Re: Replacements for 2SA1302/2SC3281

Source: http://sci.tech−archive.net/Archive/sci.electronics.repair/2005−05/msg00741.html

- *From*: ZZactly@xxxxxxx
- *Date*: 12 May 2005 21:12:06 −0700

>This would make the repair too expensive, since >these (and the bias >transistor) blew while bench testing after fixing >the original fault.

This would worry me. Even if you could get the parts for a dime a dozen, don't waste silicon. I bet you did not fix the original fault.

Now you're holding up my dinner but that's OK because I got beer. This might get a bit longish. Years ago I worked at a rental place (I won't again) and they rented alot of audio stuff. I developed a method of testing these things so you wouldn't keep blowing outputs.

The amps we had were Fisher CA270 discete, and the PCB design easily facilitated my process. You'll have to figure out how to do it with the architecture of the PCB you're working on now. This applies to most discrete component audio output circuits, except for class D.

Disconnect the outputs. After you check the drivers and things of course, wire the circuit point which would be connected to the base, to where the emitter should go. A pair of 220 ohms should work fine, but you can lower it, not too far. Actually higher is better. During this operation you do not connect any load.

If your driver, bias, and voltage amplification stages are working it should achieve DC palance and let the relay kick in. This is why you don't want a load on it.

Now to find out if it's going to poof when you install the outputs, of course you got very low or no DC the the actual output, the junction of the emitter resistors. Now measure what is at those base terminals. In fact just measure point to point !. The bias circuit should be floating a volt or so across those two base connections. Now DRIVE it, not to clipping, but let it rip a bit. With no load the voltage shoould not increase. If it does something is leaky.

With no input nothing should be getting hot. At this point it's time to apply an input signal and look at it with a scope. It should be going both ways if you know what I mean. Put the trace in the middle and keep cranking the input level, but after a first quick test at a low level.

Higher power amplifiers with a low impedance main feedback network might load the drivers too hard and cause you to waste silicon.

Keep checking for the drivers overheating, but you should be able to get it to drive all the way to the PS levels. If you got + and − 60V you should be able to get a 120 V P−P waveform on the scope. You should even be able to plug some headphones and hear the audio since they don't load that much. Don't leave it running that way though, even that light load could be more that the drivers can handle.

There are several variations. If you really need to do a heat run you can short the bias network out and short base to base of the outputs. Shorted base to base, the drive circuit has two chances of frying your new silicon, slim and none, but slim didn't leave town. If you have a problem that causes it to generate RF or any ultrasonic frequency, if you got the bases shorted together this is almost the only way it can happen. (opinions from top techs here please, overloaded by speakers that is not the situation on your bench, question is what else can do it after you don't have any DC offset ?)

I once had to fix a CA270 discreet that would keep coming back, and blow one of their woofers on occasion. It was all on us, rent to buy. You got it turned up and it would blow kinda quick, it had to be doing about 50 WPC or so (thing was rated 110 but did actually almost 200), thing was we bought the right woofers so they COULD crank it up. This one we were pretty sure they weren't throwing six more speakers on it or anything and they were getting pissed. Managment actually thought they were scamming us somehow.

By disabling the outputs and running it unloaded, I could see on the scope that at higher power levels it was getting a significant DC component on the output. It got worse as the level increased.

As I remember it did some very light clipping at the top (positive) and the whole trace moved downward (negative). I think I'm onto something here. The DC wouldn't stay on sustained high output, it came and went with the changes in the music. But the cause ?

HAHA, we were authorized and we got prints. What do I see ? A muting transistor at the main amp input ! Stupid idiots didn't use an FET like any respectable company.

I disconnected the collector and the abberation disappeared from the scope. No more DC offset.

Of course the rest of the job is obviously a piece of cake.

Incedentally, don't ever allow a unit to be shipped with the bias off (shorted). I found out the hard way, doing so allows the power supply voltages to climb too high in some units. If a period of quiescence is followed by a full power blast it increases the likelyhood that the

current capabilities of the outputs being exceeded. This is likely to happen more in urban areas where the power line is likely to be dirtier. (spike, harmonics)

Anyway, I've addressed certain other things in this forum, such as how to REALLY set the bias for best performace and efficiency, and a few other things, but I've not before gone into exactly how to find (or lose ? lol) some of those pesky recalls.

Being DC coupled modern amps pose their own set of problems. Too many components make it nessecary to disconnect certain things for troubleshooting, but to know what to connect then is important. In such circuits sometimes even a scope can't tell you the problem without setting up a test configuration.

Last but not least, if those outputs blow with NO load and NO input, you got an RF problem. In that case you are looking for an open capacitor, most likely a teensy lil thing.

When shorted these teensy lil things cause a quick failure and you find it with an ohmmeter, when open it sticks up the works a bit. Sometimes they decide to be a resistor instead. In that case they might not even cause a big failure by being a resistor, it might happen because they are NOT a capacitor. Get it ? If a .0147 opens up that's tuning the output of an HOT, HVOT or SMPS output what happens ?

If shorted all other components should be good except maybe a fusible, or in the case of our wonderful Sony, the SMPS choppers. Fuses are that expensive Sony ? Come on !

In older Sony's shit would short out and there were literally no problems with the power supply. Early XBRs were a great example. Things are different now.

Back to the subject, this test mode can be used at the output of the voltage amp too, but expect a clipped waveform because it is alot less likely to be able to even drive the feedback. Learn to desolder and setup test setups, it is the only way to truly effectively service them. If you ever need to go there, after it works you get the driver right, then finally install the outputs.

As Murphy himself told me, you don't get luck, you make your own. I think he was right.

JURB

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- ***Follow−Ups***:

- ***Re: Replacements for 2SA1302/2SC3281***
  - ◊ *From:* michael . w . appenzeller

- ***References***:
  - ***Replacements for 2SA1302/2SC3281***
    - ◊ *From:* michael . w . appenzeller

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