In this article:

Quantec 2496 Yardstick $5695

pros

Produces wonderfully realistic room acoustics in all sizes and types.
Very natural depth and space to the sound.
Comprehensive parameters allow precise matching with real recorded acoustics.
Fast user interface and web-browser GUI option.
Once you've heard it, you'll want it!

cons

The 2496 is expensive, but comparable to the competition.
The 2492 and 2493 base models lack the fast-access buttons around the OLED display.
Only the 2498 flagship can handle true surround source material.

summary

This small box has a very big sound, and creates natural room acoustics rather than 'just' reverb! The Quantec Yardstick is full of extraordinarily realistic rooms, all of which seem to embrace the sound source rather than smother it. It has the magical property of gelling separate sound sources together within a believable space, rather than simply placing reverberation around them.

information

2492 $4250; 2493 $5275; 2496 $5695; 2498 $9900.
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Quantec 2496 Yardstick

Room Simulator

Reviews : Effects

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Can a 30-year old algorithm in a tiny blue box really be at the cutting edge of room simulation? The answer to that question would appear to be "yes".

Hugh Robjohns

The Quantec Room Simulator (QRS) became something of an instant legend when it was first introduced in 1982 at the European AES Convention, held that year in Montreux. This early digital reverberation unit, housed in a 2U, rackmount case, with chunky buttons and bright LED numeric displays littering the front panel, was competing with the likes of the (now) equally legendary AMS RMX16, Klark Technik DN780, Eventide SP2016, Ursa Major Space Station, Yamaha Rev 5 and 7 and, of course, the Lexicon 224.

The QRS was a very expensive and cutting-edge product in its day, and vintage units change hands for extraordinary prices today. However, the latest incarnation of the QRS algorithm resides in the '249x Yardstick' — a fourth-generation product that is intended to provide a relatively affordable but modern version of the QRS sound. It uses essentially the same algorithms and produces the same revered room simulation that has, arguably, never been surpassed, but it runs on a modern DSP platform with optional web browser-based remote-control and management facilities.

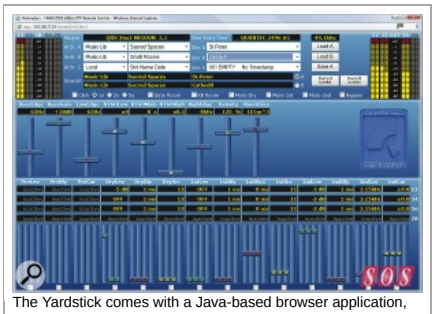
It should be noted that the QRS approach to reverberation is fundamentally different from that of most reverberation algorithms. Instead of modelling a room using ray-tracing concepts (as the TC Electronic products do, for example), or creating entirely synthetic and modulated effects (as the Lexicon reverbs do), the Quantec approach is based more on an analysis of the way the air inside a room carries sound. It's really much more about room resonances than reflections, and the result is that the QRS generates the very believable character of real rooms, rather than a fabricated sound that we perceive as a pleasing but synthetic reverb. It's a subtly different approach, but one that a great many top engineers and producers value highly — particularly in the classical music and broadcast environments (film and TV dubbing and radio dramas, especially).

However, sound quality isn't the only factor that influences purchases, and it must be said that Quantec, based in Munich, Germany, have apparently had quite a difficult time in bringing the product to a worldwide market and supporting it adequately over the past few years. A cursory search on the Internet quickly reveals a lot of dissatisfaction from early adopters, and I fear that creates something of an unfair impression of a superb product from a very small, independent company.

Quantec have had no local representation in the UK in recent years, and consequently the product is not well known at all, but with the combined efforts of Gary Ash at Sable Marketing and Chris Collins at Aspen Media (two very experienced distributors) I'm sure that UK customers, at least, will find that this product is well supported.

Overview

The Quantec Yardstick Room Simulator is available in a number of different versions, starting with the base model, a two-in, two-out version with only digital AES3 interfaces, called the 2492. It has an all-analogue-I/O sibling, the 2493, but this is the only model in the range with analogue connectivity, as Quantec's preference is for the user to provide external conversion where required.



The Yardstick comes with a Java-based browser application, which allows the user to edit the unit's parameters remotely.

The 2496 model reviewed here is also, therefore, equipped with digital I/O, in the form of a stereo input and six outputs. The flagship 2498 version provides full eight-in, eight-out connectivity via AES3 (on a D-sub connector). The 2492, 2493 and 2496 models can operate at sample rates up to 192kHz, and store up to 15 algorithms, while the 2498 can accommodate 63 algorithms but is limited to sample rates up to 96kHz. More on the algorithms later.

The review model, running the current 3.1 firmware version, was shipped to me in a large box full of polystyrene chips, and after digging about for a while, I was convinced the office had forgotten to pack the unit at all! The 'Yardstick' is appropriately named because it is a very slim, stick-like unit! Housed in an attractive, light-blue, 1U, rackmounting case, it extends only 36mm behind the rack ears — and it is entirely self-contained; there's no external power supply or hardware rack to connect. Compared with virtually every other hardware reverb product on the market, the Quantec doesn't seem credible, given its diminutive size — but looks can deceive!

The rear panel of the 2496 review model carries four XLR sockets — one for the AES3 (dual-channel) input, and three more for the six outputs in AES3 pairs. A trio of DIN sockets cater for MIDI In, Thru and Out, and there are three data configuration

ports: a high-speed USB socket (B-type), a 10-base T Ethernet socket, and an RS232 serial port on a nine-pin D-sub connector. The USB interface appears not to be enabled in the current firmware, but the manual implies that future plans include USB connectivity, as well as remote control from a DAW plug-in, via MIDI over Ethernet, and via a handheld Ethernet remote panel.

As I've mentioned it, the manual contains 210 information-packed pages, and a second 20-page MIDI interface guide is also included. Both are translated from the original German, with some difficult-to-follow, and occasionally entertaining, syntax in places. The technical detail is immense, and every aspect of the product is described precisely and in great depth. This is one of the very few products I have reviewed in recent years that included chapter and verse on the way it accommodates and uses AES3 Channel Status data, for example!

Moving on, mains power is accepted on a standard IEC inlet, and the internal universal power supply accommodates all mains supplies between 85 and 265 V AC. The unit consumes a very modest 15W of power, and the internal DSP processing uses 32-bit floating-point maths.

Control Layout

The rear panel of the 2496 Yardstick. All the audio I/O is presented on AES3 XLR sockets, while MIDI, Ethernet, USB and RS232 connectors provide remote-control functionality.

The front panel is rather busier than the rear, and is dominated by two high-contrast yellow-on-black OLED displays. On the 2496 and 2498 versions, the right-hand display is surrounded by 24 tiny buttons, which provide direct access to various menu parameters. The top and bottom rows are illuminated push-buttons, while the left and right columns are side-acting toggle switches. A conical rotary encoder wheel to the right of the displays is used to access the menu tree, along with a pair of push-buttons featuring unusually angular caps, which give the impression of a 1980s-style rocker switch. The rotary encoder and angular push-buttons provide the only means of selecting and changing preset parameters in the 2492/2493 models, but the array of miniature switches around the screen provides faster, direct-access parameter adjustment on the 2496 and 2498. I found the user interface rather daunting at first, but it quickly began to make sense as I played with it. It allows surprisingly fast configuration and adjustment once familiar.

A more conventional black rocker switch at the extreme right-hand side powers the unit on and off, and at the opposite end of the front panel, eight vertical bar-graphs show the input and output signal levels. Ten more LEDs arranged below the meters indicate sample rates, clock sources, DSP status and remote-control connections.

The OLED displays are very crisp and clear, and there are comprehensive setup parameters for adjusting contrast and brightness. A display mode button on the bottom row below the right-hand display allows the user to toggle through various display modes that show different amounts of information simultaneously, from 14 parameters down to just three. Needless to say, the 14-parameter displays are pretty cramped, while the three-parameter display is much larger and you stand a chance of reading it without having to sit right in front of the rack. My personal preference is for the six-parameter mode, which shows all the critical parameters in a single glance, yet allows instant access to the others via the up/down buttons, also on the bottom row. Displayed parameter values can be changed instantly using the adjacent toggle switches at the side of the screen to step up or down and, when in the edit parameter display mode, the left-hand screen shows the selected parameter, with a bar-graph of the current value, which can be changed with the rotary encoder.

The row of buttons along the top of the screen provides separate mutes for the input signal, the entire 'room' simulation, the dry signal feeding through to the output mix, the first reflection, and the room's reverb itself — all very useful when auditioning different presets or for special effects. The bottom row of buttons allow the display mode and displayed parameters to be changed, as already mentioned, but also switch between two preset 'scratch' memories, or access the main configuration menu.

Something worth mentioning at this point is the inclusion of a dry signal path in the mix outputs. Virtually all reverb units incorporate a dry path and have a dry/wet balance control, but conventionally most engineers set up the reverberation as a send-return effect, mixing an all-wet reverb signal with the dry source signal in the console. However, Quantec recommend performing that mix within the Yardstick as an integral part of the room simulation, and most presets are pre-configured that way (although that can be changed as a global setting). Part of the reason for this is that if you mixed the dry and wet elements externally, different path delays might be encountered (especially where external converters are employed to provide analogue I/O), potentially resulting in unwanted comb-filter effects that would impair the quality of the room simulations.

Despite the clarity of the Yardstick's OLED screens, or in situations where the Yardstick is out of reach, some users might prefer an alternative interface format, and the unit can be controlled remotely by a garish but very functional Java-based web browser interface. The Quantec unit needs to be wired into a local area network, of course. It defaults to an automatic Dynamic Host Configuration Protocol (DHCP) setting, but can be set up with a manual IP address, after which it can be controlled and configured remotely via an intuitive graphical screen. The web-page display reflects the input and output metering, the selected presets, and all of the mute buttons, and sliders are provided to display and adjust the relevant parameter values. The whole thing is very clear, logical and intuitive to use.

The Algorithm Method

When operating on higher sample-rate signals, the internal DSP simply runs the selected algorithm that much faster and recalculates the necessary processing elements accordingly. However, that also means that when operating on base-rate signals, the DSP will have unused capacity and could, instead, be used to host a more complex algorithm. Consequently, many of the QRS algorithms (called plug-ins and stored in 'banks') are available in simple, medium and complex versions — each with a number of factory-preset room simulations. The Simple versions operate at base, double and quad sample rates, while the medium versions generally operate only at base and double rates, and the complex versions are functional only for base-rate signals, because they place much greater demands on the DSP's resources. In general, the different algorithms provide the same (or similar) preset room simulations, but with varying levels of complexity and accuracy. I mostly used a Medium algorithm during the review period.

Algorithm plug-ins are managed through the web-browser interface or via dedicated boot-loader software, and placed in one (or more) of 15 bank locations in most 249x models, and in any of 63 locations for the 2498 version. These bank locations store every aspect of the machine's configuration, algorithms and even preset parameters, including temporary parameter values in the scratch memories. By copying plug-ins between different banks, it's possible to store and manage sets of presets and machine configurations, which can be useful in assembling specific collections for different projects or for different users.

GLOSSARY: technical terms explained

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The room simulation is essentially based on the concept of two spaced loudspeakers in a room being auditioned by, in the case of the 2496, six spaced microphones, all placed in the diffuse field. The first pair of outputs provides the primary stereo reverberation, but for surround applications the other channels can be employed to produce suitably related but decorrelated outputs. Thus a stereo input can generate a stereo output or a very acceptable five- or six-channel output. It's also important to note that the stereo input generates a true stereo reverberation — the two channels are not summed to feed the algorithm, something that many digital reverb processors, hardware and software alike, do.

In Use

The QRS Yardstick requires a different mind set than when using more conventional reverberation units. The number of available parameters, and the number of different algorithm plug-ins, for that matter, is limited in comparison to many synthetic reverb offerings. For example, instead of being able to control the early reflections separately from the reverberation tail, or to choose entirely different algorithms for different kinds of reverberant spaces, the QRS approach is to present a single, fully-integrated room simulation. There is a parameter to adjust the 'first reflection', but this is more for a 'slap-back' effect than to adjust the room's early reflections in isolation. Nevertheless, the single room algorithm can, if you manipulate the available parameters (or choose pre-defined presets), be shaped to simulate a wide range of acoustic spaces with remarkable fidelity and naturalness.

For the inveterate tweaker, though, there are plenty of user-adjustable parameters, including room size, density and RT60 time (with three separate values for the overall time, and the high- and low-frequency multipliers), just for starters. The threshold frequencies for the high and low RT60 values can also be adjusted with high and low 'edge' parameters, and there are 'bass edge' (a high-pass filter) and 'bass gain' parameters to determine the LF response of the reverb signal, too. The QRS algorithm essentially generates the LF spectrum of the simulated room by emulating the resonant effects of an enclosed space, and the high end by modelling absorption — recreating the way the air shapes the sound within a room, as in real life. There are also parameter controls for the relative levels and delays of the dry signal, the first (slap-back) reflection, and reverberation itself, as well as a low-pass filter for the reverberation signal. In most cases, the parameter values jump in pre-determined increments — after all, who could tell the difference between density values of 10 and 11 percent? Instead, the Yardstick offers useful value steps that scale at roughly 1.6 times the previous value, so in the case of the Density parameter the available values are 0, 10, 16, 25, 40, 63, 100, 125, 160 and 200 percent. The correlation between output channels can also be adjusted, as can the mapping of the dry input signals to the various outputs in the 2496 and 2498 versions.

In practice, using the yardstick is much like any other reverb; a likely preset is selected and the parameters fine-tuned as necessary. The ability to load different presets (factory or user) into two scratch memories (Scratch A is editable while Scratch B is fixed as a reference) and switch between them makes comparisons and tweaking very quick and easy. The factory collection of presets is divided into a music library and a dialogue library, the latter intended mainly for film, TV and radio production applications.

The music offerings are grouped into subsets: small, medium and large rooms, concert halls, sacred spaces, plates, and various. Within each are specific offerings, such as furnished and unfurnished living rooms, small theatre, various sized concert halls — importantly, offered both with and without audiences — and an assortment of churches and cathedrals, including two classics from the original QRS: St Peters in Rome, and the almost endlessly reverberant Taj Mahal mausoleum. There are also six plates with different pre-delay settings, and four emulations of early low-cost digital reverbs (intended to highlight the advantage of the QRS algorithm, rather than for use as effects in their own right!)

The dialogue library contains a lot of unusual, but amazingly useful environments, ranging from small enclosed spaces like a breadbin, a wardrobe and an oil barrel, to various vehicles (car, truck, box-van and submarine), and on to a vast collection of different rooms. These include small spaces like saunas, tents and cramped offices, through medium-sized spaces like a small garage and cinema, to larger classrooms, hallways, and even a circus tent. There are also more cavernous spaces, such as a multi-storey car park, an aircraft hangar and a power-plant hall. A number of outdoor spaces are also included: various alleyways and streets, railways station platforms, parks and a small copse. Most of these presets hit the required spot straight away, and all respond well to a little parameter tweaking when necessary to tailor the sound slightly.

Comparing the furnished and unfurnished living-room presets highlights the remarkable realism of the QRS algorithm, and the circus tent preset also stands out as an unusually accurate but distinctive sound character, which is very difficult to recreate with other reverb units.

At the end of the day, though, it all comes down to the sound of the reverberation, and, quite simply, the QRS is an astonishingly good reverberator. In many ways it is unlike anything else on the market, because whereas most hardware and software products produce nice-sounding simulations of generic spaces, the QRS seems to produce real rooms. It's very hard to put into words on paper, but the Yardstick seems to be able to place the source within a real space in a far more convincing way than most other reverbs manage — even convolution reverbs. This ability becomes even more striking when working with a complete stereo mix of a genuine acoustic performance, because the musicians appear to sit within a very natural room space, instead of having a synthetic room character pasted over the top of them.

When mixing rock and pop music, a 'reverb effect' is often precisely what is required and expected, and perhaps the Quantec's realism isn't entirely required or appropriate in that situation. However, a perennial frustration for me in my former career when editing stereo classical material, or working as a TV dubbing mixer, was that the available reverb processors generally failed to create convincing rooms that could be used to match material recorded at different times or in different locations. It was usually possible to get something close with extensive parameter manipulation, but I never felt the match was 100 percent. Most reverberators produce an effect rather than a real room emulation. Convolution reverbs offer a better alternative, but only if the required room character already exists as an impulse response. In contrast, the Quantec Yardstick seems far better able to create a vast range of realistic-sounding rooms straight away, and to be able to generate spaces to match existing rooms with relative ease. Consequently, I think the primary markets for the Yardstick are in classical music and media post-production applications, where it offers significant advantages over the traditional reverb tools.

Verdict

Overall, the quality of the Yardstick's reverberation is stunningly real — smooth, natural and organic-sounding, with a tangible sense of space and scale. Whether auditioned on speakers or headphones (and with the channel-correlation level set accordingly), the Yardstick produces far more believable acoustic spaces than I've found anywhere else. It really is a quite remarkable processor, and all the more so given the age of the underpinning algorithm. It just shows that the underlying model concept, rather than sheer DSP processing power, is what determines the realism of artificial reverberation, and clearly

Quantec developed something very special 30 years ago! The Yardstick creates room acoustics rather than 'just' reverberation, and in any application where creating or matching real room acoustics is critically important, it is a must-have. I really don't want to let the review unit go!

Alternatives

Since the 2496 is a two-in, six out unit, it should really be compared with similar surround-capable reverbs, and there's really only one: the Lexicon PCM96 Surround reverb. This Lexicon model with digital I/O costs slightly less than the Quantec, while the model with analogue I/O is slightly more expensive. However, the Lexicon can be used as a DAW plug-in, which is a function not yet available on the Quantec. The 2492 and 2493 stereo-in, stereo-out models are more or less expensive than other comparable high-end stereo reverbs such as the Bricasti M7, the Lexicon PCM96, the TC Electronic Reverb 4000 and the Eventide Reverb 2016.

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