



Getting Started

Pro Tools|HD®

Version 7.3



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chapter 1

Welcome to Pro Tools|HD

Welcome to Pro Tools|HD®. Pro Tools|HD audio cards and interfaces bring high-definition digital audio recording, editing, signal processing, mixing, and I/O capabilities to Pro Tools.

This guide covers installation and configuration of Pro Tools|HD hardware and Pro Tools® software on Windows and Mac platforms.

Pro Tools|HD Systems

Pro Tools 7.3 software supports the following systems:

Pro Tools|HD (for PCIe) Systems (Mac Only)

Pro Tools|HD (for PCIe) systems are available in the following configurations:

Pro Tools|HD 1 (for PCIe)

- Accel Core (for PCIe) card

Pro Tools|HD 2 Accel (for PCIe)

- Accel Core (for PCIe) card
- HD Accel (for PCIe) card

Pro Tools|HD 3 Accel (for PCIe)

- Accel Core (for PCIe) card
- (2) HD Accel (for PCIe) cards

Pro Tools|HD (for PCI) Systems (Windows and Mac)

Pro Tools|HD (for PCI) systems are available in the following configurations:

Pro Tools|HD 1 (for PCI)

- HD Core (for PCI) card

Pro Tools|HD 2 Accel (for PCI)

- HD Core (for PCI) card
- HD Accel (for PCI) card

Pro Tools|HD 3 Accel (for PCI)

- HD Core (for PCI) card
- (2) HD Accel (for PCI) cards



Pro Tools 7.3 also supports earlier Pro Tools|HD 2 (for PCI) and Pro Tools|HD 3 (for PCI) systems. These systems shipped with HD Process cards instead of HD Accel cards



Pro Tools HD supports more than three HD cards in certain system configurations. For more information, see the Expanded Systems Guide.

Pro Tools|HD System Packages

All Pro Tools|HD systems include the following:

- Pro Tools|HD card(s)
- Pro Tools Installer disc containing Pro Tools software, DigiRack RTAS (Real-Time AudioSuite) and AudioSuite plug-ins, and electronic PDF guides
- Pre-authorized iLok for running Pro Tools HD
- This *Getting Started Guide*, covering installation and configuration of Pro Tools|HD systems
- *Pro Tools Reference Guide* and other documentation
- DigiLink cable for connecting the primary card to an audio interface
- TDM FlexCables (multi-card systems only) to connect the cards to each other
- Digidesign Registration Information Card

All Pro Tools|HD systems also require at least one Digidesign audio interface (sold separately). See “Audio Interfaces” on page 6.

Pro Tools HD Capabilities

Pro Tools HD on Windows or Mac provides the following capabilities:

- Up to a total of 256 audio tracks, 160 Auxiliary Input tracks, 64 Master Fader tracks, 128 VCA Master tracks, 256 MIDI tracks, 128 Instrument tracks, and 64 video tracks per session
- 16-bit or 24-bit audio resolution, at sample rates up to 192 kHz
- Non-destructive, random-access editing and mix automation
- Audio processing with up to 5 TDM or RTAS plug-ins per track, depending on your computer’s capabilities
- Up to 5 hardware inserts per track
- Up to 10 sends per track
- Up to 128 internal busses for routing and mixing

The number of simultaneous tracks of audio recording or playback depends on the type of Pro Tools|HD system.

Audio Recording and Playback Capabilities

Pro Tools|HD 1 (for PCIe and PCI)

Pro Tools|HD 1 systems provide recording and playback of 24-bit or 16-bit audio files with the following track counts:

- Up to 96 tracks at 44.1 kHz or 48 kHz
- Up to 48 tracks at 88.2 kHz or 96 kHz
- Up to 12 tracks at 176.4 kHz or 192 kHz

Pro Tools|HD 2 Accel and HD 3 Accel (for PCIe and PCI)

Pro Tools|HD 2 Accel and HD 3 Accel systems provide recording and playback of 24-bit or 16-bit audio files with the following track counts:

- Up to 192 tracks at 44.1 kHz or 48 kHz
- Up to 96 tracks at 88.2 kHz or 96 kHz
- Up to 36 tracks at 176.4 kHz or 192 kHz

Non-HD Accel Systems (for PCI)

Pro Tools|HD 2 and HD 3 systems (original Pro Tools|HD systems with no HD Accel cards) provide recording and playback of 24-bit or 16-bit audio files with the following track counts:

- Up to 128 tracks at 44.1 kHz or 48 kHz
- Up to 64 tracks at 88.2 kHz or 96 kHz
- Up to 24 tracks at 176.4 kHz or 192 kHz

Pro Tools Hardware Overview

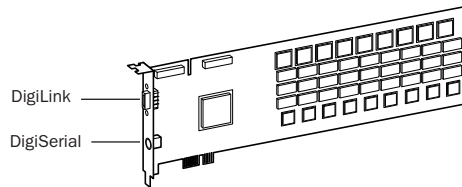
This section describes each hardware component of a Pro Tools|HD system. The number of Pro Tools|HD cards in your system will differ depending on your system configuration.

Pro Tools|HD (for PCIe) Hardware

Accel Core (for PCIe) Card

All Pro Tools|HD (for PCIe) systems include an *Accel Core (for PCIe)* card.

The Accel Core (for PCIe) card provides up to 96 tracks of direct-to-disk recording and playback, as well as DSP power for mixing and plug-in processing. The Accel Core (for PCIe) card supports up to 24-bit and up to 192 kHz sessions.



Accel Core (for PCIe) card

DigiLink Port The Accel Core (for PCIe) card includes a single DigiLink port for connecting up to 32 channels of audio input and output to your Pro Tools|HD system.

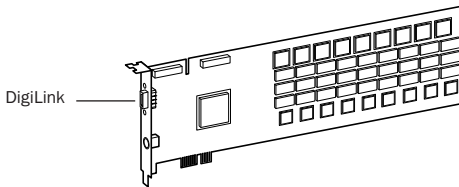
DigiSerial Port The DigiSerial port on the Accel Core (for PCIe) card is for connecting a Digidesign SYNC I/O. This connector is an 8-pin mini-DIN.

⚠ *The DigiSerial port on an Accel Core (for PCIe) card does not support Machine-Control connections.*

HD Accel (for PCIe) Card

The *HD Accel (for PCIe)* card is included in Pro Tools|HD 2 Accel (for PCIe) and Pro Tools|HD 3 Accel (for PCIe) systems. The HD Accel (for PCIe) card is an expansion card, and requires the presence of at least one Accel Core (for PCIe) card.

The HD Accel (for PCIe) card provides additional channels of direct-to-disk recording and playback, as well as additional DSP power for mixing and plug-in processing. The HD Accel (for PCIe) card supports sessions up to 24-bit and up to 192 kHz.



HD Accel (for PCIe) card

DigiLink Port The HD Accel (for PCIe) card includes a single DigiLink port for connecting up to 32 channels of audio input and output to your Pro Tools|HD system.

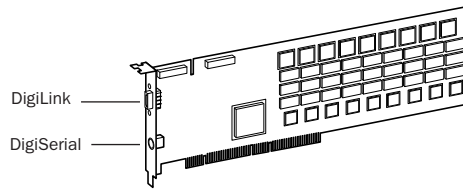
DigiSerial Port The DigiSerial port on the HD Accel (for PCIe) card does not offer any functionality.

Pro Tools|HD (for PCI) Hardware

HD Core (for PCI) Card

All Pro Tools|HD (for PCI) systems include an *HD Core (for PCI)* card.

The HD Core (for PCI) card provides up to 96 tracks of direct-to-disk recording and playback, as well as DSP power for mixing and plug-in processing. The HD Core (for PCI) card supports up to 24-bit and up to 192 kHz sessions.



HD Core (for PCI) card

DigiLink Port The HD Core (for PCI) card includes a single DigiLink port for connecting up to 32 channels of audio input and output to your Pro Tools|HD system.

DigiSerial Port The DigiSerial port on the HD Core (for PCI) card is for connecting a Digidesign SYNC I/O. This connector is an 8-pin mini-DIN.

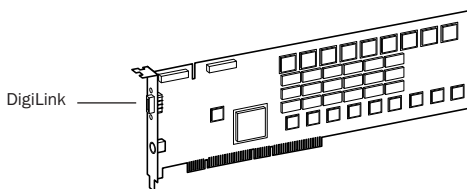
⚠ *The DigiSerial port on an HD Core (for PCI) card does not support MachineControl connections.*

⚠ *If your HD Core (for PCI) card has two DigiSerial ports, use the DigiSerial port closest to the DigiLink connector.*

HD Accel (for PCI) Card

The *HD Accel (for PCI)* card is included in Pro Tools|HD 2 Accel (for PCI) and Pro Tools|HD 3 Accel (for PCI) systems. The HD Accel (for PCI) card is an expansion card, and requires the presence of at least one HD Core (for PCI) card.

The HD Accel (for PCI) card provides additional tracks of direct-to-disk recording and playback, as well as additional DSP power for mixing and plug-in processing. The HD Accel (for PCI) card supports sessions up to 24-bit and up to 192 kHz.



HD Accel (for PCI) card

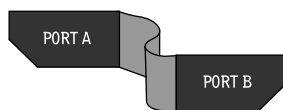
DigiLink Port The HD Accel (for PCI) card includes a single DigiLink port for connecting up to 32 channels of audio input and output to your Pro Tools|HD system.

DigiSerial Port The DigiSerial port on the HD Accel (for PCI) card does not offer any functionality.

TDM FlexCable

The TDM FlexCable is used to connect a pair of cards in your Pro Tools system so they can share data along the TDM bus. One FlexCable comes with each expansion card.

⚠ *The TDM FlexCable is a flexible printed circuit board with delicate traces. Do not overbend, twist, or pinch the cable. Doing so may cause unpredictable behavior in Pro Tools as well as harm to your system.*



TDM FlexCable

Audio Interfaces

To record and play audio you must have at least one of the following Digidesign audio interfaces:

192 I/O Audio Interface

- Supports sample rates up to 192 kHz. (At least one 192 I/O™ or 192 Digital I/O must be connected to your Pro Tools|HD system for 192 kHz recording, processing, and playback.)
- Supports both analog and digital connections, including AES/EBU, S/PDIF, TDIF, and ADAT Optical:
 - Digital (Digital I/O Card): 8 channels, DB-25 (AES/EBU and TDIF), or one pair of Lightpipe (ADAT Optical) connectors. Expandable up to 16 channels digital I/O with the addition of the 192 Digital expansion card.
 - Analog: 8 channels, DB-25 (balanced) connectors, inputs selectable between +4 dBu or –10 dBV, outputs +4 dBu only. Expandable up to 16 analog inputs or 16 outputs using an optional 192 AD or 192 DA expansion card, respectively.
 - Digital (Enclosure): 2 channels, XLR (AES/EBU) connectors; 2 channels RCA (S/PDIF) connectors.
 - Optical (Enclosure): 8 channels, one pair of Lightpipe (ADAT Optical) connectors (switchable to 2 channels, S/PDIF).
- Loop Sync In and Out for connecting Pro Tools|HD interfaces and peripherals
- External Clock In and Out receive or send 1x Word clock (configurable to 256x for Legacy support, see “Optional Legacy I/O Audio Interfaces” on page 7).

192 Digital I/O Audio Interface

- Supports sample rates up to 192 kHz. (At least one 192 I/O or 192 Digital I/O must be connected to your Pro Tools|HD system for 192 kHz recording, processing, and playback.)
- Supports digital connections, including AES/EBU, S/PDIF, TDIF, and ADAT Optical:
 - Digital (2 Digital I/O Cards): 16 channels, DB-25 (AES/EBU and TDIF), or two pairs of Lightpipe (ADAT Optical) connectors.
 - Digital (Enclosure): 2 channels, XLR (AES/EBU) connectors; 2 channels RCA (S/PDIF) connectors.
 - Optical (Enclosure): 8 channels, one pair of Lightpipe (ADAT Optical) connectors (selectable to 2 channels, S/PDIF).
- Loop Sync In and Out for connecting Pro Tools|HD interfaces and peripherals
- External Clock In and Out receive or send 1x Word clock (configurable to 256x for Legacy support, see “Optional Legacy I/O Audio Interfaces” on page 7).

96 I/O Audio Interface

- Supports sample rates up to 96 kHz.
- Supports analog and digital connections, including AES/EBU, S/PDIF, and ADAT optical:
 - Analog: 8 channels, 1/4-inch TRS (balanced or unbalanced) connectors, +4 dBu or -10 dBV
 - Digital: 2 channels, XLR (AES/EBU) connectors; 2 channels, RCA (S/PDIF) connectors
 - Optical: 8 channels, one pair of Lightpipe (ADAT Optical) connectors (switchable to 2 channels, S/PDIF)
 - External Clock In and Out receive or send 1x Word clock (configurable to 256x for Legacy support, see “Optional Legacy I/O Audio Interfaces” on page 7)

96i I/O Audio Interface

- Supports sample rates up to 96 kHz
- 16 discrete channels of input, and 2 channels of output, with 4-segment LED meters on each channel. Audio inputs and outputs include:
 - 16 channels of 24-bit, 96-kHz capable analog input, with adjustable input sensitivity
 - 2 channels of 24-bit, 96-kHz capable analog output, with selectable operating level
 - 2 channels of 24-bit, 96 kHz-capable digital S/PDIF RCA input and output
- Loop Sync In and Out for connecting Pro Tools|HD interfaces and peripherals
- External Clock In and Out receive or send 1x Word clock

Optional Legacy I/O Audio Interfaces

For additional input and output channels, older Digidesign audio interfaces (or *Legacy I/Os*) can be connected to the 192 I/O, 192 Digital I/O, or 96 I/O™ (the 96i I/O™ does not support Legacy interfaces). The following supported legacy interfaces can only be used with 44.1 kHz or 48 kHz sessions:

888|24 I/O Audio Interface

- Analog: 8 channels, XLR (balanced or unbalanced) connectors, selectable between +4 dBu or -10 dBV
- Digital: 8 channels, XLR (AES/EBU) connectors; 2 channels, RCA (S/PDIF) connectors

882|20 I/O Audio Interface

- Analog: 8 channels, 1/4-inch TRS (balanced or unbalanced) connectors, selectable between +4 dBu and -10 dBV
- Digital: 2 channels, RCA (S/PDIF) connectors

1622 I/O Audio Interface

- Analog: 16 input channels and 2 output channels, 1/4-inch TRS (balanced or unbalanced) connectors. Inputs are selectable from +4 dBu to -10 dBV line levels and higher in 2 dB gain steps; outputs are selectable between +4 dBu or -10 dBV.
- Digital: 2 channels, RCA (S/PDIF) connectors.

Digidesign 24-bit ADAT Bridge I/O

- Optical: 16 channels, a pair of Lightpipe (ADAT) connectors.
- Analog output: 2 channels, 1/4-inch TRS (balanced) connectors, selectable between +4 dBu and -10 dBV.
- Digital: 2 channels, XLR (AES/EBU); 2 channels RCA (S/PDIF) connectors.

System Requirements

Pro Tools|HD system hardware and supported audio interfaces can be used with a Digidesign-qualified Windows or Mac computer running Pro Tools HD software.

For complete system requirements, visit the Digidesign website (www.digidesign.com).


Compatibility Information

Digidesign can only assure compatibility and provide support for hardware and software it has tested and approved.

For a list of Digidesign-qualified computers, operating systems, hard drives, and third-party devices, refer to the Digidesign website (www.digidesign.com).

MIDI Requirements


USB MIDI interfaces work effectively with Pro Tools systems on Windows or Mac. Serial MIDI interfaces are supported on Windows systems only.

 *Only USB MIDI interfaces are compatible with Pro Tools systems on Mac OS X. Modem-to-serial port adapters and serial MIDI devices are not supported.*

For a list of supported adapters, refer to the Digidesign website (www.digidesign.com).


Hard Drive Requirements

For optimal audio recording and playback, all Pro Tools|HD systems require one or more Digidesign-qualified drives.

 *For general hard drive maintenance and configuration information, see Appendix B, “Hard Drive Configuration and Maintenance.”*


If you are using one or more SCSI drives, refer to Appendix A, “Connecting SCSI Drives.”

If you are using an ATA/IDE or FireWire hard drive, initialize your drive with Windows Disk Management (Windows) or the Disk Utility application included with Apple System software (Mac).

 *For more information, see Appendix C, “Hard Drive Configuration and Maintenance.”*

Avoid Recording to the System Drive

Recording to your system drive is not recommended. Recording and playback on a system drive may result in lower track counts and fewer plug-ins.

 *Digidesign does not recommend recording to a system drive. Record to a system drive only when necessary.*

Digidesign Registration

Review the enclosed Digidesign Registration Information Card and follow the instructions on it to quickly register your purchase online. Registering your purchase is the only way you can be eligible to receive complimentary technical support and future upgrade offers. It is one of the most important steps you can take as a new user.


About the Pro Tools Guides

In addition to any printed guides or documentation included with your system, PDF versions of Pro Tools guides and Read Mes are installed automatically with Pro Tools.

The main guides (such as the *Pro Tools Reference Guide* and the *Pro Tools Menus Guide*) are accessible from the Pro Tools Help menu.

- *Pro Tools Reference Guide* explains Pro Tools software in detail.
- *Pro Tools Menus Guide* covers all the Pro Tools on-screen menus.
- *DigiRack Plug-Ins Guide* explains how to use the RTAS and AudioSuite plug-ins included with Pro Tools.
- *Digidesign Plug-Ins Guide* explains how to use optional Digidesign plug-ins.
- *Pro Tools Shortcuts* lists keyboard and Right-click shortcuts for Pro Tools.

These guides and other guides are installed on your startup drive during installation. To view or print PDF guides, you can use Adobe Reader or Apple Preview (Mac only).


 *Printed copies of the Pro Tools Reference Guide and other guides in the Pro Tools guide set can be purchased separately from the DigiStore (www.digidesign.com).*


Conventions Used in This Guide


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


Convention	Action
File > Save	Choose Save from the File menu
Control+N	Hold down the Control key and press the N key
Control-click	Hold down the Control key and click the mouse button
Right-click	Click with the right mouse button

The following symbols are used to highlight important information:

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

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

 *Shortcuts show you useful keyboard or mouse shortcuts.*

 *Cross References point to related sections in this guide and other Digidesign guides.*

About www.digidesign.com

The Digidesign website (www.digidesign.com) is your best source for information to help you get the most out of your Pro Tools system. The following are just a few of the services and features available.

Registration Register your purchase online. See the enclosed Digidesign Registration Information Card for instructions.

Support Contact Digidesign Technical Support or Customer Service; download software updates and the latest online documentation; find the latest system requirements; search the online Answerbase; join the worldwide Pro Tools community on the Digidesign User Conference.

Training and Education Become a certified Pro Tools Operator or Expert; study on your own using courses available online, or find out how you can learn in a classroom setting at a certified Pro Tools Training Center.

Products and Developers Learn about Digidesign products; download demo software; learn about our Development Partners and their plug-ins, applications, and hardware.


News and Events Get the latest news from Digidesign; sign up for a Pro Tools demo.

To learn more about these and other resources available from Digidesign, visit the Digidesign website (www.digidesign.com).

chapter 2

Windows Installation

This chapter contains information for Windows systems only. If you are installing Pro Tools on a Mac computer, see Chapter 3, “Mac Installation.”

 *Before installing this version of Pro Tools, refer to the Read Me information included on the Pro Tools Installer disc.*


Installation Overview

Installation of a Pro Tools|HD system on a Windows computer includes the following steps:

- 1 “Configuring Your Computer” on page 11.
- 2 “Windows System Optimization” on page 13.
- 3 “Installing Pro Tools Hardware” on page 17.
- 4 “Installing Pro Tools HD Software” on page 23.
- 5 “Connecting Audio Interfaces” on page 19.
- 6 “Launching and Configuring Pro Tools” on page 39.
- 7 “Connecting Your Studio” on page 57.

Configuring Your Computer


To ensure optimum performance with Pro Tools|HD, configure your computer before installing Pro Tools hardware and software.

 *Before you make any changes to your computer’s system settings, make a backup copy of your registry (where many of these essential settings are stored). By doing so, you will be able to restore your system’s original settings if problems arise. Consider using a disk recovery utility such as Norton Ghost for additional security. See your Windows XP documentation for details.*

Configuring the System BIOS

BIOS (Basic Input/Output System) parameters vary depending on the make and model of the computer. Refer to the documentation that came with your computer for details.

The names and options that appear in your computer’s system BIOS may differ slightly from those described in this section.

 *If your computer does not have the BIOS configuration options included in this section, or if you do not feel comfortable changing system BIOS parameters, consult a Windows system administrator, computer dealer, or manufacturer for assistance.*

To modify your computer's system BIOS:

- 1 Start or restart the computer.
- 2 While the computer is starting up, enter BIOS Setup by pressing the appropriate key (usually indicated in the startup message) on the computer keyboard. The F1, F2, or the Delete keys are commonly used.
- 3 In the appropriate page of the BIOS Setup, disable PCI Parity. If the PCI Parity option isn't available on your computer, skip this step.
- 4 If you will be using SCSI drives or devices, and your computer is equipped with built-in SCSI hardware, enable SCSI support. SCSI support parameters are typically found on the Devices & I/O Options page of the BIOS setup utility. If you do not have built-in SCSI hardware and are using a SCSI host bus adapter (HBA) card instead, you do not need to enable SCSI support.
- 5 Disable Power Management, if present.
- 6 Enable PCI Dynamic Bursting, if present.
- 7 Save the new BIOS settings.
- 8 Exit BIOS setup and restart the computer.

Configuring the SCSI BIOS

If you are using SCSI drives or devices, you must modify the settings of your built-in SCSI hardware or SCSI host bus adapter card. This allows SCSI hard drives and devices to work properly with Pro Tools. This procedure varies on different computers. Refer to the documentation that came with your computer.

Modifying the Computer's SCSI BIOS

To modify your computer's SCSI BIOS:

- 1 Start or restart the computer.
- 2 While the computer is starting up, when the text message regarding the SCSI BIOS appears, press the key combination listed on the screen to enter the SCSI BIOS setup utility.
- 3 Refer to your SCSI host bus adapter card documentation to set the following parameters:
 - For each SCSI ID and SCSI channel connected to your audio drives, set the Maximum Sync Transfer Rate parameter to 20 MB/sec for the ATTO EPCI-DC, or to Ultra 160 for Ultra 160 cards.
 - If you are using an ATTO host bus adapter card, change the PCI Burst Size to 128 Bytes and the Burst Length Selection Timeout to 16 ms (UL3D only).
- 4 Save the new SCSI BIOS settings.
- 5 Exit SCSI BIOS setup and restart the computer.

Updating the ATTO SCSI BIOS

(ATTO SCSI HBA Cards Only)


If you are using an ATTO SCSI HBA card, you may need to update its SCSI BIOS. When starting your computer, you will see the version number of the currently installed ATTO SCSI BIOS. If it is not version 1.68 or higher, you must update the SCSI BIOS.




The following procedure uses a floppy disk as a DOS boot disk. You can use another type of bootable media if available.

To update the BIOS on the ATTO SCSI card:

- 1 Insert a PC-formatted floppy disk in your floppy drive (this needs to be a DOS boot disk).
- 2 Copy the DOS folder from the ATTO folder on the Pro Tools Installer disc to the floppy disk.
- 3 Shut down the computer.
- 4 Disconnect any hard drives connected to the SCSI card.
- 5 Start the computer with the floppy disk in the floppy drive.
- 6 From within DOS, change directory to the DOS/UTILITY folder and run *flash.bat*.
- 7 When prompted with the Update MAC, PC Setup Program message, type Y for Yes and press Enter.


 *The SCSI BIOS update may take a few minutes. Do not interrupt this process or your system may be damaged.*

 *For more information, see the *flash.txt* in the DOS/UTILITY folder.*

- 8 When updating is finished, remove the floppy disk and restart the computer.

Installing SCSI Drivers

For Pro Tools to run at maximum efficiency with SCSI Host Bus Adapters and SCSI drives, install a Digidesign approved SCSI driver.

 *For a list of Digidesign approved computers and supported SCSI driver versions, see the Digidesign website (www.digidesign.com).*

Installing the ATTO SCSI Driver

The full name of the ATTO driver is:

- ATTO ExpressPCI

To install the ATTO SCSI driver:


- 1 Start or restart the computer.
- 2 Insert the Pro Tools Installer disc in your CD/DVD drive.
- 3 In the Additional Files\ATTO\Driver 1.68 folder, locate and click Setup.exe.
- 4 Follow the on-screen instructions to update the driver on your SCSI Host Bus Adapter.
- 5 When Setup is finished, restart the computer.

Windows System Optimization

Before configuring your computer, make sure you are logged in as an Administrator for the account where you want to install Pro Tools. For details on Administrator privileges, refer to your Windows documentation.

Required Optimizations

To ensure optimum performance with Pro Tools, configure the following settings before you install Pro Tools software.

 *When you are finished changing Windows system settings, restart your computer.*

Enabling DMA

Enabling your computer's DMA (Direct Memory Access) frees up CPU bandwidth so the computer can do other Pro Tools tasks.

In most cases the DMA option will already be set correctly, as Windows XP detects and activates DMA mode by default.

To enable DMA for any IDE hard drives:

- 1 Choose Start > Control Panel.
- 2 In Classic View, double-click System.
- 3 Click the Hardware tab.
- 4 Under Device Manager, choose Device Manager.
- 5 In the Device Manager window, double-click IDE ATA/ATAPI controllers, then double-click the Primary IDE Channel for your IDE hard drive.
- 6 Click the Advanced Settings tab.
- 7 For each device, set the Transfer Mode to "DMA if available," and click OK.
- 8 Repeat steps 5–7 for any additional IDE Channels.
- 9 Close the Computer Management window.

Disabling System Standby and Power Management

When using Pro Tools, the Windows System Standby power scheme must be set to Always On. This helps prevent long record or playback passes from stopping due to system resources powering down.

To configure Windows Power Management:

- 1 Choose Start > Control Panel.
- 2 Double-click Power Options.
- 3 Click the Power Schemes tab.
- 4 From the Power Schemes pop-up menu, select Always On.
- 5 Click OK.

This sets System Standby, System Hibernate, and "Turn off hard disks" to Never.



On AMD processors, be sure to check and disable Cool N'Quiet in the System BIOS (in the Cool & Quiet Configuration section). Refer to the manufacturer's documentation for instructions on disabling this power option, if necessary.

Disabling ClearType Font Smoothing

When using Pro Tools, the Effects "Clear Type" setting must be disabled.

To disable ClearType font smoothing:

- 1 Choose Start > Control Panel.
- 2 Double-click Display.
- 3 Click the Appearance tab.
- 4 Click Effects.
- 5 Deselect "Use the following method to smooth edges of screen fonts."
- 6 Click OK to save your settings and close the Effects dialog.
- 7 Click OK.
- 8 Restart the computer.

Recommended Optimizations


Pro Tools can also be affected by other software and hardware drivers installed on your computer. It is recommended (but not required) that you do the following:


- Avoid running any unneeded programs at the same time as Pro Tools.
- Turn off any software utilities that run in the background, such as Windows Messenger, calendars, and disk maintenance programs.
- Turn off any nonessential USB devices while running Pro Tools.
- If your video display card supports it, enable Bus Mastering in the manufacturer's Control Panel. Refer to the manufacturer's instructions for details.
- If your computer is connected to a network, make sure that all mapped network drives are available. If necessary, unmap any network drives that are not available.

Re-enabling Hyper-Threading

Pro Tools 7 takes advantage of the added processing power of computers that have multiple processors, or that feature multi-core processing or hyper-threading, for RTAS processing.

If you disabled Hyper-Threading to run a previous version of Pro Tools, re-enabling Hyper-Threading will allow your system to use this feature.

 Refer to your computer's documentation for steps on how to enter the computer's BIOS and disable Hyper-Threading.

 With Hyper-Threading enabled, certain RTAS Processors settings in Pro Tools may cause a decrease in performance. See "Disabling Hyper-Threading" on page 16.

Optional Optimizations

The following system optimizations may help Pro Tools perform better on some systems. It is recommended that you only try these optimizations if necessary, as they may disable or adversely affect the functionality of other programs on your system.

Disabling Network Cards

If applicable, disable any networking cards (other than a FireWire card that you might use to connect an external drive to your system).

To disable a network card:

- 1 Right-click My Computer and choose Manage.
- 2 Under System Tools, select Device Manager.
- 3 In the Device Manager window, double-click Network adapters, then double-click the Network Adapter card you want to disable.
- 4 Under the General tab, choose "Do not use this device (disable)" from the Device Usage pop-up menu, and click OK.
- 5 Close the Computer Management window.

Adjusting Processor Scheduling

To Adjust Processor Scheduling Performance:

- 1 Choose Start > Control Panel.
- 2 In Classic View, double-click System.
- 3 Click the Advanced tab.
- 4 Under the Performance section, click the Settings button.
- 5 In the Performance Options window, click the Advanced tab.

6 Under the Processor scheduling section, select the Background Services option.

7 Under the Memory Usage section, select the System cache option.

8 Click OK to close the Performance Options window.

9 Click OK to close the System Properties window.


10 Restart the computer for the changes to take effect.

Disabling Hyper-Threading

Pro Tools 7 takes advantage of the added processing power of computers that have multiple processors, or that feature multi-core processing or Hyper-Threading, for RTAS processing.

However, if you set the number of processors available for RTAS processing to 1 (in the Pro Tools Playback Engine dialog), some computers with hyperthreading capability may experience decreased performance.

If this occurs, you can increase the number of RTAS processors in the Playback Engine dialog, or you can disable hyper-threading on the computer.

 Refer to your computer's documentation for steps on how to enter the computer's BIOS and disable Hyper-Threading.

Disabling System Startup Items

The fewer items in use by your computer, the more resources are available for Pro Tools. Some startup applications may be consuming unnecessary CPU resources, and should be turned off.

If you disable any of the following startup items, do so carefully:

- Portable media serial number (required for applications that utilize a copy protection key)
- Plug and play
- Event log
- Cryptographic services
- DHCP Client, TCP/IP Net BIOS, and other networking-related items (unless the computer has no network or internet connection, in which case these items can be disabled)

To disable System Startup Items:

- 1** From the Start menu, choose Run.
- 2** Type "msconfig" and click OK. The System Configuration Utility opens.
- 3** Under the General tab, choose Selective Startup.
- 4** Deselect Load Startup Items and click OK.
- 5** Click Restart to restart the computer.
- 6** After restarting, the computer displays a System Configuration message. Check to see if Pro Tools performance has increased before you deselect the "Don't show this message again" option. If performance has not changed, run "msconfig" and return your computer Selective Startup back to Normal Startup. Alternatively, try disabling Startup items and non-essential processes individually.

Installing Pro Tools Hardware

Disabling Driver Signing Warnings

Before you install Pro Tools|HD cards, temporarily disable the Driver Signing warning option. This expedites and automates much of the installation process. If you do not temporarily disable this option, warning messages (that you are installing an unsigned driver) will appear for each DSP chip detected during software installation.

To disable the warning option:


- 1 Choose Start > Control Panel.
- 2 Double-click System.
- 3 Click the Hardware tab in the System Control Panel.
- 4 Click the Driver Signing button.
- 5 Select “Ignore—Install the software anyway and don’t ask for my approval.”
- 6 Click OK to close the Driver Signing Options window.
- 7 Click OK to close the System Properties window.
- 8 Turn the computer off.
- 9 Proceed to “Installing Pro Tools|HD Cards” on page 17.

Installing Pro Tools|HD Cards

This section shows how to install Pro Tools|HD cards into a Windows computer. To install cards into an expansion chassis, see the *Expanded Systems Guide*.

To install Pro Tools cards:

- 1 Turn off your computer and any peripherals. Leave your computer’s power cable plugged in so the computer is grounded.
- 2 Disconnect all cables attached to the computer (such as hard drives, displays, USB and FireWire devices) except for the power cable.
- 3 Open the computer case.
- 4 Remove the metal access port cover behind the slot you want to use by removing the screw and sliding the cover out from the access port.

 *Before handling any card, discharge static electricity from your clothes or body by touching a grounded metal surface, such as the power supply case inside your computer.*

- 5 Install the HD Core card in the first PCI slot.
- 6 If you are installing additional Pro Tools cards (or other cards), skip to the next step. If you have no additional cards to install, do the following:
 - Secure the card in place with the slot access port screw you removed earlier.
 - Close the computer case.
 - Skip to “Connecting Audio Interfaces” on page 19.

7 Install the first HD Accel card (if any) in the second PCI slot.

8 Install any remaining HD Accel cards in the remaining consecutive PCI slots.

9 Install any HD Process cards in the remaining consecutive PCI slots (64-bit or 32-bit).

10 If you are installing a SCSI host bus adapter (HBA) card, install it in the highest-numbered remaining slot.

11 Check to be sure that your cards are installed in the proper order for your system, starting with the lowest numeric slot:


- Display card for your computer monitor
- HD Core card
- HD Accel cards
- HD Process cards
- SCSI host bus adapter (HBA) card

12 Secure each card in place with the slot access port screws you removed earlier.

Connecting Pro Tools|HD Cards

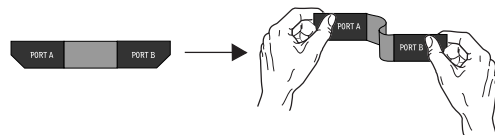
In systems that include more than one card, you must connect all the Pro Tools|HD cards to each other with TDM FlexCables.

Each Pro Tools|HD card has two ports along the top of the card, labeled *Port A* and *Port B*. The FlexCable has two connectors, also labeled Port A and Port B, to ensure proper connection. Data communication across multiple cards is achieved by connecting Port B of the first card to Port A of the next card with a TDM FlexCable.

 *The first FlexCable always goes from Port B on the core card to Port A on the first expansion card, as described in the following steps.*

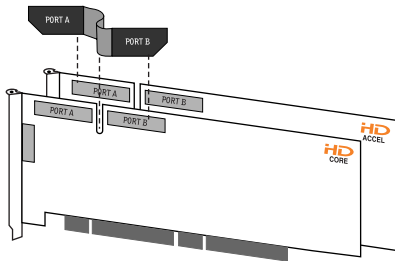
To connect Pro Tools|HD cards:

1 Shape the FlexCable before installing it on the card by holding the cable with its printed side facing you, and moving the Port B portion of the cable straight towards you and inwards, as shown below. Do not bend the cable more than you need to, as you may damage the traces in the cable.



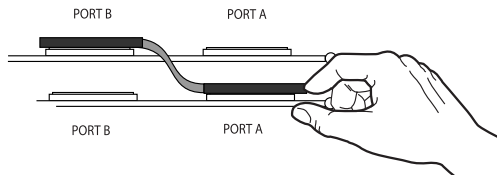
Preparing TDM FlexCable for installation

2 Slide the FlexCable into the notch of the *first* card, so that the Port B connector of the FlexCable can be aligned with Port B of the first card; and the Port A connector of the FlexCable can be aligned with Port A of the second card, as shown below.



Inserting TDM FlexCable

3 Connect the Port A connector of the FlexCable to Port A on the second card. Push gently but firmly until the cable is fully connected to the card. Attach the other end of the FlexCable (labeled Port B) to Port B on the first card.



Top view of two cards connected with TDM FlexCable

4 Verify the connection. Make sure the FlexCable ports seat flat against the sockets on the cards, and are firmly attached.

5 For systems with more than two cards, connect each additional card to its preceding card. Use FlexCables to connect card pairs together, as described above, until all cards are connected. (Each HD Accel or HD Process card is packaged with a FlexCable.)

6 Close the computer case.

Connecting Audio Interfaces

Each Pro Tools|HD audio interface supplies up to 16 channels of input and output to your system. Audio interfaces are connected directly to Pro Tools|HD cards, or through the Expansion ports on other Pro Tools|HD interfaces.

Each Pro Tools|HD card supports up to 32 channels. To get a full 32 channels of I/O from one card, you can connect, or *daisy-chain*, a second 16-channel Pro Tools|HD I/O to the first Pro Tools|HD I/O that is connected directly to the Pro Tools|HD card.

Pro Tools|HD supports up to a maximum of ten 192 I/Os, 192 Digital I/Os, or 96 I/Os. Up to five 96i I/Os can be used simultaneously.

For examples of connecting multiple I/Os, see Figure 1 and Figure 2 on page 21.

⚠ *Pro Tools|HD audio interfaces need room at their sides to maintain proper air flow for cooling. Do not block the sides of the unit or disconnect the internal fan. If the units are rack-mounted in a case, remove the case lids or doors before operating the system. Failure to do so can result in the units overheating very quickly, which can permanently damage sensitive components.*

Legacy audio interfaces can also be connected to Pro Tools|HD interfaces. See “Connecting an Additional 16 Channels of Audio with Legacy Audio Interfaces” on page 22.

To connect Pro Tools|HD audio interfaces:

1 If you are using a single 192 I/O, 192 Digital I/O, 96 I/O, or 96i I/O, connect its Primary Port to the HD Core card with the DigiLink cable provided with the card. You must attach at least one 192 I/O, 192 Digital I/O, 96 I/O, or 96i I/O to your system in order for Pro Tools to launch.

▲ *If you have at least one 192 I/O or 192 Digital I/O in your system configuration, it must be connected to the HD Core card as the primary interface.*

2 Connect additional Pro Tools|HD audio interfaces to subsequent Digidesign audio cards, or daisy-chain the interfaces (by connecting the Primary Port of the secondary interface to the Expansion Port of the primary interface).

If you are connecting both 192 I/O (or 192 Digital I/O) and 96 I/O audio interfaces to your system, connect the 192 I/O (or 192 Digital I/O) to your HD Core card, followed by any additional 192 I/O (or 192 Digital I/O) interfaces connected to subsequent cards. Then connect 96 I/O interfaces to subsequent cards, or to other interfaces, then connect 96i I/O interfaces.

You can also connect a single Pro Tools|HD interface to each Pro Tools|HD card in your system using the provided DigiLink cables. (However, there is no advantage to this configuration over daisy-chaining interfaces.)

Connecting Loop Sync

If you are using two or more Pro Tools|HD audio interfaces or a SYNC I/O peripheral, Loop Sync must be connected to maintain proper clock among the devices.

To make Loop Sync connections:

1 Connect the Loop Sync Out of each interface to the Loop Sync In of the next interface with the BNC cables included in your I/O packaging.

2 Connect the Loop Sync Out of the last interface to the Loop Sync In of the primary interface or SYNC I/O peripheral.

Connecting Legacy Audio Interfaces

If you are connecting a Digidesign Legacy audio interface, continue with “Connecting an Additional 16 Channels of Audio with Legacy Audio Interfaces” on page 22.

▲ *The 96i I/O does not support Legacy I/O.*

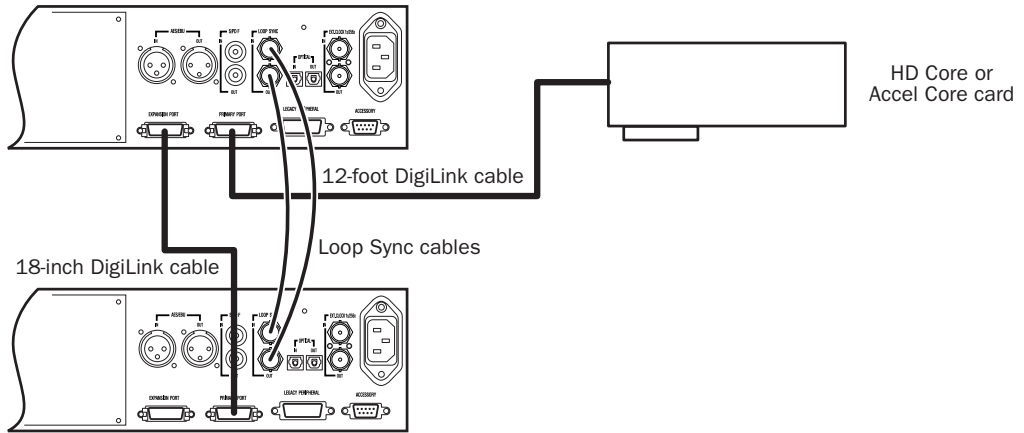


Figure 1. Two 96 I/Os (32-channel system)

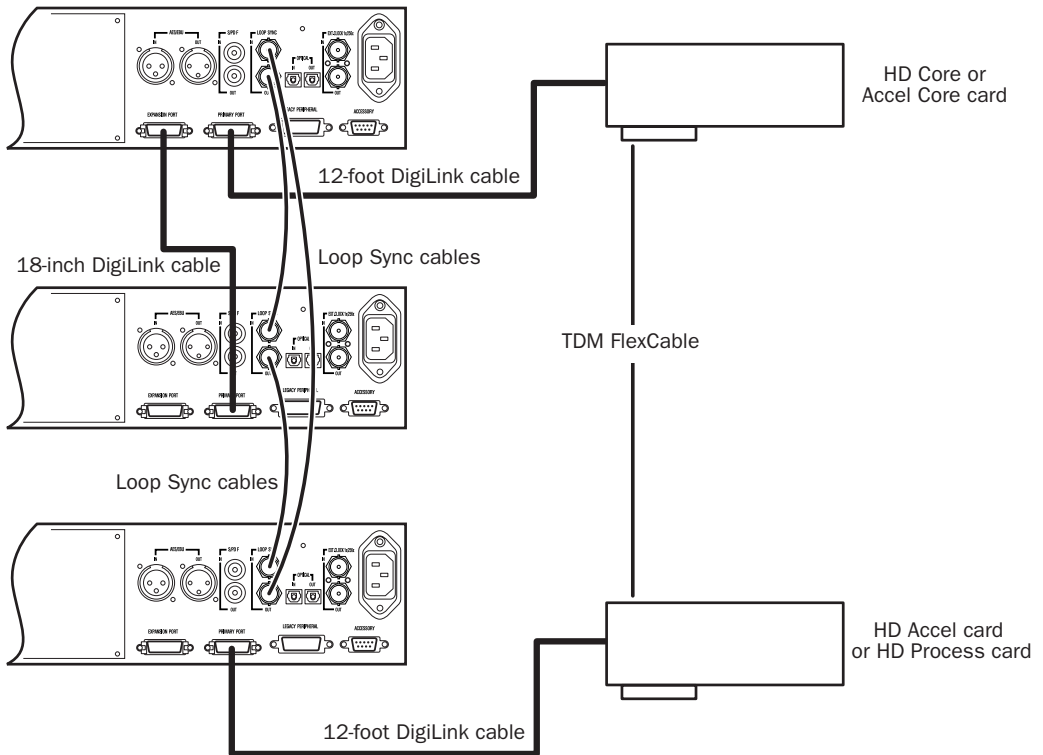


Figure 2. Three 96 I/Os (48-channel system)

Connecting an Additional 16 Channels of Audio with Legacy Audio Interfaces

Each 192 I/O, 192 Digital I/O, and 96 I/O can support 16 channels of audio to and from Digi-design Legacy I/Os. (The 96i I/O does not support Legacy I/O.) Legacy I/Os include the 888|24 I/O™, 882|20 I/O™, 1622 I/O™, and the 24-bit ADAT Bridge I/O™.

⚠ *The original 888 I/O and 882 I/O interfaces are not supported with Pro Tools|HD.*

To connect Digidesign Legacy audio interfaces:

1 Connect the “MIX card” end of the peripheral cable that came with your Legacy audio interface (60-pin side) to the Legacy Port on the primary Pro Tools|HD audio interface. Connect the other end to the Computer Port on the Legacy audio interface.

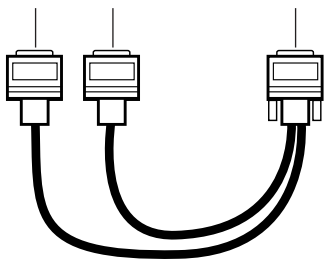
2 Do one of the following:

- Connect any additional Legacy audio interfaces in the same manner, to Pro Tools|HD audio interfaces connected directly to HD cards.

– or –

- If you are using a Y cable (Legacy 16-channel peripheral cable adapter), connect this to the Legacy port first, then connect the audio interface peripheral cables to Port A and Port B of the Y cable.

“A” to first Legacy I/O “B” to second Legacy I/O To Legacy Port on Pro Tools|HD audio interface



Optional 16-channel peripheral cable adapter

3 To properly clock the Legacy audio interface, connect the Ext. Clock output port on the Pro Tools|HD I/O to the Slave Clock IN on the Legacy audio interface. The Legacy audio interface will switch to Slave mode once the proper clock is outputting from the Pro Tools|HD I/O. Always use the Ext. Clock Out port of the same I/O to which the Legacy audio interface is attached.


If you are using the Y cable to connect multiple MIX audio interfaces, you must also connect the Slave Clock Out of the first Legacy interface to the Slave Clock In of the second Legacy interface with the provided BNC cable. You cannot clock more than two MIX audio interfaces from a single Pro Tools|HD audio interface. If you have a third MIX audio interface, supply its 256x clock from the Pro Tools|HD I/O to which its 60-pin cable is attached (either your second audio interface, or directly to an HD Accel or HD Process card).

⚠ *To ensure the proper functioning of Legacy audio interfaces (such as an 888|24 I/O or 882|20 I/O), launch Pro Tools and initialize the Legacy audio interfaces in the Hardware Setup dialog before turning them on (See “Configuring Legacy Audio Interfaces” on page 53). Then quit Pro Tools and shut down your computer. When relaunching your Pro Tools system, turn on your Legacy audio interfaces first and allow them to finish booting before turning on your Pro Tools|HD audio interfaces, and then your computer.*

⚠ *Before you turn on and configure your Legacy audio interfaces, turn down the volume of output devices. Very loud digital noise may be emitted before the Legacy audio interface is initialized.*


Installing Pro Tools HD Software

After your Pro Tools|HD hardware is installed and connected, you are ready to install Pro Tools software.

 *Windows will display several messages during installation that can be ignored, including multiple “Found New Hardware” dialogs and “A Problem Occurred During Hardware Installation.”*

To install Pro Tools HD software:

1 If you have Media Station|PT or Media Station|V10 installed on your system, uninstall it before proceeding.

 *For details on uninstalling Media Station|PT or Media Station|V10, see the Avid Video Peripherals Guide.*

2 Start Windows, logging in with Administrator privileges. For details on Administrator privileges, refer to your Windows documentation.

3 Wait for the Found New Hardware Wizard dialog to appear and leave it open: Do not click Next.

4 Insert the Pro Tools Installer disc in your CD/DVD drive.

5 On the Installer disc, locate and open the Pro Tools Installer folder.

6 Double-click the Setup icon.

7 Follow the on-screen instructions to proceed with installation.

8 Select the install location. For maximum reliability, install Pro Tools on your startup drive.

9 Click Next.

10 Select the Pro Tools application for installation.

11 You can also select from a list of optional items to install along with Pro Tools.

Mac HFS+ Disk Support Option This option lets your Pro Tools system read, write, record, and play back using Mac-formatted HFS+ disks. HFS+ disks are commonly referred to as Mac OS Extended disks.

Avid Video Engine The Avid Video Engine is required to use Pro Tools with Avid video peripherals such as the Avid Mojo or the Digidesign AVoption|V10.

DigiTranslator DigiTranslator™ is a software option for Pro Tools that lets you convert and exchange OMF and AAF sequences and MXF files directly in the Pro Tools application. This option is purchased separately.


MachineControl Digidesign MachineControl™ is a software option that lets you control external audio/video devices from Pro Tools using serial 9-pin protocols. This option is purchased separately.

Command|8 Controller and Driver The Command|8 Driver is required if you are using the Digidesign Command|8 control surface.

MP3 Export Option The MP3 Export Option lets you export MP3 files from Pro Tools. This option is purchased separately.

12 Click Next.


13 Select your work environment. This loads an initial set of Pro Tools Preferences that include some of the more popular settings for post production, audio, or audio with MIDI.

 *Preference settings can be customized at any time in Pro Tools. See the Pro Tools Reference Guide for more information.*

14 Click Next.


15 Select whether to install the Surround Mixer plug-in. This plug-in is required for mixing, mastering, and monitoring in surround.

- Select “Yes – Monitor in Pro Tools Film Format” if your monitoring is configured for Film Format surround.
- Select “Yes – Monitor in ProControl (DTS Format)” if you are using a ProControl dedicated controller.
- Select “No – Stereo mixing only” if your monitoring is configured for Stereo.

 *AFL/PFL Solo modes require the Surround Mixer plug-in. See the Pro Tools Reference Guide for more information.*

16 Click Next.

17 Click Install.


 *Windows will display several messages during installation that can be ignored, including multiple “Found New Hardware” dialogs and “A Problem Occurred During Hardware Installation.”*

18 Wait for the installer to finish installing all software components, drivers, and PACE System files before proceeding to the next step.

19 When installation is complete, click Finish.


Installing QuickTime

QuickTime is required for Pro Tools if you plan to include movie files, or import MP3 or MP4 (AAC) files in your sessions. QuickTime for Windows XP is available as a free download from the Apple website.

 *For information on which version of QuickTime is compatible with your version of Pro Tools, visit the compatibility pages of the Digidesign website (www.digidesign.com).*


To install QuickTime:

- 1** Visit www.apple.com and download the QuickTime for Windows installer application to your computer.
- 2** Double-click the QuickTime installer application and follow the on-screen installation instructions.
- 3** Restart your computer.

 *If you turned off Driver Signing Warning on your computer, be sure to enable it once Pro Tools hardware and software have been installed.*

Additional Software on the Pro Tools Installer Disc

The Pro Tools Installer disc provides additional software for your system, including audio drivers (for playing other audio applications through your Digidesign hardware) and a Pro Tools demo session.

 *Refer to your Pro Tools Installer disc for additional software and installers.*


Windows Audio Drivers

The Digidesign ASIO Driver and WaveDriver Windows System Audio Driver let you use your Digidesign hardware interface with third-party applications that support the ASIO Driver or WaveDriver MME (Multimedia Extension).

The Digidesign ASIO Driver and WaveDriver for your Digidesign hardware are automatically installed when you install Pro Tools.


Digidesign ASIO Driver

The Digidesign ASIO (Audio Sound Input Output) Driver is a single-client multichannel sound driver that allows third-party audio programs that support the ASIO standard to record and play back through Digidesign hardware.

 *For detailed information on configuring the Digidesign ASIO Driver, see the Windows Audio Drivers Guide.*


Digidesign WaveDriver

The Digidesign WaveDriver Windows System Audio Driver is a single-client, stereo sound driver that allows third-party audio programs that support the WaveDriver MME (Multimedia Extension) standard to play back through Digidesign hardware.

 *For detailed information on configuring the Digidesign WaveDriver, see the Windows Audio Drivers Guide.*

Standalone Digidesign ASIO Driver

Digidesign Windows Audio Drivers can be installed on Windows systems that do not have Pro Tools software installed. Use the standalone version of the Digidesign Windows Audio Drivers installer (Digidesign Audio Drivers Setup.exe), which is available on the Pro Tools Installer disc.

 *For information on installing and configuring the standalone version of the Digidesign Windows Audio Drivers, see the Windows Audio Drivers Guide.*

Pro Tools Demo Session

The Pro Tools Installer disc includes a separate demo session installer. You can use this session to verify that your system is working.

To install the demo session:

- 1 Insert the Pro Tools Installer disc into your CD/DVD drive.
- 2 From your CD/DVD drive, locate the Additional Files/Pro Tools Demo Session Installer folder.
- 3 Double-click Setup.exe.
- 4 Set the install location to your audio drive and click Install.
- 5 When installation is complete, click OK.

Removing Pro Tools

If you need to remove Pro Tools software from your computer, you can use the Add or Remove Programs command.

To remove Pro Tools from your computer:

- 1 Choose Start > Control Panel.
- 2 Launch Add or Remove Programs.
- 3 From the Currently installed programs list, select Digidesign Pro Tools.
- 4 Click the Change/Remove button.
- 5 Follow the on-screen instructions to remove Pro Tools.

chapter 3

Mac Installation

This chapter contains information for Mac systems only. If you are installing Pro Tools on a Windows computer, see Chapter 2, “Windows Installation.”

▲ *Before installing this version of Pro Tools, refer to the Read Me information included on the Pro Tools Installer disc.*

Installation Overview

Installation of a Pro Tools|HD system on a Mac includes the following steps:

- 1 “Mac System Optimization” on page 27.
- 2 “Installing Pro Tools Hardware” on page 28.
- 3 “Installing Pro Tools HD Software” on page 36.
- 4 “Connecting Audio Interfaces” on page 32.
- 5 “Launching and Configuring Pro Tools” on page 39.
- 6 “Connecting Your Studio” on page 57.

Mac System Optimization

To ensure optimum performance with Pro Tools, configure your computer before installing Pro Tools hardware and software.

Before configuring your computer, make sure you are logged in as an Administrator for the account where you want to install Pro Tools. For details on Administrator privileges in Mac OS X, refer to your Apple OS X documentation.

▲ *Do not use the Mac OS X automatic Software Update feature, as it may upgrade your system to a version of Mac OS that has not yet been qualified for Pro Tools. For details on qualified versions of Mac OS, see the Digidesign website (www.digidesign.com).*

Turning Off Software Update

To turn off the Software Update feature:

- 1 Choose System Preferences from the Apple menu and click Software Update.
- 2 Click Update Software and deselect Check for Updates.

Turning Off Energy Saver

To turn off the Energy Saver feature:

- 1 Choose System Preferences from the Apple menu and click Energy Saver.
- 2 Click Sleep and do the following:
 - Set the computer sleep setting to Never.
 - Set the display sleep setting to Never.
 - Deselect “Put the hard disk(s) to sleep when possible” option.

Setting Processor Performance

(Mac G5 Computers Only)

To set the Processor Performance:

- 1 Choose System Preferences from the Apple menu and click Energy Saver.
- 2 Click Options and set Processor Performance to Highest.

Disabling Spotlight Indexing

The Mac OS X Spotlight feature indexes files and folders in the background, affecting system performance. It is recommended that you disable Spotlight indexing before using Pro Tools.

To disable Spotlight indexing:

- 1 Choose System Preferences from the Apple menu and click Spotlight.
- 2 In the Spotlight window, click Privacy.
- 3 To prevent indexing of a drive, drag its icon from the desktop into the list.

Disabling the Spotlight Shortcuts

The Mac OS X Spotlight feature uses the same key commands Pro Tools uses to start recording (Command+Spacebar), and to record online (Command+Option+Spacebar). To retain use of these key commands in Pro Tools, these shortcuts must be disabled.

To disable the Spotlight keyboard shortcut:

- 1 Choose System Preferences from the Apple menu and click Spotlight.
- 2 Deselect “Spotlight menu keyboard shortcut” and “Spotlight window keyboard shortcut.”

Disabling Dashboard and Exposé

The Mac OS X Dashboard and Exposé features use function keys that are also used by Pro Tools (F9–F12). To retain use of these keys in Pro Tools, these features must be disabled.

To disable Dashboard and Exposé:

- 1 Choose System Preferences from the Apple menu and click Dashboard and Exposé.
- 2 In the pop-up menus for each keyboard shortcut, set the shortcut to “–” to disable it.

Enabling Journaling for Audio Drives

If you plan to use an audio drive that you used with a previous version of Pro Tools on the Mac, enable journaling.

To enable journaling:

- 1 Launch the Disk Utility application, located in Applications/Utilities.
- 2 Select the volume in the left column of the Disk Utility window.
- 3 Click Enable Journaling in the toolbar.

Installing Pro Tools Hardware

To install Pro Tools|HD hardware, you first install Pro Tools|HD cards, then for systems with more than one card, connect the cards with a TDM FlexCable.

Installing Pro Tools|HD Cards

This section shows how to install Pro Tools|HD cards into a Mac computer. To install cards into an expansion chassis, see the *Expanded Systems Guide*.

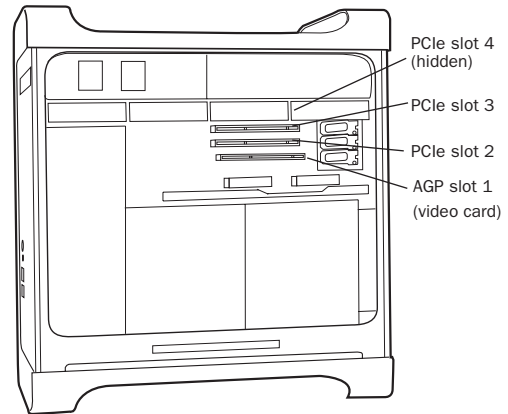
To install Pro Tools cards:

- 1 Turn off your computer and any peripherals. Leave your computer's power cable plugged in so the computer is grounded.
- 2 Disconnect all cables attached to the computer (such as hard drives, displays, USB and FireWire devices) except for the power cable.
- 3 Open the computer case.
- 4 Remove the metal access port cover behind the slot you want to use by removing the screw and sliding the cover out from the access port.

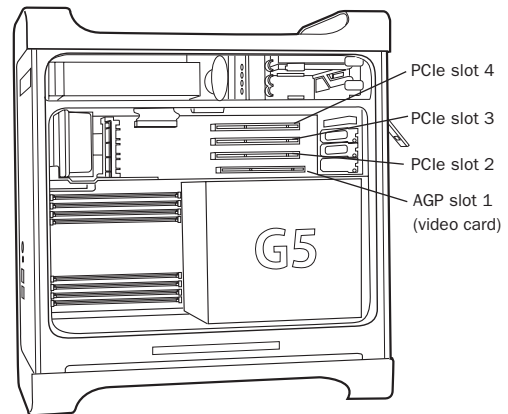
⚠ Before handling any card, discharge static electricity from your clothes or body by touching a grounded metal surface, such as the power supply case inside your computer.

- 5 Install the Accel Core (for PCIe) or HD Core (for PCI) card into the lowest-numbered slot in the computer. This will be the slot closest to the graphics card, as shown in the following examples:

Mac Pro and Power Mac G5 (PCI Express) The PCI Express-equipped Mac Pro and Power Mac G5 have three PCI Express (PCIe) slots (named slots 2, 3, and 4). The PCI Express slot numbers increase from *bottom to top* as you face the open computer case from the side. Install the Accel Core (for PCIe) card into PCI slot 2.

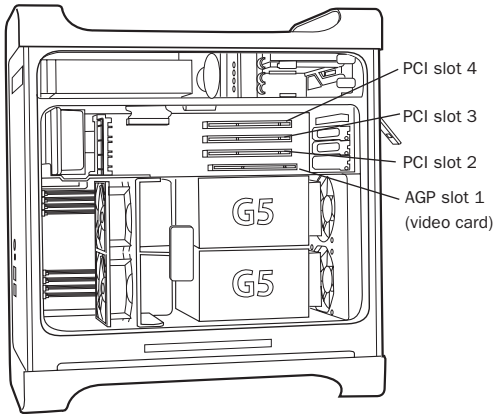


Mac Pro



Power Mac G5 (PCI Express equipped)

Power Mac G5 (PCI) The PCI-equipped Power Mac G5 has three PCI slots (named PCI slot 2, 3, and 4). Slot numbers increase from *bottom to top* as you face the open computer case from the side. Install the HD Core (for PCI) card into PCI slot 2.



Power Mac G5 (PCI equipped)

6 Install the first expansion card (if any) in the second slot (slot 3).

7 On Mac Pros, if you are installing a card into slot 4, do the following:

- Remove all SATA drive trays from the Mac Pro.
- Move the card into the area where the SATA trays were.
- Place the rear of the card first into the slot at the back of the PCIe slots.
- Maneuver the front of the card up and around; line it up with the PCIe slot and seat it.
- Replace the SATA drives.

8 If you are installing a SCSI host bus adapter (HBA) card, install it in the highest-numbered remaining slot.

9 Check to be sure that your cards are installed in the proper order for your system, starting with the lowest numeric slot:

- Pro Tools|HD (for PCIe) Systems
 - Display card for your computer monitor
 - Accel Core (for PCIe) card
 - HD Accel (for PCIe) cards
 - Digidesign-approved video capture card
 - SCSI host bus adapter (HBA) card
- Pro Tools|HD (for PCI) Systems
 - Display card for your computer monitor
 - HD Core (for PCI) card
 - HD Accel (for PCI) cards
 - HD Process (for PCI) cards
 - Digidesign-approved video capture card
 - SCSI host bus adapter (HBA) card

10 Secure each card in place with the slot access port screws you removed earlier.

Connecting Pro Tools|HD Cards

In systems that include more than one card, you must connect all the Pro Tools|HD cards to each other with TDM FlexCables.

Each Pro Tools|HD card has two ports along the top of the card, labeled *Port A* and *Port B*. The FlexCable has two connectors, also labeled Port A and Port B, to ensure proper connection. Data communication across multiple cards is achieved by connecting Port B of the first card to Port A of the next card with a TDM FlexCable.

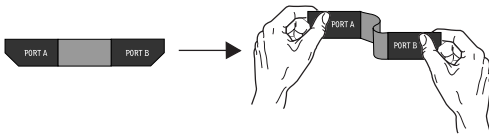


The first FlexCable always goes from Port B on the core card to Port A on the first expansion card, as described in the following steps.

The slot numbering in your computer determines whether you will be working right-to-left or left-to-right when connecting cards. Refer to the instructions below for your model of computer.

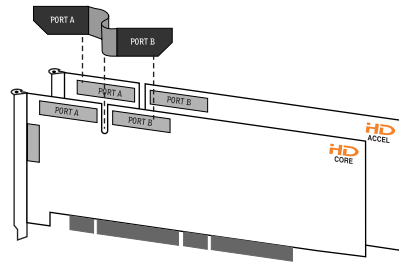
To connect Pro Tools|HD cards:

1 Shape the FlexCable before installing it on the card by holding the cable with its printed side facing you, and moving the Port B portion of the cable straight towards you and inwards, as shown below. Do not bend the cable more than you need to, as you may damage the traces in the cable.



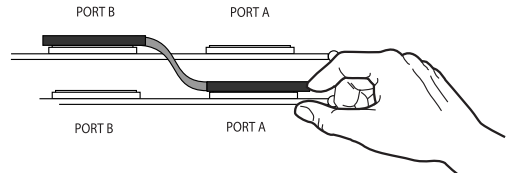
Preparing TDM FlexCable for installation

2 Slide the FlexCable into the notch of the *first* card, so that the Port B connector of the FlexCable can be aligned with Port B of the first card; and the Port A connector of the FlexCable can be aligned with Port A of the second card, as shown below.



Inserting TDM FlexCable

3 Connect the Port A connector of the FlexCable to Port A on the second card. Push gently but firmly until the cable is fully connected to the card. Attach the other end of the FlexCable (labeled Port B) to Port B on the first card.



Top view of two cards connected with TDM FlexCable

4 Verify the connection. Make sure the FlexCable ports seat flat against the sockets on the cards, and are firmly attached.

5 For systems with more than two cards, connect each additional card to its preceding card. Use FlexCables to connect card pairs together, as described above, until all cards are connected. (Each expansion card is packaged with a FlexCable.)

6 Close the computer case.

Connecting Audio Interfaces

Each Pro Tools|HD audio interface (except the 96i I/O) supplies up to 16 channels of input and output to your system. Audio interfaces are connected directly to Pro Tools|HD cards, or through the Expansion ports on other Pro Tools|HD interfaces.

Each Pro Tools|HD card supports up to 32 channels. To get a full 32 channels of I/O from one card, you can connect, or *daisy-chain*, a second 16-channel Pro Tools|HD I/O to the first 16-channel Pro Tools|HD I/O that is connected directly to the Pro Tools|HD card.

Pro Tools|HD supports up to a maximum of ten 192 I/Os, 192 Digital I/Os, or 96 I/Os. Up to five 96i I/Os can be used simultaneously.

For examples of connecting multiple I/Os, see Figure 3 and Figure 4 on page 34.

⚠ *Pro Tools|HD audio interfaces need room at their sides to maintain proper air flow for cooling. Do not block the sides of the unit or disconnect the internal fan. If the units are rack-mounted in a case, remove the case lids or doors before operating the system. Failure to do so can result in the units overheating very quickly, which can permanently damage sensitive components.*

Legacy audio interfaces can also be connected to Pro Tools|HD interfaces. See “Connecting an Additional 16 Channels of Audio with Legacy Audio Interfaces” on page 35.

To connect Pro Tools|HD audio interfaces:

1 If you are using a single 192 I/O, 192 Digital I/O, 96 I/O, or 96i I/O, connect its Primary Port to the HD Core (for PCI) or Accel Core (for PCIe) card with the DigiLink cable provided with the HD Core (for PCI) or Accel Core (for PCIe) card. You must attach at least one 192 I/O, 192 Digital I/O, 96 I/O, or 96i I/O to your system in order for Pro Tools to launch.

⚠ *If you have at least one 192 I/O or 192 Digital I/O in your system configuration, it must be connected to the HD Core (for PCI) or Accel core (for PCIe) card as the primary interface.*

2 Connect additional Pro Tools|HD audio interfaces to subsequent Digidesign audio cards, or daisy-chain the interfaces (by connecting the Primary Port of the secondary interface to the Expansion Port of the primary interface).

If you are connecting both 192 I/O (or 192 Digital I/O) and 96 I/O audio interfaces to your system, connect the 192 I/O (or 192 Digital I/O) to your HD Core (for PCI) or Accel Core (for PCIe) card, followed by any additional 192 I/O (or 192 Digital I/O) interfaces connected to subsequent cards. Then connect 96 I/O interfaces to subsequent cards, or to other interfaces, then connect 96i I/O interfaces.

You can also connect a single Pro Tools|HD interface to each Pro Tools|HD card in your system using the provided DigiLink cables. (However, there is no advantage to this configuration over daisy-chaining interfaces.)

Connecting Loop Sync


If you are using two or more Pro Tools|HD audio interfaces or a SYNC I/O peripheral, Loop Sync must be connected to maintain proper clock among the devices.

To make Loop Sync connections:

- 1 Connect the Loop Sync Out of each interface to the Loop Sync In of the next interface with the BNC cables included in your I/O packaging.
- 2 Connect the Loop Sync Out of the last interface to the Loop Sync In of the primary interface or SYNC I/O peripheral.

Connecting Legacy Audio Interfaces

If you are connecting a Digidesign Legacy audio interface, continue with “Connecting an Additional 16 Channels of Audio with Legacy Audio Interfaces” on page 35.

 *The 96i I/O does not support Legacy I/O.*

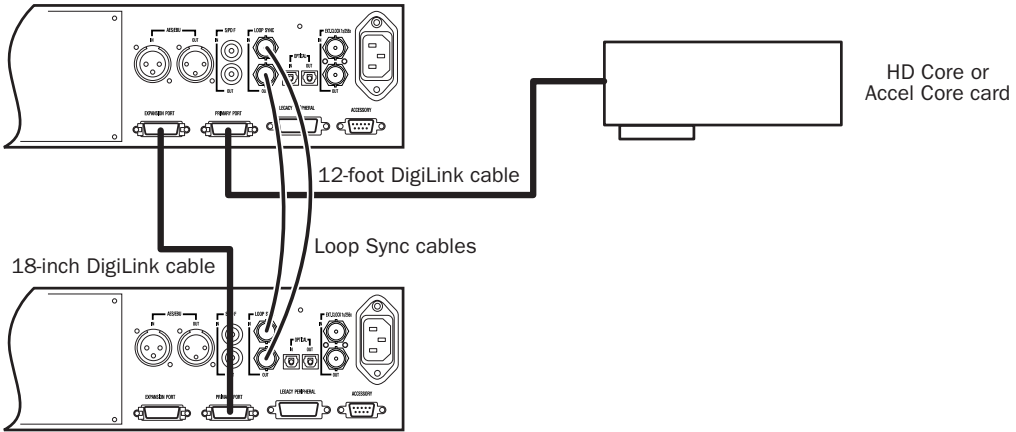


Figure 3. Two 96 I/Os (32-channel system)

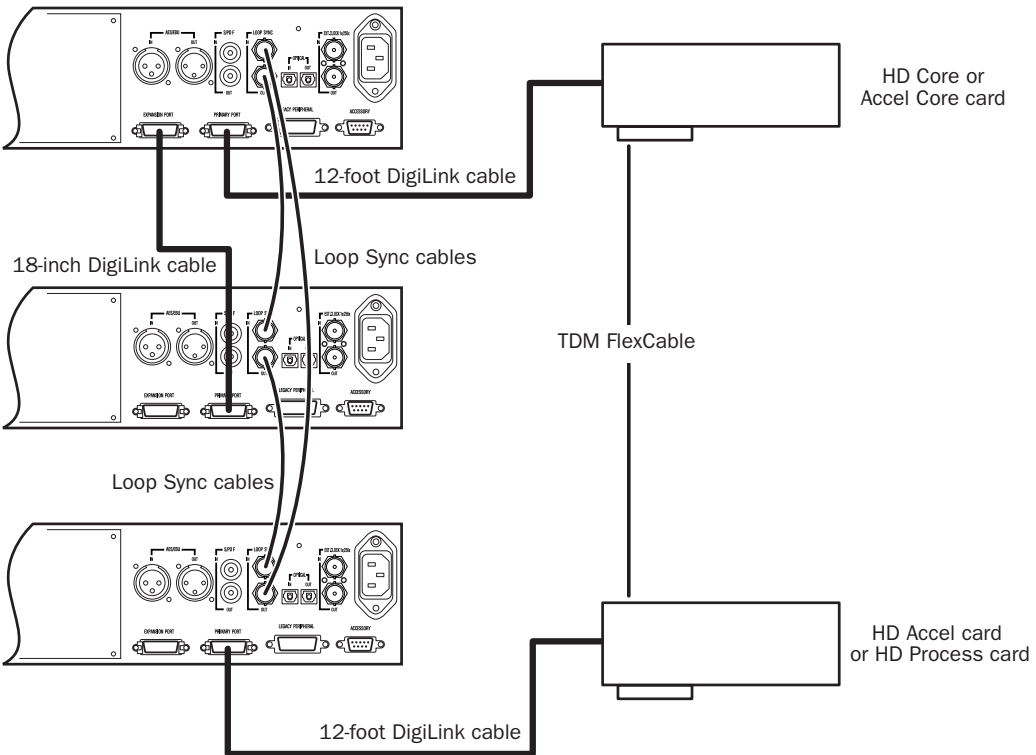


Figure 4. Three 96 I/Os (48-channel system)

Connecting an Additional 16 Channels of Audio with Legacy Audio Interfaces

Each 192 I/O, 192 Digital I/O, and 96 I/O can support 16 channels of audio to and from Digidesign Legacy I/Os. (The 96i I/O does not support Legacy I/Os.) Legacy I/Os include the 888|24 I/O, 882|20 I/O, 1622 I/O, and the 24-bit ADAT Bridge I/O.

⚠ *The original 888 I/O and 882 I/O interfaces are not supported with Pro Tools|HD.*

To connect Digidesign Legacy audio interfaces:

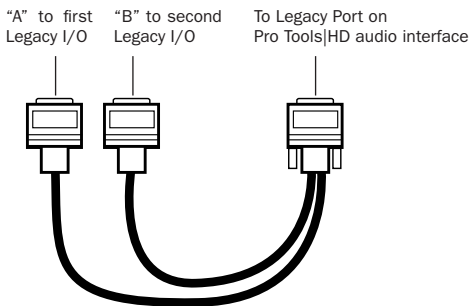
1 Connect the “MIX card” end of the peripheral cable that came with your Legacy audio interface (60-pin side) to the Legacy Port on the primary Pro Tools|HD audio interface. Connect the other end to the Computer Port on the Legacy audio interface.

2 Do one of the following:

- Connect any additional Legacy audio interfaces in the same manner, to Pro Tools|HD audio interfaces connected directly to Pro Tools|HD cards.

– or –

- If you are using a Y cable (Legacy 16-channel peripheral cable adapter), connect this to the Legacy port first, then connect the audio interface peripheral cables to Port A and Port B of the Y cable.



Optional 16-channel peripheral cable adapter

3 To properly clock the Legacy audio interface, connect the Ext. Clock output port on the Pro Tools|HD I/O to the Slave Clock IN on the Legacy audio interface. The Legacy audio interface will switch to Slave mode once the proper clock is outputting from the Pro Tools|HD I/O. Always use the Ext. Clock Out port of the same I/O to which the Legacy audio interface is attached.

If you are using the Y cable to connect multiple MIX audio interfaces, you must also connect the Slave Clock Out of the first Legacy interface to the Slave Clock In of the second Legacy interface with the provided BNC cable. You cannot clock more than two MIX audio interfaces from a single Pro Tools|HD audio interface. If you have a third MIX audio interface, supply its 256x clock from the Pro Tools|HD I/O to which its 60-pin cable is attached (either your second audio interface, or directly to an HD Accel or HD Process card).

⚠ *To ensure the proper functioning of Legacy audio interfaces (such as an 888|24 I/O or 882|20 I/O), launch Pro Tools and initialize the Legacy audio interfaces in the Hardware Setup dialog before turning them on (See “Configuring Legacy Audio Interfaces” on page 53). Then quit Pro Tools and shut down your computer. When relaunching your Pro Tools system, turn on your Legacy audio interfaces first and allow them to complete booting before turning on your Pro Tools|HD audio interfaces, and then your computer.*

⚠ *Before you turn on and configure your Legacy audio interfaces, turn down the volume of output devices. Very loud digital noise may be emitted before the Legacy audio interface is initialized.*

Installing Pro Tools HD Software

After your Pro Tools|HD hardware is installed and connected, you are ready to install Pro Tools software.

⚠ *Do not install or operate Pro Tools while logged in as a root-level user. File permissions of a root-level user make it possible to perform actions that may conflict with Pro Tools file management tasks.*

To install Pro Tools HD software:

- 1 Make sure you are logged in as an Administrator for the account where you want to install Pro Tools. For details on Administrator privileges in Mac OS X, refer to your Apple OS X documentation.
- 2 Insert the Pro Tools Installer disc in your CD/DVD drive.
- 3 On the Installer disc, locate and double-click “Install Pro Tools.”
- 4 Follow the on-screen instructions to proceed with installation.
- 5 Select the install location. For maximum reliability, install Pro Tools on your startup drive.
- 6 Click Continue.
- 7 Select the Pro Tools application for installation.
- 8 You can also select from a list of optional items to install along with Pro Tools:

Avid Video Engine The Avid Video Engine is required to use Pro Tools with Avid video peripherals such as the Avid Mojo or the Digidesign AVoption|V10.

DigiTranslator DigiTranslator™ is a software option for Pro Tools that lets you convert and exchange OMF and AAF sequences and MXF files directly in the Pro Tools application. This option is purchased separately.

MachineControl Digidesign MachineControl™ is a software option that lets you control external audio/video devices from Pro Tools using serial 9-pin protocols. This option is purchased separately.


MIDI I/O Driver The MIDI I/O Driver is required if you are using the Digidesign MIDI I/O.

MP3 Export Option The MP3 Export Option lets you export MP3 files from Pro Tools. This option is purchased separately.

9 Click Install.

10 If prompted, enter your Administrator password and click OK to accept the installation.


11 Select your work environment. This loads an initial set of Pro Tools Preferences that include some of the more popular settings for post production, audio, or audio with MIDI.

 *Preference settings can be customized at any time in Pro Tools. See the Pro Tools Reference Guide for more information.*

12 Select whether to install the Surround Mixer plug-in. This plug-in is required for mixing, mastering, and monitoring in surround:


- Select “Yes – Monitoring in Standard Pro Tools (Film Format)” if your monitoring is configured for Film Format surround.
- Select “Yes – Monitoring in ProControl (DTS Format)” if you are using a ProControl dedicated controller.

- Select “No – Stereo mixing only” if your monitoring is configured for Stereo.

 *AFL/PFL Solo modes require the Surround Mixer plug-in. See the Pro Tools Reference Guide for more information.*

13 Click Continue.

14 When installation is complete, click Restart.

 *The Pro Tools Installer disc includes additional software for your system. For more information, see “Additional Software on the Pro Tools Installer Disc” on page 37.*

Additional Software on the Pro Tools Installer Disc


The Pro Tools Installer disc provides additional software for your system, including audio drivers (for playing other audio applications through your Digidesign hardware) and a Pro Tools demo session.

 *Check your Pro Tools Installer disc for additional software and installers.*

Digidesign CoreAudio Driver


The Digidesign CoreAudio Driver is a multi-client, multichannel sound driver that allows CoreAudio-compatible applications to record and play back through Digidesign hardware.

The CoreAudio Driver is installed by default when you install Pro Tools.

 *For information on configuring the Digidesign CoreAudio Driver, see the Digidesign CoreAudio Guide.*

Standalone CoreAudio Driver

The Digidesign CoreAudio Driver can be installed as a standalone driver on Mac systems that do not have Pro Tools software installed. The standalone version of this driver is available on the Pro Tools Installer disc (in the Additional Files Folder).

 *For information on installing and configuring the standalone version of the Digidesign CoreAudio Driver, see the CoreAudio Drivers Guide.*

Pro Tools Demo Session

The Pro Tools Installer disc includes a separate demo session installer. You can use this session to verify that your system is working.

To install the demo session:


- 1** Insert the Pro Tools Installer disc in your CD/DVD drive. Locate and double-click the demo session installer icon.
- 2** Set the install location to your audio drive, and click Install.
- 3** When installation is complete, click Quit.

Removing Pro Tools

If you need to remove Pro Tools software from your computer, use the Uninstaller application.

To remove Pro Tools from your computer:

1 Make sure you are logged in as an Administrator for the account where Pro Tools is installed.

 *For details on Administrator privileges in Mac OS X, refer to your Apple OS X documentation.*

2 Go to Applications/Digidesign/Pro Tools/Pro Tools Utilities and double-click the “Uninstall Pro Tools” file.

3 Click Continue to proceed with the uninstall.

4 Choose the type of uninstall you want to perform:

Safe Uninstall Leaves certain plug-ins and system files needed for compatibility with some Avid products.

Clean Uninstall Removes all Pro Tools files, including system files, Digidesign plug-ins, and MIDI patch names.

5 Click Uninstall.

6 Enter your Administrator password and click OK.

7 Click Finish to close the Installer window.

Launching and Configuring Pro Tools

Checking the System

Before you launch Pro Tools, you may want to run the DigiTest diagnostic application to ensure that all Pro Tools|HD cards in the system are recognized, installed in the proper order, and have valid TDM FlexCable connections.

Starting Up Your System

Whenever you start your system, turn on all of your system components in a specific order.

To start your Pro Tools system:

- 1 Make sure all your equipment (including your computer) is off.
- 2 For Pro Tools|HD systems with an expansion chassis, turn on the expansion chassis.
- 3 Turn on any external hard drives. Wait approximately ten seconds for them to spin up to speed.
- 4 Turn on any MIDI interfaces and devices, or synchronization peripherals.
- 5 Lower the volume of all output devices, then turn on any Pro Tools Legacy audio interfaces (such as an 888|24 I/O or 882|20 I/O). Wait at least fifteen seconds for the audio interface to initialize and the status LEDs to stop flashing.
- 6 Lower the volume of all output devices, then turn on your Pro Tools|HD audio interfaces. Wait at least fifteen seconds for the audio interface to initialize and the status LEDs to stop flashing.
- 7 Turn on your computer.

Running DigiTest

DigiTest is installed with Pro Tools and resides in the following folder on your hard drive: Digidesign/Pro Tools/Pro Tools Utilities.

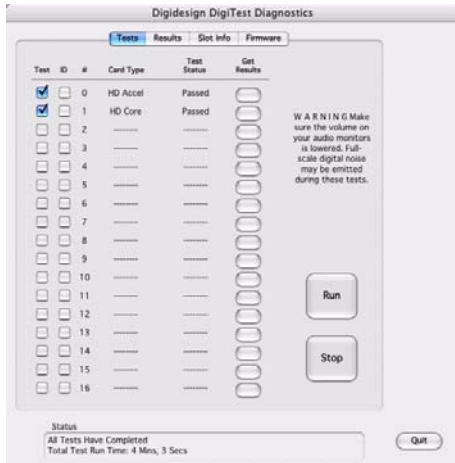
A *Before you run DigiTest, lower the volume of all output devices. Very loud digital noise may be emitted during the test.*

To run DigiTest:


- 1 Quit Pro Tools if it is running.
- 2 Lower the volume of all output devices on your system.
- 3 Locate and double-click the DigiTest icon on your hard drive.

DigiTest opens and lists the supported cards it finds in your system, showing their corresponding slot locations.

If you have a large number of cards or audio interfaces, it may take a while for the DigiTest window to appear, as DigiTest scans for all cards and interfaces connected to the system.



DigiTest main test window

 The order in which cards are listed within DigiTest may not match the actual slot locations of cards installed in your computer or expansion chassis. This is normal, and does not affect DigiTest operations in any way.

4 Select the cards in your system you want to test by selecting Test in the left hand column for each card.


5 Click Run.

If cards are not installed in the proper order, DigiTest will display error codes in the Status box of each card identified as being misconfigured.

The more cards and audio interfaces in your system, the longer the test will take.

6 When prompted, power cycle all Pro Tools peripherals in your system. Click Continue.


7 To test the interfaces connected to your system, check “Test I/O Box.”

 LEDs on your digital interfaces may light up during this test. This is normal.

8 When the test is finished, you can view the test results by doing one of the following:

- Click the Get Results button next to a card name.
- Click the Results tab and choose a card slot from the pop-up menu.

9 In the Results page of the DigiTest window, click Show Failures Only to display failed tests for the selected card, or click Show All Results to display all test results for the selected card.

 For descriptions of error codes, refer to “DigiTest Error Codes” on page 41

10 Click Quit to close DigiTest.

11 Restart your computer.

Errors and Undetected Cards

Complete the steps below if any of the following occur:

- DigiTest fails to launch.
- An error message has been displayed for a card in DigiTest.
- A supported card is installed but not automatically detected during DigiTest.

If a supported card is installed and is not automatically detected:

- 1** Quit DigiTest.
- 2** Turn off the entire Pro Tools system.
- 3** Reinstall the Pro Tools|HD cards.

- 4 Check the card seating.
- 5 Check the TDM FlexCable connections. Check the orientation of the cable from card to card (ports B to A), and check the integrity of the FlexCable connections to the cards.
- 6 Turn on the system.
- 7 Run DigiTest again.

DigiTest Error Codes

DigiTest Error Codes

Code	Description
Err3	Cards from different Pro Tools systems are incorrectly mixed. See the configuration chapters.
Err4	Cards marked with this error are installed in the wrong order. See the configuration chapters.
Err5	Too many cards of this type are installed in the system. Refer to the Digidesign website for compatibility information.
Err6	A card is installed in a reserve slot. For example, a Digidesign card is installed in the slot reserved for the Expansion Chassis Host Interface card. Refer to the configuration chapters, as well as related installation guides.
Err1220	SCSI Accelerator card is installed in the wrong slot. See the configuration chapters for correct location of the card.
Err1221	Expansion Chassis Host Interface card is installed in the wrong slot. See Expanded Systems Guide for correct location of the card.

Identifying Digidesign Cards with DigiTest

You can use DigiTest to identify which cards are in which slots in your system. This is especially useful if you have multiple Digidesign cards of the same type installed in your system.

To identify Digidesign cards with DigiTest

- 1 Quit Pro Tools if it is running.
- 2 Locate and double-click the DigiTest icon on your hard drive.

DigiTest opens and lists the supported cards it finds in your system.

- 3 Open your computer case or expansion chassis so you can see the top edge of the cards installed in your system.
- 4 In the DigiTest window, select the ID check box next to a card name. The green LED near the top edge of the corresponding card flashes.

Viewing Card Information with DigiTest

DigiTest can display identifying information such as serial number, date of manufacture, and firmware ROM version for each card in your system. This information is useful if you need to contact Digidesign Technical Support about your Pro Tools hardware.

To display information for a card in your system:

- 1 Quit Pro Tools if it is running.
- 2 Locate and double-click the DigiTest icon on your hard drive.
- 3 Click the Slot Info tab.
- 4 Choose a card slot from the pop-up menu.

Updating Audio Peripheral Firmware with DigiTest

If firmware updates are available for any of your Pro Tools|HD audio interfaces (192 I/O, 192 Digital I/O, 96 I/O, or 96i I/O), you can use DigiTest to perform the update. Within DigiTest, the Firmware Update page tells you the firmware version for the selected peripheral and lets you update to a newer version, if necessary.

To update the firmware in a Pro Tools|HD audio interface:

- 1 Quit Pro Tools if it is running.
- 2 Locate and double-click the DigiTest application on your hard drive.
- 3 Click the Firmware tab.
- 4 Choose a card slot from the pop-up menu. If any Pro Tools|HD audio interfaces are connected to the card, the Primary or Secondary options will become available in the HD Peripheral section of the Firmware page.

If any connected interfaces are not recognized, check the connections and power to each interface and click Re-Scan.

- 5 Under HD Peripheral, select Primary or Secondary to view the firmware version for the corresponding interface. The firmware version is displayed just below the HD Peripheral section of the Firmware page.
- 6 If the firmware version is not current, click Begin Update to update the firmware in the selected audio interface.

The status of the firmware update process is displayed in the status area at the bottom of the Firmware page.


- 7 After the update process is complete, click Quit to close DigiTest.

Launching Pro Tools

To use Pro Tools HD, you must always have an inserted iLok with an authorization for Pro Tools HD. One pre-authorized iLok is included with your Pro Tools HD system.

To authorize Pro Tools HD software:

- 1 Insert the pre-authorized iLok into an available USB port on your computer.
- 2 Do one of the following:
 - Double-click the Pro Tools HD shortcut on the desktop (Windows) or click the Pro Tools HD icon in the Dock (Mac).
 - or –
 - Locate and double-click the Pro Tools HD application on your hard drive.

 *Do not remove the iLok during Pro Tools launch or use.*

Configuring Pro Tools

Pro Tools System Settings

Pro Tools lets you adjust the performance of your system by changing *system settings* that affect its capacity for processing, playback, and recording.

In most cases, the default settings for your system provide optimum performance, but you may want to adjust them to accommodate large or processing-intensive Pro Tools sessions.

Hardware Buffer Size

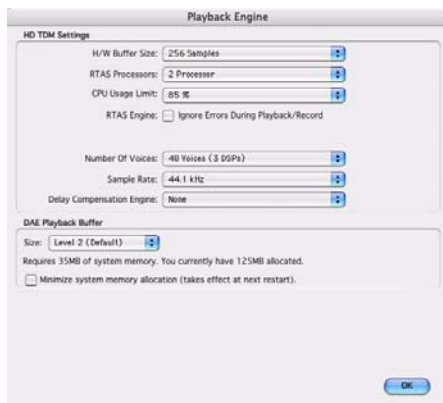
The Hardware Buffer Size (H/W Buffer Size) controls the size of the buffer used to handle host processing tasks such as Real-Time AudioSuite™ (RTAS) plug-ins. The H/W Buffer setting can also be used to manage monitoring latency.

- Lower Hardware Buffer Size settings reduce monitoring latency, and are useful when you are recording live input.
- Higher Hardware Buffer Size settings allow for more audio processing and effects, and are useful when you are mixing and using more RTAS plug-ins.

⚠ *In addition to causing slower screen response and monitoring latency, higher Hardware Buffer Size settings can increase the latency caused by RTAS plug-ins, and affect the accuracy of plug-in automation, mute data, and MIDI track timing.*

To change the Hardware Buffer Size:

- 1 Choose Setup > Playback Engine.



Playback Engine dialog for Pro Tools | HD system

- 2 From the H/W Buffer Size pop-up menu, select the audio buffer size, in samples.
- 3 Click OK.

RTAS Processors

The RTAS Processors setting determines the number of processors in your computer allocated for RTAS plug-in processing.

With computers that have multiple processors, or that feature multi-core processing or hyper-threading, this setting lets you enable multi-processor support for RTAS processes. Used in combination with the CPU Usage Limit setting, the RTAS Processors setting lets you control the way RTAS processing and other Pro Tools tasks are carried out by the system.

- ◆ A higher number of processors reserves more CPU processing capacity for RTAS plug-in processing. This is useful for sessions with large number of RTAS plug-ins.
- ◆ A lower number of processors leaves more CPU processing capacity for automation, screen redraws, and video playback in Pro Tools, or for other application running at the same time as Pro Tools.

To set the number of RTAS Processors:


- 1 Choose Setup > Playback Engine.
- 2 From the RTAS Processors pop-up menu, select the number of available processors you want to allocate for RTAS plug-in processing.
- 3 Click OK.

CPU Usage Limit

The CPU Usage Limit controls the percentage of CPU resources allocated to Pro Tools host processing tasks. Used in combination with the RTAS Processors setting, the CPU Usage Limit setting lets you control the way Pro Tools tasks are carried out by the system.

- ◆ Lower CPU Usage Limit settings limit the effect of Pro Tools processing on other CPU-intensive tasks, such as screen redraws, and are useful when you are experiencing slow system response, or when running other applications at the same time as Pro Tools.
- ◆ Higher CPU Usage Limit settings allocate more processing power to Pro Tools, and are useful for playing back large sessions or using more real-time plug-ins.

The maximum available CPU Usage Limit depends on the number of processors in your computer and on the number of processors you specify for RTAS processing. This value can range from 85 percent for single-processor computers to 99 percent for multi-processor computers.

 *Increasing the CPU Usage Limit may slow down screen responses on slower computers.*

To change the CPU Usage Limit:

- 1 Choose Setup > Playback Engine.
- 2 From the CPU Usage Limit pop-up menu, select the percentage of CPU processing you want to allocate to Pro Tools.
- 3 Click OK.

RTAS Engine (RTAS Error Suppression)

The RTAS Engine option determines RTAS error reporting during playback and recording. This is especially useful when working with instrument plug-ins.

You should only enable RTAS error suppression if you are experiencing frequent RTAS errors that are interrupting your creative workflow. When RTAS error suppression is enabled, you can experience a degradation of audio quality. However, this may be acceptable in order to avoid interrupting playback and recording when working with instrument plug-ins. Be sure to disable RTAS error suppression when you need to ensure the highest possible audio quality, such as for a final mix.

On Pro Tools|HD systems, there is a single RTAS Engine option:

Ignore Errors During Playback/Record When enabled, Pro Tools continues to play and record even if the RTAS processing requirements exceed the selected CPU Usage Limit. This can result in pops and clicks in the audio, but does not stop the transport.

To enable RTAS error suppression:


- 1 Choose Setup > Playback Engine.
- 2 Select Ignore Errors During Playback/Record.
- 3 Click OK.

Number of Voices

The Number of Voices setting lets you control the number of voices available on your system. For example, the default number of voices on an Pro Tools|HD 1 system is 48 voices, using one DSP (at sample rates of 44.1 kHz or 48 kHz).

⚠ *Changing the number of voices affects DSP usage, the total number of voiceable tracks, and overall system performance.*

Depending on the current sample rate and the number of cards in your system, and whether you are using an expansion chassis, you will have different choices for voice count.

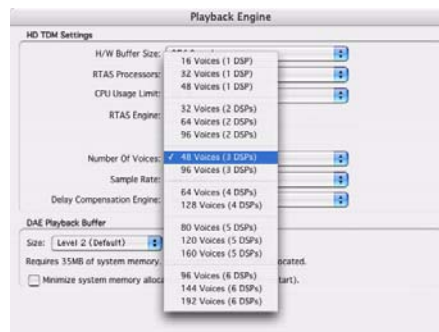
 *For additional information on voice count, refer to the Pro Tools Reference Guide and the Expanded Systems Guide.*

To change the Number of Voices and DSP to allocate for voicing:

1 Choose Setup > Playback Engine.

2 Select the number of voices and DSPs to allocate for voicing by choosing a value from the Number of Voices pop-up menu.

- Select higher voice numbers when your Digidesign cards are the only PCI cards in your computer, or when you are using an expansion chassis to run higher track counts (such as 64 tracks at 96 kHz) and you want more voices per DSP (such as 16 voices per DSP at 96 kHz). These settings use fewer DSP chips for mixing (leaving more available for plug-ins) but place the highest processing load on each.
- Select medium voice numbers when your Digidesign cards are in an expansion chassis, or when you are using other PCI cards along with Digidesign cards. These settings generally provide an optimum balance between number of chips needed for voicing, and the processing load placed on each.
- Select minimum voice numbers if you are using high-bandwidth PCI cards (such as video capture cards) along with your Digidesign cards. These settings place the lightest processing load on each allocated DSP chip, but generally require more DSP chips be dedicated to voicing and mixing (leaving fewer available for plug-ins).



Number of Voices menu (HD Accel-equipped system)

3 Click OK.

Default Sample Rate

The Sample Rate setting appears as the default sample rate when you create a new session. (This setting is available only when there is no session open.)



You can change the sample rate when creating a new Pro Tools session by selecting a different sample rate in the New Session dialog.

To change the default Sample Rate:

- 1 Choose Setup > Playback Engine.
- 2 Select the sample rate from the Sample Rate pop-up menu.
- 3 Click OK.

Delay Compensation Engine

Delay Compensation automatically manages DSP delays that occur on audio tracks, Auxiliary Inputs, or Master Faders because of plug-in use and mixer routing. With Delay Compensation enabled, Pro Tools maintains time-alignment between tracks that have plug-ins with differing DSP delays, tracks with different mixing paths, tracks that are split off and recombined within the mixer, and tracks with hardware inserts.

To maintain time alignment, Pro Tools adds the exact amount of delay to each track necessary to make that particular track's delay equal to the delay of the track that has the *longest* delay.

Delay Compensation should be enabled during mixing and playback for optimal delay compensated sound. In some cases when recording, Delay Compensation should be turned off.



For more information on using Delay Compensation, see the Pro Tools Reference Guide.

Delay Compensation Settings

There are three settings in the Playback Engine dialog for dedicating DSP resources for Delay Compensation:

None Allocates no DSP resources for Delay Compensation.

Short Allocates minimal DSP resources of delay compensation for each channel. This is the most efficient setting for Pro Tools|HD Accel systems.

Long Allocates maximum DSP resources for Delay Compensation for each mixer channel. Long Delay Compensation uses the same DSP resources used by high DSP overhead plug-ins.

To configure the Delay Compensation Engine:

- 1 Choose Setup > Playback Engine.
- 2 From the Delay Compensation Engine pop-up menu, select a Delay compensation setting.
- 3 Click OK.

The Delay Compensation setting is saved as a session and system preference.

To enable Delay Compensation:

- Choose Options > Delay Compensation.

DAE Playback Buffer Size

The DAE Playback Buffer Size determines the amount of memory DAE allocates for disk buffers. The optimum DAE Playback Buffer Size for most disk operations is Level 2.

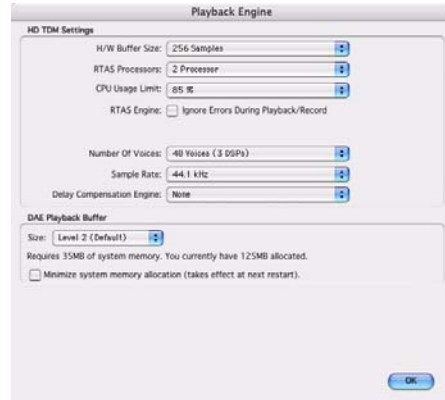
◆ DAE Playback Buffer Size settings lower than Level 2 may improve playback and recording initiation speed, but may make it difficult to play or record tracks reliably with sessions containing a large number of tracks or a high density of edits, or with systems that have slower or heavily fragmented hard drives.

◆ DAE Playback Buffer Size settings higher than Level 2 will allow for a higher density of edits in a session or a higher track count when using slower hard drives. However, a higher setting can also cause a time lag to occur when starting playback or recording, or longer audible time lag while editing during playback.

💡 *Using a larger DAE Playback Buffer Size leaves less system memory for other tasks. The default setting of Level 2 is recommended unless you are encountering -9073 (“Disk too slow or fragmented”) errors.*

To change the DAE Playback Buffer Size:

- 1 Choose Setup > Playback Engine.
- 2 From the DAE Playback Buffer pop-up menu, select a buffer size. Memory requirements for each setting are shown at the bottom of the Playback Engine dialog.



Playback Engine dialog for Pro Tools | HD Accel system

- 3 Click OK.

If Pro Tools needs more system memory for the DAE Playback Buffer, it will prompt you to restart your computer.

System Memory Allocation

When you start your computer, Pro Tools automatically reserves a portion of system memory for the DAE Playback Buffer. This reserved memory is unavailable to other applications, even if Pro Tools is not running.

You can set Pro Tools to reserve only the minimum amount of required memory, so that more system memory is available to other applications.

To minimize system memory allocation:

- 1 Choose Setup > Playback Engine.
- 2 Select the “Minimize System Memory Allocation” option.
- 3 Click OK.
- 4 Restart your computer.

MIDI Studio Setup

(Windows Only)

If you plan to use any MIDI devices with Pro Tools, configure your MIDI setup with MIDI Studio Setup. See Appendix C, “Configuring MIDI Studio Setup (Windows Only).”

Audio MIDI Setup (AMS)

(Mac Only)

If you plan to use any MIDI devices with Pro Tools, configure your MIDI setup with the Apple Audio MIDI Setup (AMS) utility. See Appendix D, “Configuring AMS (Mac OS X Only).”

Pro Tools Hardware Settings

Pro Tools lets you set the default sample rate and clock source for your system, as well as a range of controls specific to each type of audio interface.)

Default Sample Rate

The Sample Rate setting appears as the default sample rate when you create a new session. (This setting is available in the Hardware Setup dialog only when no session is open.)



You can change the sample rate when creating a new Pro Tools session by selecting a different sample rate in the New Session dialog.

To change the default Sample Rate:

- 1 Choose Setup > Hardware.



Hardware Setup dialog for 192 I/O, Main page

- 2 Choose the sample rate from the Sample Rate pop-up menu.
- 3 Click OK.

High Sample Rates and Expanded Systems

With 176.4 kHz and 192 kHz sample rates, as many as four Pro Tools|HD cards can be used. Any additional cards (up the total system maximum of seven cards) will switch to Inactive mode. The cards and any attached peripherals will become active again when the sample rate is set to 96 kHz or lower. See the Pro Tools Expanded Systems Guide for more information.

Clock Source

The Pro Tools Hardware Setup dialog lets you select the Clock Source for the system.

Internal If you are recording an analog signal directly into Pro Tools, you will usually use the Pro Tools Internal clock source.

External If you are transferring material into Pro Tools from an external digital device, or if you utilize a common house clock signal, you will synchronize Pro Tools to that digital device or common signal. Depending on your audio interface, external options can include AES/EBU

[Encl], S/PDIF, Optical [Encl], AES/EBU 1–8, TDIF, ADAT, and Word Clock. For details, refer to the *Pro Tools Reference Guide* or the guide for your audio interface.

To select the Clock Source:

- 1 Choose Setup > Hardware.
- 2 Choose the clock source from the Clock Source pop-up menu.
- 3 Click OK.

! *Your digital input device must be connected and powered on for Pro Tools to synchronize to it. If your input device is not powered on, leave the Clock Source set to Internal.*

Configuring Audio Interfaces

Pro Tools|HD audio interfaces support 16 channels of simultaneous I/O and multiple I/O formats (including analog, AES/EBU, ADAT Optical, S/PDIF, and TDIF).



Hardware Setup dialog for 192 I/O, Main page

The Main page of the Hardware Setup dialog is where you define which physical inputs and outputs on your audio interface are routed to available inputs and outputs in Pro Tools. You can think of this window as a patchbay that allows you to route any of the inputs or outputs on your Pro Tools|HD audio interfaces to channel assignments in the Pro Tools mixer.

The Main page also provides controls for defining whether Expansion Port or Legacy Port peripherals are active.

To configure the interfaces in your system, you select each interface in the Peripherals list and set the parameters for that interface.

Identifying Audio Interfaces

If you have multiple audio interfaces of the same type connected to your system, before you make audio connections to them, you should confirm the identity of each interface. This ensures that you choose the appropriate interface in the Peripherals list when you define its inputs and outputs in the Hardware Setup dialog.

To identify audio interfaces in your system:

- 1 Choose Setup > Hardware.
- 2 From the Peripherals list, select an audio interface connected to your system.

SHIFT *Use the Up and Down Arrow keys to scroll through the Peripherals list in the Hardware Setup dialog.*

- 3 Make sure the Main page tab is chosen.
- 4 Select the Identify option, located in the lower left corner of the Hardware Setup dialog. This illuminates all the LEDs on the front panel of the selected audio interface.
- 5 Make a note of which interface in your studio setup corresponds to the identified interface.
- 6 Repeat the above steps for each additional audio interface in your setup.

! *Legacy audio interfaces must be initialized in the Peripherals list before they can be identified. See “Configuring Legacy Audio Interfaces” on page 53.*

To configure Pro Tools|HD audio interfaces:

- 1 Choose Setup > Hardware.
- 2 From the Peripherals list, select an audio interface connected to your system.
- 3 Make sure Main page tab is chosen.
- 4 From the Clock Source pop-up menu, select the appropriate clock source for the interface.
- 5 If you want to send clock output to other devices attached to the audio interface, select the appropriate output from the Ext. Clock Output pop-up menu.

If the Legacy I/O Port is enabled (and not the Expansion I/O Port) then the Ext. Clock Output automatically switches to Slave Clock (256x sample rate). To reset the Ext. Clock Output to Word Clock, change the Port Settings back to Expansion I/O, then select the Legacy audio interface in the Peripherals list, and set it to No Interface in the Interface pop-up menu. (The 96i I/O does not support Legacy I/O.)

- 6 Select which digital I/O port on your audio interface enclosure is active by selecting an option under Digital Format. Depending on the type of interfaces in your system, choices include AES/EBU, S/PDIF, and Optical (S/PDIF). Selecting Optical (S/PDIF) resets the Optical I/O port (which is, by default, eight channels of ADAT Optical I/O) to two channels of S/PDIF Optical I/O. (The 96i I/O supports stereo S/PDIF RCA digital input and output only.) For more information about Pro Tools|HD enclosure and card ports, refer to the guide for your audio interface.
- 7 For S/PDIF compatibility with Tascam DA-30 DAT recorders, select the Tascam option under S/PDIF Format.

8 From the Input and Output channel pop-up menus, select the physical ports (such as Analog 1–2 or Optical 1–2), that will be routed to the corresponding Pro Tools input and output channels (such as Ch 1–2, Ch 3–4), listed on the left side of the Main page. (This feature is not available with the 96i I/O.)

Inputs and outputs of similar format are differentiated in the input and output channel pop-up menus. For example, the AES/EBU inputs and outputs in the 192 I/O enclosure are listed as AES/EBU [Encl], while the AES/EBU inputs and outputs on the factory-installed Digital I/O card are listed (in pairs) as AES/EBU 1–2, AES/EBU 3–4, AES/EBU 5–6, and AES/EBU 7–8. For 192 I/Os equipped with the optional Digital I/O Card, the additional AES/EBU I/O ports on the optional card are listed as AES/EBU 9–10, AES/EBU 11–12, AES/EBU 13–14, and AES/EBU 15–16.



Refer to your peripheral's guide for configuration details and restrictions. For example, the Optical 1–8 channels (on the 192 I/O enclosure) will not be available at session sample rates of 88.2 kHz or higher, while the ports on the 192 I/O Digital I/O card will still be available.

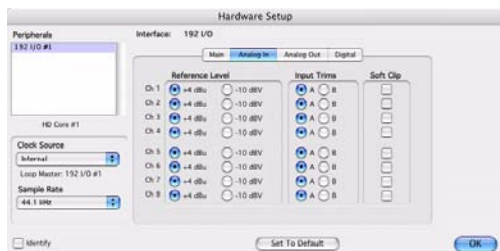
- 9 Configure controls for your Pro Tools|HD audio interface. See “Configuring 192 I/O and 192 Digital I/O Controls” on page 51, “Configuring 96 I/O Controls” on page 52, and “Configuring 96i I/O Controls” on page 52.
- 10 For additional Pro Tools|HD interfaces, choose the interface in the Peripherals list, and repeat the above steps.

Configuring 192 I/O and 192 Digital I/O Controls

To configure controls for a 192 I/O:

1 With the 192 I/O selected in the Peripherals list, click the Analog In tab for the following options:

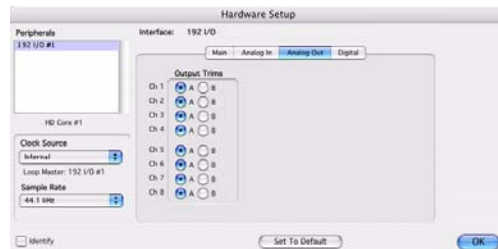
- You can set your operating level on a channel-by-channel basis by selecting Reference Level +4 dBu or -10 dBV. These settings correspond to two different input connectors on the rear of the 192 I/O. Refer to the *192 I/O Guide* for more information on setting operating levels.
- Each of the analog channels in the 192 I/O has two Input Trims, labeled A and B, for precisely calibrating and switching levels. You can select Input Trim A or B on a channel-by-channel basis. Refer to the *192 I/O Guide* for information on setting the rear panel trims.
- You can select Soft Clip on a channel-by-channel basis. The Soft Clip limiter attenuates the incoming analog signal, providing extra protection from temporary clipping transients that can cause digital distortion when they exceed the maximum input of the unit. With Soft Clip enabled, 192 I/O supports an additional 4 dB of headroom by rounding off the top 4 dB to the clip point. This is useful for eliminating stray transients or for emulating analog tape saturation.



Hardware Setup dialog for 192 I/O, Analog In page

2 Click the Analog Out tab for the following option:

- Each of the analog channels in the 192 I/O has two Output Trims, labeled A and B, respectively. You can select Output Trim A or B on a channel-by-channel basis.



Hardware Setup dialog for 192 I/O, Analog Out page

To configure controls for a 192 Digital I/O or 192 I/O with an optional Digital I/O card:

- On the 192 Digital I/O or a 192 I/O with an optional Digital I/O card, click the Digital tab to set the Input Format (AES/EBU, TDIF, or ADAT Optical) and enable real-time sample rate conversion (in channel pairs, with the SR Conversion option).



At session sample rates above 48 kHz, sample rate conversion for the TDIF and Optical (ADAT) inputs on the Digital I/O card is automatically enabled on all eight inputs of the selected format.

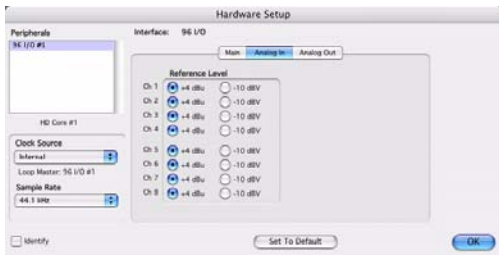


Hardware Setup dialog for 192 I/O, Digital page

Configuring 96 I/O Controls

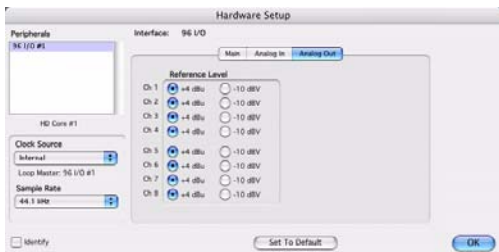
To configure controls for a 96 I/O:

- 1 With the 96 I/O selected in the Peripherals list, configure your I/O front panel meters for input or output metering from the Meters pop-up.
- 2 Click the Analog In tab for the following option:
 - You can set your operating level on a channel-by-channel basis by selecting Reference Level +4 dBu or -10 dBV. Refer to the *96 I/O Guide* for more information on setting operating levels.



Hardware Setup dialog for 96 I/O, Analog In page

- 3 Click the Analog Out tab for the following option:
 - You can set your output level on a channel-by-channel basis by selecting Reference Level +4 dBu or -10 dBV. Refer to the *96 I/O Guide* for more information on setting operating levels.



Hardware Setup dialog for 96 I/O, Analog Out page

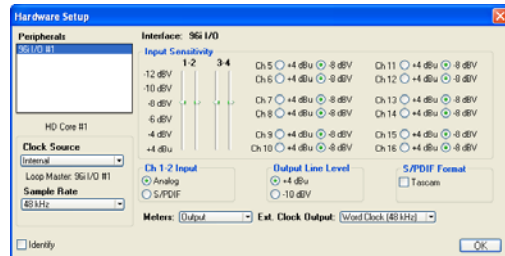
Configuring 96i I/O Controls

To configure controls for a 96i I/O:

- 1 With the 96i I/O selected in the Peripherals list, configure your I/O front panel meters for input or output metering from the Meters pop-up.
- 2 Set input sensitivity by doing the following:
 - For Inputs 1–4, set the input trim slider to match the output level of the connected instrument. Choices range from -12 dBV to +4 dBu. If you do not know the output level of the device, use the default input trim level, then fine tune the input level sensitivity.
 - For each input 5–16 being used, select -8 dBV or +4 dBu as appropriate to best match the output level of the connected instrument.

- 3 Set Output levels (select -10 dBV or +4 dBu).

- 4 Click Done.




Hardware Setup for 96i I/O

You can select analog or digital input as sources for 96i I/O channels 1–2. Only channels 1–2 can access the S/PDIF inputs.

To select analog or digital input for channels 1-2:

- 1 Choose Setup > Hardware, and select 96i I/O in the Peripherals list to display the 96i I/O window.
- 2 Click to set Ch 1–2 Input to Analog or S/PDIF, as appropriate.

 *The 96i I/O only supports analog and digital switching for channels 1–2, and only from within the Hardware Setup and I/O Setup dialogs. The 96i I/O does not support path remapping within I/O Setup.*

Configuring Legacy Audio Interfaces


Before you can configure a Legacy audio interface, it must first be initialized in Hardware Setup.

To initialize a Legacy audio interface:

- 1 Make sure to lower the volume of your output devices. Very loud digital noise may be emitted before the Legacy audio interface is initialized.
- 2 Turn on your Legacy audio interface.
- 3 From the Peripherals list, choose the primary audio interface (the interface to which your Legacy audio interface is connected).
- 4 In the Main page of the Hardware Setup dialog, select the Legacy I/O option under Port Settings.
- 5 In the Peripherals list, “No Interface” is listed twice, directly below the primary audio interface. Click the first “No Interface.” An Interface pop-menu appears in the Hardware Setup dialog, listing supported I/O choices.
- 6 From the Interface pop-up, select the type of Legacy audio interface you connected. (If your Legacy interface does not appear, check connections and repeat from step 1, above. See also “Offline Peripherals” on page 53.)

After you select the type of Legacy audio interface, the Main page updates with controls that can be configured.

- 7 Repeat the above steps for each additional Legacy audio interface.

 *For more information on Hardware Setup controls for each I/O, refer to its guide.*

Offline Peripherals


When a Legacy audio interface and Pro Tools|HD peripheral are connected to your primary Pro Tools|HD peripheral, only one can be online at a time. An offline peripheral is indicated by brackets in the Peripherals List of the Hardware Setup dialog. For example, if you have a 96 I/O and an 882|20 connected to a 192 I/O, and the 96 I/O is offline, it will appear in the Peripherals List as “[96 I/O].”

Peripherals will also go offline if the audio interface or card to which they are attached is made inactive.

Configuring I/O Setup

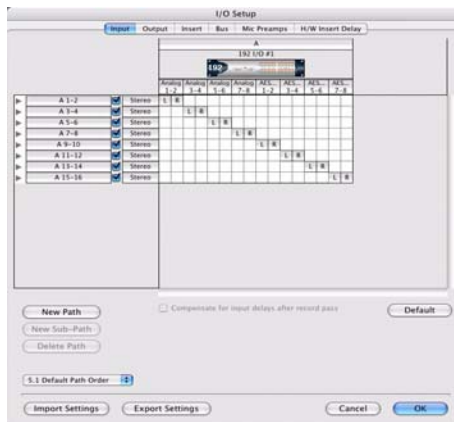
The I/O Setup dialog provides a graphical representation of the signal routing for each connected audio interface, with controls to route physical ports to Pro Tools inputs and outputs. These controls mirror the routing controls found in the Hardware Setup dialog—changes made to physical routing in one dialog are always reflected in the other. The I/O Setup dialog also lets you label and map Pro Tools input, output, insert, and bus *signal paths*.

Pro Tools comes with default I/O Setup settings that will get you started. You only need to go to I/O Setup if you want to remap or rename the default I/O paths or if you change your system hardware (for example, adding an expansion card to a 192 I/O).

 Refer to the *Pro Tools Reference Guide* for more information on setting up I/O paths.

To configure I/O routing in I/O Setup:

- 1 Choose Setup > I/O.
- 2 Click the Input or Output tab to display the corresponding connections.
- 3 To change the name of a path or subpath, double-click directly on the Path Name, type a new name for the path, and press Enter.
- 4 To change the destination of an Input or Output path or subpath, click directly on an Input or Output Selector for an interface channel pair, just below an audio interface icon. (This feature is not available for the 96i I/O.)
- 5 From the pop-up menu, select a physical port pair (such as Analog 1–2), to route to the corresponding Pro Tools channel pair (such as A 1–2) in the Path Name column on the left.
- 6 Repeat the above steps for additional channel pairs.
- 7 Click OK.



I/O Setup dialog for Pro Tools |HD system

Routing a Pro Tools Output Pair to Multiple Destinations

Pro Tools channel pairs can be routed to multiple outputs on your Digidesign audio interface through the Hardware Setup dialog.

For example, if Pro Tools Outputs 1–2 are assigned to both Analog 1–2 and Digital 1–2, that signal will be routed simultaneously to both pairs of output ports on your audio interface.

This lets you send the same signal (such as a stereo pair, a stem mix, or a multichannel mix) to multiple destinations (such as multiple mastering devices).

To route a Pro Tools output channel pair to multiple audio interface output ports:

- 1 Choose Setup > Hardware.
- 2 From the Peripherals list, select an interface.
- 3 Click the Main tab.
- 4 Select an output pair from an Output pop-up menu.
- 5 Start-click the same pop-up menu and choose an additional output pair.

The output name updates with a plus sign (“+”) before it to indicate that multiple output ports are selected. In the pop-up menu, each physical port pair assigned to that Pro Tools output pair is indicated by a check mark.



Hardware Setup dialog for 96 I/O, Main page

- 6 Repeat the above steps to select additional output destinations. The only limit to output choices is the number of outputs available in your system.

Backing Up your System Configuration

After configuring your system and Pro Tools, you should save an image of your system drive using a backup utility such as Norton Ghost (Windows) or Bombich Carbon Copy Cloner (Mac). By doing this, you can quickly restore your system configuration and settings if you encounter any problems.

chapter 5

Connecting Your Studio

This chapter provides general information on connecting Pro Tools to your system, including digital equipment, effects units, MIDI gear, and SMPTE synchronization devices.

Refer to the *192 I/O Guide*, *192 Digital I/O Guide*, *96 I/O Guide*, or *96i I/O Guide* for specific details regarding:

- Front and back panel connectors and indicators
- Installation of optional expansion I/O cards (192 I/O only)

⚠ *Pro Tools|HD audio interfaces need room at their sides to maintain proper air flow for cooling. Do not block the sides of the unit or disconnect the internal fan. If the units are rack-mounted in a case, remove the case lids or doors before operating the system. Failure to do so can result in the units overheating very quickly, which can permanently damage sensitive components.*

Setting Up Your Studio

Figure 5 illustrates a typical studio setup, with a 192 I/O connected to a mixing console, effects and other equipment.

Figure 6 illustrates a setup without a mixer, where effects and monitoring gear are connected directly to a 96 I/O.

Example Studio Setup with a Mixing Console

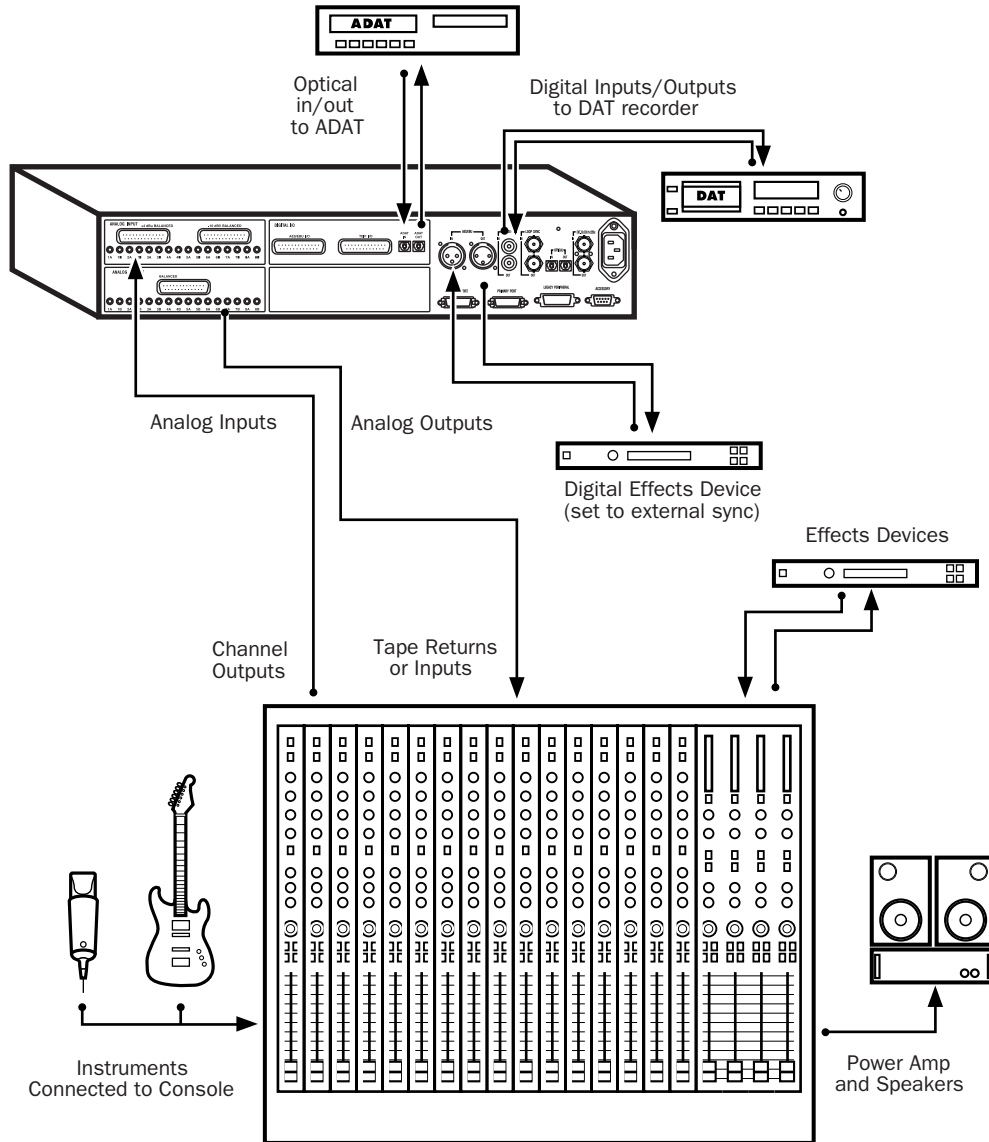


Figure 5. Typical studio configuration using a 192 I/O with mixer connections

Example Studio Setup without a Mixing Console

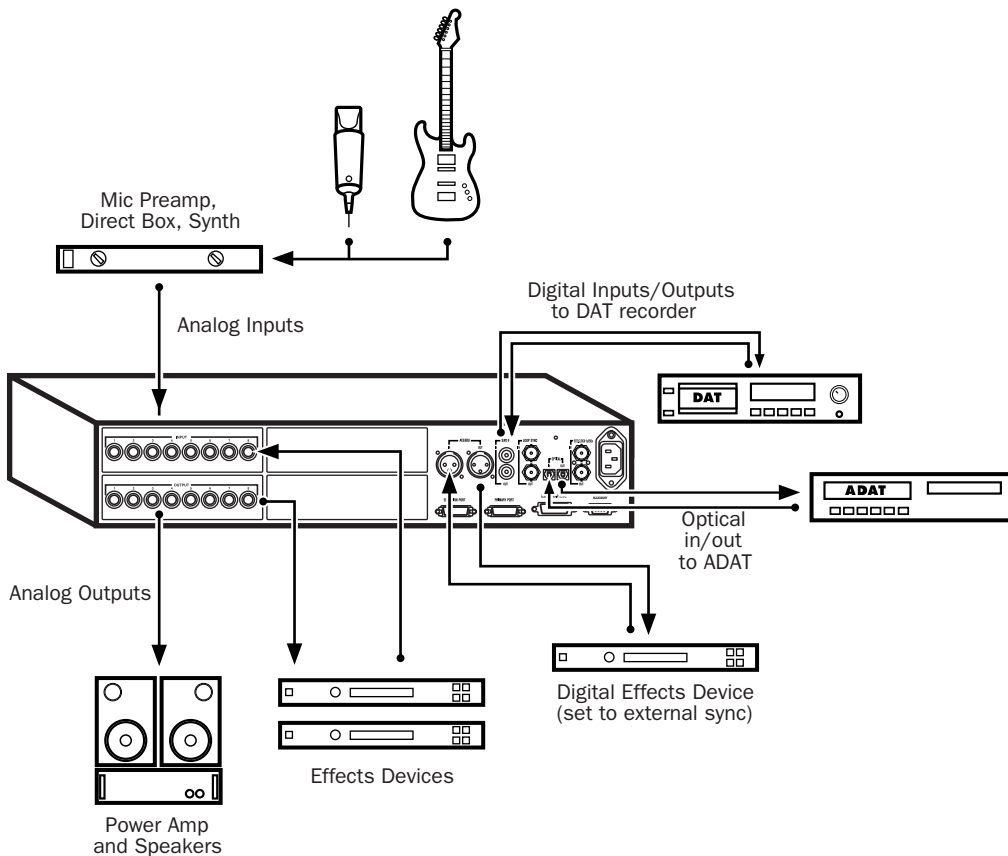


Figure 6. Typical studio configuration using a 96 I/O without a mixer

192 I/O

The 192 I/O features two DB-25 breakout connectors for two sets of eight inputs each, at +4 dBu and -10 dBV respectively.

There are no -10 dBV outputs, however; analog outputs break out from a single DB-25 output at +4 dBu operating levels.

⚠ *When driving unbalanced lines on the 192 I/O output card, leave the negative “-” terminals disconnected. Failure to do so will result in noisy outputs.*

The 192 I/O requires a custom DB-25 snake. Digidesign sells several different DigiSnake DB-25 cables for this purpose. Contact your dealer or Digidesign for more information.

192 Digital I/O

The 192 Digital I/O features two DB-25 breakout connectors for two sets of eight AES/EBU or TDIF inputs and outputs, along with a pair of ADAT Optical ports.

The 192 Digital I/O requires a custom DB-25 snake. Digidesign sells several different DigiSnake (DB-25) cables for this purpose. Contact your dealer or Digidesign for more information.

96 I/O

The 96 I/O analog connectors are TRS 1/4-inch with TIP wired hot (or “+”), RING cold (or “-”), and SLEEVE ground. If connecting to unbalanced loads, use unbalanced TS cables.

There is one bank of eight inputs (software-switchable between +4 dBu and -10 dBV line levels on a line-by-line basis).

There is one bank of eight outputs (that use +4 dBu line levels).

96i I/O

The 96i I/O analog connectors are balanced TRS 1/4-inch with TIP wired hot (or “+”), RING cold (or “-”), and SLEEVE ground. If connecting to unbalanced loads, use unbalanced TS cables.

The 96i I/O provides 16 inputs and two outputs. Inputs 1-4 feature variable, multi-level input sensitivity, controllable from within Pro Tools (from -12 dBV to +4 dBu). Inputs 5-16 provide a choice of two fixed operating levels (-8 dBV or +4 dBu).

Outputs 1-2 are selectable between -10 dBV and +4 dBu.

Connecting Equipment with Digital Audio Ins and Outs


Each Pro Tools|HD audio interface includes at least one AES/EBU, S/PDIF, or Optical (ADAT) digital option. For example, the 192 I/O includes additional AES/EBU and optical ports, as well as TDIF, dual-wire AES/EBU at 192 kHz, and sample rate converters. The 96i I/O provides two channels of S/PDIF only. (See the documentation for your audio interface for details.)

The following example provides basic setup guidelines for connecting Pro Tools to a DAT recorder.

To connect your Pro Tools system to a DAT recorder:

1 Connect the AES/EBU or S/PDIF output on the enclosure of your Pro Tools|HD audio interface to the AES/EBU or S/PDIF input of your DAT deck. By default, this port is assigned to Pro Tools Output 1-2.

2 Connect the AES/EBU or S/PDIF input on the enclosure to the AES/EBU or S/PDIF output of your DAT deck. Route the digital input to Pro Tools inputs in the Hardware Setup dialog.

 *You can route any of the physical input or output pairs to any of the input and output channel assignments in the Pro Tools mixer. (The 96i I/O does not support input mapping, however.) For more information see the Pro Tools Reference Guide.*

Connecting Effects Units

The 192 I/O, 192 Digital I/O and 96 I/O let you connect analog or digital effects units to your Pro Tools system, and use them as inserts or make them the destination for effects sends and returns. (The 96i I/O supports a single pair of hardware inserts using channels 1–2. See the *96i I/O Guide* for more information.)

Five inserts are available on each audio channel. Each insert can be a hardware insert (or software plug-in), and can be mono or stereo.

When using a hardware insert, you must connect the device to matching inputs and outputs on your system. For example, a stereo insert could use outputs 7–8 and inputs 7–8 for the sends and returns, respectively. Routing the physical inputs and outputs of the interface to Pro Tools inputs and outputs can be done in either the Hardware Setup dialog or I/O Setup dialog. From I/O Setup, inserts can also be defined, and their channels mapped to audio interface channels. (For more information, see the *Pro Tools Reference Guide*).

You can also connect effects units to your system by using any analog or digital inputs and outputs as Auxiliary Inputs and Outputs for effects sends and returns. Once an effects unit is attached this way, you can send a variable amount of a track's output to the effects unit using a *send* in Pro Tools.

Ten separate send controls on each Pro Tools track allow you to route audio to any of the available outputs connected to your system or through any of the 128 internal busses in the Pro Tools Mixer. Outputs can be returned to Auxiliary Inputs for automated mixing or processing.

When you are using an effect in this send and return type of configuration, make sure the unit's internal mix or balance between direct (unprocessed) and wet (effected) signal is set so that only the processed signal is returned to Pro Tools. On most effect units, a balance setting of 100% (completely wet) is the appropriate setting.

If you've been using an effects unit in an instrument setup, such as a guitar effects rack, you'll probably find the balance to be below 50%. If the unit has separate dry and effect level knobs, turn dry level control off. If you don't do this, the dry, unprocessed signal will be present in an effect's output along with the desired processed sound, and you'll have trouble accurately controlling the effect balance in your final mix.

Connecting Effects Units Digitally

To use your audio interface's inputs and outputs as effects sends and returns to a digital effects device, set your interface's Clock Source to Internal in the Hardware Setup dialog (unless it is referenced to another clock source or peripheral). You should then set your digital effects devices to accept an external digital clock so that they

will synchronize themselves to Pro Tools. Make sure you set the channel pair to the digital input in the Hardware Setup dialog (or I/O Setup dialog).

Connecting MIDI Devices

By adding a compatible MIDI interface to your system, you can take advantage of all the MIDI features of Pro Tools, including recording and editing MIDI tracks, and synchronizing to MIDI Time Code or MIDI beat clock.

USB MIDI interfaces work effectively with Pro Tools systems on Windows or Mac. Serial MIDI interfaces are supported on Windows systems only.

⚠ *Only USB MIDI interfaces are compatible with Pro Tools systems on Mac OS X. Modem-to-serial port adapters and serial MIDI devices are not supported.*

📖 *See Appendix C, “Configuring MIDI Studio Setup (Windows Only)” or Appendix D, “Configuring AMS (Mac OS X Only)” for detailed information on how to identify external MIDI devices connected to your MIDI interface and configure your MIDI studio for use with Pro Tools.*

To connect MIDI devices to your system:

- 1 Connect the MIDI interface to your computer according to the MIDI interface’s documentation.
- 2 Install any MIDI driver software required by the MIDI interface. (Once you have installed your MIDI interface hardware and software, confirm that it is working properly using the procedure given in the interface’s documentation.)

3 Connect the MIDI OUT of your MIDI device to the MIDI IN of your MIDI interface.

4 Connect the MIDI IN of your MIDI device to the MIDI OUT of your MIDI interface.

Connecting SMPTE Synchronization Devices

If you intend to synchronize Pro Tools to external devices with SMPTE, your system must be connected properly. For details on SMPTE and synchronization, see the *Pro Tools Reference Guide* or the *SYNC I/O Guide*.

Digidesign SYNC I/O

Digidesign’s SYNC I/O is a multi-purpose synchronization peripheral that provides all the functions and connections needed to synchronize to a variety of devices with Pro Tools|HD.

SYNC I/O lets you synchronize Pro Tools to LTC, VITC, and Bi-Phase/Tach, or internal for positional reference (time code), and supports all major clock references.

SYNC I/O integrates into the Loop Sync configuration of a Pro Tools|HD system, offering extremely fast lockup, near-sample accurate synchronization, and an exceptionally low-jitter clock. These features provide professional performance and maximum audio fidelity under a wide range of synchronization conditions.

For more information, refer to the *SYNC I/O Guide*.

Connecting Ethernet Control Surfaces

If you are using a built-in Ethernet port or a PCI Ethernet card to connect your computer directly (rather than across a network) to a D-Control, D-Command, ProControl or Control|24, the TCP/IP address must be set manually. The default manual settings will work in most cases. Do not use DHCP unless your computer is connected to a network that provides DHCP services.

appendix a

Connecting SCSI Drives

SCSI hard drives are the recommended recording media for Pro Tools|HD systems on Windows, and can also be used with Pro Tools on the Mac.

Although Pro Tools will let you record to your system drive, this is generally not recommended. Performance for recording and playback on system drives is sometimes worse than on non-system drives, resulting in lower track counts and fewer plug-ins.

⚠ *Be aware that recording to your system drive can quickly use up available hard drive space. This can negatively affect system stability and the performance of all applications including Pro Tools.*

For the most current information on hard drive requirements and recommendations, see the Digidesign website (www.digidesign.com).

SCSI Requirements

Digidesign recommends qualified SCSI hard drives and a qualified SCSI host bus adapter (HBA) card or (on Windows systems) a qualified built-in SCSI HBA connector on the motherboard.

For a list of qualified SCSI hard drives and SCSI HBA cards, see the Digidesign website (www.digidesign.com).

⚠ *Software RAID is not supported for audio drives.*

SCSI Cables

Use shorter SCSI cables to improve reliability. Table 1 provides guidelines for maximum cable lengths according to SCSI type.

In the following table, the maximum cable length includes all cables used in the chain, not just point-to-point connections.

Table 1: Maximum cable length and number of drives supported according to SCSI type

SCSI Type and Transfer Rate	Maximum Cable Length	Maximum Number of Drives
Fast SCSI 10 MB/sec	3 meters	8
Wide SCSI 20 MB/sec	3 meters	16
Ultra SCSI 20 MB/sec (8-bit narrow)	3 meters	5
Ultra SCSI 40 MB/sec (16-bit wide)	3 meters	5
Ultra SCSI 20 MB/sec (8-bit narrow)	1.5 meters	6–8
Ultra SCSI 40 MB/sec (16-bit wide)	1.5 meters	6–8
Ultra1 SCSI Low Voltage Differential (LVD) 160 MB/sec	12 meters	16
Ultra2 SCSI Low Voltage Differential (LVD) 80 MB/sec	12 meters	16
Ultra3 SCSI Low Voltage Differential (LVD) 320 MB/sec	12 meters	16

Distribute Audio Across Multiple Drives

For best recording and playback performance, don't record and play back all audio files in a session from the same drive. Instead, use Pro Tools Disk Allocation features to distribute audio files between multiple drives. See the *Pro Tools Reference Guide* for details.

Separate Video and Audio Files

If you are working with QuickTime, movie files must reside on a different SCSI bus than audio files. If audio files reside on disks connected to a SCSI HBA card, video data should reside on drives connected to a different SCSI bus.

Dual-Channel SCSI HBA Cards

If you use a dual-channel SCSI HBA card, allocate audio files equally to drives connected to each of the two busses on the card for optimal performance.

If using video files, make sure to put your video files on one bus and audio files on the other bus.

Connecting SCSI Drives

To connect an external SCSI drive:

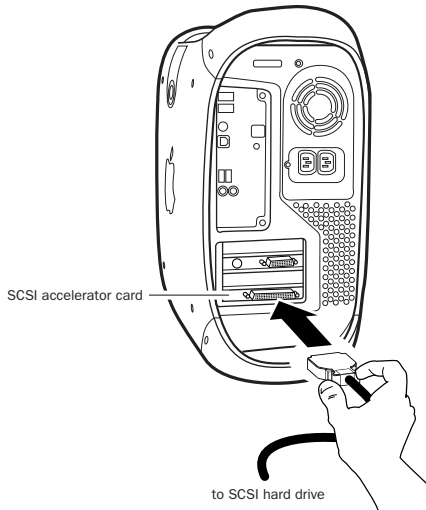
- 1 Turn off power to both the computer and the hard drive.
- 2 Attach a SCSI cable from the SCSI port of the hard drive to the SCSI port of the SCSI HBA card or computer.
- 3 Secure the cable's connectors to the hard drive and computer.
- 4 Connect additional drives by daisy-chaining from one drive to another. Keep cable lengths to a minimum (see Table 1).

5 Verify that the last SCSI device in the chain is properly terminated. (See “SCSI Termination” on page 67.)

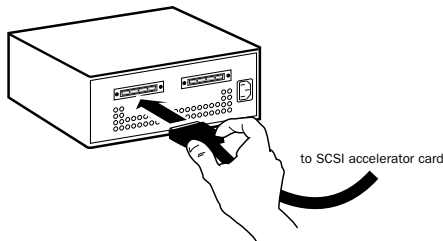
6 Make sure each SCSI device has a unique ID.

⚠ *SCSI ID 7 is reserved for the host computer. Do not use ID 7 with any of your SCSI devices.*

7 Attach power cables to the hard drives.



Connecting a SCSI cable to a SCSI HBA card



Connecting an external SCSI hard drive

SCSI Termination

Your computer's SCSI chain must be properly terminated or your system will not function correctly. Only the last device on the chain should be terminated using the termination type recommended by the hard drive manufacturer.

The drive should use either an external terminator plug or have its internal terminators enabled. If you are using a terminator plug, Digidesign recommends that you purchase and use an *active* terminator.

⚠ *Do not enable internal termination and install an external terminator plug on the same drive. This will cause SCSI errors. See your hard drive's documentation for information on which type of termination it uses.*

appendix b

Hard Drive Configuration and Maintenance

It is recommended that you start with a newly formatted external or secondary internal audio drive. You should also periodically defragment your audio drive to ensure continued system performance.

⚠ *Always back up any important data on your drive before formatting it, as it will erase all data on the drive.*


Avoid Recording to the System Drive

Recording to your system drive is not recommended. Recording and playback on a system drive may result in lower track counts or fewer plug-ins.

Supported Drive Formats and Drive Types

Drive Formats

Windows Windows XP systems should use drives formatted as NTFS or FAT32 (NTFS preferred).

 *Windows systems can also support Mac drives formatted using the HFS+ system (also commonly referred to as Mac OS Extended). Refer to the Pro Tools Reference Guide for more information.*

Mac Mac systems should use drives formatted with HFS or HFS+ file system only.

⚠ *HFS drives are supported as Transfer drives only.*

Hard drive performance depends on factors including system configuration, number of tracks, session sample rate, density of edits, and the use of crossfades and other processes such as Beat Detective in a session.

For complete hard drive requirements, see the Digidesign website (www.digidesign.com).

SCSI Hard Drives

Digidesign recommends qualified SCSI hard drives and a qualified SCSI host bus adapter (HBA) card or (on Windows systems) a qualified built-in SCSI HBA connector on the motherboard.

 For more information, see Appendix A, “Connecting SCSI Drives.”

For complete information on track count and the supported number and configuration of SCSI drives, visit the Digidesign website (www.digidesign.com).

FireWire Hard Drives


Digidesign recommends qualified FireWire drives and (on Windows systems) a qualified FireWire host adapter.

For complete information on track count and the supported number and configuration of FireWire drives, visit the Digidesign website (www.digidesign.com).

IDE/ATA/SATA Hard Drives

A qualified internal IDE/ATA/SATA drive may be used as a dedicated audio drive.

For complete information on track count with internal drives, refer to the Digidesign website (www.digidesign.com).

 *IDE/ATA/SATA hard drives provide limited track count performance and are not supported when an Expansion Chassis is used. For more information regarding Expansion Chassis operating procedures, see the Pro Tools Expanded Systems Guide.*

Formatting an Audio Drive

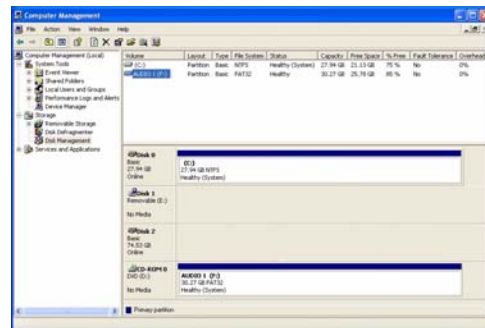
Formatting Windows Audio Drives

(Windows Only)

For optimal performance, audio drives should be formatted as FAT32 or NTFS.


To format an audio drive:

- 1 Right-click My Computer and choose Manage.
- 2 Under Storage, choose Disk Management.




Disk Management window


3 If the volume is “Healthy,” do the following:

 *Healthy volumes are volumes that have previously been partitioned and formatted.*

- In the Disk Management window, right-click the hard drive you will use for audio and choose Format.
- In the Format window, name the volume.
- Choose a file system. For optimum performance, audio drives should be formatted as NTFS. (FAT32 is also supported.)


 *Windows Disk Management can only create FAT32 volumes 32 GB or smaller. To create FAT32 volumes greater than 32 GB (up to 2 TB), use a third part utility (such as Swiss Knife or Partition Magic).*

- Select “Perform a quick format.”
- Make sure “Enable file and folder compression” is not selected.
- Set the Allocation unit size to Default.
- Click OK.


 *Pro Tools only supports Basic drive types. Do not convert the drive to a Dynamic type.*

4 If the volume is “Unallocated,” do the following:


- In the Disk Management window, right-click the hard drive you will use for audio and choose New Partition.
- In the New Partition Wizard window, click Next.
- When prompted, select the partition type.

 *Digidesign recommends using Primary partitions, instead of Extended partitions.*

- Follow the on-screen instructions to select a partition size and other partition settings.
- When prompted, choose a file system. For optimum performance, audio drives should be formatted as NTFS. (FAT32 is also supported.)

 *Windows Disk Management can only create FAT32 volumes 32 GB or smaller. To create FAT32 volumes greater than 32 GB (up to 2 TB), use a third part utility (such as Swiss Knife or Partition Magic).*

- Select “Perform a quick format.”
- Make sure “Enable file and folder compression” is not selected.
- Set the Allocation unit size to Default.
- Click OK.

 *Pro Tools only supports Basic drive types. Do not convert the drive to a Dynamic type.*

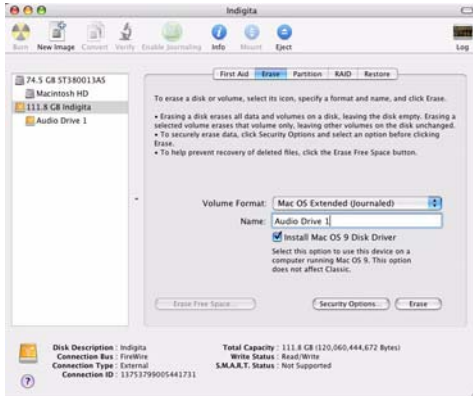
Formatting Mac Audio Drives

(Mac Only)

For optimum performance, audio drives should be formatted as Mac OS Extended (Journaled).

To format an audio drive:

- 1 Launch the Disk Utility application, located in Applications/Utilities.



Disk Utility (Mac OS X)

- 2 Click the Erase tab.
- 3 Select the drive you want to initialize in the column on the left side of the window.
- 4 Choose the Mac OS Extended (Journaled) format.

⚠ Do not choose the “Case-Sensitive” format option. Pro Tools will not operate properly with case-sensitive formatted drives.

- 5 Type a name for the new volume.
- 6 If you plan to connect the drive to a Mac OS 9 computer, select Install Mac OS 9 Drivers.
- 7 Click Erase.

The drive appears on the Desktop with the new volume name.

Partitioning Drives

Partitioning creates a logical volume or volumes on a physical drive, almost as if you were creating virtual hard drives. Partitions can then be formatted with the appropriate file system (NTFS or FAT32 for Windows, HFS+ for Mac).

FAT32 drive partitions have a limit of 2 terabytes (2000 gigabytes), whereas NTFS drive partition sizes are almost limitless.

⚠ Windows XP allows drives formatted with the NTFS or FAT32 file systems to be seen as whole volumes. Single Pro Tools audio files cannot exceed 2048 MB in size.

⚠ Mac OS allows drives larger than 4096 MB to be seen as whole volumes. Drives must be initialized with a disk utility that recognizes the 2 terabyte limit. Single Pro Tools audio files cannot exceed 2048 MB in size.

Seek Times on Partitioned Drives

Seek times are actually faster on partitioned drives (assuming that reads and writes are performed on a single partition), since the heads only have to seek within the partition boundaries, rather than the whole capacity of the drive.

Smaller partitions perform faster than larger partitions, but this comes at the expense of contiguous storage space. When you partition a drive, you will need to find the compromise that best suits your performance and storage requirements.

⚠ Avoid distributing audio files within a session over different partitions on the same drive since this will adversely affect drive performance.

Defragmenting an Audio Drive

Mac Systems

When working with larger files (such as video), you can limit fragmentation by backing up your important files to another disk, erasing the files from the original hard disk, then copying the files back, instead of doing a defragmentation.

Window Systems

Periodically *defragment* audio drives to maintain system performance.

For maximum recording and playback efficiency, data should be written to your hard drive in a contiguous fashion—minimizing the seek requirements to play back the data. Unfortunately, your computer can't always store the sound files in this way and must write to disk wherever it can find space.

In multitrack recording, audio tracks are written in discrete files, spaced evenly across the disk. While fragmentation of individual files may be zero, the tracks may be far enough apart that playback will still be very seek-intensive. Also, the remaining free space on the disk will be discontinuous, increasing the likelihood of file fragmentation on subsequent record passes.

Increased fragmentation increases the chance of disk errors, which can interfere with playback of audio, and result in performance errors.



On Windows, to avoid fragmentation, format drives with higher cluster sizes (such as 32K).

Optimizing (Defragmenting) Drives

To prevent fragmentation, you can optimize your drive, which rearranges your files into a contiguous format. Most optimizing software lets you run a check on a drive to find out the percentage of fragmentation. If your drive shows moderate to heavy fragmentation, you should consider optimizing it.

If you use your system for intensive editing, or if you frequently delete audio or fade files from your hard drive, you may need to optimize your drives on a weekly basis, or even every few days, since it doesn't take long for even a large hard drive to become fragmented.

Backing Up Data Before Optimizing

Since your files will be rewritten by the optimization process, always make a backup copy of the data on your hard drive before you optimize it. You should also use a hard drive utility to find and repair any problems before optimizing data or re-initializing your drives. If there is any damage to your hard drive's directories prior to optimizing, serious data loss may result.

Defragmenting Windows Audio Drives

To defragment an audio drive (Windows):


- 1 Right-click My Computer and choose Manage.
- 2 Under Storage, choose Disk Defragmenter.
- 3 In the Disk Defragmenter window, choose the drive you want to defragment
- 4 Click the Defragment button and follow the on-screen instructions.

When defragmenting is complete, close the Computer Management Window.

Using Mac Drives on Windows Systems

Pro Tools for Windows lets you record and play back sessions directly from a Mac-formatted (HFS+) drive connected to a Windows system. This functionality requires that all Mac session and audio files be stored on Mac-formatted drives.

During Pro Tools installation, make sure to select the Mac HFS+ Disk Support option. This option lets your Pro Tools system read, write, record, and play back using Mac-formatted HFS+ disks.

 *For information on using the Mac HFS+ Disk Support option, see the Mac HFS+ Disk Support Option Guide.*

For information on sharing sessions between Mac and Windows systems, see the Pro Tools Reference Guide.

Formatting and Maintaining HFS+ Drives

To format and partition any drives as HFS+, connect the drives to a Mac computer and use the Apple OS X Disk Utility.

Hard Disk Storage Space

Mono audio tracks recorded with 16-bit resolution at 44.1 kHz (CD quality) require approximately 5 MB of hard disk space per minute. The same tracks recorded with 24-bit resolution require about 7.5 MB per minute.

Stereo audio tracks recorded with 16-bit resolution at 44.1 kHz (CD quality) require approximately 10 MB of hard disk space per minute. The same tracks recorded with 24-bit resolution require about 15 MB per minute.

Table 3 lists the required disk space for certain track numbers and track lengths, to help you estimate your hard disk usage.

Table 3. Required hard drive space for audio tracks (44.1 kHz and 48 kHz sessions shown)

Number of Tracks and Length	16-bit at 44.1 kHz	16-bit at 48 kHz	24-bit at 44.1 kHz	24-bit at 48 kHz
1 mono track, 1 minute	5 MB	5.5 MB	7.5 MB	8.2 MB
1 stereo track (or two mono tracks), 5 minutes	50 MB	55 MB	75 MB	83 MB
1 stereo track (or two mono tracks), 60 minutes	600 MB	662 MB	900 MB	991 MB
24 mono tracks, 5 minutes	600 MB	662 MB	900 MB	991 MB
24 mono tracks, 60 minutes	7 GB	7.8 GB	10.5 GB	11.6 GB
32 mono tracks, 5 minutes	800 MB	883 MB	1.2 GB	1.3 GB
32 mono tracks, 60 minutes	9.4 GB	10.4 GB	14 GB	15.4 GB

appendix c

Configuring MIDI Studio Setup (Windows Only)

MIDI Studio Setup

MIDI Studio Setup (MSS) lets you configure the MIDI controllers and sound modules that are connected to your system, and control the routing of MIDI data between your MIDI equipment and Pro Tools.

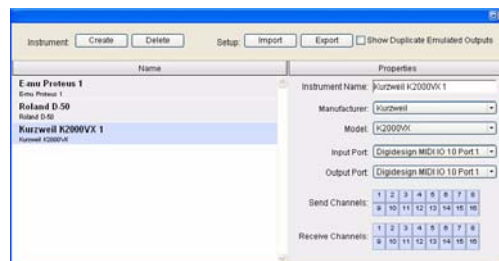
MSS automatically finds MIDI interfaces, and lets you specify a custom name for each of the MIDI ports within the MIDI Studio Setup document.

MSS also supports XML-based patch file names for storing and importing patch names for your external MIDI devices.

Entire MIDI Studio Setup configurations created within MSS can be imported and exported.

MIDI Studio Setup Window

The MIDI Studio Setup window is organized into three sections. Interface controls are at the top of the window. All the currently defined instruments are displayed in the Instrument Name list on the left side of the window. A detailed view of MIDI parameters is shown in the Properties section on the right.



MIDI Studio Setup window

Interface Controls

Create This button adds a new instrument to the Instrument Name list.

Delete This button deletes the instrument or instruments selected in the Instrument Name list.

Import This button lets you import an existing MIDI Studio Setup file.

Export This button lets you export the current MIDI Studio Setup file.

Show Duplicate Emulated Ports If you are using a MIDI interface that supports timestamping (such as MIDI I/O), when the Show Duplicate Emulated Outputs option is selected, the MIDI Studio Setup window shows both the Direct-Music time-stamped output ports, and non-stamped duplicate emulated output ports.

⚠ *Some MIDI Interfaces will not properly load or unload their drivers unless you quit and re-launch Pro Tools. Check the documentation that came with your MIDI interface for more information.*

Instrument List

The Instrument list contains all the currently defined instruments. Selecting an instrument in the list displays that instrument's properties in the Properties section of the window.

Properties Section

The Properties section lets you edit information for new instruments, or instrument currently selected in the Instrument list.

MIDI Studio Setup Properties section

When a previously defined instrument is selected in the Instrument list, the Properties section changes to reflect the properties of the selected instrument.

To define an instrument with MIDI Studio Setup:

- 1 Choose Setup > MIDI > MIDI Studio.
- 2 Click Create.
- 3 In the Instrument Name field, type the name of your instrument, and press Enter.

💡 *If you do not enter an instrument name, the Instrument Name field will automatically inherit information from the Manufacturer and Model pop-up menu.*

- 4 Set a manufacturer and model for the new device from the corresponding pop-up menus. If the Manufacturer and Model pop-up menus do not provide a name for your particular device, choose None.

- 5 From the Input pop-up menu, choose the input port on your MIDI interface that is connected to the MIDI Out of your instrument.

- 6 From the Output pop-up menu, choose the output port on your MIDI interface that is connected to the MIDI In of your instrument.

- 7 Enable the appropriate MIDI channels (1–16) for the Send Channels and Receive Channels options (These determine which channels send and receive MIDI.)

Instrument Name

The Instrument Name field shows the user-definable instrument name for the currently selected instrument.


Manufacturer

The Manufacturer pop-up menu provides a list of MIDI equipment manufacturers. This list is derived from the XML-based MIDI device files.

📖 *For more information, see “MIDI Patch Name Support” on page 79.*


Model

The Model pop-up menu provides a list of MIDI devices, filtered by the manufacturer name. This list is derived from the XML-based MIDI device files provided with your Pro Tools installation.

 For more information, see “MIDI Patch Name Support” on page 79.


Input Port

The Input Port pop-up menu displays a list of available MIDI interface input ports. The MIDI interface port that is set and displayed here is the port through which MIDI data is sent from the external MIDI device specified in the Instrument Name field into your MIDI interface.

 If you set the input port to None, the defined instrument will not appear as a choice in a MIDI Input Selector.

Output Port

The Output Port pop-up menu displays a list of available MIDI interface output ports. The port set and displayed here is the port through which MIDI data is sent from your MIDI interface to the MIDI device specified in the Instrument Name field.

 If you set the output port to None, the defined instrument will not appear as a choice in a MIDI Output Selector.

Send Channels

The Send Channels grid sets the send channels for the MIDI device specified in the Instrument Name field.

Receive Channels

The Receive Channels grid sets the receive channels for the MIDI device specified in the Instrument Name field.

MIDI Patch Name Support

Pro Tools supports XML (Extensible Markup Language) for storing and importing patch names for your external MIDI devices. Pro Tools installs MIDI patch name files (.midnam) for the factory default patch names of many common MIDI devices. These files reside in directories, sorted by manufacturer, in Program Files\Common Files\Digidesign\MIDI Patch Names\Digidesign.

To import MIDI patch names into Pro Tools:

- 1 Verify the MIDI Device name in the MIDI Studio Setup window (see “MIDI Studio Setup” on page 77).
- 2 Verify the MIDI track’s output is correctly assigned to the MIDI device.
- 3 Click the MIDI track’s Patch Select button.

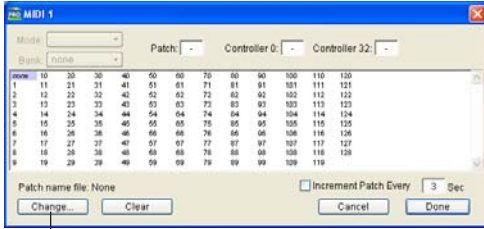


Patch Select button, Edit window



Patch Select button, Mix window

4 In the Patch Select dialog, click the Change button.



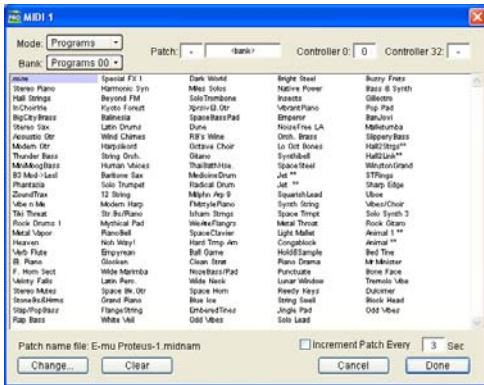
Change button

Patch Select dialog

5 In the Open dialog, navigate to Program Files\Common Files\Digidesign\MIDI Patch Names\Digidesign\<name of manufacturer>, and select the MIDI Patch Name file (.midnam) for the MIDI device.

6 Click Open.

The Patch Select dialog is populated with patch names and the Patch Name Bank pop-up menu appears in the upper left hand corner of the window.



Patch Select dialog with patch names

Once patch names have been imported into Pro Tools, they are available for that MIDI device in all sessions.

To clear patch names:

- In the Patch Select dialog, click the Clear button, and click Done.



MIDI patch name files (.midnam) can be edited in any text editor, or you can use third party patch librarian and editor software to create your own custom patch names.

appendix d

Configuring AMS (Mac OS X Only)

Audio MIDI Setup

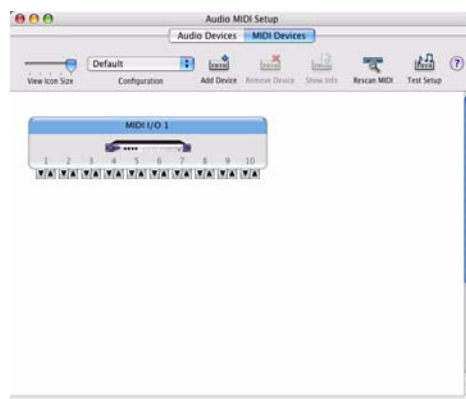
Pro Tools recognizes the ports on your MIDI interface as generic ports. With Mac OS X, you use Apple's Audio MIDI Setup (AMS) utility to identify external MIDI devices connected to your MIDI interface and configure your MIDI studio for use with Pro Tools.

⚠ *To ensure optimum performance, do not change the AMS configuration while Pro Tools is playing back. Stop the Pro Tools transport before launching AMS.*

To configure your MIDI studio in AMS:

- 1 Do one of the following:
 - Launch Audio MIDI Setup (located in Applications/Utilities).
 - or –
 - In Pro Tools, choose Setup > MIDI > MIDI Studio.

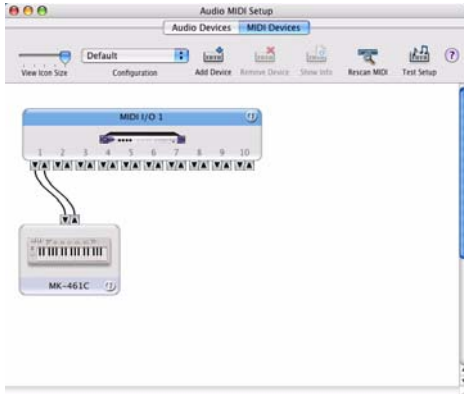
- 2 Click the MIDI Devices tab. AMS scans your system for connected MIDI interfaces. If your MIDI interface is properly connected, it appears in the window with each of its ports numbered.



Audio MIDI Setup (MIDI Devices tab)


- 3 For any MIDI devices connected to the MIDI interface, click Add Device. A new external device icon with the default MIDI keyboard image will appear.
- 4 Drag the new device icon to a convenient location within the window.

5 Connect the MIDI device to the MIDI interface by clicking the arrow for the appropriate output port of the device and dragging a connection or “cable” to the input arrow of the corresponding port of the MIDI interface.



Making MIDI input and output connections

6 Click the arrow for the appropriate input port of the device and drag a cable to the output arrow of the corresponding port of the MIDI interface.

 *To remove a connection, select the cable and press Delete.*

7 Repeat steps 3–6 for each MIDI device in your MIDI setup.

To configure an external MIDI device:

1 Select the external device icon and click Show Info (or double-click the new device icon).



External Device Icon

2 Select a manufacturer and model for the new device from the corresponding pop-up menus. (If the Manufacturer and Model pop-up menus do not provide a name for your particular device, you can type a name.)

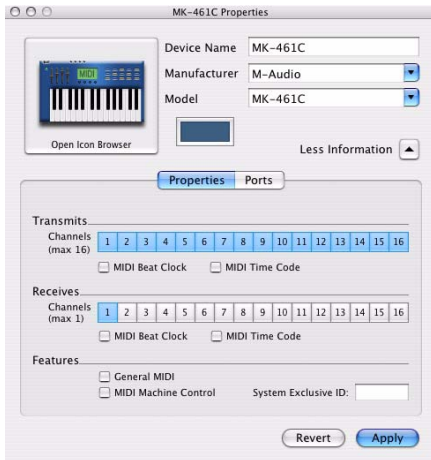


Naming a new MIDI device



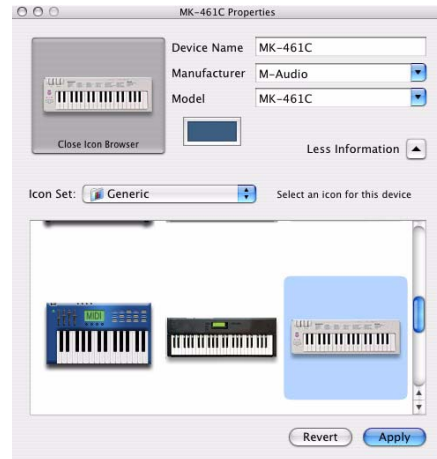
For Manufacturer and Model names, AMS refers to one or more files with the suffix “.middev” in the directory Root/Library/Audio/MIDI Devices. Pro Tools installs a file that contains information for many commercially available MIDI devices, named “Digidesign Device List.middev.” If the Manufacturer or Model names for any of your external MIDI devices is not available in the AMS Manufacturer and Model pop-up menus, you can add them by editing the .middev file in any text editor (such as TextEdit).

- 3 Click the More Information arrow to expand the dialog, then enable the appropriate MIDI channels (1–16) for the Transmits and Receives options. (These determine which channels the device will use to send and receive MIDI.)



Enabling MIDI channels

- 4 Click the device image. The window expands to show images for various MIDI devices (such as keyboards, modules, interfaces, and mixers). Select an icon for your device.



Selecting a device icon



To use your own custom icons, you can place TIFF image files in /Library/Audio/MIDI Devices/Generic/Images, and they will appear as choices in the AMS device window.

- 5 Select a device image and click Apply.
- 6 Close the AMS window to quit the AMS application.



To ensure optimum performance, do not launch the Pro Tools application while running AMS. Quit the AMS application first, then launch Pro Tools.

The device names you enter appear as MIDI input and output choices in Pro Tools.

MIDI Patch Name Support

Pro Tools supports XML (Extensible Markup Language) for storing and importing patch names for your external MIDI devices. Pro Tools installs MIDI patch name files (.midnam) for the factory default patch names of many common MIDI devices. These files reside in directories, sorted by manufacturer, in /Library/Audio/MIDI Patch Names/Digidesign.

To import MIDI patch names into Pro Tools:

- 1 Verify the MIDI Device name in the Audio MIDI Setup window (see “Audio MIDI Setup” on page 81).
- 2 Verify the MIDI track’s output is correctly assigned to the MIDI device.
- 3 Click the MIDI track’s Patch Select button.



Patch Select button

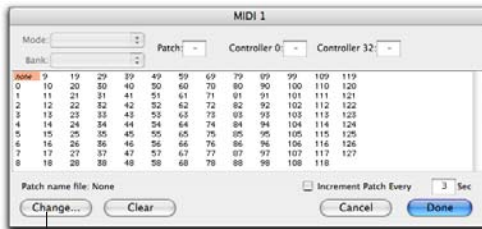
Patch Select button, Edit window



Patch Select button

Patch Select button, Mix window

- 4 In the Patch Select dialog, click the Change button.



Change button

Patch Select dialog

- 5 In the Open dialog, navigate to /Library/Audio/MIDI Patch Names/Digidesign/<name of manufacturer>, and select the MIDI Patch Name file (.midnam) for the MIDI device.
- 6 Click Open.

The Patch Select dialog is populated with patch names and the Patch Name Bank pop-up menu appears in the upper left hand corner of the window.

Once patch names have been imported into Pro Tools, they are available for that MIDI device in all sessions.

To clear patch names:

- In the Patch Select dialog, click the Clear button, and click Done.



MIDI patch name files (.midnam) can be edited in any text editor, or you can use third party patch librarian and editor software to create your own custom patch names.

DSP-Induced Delays in Mixing

This appendix provides an overview of DSP-induced delays, and explains how you can compensate for these delays to improve time and phase alignment of audio in complex or critical mixing situations.

- To learn about DSP-induced delays and when you should compensate, see “Introduction to DSP-Induced Delay” on page 85.
- To learn how to compensate for delays automatically with Delay Compensation (Pro Tools HD only), see “Delay Compensation” on page 86.
- To learn how to compensate for delays manually, see “Manually Compensating for Delays” on page 87.
- For details on the sources of DSP-induced delay, see “Delay Factors” on page 89.

Introduction to DSP-Induced Delay

In all digital systems, DSP processing causes signal delays of varying amounts. These DSP-induced delays can vary from as short as several microseconds to as long as several milliseconds, depending on the type of processing or routing being performed.



Do not confuse signal processing-induced delays with time domain effects processing (such as delay, echo, reverb, and other desirable delay effects).

Each plug-in, hardware insert, and mixer assignment on a track delays that track by an amount equal to the total of all DSP-delay factors. (For details on these delays, see “Delay Factors” on page 89.)

In some cases, signal processing 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 imparts an unequal amount of delay to the signals on that channel, which subsequently may cause undesirable cancellation of certain frequencies.



Audible symptoms of phase issues include comb-filtering and loss of high frequencies.

In simple terms, DSP-induced delay can cause audio to arrive at the main output (or a submix output) at different times. To maintain time alignment, you can *compensate* for DSP-induced delays.

When to Compensate

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 do not need to worry about compensating for delays.

However, larger sessions with higher track and voice counts, many plug-ins, and/or complex mixer routing can benefit when DSP-induced delays are compensated to maintain proper time alignment.

In any session, if you want to maintain absolute time alignment across all tracks you should always compensate for signal processing delays.

How to Compensate

Pro Tools systems provide tools to compensate for signal processing delays, as follows:

- You can automatically calculate and compensate for processing delays by using the Pro Tools Delay Compensation feature. See “Delay Compensation” on page 86.

- You can manually compensate for delays with one or more of the following methods:
 - Apply sample-level delay to tracks with the TimeAdjuster plug-in (see “Using TimeAdjuster TDM Plug-In” on page 88).
 - Manually nudge tracks earlier or later in time as needed “Nudging Audio Tracks” on page 89.
 - Use the same plug-ins on all tracks.

While learning about how to compensate for delays, keep in mind that the best results can be often obtained by using a combination of one or more methods. Doing so gives you more options for managing DSP resources as needed by Delay Compensation and the TimeAdjuster (TDM) plug-in. In addition, the variety of tools available for compensating for delays help ensure compatibility if the session is to be transferred to another system.

Automatically Compensating for Delays


If you want Pro Tools to automatically compensate for offsets incurred by processing delays, use Delay Compensation.

Delay Compensation

Delay Compensation automatically manages DSP delays that occur on audio tracks, Auxiliary Inputs, or Master Faders because of plug-in use and mixer routing. With Delay Compensation enabled, Pro Tools maintains time-alignment between tracks that have plug-ins with differing DSP delays, tracks with different mixing paths, tracks that are split off and recombined within the mixer, and tracks with hardware inserts.

To maintain time alignment, Pro Tools adds the exact amount of delay to each track necessary to make that particular track's delay equal to the delay of the track that has the *longest* delay.

Delay Compensation should be enabled during mixing and playback for optimal delay-compensated sound. In some cases when recording, Delay Compensation should be turned off.

 For more information on using Delay Compensation, see the *Pro Tools Reference Guide*.

To use Delay Compensation to compensate for DSP-induced delays:

- 1 Choose Setup > Playback Engine, and choose a Delay Compensation setting (see “TimeAdjuster and Delay Compensation” on page 87).
- 2 Select View > Mix Window > Delay Compensation.
- 3 Choose Options > Delay Compensation.
- 4 Use the track Delay Compensation displays and other settings to do any of the following, as needed:
 - Define specific delay values for hardware inserts
 - Bypass Delay Compensation per track
 - Fine tune Delay Compensation for each track by entering a User Offset

TimeAdjuster and Delay Compensation

TimeAdjuster plug-ins behave in a special way when used with Delay Compensation, as follows:

- When Delay Compensation is enabled, TimeAdjuster does not report to Pro Tools its Delay setting (the amount of delay to be added to the signal path). However, TimeAdjuster does report its internal plug-in delay of 4 samples to Pro Tools, and this delay is reported in the track Channel Delay indicator (or Delay Compensation View) in the Mix window.
- When Delay Compensation is turned off or unavailable, TimeAdjuster operates as expected and applies its Delay setting to the track. For more information, see “Manually Compensating for Delays” on page 87.

This ability to maintain TimeAdjuster instances and their Delay settings lets you more easily transfer sessions between systems with and without Delay Compensation.

Manually Compensating for Delays


If you want to manually compensate for offsets incurred by processing delays, do any of the following:


- Use the same plug-ins on all tracks.
- Apply sample-level delay to tracks with the TimeAdjuster plug-in. See “Using TimeAdjuster TDM Plug-In” on page 88.
- Physically adjust audio tracks in the Edit window by the appropriate number of samples (for example, by using the Nudge function). See “Nudging Audio Tracks” on page 89.

Using TimeAdjuster TDM Plug-In

You can use the TimeAdjuster TDM plug-in provided with your Pro Tools system to apply an exact number of samples of delay to the signal path of the tracks you are working with. Up to 2048 samples of delay are available.

The Channel Delay indicator (dly) in the Mix window displays the total delay, in samples, incurred on a track from the use of any plug-in on that channel. TimeAdjuster can be used to match these delay values for other tracks that need to remain in phase (as can occur with instruments recorded with multiple microphones or stereo pairs, if the tracks do not use the same plug-ins).

 See also “TimeAdjuster and Delay Compensation” on page 87.

 For information on delay indication when using Delay Compensation, see the Pro Tools Reference Guide.

To use TimeAdjuster to compensate for a time delay (for example, between two tracks):

- 1 In the Mix window, Control-click (Windows) or Command-click (Mac) the first track’s Volume/Peak/Channel Delay indicator to toggle to Channel Delay (dly).
- 2 Note the Delay value, shown in samples.
- 3 Insert the TimeAdjuster plug-in on the second track (the one whose delay you want to change to match the first track).
- 4 Control-click (Windows) or Command-click (Mac) the track’s Volume/Peak/Channel Delay indicator until the Channel Delay (dly) value is displayed for that track.

5 Change the delay time in TimeAdjuster by moving the Delay slider or entering a value in the Delay field, until the second track’s delay value matches that of the first track.

Testing TimeAdjuster

You can test the delay values by duplicating an audio track and reversing its phase while compensating for delay.

Using TimeAdjuster with Plug-Ins

If you are using a plug-in whose delay factor you are not familiar with, you can set the delay by ear.

To use TimeAdjuster to compensate for plug-ins with unknown time delays:

- If you are working with phase-coherent track pairs, or tracks that had been multi-miked, you can “null out” the delay. Invert the phase of the target track using the TimeAdjuster Phase Invert button, and adjust the plug-in delay time until the signal disappears. (When they are perfectly synchronized, duplicate signals of opposite polarity cancel each other out.) When you are finished, disengage the Phase Invert button.
– or –
- Change the delay while listening to the signal in phase, adjusting until any comb-filter effects cancel out.

Nudging Audio Tracks

On audio tracks, you can use the Pro Tools Nudge feature to nudge the affected regions in single-sample (or other) increments, to preserve phase coherency. If it is necessary to nudge a region by a large number of samples, you may want to calculate the equivalent value in milliseconds and nudge the Region in millisecond increments. If the value does not divide evenly, you can switch the Nudge value back to samples and use these smaller increments for the remainder.

The disadvantage of using this method is that it only works with audio tracks (not live inputs), and the timing relationship between tracks is permanently altered, which can affect editing.

Sample Rate and How it Affects Delay

The delay in samples caused by TDM processing is the same regardless of the sample rate because a sample is tied to the rate of the sample clock for the entire system. However, when samples are converted into a time value (milliseconds or microseconds), the sample rate (44.1 versus 48 kHz) must be taken into account.

Delay Factors

With Pro Tools HD, delay is incurred when you perform the following processes:

- Bouncing tracks. See “Bouncing Tracks” on page 89.
- Real-time processing with plug-in inserts. See “Using Plug-In Inserts” on page 89.
- Mixing and routing with sends. See “Using Sends” on page 90.
- Mixing and routing with hardware I/O (sends or inserts). “Using Hardware I/O” on page 90.

Bouncing Tracks

Bouncing to tracks causes additional delay, as follows:

Bus-Based Bounces When you bus a track to another track and record the result, the following delays are incurred:


Bus-based bounce delays for each Pro Tools system

HD Mixer	Delay
Stereo Mixer	10 samples
Surround Mixer	8 samples

Bounce to Disk The File > Bounce to > Disk command causes no delay on Pro Tools|HD systems, because delay compensation for the bounce function is built in. This form of bouncing may be more desirable than bus-based bouncing. For more information, see the *Pro Tools Reference Guide*.


Using Plug-In Inserts

Using plug-in inserts on a track causes additional delay.

 For specific information on the delay amounts for DigiRack or Digidesign plug-ins, refer to your DigiRack Plug-Ins Guide or Digidesign Plug-Ins Guide.

Channel Delay Indicator

On all systems, the Channel Delay indicator (dly) in the Mix window displays the total delay, in samples, incurred on the track from the use of any TDM plug-ins on that channel.

 For information on delay indication when using Delay Compensation, see the *Pro Tools Reference Guide*.

To see the amount of processing delay on a track that uses plug-in inserts:

- In the Mix window, Control-click (Windows) or Command-click (Mac) the track's Volume indicator to toggle between Volume (“vol”), Peak (“pk”) and Channel Delay (“dly”) indications.

Using Sends

When you send a track to another track and return it to a track (audio, Auxiliary Input, or Master Fader), the following delays are incurred:

Sends delays for Pro Tools|HD systems

HD Mixer	Sends	Delay
Stereo Mixer	Pre-fader send to bus	10 samples
	Post-fader send to bus	8 samples
Surround Mixer	Pre-fader send to bus	8 samples
	Post-fader send to bus	12 samples

Hardware sends also produce delays (see below).

Using Hardware I/O

When an audio interface is used on an insert or send, there is delay introduced by going through the D/A and A/D converter pair (for analog devices) or digital I/O connection (for digital devices) on the audio interface.

You can define a delay value for hardware inserts in the I/O Setup dialog. See the *Pro Tools Reference Guide* for more information.

The following tables list the delay incurred by each type of analog and digital output available in Pro Tools|HD systems.

Pro Tools|HD I/O characteristics

Interface and I/O Port	Stereo Mixer	Surround Mixer
192 I/O or 192 Digital I/O AES/EBU	24 samples	22 samples
192 I/O Analog	103 samples	103 samples
96 I/O AES/EBU	21 samples	19 samples
96 I/O Analog	79 samples	77 samples

I/O characteristics for Pro Tools|24 MIX-series Legacy interfaces connected to Pro Tools|HD Legacy Port

Interface and I/O Port	Stereo Mixer	Surround Mixer
888 24 I/O AES/EBU	18 samples	16 samples
888 24 I/O Analog	82 samples	80 samples
888 20 I/O AES/EBU	20 samples	18 samples
888 20 I/O Analog	18 samples	16 samples
ADAT Bridge Optical	18 samples	16 samples
ADAT Bridge S/PDIF	76 samples	74 samples
1622 I/O Optical	18	16 samples
1622 I/O S/PDIF	76	74 samples



On the 888|24 I/O, the Digital I/O delay incurred when using AES/EBU or S/PDIF is identical.

appendix f

TDM Mixing and DSP Usage

Benefits of TDM II

Digidesign's TDM (or *time division multiplexing*) technology is based on the concept of a single, high-speed data *highway*, or *bus* that transmits data between your Pro Tools CPU, Pro Tools cards, and the DSP chips on the cards.

Pro Tools|HD cards feature Digidesign's enhanced TDM II architecture. The TDM II architecture provides many advantages over the original TDM (or TDM I) architecture in terms of its mixing capacity and flexibility.

In TDM systems, individual channels from sources such as audio tracks, sends, or busses are sent out from Pro Tools audio cards, and combined together or *multiplexed* onto the TDM bus so that all signals can travel simultaneously and can be accessed within a single sample period. At the receiving end, the audio cards can listen to any connection on the bus, and take whatever data they need.

The TDM bus runs fast enough to accommodate many audio signals at the same time. Each separate audio signal or *stream*, takes up a single *time slot* on this multiplexed bus.

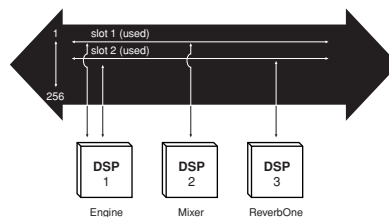
One of most powerful features of the TDM architecture is that a single time slot can be used to “broadcast” data to many destinations simultaneously.

With TDM II, not only can it send data to many destinations simultaneously, but it can also send signals both bi-directionally and “privately” between DSP chips, which effectively provides a much greater number of available time slots. This provides a greater potential number of connections for routing, processing and mixing audio signals within Pro Tools.

TDM (or TDM I)

(Legacy Pro Tools MIX-Series Systems Only)

The TDM I architecture (used with Pro Tools|24 MIX systems) has a single bus where every DSP within the entire TDM system shares a single pool of 256 time slots. In practice, this means, for example, that if an audio track has a Reverb One plug-in insert, one of the 256 time slots is used to connect the Engine DSP on one chip to the Reverb One plug-in DSP on another chip. The TDM time slot used comes from the pool of 256 time slots, and is unavailable for use by the rest of the system.

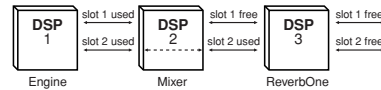


Time slot usage on Pro Tools|24 MIX hardware

TDM II

With TDM II, there is a separate TDM I/O bus between each DSP chip on the Pro Tools cards, each with up to 512 bi-directional time slots at a session sample rate of 44.1 or 48 kHz (both between DSPs on each card, and between the DSPs that communicate between cards). The DSP chips are arranged serially, with a TDM I/O bus connecting one chip to the next. This means that every TDM II connection need only use time slots between the two DSPs that are being connected. See Figure 7 on page 92.

So, using the same example as above, if an audio track has a Reverb One plug-in insert, a time slot is used between the Engine DSP (sending out the audio track) and the DSP with the Reverb One instance. If the Reverb One insert is handled by a DSP that is physically next to the DSP handling mixing tasks, as shown in the illustration below, this leaves time slot 2 available for use between DSP 3 through DSP 9, and subsequent Pro Tools|HD cards.



Time slot usage on Pro Tools|HD hardware

The maximum consumption of the time slots for a single connection occurs when the audio must be sent between the first and last DSP in the system. In this instance, a time slot between each DSP is used to reach the last DSP in the chain.

Another example of how TDM II is more efficient than TDM I is to imagine a single HD Core card with one Engine chip and two Mixer chips. The DSPs with plug-in instances associated with the first Mixer do not need to communicate with the second Mixer, therefore the time slot numbers used can be re-used by the second Mixer to communicate with other DSPs loaded with other plug-ins.

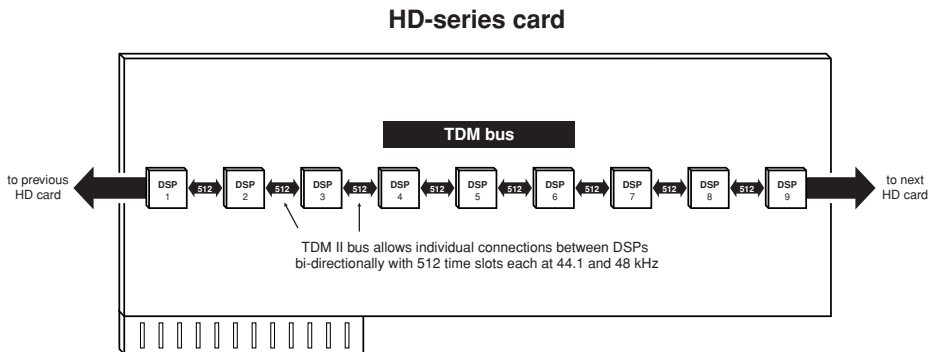


Figure 7. TDM bus on Pro Tools|HD hardware

DSP Allocation

Digital Signal Processing (or DSP) capability is one of the most powerful elements of your system. The DSP chips in your system provide the real-time processing power for your TDM Mixer and plug-ins. There is a limit, depending on your system, to how many functions a single DSP chip can power at once. This section contains some guidelines for getting the most from your available DSP capacity.

DSP Allocation Basics

As in the analog world, every send bus or output mix that you use demands that a summing mixer exist for that group. On an analog console, the number of these summing mixers is fixed by the physical layout of the console. In the Pro Tools mix environment, this number is variable, and depends on the number of output mixes or sends that you choose to create. Pro Tools allocates DSP power as it is needed to build the mixers for each session.

We describe certain mixing or signal processing functions as “using one DSP” or “using two DSPs.” This refers to the fact that there are 9 DSP chips on each HD card.

Each chip on a card can only power a certain number of processing functions. If you have a single Pro Tools|HD card, and you create a big enough TDM mixer and use enough sends or plug-ins, you will eventually use up or “max out” the DSP capacity of that card.

Mixing and DSP Usage

Pro Tools builds a TDM mixer every time a session is opened. Note that the term “mixer channel” applies to audio tracks (total voiceable tracks), Auxiliary Input tracks, and sends and returns that use any of the 128 internal busses. When you go beyond a certain number of mixer channels, Pro Tools will use another DSP to create additional mixer capacity.

Master Faders do not use additional DSP power.

DSP Manager

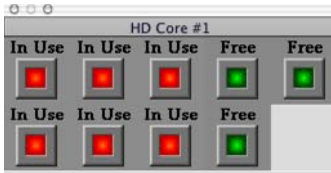
Pro Tools software includes the *DSP Manager*, a software component that optimizes the use of DSP capacity on Pro Tools|HD systems.

When you have an Pro Tools|HD card in your system, if your current DSP usage is approaching the capacity of the card, and you then try to add a mixer channel or assign a plug-in, the DSP Manager will automatically try to make room for the new mixer or plug-in on the Pro Tools|HD card. It does this by reallocating the existing TDM mixers and plug-ins to use the available DSP capacity on the Pro Tools|HD card as efficiently as possible.

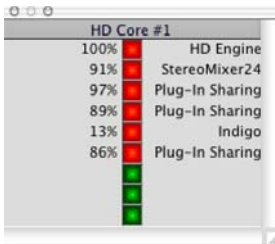
Monitoring DSP Usage

The System Usage window provides a display of DSP usage. As you allocate DSP to mixing or processing with plug-ins, the System Usage window indicates when DSP chips are available and when they are in use. Green indicates a chip is free. Red indicates a chip is in use.

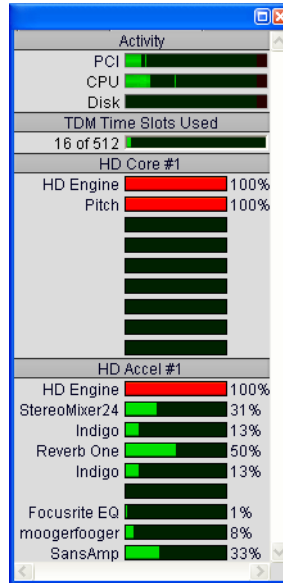
There are five different System Usage View formats: Small, Large, Detailed, Gas Gauge, and Activity Only. The Detailed and Gas Gauge formats show the percentage of each DSP chip in use.



System Usage window showing Large format




System Usage window showing Detailed format



System Usage showing Gas Gauge format

With these indicators as your guide, you can try different mixer setups and different arrangements of plug-ins, sends, and Auxiliary Inputs to maximize your use of available DSP power.

 Another feature available for DSP management is Active and Inactive switching. See the Pro Tools Reference Guide for more information.

To monitor the usage of DSP resources during a Pro Tools session:

- Choose Window > System Usage.

To display DSP resources in different view formats:

- Choose View > System Usage, and one of the System Usage View formats (such as Small).

Setting up Sessions to Use DSP Efficiently

The dynamically configurable mixing environment in Pro Tools lets you make choices based on the type of setup you want to have—such as how many inputs you want for your mixer, how many plug-ins you want to use, or how many sends you need.

For example, you could allocate all of your DSP power to create a large mixer with dozens of channels—but you would not be able to use as many busses, sends, or TDM plug-ins. Alternatively, you could create a mixer with a smaller number of mixer channels plus some sends and Auxiliary Inputs for returns, and TDM plug-ins on several tracks.



RTAS (Real-Time AudioSuite) plug-ins, as well as AudioSuite plug-ins, do not use DSP and are always available. Refer to your DigiRack Plug-Ins Guide for more information.

You can set up your session by choosing one of the session templates supplied with your system as a starting point, or by building it from scratch. If you are starting from scratch, a good rule of thumb is to start by building your mixer first, since at least one of the DSPs in your system is automatically dedicated to mixing. Start with audio tracks, then add sends and Auxiliary Inputs, and finally add plug-ins as available DSP allows. Master Faders do not use additional DSP power.

DSP Usage and Mixer Plug-Ins

Understanding Mixers

Pro Tools|HD systems include two mixer plug-in “flavors”: stereo and surround (both of which are available with dither or without). Pro Tools uses these plug-ins to create “dynamic mixers,” meaning that the mixer size can *expand* or *contract* as mix channels are added or deleted in Pro Tools. More channels take up more DSP power from your Pro Tools hardware. This is different from hardware mixing consoles where hardware (analog or digital) creates “fixed” mix configurations consisting of an unchangeable number of master outputs, busses or sends.

DSP allocation for mixing in a Pro Tools|HD system is based on the concept of DSP summing mixers. Every send bus or output mix that you use requires that a summing mixer exists for those signals. Every single signal path that is mixed together requires the use of a mixer plug-in (whether a main output that goes to hardware, a bus or a send). This is even true for an individual signal that travels from hard disk to an individual hardware output. These individual dynamic mixers are created using the appropriate TDM mixer plug-in (stereo or surround) that is installed in your Plug-Ins folder.

An “input” can be an audio track, send, or internal bus connection. Adding an output or bus path (mono or multichannel) adds the requirement for DSP power to mix the signals together.

Each Pro Tools|HD card has nine DSPs, which can power a certain number of signal processing tasks. DSP resources are dynamically allocated as the number of mixers and inputs increases.

The TDM mixer provides basic building blocks by which applications such as Pro Tools can create a wide variety of mixer configurations.

Mono and Stereo

Each TDM mono or stereo mixer is of the dimensions “N x 2,” meaning that it mixes a variable number of inputs to an output pair. For example: A session with six tracks routed to Output 1–2 would require a single 6 x 2 mixer. If one of the six tracks is assigned to Output 3–4, however, two mixers are required—one 5x2 mixer routed to Output 1–2, and one 1x2 mixer routed to Output 3–4.

Multichannel Surround

Each Surround mixer can have a variable number of outputs as well as a variable number of inputs. For example, the 7.1 format requires eight outputs. A single mono track assigned to a 7.1 Output or Bus path would require a 1x8 mixer, while one mono and one stereo track assigned to a 7.1 Output or Bus path would require a 3x8 mixer.

The important concept here is that every output (whether they are I/O or bus outputs) requires that a mixer exists for that output. This means that creating a send to bus 1 requires that a mixer be created for the bus 1–2 outputs, and that mixer will have one input.

Mixing with Sends and Busses

Each send will add an input to the destination output pair. For example, a send to output 1 will add another input to the output 1–2 mixer. If the send destination doesn’t already have a mixer for its output pair, then a new mixer will be created. A send to bus 3 will make a 1x2 mixer for bus 3 if no other bus 3 sources have been created yet.

In addition, adding a new track and assigning its input to a bus source will create a mixer for that bus pair if there is not one already.

For example, creating a new Auxiliary Input track and setting its input to bus 5 will create a 1x2 mixer for bus 5, even if no sources have been created yet.

Submixing

When the number of channels that must be mixed exceeds the capacity of a single DSP, additional “main” mixers are created automatically, along with summing submixers (which sum together the “main” mixers). The use of submixers allows large mix configurations to be created.

For example, on a Pro Tools|HD system, when a Stereo mixer running at 44.1 kHz needs to grow to more than 68 inputs, a submixer is created along with another “main mixer” that provides “n” number of inputs beyond 68. Both the original 68x2 mixer and the new “N x 2” mixer which provides additional inputs are routed to a submixer, and its outputs are finally sent to the desired destination (such as Output 1–2 on your main audio interface).

Note that any small delays (on the order of a few samples) that are created remain equal between these main mixers because they are summed together by means of submixers, and are not cascaded.

The total number of voiceable tracks supported by your particular Pro Tools configuration will ultimately determine the maximum number of channels for your TDM mixer.

Mixers and DSP Hardware

Different mixer plug-ins are available, each of which uses DSP power at slightly different rates on the different audio cards (and their DSP chips), as shown in the following tables.

 See “Mixer Plug-Ins” on page 99.

In Pro Tools|HD systems, the number of available mixers per DSP chip is based on the type of card and session sample rate.

HD Accel (for PCI or PCIe) card, Standard mixers

Mixer	Sample Rate (kHz)	Usage per Chip
Stereo	44.1 and 48	124x2
	88.2 and 96	54x2
	176.4 and 192	16x2
Surround, 5.1	44.1 and 48	46x6
	88.2 and 96	34x6
	176.4 and 192	8x6
Surround, 7.1	44.1 and 48	34x8
	88.2 and 96	25x8
	176.4 and 192	4x8

HD Accel card (for PCI or PCIe), Dithered mixers

Mixer	Sample Rate (kHz)	Usage per Chip
Stereo Dithered	44.1 and 48	113x2
	88.2 and 96	54x2
	176.4 and 192	16x2
Surround Dithered, 5.1	44.1 and 48	44x6
	88.2 and 96	27x6
	176.4 and 192	8x6
Surround Dithered, 7.1	44.1 and 48	34x8
	88.2 and 96	20x8
	176.4 and 192	4x8

HD card (for PCI), default Standard mixers

Mixer	Sample Rate (kHz)	Usage per Chip
Stereo	44.1, 48	68x2
	88.2, 96	44x2
	176.4, 192	16x2
Surround, 5.1	44.1, 48	22x6
	88.2, 96	12x6
	176.4, 192	4x6
Surround, 7.1	44.1, 48	16x8
	88.2, 96	8x8
	176.4, 192	2x8

HD card (for PCI), Dithered mixers

Mixer	Sample Rate (kHz)	Usage per Chip
Stereo Dithered	44.1, 48	56x2
	88.2, 96	34x2
	176.4, 192	14x2
Surround Dithered, 5.1	44.1, 48	19x6
	88.2, 96	10x6
	176.4, 192	1x6
Surround Dithered, 7.1	44.1, 48	15x8
	88.2, 96	7x8
	176.4, 192	not supported

48-Bit Mixing Precision

The Pro Tools mixer plug-ins use a register area inside of the DSPs on the hardware to hold a full 48-bits of precision when mixing signals together. This allows a fader to be lowered in level without any loss of resolution. (Even if the fader is lowered almost to the bottom, all 24 of the original 24 bits of the signal are preserved.)

Mixer Headroom

Use of 48-bit precision when mixing allows the mixer to be designed to provide a very large amount of headroom, which allows the faders on the Pro Tools mixer to be placed in the “sweet spot” position without clipping.

Mixer plug-ins provided with Pro Tools|HD systems provide 48-bit precision with 48 dB of headroom. This means that on the “input” side of the bus (where signals are summed together), signals can never clip (even if channel faders are set to a full +12 dB of gain).

However, the “output” side of the summing mixer (where the signal is sent in the 24-bit world of a digital output or onto the TDM bus) *can* clip. You can use a Master fader (which does not “cost” any DSP) to scale the output level of any mix summing point (a bus or physical output). The master fader's meters will tell you if you are clipping the mix bus, and the fader can be used to safely scale the level to avoid clipping, with no loss of quality.



If you are mixing larger numbers of signals together, always use a master fader so that you can monitor levels for the bus (using the master fader meter), and to trim the result to avoid clipping. Since Master faders cost no DSP, there is no reason not to use them.

Note that clipping the “input” side of a mixer is *not* a concern on Pro Tools|HD systems. It is virtually *impossible* to clip the input of any Pro Tools|HD mixer plug-in, because the 48 dB of headroom provided prevents any possibility of overload, even with a maximum number of inputs being fed by full-code signals with fader gains at maximum. While it *is* possible to clip the “output” side of the mixer, you can safely use a Master Fader to trim your mix bus back to avoid clipping (by simply examining the Master Fader meter for clipping, and pulling back the fader until it disappears; make sure that any plug-ins you may have on the Master Fader inserts are not the cause as well). The 48-bit precision of the mixer allows gain adjustment on the Master Fader with no loss of data integrity or audio quality, so there is no need to trim the individual input faders back to avoid clipping.

Mixer Automation

Volume automation on all mixer versions is near sample-accurate (as is pan automation on the stereo versions). In addition, DAE provides 24-bit interpolated values between mix breakpoints, which provides near “analog-like” resolution. This process of interpolation means that a smooth “data series” is created between any two breakpoints that you specify in Pro Tools. DAE calculates these smooth transitions on the DSP hardware with 24-bit precision, which provides extremely smooth volume changes. In addition, DAE “de-zippers” any “live input” to the mixer so that fast, real-time fader changes that come in from fader movements (on the Pro Tool user interface or control surfaces), do not cause audible artifacts as the mixer tries to “catch up” to fast changes that it receives.

Stereo and Surround Dithered Mixers

The Stereo Dithered and Surround Dithered mixer plug-ins provide non-correlated dither in addition to other basic attributes of the mixers described above. Every output summing point (whether to an internal bus or an physical output) is dithered in these mixers. This technique is used to avoid any possibility of audible artifacts caused by truncation of extremely low level data that occurs when signals pass from the 48-bit world of a TDM mixer to the 24-bit world of a TDM bus connection or a hardware output. Any material that is truncated, lies below -144 dBfs (reflecting 24-bit of dynamic range).

There is dissension in the audio community as to whether or not artifacts that fall within this area are actually audible in some way. (The normal dynamic range of human hearing is generally accepted to fall within a range of around 120 dB, from the threshold of audibility to the threshold of pain.)

Digidesign has developed a mixer that provides all of the benefits of the standard stereo and surround mixer plug-ins, but also provide uncorrelated dither on any summed output. This provides a steady dither “noise floor” at extremely low level, which causes any truncation artifacts to be converted into steady white noise. However, the addition of uncorrelated dither requires more DSP horsepower. As a result, the channel instance count from the dithered versions of the mixers is around 15% lower (or more) than the non-dithered standard versions (this varies with sample rate and mixer type).

For this reason, we offer both types of mixer plug-in. You may want to use the standard non-dithered mixer in most applications because of its greater efficiency (allowing you to mix more channels without running out of DSP power), or the dithered mixer because of its theoretical advantages.

A Note About Dithering to 16-Bit and Dither Plug-Ins

The Dithered mixers provide 24-bit dither at their summing points. When creating a final mix that results to 16-bits (for example, for CD mastering), final dithering should still be handled by plug-ins that provide dither. To properly dither the final mix result, insert a dither plug-in on the post-fader inserts of a Master fader. Details about dither and proper usage of the dither plug-ins can be found in the *DigiRack Plug-Ins Guide*.

Mixer Plug-Ins

Pro Tools|HD systems come with four different mixers: Stereo, Surround, Stereo Dithered, and Surround Dithered.

The standard Stereo and Surround Mixer plug-ins are installed by default. When you run your Pro Tools Installer, a copy of the Stereo Dithered and Surround Dithered mixers are placed in the folder “Plug-Ins (Unused).”

Plug-In Features

Standard Surround and Stereo Mixers


Both the Surround and Stereo Mixer plug-ins provide the following:

- 24-bit digital output, from an audio interface output or Bounce to Disk. Mix level scaling stores 48-bit results, using a 56-bit accumulator for maximum precision.
- 48 dB of mix headroom.
- Output clip indication.
- Multichannel mixing formats for surround (Surround Mixer only).

Surround Dithered and Stereo Dithered Mixers

Both the Surround Dithered and Stereo Dithered Mixer plug-ins provide the following:

- The same features as the standard Pro Tools|HD Stereo and Surround mixers, with the addition of non-correlated dither to any output or bus send.

 *When using Dolby Digital encoders or Dolby E, you can only use the non-dithered mixer. The Dithered mixer will not allow proper playout of Dolby Digital or Dolby E out of an output.*

Switching Mixer Plug-Ins

To switch TDM Mixer plug-ins:

- 1 Quit Pro Tools.
- 2 Do one of the following:
 - On Windows systems, open the “Plug-Ins (Unused)” folder (Program Files\Common Files\Digidesign\DAE).
 - or –
 - On Mac systems, open the “Plug-Ins (Unused)” folder on your Startup drive (Library/Application Support/Digidesign).
- 3 Locate the Mixer plug-in that you want to use, and drag it to the Plug-Ins folder.
- 4 Open the “Plug-Ins” folder, locate the Mixer plug-in version that you no longer want to use, and drag it to the “Plug-Ins (Unused)” folder.
- 5 Launch Pro Tools.

Mixer Usage Guidelines


The following conditions apply to mixing with Pro Tools|HD systems.

- ◆ One DSP chip is automatically dedicated to mixing in the TDM environment.
- ◆ As you reach the basic mixer limits for a single DSP chip, the system will automatically begin allocating DSP resources from another chip (if available), making it unavailable for plug-ins.
- ◆ Each bus or send connection requires DSP to mix signals. This means that each send or Auxiliary Input that you create will require DSP power to mix the results.

DSP Usage with TDM Plug-Ins

To get the best results when using TDM plug-ins, keep in mind the following guidelines

- ◆ Pro Tools|HD systems use Digidesign's MultiShell™ technology, that lets any MultiShell compatible plug-in share DSP chips HD cards. Up to five types of MultiShell compatible plug-ins can share a single DSP chip.

 *Refer to the DigiRack Plug-Ins Guide for details on MultiShell plug-ins.*

- ◆ Stereo DSP plug-ins generally use up twice as much DSP as mono plug-ins.
- ◆ Master Faders do not require additional DSP. Use them freely to control submix levels, send/bus output levels, and the master output level of your session.

The session templates provided with your system include several useful preconfigured session setups that make efficient use of DSP resources.

If your computer has unused slots, you can always increase your available DSP resources by adding additional HD cards to your Pro Tools|HD system.

Troubleshooting

Backing Up Your Work

It is highly recommended that you back up your work on a regular basis, and especially before making changes to your system configuration.

Backing Up Your Session Data

Back up your session and audio data frequently. There are a variety of media that are suited to back up projects of various sizes, from automated tape backup systems to high-capacity optical drives, to CD/DVD burners.

The best way to back up an entire session is to use the Save Copy In command. This command lets you save the session file and all of its associated files to a new location.



You can also use the Auto Save Backup feature (in the Operation Preferences page) to have Pro Tools automatically save backups of the session file while you work.

Backing Up Your System Configuration

After configuring your system and Pro Tools, you should save an image of your system drive using a backup utility such as Norton Ghost (Windows) or Bombich Carbon Copy Cloner (Mac). By doing this, you can quickly restore your system configuration and settings if you encounter any problems.

Common Issues

Pro Tools Won't Launch

Problem

When you double-click the Pro Tools application or a Pro Tools session file, Pro Tools doesn't launch, or displays an error message.

Possible Solutions

- ◆ Check to be sure your computer has the required amount of RAM to launch Pro Tools. Refer to the Digidesign website (www.digidesign.com).
- ◆ Try a complete restart. Turn off your audio interfaces, computer peripherals and your computer, and then turn them on again in the proper sequence.

- ◆ If you tried to launch Pro Tools by double-clicking a Pro Tools session file, do the following:
 - Close any error message.
 - Double-click the Pro Tools application.
 - In Pro Tools, choose File > Open Session to open the session.
- ◆ Reinstall the Pro Tools application, using the Pro Tools Installer disc.

Audio Interface Is Not Recognized

Problem

When you launch Pro Tools it does not recognize an audio interface, or a connected audio interface is not available.

Possible Solutions

- ◆ Turn off your computer and check to be sure your cables are properly and securely connected to your computer and to your audio interface.
- ◆ Verify that your Hardware Setup dialog settings are correct.
- ◆ If you only have one interface, make sure it is connected to the HD Core card.
- ◆ Make sure Loop Sync, SuperClock or other synchronization connections to your audio interface are correct. Disconnect the clock source from the interface and see if the problem persists.

Using DigiTest as a Diagnostic Tool

The DigiTest utility performs diagnostic tests on the Pro Tools cards in your system. If DigiTest reports that any of your cards have failed, click the Info button next to that card. Write down the information that appears and report it to your local Digidesign dealer or to Digidesign Technical Support.

Performance Factors

There are several conditions that may adversely affect the performance of Pro Tools. These include:

Network Connections Close any network connections unless you are using them for network interchange of audio data.

Background Applications Any software utilities that run in the background or generate disk activity, such as virus protection, disk optimization, or file savers, should be turned off or removed.

Screen Savers Screen saver software should be completely disabled on your computer before running Pro Tools.

Power Saver Features Some automatic power saver features, such as those that spin down the system hard drive, can affect Pro Tools performance. These features should be turned off.

Before You Call Digidesign Technical Support

Register Your System

Register your purchase immediately after reviewing the Digidesign Registration Information Card included with every Pro Tools system. Registering your purchase is the only way you become eligible to receive complimentary technical support and future upgrade offers. Registering is one of the most important steps to complete as a new user.

Use Digidesign Resources

In addition to the printed and PDF versions of Pro Tools guides, your system includes the following sources of information:

Read Me Files These contain late-breaking information and known issues pertaining to Pro Tools software and hardware configurations. Read Me files are installed in the Documentation folder when you install Pro Tools.

Answerbase This is a database of common problems and DAE errors, and their solutions based on the latest information from Digidesign Technical Support. This database is installed in the Digidesign folder when you install Pro Tools. The Answerbase is also available on the Digidesign website (www.digidesign.com).

Website (www.digidesign.com) This is your best online source for information to help you get the most out of your Pro Tools system.

Gather Important Information

Digidesign wants to help you resolve problems as quickly and efficiently as possible. If you have the following information handy when you contact Technical Support, it will make the diagnosis of your problem easier. Take a few minutes to collect the following basic information:

System Information

Computer

- Make, model, processor speed
- Amount of system RAM
- Operating system (version of Windows or Mac OS)
- Any Drivers, Disk Utilities, or other system-related applications you may have installed

Digidesign Hardware

- Type of cards, interfaces, or peripherals
- Where the cards are installed
- PCI card order in computer or chassis
- Interfaces connected to each card

Hard Drives

- Make, Model
- Drive size (GB)
- Drive speed (RPM)
- Drive type (SCSI, FireWire, IDE/ATA)
- Utility used to format the drive
- Number and size of partitions on the drive

Digidesign Software

- Pro Tools software version
- Plug-in versions
- Other Digidesign software
- Additional plug-ins from Digidesign Development Partners

Other Hardware

Refer to the manufacturer's documentation for operational details.

The most common hardware additions include:

- SCSI host bus adapter (HBA) cards (manufacturer, model, settings)
- 1394 (FireWire) cards for Windows systems (manufacturer, model)
- Expansion Chassis (manufacturer, model, bridge chip type)
- Video Capture cards (manufacturer, model)

To verify that your hardware is qualified for use with your Pro Tools system, refer to the Digidesign website (www.digidesign.com).

Other Software

If you are using other audio or video applications, refer to the manufacturer's documentation for operational details.

Make note of any other software that was running when a problem occurred.

Diagnostic Information

DigiTest

If you run DigiTest, be sure to make a note of any error codes or messages it generates.

Other Information

Note any DAE errors or other error codes you encounter. Additionally, note the ability to reproduce the problem under different conditions, for example, with another session, or after changing settings (such as the Hardware Buffer Size).

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www.digidesign.com

DIGIDESIGN

2001 Junipero Serra Boulevard
Daly City, CA 94014-3886 USA
Tel: 650.731.6300
Fax: 650.731.6399

TECHNICAL SUPPORT (USA)

Tel: 650.731.6100
Fax: 650.731.6384

PRODUCT INFORMATION (USA)

Tel: 800.333.2137

INTERNATIONAL OFFICES

Visit the Digidesign website
for contact information