

The "990 Mod Kit" for
MXL: 990, 920, 770, 603, 603S, 604, CR24P, 441,
551, 991, V57M, V63M, V250, 2003, 2006, MCA SP1;
CAD: GXL1200, GXL2200, GXL2400; Nady: CM90, SCM900;
Apex: 180, 185; Monoprice: 600700, 600800

This mod works for some variants of the makes and models listed above. This kit is also compatible with more recent versions of the Nady SCM-900. Note that earlier versions (pre 2002) of the SCM-900 share the same circuit as the MXL 2001, and can be modified using one of our other kits (<http://micmodkits.com/mod-kits/2001-mod-kit/>) This kit is also compatible with the original MXL 2003 (NOT the MXL 2003A, which uses a different circuit), although the caps for the 2003 are labeled differently (this will be explained in detail in the instructions that follow). Even if your mic isn't listed above, the mod may still work, since many more imported mics use this same circuit design, and are simply stamped with a different make and model on the outside of the mic. For the most up-to-date list of compatible models, visit our website at <http://micmodkits.com/mod-kits/990-mod-kit/>.

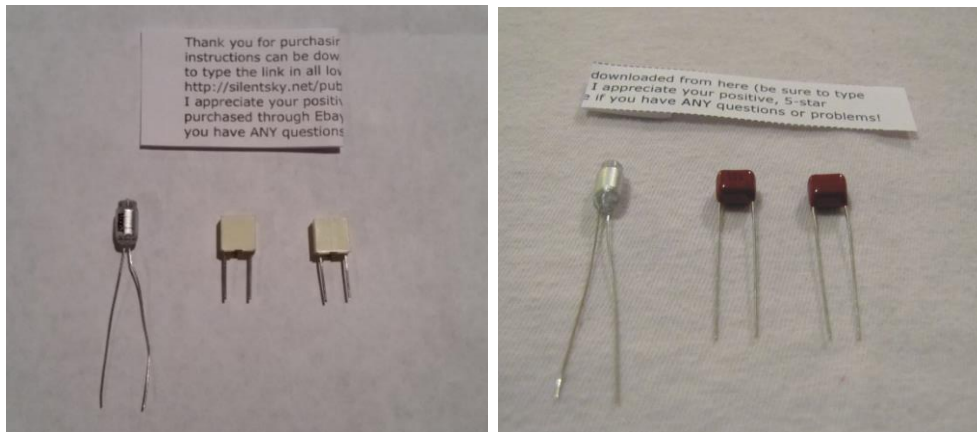
Take Pictures

Before you begin, take pictures of where the wires connect to the circuit board/s for your mic. That way, if a wire comes loose, you can consult the pictures to determine where it should be connected to the board. I hear pretty often from customers who have had a wire come loose while they are working on their mics, and it's not always obvious where it was originally connected!

Performing the Mod

To perform this mod, you will be changing out 3 capacitors ("caps"). First, you will remove the two caps labeled C3 and C4 (on most mics), and replace them with the metal film caps included in this kit. These are the dark-red, square-shaped capacitors—you should receive 2 of these for each kit purchased.

Then, you'll remove the ceramic capsule/gate cap. On most mics, this cap is labeled C13, and is located on the opposite side of the circuit board as C3 & C4. You'll be replacing it with a polystyrene cap, which is the clear, cylindrical-shaped cap that is included in the kit—you should receive 1 of these for each kit purchased.



The newer caps included in this mod kit (left) and the older caps (right)

Please note that beginning in May 2017, we are now including different caps for C3 and C4 in our kits than before. The red caps that we have used previously have been discontinued, so we are now including the cream-colored caps pictured above. The photos of the mics in the remainder of these instructions will be of the older red caps, so you will simply use the cream-

colored caps in their place. The new caps share the same specs as the old, and based upon our own testing and feedback received from beta testers, their performance is equal to (if not better) than the older caps. We apologize for any confusion and will update these instructions with new photos of each mic as time permits.

Safety First

The tip of a soldering iron can commonly heat up to over 600 degrees Fahrenheit. So be careful when handling it! Also, be careful of splattering molten solder onto your skin. It burns and burns badly! This job is small enough that you shouldn't require much solder, so the likelihood of splattering should be minimal, but still be careful. Also, wear some safety glasses. Sometimes when soldering, small bits of solder or flux will randomly shoot off in the air. If one of these hits you in the eye, you could permanently damage your vision.

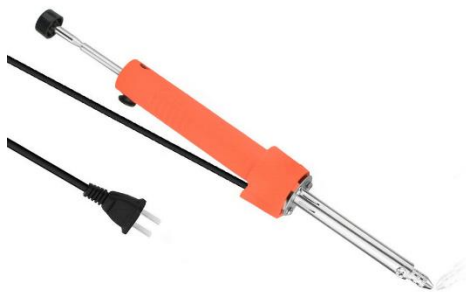
General Tips

I recommend using a "pencil-style" soldering iron with a small, sharp pointed tip as opposed to the "gun-style" soldering irons with a bent, rounded tip. Before beginning, the tip should be cleaned and tinned. To clean your soldering iron, heat up your iron, then take a wet kitchen sponge and wipe the tip against the sponge. Rotate the iron as you wipe so you will clean the tip all the way around.

To "tin" the tip - take some solder and touch it to the tip. Remove any excess as you go by again wiping against the damp sponge. When you are finished, the tip should be a nice, shiny, silvery-color. Use some quality solder from an electronics supplier. I use 60/40 Rosin-core solder from Radio Shack.

Desoldering Tips

To remove the old components, you must desolder them from the circuit board and gently pull them loose. If they don't come loose easily, you probably haven't sufficiently desoldered them yet. To desolder, heat the solder joint for one of the cap's leads (the wire that pokes through the circuit board) and immediately pull that side free from the PCB with a pair of needle nose pliers, or gently pry it away from the board with a small screwdriver. Do the same to the other lead. This should only require a momentary touch or two from your soldering iron to melt the solder. Be careful not to hold the soldering iron in place too long, which could overheat the PCB and possibly damage it! To make things easier, you can use a desoldering braid or desoldering pump to remove the melted solder (search YouTube for tips on desoldering with a braid or pump), leaving the holes clean and free to poke the leads of the new capacitors through. You can also purchase a combination desoldering iron/pump for around \$10 to \$12, which both melts the solder AND allows you to suck it up with a pump. I frequently use one of these for modifying mics, and it makes desoldering and removing the components MUCH EASIER:



Save the Old Components

As you are removing the original capacitors from your mic--save them! Do not throw them away! That way, if you have trouble with your mic after installing the kit, you can swap back in one or more of the original capacitors to be sure you didn't accidentally overheat and damage one of the new caps. You can find more troubleshooting tips on our website at:

<http://micmodkits.com/faqs/>

Cleaning the Printed Circuit Board

When you are finished soldering, some folks say to clean the PCB. Many have expressed amazement at how dirty the PCB's often are, and some have claimed that simply cleaning the board without swapping out any caps actually improved the sound! I'm lazy (and try to be neat), so I typically don't bother with cleaning mine. For more details on cleaning a PCB, just do a Google or YouTube search.

From here, you will need to follow the instructions below for the specific mic that you are modifying. There are generally 3 categories of mics: the Small-Format Pencil-Style Mics (e.g. MXL 603S), the Large-Format Mics (e.g. MXL V63M), and the Medium-Format Mics (MXL 990/770, Monoprice 600800). All of these mics share the same circuit, and you will be changing out the same caps (C3, C4, C13), but because of the 3 different styles/shapes of the mics and their circuit boards, the procedure is slightly different.

Troubleshooting Tips

If you have trouble with your mic (no output, low output, noise, distortion, hum, etc.) after installing a kit, visit this page of our website, where we have several tips for troubleshooting: <http://micmodkits.com/faqs/#troubleshoot>

Instructions for Small-Format, Pencil-Style Mics **(MXL 603, 603S, 604, 991, 441, 551, CR24P,** **CAD GXL1200, Nady CM90, Apex 180, Monoprice 600700)**

Removing the Old Components

First, you'll need to remove the PCB (Printed Circuit Board) from the mic's body. To do this, locate the three small screws near the XLR connector at the base/bottom of the mic (if pointing the mic straight up). Using a small precision screwdriver, tighten (yes, *tighten*) each screw until it is fully tightened all the way in. Note that on some variants of these pencil mics, there are no screws—you simply grip the base (the end with the XLR socket where the mic cable plugs in) of the mic and unscrew it from the body. Once the screws are fully tightened, grip the XLR base and pull it straight out of the body. The PCB is connected to the base and should normally pull free fairly easily.

IMPORTANT: Note that some mics may be equipped with one or more switches (e.g., MXL 993, MXL 604, AKG Perception 170). On some of these mics, there may be a plastic switch cover over the switch itself that sticks out through a hole in the mic's body that may need to be removed first prior to pulling the body off, or you could damage the switch beneath the cover. On other mics, the switch cover may be recessed into the hole enough that the mic's outer body will slip over it without any trouble. In any case, if your mic is equipped with switches, please take special care while disassembling the mic so as not to damage them!

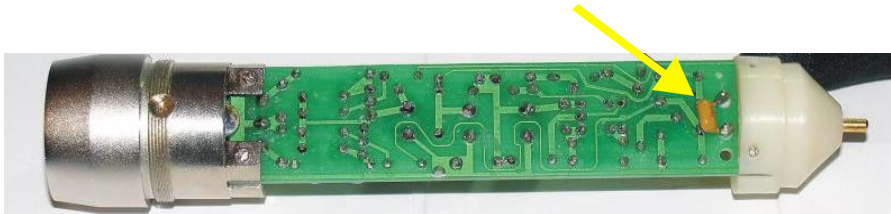


Locate the cap labeled C3. Desolder and remove the cap using the procedure outlined in the "Desoldering Tips" section earlier in this document. This image shows the location of caps C3 & C4:



Remember, desoldering should only require a momentary touch or two from your soldering iron to melt the solder. When removing each of these caps, be careful not to hold the iron in place too long, which will overheat the PCB and can possibly damage it! If there's a lot of excess solder, first use a desoldering braid, desoldering pump, or combination desoldering iron/pump to remove it, leaving the hole free to poke the leads of the new capacitor through. After removing cap C3, repeat this procedure for cap C4.

Locate cap C13. It will be located on the bottom/opposite side of the PCB as C3 & C4. The leads for C13 do not actually poke through the PCB, so it should be even easier to remove. This image shows the location of cap C13 (it's the only cap on this side, so you can't miss it):



Installing the New Components

The capacitors included in your kit may either be loose or attached to some thin strips of cardboard. If they are attached to the cardboard, begin by removing them. I usually cut the leads (just above the cardboard) to free them, since the tape can be pretty tough to peel off. Then, trim the leads to the correct length. Just take some snips and cut them, leaving enough length to extend through the PCB. You can use the length of the leads from the old caps as a guide, if needed. Be careful not to cut them too short, or you will have a hard time getting the leads to poke through the PCB to solder them in place. Alternatively, some folks prefer to leave the leads uncut, solder them in place, and then cut them to length. But also be careful not to leave them too long--if you do, one or both of the leads could come into contact with the mic's body when it is reassembled, which could cause a short in the circuit.

For caps C3 & C4, insert the leads through the proper holes in the circuit board. If you didn't remove the old solder with a de-soldering braid, you may have to momentarily touch your iron to the hole in the PCB so that the lead will pass through it. If necessary, solder the leads in place with some fresh solder. Here are caps C3 & C4 after being replaced with the new caps from this kit:



Take special care when soldering cap C13. It can be a little tricky because there usually aren't any solder pads on the circuit board for the solder to cling to. Instead, there are typically a couple of wire "stand-offs" sticking up from the circuit board, and you have to solder the replacement cap's leads to those. However, because there aren't any solder pads, sometimes it's a little tricky to get the solder to stick to them. I typically just try to melt some solder and kind of daub or drip it in place, covering both the lead of the new cap and the wire stand-off. You have to be really careful while doing this not to overheat the board or the new C13 cap, or you can damage it. If you have a metal "alligator clip", you can clip it onto the lead that you're soldering, putting the alligator clip in between the body of the cap and the end of the lead where you'll be soldering. This will allow the clip to absorb some of the heat from the soldering and help protect the cap. Here is cap C13 after being replaced:



When you're finished, simply insert the PCB back into the mic's body and loosen/back out the screws (if applicable). Voila! You've done your first mic mod!

Instructions for Large-Format Mics
(MXL V57M, V63M, V250, 2003, 2006, MCA SP-1,
CAD GXL2200, GXL2400, Nady SCM900)

Removing the Old Components

First, you'll need to open up the mic to gain access to the PCB (Printed Circuit Board). To do this, first unscrew the black ring mount retainer at the bottom of the mic's body (if pointing the mic straight up):



Then, grip the bottom of the mic's body and unscrew it:

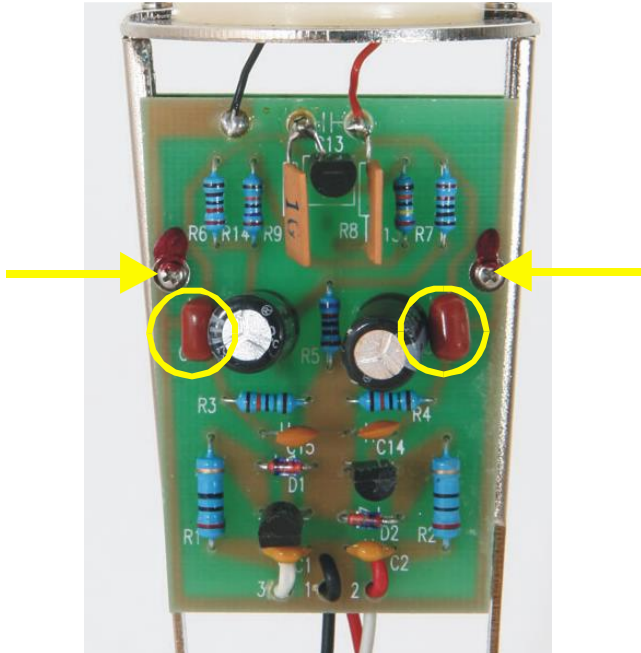


Now, remove the metal cylinder that pretty much makes up the body of the mic:

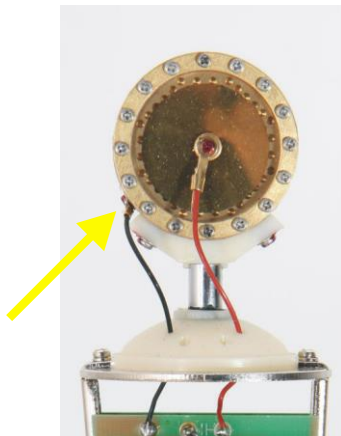


This will expose the circuit boards. There are actually two circuit boards in these mics—one on each side. You will only be interested in the one with the caps labeled C3 & C4. Remove the screw on each side of the PCB that secures it to the mic's body. You must do this in order to access the solder joints for C3 & C4, and to access cap C13.

Note that your mic may either have ceramic or metal film capacitors for C3 & C4. Metal film caps will be similar in appearance to the ones included in your kit/s. Ceramic caps will be similar in appearance to those pictured in the instructions for the MXL 603 and 990 (see instructions, above and/or below). This image displays the locations of the screws, as well as caps C3 & C4:



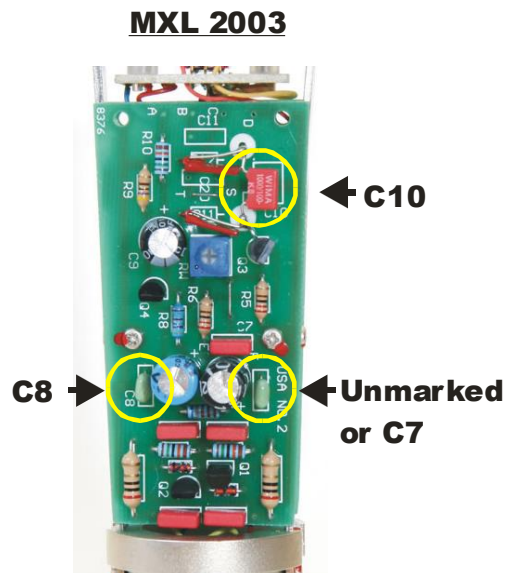
If there's not enough excess wire to allow you to access the solder joints, you can disconnect the black wire from the capsule by removing the screw that is attached to the side of the capsule housing or desolder the wire/s from the circuit board. This will give you some extra slack on the wire/s that will allow you to more easily access the underside of the PCB:



Locate the cap labeled C3. This cap will be located on one side of the PCB near the edge. Remove the cap using the procedure described in the "Desoldering Tips" section earlier in this document. Desoldering should only require a momentary touch or two from your soldering iron. If there's a lot of excess solder, first use a desoldering braid, desoldering pump, or combination desoldering iron/pump to remove it, leaving the hole free to poke the leads of the new capacitor through.

Locate cap C4. It should also be located near the edge of the PCB on the opposite side as C3. Repeat the procedure described above for cap C3 to remove C4.

Note that on the MXL 2003 (pictured below), you will replace caps C8 and the unmarked cap opposite to it instead of C3 and C4. Also note that on some variants of the 2003, the unmarked cap may be labeled as C7 on the board, while on other variants it is unmarked. See the picture below of the (stock/unmodified) 2003 circuit for details.

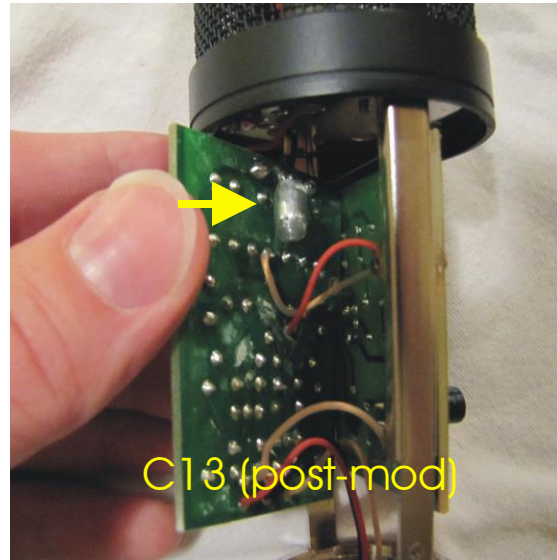
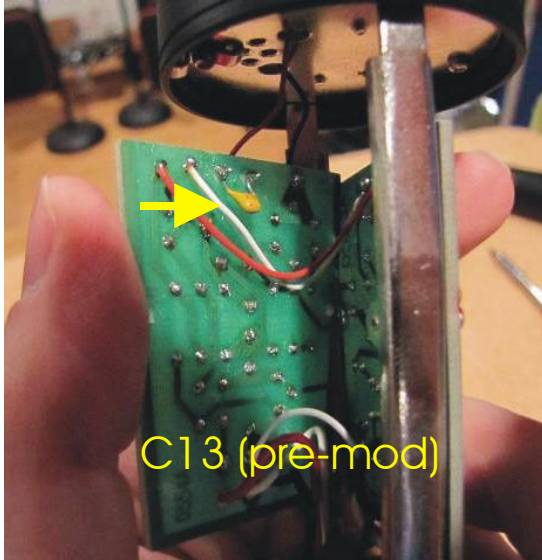


Now locate cap C13. On most mics, it will be located on the bottom/opposite side of the PCB as C3 & C4. On these mics, the leads for C13 DO NOT actually poke through the PCB, so it should be even easier to remove.

However, on the MXL 920, cap C13 is on the same side of the PCB as the other caps, and its leads DO poke through the board. It's also squeezed into a very tight spot on the 920, which makes it more difficult to grip with needle-nose pliers. To make removal of this cap easier, I typically thread a thin piece of wire or string between its leads, and very gently tug it loose from the board with the wire/string while heating the solder joints on the other side with my soldering iron. Do not force it, or pull too hard or you could damage the circuit board!

Note that on the MXL 2003, you will replace cap C10 instead of C13. Cap C10 is located on the same side of the board as the other caps, and its leads DO NOT poke through the board. Instead, its leads are connected to the flat 1 Meg resistors.

When removing each of these caps, be careful not to hold the iron in place too long, which can overheat the PCB and can possibly damage it!



Installing the New Components

The capacitors included in your kit may either be loose or attached to some thin strips of cardboard. If they are attached to the cardboard, begin by removing them. I usually just cut the leads (just above the cardboard) to free them, since the tape can be pretty tough to peel off. Now, trim the leads to the correct length. Just take some snips and cut them, leaving just enough length to extend through the PCB. You can use the length of the leads from the old caps as a guide, if needed. Be careful not to cut them too short, or you will have a hard time getting the leads to poke through the PCB to solder them in place. Alternatively, some folks prefer to leave the leads uncut, solder them in place, and then cut them to length.

For caps C3 & C4, insert the leads through the proper holes in the circuit board. If you didn't remove the old solder with a de-soldering braid, you may have to momentarily touch your iron to the hole in the PCB so that the lead will pass through it. If necessary, solder the leads in place with some fresh solder.

Take special care when soldering cap C13. It can be a little tricky because there usually aren't any solder pads on the circuit board for the solder to cling to. Instead, there are typically a couple of wire "stand-offs" sticking up from the circuit board, and you have to solder the replacement cap's leads to those. However, because there aren't any solder pads, sometimes it's a little tricky to get the solder to stick to them. I typically just try to melt some solder and kind of daub or drip it in place, covering both the lead of the new cap and the wire stand-off. You have to be really careful while doing this not to overheat the board or the new C13 cap, or you can damage it. If you have a metal "alligator clip", you can clip it onto the lead that you're soldering, putting the alligator clip in between the body of the cap and the end of the lead where you'll be soldering. This will allow the clip to absorb some of the heat from the soldering and help protect the cap.

When you're finished, simply reassemble the mic in the reverse order for disassembling it as described above. Voila! You've completed your first mic mod!

Instructions for the MXL 990/770/Monoprice 600800

Removing the Old Components

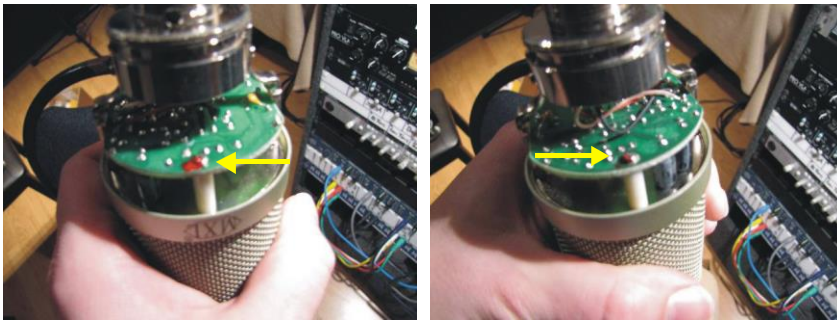
The first step is to open up the mic to gain access to the PCB (Printed Circuit Board). To do this, first unscrew the black ring mount retainer at the bottom of the mic's body.



Then, grip the bottom of the mic's body and unscrew it. This will expose the circuit board.



Remove the two screws that secure the PCB to the mic's body. These same screws also secure the lower portion of the mic to the headbasket. The heads of the screws will be daubed with some red paint.



After removing the screws, separate the lower portion of the mic from the headbasket. Set the headbasket aside for now.

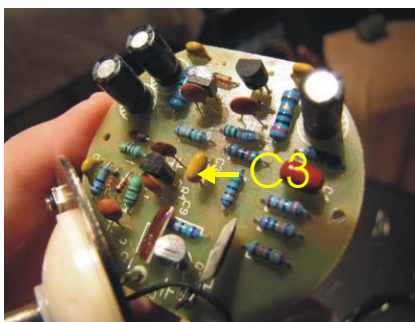


There should be enough excess wire to allow you to "swing out" the PCB so that you can access the solder joints. Locate the cap labeled C4. This yellow-colored cap should be near the edge of the PCB.

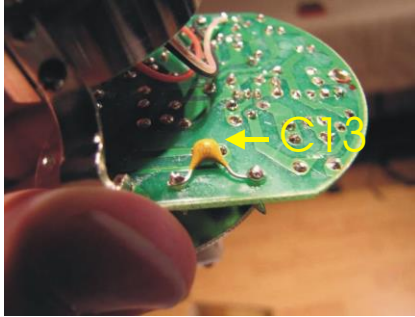


Remove the cap using the procedure described in the "Desoldering Tips" section earlier in this document. Desoldering should only require a momentary touch or two from your soldering iron. When removing each of these caps, be careful not to hold the iron in place too long, which will overheat the PCB and can possibly damage it! If there's a lot of excess solder, you may want to first use a desoldering braid, desoldering pump, or combination desoldering iron/pump to remove it, leaving the hole free to poke the leads of the new capacitor through.

Locate cap C3. It should be located near the center of the PCB. Repeat the procedure described above for cap C4 to remove C3.



Locate cap C13. It will be the only cap located on the bottom/opposite side of the PCB as C3 & C4. The leads for C13 do not actually poke through the PCB, so it should be even easier to remove.

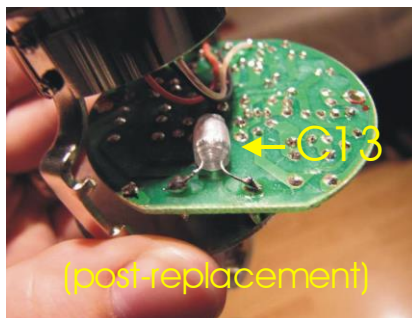
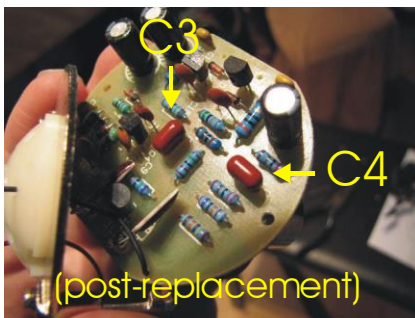


Installing the New Components

The capacitors included in your kit may either be loose or attached to some thin strips of cardboard. If they are attached to the cardboard, begin by removing them. I usually just cut the leads (just above the cardboard) to free them, since the tape can be pretty tough to peel off. Now, trim the leads to the correct length. Just take some snips and cut them, leaving just enough length to extend through the PCB. You can use the length of the leads from the old caps as a guide, if needed. Be careful not to cut them too short, or you will have a hard time getting the leads to poke through the PCB to solder them in place. Alternatively, some folks prefer to leave the leads uncut, solder them in place, and then cut them to length.

For caps C3 & C4, insert the leads through the proper holes in the circuit board. If you didn't remove the old solder with a de-soldering braid, you may have to momentarily touch your iron to the hole in the PCB so that the lead will pass through it. If necessary, solder the leads in place with some fresh solder.

Take special care when soldering cap C13. It can be a little tricky because there usually aren't any solder pads on the circuit board for the solder to cling to. Instead, there are typically a couple of wire "stand-offs" sticking up from the circuit board, and you have to solder the replacement cap's leads to those. However, because there aren't any solder pads, sometimes it's a little tricky to get the solder to stick to them. I typically just try to melt some solder and kind of daub or drip it in place, covering both the lead of the new cap and the wire stand-off. You have to be really careful while doing this not to overheat the board or the new C13 cap, or you can damage it. If you have a metal "alligator clip", you can clip it onto the lead that you're soldering, putting the alligator clip in between the body of the cap and the end of the lead where you'll be soldering. This will allow the clip to absorb some of the heat from the soldering and help protect the cap.



When you're finished, simply reassemble the mic in the reverse order for disassembling it as described above. Voila! You've completed your first mic mod!

Conclusion

If you've purchased a kit, and (after reading these instructions) are worried or feel that you've bitten off more than you can chew, don't worry. Step back, take a deep breath, and just dive in. Take the mic apart, just look at it, and get used to handling it. See, that's not so bad! Now fire up the soldering iron! Psyche yourself up, if you have to!

Worst case scenario, you ruin your mic, and can buy another used one on Ebay for cheap, so it's not the end of the world. But trust me, that's very unlikely to happen. If you have even a *minimal* amount of soldering experience, you should be fine. If you don't have *any* soldering experience, then this might not be an ideal first-time project for you, and you might want to ask for some help from someone who does.

Feel free to e-mail me if you have any questions, or think these instructions could be improved in some way. Finally, if you decide that this is something that you really just don't want to tackle on your own, contact me. I offer these mods as a service for those who don't have the tools or skills/experience to do it on their own.

Also let me know what you think of the post-modified mics, and please leave 5-star, positive Seller Feedback for me (on Ebay, Reverb, or Amazon—if you purchased your kit through one of those marketplaces) if you're satisfied with the products and service that you've received. And if there's ever a problem with your order, please contact me through my website at <http://micmodkits.com>, and I'll do my best to set things straight. Best of luck, and happy recording!

BONUS: Headbasket Mod

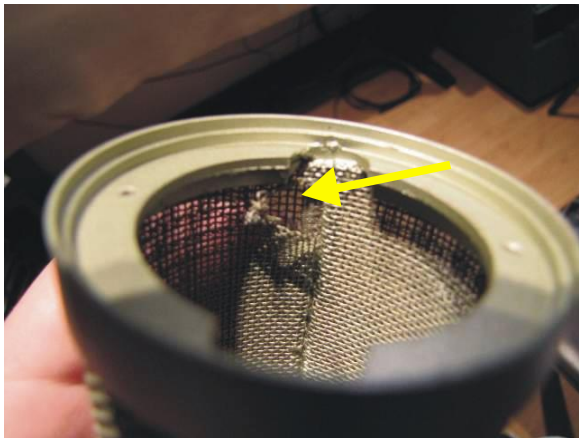
The “headbasket mod” involves removing 1 or 2 of the inner layers of mesh from the mic’s headbasket. Note that on most of these mics, there are 3 total layers (on some models there may be only 2). You will need to use care to be sure not to damage the outermost layer, which is obviously needed to protect the capsule. If you use your mic/s to record vocals, you will definitely need to use an external pop filter after performing this mod, which is generally a good idea, even if you haven’t performed the headbasket mod.

IMPORTANT: Note that some mics may not be as good a candidate for the headbasket mod as others! Some manufacturers attach the mesh layers very loosely without much solder in place, which makes it easy to remove the inner layer/s. Other manufacturers use a LOT of solder to weld the layers in place very firmly, which makes it more difficult to remove and easier to damage the outer layer! Use your own best judgment when determining whether to perform the headbasket mod on your mic!

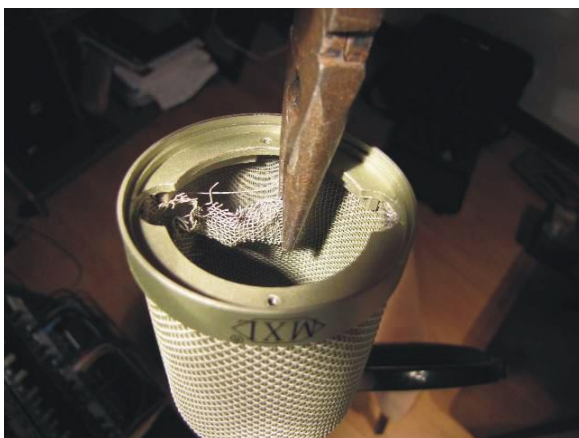
Each layer of mesh actually consists of two pieces—one for the front, and one for the back side of the headbasket. Each piece is attached to both the vertical brace that extends up the sides and around the top of the headbasket, as well as the reinforcement ring around the bottom of the headbasket. After working each piece loose from the reinforcing ring, you will also need to pry them loose from the vertical brace using your pliers. This image shows the brace and ring to which the headbasket layers are attached (on the inside, of course).



Ok, now let’s get started. Remove the headbasket from the rest of the mic’s body as described in the instructions above. Using a precision screwdriver, pry loose one side of the innermost layer.



After prying the corner loose, use a pair of needle-nose pliers to begin working your way around the inside of the ring, working the innermost layer loose from it. Just work your way slowly around, twisting the pliers as you go. After getting it loose from the ring, you'll also need to work it loose from the brace.



Repeat this procedure for the same layer on the opposite side of the headbasket.

Then, repeat the entire procedure for the next layer of mesh. When removing the second layer, again, be careful not to accidentally damage the outermost layer.

When you are finished, re-assemble the mic. You should now be able to see the mic's capsule much better now through the single layer. And the capsule should be able to "see" (hear) any sounds much better, which you may be recording with it!