Subject: Kustom Bass III Channel 1 Hiss
Posted by thespeakerport on Fri, 22 Jul 2022 02:11:39 GMT
View Forum Message <> Reply to Message

I have gone 12 rounds with this animal and desperately need help. I had this unit come in because the unit was making a horrible buzzing sound when turned on. basic troubleshooting discovered that unplugging the 6 pin molex connector from channel 1 made the noise go away. Channel 2 was working ok. Traced the issue to the RC4739 chip being fried. All other transistors/resistors/caps seemed to be ok on the board, however, voltages were way off. Was getting -12V and +24V instead of +/-12. Found out that one of the rectifier Diodes were shot. Replaced it and re-tested the board and it still buzzed. So I got the Brown Dog adapter OpAmp to replace the 4739 and low and behold, it worked. BUT...channel 1 is putting out an enormous amount of hiss. I was suspicious of the opamp, but after pulling out the C16 capacitor to disconnect signal going into the Bass/Treble circuit (and subsequently the OpAmp), the hiss went away....so whatever it is is more up stream. My first instinct was noisy transistors. There were only 7 of them so I was able to get some info about suitable replacements and the good ole OnSemi KSA992 and KSC1845's came up (and i had them in stock). Replaced all of them and the the hiss remains. (Sigh) I decided to put back in the original transistors. Some additional searching and I found suggestions that these old carbon comp resistors may be getting noisy. Some were out of range anyhow so I decided to just update this board and replace them all. (Yes, I know way overkill, but I was looking for a quick victory.) No victory, hiss remained. Only thing left were the caps. So I replaced the electrolytics, films and ceramics. Might as well....when this far, why not. The hiss still remains! I dont get it. Every part was replaced and it affected nothing. All the parts are new on this board except the pots and the transistors (and i already tried swapped the transistors out.) I refuse the believe the pots are causing hiss as i have never seen that happen before. Crackle, static, dropout...yes....but not hiss.

I am at the end of my rope with this guy. Any thoughts/input as to what the heck is going on? Is this board that badly designed to where channel 1 is supposed to put out this much hiss?

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by stevem on Fri, 22 Jul 2022 09:58:07 GMT
View Forum Message <> Reply to Message

Your issue may not lie on the board at all!

I have had bad resistors on the jacks make for tons of hiss.

The unsolder the jack hot lead from that board and see if f it goes away.

It sounds like you have a schematic for this amp, or at least the preamp boards, can you email them to me if the pc numbers of them are not being in this site's tech section.
smag25ra5@yahoo.com

Subject: Re: Kustom Bass III Channel 1 Hiss

Posted by thespeakerport on Fri, 22 Jul 2022 14:03:41 GMT
View Forum Message <> Reply to Message

Each channel board has two molex connectors...one that goes to the input jacks and the other for power and signal output. The hiss is present if you have then connector that goes to the input jacks plugged in or not. I will absolutely post the schematic in about an hour when I get back to my shop.

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by stevem on Fri, 22 Jul 2022 15:27:21 GMT
View Forum Message <> Reply to Message

This site can not except pictures so do not bother trying to post the schematic here, that's why I asked for it to be sent to my email.

Note that you will have to make 3 more post to this site for me to approve before you post will just go right up to the board.

You can simply make 3 that say test if you like.

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by thespeakerport on Fri, 22 Jul 2022 16:48:11 GMT
View Forum Message <> Reply to Message

One thing I did notice is that Channel 1 loops through Channel 2. Tracing the output of Channel 1, i see that it feeds into pin 6 on the IC on Channel 2 via a 220K resistor. I completely eliminate Channel 2 contributing to this issue, I jumpered the output of channel 1 directly into the power amplifier board essentially bypassing Channel 2 altogether. I still get the hiss...so it is definitely from channel 1.

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by stevem on Fri, 22 Jul 2022 20:58:18 GMT
View Forum Message <> Reply to Message

The right way to trouble shoot this now is with a scope to look for which semiconductor is adding the hiss.

Short of doing that my best guess seeing all that you have done and with my own experience with these preamp boards is that your 14 pin IC1 is bad .
Interestingly enough a few years ago with my k250 I had this same IC go bad .
It was fine at one rehearsal and a week later when I powered it on it had a major level of hiss that almost made it impossible for me to use it that night!
If you do not have a scope then the fact that you have another working preamp will allow you to signal trace thru that bad preamp.

To do this just just make a open end cable to plug into the working preamps input.
Solder on a length of sure to the hot/ center conductor And then to the end of that wire solder on a 25 volt electrolytic cap with its negative end to the wire.

Using the + end of the cap as a probe will allow you to listen in to that preamp board wherever you want!
Since that IC runs on the + and- 12 volt rails I bet that when you had that bad Zener making for that high voltage it damaged that IC1.

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by thespeakerport on Sat, 23 Jul 2022 03:58:52 GMT
View Forum Message <> Reply to Message

As I mentioned in my original post, all semiconductors were replaced with brand new onsemi transistors and the problem did not go away. In addition the IC had been replaced as also mentioned with the Black Dog replacement opamp.

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by stevem on Sat, 23 Jul 2022 10:16:51 GMT
View Forum Message <> Reply to Message

That does not mean you can't have a bad new component!
I have had this many many times over the years, and to get to the bottom line on this all there are only two things that will add hiss into a audio stream .

1) a bad semiconductor.

2) a noisy resistor.

Maybe although you have changed out tons of resistors, maybe you put on a wrong value by a factor of 10 and now you have too much gain?

One thing is certain if you signal trace thru the circuit you will for sure find the source of the hiss, you could even do it the cave Man way by process of elimination of cutting circuit traces open!

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by stevem on Sat, 23 Jul 2022 11:47:59 GMT
View Forum Message <> Reply to Message

I have never heard of this black dog replacement chip which gives me cause to question it!

I have always used these.

1) NTE725.

2) ECG725.

3) GE725.

I have never had issues with any of these brands.

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by thespeakerport on Sat, 23 Jul 2022 21:38:11 GMT
View Forum Message <> Reply to Message

The NTE725, ECG725 or GE725 are not available anymore. You may be able to find them here and there, but there are modern solutions to replace the original RC4739. I did misstate the name, it's not Black Dog, just BDog adapter. I am not allows to provide links yet, so you can google it. "BDog RC4739 adapter" Should be the first listing that comes up.

The replacement IC is not the issue. It works. If you look at the schematic for the board in question, C16 couples signal into the bass/treble control which feeds into the first half of the IC. In between the first the second half is the volume control. The output of the IC directly feeds into channel two and then to the main amplifier. I had pulled C16 completely out and when I did, all hiss went away, not matter where I had the volume set to. Wherever the problem is, its not being generated by the IC. I started reaching out for help on AudioKarma and got a few folks chiming in (who originally had me pull C16 to sort of isolate the part of the circuit causing issues. (Again, cant put in links yet, but if you go over there and search from Kustom III Hiss....you'll see it.) I have no problem replacing the transistors again with new OnSemi's but I fear I am going to have the same exact result as I did when I originally replaced them.

As far as the replacement resistors are concerned, I did not start replacing resistors until the issue with hiss was discovered. So what was there was all original. The only things that were initially replaced were the IC and transistors before I started going nuts replacing parts. No, I am not perfect and you are right, it can be easy to replace a resistor with a factor of 10 up or down if you are not careful. But again, this was a pre-existing condition. Now, is it possible that this board was repaired before I got it and someone had put in wrong parts...ABSOLUTELY!. I am just going by what i found on the board and did a 1 for 1 replacement. One thing I did not do is step through the schematic and see if there is a mistake somewhere....a resistor that was possibly replaced with a wrong size somewhere...again, assuming this was modified at some time.

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by stevem on Sun, 24 Jul 2022 10:16:08 GMT
View Forum Message <> Reply to Message

Well at any rate, and like I posted I really think your down to either scoping thru the gain stages

section by section or listening in on them to narrow things down and then review the parts in that section.

I have found at times that it's better and safer to take the time to solder in test points so your not always flipping the board around.
Maybe Bill will add his comments to this to give some guidance?

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by chicagobill on Sun, 24 Jul 2022 22:48:18 GMT
View Forum Message <> Reply to Message

I'm not familiar with this circuit, but let me ask a few questions to get up to speed on what was done.

All of the transistors, resistors and caps have been replaced. The 739 chip has been replaced with a modern adapter board that has a modern 8 pin chip on it. Changing all of this so far has restored the channel to pass signal and to stop the hum.

When the adapter board was installed, were all of the old compensation parts removed from the circuit?

When the resistors were replaced, what kind of resistors were used as replacements? I noticed on the schematic that there are a lot of 1% resistors specified. This is a common Kustom engineering trick that puts metal film resistors in the circuit to reduce noise and hiss.

Do the volume and clarity controls change the character of the his when they are rotated?

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by thespeakerport on Fri, 29 Jul 2022 18:43:03 GMT
View Forum Message <> Reply to Message

Sorry for the delay in responding...been distracted with other repairs and finally circling back on this. To answer your questions:

When the adapter board was installed, were all of the old compensation parts removed from the circuit? - Initially no, but i did remove the ceramic caps around it and it did not seem to help. Not sure if other part removals are necessary, but that was all I had tried.

When the resistors were replaced, what kind of resistors were used as replacements? Carbon for Carbon...but for the 1% versions, i used metal film equivalents. They were not 1% replacements, but i tested the replacement and put in ones that were essentially as close to specified values as I could find.
I noticed on the schematic that there are a lot of 1% resistors specified. This is a common Kustom engineering trick that puts metal film resistors in the circuit to reduce noise and hiss.

Do the volume and clarity controls change the character of the his when they are rotated? - Yes they do.

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by thespeakerport on Fri, 29 Jul 2022 18:44:26 GMT
View Forum Message <> Reply to Message

By the way, i did find a new ECG725 chip that I bought and was going to try and drop in for kicks and grins. Should be here later today.

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by chicagobill on Fri, 29 Jul 2022 22:36:28 GMT
View Forum Message <> Reply to Message

Why change the chip back? You have already isolated the hiss to the circuit ahead of C16 that feeds the tone controls.

The volume control R6A does two things as it is rotated. When the control is CCW the output of the Q1 and Q2 is grounded through cap C7. As the control is moved to the CW side, the output is ungrounded and the gain of the stage is increased by grounding the C5/R5 connection to the emitter of Q1.

If the hiss increases as the control is rotated to the CW side, then some of the hiss is being generated in this stage.

The Clarity control is supposed to be a low bass control that I will guess works as a big negative feedback loop to boost ultra low frequencies.

I would suggest that you try and isolate the noise source to see where it is being generated. Maybe used the BFV cap method to ground out the signal at various signal points to see if you can isolate the stages.

As for the 1% caps, Kustom started using these metal film resistors in the K200 series amps. Back in the day, the only metal film type resistors were low tolerance 1% types. Kustom started using them in the preamps to reduce noise, as they were much better than carbon comps. The first time I remember seeing these was in the late '60s. There were even mentions of these parts in the marketing materials as part of the High Tech engineering that they used to build these amps.

I don't really think that the actual value is that important, so it would seem that what you have done should be fine.

Subject: Re: Kustom Bass III Channel 1 Hiss

Posted by thespeakerport on Fri, 05 Aug 2022 15:46:07 GMT
View Forum Message <> Reply to Message

sorry for the delay in the response. Been out of town for a while.

I ordered the chip because I do not know what else to do. This makes absolutely no sense. I went ahead and replaced the original transistors again with new OnSemi versions and the problem still did not go away. I am going to be installing the new chip today to see what that does, but I have no expectation it will make a hill of beans difference. How can you replace every single part with brand new pieces and get the exact same result. There should have been SOME improvement....and there is nothing. I have traced this board 10 ways from Sunday on my scope to find a 'culprit' component; if one exists, I am not finding it.

I am not familiar with the BFV cap method. Can you give me some guidance on this?

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by chicagobill on Fri, 05 Aug 2022 16:57:12 GMT
View Forum Message <> Reply to Message

You need to try to isolate the noise. If you take a Big F'ing Value cap and use it to ground out the signal at different points of the circuit, you might be able to figure out where it is coming from.

A cap will keep the dc voltages in the circuit unchanged, but will shunt any audio portion like hiss or hum to ground. Try to find a non-polarized cap rated at 2uF or so and ground one end to circuit ground. Attach a clip wire to the other end and then clip the wire to the base of Q7, then maybe the collector of Q7. Any change in the noise?

Continue grounding different points in the circuit to see if it helps isolate the source of the noise. It may or may not work for you, but it should at least help direct you in a way to a solution that doesn't include random replacement of parts.

And I don't know if you ever answered Steve's question about whether the board had been worked on before and if all of the component values are correct to the existing schematic.

Good luck!

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by stevem on Fri, 05 Aug 2022 18:17:09 GMT
View Forum Message <> Reply to Message

You can make a non polarized cap for testing by taking two electrolytic caps can connecting the two positive ends together..

I have used this method that Bill posted here and with the same cap I have used the listen in method that I posted up in this string before.

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by thespeakerport on Tue, 09 Aug 2022 22:27:35 GMT
View Forum Message <> Reply to Message

I will tie together a couple of 2.2uF/50V caps together (positive to positive) as you mention and see what i can come up with. By the way, the replacement IC (ECG725) and it did nothing to change the condition as expected.

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by thespeakerport on Tue, 09 Aug 2022 22:40:22 GMT
View Forum Message <> Reply to Message

Alright, so I just finished using the coupled 2.2uF caps, had one end tied to ground and with the other end probed all the legs of all the transistors. There was no change in behavior. A couple of point it did reduce the hiss as if I turned down the treble, but you could still hear it present. I do have one question about the polarized caps in this unit. There were 7 of them that I replaced with Nichicon FG series. the originals almost looked like they were tantalum caps, not the traditional can style electrolytics. Could this have anything to do with the fact that I replaced them with electrolytics? I a replaced tons of tantalums in the past with electrolytics and never had any issue like this. Unfortunately, I do not have the originals to put back in...I had already pitched them.

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by stevem on Wed, 10 Aug 2022 13:42:24 GMT
View Forum Message <> Reply to Message

The difference in basic coupling cap type is not part of the issue you are having, in fact going back to the better audio quality of the Tantalum's might make the hiss worse.

I just took a good listen to my k150 that uses the 5066 and 5067 board combo and my 5067 board has less hiss then my 5066 board.
When playing both Boards with the treble up full there is far more highs then anyone could ever need, especially if you have the brite switch on.

This brings up another question, your brite switch shorted and on all the, because that adds a lot more hiss?

On boards 5066 boards made after 11 of 1971, R29 was changed from 8200 to 4700 to add more gain to the 5067 board, so maybe try going back to 8200.

Just to confirm and go back to square one here, when you turn down the volume pot on that 5067 board all the added hiss goes away, right?

On the 5966 board do R6 and R16 both test within 10%?

And does R5 test within 1% ?

Subject: Re: Kustom Bass III Channel 1 Hiss
Posted by thespeakerport on Sun, 21 Aug 2022 13:11:12 GMT
View Forum Message <> Reply to Message

Again, sorry for the delay in responding. Been a crazy past month with workload. The customer decided to take back the unit and just disconnect this channel and use the other for the time being. He needed it back and could not wait any longer. But to answer as many questions as i can, see below:

This brings up another question, your brite switch shorted and on all the, because that adds a lot more hiss? <-The bright switch did not really make any different in the hiss...but it is effective to the sound.

On boards 5066 boards made after 11 of 1971, R29 was changed from 8200 to 4700 to add more gain to the 5067 board, so maybe try going back to 8200. <-Did not know this, if the customer brings it back in....i can give this a try.

Just to confirm and go back to square one here, when you turn down the volume pot on that 5067 board all the added hiss goes away, right? <- that is correct. No hiss at all if the volume is all the way down.

On the 5966 board do R6 and R16 both test within 10%? <-Initially all resistors tested within spec with the exception of about 3 or 4 carbons. The entire board had all the resistors replaced. The low tolerance resistors i used metal film versions. I did not have 1% grade versions, but i went through what i had and tested each until i found ones that were as close to target value as possible. None of this work made any difference at all.

And does R5 test within 1% ?