darTZeel NHB-108 model one
Amplifier

We consider our products to be musical instruments.

When an exacting musician—do non-exacting musician exist?—visits an instrument maker, technical discussion cannot always be avoided. At the end, the choice will be influenced by those more down-to-earth, we would say, considerations.

The high speed, dual mono power amplifier from darTZeel is not an exception to the rule. Technology matters, and makes a difference. But rather than claiming extravagant virtues which may be more or less verifiable, we much prefer to show you the facts, and only the facts.

Some review:

If you discovered the darTZeel NHB-108 model one for the first time through our web site, it may be helpful to recall some design basics:

* No global Negative Feedback
* Open-loop input and output stages
* No relay, switch, fuse or the like in the whole signal path
* Only 6 transistors per polarity side, from input to output
* One single bipolar-transistor output pair

The five key design elements listed above are of course not exhaustive. But they do reflect the extreme care we put into the concept. We envisioned every detail of the complete design with only one thing in mind as being of paramount importance: All drawings and schematics concerning the darTZeel NHB-108 model one are copyrighted and patent-protected.

The most musical reproduction possible, with the highest fidelity regarding the audio signal.

For all who would know more, we will strongly recommand to read our “Audiophile’s technical manual”, available in PDF format.(575KB)

And now, Ladies and Gentlemen, the curves!

Our hearing is extremely sophisticated. Just saying that we can hear frequencies from 20 Hz to 20’000 Hz is, to say the least, quite an over-simplification. The ear-brain system is not only able to “decode” the pitch of a sound—its frequency—but also its character, what we call its timbre, texture, envelope (attack, sustain, decay), its ambiance, etc. We can generally surmise that right after we are born, our hearing “loses” 1000 Hz per decade. So, pushing 40, when most music lovers finally have their wallet thick enough for their dream system, they can no longer hear frequencies above 16kHz? Right.

So, would this then mean that they could not discern the subtleties of the harmonics generated by cymbals, bells, triangle, or vibraphone? Wrong. Hearing can perceive sounds through at least two different modes: the frequency domain, and also the time domain. This simply means that we can capture the “speed” of the sound. An extremely fast attack, as produced by a brutal hit on a snare drum, is perfectly recognized by every human being still having her/his pair of ears, regardless how old she or he is. A microphone, by contrast, will need to be of high-end laboratory performance,

i.e. having a bandwidth of near 40,000Hz fully to capture the event… So if the darTZeel NHB-108 model one shows such a wide bandwidth – close to the MHz range – it is precisely because hearing requires high-speed accuracy, and not just because it's in the mood.

In a live event, what we call "stereophony" does not exist. Really? The word "stereo" comes from the Greek word root meaning "solid" and which implyies "three-dimensional". Stereophony is the modern process that can capture and reproduce the illusion of acoustical solidity—that acoustical images are fixed in space and have height and width and depth and localization. The word "stereo" is commonly understood as "2-channel", but…

Any multi-channel system, being 5.1, 9.1 or X.1, is a stereo system! A good 3-dimentional image can be correctly reproduced only if the channels (however many there are) are as independent as possible from each together. A musical signal (with its own unique blend of amplitude, time, and phase information) existing on one channel only, must be totally absent from all other ones. This parameter is called "crosstalk", or "Xtalk". The lower the Xtalk is, the better the reproduced stereo image that you will be able to perceive. While housing the stereo 2 channels in a single box, the darTZeel NHB-108 model one functions exceptionally well in this regard, really bringing a new degree of freedom from crosstalk and therefore purity of the perceived stereo image.

When Art Commands Technology

Distortion. What an ugly word! Please skip this page if you feel uncomfortable…

So much ink has been spilled on paper about all the types of distortion, which ones are bad, which are good—if any—that to give adequate coverage we would need an entire web site specially devoted to this topic. We will just talk about temporal distortion, which we have found is the only one of great significance. When kept under few percents, THD or IMD are not audible while listening to music, especially if these distortions linearly decrease versus frequency. But perhaps you do not believe us on this particular point? Just ask anyone who already owns a darTZeel NHB-108 model one…

In spite of the very few components involved in the audio circuit -only six junction devices from input to output- and the total lack of negative feedback from output to input, darTZeel's IMD spectrum exhibits values comfortably under the threshold of audibility, as shown on the left graph. IMD peaks at 0.18%, and the decreasing shape is so regular that one could thing we drew it by hand. What do you think about that?

Here -see right- the THD spectrum also shows a regular decrease versus frequency. Please accept our apology for displaying the scale with such high peaks: even with 120 dB dynamic range, it is still not possible to see the noise floor!

To conclude with these so little appreciated distortions, we would just, for the last time -promise!- graph THD against output power, under 4 ohms nominal load. We can clearly see that THD always remains under 1%, way below the audible threshold while listening to music. We will save you from the THD versus frequency curve, as it is so completely flat across the whole audio spectrum…

Do not hesitate to take a look at the "Audiophile's technical manual". You could perhaps learn a trick or two about distortion, who knows?

Time and space. These are the two main musical vectors, in both terms of performance and emotion. We said above that good stereophonic rendering was partly due to a good Xtalk factor; laterally speaking, to say the least. But "stereo" means 3-dimension imaging, and we might wonder how we can perceive the height. As our ears are located on either side of our heads, it is quite easy to understand how we can figure out the direction, horizontally speaking, of a sound coming from a given source. One interesting thing is that we do that through 2 different ways. First, the intensity:

a sound coming from the right will be heard louder with the right ear. Second, the arrival time: the same sound will arrive sooner at the right ear, too. Our brain then acts as a precision stopwatch and detects the respective arrival times to left and right ears. Quite impressive, isn't it?

Lets us imagine that the same sound, now coming from dead centre, is produced from different heights. How could our "only" 2-eared hearing system detect the true sound origin. No intensity difference, same arrival times... Boundaries reflections are the solution key. Thanks to the listening room boundaries, the sounds are reflected, and then our hearing system can deduce their provenance by "computing" intensities and arrival times. So we can locate laterally, vertically, and in depth. To correctly reproduce, i.e. without altering it, this spatial information, the amplifier has to follow perfectly the temporal, musical frame. To accomplish this, all we need is speed.

The faster the amplifier, the better the temporal frame will be preserved. The darTZeel NHB-108 model one can easily amplify frequencies beyond 1 MHz, say fifty times the highest audible frequency. Thus, the tiniest speed or time change – the one being proportional to the other – is reproduced with an extreme, near-absolute precision, leading to a perfect placement in space of each instrument.

But speed is not all.

To correctly capture the whole musical message, and then reproduce it unaltered, it is also necessary to amplify the lowest frequencies without any time smearing, i.e. without any phase shift. You can see to the right: a nearly-perfect 10 Hz square wave signal, with near text-book flat plateaus, indicating outstandingly delineated bass reproduction.

Music is a universal means of expression; the language of notes is unique by itself, but understood by all. The emotion it brings out generates a true timeless art, which will not ever cease, as long as there will be women and men, some for writing music, others for listening to it...

Musical experience is always a source of spiritual richness and dialogue.double bass...

We are convinced that the familiar (but usually misquoted) adage:

"Music hath charms to soothe the savage breast,
To soften rocks, or bend a knotted oak."

William Congreve (1679-1729)
The Mourning Bride
Act i Sc. 1

It reflects a big part of the truth.

Listening to a piece of music, whether happy or sad, always moves the mind away.

The darTZeel NHB-108 model one, not being a component made like others, we would not be surprised, upon closer examination, that it has some common points to share with this superb double bass...

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How could it be otherwise?

It is often the case, nowadays, that music is regarded only as a second or third source of relaxation. The excuse most frequently mentioned is the lack of time, and the space all other activities tend to occupy in our lives. But is it necessarily so? Can we still think and decide freely? Perhaps we tend to forget what freedom means. The darTZeel NHB-108 model one will help you to think about this. Every day.

Specifications

Nominal output power:	100 watts RMS @ 8 (Hi) and 2 (Lo)Ohms . 160 watts RMS @ 4 (Hi) and 1 (Lo) Ohms.
Gain:	26 dB @ 8 Ohms.
Input impedances:	RCA: > 100 kOhms, 5 Hz to 200 kHz. BNC: 50 ±1 Ohms, 1 Hz to 1 MHz.
Version A:	XLR: > 100 kOhms bet. Pin 1 and 2 (hot leg and ground)
Version B:	XLR: > 13 kOhms bet. Pin 1 and 3 (cold leg and ground). 33 kOhms bet. Pin 1 and 2. 33 kOhms bet. Pin 1 and 3.
Output impedance:	< 0.33 Ohms, from 20 Hz to 20 kHz (measured @ 8 Ohms).
Frequency response:	1 Hz to 1 MHz, +0, -6 dB (depends on measurement method). 10 Hz to 100 kHz, +0, -0.5 dB (depends on measurement method). 20 Hz to 50 kHz, ±0.5 dB (Version B, XLR inputs).
Rise time:	< 0.8 µs.
Slew rate:	88 V/ms, peak-peak.
DC voltage output drift:	Version A: < ±590 mV max. Version B : < ±10 mV max.
Total Harmonic Distortion (THD):	<1 % from 7 Hz to 77 kHz
Temporal Distortion:	None, at any level and load, as specified above.
Crosstalk:	<-90 dB from 20Hz to 20kHz.
Signal to noise ratio:	> 105 dB (A) @ nominal power.
Consumption:	150 watts @ idle, up to 1000 watts @ maximum output power.
Size in mm:	18 x 14 x 7 (WxDxH). Total depth including handles: 17 in.
Net weight:	67 lbs.

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