

Sega Genesis 1 Capacitor Replacement Kit Installation Guide

Thank you for your purchase of a Sega Genesis 1 capacitor replacement kit from Mortoff Games. We appreciate your business and look forward to serving you again in the future. This guide is intended to take you through the steps involved in the installation of your capacitor replacement kit. If you have any questions along the way please contact us at customerservice@mortoffgames.com

Thing you will need

- Sega Genesis 1 capacitor replacement kit
- Small Philips head screw driver
- Small flat head screw driver
- Soldering iron
- Solder
- Soldering braid
- Fume hood
- Patience
- A clean work area where small parts will not get lost
- About 1.5-2hrs of spare time

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 will 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.

Patience

This repair requires roughly one and a half to two hours of intensive work. If you start to get tired we recommend that you stop and come back to the work at a difference time. Attention to detail is an absolute must during this repair.

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 Starwander@Comcast.net. We are more than happy to sell them individually.

Capacitor	Quantity
220uf 16V	1
100uf 10V	8
10uf 16V	12
220uf 10V	3
1uf 50V	6
47uf 10V	6
100uf 16V	1

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.

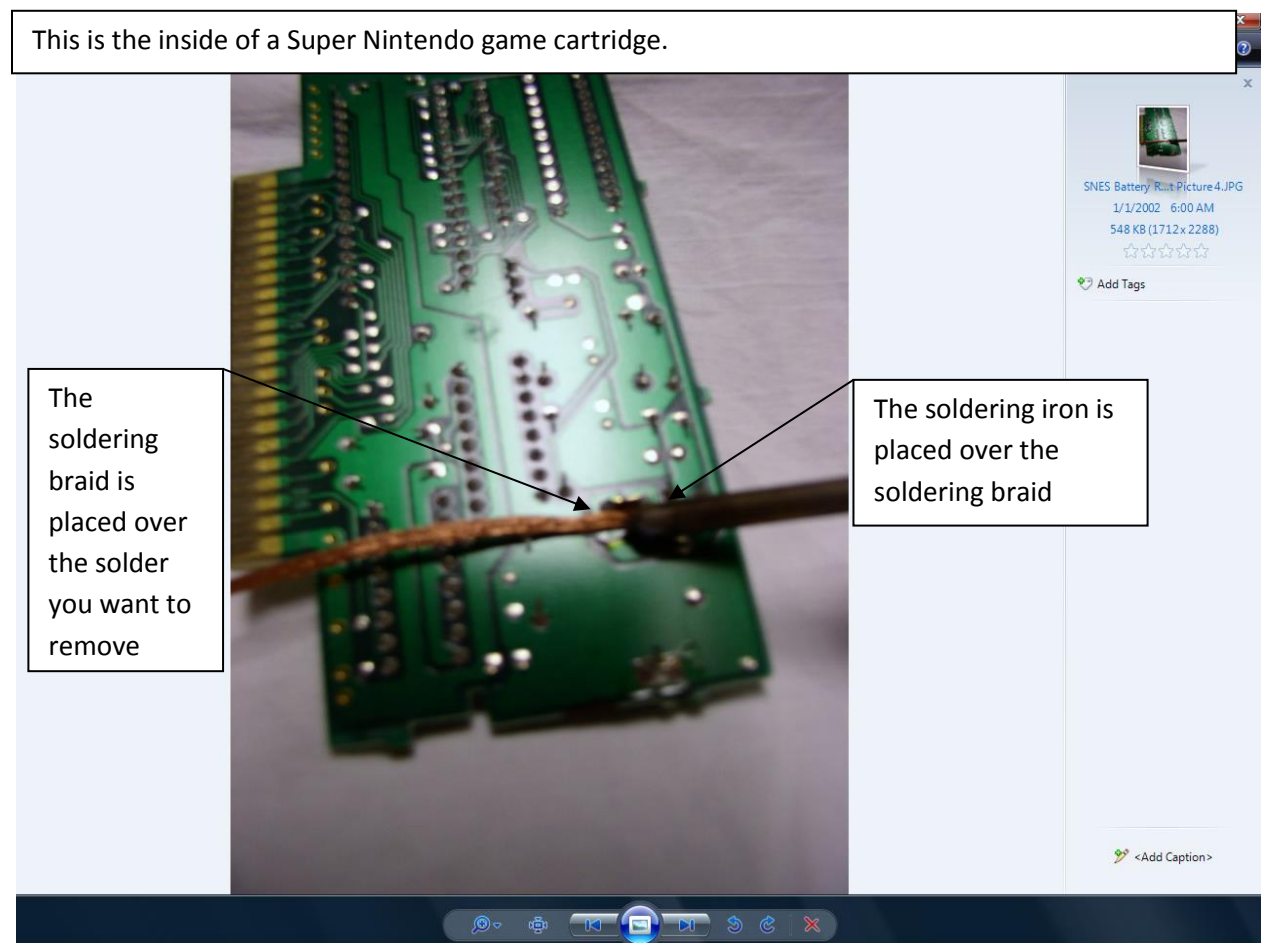
Part Number	Rating
C1	220uf 16V
C4	100uf 10V
C5	10uf 16V
C13	10uf 16V
C23	100uf 10V
C24	100uf 10V
C30	10uf 16V
C31	10uf 16V
C32	220uf 10V
C38	10uf 16V
C40	1uf 50V
C41	10uf 16V
C42	1uf 50V
C43	10uf 16V
C44	1uf 50V
C49	100uf 10V
C50	220uf 10V
C51	220uf 10V
C52	100uf 10V
C53	100uf 10V
C55	10uf 16V
C57	10uf 16V
C58	1uf 50V
C59	47uf 10V
C60	47uf 10V
C61	1uf 50V
C62	1uf 50V
C63	47uf 10V
C64	10uf 16V
C65	47uf 10V
C68	47uf 10V
C71	10uf 16V
C72	10uf 16V
C74	100uf 10V
C79	100uf 16V
C86	100uf 10V
C111	47uf 10V
C112	10uf 16V

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:

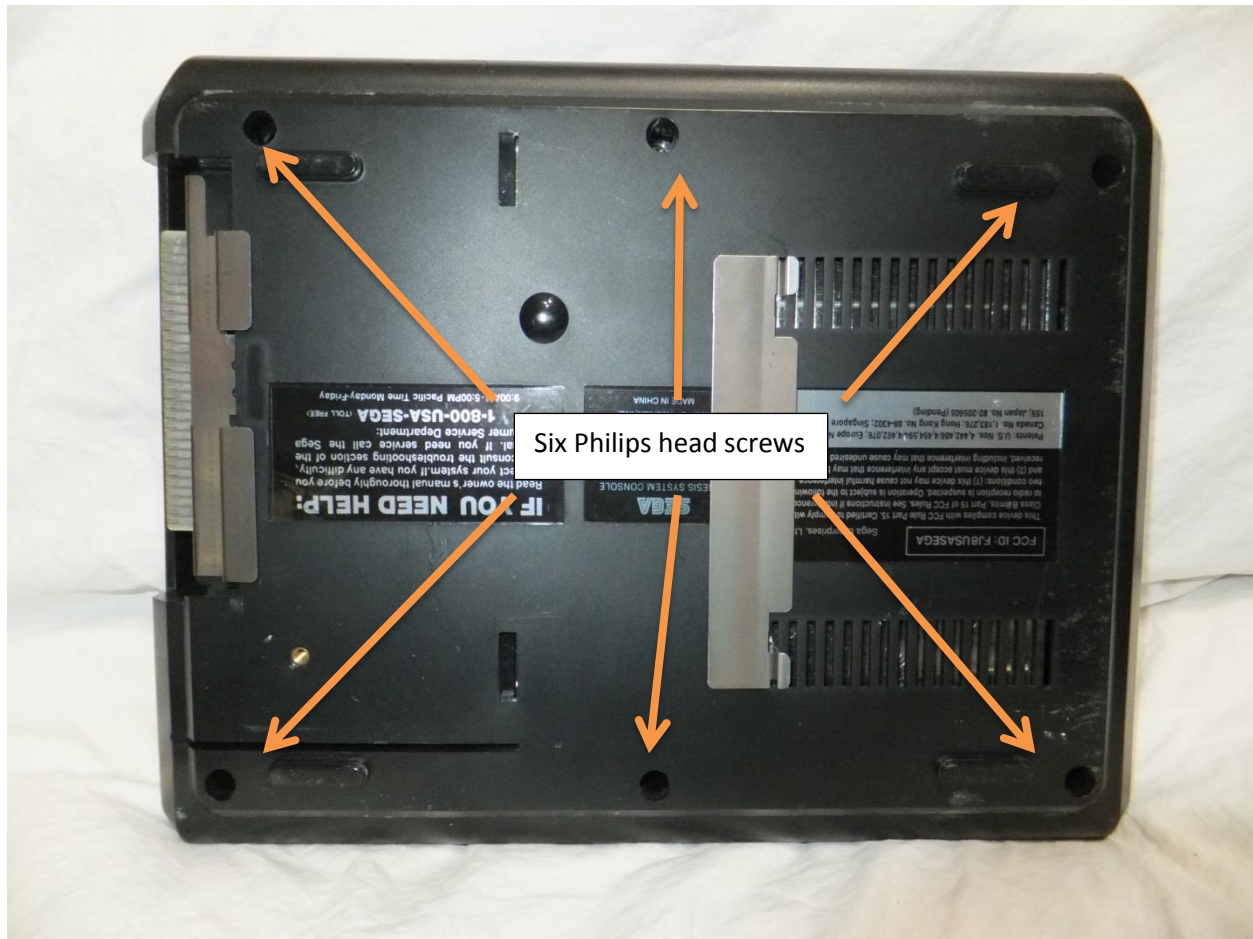
- 1) Never allow patches of solder to overlap or touch, doing so creates a short, thereby rendering the circuit inoperable.
- 2) Make sure to use enough solder to securely attach whatever it is you are soldering, do not be afraid to test the joint out.

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 try to solder in a replacement battery. Now that we have covered the basics of soldering and unsoldering, let's get started with the replacement of those capacitors.

Step One:

To start please turn over the unit and locate the six casing screws as seen in picture one below.



Picture One: Back side of the Sega Genesis 1 system

Once you have located them please unscrew the screws and proceed to step two.

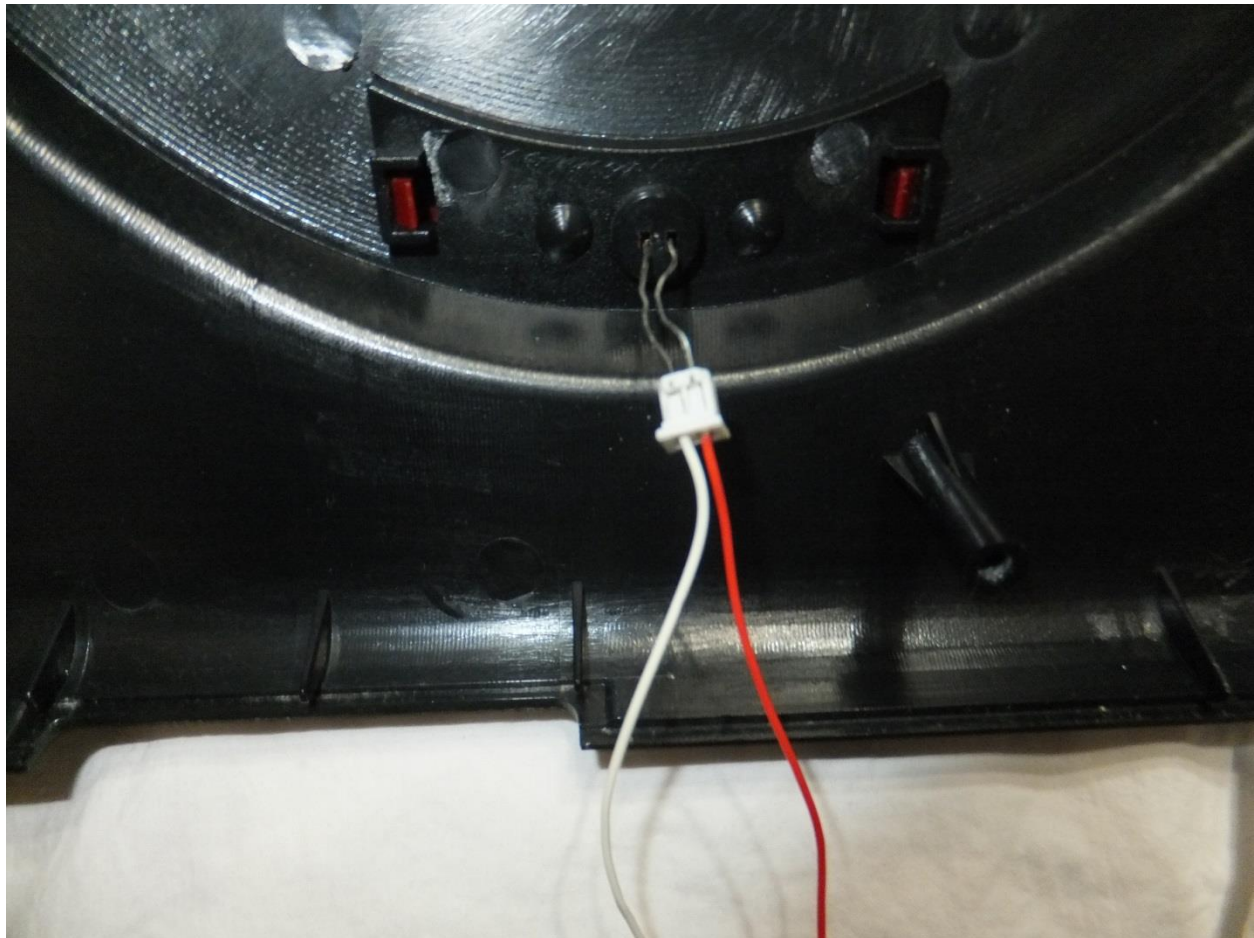
Step Two:

When you start to remove the top casing you will notice that the LED light on the top casing is connected to the mother board by a cable; however this cable isn't easily disconnected. The leads of the LED light are actually inserted through the ports on the cable connector.

We recommend the following options in disconnecting the LED light. Mark each lead on the LED light to which color cable it is connected to. Then pull out the LED leads; however we have found this has a good chance of damaging the connector itself. We haven't found a way around this unfortunately.

If the connect is damaged you can always cut off the connector and directly solder the LED leads to the cables themselves. If you do this we recommend that you place rubber sleeves over the cable and wire to prevent creating a short.

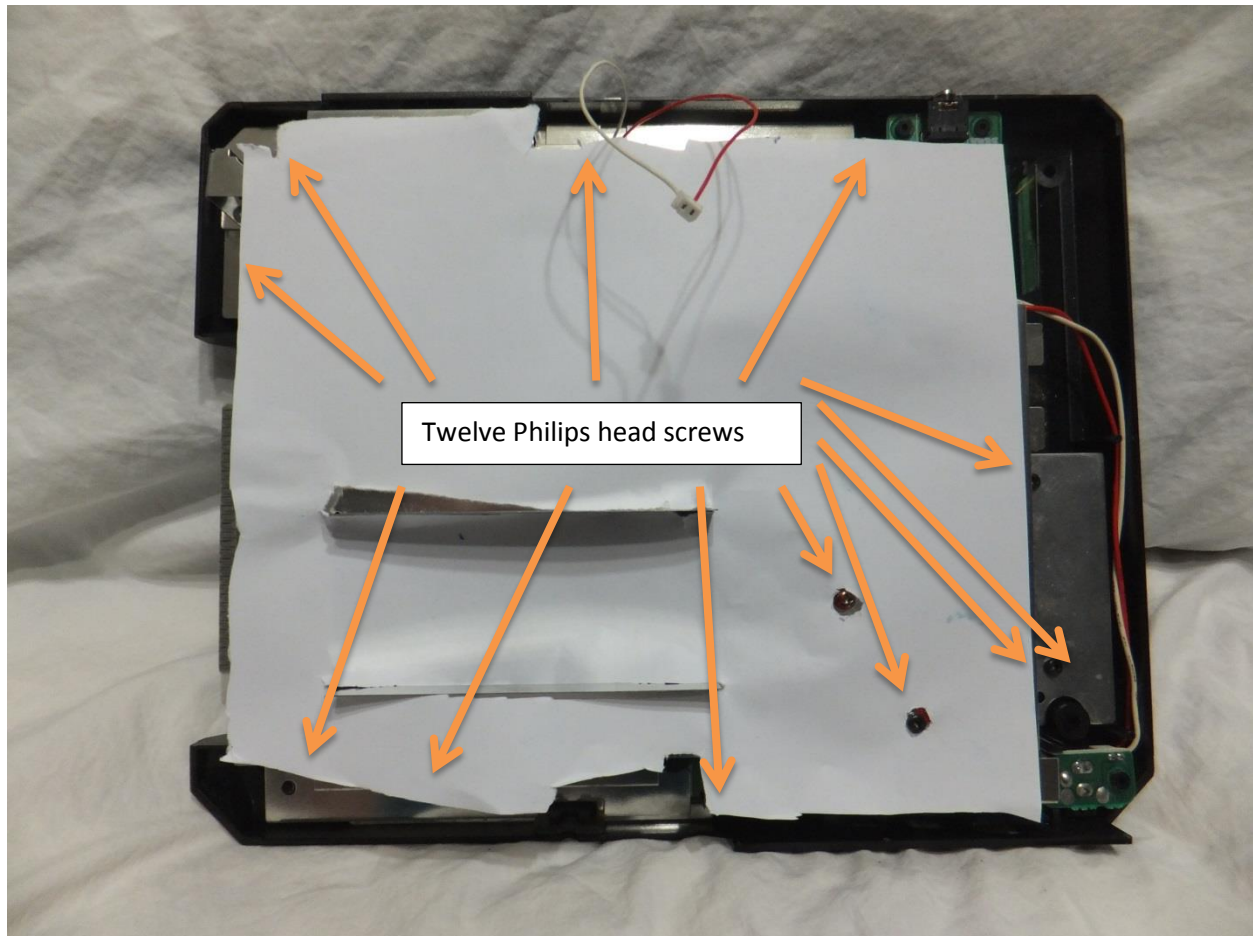
Another option is to solder a wire connect onto the LED leads and another connector onto the red and white wires. This way you can disconnect and connect the two easily in the future. This is the option that we recommend. It takes a bit more time and costs a bit more money, although it makes it easy to open the system in the future. Once done please move onward to step three.



Picture Two: LED light and Sega's ridiculous design

Step Three:

Now that you have decided how to handle the LED lead situation it is time to remove the top RF shield. Please locate the twelve Philips head screws located in picture four below.



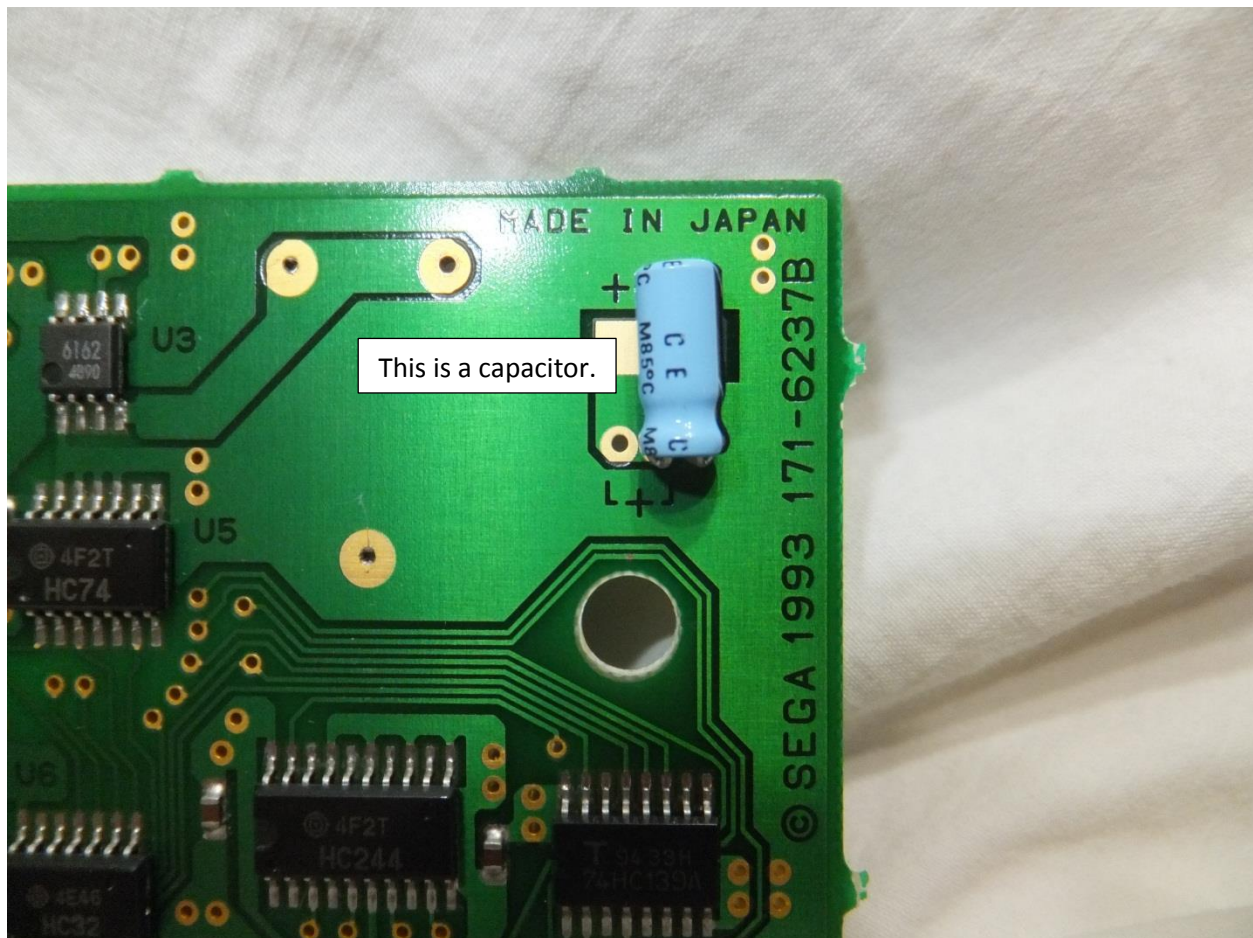
Picture Four: Top RF plate

Once you have the twelve screws removed you should be able to remove the top RF shield and then get to work with the capacitor replacement; however beforehand we need to have a short discussion about capacitors.

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 (μF) 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.

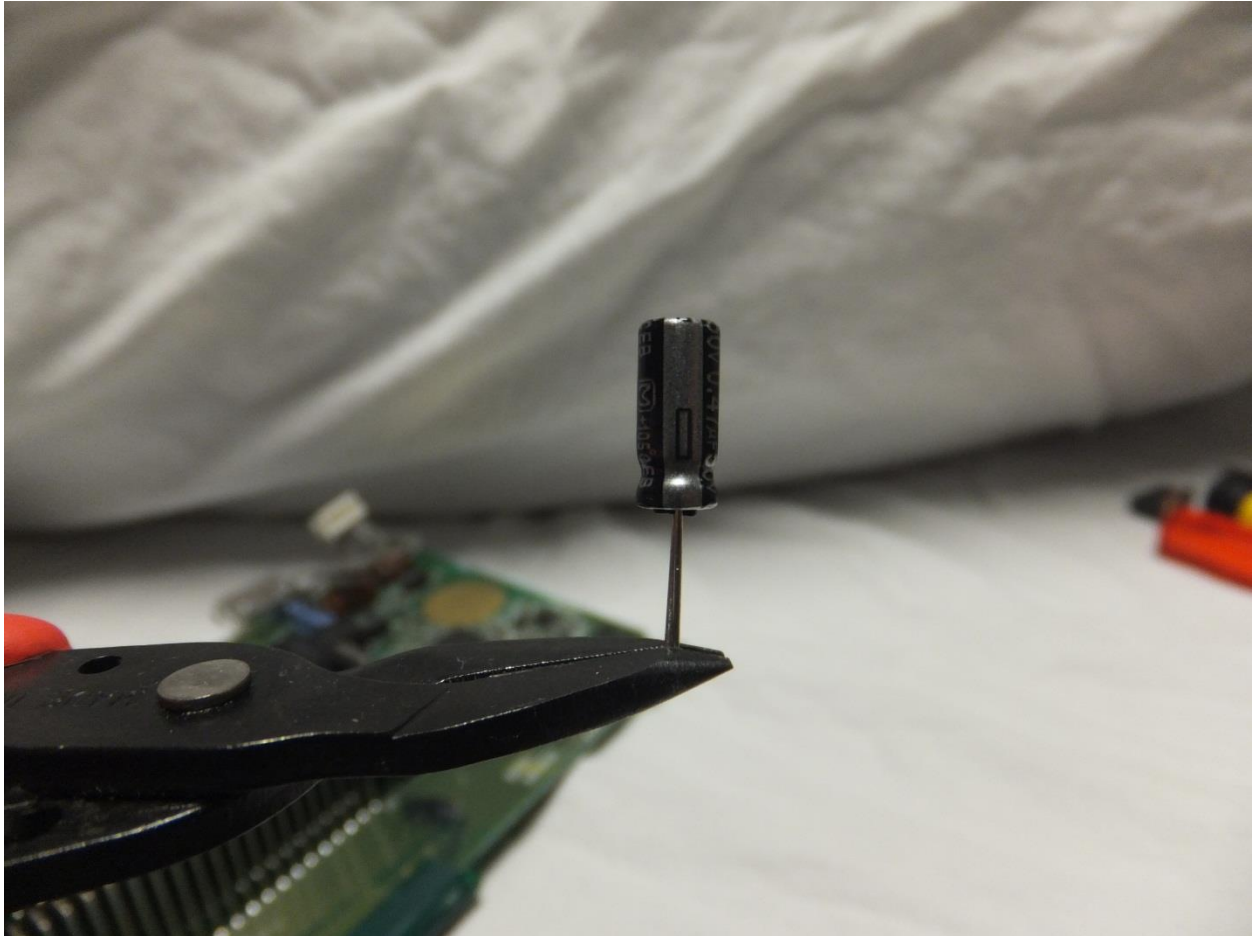
Next you will notice that the capacitor two leads. One is the positive lead and one is the negative lead. It is very important to make sure that you don't get these backwards. The positive terminal should be soldered to the positive terminal on the circuit board and the negative terminal to the negative 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 Five: 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.

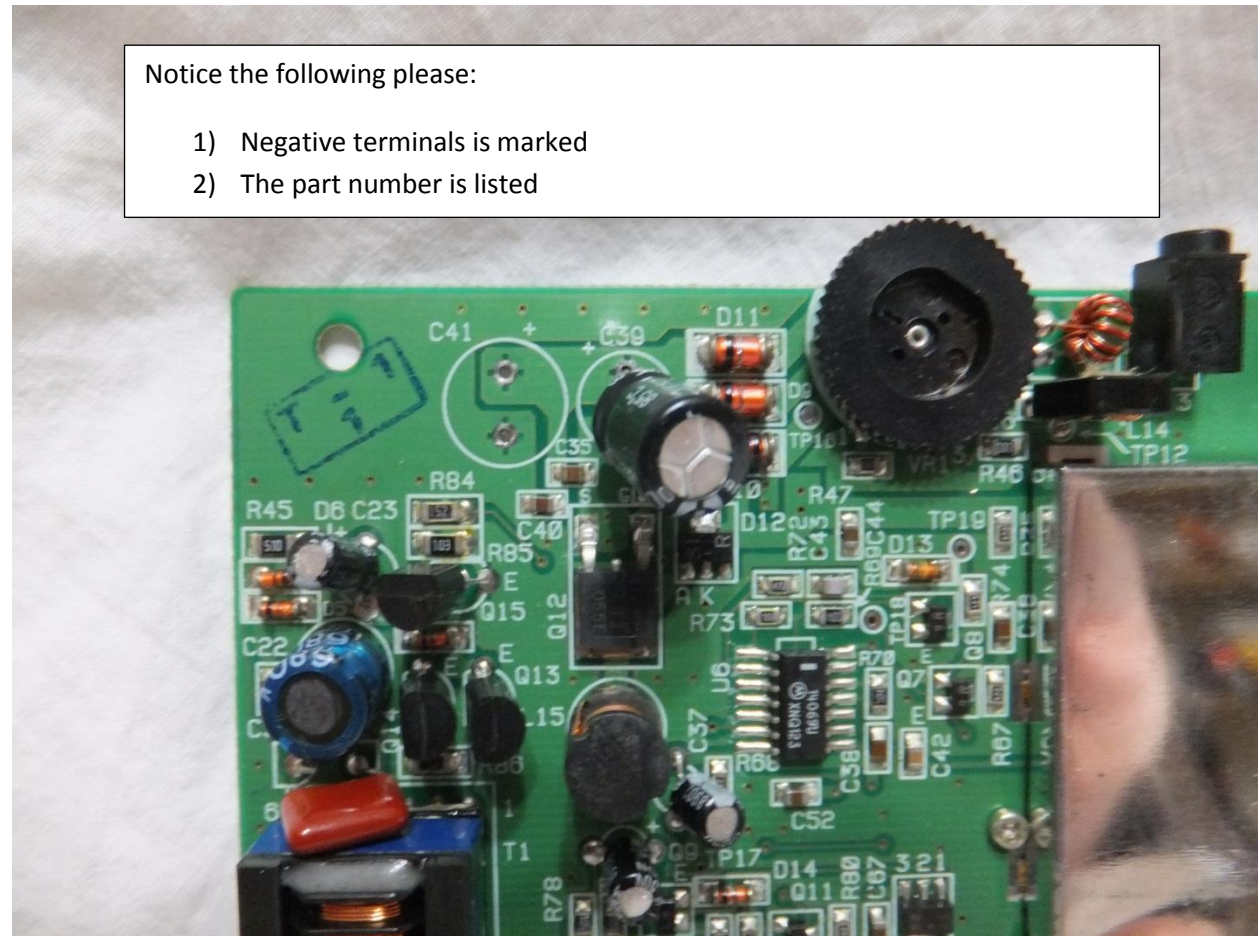


Picture Six Replacement capacitors

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 Four:

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 Seven: Replacement of C41

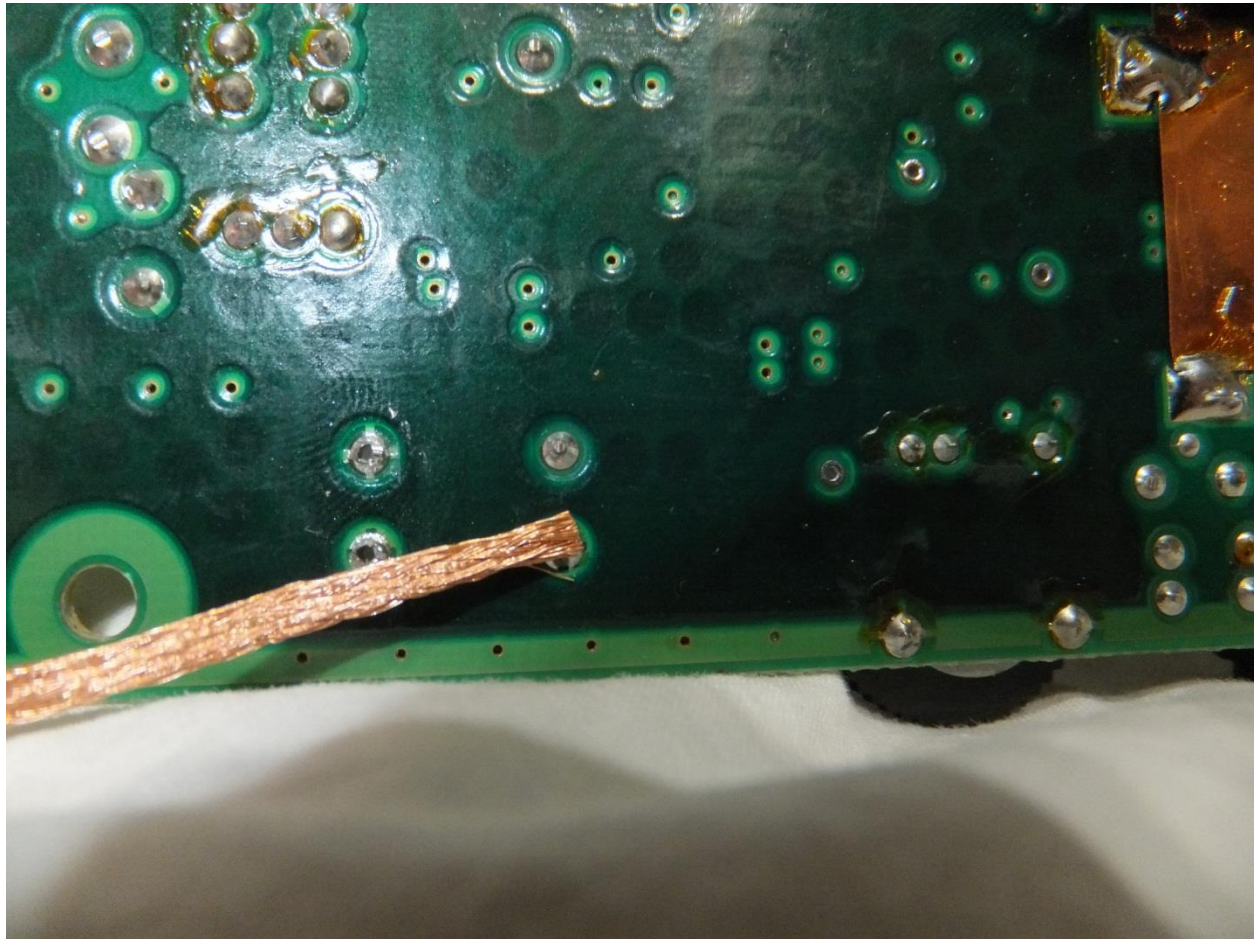
You may notice that the capacitor has already been removed. This is intentional as it allows for better visualization of important information on the circuit board. Please notice the following:

- 1) Negative terminals is marked
- 2) The part number is listed

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

Step Five:

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



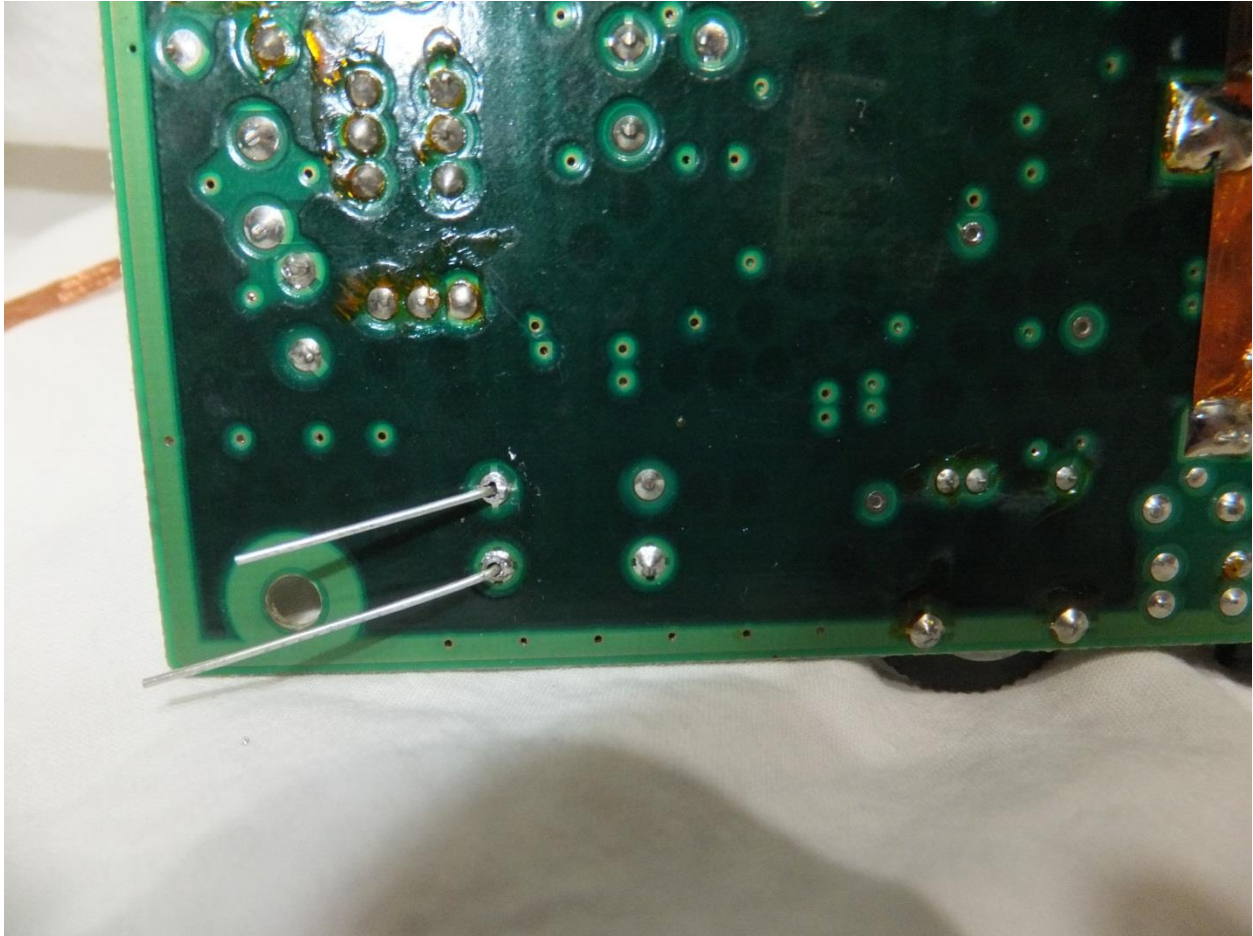
Picture Eight: Proper usage of soldering braid

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 Six:

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



Picture Nine: 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.