Sony MDM-X4 digital multitracker

Scott Christie tests Sony's entry into the MiniDisc multitrack market.

In the highly competitive and unforgiving world of audio technology, very few recording formats get a second chance. Sony's MiniDisc, however, is attempting a neat back-from-beyond the-grave trick, returning as a viable format for stereo and four track audio recording.

Your MD for this evening...

The Sony MDM-X4 is a four track MD (MiniDisc) multitrack recorder integrated with a six channel analogue mixer. Its layout is in the tradition of the classic portastudio-style cassette multitrackers. In fact, if you've used a cassette-based portastudio before, you'll be up and recording on the MDM-X4 within minutes of pulling it out of the box – no room for technophobia here!

Channels one to four each consist of line/mic or track inputs with trim, three band EQ, two auxiliary sends controlled from one pot (i.e. aux one to the left, aux two to the right) and the usual 'two button plus panpot' assign section. As an added bonus, channels one and two offer balanced XLR mic inputs, so you can plug in a pair of decent microphones and put all that nice MD dynamic range and frequency response to good use. It's surprising how many other semi-pro digital mixer/recorders completely overlook this useful addition. These inputs don't have phantom power, however, so you'll have to use batteries or external powering if you want to record with condenser mics.

Channels five and six appear as a stereo input channel, offering two extra inputs which are assignable to the mix output and the multitrack recorder. These are useful for connecting another mixer, CD player or additional instruments. For example, a drum machine or multi-timbral keyboard could be run in sync with the MDM-X4 via an external sequencer using Midi Timecode, and never have to be multitracked. The mixer also includes two stereo effects returns that are assignable to the multitrack recorder. Monitoring during recording is handled by a simple four pot cue section allowing a mono level control over tracks one to four.

Unfortunately there are no digital in/outs to speak of, but there are individual analogue track outputs (one to four) which allow you to transfer to another multitrack or utilise another mixer for mixdown.

What is this MD format?

The MD format uses a 64mm diameter disc housed in a roughly square housing - about the size of a SAO biscuit. There are two types of discs available: MiniDisc (MD) and MD-Data discs. The MiniDisc (MD) format was developed specifically for stereo music recording and can store up to 74 minutes of music - the same maximum amount as CD. The MD Data format supports four track recording and can store up to 37 minutes. You also have the option with MD Data to use only two tracks (74 minutes) or one track (148 minutes). The MDM-X4 can use either MD or MD Data discs.

The ability to cram a CD's worth of music onto a disc with less than one third the surface area of a CD is achieved by employing a data reduction algorithm developed by Sony known as ATRAC (Adaptive Transform Acoustic Coding). Data reduction is based on the premise that the human ear doesn't necessarily hear all the component frequencies in a complex audio signal all the time. Therefore if you can determine and filter out what the ear doesn't hear, you end up with less data to store.

The way MD stores and retrieves data off disc, however, seems to be at odds with some of the basic operations of multitrack recording and fails to take full advantage of the benefits of sample accurate digital editing. As an alternative to the two track cassette, MD could well be the answer, but it may challenge your expectations as a flexible and powerful digital multitrack format.

MD Recording

The recorder section of the MDM-X4 consists of a standard set of transport controls, a jog/shuttle dial for selecting and adjusting parameters, a set of function buttons and a pleasantly large fluoro display. The function buttons include eight locate points, auto punch in/out mark points, record rehearsal mode, undo edit, and song/disc repeat. There are also three edit mark points which allow data to be copied, moved, erased or even switched. These edits can be between different songs or within the same song. Editing is available in Track Edit or Section Edit mode (which is dependent on the number of tracks you have the MDM-X4 working in). All editing operations are limited to one level of Undo, which is applicable until either another edit is performed, the unit enters record mode, or the disc is removed.

The MDM-X4 does have a number of limitations which are all limitations of MD technology itself and therefore affect all MD multitrackers.

Section Edit mode has a few dubious peculiarities which place restrictions on the smallest size an edited block, or Section, can be. A Section contains approximately 16 seconds worth of audio - determined by the recording mode you're using. For one track mode, a Section consists of one track, 16 seconds long. In two track mode, a Section becomes two tracks of eight seconds each, and in four track mode a Section becomes four tracks of four seconds each. This minimum size limitation rules out any realistic song structure editing - which is one of the major benefits of digital recording.

It is important to note that this limitation affects Section Editing only. Individual tracks can be edited down to frame resolutions, so as a work around you could achieve song edits by editing each track individually. Another odd function of MD is that it is not possible to do further recording operations on songs which have been modified with Section Editing. You must first make a copy of the entire edited song and continue recording onto this new version.

Perhaps the greatest limitation as far as multitracking is concerned is that the first track you record in a song determines the song's overall length - the end! You cannot record other tracks beyond this length. This is a serious flaw in the creative process of multitrack recording. With this sort of limitation, the Beatles' Sgt Peppers album would have lasted about five minutes in total!

One beneficial function of the MD format is the ability to record other sounds on top of a previously recorded track. This is known as 'Mix Write' recording. For example, you could record a single backing vocal onto track four and then continually add layers of harmony backing vocals, all to just track four. In essence, the previously recorded material is recorded back onto itself while adding the new material. Another obvious application of Mix Write recording is bouncing all four tracks back onto one track, thus freeing up three new tracks to continue recording. The manual doesn't explain how MD actually achieves this but I imagine it involves some timing tricks with a read-ahead data buffer.

Each time the original signal is re-recorded it goes through quite a bit of processing. Playing the signal requires converting it back into a 16-bit data stream from the ATRAC compressed data recorded on the disc (see 'What is this MD format?'), playing it through the D/A converters, mixing it with the new signal in the analogue domain, converting it back into digital through an A/D converter, and then re-compressing the resulting 16-bit data through the ATRAC process. The artefacts of all this conversion and compression build up from generation to generation, resulting in a reduction in the sound quality.

Each disc can store a maximum of 255 songs, whose names and locations are stored on the disc in a Table Of Contents (TOC) file. The TOC is updated automatically when the disc is ejected, or by pressing the stop button when the unit is in stop mode. The manual recommends always ejecting discs before turning off the power, which ensures the TOC will be updated at the end of your session. If not, you risk the possibility of losing the song you've been editing and, in fact, loosing the contents of the entire disc. I thought this bit of info might be useful!

Desperate & data loss

One of the main questions to be asked of the MD format is of the actual sound quality after data reduction had been applied. The comparisons I made suggested that original material sounded smoother and more detailed while MD recordings sounded a tad grainy. This was most easily identified on the tails of decaying reverb on Gucci quality vocal recordings. Having said this, the quality is still vastly superior to cassette - a format which can't become a museum piece fast enough as far as I'm concerned. The background noise and frequency response are essentially CD quality.

Conclusion

The benefits of MD as an audio format are obvious. MD is portable, highly shockproof, relatively inexpensive and offers audio quality to suit all but the highest of applications. It doesn't suffer from the noise associated with tape, or the endless back-up and maintenance issues of hard disk recording.

It is important to note that the limitations of the MDM-X4 mentioned in this review are actually limitations of the MD format itself, and apply to all MD recorders. The MDM-X4 itself is well designed, flexible and intuitive to use as a simple four track recorder.

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Distributor's Comment

I'm sorry Scott doesn't seem too impressed with the MD format. There are a couple of points I would like to clarify about MiniDisc in general and the MDM-X4 in particular.

Firstly, digital outputs. Getting the data off the disc in a useable digital format requires the ATRAC encoded signal to be decoded. ATRAC encoded data is not just a compressed version of SPDIF or AES/EBU digital audio, it is a special encoding technique which translates analogue audio into a compressed data stream. The reverse is also true, the compressed data stream is converted directly back into analogue audio. To provide a digital audio output in a form that would be useful in a studio environment would mean adding a separate A/D converter for this function. If you think about why a user would want a digital output from the MDM-X4, it is probably so that they could feed a digital recorder - and that digital recorder probably has a reasonable A/D converter in it already, almost certainly better than what the manufacturer of the MD Multitrack can provide without adding significantly to the retail price. Sony's attitude is that it was better to spend the money where the user will get better value in the product they buy. In this case, better audio quality (even I can hear it easily!) and better editing facilities.

It is also important to note that what Scott describes as the limitations of MD would be better described as the limitations of MD Multitrack, as there are a number of issues which arise when editing multitrack MD which are not applicable to standard two channel stereo MiniDisc.

- James Waldren, Sony Australia Pty Ltd