

FIG. 1: Emulator X Studio is the top-of-the-line offering in E-mu's new series of audio interfaces and software bundles. The system includes a PCI interface card with an external audio breakout box and a sync daughtercard. The sampling software is based on E-mu's EOS operating system.



E-MU Emulator X Studio 1.0.1 (WIN)

E-mu moves from the rack to the desktop.

By Dennis Miller

The new series of Windows-based digital audio workstations and sampling software from E-mu will turn more than a few heads. With their high-quality specs, hardware-accelerated effects, and breakthrough pricing, the systems offer a great value in configurable bundles, allowing you to buy only the features that you need. Emulator X Studio, the focus of this review, is the top-of-the-line offering in E-mu's new five-product series and combines a multicomponent audio interface with a sampling application that is based on EOS, the operating system found in E-mu hardware samplers (see **Fig. 1**). Cubase 5.1, SFX Machine Lite, and a file-format converter are also packaged with Emulator X.

E-mu calls its hardware-only products Digital Audio Systems. These include the 1212M, the 1820, and the 1820M systems. The other two systems in the lineup combine Digital Audio System hardware with a soft sampler: Emulator X bundles 1212M and a sampler, and Emulator X Studio bundles 1820M and a sampler. All of the systems use 1010 PCI, an internal audio-interface card that has coax S/PDIF I/O, a FireWire port, ADAT I/O, and a connector to the AudioDock breakout box. AudioDock comes with Emulator X Studio, 1820, and 1820M (see the table

“Digital Audio System Hardware Specifications” for more on the system’s hardware). Emulator X and 1212 use 0202—an internal card—for analog I/O. The 0202 card has the same converters as the other systems. As of this writing, E-mu is giving users of hardware-only systems the option to purchase the sampling software for \$149, which is one of the best deals to come along in a while.

Deal the Cards

All of the products in the new E-mu series rely on a PCI card. The card offers 24-bit/192 kHz recording and playback through its ASIO drivers and WDM drivers (the included WDM drivers supply a maximum of only two channels of audio) and connects internally to a daughterboard that has word clock and SMPTE I/O and MTC out. A lengthy Cat-5 cable provides connectivity and power to the AudioDock.

The 1010 PCI card uses E-mu’s newest DSP engine, the 100 MIPS E-DSP, to give you as many as 16 simultaneous 32-bit effects, which allows your host computer to deal with other tasks. The effects vary greatly in the processing power that they require and make a welcome addition to the VST or DX effects that you probably already have on your system.

I installed Emulator X into my test machine—a Pentium 4/3.06 GHz workstation with 2 GB of RAM running Windows XP—with no trouble whatsoever. In fact, the entire hardware and software installation went

smoothly. Emulator X Studio comes with printed getting-started instructions and an extensive manual in PDF format.



FIG. 2: The PatchMix console is home to Emulator X's DSP-based effects and also has an adaptive display of the channels that you have enabled.

Get on the Bus

Once you have the system installed, you should configure some bussing schemes that work for your setup.

That is done in the PatchMix DSP console application, which adapts to the number of physical and virtual (WAV and ASIO) channels (a maximum of 32) that you have enabled and gives zero-latency monitoring (see **Fig. 2**). There are numerous preset configurations (which E-mu calls Sessions) at a variety of sampling rates.

I wanted a scheme that would bring audio from my hardware sampler via digital input into Steinberg WaveLab to add some VST effects, and then send it over to PatchMix's mains for some additional processing and final output. I found a Session preset that was perfect for the job. I also found a preset that allowed me to use my external digital effects unit on a send/return chain, although that setup could be created manually with just a few mouse-clicks.

Other presets are available for a variety of recording scenarios, transferring audio to and from an ADAT, and communicating with the sampler application. There's even a guitar tuner that puts

a test signal on each of six channels, although notes G, B, and E are pitched an octave too low.

Patch It Up

The PatchMix interface is well laid out and is divided into four main sections. The channel strips are on the left side of the window, each of which has a level slider, a pan pot, mute and solo buttons, and six insert slots (by default—you can add more inserts as needed). In addition to effects, the inserts can hold a test-signal generator, peak meters, or a trim control. There's also a scribble strip, two aux sends, and buttons to add or remove a strip.

At the top-right side of the screen is a toolbar with dedicated buttons to open, save, or create a new Session; adjust sync and Session settings; set global preferences; and show or hide effects. There's a lot of flexibility here—from setting sampling rate to enabling or disabling the software's splash screen. There's no limit to the program's number of custom configurations.

Under the toolbar is the TV Screen window, which toggles between displaying effects parameters and I/O routings. Effects parameters are adjusted by clicking and dragging horizontal scrollbars or by typing in values. The I/O display toggles between inputs and outputs—assignments are made by clicking on tabs to route physical or virtual ins and outs to specific channel strips and the main and mix outs to various physical outs. At the bottom of the TV screen is a drop-down menu that allows access to the effects presets and the location in which you can save your own. It's a clean interface, although it would be useful if the screen (and the entire mixer for that matter) were resizable.

The final section of the mixer is the main section, which has standard controls for master level, two aux sends and returns, and the AudioDock's stereo monitor outs, which you can mute if needed. There's a balance control for the monitor outs, but the main volume uses only a single slider with no pan option. There are also peak level meters and indicators for sync and sampling rate, as well as six default insert slots.

In Effect

Much of the work that you'll do in the mixer will involve effects, and there's lots to choose from. The effects, which use the

card's DSP engine, come in a variety of flavors and are grouped in two categories: Core Effects, which appear in their own folder and are read-only, and nine additional folders that include various Core Effects in combination. You apply an effect by selecting it, dragging it directly into an insert slot, and then clicking on it to access its parameters. Each of the effects has a fair number of presets—over 500 in total—and most run efficiently.

For example, I loaded a combination of 18 1- and 3-band EQs at 48 kHz, at which point the remaining listings grayed out and became unavailable (the system ran out of horsepower). Four instances each of the chorus, compressor, flanger, and auto-wah, plus three

phase shifters, also loaded with no problem. Not surprisingly, the reverbs and delays demand much more system resources, but E-mu offers a range of options, from very short reverb and delay times to times that run as long as 30 and 3 seconds, respectively.

Among the other effects, the frequency shifter was the most unusual. It takes a sound's spectrum and shifts the partials into inharmonic ratios. You can configure the effect so that the right and left channels offset in different directions and change the shift frequency over a range of 20 octaves. As with all of the effects, there are bypass and solo switches. I also like the vocal morpher, a filter that lets you slowly transition between syllables.

Although you can't automate effects while in the PatchMix interface, you'll be able to accomplish that task using PowerFX. PowerFX is a utility that allows any VST host program to use the hardware-based effects, and if that host supports VST automation (which most do), you're good to go.

PatchMix has an efficient and somewhat unusual interface for adjusting the mixer's controls. The pan and aux send pots appear onscreen as colored knobs, but when you click on one to adjust it, a horizontal slider pops up. That arrangement is convenient and preferable to moving knobs by clicking and dragging them all over the desktop. I also like the fact that when you load a multi-effect into a slot, the effects parse out into their own slots, so you can see exactly what the multi consists of. The downside, however, is that you can edit only one of the effects in a multi at a time.

EMULATOR X SOFTWARE SPECIFICATIONS

Included Presets	>1,500
Envelopes	1 hardwired, 2 configurable
LFOs	2; 17 shapes
Polyphony	CPU dependent
Multitimbral Parts	CPU dependent
File Formats	WAV, AIFF
Filters	12 types (>50 presets)
Modulation Matrix	36 source/destination routings
ASIO Output Buses	32 channels (16 stereo)
Sampling Features	resampling, autosampling, 12 DSP functions
MIDI Channels	32 in standalone mode; 16 per VST instantiation
Keyboard Trigger Modes	13



FIG. 3: Emulator X offers 32 MIDI channels, which you configure in the Multisetup screen. Any number of presets can be assigned to the same channel.

The output of 1820M is outstanding—my Genelecs never sounded so good. As you may have seen in the ads, the system uses the same converters that Digidesign's high-end gear has. Not only did I hear more detail in my own music, but some tests with a few recently acquired production-library tracks also showed the high quality of the system. The low end was extremely solid and full, and throughout the spectrum I heard minute and subtle aspects of the sound.

The Sampling Lineup

E-mu's vast experience in the world of hardware samplers has put it in a good position to build a computer-based system. As mentioned above, the Emulator X software is based on E-mu's EOS, the operating system used in its top-of-the-line sampling hardware. You'll find the majority of the latest EOS features here, although some, such as beat munging (changing the tempo of a sample without changing its pitch), have yet to appear. There's also an array of time-varying filters from E-mu's Morpheus line, and a number of software-based effects that you can use in your patches. Emulator X vastly exceeds its hardware brethren in numerous areas, especially with its option to stream samples directly from a hard drive. It can also run as a standalone and as a VST Instrument.

The Emulator X interface consists of an Internet Explorer-style pane (called the Tree) on the left and a series of work areas that toggle in the display on the right (see Fig. 3). At the top level is the Multisetup view (shown in Fig. 3), where you'll find slots for 16 MIDI channels, each with volume and pan sliders, an output selector, and a switch to enable routing to an aux bus. Clicking on a button at the top of the screen toggles the view to a second set of 16 MIDI channels.

The lower portion of the Multi window displays a number of parameters that are associated with the current channel as well as global tuning and transpose functions. There are also main-mix meters, a volume slider, three aux outs, and a virtual keyboard that triggers the patch on the current channel. The channel parameters have a filter section, which overrides the filter configured at the Voice level, and 16 assignable MIDI controllers.

Up a Tree

Once you load a bank, you'll see a list of all the presets, samples, and multisets on your system in the Tree view. You can toggle a display of the folders' contents,

but here again, being unable to resize a window can be a problem when you have more than several files to handle. Fortunately, there are some display options that allow you to view a list of your data in the large window on the right and even sort the information in various ways.

To load a preset, click-and-drag it from the list to one of the slots, and you're ready to go. I had expected Emulator X to let me put more than one preset on a MIDI channel as does Tascam's GigaStudio, but at first I didn't see that option. Within a few moments (and a quick read of the manual), I discovered that you can link any number of presets into a group and assign the entire group to a single MIDI channel. In effect, you can have as many presets playing on one channel as you want (see **Web Clip 1** for an example of linked presets).

There's a dedicated Preset Editor in which you can make global volume and tuning adjustments and pick from one of 12 tuning tables (you can't make your own). The Preset Editor also gives access to several data processors—for example, the two Channel Lag processors, which you can use to alter a stream of control data on its way to its destination. Somewhat reminiscent of several Kurzweil K2xx series Funs, the Lag processor could be inserted between an LFO and, say, a filter cutoff, and would modulate the modulator (that is, the LFO). You can make the various routing assignments in the preset's Voice-Processing screen.

Build Me Up

Like its hardware counterpart, Emulator X's architecture starts with a sample that, when assigned to a key and Velocity range in the Voices and Zones screen, becomes the basis for a voice. One or more voices is used to create a preset, and presets are saved in banks. Unlike the hardware sampler, you can save individual presets to disk. Each preset can contain as many as two software effects, and there are more than 100 templates to choose from that employ the 19 basic software-effects algorithms.

The Voices and Zones screen toggles among its four dedicated work areas: Mix/Tune, Key Window, Velocity Window, and Realtime Window, which are accessed by clicking on their respective buttons at the top of the display. There are an additional five windows in which you can assign various sources to control fading and switching among voices at a

note's start time. Each of the work areas allows for multiple methods of data entry. For example, in addition to using scroll arrows to set values for a sample's high and low key in the Key Window screen, you can type in a value or manipulate a graphic display of the sample's position (a piano keyboard appears above the display as a reference).

Also in the Key Window, you can import samples from your drive or click-and-drag them directly from the Sample folder in the Tree and adjust their pitch using the Transpose, Fine Tune, or Coarse Tune settings. You can use the Fade feature to fade the samples in a voice in or out as notes in its key range are received. The Fade feature also works for Velocity switching, which you would set in the Velocity Window. You can even configure an option for different voices to randomly crossfade by enabling that feature in the Realtime Window.

In general, working with the Voices and Zones functions is easy, but E-mu makes the job even simpler with a MIDI learn feature called IntelliEdit, which allows you to assign key ranges by pressing notes on your MIDI controller. There are also a variety of automated preset and voice-creation features. For example, if you choose the Import Sample command from the File menu and pick 50 WAV files, Emulator X will automatically create a new

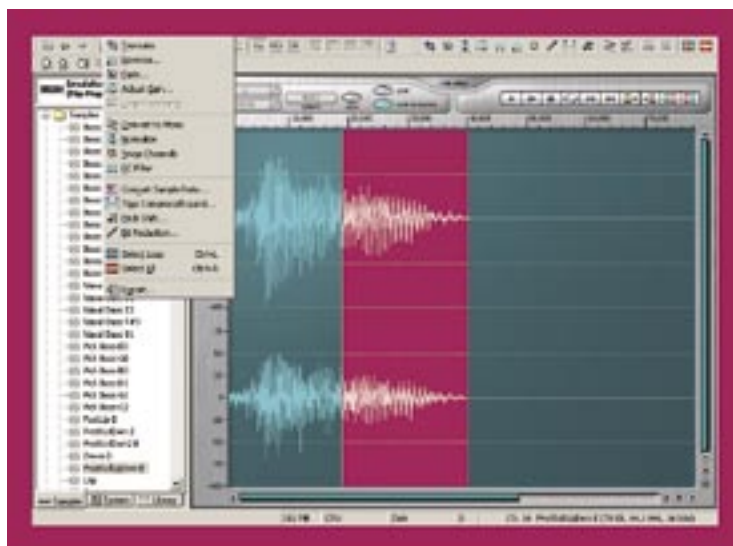


FIG. 4: The Sample Editor has a number of destructive effects (shown in the drop-down insert) and is well suited for tuning loops.

preset containing all 50 samples in individual, editable voices. If you enable the Single Voice and Chromatic options, the samples will be assigned to a single voice and mapped chromatically, one sample per note, up the keyboard. That feature is a huge help for sound effects (Foley, for example) and would take hours to duplicate on most hardware samplers.

The only snag I ran into when creating a voice was trying to access the drives on my system using the Library tab in the Tree—that dumped me out of Emulator X and closed the program. Apparently, there is a bug that con-

fuses the Emulator X file database when it tries to access external drives (I have FireWire and USB drives). E-mu is looking into the problem and expects to have a fix by the next release.

DIGITAL AUDIO SYSTEM HARDWARE SPECIFICATIONS

E-mu's series of five products includes Emulator X and Emulator X Studio, which combine one of the Digital Audio System audio interfaces with sampling software. The table below shows the specs for 1820M, which is the hardware side of Emulator X Studio, and 1212M, which is bundled in Emulator X. Both 1820M and 1212M are available as hardware-only options, as is 1820, which is also shown below.

Model	1820M	1820	1212M
Computer Interface Type	PCI	PCI	PCI
Power	PCI bus	PCI bus	PCI bus
Sampling Rates	44.1-, 48-, 96-, 192 kHz	44.1-, 48-, 96-, 192 kHz	44.1-, 48-, 96-, 192 kHz
Maximum Sampling Resolution	24-bit	24-bit	24-bit
Analog Inputs	(2) balanced mic preamps; (6) ¼" balanced line ins; turntable input	(2) balanced mic preamps; (6) ¼" balanced line ins; turntable input	(2) ¼" balanced line ins
Analog Outputs	(8) ¼" balanced line outs; (8) ⅛" speaker outs	(8) ¼" balanced line outs; (8) ⅛" speaker outs	(2) ¼" balanced line outs
Digital I/O	ADAT (switchable to S/PDIF); coaxial S/PDIF (switchable to AES/EBU); optical S/PDIF (switchable to AES/EBU)	ADAT (switchable to S/PDIF); coaxial S/PDIF (switchable to AES/EBU); optical S/PDIF (switchable to AES/EBU)	ADAT (switch- able to S/PDIF); coaxial S/PDIF (switchable to AES/EBU)
Additional I/O	SMPTE, MTC, word-clock sync; (1) ¼" stereo headphone; FireWire (data or video only)	optional sync; (1) ¼" stereo headphone; FireWire (data or video only)	optional sync; FireWire (data or video only)
Mic Preamp	(2) TFPro mic preamps with 48 V phantom power and Neutrik connectors	(2) TFPro mic preamps with 48V phantom power and Neutrik connectors	none
MIDI	(2) In, (2) Out	(2) In, (2) Out	(1) In, (1) Out
Effects	16	16	16
Total Harmonic Distortion	-110 dB (1 kHz @ -1 dBFS) inputs; -105 dB (1 kHz @ -1 dBFS) outputs	-102 dB (1 kHz @ -1 dBFS) inputs; -98 dB (1 kHz @ -1 dBFS) outputs	-110 dB (1 kHz @ -1 dBFS) inputs; -105 dB (1 kHz @ -1 dBFS) outputs
SNR Ratio	111 dB input; 112 dB output	120 dB input and output	120 dB input and output
Price	\$699	\$499	\$299

Up Close

Emulator X has a built-in sample editor that can perform many basic and even some complex tasks, which means that you don't have to exit the program to tweak your audio files. Double-click on a sample from the Tree list and the Sample Editor window opens, revealing a large, zoomable waveform display (see Fig. 4). Sample Editor is optimized for looping operations and also has various destructive-editing functions. Transport controls have the usual options.

Among the more interesting processing functions is the time-stretch/compress feature, which has 12 stretch/compress algorithms and produces clean stretches to its maximum 200 percent length. Even performing multiple stretches at the maximum setting in succession produced fewer artifacts than I'm accustomed to hearing. You can adjust the timing ratio using percent (step increments are one-tenth of one percent), file length, or tempo (beats per minute). You can also export your files in WAV or AIFF format if you do need to use other editing software (there are no hot links to open other software).

A number of professional features—such as allowing different curves for the beginning and end of a fade—make Sample Editor a versatile tool, but it would be great to have support for VST plug-ins from that work area. That would be especially helpful if, for example, you wanted to apply destructive effects such as reverb, delay, and chorus to your samples. You can build these effects into your presets or bus Emulator X's output to PatchMix channels containing the effects you want. (A preset Session has that configuration.)

It is worth noting that Emulator X does something that many other soft samplers don't: it samples. And although you cannot resample directly from within the Emulator X main screen, it is trivial to set up a routing from PatchMix back to Emulator X's Acquire Samples screen, where you'll find the system's recording feature.



FIG. 5: The Voice-Processing screen is at the heart of the Emulator X's programmable parameters. You can save presets from each processing module.

Find Your Voice

The next level up is the Voice Editor, which offers a vast array of synthesis options, including three envelopes (one hardwired to amplitude and the others freely mappable), two multiwave LFOs, filters, an amplifier, and an extensive modulation matrix (see Fig. 5). There are also controls to delay a note's start time, chorus and glide effects, and a variety of tuning options. All of the functions are laid out in a single, neatly organized screen, and several of the controls have a visual display of their settings, although only the envelopes (which have six segments and segment times to a maximum of 136 seconds) can be edited graphically. There's no on/off button for the LFOs—a silly oversight—but if you set their tempo control to external and don't send a timing signal, it serves the same purpose.

E-mu has implemented the exact code for its filters that is used in its hardware, and that alone would be worth the price of admission. Filter settings, like those of all the other components, can be saved independently of the voice you're modifying and used where needed. There are 12 unique filter types that are configured into 53 different filter presets, and their range is extraordinary. Steep, 6-pole lowpass; phasing comb filters, AM-radio emulations; sweeping, vintage effects of all varieties; and much more are available, each subject to a time-varying Morph and Gain setting that adds even more flexibility. Four of the filters implement E-mu's well-known morphing capability, which lets you move between two completely different filter settings as a note plays using various control sources.

The Voice Editor is also home to the Modulation Cords patching area. Here again, E-mu has carried over the concept of Cords from its hardware. Put simply, Cords carry modulation sources to their destination and can be modulated (the amount of control, for example) in their own right. The

PRODUCT SUMMARY

E-MU Emulator X Studio

Emulator X Studio
audio interface and sampling
system
\$799

Emulator X
audio interface and sampling
system
\$399

OVERALL RATING (1-5): 4.5

PROS: Well-integrated hardware/software combination. Huge included sound library. Excellent audio specs.

CONS: No VST plug-in support in sampling software. Nonresizable windows.

MANUFACTURER

E-mu
www.emu.com

patching system is extremely easy to use—a source on the left is mapped to the destination on its right—and in addition to various MIDI controllers, envelopes, and LFOs, you'll find some unusual control sources (Flip-Flop, Quantizer, and Diode, for example) that perform different types of processing on a control signal before it reaches its destination.

All Preset

No soft instrument would be complete without its presets, and E-mu has gone all out in this area. Emulator X ships with four CDs full of sounds, including a two-disc grand piano, a hip collection of loops and one-shots called Beat Shop One, the Hip Hop Collection, and the Proteus Composer, which contains the entire library (samples, presets, and all) from the Proteus 2000 (a review of the Proteus 2000 is available online at the EM Web site). There's also the St. Thomas string library and a General MIDI set. It would be great if E-mu provided vocal samples and the Proteus World Collection in a future release.

The huge piano collection has numerous multisampled grands (concert, stage, and the like) and some novelty instruments such as Chorused Piano. There are also several combinations of piano and strings. If you don't have a top-quality piano library in your collection, it will be more than adequate.

The Hip Hop collection has all of the expected hits and scratches, plus some unique presets such as All Snares, which maps 31 different snares across the keyboard in a multisample. All Kicks and All Hats and Cymbal have similar setups. Beat Shop is probably my favorite collection. It offers percussion grooves under the control of tuned filters that progress from I to IV to V and others that use LFOs timed to tuplet ratios of the groove's beat; pretty unusual stuff.

The space allotted doesn't permit a more in-depth examination of the presets, but the package is an excellent mainstream library with more than a few twists. Check out the EM Web site for examples

of presets that I created (see **Web Clips 2** and **3**).

Compared to What?

There are a lot of software samplers on the market today, but E-mu is the first of the major hardware manufacturers (Kurzweil, Yamaha, and Roland) to bring its sampling expertise to the desktop. Not surprisingly, the many years of producing high-quality hardware has paid off in the current system. Emulator X is a mature and well-planned workstation. This applies across the board, from its excellent documentation, which is full of usage tips and background material, and the large number of Session configurations to the overall stability of the system. Even the AudioDock breakout box is an attractive and solid-feeling piece of gear.

I've reviewed a lot of products over the past ten years but have never felt a review simply scratched the surface more than this one. There are numerous important aspects of Emulator X that, due to space constraints, this review doesn't cover. Check out the PDF manual online at E-mu's Web site, and you'll see what I mean. What's more, E-mu claims to have big plans for the system, including better integration with VST hosts, more effects, and additional sound libraries. One company representative told me that everything the company had recorded in the last three years was done with Emulator X in mind, and even as I was reviewing the system, software updates appeared at the Web site, and a new collection of sounds, called Beat Shop Two, showed up at my door.

If you already have a software sampler and just need a new audio interface, you can check out the other options that E-mu offers. But for a little more money, Emulator X Studio has one of the top soft samplers on the market in a well-integrated bundle with professional hardware. Either way, the new series from E-mu has something for everyone.



EM associate editor Dennis Miller lives in the suburbs of Boston.