

Filter Cap Discharge Procedure

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TEST PAGE UPDATE

Welcome back DIYers! Just about any time we write an amp-related tech article, we find ourselves discussing filter cap discharge. This is an important topic because it's something that keeps us safe while working on an amplifier's internal components, and it's something every DIYer should know how to do.

Yes, amplifiers do carry lethal voltages. As an example, a Music Man amp can carry as much as 700vdc! Keep in mind that, even though it is considered low current, it still has several times the amount of current needed to kill a polar bear. The good news is, if you know the proper steps to drain your filter caps, you can prevent such a deadly (at the very least, embarrassing) occurrence. Oh, and it's important to note that many amps can hold their high voltage DC for a couple of days after their last use!

Any time you perform this procedure, you will need a good multimeter that reads DC voltage up to 100v, just to be safe. You'll also need a couple of parts (which you may have laying around your shop) to build a voltage-shunt stick or "safety pen" (patent applied for), but we'll touch more on that in a bit.

Before we even look at the amp yet, you're going to want to locate the following:

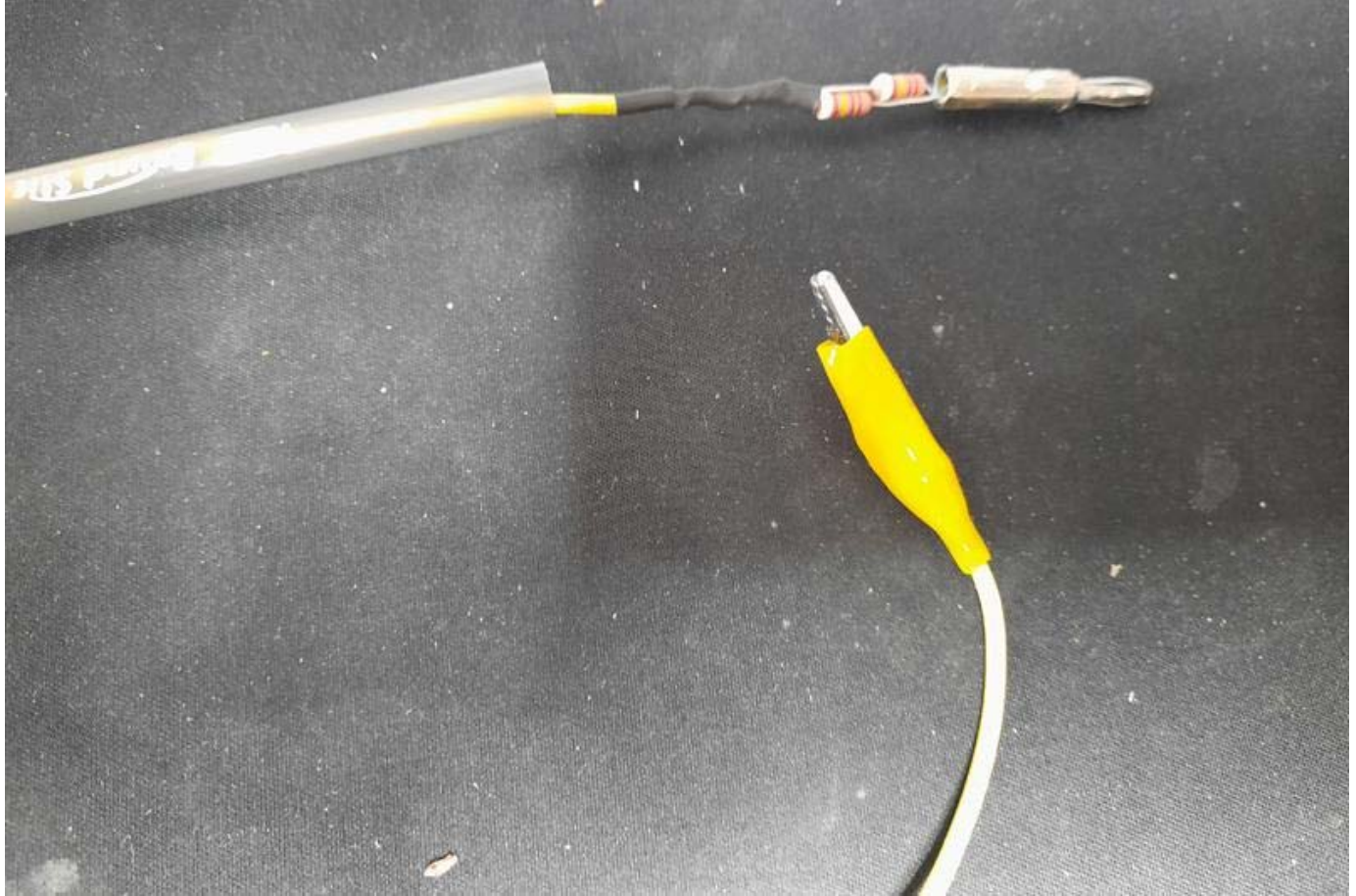
(1) 100k 1w resistor Or(2) 56K resistors run in series Or(2) 220k resistors run in parallel...

What's important is that you have around 100k final resistance.

You'll also need a small, hollow, non-conductive tube (optional), an alligator clip with some wire for a long lead (preferably 20" to 24"), and an old banana plug or screw that will fit snugly into whatever non-conductive tube you are using.

Once you've gathered all of these materials, you'll start by connecting the resistor(s) to the piece of wire above and soldering the resistor to the end of the wire. Now insert this entire assembly into your non-conductive tube. You'll want the tip to fit into the tube tightly so it does not come off when testing. Next, connect your alligator clip to the exposed wire coming out of the top of the tube. It should look something like the images below...





If you notice, a Bic pen sleeve works excellently with most banana plug tips, hence the name “safety pen.” Cool, huh?

Now that we have a way to discharge the amp, we need to know where to discharge it. In almost all vintage guitar amps, there is something called a power supply. This is where the main high DC (B+) voltage goes through and is distributed by the filter supply in different stages. This is usually near the power transformer. If it's not as obvious as a Vintage Fender or Marshall amp, follow the DC supply from the rectifier to the main board. It usually goes through the filter stage first. This will have large capacitors, either axial (Fender) or large can caps (Marshall). Below is a pic of the Deluxe Reverb voltage points just for reference. The red arrows point out different high

voltages in this amp. These leads come from the filter cap board underneath the chassis...

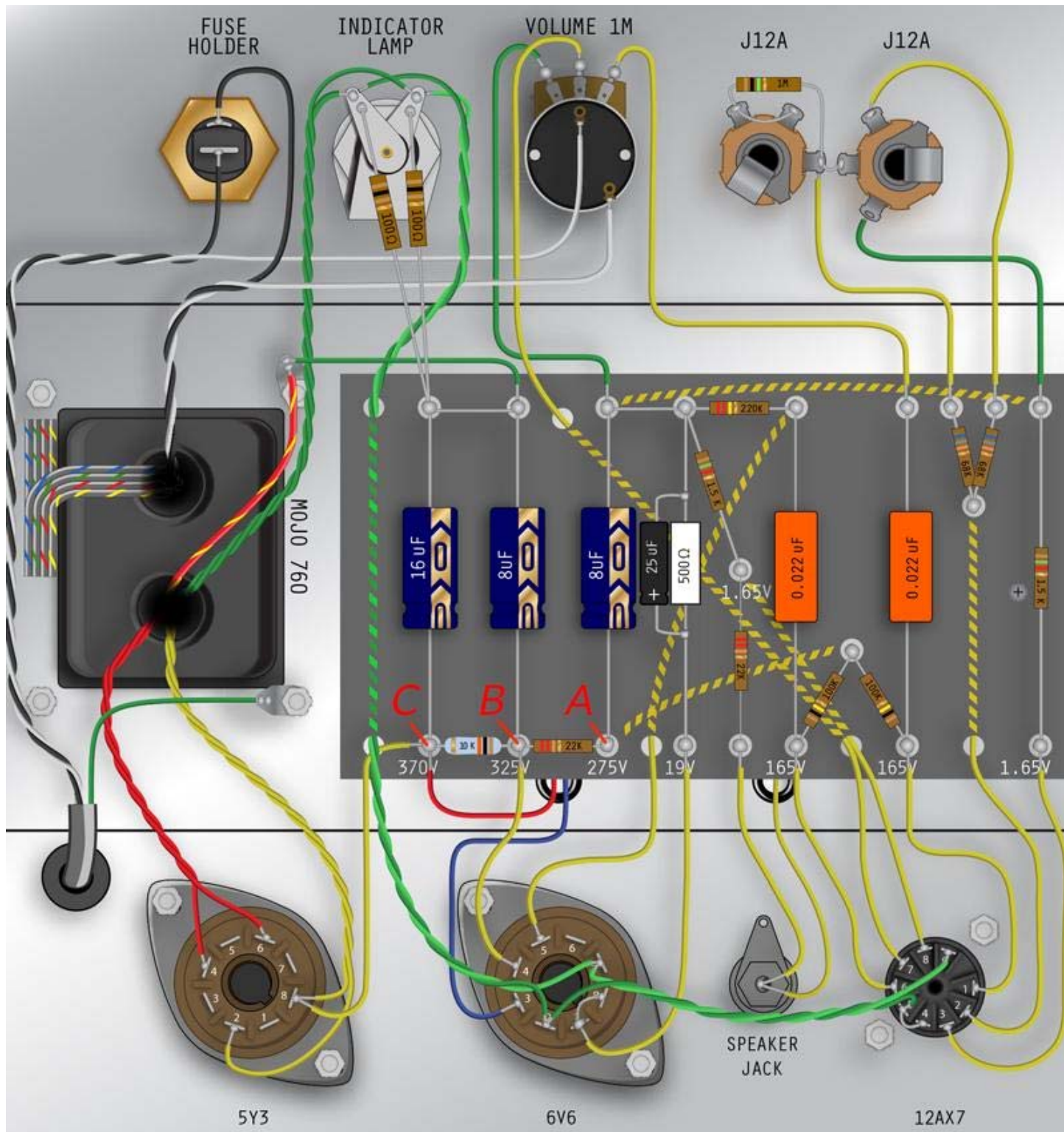


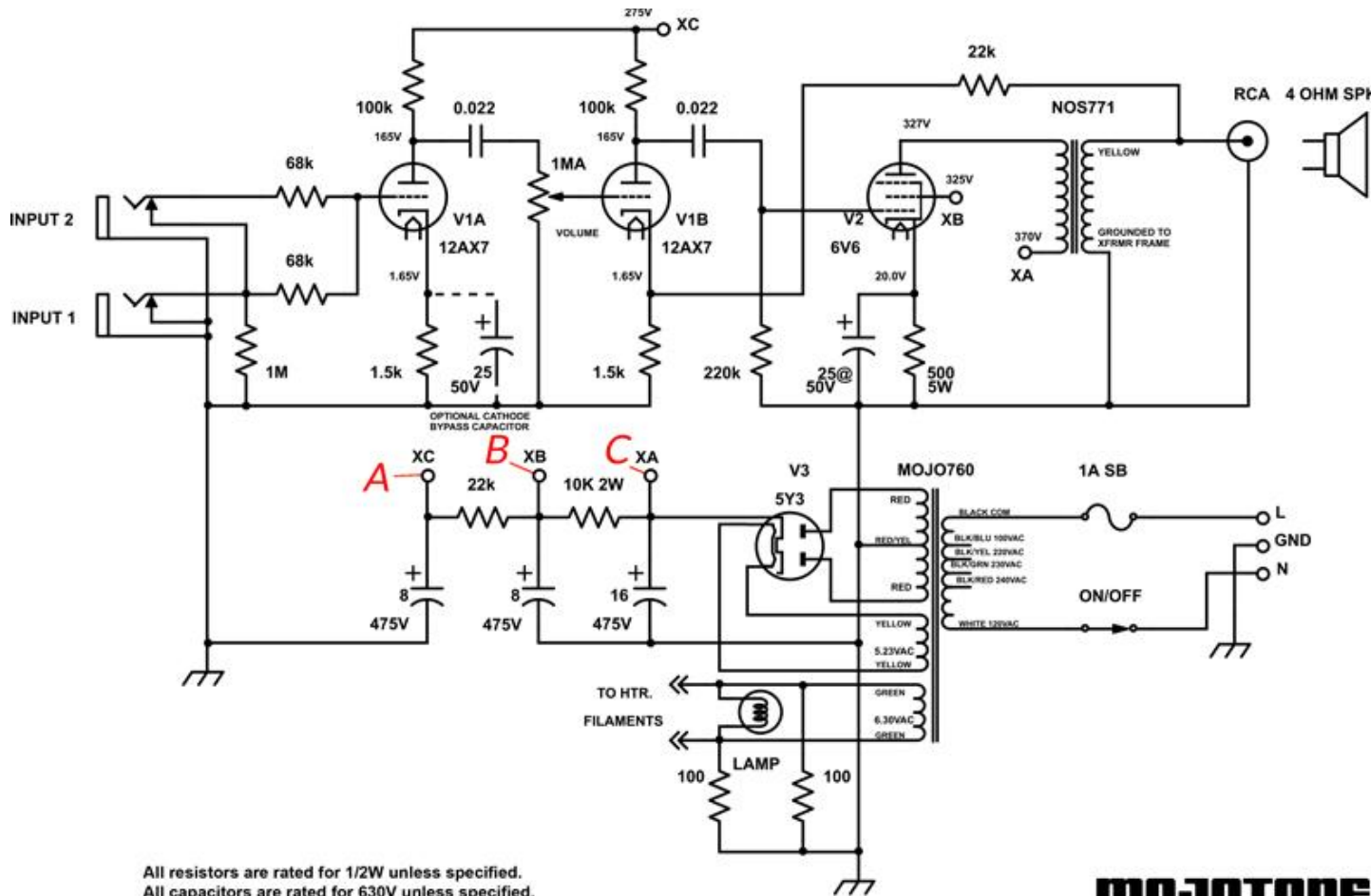
Now, set your multimeter to its highest DC reading and apply the black lead to ground (the metal chassis). Affix this in place since you will need to use your hands for holding the safety pen and the red voltmeter probe. Then ground the end of the safety pen to the ground as well.

For the following instructions on discharging, please refer to the 5F1 Wiring Diagram and Schematic below, as the crucial discharge points will be marked in red on each...

For the first discharge, you'll need to make sure the amp is off and unplugged. Next, apply the red probe of the multimeter to the solder joint on the first filter cap positive side (refer to point A on the diagram and schematic

below); once you have a voltage reading, touch the tip of the safety pen to that connection. At this point, you will see the voltage reading begin to drop down. This may take a minute or so, depending on the amp. When you see the reading settle at less than a couple of volts, move on down the line to the next cap's solder joint (Point B) and repeat the above procedure down the line to Point C. Depending upon your amp, you may have more filter cap drainage points to address.





All resistors are rated for 1/2W unless specified.
 All capacitors are rated for 630V unless specified.
 All voltages were measured at idle with a DMM
 referenced to chassis ground.

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After you have drained and checked all of the caps, check your voltage at various points around the amp to make sure there are no lingering voltages present. If you do notice lingering voltages, just touch the circuit with the pen again.

As you can see, it's actually quite simple once you know where to look. If you are uncertain as to where these points are in your amplifier, please consult your amp's user manual or contact the manufacturer before beginning this procedure. Stay safe and always treat an amp like it has live voltage on it. The moment you start getting comfortable with it, that's when the danger starts! Thanks for tuning in -- we'll see you next time!

KNOWLEDGE BASE / CAPACITORS

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