

Converting a Cinematronics Monitor To Accept The Joystick From Tailgunner

Rich Potts

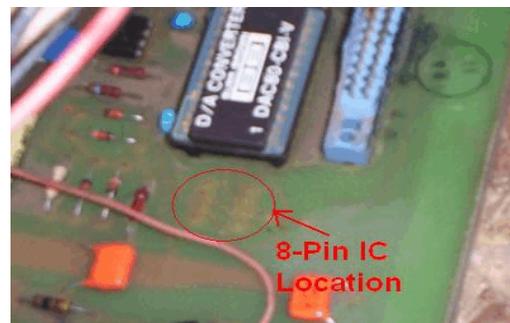
I would be remiss if I did not say that without the help of Matt Rossiter, this would have never happened. By providing the illustrations of his original Tailgunner monitor included here, as well as some great guidance, we have succeeded in finding a new alternative to the almost impossible to find Tailgunner monitor.

O.K. The very first thing to mention here is that working on any monitor is **DANGEROUS!!** Monitors can carry a charge large enough to be lethal. Before you even get started, make sure that the monitor has been properly discharged by a person who is authorized to do so. If you don't know how, **DON'T DO IT!!!**

Now, there are several revisions of the Cinematronics monitor PCB. I believe Tailgunner had it's own revision, so I decided to choose one that had similar features. Specifically one that had the high voltage unit mounted to the board, or what most people would consider an older rev. monitor. I have no idea if this will work on a newer rev.(Star Castle style), as they have a brown jumper wire that could interfere with the wiring. I swapped out the one in my Starhawk, as that was the closest match that I have. Let's get started!

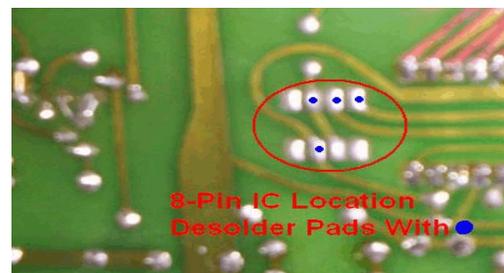
Looking at Figure A, you can see to the left of the DAC, there is what looks like an empty spot for an 8-pin I.C. This would be the DAC that is located next to the ribbon connector. This is where the wires from the sound board connection will be soldered to. There are traces that lead over to the DAC from this point that convert the signals from the joystick.

Figure A



Once you have located this, you will need to carefully turn the monitor on the tube face so that the bottom of the board is now facing you. You will want to locate the pads that correspond with the location on the top of the board. See Figure B. The pads marked with the blue dot will need to be desoldered.

Figure B



O.k., we've located where the wires need to go, now you'll need 4 wires, 18 or 20 AWG should suffice, about 24 or so inches long. Leave yourself enough slack to reach the sound board comfortably. To be accurate, you might want to use the same colors as in Figure C, as those are the originals that Cinematronics used. Location 2 is black (it's hard to see), and it is the ground location. You'll need to strip the wire ends off, poke them through the holes, and solder the bare wire to the pads. Be careful when you do this, as the pads are very easy to pull off the board, and are brittle. Be sure to get a good solder. You can check for continuity along the trace to make sure you are making good contact. Here are the wires and their designations:

Black	Pin 2	Ground
White	Pin 3	DAC input
Violet	Pin 4	-15v
Red	Pin 7	+15v

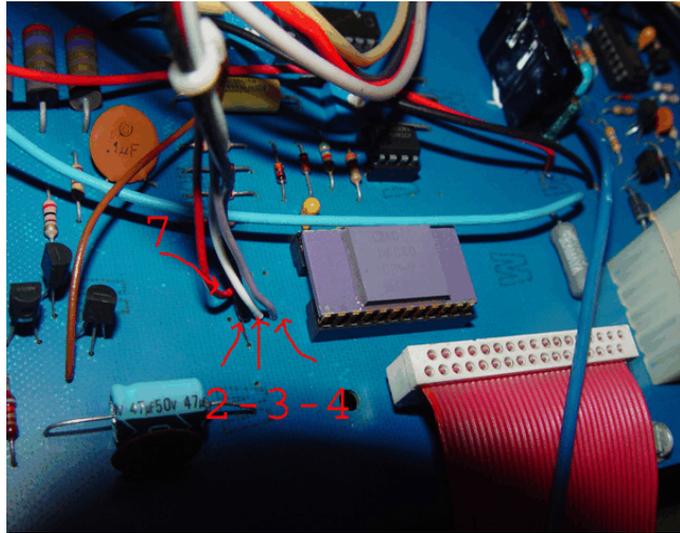


Figure C

We're not quite done with all the connections on the monitor board. Even though the ground wire is soldered to the pad, it is still not grounded to the monitor board. I missed this when I originally wired this, and the joystick will obviously not work. To properly ground the wire, look at the green jumper wire in Figure D. My monitor did not have this ground trace, but as long as you solder it to a pad in the ground circuit, it will work fine.

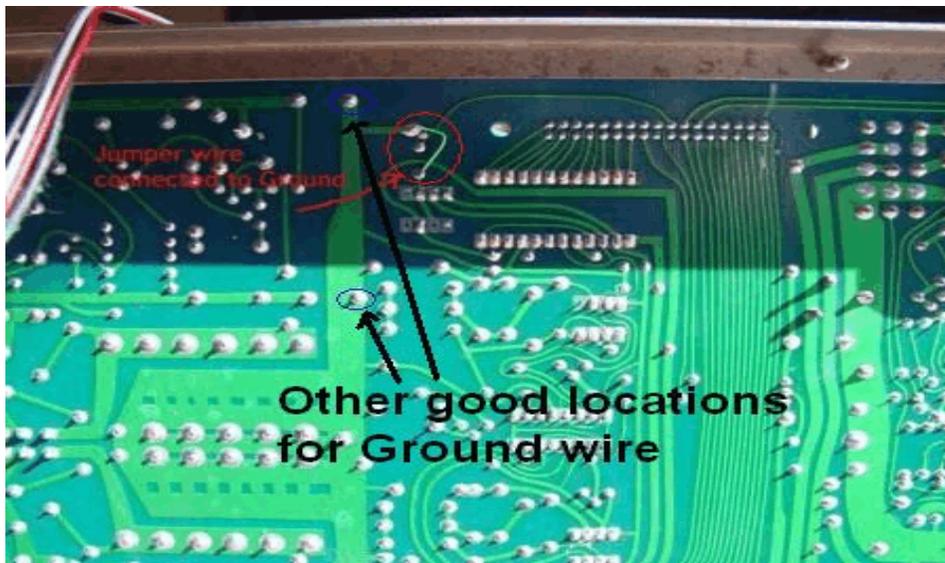


Figure D

If you wish, you can also solder the ground wire directly to a pad in the ground circuit, and skip having to make a jumper altogether.

Well, we now have our 4 wires connected to the monitor board. The next step is to locate J5 on the sound board. It is located on the left side of the sound board, right below the plug for the joystick harness. You'll need a 6-pin molex connector, but will be using the FEMALE side only. Strip the ends of your four wires and crimp female pins on to them. Using Figure E, insert the wires in the appropriate pin locations. Be careful that you double check that they are correct, as you could damage the DAC, the joystick, or an IC on the soundboard. Here are the wires and their designations:

Red	Pin1	+15v
Violet	Pin3	-15v
White	Pin4	DAC
Black	Pin6	Ground

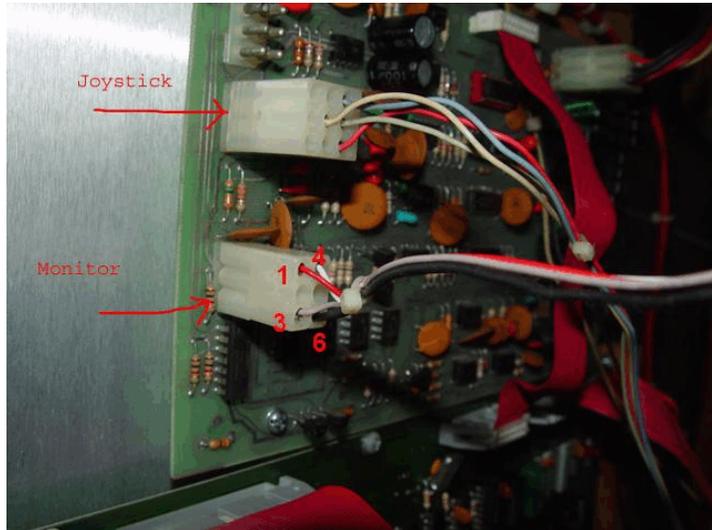


Figure E

The pin numbers vary depending on how you choose to count the pin locations. The important thing is to properly connect the wires to the locations on the sound board.

J2 on the sound board doesn't need to connect to anything. Apparently Cinematronics tried to save money by buying tons of 2708 eeproms that were a lot cheaper than the 2716 eeproms at the time. So they made a daughter card for all those roms. My board instead came with just two 8332 masked roms, which Matt replaced for me (see his doc on Tailgunner ROM replacement). Thus, no need for the rom daughter card. Also, when you plug everything back in, do not get the joystick and power plugs switched!!! They are both the same molex size and you'll blow the board apart on power up. Cinematronics sent out a service note at one time because of it:

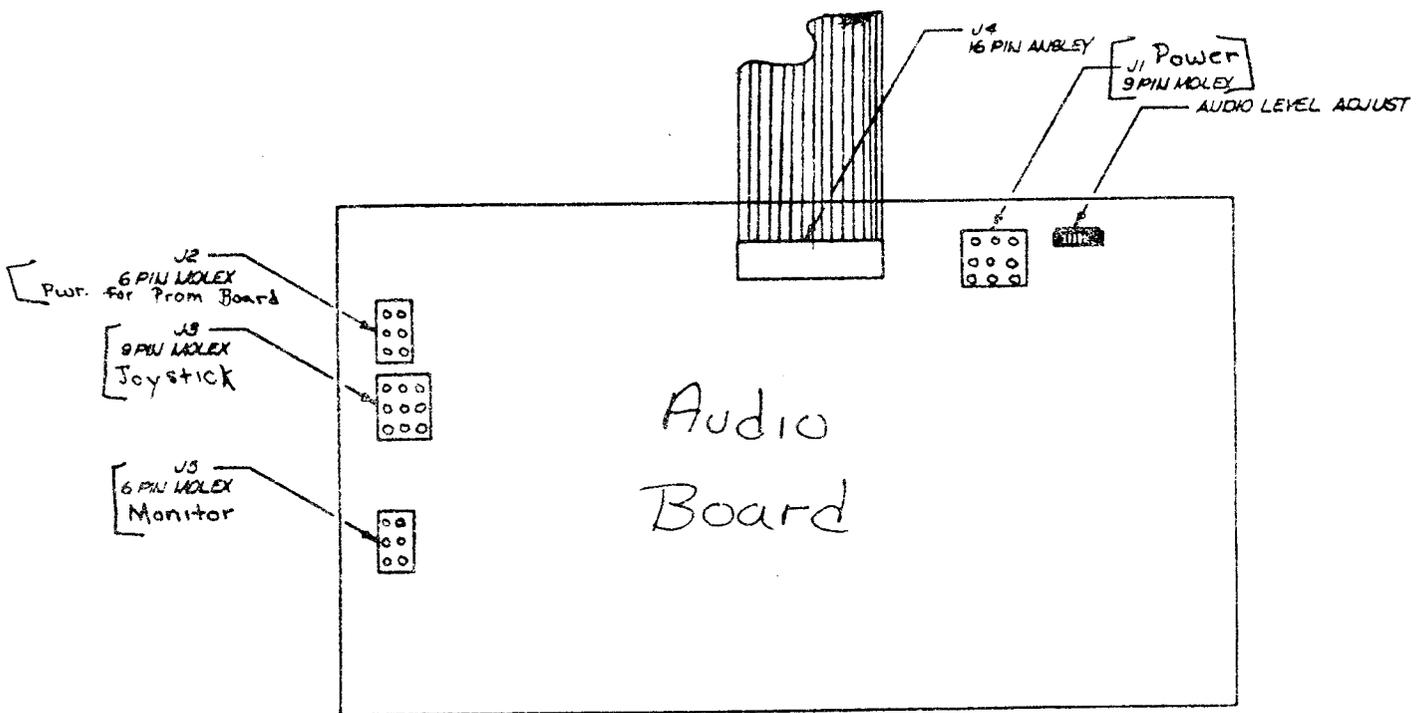
<http://www.arcadehelp.com/spies/schematics/cine/serv19.tiff>

Believe it or not, that is it!! Fairly simple procedure, and would probably take less than a half hour for the skilled technician. It was Matt's and my hope that this would help to resurrect a number of Tailgunner machines that have been put aside because of the issues with not being able to get the joystick to interface with the various monitor revisions. As an avid Cinematronics collector, I have spent the last 7 years collecting and restoring the old black and white vectors, and have met many good friends along the way. This is my way of trying to give back to them, and help fellow collectors in the process.

TO: ALL SUPERVISORS, ROVERS, AND MANAGERS

RE: TAILGUNNER 2

NUMEROUS AUDIO BOARDS FROM TAILGUNNER 2 HAVE BEEN DAMAGED BECAUSE OF THE CONFUSING PLUG CONFIGURATIONS. THIS ILLUSTRATION DESCRIBES THE FUNCTION OF EACH PLUG. FOLLOW IT CAREFULLY.



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