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Subject: 1967 Kustom 200A4 update

Posted by [Shaun\\_Musings](#) on Sun, 24 Jan 2016 03:26:41 GMT

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Okay, so what I've done is replaced all of the resistors and transistors on PC502 and PC602; I wanted to pretty much start from scratch. I made sure everything was in the correct position there, and then moved to PC702. Replaced all the transistors with heat sinks, replaced the other three transistors without heat sinks mounted on the boards, replaced most of the resistors, replaced the diode attached to the clamp. Now, toward the output side of 702, there are two 40410 transistors which have been replaced with NTE129s. The resistor next to the first one started smoking and I turned off the amp. I've checked where it is in the circuit, and it is attached to not just the transistor on the floor in the metal case, but to a green wire which is going to the top of one of the big filter caps.

I have new floor replacement transistors (The ones in the metal case), but I don't just want to throw them in and find out it was something else that is causing the problem.

I've ordered the remaining resistors on PC702 that need to be replaced, along with the 5 watt 1 ohm resistors (I had ordered them but for some reason they sent 22 ohm 5 watt resistors. Bizarre). I guess the question is: am I missing something? Once these pieces are installed, the only thing that would be left are the diodes which are attached to the board. Suggestions?

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Subject: Re: 1967 Kustom 200A4 update

Posted by [chicagobill](#) on Sun, 24 Jan 2016 08:13:02 GMT

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I have tried to help you with this amp and would continue to try, but you make it difficult by posting things like "the resistor next to the first one started smoking". I have no idea as to which resistor you are talking about and it would take a lot of time for me to sit down with a copy of the schematic and figure it out.

If you have a copy of the schematic and can reference the parts that you are changing or are talking about by the part numbers on the schematic we can all help you more because we will all know exactly what you are talking about.

Whenever a resistor burns, it is because something that it is connected to is drawing too much current. If one the side of the resistor connects directly to the negative power supply (green wire) then the component that is connected to the other end of the resistor is drawing too much current and is causing the resistor to burn. What is the other end of the resistor connected to?

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Subject: Re: 1967 Kustom 200A4 update

Posted by [Shaun\\_Musings](#) on Sun, 24 Jan 2016 16:30:52 GMT

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My apologies; I spent some time last night learning how to read the schematic. The ones for

PC502 and PC602 are easy enough, but this one is pretty tough for me.

It looks like resistor #715 is having a problem. Now, does that indicate Q6 is bad (on the floor) or Q706 (the heatsinked transistor).

What I am wondering is if there is a possibility that I put Q706 in wrong and perhaps switched the emitter and base; resistor 715, is on the same path as the collector (originally it was the heat sink which was in the circuit, and so I connected the collector lead with a small wire to where the heatsink was mounted).

Now, here is a picture of what my board looks like (it opens someone else's photobucket).  
[http://s27.photobucket.com/user/campsite/media/kustom/rearpc b.jpg.html](http://s27.photobucket.com/user/campsite/media/kustom/rearpc%20b.jpg.html)

What I have done so far:

PC502 & 602 have been completely redone; all new transistors and resistors.

I have replaced most of the resistors on this board. The only semiconductor I have not replaced yet is the button-style one right below the fuse, right next to the blue wire going to the output jacks (Q705?).

I have replaced the heatsink transistors, the non-heatsink transistors, and am waiting for the 80mfd/50volt capacitors to come in and replace.

I've also purchased new filter caps.

The bridge rectifier has been upgraded to 35, as some people recommend.

The 5-watt 1 ohm resistors are on their way, as well.

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Subject: Re: 1967 Kustom 200A4 update

Posted by [chicagobill](#) on Mon, 25 Jan 2016 00:39:48 GMT

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If R715 is burning, either the driver Q706 or the power transistor Q6 can be at fault, but the driver Q706 is most likely the problem. Q706 should be a RCA40410 PNP. What did you replace it with? A simple test would be to pull off the connector from Q6 and see if the resistor is still over heating.

Do you have a light bulb limiter available?

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Subject: Re: 1967 Kustom 200A4 update

Posted by [Shaun\\_Musings](#) on Mon, 25 Jan 2016 01:50:13 GMT

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I replaced RCA40410 with NTE129. I looked at what I was using as the driver, and it appears I fell asleep at the switch when I ordered new driver (case types) transistors. The only one which did not get changed (because I bought 5 instead of 6) was, you guessed it, Q6. The ones I have for replacements are MJ15015G, which I am putting in. I will NOT be starting this amp until the 1 ohm 5 watt resistors are in, the new 80uf/50v are installed, and the new Mallories are put in.

The trouble now that just popped up is on the drivers, the black triangular pieces where the pins

are supposed to go into are loose; perhaps from being jostled around. How can I get them back to where the need to be?

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [chicagobill](#) on Mon, 25 Jan 2016 02:41:15 GMT  
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Okay, to start with, the drivers are the small heat sunked transistors on the board (the 40409 and 40410). The large transistors on the floor of the chassis are the 4 output transistors.

The black connectors contact the Base and Emitter pins of the output transistors. They really are not that tight of a fit. I suppose that you could take something like a straight pin and try to use it to push the two halves of the contact points inward to tighten the grip. Have you meter tested the contacts to see if they are making good contact or not?

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [Shaun\\_Musings](#) on Mon, 25 Jan 2016 03:04:13 GMT  
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I haven't used the meter yet on the output transistors (the floor ones). What should I be testing? I was using the diode function between the collector at the chassis to make sure nothing was touching (for some reason one of the plastic white insulator washers was not really cooperating so I kept getting a short).

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [chicagobill](#) on Mon, 25 Jan 2016 18:33:25 GMT  
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Checking to make sure that the cases of the power transistors are not shorted to the chassis is very important. The nylon shoulder washers are one part to inspect, the others are the mica insulators that isolate the metal case of the transistor itself.

Transistors are kind of like triode tubes. They can be compared to a water valve. There are two terminals that allow the passage of electrons and one terminal that turns on and off the flow.

On a tube these terminals would be the control grid, the plate and the cathode. On a transistor, these would be the Base, the Collector and the Emitter.

To test a transistor set your meter to the diode test function. Hold the red lead to the Base and then touch the black lead first to the Collector and then the Emitter, taking note of the meter readings. Then reverse the two meter leads by holding the black lead on the Base and touching the red lead to the Collector and the Emitter, again taking note of the readings.

A good working transistor will show a meter reading of about 0.6 to 0.7 volts in one polarity and

should read open or no reading in the other polarity.

The final test would be to connect the red lead to the Collector and the black lead to the Emitter. Most transistors (or at least all of the transistors in your Kustom amp) will read open in either direction for this test.

Because of their size, the MJ15015 or 2N3055 power transistors are easiest to test. Take one and look at the two leads that come out of the bottom of the case. You should notice that the leads are not centered between the two mounting screw holes. They are closer to one end than the other. Hold the transistor vertically with the leads facing you so that the two leads are closer to the top mounting hole. Looking at it this way, the Base is the pin on the left side, the Emitter is the pin on the right side and the Collector is the metal case.

Now run the tests that I described earlier and see what you find out.

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [stevem](#) on Tue, 26 Jan 2016 10:51:33 GMT  
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Your trying to do too many things at once!  
If the filters are not shorted I would leave replacing those to last once the amp is otherwise up and running!

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [Shaun\\_Musings](#) on Tue, 26 Jan 2016 16:02:36 GMT  
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I have tested the transistors themselves and they are fine; what I mean is did I put them into the amp itself wrong, somehow? I did check each one and write down each leg, and in the case where I had a metal cap transistor there is that little tab on it which makes things very easy, but if I had somehow mixed the base and emitter up, would that cause a burned-out resistor? Although I can't really see how that would happen, since it is apparent where the leads of these drivers go.

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [chicagobill](#) on Tue, 26 Jan 2016 16:54:02 GMT  
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Yes, if the transistor is installed wrong it can cause things to burn up or short out. Just as bad is if a PNP transistor is installed where an NPN should be, and vice versa.

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [Shaun\\_Musings](#) on Tue, 26 Jan 2016 17:41:57 GMT

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Alright, so let me just confirm that the parts 40409 is NTE128 replacement, and 40410 is NTE129 replacement, is that correct?

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [chicagobill](#) on Tue, 26 Jan 2016 19:01:02 GMT  
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Yes, those are the correct substitutes.

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [Shaun\\_Musings](#) on Wed, 27 Jan 2016 01:07:18 GMT  
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Alright, I used the diode function on the output transistors (the power transistors on the floor). Interesting readings. Going from right to left (from close to the power transformer to away), the first one read .050, the second, third, and fourth read .034/.035, number five read .235, and the last one once again read .034.

I decided to turn on the amp and see what gives, since I had not replaced one of these and this was the one connected to the resistor which was giving me a problem. I gave it a number of minutes, but saw nothing smoking, nothing burning up, and certainly nothing exploding. I took a reading at the output; I am seeing between 7-9, which is considerably less than what I started with.

Against my better judgment, I suppose, I decided to hook it up to a speaker and see what happened. A satisfying hum which is identical to the other A4 I have was audible. When I shut off the amp, I heard the 'pop' we are all familiar with after the light went out. No smoke, nothing. So I plugged in a guitar cable, turned on the amp, and.... nothing. Tried all four input jacks, but nothing. No sound. The hum from the amp is still there, which indicates to me that the back may be all set, but the front must have a solder bridge or something funky. I replaced all the transistors on these two boards, most of the resistors, and the volume and bass pot on the left side; can someone tell me the values again, just to be sure? I recall a value of 10k, I think. These two knobs were the ones broken when I tried to drill out the screws on the knobs.

So, there is some good news to report!

SDC

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [chicagobill](#) on Wed, 27 Jan 2016 01:18:45 GMT  
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If there is still 7-9 dc volts on the output, then you still have a problem in the power amp. If you have 7-9 millivolts, then there is no problem.

For the preamp sections to work, you need to have the plus and minus 23 volts supplies working. Do you read + and - 23 volts coming from the two small regulator boards on the back wall going to the preamp boards?

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [Shaun\\_Musings](#) on Wed, 27 Jan 2016 01:53:12 GMT  
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What wires do I check for these readings, and do I turn the amp on (kind of a no-brainer) for this test?

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [chicagobill](#) on Wed, 27 Jan 2016 03:59:19 GMT  
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If you look at the small regulator board that is on the left side closest to the edge of the chassis, there are two wires at the top right side of the board. A short red one that connects to the other small regulator board and a green wire that goes into the cable bundle that heads up to the preamp boards.

The red wire is the input voltage from the +23 volt reg and the green wire is the -23 volt output. Ground the black lead of your meter to the metal chassis and use the red lead to measure the dc voltage at the ends of the two wires. They both connect to resistors right next to where the wires go into the board, so touching the red lead to the resistor ends will make the readings easy to make.

There should be +23 dc volts at the red wire and -23 dc volts at the green wire.

And yes, the amp need to be turned on for these tests.

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [Shaun\\_Musings](#) on Wed, 27 Jan 2016 15:33:57 GMT  
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Okay, took the readings: I am getting +39.0 and -38.5. Too much current, obviously. What's next?

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [stevem](#) on Wed, 27 Jan 2016 16:15:42 GMT  
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too much voltage!

I really think at this point you need to take the amp to a tech .

With that much voltage any caps on the output side of each regulator board and any caps in the preamps right off of the power supply feed may likely be bad if they are rated for less than 40 volts.

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Subject: Re: 1967 Kustom 200A4 update

Posted by [Shaun\\_Musings](#) on Wed, 27 Jan 2016 17:03:56 GMT

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All caps have been changed and rated for 50 volts. I changed the rectifier beforehand to a 35 amp one. Are there any resistors I should have put across the leads? I've seen a few around that have done that.

I took the amp to a tech before; they don't want something as time intensive... What are some of the obvious things that might be causing this? Could I have installed a cap on the 102 boards backwards?

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Subject: Re: 1967 Kustom 200A4 update

Posted by [chicagobill](#) on Wed, 27 Jan 2016 17:43:55 GMT

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The problem is on the positive 23 volt regulator board, PC502. If you have already replaced all of the parts on that board, go back and double check your work.

Compare the parts on the board to the schematic. Are all of the parts in the right places? Any solder bridges on the board? Test the pass transistor (the big one mounted to the chassis) with your meter. Are the Collector and Emitter terminals shorted together?

Repairing an amp is really a test of logic and deduction. What are the symptoms and then figuring out what sections of the amp could cause those symptoms.

Random replacement of parts may fix any problem, but it could also create a whole set of new ones as well. The photo that I saw of your amp was before anything was replaced. It looked like it had been flood damaged. The entire chassis and components were covered with filth and rust. While not impossible to restore, this amp really needs a lot of TLC to get it back into shape.

If you really want to get this fixed, stop replacing things until you get it working. Then when you replace things you'll know if there is a new problem caused by the new parts.

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Subject: Re: 1967 Kustom 200A4 update

Posted by [Shaun\\_Musings](#) on Wed, 27 Jan 2016 17:48:47 GMT

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Picture? Oh! No, that wasn't mine; that was one I found online. You're right; I should not have been replacing things until it was up and running. I am going to test 502 this afternoon. I'll test the transistors and check the readings with my other A4. This amp ran before; it sounded okay, but I'm sure it would be fine now if I had just replaced the transistors and left everything else alone...

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [Kustom\\_Bart](#) on Wed, 27 Jan 2016 19:41:44 GMT  
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ChicaoBill is right on the money, even my tech guy up here has said that he only replaces the bad parts because if you try to rebuild the entire thing, it normally causes more problems than you had before.

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [Shaun\\_Musings](#) on Wed, 27 Jan 2016 20:45:12 GMT  
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Yeah, that wasn't one of my brightest moments. My father used wood glue on fan ducts, on vents for the dryer, and even on the overhead shower faucet, which annoyed me to no end. Figures I would be just as dunder-headed about things.

Just finished cleaning up PC 602 and 502. On PC502, I found an incorrect resistor; the correct value should have been 4.7k ohms. I also found a couple of solder bridges, which I have since cleaned up. Also, there was a lifted pad that may or may not have been making contact with a transistor. I have fixed these, and I will be firing up the amp after my 5k at the gym =)

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [Shaun\\_Musings](#) on Wed, 27 Jan 2016 20:58:55 GMT  
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On the schematic for PC502, it is R503, by the way.

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [stevem](#) on Thu, 28 Jan 2016 10:53:24 GMT  
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Also go back over all the electrolytic type caps you have replaced and confirm that they are installed right .

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Subject: Re: 1967 Kustom 200A4 update

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Posted by [Shaun\\_Musings](#) on Thu, 28 Jan 2016 14:30:02 GMT

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Somebody definitely worked on this amp and replaced transistors with the wrong values or those of questionable equivalence. Looking up stuff online, I was going by the numbers that were on the transistors, rather than looking at the schematic. It hit me when I printed out the schematic and noticed I had replaced the three transistors on PC602 with 2n3904, which is an NTE123AP, when on the schematic all three are NTE129. I knew I had screwed up, and looked at the three that I had originally pulled off. Yup. Somebody probably swapped out whatever they had on hand. So. I've gone back to the drawing board, organizing all of the transistors by board number and how many I will need. I wrote out all the transistors that I could read off the schematics for the boards I had worked on. So, PC102, PC502, PC602, and PC702. Can someone just confirm these bad boys for me?

PC102 (10) NTE123 (5 on each board, Replaces 2N3565. I believe these may be all set, although someone replaced one with a 2N2222, which matches up).

PC602 (3) NTE129 (Replaces 2N3638)

PC502 (3) NTE123 (Replaces SE4002, 2N3567) (1) NTE129 (Replaces 2N3868)

PC702 (2) NTE159 (Replaces 2N2429) (3) - NTE129(includes the 2 heatsinked, plus Q709) (2) NTE128(the two heatsinked) (1) NTE108 (Replaces PET1075) (1) NTE123 (Replaces 2N3567).

I have most of these already, so it's just a matter of testing, making sure they're not toasted from improper placement, and putting them in their proper place. The NTE129s and NTE128s for the driver section are in correctly.

Going to take more than a few setbacks to stop me from getting this going!

(Will check the caps, too, Steve. I really appreciate everyone helping me. I've learned a lot about this stuff so far, and I've also learned how to read a schematic, which I'm sure will come in handy at other times. I owe you guys a beer or two!)

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Subject: Re: 1967 Kustom 200A4 update

Posted by [chicagobill](#) on Thu, 28 Jan 2016 17:48:21 GMT

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NTE transistors are a good source for replacements, but I personally don't use them much. They are far too expensive for what they are and would make many customer repairs too expensive.

I use alternative part numbers in a lot of repairs that I do and I see no problem in doing that as long as the replacements are picked to fit the application that they are being used in.

I will have to look up all of your transistors to see if you have them all identified correctly, but I do know that the PC102 boards have 4 NPN transistors and 1 PNP on them, so double check your list.

Subject: Re: 1967 Kustom 200A4 update  
Posted by [Shaun\\_Musings](#) on Thu, 28 Jan 2016 18:32:44 GMT  
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Good call; I think I had been looking at PC201 instead of 102 when I wrote that this morning. Was actually looking at the boards when you replied.

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [pleat](#) on Thu, 28 Jan 2016 19:47:57 GMT  
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Been following this thread. One think that I wonder is, if your replacing so many parts, (just because) are you taking into consideration that there may have been modification bulletins that Kustom send out to dealers to make changes to existing circuits as they found problems in the field.  
If your amp has part values that don't match the schematic, it may be the fact Kustom suggested the changes because of amp failures in the field.

pleat

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [chicagobill](#) on Thu, 28 Jan 2016 21:47:39 GMT  
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Pleat, I agree that will be something to consider.

As far as I can tell the rest of the transistor list seems fine.

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [steven](#) on Thu, 28 Jan 2016 21:57:41 GMT  
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One thing I have been toying with doing to the next A or B head that comes into my hands with failed regulator circuit(s) is to just adopt the metal face preamp regulator style of a simple dropping resistor and a Zener diode.

This would free up some current from not having those transistors idling and let the output stage have for more power output .

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [Shaun\\_Musings](#) on Thu, 28 Jan 2016 22:31:26 GMT  
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That is a good point, Pleat, and something I didn't consider. What I was hoping would be to wind up with practically a new amp. Have all the required parts; I'm hoping to have a full report for you later!

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [Shaun\\_Musings](#) on Thu, 28 Jan 2016 23:50:02 GMT  
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Okay, I have put in the correct value transistors, and fired it up. Now, before, I was getting -38.5 volts and 39 volts on the rail. The measurements now are as follows: green wire is 13.75 and 30.51. DC voltage at the output is 20.30. What I note is the absence of a negative reading, which suggests either I need to replace NTE129 and NTE128 because maybe they were having a problem before, or the EBC of a transistor or two is out of line.

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [Shaun\\_Musings](#) on Thu, 28 Jan 2016 23:51:55 GMT  
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My error; the green wire connecting PC602 and PC702 was out. I'm going to put it up for tonight and I'll start fresh tomorrow!

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [Shaun\\_Musings](#) on Fri, 29 Jan 2016 02:35:16 GMT  
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Somehow my previous post disappeared. I decided to hook up the green wire; with the green wire in place I got +39 and -5.6. Way off. So I took a look around on PC602 and discovered that I had created a bridge with solder between two of the pads. Scraped this off, plugged it back in, and viola! I got +30 and -16. So, I am off by 7 volts on each side. Since both values changed almost equally after this solder bridge was removed, I am thinking there might be another solder bridge here somewhere.

Now, I want to rule out PC102 as the problem, although last time the values were off, Bill told me it was clear the problem lay on either PC502 or 602.

I think I'm making progress. Shoot me down if it's obvious I'm heading in the wrong direction!

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [chicagobill](#) on Fri, 29 Jan 2016 03:46:28 GMT  
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Please make the following voltmeter readings. Please try and be exact.

Connect the black lead of your meter to the metal chassis as ground. With the red lead measure the voltage at the top of the two large main filter caps, one at the screw terminal where the red wires meet and two where the green wires meet.

Then keeping the black lead grounded, read the voltages on PC602 at the upper right side where the red and green wires connect to the board.

Post the readings here.

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [Shaun\\_Musings](#) on Fri, 29 Jan 2016 18:01:18 GMT  
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Red (red dot side) filter cap, black lead to ground: 40.5  
Green (opposite red dot) : -40.6

Green wire on PC602: -12.8  
Red wire: +39.1. I must have been not testing it right last night...

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [chicagobill](#) on Fri, 29 Jan 2016 18:13:19 GMT  
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Shaun\_Musings wrote on Fri, 29 January 2016 12:01Green wire on PC602: -12.8  
Red wire: +39.1. I must have been not testing it right last night...  
If these number are correct, you have problems on both PC502 and PC602.

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [Shaun\\_Musings](#) on Fri, 29 Jan 2016 18:23:04 GMT  
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Okay, what I will do is check the schematic. I'll start with 602. There are three transistors there. Nte129 are the replacements, right? Could the transistors on the floor be the problem?

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [stevem](#) on Fri, 29 Jan 2016 19:10:37 GMT  
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No, the output transistors run on the + and - 40 volts which is good by your last checks.

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [chicagobill](#) on Fri, 29 Jan 2016 19:25:27 GMT  
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I'll try explaining this to you again. The positive regulator circuit PC502 sets the 23 volt level. The negative regulator circuit PC602 matches or follows the output of the positive side.

If there is +39 dc volts coming out of PC502 then there should be -39 dc volts coming out of PC602.

While there is no problem with working on PC602 first, in order for you to tell if it is working correctly or not, you need to fix PC502 first and then fix PC602.

And yes, if the floor transistor connected to PC502 is shorted, it would pass the entire +40 volts to the output of the regulator circuit.

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [Shaun\\_Musings](#) on Sat, 30 Jan 2016 00:35:13 GMT  
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looking at the transistors on PC502, it appears I had the BCE reversed on two transistors NTE123). I replaced these, and battened down the hatches. I didn't check for bridges; I really should have and will do that tomorrow.

Green: 9.91  
Red: 25.2

Like I said, I'll check for any bridges tomorrow and update...

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [chicagobill](#) on Sat, 30 Jan 2016 01:51:24 GMT  
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Shaun\_Musings wrote on Fri, 29 January 2016 18:35  
Green: 9.91  
Red: 25.2  
Okay, the +25.2 is in the ballpark and can be called good.

Now your problem is on the negative regulator board PC602.

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [Shaun\\_Musings](#) on Sat, 30 Jan 2016 03:36:21 GMT  
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Alright, we're getting somewhere. I'm going to double check all the transistors on PC602

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tomorrow. I am using a 22/50 volt capacitor, and all the transistors on the board are NTE123s, correct? Any helpful suggestions on what I might be looking for? I'm just glad this has been isolated to PC502. One thing I should mention is that I replaced Q1 and the other 36982 transistors with MJ15015. I understand this is an upgrade. I replaced the regular resistors on both of these boards, except for R604 and R605, which are blue metal film 1%.

Now, I have done some work on PC102, changing the transistors there, and I am going to also double check to make sure there are no bridges or transistors in wrong.

I apologize if I gave the impression I just started changing things; some of the transistors on PC102, 502, and 602 had been snapped off previously and somebody soldered them back on; one was barely hanging on by a thread when I opened up the case. The reverb, trem/vibe, selective boost, and harmonic clipper do not appear to have been touched. Once I've figured all this out, I will begin work on the other boards.

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [chicagobill](#) on Sat, 30 Jan 2016 16:50:16 GMT  
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All three transistors on PC602 are 2N3638, PNP. I think that NTE123 are NPN. Check your lists. Maybe NTE129?

Unlikely that the transistors were snapped off, some people will cut transistor leads to test them without having to remove the board or unsoldering the leads. Then they will try to solder the cut leads back together. Maybe that's what was done to your amp.

Yes, start by getting the power supply working correctly, then the power amp, then the two preamp boards and finally the effect boards. This way you will be only working on one section of the amp at a time and will be able to tell if what you have changed is for the better or for the worse.

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Subject: Re: 1967 Kustom 200A4 update  
Posted by [steven](#) on Sat, 30 Jan 2016 17:01:35 GMT  
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Maybe we can start a new thread for this as my finger is getting tired of all the scrolling!