
Subject: How can I stop reverb howling on K 100?
Posted by [lassoharp](#) on Thu, 07 Jul 2016 21:22:18 GMT
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Greetings,

I have a K 100-2 head that just received a new replacement reverb tank from MOD. The reverb works fine but the amp breaks into low frequency howling whenever the reverb is turned up just the slightest bit. It only does then when the head is sitting on top of a speaker cabinet. I understand that this is a form of mechanical coupling and is thus dependent on physical proximity to the speakers, but it seems it shouldn't be doing this under any conditions. Are there any known fixes to alleviate this issue?

Also, I have been doing some background reading on this topic and for reference, I have checked the following things:

- 1) The replacement tank jacks are internally grounded on both input and output
- 2) Both RCA jacks on the PC board for the send and return have been cleaned and are nice and shiny

Thanks

Subject: Re: How can I stop reverb howling on K 100?
Posted by [chicagobill](#) on Fri, 08 Jul 2016 02:54:10 GMT
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Welcome to the place.

You need to isolate the tank from the chassis and cover the springs. How is the tank mounted in the head?

Subject: Re: How can I stop reverb howling on K 100?
Posted by [lassoharp](#) on Fri, 08 Jul 2016 05:13:24 GMT
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Thanks Bill. The new tank was mounted in the same position as the original, on the aluminum frame bars, open side up. The tank does have grommet spacers/rings for some limited isolation and I've considered adding some extra insulation but the mounting screws are still fastened to the chassis frame. I have the springs covered with a cardboard strip which does help extend the range of the reverb gain before it howls

Subject: Re: How can I stop reverb howling on K 100?

Posted by [stevev](#) on Fri, 08 Jul 2016 10:57:46 GMT

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If you have a ohm meter please measure and post up the resistance you read from each RCA Jack on the tank, as there is a chance that the tank was made wrong .

Also check each transducer (nylon bobbin where the wires go in) in the tank on each end of the springs , if either of these are loose on there iron core place a dab of silicone sealer on it to stop them from being extra sensitive to external vibration, or if you have some medium gel super glue you can run some down a tooth pick and feed it into the gap area, but the silicone blob is easier!

Subject: Re: How can I stop reverb howling on K 100?

Posted by [lassoharp](#) on Fri, 08 Jul 2016 12:52:22 GMT

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Tank Input DCR = 218 ohm

Tank Out DCR = 204 ohm

The transducers feel pretty snug. I may dab some silicone in the gaps just to make sure.

Subject: Re: How can I stop reverb howling on K 100?

Posted by [stevev](#) on Fri, 08 Jul 2016 15:31:41 GMT

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Your issue is that new tank, either end should read no more than 185 ohms.

Subject: Re: How can I stop reverb howling on K 100?

Posted by [chicagobill](#) on Fri, 08 Jul 2016 17:20:01 GMT

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I don't know if that's the issue here.

I would just add some more sound deadening padding to the tank and see if that helps. Instead of screwing the tank down to the cross bars, you can try hanging it with plastic cable ties.

The original tank cover was thin cardboard with a thin foam pad.

Subject: Re: How can I stop reverb howling on K 100?

Posted by [lassoharp](#) on Fri, 08 Jul 2016 21:09:42 GMT

"Instead of screwing the tank down to the cross bars, you can try hanging it with plastic cable ties."

Definitely will try that. I had actually added some extra rubber washers and they did help a tiny bit - you could turn the rev knob just a little farther before it took off. Suspending it makes more sense.

Subject: Re: How can I stop reverb howling on K 100?

Posted by [steven](#) on Sat, 09 Jul 2016 10:44:37 GMT

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Which mod part number tank did you purchase ?

Unless the amp has a circuit issue I still say that the higher resistance you found is making for a far higher impedance than the amp's circuit is designed to work with.

In other words the output transducer in the pan is becoming a Microphone .

As a last fix get some string and try hanging the pan from its cross bars below the top lip of the chassis.

Subject: Re: How can I stop reverb howling on K 100?

Posted by [pleat](#) on Sat, 09 Jul 2016 14:19:29 GMT

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Kustom did some circuit board changes to deal with reverb feedback and along with some suggestions to add heat sinks on a couple of transistors.

Another thought, did you try and turn the tank around so the input and output jacks face either the front panel or the back panel?

pleat

Subject: Re: How can I stop reverb howling on K 100?

Posted by [steven](#) on Sun, 10 Jul 2016 10:08:50 GMT

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Yes, the only thing is that issue and fix was for the 803 board used in the -5 pa heads.

Subject: Re: How can I stop reverb howling on K 100?

Posted by [pleat](#) on Sun, 10 Jul 2016 10:50:37 GMT

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I wasn't sure on the direction of the tank if that would make a difference.

I was looking on my K100-2 reverb tank and it has a ground wire soldered on the tank housing and the wire is connected to the chassis ground.

pleat

Subject: Re: How can I stop reverb howling on K 100?

Posted by [lassoharp](#) on Sun, 10 Jul 2016 20:02:59 GMT

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I did try turning the tank around and the PT hum pickup was worse and it seemed to break into howling sooner. Going to try suspending with cable ties next

Subject: Re: How can I stop reverb howling on K 100?

Posted by [chicagobill](#) on Mon, 11 Jul 2016 16:34:22 GMT

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Pleat has brought up a very good point here, Kustom did make a few revisions to this circuit as well as others to fix a few problems here and there.

What version of the K100-2 is your amp? There might be a version number etched in the foil of the pc board.

The mods that I have just learned about, relate to R163, R170 and R172.

R172 is the 4.7K resistor that was discussed in another post regarding not being able to turn off the reverb with the front control. The factory fix was to short out this resistor with a jumper wire.

R170 is one of the reverb mixing resistors and was increased to 22K, to reduce the amount of reverb signal, thus reducing feedback problems.

R163 is part of the reverb drive circuit. The value was reduced to 47 ohms to drive the tank with a larger signal.

In any case, you should try and compare your board to the latest schematic that is posted here and see what the values of the above resistors you have in there.

Subject: Re: How can I stop reverb howling on K 100?

Posted by [lassoharp](#) on Tue, 12 Jul 2016 02:22:47 GMT

chicagobill wrote on Mon, 11 July 2016 12:34Pleat has brought up a very good point here, Kustom did make a few revisions to this circuit as well as others to fix a few problems here and there.

What version of the K100-2 is your amp? There might be a version number etched in the foil of the pc board.

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In any case, you should try and compare your board to the latest schematic that is posted here and see what the values of the above resistors you have in there.

Thanks for those resistor values. I'm not sure of the board number printed on mine but I did notice the resistor values did not match 100% with any of the K-100 1 or 2 revision schematic values. Mine does have R172 (4.7K) which I did bypass, and this allowed the reverb to be fully off when the rev knob was turned to zero. The 4.7K resistor is not showing up on any of the K100-1/2 or any of the rev that I could see. My amp also has a 33K base resistor on the rev driver transistor whereas the K-1001/2 and revs show a 15K value. I'll need to go back and recheck the other values. Thanks for the explanations of how the mods alter circuit function.

Subject: Re: How can I stop reverb howling on K 100?
Posted by [chicagobill](#) on Tue, 12 Jul 2016 17:29:02 GMT

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lassoharp wrote on Mon, 11 July 2016 21:22Mine does have R172 (4.7K) which I did bypass, and this allowed the reverb to be fully off when the rev knob was turned to zero. The 4.7K resistor is not showing up on any of the K100-1/2 or any of the rev that I could see. My amp also has a 33K base resistor on the rev driver transistor whereas the K-1001/2 and revs show a 15K value. If your amp has the 4.7K R172, then it must be an earlier version, before they removed it from the circuit.

I would compare your circuit to the later schematics and see if making any resistor changes makes sense in solving your feedback problem.

Unfortunately I have not seen a full set of schematics for this model that would show what circuits have been modified in the different revisions. And, Kustom schematics do not include revision

notes so you need to see the older versions to compare them to the revised versions.

Subject: Re: How can I stop reverb howling on K 100?
Posted by [lassoharp](#) on Tue, 12 Jul 2016 21:24:59 GMT
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I would compare your circuit to the later schematics and see if making any resistor changes makes sense in solving your feedback problem.

Unfortunately I have not seen a full set of schematics for this model that would show what circuits have been modified in the different revisions. And, Kustom schematics do not include revision notes so you need to see the older versions to compare them to the revised versions.

Mine does have the PC104 board and, as best I can tell, R 170 is only 100 ohms , so much lower than the 15K in the rev 3 and 4 versions posted here. I suppose the next step would be to up this to either 15K or 22K and see what happens.

I tried the plastic tie wraps and no real improvement. There was officially a small improvement but its still very unstable. FWIW, I found that turning the head sideways gives immunity to howling. In other words you can stand the head on its side on top of the cab and turn the reverb up with impunity. If horizontal it requires about a 10 inch box be placed between speaker and cab to give the head enough elevation.

Subject: Re: How can I stop reverb howling on K 100?
Posted by [chicagobill](#) on Wed, 13 Jul 2016 03:31:56 GMT
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I agree, try changing the resistor to the higher value.

You never mentioned the model tank that you have, is it one set up for open side up mounting?

If you look at the tank springs when the tank is held vertically, you might see a difference in how they physically relate to the transducers. If you see something different there, you might be able to adjust the mounting springs to simulate the vertical relationship.

Subject: Re: How can I stop reverb howling on K 100?
Posted by [lassoharp](#) on Mon, 25 Jul 2016 17:22:01 GMT
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I tried changing the resistor value to 15K then 22K. No real difference. The reverb has to be turned higher to get the same amount and the oscillation point is still roughly the same.

I checked the transducers for tightness (they were tight) and wrapped them in rubber gasket seal. I also added extra foam to the tie wrap suspension. They help in tiny bits but overall its still unstable and will take off.

My conclusions are that it's a mechanical coupling issue set by distance and orientation of the head and cab. The original cabs may have been less apt to resonate at the offending frequency but I dont have one so no way to test. The original tanks may have been more resistant to oscillating but again, no way of knowing without one to compare. I've been told by many that most people simply removed the tanks in these heads due to this problem. This seems in line with what I've experienced so far.

The tank I used was a MOD 4FB3D1B note - I added the internal tank grounds myself and got this particular tank for that reason.

Thanks to everyone for chiming in

Subject: Re: How can I stop reverb howling on K 100?

Posted by [C4ster](#) on Mon, 25 Jul 2016 19:39:19 GMT

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I have been following this since it's beginning and I don't recall what speaker cabinet you are setting the K100 on. Was that even addressed? I am going to go out on a limb here and assume that it is NOT a Kustom tuck and roll cabinet. The idea that it is a mechanical connection instead, had me questioning the covering of the speaker cabinet. If the feet of the head are in direct contact with a tolex covered cabinet, there would be a direct audio connection that could be vibrating the reverb tank. Now, this is a complete longshot but I have had reverb issues if I use a JBL Cabaret cabinet with the head sitting on top of the JBL. Lifting the head immediately stops the problem.

Conrad

Subject: Re: How can I stop reverb howling on K 100?

Posted by [C4ster](#) on Mon, 25 Jul 2016 19:40:35 GMT

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I have been following this since it's beginning and I don't recall what speaker cabinet you are setting the K100 on. Was that even addressed? I am going to go out on a limb here and assume that it is NOT a Kustom tuck and roll cabinet. The idea that it is a mechanical connection instead, had me questioning the covering of the speaker cabinet. If the feet of the head are in direct contact with a tolex covered cabinet, there would be a direct audio connection that could be vibrating the reverb tank. Now, this is a complete longshot but I have had reverb issues if I use a JBL Cabaret cabinet with the head sitting on top of the JBL. Lifting the head immediately stops the problem.

Conrad

Subject: Re: How can I stop reverb howling on K 100?
Posted by [lassoharp](#) on Mon, 25 Jul 2016 21:05:52 GMT
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It was not an original tuck and roll cab. I tried it on about 4 different cabs I have and they all howled and did it at slightly different frequencies.

I had wondered if the padding on the original cabs helped isolate the vibrations. Seems like it would to some extent.

Do you have any issues when using your head on the original cab?

Subject: Re: How can I stop reverb howling on K 100?
Posted by [C4ster](#) on Mon, 25 Jul 2016 21:16:17 GMT
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I have a K100-2 and the cabinet is loaded with 12" Jensen C12N speakers, all original. I have had no problems with feedback, only the high gain limits me for the effect I want. I should make some of the mods that have been discussed here. In your case, I was thinking that if you were using a non-tuck and roll cabinet, that the feet of the head are nailed/screwed through the bottom of the head. The connection would be rather solid and could transmit the vibrations to the wooden case and subsequently to the reverb tank mounted directly to the chassis and the case. It was just a thought. You don't have the padding on the top of your speaker cabinet to absorb and isolate the head from the speakers. It was just a shot in the dark. Try placing the head on a folded towel or something similar.
Conrad

Subject: Re: How can I stop reverb howling on K 100?
Posted by [vintagefan](#) on Thu, 28 Jul 2016 07:38:17 GMT
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Well here's how I remedied my K100C-8 reverb feedback. My feedback would start out as a low rumble and get very loud, even when I had the volume at "1" on a scale of "1 to 10".

I first tried several fixes with no luck. First I had no luck stopping the feedback with any rubber covering or cardboard covering, or cardboard with thin foam rubber under it. With the foam attached under the cardboard that covered the reverb tank, when the reverb decay occurred, I could hear a subtle bassy sound as if the sound was being absorbed shortening and muffling the decay some, which I didn't like. With each of these I would tape up all the edges of the reverb tank with duct tape to make sure those cover materials were sealed. I even tried wrapping the entire tank in foam and or duct tape. And I taped up all the holes including the holes the springs attached to. Still got lots of feedback.

What did stop my feedback is I put a thin steel plate cover on the reverb tank opening and taped the edges up where it touched the reverb tank with Gorilla tape. I also taped up all the holes in the

tank including the holes the springs attach to. Downside might be when removing the tape from from the spring holes, if the tape pulls on the spring and damages it. But I removed the tape half a dozen times when trying other cover materials with no problems. ...I have no more reverb feedback at any volume.

And my tone improved also. This tone difference would be splitting hairs for most people. But in my living room playing only clean with a Fender American Telecaster or Fender 50's Road Worn Telecaster, I can hear a slight bit of metallic ring in the reverb, especially when I play a little heavier attack bringing out more of the telecaster snap, crackle, and pop identity sound....And on the reverb decay I can hear a slight increase in hi's.....These tone improvements(in my opinion) are very subtle and slight, but I really like them, but most importantly, no more feedback.

I got the idea to try a metal cover on the reverb pan from an EMT 140 plate reverb unit that major market radio stations such as WABC/NYC used on air from 1957 thru the 70's. Of course the EMT 140 plate reverb is a completely different design. But it's steel plates inspired my experiment. The EMT 140 plate reverb had plates as big as a Mini car.

<https://youtu.be/P7Mye5v4ThQ>

Subject: Re: How can I stop reverb howling on K 100?

Posted by [steven](#) on Thu, 28 Jul 2016 10:32:29 GMT

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you should not have encase the tank in concrete to get the circuit to work right that's just a crutch!

Has anyone tried changing out C128 on Q115?

If that cap has gone up in value as the do due to age, then the recovery circuit will make more gain than what's needed which will lead to the tank being overly sensitive !

Subject: Re: How can I stop reverb howling on K 100?

Posted by [lassoharp](#) on Thu, 28 Jul 2016 14:19:56 GMT

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The one thing that putting a steel plate over the open side of the tank does that cardboard will not do is shield the insides from electromagnetic radiation.

If doing this stopped the feedback, this suggests that radiation from the power transformer is likely the primary source of noise associated with the problem. Now, this is not surprising given that the PT is but 3-4 inches from the tank - BUT, I think there is an important distinction that needs to be made here:

Predominant Mechanical Coupling vs Predominant Electromagnetic coupling

The mechanical coupling portion of it is due to vibrations from the speaker cab being transmitted through the aluminum frame rails the tank is mounted on, and into the tank itself.

The electromagnetic coupling portion is mostly due to hum radiation from the PT being picked up by the tank (which is also a giant 'antenna; for such things) AND, another portion comes from the speaker which is sending out an amplified version of the low level hum that's >>always<< present in the signal regardless of circuit gain due to the fact that tank is only 3-4 inches from the PT.

Personally I think both types are happening with this head.

Relative circuit gain can be a problem if it becomes excessive, but the stock circuit is already maxing out the signal to noise ratio parameters to begin with so you don't have a lot of latitude there. For example, on my head version, when the reverb gain control was on "0" there was already quite a bit of wet reverb signal (sounded about like a typical Fender with rev turned to about 3 or 4) Now, I went in and did the mods that made it so the reverb level was zero when the knob was zero. But that didn't seem to affect the howling feedback point at all - before the mod the head would slowly begin howling with the rev control at zero - sometimes it would go faster than others but it was still hypersensitive and more less a disaster just waiting to be set off by footsteps, the bass player or drummer etc. LoL After the mod you could stop the feedback by turning the rev knob to zero . . .but of course you have no reverb then, and when you turn the knob up to get the same level of reverb you had before the mod the thing starts howling = no real effective difference in the point of oscillation. I also tried some other gain lowering mods as mentioned previously and they really didn't affect the feedback problem much at all. I think the original designers were doing the same thing that the designers of the old Pioneer stand alone reverb units were - getting the reverb circuit gain as high as possible so that the signal to noise ratio was also high enough that you never heard the PT hum pickup in your wet signal. In the original pre modded Kustom, if you already have pretty wet reverb with the knob on zero, you're probably not going to ever think about turning it anywhere past 12 oclock and thus never getting it high enough to hear the low level PT hum that's always there in the signal. Of course with the gain so high, it's more sensitive to potential runaway feedback.. . . .

. . . But the overall point here is that regardless of relative circuit gain - mechanical and electromagnetic coupling issues are best remedied through PHYSICAL DISTANCE, PHYSICAL MANIPULATION (like padding to absorb vibrations or orientation/position of head) and/or SHIELDING (which is an effective from of creating distance via isolation)

PHYSICAL DISTANCE WORKS - If I put the head on the floor or on a table, no feedback.

PHYSICAL ORIENTATION WORKS - If I turned the head sideways, meaning setting it up vertically on top of the cab it works

PHYSICAL MANIPULATION (padding) - Helps a little, but doesn't really solve the problem overall

PHYSICAL SHIELDINGdidn't go that far to try, but based on what vintagefan just said - why not? It makes really good sense.

One thing it helps to remember is that PT radiation is a 3 dimensional thing with varying peaks and nulls that interact with everything around it in complex ways. My first thought when first opening this head up and seeing how they'd mounted the tank was "What the heck were they thinking putting the tank so close to the PT?!" We all know its more likely to pickup hum, but to their credit they had selected a PT and placed it so that the tank was in a decent null zone. I sat there and moved the unmounted tank around inside the chassis and you could hear the hum soar to crazy high levels as it moved out of the null zone, which is what you'd expect with that close of distance in general. But being in a decent null zone at 3-4 inches is not as good as being 17 inches away from the PT, so they had to address that in the rev circuit by making wet gain as high as possible. I build and restore vintage tube mic pres for a living so am well familiar with dealing with PT hum pickup in transducer coils. It can be a tricky problem to solve. If vintagefan's solution proves to be consistent, it suggests that PT radiation going into the open side of the tank is a dominant factor in the feedback problem.

I realize some of you might be thinking that using steel is a bad idea because of the belief that steel conducts hum currents more than aluminum. With EMR sometimes it's not what you think. It may not make a difference. If steel works, it works. If Aluminum works, it works. Seems best and easiest just to try them and see what happens.

Subject: Re: How can I stop reverb howling on K 100?

Posted by [stevem](#) on Thu, 28 Jul 2016 18:01:33 GMT

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At this point I think you have a tank that is constructed incorrectly for its stated mounting position, if like you said you can stand the amp on end on top of the speaker cabinet and no feedback takes place.

I can't tell you how many production runs of new gear I have seen are made wrong, yet got placed on a Boat and shipped over here!

Subject: Re: How can I stop reverb howling on K 100?

Posted by [lassoharp](#) on Thu, 28 Jul 2016 18:37:28 GMT

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I had wondered that too. I did try mounting the tank face down and suspended with tie wraps but the hum pickup from the PT was way too high that way.

Do you happen to know how to tell from looking if it's a face down tank?

Subject: Re: How can I stop reverb howling on K 100?

Posted by [pleat](#) on Thu, 28 Jul 2016 22:47:24 GMT

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According to www.accutronicsreverb.com the part number of 4FB3D1B shows the tank to be open face down and the input and output impedance shows 1475 ohm input and 2250 ohms output with

both input and output as insulated from ground. I know the K200 amps want between 185 and 200 ohms input and output.

pleat

Subject: Re: How can I stop reverb howling on K 100?

Posted by [lassoharp](#) on Fri, 29 Jul 2016 11:37:27 GMT

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pleat wrote on Thu, 28 July 2016 18:47 According to www.accutronicsreverb.com the part number of 4FB3D1B shows the tank to be open face down and the input and output impedance shows 1475 ohm input and 2250 ohms output with both input and output as insulated from ground. I know the K200 amps want between 185 and 200 ohms input and output.

pleat

I had originally looked at the 4FB2C1A, and during my reading found this forum thread. I went with the 4FB3D1B based on the info in that thread and actually didn't think to go back and check the mounting position detail, assuming it was correct since JerryBass1955 had apparently used it without issue.

<http://www.vintagekustom.com/FUDforum/index.php?t=msg&th=3913&goto=21741&rid=0&S=cc3ca328bd92e96b2e0d453ea0a8d910>

Accutronics quotes their specs in AC impedance. The smaller specs are DC resistance which is approximately 10 X less. 185 DCR = 1850 AC Z, 200 DCR = 2000 AC Z. When you consider tolerances they're essentially the all equal.

Subject: Re: How can I stop reverb howling on K 100?

Posted by [stevev](#) on Sun, 31 Jul 2016 15:15:31 GMT

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I did some investigation of the reverb circuit in my K 100-2 rev-1 and my K200-4 who's board with the reverb is a rev-1, both amps were born in 1968 and use the same spec reverb pan.

On my 100 since I got it I have had to have the reverb knob opened up to 1 o'clock to start to hear any verb taking place, on my K200 using the very same pan all I need to do is click the reverb switch on with the knob down and I already have more verb than the K100 at 1 o'clock !

I have checked out the send portion of both amps and they are very close , the 100 will be pushing 4.6 volts into the pan when the amps output stage starts to pull down the power supply ,

as in clipping, and the K200 will be pumping 4.8 volts into the pan.

The big difference is on / in the recovery amp in the K100 and the K200!

If I drive the recovery amp in the 100 with a 1K tone at -50 DB of unbalanced signal input the output stage is clipping with the reverb pot full open, but only the bottom of the wave form is clipping, the reverb recovery amp needs to hit with -46 DB to start to clip the top of the wave form!

The K200 on the other hand clips at -46 DB, and clips both top and bottom of the wave form equally, and this is with the reverb just clicked on and having the reverb pot fully down!

There is a massive difference between both amps here!!!!

I do not have any more time to dig into this until the end of the week, but I would have to say that both of these amps of mine have a issue, the 200 has too much verb, and the 100 not enough!

I have a K100-8 who's reverb seems normal that I will check out also just for the hell of it.

Oh, and the K200 is now where near feeding back even when the verb knob is fully open!

Subject: Re: How can I stop reverb howling on K 100?
Posted by [lassoharp](#) on Sun, 31 Jul 2016 16:00:05 GMT
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Excellent work stevem! Very interesting. Mine was def behaving in the same way as your K-200. My head was apparently an early ver that is not included in the Kustom schematic archives.

I'm not sure of what the specifics of the recovery circuit on mine are. It would probably be best to rev engineer it to be sure.

Do you hear any PT hum in the signal on the 100 when you crank it wide open?

Subject: Re: How can I stop reverb howling on K 100?
Posted by [stevem](#) on Sun, 31 Jul 2016 20:12:53 GMT
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Yes there was some hum in the 100 but still the level of verb applied was above the hum added in.

It seems that the PT in the head is not as far to one side of the chassis as in the k200 heads so the output side of the pan does start to pick that up.

Subject: Re: How can I stop reverb howling on K 100?

Posted by [steven](#) on Sun, 31 Jul 2016 20:14:16 GMT

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We should start a new sitting on this topic as its getting really long to scroll thru!
