

On Dec 12, 2005, at 6:57 PM, cliffchappell wrote:

Hi Alex,

I hope you don't mind an unsolicited email... BUT, allow me to introduce myself. I'm Cliff Chappell and, since you've been hanging around AX84 a while you've probably seen my name 8-). I'm one of those folks who were involved in the updates to the P1, Ho, and P1eX projects. I was not one of the circuit designers on any of those amps (I am in no way qualified to do that), but I was the one who took it upon himself to kick-start things, keep them going, produce the documentation, and to build and test the prototypes (I guess I consider myself the Project Manager). It was one hell of a lot of work. Now, I'm ready for the next project:

The AX84 Speaker Cab Project!

That's where you come in. I'd like to know if you would be interested in designing a AX84 speaker cab or two. I've read your posts on AX84 and you appear to be one who isn't afraid to take a little heat. I don't know anything about the subject, and you seem to be knowledgeable and passionate about it. So I have a question for you:

1. Are you willing expose yourself to the peanut gallery?" 8-).

What I have in mind is two cabinets to begin with, a sealed cab with a single 12" speaker (I'm open to suggestions as to the make/model, probably whatever is most commonly used), and a open-backed cabinet with a 12" Celestion Blue or 12" Weber Thames.

I think those two general setup will please a pretty good segment of AX84'er. We have one setup for the modern style (metal/rockers), and another for the old school style (blues/rockers - that would be me 8-).

You, of course will get all the credit, and blame, for the design ;-).

Please let me know what you think, and thanks for your time.

Cliff Chappell

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Sent via the EV1 webmail system at mail.ev1.net

Hey Cliff.

Sounds like fun. I'm in.

As far as the 'peanut gallery' is concerned... I inadvertently exposed myself when I posted a link to sound samples on my MySpace site, so the cat is already out of the bag, and I have never been afraid to take it on the beak for my designs and opinions. HA!

I am actually working on a few 1x12" sealed designs as we speak, so I could easily tweak what I am working on for whatever speaker the boys prefer... greenback and Vin 30 seem to be the popular ones these days. I was designing around the Jensen MOD 12"/50w since they have nice theile specs and are cheap! But I can get ahold of a Vin30 for testing purposes easily. My goal is to get the response of a 4x12" cab into a 1x12" format, so I think that will go over well with the boys.

I have a full speaker design and testing suite on my computer, so I can get empirical evidence of the stuff too. I usually just slap the enclosures together out of Home Deopt pine to test them out, and then make more permanent versions if they work for me.

Lemme know more what you are looking for and I'll get it going.

Peace

Alex

PS, here is me:

<http://www.myspace.com/aletheian>

[www.aletheian.com](http://www.aletheian.com)

On Dec 13, 2005, at 11:36 AM, cliffchappell wrote:

> Sounds like fun. I'm in.

Great!

> As far as the 'peanut gallery' is concerned... I inadvertently  
> exposed myself when I posted a link to sound samples on my MySpace  
> site, so the cat is already out of the bag, and I have never been  
> afraid to take it on the beak for my designs and opinions. HA!

Thick skin, check! That'll come in handy 8-).

> I am actually working on a few 1x12" sealed designs as we speak, so I could easily >tweak what I am  
working on for whatever speaker the boys prefer... greenback and Vin >30 seem to be the popular ones  
these days.

That seems to be what I see a mentioned a lot, but don't forget about the Webers. Those Blue dogs and  
Silver Bells have a good following too. I post up a poll and see what everybody is using for sealed cabs  
with single 12" drivers, and we'll see what it  
looks like.

> I was designing around the Jensen MOD 12"/50w since they have nice theile specs and >are  
cheap! But I can get ahold of a Vin30 for testing purposes easily. My goal is to get >the response of a  
4x12" cab into a 1x12" format, so I think that will go over well with >the boys.

>

> I have a full speaker design and testing suite on my computer, so I can get empirical >evidence of the  
stuff too. I usually just slap the enclosures together out of Home Depot >pine to test them out, and then  
make more permanent versions if they work for me.

>

> Lemme know more what you are looking for and I'll get it going.

OK, here are what I see as the general design parameters:

1. Cabinet depth (front to back) is 11". That way solid wood, plywood, MFD, etc can be used. I'm a  
hardwood fan myself, and I have a 1" x 12" x 10' piece of flamed maple just waiting in the woodpile☺.
2. The cabinet MUST work with all 12" speakers. OK, I just put that in there to freak you out :) But, if  
it is possible, let's make it work with as many as we can. It can be dialed in for one particular model as  
long as it works for others. Otherwise, no one will be interested in it.
3. As portable as possible.
4. It has to sound great when being used with all of the popular AX84 amps from 1W to 50W.

Now here is where I start thinking out loud, and you start thinking that I'm off my meds, but...

You mentioned getting a 1 x 12 to sound like a 4 x 12. But wasn't it you that posted that a lot of people  
use 2 x 12's stacked because they sound better? So should we shoot for the sound of a 4 x 12, or a 2 x  
12, or a stacked set of 2 x 12's. Or maybe we should shoot something entirely different. I guess what  
I'm saying let's not just try to "re-create" an existing sound, let's come up with something BETTER!.

Why a sealed cab? What about a ported cab? Maybe then we don't need open and closed designs. I don't know anything about the technical aspects of this, so you'll have to tell me if I'm off my rocker. Can you design a generic box for any 12" speaker, that is then fine-tuned via a port(s) for different speakers?

Let me know what you think, or if you want to bail out,

Cliff

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Sent via the EV1 webmail system at [mail.ev1.net](mailto:mail.ev1.net)

Alex wrote:

Hey man,

That's all cool. Many popular guitar speakers fit into the VAS category of "around 45 liters" and the Qts category of "around .55", so I'll work around that assumption to make it as flexible as possible with popular speakers. I'll take the most popular speakers on the AX84 board and average all the values together and use those #'s.

The porting can be tuned so that the same cabinet dimensions can be used as the sealed cab, and all they have to do is cut two round holes in the rear or maybe front (if they will fit) baffle for the ports. I'll tune the diameter of the holes to work by the length of the port being equal to the thickness of the lumber being used so that porting tubes will not be necessary. Off the top of my head, that will probably look like 2 holes that are somewhere around 2.75" each, but I'll have to do all the math later.

In the tuned version, with those speaker specs, will look like a more flat response, with the low cutoff being dropped about an octave, and the low-mid hump being flattened a bit.

As far as making it sound like a 4x12" you are tight... screw that, let's make a killer sounding cab instead. I do lots of recording, and my main EQ curve for guitar looks like a low end rolloff at 65Hz or so, a peak around 120Hz-170Hz ish, a cut around 250-350Hz, another cut at 900Hz-1K, a peak at 1.5K, and a rolloff after 5k, so if a cabinet can be made to emulate that curve a bit, that would be super! I'll set the Q of the system to have a peak around 150Hz, and a F3 cutoff around 65hz or so. The high cut will be dictated by the speaker, but the midrange contours will be set by the modal cancellation that is dictated by ratio of the length of the sides of the cab... so I'll get on that math.

As far as the depth of the cab, I also set my cab depths based on the width of Home Depot lumber... which is usually 8", 10", and 12" with 10" being the most popular (usually 10" lumber is called a foot) for paneling of Oak, Cherry, mahogany, maple etc.. The front and rear baffles will sit inside, which will take up about 1.5" of front-to-back depth for 3/4" lumber (they call it 1" lumber for whatever reason) plus, the front baffle will have to be set-in at least 1/2" to allow for the speaker to be optionally front-loaded, and to mount a grille cloth, so the internal dimensions will look like  $10" - 1.5" - .5" = 8"$ , which is workable.

Peace

On Dec 13, 2005, at 2:40 PM, cliffchappell wrote:

Cool!

Once you get the dimensions, I'll produce the drawings and let you have a look. I'm sure we'll have to go back and forth several times before the prototype. Are you saying that by simply using a different baffle board (provided we can get the holes to fit in the front), the cab can be converted from a closed to open design and sound great with most of the popular speakers? Man, that would be really cool!

> As far as making it sound like a 4x12" you are tight... screw that,  
> let's make a killer sounding cab instead.

That's the spirit!

As far as the depth of the cab, I also set my cab depths based on the width of Home Depot lumber... which is usually 8", 10", and 12" with 10" being the most popular (usually 10" lumber is called a foot) for paneling of Oak, Cherry, mahogany, maple etc..

I'm lost on most of the stuff you are talking about as far as the design of the cabs goes (especially the math 8-), but I can help you out here. First, visualize a tree 8-). Sometime you should visit a lumber yard that has rough-cut hardwood. The cabinet grade lumber that they get from the mill (the 1" thick stuff) varies quite a bit as far a length and width goes. It has one fairly straight side, and one fairly smooth surface (width) that were created at the mill. The other surface (width) usually has a few more blade marks and the other edge will be pretty uneven. In many cases there will even be bark on that edge.

Anyway they call it S2S (surfaced, 2 sides) around here. So say you pick a 1" x 12" x 10' peice of cherry. If you measure it you'll find that it's a minimum of 1" thick by 11-3/4" wide by 10' long. Typically, they are larger in all three dimensions, but it's planned that way because a bunch of material is removed when the board is planed to create a S4S board like you buy at Home Depot. First the edge-plane the edge that was pretty straight from the factory, removing about 1/4" of material. Now that they have one true surface, they flip it over and remove as much as needed to bring the final width to its final dimension. Then they run it through a surface planer that remove 1/8" from the top and bottom. That leaves you with a peice of lumber that is the same as the dimensions you see at the store.

For your reference, here is the standard dimensions for S4S lumber:

1" x 4"	3/4" x 3-1/2"
1" x 6"	3/4" x 5-1/2"
1" x 8"	3/4" x 7-1/4"
1" x 10"	3/4" x 9-1/4"
1" x 12"	3/4" x 11-1/4"

The front and rear baffles will sit inside, which will take up about 1.5" of front-to-back depth for 3/4" lumber (they call it 1" lumber for whatever reason) plus, the front baffle will have to be set-in at least 1/2" to allow for the speaker to be optionally front-loaded, and to mount a grille cloth, so the internal dimensions will look like  $10" - 1.5" - .5" = 8"$ ,  
Which is workable.

Looking at the chart above, you can see why I suggested an 11" depth (from lumber that is called 1' wide). Lumber you get from the store will almost always have dings and such that need to be trimmed,

figure 1/8" from each side. Subtracting your numbers from what we have at that point ( $11" - 1.5" - 0.5" = 9"$ ) you now have a 9" depth to work with. On the cabs I build, I always use 5/8" cabinet grade plywood for the back panel. It's good quality, void-free, stuff. I inset it 3/4" which means that it's actually recessed 1/8" which is much neater looking. Hides all those nasty plywood edges 8-).

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Sent via the EV1 webmail system at [mail.ev1.net](mailto:mail.ev1.net)

Alex wrote:

Gotcha.

so 11" deep it is. And you say 5/8" think too? Cool. I'll work with that.

Another question is how the sides are joined.

If they are miter/finger/box/butt/dowel/dovetail/biscuit-joined with no bracing, then no problem, but I need to know the size of any bracing that would be in there if it is a braced-butt joint or baffle brace to compensate in the calculations for the internal volume that they take up, as well as that of the speakers (which I can figure out) and any hardware that is inset... like a deep dish handle, although I doubt that would appear on a 1x12" cab.

And yes, I can work it so that the dimensions work with ported or sealed back just by sawpping the rear baffle. Actually, it could even be a 2 part rear baffle that would allow one side to be removed/replaced for sealed/ported/open variation

Peace

alex



On Dec 13, 2005, at 3:25 PM, cliffchappell wrote:

Alex,

Only the back panel is 5/8" thick. That's so that we can inset it 1/8" to look good. The inner surface of the panel will still be 3/4" in from the outer edge. So your inside depth dimension will be 9".

Biscuits, probably! All that bracing looks terrible, and if good glue is used, the cab ought to be plenty strong. Figure on 1-1/2" x 3/4" strips biscuited and glued to the sides, to and bottom (on their 3/4" side) for the baffle mounting.

That would be really great. If we can make it a two piece back, with the lower portion fixed in place with biscuits and glue it would really firm things up. And if the rear fixed panel is 3/4" hardwood it will flush with the outside surface. The removable panel can still be inset to hide the plywood edges. But we would still need to be able to get the speaker out without removing the front baffle I suppose. Sound workable?

I know you haven't done the calcs yet, but do you have any feeling as the the approximate outer dimensions this thing will have? Just a ballpark figure?

Cliff

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Sent via the EV1 webmail system at mail.ev1.net

Alex wrote:

Well, just a rough guesstimate, the 'golden ratio' numbers would be 9x15x24 internal size (so add the wood thickness to that). But I'll have to tweak that to dial in the proper modal/standing wave numbers to get the desired EQ curve, so the 9" will be set in stone, but the ratio of the width to height will be varied, so it would PROBABLY look SOMETHING like 9x18x21-ish.

That will give a system Q around 1 for a general Celestion speaker or knockoff, with a sealed back low F3 roll off under 79Hz, and a 2dB peak resonance at 140Hz, and if it were fitted with a pair of 2.75" ports in the rear baffle with a thickness of 5/8", the tuned freq would be around 73Hz... perfect for Drop D stuff, and the f3 rolloff would be around 70Hz.

Those measurements could vary by a few inches depending on the results of the speaker poll though, contingent on how much I have to change the internal volume.

Also, I called Eminence to get full specs for their Vin30 clones (Governor, V12), Alnico Blue Clone (Red Fang), and Greenback clone (Private Jack) so I'll know more when those arrive. I can base the Celestion and Weber stuff off of those numbers as well since they are clones and will be very close in performance (Celestion will not give up their specs, but I may go through the bother of measuring them myself and posting them EVERYWHERE)

Peace

Alex

Alex wrote:

I ran a bunch of numbers and it looks like the aspect ratio that corresponds to the 9" x 18" x 21" will work pretty well, even if the actual lengths change. With a smaller cab, speakers with a high Qts and a low Fs work out best for low end, so something like a Greenback family speaker (Blue/Red Fang/Legend V12/Private Jack) would sound better than a Vin30 family speaker (Swamp Thang/Governor) although the Vin30 family will emulate a 4x12" a bit more with it's slightly muddier sound and midrange thrust.

I'll have concrete numbers when I get the speaker parameters together.

Peace

On Dec 14, 2005, at 9:11 AM, cliffchappell wrote:

Morning Alex,

OK, so our current outer dimensions (subject to change) are looking like 11"D. x 19 1/2" x 22 1/2". So, allowing for rubber feet on the bottom, it sounds like the head cabinet will occupy the space from about 24" to 34" above the floor. I just marked those dims out on the wall here at work, and it looks as though the knobs on the head will be right at the lower reach of my hand without bending over (I'm 5'10, without long arms 8-), so that's just about perfect. If it gets a little taller, no problem. Sounds like there will be plenty of room for ports in the front baffle. Is that the best place for them?

Amazing! I think this is going to work out great. Take a look at the poll numbers so far:

Eminence Governor	1
Eminence Legend	1
Eminence Wizard	1
Celestion Blue	2
Celestion G12H30	5
Celestion Seventy/80	2
Celestion 25-watt Greenback reissue	4
Celestion V12-60	1
Celestion G12H100	1
Weber Blue Dog	3
Weber Ceramic Silver Bell	3

Seems like what is popular in the polls is exactly where your design is heading. I gotta admit, I gettin' pretty excited about this 8-).

Cliff

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Sent via the EV1 webmail system at mail.ev1.net

Alex wrote:

Yeah, it looks like things are definitely headed in the Greenback/Alnico-Ceramic Blue direction, whether that be Weber, Celestion or Eminence.

I just got the full specs from Eminence on their various Greenback and Celestion Blue clones and I am looking over them right now. Some of the parameters are waaaaaay different than their online literature would have had me believe, so I need to do some tweeking. I was working up a computer model of the various cabinet options last night that I can import the speaker's freq resp curves into to see what the thing will sound like when it is together. When I have any freq curves I'll e mail them to you, but this software is a bit quirky, so I have to get used to it a bit first.

From what I DID do last night, it looks like I might change the ratio of the sides a bit because there is an ugly modal pileup at 750Hz that may make things bit muddy, but there are tangential cancelltions at 820 and 1K, so maybe it will be cool, I'll have to see what it looks like with the various speakers superimposed over it. adding another 3/4" to 1" to the longer (the 21") side, or cutting the shorter side ( the 18") by that much would smooth that hump out a bit.

Peace.

OK man,

It is looking like the best overall compromise for sealed/ported/open cabinet in a 1x12" across the Greenback/weber family and the Vin30/Eminence family is 55 liters. That's a bit larger than I wanted to go, but it is a good balance between the three box designs and between those two families of speakers. From the raw numbers, it looks like the Greenback/Weber/Red Fang/Private Jack will sound a bit better, but the Vin30/Governor/V12 with the back sealed would do an almost dead-on impersonation of a small Marshall 4x12" cab... which was unplanned, but a nice option nevertheless.

As far as the port goes, the best way to do it is to to split the rear baffle, and make one pannel removable/replaceable with a ported pannel, sealed pannel, and removed entirely for open backed. The port should be centered to the cone's diameter axis, but offset from it's center, but it really does not matter that much. It's placement will only effect the axial and tangential modes, which are not that strong anyway.

The port needs to be tuned at least as low as the lowest note on the guitar since the suspension of the speaker will be the only thing protecting it from over-excursion if you feed it a frequency below the cabinet's tuned freq. With the volume of 55L, and a rear baffle thickness of 5/8", the port could be either 5.25" circle to tune it to an open E, a 4.25" hole to tune it to 'Drop-D' or a 3.5" circle to tune it to the popular 7-string/baritone range. It does not hurt to go lower, so the 3.5" hole is probably the best bet, but the lower you tune it, the flatter the lower-mid response will be... which is not too bad since small cabinets tend to have a boxy quality to the lower mids anyway.

But 'boxy' frequencies, in small doses, can also be construed as 'warm' so the sealed back arrangement will give that option, while the open back will sound more... well... open and loose. Open back "tubes" the cabinet more to the resonant frequency of the speaker than anything else, which is usually closer to the lower-mid area, and that is why the bass sounds more loose and the overall tone is a bit 'warmer'. It

also lets the speaker 'freak out' a bit since it is functioning below the enclosure tuning for most of the low E string stuff, which is another characteristic of an open back... loose and tough on speakers. it lets it 'break up' at a lower power level.

Assuming a total displacement volume of about 4 liters or so for the internal bracing and speaker magnets, the INTERNAL dimensions of the box should be 22" x 18-7/8" x 8-2/3". The 8-2/3" can be accomplished by setting the front baffle in an extra 1/3"... no biggie. That, combined with the additional 7/8" in height, will drastically improve the reduce the ugly 800Hz 'honk' factor, and the 400Hz 'mud' factor, so it is definitely worth doing.

I'll run the frequency response numbers tonight and give you a general outline of what it will look like. I also plan to build the cab this week if I have time to get some lumber, so that I can put a mic on it and see how closely reality sits to the world of abstract math.

Unfortunately, I only have Swamp Thangs and Celestion Vin 30's here to test it with. If I had the cash to pick up one of the weber 1230's or a greenback/private Jack/Red Fang, then I'd test those too, but I'll see about borrowing them from some guys.

Peace

Alex

Alex wrote:

Cool.

The Red Fang is \*close\* enough (but no cigar...) in general spec to the Celestion Blue that any calculation for one will apply to the other. It looks like the Blue will sound better overall in this cab than a Greenback, but the Greenie will have a bit more bite. Unfortunately, Celestion do not have their specs available, BASTARDS. But it looks like just about any common speaker will sound 'good' in there, just different flavors. They do have the response curve you though, so I can make a composite curve for the speaker in the cab, which is really all that counts. The 'missing' T/S parameters just let you know how deep the bass will go and where the resonant peak will be, which I can 'guesstimate' based on the other models with similar voice coils and magnets.

Consequently, the old Legend V12 looks like it will sound real good in there, as well as the Jensen MOD 12"/50w. Both look like they will give a nice solid bass response for the heavier guys, and V12's have a reputation for mellowing out buzzy sounding amps nicely. I have a Legend 125 here that I can test too. It's in a Fender combo that I am repairing.

As far as the port location on that back... not critical, so don't worry about it, just put it wherever as long as it is not directly in the center of the cab or too close to the sides. So like you said, near the outer edge of the cone and aligned along the center axis would be fine.

I have some friends that play Greenbacks and Webers, so I can get those if I ask real nice.

I couldn't get down to Home Depot tonight, so I'll get out there tomorrow hopefully and build a prototype to test.

Peace

Alex

PS I don't know if you also need info on how solid woods effect the tone, but I have a bunch of math on it somewhere that I will try to dig up if you are interested. As a reference, Oak, denser Cherry, Birch and Maple all have about the same density as MDF and pressed, void-free hardwood plywood. So anything at or over 3/4" will be pretty even toned. Exotic hardwoods are pretty non-resonant even at 5/8" since they are so dense. Pine, mahogany, softer maple, lighter cherry and oak, poplar, light walnut etc will all add their own coloration even at 3/4". If I had the time and \$ to build cabs out of a few different woods and slapped some contact sensors on them, then I could be more conclusive.

On Dec 15, 2005, at 9:45 AM, cliffchappell wrote:

Alex,

Do the 3/4" x 1 1/2" strips for attaching the front and rear baffles go on all four sides, or just the two sides in your model?

Also, did you allow for a horizontal one across the back where the fixed and removable panels meet?

If you didn't allow for the one across the back, it may not matter. I'm starting to wonder about the removable panel rattling and/or buzzing. Probably would be better to have multiple backs: 1 solid, one ported, and one with a large opening in the middle to simulate the typical "open back". What do you think?

Cliff

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Sent via the EV1 webmail system at mail.ev1.net

Alex wrote:

I figured that they would be on all 4 sides of both the front and the back.

The longer strips will take up about .4 liters of volume each, and the shorter ones will be .3 liters each, so multiply each by 4 and add them together and that makes for 2.8 L of volume that they occupy I guesstimated about a liter to a liter and a half for the speaker, etc, so that works. A strip across the back for a split baffle would only occupy an additional .3 liters, so that is not critical.

There are actually a few boutique companies, and a few big companies that split the backs of their 4x12 cabs to allow for removal of one pannels, and they have never had any vibration problems. But if you have experienced issues yourself, then you could go with a whole replaceable rear baffle too, that is no biggie. It's only a 1x12" so it is not like it is a bunch of extra wood.

Peace

alex

PS

Here is a little reference sheet that I built up a while ago showing the relative densities and elasticity of woods. The velocity if sound in a piece of wood is a function of it's modulus of elasticity to it's density. it effects how quickly the wood can react sympathetically to frequencies... it works kinda like capacitive reactance, in that it

effects how much resistance there is at certain freq. The slower the wood, the more coloration generally, but you have to take into account thickness, grain of the cut and density too. Also the more porus the wood, the more freq combing, and woods like Spruce or Swamp ask that have internal chambers ans a harder exoskeleton will act like two simultaneous different typed of woods, reacting differently.

	A	B	C	D	E
1	SPECIES	Density Lb/Sq. Ft.	Hardness	GRAIN	MODULUS ELASTICITY (Mpa)
2					
3	MDF	~48	M/H	L	55k
4					
5	Alder	25-30	M	L - OPEN	9.5k
6	Ash	40-45	H	M	12k
7	Birch	40-45	H	M	13.9k
8	Cherry	~35	M/H	M	10.3k
9	Ebony	~30	H+	L	
10	African Mahogany	~35	M/H	OPEN	
11	Honduran Mahogany	~35	H	OPEN	9k
12	Hard (sugar) Maple	35-45	H	L - OPEN	12.6k
13	Red Oak	~45	H	H - OPEN	12.5k
14	White Oak	~47	H	H - OPEN	12.3k
15	Northern Pine	~25	S	L	
16	Western Pine	~27	S	L	
17	Poplar	~30	M/H	M	10.9k
18	Indian Rosewood	~55	H	H	
19	Spruce	~28	S/M	H - OPEN	10.3k
20	Teak	~45	H	H	
21	Black Walnut	~38	H	H	
22	Claro Walnut	~30	M/H	H	
23	Zebrawood	~48	H	H	

For cabinet purposes, MDF, and harder Oak, Rock Maple, Birch, White Ash, Teak, Zebrawood, Rosewood, etc will all sound pretty similar (unless they are thinner then they'll impart more character), and effect the tone of the cab minimally, which is why many audiophile speaker companies offer those woods as upgrades to MDF. Pine,

Mahogany, Poplar, Alder, Spruce, Swamp Ash, Walnut, etc will all color the sound uniquely, and definately make a noticable difference, even if they are as thick as 3/4".



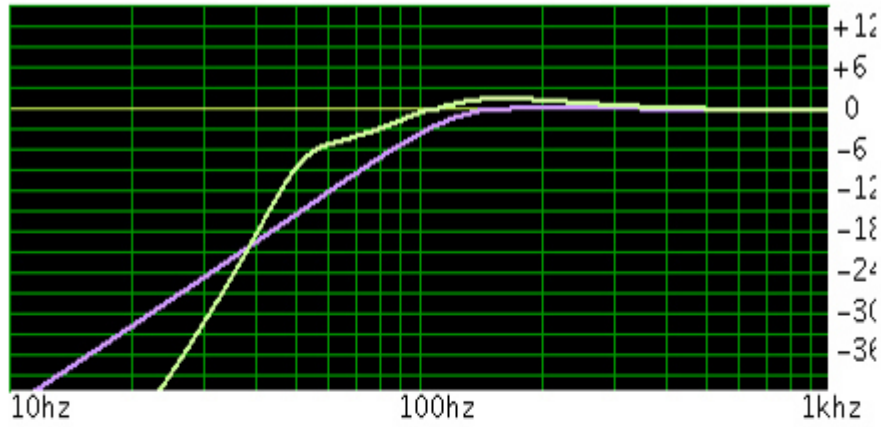
My personal cabinet has solid pine top/bottom/sides, and 3/4" thick hard maple plywood front and rear baffle. I found that combination to give a nice woody mid character with just enough snap on the top, and tightness on the bottom. I tried poplar, and it sounded a bit thin and dead, Oak sounded pretty even toned, Cherry gave a bit more flavor to the upper mids and highs, and MDF was almost completely flat across the guitar range.

Here is a small representation of what the low end of the cabinet will look like ported (green) as compared to sealed (purple). I used the averaged characteristics of the general high Fs/ high Qts Greenback family (Celestion G12H and G12M/Weber Blue, Red Fang, Private Jack, weber 1230, etc.) and the general lowFs/lowQts Vintage 30 family (Governor, V12, etc) for comparison. The graphs show the low cutoffs and peaks below 200. The 'Vin 30' sealed response actually has a small peak just over 200 that is not shown on the graph though. I can work out individual speakers too if you want... it is really no big deal.

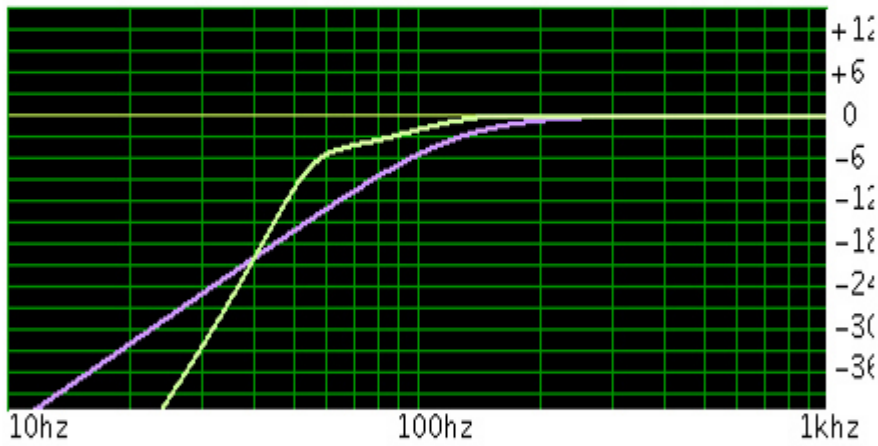
The bottom text is the axial modal piling. the frequencies in red will be boosted a couple dB by the cab. I don't have a graph for that yet... working on it. I also don't have a graph for the phase cancellation nulls, but I do know that they will be around 800Hz, 1.7K, 2.3K, and 3K.

The high end response of the cabinet will be determined by the high rolloff of the speaker, the type of cone and dust cap, the damping of the cabinet enclosure wood, and the type of grille cloth.

# Greenback



Vin 30



Calculated internal volume: **59.03** litres.

Standing wave modes

Mode	Height	Width	Depth
1	307 Hz	357 Hz	780 Hz
2	614 Hz	715 Hz	1.56 KHz
3	920 Hz	1.07 KHz	2.34 KHz
4	1.23 KHz	1.43 KHz	3.12 KHz
5	1.53 KHz	1.79 KHz	3.90 KHz
6	1.84 KHz	2.14 KHz	4.68 KHz
7	2.15 KHz	2.50 KHz	5.46 KHz
8	2.45 KHz	2.86 KHz	6.24 KHz

On Dec 15, 2005, at 3:10 PM, cliffchappell wrote:

Ahhh.... A most excellent post 8-)

\*\*\*\*\*

Avoid having them show up in red if at all possible. The black is OK. Red means that two or three of the dimensions are causing modes at that freq, so there will be a boost there, a bit one if it is all 3 dimensions.

here are some general guidelines for guitar freq:

<60Hz-rumble

80hz-lows/flubbiness

100Hz-boominess/fullness

250-350Hz-muddiness

400-500Hz-boxiness/woodiness/thickness

800Hz- cheapness

1.5k-2.5kHz-thrust/crunch

3k-attack/cut

5k - brightness

7k-8kHz-sharpness/presence

10k-fizz/sparkle

\*\*\*\*\*

Now, looking at the chart you attached to your last message, I see that you have mostly black numbers and no where do more than two reds line up. I also see that you have a moderate boost (two reds 2.15K - 2.50K) indicating you are tuning the cabinet for "thrusting crunchyness". Or am I off my nut again? 8-)

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Sent via the EV1 webmail system at mail.ev1.net

Alex wrote:

HA! Thrusting crunchiness indeed. I have noticed that the cabinets that people tend to like have that bump at 2k-2.5k, and at 1.5K -ish. So I was trying to preserve that in the design.

The low and high cutoff is just where the ability of the system (speaker+box) to reproduce sound above that level is down -3dB.. which is where the ear starts to take notice. At -6dB, you really hear a cut, and at -12dB, you can basically say there is nothing there for all intents and purposes.

The big difference between the Vin30 and Greenback families is the location of the 'hump' around 100-200Hz. The greenbacks are lower, so they will sound fuller and mellower, where the Vin30 will be a bit more midrangey and rude.

The drawings that you sent look cool. You might want to consider closing up the back a bit more in the 'open back' arrangement by altering the ratio of the two baffles. Most 'open backs' are actually 50% to 75% closed, and actually, as a rule of thumb, any opening that is at least 30% of the size of the baffle or over is essentially open, but Fedner, vox and the like have found that closing the back up somewhat reduces phase cancellation (which reduces the loudness, and alters the freq response depending on how loud you are playing) from leakage around the cabinet. Consequently, that is also why there is a larger enclosed section at the top of the cabinet than the bottom, because the floor prevents leakage that direction.

Peace

Alex wrote:

The drawings that you sent look cool. You might want to consider closing up the back a bit more in the 'open back' arrangement by altering the ratio of the two baffles. Most 'open backs' are actually 50% to 75% closed, and actually, as a rule of thumb, any opening that is at least 30% of the size of the baffle or over is essentially open, but Fedner, vox and the like have found that closing the back up somewhat reduces phase cancellation (which reduces the loudness, and alters the freq response depending on how loud you are playing) from leakage around the cabinet. Consequently, that is also why there is a larger enclosed section at the top of the cabinet than the bottom, because the floor prevents leakage that direction.

Alex

Cliffchappell wrote:

OK, how about this, then. I rotated the port around so that it is at the bottom center of the speaker edge. Next I positioned the center brace to clear the three optional port holes. So removing the ported panel at the bottom creates the "open" cab, or replacing it with a solid piece creates the "closed cab. Total area of the back is 415.25 square inches. The area hatched in cyan is what will be open when the panel is removed. It is 107.16 square inches in area, or 25.8% of the total. That look good to you?

Cliff

Alex wrote:

I threw together a proto cab from 3/4" pine and MDF today. I just used butt joints with drywall screws and wood glue to get it together quickly. I'll be tossing in a few different speakers this week and making some sound clips. I don't have any AX84 style amps together at the moment, so I'm going to build up a breadpan hi-octane tomorrow to make the clips with. I'll make sealed and ported clips for your perusal. I'll be making some clips with a Fender reverb too and a Soldano, just for reference.

Peace



It's no biggie to build up an HO. It'll take an afternoon, and I have been wanting to make another one for a while now anyway. I'm also going to gook up a switch to bypass the components that will turn it into a P1-eX, so that way I can represent a wider portion of the AX84 projects. i have all the parts here except the OT, because I put it in a reverb circuit, so I ordered a \$5 cheapie and I'll be getting it in a few days (I hope).

Also, I was hunting around for parts the other day, and stumbled across some recessed round speaker wire terminal plates that are the right size to plug up the port on the cab. if I can find a supplier that has them without the wire stud mounts pre-drilled, that may be another option to switch between ported and sealed configuration without having to have 2 rear baffles. Maybe mount them with brass threaded inserts and thumb screws from a hardware store. Just a thought that might save a lot of work.

Peace

Alex

From: Alex Kenis <[alex@aletheian.com](mailto:alex@aletheian.com)> [Save Address](#)

Subject: Hey man

Date: Mon, 9 Jan 2006 00:06:37 -0500

To: <[cliffchappell@mail.ev1.net](mailto:cliffchappell@mail.ev1.net)>

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Sorry about the lack of sound clips. I traded in a 'Swamp Thang' for a 'Private Jack' and I am waiting to get it in the mail. I figured the clips are no good if I was using a type speaker that was not at the top of the list. The 'jack is more in the Greenback/Weber family, so it would be a better representation than the Swampy.

I'll let you know when I get it in.

Peace

Alex

Yeah, there are a LOT of speakers out there these days. I wish that I had access to more, because I would do up graphs for each model. But anyway, I guess the important speakers to hit would be the ones that you listed. They fall into 3 tone categories: Greenback, Blue, Vin30.

Celestion:

G12M / H "greenback"

Vintage 30

Blue

Eminence:

Red Fang (Celestion Blue Clone)

Private Jack (greenback clone)

Governor (Vintage 30 Clone)

Weber:

Silver Bell (greenback clone)

Blue Dog (Blue Clone)

1230 (greenback clone)

12V (vintage 30 clone)

Jensen:

C/P 12 R/Q/N

MOD 12/50

Hopefully. I'll have that speaker in soon, so that I can test out the "Greenback" family of stuff. I have that other Swamp Thang still, which has a very unique sound, but resembles a warm, 'americanized' Vin 30... at least in it's specifications. I'm also trying to borrow a few speakers from friends to try out. I have a buddy with Vintage 30's, and a friend with G12H's, and another guy with Jensen p12's, so I'll see what I can do.

From: Alex Kenis <[alex@aletheian.com](mailto:alex@aletheian.com)> [Save Address](#)

Subject: OK, here is a clip

Date: Tue, 10 Jan 2006 12:39:40 -0500

To: <[cliffchappell@mail.ev1.net](mailto:cliffchappell@mail.ev1.net)>

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I got the speaker in and threw an SM57 in front of it. I don't have time to do any more today because I have a recording gig, but I'll see what I can do later in the week. This is the little intro to "Stach Boogie". I figured that would do in place of "Summer Song" since my wah pedal is not around. I'll see if I can get it from my buddy sometime soon.

This is the modded Hi-Octane through the cab with an Eminence "Private Jack" speaker. I wanted to crank it up more to get a better tone, but the neighbors were getting restless. It sounds pretty good though.

Alex  
satchboogie.mp3

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