Subject: K200B1 overheating
Posted by real_to_reel on Thu, 18 Feb 2010 01:31:46 GMT
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Does anyone have schematics for a K200B-1?

Needed are PC703, PC203, PC105

I believe the previous crackling problem is resolved. My current issue: amp is hot enough to bond the naugahyde to the speaker cabinet T&R.

readings:
Output jack 11.6 DCV
Green preamp wire –8.3 DCV
Red preamp wire +8.7 DCV
High voltage DC power supply: -38.9, +39.4

If amp is overheating and not shutting down, is the Thermal circuit breaker (black round plastic, 2 spade connections) failing?

Re. Bias diode - should I add transistor heat compound to it? (there is none on it)

Chassis mounted RCA 36892 transistors – From reading previous posts it appears that these can be easily removed for testing by removing 2 hold-down screws – is this correct?

Thanks for you assistance.

Subject: Re: K200B1 overheating
Posted by ellum68 on Thu, 18 Feb 2010 01:47:15 GMT
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It would be kinda neat if you could get one of those infrared heat guns and zero in on what exactly is getting hot.

Subject: Re: K200B1 overheating
Posted by chicagobill on Thu, 18 Feb 2010 20:58:47 GMT
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If there is DC on the speaker jack, you may have a shorted output or driver transistor.

The outputs have plug on connectors for the base and emitter legs. Pull the triangular black plastic connector up off of the pins and you can test it without removing it from the chassis. For

reference, the blue lead is the base and the yellow the emitter.

Adding grease to the diode on the heat sink will help, there was some originally, but it has probably melted through the years.

I'm not sure, but I think that the thermal shut off is designed to open at 180 degrees F.

As for the schematics, PM your email address to me and I'll send them.

Subject: Re: K200B1 overheating
Posted by stevem on Fri, 19 Feb 2010 10:52:47 GMT
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Their are 5 transistors you need to check.
Outputs Q1 and Q2.
Q704,706 AND 708.

Subject: Re: K200B1 overheating
Posted by real_to_reel on Sat, 20 Feb 2010 00:09:04 GMT
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Thanks to all for the schematics.

Please excuse the following questions that are probably Electronics 101. I've read previous postings but, can't find the answers.

How exactly do I test Q1, Q2, Q3, Q4 transistors after I have pulled the triangular black plastic connector up off of the pins? Multimeter set at? Red probe goes to? Black probe goes to? Sequence? What readings am I looking for, what is a bad reading indicating a defective transistor?

Can Q704, Q706, Q708 be checked on the board or, are they to be removed from the board for testing?

There are no "Q" numbers on the PC boards. How do you know what Q number corresponds to the schematic and the board? (example: 36892 transistors) I know Q1 to Q4 are not on the board but, don't know how to identify them in their chassis position.

Subject: Re: K200B1 overheating
Posted by ellum68 on Sat, 20 Feb 2010 03:51:11 GMT
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Set your multimeter to the diode test mode. Remember where all your wires goes before you

remove the black plastic caps. Take your positive probe and touch it to where your blue wire went to (the "base" of the transistor) . Then take your negative lead and touch to where your red wire (collector) went to and then to where your yellow went (emitter). Your meter should show something in .6-.8 range. Then do the same test again, but swap your negative and positive probes. You should show no current flow. If you switch your meter to ohms, you should see an open circuit or a very high resistance. Q704, Q706, and Q708 are the transistors that lie in the big metal heatsinks near the bottom of the PCB. I THINK you can test them still in circuit, but don't quote me. These are NPN transistor, so the test procedure should be the same. Look here to see what I'm talking about. Use your schematic to help identify where your base, emitter, and collector are located for these transistors.

Subject: Re: K200B1 overheating
Posted by real_to_reel on Tue, 23 Feb 2010 01:55:39 GMT
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I tested Q1, Q2, Q3, Q4 attached to the chassis but, all wires removed.

I designated Q1 as the transistor on the left side of the heatsink that is riveted to the chassis. When looking at the back wall of the amp from the front side, Q1 is furthest from the output jacks. Have I identified Q1 correctly? I assume Q4 is at the end of the line.

Results of Q1 test:
Base to Collector: 581
Base to Emitter: 603 on 1st test, 586 on second test
The other 4 combinations were -0-

Results of Q2 test:
Base to Collector: 602-598
Base to Emitter: 601-606 on 1st test, 590 on second test
The other 4 combinations were -0-

Results of Q3 test:
Base to Collector: 578
Base to Emitter: 577
The other 4 combinations were -0-

Results of Q4 test:
Base to Collector: 569
Base to Emitter: 571
The other 4 combinations were -0-

Possibly there should be a decimal point after the first number but, meter set on diode - no decimal appeared.

Can Q704, Q706, Q708 be checked on the board or, are they to be removed from the board for testing?

I have not been able to replicate the overheating condition at idle with the chassis out of the cabinet but, the 11 volts DC is still at the output.

Thanks.

Subject: Re: K200B1 overheating
Posted by chicagobill on Tue, 23 Feb 2010 18:01:43 GMT
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It seems that the four outputs are ok, so now test the drivers. These are the ones that have the square metal heatsinks.

Test them in circuit first and see if they seem ok. If you get any really odd readings, you may have to remove them to check them out of circuit before moving on.

When you check a transistor or diode with your meter, you are reading the voltage at which the junction conducts. So the numbers that you are getting actually mean 0.601 volts. This is normal for a silicon transistor, it would be lower for a germanium one.

The most important thing is that when you reverse your meter connections, that the reading is higher if not completely open. The transistor is supposed to conduct only in one direction so you should get a low reading with the meter hooked up one way and a high reading when the leads are reversed.

Good luck and let us know what you find out.

Subject: Re: K200B1 overheating
Posted by real_to_reel on Sat, 27 Feb 2010 21:59:03 GMT
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Results of Transistor test, tested on board (PC703):

Q704 RCA 38736 (NPN)
BE - current
EB - no current
BC - current
CB - no current
CE - current
EC - no current

Q706 3567 (NPN)
BE – current
EB – current
BC – current
CB – no current
CE – no current
EC – current

Q708 RCA 38736 (NPN)
BE - current
EB - no current
BC - current
CB - no current
CE - current
EC - no current

Q705 RCA 38737 (PNP)
BE - no current
EB - current
BC - no current
CB - current
CE - no current
EC - no current

Q709 RCA 38737 (PNP)
BE - no current
EB - current
BC - no current
CB - current
CE - no current
EC - no current

Could a resistor or diode adjacent to the above transistors affect the meter readings?

Subject: Re: K200B1 overheating
Posted by stevem on Sun, 28 Feb 2010 00:09:45 GMT
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Looks like Q706 is toast.

Subject: Re: K200B1 overheating
Posted by real_to_reel on Sun, 28 Feb 2010 21:39:01 GMT
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Thanks Steve.

I also just checked Q714 and Q718. I get current reading at all six combinations of test positions. Are these readings indicating bad transistors or, are readings influenced by a adjacent component?

Regarding Q706: I assume the current at BE & EB was the indication of the problem. What about current at EC? In 2008, Chicagobill wrote: "There should be no conduction at all between emitters and collectors."

On 1/19/10 you wrote:
"If you are reading DC voltage on the output jack than you have at least one bad output transistor on the positive leg of the power supply if the meter read + DC, or the other way around."

I rechecked Q1 and Q2, they are still testing good.

Should I replace Q1 & Q2 in addition to Q706?

Subject: Re: K200B1 overheating
Posted by chicagobill on Mon, 01 Mar 2010 17:30:01 GMT
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In answer to your question, yes other components can cause an unsure reading when testing transistors. This is where you need to compare how much voltage is being read by your meter and in each direction.

Q706 and Q707 are part of the output amp protection circuit. They both have some low value resistors in circuit that can cause unclear test readings. Retest Q706 and Q707 and compare them to each other. The polarities should be reversed, but the readings should be similar. If you are getting similar low readings from BE and EB on both transistors, then it's probably the in circuit resistor that is causing the low readings.

If Q1 and Q2 test ok then leave them. Q714 and Q718 are part of the low voltage regulator circuits. Your earlier tests showed that you had both + and - 8 volts, so they are fine, leave them.

Have you tested the other transistors? How about the 5 diodes on the board?

You may have to remove the questioned transistors and test them out of circuit. I don't know what skills and equipment that you have, but you don't need too much to remove most of these. Let us know if you need soldering advice.

Subject: Re: K200B1 overheating
Posted by C4ster on Tue, 02 Mar 2010 14:58:07 GMT

After you have tested the transistors and have unclear readings on the voltage scale, change to resistance and you might see the value of the resistor in question. This is typical of resistors across the emitter/base.
Conrad

Subject: Re: K200B1 overheating
Posted by real_to_reel on Wed, 03 Mar 2010 06:46:12 GMT

Below are the 5 diode and other transistor readings for PC703. Thanks for reviewing these. All are still on the board.

Diodes:
CR700 meter: 650
CR701 meter: 689
CR702 meter: 660
CR703 meter: 678
CR704 meter: 671

Transistors:
Q706
BE – Meter: 081
EB – Meter: 081
BC – Meter: 745
CB – Meter: 0
CE – Meter: 0
EC – Meter: 756

Q707
BE – Meter: -196 then 080
EB – Meter: -193 then 080
BC – Meter: 0
CB – Meter: 807
CE – Meter: 829
EC – Meter: 0

Q700
BE – Meter: 877
EB – Meter: 0
BC – Meter: 860
CB – Meter: 0
CE – Meter: 890
EC – Meter: 0

Q701

BE – Meter: 0
EB – Meter: 925
BC – Meter: 0
CB – Meter: 910
CE – Meter: 0
EC – Meter: 0

Q702
BE – Meter: 0
EB – Meter: 826
BC – Meter: 0
CB – Meter: 790
CE – Meter: 0
EC – Meter: 903

Q703
BE – Meter: 977
EB – Meter: 0
BC – Meter: 791
CB – Meter: 0
CE – Meter: 0
EC – Meter: 647

Q710
BE – Meter: 861
EB – Meter: 0
BC – Meter: 845
CB – Meter: reads 865 for fraction of a second
CE – Meter: reads 543 for fraction of a second
EC – Meter: 0

Q711
BE – Meter: 855
EB – Meter: 0
BC – Meter: -
CB – Meter: -
CE – Meter: -
EC – Meter: -

Q712
BE – Meter: 824
EB – Meter: 619
BC – Meter: 722
CB – Meter: 0
CE – Meter: display shows 4 different numbers, ends at 804
EC – Meter: 530

Q713

BE – Meter: -124, then 004
EB – Meter: 003
BC – Meter: 750
CB – Meter: 680
CE – Meter: 724
EC – Meter: 751

Q715
BE – Meter: 0
EB – Meter: 864
BC – Meter: 0
CB – Meter: 857
CE – Meter: reads 674 for fraction of a second
EC – Meter: reads 615 for fraction of a second

Q716
BE – Meter: 794
EB – Meter: 865
BC – Meter: 0
CB – Meter: 855
CE – Meter: 085
EC – Meter: 547

Q717
BE – Meter: 004
EB – Meter: 004
BC – Meter: 866
CB – Meter: 792
CE – Meter: 794
EC – Meter: 865

Subject: Re: K200B1 overheating
Posted by chicagobill on Wed, 03 Mar 2010 23:06:43 GMT
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It took a little while to go through all of your numbers.

Nothing seems to stand out to me as being really wrong.
Please for now, don't worry about the regulator transistors Q710 thru Q718, as I stated earlier, the voltages are ok so they are working.

Did you reverse test the diodes?

The next tests would be to start checking voltages on the board and comparing them to the voltages listed on the schematic. To do this, you will need to work on the amp while it is plugged into the wall and turned on. If you don't feel comfortable doing this, it will be time to refer to a tech

type.

If you do check the amp while it is live, work slowly and carefully, and remember that there can be enough voltage in the chassis to cause you bodily harm.

The voltage readings will not match exactly, but they will show you where something is really wrong. The voltages are all referenced to ground, so attach the black lead of your meter to the chassis and carefully probe the connections with your red lead.

Subject: Re: K200B1 overheating
Posted by real_to_reel on Fri, 05 Mar 2010 03:59:03 GMT
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Thanks for looking at the transistor readings. I reverse checked the 5 diodes – didn't get a reading on the meter.

I'm comfortable with checking voltages on the board. Are there specific components to check first?

I'll remount the board to the chassis, reconnect everything and then check voltage for transistors Q1 to Q4 I assume Q1-Q4 are to be probed at the yellow, red, blue wire connections.

If I'm reading the schematic correctly, Q1 and Q2 should have +39.5v at the collector, +6v at the base and +.1 at the emitter. Q3, Q4 should have -.1 at the collector, -38.3 at the base and –39.5 at the emitter.

The other readings appear to be difficult to obtain because I'm not sure how to pinpoint the junction between components. I guess it takes time. Too bad these boards don't have more identifying info on them or, replicate the schematic layout. Is there a resistor or capacitor layout diagram (similar to the transistor diagram) for the PC703 board? Are there specific places to target for readings?

Subject: Re: K200B1 overheating
Posted by stevem on Fri, 05 Mar 2010 10:41:18 GMT
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Before you re-mount the board get a black and red marker and trace out the base and collector paths onto the componet side of the board.
I find this helps me to trace things out faster when the board is bolted back up to the rear wall, as kustom never supplyed board layouts in regards to resistors and caps other than in the latter k150 and 250 amps.
Aslo make sure that non of your 1 ohm 5 watt resistors are open, as many times they may not look burnt, but are open.

Also the first time you fire it up to check volatges, check the output jack for DC agian.