

## FROM THE VAULT

# DNM PA3 S power amp

Does enormous power always make musical sense? **Martin Colloms** hears a new stereo power amp from a designer who begs to differ

**D**NM's long-awaited update to the PA3 power amplifier has finally arrived. Fully regulated, the PA3 S reflects the uncompromising approach of its designer Denis Morecroft. Offering just 23W per channel but costing £3750, this stereo power amp has undergone a long gestation, the reasons for which Morecroft outlines in our interview boxout [see p129].

He would be the first to accept that the PA3 S forms part of DNM's pre/power architecture, which includes the long-running and oft-upgraded 3B preamp, plug-in cards for which were recently revised to take into account the anticipated leap forward in performance of the PA3 S power amplifier.

For the purposes of this review, DNM supplied the entire 3B/PA3 S system including integral, factory standard, DNM single-strand cabling. On request, DNM also supplied



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a 'one-off' PA3 S, standard in all respects except for the provision of phono input sockets and speaker cable binding posts to enable more precise comparisons within the context of a standard review system.

### CURRENT AFFAIRS

DNM operates a trade-in upgrade policy whereby older and more junior members of the range may be returned in exchange for a full allowance on a new model, minus a £50 handling charge. So, for example, DNM's previous PA1 (£1650) may be exchanged for the unregulated 45W-per-channel DNM PA3 (£2500) or the PA3 S. The returned models are remanufactured to factory condition, and then resold with a full three-year guarantee.

The 'S' version of the PA3 is said to be half as powerful as its unregulated predecessor, Denis Morecroft asserting that the cleaner, more dynamic delivery makes these two power amps equally loud, subjectively at least. In theory, the

**ABOVE:** The DNM PA3 S power amp with its separate transformer box (top) cost £3750 when released in 1998

3dB difference corresponds to just one volume control notch – or so I keep telling myself!

What you receive is a compact acrylic-cased power amp linked umbilically to a separate transformer box, the latter equipped with a power switch and a detachable IEC plug cable. Inputs are on 5-pin DINs; dealer-set outputs, as required, are for single, double or triple pairs of speaker connections, via buried 2mm gold-plated sockets.

Discrete components are used throughout the PA3 S, which operates in push-pull, direct-coupled, Class A/B mode. Single FET output devices are sufficient at this power level. Stable, rail-to-rail differential circuitry avoids current mirrors, and while this amplifier uses substantial negative feedback, great care has been taken to make the current paths as pure as



## FROM THE VAULT

frequency range. For example, in the treble it was highly resolved, very delicate, airy and neutral. As for the bass, within its dynamic compass and modestly limited extension, I rated it among the best.

### UNCANNY ABILITY

Given a reference-grade signal input, the PA3 S amplifier showed gains in transparency, attaining a 'very good to excellent' rating with well layered image perspectives. Exceeding its already satisfying performance on rhythm and dynamics, its timing now reached near textbook standard, so well did it 'lock in' both the performance and the performers. It also had the uncanny ability to make many competing power amplifiers sound rather blurred. Beginnings and ends of notes were superbly defined over the whole frequency range, while complex scoring was read cleanly with none of the usual mix-up between the instrumental lines when the music gets complicated.

This stable consistent clarity, and very fine dynamic expression, were both factors in imparting high musical involvement and satisfaction without the need for high listening levels. Aural fatigue was rated



consistently low at moderate listening levels, though the sound thinned a little towards full power (not clipped, monitored with a peak power meter!). Bearing in mind its relatively small size and finite bass weight at very low frequencies, and knowing full well that floor-shaking musical events are beyond its compass, I am persuaded by its sheer musicality to rate this amp as pre-eminent in its class.

### LAB REPORT

Since the regulated power supply is stabilised to a fixed value, output

**ABOVE:** The rear of the PA3 S sports 5-pin DIN inputs plus buried 2mm gold-plated sockets for single, double or triple pairs of speaker connections. An umbilical cord from the external transformer case plugs into the central three-pin XLR socket

power may be precisely set, no more and no less. Thus, the PA3 S delivers precisely what is promised, being 13.6dBW or 23W into 8ohm loads. With both channels driven, there's about 1dB less output. Meanwhile, almost twice that power was available into 4ohm, and for this moderate powered amplifier, ample current was available. Even for 2ohm loads, more than 6A is generated, given due consideration to the self-resetting thermal cutout.

As for the output impedance, this was remarkably constant at about 0.25ohm, low enough to be

## 'NOT FOR HEADBANGERS'

The company's amplifiers represent the antithesis to mega-muscle power. As Denis Morecroft, DNM's founder and designer, says, 'I'm not designing for headbangers! They've got to look elsewhere! But in my defence, I'd argue that the dynamic expression I try to achieve makes my amplifiers sound louder and more satisfying than amplifiers of nominally greater power.'

'The sense of power in live unamplified music derives from the fine detail, not from the loud parts. For reproduction, resolution is thus more important than brute force... resolution without intermodulation effects.'

'Frequently my amps are used like SE triode models with higher sensitivity speakers (greater than 90dB/W) and my distributor finds a good match with the highly efficient French made Rhedeko speakers, which I also like.'

In the PA3 S, Denis Morecroft tried to concentrate on a number of concepts concerning the perfection of the layout of the amplifier.

He was concerned to obtain the right relationship of parts, and to understand the current flow and interaction between circuits. He also tried to minimise unwanted coupling even at very high frequencies.

### ON THE BOARDS

In Morecroft's view, 'If power supply and ground routing don't intrude then a close approach to a perfect layout can be achieved. I've used modern technology in the form of surface mount techniques to make the power amplifier uniquely small. But then you have to connect power to it.'

'My solution involved three stacked printed circuit boards with the power lines and power grounding running vertically, that is at right angles to the area of the circuit, so minimising the interaction between sensitive low level parts and high current regions.'

'My research showed that problems of feedback stability, clarity and dynamic expression often related to

these unwanted interactions which I've tried so hard to avoid. In a sense it completes a path of development which began with optimised star grounding, ultra clean power supplies, non interactive casework and, despite the expense, full supply regulation when deemed essential.'

### BUILDING BLOCKS

DNM has adopted an evolutionary approach to design. As Morecroft reflects: 'While the PA3 S may be substantially different to previous models, it embodies successful aspects of designs that go back over ten years. For example, regardless of expense I've retained the alumina block thermal coupling between the output FETs and the heatsinks to minimise interaction with the metal of the heatsinks.'

'And there are high performance power regulators in the supplies of the top model, which give the cleanest and most stable power. In a sense they are power amplifiers in their own right.'

## FROM THE VAULT

inconsequential. The response runs from 36Hz-32kHz ( $\pm 0.5$ dB). Simple measurements for total harmonic distortion gave very low residuals, better than 90dB midband at full power, while spectrum analysis was necessary to track down the distortion (typically -100dB for low and mid frequencies, and perhaps -81dB, or 0.009%/20kHz).

### CONCLUSION

The PA3 S largely vindicates Denis Morecroft's assessment of negative feedback. He believes that although invariably it is a major source of problems, as long as extraordinary care is taken to overcome common pitfalls, and careful use is made of appropriate circuit topology, the application of negative feedback in a solid-state amp can be justified as a means of obtaining satisfactory linearity and load matching.

Through his efforts to bring several factors under his control, Morecroft has proved himself to be a highly committed designer who has achieved much. Innovations that testify to Morecroft's achievements include minimisation of stray induced currents; the painstakingly detailed optimisation of stability margins in the ultrasonic range to minimise the feedback signature; development of a unique 'T' network reservoir capacitor; and the use of

*'The PA3 S power amp is perfection in miniature'*



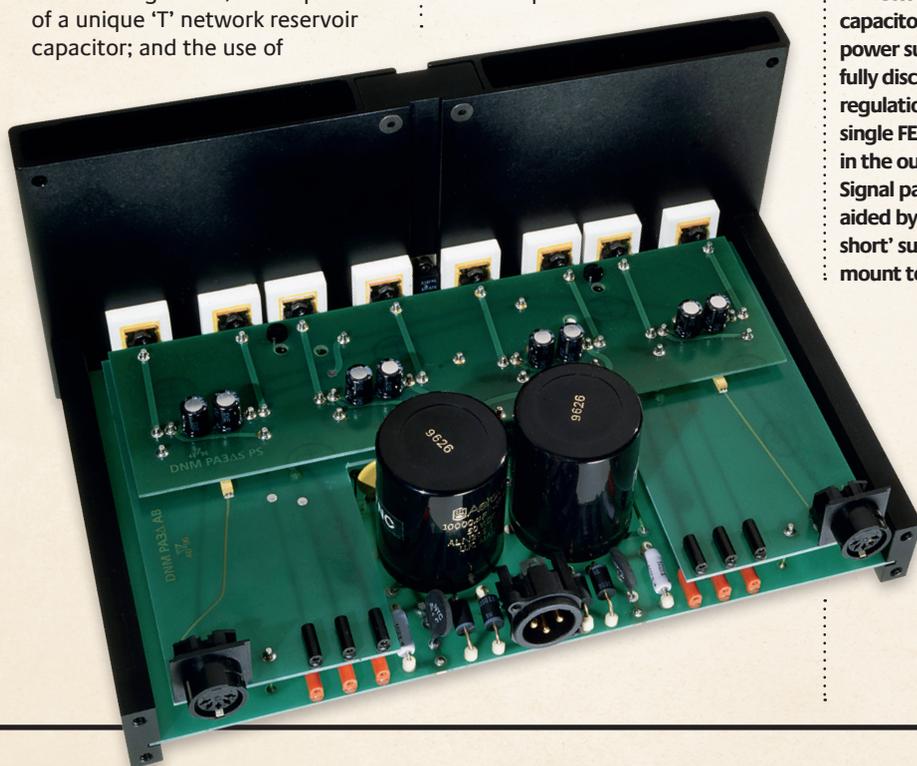
**LEFT:** Denis Morecroft holds a DNM Series 3 preamp at the Lucern Hi-Fi Show in 1987. It was the first amp he made using fully non-metal acrylic casework. The drawing board behind him shows the original semi-transparent film for the Series 3 preamp motherboard, made using black tape as computer-aided PCB design was yet to become routine

costly active push-pull regulated supplies and 3D topology in a tiny, optimised amp kernel. The DNM

PA3 S proves the validity of Morecroft's work very effectively indeed. Perfection in miniature, this reference quality power amplifier is highly rewarding musically. Despite its

high pound-to-watt ratio it is easy to recommend. If, in practice, you find the PA3 S goes loud enough then look no further, unless you have a lot more to spend. ☺

**BELOW:** The PA3 S power amp with its lid removed. It uses custom 10,000pF 'T' network capacitors in the power supply, fully discrete regulation, and single FET devices in the output. Signal paths are aided by 'super short' surface mount technology



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