Subject: 250-4
Posted by kb0rex on Wed, 22 Jun 2022 20:29:03 GMT
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got brought a 250-4 from garage sale got it for 50 bucks... I can see why. It's smoked 9 ways to Sunday. Customer got this in black with the speakers wants the pa repaired. Found this site pulled the schematics. Someone had tried to repair and had no idea as the outputs were all the same wiring (2 backwards) the usual suspects 95.3 681s and 1ks burnt in half. driver also shorted. Relaced all the above and it's somewhat alive, has a nasty hum but does pass signal now that the effects board is also repaired the ic1 op amp 1/2 gone. reverb tremolo and vibrato good. It now limps along. It runs hot and thermal on the heat sink will shut it down. the 5065 board seems to still have issues, but I am apparently too dumb to figure it out, its pulling the power supply down to 37+- volts. I had no voltage on the outputs but after going back over the board and putting in the correct 95.3 and 681s I also tried using 4007s for cr1 and 2 as they tested better than the old white ones in there. I also thought this might clean up the Humm and heat but not I have a +1 volt or so on output . Steve or Bill I seem to be thrashing on this one. Work on lots of amps first time Kustom although it seems like a interesting amp built like a tank. Thanks Doug

Subject: Re: 250-4
Posted by chicagobill on Thu, 23 Jun 2022 19:49:38 GMT
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Welcome to the place.

I would first fix the power amp problems before working on the FX and the preamps. Almost all of the Kustom power amps use the same basic architecture, and are really basic. All the major manufacturers have used the same basic design for the past 40-50 years. You should not have any problem getting it figured out.

If the power amp is overheating, then there probably is a balance problem between the two halves of the output section. This can also be the source of the hum and of the voltage on the output. I don't know if you have a light bulb limiter available, but if you do, use it until you get the power amp working. Check all of the transistors in the power amp and take voltage readings to see if they come close to the listed schematic values.

The 1N3754 diode that clips to the heat sink is fragile, so be careful while you are working on the amp.

Subject: Re: 250-4
Posted by kb0rex on Thu, 23 Jun 2022 21:17:17 GMT
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well I typed a long reply but apparently got logged out. So here is the short retyped version. I usually use the bulb limiter on any items I get into for repair. also a variac. On this on I replaced the worst first, the output's , which were shorted the drivers also and there 95.3 and 681 and .51 5

watters. I also replaced q6 and 7. So q4-13 have been replaced and the resisters associated with them. I also replaced cr1 and cr2 with 4007s to try and cool power section as its working now but hot. I have also at this time repaired the effects board to function and now this amp passes signal end to end with good volume. I just can't seem to get the power amp section to balance. I have not tried the diff amp q1 and q2 or changed q3. With power amp disconnected I have good +- rails at 40.3volts. This drops to 37 with power amp inline. So I am at a loss where to got.... I suspect the bias but don't know this amp well enough. Thanks for tossing me a life line.

Doug
:(

Subject: Re: 250-4
Posted by kb0rex on Thu, 23 Jun 2022 21:17:47 GMT
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test1

Subject: Re: 250-4
Posted by kb0rex on Thu, 23 Jun 2022 21:20:31 GMT
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test4

Subject: Re: 250-4
Posted by kb0rex on Thu, 23 Jun 2022 22:09:05 GMT
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I forgot I have also converted this to 3 prongs plug and used the polarity switch for the power switch as it had a single metal switch for the power switch put in with a branding iron I think. I have ordered the replacement bulb and am thinking of putting a 120v neon behind a blue plastic face for the polarity. It looks like all this drama happened because the reverb tank holders wore out and broke and it landed on the power outputs. Ka Boom

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Subject: Re: 250-4
Posted by kb0rex on Thu, 23 Jun 2022 23:45:05 GMT
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since the reverb tank mounts rotted away and landed on the +- rails, now what is the best way you all have found to reattach it?

Subject: Re: 250-4
Posted by stevem on Fri, 24 Jun 2022 10:20:32 GMT
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There held on with four 6/32" machine screws if I recall right , and you mean to tell me they rotted away, or did the metal reverb lock disc come off its handle and fall down?

With this lock on rear set I don't think that tank can fall that far!

I will open one of mine on the weekend and confirm the size of the machine screws for you.

Note that most times you can find the correct 1N3754 bias diode being sold on eBay, or 4 star electronics and other N.O.S suppliers have them.
I would get the correct one even if it's 15 bucks!

PS.
I too have been logged off the site somehow when typing a long reply and then going to post it , so don't feel bad, lol!

Subject: Re: 250-4
Posted by kb0rex on Fri, 24 Jun 2022 14:50:21 GMT
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Steve or Bill any ideas on what else to try on the 5065-board balance problem or maybe so much has been done on this we need to start from ground zero? At this time amp can be powered from wall outlet but has signal and volume but has pretty good Humm and the outputs get hot and thermal will cut in. With a thermal gun I think its related to q10 and 11 and supporting drivers. Steve, it looks like the original reverb bolts were on one end with rubber shock supports and then another thread to a bolt on the tank, I am thinking of 8x32 threaded rod with piece of plastic for shock support to reinstall tank. The tank in this thing is a accutronics 031-0047-01. I don't see a hole or any kind of area for a reverb lock, on this amp.

Subject: Re: 250-4
Posted by kb0rex on Fri, 24 Jun 2022 15:00:59 GMT
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Remeasuring this morning I have +.210 on speaker output and 36.46 on +- rails. With all preamps turned down. Could the diff amps have been stressed when this got cooked? I just can't remember how they work but I seem to recall they must be the phaser in this amp. I can't figure out what q3 does. Almost want to put a pot in for the bias to play with it.

Subject: Re: 250-4
Posted by kb0rex on Fri, 24 Jun 2022 15:23:30 GMT

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remeasuring more I am going to check cr3. What diodes can I sub into this for cr 1-3 to test. 4148's or 4007s?

Subject: Re: 250-4
Posted by stevem on Fri, 24 Jun 2022 15:23:33 GMT
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A easy test to make if you can't test the 4 outputs directly for leakage is to swap them in pairs around each side of the thermal breaker.

If the + .210 VDC you have on the jack goes to a negative, then one of those two outputs on the negative rail is leaking, or one of them is very very unmatched to the other 3 .

All K 250 and 150 metal face amps like you have, have or had a reverb lock.

I guess you now have a hole in the center rear of the back panel?

Subject: Re: 250-4
Posted by kb0rex on Fri, 24 Jun 2022 16:19:12 GMT
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The back on this 250-4 is different then the one on the reverb store pictures. It has on the back 6 1/4 inch jacks. Reverb,fuzz,boost,output,tape record, and way on the right corner module input. No place for reverb lock handle. Looks like a opening for a slide switch on the far left side by the slack wind up which is open, nothing in it. So I don't know if this is really old or came later without the reverb lock. Serial number 104867.

Subject: Re: 250-4
Posted by kb0rex on Fri, 24 Jun 2022 16:34:10 GMT
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I am looking online at this url https://reverb.com/item/28177357-vintage-1972-kustom-k250-4-solid-state-250-watt-tuck-roll-head and I see on mine the 2 little holes to the above right of the tape record but no hole for the lock maybe it was towards the end of production.

Subject: Re: 250-4
Posted by chicagobill on Fri, 24 Jun 2022 16:47:47 GMT
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Definitely check the differential pair transistors. They have a great effect on output offset voltage.

Bias is set by the three diodes that connect the bases of the driver transistors. The higher the voltage difference between the bases the higher the idle bias. The 1N4007 will work as replacements, but so will 1N4148s. There should be approx. 2 vdc different between the bases.

What transistors did you use as replacements for the outputs and for the drivers?

Subject: Re: 250-4
Posted by kb0rex on Fri, 24 Jun 2022 17:56:32 GMT
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Hi Bill
I used rca 40409's and 40410 for drivers and nte130's for the mains. It was really fried when I got it. I did not change the diff's I have somebc556's on hand would they work? Do'nt know what to use for q3. What little hair I have left is commihng out now... I swapped in some 9500 50volts caps to no change, I really agree its unbalanced, Steve I swapped the outpts from the 2 halfs, now I have +3.2... I will double check what I have done.

Subject: Re: 250-4
Posted by kb0rex on Fri, 24 Jun 2022 18:42:12 GMT
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your right bill 2.01 volts across the bias diodes base to base. I guess if these are good, :cry: I'll go after the diff's... aye pull the board again.

Subject: Re: 250-4
Posted by stevem on Fri, 24 Jun 2022 19:09:31 GMT
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Since it's dc and not ac ripple your reading on the output jack changing out the main rail filter's would not solve that issue.

Also do not power up the amp without that 3 pin molex connector being plugged in as that is where that whole 5065 board gets it's ground from, that's unless you want to blow up more parts, lol!

A long these same lines since the connection pins on the board are aluminum I have seen these solder connections go bad, so I now always reflow them with a really hot iron, and with the plug out of the connector.

Subject: Re: 250-4
Posted by kb0rex on Fri, 24 Jun 2022 19:47:19 GMT

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hi Steve acouple of days ago I had the board out when doing initial repairs and when reinstalled notice crap from the connector and when I inspected the board all 3 pins were iffy and totally loose and wiggled to the touch. I did reflow those a couple of days back. When I was fixing the effects board i noticed the only ground path was pin 2 of the molex.. don't really like that engineering but it is what it is. When I was tracing signal I had the connector apart but made sure I jumpered the ground path into pin 2. I swapped the differental transistors to pnp bc556 to no effect seems the same. maybe a little quiter. have not changed out q3.

Subject: Re: 250-4
Posted by kb0rex on Fri, 24 Jun 2022 20:07:06 GMT
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looks like q3 crosses to nte128 for 38735 and nte16005 for 40408 so that's weird do you guys have a preferred one?

Subject: Re: 250-4
Posted by stevem on Fri, 24 Jun 2022 20:49:58 GMT
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The 16005 is a 2 amp rated, but I have always used a 128 with a heat sink cap on it.
The later 5065 boards used in the PA stand alone power amps used 60859 TO 220 type on a heat sink, so something like that will work if you have such .

Subject: Re: 250-4
Posted by kb0rex on Fri, 24 Jun 2022 21:22:09 GMT
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Maybe we are finding something I have +5 volts or so at the collector of q6 on the cathode side of cr 4, so somethings not right around the q6 area. When I got this mess this transistor was blowen in half. I replaced it makes me wonder now if it got blowen again.

Subject: Re: 250-4
Posted by stevem on Fri, 24 Jun 2022 23:15:36 GMT
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Does Q8 test shorted?

Subject: Re: 250-4

Posted by kb0rex on Sat, 25 Jun 2022 02:16:57 GMT
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going to have to test it I changed all the drivers. But a lot has happened since then. I will ohm it out in ckt first, if it looks weird I'll pull it unless you recommend pulling it first.

Subject: Re: 250-4
Posted by kb0rex on Tue, 28 Jun 2022 18:43:30 GMT
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Looks like I smoked the positive mains again plus the q11 100 ohm will reorder a matched pair of nte130's. I have some mj15024s laying around, but I don't think they sub, but I have 6 or 8 of those to possibly see if the dc values look better but I don't want to smoke anything else.

Subject: Re: 250-4
Posted by kb0rex on Wed, 29 Jun 2022 16:12:55 GMT
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I also find it interesting that these 5065 boards have an isolated ground. I don't know why they didn't use a common ground scheme and just tie it to the chassis. interesting how this was engineered back in the day.

Subject: Re: 250-4
Posted by stevem on Thu, 30 Jun 2022 10:12:19 GMT
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At times when I have worked on these boards in amp I have ran a ground wire from the molex connector trace back to the common of the rail filters so I don't have to have the molex plugged in.

When I have done this I have never noticed a increase or decrease in 120 hum / noise level in the amps output so I remove the wire when I am done.

Subject: Re: 250-4
Posted by kb0rex on Mon, 04 Jul 2022 17:19:55 GMT
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waiting for nte130's
will start over then.
negative rail side runs cool
positive rail has a problem, ran hot then cooked the 130, drivers test good so far as they were hard to get.
may work on the reverb reattachment and got the piolet light for the polarity hole.

my serial number looks like a very late date so they must have changed the reverb tanks to no lock.

Subject: Re: 250-4
Posted by stevem on Mon, 04 Jul 2022 21:02:48 GMT
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I think one of your problems all along was a leaky 2N3055/36892/NTE130.

Subject: Re: 250-4
Posted by kb0rex on Tue, 05 Jul 2022 02:03:00 GMT
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probably q11 it always was running hot with thermal gauge. Either bad or leaky out of the box all were brand new

Subject: Re: 250-4
Posted by kb0rex on Sat, 09 Jul 2022 03:37:07 GMT
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well, it looks like I double ordered the 130 so now I have 8 and the drivers, I guess I can start a little bonfire now and not care. I guess Monday well try again

Subject: Re: 250-4
Posted by stevem on Sat, 09 Jul 2022 21:15:22 GMT
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Ok let us know.

Subject: Re: 250-4
Posted by kb0rex on Wed, 13 Jul 2022 16:58:32 GMT
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ok I replaced the nte130's and put it back together and... well not to much. It runs now pulling very little current, but it seems the output board is not amplifying as I have signal but not loud like only the preamp or drivers working, is not getting hot anymore but I feel that is not pulling any draw. On

the scope I have signal in pin 1 of the Molex but on the differential, I see half the wave which may be what the differential is supposed to do and then send its half to the plus or minus side. It seems to be doing that, but the main drivers and amps are not turning on???? will take some more measurements soon on this eternal restoration.

Subject: Re: 250-4
Posted by kb0rex on Wed, 13 Jul 2022 18:59:49 GMT
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pin 3 signal in.. not looking and typing

Subject: Re: 250-4
Posted by kb0rex on Wed, 13 Jul 2022 19:13:53 GMT
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If I jumper from input to r6 on amp board, I have good loud signal I may now still have preamp problems. With jumper in place its loud and not getting hot anymore, so some progress

Subject: Re: 250-4
Posted by stevem on Wed, 13 Jul 2022 21:17:31 GMT
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If you input like 150mv into either preamp you should be able to have close to 3 volts rms show up at the power amp booster jack on the rear of the amp.

I would check that you have 12 volts + and - feeding the preamps from the two Zener diodes.

Subject: Re: 250-4
Posted by kb0rex on Thu, 14 Jul 2022 02:18:12 GMT
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+11.88 and -11.88 I have odd signal around ic1 on the effects board again.

Subject: Re: 250-4
Posted by stevem on Thu, 14 Jul 2022 09:51:46 GMT
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What do you mean again?
This is the first time in this string of post that your mentioning a issue with the effects board.

Subject: Re: 250-4
Posted by stevem on Thu, 14 Jul 2022 11:17:15 GMT
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For now I would unplug the effects board and on the second small molex connector on the 5066 board, unplug that and then jump pin 1 and 2 of that connector.

This will then be the same set up as a k250-1 which has no effects and then allow you to prove out the rest of the amp.

Subject: Re: 250-4
Posted by kb0rex on Thu, 14 Jul 2022 15:27:03 GMT
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Hi Steve, I did replace ic1 early on to get signal to the amps at the start. By jumping the 5066 board the signal stills goes through ic1 ic2 ic3 and ic6 on the effects board right? Comes in on 5069 on pin 1 and out to amp on pin 9 I think, but all the weird effects are bypassed along with half the 5069 board? I will do that next the +- rails look good now on the amp board at 40.3+-. The schematic is poor on the readings of cr4 and cr5. What is the cathode voltages of cr4 and cr5? wilkl check back

Subject: Re: 250-4
Posted by kb0rex on Thu, 14 Jul 2022 15:56:27 GMT
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so it looks like I take out the 3-wire jumper from 5066 to 5069 and jumper 5069 j1 pin1 to pin 2.. ok will report back

Subject: Re: 250-4
Posted by kb0rex on Thu, 14 Jul 2022 16:08:30 GMT
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ok i jumped the 5066 and its now loud good signal still has vibrato and tremolo

Subject: Re: 250-4
Posted by kb0rex on Thu, 14 Jul 2022 16:09:57 GMT
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for now the amp is not pulling down the power supply and is running cool to the touch. Looks like maybe the amp portion is ok and time to move upstream.

Subject: Re: 250-4
Posted by kb0rex on Thu, 14 Jul 2022 16:25:05 GMT
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unplug just the 3wire connector right then jump 1&2 on the 5066 board right?

Subject: Re: 250-4
Posted by kb0rex on Thu, 14 Jul 2022 17:19:09 GMT
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now it looks like noise is being introduced somewhere in the preamps, I have a parasitic ocillation on the wave form on all preamp and 5069 board, gets worse the higher the frequncey. So far been a buger to isolate. any good way to jumper past the 3 boards one at a time to find problem? I can put my scope on the input and when I turn it up just a little boom trash on top of sine wave.Hmmmm

Subject: Re: 250-4
Posted by kb0rex on Fri, 09 Sep 2022 20:46:46 GMT
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Finished repair a couple of week ago. Thought I would update final repair. Amplifier worked but had a odd 3mhz oscillation on the output. After a lot of head scratching a talk with Bill we added snubber caps on the drivers which were replaced. This did take care of the problem. The new transistors of today are of higher performance and higher bandwidth gain then the old transistor, so you have to degrade or reduce the bandwidth to not introduce the reproduction in this case of the power supply ripple. Nice to know now and makes sense. Amp is stable and really a nice product with its matching dual 15-inch cabinet in folded finish. The customer got this at a garage sale for 50$ and seems pretty darn happy now.

Subject: Re: 250-4
Posted by stevem on Sat, 10 Sep 2022 00:06:00 GMT
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Good to hear and I am glad you had the patience to stick with it!
You customer being happy will be great word of mouth for you.
Here's a old story you will relate with I think.

I had SS Vox Beatle head that was a very late model made just before Thomas organ ditched them.

These had very long wires to the T03 output transistors on the far side of the chassis.

This guys amp would blow the outputs when others that I repaired would not.

Now in these late amps I found out that they changed the wiring layout.

At first I thought that it was because this guy used to play the amp dam loud and the amp would go into run away heat over load, so I put a big Ass fan blowing on the heat sinks but it blew yet again.

I finally look at the thing and found that it was oscillating way up there like yours.

I came to the conclusion that it was due to the long and uneven wire length feeding the outputs which was making for a uneven impeadence load on the outputs.

To counter that I added a 10 ohm 1/2 watt resistor in line with all of the four base leads right at the transistors.
The result, I never saw that amp again and in fact I know the next person who now owns it and where talking 18 years since the new owner has had it!
