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Subject: Need some serious help with OHM load and wiring...

Posted by [niFe](#) on Fri, 17 Mar 2006 21:21:28 GMT

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Ok guys, let me see if I'm thinking along the right track. I apologize for my EXTREME newbiness.

All of the old Kustom heads were designed to run on an 8 OHM load, but they will handle a 4 OHM load without a problem, right? Anything below 4 OHM runs the risk of damaging the head, correct?

I just got two Kustom heads that I'm considering using on an older Marshall 1960A cab, but I'm getting confused about how to wire the speakers (the insides were seriously mangled by its previous owner). First, let me explain my heads.

I've got an older Frank head with only one speaker output. I've also got an older 200 with what seems to be two speaker outputs. Does this seem right? Well, I'm wondering this: The Frank head wants an 8 OHM resistance on that one speaker jack, I think, but I am confused about the 200 with two speaker outs. Should EACH of these outputs have an 8 OHM load, or should each have a 4 OHM load, 16 OHM load, or what? I'm not sure how the two speaker outs on the 200 react to one another. Basically, are the loads on each input added, cut in half, etc.

Secondly, onto the Marshall cab. It is loaded with the original Celestion 75W 12" speakers, rated at 16 OHM each. I THINK the cab is wired in stereo, because the previous owner added a second input. As is it, it is wired like this:

The two left speakers are wired to one input. The wiring goes:

POS of Speaker 1 to POS of Speaker 2  
NEG of Speaker 1 to NEG of Speaker 2.  
POS of Speaker 1 to Input Jack  
NEG of Speaker 2 to Input Jack

The two right speakers are wired the exact same way, only they're only connected to the second input jack.

The way it is currently set up, both pairs of speakers are independantly wired in parallel, right? Since the speakers are 16 OHM each, this would mean each input has an 8 OHM load, right?

Now, my REAL question is, is the current set up OK for the 200 (using both speaker outs on the back), or should I rewire it for a different load? ANY help you guys can give would be great. I hope this wasn't too confusing. Thanks

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Subject: Re: Need some serious help with OHM load and wiring...

Posted by [rodak](#) on Fri, 17 Mar 2006 21:43:14 GMT

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First, not all Kustom heads were designed for an 8ohm load. I believe K100's were designed for

8, and K200's for 4. I'm not sure about the Franks. Just because a particular amp was sold with an 8ohm speaker complement (two 16ohm 15's, for example), doesn't mean that's what the amp was "designed" for. To me the lowest impedance an amp will safely drive (also providing maximum output) is what it was designed for.

The two jacks on the K200 are wired in parallel. It doesn't really matter what you plug in where. All that matters is what the total load is (and you have to understand how impedance loads are calculated - more on this later).

You're right, the Marshall cab appears to be wired for stereo, with each jack presenting an 8ohm load.

Connecting each jack of the K200 into one jack on the Marshall cab will be perfect (two speaker cables), presenting a 4ohm total load.

If you'd rather just wire the whole cab for a single 4ohm load, using only one jack (and saving yourself a speaker cable, but reducing flexibility for future uses), then wire the pos for all four speakers to one lug one jack, and the negs for all four speakers to the other lug on the same jack, leaving the other jack unused.

When wiring pairs of speakers in parallel (as we're talking about here), the total impedance is half the impedance of each speaker. For four speakers, it's one fourth. When wiring odd numbers of like speakers, there's a formula I can never remember, but for example, 3 16ohm speakers is something like 5.33ohms. When wiring speakers in series, you just add the impedances - two 8ohms in series make 16ohms.

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Subject: Re: Need some serious help with OHM load and wiring...

Posted by [niFe](#) on Fri, 17 Mar 2006 21:51:49 GMT

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Wow, thanks for the quick response, rodak!

That definitely cleared some things up for me! I was hoping that the 200 would be able to be hooked up directly to the marshall cab the way it is wired, using both jacks on the head and cab.

Another quick question for ya... What is the ideal wire guage for cabs? I've got some 12ga braided speaker wire laying around, and am thinking it should do the job just fine. The previous owner had some super thin wire (18ga or less), and did some pretty dodgy soldering, so I'm sure it is due for an update. Any suggestions?

Again, thanks for the help, rodak, and everyone else feel free to chime in with any other info that might be helpful.

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Subject: Re: Need some serious help with OHM load and wiring...

Posted by [C4ster](#) on Sat, 18 Mar 2006 01:12:50 GMT

OK, the formula for parallel speakers of the SAME impedance is the speaker impedance divided by the number of speakers. That's it. So for 16 ohm speakers,  $16/2=8$   $16/3=5.33$   $16/4=4$ . All those combinations were used by Kustom in the T&R eras. The franks were not designed for 4 ohms as they only had one speaker output but the speakers in the cabinets were 16 ohms. The same thing holds true for the K100 series. The maximum output for a K200 is 100 watts RMS at 4 ohms. That would be with 2 cabinets of 2x15 speakers. When you used 1 2x15 cabinet, the output is about 65 watts. I would assume that a 3x15 not siren cabinet would put out 85 watts or so. A siren cabinet has a whole different vibe going but it matches the 2x15 for the power from the 15's. Then you add in the extra cabinet size and then the high frequency response and it is a completely different animal. Now about the wire. I know I will get crap from the Monster Cable crowd, if there are any but the wire necessary is only big enough to handle the current and 18ga is good enough. Wiring charts are based on long lengths of wire not short 3 foot pieces in a speaker cabinet. However, if you run a 100' cable to power a PA speaker across the stage, then you might want to increase to 16 or 14 ga for each speaker cabinet. I have a cable made for my power snake. My power amps are at the board and I send the power to the stage through a 12ga 10 conductor cable that is carrying 1700 watts to 2 ohms though. That's when you need the extra size. Good luck.  
Conrad

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Subject: Re: Need some serious help with OHM load and wiring...

Posted by [niFe](#) on Sat, 18 Mar 2006 01:30:48 GMT

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Ok, back again, lol...

Turns out I searched for "speaker gauge" AFTER I posted the above, and realized from older threads that 18 gauge should be fine. I redid the wiring anyway (with brand new 18 gauge wiring), just because it was so poorly done before.

I tried the Frank and the 200 with the Marshall cab and both sounded superb! So far, I am preferring the Frank for tone because it is absolutely quiet, not a single bit of hissing, and, as you all know... that signature Kustom tone cannot be beaten.

However, the 200 is way, way, louder (given that it is running on a 4 OHM load instead of 8, and using all four speakers instead of just two). Don't get me wrong, I am already in love with both, and can tell they'll both be getting the use that they deserve. But now, I have another problem, this one might not be as easy to solve...

Well, after redoing the cab wiring and hooking up the heads, I plugged my guitarists mexican/american hybrid strat in, and there was TERRIBLE humming and feedback. I couldn't get any sound to come out of either head. At first, I thought I'd gotten ripped off and that both were going to need some serious work. Until...

I plugged in my completely stock new Ernie Ball musicman sterling, and BAM, awesome tone, no hum (a little on the 200), and I was stunned. So, I plugged the strat back in... same problem.

While the strat was plugged in, I realized that if I touched the screws on the pickguard, the humming would change or almost go away... So I realized that I was somehow grounding his guitar, and the problem was definitely in the guts of his axe somewhere.

Any ideas? He replaced all of his electronics with aftermarket active EMGs (this is the set he put in: <http://www.emginc.com/displayproducts.asp?section=Guitar&categoryid=11&catalogid=56>). Could it be just the active pickups themselves, or must something be wired wrong underneath his pickguard or with his 1/4" out? I'm leaning toward the latter, but I don't want to tear his guitar apart if that's not the problem... Let me know!

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Subject: Re: Need some serious help with OHM load and wiring...

Posted by [C4ster](#) on Sat, 18 Mar 2006 03:08:31 GMT

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Grounding, grounding, grounding. Now that I have your attention, do check and make sure there is a ground wire from your jack shell to EVERY piece of metal in the control compartment. That does include a wire to the bridge to ground the strings. Now that you have that fixed, change your cords on your Kustoms to 3 wire grounded cords. I buy a 16ga black or dark color 25' extension cord. Not orange!!! Cut off the female end and replace the original 2 wire cord and connect the black and white wires to the switch as they were before. Then crimp or solder a lug on the green wire and find a screw and nut to attach it to. Any screw through the back or bottom will work just don't use one that is mounting the circuit boards. Your hum problem should be a thing of the past. But realize that your transformer in your Kustom gives off plenty of interference that will be picked up by your pickups. Keep your distance and different angles with respect to the amp may need to be experimented with. Also dimmers in the room you are playing in can cause a buzzing different than a hum from the transformer and single coils are worse than humbuckers in that regard.

Conrad

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Subject: Re: Need some serious help with OHM load and wiring...

Posted by [niFe](#) on Sat, 18 Mar 2006 03:36:09 GMT

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Conrad... thank you so much for all your help! I think I am catching on, albiet a bit slowly, lol...

About grounding the guitar... I posted this same question at the Harmony-Central forums, and someone responded with:

"It sounds like he . . . forgot to UNWIRE the ground to the bridge. This will cause issues with EMGs."

So, I guess I might have to contact EMG after putting new power cords on the Kustoms. We'll just have to see, I suppose...

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Subject: Re: Need some serious help with OHM load and wiring...

Posted by [rodak](#) on Sat, 18 Mar 2006 04:26:21 GMT

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Thanks for the speaker wire info, Conrad. Nice to see there aren't any of those pseudo-techno-nimrods around here pushing huge, super-expensive, gold-plated, nuclear-shielded speaker and power cables. That's such a load of hooley it would be funny - if so many people weren't getting ripped off by those shysters.

Ahh, that felt good!

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Subject: Re: Need some serious help with OHM load and wiring...

Posted by [C4ster](#) on Sun, 19 Mar 2006 00:40:13 GMT

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Let's see, you buy a 12 gauge braided gold plated cable for let's say \$10.00 a foot and then you need to reduce the size to fit it into your speaker terminals. So you trim off 1/2 of the strands just to get it to fit. Then you need to unbraid it and straighten the strands and then you tin it so it doesn't unravel before you stick it in, the wire that is. And when you are done, it has the same characteristics as a piece of 16 gauge that you can buy at Home Depot for \$5.95 per 100 feet. Do I have that right??? I saw an audio grade recepticle, yes a 20 amp 120 volt recepticle for your wall to plug your overpriced class A, tube amplifier into for \$110. I am not kidding. It was the exact same hospital grade recepticle you can buy at any electrical supply store including Graingers for \$15.00. But remember, it was an AUDIO GRADE RECEPTICLE. I didn't know you could get audio out of your floor lamp.

Conrad

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Subject: Re: Need some serious help with OHM load and wiring...

Posted by [stevem](#) on Tue, 21 Mar 2006 13:03:41 GMT

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The formula for the parallel total impedance of two different impedance speakers is this example.  $16 \text{ ohms} \times 4 \text{ ohms} = 64$ ,  $16 \text{ ohms} + 4 \text{ ohms} = 20$ ,  $64 \text{ divided by } 20 = 3.2 \text{ ohms}$ . This is the same formula for resistors.

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Subject: Re: Need some serious help with OHM load and wiring...

Posted by [RickBlacker](#) on Sun, 18 Sep 2011 16:33:25 GMT

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C4ster wrote on Fri, 17 March 2006 22:08 Now that you have that fixed, change your cords on your Kustoms to 3 wire grounded cords. I buy a 16ga black or dark color 25' extension cord. Not orange!!! Conrad

So, I'm curious, why not orange? Is there something different about the cord itself or is it because

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you want to try and keep the amp as original as possible?

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Subject: Re: Need some serious help with OHM load and wiring...

Posted by [C4ster](#) on Tue, 20 Sep 2011 20:51:44 GMT

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You must have me confused with someone else. I have advocated using Bissell steam cleaner cords. They are 16 guage, 30' long, grounded, black ribbed with a cord clip molded into the plug. These are easily purchased at your local vaccuum cleaner repair shop. The first one I did change, however, was green to match the Cascade amp I put it on. I never suggested ORANGE!!!!  
Conrad

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Subject: Re: Need some serious help with OHM load and wiring...

Posted by [pleat](#) on Wed, 21 Sep 2011 03:41:26 GMT

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Orange is ugly!!!!!!!!!!!!!!

pleat

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