Subject: Optimum range JBL 2226
Posted by SteveBrown on Thu, 28 Jan 2010 00:14:57 GMT
View Forum Message <> Reply to Message

I did a couple searches with no results, though I'm sure this has been discussed before. I have a pair of 2226's. I have a feeling they take a good bit of power to get the stiff suspension to really take off. Playing at 90db is a lot more fun than at 75db and a 30w amp makes these come to life more than a 2w amp - nevermind the 97db spec. Have others found that to be ture? But my bigger question goes to this, what is the optimum range for these guys? I see stuff that says 600hz tops, and not below 60. I see specs that seem to suggest 45 on the bottom is easy, and up to 2.5k on the top. So what is really the best bet? Here is where I'm going on this... in a two way system, do I really want a 0.5way speaker? I mean, if it is really only good for 70hz to 600hz, and needs 30+ watts, should I sell these and get a different woofer?

Subject: Re: Optimum range JBL 2226
Posted by Wayne Parham on Thu, 28 Jan 2010 02:02:22 GMT
View Forum Message <> Reply to Message

As you know, I have a lot of experience with the JBL 2226 woofer. I've used 'em new, old, run with only flea power, beat to snot with arc welders, reconed, re-dust-capped, etc. So I think I have a pretty good handle on these woofers.

To use them just to 600Hz is a waste, in my opinion. Any old woofer will reach that high. The real strength of the 2226 is how well it behaves up high, not down low. It truly is a midwoofer.

That said, in my cornerhorns, they're only used up to about 300Hz, but it's with a first order slope so there's a pretty fair amount of overlap. Still, I think the main thing that sets the 2226 apart from most other woofers is its ability to play clean through the midrange.

So the range is definitely 40Hz to 1.6kHz. Now, mind you, at the top end, the beamwidth is definitely narrowing. That is a good thing when used properly, matched to the next adjacent subsystem. These things can easily be crossed anywhere between 800Hz and 1.6kHz. Response up there is very smooth, cone motion is well damped and it sounds nice. Beamwidth is just where you would expect for a round direct radiator, about 90° around 1kHz to 1.2kHz or so.

As for power, I think they sound just fine with flea power, even down to those little 2 or 3 watt 45 and 2A3 amps. But to me, that's just not enough power for a 97dB speaker. It's just a simple matter of headroom to me, you just don't have enough oomph. But for low volumes, it sounds fine. Give 'em 10 or 20 watts and they're getting enough power to play quite loud.

One thing I do see, on a similar note, is these woofers really have stiff suspensions when new, straight out of the box. I generally make speakers that are slightly overdamped, a conservative alignment with gradual rolloff slope. This allows for electro-mechanical shifts from (high power) heat and other conditions. But the 2226 is so stiff when new that they measure slightly underdamped. In a more traditional cabinet tuned closer to max-flat alignment, they can sound really thumpy at first, with too much 80Hz midbass from the excessively stiff suspension shifting

the system towards being pretty heavily underdamped. So if you're using a low-power amp, give 'em some juice for a while first. They won't sound all that great until you do.

Subject: Re: Optimum range JBL 2226
Posted by SteveBrown on Thu, 28 Jan 2010 04:00:58 GMT
View Forum Message <> Reply to Message

Thanks, Wayne! I know you're a 2226 guru, so I appreciate the input. Mine are at least 5 years old, so I think they're busted in. In fact, one still has a dust cap with a finger hole from a 5-year-old in it (no, it wasn't Eddie). But I don't find them wonderful at late night low levels, and I'm still working to find just the right way to cross them to the higher speakers. I've been playing with some Fostex FE167's Open Baffle crossed at about 1200 khz (1st order). Okay, but in my small room, I think they need more space to really showcase the open baffle bit. I'd love to use the horns I have but again, the small room isn't ideal, unless you want a laser beam right between the eyes. What I'd really like to find is a good "normal" tweeter to pair with it, like the old Dynaco A25 (which I've been experimenting with). First order on the tweeter, no crossover on the woofer, cross about 2.5khz. Do you think the 2226 is okay to 3khz? I've got some Aurum Cantus GS2i (I think) ribbon tweeters of similer effiecency, but hesitant to toss them in there due to the intollerant nature of ribbons crossed too low. Any thoughts are appreciated. I don't think horns (given my smallish room) are for me.

Subject: Re: Optimum range JBL 2226
Posted by Wayne Parham on Thu, 28 Jan 2010 13:53:08 GMT
View Forum Message <> Reply to Message

No, you can't push the 2226 to 3kHz, it's out of gas by there.

Keep us posted with your progress!

Subject: Re: Optimum range JBL 2226
Posted by SteveBrown on Thu, 28 Jan 2010 21:29:02 GMT
View Forum Message <> Reply to Message

Right now I've got a pair of Fostex FE167's on open baffle on top of the 2226 cabs, using a Parts Express 500hz 2nd order crossover. Sounds pretty good. I'm sure given our icy weather, I'll be having some more time to play with this over the next couple days. In the mean time, quick question for Wayne or other smart guy: do I need to reverse polarity on the top or bottom to make it all in phase? I seem to remember that the 2226 is backwards or some such thing? If I just keep all the +'s and -'s stright through, are we okay, or one needs to be swapped? Thanks!

Subject: JBL 2226 Usage
Posted by Wayne Parham on Fri, 29 Jan 2010 01:10:54 GMT
View Forum Message <> Reply to Message

I meant to say this earlier, but then got busy with my morning things and just clicked "send". I wonder if what you're hearing (or missing) at low levels is a Fletcher-Munson thing. I could understand that, 'cause the deep bass needs more volume at very low power levels, according to the Fletcher-Munson curve and 2226's are really midwoofers. They're detailed to my ears even at the lowest levels. But deep bass drivers, they're not. Might try and add subs and see what you think.

Your three-way approach might work nicely too though. One thing I like about that is it gets all the vocals and most instrument fundamentals from one source, the midrange or fullrange driver. The woofer just covers the modal region, which is an entirely different animal. So it lets you deal with that specifically, and just by having the two sound sources overlapping in the upper modal region, you'll get some smoothing. Just run a first-order low-pass on the woofers somewhere in the 150Hz to 200Hz range and let the mids run all the way down, overlaping as far down from there as they'll go. This give more sound sources below the Schroeder frequency, which most agree is a good thing.

As for polarity, yes, the 2226 has what most would consider to be reversed polarity. Positive on the black terminal gives forward cone motion. So in general, you'll want to connect the woofer with positive to black. But when you start measuring stuff, sometimes you want it the other way around depending on driver spacing and crossover phase.

If you crossover as I suggested around 200Hz with a low-order low-pass on the woofer and run the mids all the way down for overlap, this becomes a different issue, even more complex because it includes room modes. It is non-trivial to know what is the "right" or "wrong" way to connect, because what combines constructively in one area of the room will probably combine destructively in another area of the room, forming modes.

Room modes are why it is good to have several sound sources, because where one driver self-interference (from a wall, ceiling or floor) forms a null, another driver self-interference may form a peak, somewhat averaging to smooth the overall sound field. This kind of thing only happens from about 200Hz down, and so this peculiar arrangement using several sound sources having several phase relationships only really works in these lower frequencies. Above that, you really want a single sound source, or where multiples combine, they should be in phase.

Long story short: Remove the 500Hz crossover and instead use a 5mH coil in series with the 2226. Don't use a series cap on the FE167 - let it run all the way down. I'll bet a months worth of lunches it sounds waaaaaay better that way.

Subject: Re: JBL 2226 Usage
Posted by SteveBrown on Fri, 29 Jan 2010 01:46:42 GMT
View Forum Message <> Reply to Message

Thanks for the great answers, Wayne! Closest I have to 5mh on hand is 7. So I'll give that a try and see how she sounds. Even with the OB 167's pretty close to side and front walls, I really like the texture and imaging. Very wide and deep. Instrument placement is excellent.
On the fletcher-munson thing, I have some vintage amps and I've tried the "loudness" compensation, it does improve bass w/low levels, of course, but becomes a bit too bass heavy. I'll be the whole loudness comp thing could be better done if adjusted for room issues.

Subject: Re: JBL 2226 Usage
Posted by SteveBrown on Fri, 29 Jan 2010 03:07:38 GMT
View Forum Message <> Reply to Message

I took out the 500hz crossover. Added 7mh for the woofer. It sounded really shouty with the FE167's running full out. I put a series 40uf oil cap in series with the 167's - sounded much better, still kind of shouty especially with horns (listening to Chet Baker). Next I added 4.5ohm 12W mills in series w/167 (it was the lowest value decent resistor pair I had on hand). Now it sounds very well balanced, maybe a touch tilted toward warm side. The 167's (IIRC) are 94db but being open baffle should be 97 in room (or 100? Not sure if it is +3 or +6db). with the 2226's being 97db I didn't think I'd need to pad down the top at all, but apparently yes. I'll live with this a bit and see how it goes. My next thought is to put a small HF comp cap across the 4.5 to see if we can get just a tad more out of the top end. FWIW, we're seeing peaks of 85db right now. Not too loud.
Thanks for your suggestions, Wayne!

Subject: Re: JBL 2226 Usage
Posted by Wayne Parham on Fri, 29 Jan 2010 06:03:28 GMT
View Forum Message <> Reply to Message

I thought about mentioning padding in my last post, but kinda figured you knew to pad the mids to

The adjustable L-Pad would give you some flexibility.

I'd be careful using a high-pass cap with a series resistor, because that might make a peak in the mids. Depends on the values. But even if they were right, the series cap limits overlap down low, which prevents you from taking advantage of mode smoothing. Got any ol' L-Pads lying around?

Subject: Re: JBL 2226 Usage
Posted by SteveBrown on Fri, 29 Jan 2010 20:17:05 GMT
View Forum Message <> Reply to Message

Having a bit of time today to play (given our awful weather), I did as you suggested - removed the cap and series R, replaced w/8 ohm Lpad. Only listened a few minutes so far, but sounds very nicely balanced (at about 50% on the pad). Part of my rationale on adding the cap in the first place was to limit cone movement on low passages, I have always found that isn't great for sonics on the Fostex speakers, so we will see about that. For now, sounds good without it.

Subject: Re: JBL 2226 Usage
Posted by Wayne Parham on Sat, 30 Jan 2010 00:29:02 GMT
View Forum Message <> Reply to Message

I agree with you on limiting cone excursion on mids and low xmax drivers using a high-pass filter, and wouldn't have suggested removing the high-pass if you were running any real power to the drivers.

What we have is competing priorities: Increasing the number of sound sources in the modal region is a good thing because it smoothes that range. This is why there is an advantage running the mids/mains all the way down as low as they'll go. But then there's the IMD/excursion issue, and you definitely don't want to push the driver close to xmax. If you need higher SPL, then it makes sense to high-pass the mids/mains because they'll likely see some power. To me, the balance is struck where power requirements don't exceed xmax at the lower limit of the mid/main passband.

Subject: Re: Optimum range JBL 2226
Posted by spkrman57 on Tue, 09 Feb 2010 10:54:37 GMT
View Forum Message <> Reply to Message

Hi Wayne!

Steve (Brown)is going to build the Steve Bench tubed electronic crossover for me to use. I plan to have the frequency set at 800hz and use my McIntosh MC-240 amp on my JBL 2226J's(SS amp for summer time use to keep heat issues down), for the top end will be my 300B amp on Altec 299 (1 - 3/8") driver mounted on either a 500hz or 350hz Edgar round tractix horn.

I have used electronic crossovers in the past, but did not like the inclusion of SS sound into my mainly tubed system. So this will be my way of jumping back into bi-amping!

Do you know of anyone who has built those crossovers, and what did they think of the results?

Regards, Ron

Subject: Re: Optimum range JBL 2226
Posted by Wayne Parham on Wed, 10 Feb 2010 01:15:28 GMT
View Forum Message <> Reply to Message

A few guys from the forum have made them, and I think they were all pleased with the results. Hopefully some of them will chime in. It's been a while though, and I don't remember exactly who all built that circuit. I remember talking a lot with Sam P. about the crossover and power supplies for it. I Suppose I could go back through the E-Mails from the early 2000's and find some of the others.

I built a couple way back then, and thought they sounded good. I've made improvements since then though, so it's probaby worth dusting the boards off and trying them out again. I'm pretty sure my new passives are better because they've been optimized. But I could do the same thing with the actives. That's where you get the Nth degree, in my opinion, by dialing them in to place the forward lobe and the vertical nulls precisely where you want them. I used to do this with meticulous, time-consuming manual calculations and I still do that for initial crossover values but now I refine that with measurements.

Crossover optimization for DI-matched two-way speakers