

GK Backline 600 Review

Francis Deck, 12/22/05



Summary

I am very happy with my GK Backline 600 bass head, which I intend to use for both electric and upright bass on gigs requiring high volume levels. Out of the box, the BL600 sounds great with the default voicing, or it can be dialed to a flat voicing, either of which would serve as a good starting point for getting your own sound. All of my tests were at 8 Ohms. The power amp section is transparent until it reaches roughly 127 Watts, whereupon it is affected by mild asymmetric soft clipping of the "boost" circuit. At roughly 150 Watts, symmetrical hard clipping takes over, and the amp reaches its rated 180 Watts into 8 Ohms with roughly 10% THD. The amp ran continuously during a test at 180 W into an 8-Ohm resistive dummy load.

Motivation

For several years, my only bass amp has been a GK MB150E combo. I am happy with its sound and convenience. Though I am mainly a jazz player, I find that the amp achieves good tone quality when I use it for practically any musical style, on both electric and upright bass. The bad news is that about 20% of my gigs are casuals in large rooms, where PA support is often inadequate, incompetent, or nonexistent. These gigs require enough power that I am finding myself pushing the combo to the point of audible clipping on a regular basis. It's time for a more powerful amp.

Although there are "high end" amps on the market, I was having a hard time seeing the point. There is a lot of mystique about amps that I just don't believe, and I have a fairly complete understanding of how bass amps work. The main attractions of high-end amps are switching power supplies and Class-D designs, which allow an amp to be much smaller and lighter. But these products are presently geared towards high power needs, and are still fairly expensive. Ultimately, I could not see spending hundreds of dollars for an amp that would only receive sporadic use.

As an approach to getting more sound from the GK combo, I built a compact and efficient 15"

extension speaker that mimics the tone quality of commercial 10" systems favored by upright players. Desiring to make the total package more compact, I decided to pair this speaker with a conventional bass head. Being a happy GK customer, it made sense for me to look at their newest offerings. The Backline 600 head has more than enough power for my needs, while appearing to be simple, rugged, and inexpensive.

Playing and Listening

My first test of the BL600 was with my de-fretted passive Ibanez 4-string bass, and my 15" speaker. The tone quality is superb, and the noise floor is virtually inaudible. Since I had already downloaded the owner's manual, there were no surprises from any of the controls. The 4-band EQ is effective. The "boost" control produces a progressively increasing amount of distortion, as expected from a Class-A JFET gain stage. Functionally, if not sonically, a JFET stage mimics a tube preamp.

The two-speed cooling fan is inaudible at its slow speed. I have not pushed the amp hard enough yet to activate the high fan speed. In a minor departure from the picture shown in the manual, the cooling vents are on the top and front. There are no rear vent holes. The fan blows downward onto a sizeable heat sink. I can't see a problem with this arrangement, but it might affect how the amp is installed in a rack.

I find the "overdrive" feature to be useless. It produces a "fuzz box" effect that seems more at home on a guitar amp. And it is not particularly controllable. The "contour" effect makes my sound mushy. I assume that these controls are for playing styles that I have not yet explored. On the other hand, these controls certainly don't get in the way, and they can both be defeated.

At present, I still prefer "boost" to be at a minimum, but I may eventually become more comfortable with adding some growl to my electric bass sound. The boost effect sounds good, but I have not yet incorporated it into my own playing. My style tends to be fairly dynamic, and I want a note to really speak out if I punch it hard, thus I am not looking for the compression that accompanies soft clipping.

The design quality of the BL600 is excellent. The chassis is heavy gage sheet metal, with a nice tight fit. I don't like big wooly MDF cabinets, which just seem like a waste of space. Give me metal. Peering inside with a flashlight, I see a design style that I am familiar with from my MB150E combo. The power transformer, power amp circuit, and heat sink, are all fixed to the bottom of the chassis, making for a stout mechanical design. There is not a lot of empty space inside the chassis. My only minor issue with the design is that stress on cables will be transferred to the circuit boards. But this is an issue with virtually all bass amps on the market. Make sure that the cables are supported by something other than the jacks, for instance by passing them through the side handle. This should be standard procedure with any music gear.

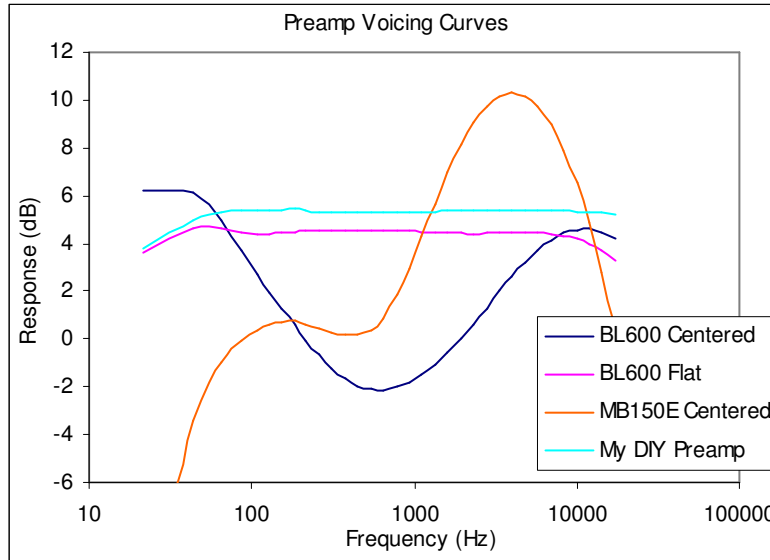
I also tested the BL600 with my upright bass, and found that I could get pretty much the same sound as I was getting out of the MB150E combo. Indeed, upright is my main instrument, so I am happy to have found a powerful upright rig that sounds good without breaking the bank. As I will describe below, the BL600 can be set up for transparent sound, which is how I got the best results on my upright.

On upright, I have my choice of pickups. A K&K BassMax is a mainstream piezo. It easily clips the input of the BL600 unless the 10 dB pad is used. As if by pure luck, I was able to achieve very high volumes without feedback, and without resorting to unnatural tone settings. My other pickup is a homemade magnetic unit that I use at really high volume levels, such as gigs that cross over into rock and blues styles.

The BassMax pickup has enough capacitance that it is perfectly happy with the 1 MegOhm input impedance of the BL600. It is my opinion that higher input impedance is unnecessary for most piezo upright bass pickups.

Bench Testing

As an electronics hobbyist, I am interested in gaining a better understanding of how bass amps work. It is also my hypothesis that the "sound" of a solid state bass amp is primarily driven by the frequency response of the preamp. If two amps sound different, the root cause is likely to be found in the response curves. This led me to measure my two amps. The curves are shown here:



Each curve is referenced to an arbitrary level. As a reminder about how a dB scale works, an overall change of gain shifts the whole curve up or down without changing its shape, and I did not deliberately balance the gains. The very small wiggles in the curves represent the experimental uncertainty of my measuring system. The "Centered" graphs are with the EQ knobs centered and the Contour effects turned fully counterclockwise. On the MB150E combo, I also turned the Hi Boost all the way down.

The "Flat" graph is my best attempt to dial in flat response. It is notable that the BL600 produces a classic "smiley face" curve in its default voicing. However, I was able to get the curve to be within 0.5 dB of flat. That's good enough for transparent sound. Most speakers have bigger lumps in their curves. Counting the little notches on the faceplate behind the knobs, the "flat" settings are:

Treble = -2
Hi Mid = +1
Lo Mid = -1
Bass = -3
Contour = Minimum

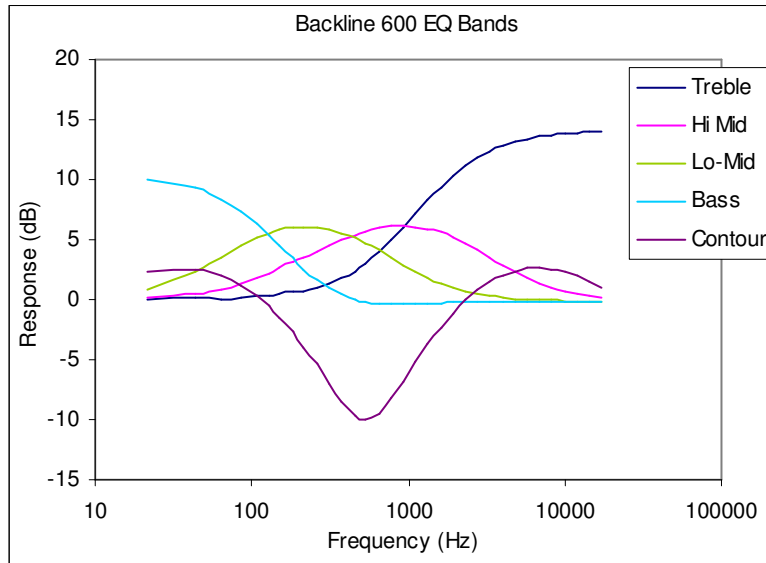
The MB150E combo has an interesting curve. It's worth remembering that on a combo amp, it is fair game to design a voicing that makes the amp sound best with the built-in speaker. The 20 dB treble boost counteracts the relative lack of high end in the speaker, and the rolloff below roughly 60 Hz may help control over-excursion of the cone. I was able to flatten the entire curve, except for the very low end.

Using an oscilloscope, I looked at the waveform produced by the distortion channel. It is a symmetrical hard clipping effect. The boost channel is described in the owners manual as a Class-A JFET gain stage. The asymmetrical soft clipping of the JFET stage produces a more musically pleasing series of harmonics.

My homemade preamp is included in the graph just for reference. It is rigorously flat. The high

frequency rolloff is characteristic of my measurement system. Both GK amps deliver flat response when fed through the Effects Return input, in case you are thinking about using an outboard preamp.

In my opinion, the "flat" settings on the BL600 prove that the amp can deliver practically any desired voicing, assuming that a 4-band EQ is sufficient for the job. It probably is, for most playing styles. The following graph shows the action of each EQ control, relative to the default voicing:



After reading some comments on the TalkBass forum, I decided to run some full power tests of the BL600 head, driving an 8-Ohm resistive dummy load. Assuming an output voltage of $V = \sqrt{P \cdot R}$, I applied a 1 kHz sine wave to the effects return input, and adjusted the gains to see 37.9 V RMS across the load, using a true-RMS voltmeter. At 180 Watts RMS output, I measured roughly 10% THD. The output power drops to about 130 Watts at 1% THD. My GK MB150E combo produced the same waveform at 28 V RMS, corresponding to 100 Watts into 8 Ohms.

My own personal definition for output power is based on the hard clipping limits typical of solid-state amps. I look for when a sine wave just begins to clip, and measure the power at that point. The BL600 clips somewhat asymmetrically, and can reproduce a sine wave up to about 32 V RMS, corresponding to an output power of 130 W.

Following these tests, I decided to take a more careful look at the power amp signal path. The DI output allows monitoring of the signal feeding the power amp, after the "boost" circuit. This signal shows the same asymmetry as the power amp output, suggesting that the power amp is delivering linear performance up to roughly 98 Volts p-p, which would translate into clean sine wave output at 150 W into 8 Ohms.

I have calculated that an ideal amplifier with symmetrical hard clipping would reach 10% THD at 129% of the maximum clean sine wave output power. Notably, 129% of 150 W is 193 W, in good agreement with the power rating for the BL600.

While I only tested the amp at 8 Ohms, my results should be comparable to testing at 50% of the rated thermal load when driving 4 Ohms. That's still a pretty good test, as an undistorted bass waveform does not have a high ratio of RMS to peak power. However, my results would not be valid for musical styles that involve a fair amount of distortion or compression.

I let this test run for well over an hour. The cooling fan ran at only a moderate speed, where it was barely audible. Ambient temperature in my basement was 62 °F, and the air coming out the front

vent was about 83 °F.

Warning: Don't try this at home. I am professionally qualified to perform these tests. My tests are purely informal. I did not use certified equipment, and I did not test under a wide range of operating conditions.

Other Reviews

Given the popularity that the BL600 head has achieved in a brief few months, it is possible to find numerous reviews of the product. Check out www.talkbass.com and www.harmony-central.com. The reviews at Harmony Central are glowing. It is also worthy of note that the reviews for the BL250 head tell a different story, so you have to ask anybody who comments on a generic "Backline" product which one they are actually reviewing.

Notes About Power

I have not tested the BL600 at full power on a gig, and it is unlikely that I will ever do so. I am a jazz player who occasionally ventures into pop music, and I don't want to play really loud gigs. But I am also playing through an 8-Ohm speaker, and I hope to never add a second cab. Thus, I am really using the BL600 as a 180-Watt amp, where it runs at roughly half of its rated thermal load. Given that I depend on utter reliability, I consider a measure of "thermal headroom" to be a bonus. Based on how I expect to use the BL600, I am satisfied that my dummy load test is more stringent than anything that I will do to the amp at a gig.

Unfortunately, the power requirements for electric bass in many contemporary music styles seem to be driven by the maximum power attainable by guitar amplifiers. The BL600 is not a powerful bass amp by those standards. But I consider myself fortunate to have opted out of that arms race.

I have yet to decide what to think about the relatively high distortion required to replicate the power rating of the BL600. This may be a widely accepted practice in the industry, but it does have the look of making amps seem more powerful than they really are. My only solace is that I am going from one amp to another from the same manufacturer, and both amps seem to be rated in the same way, so I will obtain the increase in volume that I expected.

Conclusions

The GK Backline 600 head seems to be a high quality bass amp in a compact package. It sounds good with both electric and upright bass. The default tone seems to be pretty versatile, and the tone controls are effective at dialing in other voicings, including the "transparent" response desired by many upright players.

I was pleasantly surprised by the extremely low noise of the BL600. While the amp is louder than I will ever need it to be, I am disappointed with the measured output power from a purely intellectual standpoint. My expectations were probably not justified, but the industry should do a better job of explaining amp power ratings.

Revision History

12/17/05: Original version

12/20/05: Added dummy load power test and comments about THD

12/22/05: Updated dummy load power test