

## **Atari 2600 CX2600A Capacitor Replacement Kit Installation Guide**

Thank you for your purchase of an Atari 2600 CX2600A capacitor replacement kit from Mortoff Games. This guide is designed to help you through the many steps involved in the installation of your replacement capacitors. If at any time you have questions or need assistance please don't hesitate to contact us at [customerservice@Mortoffgames.com](mailto:customerservice@Mortoffgames.com)

### **Things you will need**

- Atari 2600 CX2600A Capacitor Replacement Kit
- Soldering skills
- Soldering iron
- Solder
- Small Philips head screw driver
- Triwing security screw driver
- Small needle nose pliers
- Clean work area and about fifteen to thirty minutes of free time
- Patience
- Fume hood

### **Safety**

This repair requires hours of extensive solder and unsoldering. Much of the old solder is composed of lead and other harmful toxins. In addition the board is covered in plastic and glue that can be melted during this repair. All of these substances should not be inhaled. Throughout this repair you should use a fume hood to protect yourself from the dangers associated with breathing these fumes in. Please do not try to do these repairs without one. We are more than happy to provide you with a full refund on this repair kit rather than have you endanger yourself because you lack the proper protection equipment.

### **Soldering Skills Needed**

This repair requires extensive soldering skills and should not be attempted by a novice. You are more likely to damage the system if you don't have the proper skills. We recommend that if you are not completely comfortable with your soldering skills you return this repair kit for a full refund at this time.

**Index of Capacitors in Kit**

In case you are interested here is an index of all of the capacitors include in this repair kit. As you may notice the capacitors are packaged by type and labeled accordingly for ease of usage. If you ever find what you need more of a particular type of capacitor please contact us at

[Customerservice@MortoffGames.com](mailto:Customerservice@MortoffGames.com) we are more than happy to sell them individually.

Value	Mounting Type	Quantity
4.7uf 35V	Radial	2

**Index of Part Numbers and their Associated Capacitor**

When looking at the circuit board you will notice there is a number next to each capacitor that identifies its part number. The part number will always start with the letter “C”. This is an index of those part numbers and their associated capacitors.

**Main Mother Board**

<b>Part Number</b>	<b>Value</b>	<b>Mounting Type</b>
C201	4.7uf 35V	Radial Mount
C213	4.7uf 35V	Radial Mount

### **Using a Capacitor Checker**

While you can certainly change out every capacitor on the circuit board this is both a tiresome and unnecessary action. While you might have heard or read otherwise on the internet if a capacitor is working it does not need to be replaced if it is working within factory guidelines.

There are devices that allow you to check capacitors to determine if they are operating within appropriate parameters. We use the CapAnalyzer 88A Series II. It is very simple and operator friendly; however it does cost over \$200. This is a great deal of money; although if you are doing regular electronics work it is a great tool to add to your collection along with a voltmeter and oscilloscope.

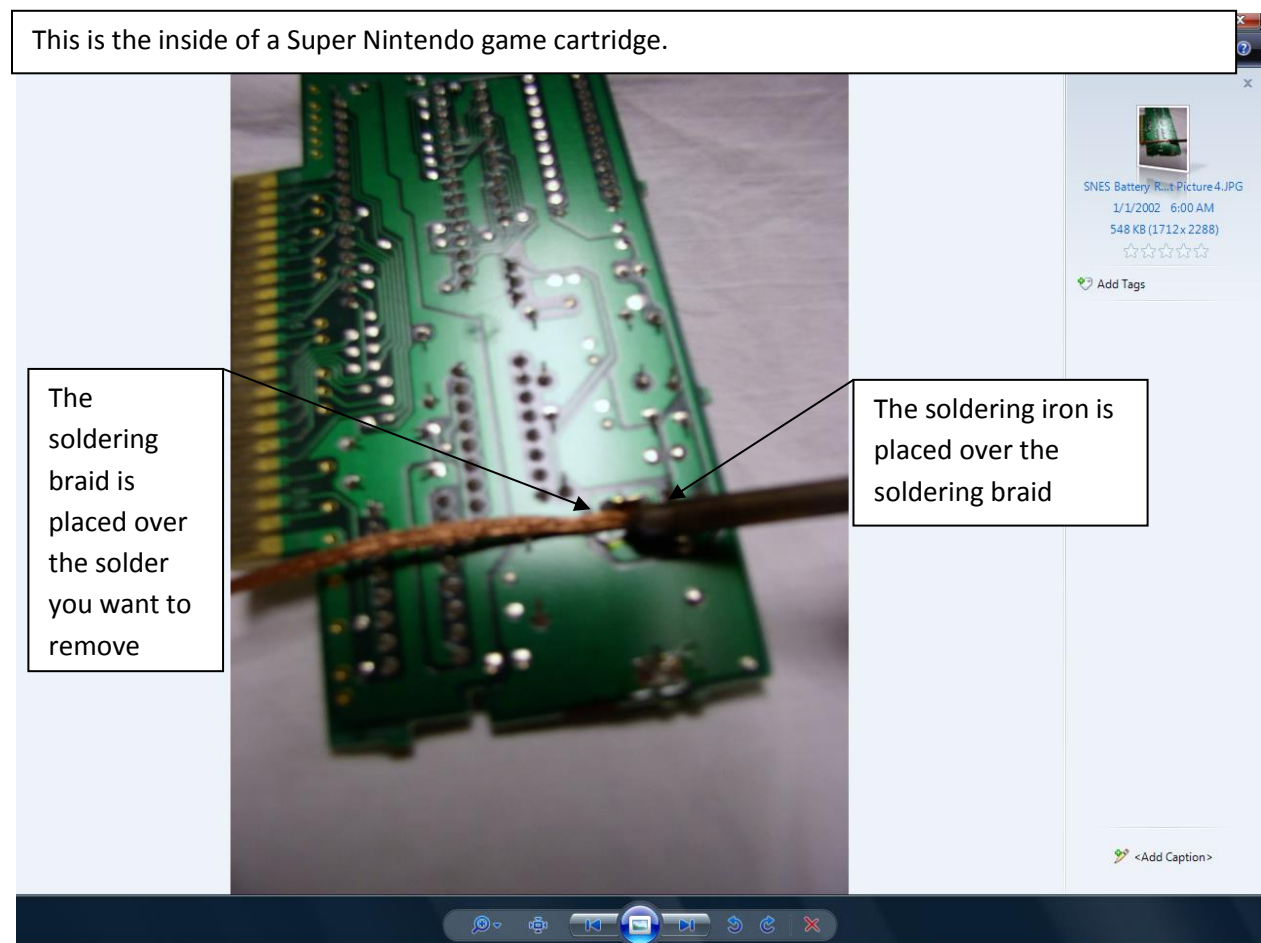
There are many capacitor analyzers on the market, although most cost several hundred dollars. If you do purchase one, we recommend getting one that can check capacitors in circuit. This allows you to check them each capacitor without having to unsolder it.

**Soldering Techniques:**

In order to solder and unsolder correctly you will need a soldering iron, solder and soldering braid. Once you have these items it is safe to proceed forward. For the duration of this project it is not recommended that you use a cold heat or any other instantaneous heating soldering gun, since these guns use an electrical current to melt the solder. Passing a strong electrical current through your games is not recommended and as such should be avoided. We recommend that you use a typical soldering gun, the type that you have to plug in and wait to heat up. In addition it is recommended that you set your soldering iron to 30watts for the duration of this project.

**Unsoldering:**

Correctly unsoldering a joint is rather easy once you get the hang of it. In order to unsolder a joint place soldering braid over the solder you wish to remove and then place the soldering iron over the soldering braid. The soldering iron will heat the braid and in turn the solder will liquefy, which will be sucked up by the braid. Please see the picture below.



Picture Introduction: Proper usage of solder braid

Although it might take a little while to completely remove all of the solder, patience and persistence will pay off in this case. Every 10-15 seconds remove the soldering braid and check to see if the solder have been fully removed. As soldering braid is takes up solder periodically cut off these used sections as needed.

**Soldering:**

Now that the solder has been removed you can now remove the object that the solder was holding in place and you are now ready to solder something new into place. During this project it is not safe to use excessive soldering material as bridging between joints is very easy due to their close proximity to each other.

The two most important things to keep in mind are:

- 1) Never allow patches of solder to overlap or touch, doing so creates a short, thereby rendering the circuit inoperable.
- 2) Make sure to use enough solder to securely attach whatever it is you are soldering, do not be afraid to test the joint out.

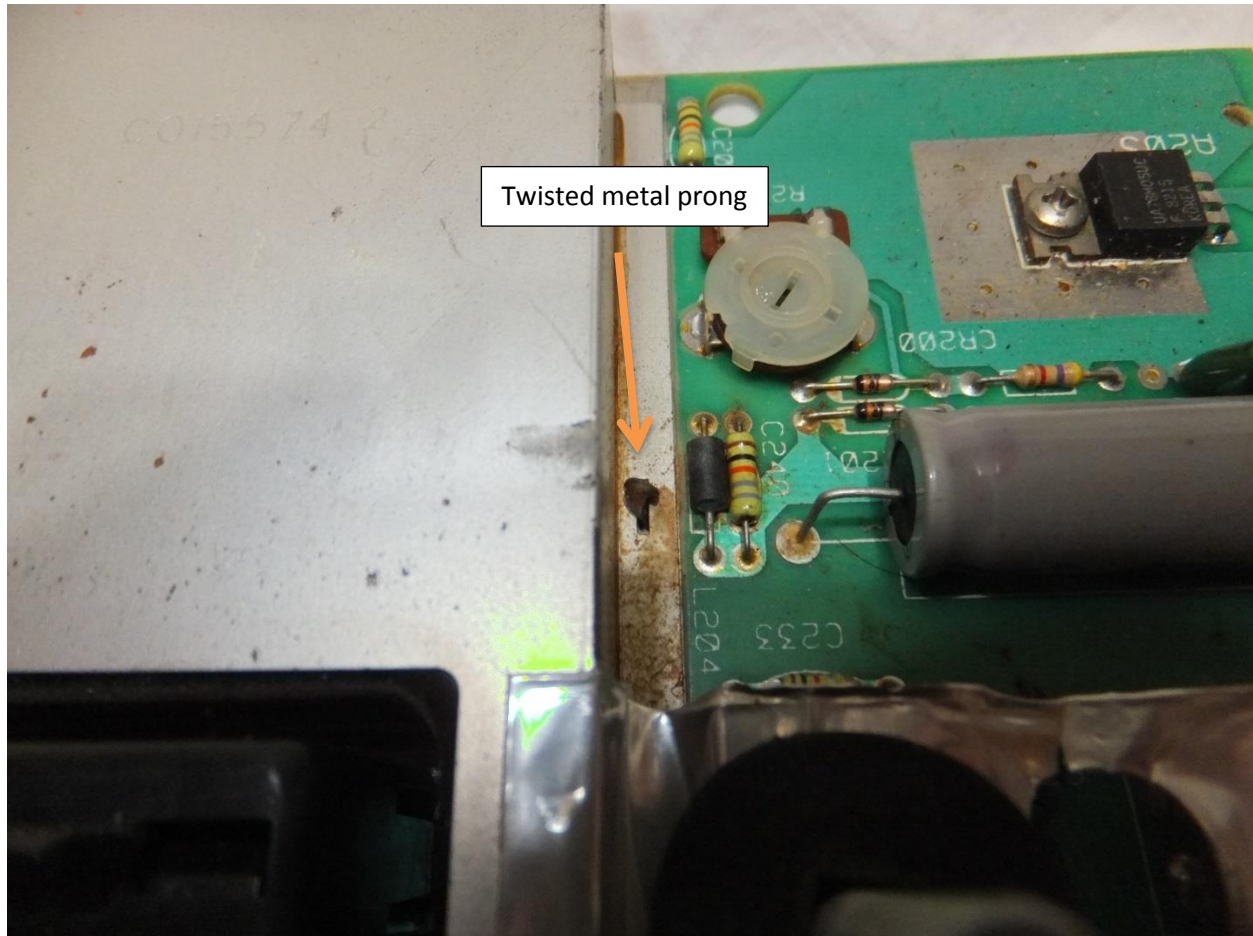
Keeping these items in mind lets continue with our demonstration. To apply the solder take it and place it over the soldering joint and then lightly place the soldering iron over the solder. This is just like unsoldering, although this time you are soldering and not unsoldering. This part is a little tricky when you first start and is hard to describe with words alone. It is recommended that you test out melting solder first to get an idea of how it behaves.

One ideal exercise you might want to try is to attempt to solder together two pieces of wire. Take two pieces of wire, strip the ends, twist the ends together and then practice applying solder over this twisted joint. During the course of this project if you run into trouble remember you can always back track and remove the solder and try again, using the soldering braid. Soldering braid and solder are very cheap and as such are worth playing around with to get comfortable with before you go ahead and install your replacement part.



## Step Two

Now that that the system's mother board is accessed there is one additional step to preform before you are ready to start replacing the capacitors. There is a metal shield that is held in place by four pieces of metal that are twisted as seen in picture two below. Using a set of pliers unbend these metal pieces and then remove the RF shield.



Picture Two- Twisty metal prong

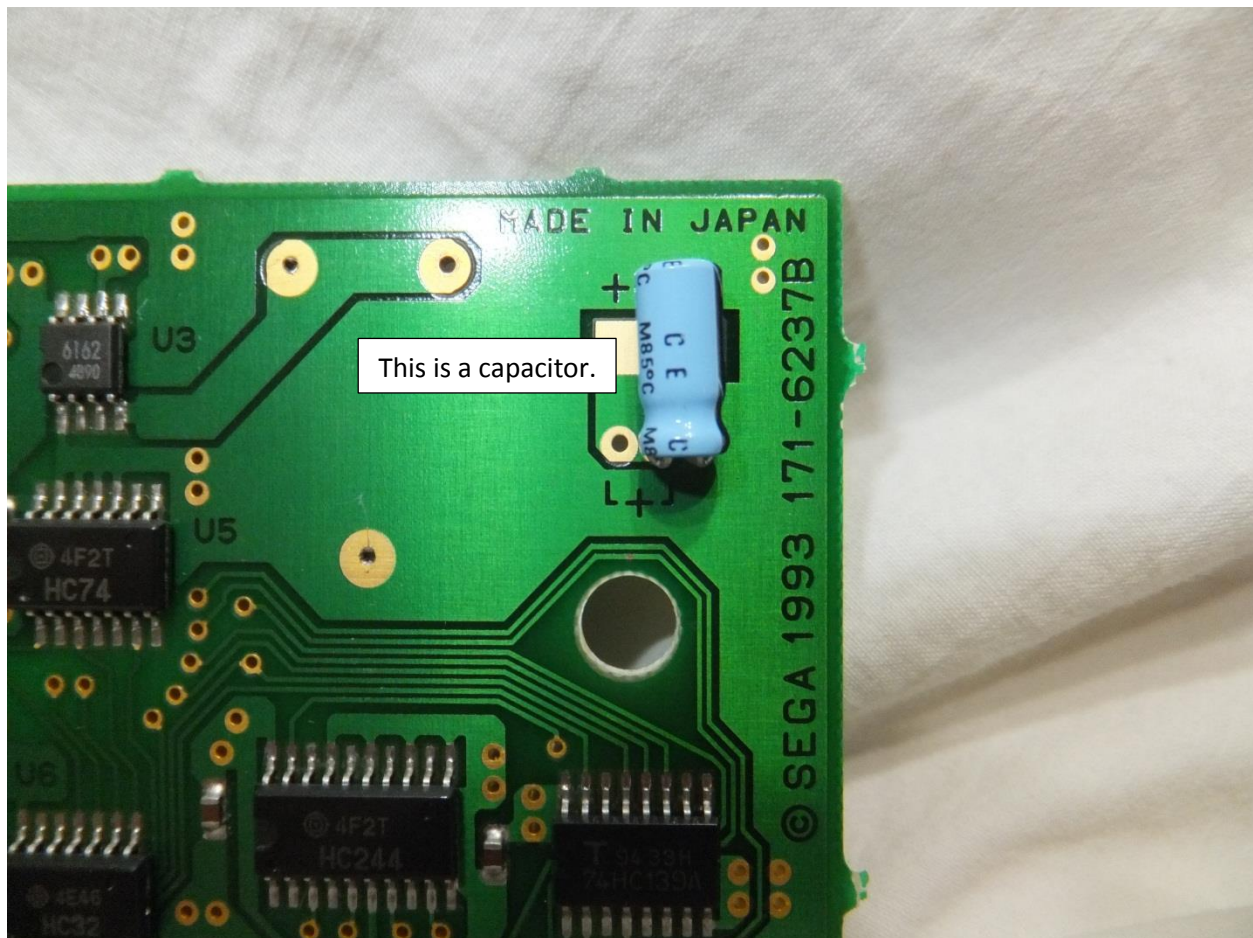
Once you have the metal shield off you are ready to start replacing the capacitors; however before you do please read out introduction to capacitors section on the next page.



### An Introduction to Capacitors

Before we jump into the capacitor replacement it's important to understand the basics first. A capacitor is used to store electrical energy. It has two listed measurements microfarads ( $\mu\text{F}$ ) and voltage (V). You will notice when you look at your replacements capacitor it has the microfarads and voltage listed on it. It is important that you replace each capacitor with the same ratings as the original for optimal performance.

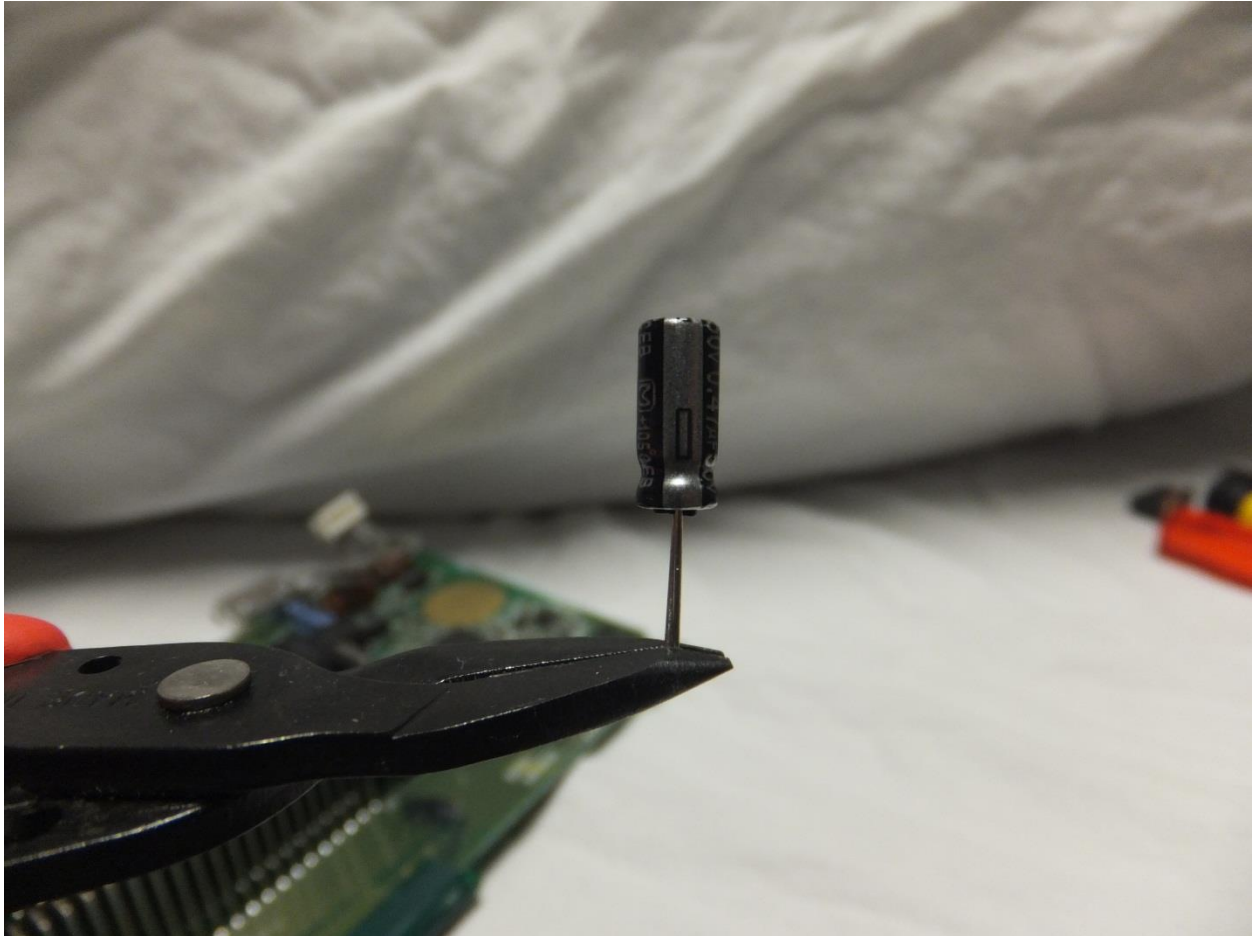
Next you will notice that the capacitor two leads. One is the positive lead and one is the negative lead. It is very important to make sure that you don't get these backwards. The positive terminal should be soldered to the positive terminal on the circuit board and the negative terminal to the negative terminal on the circuit board. Fortunately the positive terminal is marked on the circuit board; however the terminals on the capacitor are not marked. This is discussed on the next page.



Picture Three: Sample capacitor

### **An Introduction to Capacitors Continued**

Most capacitors do not have the positive and negative terminals marked with symbols, but instead the negative terminal is defined by the terminal that originates from the part of the capacitor that has a strip running down it. This strip can vary in color.

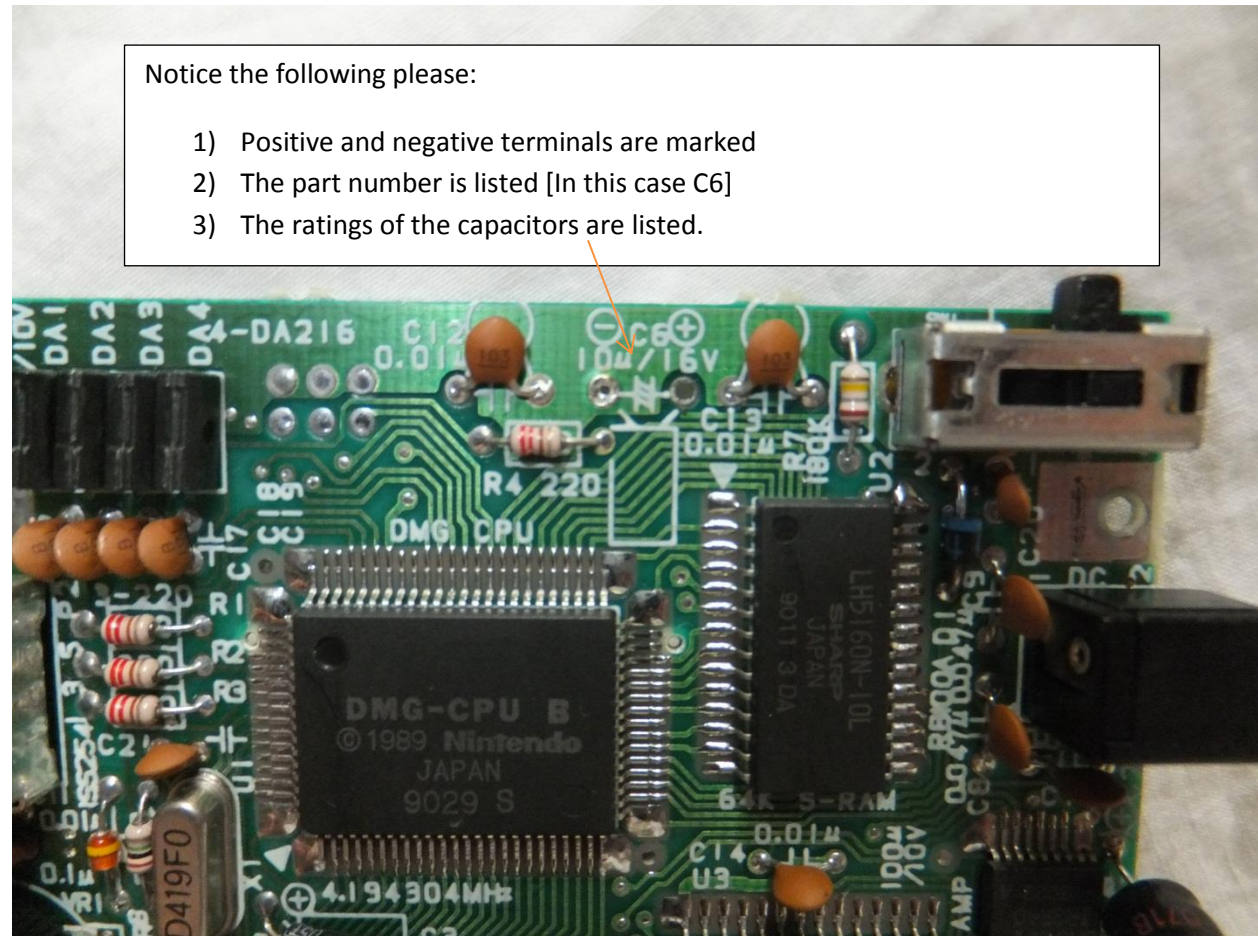


Picture Four: Replacement capacitors

In this case the strip is silver in color. Please don't be fooled as the strip can be different colors. Just remember that the strip always denotes the negative terminal of the capacitor. Now that you have a general understanding of what capacitors are and how to properly identify their microfarad and voltage rating it is time to start replacing them.

**Step Three:**

This guide does not cover the installation of each capacitor as this would be redundant. Instead the installation of one capacitor is covered instead.



Picture Five: Replacement of C6 on a sample board

You may notice that the capacitor has already been removed. This is intentional as it allows for better visualization of important information on the circuit board. Please notice the following:

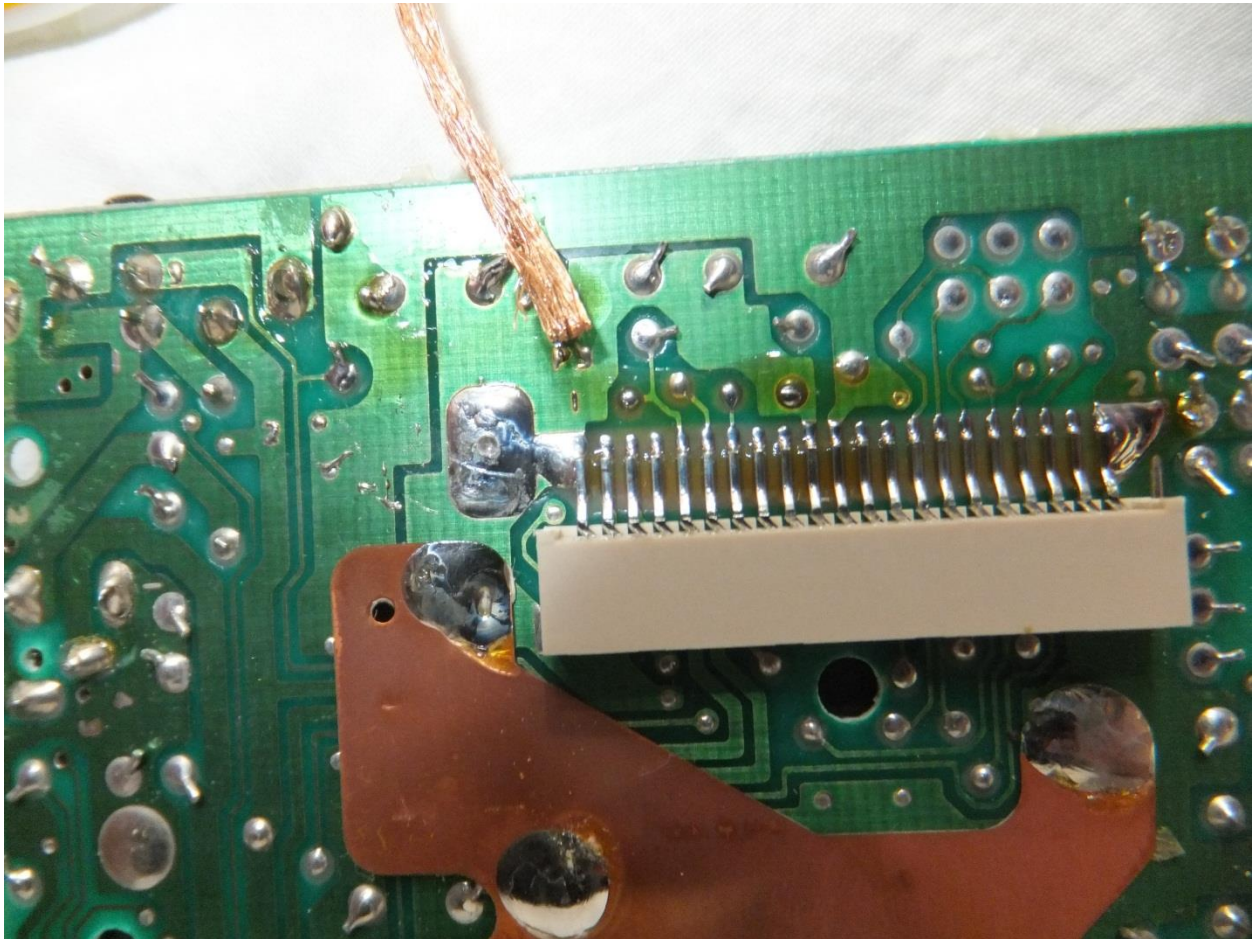
- 1) Positive and negative terminals are marked
- 2) The part number is listed
- 3) The ratings of the capacitors are listed.

Alrighty now that we have familiarized ourselves with what all the information on the circuit board means lets continue onwards.



**Step Four:**

Unsolder the capacitor of interest. We recommend the following strategy.



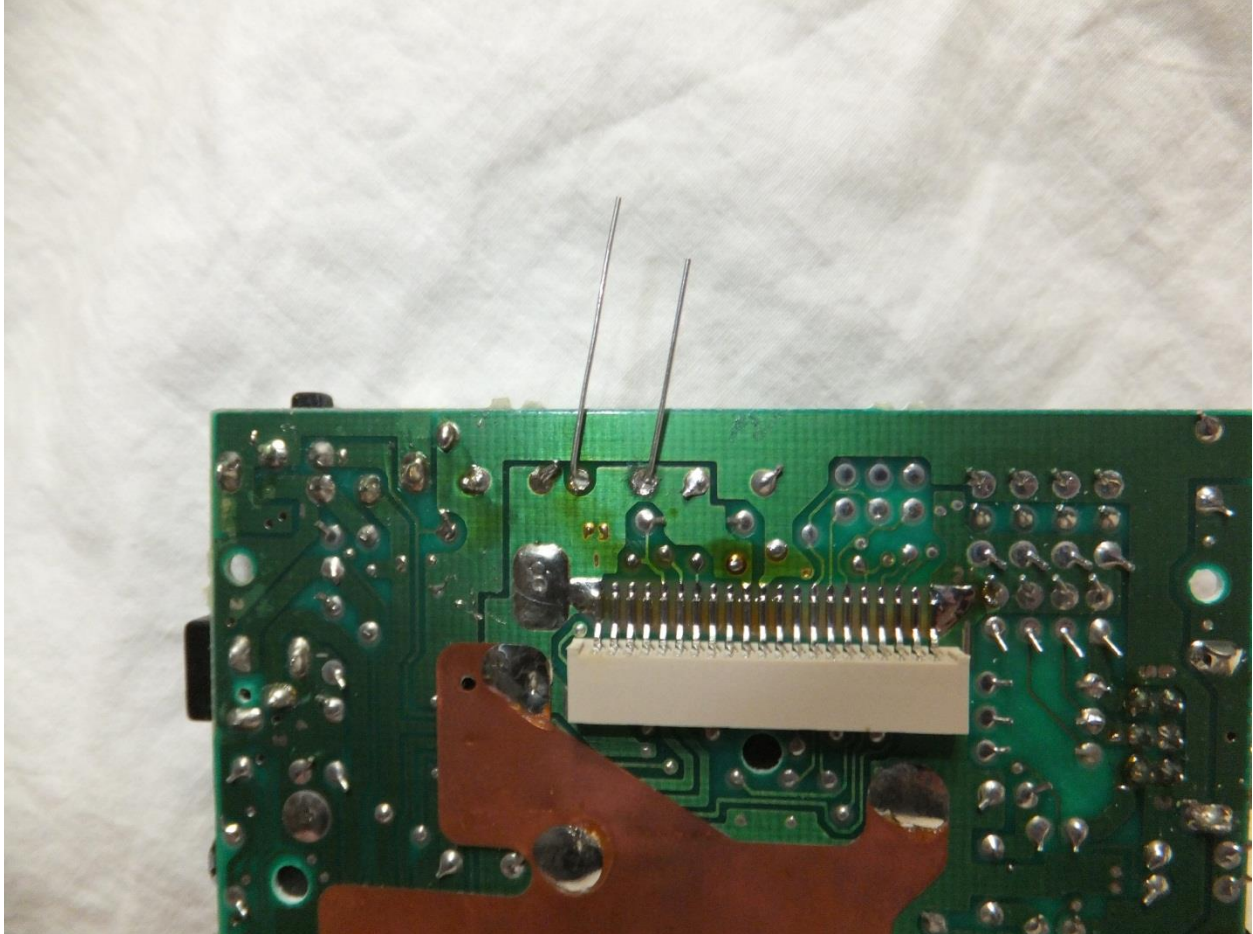
Picture Six: Proper usage of soldering braid

Place the soldering braid over the solder joint and then heat the joint with your soldering iron. The braid will suck up the solder and free the lead. You can also apply a small amount of traction on the lead by grasping the lead from the other side with a set of needle nose pliers and pulling if needed.

Once the leads are unsoldered please proceed to the next step.

**Step Five:**

Next you need to solder the replacement capacitor into place. Remember negative to negative and positive to positive. We recommend the following strategy.



Picture Seven: Lead soldering

Insert the leads and then bend them at a ninety degree angle. Then cut the leads down to the desired length. Finally solder the leads into place.

Please continue replacing the capacitors as needed. Here are some very important points not to forget.

- 1) Make sure you do not bridge any terminals
- 2) Make sure the leads of the capacitors don't touch each other.
- 3) Don't be afraid to bend the capacitors leads. You will have to flatten them anyways to get the casing to close.

### **Troubleshooting Section**

We are sorry to hear that you ran into complications from your repair. Unfortunately this particular repair is difficult to troubleshoot due to the complexity of the repair job, although here are some general guidelines.

- 1) Make sure that the terminals of each capacitor are firmly soldered in place.
- 2) Make sure that none of the terminals are bridge with solder
- 3) Make sure that none of the leads of the capacitors touch each other.

We do apologize that we can't be more helpful than this.