Princeton Digital
Reverb 2016 User Guide

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For DigiDesign ProTools 6.0 or greater
TDM HD/Accel Hardware Required
Mac OS X 10.2 or later

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Introduction

Note: Be sure to read the FAQ on our website (www.princetondigital.com) for quick answers to many common question; including troubleshooting issues.

Some equipment racks are lucky enough to have an Eventide® SP2016. It's an effects processor from the mid-1980's that included several reverb algorithms that are still prized today: Stereo Room, Room Reverb, and High Density Plate. Princeton Digital has recreated these reverbs in the Reverb 2016 hardware unit, and these same sounds are available as a set of Digidesign Pro Tools TDM (DSP-based) plug-ins (HD or Accel hardware required).

The plug-ins require Pro Tools 6.0 (or newer) on a Macintosh OS X 10.2 Operating System (or newer). Installation is performed by running the installer found on the distribution medium or within the Internet download.

The plug-ins are protected by the same iLok hardware dongle that's provided with your Pro Tools TDM system and they will not run without the dongle. All installs are initially set up with a 30-day demonstration period. If you have not yet purchased the plug-ins, this gives you a chance to try them out. Due to the nature of the iLok protection you *will* need to authorize the demo period via our website and iLok.com. You cannot extend the demo period by reinstalling the plug-ins; actually, we can't even extend it for you.

To authorize the demo, go to http://www.princetondigital.com/plugins/demoauth and follow the instructions provided on that page. You may get instructions for downloading the demo; you don't need to do it if you already have the software from a CD-ROM or elsewhere.

After following the authorization process, you'll need to go to www.ilok.com, log in (or create an account if you haven't done so yet), and download the authorization to your iLok.

If you later decide to purchase the Reverb2016 software, we'll send an authorization to ilok.com updating your account.

When Pro Tools starts, you'll see multiple demo reminder panels because there are multiple plug-ins in the Reverb2016 bundle. The reminder panels will go away after the demo period or after you purchase and authorize the plug-ins.

When you purchase the software, you'll be able to authorize your installation via iLok.com. Check our website for more information about this feature.

If you purchased your plug-ins through a dealer, you may have received a license card that can be used to authorize the plug-ins. Insert the license card into the iLok's built-in card reader. When Pro Tools starts with the plug-in loaded, the demonstration reminder panel appears. Click "Authorize," check the 'Use License Card" checkbox, and click "Next." If you have not already placed the license card into the reader, then do so when the prompt appears, click "Next" again, and you're done. The reminder panel shouldn't appear again if you've properly completed the procedure.

There's more information about iLok in the documentation that came along with your Pro Tools system or go to www.iLok.com. If you don't want to read about using the iLok and the license

card, then we just want to remind you to be really careful when separating the small license card from its mounting, as it is possible to crack the card. Don't be rough with it!

We assume that you're familiar with Pro Tools, how to insert a plug-in into a track, and how to save plug-in setups using the top toolbar of a plug-in. If not, please consult the manuals that came with the Pro Tools system.

There are three independent reverb plug-ins in this package, and each has several input/output formats to use with different types of tracks:

Plug In	Input	Output
Stereo Room	Stereo	Stereo
	Mono	Stereo
	Mono	Mono
Plate Reverb	Mono	Stereo
	Mono	Mono
Room Reverb	Mono	Stereo
	Mono	Mono

All three plug-ins support single-channel input and single- or dual-channel outputs; only Stereo Room offers a dual-channel input. This flexibility allows use of the plug-ins in many different kinds of track setups.

The controls for all three plug-ins are the same; however, the underlying core of the digital signal processor software running on the HD/Accel card is completely different for each plug-in. The three reverbs are not generated by presetting various parameters; they are completely independent effects.

At the time of this writing, the plug-ins support sample rates of 44.1 kHz, 48 kHz and 96 kHz. Please note that 96 kHz support is only available on Digidesign's Accel hardware board. Furthermore, since only four of the DSP chips on the Accel board have external memory, 96 kHz sample rates are only available on those four DSP chips. Since all of the reverbs require external memory, the 44.1 and 48 KHz versions cannot run on the DSP chips on Accel without external memory. The following table shows which DSPs on an Accel board support one sample rate or another. The DSP numbers refer to the 'System Usage' window: DSP #1 is the topmost DSP and DSP #9 is at the bottom.

Accel DSP #	**Sample rate support**
1	44.1, 48
2	44.1, 48
3	44.1, 48. 96
4	44.1, 48. 96
5	44.1, 48. 96
6	44.1, 48. 96
7	None
8	None
9	None

About Reverb

Creating a reverb algorithm is part art and part science.

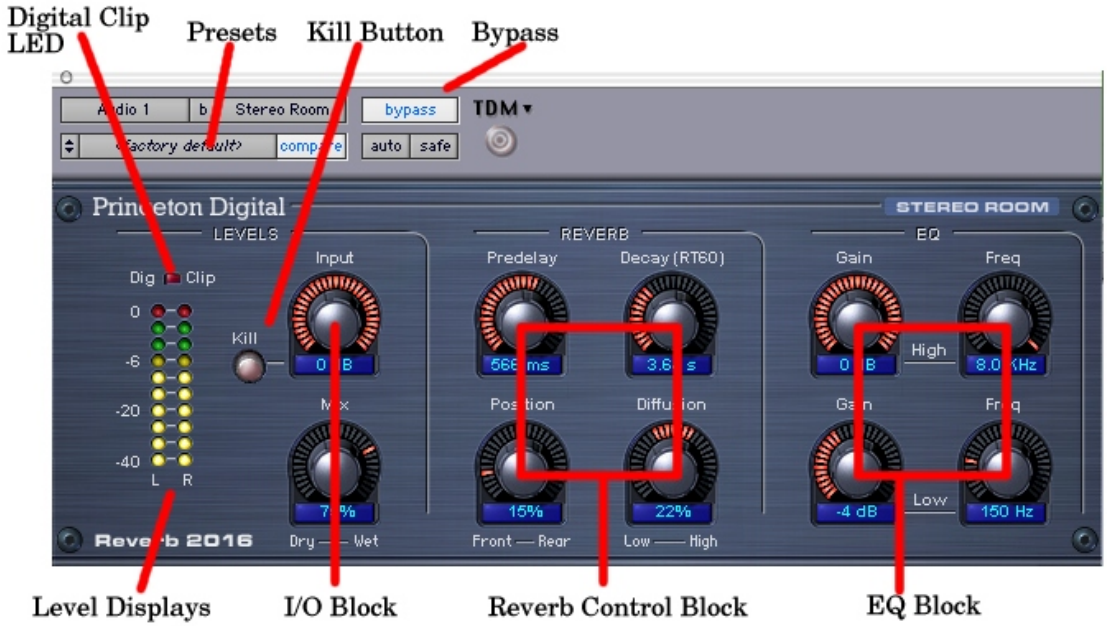
The science bit is all about the naturalness of the sound — whether the simulation convincingly conveys the *feel* of a real room. Some digital reverbs don't have the horsepower to run a sufficiently complex program to achieve *naturalness*. Without enough processing power, the effect will suffer from low echo density or unnatural density growth with time or comb filter effects, etc. As Einstein is alleged to have said “things should be as simple as possible, but no simpler.” This principle certainly applies to reverb algorithms.

The art of reverb algorithm design begins with simulating a “room” that actually sounds good. Needless to say, rooms that sound awful exist in the real world. The structure of the reverb algorithm combined with the choices of delay lengths, interconnects, filter placement, early reflections, etc., all contribute to the overall sound. The final element of the art of reverb design is the designer's choice of the ways in which, and the extent to which, the artist/engineer/producer is permitted to modify the effect. What are the parameters and what do they do?

The degrees of freedom available to the designer guarantee that no two (sufficiently complex) reverb algorithms will sound the same. Each will be unique. There are a number of popular digital reverberators for good reason. Each has a distinctive sound; each has a particular set of possibilities. The SP2016 reverbs have attracted a loyal user base because of a particular blend of art and science. They sound *natural*. They sound *distinctive*. And, while they allow the user to vary the effect dramatically, the controls can't be set in a way that will create an unnatural sounding effect.

The algorithms naturally simulate every aspect of the sound of a real enclosure — from the complex early reflections, to the natural way in which the echo density increases with time, to the smooth Gaussian decay of the reverb tail. It’s a powerful simulation that lends itself to parametric control.

Controls



The image above is of the Stereo Room plug-in for the Stereo-In to Stereo-Out mode. In the Mono-to-Mono mode there's only one level display. The Plate and Room plug-ins also have only one level display, but otherwise appear and function identically to Stereo Room.

Operating these plug-ins is simple and intuitive. The controls visually indicate their setting with a single segment, a continuous array of segments, or a fan-out appearance (whichever is appropriate for the particular parameter that's being controlled). Click and drag up-down to change a knob's setting. Don't try to turn them in a circle.

Like all Pro Tools controls, you can hold down the "Apple key" (A.K.A. Command key) prior to click-dragging the knob to have the knob turn more slowly and get a finer degree of control over the parameter.

The parameter value for the control is displayed underneath the knob and is updated in real time. These values are also clickable: You can click into the value field and enter a new value; then click ENTER to register it.

The controls are divided into five main sections:

- Level Displays and Digital Clip LED
- Presets and Bypass
- I/O Block and Kill Button
- Reverb Control Block
- EQ Block

These are discussed below.

Level Displays and Digital Clip LED

The Level Displays comprise one or two stacks of green, yellow, and red LEDs that indicate the input level to the reverb. The input to the displays is driven from the output of the INPUT control.

The Digital Clip LED illuminates when the internal reverb "matrix" is overdriven into digital clipping. This may occur (and usually will) even if the Level Displays are nowhere near a maximum level indication. Digital clipping will commonly occur if the Decay knob is at its most clockwise setting, or if you add gain at low frequencies using the Low-Frequency gain knob. The remedy is simple: lower the input level using the Input knob. This is a normal operating scenario; it is not a defect.

Presets and Bypass

The Preset list box is a standard Pro Tools function that allows you to save your current control settings to a named file. It's a handy way to save a particularly nice reverb environment for re-use. Each plug-in has a number of predefined presets — use them as is or modify them. If you overwrite one by mistake you can find the originals in the Princeton Digital folder that was originally installed on your desktop. Pro Tools places the presets in Library:Application Support:Digidesign:Plug-In Settings; although you may have them in other locations as well.

The Bypass control completely bypasses the reverb as far as Pro Tools is concerned. However, the reverb's inputs are still driven and all controls are still operational. This is important so that audible artifacts are not created when you remove the bypass.

I/O Block and Kill Button

These three controls are used to control the audio I/O of the reverb.

The Input Level control can be used to attenuate the input from Pro Tools or a preceding plug-in so as not to overdrive the reverb and produce distortion. Like most audio gear, and digital gear in particular, you want to keep the attenuation as low as possible (i.e., the knob should be turned as far clockwise as possible before inducing distortion) while still keeping the reverb from being overdriven into distortion as indicated by the Clip LED lighting up.

The Mix control is used to control the mix between the unprocessed input and the reverberated output. This is especially useful when some pre-delay is added.

The Kill button is a quick way to remove the input from the reverberator so that you can listen to the tail (reflections) caused by your input. Note that this button lights up when it is "depressed" so that you can tell that the input is interrupted. This button also kills the input to the Dry side of the Mix control.

Reverb Control Block

These four parametric controls directly control the reverberator.

Predelay introduces a delay before the reverb effect. If you want to control the delay change more accurately, hold down the "Apple" key before you click and drag this knob.

Decay (RT60) sets the time (in seconds) for a full amplitude signal to decay by 60 dB. In other words, this control sets the *reverb time*.

Position is used to move your "listening position" from the front of the "room" to the rear. A simplified explanation: it changes the mix between the early and late reflections. Actually, what happens in the algorithm is more complex than this. You'll find that Position is one of the most useful controls

Diffusion alters the character of your space – from the sharp reflections of flat, hard surfaces (Low) to the diffused reflections from rough, irregular ones (High). Note that this can often be a subtle difference and may be difficult to hear with some types of program material and/or with long Decay times.

EQ Block

These four controls can be used to change the internal frequency characteristics of the reverberator. **Important**: Boosting the **low** frequencies when the Decay (RT60) control is set for a **long** decay time can cause the effect to "run away."

At the top of this block you'll find the High gain and frequency controls, and at the bottom are the LOW gain and frequency controls. For each, the Gain control permits gain (low frequencies only) or attenuation; the Freq control sets the corner frequency of the filter.

You can use the clickable text fields under each control to enter arbitrary values; however, these controls are "stepwise" and offer the following settings:

High	Gain	–8 through 0 dB in 1 dB steps
	Freq	1000 through 8000 Hz in 500 Hz steps
Low	Gain	-8 through +4 dB in 1 dB steps
	Freq	50 through 500 Hz in 50 Hz steps

It's usually easy to hear the effect of attenuating the high frequencies; it's usually less easy to hear the difference when changing the low frequency adjustment. These controls affect parameters deep within the reverberator and the effect may be subtle or dramatic depending on the program material and other reverb settings such as Decay, Position, or Diffusion.