# delta force

## M AUDIO DELTA 1010 PCI DIGITAL RECORDING SYSTEM

For the launch of their new range of 24-bit/96kHz-capable PCI recording systems, established gadget manufacturers Midiman are going under the name M Audio. Martin Walker takes a look at the flagship product in their new line.

Midiman have always been the sort of company who would spot gaps in the market and develop their products to fill them. For example, they were virtually the only company to see that many musicians wanted more channels than were provided by a stereo soundcard, but couldn't afford most 8-in/8-out solutions, so they launched the Dman 2044. While this philosophy is still being used in their colourful range of MIDI Interfaces (BiPort 2x4s, USB Midisport 2x2) and accessory mixers (the Audio Buddy dual mic preamp and Multimixer 10 mini-mixer), a completely different approach is being used with their new and rather more upmarket range.

The M Audio product line not only has a different name, but a smart new logo and sophisticated black/silver look as well. The entire range is 24-bit/96kHz-capable and designed from the ground up for high-quality audio, while still keeping prices competitive. The Delta 66 (£349) is the closest to the Dman 2044, as it also has four analogue ins and outs mounted in a similar external breakout box, though it adds S/PDIF I/O, and its converters are 24-bit/96kHz-capable. The Delta DiO 2496 PCI card (£219) provides both co-axial and optical digital inputs (either but not both at once), along with simultaneous co-axial digital, optical digital, and 24/96 analogue outputs for monitoring purposes (see box for more details).

The Super DAC 2496 (£249) is an external box containing 24/96-capable D-A converters with a claimed 115dB dynamic range on balanced XLR and unbalanced quarter-inch jack outputs, fed from AES-EBU, co-axial S/PDIF, or optical S/PDIF inputs.

Even the very handy CO2 Co-axial/Optical converter from the previous range (I've been using one for the last year to interface various DAT recorders to soundcards) has now been upgraded to the CO3 (£149), which adds AES-EBU and 24-bit support.

### Overview

The flagship of the new range is the product under review here: the Delta 1010 10-in/10-out PCI Digital Recording System (to give it its full and

With 10 inputs and 10 outputs, the M Audio Delta 1010 should prove suitable for small studios, but if this is not enough, four cards can be run simultaneously using a single set of drivers, giving a possible 40 ins and 40 outs for those with plenty of expansion slots to spare.


## M AUDIO DELTA 1010 £649

### pros

- Excellent sound quality and wide dynamic range.
- Informative and helpful manual.

### cons

- No DirectSound or Mac drivers yet (but they should be available by the time you read this).
- Back-panel sensitivity switches may be inaccessible once mounted in a rack.
- Some people may miss the lack of bundled software.

### summary

The Delta 1010 has a clean transparent sound and a large dynamic range. Just for once, here's a product that really does exactly what it says on the box!

SOUND ON SOUND

rather grand title). This provides eight analogue ins and eight analogue outs on balanced/unbalanced quarter-inch TRS jack sockets, along with a single S/PDIF I/O socket pair, single MIDI In and Out, and word clock In and Out, with all the analogue converters and sockets in a 1U rackmounting case. The external box connects to the half-length PCI host card via a 25-way umbilical cable.

The case is reassuringly solid, and the 3mm-thick aluminium front panel has an attractive sparkly silver finish. The majority of the sockets are on the rear panel, which seems the most suitable solution for most musicians; apart from the yellow LED power indicator, the front panel contains only a pair of MIDI sockets, each with an LED activity indicator. Unusually, the eight analogue ins and eight analogue outs on the rear panel are each supplied with a switch for adjusting sensitivity between +4 and -10dB standards. Most modern designs do this in software, but unless you mount the case in the bottom of a rack and need to repatch regularly this shouldn't be a disadvantage. All analogue sockets are quarter-inch jacks, TRS-wired for balanced or unbalanced operation. Apart from ▶

these there is a 25-way D-type connector for the host cable, BNC word clock In and Out sockets, and the usual connector for plugging in the chunky 9 Volt AC power supply.

## Installation And Setup

Modern PCI cards are rarely large, and the Delta 1010 host card is no exception; at just under five inches long it should fit into even the most dimensionally challenged PC cases. The digital I/O circuitry is on this card, but the A-D and D-A converters and support circuitry are inside the rack case, which contains two large piggybacked circuit boards. The lower one houses AK4393 D-A converters from AKM (with a quoted dynamic range of 120dB), word clock I/O and PSU circuitry. Two voltage regulators are bolted to metal pillars, which connect to a long slab-shaped heat sink which runs almost the full length of the case. This is ventilated via slots on the top panel of the case, although the unit didn't get more than lukewarm after many hours of use, so I doubt that you would need an empty rack space above the unit.

The upper circuit board houses the A-D converters, again by AKM, which are marked AK5383 and have a quoted dynamic range of 110dB. I'm pleased to see that Midiman haven't simply resorted to reprinting these typical chip figures in their spec like so many other manufacturers. Instead they quote real-world measured figures for the converters plus the rest of the support circuitry (which are, unsurprisingly, slightly worse than those for the converters alone).

A 1.8-metre-long umbilical cable is supplied to join the host card and rack unit, and the mains power supply in the rack is cleverly designed to be switched on automatically when your PC powers up (using a relay by the sound of it).

## Drivers And Control Software

As with most professional soundcards, persuading the PC to recognise the hardware and install the drivers is simplicity itself. I even managed to beat my own record by getting the Delta 1010 to run happily alongside my existing Echo Gina, Yamaha SW1000XG and AWE64 Gold — making a total of four soundcards in the same PC!

The software is supplied on a single high-density floppy disk, which minimises unwanted clutter on your hard drive, since there are only 861Kb of driver files in total. I know that some musicians might prefer to have plenty of bundled software, but for a professional card like this the typical 'lite' versions of wave editors and audio recording packages won't cut the mustard. What musicians really need is exactly what comes with the Delta 1010: Windows 95, 98, NT and ASIO drivers, along with comprehensive *Control Panel* software. In fact, the same drivers are used by all members of the Delta family — the functions of the *Control Panel* simply adapt to suit the facilities of each one.

Once installed, the Delta 1010 audio drivers appear to Windows as a set of five stereo output pairs. These are named 'WavOut 1/2 Delta-1010' through to 'WavOut 7/8 Delta-1010', along with 'WavOut S/PDIF Delta-1010'. The audio inputs are, similarly, named 'PCM In 1/2 Delta-1010' to 'PCM In 7/8 Delta-1010' and 'S/PDIF In Delta-1010'. However, there is an additional input labelled 'Mon. Mixer Delta-1010': the function of this will become clear when I discuss the M Audio *Delta Control Panel* in the next section. The MIDI I/O appears to Windows applications as 'Midi In Delta-1010' and 'Midi Out Delta-1010'.

## Staying In Control

The *Control Panel* appears as an extra Applet inside the Windows Control Panel labelled 'M Audio Delta H/W', and can also

## Delta DiO 2496

**Midiman also sent me a DiO card to look at, and although I didn't submit this to the full install and test procedure, the design philosophy is close enough for me to have similar confidence in its abilities. Exactly the same size as the Delta 1010 host card, it has 2-in, 4-out capability at 24-bit/96kHz. Both co-axial (phono) and optical (TOSlink) digital inputs are provided, but only one can be active at a time. This is hardly surprising, since you need the active input to supply the master clock for the card when transferring digitally from an external device. Both co-axial and optical digital outputs are provided, which can be used simultaneously, along with stereo analogue outputs on a pair of phono connectors. These use AK4924 D-A converters from AKM, which are not quite as highly specified as those of the Delta 1010, but still have a measured dynamic range of 101dBA.**

**The *Control Panel* software looks identical to that of the Delta 1010 apart from various 'greyed out' boxes for irrelevant extra channels in the Monitor Mixer, and the driver software is identical. The DiO 2496 is designed for those who want to transfer digital audio to and from external gear such as DAT or ADAT recorders. It should also prove ideal in conjunction with an external rackmounting A-D converter as a high-class replacement for a stereo soundcard. At a similar price (£219) to USB solutions like Opcode's DATport, it offers full 24-bit/96kHz capability, as opposed to 16-bit/48kHz, and looks like a reliable yet cost-effective solution to getting digital audio in and out of any PC.**

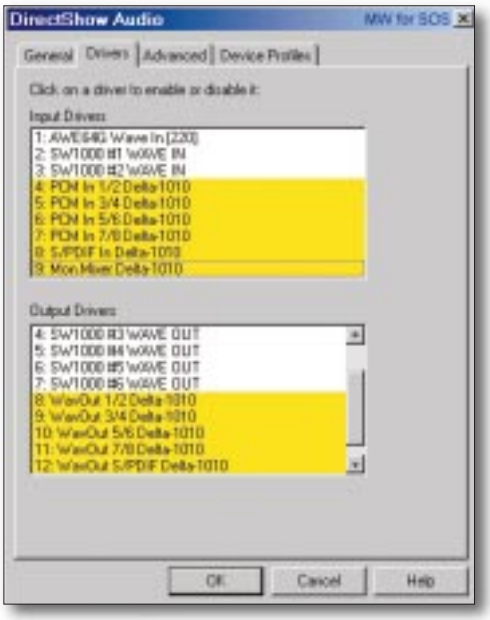
## M AUDIO DELTA 1010

be launched from inside *Cubase* if you are using the ASIO drivers. It has four main tabbed pages, along with a fifth About page that displays the installed Driver and Panel version. The first of these is the Monitor Mixer, which lets you mix together all five pairs of Wave outputs with all five hardware input pairs. The function of the 'Mon. Mixer Delta-1010' input now becomes clear: you can use it inside an audio sequencer to record the monitor mix.

Each of the 10 Mixer Input pairs has its own small panel featuring individual controls for both left and right channels. The source input levels are displayed on peak-reading level meters, and the output levels can be adjusted using faders calibrated over the full 24-bit range (from 0 to –144dB). These can either be set separately for mono sources, or ganged together for stereo operation using the 'Stereo Gang' tick box. Each channel also has mute, solo, and pan controls. The overall output level is controlled from the Master Volume panel, which again has peak-holding level meters, output level faders, and a Mute tick box. Only four of the input panels are displayed at any time, but you can use the horizontal scroll bar to get to the other panels. This is easy enough to do, but having an option to display every panel simultaneously (using narrower panels) would save a lot of scrolling back and forth. Otherwise, the look is basic but functional, though graphical Mute and Solo buttons would have made settings easier to take in at a glance.

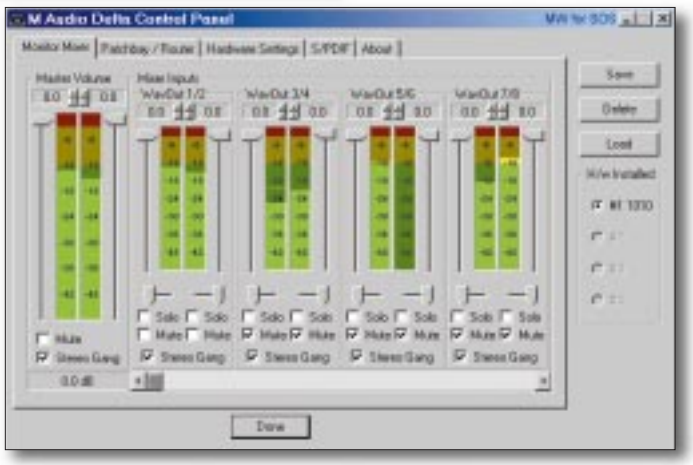
The secret to using the Monitor Mixer is revealed in the second page of the *Control Panel*, the Patchbay/Router. This consists of five columns of Windows 'radio buttons' that let you choose which signals are sent to the actual hardware output sockets (H/W Out 1/2, H/W Out 3/4, H/W Out 5/6, H/W Out 7/8, and H/W Out S/PDIF). In each case the appropriate WavOut signal can be routed to its own output (for instance WavOut 1/2 to H/W Out 1/2), but you can instead switch to route any of the hardware inputs direct to the hardware outputs. This is very useful for 'zero'-latency monitoring, as well as for letting you hear an incoming S/PDIF signal via an analogue output. The output of the Monitor Mixer can be routed to either or both of the H/W Out 1/2 and H/W Out S/PDIF sockets.

The third page is used to control a number of Hardware Settings. The Master Clock can be changed between Internal Xtal, S/PDIF In or Word Clock, and there is a useful Locked/Unlocked indicator beneath these controls so that you can check that the card is receiving a valid clock signal. If you are running on the Internal Xtal setting you can see the current sample rate (chosen inside a running software application) in the Codec Sample Rate section. You can also lock this globally by clicking in the 'Rate Locked' box, to ensure that you don't make mistakes: once locked, any attempt to run a software application at any other rate will produce an error message. The 'Reset Rate When Idle' tick box lets the card return to your chosen default sample rate whenever a software application stops actively using a different one.




Left: The Delta 1010 provides a host of new audio drivers, including an extra Monitor Mixer input that lets you re-record the mixed signal from all Wave outputs and hardware inputs.

Below: The Monitor Mixer allows all ten hardware inputs and all ten Wave outputs to be mixed together and sent to either Channel 1/2 analogue output sockets or the S/PDIF output socket.





Left: The Hardware Settings section of the Delta *Control Panel* lets you choose the Master Clock, lock a preferred sample rate, optimise the driver timing for single- or multiple-application support, and tweak the buffer sizes for lowest latency.

S/PDIF Sample Rate can be set to one of five values (32, 44.1, 48, 88.2, and 96kHz), which tells the software application what to expect before the actual clock signal is presented at the S/PDIF input: presumably this helps with lockup times. Two other parameters can be set on the Hardware Settings page. 'Multitrack Driver Devices' has two settings: 'Single and In-Sync' should be selected with multitrack software that uses multiple outputs, to ensure that they all remain in absolute sync with each other, while 'Independent' is more suitable when you are running several audio applications (such as an audio sequencer and software synth or sampler), so that channels can run independently.

DMA Buffer Sizes can be set for both Wave and ASIO drivers and, as always, the values entered here will represent a compromise between glitch-free operation and higher latency — you can lower the default values until you start to get glitches, and then edge them a little higher to achieve the optimum setting for your own PC. The default values are 20mS for the Wave drivers (the available values range between 8mS and 28mS), and 2688 samples per buffer for the ASIO drivers (this gives a latency value of 61mS, while the lowest setting of 336 samples per buffer gives 8mS, both at a sample rate of 44.1kHz).

The final S/PDIF page is rather simpler, giving a choice of consumer or professional output formats. Consumer is normally used and is recognised by S/PDIF devices, whereas the Professional setting produces an AES-EBU type data stream, though still at the lower S/PDIF voltage level — some AES-EBU devices will accept this with a suitable converter lead. Both formats have an Advanced Settings section with differing options: for consumer format, various SCMS copy options are available (including the most favourable 'No SCMS' one), as well the ability to set the Emphasis flag should this be necessary. The Professional options are Data Type (Audio or Non-Audio) and Emphasis (None, CCITT, or 50/15 microseconds). Again, you are rarely likely to need these, but who knows when they might come in useful?

You can Save every current *Control Panel* setting complete with a descriptive name, and if you have multiple Delta 1010 cards (up to four can be installed and run together from the driver and *Control Panel*) you can select which one is currently being controlled. Midiman UK told me that the current drivers can already keep four cards in perfect sync, but there are some fixed offsets between them; this will be overcome in a future driver release. The only problem I discovered was a missing help file: if you press the F1 key a 'Deltapnl.hlp file not found' error message pops up. However, the printed manual is well written, and apart from covering the *Control Panel* functions provides an informative section on connecting typical setups, as well as several pages of trouble-shooting information (although I didn't need to use this at all).

## In Use

Even on initial auditioning with 16-bit playback, the converters of the Delta 1010 sounded noticeably sweeter and more focused at the top end than those of my 20-bit Gina card. Measuring RMS background noise levels at 44.1kHz and 48kHz using *Wavelab* gave values of –93.4dB at 16-bit, and –109dB at 24-bit. Increasing the sample rate to 96kHz didn't change noise levels at 16-bit, but noise levels at 24-bit increased to about –102dB. This isn't so surprising when you consider that the noise bandwidth has doubled! I should point out that both *Wavelab* and *Sound Forge* use the convention that 0dB RMS is the largest possible square wave signal, so a sine wave with a peak level of 0dB will actually measure –3dB RMS. Because of this, the actual signal-to-noise ratios (measured relative to a sine wave at full level) are 3dB smaller than the figures I have quoted.

With the ASIO drivers, I managed to run my Pentium II 450MHz machine with the lowest setting of 336 bytes per buffer, which gave me a latency of 8 milliseconds at 44.1kHz (7mS at 48kHz). However, I only had to raise this to 528 bytes per buffer when using higher sample rates, giving very low latencies of 6mS at 88.2kHz and 5mS at 96kHz. The only annoying factor when setting up this buffer size for a particular PC is that you have to exit your sequencer and reboot it before the changes take place. Various other soundcards, such as the ▶

## M AUDIO DELTA 1010

RME Hammerfall, have got round this limitation allowing you to change settings 'on the fly', but once optimised this setting should rarely need to be changed.

No ASIO 2.0 Direct Monitoring is available for automatic 'zero-latency' monitoring during recording (the option is 'greyed out' in my *Cubase* Audio System Setup), but of course you can still do this manually by routing the input signal directly to a hardware output using the Delta 1010 *Control Panel* utility. However, if your PC is capable of latency values of under 10mS, like mine, you can usually ignore hardware monitoring and use *VST* monitoring directly. Doing this allows you to monitor a 'live' recording with real-time VST effects, and I experienced no problems with this at all.

I also tried out a few other applications while varying the DMA Buffer Size of the Delta 1010 drivers. Set to the minimum 8mS DMA Buffer Size I managed a very respectable 15mS Play Ahead setting inside Native Instruments' *Reaktor* software synth, which made real-time performances very responsive. However, I had to increase to 16mS DMA Buffer Size with Seer Systems' *Reality* to prevent break-up, and still got a noticeable performance delay. Each soft synth has its own way of dealing with Wave driver latency, but I suspect that all will play well when Midiman release DirectSound drivers (which should have been released by the time you read this, along with Mac drivers).

I also checked multi-application support by changing the setting of 'Multitrack Driver Devices' to Independent. When using the 'M Audio Delta ASIO' drivers, *Cubase* grabs every channel, but sure enough, once I switched to the ASIO Multimedia drivers in *Cubase* I could disable specific channel pairs inside the Advanced Options page of ASIO Multimedia Setup, and then use these with other applications.

Sound quality was excellent at all sample rates and bit depths, although I did notice a tiny amount more hum from outputs 1 and 2, which are nearest the PSU circuitry, than from the other outputs. However, this was totally inaudible at normal operating levels, and I wouldn't have noticed it at all if I hadn't had the amplifier turned fully up to hear how low the hiss was. I checked S/PDIF file transfers by transferring data to and from a DAT recorder: the re-imported file was a bit-for-bit copy of the original as long as the Master Clock setting of the Delta 1010 was correctly set to 'S/PDIF In'. During the entire audition period I only spotted one small bug with the latest drivers (version 4.1.15.8) — the first few milliseconds at the start of playback were strangled when listening to the output of the Monitor Mixer. Inserting a few milliseconds of silence before the sample cured the problem, and no doubt Midiman are beavering away as I write this to cure the problem.

### Brief Specifications

- Analogue Connectors: balanced/unbalanced TRS quarter-inch jack sockets.
- Analogue Inputs: 8, with individually hardware-switched +4dBu/-10dBV sensitivity.
- Analogue Outputs: 8, with individually hardware-switched +4dBu/-10dBV sensitivity.
- Peak Input signal: +20.2dBu at +4dBu, +2.1dBV at -10dBV sensitivity.
- Peak Output signal: +20.0dBu at +4dBu, +2.0dBV at -10dBV sensitivity.
- A-D Converters: AKM AK5383 24-bit dual-bit delta-sigma.
- Input Dynamic Range: 109dB (A-weighted).
- Input Impedance: 10kΩ minimum.
- D-A Converters: AKM AK4393 24-bit delta-sigma 128x oversampling.
- Output Dynamic Range: 108dB (A-weighted).
- Total Harmonic Distortion: <0.001% (A-D), <0.0015% (D-A).
- Frequency Response: 22Hz to 22kHz, +0.3/-0.2dB.
- Supported Bit Depths: 8, 16, and 24.
- Internal Mixing Path: 36-bit.
- S/PDIF: In, Out. Up to 24-bit 96kHz operation supported.
- Internal Sample Clock: 8, 9.6, 11.025, 12, 16, 22.05, 24, 32, 44.1, 48, 88.2, and 96kHz.
- MIDI: In, Out (both with LED activity indicators).

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### Final Thoughts

There are now quite a few 8-in/8-out soundcards on the market, even if you restrict yourself to those with external converters, and anyone thinking of buying one needs to narrow down the options. One obvious competitor is the Echo Layla at a street price of about £675, but this is now showing its age (and is shortly to be superseded by the Layla 24). Despite having an extra pair of analogue outputs relative to the Delta 1010, its 20-bit/48kHz converters make it less attractive to those seeking digital nirvana. The Gadget Labs Wave/8•24 (reviewed in *SOS* August '99) has 24-bit/48kHz Crystal converters, and with its optional S/PDIF daughterboard costs a similar £609. However, it has no word clock facilities, and the audio spec of the Delta 1010 certainly has the edge, thanks to its larger dynamic range and 96kHz capability.

The Terratec EWS88MT (reviewed in *SOS* October '99) is a bargain at £400, especially as it has full 24-bit/96kHz capability, and its *Control Panel* has many similarities to that of the Delta 1010. However, the big difference is in its converter codecs: both the A-D and D-A converters of the Delta 1010 are capable of 10dB more dynamic range, and as any serious audiophile knows, this doesn't come cheap.

So, ultimately the choice comes down to audio quality every time. With its new logo and upmarket look, Midiman's M Audio Delta 1010 looks and sounds expensive, and while there may be cheaper options none of these can match its audio specification. To my ears the M Audio 1010 is the best sounding 8-in/8-out soundcard I've reviewed to date. What more can I say but stick it on your shortlist? SOS

**information**

£ Delta 1010 £649; DiO £219. Prices include VAT.
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