Sony DRE S777

Sampling Digital Reverb

Reviews : Effects

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One of the most exciting developments in sound processing technology this year was the announcement from Sony of a dedicated reverb unit which applied ambiences 'sampled' from real acoustic spaces. Now the theory is reality. **Hugh Robjohns** gets his hands on the DRE S777.

Sony's latest weapon in the cutthroat market for high-spec reverb units is a cunning and powerful digital data-manipulation technique known as convolution, which can create stunningly realistic reverb derived from the measured (or 'sampled') acoustic signatures of real performance venues around the world. The broad concepts behind this radical technique were described in the June issue of *Sound On Sound*, but essentially Sony's new DRE S777 imposes (convolves) the carefully recorded and measured reverberation characteristics of selected venues upon its audio inputs. The result is a reverberant sound stage which, to all intents and purposes, sounds just as it would if the sources were actually recorded live in the selected environment!

The concept is not new, and neither is the technology really -- SONAR and RADAR systems have been using convolution for years to improve sound and visual image extraction. But producing the kind of processed quality needed for high-resolution audio has, until very recently, required greater DSP resources than have been available in any practical form (at least in terms of a compact rackmounting studio unit).

A few software-based off-line convolutional reverb systems have been developed, and TC Electronic have employed a degree of real-time convolutional processing to produce realistic early reflections in some of their reverb algorithms. However, the Sony DRE S777 is the first commercial, real-time convolutional reverberator to reach the marketplace, although it is being called a 'digital sampling reverb', to make the marketing a tad easier!

SONY DRE S777 £4289

pros

- Stunningly believable room signatures.
- Flexible input and output configurations.
- Sufficient parameter variations to meet most needs.
- Surprisingly simple user interface.
- No more expensive than the flagship Lexicon.

cons

- Loading CD-ROMs is a rigmarole.
- Bulky, heavy and hot.
- Fiddly access to the equaliser.
- As expensive as the flagship Lexicon!

summary

The first of the new generation! State-of-the-art convolutional reverb machine, defining a new standard of realism in artificial reverberation without breaking the European Central Bank in the process.

SOUND ON SOUND

DRE S777

Like all first-generation Sony products, the DRE S777 is big, and although fashioned into a standard 2U rackmounting box, it extends over 20 inches (515mm) to the rear, weighs a substantial 15kg, and leaves absolutely no spare room inside for the studio spider to spin its cobweb! Perhaps in a year or two Sony will have perfected and miniaturised the second or third generation of super-DSPs needed for this kind of signal processing, and the whole thing will fit in a half-rack 1U case, with a price to match. Until then, the DRE S777 certainly has the bulk to justify its actual price -- which, for the record, compares very favourably with that of the flagship Lexicon 480L.

The basic DRE machine is equipped with an AES-EBU interface for digital I/O, but comes with no analogue connections at all. In this stripped-down form the machine also has limited capabilities in the reverb department, as it only supports a mono-in, stereo-out configuration. I should, in fairness, point out that most conventional digital reverbs also only offer mono-in, stereo-out programs, and I only refer to this as a limitation because the review model has all the optional bells and whistles installed, and is thus capable of genuine stereo-in and -out reverbs, as well as dual mono-in, stereo-out modes and a spectacular mono-in, four-channel-out configuration.

Analogue inputs and outputs can be added to the basic model courtesy of the DABK-S701 2-channel A-D board and the DABK-S702 2-channel D-A board. If four channels of analogue output are required, a second S702 card must be installed. Analogue conversion is performed with 24-bit resolution and at 44.1, 48, 88.2 or 96kHz sample rates. Sony have obviously gained a lot of experience in designing high-quality converters, and the technical specifications for the S701 and S702 are excellent -- so much so that, apparently, some DRE users are already employing it as a high-quality digital converter in its own right.

To extract the full multi-channel reverberation capabilities of the supplied data CD-ROMs, or to operate at high sample rates, additional DSP capacity is needed in the form of the DABK-S703 DSP upgrade. With this option fitted the unit supports the additional reverb modes of stereo-in, stereo-out; mono-in, four-channel out; dual-mono-in, dual-stereo-out; and 96kHz mono-in, stereo-out.

The DRE S777 is supplied with a CD-ROM containing the necessary data for a small number of 'generic' halls (3), churches (2), studios (8) and plates (2). Additional specialist CD-ROMs are planned (see the 'Forthcoming Attractions' box), and all CDs are accompanied by a miniature 'Memory Stick' which has configuration presets and authorisation codes

Housekeeping

The DRE S777 is very simple to use once it is set up and running, but there are a few menu pages necessary to establish the correct operating modes, accessed by repeated presses of the F1 button. The first menu, labelled Mixer, provides the equaliser settings (signal paths and filter parameters), the input level trims (-12 to +6dB for each channel), and output level balance (dry, wet

and master). This page also contains the bypass mode selector and the metering peak hold function.

Parameters are selected and adjusted with the soft-keys and wheel in much the same manner as the reverb selection, although Exit and Enter functions are presented above the F3 and F4 keys to navigate the various sub-levels of the menu structure.

The second housekeeping page is labelled Setup, and provides a host of facilities distributed over three sub-pages. The first allows the CD-ROM to be ejected and the Memory Stick removed, and also permits selection of the reverb mode (mono-in, stereo-in and so forth), reverb only or reverb-plus-direct outputs, routing of the analogue ports directly to and from the digital interfaces (bypassing the reverb processing entirely), and loading or saving setups to the Memory Stick.

The second page is concerned with the contrast and brightness of the LCD, various warning and error messages, the selection of analogue or digital inputs, and the word clock source and rate. The last page determines the measurement units for the pre-delay (mS, cm or feet), the MIDI channel number, RS232 baud rate, and various self-diagnostic functions.

necessary to activate the CD-ROM.

The Guided Tour

Starting at the rear panel, the right-hand side carries the IEC mains inlet and a large area of surprisingly hot heat-sink fins. The machine consumes 55 Watts, and a good proportion of this is clearly expended as heat. Moving over to the left-hand side, the optional analogue input card is mounted near the top, with provision for two analogue output cards below. These are all equipped with balanced XLR connections and selectors on the circuit cards for +4 or 0dBm operating levels.

The digital I/O connections consist of a single input XLR and a pair of output XLRs, all conforming to the AES-EBU data format. The second output is only operational when the DSP Upgrade board is installed. Word clock in and out is catered for with a pair of BNCs, the clock output only active when its driver 'sees' a 75(omega) termination. A pair of 5-pin DIN connectors is fitted for MIDI In and Out/Thru, although these are not functional with v1.0 software. A 9-pin D-Sub connector provides an RS232 interface, primarily intended for maintenance purposes.

The front of the machine is hardly more complex than the rear, boasting the grand total of six buttons and a rotary encoder on its polished rosewood panel. The top-left corner houses a chunky mains power button with an adjacent PCMCIA card slot, and a multi-speed CD-ROM drawer below. An Eject button beneath the drawer provides access although, once the program is running, the tray can only be opened via a software menu. The PCMCIA slot is equipped with an adaptor for the 4Mb 'Memory Sticks' supplied with the CD-ROMs. These Sticks store up to 99 reverb setups, seven of which are protected factory presets.

GLOSSARY: technical terms explained

A large (yellow) monochrome LCD screen dominates the front panel, with four square illuminated 'soft-key' buttons underneath. The first button (F1) cycles the menu display screens between the main Reverb, Mixer and Setup pages (see Housekeeping box, left). The other three buttons perform various functions according to the legends displayed above each one. The rotary encoder, which is much lighter than it appears and has a detented action, selects items and adjusts parameters.

The review machine was supplied with only a standard CD-ROM containing seven primary reverb sources: Hall A and B, Church A and B, four different studio rooms, and two (digitally simulated) plates. Each reverb program is different, of course, but in general, the reverb time can be varied over a range from 0.3 to 6 seconds (in quarter-second steps) and the pre-delay adjusted from 0 to 0.5 seconds. Data from the CD-ROM can be pre-loaded into nine onboard cache memories to allow instant switching between reverb programs, and a four-band parametric equaliser can be configured to modify the 'dry' signal only, the 'wet' signal only (the input to the reverb), or both. The top and bottom bands are shelving types with bell curves for the mid-bands, all with generously overlapping frequency ranges and a +/-12dB gain swing. The two mid sections also have adjustable Q between 0.1 and 4.

The signal path through the DRE can be thought of as being constructed around two input modules, four 'blocks' of processing power (assuming the additional DSP card is installed), and four output stages. In the mono-in, stereo-out modes, one of the two inputs is selected to drive two processing blocks and two outputs (all four processing blocks are used in the double-sample-rate mode). The mono-in, four-channel-out mode routes a single input to all four processing blocks and subsequent output stages, while the Split mode (dual-mono-in, dual-stereo-out) allocates each input to drive a pair of processing blocks and output stages.

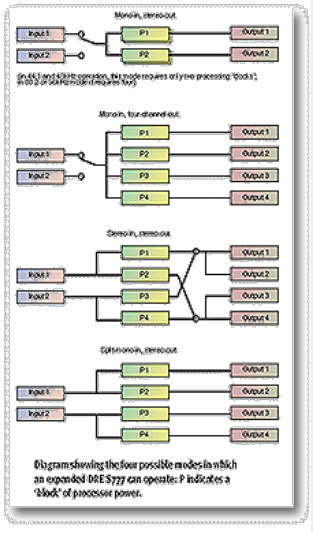


Diagram showing the four possible modes in which an expanded DRE S777 can operate: P indicates a 'block' of processor power.

The stereo-in, stereo-out mode is a little more complex, as it involves cross-coupled outputs. Input One feeds two processing blocks, each feeding a separate output stage allocated to left and right. The second input drives its own pair of processors whose outputs are combined with those of the others (see diagram below).

Operation Reverb

Using the DRE is a slightly strange experience, simply because it is not like any other reverb machine. Turning the unit on results in... nothing at all! The CD-ROM and associated Memory Stick have to be inserted, and then you have to wait around three minutes for the high-speed whirring of the disc drive to abate before the machine is capable of doing anything useful at all. However, once the required data has been loaded into the nine onboard memories, the machine operates much like any other reverb processor. You are only reminded of the unusual nature of the machine if a reverb program is selected which doesn't happen to reside in the cache, where upon the machine enters its spin-cycle again as the new data is extracted from the CD-ROM.

The large LCD screen presents a combination of textual, numerical and graphical information concerning a selected reverb program. The left-hand side carries a basic stereo bar-graph input meter, with the current cache memory location indicated in the top corner. The right-hand side portrays the source and microphone positions used to derive the current program data. The lower edge of the screen carries data about the sample rate, the reverb program, source-mic configuration codes, pre-delay and reverb time -- each of which can be adjusted by pressing the soft-key below the relevant legend and then spinning the rotary encoder.

Loading a specific reverb program is simple enough: the F1 soft-key is pressed to select the Reverb menu, whereupon the F2 button accesses the reverb program list, the wheel scrolling through the available programs stored on the CD-ROM. Each program type (Hall, Church, Studio and so on) has a number of variations with different sound-source locations, microphone locations and microphone types (omni or directional). These are all detailed in the disc's sleeve notes, as

well as in a representative graphic on the display. The programs are described with configuration codes, such as 'C12', meaning centre speaker and microphones 1&2 for a mono-in, stereo-out arrangement, or 'LR56' meaning left and right stereo inputs to (distant) microphones 5&6, for example.

When the desired program is located, a second press of the F2 button loads the necessary data from the CD-ROM. In the dual-input (split) mode, the display refers to either Split Ch 1-2 or Split Ch 3-4 -- each being selected as necessary via the wheel for the loading and manipulation of the desired programs. The selected reverb program loads into the currently selected cache memory; a different cache can be chosen by ensuring that none of the soft-keys are illuminated, and then rotating the wheel to select a new memory. When overwriting a program which is currently in use, the sound is unaffected while the new program loads: only when the upload is complete does the new program become active and replace the previous one.

Recalling a program stored in a cache memory is performed in the same way as selecting a memory for loading. Empty locations display a blank screen when selected, but cache memories storing reverb programs present a suitable graphic. Changing between cache memories is instantaneous, but results in clicks, splats and glitches for a few seconds as the data works its way through the DSPs.

Forthcoming Attractions

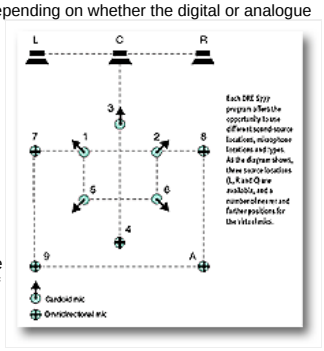
As the DRE S777's program information is supplied on CD-ROM, Sony's idea is clearly that owners will purchase additional discs with newly 'sampled' spaces as they become available. It is also intended that third-party developers will be able to produce sample discs for the S777. At present, one additional disc is available from Sony themselves, the DASK-S701 *European Halls And Churches*. This includes seven well-known halls and churches from various European countries: the large and small halls at Amsterdam's Concertgebouw, the Grosser Musikvereinssaal in Vienna, the Konzerthaus and Jesus Christus Kirche in Berlin, and St Vincente of Cardona, Spain. The disc retails at £586.33 including VAT. A disc of American spaces is also expected soon, and will apparently include the sampled reverberation of the Grand Canyon, as well as the unmistakeable ambience of several 'classic' American studios.

Changing the pre-delay and reverb times is simply a matter of pressing the relevant soft key and twirling the wheel -- the adjustment range varying with the selected program as already mentioned.

Using The DRE

The DRE takes a little getting used to -- all that whirring and waiting is not quite what one has come to expect of a digital reverb machine. However, once the cache memories are programmed with a selection of programs it is very fast and easy to use -- the only tedious section being the equaliser, which requires an excessive amount of button-pushing and menu navigation. Having said that, the reverbs are so amazingly real and natural that the equaliser is largely superfluous and will be rarely used.

The machine has a fixed processing delay of between 6 and 8mS (at 44.1kHz), depending on whether the digital or analogue ports are used. This inherent delay might cause phasing problems if the 'direct + reverb' mode is selected and the reverb output combined with the source signal, but is unlikely to be a problem in normal use.



The reverb programs on the standard disk provide a worthwhile range of usable effects, each being clearly identifiable in its own right, and amazingly natural. The DRE S777 has a level of detail and finesse which is quite uncanny. I always thought the big Lexicons were excellent -- and they still are, of course -- but they produce a realistic *reverb effect*, whereas this machine provides an almost tangible *reverberant acoustic*.

Selecting different source locations, microphone types and positions within each program produces exactly the change in sound which you would expect. If you are looking for a 'nice-sounding room' you will certainly find one in this machine, and if you know how to adjust the source and mic positions to fine-tune the sound in a specific way, so much the better -- the DRE enables you to create astonishingly real room sounds.

The mono-in, stereo-out modes work impressively well, but the stereo-in, stereo-out modes are even better, with the reverberation evolving as sounds are panned around. The four-channel surround mode is quite wonderful, and there seems to be an increasing degree of sonic integration and solidity about the recreated sound spaces as you step up through the levels of convolutional sophistication. Whether auditioned on headphones or loudspeakers, the quality of the reverb never failed to impress with its complex density of early reflections, and diffuse reflections which could never be synthesized in such a convincing way.

As you can probably tell, I am extremely impressed with this machine. It is inevitable that other manufacturers will follow Sony down this new technological avenue -- the results certainly justify the R&D costs for many markets. Convolutional reverb may appear an unnecessary luxury for some sectors of the audio industry at present, but for those at the upper echelons this is a major step forward in realism which more than justifies its surprisingly modest cost. I am quite convinced this kind of technology will rapidly become the standard mechanism for reverberation (and many other sonic effects as well), with the costs bound to tumble dramatically as other manufacturers catch up with Sony's pioneering lead.

information

£ DRE S777 £4288.75; DABK-S701 A-D board £763.75; DABK-S702 D-A board £528.750; DABK-S703 DSP board £1526.33. Prices include VAT.

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