BYOC Analog Delay Kit Instructions

Please read through the instructions completely before beginning this project. This is one of our most difficult kits and it is a little different than other BYOC kits, so even if you are an experienced builder, take the time to look these instructions over in their entirety before beginning.

Warranty:

BYOC, LLC guarantees that your kit will be complete and that all parts and components will arrive as described, functioning and free of defect. Soldering, clipping, cutting, stripping, or using any of the components in any way voids this guarantee. BYOC, LLC guarantees that the instructions for your kit will be free of any majors errors that would cause you to permanently damage any components in your kit, but does not guarantee that the instructions will be free of typos or minor errors. BYOC, LLC does not warranty the completed pedal as a whole functioning unit nor do we warranty any of the individual parts once they have been used. If you have a component that is used, but feel it was defective prior to you using it, we reserve the right to determine whether or not the component was faulty upon arrival. Please direct all warranty issues to: sales@buildyourownclone.com This would include any missing parts issues.

Return:

BYOC, LLC accepts returns and exchanges on all products for any reason, as long as they are unused. We do not accept partial kit returns. Returns and exchanges are for the full purchase price less the cost of shipping and/or any promotional pricing. Return shipping is the customers responsiblity. This responsibility not only includes the cost of shipping, but accountability of deliver as well. Please contact

sales@buildyourownclone.com to receieve a return authorization before mailing.

Tech Support:

BYOC, LLC makes no promises or guarantees that you will sucessfully complete your kit in a satisfactory mannor. Nor does BYOC, LLC promise or guarantee that you will receive any technical support. Purchasing a product from BYOC, LLC does not entitle you to any amount of technical support. BYOC, LLC does not promise or guarantee that any technical support you may receive will be able to resolve any or all issues you may be experiencing.

That being said, we will do our best to help you as much as we can. Our philosophy at BYOC is that we will help you only as much as you are willing to help yourself. We have a wonderful and friendly DIY discussion forum with an entire section devoted to the technical support and modifications of BYOC kits.

www.buildyourownclone.com/board

When posting a tech support thread on the BYOC forum, please post it in the correct lounge, and please title your thread appropriately. If everyone titles their threads "HELP!", then it makes it impossible for the people who are helping you to keep track of your progress. A very brief discription of your specific problem will do. It will also make it easier to see if someone else is having or has had the same problem as you. The question you are about to ask may already be answered. Here are a list of things that you should include in the body of your tech support thread:

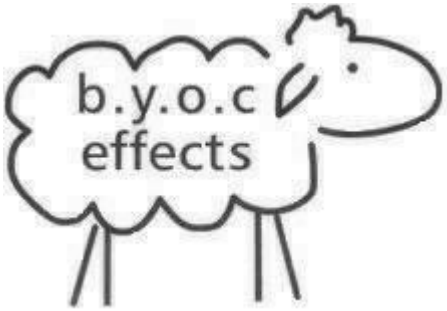
1. A detailed explanation of what the problem is. (not just, "It doesn't work, help")
2. Pic of the top side of your PCB.
3. Pic of the underside of your PCB.
4. Pic that clearly shows your footswitch/jack wiring and the wires going to the PCB
5. A pic that clearly shows your wiring going from the PCB to the pots and any other switches(only if your kit has non-PC mounted pots and switches)
6. Is bypass working?
7. Does the LED come on?
8. If you answer yes to 6 and 7, what does the pedal do when it is "on"?
9. Battery or adapter.(if battery, is it good? If adapter, what type?)

Also, please only post pics that are in focus. You're only wasting both parties' time if you post out of focus, low res pics from your cell phone.

Revision Notes:

Rev 1.1 (current)
Rev 1.0 - 4 x 10k resistors need to be replaced with 1k. 1 x 100k resistor needs to be replaced with a 10k. 1 x 22k resistor needs to be replaced with a 15k. A trace needs to be cut and jumpered with a 33k resistor. See pages 6 and 7 for more info.

Copyrights:

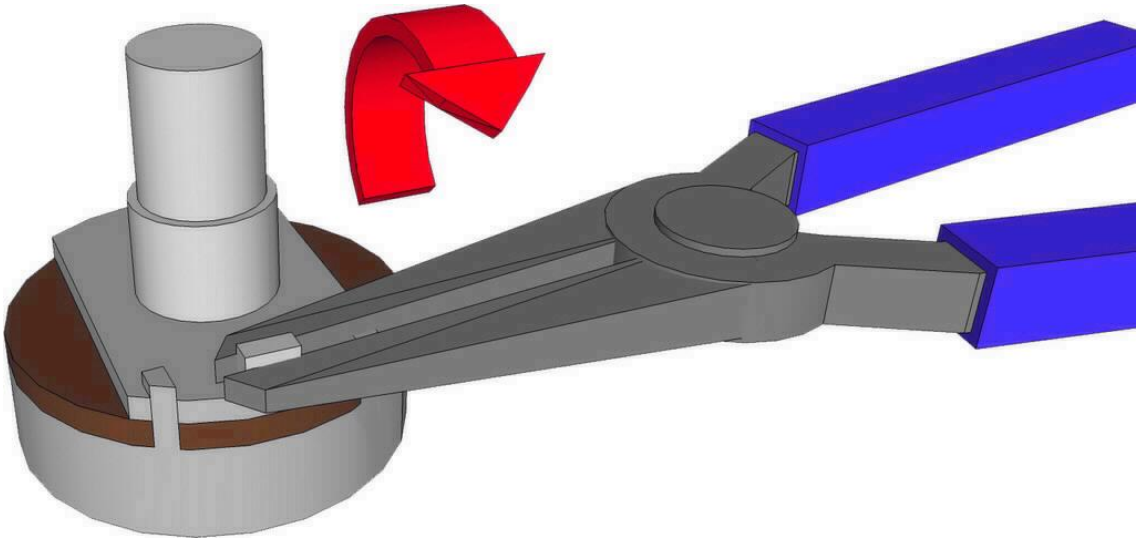


ANALOG DELAY KIT
INSTRUCTION INDEX

Parts Checklist for BYOC Analog Delay Kit

Resistors:
1 - 100ohm/101 (brown/black/black/black/brown)
1 - 470ohm/471 (yellow/purple/black/black/brown)
7 - 1k/102 (brown/black/black/brown/brown)
20 - 10k/103 (brown/black/black/red/brown)
1 - 12k/123 (brown/red/black/red/brown)
1 - 15k/153 (brown/green/black/red/brown)
2 - 22k/223 (red/red/black/red/brown)
1 - 33k/333 (orange/orange/black/red/brown)
13 - 100k/104 (brown/black/black/orange/brown)
3 - 470k/474 (yellow/purple/black/orange/brown)
Capacitors:
4 - 100pf ceramic disc(101)
1 - 330pf ceramic disc(331)
2 - 470pf ceramic disc(471)
1 - 820pf ceramic disc(831)
1 - .0022µf/2n2 film (2n2j)
1 - .0047µf/4n7 film (4n7j)
1 - .022µf/22n film (22nJ)
1 - .033µf/33n film (33nj)
3 - .047µf/47n film (47nj)
2 - .47µf aluminum electrolytic
11 - 1µf aluminum electrolytic
10 - 10µf aluminum electrolytic
1 - 220µf aluminum electrolytic
Diodes:
6 - 1N4148 or 1N914
1 - 1N4001
IC's and IC sockets:
1 - TL082, TL072, 4558 or other dual op amp
5 - MN3102, V3102D, or BL3102
4 - MN3205 or V3205D
6 - DIP 8 socket
4 - DIP14 socket
1 - DIP16 socket
Transistors:
1 - BS170
1 - MPSA18
1 - 2N5088
3 - MPS6521

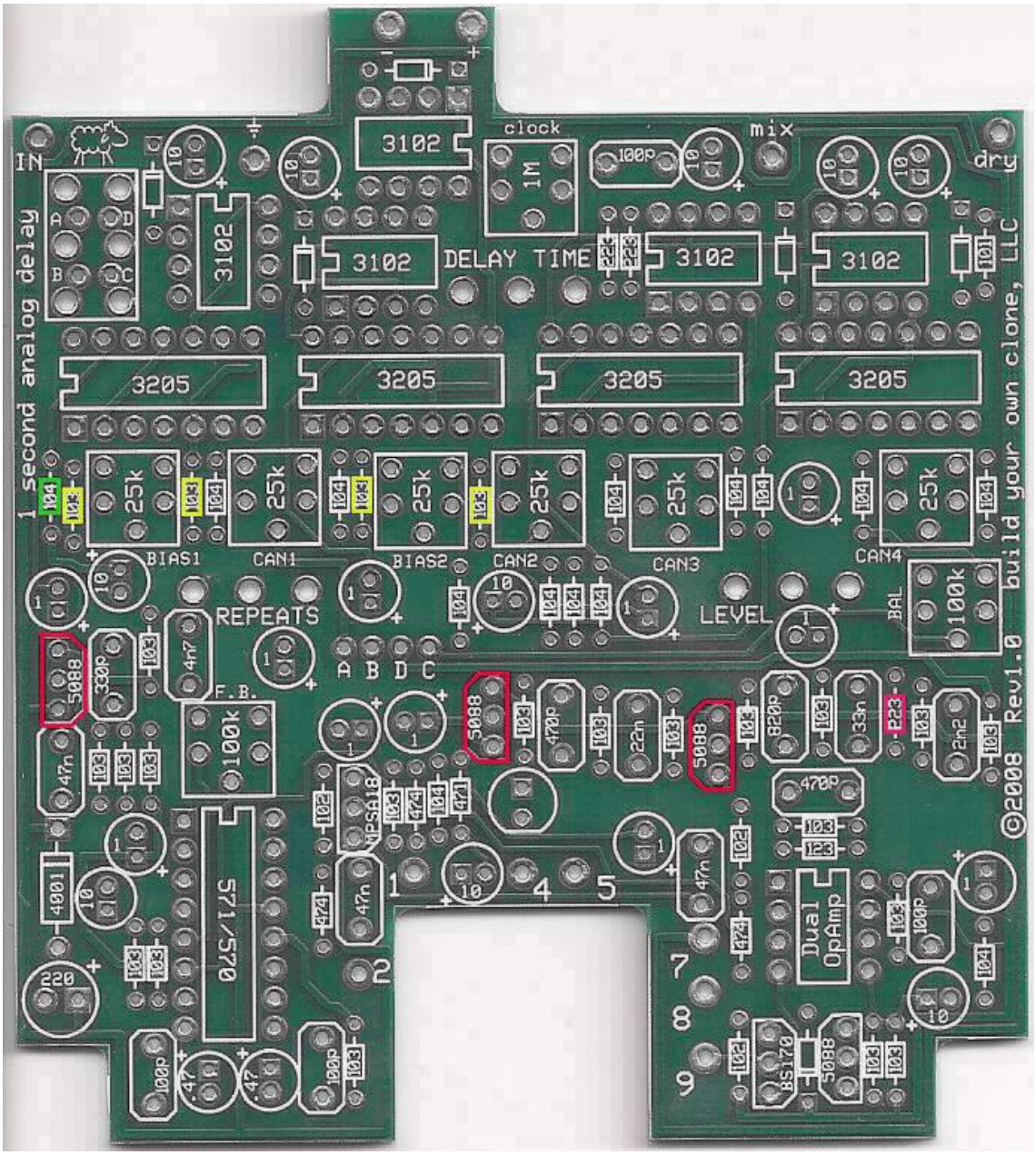
Potentiometers: Be sure to snap off the small tab on the side of each pot.



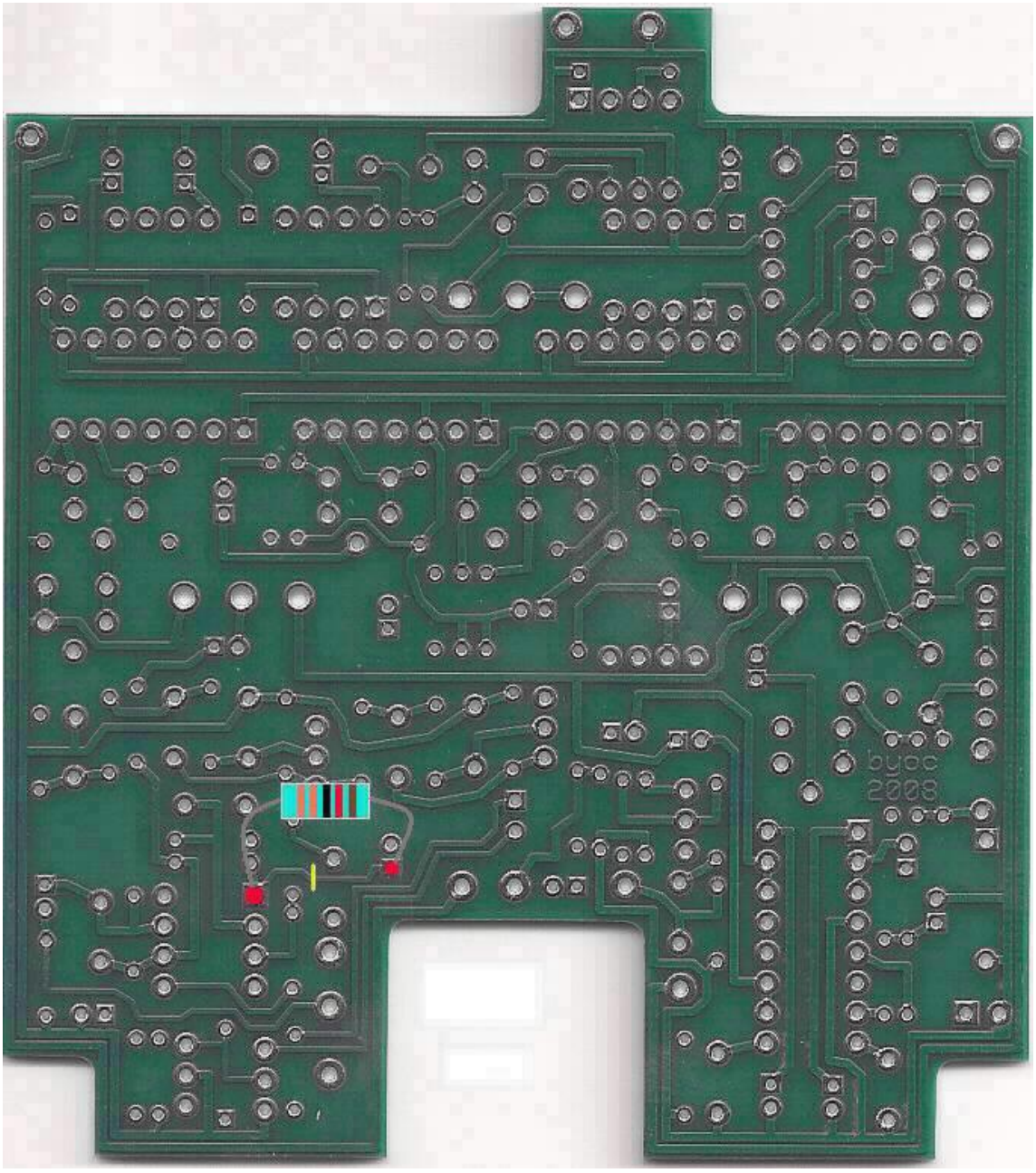
2 - B100k linear (delay level & repeats)
1 - B1M linear (delay time)
1 - 1M trimpot (105)
2 - 100k trimpot (104)
6 - 25k trimpots (253)

Hardware:
1 - drilled enclosure w/ 4 screws
1 - byoc analog delay kit circuit board
1 - DPDT PC mounted toggle switch
1 - 3PDT footswitch
3 - knobs
1 - AC adaptor jack
3 - ¼"mono jack
1 - red LED
hook-up wire

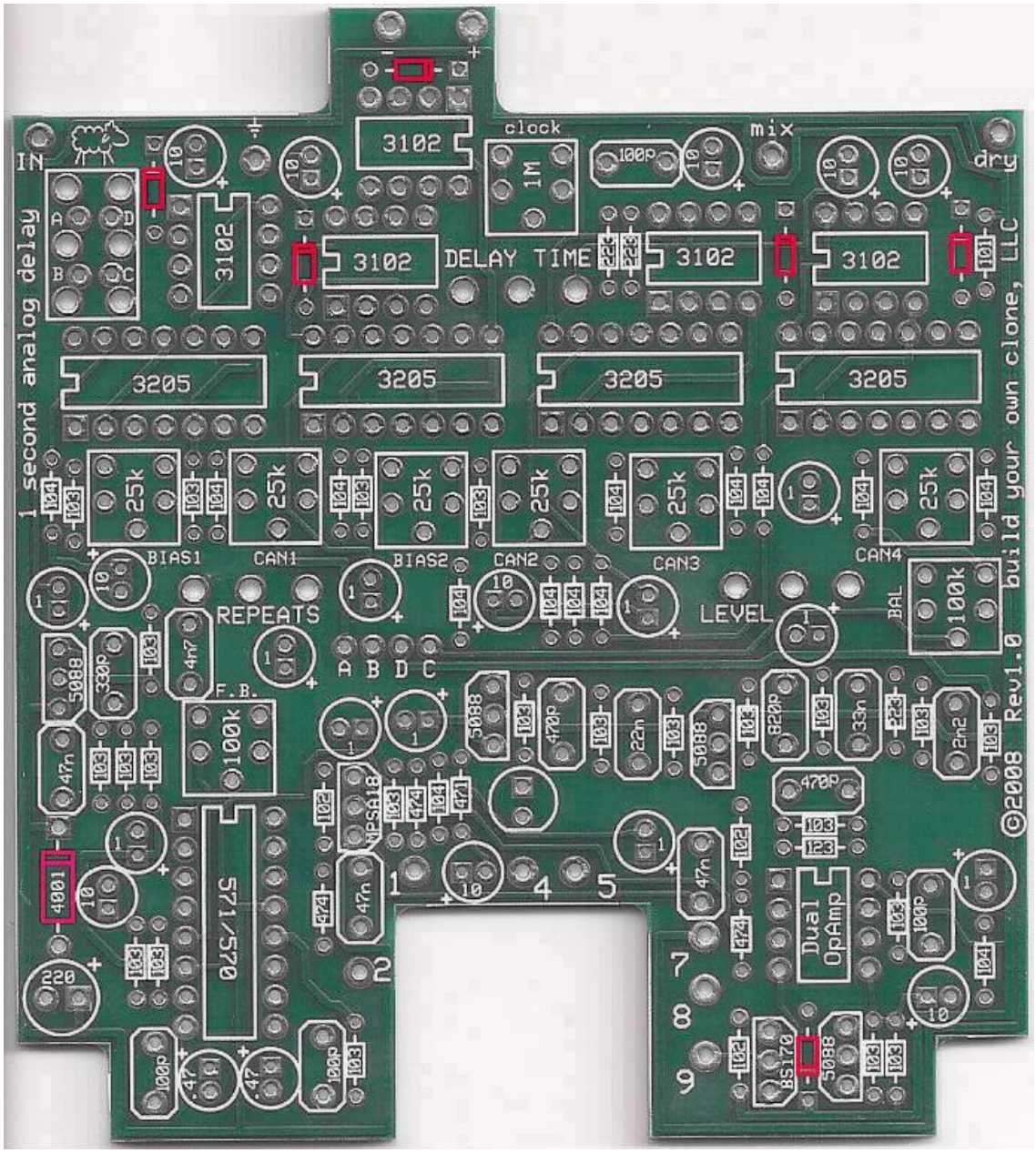
Populating the Circuit Board



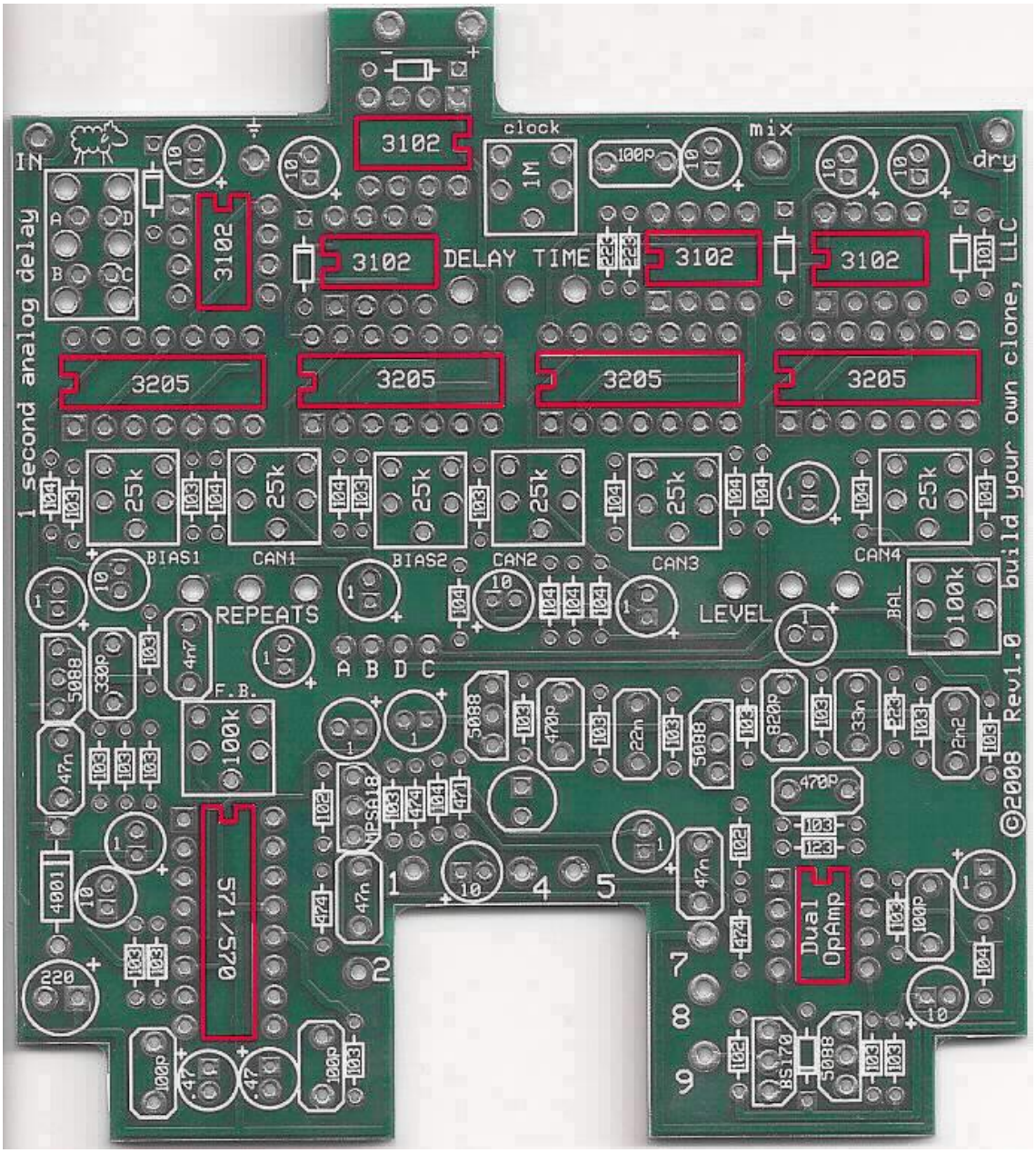
Before you begin: This is only necessary for the Rev1.0 PCB. If you have a Rev1.1 or higher, you do can ignore pages 6 & 7. Be aware there are several components that need to be changed. The four 10k (103) resistors highlighted in yellow should be changed to **1k.** The 100k(104) resistor highlighted in green should be changed to **10k.** The 22k(223) resistor highlighted in pink should be changed to **15k** And the three 2N5088 transistors highlighted in red should be changed to **MPS6521** transistors. You will be reminded of these changes when you get to the point where we add the transistors and again when we get to the resistors.



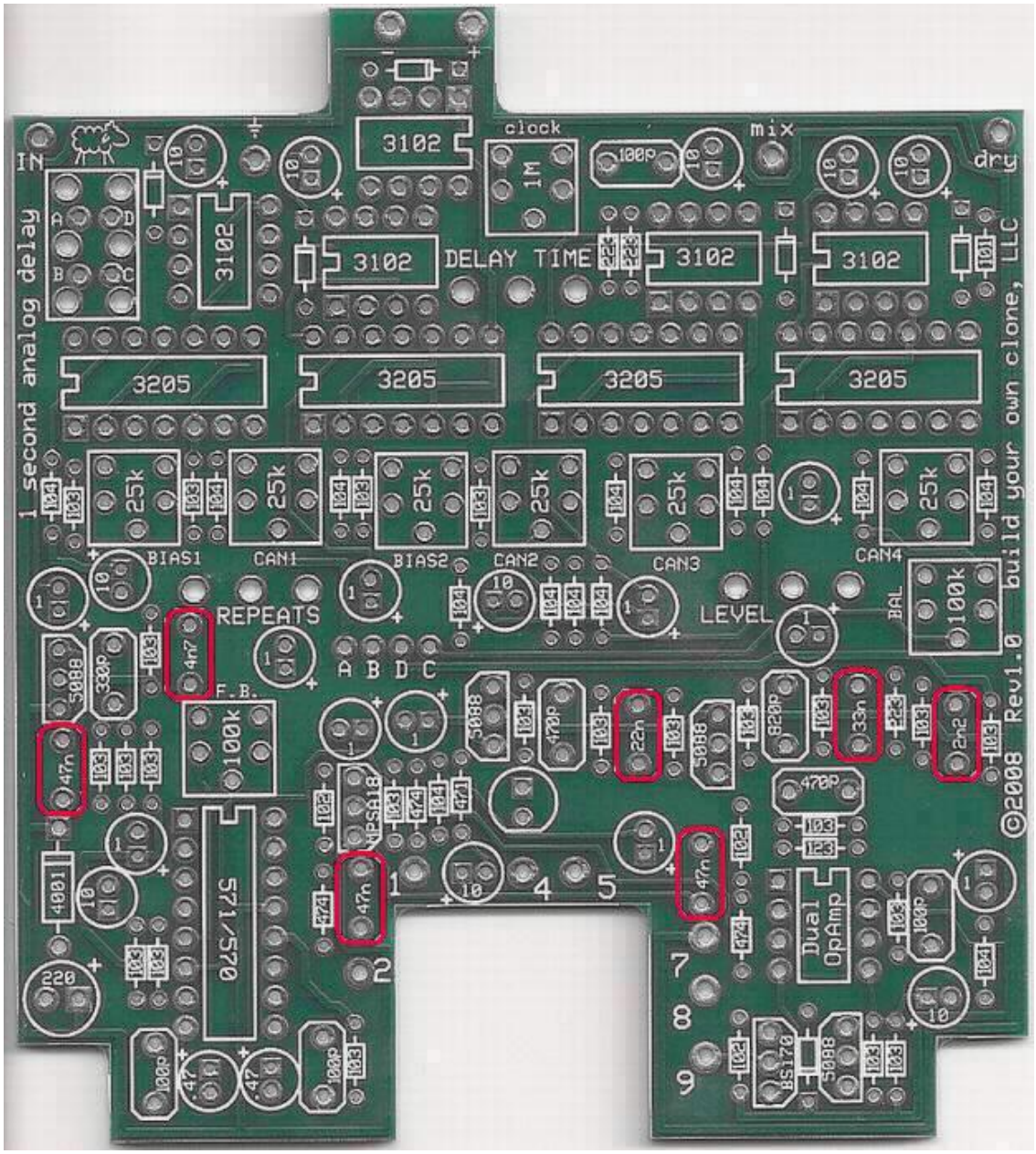
You'll also need to make a minor adjustment to the PCB. You will need to use a utility knife, razor blade, exacto knife or something sharp to cut one of the traces on the bottom side of the PCB . You will make the cut at the yellow line highlighted in the diagram above. You will then need to add a 33k resistor to the bottom side of the PCB, connecting it to the solder pads highlighted in red. You should save this for the step till the end of the "populating the PCB" process. You will be reminded.



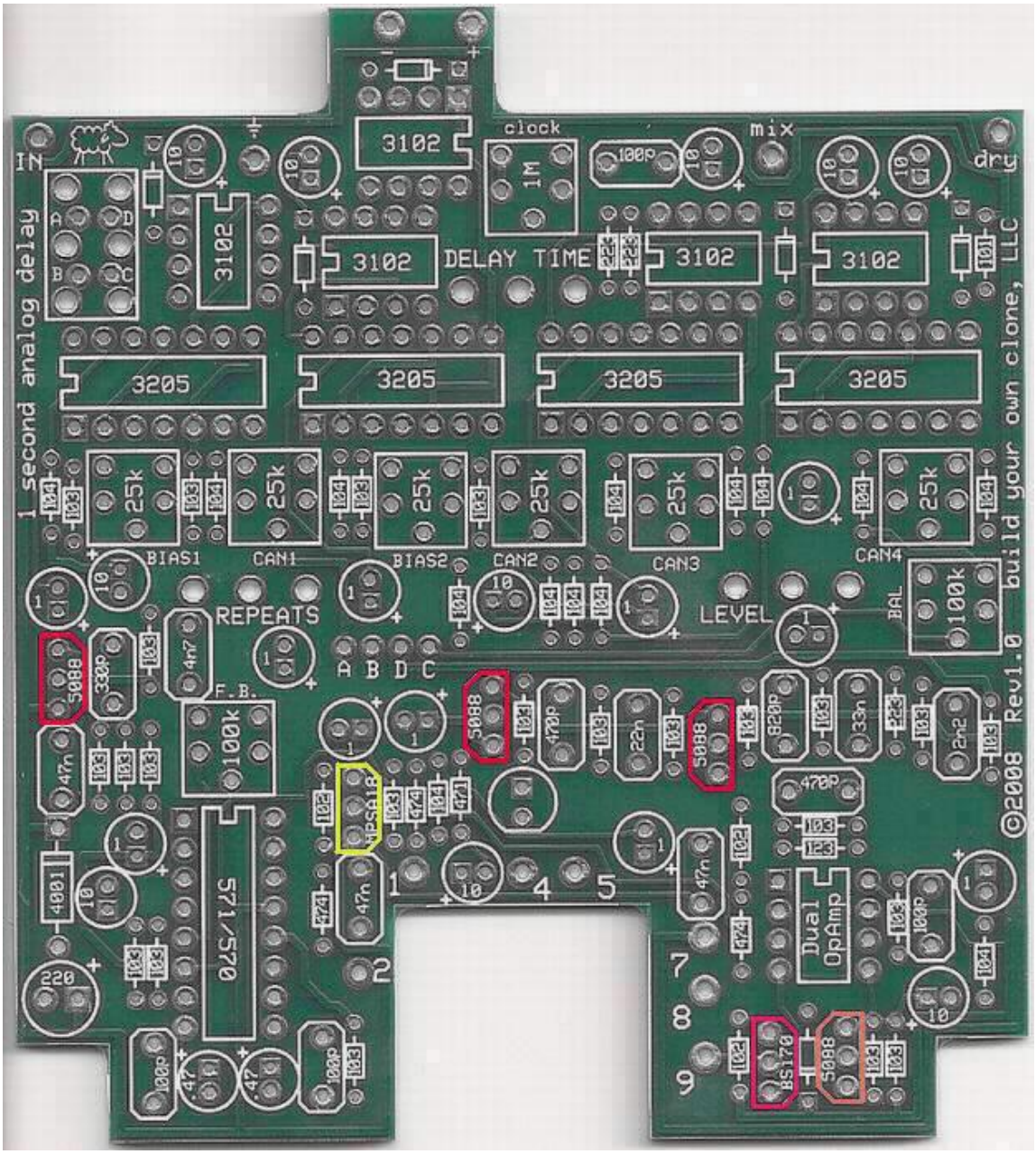
STEP 1: Add the diodes. There are six 1N914 and 1 1N4001 diodes. Be sure to matched the end of the diode with the stripe to the layout on the PCB. The stripped end should go in the square solder pad.



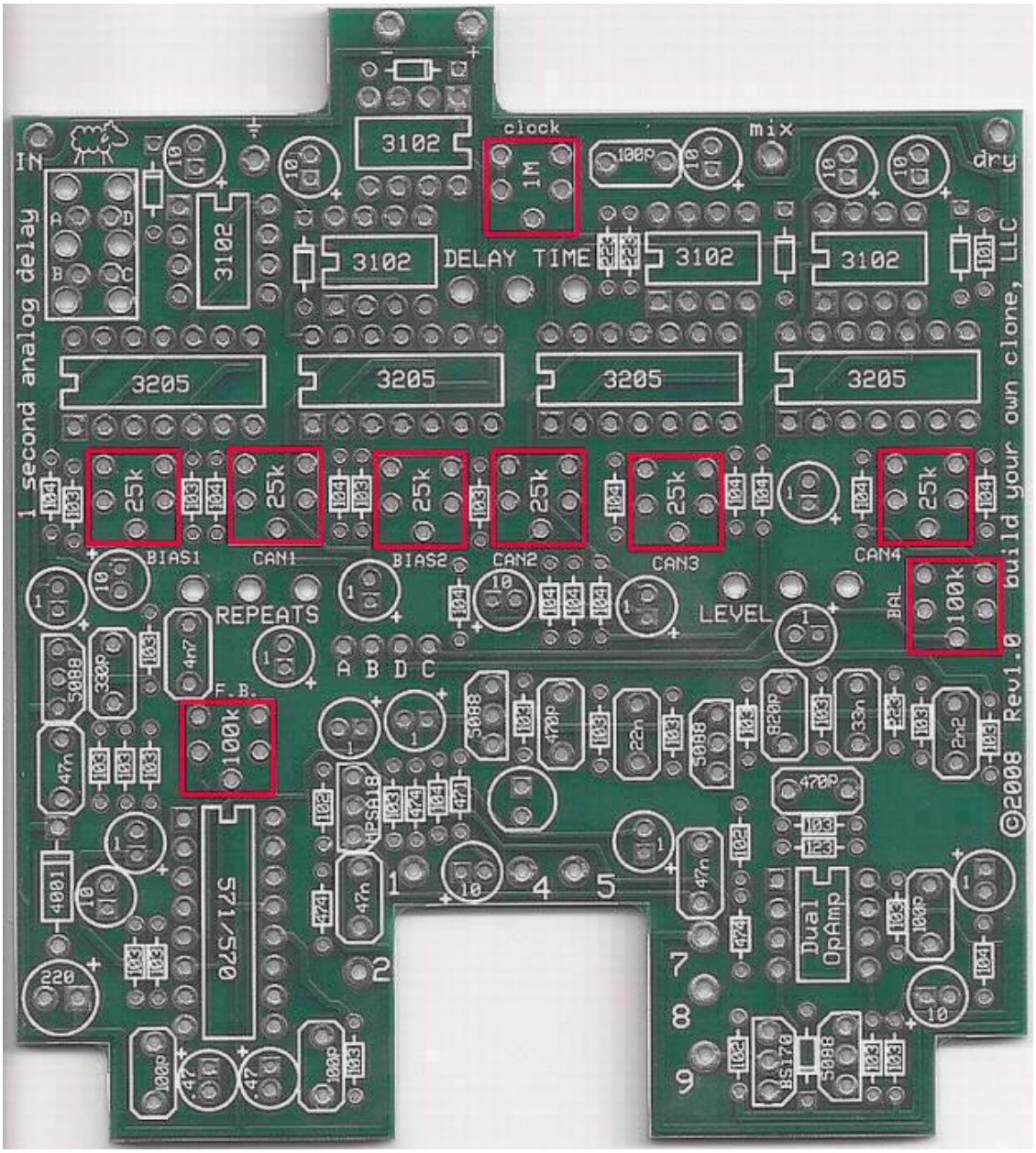
STEP 2: Add the IC Sockets. DO NOT SOLDER THE ACTUAL CHIPS!!!! You will put the chips into the sockets in the "Installing the ICs" portion of the instructions. See page 22 - 23 for more details. Each socket has a notch in one end. You should match that notch up with the layout on the PCB and solder the socket directly to the PCB.



STEP 3: Add the film capacitors. These are not polarized so they can be inserted into the PCB in either direction.

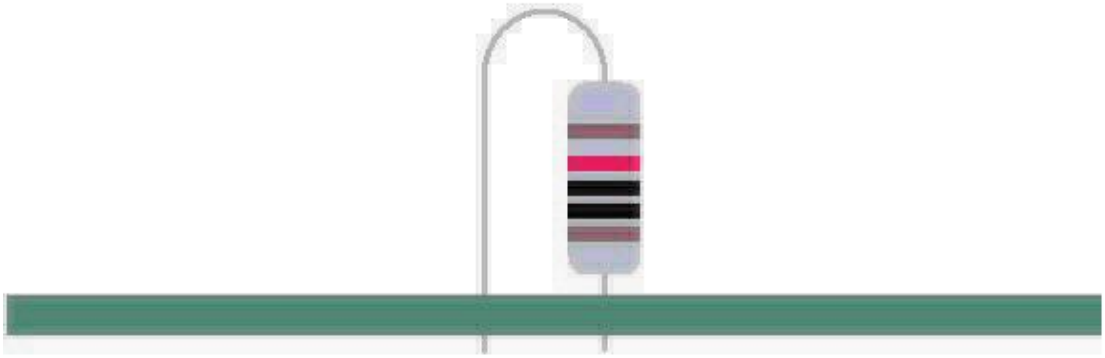


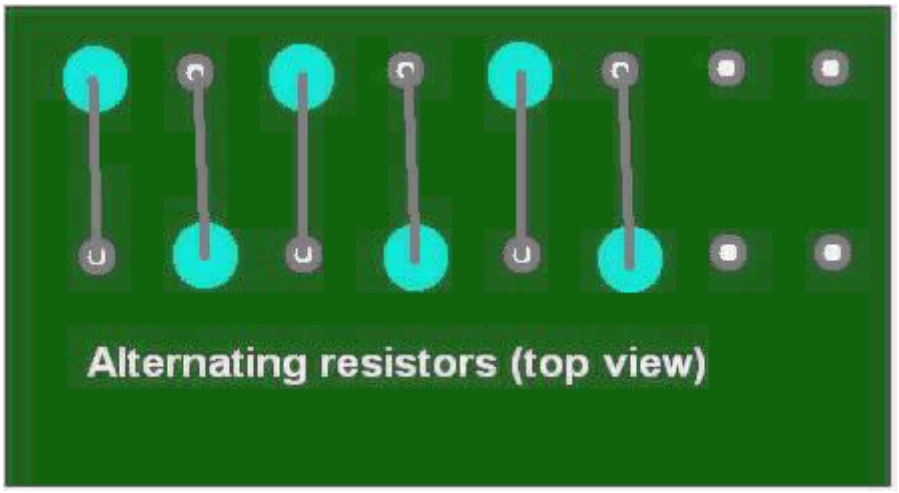
STEP 4: Add the transistors. Match the flat side of the transistor to the flat side of the layout on the PCB. One MPSA18 goes in the space highlighted in yellow. One BS170 goes in the space highlighted in pink. One 2N5088 goes in the space highlighted in orange. And remember that three MPS6521 transistors go in the spaces highlighted in red even though the PCB calls for 2N5088. If you have a Rev1.1 PCB or higher, the parts numbers of the transistors will be labelled correctly.

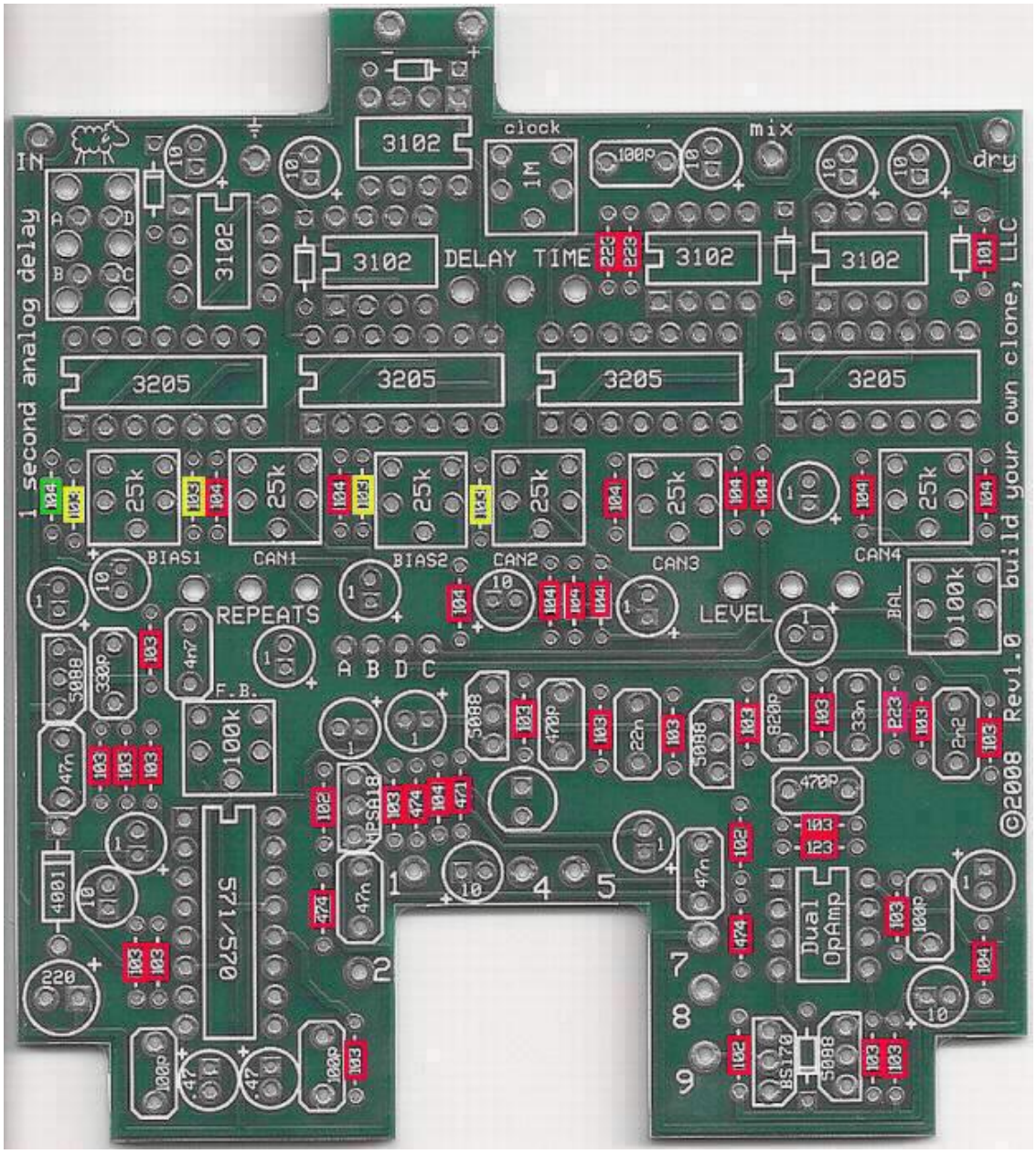


STEP 5: Add the internal trimpots. Many people get confused by these because the trimpot itself only has 3 legs, but the PCB has 5 holes. The PCB has 5 holes so that it can accomodate a variety of different trimpot brands and models. There should only be one way the trimpot will fit into the PCB without having to bend the legs.

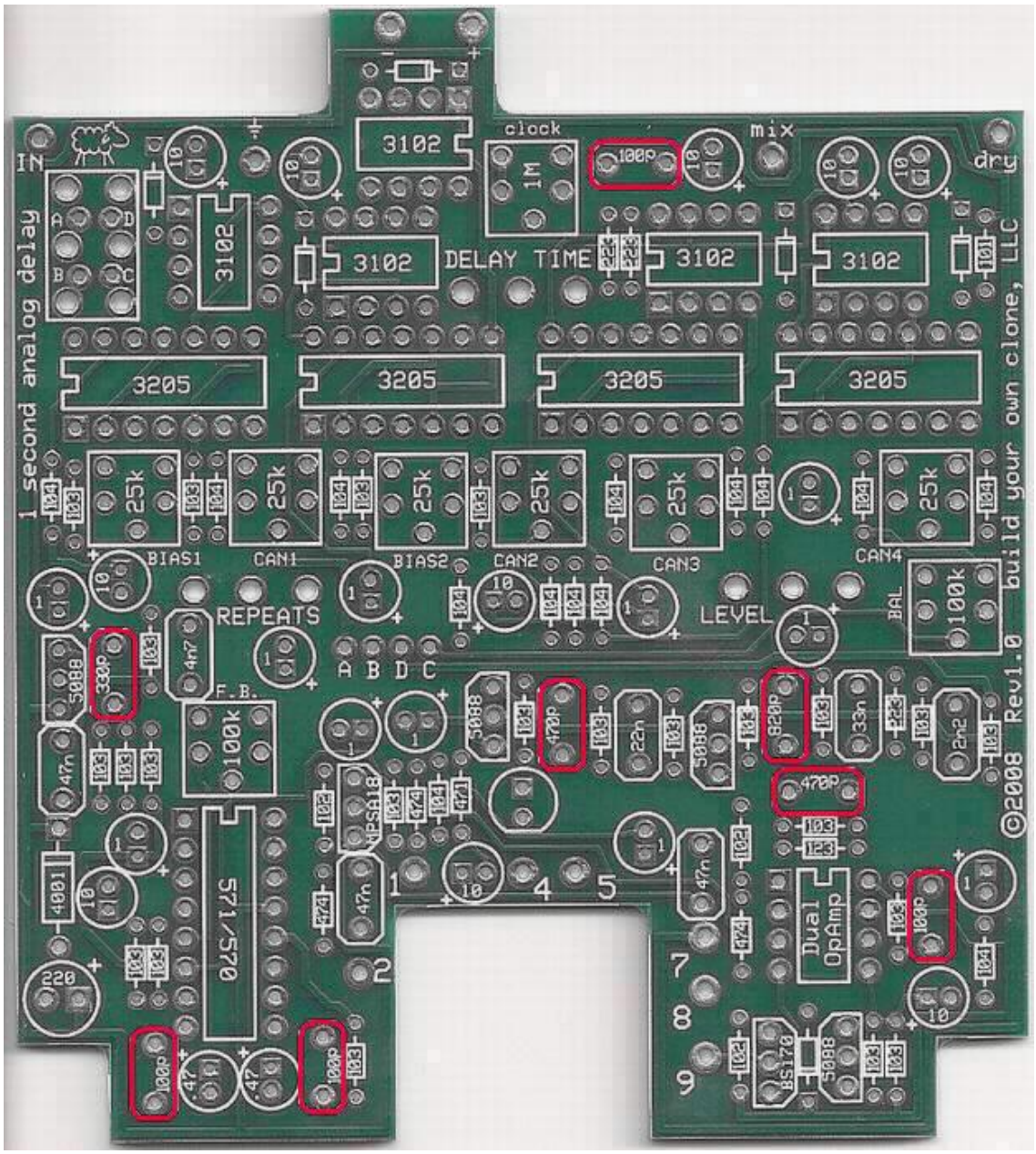
STEP 6: Add the resistors. Resistors are not polarized, so it does not matter which end goes in which solder pad. The resistors need to stand on end. Also, if you have two or more resistors next to each other, you will need to alternate them so that the body of one transistor is across from the next because there will not be enough room to stick two resistor bodies next to each other.



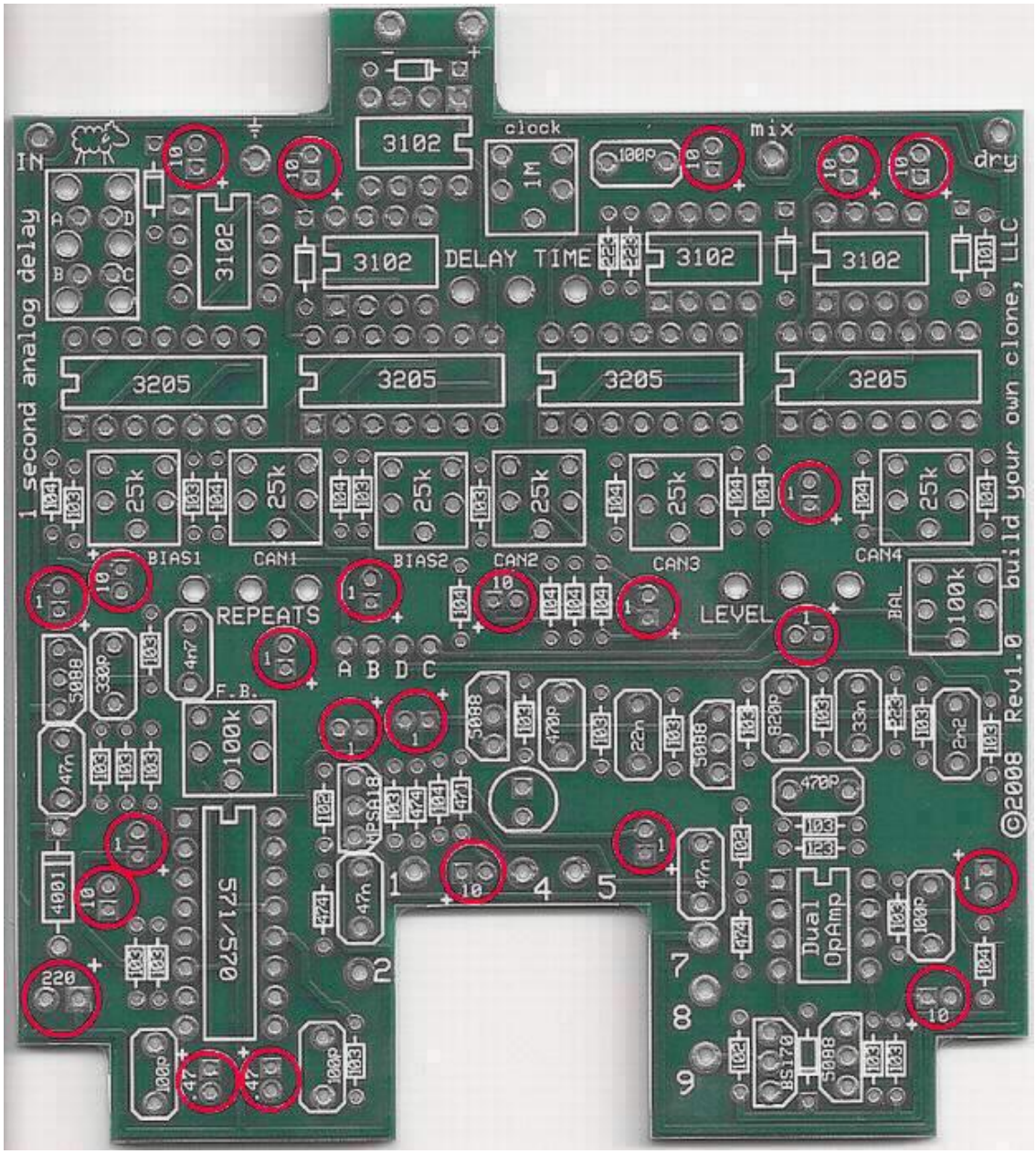




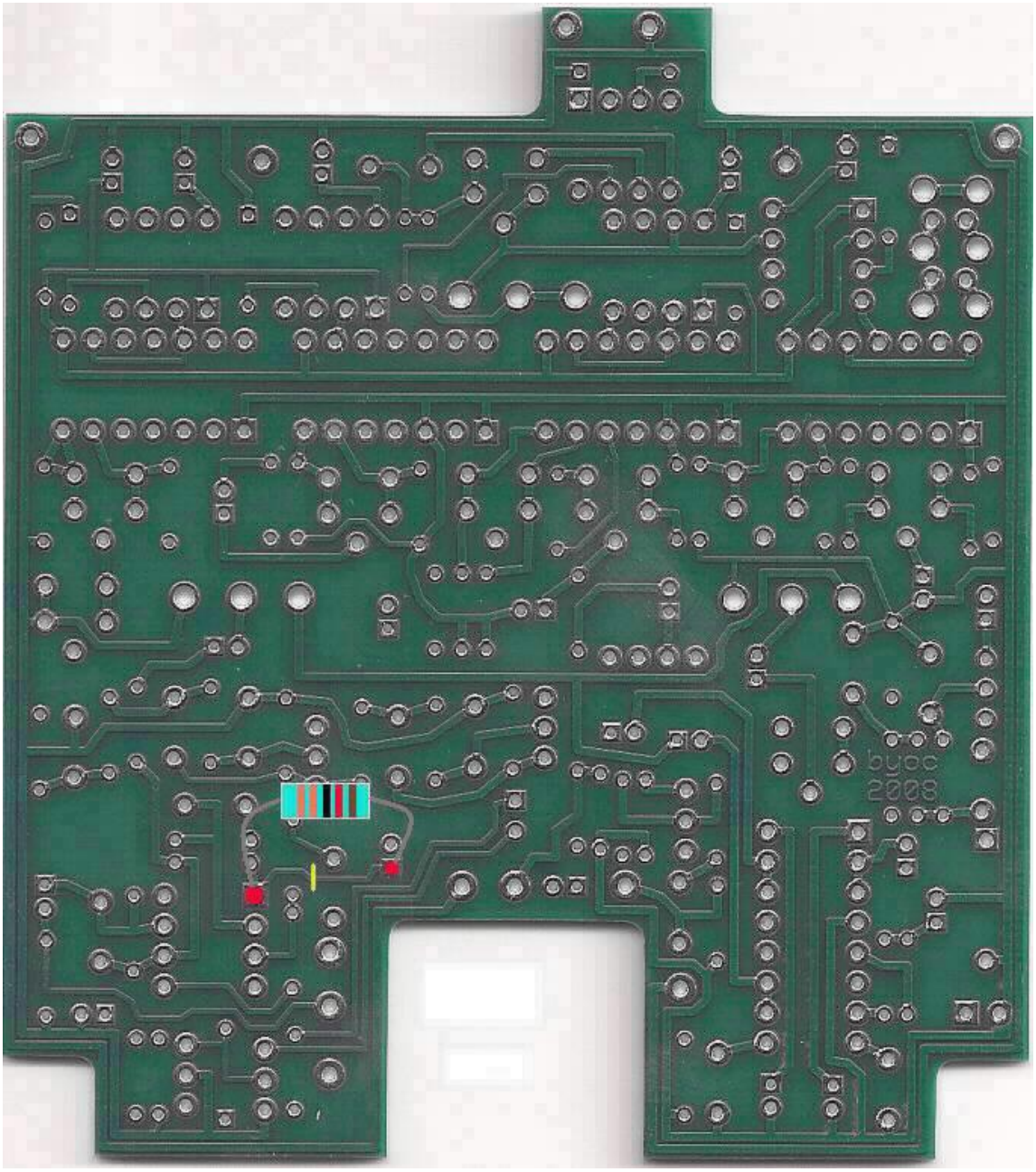
Add the resistors. Remember that the four 10k resistors highlighted in yellow should actually be 1k, the 100k highlighted in green should actually be 10k, and the 22k highlighted in pink should atually be 15k. If you have a Rev1.1 PCB or higher, the resistor spaces will be labelled correctly. A space for the 33k resistor has been added to the PCB and should be soldered at this time.



STEP 7: Add the ceramic disc capacitors. These are not polarized and can be inserted into the PCB in either direction.



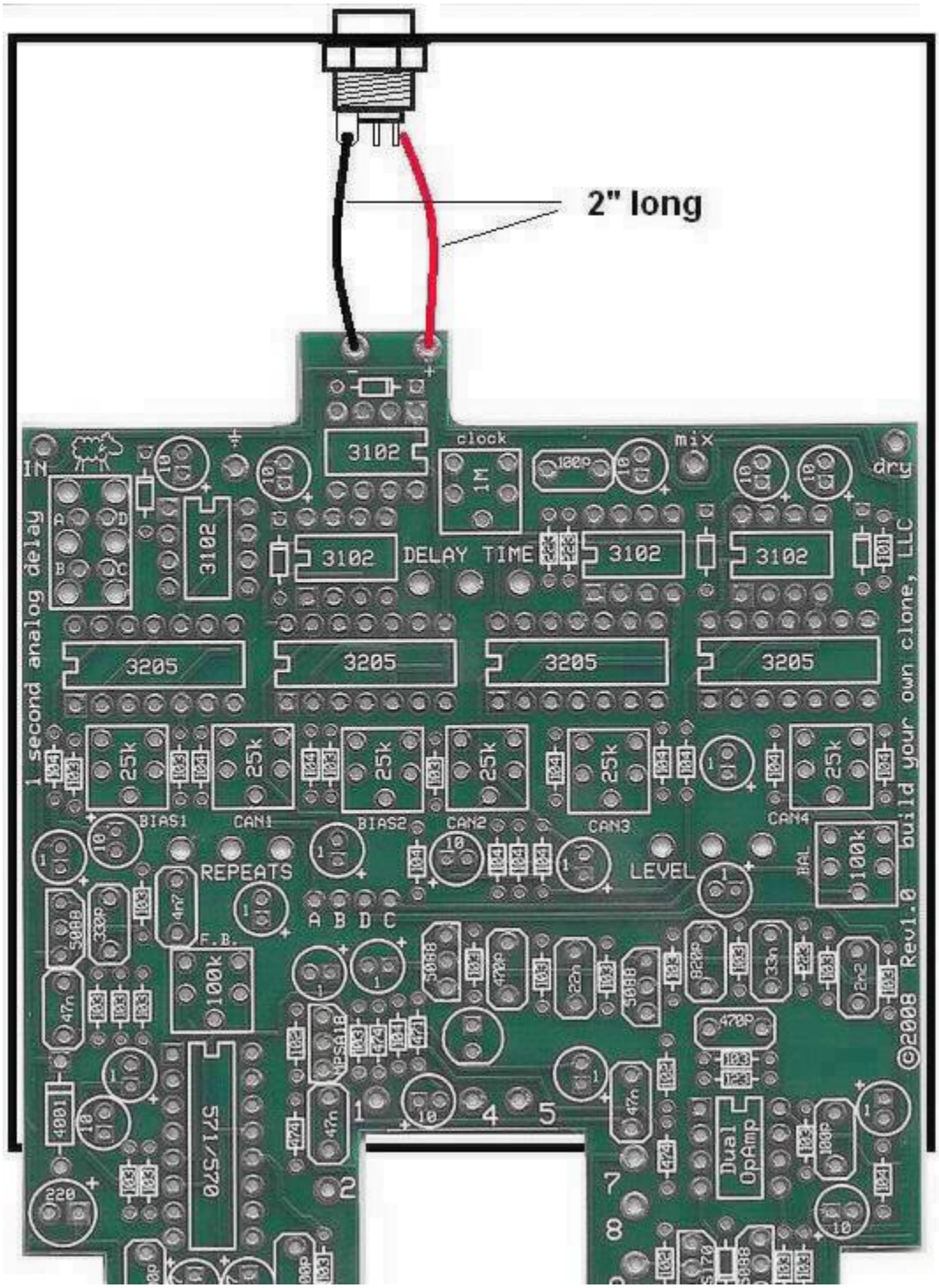
STEP 8: Add the aluminum electrolytic capacitors. These are polarized. The positive end will have a longer lead and should go in the square solder pad. The negative end will have a shorter lead with a black strip running down the body of the capacitor.



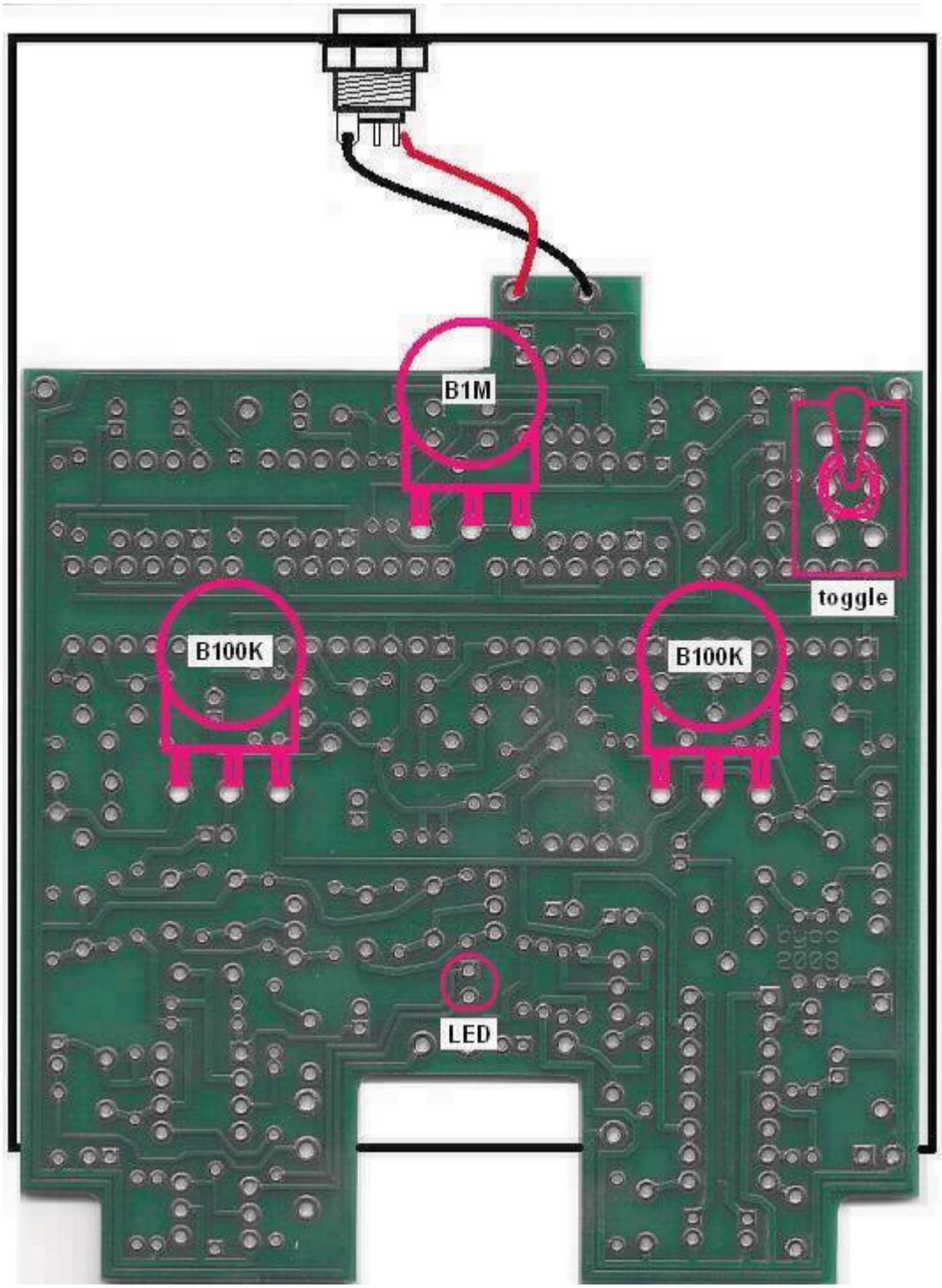
STEP 9: DO NOT DO THIS STEP IF YOU HAVE A REV1.1 PCB OR HIGHER.
After you have finished populating the PCB, remember to cut the trace on the bottom of the PCB where it is highlighted in yellow in the diagram above. Then jumper a 33k resistor between the two solder pads highlighted in red on the bottom of the PCB. Be sure not to short out the 33k resistor against any of the other solder pads.

Assembly

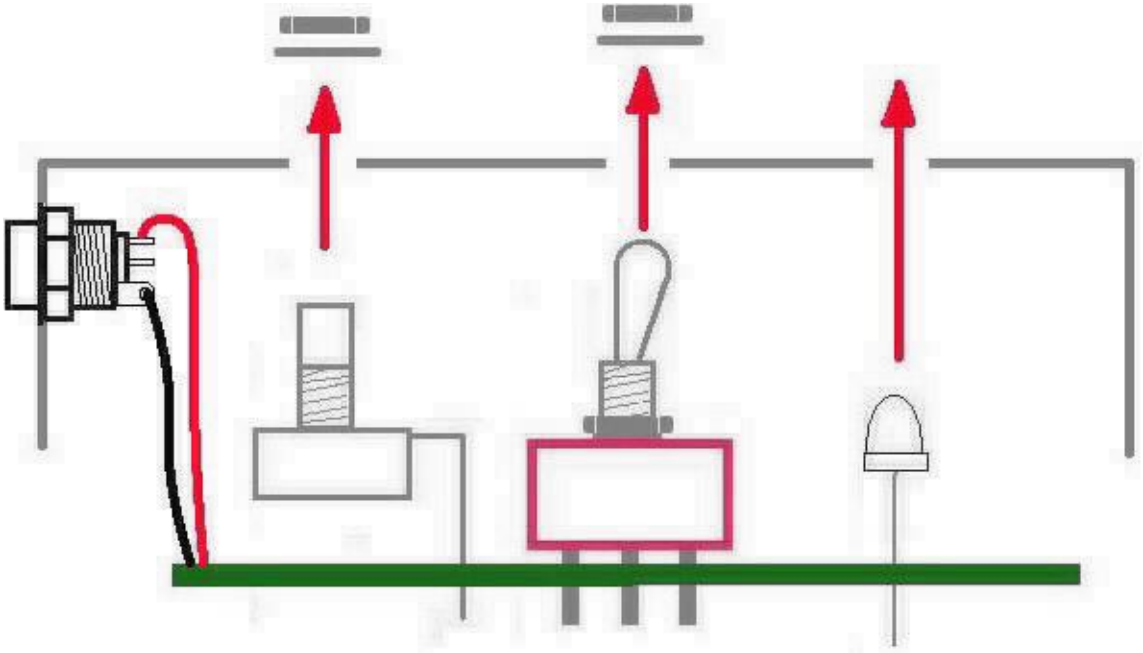
Step 1: Mount the DC adaptor jack to the enclosure.



Step 2: Connect the TIP (negative) terminal of the DC adaptor jack to the "-" eyelet on the PCB with 2 inches of hook up wire. Connect the SLEEVE of the DC adaptor jack to the "+" eyelet on the PCB with 2 inches of hook up wire.



Step 3: Flip the PCB over so that the bottom or solder side is up. Insert the three potentiometers, the LED, and the toggle switch into the bottom side of the PCB. DO NOT SOLDER!!!There are only two ways in which the toggle switch can fit into the PCB. Either way is fine. The LED will have one longer lead. The longer lead goes in the square solder pad. There will be two B100k potentiometers and one B1M potentiometer. The B1M pot is your delay time pot and should be mounted towards the top of the PCB. The other two pots are for delay level and repeats.

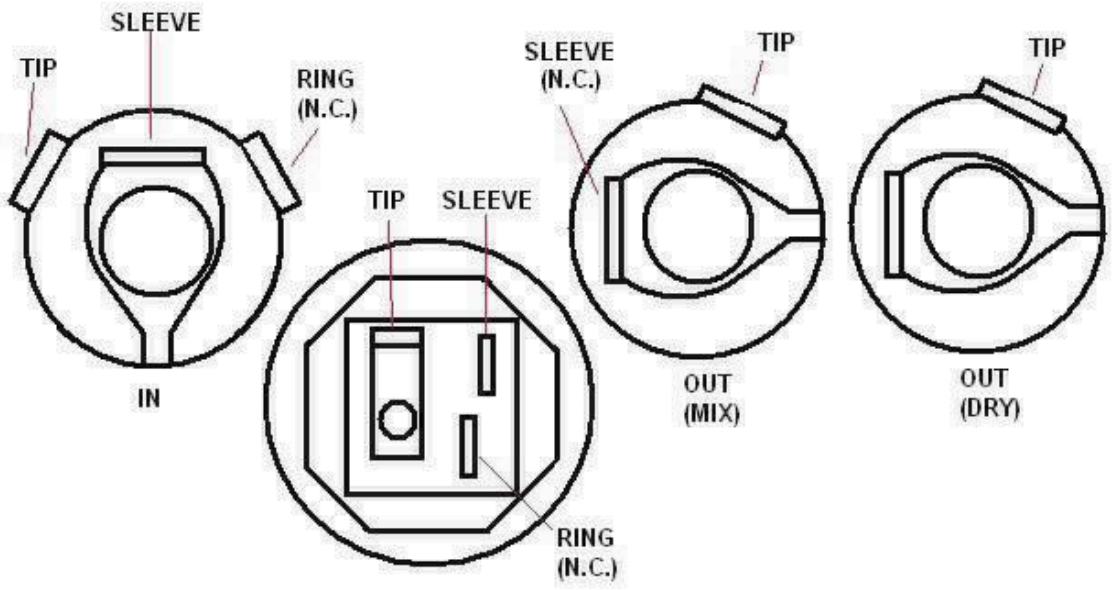


Step 4: Hold the PCB in one hand so that the component side of the PCB is in the palm of your hand and the bottom side with the pots, toggle switch and LED is facing up. Now use your other hand to guide the predrilled enclosure onto the PCB assembly so that the pots, toggle switch and LED all go into there respective holes. Once the PCB assembly is in place, secure it by screwing on the washers and nuts for the pots and toggle switch. Only tighten them with your fingers. You do not want them very tight yet. Be sure to keep your hand on the PCB so that it does not fall off the PC mounting posts of the pots and toggle switch.

Step 5: Turn the entire pedal over so that the component side of the PCB if facing up. Lift the PCB up off the pots and toggle switch about 2mm just to make sure that the back of the PCB does not short out against that pots. Make sure the PCB is level and symetrically seated inside the enclosure.

Step 6: Solder the pots, PCB, and LED. You will solder these parts on the component side of the PCB. After you have soldered them in place, be sure to tighten up their nuts.

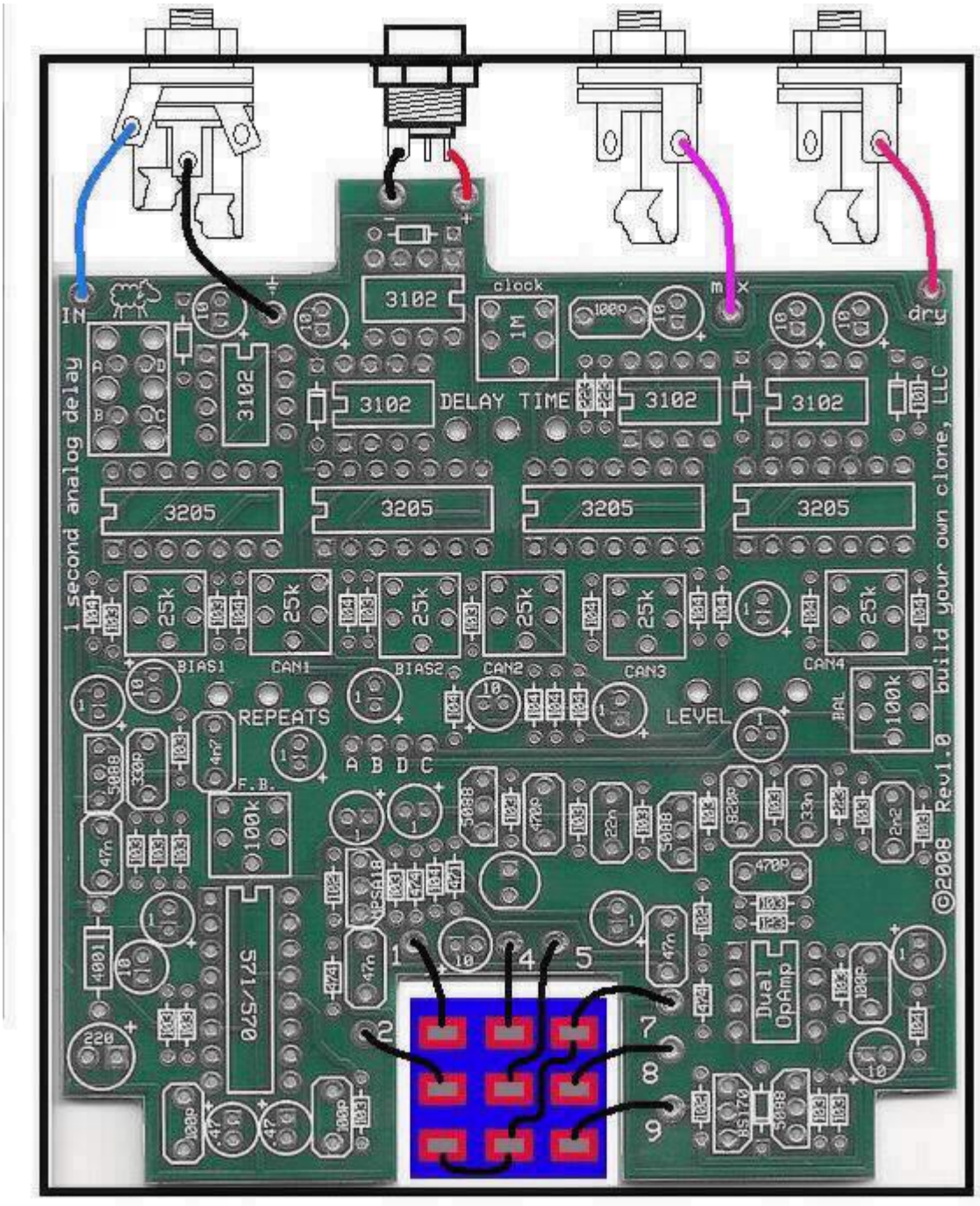
Wiring the jacks, footswitch, and toggle switch



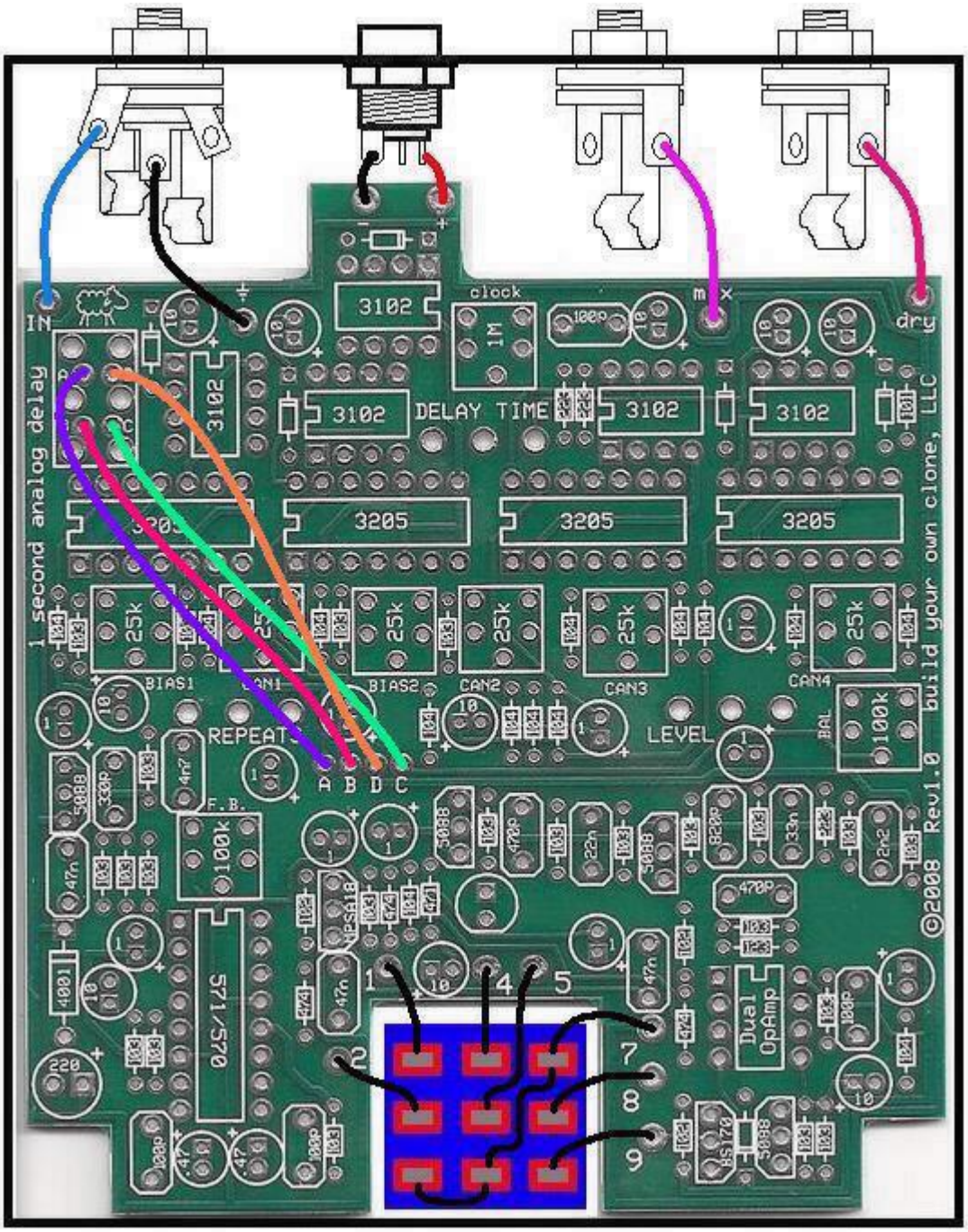
Step 1: Install the 1/4" jacks to the enclosure. Be sure to turn the OUT jacks 1/4 turn counter clockwise so that their prongs do not short out against the delay time pot.

Step 2: Install the footswitch to the enclosure. It will have a white nylon washer and a silver metal washer. You can decide which washer you want to be visible on the outside of the enclosure.

Step 3. Wire and solder the footswitch and 1/4" jacks according to the wiring diagram on the next page.



Step 4: Wire the "ABCD" jumpers. Use 4 pieces of wire approx. 3" long. You are simply connecting the "A" eyelet next to the toggle switch with the "A" eyelet more towards the center of the PCB. And "B" to "B", "C" to "C", and "D" to "D". Wire the C and D eyelets first. Then wire the A and B eyelets.


IN
mix
dry
clock
3102
DELAY TIME
3205
BIAS1
CAN1
BIAS2
CAN2
CAN3
CAN4
REPEAT
LEVEL
F.B.
BAL
Dual OpAmp
571/570
1 second analog delay
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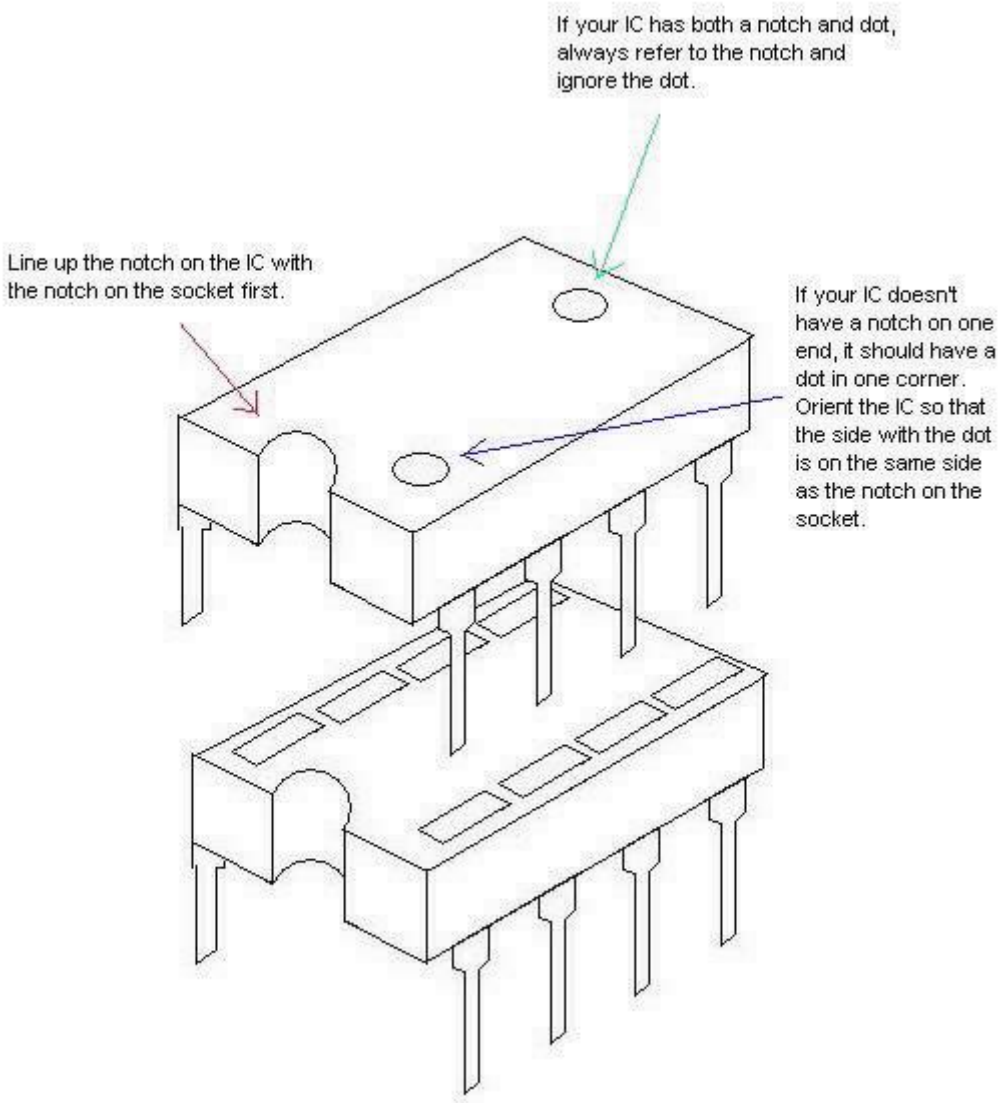
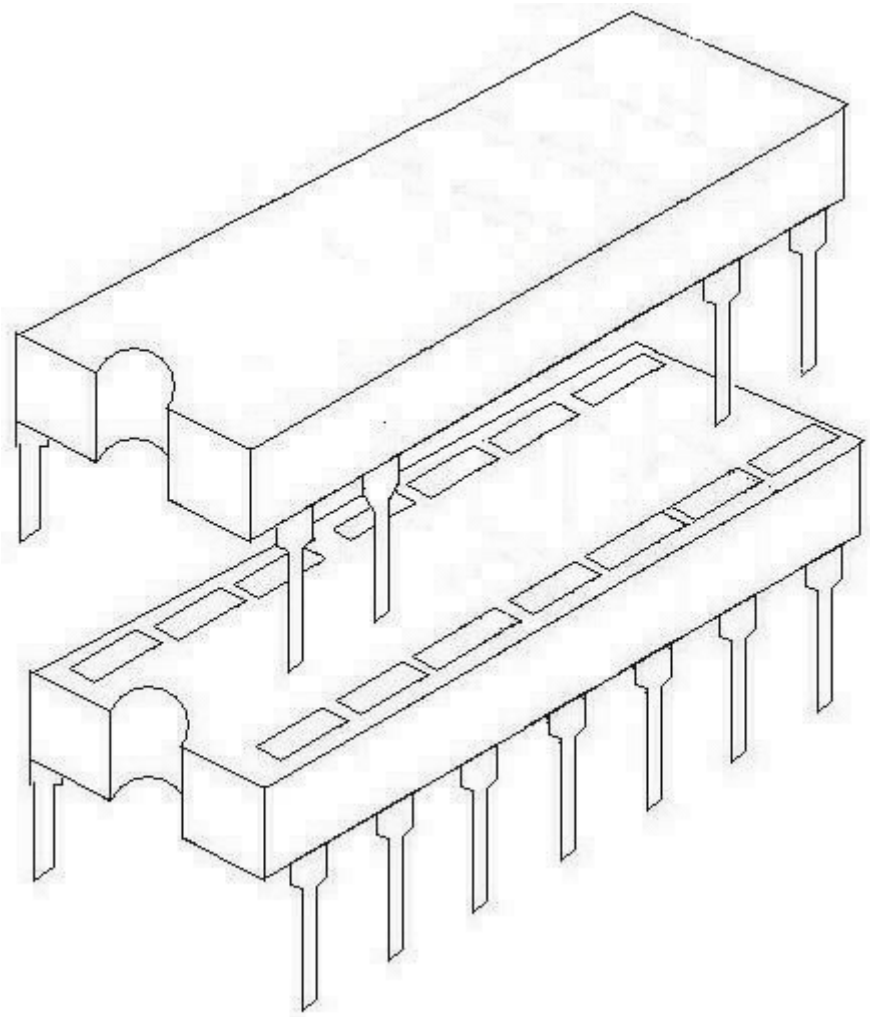
Installing the ICs





The BBD chips will be slightly different. They will only have 8 pins, but in a 14 pin space. The 6 center pins (3 on each side) of the socket are not used. You may see traces on the PCB, but they are simply being used as vias. So don't let this confuse you. Treat the BBD chips as if they were 14 pin chips and put them in the 14 pin socket.

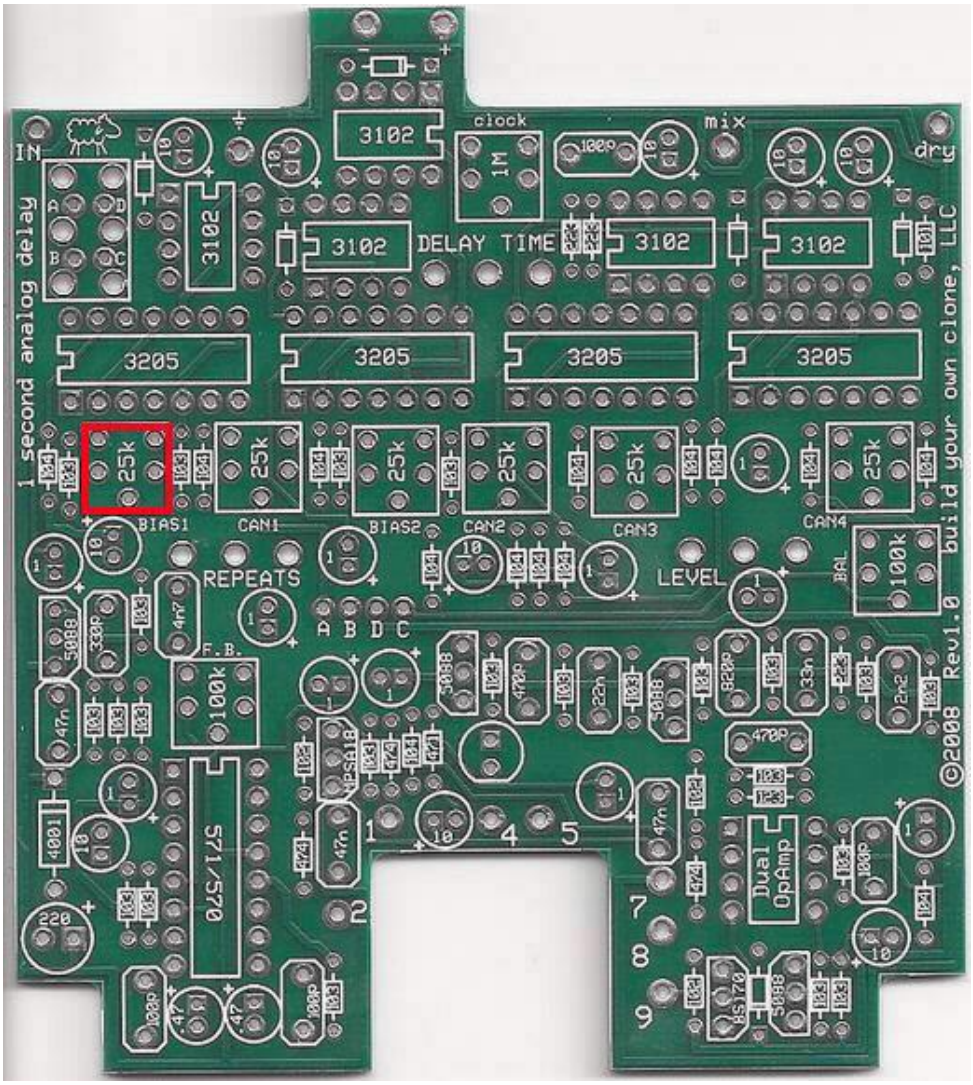
Setting up the Internal Trimpots

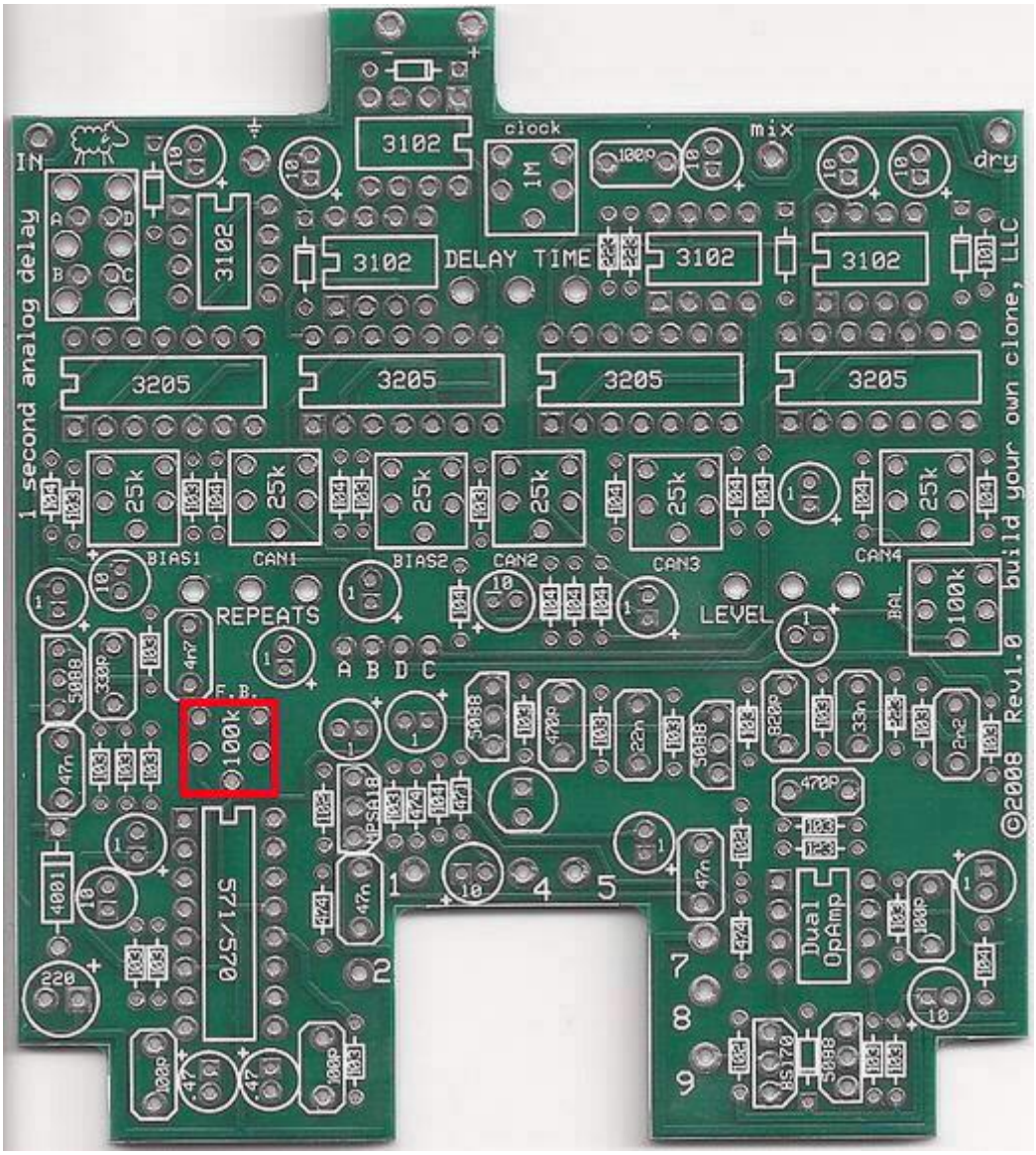
Step 1: Set all of the trimpots to noon.

Step 2: Set the delay level and repeats knobs to full turn clockwise. Set the delay time knob for noon.

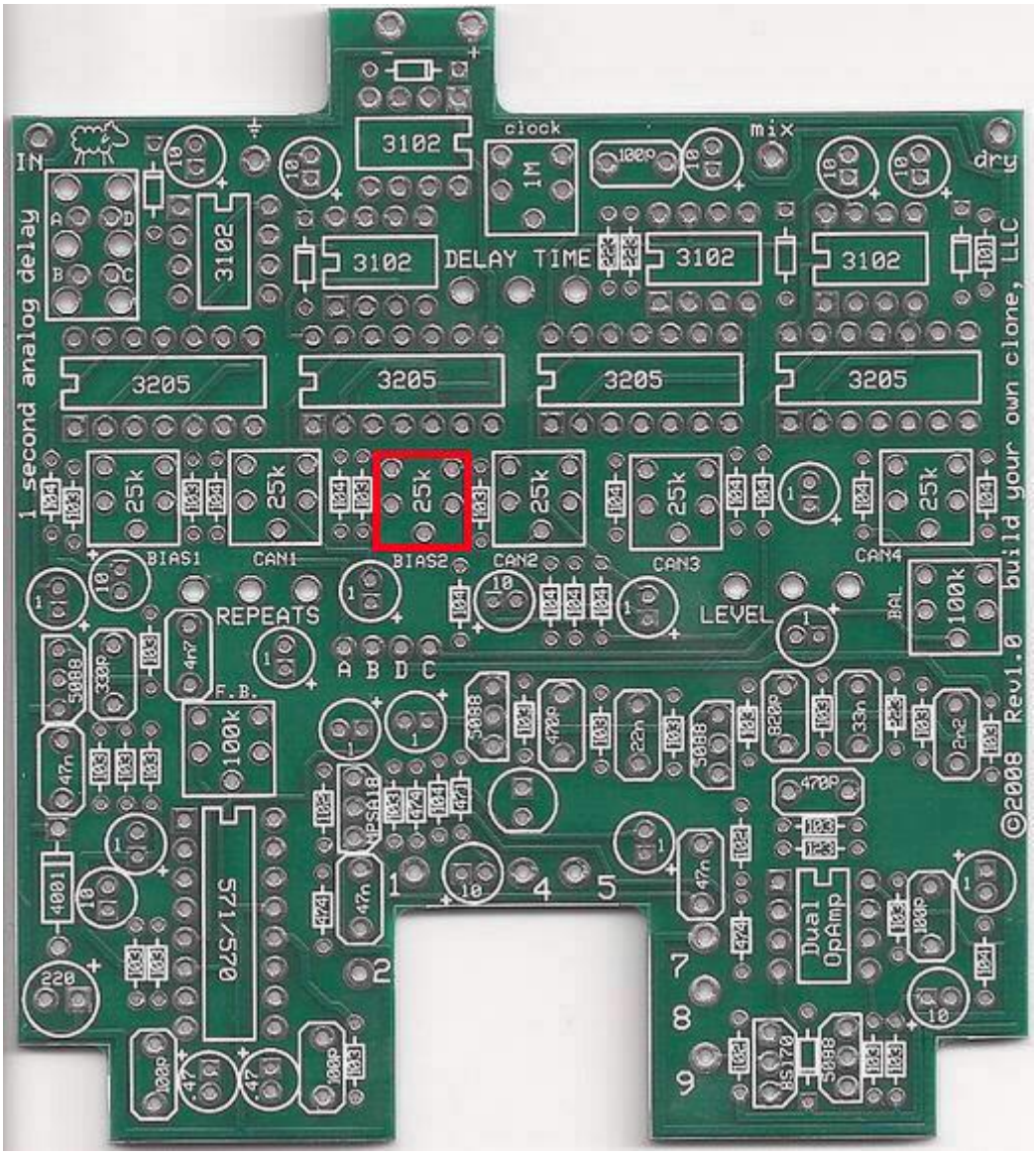
Step 3: Set the long/short switch for short delay time. The toggle bat would be pointing down towards the footswitch in short mode.

Step 4: At this point, your delay should not be producing any echoes, so do not worry about that. Adjust the BIAS1 trimmer untill you hear the repeats start to echo. Find the "working" range of the BIAS1 trimmer. Set the trimmer so that it is in the middle of this range. Now tweek the trimmer very carefully in either direction so that it gives you the best sounding repeats. Use your ears for this step.

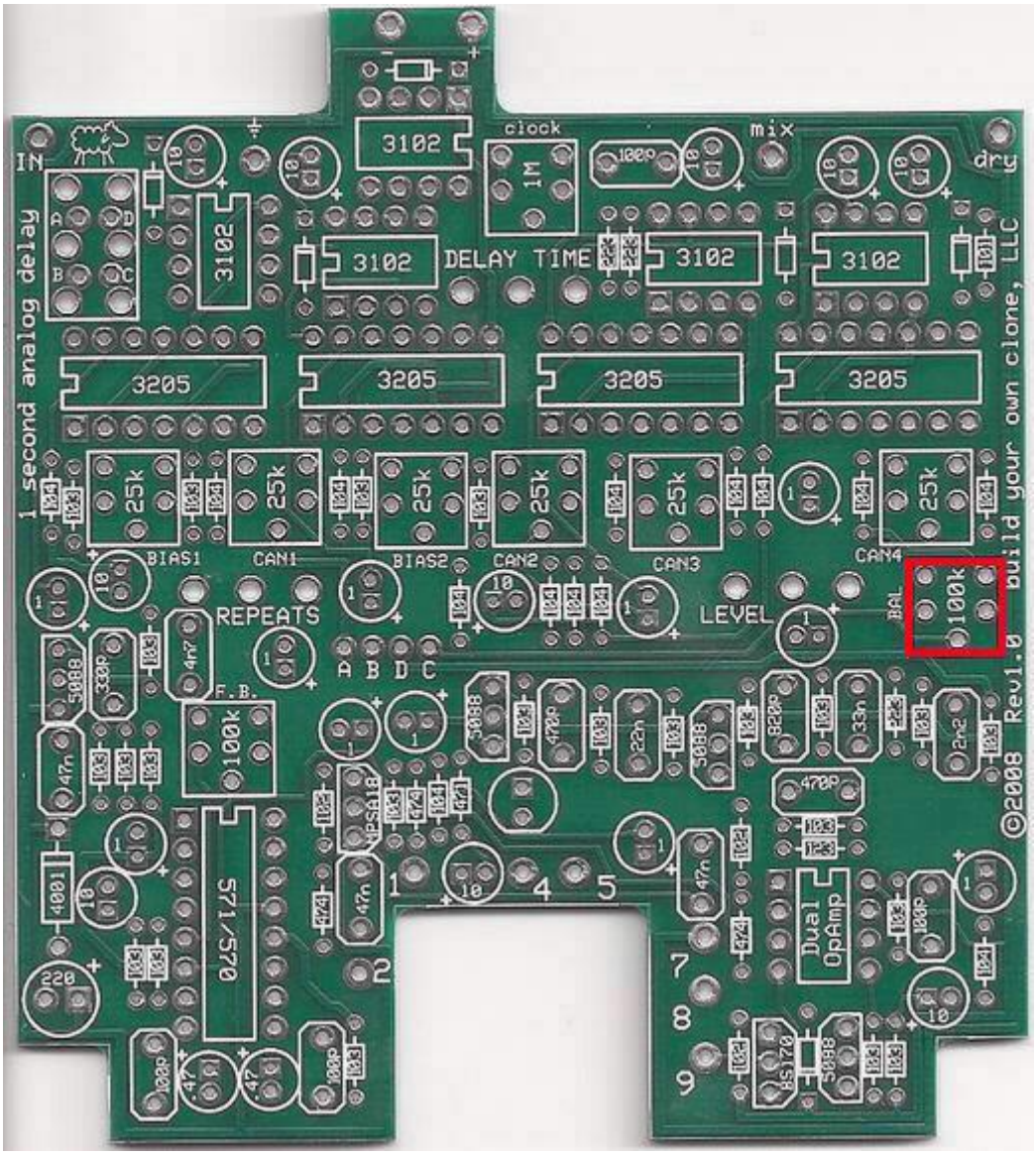




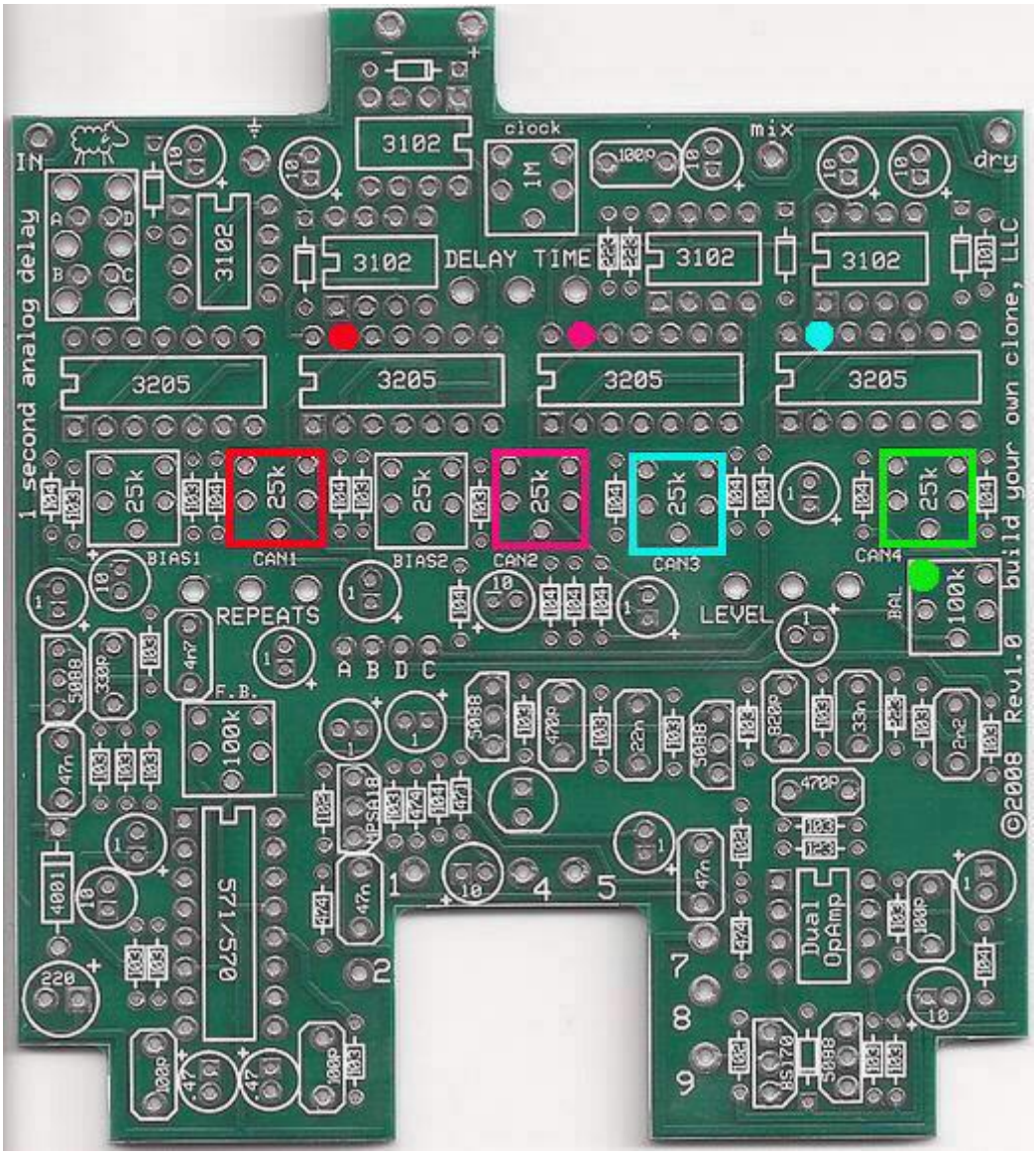
Step 5: Set the F.B. trimmer. F.B. stands for FeedBack threshold. You want to set this trimmer to taste. Turning it clockwise will inscrease the sensitivity of the repeats knob. Keep in mind that your repeats knob is at full turn clockwise (or it should be....double check) while setting the F.B. trimmer. So you want to set this trimmer so that your echoes behave the way you want them to when your repeats knob is full turn clockwise. If you only want infinite repeats, but don't want self-oscillation (run-aways repeats), then adjust the F.B. trimmer accordingly. And if you want self-oscillation, then adjust the F.B. trimmer accordingly.



Step 6: Set the BIAS2 trimmer. The first thing you must do is **MAKE SURE THE LONG/SHORT SWITCH IS IN LONG MODE!** Flip the toggle bat so that it is pointing up towards the jacks. You should not hear any echoes again. Now adjusts the BIAS2 trimmer so that you can hear echoes. Now find the "working" range of the trimpot and set it in the middle. Now use your ears to find the best sounding repeats.

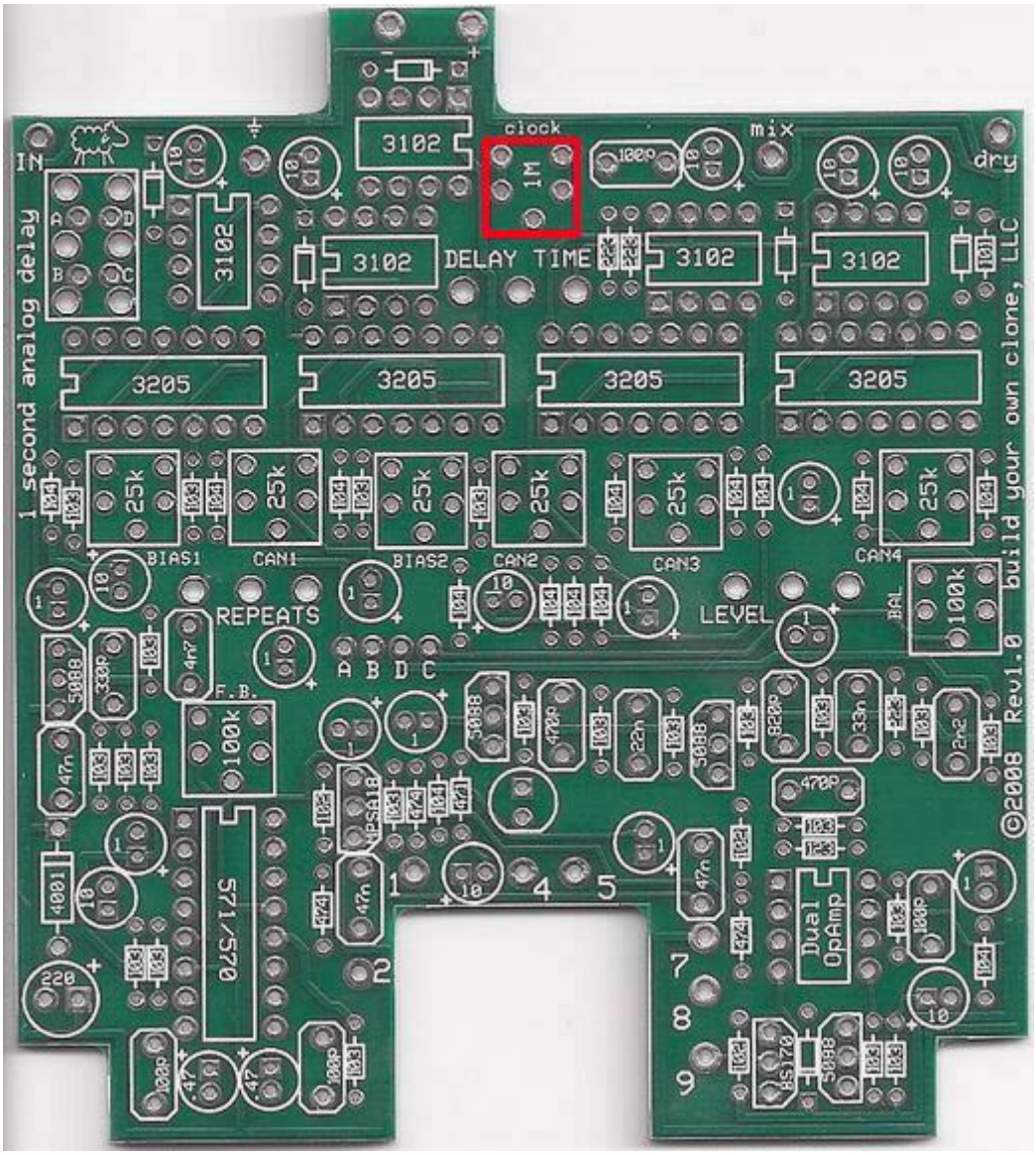


Step 7: Adjust the BAL trimmer. BAL is short for balance. It adjusts the output of the delay line when all 4 BBD stages are engaged. You want to set the BAL trimmer so that the output of all 4 BBD stages in long mode are the same as the output of just the one BBD stage in short mode. This is almost impossible to do. But if you think of the BAL trimmer as being the "F.B." trimmer for long mode, then it is very easy to set up. Simple turn your BAL knob so that the repeats knob behaves the same in long mode as it does in short mode. If you do this, then it means that the output of all 4 BBD stages is the same as the output of only the first BBD stage. Note - Turning the BAL trimmer counter clockwisw will increase output.

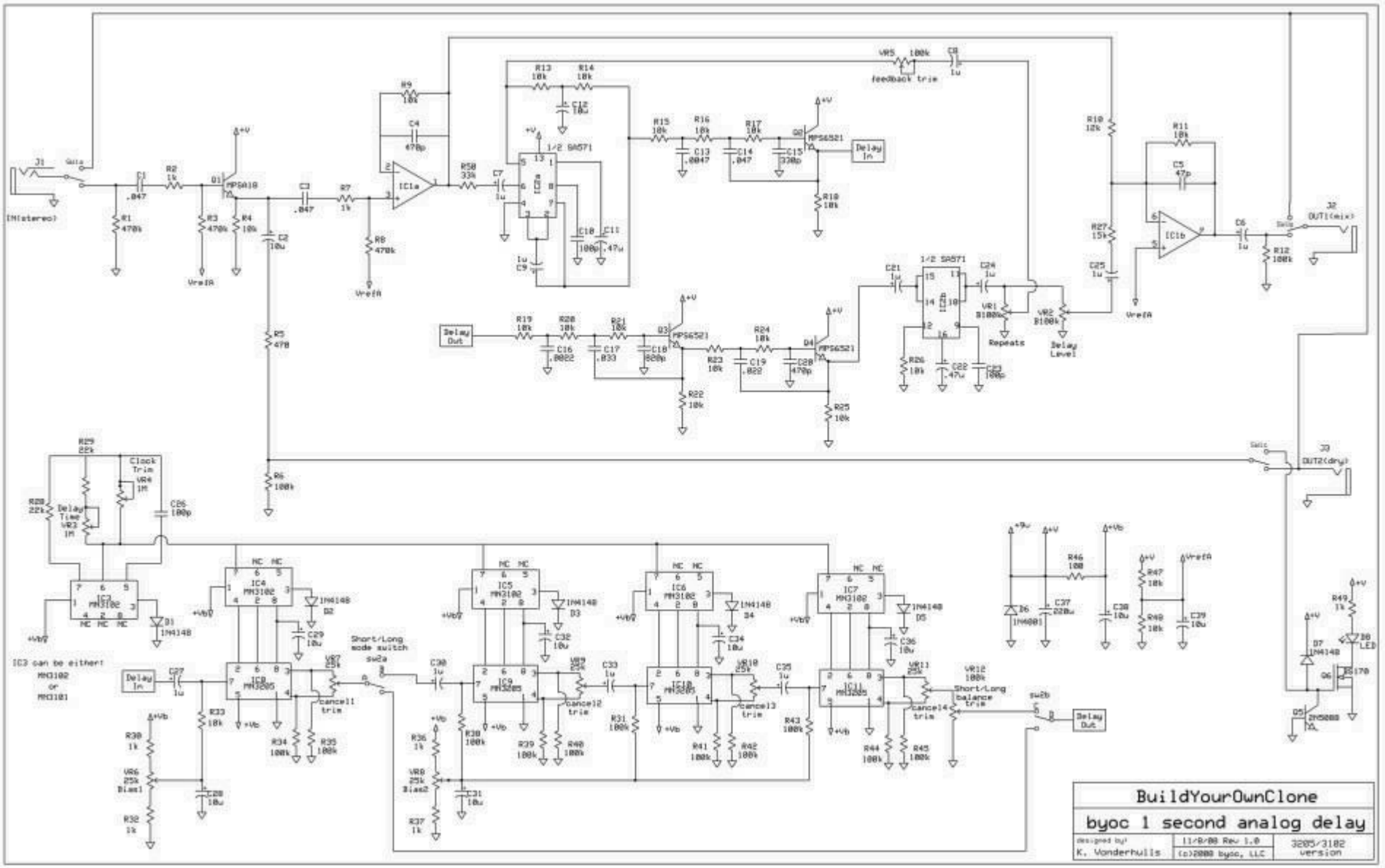


Step 8: Adjust all the CAN trimmers. YOU WILL NEED TO USE THE SIGNAL TESTER FOR THIS. CAN is short for cancel. The goal here is to adjust each trimmer to cancel out as much clock noise as possible. CAN1 is the cancel trimmer for BBD1. CAN2 is the cancel trimmer for BBD2. And so on... The red dot is the check point where you will place the Signal Tester when adjusting the CAN1 trimmer which is also highlighted in red. The pink dot is the check point where you will place the Signal Tester when adjusting the CAN2 trimmer which is also highlighted in pink. And so on... Note that the first 3 check points are Pins 7 of the 2nd, 3rd, and 4th BBD chips. This is because Pin 7 is the input of each BBD. So this also makes Pin 7 the ultimate output of the previous BBD. This is why we test the output of the first BBD at the input of the Seccond BBD. And the output of the second BBD at the input of the third BBD. And so on.... Until we get to the last BBD. When adjusting the CAN4 trimmer, the check point will be lug 3 of the BAL trimmer highlighted in green. Lug 3 of the BAL trimmer should have some exposed metal on the top of the trimpot iself which should make this fairly easy. Ok....so here we go... This is going to be loud and noisy and will give you a new

appreciation for how much noise the compander chip removes. You will hear a loud hissing noise with a very high pitched squeel on top of it. Start with the CAN1 trimmer and check point. Experiment by turning the trimmer full turn in both directions so you can hear what it does. You should notice that the farther you get from center, the louder the high pitched noise will become. This is the clock noise that we are trying to dial out. So somewhere around noon on the trimpot, but usually not exactly, is where you want to set it. Repeat this process for all 4 of the CAN trimmers.



Step 9: Adjust the clock trimmer. The clock trimmer will set the maximum amount of delay time and dial out the clocknoise. It's a give and take. The more delay time you have, the noisier it will be. Usually noon, or just shy of noon will give you about 1 second of delay time when the delay time knob is maxed. 800ms should be about 4 or 5 o'clock on the trimmer and should be where you get almost no clock noise at all. A note about noise - If you've never played an analog delay, you should know that there will always be some element of noise. Each repeat should sound like it's riding on top of a little cloud of noise. It shouldn't be excessive or too terribly annoying (if it is, then maybe you need to stick to digital delay) but just be aware, there will always be some element of graininess and noise with associated with analog delay.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byoc 1 second analog delay
designed by:
K. Vanderhulls
11/8/00 Rev 1.0
(c)2000 byoc, LLC
3205/3102
version
IN(stereo)
OUT1(mix)
OUT2(dry)
Delay In
Delay Out
Repeats
Delay Level
feedback trim
Clock Trim
Delay Time
Short/Long mode switch
Short/Long balance trim
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