

MERIDIAN 601

£2750

Digital Signal Processing doesn't need to prove its potential to revolutionise hi-fi – but it does need to prove its practical worth. Can it do it in the form of the 601, asks Jimmy Hughes

Simplicity and minimalism have long been watchwords when it comes to specialist hi-fi, a product can be taken less than seriously if it offers too many features.

But the time has come to think again. It may have been true historically that tone controls, filters and equalisers had a detrimental effect on performance, but it isn't right to assume that these things are always necessarily bad.

Thanks to digital signal processing – potentially the most exciting recent development in hi-fi – you can get all the advantages of sophisticated tone control without the penalties of poorer sound quality. It is this new technology which makes the Meridian 601 preamp so worthy of note.

It is a remarkably flexible unit with a host of unique features, offering precise, repeatable tonal correction to compensate for difficult room acoustics, poor source material, loudspeaker deficiencies, headphone anomalies, and more. Additionally, it can be used to control two separate hi-fi systems.

The 601's sheer comprehensiveness gives the user an unusually wide range of options to choose from. Most commands are given via the excellent supplied remote control, which has colour-coded buttons to make it easier to program. The 79-page instruction book is clear and easy to follow, taking you painlessly through each stage. You begin by using the 601 as a basic preamp, and progress through its DSP functions as you get the hang of things.

Among the 601's most useful DSP programs are the two Kube options: Kube 107 and Kube 200. These were originally developed for use with specific KEF speakers to enhance low frequency performance. Both Kube settings give substantial bass boost – as much as +20dB at 20Hz with Kube 200 – and a mild treble boost/cut. You can vary the amount of added equalisation to suit your room and speakers. I found the Kube 200 remarkably effective with my Impulse

H1 horn speakers, giving a depth of bass I'd never previously experienced.

The beauty of Kube equalisation (especially Kube 200) is its limited effect on the upper bass frequencies. It lifts really deep bass without muddying the sound higher up. Often, with normal program material, you'd be hard pressed to say whether or not Kube 200 was selected. But with really deep bass notes present there was no doubt; the effect was awesome in its breadth and power.

Another useful feature is the ten band Octave Equaliser, giving a maximum of 7dB boost/cut at discrete points from 31Hz to 16kHz. Where a more conventional type of tone control is needed, a gentle tilt bass/treble equalisation can be selected. This introduces bass lift and treble cut (or vice-versa) to correct bright or dim recordings.

Equalisation is often required because of room problems. For example, when speakers are producing boomy bass because of space or domestic restrictions such as close wall/corner placement. The 601 has its own Speaker Equaliser to take care of this, allowing the low frequency response to be tailored to give a even response without boom. It can also work to achieve the opposite effect, lifting bass in situations where a speaker lacks low frequency extension.

The most unusual feature of all is Archive, a range of disc equalisations (microgroove LP and coarse groove 78) to suit different replay standards. You can use these on LPs and 78s; but the feature also operates on line sources, allowing you to re-equalise 78rpm recordings which have been incorrectly transferred to CD.

Headphone users can select digital delay, equalisation, and cross feed between the two stereo channels to help improve clarity and naturalness. Effectively, it enables you to tailor the sound produced by headphones to meet your own specific requirements.

Because the 601 passes all analogue signals through analogue/digital, digital/analogue conversion, it's vital to ensure that the full dynamic range of the digital processor is

used to maximise resolution. Thus, each input is adjustable for sensitivity, and there is a visible indicator to warn when clipping is about to occur. The various line level sources – tape, radio, video – have

a fairly predictable output level, but LP may need adjusting because cartridge output varies considerably.

When using CD, you've a choice of taking the CD player's analogue output straight to a line input, or alternatively, going from its digital output (coaxial or optical) to the 601's own digital input. Which sounds better depends on the quality of your CD player and its internal/external DAC.

Using the 601 with a Denon DCD-1290 I preferred to use the built-in Meridian DAC. However, the results were even better when the DCD-1290 was partnered with a Marantz DA12 DAC and connected to a line input. If you own a good outboard DAC it may outperform the 601's internal DAC.

The 601 is costly – potential purchasers are bound to wonder whether or not it

DATA

Price:	£2750
Size:	32.5cm x 10cm x 32cm (WxHxD)
Inputs:	Analogue; LP (MC/MM) four line level digital; four coaxial; two optical 32kHz, 44.1kHz, 48kHz
Outputs:	Analogue; two unbalanced fixed/variable one balanced variable digital; two coaxial, two optical
Phones socket:	Yes, with DSP processing
Tone controls:	Yes
Tone Defeat:	Yes
D-A conversion:	Two x 18-bit, eight times
A-D conversion:	One x 16-bit, 64 times

DESIGN

- ▶ Digital signal processing preamp with purist audiophile pretensions
- ▶ A host of equalisation, filtering and system operation optimisation features including room boundary and LP/78 settings
- ▶ Digital in/out sockets
- ▶ No analogue tape loop

PERFORMANCE

- ▶ Room equalisation DSP function works extremely well
- ▶ Lean, analytical and electrically/mechanically quiet operation
- ▶ DAC not as satisfying as state of the art specialist external DACs
- ▶ Does not supplant the best analogue preamps in purist high performance terms



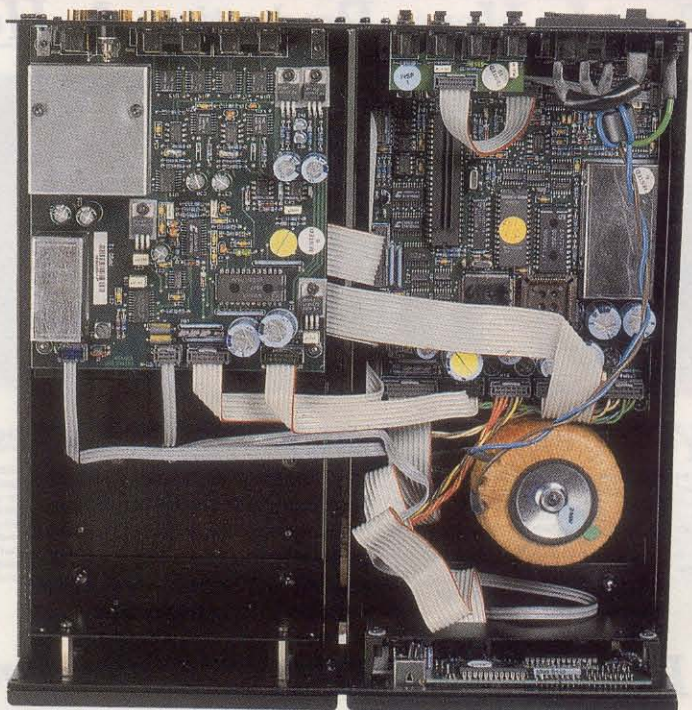
601's rear panel reveals its wealth of inputs



holds its own against comparably priced analogue preamps. Clearly its DSP facilities place it in a special category, so the comparisons aren't strict ones. But, if you don't intend to use these facilities much, can it justify its price on sonic grounds alone?

Using the 601 without DSP in place of my usual Michell Argo analogue preamp, I found it pleasantly open and tonally neutral. It gives a fairly lean, tightly controlled presentation, perhaps a shade light in terms of weight, and the 601's dynamics are cool and analytical rather than full and warm. It sounds tidy, if a little contained, as though the music were being held slightly in check.

Something I noticed when setting the 601's input sensitivity, was a change in sound quality between the highest gain option and the two attenuated alternatives. Basically, the sound is livelier, sharper, and subjectively more dynamic when the input sensitivity is at its highest. As soon as you introduce either of the two lower gain settings the sound loses some of its brilliance and bite. Unfortunately this limits the 601's ultimate sonic capability, as most sources



The 601's internal architecture does not allow for an analogue signal path through the circuit. This may account for the 601's less exciting performance with analogue sources

MERIDIAN 601: THE FIRST TRULY DIGITAL PREAMP

Preamps and integrated amps which aspire to the label 'digital' are nothing new. To date, all have comprised conventional analogue circuits preceded by a DAC, and are only digital in the sense that they accept a digital input. All signal manipulation is performed in the analogue domain, not the digital, just as in any other preamp.

Any other preamp, that is, than the Meridian 601 – the first in the world worthy of the description 'digital'. Meridian prefers to call the 601 a DSP (digital signal processing) preamp to make its provenance crystal clear. This is not an analogue preamp with a DAC stitched on its input; it is a truly digital preamp in which virtually all signal manipulation is undertaken in the digital domain. Thus, the 601 is able to offer a host of powerful signal conditioning facilities which would be unthinkable to attempt using analogue circuitry.

The internal architecture is shown on the previous page. Two important points emerge. First, though the 601 has analogue as well as digital inputs and outputs, there is no analogue signal path through the circuit. All analogue inputs are converted into digital code, regardless of whether an analogue or a digital output is required. The analogue outputs are derived by means of digital-to-analogue converters which, following any DSP manipulation, restore the selected input signal to analogue form.

Thus even if the 601's DSP functions are bypassed, there is always back-to-back A/D and D/A conversion present between any analogue input and either analogue output. This may explain Jimmy Hughes' observation that on analogue inputs the 601 cannot quite match the sound quality available from the best analogue preamps.

The second point is that each of the two analogue and two digital group outputs is independent, being derived from a separate DSP output (and, in the case of the analogue outputs, from separate DACs). This allows for one output to carry a processed and the other an unprocessed signal, particularly useful when one is used to form a tape loop. The unprocessed signal can be sent to the tape machine (analogue or digital) while the processed signal (analogue or digital) is sent to the speakers or head-

phones. Independent outputs also provide for multiroom applications and for surround sound.

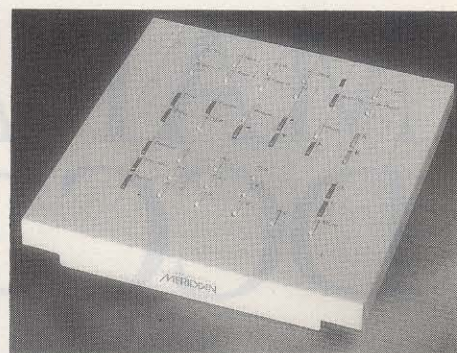
When the prototype 601 was first shown in 1991, it used Philips' DAC7 BitStream to derive the analogue outputs. Recently, however, Meridian has used Crystal Semiconductor's delta-sigma DACs. Meridian's 64-times oversampling delta-sigma ADC is used to convert analogue input signals into digital.

The 601's use of DSP provides both unprecedented accuracy and flexibility of signal processing (only some of the numerous facilities are touched on in the review), but there are potential disadvantages. In particular, any 'boost' applied to part of the frequency range has to be implemented by attenuating the signal level at surrounding frequencies, since the processed signal must still be accommodated within the 16-bit dynamic range. Any attenuation causes the level of quantisation noise to rise relative to the average signal level, which is undesirable.

This poses a particular problem for DSP realisation of phono equalisation. The RIAA replay equalisation characteristic defines an 18.6dB boost at 20Hz and 19.6dB cut at 20kHz, relative to 1kHz (0dB). In the digital domain this would have to be realised as an 18.6dB cut at 1kHz and a 38.2dB cut at 20kHz, relative to 0dB at 20Hz. In the ear's most sensitive frequency range (around 3kHz), the 97dB dynamic range available from 16-bit would be reduced by around 24dB (4 bits).

This is avoided in the 601 by executing the low frequency part of the equalisation characteristic within the disc input stage, prior to A/D conversion. The high frequency roll-off is then implemented partly by DSP and partly by the analogue output de-emphasis, necessitated by CD.

In other DSP modes requiring frequency selective boost, advantage is taken of music's spectral characteristics. For example, the Kube 107 mode provides for up to 15dB of bass boost at 20Hz. To prevent overloading the DSP, this would require reducing the reference signal level by the same amount (equivalent to 2.5 bits). In practice, however, the bass content of music is usually limited, which means that the reference level attenuation can be reduced, albeit at a small risk of DSP overload. If this occurs, the DSP is designed to clip gently and a 'Clip' warning is illuminated on the display.



Full remote control from your armchair

(with the exception of LP), are likely to require attenuated input sensitivity. The 601 gave a very consistent performance on all inputs, and its slight lack of weight/warmth could easily be put back with DSP.

The various Archive settings proved interesting too, though not quite as I expected. For example, 1950's Decca FFRR (full frequency range recording) mono LPs are usually quite bright and sharp sounding via standard RIAA equalisation. However, played through the FFRR Archive setting the sound grew brighter with the treble sounding excessively emphasised.

The 601 is a clean and quiet performer, both electrically and mechanically. Occasionally there is some mild switching noise as you go between DSP settings, but otherwise the unit is virtually noise-free. One of the benefits claimed for the 601 is the way the digital circuitry effectively isolated the input and output halves of the preamp, the two being linked through opto-couplers.

If you look at the back of the 601 you won't find a set of analogue tape outputs. This is down to the digitisation of the signal and the desire to keep input and output earthing separate. An analogue tape feed would require its own DAC, adding to the cost. However, you can record tapes by using the second variable analogue output.

Looking at the 601, it's hard not to regard it, in concept at least, as the future direction for hi-tech audio. Its sophistication, versatility, and wide range of options make it an ideal control centre for a state-of-the-art hi-fi system. It may look simple, but its slim exterior hides a wealth of processing power.

I really liked the 601. My only complaint is that its sound isn't a little fuller, livelier, and more dynamic – something I lay at the door of the line input stages with their variable sensitivity. Otherwise, I was pleased with its sound, especially when the Kube 200 DSP option was in full flight.

I wouldn't say the 601 supplants the performance of a good analogue preamp like the Michell Argo (which is about a third of the price of the 601), but those who need its DSP functions to correct room problems may find tailoring the sound to meet precise requirements more important than the last degree of sonic excellence.

■ **Right of Reply:** see page 65

Right of Reply

Linn £3500 CD System

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If it had been a good review we would have thanked you. If it was a bad review we'd have argued. At the end of the day only the customer can decide.

Any 'rumpled' Linn authorised retailer will be pleased to help. Thanks anyhow.

Neil Gaydon

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Meridian 601

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Thank you for your careful review of the Meridian 601 DSP preamplifier. We do not agree that the sound of the Meridian 601 could be improved by using an external DAC. Not only is the 601's DAC of extremely high standard, but equally important, the whole output section of the 601 is used as part of the variable analogue output and this cannot be implemented outboard.

There is a paradox in Jimmy Hughes' thoughts on this. How can the 601 DAC be blamed for the fact that he finds CD sounds better when he feeds an externally converted analogue, rather than digital input to the 601?

The 601's DAC is being used in both situations! That he prefers the signal passing through the external DAC and then the A/D of the 601 simply indicates how precise the A/D of the 601 is.

In the 601 extreme care is taken to maintain the full dynamic range of the signal. Careful redithering where necessary prevents the 601 intro-

ducing quantisation distortion.

Perhaps the most exciting thing about the 601 is its combination of input/output isolation with powerful signal control through DSP. As Jimmy Hughes says, this is the future.

Bob Stuart

DGW

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Marantz DD-82 DCC Deck

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Marantz expects to be able to provide improved performance from DCC. Alvin Gold and the listening panel appear to concur.

It is nice to know that DCC has won over some more sceptics. It seems to be that most people who have had a chance to 'listen' to the system properly are coming to the same conclusion: it works well.

Doug Randall

Marantz

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Pioneer PD-95

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The PD-95 which, as Keith Howard has discovered, makes a combination of *Audiophile* Award-winning components (a top-end transport and DAC), sound ragged in comparison, is testament to our engineer's dedication to supporting the committed audiophile's cause.

The PD-95 has won several prestigious awards in Japanese hi-fi magazines, and I know that our engineers will be very pleased to hear that their hard work is not unappreciated here in the UK also.

John Bamford

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