Understanding Small Guitar Combo Loudness

Short Answer

The human hearing does not respond to bass frequencies very well. Therefore, we hear amplified 'bass heavy' guitar tone it as being a lot less loud than if it was mid and high frequency dominated.

You will know this to be true, because bass players need amps with a lot more power! So an electric guitar played with a heavily bass coloured tone will appear to run out of power much earlier than a guitar amp EQ'd for predominately mid and treble tones. This can often be referred to as 'low clean headroom.'

To maximise 'clean headroom' try to keep the bass control turned low. Bass heavy guitar tone through a low power amp fitted in a small cabinet simply does NOT work too well for high volumes. It would be better if the amp was played through a larger extension cabinet with 2 x 12" speaker employed. This is because large cabinets generate much more acoustic bass tone and will compensate for the amp's lower power output.

Long Answer

It will probably be surprising for most guitarists to learn that the human hearing does NOT have a flat frequency response… meaning that we cannot hear all frequencies with equal loudness. Bass in particular, is seriously attenuated by how our brains process sound. That's why bass players need such a high powered amplifier.

Statement clarification *- 100 Watts of lead guitar will sound far louder than 100 Watts of bass guitar… purely and simply because we cannot hear bass frequencies with the same intensity as treble frequencies!*

So, for all electric guitar players, you'll not be too shocked to understand that the more you turn up the bass you have in a guitar sound, the sooner the amplifier will appear to distort! This is because you are pushing more bass frequencies at higher power and causing them to distort when, at the same time, our hearing is turning down the intensity of bass frequencies! This makes you believe your amp is lacking power or 'clean headroom.'

Definition of Clean Headroom *- In simple terms, an amp's 'clean headroom' is determined mainly by the amount of power the amp is able to deliver into its speakers before the power amp begins to distort. Clean Headroom ALWAYS sounds much less in volume than distorted guitar sounds - no matter what make or technology the amp is!*

Now, there is a very simple way to help reduce the impact low frequency distortion can have on your amps volume… turn down the bass level control! But that will make your guitar tone thinner, probably not what you like! But you see, us guitarists create a major conflict in what we want from small amplifiers. On the one hand, the guitarist wants a warm full tone and, at the same time, needs a small lightweight amplifier he/she can easily transport. Well, because of the laws of physics, it's not possible to have both, sadly. So we all have to compromise.

We all know that bigger speaker cabinets produce a much fuller bass tone - sometimes too much. This then means that the amp designer has to cut down the low frequencies passing through the amplification to counteract the excess of bass output into the speakers. OK, by cutting down the bass going through the amplifier, it will 'appear' to be much louder because the low frequencies which cause the amplifier to distort early are reduced in amplitude… putting far less demand on the amp's 'clean headroom' at the low frequencies we don't hear too well. The reduced bass is compensated for by the increased 'acoustic' bass

output of the larger speaker cabinet. So bass levels are restored by the cabinet, NOT the amplifier.

You see, having a small low powered amp can sound very loud with regard to the middle and treble frequencies, but NOT the bass frequencies too. To get louder bass frequencies as well, EVERY player must plug their amplifier into a larger, say, 2 x 12" or 4 x 12" cabinet.

The early Marshall 'Super Lead' heads have their bass signals VERY much attenuated. This was because their huge 4 x 12" cabinets made the guitar tone have far too much bass! But, doing this provided an added benefit… it caused the amps to distort mainly in the mids and higher frequencies, which sounds much sweeter and better defined! Not many enjoy a big 'farty' bass laden distortion tone! This worked out to be the ideal fix.

In order to achieve a warm toned small combo, it's NOT actually possible to employ this technique, because the cabinet is far too small to enable it to acoustically restore the bass attenuated by the amplifier!
A 22 Watt amp chassis WITH attenuated bass driving a 2 x 12" cabinet will always sound louder than the same 22 Watt amp WITHOUT bass attenuation playing through a small 1 x 12" combo.

BluesBaby 22 & BJr 15 Comparison
Baring in mind what I have previously said, BB22 has more bass output from the power amp than a BJr 15. Most owners complain that the BJr sounds rather harsh/brash, resulting in many attempts to warm them up with a speaker change… often to the Eminence Cannabis Rex. This is a popular choice, but does not deal with the basic problem already talked about. It merely cuts the higher frequencies and, to my ears, gives the amp a somewhat woolly tone! That change would be true for the BB22 as well! So there's no escaping the laws of physics **FOR ANY AMP MAKER!**

If you perceive that the BB22 volume is less when compared with a BJr, but you prefer the warmer tone of the BB22, then the extra bass output from BB22 is certainly the reason it might not appear to sound as loud. However BB22 is a real 22 Watts exactly as any valve 22 Watt amp would be.

Power (Watts) created by valve or solid state amps is the same - providing both amps are truly the same power. It is defined by V^2/R or I^2R… so cannot be different. However, in the past manufacturers have been a little less than honest with their amps power ratings. Yes, many SS amplifiers are over-rated in the specs department. *I will say though, that Fender SS amp power ratings are spot on; and they even tell you how that power rating was arrived at on their amp schematics!*

Some years ago I repaired a few 'Well Known British' 40 Watt rated SS amps and found they were only 28Watts! They also had a low budget Celestion speaker with a very small magnet. Unsurprisingly, the speaker magnet size is responsible for how efficient the speaker is in turning electrical power into acoustic energy - the sound you hear from the speaker's cone. Is it any wonder then, that guitarists would believe a supposed 40 Watt SS amp (but really only 28 Watts) employing a low efficiency speaker is NOT as loud as a truly 40 Watt valve amp employing a top of the range 'large magnet' guitar speaker? No, of course not!

As long as this kind of performance inflation continues, then guitarists WILL think that "valve watts are louder than SS Watts." Which they most definitely are NOT!

This scientific chat applies to any make amp, of any technology. There is NO magic fix for this problem!