to match wire colors. The top wire of one connector will splice to the top wire of the other connector, and so on.



The order of the wiring, top to bottom, and the corresponding wire color of the new connector is as follows -

- **RGB-Red, wire color red,**
- RGB-Green, wire color green,
- RGB-Blue, wire color blue,
- Common, wire color black, and
- Composite horizontal and vertical sync, wire color white (you will be splicing one or two wires to this one white wire).

The new connector attaches to the converter at the white connection point located at the left bottom corner, and marked P3 on the converter.

When the RGB video cable is connected properly to the converter, the top wire will be red.

## 4. VGA Video Output.

Furnished with your LCD monitor, you will find a VGA video cable. The cable will attach to the monitor at the VGA port. And, to the converter at the VGA port.

The converter VGA port is blue and located top left corner in the photo above, and marked P4 on the converter.

## 5. Converter Adjustments.

There is a cluster of four small black buttons (keys) that can be used for certain adjustments. They are marked Up (top button), Down/Auto (bottom button),

SW (left button), and Menu (right button) on the converter.

The two marked Up and Down/Auto can be used for centering, increasing, and reducing the monitor image.

Five seconds after power up, press Down/Auto to self-adjust and lock-in the monitor image.

Adjustment of the SW and Menu buttons would not likely be required for this project. SW (Switch) is for switching the video input signal - CGA, EGA, or YUV. And, Menu opens the OSD (On-screen display) menu.

The four buttons are located at bottom right corner of the converter.

There is a bank of three small white round variable resistors (VR) located near the left bottom corner. They are not marked for function, but they are for adjusting red, green, and blue color gain.

#### 6. Other Considerations and Troubleshooting.

**Be sure to mount the converter securely to the cabinet. And, use cable supports and cable ties to prevent any loose cable connections.**

**Before you secure the LCD monitor to the cabinet, be sure that the screen image is correctly oriented. We have not found a way to flip an image (although that function may be found in the OSD menu), so you may have to flip the image by rotating the monitor.**

**The converter offers a wide range of video signal conversion possibilities. Certainly many more than the one application addressed in this article. But, since there is no manufacturer's operating manual, I cannot offer any help with its other applications.**

**If the monitor displays a "No Signal" message, allow the converter a couple of minutes to boot up. Then, if still no signal, try pressing the SW button to switch to a different video input signal.**

**If the monitor displays an "Input Not Supports" message, try pressing Down/Auto button for over 5 seconds. Then, release to reset the system.**

**If the monitor image shakes or is frozen, try pressing Down/Auto to initiate auto scan and possibly restore the image.**

**Conclusion:**

**Congratulations. At this point, your upgrade project should be finished. You have just breathed new life into your classic arcade video game. Enjoy.**