

CI Audio Monoblocs Class D rocks!



Class D amplifiers are by technical reasons; almost perfect in the way it goes about doing its business. Think about all those amplifiers you have used in the past, imagine how much power goes to waste, quite unthinkable when today's oil prices peaks at over USD60 a barrel and we are burning fossil fuel just to listen to music! With technology, we should be able to come up with the purrrrfect amplifier – one with near 100% efficiency, unconditionally stable into all loads, immeasurable levels of distortion, great sound and so on. Well, we are getting there with Class D amplifiers.

D-200

In the recent years Class D amplifiers are getting increasingly popular with car audio amplifiers especially in the kilowatt class, something Class AB amplifiers never could achieve and Class A amplifiers is decidedly unfashionable (see the attached feature on Amplifier Classes Hierarchy) save for a stubborn few. Class D home amplifiers are starting to appear – Linn, TacT, Bel Canto EVO, NuForce and now CI Audio. With Class D efficiency means you can achieve good power delivery without having to up sizing power supplies. Transistors are cheap but power supplies (transformers and capacitors) cost as much as 50%~70% the asking price of a typical AB amplifier. So it pays to either maximize efficiency or allows a greater degree of miniaturization.

The D-200 comes in a compact monobloc package, the all-aluminum casing is well built and finished. There isn't an on/off switch – the front panel button merely mutes the amplifier. The power supply feed through the power determines if the amplifier is turned on. A rear switch would be nice. Either way, it points to the D-200's best left on 24/7.

The innards of the amplifier is sheer simplicity. The amplification module is attached to the rear panel and that's where the heat gets dumped. The large toroidal transformer and the two large 10,000uF caps dominate. The review sample comes with balanced input and a pair of single ended RCA to balance XLR adapter (Cardas, no less) is provided. You can order the amplifier with just single ended input. Rated at 200 watts per channel into 8 ohms and a 325 watts into 4 ohms, the D-200 should have no problems with typical loudspeaker loads save for a few cases. The amps weigh only about 7 kg each, on first look it certainly doesn't belong to the heavy weight class. In this case, looks can be deceiving.

In my notebook, I read – typical Class D amplifier – sound – low noise, quiet, clean sounding low frequencies, clean sounding high frequencies, analytical midrange, perhaps dry and lacking emotion.

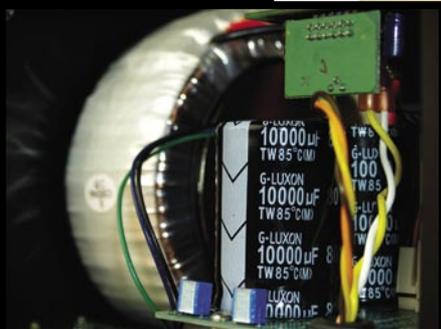
Boy, was I right and wrong on most counts. I am certainly impressed with the clean sound, almost clinical but in a very nice sort of way. I would not describe the D-200 was tube-like, tubes are far too muddy sounding most of the time unless we are talking about some really expensive tube amps. I am also most impressed with its no nonsense rendition of the human voice, male voices in particular can be an entrancing experience. The midrange may be analytical but it is no way a dry and emotionless presentation. The whole soundstage is airy with a wide spatial spread of instruments without the sound bunching up into a mess when it goes loud.

Bass end seems deep enough and well defined in pitch. Some might like a ripier, fuller sounding bass than the D-200 but I believe the lack of low frequency distortion makes for a more accurate balance. Perhaps this may take a bit getting used to. Some would call the bass 'fast' meaning impressive leading edges with a less than impressive decay. That is not quite what the D-200 is all about, the

lack of distortion in the low frequencies makes for a very fast and dynamic bass quality. The decay is somewhat less obvious, but if you would listen carefully to, say a solo cello performance, you would be most impressed with the level of energy in the bass frequencies, I can say for certain, the dying harmonics of the notes decays in a natural and uncoloured manner.

Perhaps the only bugbear for one not familiar with typical Class D amplifiers is the relative lack of 'excitement'. They sound too clean, too natural and so effortless that it almost begs for something to stir the still waters. The D-200 instead deftly avoids the non-persona of typical Class D amps for something is quite likeable, quite musical (hah! There, I said it!) and pretty nice to listen to. If you are looking for something to impress in terms of sheer dynamics or warm midrange, there are 'better' amps to be had. The question is, can you live with such an amplifier?

The D-200 is not the first and you can bet there will be more of such amplifiers. Much has been said of the D-200 performance can rival that of amplifiers costing 4 times as much. Either we have a lot of over priced amplifiers out there or the D-200 is pretty exceptional for its asking price. Perhaps the reality lies somewhere in between.



Performance	●	●	●	●	●	●	●	●	○	○	○
Value	●	●	●	●	●	●	●	●	○	○	○

RCP \$3899 per pair

..... Amplifier Class Hierarchy

Class A amplifiers output stages operate at a constant current equal to or greater than the current which the load requires. This means that the output devices (Bipolar, Tubes, Mosfets, IGBTs) are never driven into cut off. They conduct through 360 degrees of the output waveform. All analog amplifiers have input and driver stages which pretty much all operate in pure class A mode. They can because their heat dissipation is relatively low. What are the disadvantages to pure class A amplifiers. Heat! A reasonable powered amplifier dissipates enormous amounts of heat. Please refer to the discussion on Amplifier Efficiency to see some simple calculations of how efficient a class A amplifier is. For this discussion let's use an average figure of say 15% which is a conservative number. This means that for every 100 watts of power into our amplifier, 85 watts go out as heat and 15 watts go to the loudspeakers! Not a very good situation if you must pay the electric bill.

Class B amplifiers are the opposite of Class A. They only conduct through 180 degrees of the output wave form and are all push-pull by design. The output stage has device(s) for both halves of the waveform. This means that when the positive device is conducting and sourcing current to the load, the opposite device is cut off (not conducting). This is kind of analogous to two people on opposite ends of a rope. One pulls and the other can relax and visa versa. During the time at which one person ceases to pull and the other starts to pull, the rope is limp (in a cut off stage). This is the region in which one half of the output stage stops conducting and there is a short period of time before the other half begins conducting. This time interval is what we call "crossover distortion". It manifests itself as a small time step on the sinewave on both the positive and negative going halves of the sinewave.

In order to reduce this crossover distortion to a small value we introduce a small idling current in the output devices. This current is normally in the order of milliamps. What this does is causes the output devices to conduct for slightly more than the 180 degrees. Depending on the amount of idle current introduced this may be up to 200 degrees and more. Technically the output stage runs in class A up to a very small power output.

Class A-B amplifiers are just a variation of a class B amplifier as described above. Most amplifiers made today are A-B simply because a pure class B would be unacceptable for audio owing to its high distortion at crossover. Otherwise the two are identical.

Class D amps are Pulse Width Modulated switching power supplies where the modulation is the audio signal. Typically a high frequency carrier (50KHz-500KHz) is converted to a triangle waveform. This triangle waveform is fed into a comparator together with the incoming audio signal. The resultant PWM waveform is fed into an output stage which alternately switches either the positive switches on or negative switches on depending on the polarity of the incoming waveform. Since the Mosfet switches are either on or off, their efficiency is close to 100%. What little efficiency it loses in the Mosfets are due to their finite on resistance and the losses which occur during their transition from off to on and back to off states. The high frequency pulse train must then be demodulated back to an analog form in order that the loudspeaker can reproduce it. This is done with a passive L-C filter whose cut off frequency is normally higher than the highest audio frequency the amplifier is being asked to reproduce. So in a 20Hz-20KHz amplifier a 25-30KHz cut off filter would be used. Feedback is nearly always implemented to get the distortion low, the output impedance low and the noise low.