

# **Pro Tools**

## **DigiRack Plug-Ins Guide**

### **Version 5.3 for Macintosh and Windows**

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## chapter 1

# Getting Started with Plug-Ins

Plug-ins are special-purpose software components that add additional signal processing functionality to Pro Tools.

The DigiRack plug-ins included with Pro Tools provide a comprehensive set of digital signal processing effects that include EQ, dynamics, delay, and other essential functions.

There are three formats of plug-ins:

- TDM plug-ins (real-time, DSP-based)
- RTAS plug-ins (real-time, host-based)
- AudioSuite plug-ins (non-real-time, file-based processing)

### TDM Plug-Ins

#### (TDM Systems Only)

TDM plug-ins function as track inserts, are applied to audio during playback, and process audio non-destructively in real time. TDM plug-ins are designed for use on TDM-based Pro Tools systems, and rely on the processing power of Digidesign DSP cards.

The number and variety of TDM plug-ins that you can use simultaneously in a session are limited only by the amount of DSP available. You can increase available DSP by installing additional DSP cards in your computer. On HD-series systems, use HD Core or HD Process cards;

on MIX-series systems, use MIX Core, MIX Farm, or DSP Farm cards. This power-on-demand aspect is a significant advantage of TDM-based systems.

**▲** *MIX Farm and DSP Farm cards are not supported on HD-series systems.*

### RTAS Plug-Ins

RTAS (Real-Time AudioSuite) plug-ins provide features and functionality similar to their TDM counterparts, but unlike TDM plug-ins, they rely on and are limited by the processing power of your computer. The more powerful your computer, the greater the number and variety of RTAS plug-ins that you can use simultaneously.

Because of this dependence on the CPU or *host processing*, the more RTAS plug-ins you use concurrently in a session, the greater the impact on other aspects of system performance such as available track count, edit density, and automation latency.

RTAS plug-ins can be used on both Pro Tools TDM and LE systems.

## AudioSuite Plug-Ins

Non-real-time AudioSuite plug-ins are not used during playback, but are instead used to process audio files on disk, creating new, rewritten audio files with the effect permanently applied. AudioSuite plug-ins can be used on all Pro Tools systems.

---

## System Requirements

To use Digidesign plug-ins you need:

- ◆ A Digidesign-approved Pro Tools system with version 5.3 software or later
  - or –
- ◆ A third-party software application that supports the Digidesign TDM, RTAS, or AudioSuite plug-in standard

For the latest compatibility information, contact your local Digidesign dealer or visit Digidesign's Web site.

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## Installing Plug-Ins

The Digidesign DigiRack Plug-Ins are installed when you install Pro Tools. For more information about installing Pro Tools, see the *Getting Started with HD Guide*.

 *Versions of plug-ins prior to 5.3 are not supported in Pro Tools 5.3 on HD-series systems.*

---

## Allocating Additional Memory to Pro Tools

### (Macintosh Only)

If you plan to use a large number of TDM plug-ins in addition to the DigiRack TDM plug-ins included with Pro Tools, allocating additional memory to Pro Tools will help ensure reliable system performance.

If enough RAM is available in your computer, allocate 1–2 megabytes of additional RAM to Pro Tools for each non-DigiRack plug-in installed on your system.

### To allocate additional memory to Pro Tools:

- 1** Start Pro Tools so that it can calculate its basic memory allocation.
- 2** Go to the Finder and choose About This Computer from the Apple menu.
- 3** If you have 3 MB or more of memory available (as indicated in the Largest Unused Block portion of this window), go to step 4. If you have less than 3 MB of free memory, stop here: Do not allocate additional memory to Pro Tools unless you install additional RAM in your computer.
- 4** Quit Pro Tools.
- 5** Open the Pro Tools folder, select the Pro Tools application, and choose Get Info from the Finder's File menu.
- 6** Choose Memory from the Show menu.

7 Enter the desired amount of memory *above the minimum requirement* in the Preferred Size field. For example, if the Preferred Size field currently says “30410”k and you want to allocate an additional 3 MB of memory (1 megabyte equals 1,024 kilobytes), enter “33482”k into the Preferred Size field.

8 Close the Get Info dialog.

The next time you start Pro Tools, it will use this new memory allocation.

---

## Conventions Used in This Guide

All Digidesign guides use the following conventions to indicate menu choices and key commands:

Convention	Action
File > Save Session	Choose Save Session from the File menu
Control+N	Hold down the Control key and press the <i>N</i> key
Option-click	Hold down the Option key and click the mouse button

The following symbols are used to highlight important information:

 *User Tips are helpful hints for getting the most from your Pro Tools system.*

 *Important Notices include information that could affect your Pro Tools session data or the performance of your Pro Tools system.*

 *Shortcuts show you useful keyboard or mouse shortcuts.*

 *Cross References point to related sections in the Pro Tools Guides.*

### Choose and Select

The words “choose” and “select” are often interchangeable in conversational English. In this guide, however, there is a distinction between the two terms.

**Select** When the guide instructs you to *select* something, it stays selected. This is the case with dialog box options and menu items that enable or disable an option.

**Choose** When the guide instructs you to *choose* something, a one-time action is performed. This is the case with most menu commands; they perform their chosen action only once.



## chapter 2

# Working with Real-Time Plug-Ins

Real-time plug-ins process audio non-destructively in real time. They do not alter the original source audio, but only apply their effect during playback.

There are two formats of real-time plug-ins:

**TDM Plug-Ins** Rely on the processing power of Digidesign DSP cards. TDM plug-ins run only on Pro Tools TDM systems.

**RTAS Plug-Ins** Rely on the processing power of your computer. RTAS plug-ins run on Pro Tools TDM and LE systems.

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## Processing Power Requirements of TDM and RTAS Plug-Ins

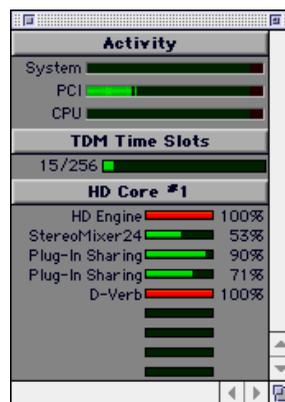
TDM and RTAS plug-ins differ in their processing power requirements.

### TDM Plug-Ins

Each real-time TDM plug-in in a Pro Tools session uses a portion of your system's total available DSP resources. Since these DSP resources reside on the cards that make up your particular Pro Tools hardware configuration, the amount of DSP available depends entirely on the number and type of DSP cards in your system.

You can add more mixing and processing power to your system by installing additional DSP cards, provided you have unused PCI expansion slots in your computer or use a Digidesign-approved Expansion Chassis.

The System Usage window (Windows > Show System Usage) shows how much DSP is available on your system and how it is currently being used. For more information on the System Usage window, see the *Pro Tools Reference Guide*.



System Usage window

See Appendix A, “DSP Requirements for TDM Plug-Ins” for the number of instances of each DigiRack TDM plug-in that can be powered by a single DSP chip. DSP usage differs according to card type.

## DSP Sharing Between TDM Plug-Ins

Digidesign's MultiShell II technology allows different types of TDM plug-ins to share the same DSP chip at the same time. This allows you to simultaneously use a greater variety of plug-ins by efficiently managing the DSP available on each chip in your system.

In order to take advantage of this capability, plug-ins must be MultiShell II compatible. All DigiRack TDM plug-ins with the exception of Direct Connect are MultiShell II compatible.

Some third-party plug-ins may not be MultiShell II compatible. To check compatibility, contact the developer.

## RTAS Plug-Ins

RTAS plug-ins rely on and are limited by the processing power of your computer's CPU. The more RTAS plug-ins you use concurrently in a session, the greater the impact it will have on other aspects of your system's performance, such as maximum track count, the density of edits possible, and latency in automation and recording.

The CPU meter in the System Usage window (Windows > Show System Usage) shows how much of your computer's processing power is currently being used by Pro Tools, and how much is still available.

 For more information on the System Usage window, see the Pro Tools Reference Guide.

## Improving RTAS Plug-In Performance

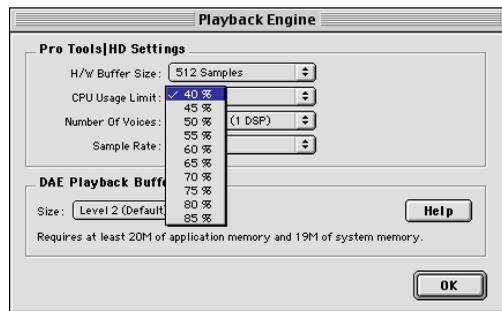
You can increase the number of RTAS plug-ins your system can use concurrently by increasing the Hardware Buffer Size and CPU Usage Limit parameters.

These parameters determine how much of your computer's processing power is dedicated to running RTAS plug-ins and other host processing tasks.

 If you are using many RTAS plug-ins concurrently, setting the Hardware Buffer Size and CPU Usage Limit parameters too high may have a negative impact on on-screen performance tasks such as metering, fader movement, and automation accuracy.

**To improve RTAS plug-in performance:**

- 1 Choose Setups > Playback Engine.
- 2 From the H/W Buffer Size pop-up, select the desired hardware buffer size.
- 3 From the CPU Usage Limit pop-up, select the percentage of CPU power you want to dedicate to RTAS plug-ins and host processing.



**Choosing the CPU Usage Limit**

- 4 Click OK.

 For more information on the Hardware Buffer Size and CPU Usage Limit parameters, see the Pro Tools Reference Guide.

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## Delay in Digital Signal Processing

### (TDM Plug-Ins Only)

DSP processing in digital audio systems incurs signal delay of varying amounts. Such delays can vary from as short as few samples to as long as several hundred samples, depending on the type of processing applied.

If you have recorded an instrument on multiple tracks using multiple microphones—a drum kit for example—and process the different tracks with different TDM plug-ins, the tracks may go out of phase. You will then need to compensate for these delays to avoid phase correlation problems.

 See Appendix B, “DSP Delays Incurred by TDM Plug-Ins” for information on delays inherent in specific DigiRack TDM plug-ins. See also the Pro Tools Reference Guide for a guide to calculating DSP-induced delays.

### Compensating with TimeAdjuster

You can compensate for TDM plug-in-induced delays by using the TimeAdjuster plug-in. This plug-in allows you to apply a specific number of samples of delay to the signal path of a Pro Tools track. TimeAdjuster provides settings files that apply the correct compensation time in samples for delay introduced by one or more plug-ins. See “TimeAdjuster” on page 46.

 On Pro Tools TDM systems, you can also use the TDM Time Adjuster plug-in to compensate for RTAS plug-in induced delays. However, since Time Adjuster is a TDM only plug-in, it cannot be used to compensate for plug-in induced delays on Pro Tools LE systems.

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## Plug-Ins as Inserts

Real-time plug-ins are available as in-line inserts on audio tracks, Auxiliary Inputs, and Master Faders. A maximum of 5 real-time plug-ins can be used per track.

When more than one insert is used on a track, they process the audio in series, each effect being added to the previous one, from top to bottom in the Mix window.

 If you are using both TDM and RTAS plug-ins on the same track, RTAS plug-ins must occur first in the signal chain, followed by TDM plug-ins. You cannot place TDM plug-ins before RTAS plug-ins.

Inserts can be used in two ways:

**On Single Tracks** An insert can be applied to an individual audio track or auxiliary input using the Insert Selector on that track.

With in-line inserts, you control the level of effect by adjusting the controls of the plug-in.

**As Shared Resources** An insert can be used as a shared resource in a send-and-return arrangement by bussing signals from several tracks to an auxiliary input, and applying the insert to the auxiliary input track. With such an arrangement, you can control the send level for each track and the overall level of the effect can be controlled from the auxiliary input track.

Shared arrangements allow you to make more efficient use of your system's processing power.

 On TDM systems, RTAS plug-ins can be inserted on audio tracks only. For Auxiliary Inputs or Master Faders, use TDM plug-ins.

## Pre-Fader Operation

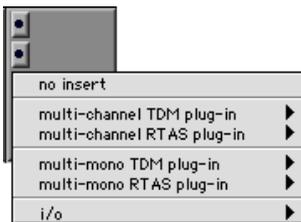
Real-time plug-ins function as *pre-fader* inserts (except on Master Fader tracks, where inserts are post-fader), meaning that their input levels are not affected by a track's volume fader.

**⚠** *Real-time plug-ins are pre-fader, but post-disk. This means that if you record to disk with a plug-in inserted on the record track, you will hear the effect of the plug-in, but the effect will not be recorded to disk. To record with a plug-in effect, use an Aux track for input, insert the desired effect on the Aux track, then route the Aux track to the Audio track to which you want to record; or bounce the Audio track with the plug-in after recording in order to write the effected audio to disk.*

## Mono, Multi-Mono, and Multichannel Plug-Ins

Plug-ins can be used in mono, multi-mono, or multichannel formats, depending on the type of plug-in and whether the destination is a mono or multichannel track.

In general, when working with stereo and greater-than-stereo tracks, use multichannel plug-ins. If a multichannel version of a plug-in is not available, use a multi-mono version.



Plug-in formats

**Mono Plug-Ins** Are designed for use on mono tracks. Some mono plug-ins (such as Mod Delay) allow you to generate a stereo output from a mono channel. Plug-ins that occur on a track after a stereo plug-in are used in stereo as well.

**Multi-Mono Plug-Ins** Are designed for use on stereo or greater-than-stereo multichannel tracks only when a multichannel version of the plug-in is not available. Multi-mono plug-ins will analyze and process each channel independently without regard to each other. Parameters for all channels are linked by default so that you can adjust them in tandem. You can unlink parameter controls for independent adjustment using the Master Link button. See “Linking and Unlinking Controls on Multi-Mono Plug-ins” on page 13.

**⚠** *Multi-mono plug-ins, such as dynamics-based or reverb plug-ins, may not function as you expect. Use the multichannel version of a multi-mono plug-in when available.*

**Multichannel Plug-Ins** Are designed for use on stereo and greater-than-stereo multichannel tracks. On greater-than-stereo multichannel tracks, the parameters for all channels are always linked together.

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## Inserting Plug-Ins on Tracks

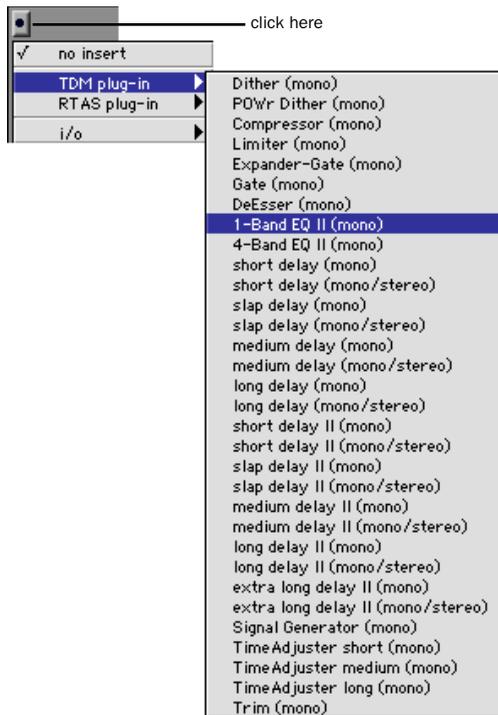
To use a real-time plug-in in a Pro Tools session, insert it on a track. Before doing so, make sure the Inserts View is shown in the Mix window.

### To show inserts in the Mix window:

- Choose Display > Mix Window Shows > Inserts View.

### To insert a plug-in on a track:

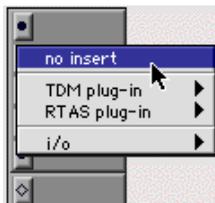
- Click the Insert Selector on the track and select the plug-in that you want to use.



Inserting a plug-in

### To remove an insert from a track:

- Click the Insert Selector and choose No Insert.



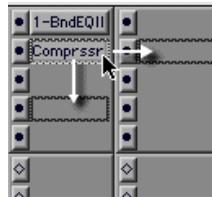
Removing a plug-in

## Moving and Duplicating Inserts

You can move or duplicate an insert by dragging it to a different position on the same track or a different track. Inserts that are moved or duplicated retain their original settings and automation.

### To move an insert:

- Drag the insert to the desired location.



Moving a plug-in

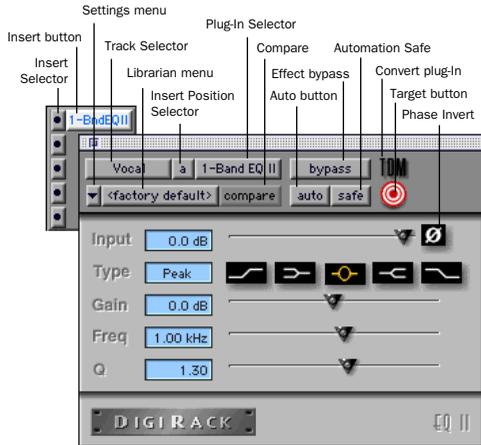
**⚠** Dragging an insert on top of an existing insert will replace it.

### To duplicate an insert:

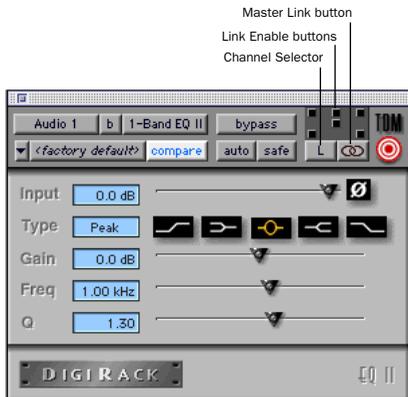
- Option-drag (Macintosh) or Alt-drag (Windows) the insert to the desired location. The duplicated plug-in retains its original settings and automation.

# The Plug-In Window

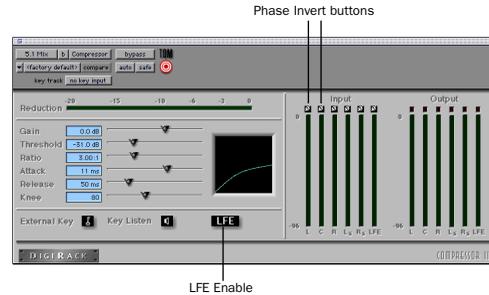
The Plug-In window appears whenever you click the Insert button on a track. This floating window allows you to edit the parameters of any real-time plug-in in use on a track.



Plug-In window (mono 1-Band EQ shown)



Plug-In window (multi-mono 1-Band EQ shown)



Plug-In window (multichannel Compressor shown)

**Settings Menu** Allows you to copy, paste, save, and import plug-in settings.

**Track Selector** Accesses any non-MIDI track in your session.

**Librarian Menu** Recalls settings files saved in the plug-in's root settings folder or in the current session's Settings folder. See "Using the Librarian" on page 16.

**Insert Position Selector** Accesses any insert on the current track.

**Key Input Selector** Allows you to select audio on a particular input or bus and route it to trigger the plug-in. This menu only appears on plug-ins that feature side-chain processing. Key inputs are monophonic.

**Plug-In Selector** Allows you to select any real-time plug-in installed in the DAE Plug-Ins folder (that is created when you install Pro Tools).

**Compare** Toggles between the original saved plug-in setting and any changes you have made to it so you can compare them.

**Effect Bypass** Disables the currently displayed plug-in. This allows you to compare the track with and without the effect.

**Auto** Allows you to enable individual plug-in parameters for automation recording. See “Automating Plug-Ins” on page 14.

**Safe** When enabled, prevents existing plug-in automation from being overwritten.

**Convert Plug-In** Allows you to convert the insert from a TDM plug-in to an RTAS plug-in of the same type (or vice-versa). This feature can only be used on plug-ins that are available in both TDM and RTAS formats.

**Target Button** When multiple Plug-In windows are open, clicking this button selects that plug-in as the target for any computer keyboard or control surface commands.

**Phase Invert Button** Inverts the phase polarity of the input signal.

**Channel Selector** Accesses a specific channel within a multichannel track for plug-in parameter editing. This menu appears only on multi-mono plug-ins inserted on tracks with more than one channel. Shift-clicking this selector opens a separate Plug-In window for each channel of the multichannel track on which the plug-in is inserted.

**Master Link Button** When enabled, links the parameter controls on all channels of a multi-mono plug-in so that they can be adjusted in tandem.

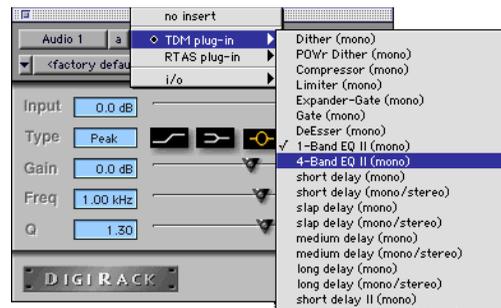
**Link Enable Buttons** Allow you to selectively link the parameter controls of specific channels of a multi-mono plug-in. Each square represents a speaker channel. The Master Link button must be disabled to use the Link Enable buttons. See “Linking and Unlinking Controls on Multi-Mono Plug-ins” on page 13.

**LFE Enable** Enables plug-in processing of the LFE (low frequency effects) channel on a multichannel track formatted for 5.1, 6.1, or 7.1. To disable LFE processing, deselect this button. For more information on the LFE channel, refer to the *Pro Tools Reference Guide*.

## Using the Plug-In Window

**To select a different plug-in on the same track:**

- Click the Insert Selector and choose a plug-in from the pop-up menu.



**Choosing a plug-in from the Plug-In window**

**To choose a different track:**

- Click the Track Selector and choose a track from the pop-up menu.

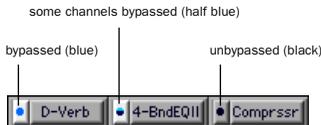


**Choosing a track from the Plug-In window**

### To bypass a plug-in:

- Click the Plug-In window's Bypass button.
  - or –
- Command-click (Macintosh) or Control-click (Windows) the plug-in's Insert button in the Mix window.

 *When a plug-in is bypassed, the Insert Selector in the Mix window changes its color to blue for easy visual reference. If some, but not all channels of an unlinked multi-mono plug-in are bypassed, the Insert Selector appears half blue and half black.*



*Bypass states indicated by color*

## Opening Multiple Plug-In Windows

To reduce screen clutter, Pro Tools normally displays a single Plug-In window from which you can edit the parameters of any plug-in in a session. If you want, however, you can open additional Plug-In windows for specific plug-ins.

Once you begin working with multiple Plug-In windows, you will need to click the Target button on the plug-in whose parameters you want to edit using keyboard commands.

### To open a Plug-In window for a specific plug-in:

- In the Mix window, Shift-click the Insert button of the desired plug-in.

### To open Plug-In windows for each channel of a multi-mono plug-in:

- Option-click (Macintosh) or Alt-click (Windows) the Channel Selector in the Plug-In window of the desired plug-in.

### To close all currently open Plug-In windows:

- Option-click (Macintosh) or Alt-click (Windows) the close box of any currently open Plug-In window.

---

## Editing Plug-In Parameters

You can edit plug-in parameters by dragging the parameter's slider or by typing a value into the parameter's text box.

### To edit a plug-in parameter:

- 1 Begin audio playback so that you can hear parameter changes in real time.
- 2 Adjust the parameters of the plug-in for the effect you want.

### Keyboard Shortcuts

- For finer adjustments, Command-drag (Macintosh) or Control-drag (Windows) the control.
- To return a control to its default value, Option-click (Macintosh) or Alt-click (Windows) the control.

## Keyboard Input for Plug-In Parameters

You can use your computer keyboard to edit plug-in parameters. If multiple plug-in windows are open, click the Target button on the plug-in whose parameters you want to edit.

### To edit parameters with a keyboard:

- ◆ Click the parameter text field that you want to edit. Type the desired value.
- ◆ In fields that support values in kilohertz, typing “k” after a number value will multiply the value by 1000. For example, type “8k” to enter the value of 8000.
- ◆ To increase a value, press the Up Arrow on your keyboard. To decrease a value, press the Down Arrow on your keyboard.
- ◆ Press Enter on the numeric keyboard after typing a value to input the value (without leaving the selected parameter field).
- ◆ Press Return (Macintosh) or Enter on the alpha keyboard (Windows) to enter the value and leave keyboard editing mode.

To move downward through the different parameter fields, press the Tab key. To move upwards, press Shift+Tab.

## Linking and Unlinking Controls on Multi-Mono Plug-ins

When a multi-mono plug-in is used on a multi-channel track, the controls are normally linked. Adjusting the Gain parameter on one channel, for example, will adjust it for all channels.

If necessary, you can unlink plug-in controls on specific channels of a track and edit them independently. You can also selectively link the controls of specific channels.



Channel Selector and Link controls

### To unlink controls on a multi-mono plug-in:

- Deselect the Master Link button.

### To access controls for a specific channel:

- Select the desired channel from the Channel Selector.

### To link the controls of specific channels:

- 1 Deselect the Master Link button if it is not already deselected.
- 2 Click the Link Enable buttons for the channels whose controls you want to link.

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## Using a Key Input for Side-Chain Processing

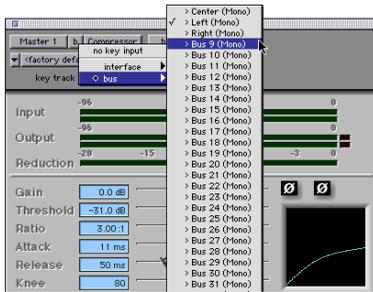
Some plug-ins, such as the Compressor, Limiter, Gate, and Expander/Gate, feature side-chain processing capabilities. Side-chain processing allows you to trigger a plug-in from a separate reference track or external audio source. The source used for triggering is referred to as the *Key Input*. Key inputs are monophonic.

A typical use for this feature is to control the dynamics of one audio signal using the dynamics of another signal (the Key Input). A kick drum track, for example, can be used to trigger gating of a bass track to tighten it up. A rhythm guitar track can be used to gate a keyboard pad, and so on.

**⚠** *RTAS plug-ins do not provide side-chain processing when used on TDM-based systems; consequently, use the TDM versions of plug-ins on TDM-based systems if you want to use side-chain processing.*

## Key Input Filters

Some plug-ins feature key high pass and low pass filters. These controls allow you to define a specific frequency range in the Key Input signal with which to trigger the plug-in effect. A common production technique is to use these controls to filter a drum track so that only specific high frequencies (a hi-hat, for example) or low frequencies (a tom or a kick, for example) trigger the effect.



### Choosing a Key Input

#### To use a Key Input for side-chain processing:

- 1 From the Key Input menu, choose the input/bus carrying the audio you want to use to trigger the plug-in.
- 2 Click External Key to activate side-chain processing.
- 3 To hear the audio source you have selected to control side-chain input, click Key Listen.
- 4 To filter the Key Input so that only specific frequencies trigger the plug-in, use the Key HPF and Key LPF controls (if available) to select the desired frequency range.
- 5 Begin playback. The plug-in uses the input/bus that you chose as a Key Input to trigger its effect.

6 Adjust the plug-in's Threshold parameter (if available) to fine tune Key Input triggering.

7 Adjust other parameters to achieve the desired effect.

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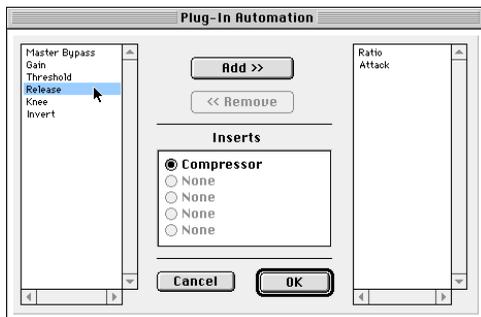
## Automating Plug-Ins

You can automate changes to plug-in parameters. Since Pro Tools creates a separate playlist for each plug-in parameter that you automate, you can later edit and modify each automated parameter individually. This allows you to build up complex automation in stages.

 To create automation for a stereo plug-in with separate controls for each channel, (such as Mod Delay), record the automation for one channel then copy and paste it to the other channel.

### To enable automation:

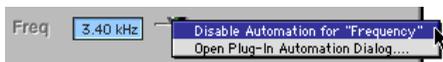
- 1 Open the Plug-In window for the plug-in you want to automate.
- 2 Click the Auto button, choose the parameters to automate, and click Add, then OK.



Plug-In automation dialog

– OR –

Command-Control-Option-click (Macintosh) or Control-Alt-Start-click (Windows) the parameter's slider or knob and choose Enable Automation for each parameter you want to automate.



Enabling plug-in automation

### To record automation:

- 1 In the Automation Enable window, make sure that plug-in automation is write-enabled.



Automation Enable window

- 2 On the track with the plug-in, choose an automation mode. For an initial pass, choose Auto Write.
- 3 Click Play to begin writing automation, and move the controls you want to automate.
- 4 When you have finished, click Stop.

After the initial automation pass, you can write additional automation to the track without completely erasing the previous pass by choosing Auto Touch mode or Auto Latch mode. These modes add new automation only when you actually move the control for that parameter.

## Record Safing Plug-In Automation

If you are satisfied with the automation recorded for a plug-in, you can use the Automation Safe button to ensure that you do not inadvertently overwrite it.

### To record safe automation for a plug-in:

- 1 Open the Plug-In window for the plug-in.
- 2 Select the Safe button.

### To disable automation record safing for a plug-in:

- Deselect the Safe button on the desired plug-in.

 For more information on creating and editing automation, see the Pro Tools Reference Guide.

## Using the Librarian

The Settings Librarian makes it easy to create your own library of plug-in settings. Using the Librarian and Settings pop-up menus, you can copy, paste, save, and import these settings from plug-in to plug-in, or from session to session.



Librarian menu

Once you create and save settings files to disk (and tell Pro Tools where to find them by assigning their *root* folder) they will appear in the Librarian menu.

## The Settings Menu

The Settings menu allows you to save, copy, paste, and manage plug-in settings files.



Settings menu

Settings menu commands:

**Save Settings** Saves the current settings. This command overwrites any previous version of the settings. The setting then appears in the Librarian menu.

**Save Settings As** Saves the current settings under a different name.

**Copy Settings** Copies the current settings. You can then apply these settings to the same type of plug-in on a different track by choosing the track in the Plug-In window and pasting the settings with the Paste Settings command.

**Paste Settings** Pastes settings copied with the Copy Settings command.

**Import Settings** Imports a settings file from a location other than the Root Settings folder or Session folder.

**Delete Current Settings File** Permanently deletes the current settings file from disk.

**Lock Settings File** Prevents the current settings from being overwritten by the Save command. If you attempt to save parameter changes, you will be required to save them using a different name or disk location.

**Set As User Default** Defines the current settings as the User Default for a specific plug-in.

## Settings Preferences

The sub-menus that appear here are for choosing preferences for saving and importing plug-in settings. They include:

**Set Plug-In Default To** Sets the default setting to either Factory Default (the standard default setting for that plug-in) or User Default (your custom setting).

**Save Plug-In Settings To** Selects the folder where plug-in settings are saved. If you choose Session Folder, the settings are saved in a folder named “Plug-In Settings” within the current Session folder. If you choose Root Settings Folder, the settings are saved in the folder you specified with the Set Root Settings Folder command.

**Set Root Settings Folder** Selects a source or *root* folder for saving and importing settings. The root settings folder must be named “Plug-In Settings.” Use this command only if you want to choose a location other than DAE’s Plug-In Settings folder.

 *To save plug-in settings to any location other than the Plug-In Settings folder in the DAE folder, you must first create a folder named “Plug-In Settings” in the new location and then save to that folder.*

## Choosing a Destination for Settings

Before you save settings, select their destination folder.

### To select a destination folder:

- From the Settings pop-up menu, choose Settings Preferences > Save Plug-In Settings To, and choose Session Folder or Root Settings Folder.

If you choose Root Settings folder, Pro Tools saves to the Plug-In Settings folder within the DAE Folder unless you have specified a different location for the Root Settings folder.

### To select a different Root Settings folder:

- 1 From the Settings pop-up menu, choose Settings Preferences > Set Root Settings Folder.
- 2 Select the folder you want to use as your Root folder and click Select “(your folder’s name).”

## Managing Settings

Use the Settings pop-up menu to manage settings.

 *Unlinked multi-mono plug-ins have specific rules for settings. See “Editing Settings on Unlinked Multi-Mono Plug-ins” on page 18.*

### To save a setting:

- 1 Choose Save Settings from Settings pop-up menu.
- 2 Type a name and click OK. The setting now appears in the Librarian menu.

 *Press Command+Shift+S on Macintosh or Ctl+Shift+S on Windows to save plug-in settings.*

### To load a previously saved setting:

- Choose the setting from the Librarian pop-up menu.

### To import a setting:

- 1 Choose Import Settings from the Settings pop-up menu.
- 2 Locate the settings file you want to import and click Open. Pro Tools loads the setting and copies it to the root destination folder.

### To copy a setting:

- Choose Copy Settings from the Settings pop-up menu.

 *Press Command+Shift+C on Macintosh or Ctl+Shift+C on Windows to copy plug-in settings.*

### To paste a setting:

- 1 Open the destination plug-in.
- 2 Choose Paste Settings from the Settings pop-up menu.

 Press **Command+Shift+V** on Macintosh or **Ctl+Shift+V** on Windows to paste plug-in settings.

### To create a custom User Default setting:

- 1 Create and save a setting.
- 2 Choose Set As User Default from the Settings pop-up menu.

### To make a plug-in default to your custom setting:

- From the Settings pop-up menu, choose Set Plug-In Default To > User Setting.

## Editing Settings on Unlinked Multi-Mono Plug-ins

When a multi-mono plug-in is unlinked, importing, copying, pasting, or bypassing settings affects only the currently selected channel.

### To apply an operation to all channels of an unlinked plug-in:

- Hold down the Option key (Macintosh) or Alt key (Windows) while performing the command.

## Creating Subfolders for Settings

To make it easier to find specific types of settings, you can subdivide settings files by creating subfolders for them.



*Librarian menu with subfolders for settings*

### To create a settings subfolder:

- 1 From the Settings pop-up menu, choose Save Settings.
- 2 Click the New Folder button and type a name for the subfolder.
- 3 Name the setting and click Save. The setting is saved within the subfolder.

## chapter 3

# Working with AudioSuite Plug-Ins

AudioSuite plug-ins differ from TDM and RTAS plug-ins in that they are not used non-destructively in real time, but are instead used to process and modify audio files on disk. Depending on how you configure a non-real-time AudioSuite plug-in, it will either alter the original source audio file or create an entirely new audio file.

AudioSuite plug-ins are accessed through the AudioSuite menu.

### AudioSuite

1-Band EQ II  
4-Band EQ II  
Compressor  
D-Verb  
DC Offset Removal  
DeEsser  
Delay  
Duplicate  
Expander-Gate  
Gain  
Gate  
Invert  
Limiter  
Normalize  
Pitch Shift  
Reverse  
Signal Generator  
Time Compression Expansion

*AudioSuite menu*

## AudioSuite Plug-Ins

**1-Band EQ II** Processes audio with high pass, low shelf, high shelf, low pass or peak EQ filters, in a 1-band module.

**4-Band EQ II** Processes audio with high pass, low shelf, high shelf, low pass or peak EQ filters, in a 4-band module.

**Compressor** Processes audio with compression.

**Limiter** Processes audio with limiting.

**Gate** Processes audio with gating.

**Expander Gate** Processes audio with expander-gating.

**De-esser** Processes audio with de-essing to remove sibilance.

**Invert** Inverts phase (polarity).

**Duplicate** Creates a new, continuous source audio file (and region) from the selection.

**Delay** Adds up to 10.9 seconds of delay.

**Normalize** Uniformly adjusts all levels in a region or regions to a user-definable level, using the loudest peak in the audio file as the reference.

**Gain** Allows variable gain (volume) change, in decibels or percentage before clip.

**Reverse** Rewrites selected audio in reverse.

**DC Offset Removal** Recognizes and removes DC offset from audio files.

**Signal Generator** Generates audio tones for equipment calibration purposes.

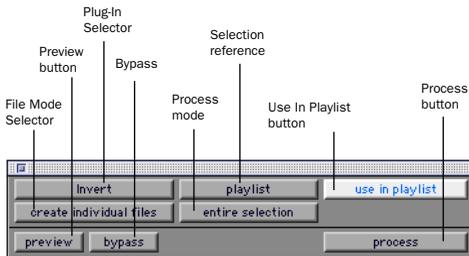
**Time Compression/Expansion** Changes an audio file's duration with or without changing its pitch.

**Pitch Shift** Changes an audio file's pitch with or without changing its duration.

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## The AudioSuite Window

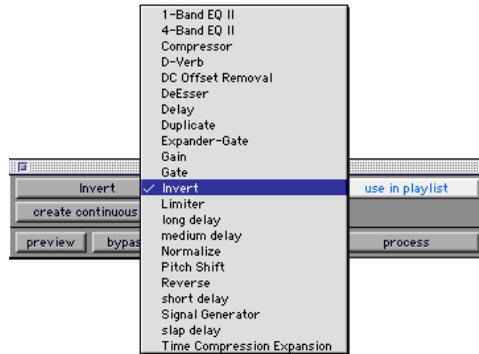
When you choose a plug-in from the AudioSuite menu, the AudioSuite window appears. This floating window allows you to access and edit the parameters for any non-real-time AudioSuite plug-in.



**AudioSuite window**

## Plug-In Selector

This menu allows you to select any AudioSuite plug-in installed in your Plug-Ins folder.



**Plug-In Selector menu**

## Selection Reference

This menu aims the selected process at either regions selected in an audio track or playlist, or at regions selected in the Audio Regions List.

When you select a region on-screen (in either a track/playlist or the Region List) Pro Tools normally selects both occurrences of the region. Since you may not want to process both, this menu provides a convenient means of limiting the AudioSuite process to regions selected in one or the other.



**Selection Reference pop-up menu**

**Playlist** Applies AudioSuite processing only to regions currently selected in tracks/playlists in the Edit window. Processing will not be applied to regions in the Audio Regions List.

**Region List** Applies AudioSuite processing only to regions currently selected in the Audio Regions List. Processing will not be applied to regions located in tracks and playlists in the Edit window.

▲ *If the Use In Playlist option is enabled in addition to Region List being selected in the Selection Reference pop-up menu, the processing will be applied to the selected region in both the playlist and the Regions List. See “Use In Playlist Button” on page 21.*

## Use In Playlist Button

This button determines whether the AudioSuite plug-in will replace *all instances* of the selected regions everywhere in the session, or *only* the occurrences of the regions that are currently selected.



*Use in Playlist button*

**Use In Playlist Off** When Use in Playlist is disabled, only the currently selected region will be replaced.

### Use In Playlist On, Reference = Region

**List** When Use in Playlist is enabled and the Selection Reference pop-up menu is set to Regions List, all copies of the selected region will be replaced everywhere in the session.

**Use In Playlist On, Reference = Playlist** When Use in Playlist is enabled and the Selection Reference menu is set to Playlist, only regions selected in tracks in the Edit window will be re-

placed. If the session includes other copies of the region used in other playlists, those copies of the original, unprocessed region will not be replaced.

▲ *If the Selection Reference pop-up menu is set to Region List, the Use in Playlist button will automatically be disabled to ensure that you do not accidentally replace every occurrence of the region in a session.*

## File Mode Selector

This menu allows you to select whether or not the AudioSuite plug-in will process the selected audio destructively or non-destructively, and how the original files will be modified.



*File Mode pop-up menu*

There are three options:

**Overwrite** Processes the selected regions destructively, overwriting the original audio. Not all AudioSuite plug-ins can be used destructively.

**Create Individual Files** Processes the selected regions non-destructively, creating a new audio file for each region. The new audio files are added to the session, leaving the original source audio files in the Regions List unchanged. (Whether the processed audio is added to the current playlist or only to the Regions List, is determined by the Selection Reference setting, as explained earlier.)

**Create Continuous File** Processes the selected regions non-destructively and creates a new audio file consisting of the selected regions consolidated into a single, unbroken region. This mode is particularly useful if you are assembling a composite track from multiple takes. This mode is not available when the Selection Reference is set to Region List.

 *The Create Continuous File option is not available with some time domain plug-ins. To achieve a similar result, use the Duplicate plug-in to consolidate regions processed with these plug-ins.*

## Process Mode Selector

If you have made a selection that includes multiple regions, this pop-up menu allows you to specify whether AudioSuite processing is performed on a region-by-region, or entire-selection basis.



**Region by Region** Analyzes each region in a selection individually, rather than over the entire multi-region selection as a whole.

**Entire Selection** Uses the entire selection for analysis. All regions will be analyzed and processed relative to the entire selection.

## Chan/Track Process Mode Selector

If you have made a selection that includes regions from multiple tracks, the Normalize AudioSuite plug-in (as well as some third-party AudioSuite plug-ins) allows you to choose whether you want to perform processing on a channel-by-channel/track-by-track, or an all-channel/all-tracks basis using the Chan/Track Process Mode Selector.



*Chan/Track Process Mode Selector pop-up menu*

**Peak On Each Chan/Track** Analyzes and processes each selected track individually. If you apply the Normalize plug-in to multiple tracks or a multichannel track in Peak On Each Chan/Track mode, each channel or track will be normalized independently, without regard to the other selected tracks.

**Peak On All Chans/Tracks** Uses all currently selected channels and tracks for analysis. If you apply the Normalize plug-in to a multichannel track or multiple tracks in Peak On All Chans/Tracks mode, the tracks will be analyzed as a single entity and regions will be normalized relative to the averaged peak level within all selected channels and tracks.

## Preview

The Preview button allows you to audition the effect of a plug-in before you process the audio. By adjusting the plug-in parameters while you listen to this audio preview, you can fine-tune the effect. Not all AudioSuite plug-ins support this feature.

The Preview function routes audio to the specific outputs you have chosen with the Audition pop-up in the Outputs page of the I/O Setup dialog. Make sure you have configured this parameter correctly for your system or you may not be able to hear previewed audio.

 *For more information on using the I/O Setup dialog to configure your system's audio outputs, refer to the Pro Tools Reference Guide.*

Before you use Preview, be aware that:

- ◆ The performance of the Preview function depends on the speed of your CPU. Faster computers preview AudioSuite effects better than slower computers.
- ◆ Regardless of how many tracks/regions are currently selected, the Preview button will audition only the first selected stereo track or the first selected pair of mono tracks.
- ◆ If you are using Region-by-Region processing mode, the Preview function will preview only the first region within a multi-region selection. To hear all selected regions, temporarily select Create Continuous File from the File Mode menu before previewing.
- ◆ The Preview function is affected by the AudioSuite Buffer Size parameter (on the Processing page of the Pro Tools Preferences dialog). See “The AudioSuite Processing Preferences Dialog” on page 24.

## Bypass

When Bypass is enabled, the selected audio is previewed without AudioSuite processing. The Bypass button applies only to previewing. It does not affect actual AudioSuite processing.

## Process

Clicking this button begins AudioSuite processing of the selected audio. Processing can occur during playback (though it may take slightly longer). Processed files are auto-named with the region or audio file’s name plus an acronym for the chosen AudioSuite process.

New files are written to the hard disk specified for that track in the Disk Allocation dialog, or to the same drive as the original file if the region is not currently on a track. See “Auto-File Naming of AudioSuite-Processed Audio” on page 23.

## Multichannel Processing

Most DigiRack AudioSuite plug-ins allow up to 48 channels of audio to be processed simultaneously.

**A** *When processing multiple regions of different formats (mono and multi-channel surround, for example), all channels will be processed according to the channel format of the AudioSuite plug-in. Mono AudioSuite plug-ins can process stereo regions and stereo AudioSuite plug-ins can process mono regions.*

## Undoing AudioSuite Processing

If you have processed an audio selection non-destructively, the Undo and Redo commands allow you to undo the selected AudioSuite process. You can undo/redo an AudioSuite process during audio playback.

**A** *Undo is not available when a plug-in is configured for destructive editing since the process has already overwritten the source audio file.*

## Auto-File Naming of AudioSuite-Processed Audio

When new audio files are created as a result of AudioSuite processing, Pro Tools will auto-name these files according to the type of plug-in used. The name of the region determines the prefix, while the type of AudioSuite plug-in determines the suffix. For example, if you process a audio file named “Audio 1” with the AudioSuite Compressor plug-in, the resulting audio file will be automatically named “Audio 1-DCLB\_01”.

### Auto file-naming follows these rules:

- ◆ New regions are named beginning with the region name, followed by an abbreviation of the current AudioSuite process, followed by standard Pro Tools file and region numbering.
- ◆ If a plug-in's File Mode pop-up is set to Overwrite, the original region's name will not be changed.
- ◆ If a plug-in's File Mode pop-up is set to Create Individual Files, the resulting regions will have an abbreviated version of the plug-in name appended to them.

### Other AudioSuite Parameters

In addition to the standard AudioSuite parameters, there are a number of special-purpose controls found on certain plug-ins:

**Plug-In Librarian/Settings Menus** The Settings and Librarian pop-up menus that appear in some AudioSuite plug-ins provide a means of saving, loading, copying, pasting and organizing custom plug-in settings files. See “Using the Librarian” on page 16.

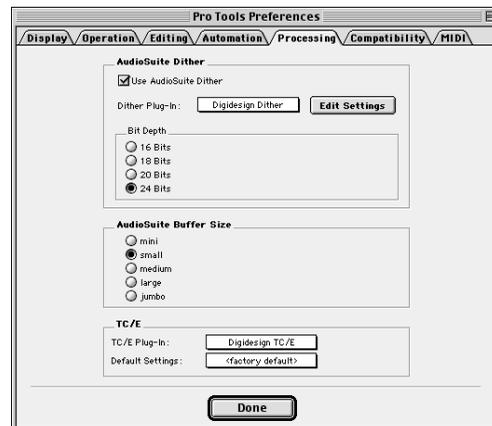
**Analyze Button** Analyzes a selection without actually processing it. On the DigiRack Gain plug-in, the Analyze feature allows you to determine the maximum peak level on a track at a specific gain value before you process the audio.

**Side-chain Input Selector** Selects a track/bus to be used to trigger processing. In order to use this feature, the key input source audio must occur at the same time as the target audio. Side-chain input is monophonic. See “Using a Key Input for Side-Chain Processing” on page 13.

**⚠** *Side-chain inputs for plug-ins have no effect on AudioSuite processes when the Selection Reference is set to Region List.*

## The AudioSuite Processing Preferences Dialog

Before you begin using AudioSuite plug-ins, use the Preferences dialog (Setup > Preferences > Processing) to configure default AudioSuite parameters according to your needs. These parameters include the default dither setting, a dither on/off checkbox, and the AudioSuite buffer size parameter.



Processing Preferences page

**AudioSuite Dither** When selected, dither is applied during certain AudioSuite processes (such as Normalize and Gain), using the dither algorithm selected in the Dither Plug-In pop-up. Dither is most useful when working with low-level files that contain a fade in or fade out.

**Dither Plug-in** AudioSuite plug-ins always create files that inherit the session's bit depth. The Dither Plug-In pop-up menu allows you to choose the dither algorithm used for dithering higher-bit source files during AudioSuite processing.

**Edit Settings** Accesses options for the presently selected Default Dither plug-in. In the case of the Digidesign Dither plug-in, this allows you to turn noise shaping on or off.

 See “Noise Shaping” on page 31 for more information.

**Bit Depth** Selects the default bit depth used by the dither function during AudioSuite processing. Bit depth can be set to 16-, 18-, 20-, or 24-bit.

 For an explanation of dither, See “Dither” on page 30.

**AudioSuite Buffer Size** Selects the size of Pro Tools memory buffer for processing and previewing AudioSuite plug-ins. Choices are Mini, Small, Medium, Large, or Jumbo. In general, choosing a smaller buffer speeds up AudioSuite previewing functions. Choosing a larger buffer speeds up AudioSuite processing of audio files.

#### To configure the AudioSuite Buffer Size:

- 1 Choose Setups > Preferences.
- 2 Click Processing.
- 3 Select an AudioSuite Buffer Size. Your choice will depend on whether you want to give priority to the length of the audio preview, or to the speed at which the plug-in can process the selected audio.
- 4 Click Done.

Though the default setting will work well for most situations, you may want to set the buffer according to your current task. Before you audition an AudioSuite plug-in, set this buffer to Mini or Small. Then, when you are ready to process a file, reset it to Large or Jumbo.

**TC/E** Selects the Time Compression & Expansion plug-in and default settings used when editing with the Time Trimmer.

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## Using AudioSuite Plug-Ins

AudioSuite plug-ins can be applied to whole regions, partial regions, or selections that are made up of whole and partial regions across one or more tracks.

When audio selected in the Edit window includes partial regions, the regions will automatically be split into two or more regions when they are processed. Processing will occur only on the selection, leaving other regions unchanged.

 *Processing a locked region will cause the region to become unlocked. For more information about locked regions, refer to the Pro Tools Reference Guide.*

Only audio files on locally connected hard drives can be processed with AudioSuite plug-ins. You cannot process audio files on remote hard drives over a network.

## Selecting Tracks for AudioSuite Processing

Because AudioSuite processes are performed on the specific regions that you select, it is important that you select only those regions, or parts of regions, you actually want to process.

Selecting a region in the Audio Regions List will automatically select it in a track (if it currently resides on one). This is the default behavior for Pro Tools. However, you can change this using the Region Selection Follows Track Selection, and Track Selection Follows Regions List Selection options in the Editing page of the Preferences dialog. See the *Pro Tools Reference Guide* for an explanation of these Preferences.

 *When processing a single audio channel with an AudioSuite plug-in, make sure that the plug-in is set to Mono mode (if available).*

## Selecting Tracks for Delay or Reverb Processing

Because some AudioSuite effects such as delay and reverb add additional material to the end of the selected audio (a reverb tail or a delay tap), it is very important that you make a selection that is *longer* than the original source material so that the plug-in can write it into the audio file.

If you select only the original material, without leaving additional space at the end, a reverb decay or delay that occurs after the end of the region will be cut off.

To accommodate for this, place the region in a track, and select the desired audio *plus* an amount of blank space at the end of the region equal to the amount of delay or reverb decay that you have added in the plug-in. The plug-in will then have space at the end of the region in which to write the final delay or decay.

If you select more blank space than you need, you can remove it using the Trim tool after applying AudioSuite processing.

### **To process audio with an AudioSuite plug-in:**

**1** Select the desired regions in the target track(s) and/or in the Audio Regions List. Shift-click to select multiple regions. Only regions that are selected will be processed.

**2** Choose the desired AudioSuite plug-in from the AudioSuite menu.

**3** Click the Preview button to begin playback of the selected material.

**4** Adjust the plug-in parameters to achieve the effect that you want. These settings will determine how the file is processed and what effect the processing will have on the original regions. Follow these guidelines:

- ◆ To process the selected region only in the track in which it appears, select Playlist from the Selection Reference pop-up. Alternatively, if you want to process the selected region in the Audio Regions list only, choose Region List from this pop-up.

- ◆ If you want to process and update every occurrence of the selected region throughout your session, enable the Use In Playlist button (and also select Region List from the Selection Reference pop-up). Alternatively, if you do not want to update every occurrence of the selected region, deselect the Use In Playlist button.

- ◆ To configure the plug-in for destructive processing, select Overwrite Files from the File Mode pop-up menu. This will overwrite and permanently modify the original source audio files.

- ◆ Alternatively, to configure the plug-in for non-destructive processing, select Create Individual Files from the File Mode pop-up menu. This will create new audio files that have been processed with the AudioSuite Plug-in and leave the original source audio files untouched.

- ◆ If you have selected multiple regions for processing and want to create a new file that connects and consolidates all of these regions together, select Create Continuous File from the File Mode pop-up menu.

**5** Finally, when you are ready, click the Process button. The selected audio is processed according to the settings you have specified. Pro Tools appends an acronym to the region's name indicating the AudioSuite process that has been applied. The new audio files then appear in your session.

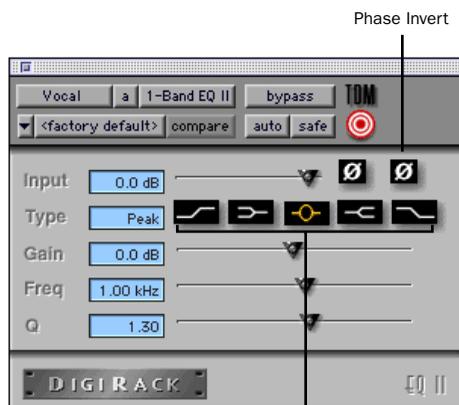


## chapter 4

# DigiRack Real-Time TDM and RTAS Plug-Ins

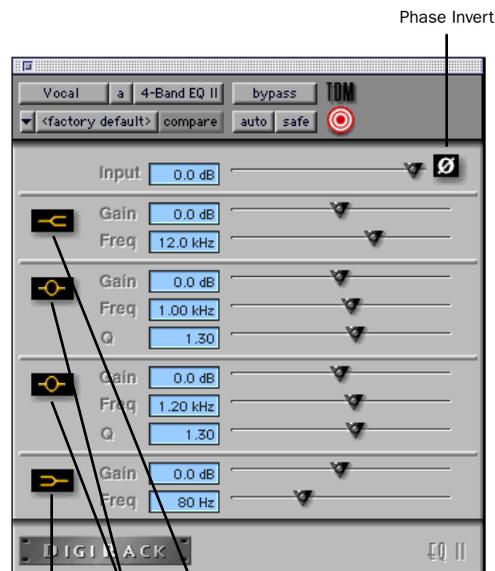
## EQ II

The DigiRack EQs included with Pro Tools feature a 1-Band and a 4-Band EQ. The 4-Band EQ provides a wider range of control over the frequency spectrum of an audio signal and thus requires more DSP.



EQ Type buttons (from right to left): High-Pass, Low-Shelf, Peak, High-Shelf, Low-Pass

1-Band EQ plug-in



Low-Shelf Peak High-Shelf

4-Band EQ plug-in

## Adjusting EQ

A useful way to audition an EQ is to increase or decrease its gain several dB then sweep the frequency up or down until you hear its effect. You can then make more precise adjustments to the settings.

## EQ II Parameters

**Input** Controls the input gain of the EQ, allowing you to prevent clipping. Since Pro Tools inserts are pre-fader, plug-ins used as inserts can cause clipping if their levels are boosted excessively.

**Phase Invert** Inverts the phase (polarity) of the input signal, allowing you to change frequency response characteristics between multi-miked sources (a common technique for miking a guitar cabinet), or to correct for miswired microphone cables.



*Phase Invert*

**Type** Allows you to select an EQ type (high-pass, low-shelf, peak, high-shelf or low-pass).

**Freq** Designates the center of the frequency region to be cut or boosted.

**Gain** Controls the amount that the selected frequencies are cut or boosted.

**Q** Sets the bandwidth of the Peak filter. Higher values represent narrower bandwidths. Lower numbers represent wider bandwidths. This parameter is only available on the Peak EQ.

**Bypass** Bypasses the EQ. The 4-Band EQ has individual Bypass buttons for each band (the black buttons with appropriate EQ curve icons), as well as the standard all-band Bypass button at the top of the Inserts/Sends Editor window.



*Bypass EQ band button on the 4-band EQ*

**High-Pass Filter** Attenuates all frequencies below the selected cutoff frequency setting at a rate of 12 dB per octave while allowing all others above to pass through. For this reason, no gain control is available for this filter. High-Pass filters can be useful for removing low frequency rumble or thinning out the lower end of a sound for special effects such as simulating a telephone effect.

**Low-Shelf EQ** Produces a lift or a cut at and below the specified frequency.

**Peak EQ** Boosts or cuts only those frequencies centered around the selected center frequency. The Q button sets the bandwidth of the Peak filter. This determines the width of the filter's overall slope—from a broad bell shape to a narrow notch. Broad curves tend to be most useful for musical applications. Narrow curves are useful for special purpose processing such as hum removal. Higher values represent narrower bandwidths. Lower numbers represent wider bandwidths.

**High-Shelf EQ** Produces a lift or a cut at and above the specified frequency.

**Low-Pass filter** Attenuates all frequencies above the selected cutoff frequency setting at a rate of 12 dB per octave while allowing all others below to pass through. For this reason, no gain control is available for this filter.

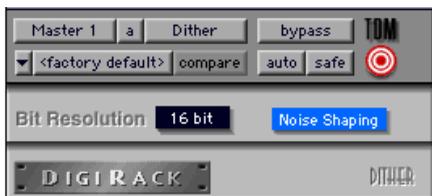
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## Dither

The Dither plug-in is designed for reduced quantization noise when mixing or fading low-level audio signals during word size reduction to 16-, 18-, or 20-bits.



*For more advanced dithering, use the DigiRack POW-r Dither plug-in. See "POW-r Dither" on page 33.*



**Dither plug-in**

Dither is a form of randomized noise used to minimize quantization artifacts in digital audio systems. Quantization artifacts are most audible when the audio signal is near the low end of its dynamic range, such as during a quiet passage or fade-out.

The introduction of dithering can reduce these quantization artifacts with very low-level noise, minimizing artifacts as audio reaches low level. With dithering there is a trade-off between signal-to-noise performance and less-apparent artifacts. Proper use of dithering allows you to squeeze better subjective performance out of 16-bits (or whatever your destination bit-depth is).

The most common application of dithering is to use it on a master output mix as the last processor in the signal path when preparing a 24-bit session for CD mastering. In this case, you would insert the Dither plug-in on a Master Fader to reduce session bit-depth from 24-bits to 16-bits. The inserts on a Master Fader track are always post-fader.

**A** *Insert the Dither plug-in (or any dithering plug-in, such as Dither, POW-r Dither, or Maxim) on a Master Fader track when using Bounce to Disk to create a 16-bit file (or any bit depth lower than 24-bit) from a 24-bit session; otherwise the resulting 16-bit file will be “truncated” at the destination bit depth. For more information on Bounce to Disk, see the Pro Tools Reference Guide.*

The Dither plug-in has user-selectable bit resolution and a noise shaping on/off option.

 *If you are outputting 24-bit audio to a 96 I/O or 192 I/O, there will be no need to use Dither. This allows maximum output fidelity from the 96 I/Os or 192 I/Os high-performance 24-bit digital-to-analog converters.*

## Noise Shaping

The Dither plug-in features a technique known as noise shaping to further improve audio performance and reduce perceived noise in low-level signals. Noise shaping utilizes filtering to reduce noise that falls in the middle of the audio spectrum (specifically, around 4 kHz). This is the range where human hearing is most sensitive.

In reality, since the noise plays an important role in reducing quantization artifacts, the noise is not reduced, rather it is shifted into a frequency range where it is harder to hear. Essentially, noise shaping lessens our perception of the noise inherent in dithering schemes by shifting audible noise components into a less audible range.

## Dither and Output Bit Resolution

Dither has two user-selectable parameters that allow you to optimize its operation:

### Bit Resolution

This pop-up menu allows you to choose one of three possible resolutions for the Dither processing. As a general rule, you should set this parameter to the maximum bit resolution of your destination.

**16-bit** Recommended for output to digital devices such as DAT recorders and CD recorders, since they have a maximum resolution of 16-bits.

**18-bit** Recommended for output to analog devices if you are using an 18-bit audio interface, such as the 888 I/O or 882 I/O Audio Interface; this is the maximum resolution available from the 18-bit digital-to-analog convertors of these devices.

**20-bit** Recommended for output to digital devices that support a full 20-bit recording data path, such the Sony PCM-9000 optical mastering recorder, or the Alesis ADAT XT 20. Use this setting for output to analog devices if you are using a 20-bit audio interface, such as the 882|20 I/O Audio Interface. The 20-bit setting can also be used for output to digital effects devices that support 20-bit input and output, since it provides for a lower noise floor and greater dynamic range when mixing 20-bit signals directly into the TDM environment.

If you want, you can choose not to use the Dither plug-in and instead utilize the full 24-bit resolution of Pro Tools' digital output, depending on your destination device. As noted previously, if you have a 24-bit-capable Pro Tools sys-

tem with an 888|24 I/O, 96 I/O, or 192 I/O. Audio Interface and are outputting audio to an analog destination, we recommend that you do not use dither.

 *The DigiRack Dither plug-in only provides eight channels of uncorrelated dithering noise and is not supported for more than eight channels of dither. If the DigiRack Dither is used on more than eight tracks, the dither's noise seeds begin to repeat themselves. For example, if two Quad DigiRack Dithers are instanced in a session, both Quad instances of Dither will have all of its dither noise uncorrelated. However, any additional instances of the Dither plug-in will begin to repeat noise seeds.*

## Noise Shape

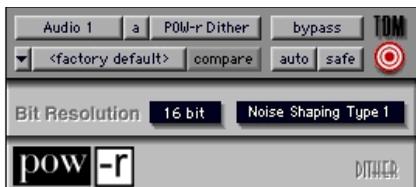
This button engages or disengages Noise Shaping. Noise shaping is on when the button is highlighted in blue. See “Noise Shaping” on page 31 for more information.

 *See the Pro Tools Reference Guide for details on using the Dither plug-in during mix-down.*

---

## POW-r Dither

The POW-r Dither plug-in is an advanced type of dither that provides optimized word length reduction. It is designed for final-stage critical mixdown and mastering tasks where the highest possible fidelity is desired when reducing bit depth. For more information on dithering, see “Dither” on page 30.



POW-r Dither plug-in

**⚠** *The POW-r Dither plug-in does not run on third party software applications that use DAE.*

**⚠** *The multichannel TDM version of the POW-r Dither plug-in is not supported at 192 kHz, use the multi-mono TDM or RTAS version instead.*

## POW-r Dither Parameters

### Bit Resolution

This pop-up menu allows you to choose either 16- or 20-bit resolutions for POW-r Dither processing. Set this parameter to the maximum bit resolution of your destination.

**16-bit** Recommended for output to devices with a maximum resolution of 16-bits, such as DAT and CD recorders.

**20-bit** Recommended for output to devices that support a full 20-bit recording data path.

## Noise Shaping

Noise shaping improves audio performance and lessens our perception of the noise inherent in dithering schemes by shifting audible noise components into a less audible range.

**⚠** *The POW-r Dither plug-in is not appropriate for truncation stages that are likely to be further processed. It is recommended that POW-r Dither be used only as the last insert in the signal chain (especially when using Type 1 Noise Shaping).*

The POW-r Dither plug-in provides three types of noise shaping, each with its own characteristics.

It is recommended that you try each noise shaping type and choose the one that adds the least amount of coloration to the audio being processed.

**Type 1** Has the flattest frequency spectrum in the audible range of frequencies, modulating and accumulating the dither noise just below the Nyquist frequency. Recommended for less stereophonically complex material such as solo instrument recordings.

**Type 2** Has a psychoacoustically optimized low order noise shaping curve. Recommended for material of greater stereophonic complexity.

**Type 3** Has a psychoacoustically optimized high order noise shaping curve. Recommended for full-spectrum, wide-stereo field material.

See the *Pro Tools Reference Guide* for details on using the *Dither* plug-in during mix-down.

Instances of *POW-r Dither* on a *DSP Farm* (using a *MIX-series* system) beyond *LCR* multichannel tracks require more than one *DSP* chip. Instances of *POW-r Dither* on a *MIX* card (using a *MIX-series* system) beyond 7.0 multichannel tracks require more than one *DSP* chip.

## Dynamics II

There are five types of DigiRack Dynamics processors: Compressor, Limiter, Gate, Expander/Gate and DeEsser.

### Compressor II



Compressor II plug-in

The Compressor reduces the dynamic range of signals that exceed a selected threshold by a specific amount. The increase of input signal needed to cause a 1 dB increase in the output signal of the compressor is called the compression ratio. For example, with a ratio of 4:1, an 8 dB increase of input produces a 2 dB increase in the output.

Audio material often varies in loudness, and can be above the threshold at one moment and below it the next. The Attack slider sets the compressor's response time, or attack. The Release slider sets the amount of time that it takes for the compressor's gain to return to its original level.

### Using Compression Effectively

To use compression most effectively, the attack time should be set so that signals exceed the threshold level long enough to cause an increase in the average level. This helps ensure that gain reduction doesn't decrease the overall volume.

Release times should be set long enough that if signal levels repeatedly rise above the threshold, they cause gain reduction only once. If the release time is too long, a loud section of the audio material could cause gain reduction that persists through a soft section. Of course, compression has many creative uses that break these rules.

The Compressor has built-in metering that allows you to monitor the amount of gain reduction taking place. The gain reduction meter usually remains at 0 level when the input signal is below the threshold and falls to the left to show the amount of gain reduction in decibels when the input signal exceeds the threshold.

**⚠** *Compressor settings created in version 5.x and later of Pro Tools are not compatible with earlier versions. Saving a session in a pre- 5.x format will cause Compressor settings to be lost.*

## Compressor Parameters

**Phase Invert** Inverts the phase (polarity) of the input signal, allowing you to change frequency response characteristics between multi-miked sources or to correct for miswired microphone cables.



*Phase Invert*

**Gain** Provides overall output gain adjustment. It allows you to compensate for heavily compressed signals.

**Input Meter** Indicates the level of the unprocessed input signal to the Compressor.

**Output Meter** Indicates the output level of the Compressor, including any gain compensation added via the Gain parameter.

**Reduction** Indicates the amount of gain reduction in dB.

**Threshold** Sets the threshold level. Signals that exceed this level will be compressed. Signals that are below it will be unaffected. A level setting of 0 dB is equivalent to no compression.

Unlike scales on analog compressors, metering scales on a digital device reflect a 0 dB value that indicates full scale (fs)—the full-code signal level. There is no headroom above 0 dB.

**Ratio** Sets the compression ratio. The range is based on decibels above the threshold. For example, if this is set to 2:1, it will compress changes in signals above the threshold by one half.

**Attack** Sets the Compressor's attack time. The smaller the value, the faster the attack. The faster the attack, the more rapidly the Compressor applies attenuation to the signal. If you use fast attack times and heavy limiting, you should generally use a proportionally longer release time, particularly with material that contains many peaks in close proximity.

**Release** Controls how long it takes for the Compressor to be fully deactivated after the input signal drops below the threshold level. In general, if you use heavy compression, you should use proportionally longer release times in order to avoid pumping that may occur when the Compressor is forced to jump back and forth between compressed and uncompressed signal levels. Lengthening the release time will help smooth these changes in level by introducing a lag in the ramp-up/down time of attenuation. Use shorter release times on material with fewer peaks that do not occur in close proximity to each other.

**Knee** Sets the rate at which the compressor reaches full compression once the threshold has been exceeded. This parameter ranges from 0 (hardest response) to 200 (softest response).

**Graph** Displays the response curve set by the Compressor's Threshold, Ratio, and Knee settings. As you adjust these parameters, refer to the graph to see how the shape of this curve changes. This will allow you to see the effect of your settings.

**External Key** Enables and disables side-chain processing. Side-chain processing allows the Compressor to listen to the varying amplitude of a separate reference track and use it to trigger compression. See "Using a Key Input for Side-Chain Processing" on page 13.

**Key Listen** When enabled, this allows you to listen to the reference track controlling the side-chain input. This is often useful for fine tuning the Compressor's settings to the Key Input. Key Listen auditions the right audio channel on RTAS and AudioSuite versions of the Compressor.

**!** *Key Listen is not saved with the other plug-in settings.*

## Limiter II



Limiter II plug-in

The Limiter is used to prevent signal peaks from ever exceeding a chosen level so that they don't overload amplifiers or recording devices. Most limiters have ratios of 10:1 or 20:1, although some provide ratios of up to 100:1. Large ratios effectively limit the dynamic range of the signal to a specific value by setting an absolute ceiling for the dynamic range.

The Limiter's ratio is internally set to 100:1, and the Attack time defaults to 1 millisecond. The Limiter is similar to heavy compression. It can be useful for reducing pops and clicks, or for hard-limiting dynamic range for broadcast or band-limited mediums such as cassette.

Limiting is used to prevent short-term peaks from reaching their full amplitude. Used judiciously, limiting allows you to achieve higher average levels, while avoiding overload (clipping or distortion), by limiting only some short-term transients in the source audio. To prevent the ear from hearing the gain changes, extremely short attack and release times are used.

Limiting is used to remove only occasional peaks because gain reduction on successive peaks would be noticeable. If audio material contains many peaks, the threshold should be raised and the gain manually reduced so that only occasional, extreme peaks are limited.

### Limiter Parameters

**Phase Invert** Inverts the phase (polarity) of the input signal, allowing you to change frequency response characteristics between multi-miked sources or to correct for miswired microphone cables.

**Gain** Provides overall output gain adjustment.

**Input Meter** Indicates the level of the unprocessed input signal to the Limiter.

**Output Meter** Indicates the output level of the Limiter, including any gain compensation added via the Gain parameter.

**Reduction** Indicates the amount by which the signal is being attenuated.

**Threshold** Sets the threshold level. Signals that exceed this level will be limited. Signals that are below it will be unaffected.

**Attack** Sets the Limiter's attack time. The smaller the value, the faster the attack. The faster the attack, the more rapidly the Limiter applies attenuation to the signal. If you use fast attack times and heavy limiting, you should generally use a proportionally longer release time, particularly with material that contains many peaks in close proximity.

**Release** Controls how long it takes for the Limiter to be fully deactivated after the input signal drops below the threshold level. In general, if you use heavy limiting, you should use proportionally longer release times in order to avoid pumping that may occur when the Limiter is forced to jump back and forth between limited and unlimited signal levels. Lengthening the release time will help smooth these changes in level by introducing a lag in the ramp-up/down time of attenuation. Use shorter release times on material with fewer peaks that do not occur in close proximity to each other.

**Graph** Displays the response curve set by the Limiter's Threshold setting. As you adjust these parameters, refer to the graph to see how the shape of this curve changes. This will allow you to see the effect of your settings.

**External Key** Enables and disables side-chain processing. Side-chain processing allows the Limiter to listen to the varying amplitude of a separate reference track and use it to trigger limiting. See "Using a Key Input for Side-Chain Processing" on page 13.

**Key Listen** When enabled, this allows you to listen to the reference track controlling the side-chain input. This is often useful for fine tuning the Limiter's settings to the Key Input. Key Listen auditions the right audio channel on RTAS and AudioSuite versions of the Limiter.

**⚠** *Key Listen is not saved with the other plugin settings.*

## Gate II



### Gate II plug-in

The Gate (also known as a noise gate) allows a signal above the selected threshold to be passed through to the output at unity gain, without dynamic processing. Once the input signal falls below the threshold level, the gating shuts down the signal by fully or partially attenuating the output. In this way, the desired signal is allowed to pass, but unwanted signal is not. The Gate is useful for noise removal on individual tracks, and can be used for special effects such as cutting off a reverb tail.

## Gate Parameters

**Phase Invert** Inverts the phase (polarity) of the input signal, allowing you to change frequency response characteristics between multi-miked sources or to correct for miswired microphone cables.

**Gating** Indicates the amount of reduction in dB.

**Threshold** Sets the threshold level. Signals that exceed this level will pass through. Signals that are below it will be gated, depending on the settings of the Attack, Hold, Decay, and Range parameters (explained below).

**Attack** Sets the attack time of the Gate.

**Hold** Specifies a duration (in seconds or milliseconds) that the Gate will stay open after the initial attack cycle. This can be used as a one-shot function to keep the Gate open for longer periods of time with a single crossing of the threshold. It can also be used to prevent gate chatter that may occur if varying input levels near the threshold cause the Gate to open and close very rapidly.

**Decay** Controls how long it takes for the Gate to close after the signal falls below the threshold level.

**Range** Sets the depth of the Gate when closed. It has a maximum depth of -80 dB. Setting the gate to higher range levels allows more of the gated audio that falls below the threshold to peek through the gate at all times. This is useful for things such as drum leakage, where you may want to suppress the overall drum kit sound by a specific amount, while emphasizing the gated instrument such as a snare.

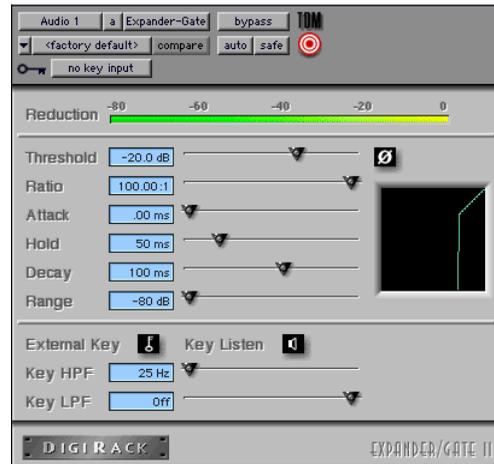
**Graph** Displays the response curve set by the Gate's Threshold and Range settings. As you adjust these parameters, refer to the graph to see how the shape of this curve changes. This will allow you to see the effect of your settings.

**External Key** Enables and disables side-chain processing. Side-chain processing allows the Gate to listen to the varying amplitude of a separate reference track and use it to trigger limiting. See “Using a Key Input for Side-Chain Processing” on page 13.

**Key Listen** When enabled, this allows you to listen to the reference track controlling the side-chain input. This is often useful for fine tuning the Gate's settings to the Key Input.

**⚠** *Key Listen is not saved with the other plugin settings.*

## Expander/Gate II



Expander/Gate II plug-in

The Expander/Gate reduces noise by decreasing the gain of signals that fall below a user-selectable threshold. Expanders are particularly useful for reducing noise or signal leakage that creeps into recorded material as its level falls, as often occurs in the case of headphone leakage.

Expanders can be thought of as soft noise gates since they provide a gentler way of cutting off noisy low-level signals than the typically abrupt cutoff of a gate. If you want, however, you can actually use this plug-in as a gate, simply by setting the Ratio to its maximum value and using short attack, decay, and release settings.

## Expander/Gate Parameters

**Phase Invert** Inverts the phase (polarity) of the input signal, allowing you to change frequency response characteristics between multi-miked sources or to correct for miswired microphone cables.

**Reduction Meter** Indicates the amount of signal reduction in dB.

**Threshold** Sets the threshold level. Signals that fall below the threshold will be reduced in gain. Signals that are above it will be unaffected. (When adjusting the Threshold slider be sure that audio material is playing through the Expander/Gate to see changes reflected in the Reduction meter.)

**Ratio** Sets the amount of expansion. For example, if this is set to 2:1, it will lower signals below the threshold by one half. At higher ratio levels (such as 30:1 or 40:1) the Expander/Gate functions like a gate by reducing lower level signals much more dramatically. As you adjust the ratio parameter, refer to the built-in graph to see how the shape of the expansion curve changes.

**Attack** Sets the Expander's attack time. This determines how quickly a signal's level is reduced once it falls below the threshold. This, along with the ratio setting, allows you to control how soft the Expander's gain reduction curve is.

**Hold** Specifies a duration (in seconds or milliseconds) that the Expander/Gate will stay open after the initial attack cycle. This can be used as a one-shot function to keep the Expander/Gate open for longer periods of time with a single crossing of the threshold. It can also be used to prevent gate chatter that may occur if varying input levels near the threshold cause the gate to open and close very rapidly.

**Decay** Controls how long it takes for the gate to close after the input signal falls below the threshold level and the hold time has passed.

**Range** Sets the depth of the gate when closed. It has a maximum depth of -80 dB. Setting the gate to higher range levels allows more and more of the gated audio that falls below the threshold to peek through the gate at all times.

**Key HPF** This is a high-pass filter that removes low frequencies in the Key Input signal. This allows you to define a specific frequency range of the Key Input to trigger the Expander/Gate. A typical use for this feature is to filter a drum track used as a Key Input so that only specific high frequencies (such as a snare drum) will open the Gate.

**Key LPF** This is a low-pass filter that removes high frequencies in the Key Input signal. This allows you to define a specific frequency range of the Key Input to trigger the Expander/Gate. A typical use for this feature is to filter a drum track used as a Key Input so that only specific low frequencies (such as a kick drum or tom) trigger the Expander/Gate. The maximum value for Key LPF is Off. This allows the Key Input to pass through without limiting its high-frequency bandwidth.

**Graph** Displays the response curve set by the Expander/Gate's Threshold, Ratio, and Range settings. As you adjust these parameters, refer to the graph to see how the shape of this curve changes. This will allow you to see the effect of your settings.

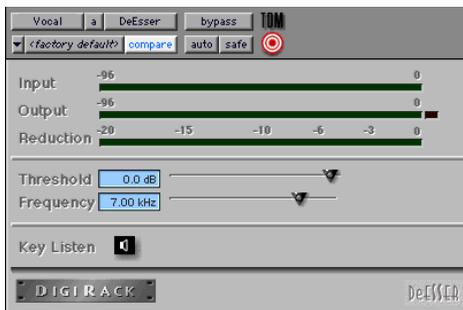
**External Key** Enables and disables side-chain processing. Side-chain processing allows the Expander/Gate to listen to the varying amplitude of a separate reference track and use it to trigger expansion. See "Using a Key Input for Side-Chain Processing" on page 13.

**Key Listen** When enabled, this allows you to listen to the reference track controlling the side-chain input. This is often useful for fine tuning the Expander/Gate's settings to the Key Input.

**⚠** *Key Listen is not saved with the other plug-in settings.*

**⚠** *Expander/Gate settings created in version 5.x and later of Pro Tools are not compatible with earlier versions. Saving a session in a pre- 5.x format will cause settings to be lost.*

## DeEsser



### DeEsser plug-in

The DeEsser reduces sibilants ("s," "sh," and "t" sounds) and other high frequency noises that can occur in vocals, voice-overs, and wind instruments such as flutes. These sounds can cause peaks in an audio signal and lead to distortion.

The DeEsser reduces these unwanted sounds using fast-acting compression. A Threshold control sets the level above which compression starts, and a Frequency control sets the frequency band in which the DeEsser operates.

**⚠** *The DeEsser is a monophonic-only plug-in.*

### Using De-essing Effectively

To use de-essing most effectively, the DeEsser should be used before any compressor or limiter plug-ins.

Because too much de-essing can make audio material sound lifeless, it is best used on individual tracks rather than entire mixes.

The Frequency slider should be set to remove sibilants (typically the 4–10 kHz range) and not other parts of the signal. This helps prevent de-essing from changing the original character of the audio material.

Similarly, Threshold should be set high enough that de-essing is triggered only by sibilants. If the Threshold is set too low, a loud, non-sibilant section of audio material could cause unwanted gain reduction or cause sibilants to be over attenuated.

To improve de-essing of material that has both very loud and very soft passages, automate the Threshold control so that it is lower on soft sections.

### **DeEsser Parameters**

**Input Meter** Indicates the level of the unprocessed input signal to the DeEsser.

**Output Meter** Indicates the output level of the DeEsser.

**Reduction** Indicates the amount of gain reduction in dB. It remains at 0 dB level when the input signal is below the threshold.

**Threshold** Sets the threshold level. Signals that exceed this level will be compressed. Signals that are below it will be unaffected. A setting of 0 dB is equivalent to no de-essing.

**Frequency** Sets the frequency band in which the DeEsser operates. Frequencies in the specified range will be gain reduced. To find the optimum Frequency setting, sweep this control back and forth during audio playback.

**Key Listen** Monitors the sibilant peaks used by the DeEsser as a Key Input to trigger compression. This is useful for listening only to the sibilance and fine tuning settings to remove them.

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## **Mod Delay and Mod Delay II**

The DigiRack Mod Delay and Mod Delay II plugins provide time delay-based effects. Effects obtained through the use of Mod Delay and Mod Delay II include echo, slap echo, doubling, chorusing, and flanging. Mod Delay II improves on Mod Delay by supporting tempo controls and sample rates up to 192 kHz.

 *It is recommended that you only use Mod Delay II for all new sessions. Use Mod Delay only for compatibility with existing sessions. If you do not need to use Mod Delay, move it from the Plug-Ins folder into the Plug-Ins (Unused) folder in the DAE Folder. Mod Delay settings can be imported into Mod Delay II.*

## Mod Delay

There are four different Mod Delays, each of which is capable of a different maximum delay time:

- The Short Delay provides 1024 samples of delay (23.2 milliseconds at 44.1 kHz or 21.3 ms at 48 kHz).
- The Slap Delay provides 7186 samples of delay (162 ms at 44.1 kHz or 149 ms at 48 kHz).
- The Medium Delay provides 16384 samples of delay (371 ms at 44.1 kHz or 341 ms at 48 kHz).
- The Long Delay provides 162474 samples of delay (3.68 seconds at 44.1 kHz or 3.38 seconds at 48 kHz).

**⚠** *The Long Delay TDM plug-in is only available on systems equipped with HD-series or MIX-series systems.*



Mod Delay plug-in

**⚠** *Mod Delay is not supported in sessions at sample rates greater than 48 kHz.*

Multiple Mod Delay plug-ins can be cascaded on inserts one into another to achieve even longer delay times. For each delay, set the Feedback to 0% and the Mix to 100% to get a single long delay (the sum of all the delay times). Adjust the various parameters of each of the delays independently to create complex delay patterns.

The Mod Delays are unique among the DigiRack TDM plug-ins in that they each provide a Mono In/Stereo Out option. Choosing a delay in the Mono In/Stereo Out format allows you to “stereoize” the output of a mono track. A track created in this way will then have stereo pan faders for controlling each channel of the stereo signal. As explained previously, any inserts that occur on a track after a mono-to-stereo Insert will automatically become stereo as well.

### Mod Delay Parameters

**Input** Controls the input volume of the delay, allowing you to prevent clipping.

**Mix** Controls the balance between the delayed signal (wet) and the original signal (dry). If you are using a delay for flanging or chorusing, you can control the depth of the effect somewhat with the Mix setting.

**⚠** *The Mix parameter is fixed at 100% in the TDM version of the mono-to-stereo and stereo Mod Delay Long Delay on Pro Tools|HD-series systems.*

**LPF (Low-Pass Filter)** Controls the cutoff frequency of the low-pass filter. This allows you to attenuate the high frequency content of the feedback signal. The lower the setting, the more high frequencies are attenuated.

**Delay** Sets the delay time between the original signal and the delayed signal.

**Depth** Controls the depth of the modulation applied to the delayed signal.

**Rate** Controls the rate of modulation of the delayed signal.

**Feedback** Controls the amount of feedback applied from the output of the delay back into its input. It also controls the number of repetitions of the delayed signal. Negative feedback settings give a more intense “tunnel-like” sound to flanging effects.

## Automation

Mod Delay cannot have automation data copied and pasted to the adjacent left or right audio channel. This occurs even when the automation data is to or from the same control. For example, Feedback Left automation data cannot be copied to Feedback Right.

To apply automation data to both the left and right channels of the Mod Delay stereo outputs, use multi-mono plug-ins in place of the stereo or mono-to-stereo Mod Delay. Multi-mono plug-ins allow automation to be linked, thereby providing the same automation data to all linked channels.

## Mod Delay II

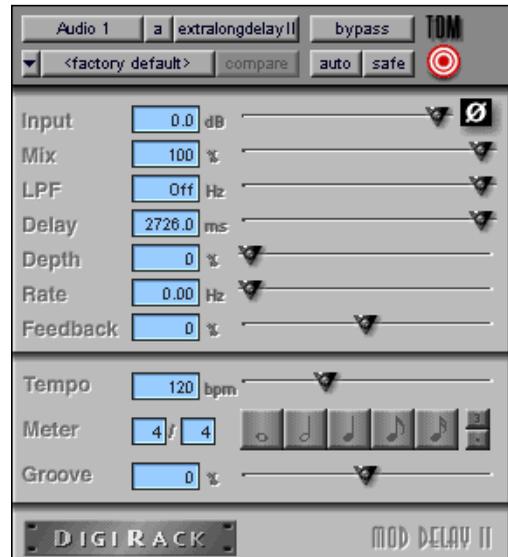
There are five different Mod Delay II plug-ins, each of which is capable of a different maximum delay time:

- The Short Delay provides 43 ms of delay at all sample rates.
- The Slap Delay provides 171 ms of delay at all sample rates.

**⚠** *Short Delay and Slap Delay do not have the Tempo, Meter, Duration, and Groove parameters.*

- The Medium Delay provides 341 ms of delay at all sample rates.
- The Long Delay provides 683 ms of delay at all sample rates.
- The Extra Long Delay provides 2.73 seconds of delay at all sample rates.

**⚠** *The TDM versions of the Extra Long Delay mono-to-stereo and stereo plug-in are not supported at 96 kHz. All TDM versions of the Extra Long Delay plug-in are not supported at 192 kHz. RTAS versions of the Extra Long Delay plug-in are fully supported at all sample rates.*



*Mod Delay II plug-in*

## Mod Delay II Parameters

**Input** Controls the input volume of the delay, allowing you to prevent clipping.

**Mix** Controls the balance between the delayed signal (wet) and the original signal (dry). If you are using a delay for flanging or chorusing, you can control the depth of the effect somewhat with the Mix setting.

**LPF (Low-Pass Filter)** Controls the cutoff frequency of the Low-Pass Filter. Use the LPF setting to attenuate the high frequency content of the feedback signal. The lower the setting, the more high frequencies are attenuated. The maximum value for LPF is Off. This allows the signal to pass through without limiting the bandwidth of the plug-in.

**Delay** Sets the delay time between the original signal and the delayed signal.

**Depth** Controls the depth of the modulation applied to the delayed signal.

**Rate** Controls the rate of modulation of the delayed signal.

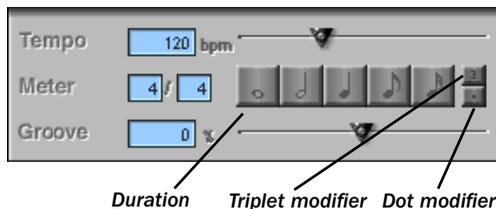
**Feedback** Controls the amount of feedback applied from the output of the delay back into its input. It also controls the number of repetitions of the delayed signal. Negative feedback settings give a more intense “tunnel-like” sound to flanging effects.

**Tempo** Selects the desired tempo in beats per minute (bpm). This setting is independent of Pro Tools’ tempo. When a specific Duration is selected (see “Duration” below), moving this control will affect the Delay setting. Likewise, the range of both controls will be limited to the maximum available delay with the currently selected Duration. To enter very short or long delays it may be necessary to deselect all Duration buttons.

💡 Use *Edit > Identify Beat* or *Beat Detective* to determine the tempo. For more information about *Identify Beat* and *Beat Detective* refer to the *Pro Tools Reference Guide*.

**Meter** Allows you to enter either simple or compound time signatures. The Meter control defaults to a 4/4 time signature.

**Duration** Specifies a desired delay from a musical perspective. Enter the desired delay by selecting appropriate note value (whole note, half note, quarter note, eighth note, or sixteenth note). Select the Dot or Triplet modifier buttons to dot the selected note value or make it a triplet. For example, selecting a quarter note and then selecting the dot indicates a dotted quarter note, and selecting an eighth note and then selecting the triplet indicates a triplet eighth note.



*Tempo, Meter, Duration, and Groove controls for Mod Delay II*

**Groove** Provides fine adjustment of the delay in percentages of a 1:4 subdivision of the beat. It can be used to add “swing” by slightly offsetting the delay from the precise beat of the track.

⚠ *It is not possible to exceed the maximum delay length for a particular version of Mod Delay II. Consequently, when adjusting any of the tempo controls (Tempo, Meter, Duration, and Groove) you may not be able to adjust the control across its full value range. If you encounter this behavior, switch to a version of Mod Delay II that has a longer delay time (for example, switch from Medium Delay to Long Delay).*

## Multichannel Mod Delay II

The Tempo and Meter controls are linked on multichannel versions of Mod Delay II. Each channel has its own Duration and Groove controls, but the Tempo and Meter controls are global.

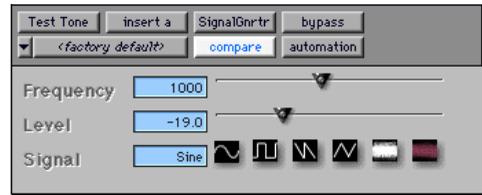


*Tempo, Meter, Duration, and Groove controls for a stereo instance of Mod Delay II*

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## Signal Generator

The Signal Generator plug-in produces audio test tones in a variety of frequencies, waveforms, and amplitudes. It is particularly useful for generating reference signals with which to calibrate the 96 I/O or 192 I/O and other elements of your studio. See the Pro Tools *Getting Started Guide* for instructions on using Signal Generator to calibrate the 96 I/O, or 192 I/O Audio Interfaces, as well as older audio interfaces.



**Signal Generator plug-in**

💡 *The signal generator produces a tone as soon as it is inserted on a track. To mute the Signal Generator, use the Bypass button.*

## Signal Generator Parameters

**Frequency** Sets the frequency of the signal in hertz. Values range from a low of 20 Hz to a high of 20 kHz in a 44.1 kHz session. The upper limit of the frequency range for this setting will increase to match the *Nyquist frequency* (half the sample rate) in 96 kHz and 192 kHz sessions (HD-series systems only).

**Level** Sets the amplitude of the signal in decibels. Values range from a low of -95 dB to a high of 0.0 dB.

⚠ *The pink noise generator in the Signal Generator plug-in is at RMS level, rather than peak level.*

**Signal** These buttons select the waveform. Choices are sine, square, sawtooth, triangle, white noise, and pink noise.

⚠ *The Signal Generator plug-in is not intended for rigorous test purposes; it is a simple level calibration tool.*

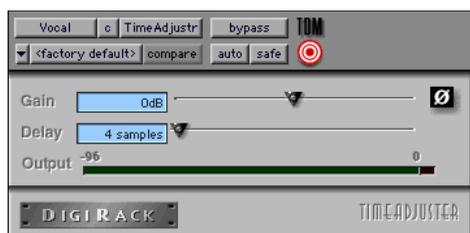
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## TimeAdjuster

### (TDM Systems Only)

The TimeAdjuster plug-in provides three functions:

- Compensation for delays due to TDM-based routing
- Gain compensation (+/- 24 dB)
- Phase inversion for correcting out-of-phase signals



#### TimeAdjuster plug-in

The TimeAdjuster plug-in is the most efficient way to compensate for DSP processing delays in your Pro Tools system. There are three versions of the TimeAdjuster plug-in, each of which supports different sample delay ranges:

**Short** Supports a maximum delay of 256 samples at all sample rates.

**Medium** Supports a maximum delay of 2048 samples (the same delay as previous versions of TimeAdjuster) at all sample rates.

**Long** Supports a maximum delay of 8192 samples at all sample rates.

### TimeAdjuster Parameters

**Phase Invert** Inverts the phase (polarity) of the input signal. While most Digidesign plug-ins supply a phase invert button of their own, some third-party plug-ins may not. In addition, phase

inversion is useful for performing delay compensation by tuning unknown delay factors by ear (see “Using TimeAdjuster for Delay Compensation” on page 47).

**Gain** Provides up to 24 dB of positive or negative gain adjustment. This control is useful for altering the gain of a signal by a large amount in real time. For example, when you are working with audio signals that are extremely low level, you may want to adjust the channel gain to a reasonable working range so that a fader is positioned at its optimum travel position. This control allows you to make a wide range of gain adjustment in real time without having to permanently process the audio files, as you would with an AudioSuite plug-in.

**Delay** Provides up to 8192 samples of delay compensation adjustment, or for general adjustment of phase relationships of audio recorded with multiple microphones, depending on which version of TimeAdjuster is used. It defaults to a minimum delay of four samples, which is the delay created by use of the TimeAdjuster plug-in itself.

While phase inversion controls have been used for many years by engineers as creative tools for adjustment of frequency response between multiple microphones, sample-level delay adjustments provide far more control. Creative use of this control can provide a powerful tool for adjusting frequency response and timing relationships between audio signals recorded with multiple microphones.

## Using TimeAdjuster for Delay Compensation

DSP processing in all digital systems incurs delay of varying amounts. You can use the TimeAdjuster TDM plug-in to apply an exact number of samples of delay to the signal path of a Pro Tools track to compensate for delay incurred by specific plug-ins. TimeAdjuster provides presets for common delay-compensation scenarios.

To compensate for several plug-ins in-line, use the delay times from each settings file as references, and add them together to derive the total delay time.

**▲** *Only a few plug-ins will have different delays at different sample rates. For example, Maxim and DINR BNR have different delays at different sample rates; see the “Digidesign Plug-Ins Guide” for more information about these plug-ins.*

Alternatively, look up the delay in samples for the plug-ins you want to compensate for, then apply the appropriate amount of delay.

 *A delay table for DigiRack plug-ins appears in Appendix B, “DSP Delays Incurred by TDM Plug-Ins.”*

To compensate for DSP-induced delays, try one of the following methods:

### Phase Inversion

If you are working with phase-coherent track pairs, or tracks recorded with multiple microphones, you can invert the phase to negate the delay. If you don't hear any audio when you invert a signal's phase, you have precisely adjusted and compensated for the delay. This is because when you monitor duplicate signals and invert

the polarity (phase) of one of them, the signals will be of opposite polarity and cancel each other out. This technique is convenient for finding the exact delay setting for any plug-in.

### To determine the delay of a plug-in by inverting its signal phase:

- 1 Place duplicate audio regions on two different audio tracks and pan them to the center (mono).
- 2 Apply the plug-in whose delay you want to calculate to the first track, and a Time Adjuster plug-in to the second track.
- 3 With TimeAdjuster, invert the phase.
- 4 Command-drag (Macintosh) or Control-drag (Windows) to fine-tune delay in one sample increments, or use the up/down arrow keys to change the delay one sample at a time until the audio signal disappears.
- 5 Change the polarity back to normal.
- 6 Save the TimeAdjuster setting for later use.

### Comb-Filter Effect Cancellation

Adjust the delay with the signal in phase until any comb-filter effects cancel out.

### Viewing Channel Delay

Because TDM plug-ins display their delay values in the Mix window's channel delay indicators, this can be used as another method for determining delay compensation.

**To view time delay values and use TimeAdjuster to compensate for the delay:**

1 In the Mix window, Command-click (Macintosh) or Control-click (Windows) the Track Level Indicator to toggle between level (that appears on the display as “vol”), headroom (“pk”), and channel delay (“dly”) indications. Delay values are shown in samples.



**Determining the DSP delay of track inserts**

2 Apply the TimeAdjuster plug-in to the track whose delay you want to increase, and Command-click (Macintosh) or Control-click (Windows) its Track Level indicator until the channel delay value is displayed for that track.

3 Change the delay time in TimeAdjuster by moving the Delay slider or entering a value in the Delay field, until the channel delay value matches that of the first track.

4 Test the delay values by duplicating an audio track and reversing its phase while compensating for delay.

## When to Compensate for Delays

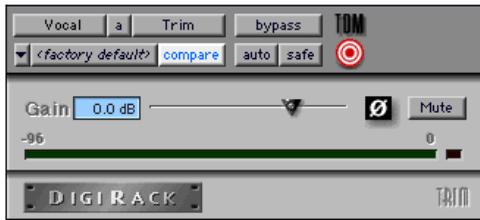
If you want to compensate for delays across your entire system, you will want to calculate the maximum delay incurred on any channel, and apply the delays necessary to each channel to match this channel.

However, this may not always be necessary. You may only really need to compensate for delays between tracks where phase coherency must be maintained (as with instruments recorded with multiple microphones or stereo pairs). If you are working with mono signals, and the accumulated delays are small (just a few samples, for example), you probably needn't worry about delay compensation.

 For more information about delays and mixing in TDM systems, see the *Pro Tools Reference Guide*.

---

## Trim



### Trim plug-in

The Trim plug-in can be used to attenuate an audio signal from  $-\infty$  (Infinity) dB to +6 dB. For example, using a multi-mono Trim plug-in on a multi-channel track provides simple, DSP-efficient muting control over the individual channels of the track. This capability is useful, since Track Mute buttons mute *all* channels of a multi-channel track and do not allow muting of individual channels within the track.

 *Option-click the Trim selector to open a Plug-In window for each channel of a multi-channel track.*

### Trim Parameters

**Phase Invert** Inverts the phase (polarity) of the input signal, allowing you to change frequency response characteristics between multi-miked sources or to correct for miswired microphone cables.

**Gain** Provides  $-\infty$  dB to +6 dB of gain adjustment.

**Output Meter** Indicates the output level, including any gain compensation added using the Gain parameter.

**Mute** Mutes the signal output.



## chapter 5

# DigiRack AudioSuite Plug-Ins

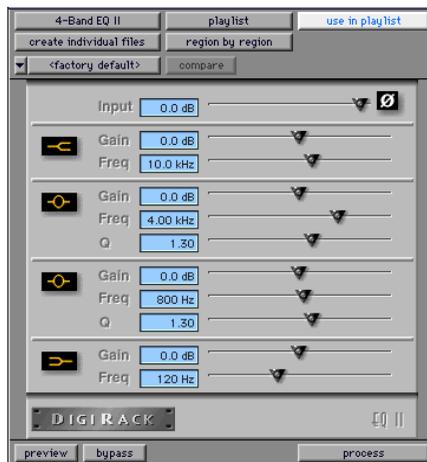
### EQ II

The EQ II plug-in allows you to use either a 1-Band or 4-Band EQ to adjust the frequency spectrum of an audio selection. The 1-Band EQ can be configured as a high pass, low shelf, high shelf, low pass, or peak EQ. The 4-Band EQ provides one high shelf, one low shelf, and two peak EQs.



1-Band EQ II AudioSuite plug-in

The features of these plug-ins are non-real-time, but otherwise identical to their real-time counterparts.



4-Band EQ II AudioSuite plug-in

 For information on the individual parameters of these plug-ins, see “EQ II” on page 29.

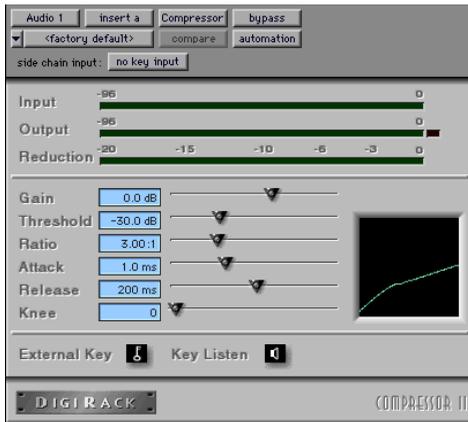
### Dynamics II

Five different AudioSuite dynamics plug-ins are provided with Pro Tools:

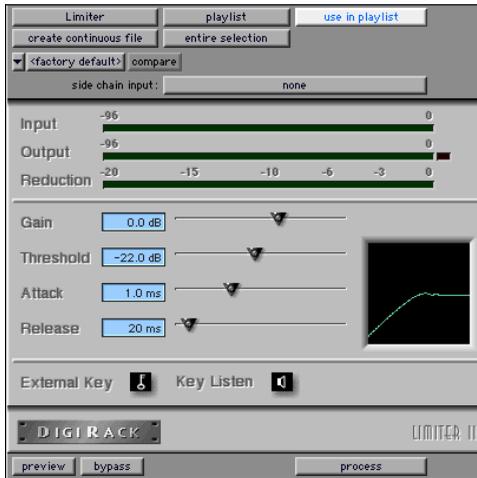
- Compressor II
- Limiter II
- Gate II
- Expander/Gate II
- DeEsser

The features of these plug-ins are non-real-time, but otherwise identical to their real-time counterparts.

 For information on the individual parameters of these plug-ins, see “Dynamics II” on page 34.



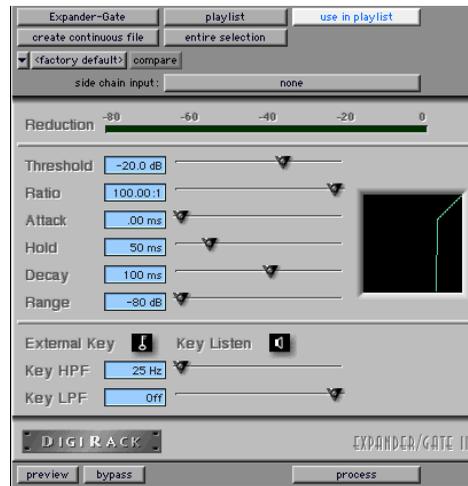
Compressor II AudioSuite plug-in



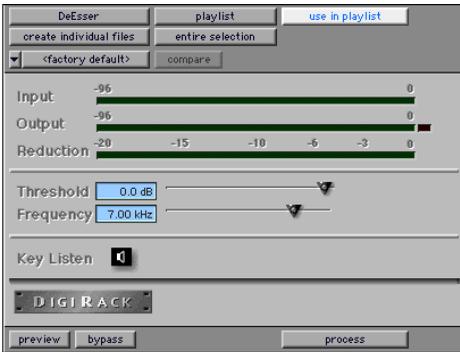
Limiter II AudioSuite plug-in



Gate II AudioSuite plug-in



Expander/Gate II AudioSuite plug-in



*DeEsser AudioSuite plug-in*

## Invert

The Invert plug-in reverses the polarity of the selected audio. All positive sample amplitude values are made negative, and all negative amplitudes are made positive. This process is useful for permanently altering the phase (polarity) relationship of tracks. The Invert plug-in is particularly useful during mixing because it allows you to modify frequency response between source tracks recorded with multiple microphones. It also allows you to correct for audio recorded out of phase with an incorrectly wired cable.



*Invert plug-in*

## Duplicate

The Duplicate plug-in duplicates the selected audio in place. Depending on how its parameters are configured, the new region will appear in either the Regions List or playlist. This allows

you to “flatten” or consolidate an entire track consisting of multiple regions into one continuous audio file that resides in the same place as the original individual regions.



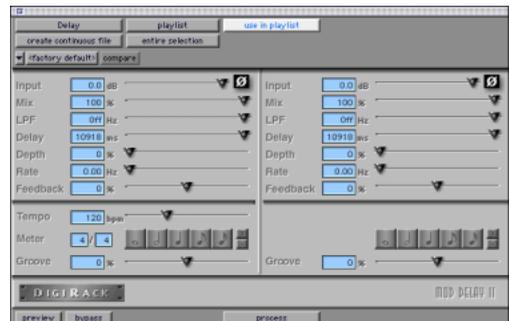
*Duplicate plug-in*

The audio is unaffected by Pro Tools volume or pan automation, or by any real-time plug-ins that may be in use on the track as inserts. The original audio file regions are merely rewritten in place to a single duplicate file.

The Duplicate plug-in always works in non-destructive mode—you cannot choose to overwrite files. The original source files will always be retained.

## Delay

The AudioSuite Delay plug-in provides time delay-based effects, with up to 10.9 seconds of delay (regardless of the sample rate). In addition to long delays, you can create multiple delay-based effects with this plug-in, including slap echo, doubling, chorusing, and flanging.



*Delay AudioSuite plug-in*

The feature parameters of the AudioSuite Delay plug-in are non-real-time, but otherwise identical to the real-time Mod Delay II plug-in.

 For information on the individual parameters of the AudioSuite Delay plug-in, see “Mod Delay II” on page 43.

If you have the Mod Delay Plug-In installed, Short Delay, Slap Delay, Medium Delay, and Long Delay will be available in the AudioSuite menu in addition to Delay (Mod Delay II). The features of these plug-ins are identical to their real-time counterparts. The only difference is that the AudioSuite versions operate in non-real time.

 For information on the individual parameters of the AudioSuite Short Delay, Slap Delay, Medium Delay, and Long Delay plug-ins, see “Mod Delay” on page 42.

## Selecting Audio for Processing with AudioSuite Delay Plug-Ins

Because AudioSuite Delay adds additional material to the end of the selected audio (a delay tap), it is important that you make a selection that is longer than the original source material so that AudioSuite Delay can write it into the audio file.

If you select only the original material, without leaving additional space at the end, a delay that occurs after the end of the region will be cut off.

To accommodate for this, place the region in a track, and select the desired audio plus an amount of blank space at the end of the region equal to the amount of delay that you have added in the plug-in. The plug-in will then have space at the end of the region in which to write the final delay.

---

## Normalize

The Normalize plug-in allows you to optimize a selected region’s level. It is useful in cases where an audio file has been recorded with too little amplitude, or where volume is inconsistent throughout the duration of an audio file (as in a poorly recorded narration). Applying Normalization to a selection maximizes its level while ensuring that the inherent dynamics of the material remain unchanged. Unlike compression/limiting, that limits the maximum amplitude of the loud parts and makes the quiet parts louder, normalization uniformly increases (or decreases) the amplitude of a selection.



Normalize plug-in

**Max Peak At Parameter** In addition to the standard AudioSuite functions, the Normalize plug-in provides a Max Peak At parameter that lets you specify how close to maximum level (clipping threshold) the peak level of your selection will be boosted.

You can specify this value by manually adjusting the Max Peak At slider, or by entering a numeric decibel value below the clipping threshold, or by entering a percentage of the clipping threshold.

The Normalize plug-in allows stereo pairs to be processed together so that the two sides of the stereo signal are processed relative to each other.

When multiple regions are selected across multiple tracks, the Normalize plug-in can search for peaks in two different modes:

**Peak On Each Chan/Track** Searches for the peak level on a channel-by-channel or track-by-track basis.

**Peak On All Chans/Tracks** Searches for the peak level of the entire selection. If ten tracks are selected, for example, the Normalize function will find the peak value from all ten.

---

## Gain

The Gain plug-in allows you to boost or lower a selected region's amplitude by a specific amount. It is ideal for smoothing out undesirable peaks and other dynamic inconsistencies in audio material.



### Gain plug-in

#### Gain Parameter

In addition to the standard AudioSuite functions, the Gain plug-in provides a Gain parameter that lets you specify the desired gain level.

You can specify this value by manually adjusting the Gain slider, or by entering a numeric decibel value, or by entering a percentage.

#### Find Peak

Use the Find Peak button to display the value of the peak amplitude for the current selection.

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## Reverse

The Reverse plug-in allows you to modify a selection so that it plays backwards. This effect has many useful applications in music, film, and video.

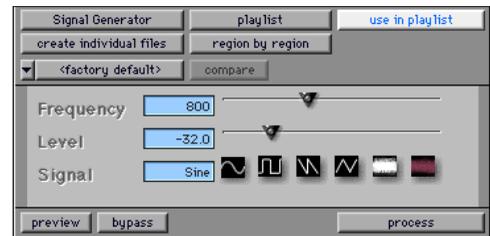


### Reverse plug-in

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## Signal Generator

The Signal Generator plug-in produces audio test tones in a variety of frequencies, waveforms, and amplitudes.



### Signal Generator plug-in

The features of this plug-in are non-real-time, but otherwise identical to its real-time counterpart.

 You can use the AudioSuite Signal Generator plug-in for musical purposes as well as for testing purposes. For example, you might want to add a little color to a kick drum track by doubling it with a 50 Hz tone, using the kick track as the key input signal gating the tone track.

## To create an audio region using the Signal Generator plug-in:

- 1 Make a selection in the Tracks window.
- 2 Choose AudioSuite > Signal Generator.
- 3 Enter the desired values for the Frequency, Level, and Signal parameters.
- 4 Click Process in the Signal Generator plug-in.

 For information on the individual parameters of the Signal Generator plug-in, see “Signal Generator” on page 45.

## DC Offset Removal

The DC Offset Removal plug-in removes DC offset from audio files. DC offset is a type of audio artifact that can appear in digital audio signals as a result of miscalibrated analog-to-digital convertors.

DC offset can be easily identified in a waveform. In portions of the audio file where there should be silence, the DC offset appears as a near-vertical fade in with a constant or steady-state offset from zero.

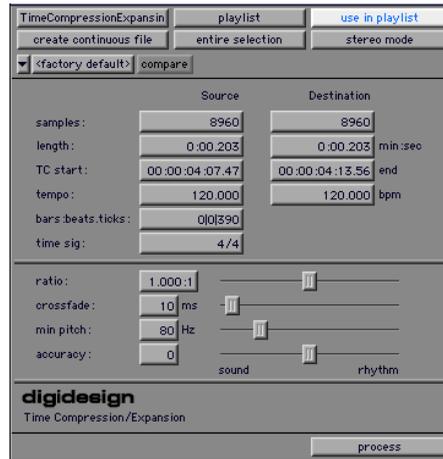
If you find DC offset in an audio file, you should always use the DC Offset plug-in to remove it, since DC Offset can cause pops or clicks to occur on edited material.



**DC Offset Removal plug-in**

## Time Compression/Expansion

The Time Compression/Expansion plug-in allows you to adjust the duration of selected regions, increasing or decreasing their length without changing pitch.



### Time Compression/Expansion plug-in

This is a particularly useful function in audio post-production applications since it allows audio to be adjusted to specific time lengths or SMPTE durations for synchronization purposes. Time Compression/Expansion always works in non-destructive mode.

 Normalizing a selection before using Time Compressing/Expansion will often produce better-sounding results.

## Time Compression/Expansion Parameters

In addition to the standard AudioSuite functions, the Time Compression/Expansion plug-in provides the following parameters:

**Source and Destination** The Source fields display the length of the current selection before processing in each of the listed formats. All of the fields in both columns are constantly active, and a change made to one value is immediately reflected in the values displayed in all the others.

The Destination fields both display and control what the length of the selection will be after processing using the current settings. You can enter the length of the Destination file by double-clicking the appropriate field in the Destination column.

The controls below the bar line allow fine-tuning of the Time Compression/Expansion process. They include the Ratio, Crossfade, Min Pitch, and Accuracy sliders.

**Ratio** Sets the destination length in relation to the source length. Moving the slider to the right increases the length of the destination file, while moving the slider to the left decreases its length.

**Crossfade** Adjusts the crossfade length in milliseconds, allowing you to optimize performance of the Time Compression/Expansion according to the type of audio material being processed. (This plug-in achieves length modification by replicating or subtracting very small portions of audio material and very quickly crossfading between these alterations in the waveform of the audio material.)

Crossfade length affects the amount of “smoothing” performed on audio material to prevent audio artifacts such as clicks. In general, small narrow-range time (length) changes require longer crossfades while larger changes in length require smaller crossfades. The disadvantage to long crossfade times is that they smooth the signal, including any transients. While this can be desirable for audio material such as vocals, it is not appropriate for material with sharp transients such as drums or percussion.

Use the Crossfade slider to manually adjust and optimize crossfade times if necessary. For audio material with sharper attack transients, use smaller crossfade times. For audio material with softer attack transients, use longer crossfade times.

**Min Pitch** Sets the minimum, or lowest, pitch that will be used in the plug-in’s calculations during the Time Compression/Expansion process. The control has a range of 40 Hz to 1000 Hz.

This slider should be set lower when processing bass guitar or other instruments with a similarly low frequency range. Set this parameter higher when processing higher frequency range sounds or instruments.

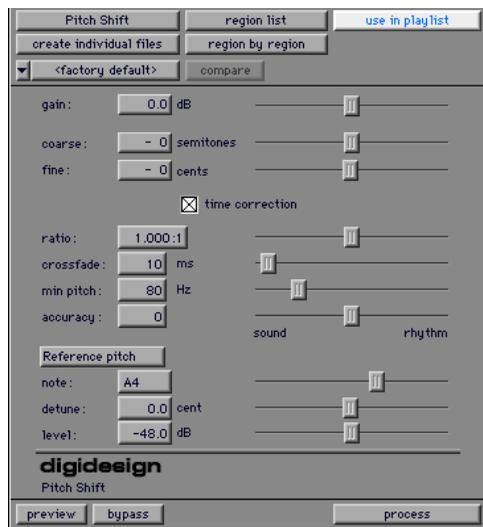
**Accuracy** Prioritizes the processing resources allocated to audio quality (Sound) or timing (Rhythm). Moving the slider towards “Sound” generally results in better sonic quality and fewer audio artifacts. Moving the slider towards “Rhythm” puts the emphasis on keeping the tempo consistent.

When you are working with audio loops, listen carefully and adjust the Accuracy slider until you find a setting that keeps timing solid within the region. If you don't, start and end times may be precise, but the beats in rhythmic material may appear to be shuffled if too little priority is given to Rhythm.

**⚠** *Time Compression & Expansion settings created in version 4.x and later of Pro Tools for Windows are not compatible with later versions. Importing a 4.x session into version 5.x and later will cause settings to be lost.*

## Pitch Shift

The Pitch Shift plug-in allows you to adjust the pitch of any source audio file with or without a change in its duration. This is a very powerful function that essentially allows sounds to be transposed a full octave up or down in pitch with or without altering playback speed.



*Pitch Shift plug-in*

## Pitch Shift Parameters

In addition to the standard AudioSuite functions, the Pitch Shift plug-in provides the following parameters:

**Gain** Adjusts input level, in 10ths of a dB. Dragging the slider to the right increases gain, dragging to the left decreases gain.

**Coarse and Fine** Adjusts amount of pitch shift. The Coarse slider transposes in semitones (half steps). The Fine slider transposes in cents (hundredths of a semitone).

**Time Correction** Disabling this option has the effect of “permanently varispeeding” your audio file. The file’s duration will be compressed or extended according to the settings of the Coarse and Fine pitch controls. When Time Correction is enabled, fidelity can be affected. For example, time expansion as a result of Time Correction when lowering pitch can cause the audio to sound granulated.

**Ratio** Adjusts the amount of transposition (pitch change). Moving the slider to the right raises the pitch of the processed file, while moving the slider to the left decreases its pitch.

**Crossfade** Allows you to manually adjust the crossfade length in milliseconds to optimize performance of the Pitch Shift plug-in according to the type of audio material you are processing. This plug-in achieves pitch transposition by processing very small portions of the selected audio material and very quickly crossfading between these alterations in the waveform of the audio material.

Crossfade length essentially affects the amount of “smoothing” performed on audio material to prevent audio artifacts such as clicks when the audio is looped to generate the desired pitch shift. In general, small narrow-range pitch changes require longer crossfades while larger

transpositions require smaller crossfades. The disadvantage to long crossfade times is that they smooth the signal, including any transients. While this can be desirable for audio material such as vocals, it is not appropriate for material with sharp transients such as drums or percussion.

Use the Crossfade slider to manually adjust and optimize crossfade times if necessary. For audio material with sharper attack transients, use smaller crossfade times. For audio material with softer attack transients, use longer crossfade times.

**Min Pitch** Sets the minimum, or lowest, pitch that will be used in the plug-in's calculations during the Pitch Shift process. The slider has a range of 40 Hz to 1000 Hz. By being able to control the minimum pitch, you can focus the Pitch Shift process for maximum efficiency—it all depends on the audio's spectral shape.

This slider should be set lower when processing bass guitar or other instruments with a similarly low frequency range. Set this parameter higher when processing higher frequency range sounds or instruments.

**Accuracy** Prioritizes the processing resources allocated to audio quality (Sound) or timing (Rhythm). Moving the slider towards Sound generally results in better sonic quality and fewer audio artifacts. Moving the slider towards Rhythm puts the emphasis on keeping the tempo consistent.

When you are working with audio loops, listen carefully and adjust the Accuracy slider until you find a setting that keeps timing accurate within the region. If you don't, start and end times may be precise, but the beats in rhythmic material may appear to be shifted if too little priority is given to Rhythm.

**Reference Pitch** Activates a sine wave-based pitch generator that you can use as an audible reference when pitch-shifting audio material. This feature has the following parameters:

**Note** Adjusts the frequency of the reference tone in semitones (half steps).

**Detune** Provides finer adjustment of the frequency of the reference tone in cents (100ths of a semitone).

**Level** Adjusts the volume of the reference tone in dB.

#### **To use the reference pitch feature of the Pitch Shift plug-in:**

- 1 Select the audio material you want to use as a pitch reference. Click the preview button to begin playback of the selected audio.
- 2 Click the Reference Pitch button—to activate the reference sine wave tone.
- 3 Adjust the Note and Detune settings to match the reference tone to the pitch of the audio playback. Adjust the level setting to change the relative volume of the reference tone. It may also be helpful to toggle the Reference Pitch on and off to compare pitch.
- 4 Select the audio material to be pitch shifted.
- 5 Adjust the Coarse and Fine Pitch Shift controls to match the pitch of the audio playback to the reference pitch.
- 6 Click Process to apply pitch shift to the selection.



# DirectConnect

DirectConnect is a Macintosh-only Pro Tools plug-in that allows up to 32 separate audio channel outputs from compatible host-based applications, such as software-based synthesizers or samplers, to be independently routed, recorded, processed and mixed within the Pro Tools environment.

Once the outputs of your software synths and samplers are routed to Pro Tools, you can:

- Assign them to busses for plug-in processing
- Automate volume, pan, and plug-in parameters
- Bounce To Disk
- Take advantage of the audio outputs of your Digidesign audio interfaces

 *If you have downloaded DirectConnect from the Digidesign Web site, see “Installing DirectConnect” on page 63 for installation instructions.*

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## DirectConnect Requirements

To use DirectConnect, you will need:

- A Pro Tools HD-series or MIX-series system, or Pro Tools LE software running on a Digidesign-approved Pro Tools configuration
- Digidesign Soft SampleCell
  - or –
- Third-party client software compatible with DirectConnect, such as:
  - *Studio9000* from Koblo
  - *Retro AS-1*, *Unity DS-1*, *Voodoo*, or *Phrazier* from Bitheadz
  - *Absynth*, *B-4*, *Battery*, *Dynamo*, *FM7*, or *Reaktor* from Native Instruments
  - *Spark XL* from TC|Works
  - *Alkali* from Audio Genetics

**⚠** *Third-party client software must support and be configured for the same sample rate as the session to use with DirectConnect. For example, third-party client software that does not support sample rates beyond 48 kHz cannot be used in 96 kHz Pro Tools sessions.*

DirectConnect support is also under development for other third-party companies. For availability, check with the manufacturer or the Digidesign Web site at:

[www.digidesign.com](http://www.digidesign.com)

## DirectConnect and Track Count on TDM Systems

Each channel of audio transmitted through DirectConnect uses the same amount of resources as a single audio track in Pro Tools. Consequently, you can only use a total combination of disk tracks and DirectConnect audio streams that does not exceed the maximum number of possible voices for your system. For example, if you are playing 40 disk tracks in a 96 kHz/24-bit session on a Pro Tools|HD 1 core system, that will leave 8 channels of audio (8 mono, or 4 stereo) that can be used with DirectConnect.

Using DirectConnect at higher sample rates will increase the load on the CPU. For example, CPU load at 96 kHz is double the load at 48 kHz. You can monitor total CPU usage in the Pro Tools System Usage window, making sure to not overtax your system.

 *The standard sample buffer size of 512 samples is strongly recommended for using DirectConnect in sessions with sample rates above 48 kHz on Pro Tools|HD systems.*

The number of available audio streams at different sample rates are:

- 32 streams at 44.1/48 kHz
- 16 streams at 88.2/96 kHz
- 6 streams at 176.4/192 kHz

If you attempt to use more channels than are available with DirectConnect, you may encounter a DAE error -6042 (PCI bus too busy).

## DirectConnect and Track Count on Pro Tools LE Systems

On Pro Tools LE-based systems, performance is determined by several factors, including host CPU speed, available memory, and buffer settings. Digidesign cannot guarantee 32 simultaneous audio channel outputs with DirectConnect on all computer configurations.

For the latest information on recommended CPUs and system configurations, check the Digidesign Web site.

## DirectConnect and DSP Resources (TDM Systems Only)

Similar to some plug-ins, DirectConnect requires a specific type of DSP chip (SRAM) to function; there are nine of these particular DSP chips on an HD Core card.

When DirectConnect is in use, it takes up one of these DSPs and makes it unavailable for any other plug-ins.

 *You can use the Show DSP Usage window (available from the Pro Tools Windows menu) to see how much DSP is available on your system and how it is currently being used. For details, see the Pro Tools Reference Guide.*

## Sample Rate and Latency

On Pro Tools HD-series systems, DirectConnect supports sample rates up to 192 kHz. Since the buffer size setting for DirectConnect is fixed, latency will decrease as the session sample rate is increased. This may cause synchronization problems with MIDI tracks if MIDI track offsets have been configured for a different sample rate.

---

## DirectConnect and Other DAE Applications

DirectConnect will work with DAE-compatible applications other than Pro Tools, including sequencers from other third-party software companies.

 *You must have completed a full install of Pro Tools before you can use DirectConnect with third-party sequencer software.*

 *Contact your sequencer manufacturer for information on compatibility with DirectConnect, and DAE and DigiSystem INIT 5.3 or later.*

---

## Installing DirectConnect

To use DirectConnect, you must install the *plug-in description* file for your software synth or sampler. This file must reside in the Plug-Ins folder inside the DAE Folder. Some DirectConnect client applications will do this for you during installation, such as Soft SampleCell.

DirectConnect also requires the following files, that are installed automatically with the Pro Tools software:

**DirectConnect** This plug-in file resides in the Plug-Ins folder inside the DAE Folder (that is in the System Folder).

**Digidesign StreamManager** This file resides in the Extensions folder inside the System Folder.

 *Contact the manufacturer to obtain the plug-in description file for your DirectConnect-compatible software if it is not installed when you install the DirectConnect client application.*

---

## Using DirectConnect

Several DirectConnect client applications have OMS drivers, such as Soft SampleCell. Once you have installed a DirectConnect client application, be sure to create a new OMS Setup that includes the DirectConnect client application's OMS driver, or update your existing OMS Setup to include the OMS driver of the DirectConnect client application.

### To update your OMS Current Studio Setup:

- 1 Launch the OMS Setup application.
- 2 Verify that your Current Studio Setup is open.
- 3 Choose Studio > MIDI Cards & Interfaces and follow the on-screen instructions.
- 4 Your DirectConnect client application's OMS driver should appear in your Studio Setup. If not, you will need to use the OMS IAC driver (see "Configuring the IAC Driver" on page 63).
- 5 Choose File > Save.
- 6 Quit OMS Setup.

## DirectConnect, OMS, and IAC

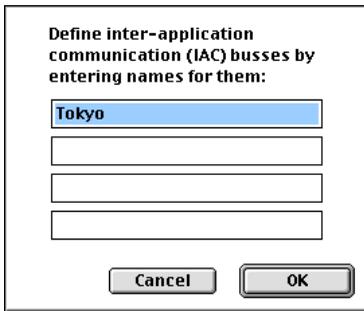
DirectConnect client applications that do not have an OMS driver, such as Studio9000 by Koblo, will require the OMS IAC Driver. Pro Tools will be able to send MIDI data to the software synth or sampler using the OMS IAC bus.

### Configuring the IAC Driver

To control a software synth that does not have its own OMS driver in Pro Tools, you will need to first configure the OMS IAC driver.

### To configure the OMS IAC driver:

- 1 If it is not already installed, install the OMS IAC driver. To do this, perform a Custom Install from the OMS Installer.
- 2 Once the IAC driver is installed and you have restarted your computer, you will need to update your OMS Studio setup. In the OMS Setup application, choose Studio > MIDI Cards and Interfaces.
- 3 Once the IAC driver appears in your Studio Setup, double-click its icon and rename one of the buses as desired.



#### Renaming an IAC bus

For example, if you are connecting to the Tokyo software from Koblo, rename the bus “Tokyo.”

- 4 Click OK.
- 5 Choose File > Save and then close OMS Setup.

### Configuring the Software Synth

Next you’ll need to route the software synthesizer’s audio output to DirectConnect, and assign its MIDI control to the IAC bus. Following is an example for configuring the Tokyo software for Koblo synths.

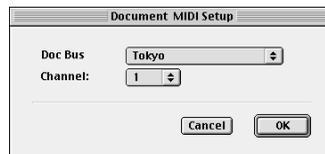
### To configure the Tokyo application for DirectConnect:

- 1 Launch the Tokyo application and select the desired synth from the Synths menu.
- 2 Choose File > Select Drivers. Set the Audio Driver to DirectConnect and the MIDI Driver to OMS.
- 3 Click OK.



#### Drivers dialog in Tokyo application

- 4 Choose Options > MIDI Setup. Set the Doc Bus to Tokyo and the Channel to 1.
- 5 Click OK.



#### MIDI Setup dialog in Tokyo application

The Koblo Tokyo software synth is now ready for use with Pro Tools and DirectConnect.

## Configuring Pro Tools

Configure Pro Tools to connect to your software synth through DirectConnect and OMS.

 *Some third-party products allow both mono and stereo outputs, while others use mono or stereo outputs exclusively. If you cannot instance a DirectConnect plug-in on a mono track, it is likely that it can only be used on stereo tracks. Conversely, if you cannot instance a DirectConnect plug-in on a stereo track, it is likely that it can only be used on a mono track.*

### To configure Pro Tools for DirectConnect:

- 1 Launch Pro Tools and open a new or previously saved session.
- 2 Choose File > New Track and specify one Auxiliary Input (stereo) track, then click Create.
- 3 Choose File > New Track and specify one MIDI Track, then click Create.
- 4 In the Mix window, click on the new MIDI track's Device/Channel Selector and select the DirectConnect client application (for example, Soft SampleCell) on channel 1.
- 5 In the Mix window, assign the DirectConnect plug-in to the Auxiliary Input track. Some DirectConnect client applications will launch automatically in the background (such as Soft SampleCell). If your DirectConnect client application does not support this auto-launch feature, open it manually.
- 6 Configure your DirectConnect client application to play the sounds you want. For example, if you are using Soft SampleCell, load the samples, instrument, or bank you want to use.

- 7 In the DirectConnect plug-in window in Pro Tools, set the output to SSC Stereo Out 1-2.



DirectConnect plug-in window

- 8 Select MIDI > Thru and record-enable the MIDI track. Play some notes on your MIDI controller to trigger Soft SampleCell.
- 9 Assign additional plug-ins as desired for the Auxiliary Input track.

---

## Automating DirectConnect

DirectConnect supports automation for switching inputs during playback.

### To automate switching inputs during playback:

- 1 Set the track's automation to write.
- 2 Change the input link pop-up menu manually.

– or –

Draw the automation in the Edit window.

 *For more information on drawing automation, see the Pro Tools Reference Guide.*

---

## Recalling DirectConnect States

Provided your client software supports it, DirectConnect lets you recall the patch settings for your software synth or sampler. Once you save and re-open your Pro Tools session, DirectConnect will automatically recall the settings previously used. Pro Tools will even launch, if necessary, your client software when opening a session that uses DirectConnect.

**⚠** *If your client software is not running and you open a DirectConnect session, allow for a short delay while Pro Tools locates and launches your client software.*

## appendix a

# DSP Requirements for TDM Plug-Ins

The tables on the following pages show the total number of instances of each DigiRack TDM plug-in that can be powered by a single DSP chip on Pro Tools|HD-series and MIX-series cards. DSP usage differs according to card type.

There are a total of 9 DSP chips on a Pro Tools|HD card. Though there are a total of 6 DSP chips on a Pro Tools|24 MIX card, certain plug-ins, such as the Mod Delays, require a specific type of DSP chip to function. The tables indicate the number of compatible chips per card for each plug-in.

Plug-ins used in multi-mono format on greater-than-stereo tracks require one mono instance per channel of the multi-channel audio format. A multi-mono EQ used on a 5.1 format track, for example, requires six mono instances since there are six audio channels in the 5.1 format.

Because multi-channel versions of the Compressor II, Limiter II, and Expander/Gate II plug-ins are available for use on greater-than-stereo tracks, separate instance counts are given for those configurations.

**▲** *The tables that follow show theoretical maximum performance when no other plug-ins are sharing available DSP resources. You will typically use more than one type of plug-in simultaneously.*

**Table 1. Maximum instances of real-time TDM plug-ins per DSP chip for a Pro Tools HD card at different sample rates (mono and stereo).**

Sample Rate:	44.1/48 kHz		88.2/96 kHz		174.6/192 kHz	
	Mono	Stereo	Mono	Stereo	Mono	Stereo
EQ II (1-band)	119	59	54	27	20	10
EQ II (4-band)	36	18	16	8	6	3
Compressor II	26	17	11	8	4	3
De-esser	20	10*	9	4*	3	1*
Limiter II	26	17	11	8	4	3
Gate II	59	41	27	18	11	7
Expander/Gate II	23	20	10	9	4	3
Mod Delay I (short)	43	21	n/a	n/a	n/a	n/a
Mod Delay I (slap)	32	16	n/a	n/a	n/a	n/a
Mod Delay I (medium)	16	8	n/a	n/a	n/a	n/a
Mod Delay I (long)	8	4	n/a	n/a	n/a	n/a
Mod Delay II (short)	43	21	19	9	7	3
Mod Delay II (slap)	32	16	16	8	7	3
Mod Delay II (medium)	16	8	8	4	4	2
Mod Delay II (long)	8	4	4	2	2	1
Mod Delay II (extra long)	2	1	1	n/a	n/a	n/a
Dither	37	18	17	8	7	3
POW-r Dither	9	4	4	2	1	n/a
Time Adjuster (short)	91	45	41	20	15	7
Time Adjuster (medium)	91	45	41	20	15	7
Time Adjuster (long)	32	16	32	16	15	7

**Table 1. (Continued) Maximum instances of real-time TDM plug-ins per DSP chip for a Pro Tools HD card at different sample rates (mono and stereo).**

Sample Rate:	44.1/48 kHz		88.2/96 kHz		174.6/192 kHz	
Plug-In	Mono	Stereo	Mono	Stereo	Mono	Stereo
Trim	113	59*	54	27*	20	10*
Signal Generator	27	12*	11	5*	4	2*

*\* Instance counts are provided for multi-mono versions of plug-ins that have no available multichannel version.*

**Table 2. Maximum instances of real-time TDM plug-ins per DSP chip for a Pro Tools HD card at 48 kHz\*\***

Plug-In	LCR	Quad & LCRS	5.0	5.1 & 6.0	6.1 & 7.0	7.1	DSP chips per HD card
EQ II (1-band)	39	29	28	19	17	14	9
EQ II (4-band)	12	9	7	6	5	4	9
Compressor II	11	9	8	6	6	6	9
De-esser*	6	5	4	3	2	2	9
Limiter II	11	9	8	6	6	6	9
Gate II	19	14	11	9	8	7	9
Expander/Gate II	15	13	12	11	11	10	9
Mod Delay I (short)	14	11	8	7	6	5	9
Mod Delay I (slap)	10	8	6	5	4	4	9
Mod Delay I (medium)	5	4	3	2	2	2	9
Mod Delay I (long)	partial	partial	partial	partial	partial	partial	9
Mod Delay II (short)	14	11	8	7	6	5	9
Mod Delay II (slap)	10	8	6	5	4	4	9
Mod Delay II (medium)	5	4	3	2	2	2	9
Mod Delay II (long)	2	2	1	1	1	1	9
Mod Delay II (extra long)	partial	partial	partial	partial	partial	partial	9
Dither	12	9	7	6	5	4	9
POW-r Dither	3	2	1	1	2	1	9
Time Adjuster (short)	30	22	18	15	13	11	9
Time Adjuster (medium)	30	22	18	15	13	11	9
Time Adjuster (long)	10	8	6	5	4	4	9

**Table 2. (Continued) Maximum instances of real-time TDM plug-ins per DSP chip for a Pro Tools HD card at 48 kHz\*\***

Plug-In	LCR	Quad & LCRS	5.0	5.1 & 6.0	6.1 & 7.0	7.1	DSP chips per HD card
Trim*	39	29	23	19	16	14	9
Signal Generator*	8	6	5	4	3	3	9

*“partial” indicates that a single instance of the multi-mono plug-in is sharing more than 1 DSP chip.*

*\* Instance counts are provided for multi-mono versions of plug-ins that have no available multichannel version.*

*\*\* Instances are roughly half at 96 kHz and a quarter at 192 kHz.*

**Table 3. Maximum instances of real-time TDM plug-ins per DSP chip for a Pro Tools |24 MIX card**

Plug-In	Mono	Stereo	LCR	Quad & LCRS	5.0	5.1 & 6.0	6.1 & 7.0	7.1	DSP chips per Mix card
EQ II (1-band)	63	31	21	15	12	10	9	7	6
EQ II (4-band)	28	14	9	7	5	4	4	3	6
Compressor II	20	13	8	7	6	5	4	4	6
De-esser	16	8	5	4	3	2	2	2	6
Limiter II	20	13	8	7	6	5	4	4	6
Gate II	31	21	10	7	6	5	4	3	6
Expander/ Gate II	19	15	11	10	9	8	7	7	6
Mod Delay (short)	33	16	3	2	2	1	1	1	5
Mod Delay (slap)	16	8	3	2	2	1	1	1	5
Mod Delay (medium)	8	4	3	2	2	1	1	1	5
Mod Delay (long)	4	2	1	1	-	-	-	-	5
Mod Delay (extra long)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dither	28	14	9	7	6	4	4	3	6
POW-r Dither	8	4	2	2	1	1	1	1	6
Time Adjuster	63	31	21	15	12	10	9	7	3
Trim	63	31	21	15	12	10	9	7	6
Signal Generator	32	16	10	8	6	5	4	4	6

**Table 4. Maximum instances of real-time TDM plug-ins per DSP chip for a DSP Farm card**

Plug-In	Mono	Stereo	LCR	Quad & LCRS	5.0	5.1 & 6.0	6.1 & 7.0	7.1	DSP chips per DSP Farm card
EQ II (1-band)	25	12	8	6	5	4	3	3	4
EQ II (4-band)	10	4	3	2	1	1	1	1	4
Compressor II	8	5	3	2	2	2	1	1	4
De-esser	6	2	1	1	-	-	-	-	4
Limiter II	8	5	3	2	2	2	1	1	4
Gate II	16	10	5	4	3	2	2	2	4
Expander/ Gate II	8	6	3	3	2	2	2	2	4
Mod Delay (short)	10	5	3	3	2	2	2	2	4
Mod Delay (slap)	5	2	1	1	1	-	-	-	4
Mod Delay (medium)	2	1	-	-	-	-	-	-	4
Mod Delay (long)	-	-	-	-	-	-	-	-	-
Mod Delay (extra long)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dither	12	6	4	3	2	2	1	1	4
POW-r Dither	3	1	1	0	0	0	0	0	4
Time Adjuster	23	11	9	7	5	5	4	3	4
Trim	29	15	10	7	6	5	4	3	4
Signal Generator	12	6	4	3	2	2	1	1	4



## appendix b

# DSP Delays Incurred by TDM Plug-Ins

This table shows the delays inherent in each type of DigiRack TDM plug-in. Delays matter only if you use a real-time TDM plug-in on one channel of a stereo or multichannel signal but not the others. This can cause the channels to be out of phase.

Use the TimeAdjuster plug-in to compensate for these delays. See “TimeAdjuster” on page 46.

**Table 5. Samples of delay incurred by each real-time DigiRack TDM plug-in on HD, MIX, and DSP Farm cards**

Plug-In	Samples of delay on HD cards	Samples of delay on MIX cards	Samples of delay on DSP Farm cards
EQ II (1-band)	4	4	4
EQ II (4-band)	4	4	4
Compressor II	4	4	4
De-esser	4	4	4
Limiter II	4	4	4
Gate II	4	4	4
Expander/Gate II	4	4	4
Mod Delay I/II (short)	4	4	4
Mod Delay I/II (slap)	4	4	4
Mod Delay I/II (medium)	4	4	4
Mod Delay I/II (long)	4	4	n/a
Mod Delay II (extra long)	4	4	n/a

*Table 5. (Continued) Samples of delay incurred by each real-time DigiRack TDM plug-in on HD, MIX, and DSP Farm*

<b>Plug-In</b>	<b>Samples of delay on HD cards</b>	<b>Samples of delay on MIX cards</b>	<b>Samples of delay on DSP Farm cards</b>
Dither	4	4	4
POW-r Dither	4	4	4
Time Adjuster	4	4	4
Signal Generator	4	4	4

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