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INTERVIEW • HERVÉ DELÉTRAZ • DARTZEEL

# Swiss roles

**Steve Harris** talks to designer Hervé Delétraz, in partnership with his cousin Serge Roch since 2004, and producer of wholly innovative high-end audio products first made in the basement of Hervé's home but now admired world-wide

If you want an amplifier with a face, not a fascia, start saving up for a darTZeel. Whatever else they do, the Swiss cousins Hervé Delétraz and Serge Roch will always be remembered for turning their on/off button into a 'nose' and their status lights into flashing 'eyes', and for calling their amplifier's volume knob the 'Pleasure Control'.

You might not have predicted such whimsy from the country that's stereotyped as the land of boring bankers (though now seen as a land of more sensible bankers). Less unexpected, perhaps, but profoundly impressive, is darTZeel's dedication to perfection in every aspect of design and construction.

Hervé was hooked on hi-fi from a very early age, but his first practical amplifier design took the form of a diploma project during his final year at engineering college in Geneva. His professor stipulated that the project must be a Class D PWM (Pulse Width Modulation) amplifier, and the prototype had to be ready in six weeks. Hervé rose to the challenge, completed the amplifier on time for assessment by the judging panel, and got his diploma.

He also got the urge to develop a commercial amplifier design of his own. But it would be many years before Hervé, in partnership with cousin Serge, finally entered the high-end audio arena in unusual and spectacular fashion.

**RIGHT: At the 'Pleasure Control': designer Hervé Delétraz, on the left, with cousin and business partner Serge Roch**

**BELOW: Hervé worked on his power amp design for 16 years. The preamp, seen below it here, was developed in five, while the new integrated only took two years. Hervé jokes, 'We've improved!'**


In 2000, the US magazine *Stereophile* ran a series of six articles in its web newsletter from 'reader Hervé Delétraz of Switzerland', which chronicled the development of his do-it-yourself amplifier design. In late 2001 the magazine published Hervé's article about cable matching. Then, in May 2002, Hervé travelled to the USA to demonstrate his completed power amplifier at the Home Entertainment show in New York.

By now, Hervé had actually started amplifier production at his home, but another year or so would pass before darTZeel took flight fully, with what was now the NHB-108 Model One.

## A SERIOUS BUSINESS

'We really began together on 2 January 2004,' says Serge, who handles darTZeel marketing and communications. 'The company was still not formally founded at that point, but we had already received orders from the USA. There was a review and also interest from distributors, such as a Japanese distributor, but they waited...'

To see if you were serious?

'Exactly. I think in this business, you can have one product that may be fantastic, and then if you don't make the second one, you are dead.'

Of course, they did make the second one. The power

amplifier was joined in 2005-2006 by a matching preamplifier, the NHB-18NS – complete with Pleasure Control for volume and Enjoyment Source input selector – and in 2008, by the CTH-8550 integrated. Next on the agenda is a big monoblock power amplifier.

After his 1984 diploma project, Hervé first thought about designing a commercial PWM amplifier. He quickly abandoned this idea, but the experience left him more than ever convinced of the benefits of avoiding negative feedback, and of a wide bandwidth design.

'When I started to design the NHB-108, I was wondering why some amplifiers were more musical than others, more acid, or more smooth – then when you look at the figures you can see that the curve is a straight line, without distortions! This is not new, everybody knows this. But to understand why, that is another story!'

## CAD SIMULATION

'I tried to make the circuit as simple as possible, and this was the difficult task. But thanks to a new computing CAD system, you could simulate circuits on the PC. That was not possible 20 years ago. Now, you can just put a circuit on the PC screen, turn on the switch, and you can see your design working even though it doesn't exist. With the program I use, the result when you build the circuit is very close to what the simulation gives you.

'You can have a circuit, then remove one component, and then try if it still works. Then you remove one at a time and it doesn't work. So you put one component more back. But then you rearrange the circuit, maybe now you can remove the component and it will work still... etc! It was like Lego, if you want.'

So, by 1999, Hervé had designed the circuit which seemed to fulfill his audiophile objectives.

'I had this circuit working on my screen. When I built it of course, it went into burning flames! But it was very close. I just had to just replace one component.

'The problem is that when the circuit is very simple, you are very close to being unstable. The goal was a circuit that could be made very stable, whatever the load. Also I wanted to avoid any negative feedback as far as possible, save for the internal small feedback.


**ABOVE: While keeping the signal path simple, the optical control system makes the NHB-18S a very complex product**


**ABOVE: Pure enjoyment? Source selection is achieved with no switching or contacts in the signal path**

The output is completely open loop, there is no compensation, no Zobel, nothing. There's just one pair of power transistors.

'And the bandwidth! Usually, when you have no feedback, the bandwidth is very small. But now I could have everything. Very wide bandwidth, very quick, without any feedback, no phase shift, and using very few components. It was a dream!

'The circuit is patented, because I wanted to know if somebody else already invented this kind of circuit. We took about two or three years to make the research, and it appeared that, no, it really was the first.

'Then I could apply for international patents. This was not done to be secret or not to be copied. But the problem is that if somebody copies you, and then he applies for the patent before you, you cannot sell in the country where he patented it! So you have to apply for the patent to protect yourself.

> 'I had this circuit working on my screen. When I built it, it went into burning flames!'

'This circuit is so simple that we could use it for any part of the signal path. It was for the power amp, but we have downscaled the same circuit for small signals in the preamp. Then we downscaled again to make the phono stage. But for the phono stage we began to reach a level where the noise is becoming very important, so we had to adapt it a bit.

'Because we did not have time to make all the development work at darTZeel, we started a ⟳

co-operation with another partner in Switzerland, ABC PCB. We worked together, and they realised what I imagined. ABC PCB's chief engineer was able to modify the phono part to make it noise-less and very efficient.

'After we had done this, I thought maybe we can make the reverse process, to make a power amp by upscaling the phono circuit, the contrary of what we did in the past. This is what we did in the integrated.

'It's the same approach, but we were able to reduce even further the number of junctions. Instead of six junctions, we have only three. There is almost nothing in the signal path now! And the same circuit is also used for the big monoblock.

'It's just crazy. It's four times quicker than the power amp, wider bandwidth, lower distortion... it's just amazing. And there is almost nothing on the board!

'We have to use two pairs of output transistors instead of one, so we lose a little bit by that, but we gain transparency because we only have two junctions in the signal path before the output stage, instead of four or five.'

## HARMONICS

Many reviews have described the extraordinarily natural sound of the NHB-108. But one of the trade-offs, in measurement terms, is a higher-than-usual level of total harmonic distortion.

'Harmonic distortion means nothing to me, because musical instruments generate a lot of harmonics. If you take a violin or piano or whatever, you have maybe 20 or 30 per cent of harmonics. If you add 1 per cent of harmonic distortion to the already 20 or 30 per cent of the instrument, at the end you don't have 21 or 31 percent. It's a little bit mathematical, but you maybe have 20.001 per cent instead of 20.

'You can't hear the difference between 20 and 20.001. Of course, if you play a pure sine wave, you could hear 1 per cent distortion. But this is not a machine to play sine waves. It's for music.

'So it was not my goal to look for low distortion. In the spec, we just say that our machines are less than 1 per cent. Actually, they are much less than this, but to me it is not important. What is important is the temporal distortion, the propagation time, the phase across the audio band.


**ABOVE: darTZeel's stunning build quality is visible through the power amp's glass top**


'If you want no phase shift at 20kHz and 20Hz, you have to have a bandwidth about 50 times larger than the band you want to reproduce. In the highs, this means that we now go to about 1MHz. We can show a square wave at 100kHz and it is still a square! No other manufacturer shows these kind of figures, because they know it's not easy to make this kind of response.'

As with the power amp, Hervé's preamplifier design aimed at the simplest possible signal path, but achieving this proved to be a complicated business.

'The goal was to not use any switch or contact or relay in the signal path. For a power amp this is quite easy, because there is just a power switch, but a preamp is quite another task because we have the input selector, and you also have the volume control, where you have a ladder or a carbon track.'

## MAKING LIGHT OF IT

'But we did it. This preamplifier is the first in the world with no contacts in the signal path whatsoever. We did it using optical components, light-dependent resistor devices. We apply light to these devices and the resistance changes, so we can enable or disable the inputs. They are not switched, just enabled or disabled. All the signals are always paralleled.

'The changes are made by light, so there is no contact and no wear, very low noise and no distortion. There is no oxidation, no diode effects. It's not easy, it was about 20,000 lines of programming to achieve all this. The software in this machine is incredible!'

Of course the optical solution was too expensive to include in the CTH-8550 integrated amplifier. Yet although this is expected to sell to those audio enthusiasts who can't quite run to the costlier pre- and power amp combination, it isn't too much of a performance compromise.

'The biggest difference is the phono stage, because the one in the preamp is amazing, but this one is very good. At the end of the day, the result is about 90 per cent of the combo, at half the price, so it's quite good!'

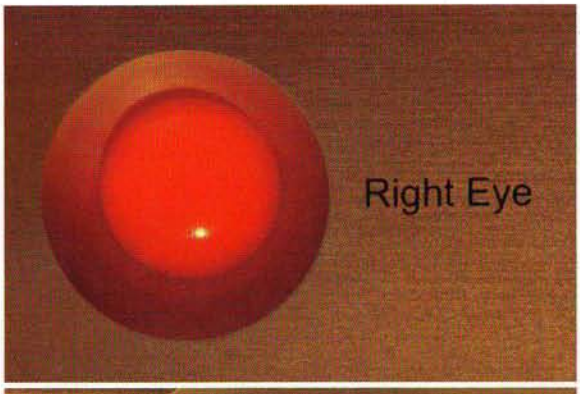
Surprisingly, perhaps, the integrated is more powerful than the NHB-108.

'The reason was not because we needed more power, but to give the customer the feeling that they would have enough. But really 150W would have been enough for most situations.'

The new monoblock will be even more powerful but still only using two pairs of output devices.

'Only two! Like the integrated. That is the trick. If you parallel too many transistors, you smear the sound, because you have longer wires, the sound is spread through multiple paths and the result is no good. The ideal is one pair. In the past, the most you could have with one pair was about 50W, but I can get 150W, or 230W into 4ohm, with one power transistor. Because we have a very sophisticated circuit to meter the real, actual dissipated power of the devices. If there is a problem, the machine will shut off.

'If you don't put this kind of circuitry inside, you cannot put out this much power, because if you are on the brink of runaway, the machine will burn!





ABOVE: darTZeel believes that products for playing music really should have a 'human' face

ABOVE: Serge and Hervé with the preamp and power amp. To follow the current integrated amp and forthcoming monoblocks, they are planning a digital source product

'With two devices, you could just put the transistors with the cases close and the leads far apart. But we reverse the transistors to have the leads very close together, so the signal path is almost exactly the same.

'Some people will say, "You cannot hear this because the speed of light is much quicker than you can hear." But it's not true.

'It's like with cables. We use special cables from the preamp to the power amp, 50ohm matched lengths, so you don't have any loss over the distance because there are no echoes, no reflections in the cables. Some guys say, "OK but this does not work in hi-fi because the frequencies are too low regarding reflections", but when we match and unmatch, you can hear the difference clearly enough.'

## SOURCE COMPONENT TO FOLLOW

Although darTZeel also provides line inputs in the 50ohm format, there is currently no source component you can plug into them. This will change.

'Right now we have quite a lot of work to produce the new integrated, and also we have to make the monoblocks. We should release them in 2009. After that we can think about a digital source.

'We don't know yet what kind of digital source it will be, but it will be a darTZeel machine. And that means it will have some special features that others don't have.'

But it won't take 16 years to develop... ⏻

hi-fi news TIMELINE

**1984**
Hervé Delétraz designs a PWM amplifier as diploma project

**1985-1996**
Begins work on state-of-the-art analogue amplifier

**1998-9**
Using CAD, Hervé completes amplifier design. Another nine months are spent perfecting the prototype

**2000**
In published articles, Hervé describes the design of his power amplifier

**2001**
First commercial series production launched

**2002**
Hervé makes first show appearance in NY. Applies for patents on amp circuit

**2004**
Hervé and Serge enter business in partnership

**2004**
NHB-108 Model One power amplifier launched on export markets

**2006**
NHB-18NS battery powered preamplifier introduced

**2008**
CTH-8550 integrated amplifier follows

**2009**
Monoblock power amplifier to appear