
Subject: 5 Transistor Frank Schematic Needed

Posted by [cassent5150](#) on Sun, 09 Jan 2011 19:18:47 GMT

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I've got a EARLY FRANKENSTEIN 5 transistor amp I'm working on with no schematic. If you have one PLEASE email me a copy to cassent5150@hotmail.com At the moment I'm just testing components to find problems. I'm testing the three TO-36 Package transistors (ECG213 and HEP233) and getting conductivity from emitter to collector in both directions. I would normally say these are all bad, but I'm unfamiliar with this design and what a second opinion. Steve C

Subject: Re: 5 Transistor Frank Schematic Needed

Posted by [stevem](#) on Sun, 09 Jan 2011 21:10:52 GMT

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On my schematic for a Frank head which is the only one I have ever seen for these amps, there are two T03 cased 36892/2N3055 transistors tied to the PC201 board (driver and regulator board) and mounted on the outside rear panel of the amp.

One transistor on the board drives T03 transistor, which then drives the phase inverter transformer mounted right next to this board, and the other transistor is part of the 4 transistor regulator circuit.

One 2N3567 drives the 36892 to make up the audio drive circuit, then you have one 2N3638, a 2N3565, a 2N3567 and another 36892 to make up the regulator circuit.
If you pm me your mailing adress I will make a copy of this and send it to you.

Subject: Re: 5 Transistor Frank Schematic Needed

Posted by [cassent5150](#) on Mon, 10 Jan 2011 14:40:01 GMT

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Stevem this model uses all PNP power transistors in the back panel. 2N3055's are NPN. Me and the conductor on here have these models. I think he's having Bill Collins go through his to get it going good. His works but its not very loud. I got mine up and running last night. Its not pushing the wattage it should but it was a experiment so I'm still pleased. I'm trying to find a suitable TO-3 PNP power transistors. Maybe you can help me here? I found a couple so far but in most cases theres a max on the emitter-base voltage difference (Much lower). Other than that, take a look at a Data Sheet for NTE180 "my first choice" and an 2N6287 (to use in place of the ECG213) and tell me what you think. I have the 2N301's in there now cause its all I had on hand in PNP at the moment. Thanks Steve C

Subject: Re: 5 Transistor Frank Schematic Needed

Posted by [chicagobill](#) on Mon, 10 Jan 2011 17:32:05 GMT

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Steve C: Those TO-36 transistors sound like Germaniums to me. If you replace them with Silicons, you will need to rebias them to get rid of the crossover distortion that will probably show up when you swap them.

I don't know what the original transistors were in your amp, because both the ECG and HEP transistors are universal replacements. Have they all been replaced?

Subject: Re: 5 Transistor Frank Schematic Needed
Posted by [cassent5150](#) on Tue, 11 Jan 2011 09:20:18 GMT
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I wouldn't have a clue without a schematic. There was 2 of the TO-3 Delco GM 2N301-6519's and the 3 germanium TO-36 (2 of the ECG213 and 1 of the HEP233). I replaced them all with TO-3 type NTE121's and its up and running. Both channels work and nothing heating up yet that I can find, but I'm looking at going with a closer value to model ECG213. I found NTE180 to be very close with 1 exception. The emitter-base voltage max is considerably lower, but is higher than the NTE121's I have in there now. Do you know of any good matches for the ECG213 in a TO-3 Package? I don't know how to bias the output transistors either I'm not a electronic wiz but a good learner if you can tell me what I need and how to do it. Thanks Steve C

Subject: Re: 5 Transistor Frank Schematic Needed
Posted by [conductortom](#) on Tue, 11 Jan 2011 13:30:50 GMT
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Steve , I have Delco Gm 2n174's in mine and 2-2n301's. I found a few on the web last night. The 174's were 8.10 each. 301's was at another place and you had to get a quote for them. Tom

Subject: Re: 5 Transistor Frank Schematic Needed
Posted by [cassent5150](#) on Tue, 11 Jan 2011 14:31:28 GMT
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You should have 2 TO-3 package (Diamond shape with 2 screw holes on each end for mounting and 2 pins) those will be the delco 2N301 transistors "I've got those transistors on hand". Looking at the back panel from behind the amp those 2N301's will be at top left and top right running horizontally. There's one of the TO-36 package (Round bottle cap style with an anchoring stud in the middle with 2 pins on each side as well as a short guide pin) under the left 2N301 transistor WHAT IS THAT ONE? I'm going to assume the ones in the middle top and bottom are the two 2N174's one above the other. Did you say the amp worked but wasn't as loud as it should be? Thanks Steve C

Subject: Re: 5 Transistor Frank Schematic Needed
Posted by [conductortom](#) on Tue, 11 Jan 2011 15:12:39 GMT

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Steve, 3 of them are 2n174's, and the other 2 are 2n301's. Yes my amp works just not as loud as I would have thought. Did have 1 bad speaker, but I plugged it into a 2-12 and a 1-15 cab and it was about the same. 8 ohm cabs.

I got some pictures of back showing transistor layout. Will send to you. Tom

Subject: Re: 5 Transistor Frank Schematic Needed
Posted by [cassent5150](#) on Tue, 11 Jan 2011 17:07:37 GMT

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The reason I asked is that the values on the data sheet on the 2N174 transistors compared to the ECG213 is considerably lower like the transistors I put in mine. I'm dealing with the same issue here. Its just not as powerful as I think it should be. We'll have to leave that to the real techs though. I'm going to still do some experimenting with the higher value NTE180's. Thanks Steve C

Subject: Re: 5 Transistor Frank Schematic Needed
Posted by [conductortom](#) on Tue, 11 Jan 2011 17:19:59 GMT

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Is the 6th transistor, on later models, use to boost output over the J models?? Anybody got an idea what the j495 suppose to put out power wise?? Thanks

Subject: Re: 5 Transistor Frank Schematic Needed
Posted by [chicagobill](#) on Tue, 11 Jan 2011 17:41:13 GMT

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No, the additional transistor is part of the power supply for the preamp circuits. There is one driver and four push pull outputs.

Looking at the photos, what I can't understand is how the power amp is wired. I know that one 2N301 is used as the driver and two 2N174s are used as power outputs. Now what I don't see is why the additional two transistors are different types.

As far as I know, the Kustom heads were always rated at "100 watts", but if they were using Germanium outputs on these early heads, perhaps they were being a tad optimistic. Or they may have been using the "Music Power" rating of 2 x R.M.S.

Steve C: Upgrading the transistors will not do much to increase power output in an amp. It may make it more reliable, but you can't get more power than what the amp was designed to produce.

Subject: Re: 5 Transistor Frank Schematic Needed

Posted by [cassent5150](#) on Tue, 11 Jan 2011 19:16:45 GMT

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I'm thinking of getting those 2N174 transistors and see what kind of difference they'll make in the output if I can find the website conductortom was talking about where they were only 8 something a piece. I ran a single 12" 8 ohms speaker on my test for 10 or 15 minutes and was full volume the whole time. It barely warmed the outputs. I'll drop that to 4 Ohm and see what that does. "OH YEA NOW WE'RE TALKING" "MUCHO BUENO" It gets some volume now! My 2-15- B CTS cabinet at 4 ohms sounding good. I think I can live with that. I'll let ya'll know how this works after I push it a while. I got to run! Steve C

Subject: Re: 5 Transistor Frank Schematic Needed

Posted by [conductortom](#) on Tue, 11 Jan 2011 20:34:37 GMT

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Atomic Mall was the place, 2n174 \$8.10 had 5 on hand.

Subject: Re: 5 Transistor Frank Schematic Needed

Posted by [cassent5150](#) on Tue, 11 Jan 2011 22:48:10 GMT

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Hay: Thanks for the Heads up TL!! I gotta go SHOPPING!!! Steve C

Subject: Re: 5 Transistor Frank Schematic Needed

Posted by [conductortom](#) on Tue, 11 Jan 2011 23:04:20 GMT

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If you get all them save me a couple if you don't use them. I might need some.

Subject: Re: 5 Transistor Frank Schematic Needed

Posted by [cassent5150](#) on Wed, 12 Jan 2011 01:46:06 GMT

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No, I only got 3 of them. I'm not sure I'm going to put them in at the moment. It really does sound good with the 2N301's and plenty of volume at 4 ohms. I just stuck my RP-50 for some reverb effect and we're good to go. Its got good tone and plenty of punch. I'm going to agree with chacagobill on the wattage being 100 watts peak not RMS and I'm getting all of 50 watts plus. If you decide you need them 2N174's I may still have them unused. Steve C

Subject: Re: 5 Transistor Frank Schematic Needed

Posted by [stevem](#) on Wed, 12 Jan 2011 20:22:55 GMT

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To simplify things you can replace PNP transistors with NPN types like the classic 2N3055, all you need to do is reverse the V+ and V- connections on the transistors. If you are also converting from Germanium to a silicon type (once again like a 2N3055/NTN131/NTN181) you will also have to rebias the transistors by changing out the 4 wire wound ceramic type resistors with a different value to produce more bias voltage. Without rebiasing you will hear a distorted ending to each note played due to crossover distortion. You can directly install the NPN types without fear once rewired as they will be idling very cold, hence the crossover distortion problem.

Subject: Re: 5 Transistor Frank Schematic Needed

Posted by [cassent5150](#) on Thu, 13 Jan 2011 00:57:11 GMT

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That's great info stevem, but I haven't a clue as how to figure out the correct bias resistors for these transistors. Is there some formula to use? How do I bias the transistors? I have those Germanium replacement transistors on the way. I got 3 of the 2N174 TO-36 type transistors off Atomic Mall the values match the one in the regulator section and another pair of Jan 2N1412A (NTE-213) TO-36 type transistors that match the 2 outputs I took out. So, how do I bias a transistor? It may not have been biased correctly when I got it. Someone's been tinkering with it a few times already. The wirewound resistors connected to the emitters are .51 5W and .68 5W with 920 ohm carbon comp resistors going from base to collector. Thanks Steve C

Subject: Re: 5 Transistor Frank Schematic Needed

Posted by [stevem](#) on Sat, 15 Jan 2011 16:34:18 GMT

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Go with the resistor values from the output transistors on the Frank schematic you have, or from that power amp section you put into the other amp.

You want the output transistors to idle at close to the voltage and temperature of these other amps.

Just remember to switch those wires, here's the reason why.

Going from PNP to NPN types, or the other way reverses the Phase of the output stage. In a feedback type amp like the Kustom this will make the amp howl like mad when you turn it on, swapping the V+ and V- wires reverses the Phase once again so you are back to where you started.

Subject: Re: 5 Transistor Frank Schematic Needed

Posted by [cassent5150](#) on Sat, 15 Jan 2011 21:57:51 GMT

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Thanks stevem, I'll make that note!! I'm staying with the PNP Type, matter of fact I didn't know

there was an option till you mentioned it. I figured the designer made it with PNP so thats just what it had to be. I think these 2N301 are Germanium transistors as well, but just in a TO-3 case PNP transistors. I redrilled the back panel to fit those in and Its all 2N301 transistors "all 5 of them". It seems to work great and stays pretty clean till around 80% volume. I have no tone control on the bass channel though, if you turn the treble all the way the bass control doesn't effect the sound at all. Yet it has very little brightness even on full treble. The guitar channel works great though. It will get good and bright and awesome bass responce I might add. Thanks Steve C

Subject: Re: 5 Transistor Frank Schematic Needed
Posted by [cassent5150](#) on Sun, 16 Jan 2011 15:30:32 GMT
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OK, mission completed. I have it all back to original TO-36 Germanium Transistors. Its not as powerful as my K200B, but its close enough. Now I just need to get the Red cabinet for this head and restoration is complete. Thanks to all of you for your help. AGAIN!!!! Saved another FRANKENSTEIN. Steve C

Subject: Re: 5 Transistor Frank Schematic Needed
Posted by [conductortom](#) on Sun, 16 Jan 2011 16:16:26 GMT
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Cool Steve. Hope I can get mine up and running too. Tom

Subject: Re: 5 Transistor Frank Schematic Needed
Posted by [stevem](#) on Sun, 16 Jan 2011 18:56:25 GMT
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Steve C, do have a schematic for this 5 transistor head you can email me?
smag25ra5@yahoo.com

Subject: Re: 5 Transistor Frank Schematic Needed
Posted by [cassent5150](#) on Sun, 16 Jan 2011 23:19:09 GMT
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No sorry, I wish I did have one I could send ya, I winged this the whole way. I was lucky I guess!!
Steve C

Subject: Re: 5 Transistor Frank Schematic Needed
Posted by [conductortom](#) on Mon, 17 Jan 2011 01:56:36 GMT

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Am wanting to take pictures of mine while it's getting fixed. Will send them to you if that will help.
Be nice to have something on these amps. Tom
