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**From:** JWK @**Date:** 9/8/2001 6:48 PM**Subject:** Bassman - AB165 vs. AA864 question

I have the AB165 I haven't done anything to yet. I was going to do the power section in AA864, but after reading some descriptions I'm not sure that's what I want. Which one of these power stages stays cleaner longer? Why is the AA864 power stage preferred over the AB165? In general, I'd be looking for the one that stays cleaner louder, if that makes any sense. Thanks.

John

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**From:** Dave K @**Date:** 9/9/2001 2:45 AM**Subject:** Re: Bassman - AB165 vs. AA864 question

I'm with you, I liked my 165 clean. I changed my bias from balance to level, but left the rest alone!

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**From:** Doc @**Date:** 9/11/2001 4:45 PM**Subject:** Re: Bassman - AB165 vs. AA864 question

I recently completed a mod to a SF Bassman that was a little later than the AB165, but had similar power stage circuitry. They use a different arrangement of negative feedback, which doesn't look like the usual Fender loop going from the secondary to the phase inverter cathode. So that's the part they say to convert back to earlier, like AA864, specs. Also, the AB165 has a low gain final preamp stage that has local plate-to-grid feedback. In Andy Ruhl's article (Machine Gun Amps site) he mentions that this stage, although it was not Fender's design intention, results in a mild pleasing compression effect, so advises to leave that stage alone. Some have 1meg grid leak & 1meg Rf, others have 470k for both. Does this make it an inverting stage with a gain=1?

One thing I'd like to mention about "blackfacing" the PI by changing its plate resistors from 47k/47k to 82k/100k: I was displeased with the higher value resistors. (The cathode string was also changed out.) My ears tell me that the 47k plate resistors and tail resistor network used in later SF amps results in a louder, cleaner signal than after BF'ing. My friend's unmodified AA371 bassman (47k plate res) is louder and stronger than my BF'd version. And his amp has the stock funky feedback arrangement. A few years ago, I rebuilt a SF Bandmaster reverb head. I left the 47k network and 330k grid resistors in the 12AT7 PI circuit, and basically recapped the amp without modifying much of anything in the preamp. (I did remove those partial cathode bias resistors in the 6L6 circuit, and converted to bias level adjust supply.) This amp had a wonderful Fender tone when the owner played his Telecaster through it. Everyone asked him about his amp. I guess I did something right without realizing it.

Although the earlier PI circuit utilizing 82k/100k plate loads with 1meg grid leaks has a higher ultimate voltage gain, it doesn't seem to provide the output stage drive capability for the AB2 power stage as the 47k (1watt) plate load/ 330k grids network. Another benefit with leaving the 47k's in there is you can plug in a 12AU7 directly and have it biased correctly. The 12AU7 lowers the maximum signal power because of its lower voltage gain, but seems to give the amp clean headroom and an unusual overdriven sound at max. Hard for me to put into words. You have to try it and listen.

So, for your amp, may I suggest you modify the bias supply and the NFB arrangement like BF amps (remember to reverse the green & black secondary leads on the speaker jack), but keep the plate & grid resistors in the PI at the lower impedance level. Decide what you want to do in the preamp for gain structure & tone shaping.

I purchased a new 1x12 combo cabinet, pine with black tolex & silver grill cloth, built to house a Bassman chassis. It's pretty cool to have a modified Bassman amp in a small package. The single 8ohm speaker makes the plates see twice the load resistance, but it sounds fine. Maximum power will be lower, but who cares. It's a good guitar amp.

Hopefully something in here will be helpful to you.

-Doc

P.S.- I like to leave the tube shield off the phase inverter tube. The tube runs cooler & lasts longer. At this high signal level, that stage doesn't need shielding anyway.

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**From:** Ted Pimm @  
**Date:** 9/11/2001 7:59 PM  
**Subject:** Re: Bassman - AB165 vs. AA864 question

Thanks Doc! Some great ideas here. I have an AB165 modified the way you have described, but I have been running 100k plate load resistors in the PI. I am interested in trying the SF style of PI arrangement to see what tonal difference it makes, and I also have the 12AU7 sub to try! I am running a 4x10 (2 ceramics/2 alnico) for a 4ohm load, and I can tell you it is REALLY LOUD. A mismatch might actually be a good idea to lower a bit of volume.

Thanks again for the fun ideas...

Ted.

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**From:** Ray Ivers @  
**Date:** 9/13/2001 1:19 PM  
**Subject:** Re: Bassman - AB165 vs. AA864 question

Doc,

I agree 100% about the PI load resistor change. IMO the 82K/100K or 100K/100K values, while appropriate for a 12AX7, have no business being in a 12AT7 or 12AU7 driver stage unless you're looking for a somewhat squashy, compressed sound. With a 12AU7, plate loads can be reduced even further for even more headroom and output tube drive, although eventually you'll end up with over 300V at the plates, of course. I like my stock AB165, but I'm not trying for anything like a sparkly clean sound out of it, and I bet I would like it even better with 33K - 47K PI plate loads.

Ray

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**From:** KB @  
**Date:** 9/13/2001 3:27 PM  
**Subject:** Re: Bassman - AB165 vs. AA864 question

Thanks guys I have an AB 165 in shop right now that the bias has been converted to BF but the PI is 100k/100k and it breaks up pretty early at about 7 and the amp really compresses hard and gets mushy. I'm going to try Ray's 33k first then the 47k. I ran a Bass thru it and it sounded good until that point but these amps are Taylored for guitar. Has anyone made extra use of the unused 1/7025 ?

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<b>From:</b>	<b>Doc</b> <a href="#">@</a>		
<b>Date:</b>	9/13/2001 3:41 PM		
<b>Subject:</b>	<b>Re: Bassman - AB165 vs. AA864 question</b>		

Make sure you use 1 watt resistors when you go 47k or lower.

The brown Bassman's bass channel sounds great for slightly dirty lead guitar. It uses four triode sections, and has cathode followers. You could convert one channel of a later BF/SF amp to the 6G6 circuit by deleting the unity gain stage of the AB165 and re-using both of its triode sections along with V1. The normal channel could be a regular two stage BF Fender preamp circuit.

Or, you could go into the switchable gain type mod using the extra tube section. (Check Blueguitar site.) Many possibilities. You have to decide what you want to use the amp for.

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<b>From:</b>	<b>Doc</b> <a href="#">@</a>		
<b>Date:</b>	9/13/2001 4:10 PM		
<b>Subject:</b>	<b>Re: Bassman - AB165 vs. AA864 question</b>		

Correction: I should have said "blond" bassman, not brown.  
-Doc

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<b>From:</b>	<b>Ray Ivers</b> <a href="#">@</a>		
<b>Date:</b>	9/13/2001 4:09 PM		
<b>Subject:</b>	<b>Re: Bassman - AB165 vs. AA864 question</b>		

KB,

TubeCAD says that a 34K plate load (PI input stage) and a 33K (PI phase inverter stage) will work well using all the other stock circuit values - tube current will be a little low, but the circuit should work fine, and balance will improve a bit too. You can use two 33K's if you want, too.

Ray

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<b>From:</b>	<b>KB @</b>		
<b>Date:</b>	9/13/2001 5:39 PM		
<b>Subject:</b>	<b>Re: Bassman - AB165 vs. AA864 question</b>		

Do you think 12AT or 12AX?,

KB

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<b>From:</b>	<b>KB @</b>		
<b>Date:</b>	9/14/2001 2:30 PM		
<b>Subject:</b>	<b>Re 33K Sounds Better Ray &amp; Doc</b>		

I put in the 33k and it was much tigher and didn't break up as quick. I have two of these and one has the 100k/82k config and the other had already been changed to 47k by someone else not too far from here. Two things that really stuck out were a tube in there was slightly Microphonic it became extremely Microphonic. The other thing is the Bias on these amps is pretty inconsistent from push to pull and I'm thinking about adding another pot so I'll have one for each side of the tranny. It was almost 6ma from side to side. I also found that the AT was better for cleaning it up and to keep the Bias down as well. I set it at 30ma or 70% plate dissipation and had EH 6L6's which I'm not sure if there 19w or 23w but went with my ears on this one and it Sounds right at 30ma but as I was saying the other side is at 25 ma. If you drop the first side to 26ma it really cleaned up with moderate volume setting but dropped the other side to 20ma. This was also using the 1 ohm current source resistors.,

Kerry B.

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**From:** Doc @**Date:** 9/14/2001 4:00 PM**Subject:** Re: Re 33K Sounds Better Ray & Doc

So the 33k's sound good when using a 12AT7? Is the other tube you tried a 12AX7 or 12AU7? I'd be surprised if the 12AU7 didn't sound as clean as the 12AT7 (but with a little less voltage gain). The 12AU7 has characteristics similar to, but not identical to the 6SN7. If you look at the long tail inverter in the Mullard circuit in a typical EICO power amp, you will see that the 6SN7 is set up with balanced (uneven) plate resistor values near 30K. The 12AX7 falls kind of short when trying to conduct higher current associated with the lower value plate loads. Where you need the combination of high gain without drive current (ex: Vox EL84 circuits and 100k PI plate resistors), the 12AX7 is great. But where your goal is clean high power, a lower mu tube with a bit of drive capability is best.

It would be great if a new tube appeared on the market that had the gain characteristics of a 12AT7, but with 2 to 3 times the plate & cathode area (and necessary higher heater current) to give longer life and better drive. Until then, we have that dual triode with the tiny RF elements to replace frequently.

When you get your PI circuit set up satisfactorily, would you mind sharing with us the cathode resistor string and NFB resistor values, and any presence control? There are so many bias resistor/tail resistor combinations used by Fender over the years it can get confusing.

Thanks,  
-Doc

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**From:** Shea @**Date:** 9/14/2001 4:32 PM**Subject:** More PI ideas / questions

Doc, I follow what you're saying about using the SF pi arrangement, but I need mine blackfaced to get the gain & distortion I want. Maybe I'd be happier using a 12AX7 together with blackface specs? On the other hand, sometimes a 12AX7 sounds more loaded down than a 12AT7, even using the blackface specs. The 12AT7 seems to push through clearer, while adding its own

distortion.

Anyway, I'm getting the idea that a good design might be to develop all the gain you want before the pi, and use a 12AT7 or 12AU7 pi with SF specs to push more current through to the output tubes. That might give more room for gain & bass before you run into blocking distortion at the output tubes, although the DC blocking caps will still put a limit on how far you can go. It's like CBS almost got it right - for loud, clean amps they DID get it right (except for the bias circuit), but for the master volume models they needed to put more gain in the preamp.

I wonder how much more gain CAN I get out of a Fender preamp? I could change all the 1k5 cathode resistors to 820. Ray has told me that 220k plate resistors are uncool because they set the bias wrong (if I understood him correctly), so I'd be inclined to stick with 100k. I could reduce the value of the 3 meg resistor that leads to the reverb recovery tube, down to 1 meg or 500k. Will it be enough to rock?

Shea

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<b>From:</b>	<b>Ray Ivers</b> @		
<b>Date:</b>	9/14/2001 5:01 PM		
<b>Subject:</b>	<b>Re: More PI ideas / questions</b>		

Shea,

It's quite possible to get the same gain with a 12AT7 as a 12AX7, especially when using low-value plate loads with both (in this case, you'll probably get *more* gain with the AT). You'll also be pushing the output tubes a bit harder, which will translate into more overdrive and crunch; does that sound like what you want? 😊 Plugging a 12AT7 into a 12AX7 circuit, especially a *driver* circuit, will not give you a true feeling for what a 12AT7 is capable of IMO, although it will function.

I'm actually a real fan of 150K - 330K plate loads with 12AX7's, *provided that the tube is biased correctly for the new plate resistor*; this is not really a drop-in mod. Changing all the 1.5K's to 820's and then putting in 220K plate resistors would be an example of what *not* to do IMO; you would end up with a strange bias point and asymmetrical clipping. I would use a 2.7K cathode resistor instead, and the 150K plate/3.3K cathode combination also looks like a winner to me in TubeCAD (370V B+).

Ray

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<b>From:</b>	<b>KB</b> <a href="#">@</a>		
<b>Date:</b>	9/14/2001 5:56 PM		
<b>Subject:</b>	<b>Re: More PI ideas / questions</b>		

This is a totally different situation than the one we were dealing with trying to get mean instead of clean. The master volume type and the placement of the tone stack have everything to do with the pre-gain distortion before we even get to the PI. With the standard Fender style gain stage Volume pot tone recovery and maybe one more stage is not desirable for distortion. Now if you add some Cascaded stages and then a Cathode Follower driving the tone stack a recovery stage and then Master Volume, like a Marshall and all the values and -3db points change as well. Adding 150k plate loads and 820 Cathode resistors will certainly give you more gain but also noise with it and Ray's combination seems to be about as good as your going to get in that situation but IMO the Topology is the problem not circuit values.

Doc, haven't thought about that Presence pot but that is something to think about. I'll post when I do get all the values worked out and I hope you guys will too and I appreciate the positive mods here once again., The 12AU was just as good if not a little better as you said of course depending on which type you use.,

KB

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<b>From:</b>	<b>JWK</b> <a href="#">@</a>		
<b>Date:</b>	9/14/2001 11:40 PM		
<b>Subject:</b>	<b>33K using Aiken's method - could this be right?</b>		

Doc and Ray, thanks for the great info on this subject. I think I would rather go in this direction (lower plate resistors) for the kind of sound I am looking for right now.

I just got through walking through Aiken's page on designing a LTP using the load line method. I printed out a couple of plate curve charts from TubeCAD and went through all the steps using a 12AT7 instead of the 6SL7 he uses. Here is what I got:

33k plate resistors  
120 ohm cathode resistor  
10k tail resistor  
400v B+  
Vo is -50v, +56v

The component values seem strange compared to all the Fender type schematics I've seen, but the gain and Vo results are extremely close to the 6SL7 circuit on Randall's page. Since the 12AT7 takes a lot more current and voltage than the 6SL7 and mu values are close (60 and 70), I guess the lower resistor values make sense.

If anyone has a way of letting me know if these figures are good, please let me know. I still haven't figured out how to get TubeCAD to jive with what the load line produces for a circuit. I also need to know how one decides what grid resistors to use. What differences to using the smaller ones as on the aa371 compared to the "standard" type 1M found in most amps?

Thanks for the help.

John

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<b>From:</b>	<b>Ray Ivers</b> <a href="#">@</a>		
<b>Date:</b>	9/15/2001 1:26 AM		
<b>Subject:</b>	<b>Re: 33K using Aiken's method - could this be right?</b>		

John,

I come up with about a 330-390 ohm cathode resistor value, assuming 7 mA total LTP current flow, which your figures seem to indicate. I would not take this for gospel, though.

TubeCAD won't give you an LTP cathode resistor value directly. Instead, you have to calculate yourself how you want to divvy up the total tail resistance and cathode resistance to end up with the grid voltage TubeCAD says you need, for the total LTP current flow you've chosen. It's a little clunky, but it can be done. Alternatively, you could use a 10K pot instead of a tail resistor initially, adjust it for desired LTP current flow, and then replace it with two fixed resistances.

Ray