SONY

Sampling Digital Reverberator
DRE-S777

Revolutionize your audio produc

Reverberation has long been the most popular effect used in music, film and television soundtrack production. To date, digital reverb has relied on artificial synthesizer technology to create these effects. The DRE-S777 is a digital reverb device that bridges the gap between "artificial" and "real" to provide a new set of creative tools based on natural-sounding reverberation.

The Sony DRE-S777 Sampling Digital Reverberator offers audio professionals a totally new approach to sound processing. The DRE-S777 is a technologically advanced digital effects processor that recreates the natural reverberation of concert halls, theaters and sound stages with unparalleled depth, presence and richness. Unlike conventional processors, the DRE-S777 achieves this breathtaking naturalism by using highly advanced processing that allows audio signals to be combined with sampled data taken from actual acousticenvironments.

Sony engineers have painstakingly collected sample data from some of the world's most highly regarded concert halls, studios and other acoustic

tions with natural reverberation.

environments, and also from classic analog plate reverb units. The DRE-S777 is supplied with a standard set of sample data, with additional libraries of samples also available.

The DRE-S777 is also capable of a 'self sampling' function, enabling the device to capture any acoustic environment. This function requires an additional software module as well as a microphone and loudspeaker system.

The DRE-S777 accepts digital signals with standard and double sampling rates and can process full 24-bit signals. Analog signals can be interfaced with the addition of optional A/D and D/A converters. Its superb audio resolution is coupled with multi-channel surround sound capabilities, extending its applications to include a wide range of modern production tasks in music recording and project studios, and in film, television and video post-production facilities.

The enclosed demonstration CD provides a brief introduction to the astonishingly lifelike world that is made possible with the DRE-S777.

Sampling Digital Reverberator
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Real-world reverb

St. Vincente de Cardona, Cardona, Spain

To achieve exceptionally natural sounding reverb, it has been necessary to capture the unique "sound" of many different environments; concert halls, churches, studios and so on. The gathering of this data was no mere mechanical process. Rather, it was a series of individual recording projects, each requiring a host of creative decisions familiar to audio professionals. Each project required loudspeakers to radiate the test signals and a microphone array to capture the reverb signature. For each of the locations, multiple samples were recorded using different combinations

Ocean Way Recording Studio B, Los Angeles, the USA

Grand Canyon, Arizona, the USA

Avatar Studio A, New York, the USA

Yokohama Nohgakudou, Yokohama, Japan

Kamaishi-mine, Iwate, Japan

Westerkerk, Amsterdam, The Netherlands

Grosser Musikvereinssaal, Vienna, Austria

Concertgebouw (large hall), Amsterdam, The Netherlands

of loudspeaker and microphone positions. These samples were then combined in the DRE-S777 to provide an extensive range of stereo and surround reverb modes. Sony hardware engineers worked closely with experienced recording engineers to choose microphone types, their directivity and location. Each acoustic space was sampled across a wide range of conditions, and the data supplied on a CD-ROM for use with the DRE-S777.

Arrangement for 5-ch surround sampling

5
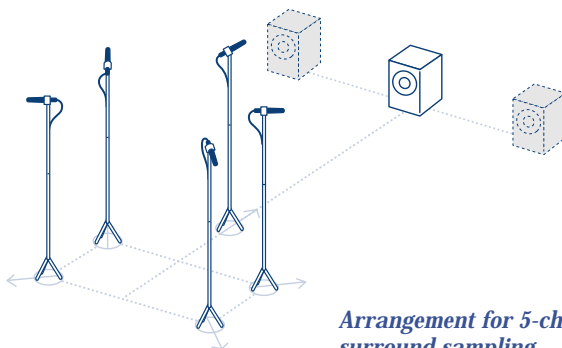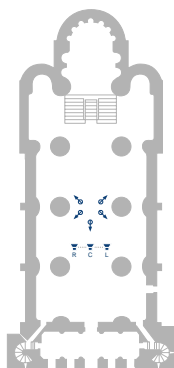
Seven standard acoustic environments, plus optional reverb sampling data

The DRE-S777 is supplied with a standard sample CD-ROM, containing seven standard presets including data from two different types of concert hall, a recording studio and two churches, plus data from two types of plate reverberator. The DRE-S777 provides for adjustment of parameters such as reverb time, effect/dry balance, equalization and pre-delay. Optional sampling reverb software is available in the DASK Series of sample discs, containing a range of acoustic environments from Europe, America and Japan. The optional reverb software series is detailed on pages 11 and 12.

"Self-sampling" function to capture any acoustic environment

With the DRE-S777, it is possible to capture any acoustic environment. The DRE-S777 is provided with a "self-sampling" function when operated with the newly developed DASK-S704 Sampling Function Software. This allows you to create reverb programs sampled at sound environments using microphones of your choice.

The "self-sampling" process is simple and straightforward. First, the DRE-S777 generates the TSP (Time Stretched Pulse) signal, which is used to energize the acoustic space using a loudspeaker system connected to the DRE-S777. The reverberation characteristics are captured with microphones connected to the DRE-S777 via external microphone amplifiers. After A/D conversion, the captured signals are converted into the system's internal data format and the sample data is stored in a Sony Memory Stick™. For example, a 64 MB Memory Stick stores the data for around 30 typical programs.

St.John the Divine, New York, the USA
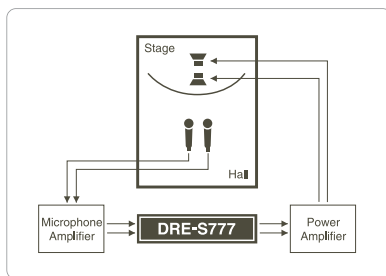
"Self-sampling" Signal Flow

Natural surround sound reverb

In addition to its stereo reverb modes, Sony has developed the DRE-S777 to support multi-channel reverberation. The emergence of formats such as DVD Video has significantly expanded the use of multi-channel sound. The DRE-S777 is therefore highly suitable for a wide range of multi-channel production tasks, including audio-for-video, and for television and film post-production applications.

With the optional DABK-S703 Expansion DSP Board installed, the DRE-S777 provides a mono input, four-channel output reverb mode. Larger surround sound arrays, for example, 5.1 channel surround, can be provided by using two or more DRE-S777 units. The optional DASK Series software includes reverberation data actually sampled using a five-position microphone array, allowing five-channel surround sound effects to be created.

Real-time DSP

For years, the "holy grail" of Digital Signal Processing has been the development of a real-time convolution processor. Unfortunately, the required processing power simply has not been available, which is why most digital reverberation systems only simulate acoustic spaces – a process based on Artificial Impulse Response. That is until now.

In order to recreate reverberation faithfully, it is necessary to sample data from the beginning to the end of the reverber

ation. The DRE-S777 convolutes an amazing 256,000 sampling points by using a new Sony DSP (Digital Signal Processor) which provides 1,000 times the processing power of a typical digital reverb unit. The result is reverberation that accurately recreates all of the detail of the early reflections and the complexity of the reverberant tails.

The DRE-S777 is not simply a reverberation effect processor, but a real ambience emulator.

DRE-S777

Amplitude

Real impulse response
(e.g. Sampler)

Time
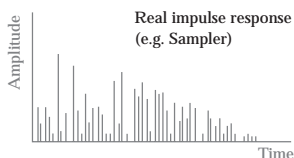
Whole impulse response
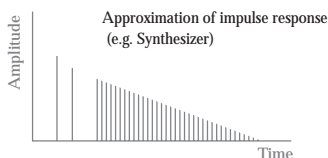(256,000 points convolution)

❶ Rich and natual reverberation
❷ Very large processing power
(until now 1000 DSPs or more)
carried out by only 11 Sony DSPs

Conventional Digital Reverberator

Amplitude

Approximation of impulse response
(e.g. Synthesizer)

Time

Pickup of early reflections
Adding of artical reverberation

❶ Artificial reverberation
❷ Small processing power (1 DSP)

96 kHz sampling

As the music and movie industries move from 48 kHz to higher sampling rates, the DRE-S777 will follow, with the optional DABK-S703 Expansion DSP Board upgrading the DRE-S777 for 96 kHz sampling. This makes the DRE-S777 compatible with DVD Video/Audio and other emerging audio formats.

Whisper-quiet signal-to-noise ratio

As well as delivering astonishingly life-like natural-sounding reverb effects, the DRE-S777 also provides whisper-quiet signal-to-noise performance. This has been achieved by taking multiple samples for each of the reverb programs. Post processing of the sample data involves an averaging technique that allows the signal to noise ratio to be dramatically improved; the net effect is a cleaner, more dynamic, subjective sound quality. This approach also provides special benefits when recording the reverberant signature of "noisy" devices such as analog plates. The DRE-S777 accurately captures the unique characteristic of these devices, with unwanted noise dramatically reduced to produce a reverb effect that is cleaner than the original plate.

Superb quality A/D and D/A conversion

To extend the versatility of the DRE-S777, two optional analog converters are available, the DABK-S701 (A/D Converter Board) and the DABK-S702 (D/A Converter Board). These converter boards incorporate discrete-transistor amplifiers, critical in maintaining the integrity of analog signals. The result is uncompromising A/D and D/A performance to match the superlative reverberation quality.

Features

- Operational modes;
    - Reverb mode: Mono in Stereo out (standard)
        - Stereo in Stereo out (with DABK-S703)
        - Mono in 4-channel out* (with DABK-S703)
        - Two Mono split in 4-channel out* (with DABK-S703)
        - Mono in Stereo out at 2Fs (with DABK-S703)
    - Direct/Rev: Direct+Reverb/Reverb
    - * In addition to the DABK-S703 Expansion DSP Board, a 4-channel analog output requires two DABK-S702 D/A Converter Boards.
- Variable reverberation time (0.3-5.5 s max.)
- Pre-delay (0-0.5 s)

- Mixer functions (peak hold, bypass, mixture of dry/wet, muting)
- Four-band parametric EQ
- MIDI control
- Factory-presets provided in Memory Stick™
- Set-up data for 92 user-presets using Memory Stick
- Nine user caches for quick reverb-program recall
- Easy operation via jog dial and four functions keys
- Self-diagnostic modes (CPU, DSP, DI/DO, AD/DA)
- Sampling function (with DASK-S704)
- Download of reverb programs* from the caches to a Memory Stick

* Programs created with the DASK-S704 Sampling Function Software can be downloaded to the Memory Stick supplied with the DASK-S704, or to a common Memory Stick. Programs uploaded from the Sampling Reverb Software to the user caches can be downloaded only to the Memory Stick supplied with the DASK-S704.

Specifications

DRE-S777

Reverb algorithm:	Real impulse response
Number of preset:	7 (Hall ×2, recording studio ×1, church ×2, plate ×2)
Reverb parameter	
Reverb time:	0.3-5.5 (max.) seconds
Pre-delay time:	0-0.5 seconds
Sampling frequency:	44.1/48 kHz (standard)
	88.2/96 kHz (optional)
Quantization:	24 bit
Digital input:	AES/EBU, XLR-3-31 type (×1)
Digital output:	AES/EBU, XLR-3-32 type (×2)
	(4-channel output is optional)
Analog input:	XLR-3-31 type (×2, optional)
Analog output:	XLR-3-32 type (×4, optional)
External synchronization:	Word sync (SDIF compatible, 75 ohms, BNC type)
	DI sync
	-12.5 to +8 % variable
Dimensions:	481.5 x 110 x 514.5 mm
	(19 × 4 3/8 × 20 3/8 inches)
Weight:	33 lb 1 oz
	15 kg (with full options)
Power consumption:	60 W (with full options)
Power requirements:	120 V (UC), 220-240 V (CE), 50/60 Hz
Supplied accessories:	Sampling reverb data CD-ROM (1)
	PC card adapter (1)
	Memory Stick™ (1)
	Operation manual (1)
	Rack Mount Adapter (2)

Rear Panel

DABK-S701 A/D converter

Input impedance:	600 ohms or 10 k ohms switchable
Standard level:	0 or +4 dBu switchable
Maximum level:	+24 dBu
CMRR:	More than 50 dB (1 kHz)
Dynamic range:	110 dB
Signal-to-noise ratio:	110 dB
T.H.D.:	0.005 % (-20 dBFs)
Crosstalk:	90 dB (8 kHz)
Frequency response:	20 Hz to 20 kHz +0.2 dB/-0.3 dB
	(Fs=44.1 kHz, 48 kHz)
	20 Hz to 40 kHz +0.2 dB/-0.3 dB
	(Fs=88.2 kHz, 96 kHz)

DABK-S702 D/A converter

Output impedance:	Less than 50 ohms
Standard level:	0 or +4 dBu (600 ohms) switchable
Maximum level:	+24 dBu (600 ohms)
Dynamic range:	110 dB
Signal-to-noise ratio:	110 dB
T.H.D.:	0.015 % (-20 dBFs)
Crosstalk:	90 dB (8 kHz)
Frequency response:	20 Hz to 20 kHz +0.2 dB/-0.3 dB
	(Fs=44.1 kHz, 48 kHz)
	20 Hz to 40 kHz +0.5 dB/-0.6 dB
	(Fs=88.2 kHz, 96 kHz)

Optional accessories

DABK-S701	A/D Converter Board
DABK-S702	D/A Converter Board
DABK-S703	Expansion DSP Board
DASK-S701	Sampling Reverb Software "European Halls & Churches"
DASK-S702	Sampling Reverb Software "American Acoustic Spaces"
DASK-S703	Sampling Reverb Software "Japanese Acoustic Spaces"
DASK-S704	Sampling Function Software "Sampling your spaces"

Standard Accessory Sampling Reverb Software

Concert hall A/B
Recording Studio
Church A/B
Plate A/B

This Software is supplied free with the DRE-S777.

Optional Self-Sampling Function Software

DASK-S704

This software adds a self-sampling function to the DRE-S777, enabling you to capture any acoustic environment.

Optional Sampling Reverb Software Series

DASK-S701
"European Halls & Churches"

Amsterdam Concertgebouw (large)

Amsterdam Concertgebouw (small)

Vienna Grosser Musikvereinssaal

Konzerthaus, Berlin

Westerkerk, Amsterdam

Jesus-Chiristus-Kiche, Berlin

St. Vincente de Cardona, Cardona

DASK-S702
"American Acoustic Spaces"

Avatar Studio A, New York

Ocean Way Recording Studio B, Los Angeles

Enterprise E2 Studio, Los Angeles

Giandomenico Studio, New Jersey

Mechanics Hall, Massachusetts

The Cathedral of St. John the Divine, New York

Grand Canyon, Arizona

DASK-S703
"Japanese Acoustic Spaces"

Sedic Audio Studio, Tokyo

Yokohama Nohgaku-dou (Noh hall), Yokohama

Bathhouse named "Tamano-yu", Tokyo

Ohya-stone quarry, Tochigi

Kamaishi-mine, Iwate

Goto Planetarium Dome, Tokyo

Hotaka mountain range, Nagano

The enclosed CD is the invitation to the acoustic world of the DRE-S777.
Once you enter it, you will soon get to know how natural, rich the reverberation is.

▽

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Section 1: By-instrument Demonstration

Source	Algorithm	Dry	Wet	Edited Effect
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	Plate A (1.8 s)		3	
Chorus	Church (Westerkerk)*	4	5	without direct
Cello	Church (Jesus-Chiristus-Kirche)*	6	7	dry -9.7 EQ wet +6
	Church (St. Vincente)*		8	dry -11.8 EQ wet +6
Violin	Church (St. Vincente)*	9	10	without direct
Acoustic guitar	Plate A (1.8 s)	11	12	
Tambourine	Hall (Concertgebouw/large)*	13	14	dry -10 wet +6
	Studio		15	without direct
Kick	Hall (Concertgebouw/small)*	16	17	without direct
	Hall (Concertgebouw/large)*		18	
	Church (Westerkerk)*		19	
High hat + Snear (brush)	Studio	20	21	without direct
Acoustic piano	Church (Jesus-Chiristus-Kirche)*	22	23	
Electronic piano	Church (St. Vincente)*	24	25	
	Church (St. Vincente)*	26	27	Panning
Trumpet	Hall (Musikvereinssaal)*	28	29	dry -9 wet +6
	Hall (Concertgebouw/large)*		30	dry -15 wet +6
	Church (Westerkerk)*		31	without direct
Sax	Church (Westerkerk)*	32	33	dry -5.2 wet +6

Section 2: Comparison Demonstration In this section, each track has five index numbers that you can choose from.

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	Plate A (3.3 s)			52		
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"Olive Tree (for Kosovo dedicated to Peace)" Composed and produced by Seigen Ono Recorded and mixed at Saidera Mastering, Tokyo 1999	54

∗ The reverb is produced by the optional DASK-S701 software.

SONY

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