PCle-to-PCle Expansion Chassis
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003, 003 Rack, 96 i/O, 96i i/O, 192 Digital I/O, 192 I/O, 888|24 I/O, 882|20 I/O, 1622 I/O, 24-Bit ADAT Bridge I/O, AudioSuite, Avid, Avid DNA, Avid Mojo, Avid Unity, Avid Unity ISIS, Avid Unity MediaNetwork, Avid Xpress, AOption, AVoption|V10, Beat Detective, Bruno, Command|8, Control|24, DC-Command, D-Control, D-Fi, D-fx, D-Show, DAE, Digi 002, Digi 002 Rack, DigiBase, DigiDelivery, Digidesign, Digidesign Audio Engine, Digidesign Intelligent Noise Reduction, Digidesign TDM Bus, DigiDrive, DigiRack, DigiTest, DigiTranslator, DINR, DV Toolkit, EditPack, Impact, Interplay, M-Audio, MachineControl, Maxim, Mbox, MediaComposer, MIDI I/O, MIX, MultiShell, OMF, OMF Interchange, PRE, ProControl, Pro Tools M-Powered, Pro Tools, Pro Tools|HD, Pro Tools LE, QuickPunch, Reel Tape, Reso, Reverb One, ReVibe, RTAS, Smack!, SoundReplacer, Sound Designer II, Strike, Structure, SYNC HD, SYNC I/O, Synchronic, TL Space, Velvet, X-Form, and Xpand! are trademarks or registered trademarks of Digidesign and/or Avid Technology, Inc. All other trademarks are the property of their respective owners.

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Warning
This product contains chemicals, including lead, known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.

Communications & Safety Regulation Information

Compliance Statement
The model Digidesign PCIe-to-PCIe Expansion Chassis complies with the following standards regulating interference and EMC:
- FCC Part 15 Class A
- EN55103 – 1, environment E4
- EN55103 – 2, environment E4
- AS/NZS 3548 Class A
- CISPR 22 Class A
- ICES-003 Class A

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Digidesign is authorized to apply the CE (Conformité Européenne) mark on this compliant equipment thereby declaring conformity to EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC.

Australian Compliance:

Radio and Television Interference
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules.

Communications Statement
This equipment has been tested to comply with the limits for a Class A digital device. Changes or modifications to this product not authorized by Digidesign, Inc., could void the Certification and negate your authority to operate the product. This product was tested for CISPR compliance under conditions that included the use of peripheral devices and shielded cables and connectors between system components. Digidesign recommends the use of shielded cables and connectors between system components to reduce the possibility of causing interference to radios, television sets, and other electronic devices.

Safety Statement
This equipment has been tested to comply with USA and Canadian safety certification in accordance with the specifications of UL Standards: UL60065 7th /IEC 60065 7th and Canadian CAN/CSA C22.2 60065:03. Digidesign Inc., has been authorized to apply the appropriate UL & CUL mark on its compliant equipment.

Warning

Important Safety Instructions

The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons;

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

1) Read these instructions.
2) Keep these instructions.
3) Heed all warnings.
4) Follow all instructions.
5) Do not use this apparatus near water.
6) Clean only with dry cloth.
7) Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
8) Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9) Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10) Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

11) Only use attachments/accessories specified by the manufacturer.
12) Unplug this apparatus during lightning storms or when unused for long periods of time.
13) WARNING: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture. This apparatus shall not be exposed to dripping or splashing, and no objects filled with liquids, such as vases shall be placed on the apparatus.
14) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15) WARNING: This apparatus is a Class I product. This product must be connected to a MAINS socket outlet with a protective earthing connection.
16) The mains plug is used as the disconnect device and shall remain readily operable.

Do not attempt to service the equipment. There are no user-serviceable parts inside. Please refer all servicing to authorized Digidesign personnel.

Any attempt to service the equipment will expose you to a risk of shock and will void the manufacturer’s warranty.

SPECIAL WARNING REGARDING VENTILATION:

Do not install the Digidesign PCIe-to-PCIe Expansion Chassis anywhere or in any way that blocks free air flow at any time around the back panel of the unit.
Contents

Chapter 1. Introduction ................................................................. 1
  PCIe-to-PCIe Expansion Chassis Features ........................................ 1
  Included with the PCIe-to-PCIe Expansion Chassis .............................. 1
  System Requirements and Compatibility Information ............................. 1
  About This Guide ............................................................................ 2
  About www.digidesign.com ............................................................... 2

Chapter 2. Digidesign PCIe-to-PCIe Expansion Chassis ............................. 3
  Specifications ................................................................................... 3
  Installing the PCIe Host Card .......................................................... 4
  Connecting Power to the Chassis ....................................................... 4
  Installing Pro Tools|HD Cards ............................................................ 5
  Connecting Pro Tools|HD Cards in the Chassis ...................................... 6
  Connecting Audio Interfaces ............................................................. 7
  Powering Up An Expanded System .................................................... 11
  Expanded System Configurations ...................................................... 12
Chapter 1

Introduction

PCIe-to-PCIe Expansion Chassis Features

The Digidesign PCIe-to-PCIe Expansion Chassis is a 7-slot expansion chassis for Pro Tools|HD systems. The PCIe-to-PCIe Expansion Chassis lets you install up to seven Pro Tools|HD (PCIe) cards for additional plug-in and mixer processing, and for connecting additional audio interfaces to the system.

Included with the PCIe-to-PCIe Expansion Chassis

The Digidesign PCIe-to-PCIe Expansion Chassis package includes the following components:

- Expansion Chassis: 4U, 19-inch rackmount enclosure
- PCIe Host Card: Dedicated card that is installed in the host computer and provides the connection to the chassis
- iPass cable: 3-meter cable to connect the host card to the PCIe-to-PCIe Expansion Chassis
- AC power cable

System Requirements and Compatibility Information

The Digidesign PCIe-to-PCIe Expansion Chassis can be used with Digidesign-qualified computers running Pro Tools HD software.

In order to achieve maximum track count with an expansion chassis, there may be additional system requirements beyond those for Pro Tools|HD systems without an expansion chassis.

For complete system requirements, including requirements for maximum track count, 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, and third-party devices, refer to the compatibility pages on the Digidesign website (www.digidesign.com/compatibility).
About This Guide

This guide explains how to install and connect the Digidesign PCIe-to-PCIe Expansion Chassis.

For complete information on using Pro Tools software, refer to the guides included with your Pro Tools system.

Conventions Used in This Guide

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

<table>
<thead>
<tr>
<th>Convention</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>File &gt; Save</td>
<td>Choose Save from the File menu</td>
</tr>
<tr>
<td>Control+N</td>
<td>Hold down the Control key and press the N key</td>
</tr>
<tr>
<td>Control-click</td>
<td>Hold down the Control key and click the mouse button</td>
</tr>
<tr>
<td>Right-click</td>
<td>Click with the right mouse button</td>
</tr>
</tbody>
</table>

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.

Keyboard 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 manuals; browse the Compatibility documents for 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
Digidesign PCIe-to-PCIe Expansion Chassis

Specifications

This section provides slot layout and technical specifications for the Digidesign PCIe-to-PCIe Expansion Chassis.

Slot Layout

The PCIe-to-PCIe Expansion Chassis has slots that are numbered sequentially, right-to-left when viewed from the front (1–7).

Hardware Specifications

Host Card

• PCIe card

Chassis Slots

• Seven PCIe slots
• Accepts the following Pro Tools|HD cards:
  • Accel Core (for PCIe)
  • HD Accel (for PCIe)

Chassis Dimensions

• Width: 19 in
• Height: 4U (4 rack spaces)

iPass Cable

• Cable Length: 3m

Ventilation Requirements

Ventilation space is required at the front and rear of the unit. Do not block the front or back of the unit, and always be sure there is adequate air flow when mounting this equipment into racks or studio furniture.
Installing the PCIe Host Card

To install the PCIe host card:

1. Turn off your computer and any peripherals.

2. Open the computer case. For additional details on installing a card in your computer, refer to its documentation.

3. Install the PCIe host card in the lowest numbered available slot in your computer.
   - In most Windows computers, this will be the slot farthest from the graphics card.
   - In most Mac computers, this will be the slot closest to the graphics card.

Before removing cards from their antistatic bags or handling any card, discharge any static electricity that may be on your clothes or body by touching a grounded metal surface (such as the power supply case inside your computer).

Connecting Power to the Chassis

The AC Power connector on the rear panel of the PCIe-to-PCIe Expansion Chassis accepts a standard AC power cable. The chassis is auto power-selecting (100V to 240V) and will automatically work with a standard modular cable to connect to AC power receptacles in any country.

To connect power to the chassis:

- Connect the supplied AC cable to the AC connector on the back panel of the chassis.

Refer to your computer’s documentation to verify slot order.
Installing Pro Tools|HD Cards

To install Digidesign audio cards in the chassis:

1. Make sure the power switch on the back panel of the chassis is in the off position.

2. To ensure proper grounding, make sure the chassis is connected to a power source (such as a power strip or wall outlet), using the supplied AC cable.

3. Remove the 6 screws from the top cover of the expansion chassis, and slide the cover toward the back panel to remove it.

4. Install the Pro Tools Accel Core card in the first PCIe slot of the expansion chassis. (This is the first slot on the right when the chassis is viewed from the front.).

5. Install the remaining HD Accel cards in successively numbered card slots in the chassis.
Example

The following table shows one possible configuration of cards (and audio interface connections), using all slots in the PCIe-to-PCIe Expansion Chassis.

**Chassis cards with multiple audio interfaces**

<table>
<thead>
<tr>
<th>Slot</th>
<th>Card</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slot 1</td>
<td>Accel Core (Interface #1 and #2)</td>
</tr>
<tr>
<td>Slot 2</td>
<td>HD Accel (Interface #3 and #4)</td>
</tr>
<tr>
<td>Slot 3</td>
<td>HD Accel (Interface #5 and #6)</td>
</tr>
<tr>
<td>Slot 4</td>
<td>HD Accel (Interface #7 and #8)</td>
</tr>
<tr>
<td>Slot 5*</td>
<td>HD Accel (Interface #9 and #10)</td>
</tr>
<tr>
<td>Slot 6*</td>
<td>HD Accel</td>
</tr>
<tr>
<td>Slot 7*</td>
<td>HD Accel</td>
</tr>
</tbody>
</table>

* Card only available at 44.1 kHz, 48 kHz, 88.2 kHz, and 96 kHz

⚠️ **Only Pro Tools|HD (for PCIe) cards can be installed in the chassis. PCI cards are not supported.**

Connecting Pro Tools|HD Cards in the Chassis

Each Pro Tools|HD card has two ports along the top of the card, labelled Port A and Port B. The FlexCable has two connectors, also labeled Port A and Port B, to ensure proper connection. Data communication across 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 with the TDM FlexCable:

1. Make sure your computer and the chassis is turned off.

2. Shape the FlexCable before installing it on your Pro Tools|HD cards by grasping the cable with both hands with its printed side facing you and moving the Port B portion of the cable away from you and outwards, as shown below. Do not bend the cable more than necessary, as you may damage the traces in the cable.

3. Turn the cable on its side, so that the connectors are facing downwards, and Port A is the higher side.
4 Slide the FlexCable into the notch of the second 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.

5 Connect the Port A connector of the FlexCable to Port A on the second card. Push down 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.

6 Verify the connection. Make sure the FlexCable ports seat flat against the sockets on the Pro Tools|HD cards, and are firmly attached.

7 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.)

8 Replace the top cover of the chassis and reattach the screws holding it in place.

Connecting Audio Interfaces

All Pro Tools|HD audio interfaces require DigiLink connections. When using multiple interfaces, you must also connect Loop Sync between all Pro Tools|HD audio interfaces. When using multiple Legacy I/Os (Pro Tools 24|MIX-series interfaces such as the 888|24 I/O and 882|20 I/O) you must connect Slave Clock to all Pro Tools 24|MIX-series audio interfaces.

Recommended Ordering of Interfaces

If your setup includes different types of audio interfaces, install them in the following order:

**192 I/O or 192 Digital I/O** Use as the primary audio interface. These interfaces provide the highest fidelity clock source for your system.

⚠️ If you have at least one 192 I/O or 192 Digital I/O in your Pro Tools system, it should be the primary audio interface and Loop Sync master.

**96 I/O** Use as the primary interface (if a 192 I/O or 192 Digital I/O is not installed), or as an expansion interface connected to the Expansion port of the primary interface.

**96i I/O** Use as the primary interface if no other Pro Tools|HD interfaces are installed, or as an expansion interface connected to the Expansion port of another Pro Tools|HD interface.

Legacy I/Os See “Connecting Legacy Audio Interfaces” on page 10.
DigiLink Connections

The DigiLink cable connects Pro Tools|HD cards and audio interfaces. A single DigiLink connector carries up to 32 channels of bidirectional audio information. These 32 channels are broken up into 2 groups of 16 channels: Group A = Channels 1–16, Group B = Channels 17–32.

The maximum number of DigiLink cables supported on a single system is ten (for session sample rates up to 96 kHz) or eight (for session sample rates of 176.4 kHz or 192 kHz).

Use a 12-foot DigiLink cable included with each Pro Tools|HD card to connect the card to a Digidesign audio interface. The primary audio interface, which functions as the Loop Sync master for other interfaces in the system, must be connected to the Accel Core card. You can purchase optional DigiLink cables of differing lengths (25-foot, 50-foot, and 100-foot), depending on the needs of your studio configuration.

Use an 18-inch DigiLink cable, included with each Pro Tools|HD audio interface, when connecting a secondary Pro Tools|HD audio interface to the Expansion port of another Pro Tools|HD audio interface.

Figure 1. Two 96 I/Os, 32-channels
To make DigiLink connections to Digidesign audio interfaces:

1. Connect the primary audio interface to the Accel Core card with the provided 12-foot DigiLink cable.

2. Connect a secondary Pro Tools|HD audio interface to the Expansion port on the primary audio interface using the 18-inch DigiLink cable (included with the audio interface). See Figure 1 on page 8.

   – or –

   Connect a secondary Pro Tools|HD interface to the DigiLink on the next card (HD Accel or HD Process).

3. Connect additional Pro Tools|HD audio interfaces to subsequent Pro Tools|HD audio interfaces or cards. See Figure 2 on page 9.

4. If connecting a Digidesign Legacy audio interface (such as the 888|24 I/O), refer to “Connecting Legacy Audio Interfaces” on page 10.

Connecting Loop Sync

To connect Loop Sync:

1. Connect the Loop Sync Out of the primary interface to the Loop Sync In of the second interface with the provided Loop Sync cables.

   When using a SYNC peripheral, the SYNC peripheral is considered the primary interface of the Loop Sync connection. For more information, refer to the SYNC HD Guide.

2. Connect the Loop Sync Out of the second interface to the Loop Sync In of the next interface.

3. Connect the Loop Sync Out of the last interface to the Loop Sync In of the primary interface.
Connecting 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 audio interfaces, or Legacy I/Os. These include the 888|24 I/O, 882|20 I/O, 1622 I/O, 24-bit ADAT Bridge I/O, and the original ADAT Bridge I/O. The 888 I/O and 882 I/O interfaces are not supported with Pro Tools HD. (The 96i I/O does not provide a Legacy port.)

The Legacy Peripheral port functions like the Expansion port.

⚠️ The Legacy port and the Expansion port both use Group B: Channels 17–32. You must choose between the Legacy port and the Expansion port in the Pro Tools Hardware Setup dialog.

A single Legacy I/O can be connected to the Legacy Peripheral port using any Pro Tools MIX peripheral cable. Two Legacy I/Os can be connected to a single Legacy Peripheral port using a “Y” cable (16-channel Peripheral Cable Adapter).

The maximum number of Legacy I/Os that can be connected to a Pro Tools|HD system is eight; requiring four Pro Tools|HD audio interfaces and four 16-channel Peripheral Cable Adapters.

⚠️ The Legacy port is not available in Pro Tools sessions at sample rates greater than 48 kHz.

To connect Digidesign Legacy audio interfaces:

1. Connect one end of a Pro Tools|24 MIX peripheral cable to the Legacy port on a 192 I/O, 192 Digital I/O, or 96 I/O.

2. Connect the other end of the cable to your MIX-compatible audio interface.

3. Connect the External Clock Out of the primary interface to the Slave Clock In of the Legacy audio interface using a BNC cable.

4. If connecting two Legacy peripherals, connect the Slave Clock Out of the first Legacy peripheral to the Slave Clock In of the second Legacy peripheral.

⚠️ Do not connect the Slave Clock Out of the last Legacy peripheral to the clock input on any Pro Tools|HD interface.

⚠️ If using an 888|24 I/O, do not power on the 888|24 until you are ready to declare it in the Hardware Setup dialog, after launching Pro Tools. See the Pro Tools|HD Getting Started Guide for more information.
Connecting the Chassis to the Computer

To connect the chassis to the computer:

1. Connect the x4 end of the iPass cable to the iPass cable port on the chassis. Make sure the connection is secure.

2. Connect the x8 end of the iPass cable to the port on the PCIe host card in the computer. Make sure the connection is secure.

Powering Up An Expanded System

This section provides general information for powering up expanded systems. Make sure to have the expansion chassis cable connected to both the expansion chassis and the computer before powering up. If the cable becomes disconnected from the computer while the system is powered on, shut down power to the computer and then the expansion chassis before reconnecting.

⚠️ Before you connect your expansion chassis or install cards in it, make sure to turn off both the chassis and your computer.

Starting Up Your System

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

To start up your Pro Tools system:

1. Make sure all your equipment is off (including your computer).

2. Move the power switch on the back panel of the PCIe-to-PCIe Expansion Chassis to the On position.
3 Press the power switch on the front panel of the PCIe-to-PCIe Expansion Chassis to turn on the chassis. The Power switch LED lights when the chassis is fully powered.

4 Turn on any external hard drives. Wait approximately ten seconds for them to spin up to speed.

5 Turn on any MIDI interfaces and devices, or synchronization peripherals.

6 Lower the volume of all output devices, then turn on your Pro Tools audio interfaces. Wait at least fifteen seconds for the audio interfaces to initialize and the status LEDs to stop flashing.

7 Turn on your computer.

Shutting Down Your System

To shut down your Pro Tools system:

1 Lower the volume of all output devices and monitors.

2 Shut down your computer.

3 Turn off Pro Tools audio interfaces.

4 Turn off any MIDI interfaces or devices.

5 Turn off external hard drives.

6 Press the power switch on the front panel of the expansion chassis.

Expanded System Configurations

Identifying Audio Interfaces

If you have multiple audio interfaces of the same type connected to your system, you can confirm the identity of each interface from Pro Tools. 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 In Pro Tools, choose Setup > Hardware.

2 From the Peripherals list, select an audio interface connected to your system.

3 Click Main.

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.
Session Sample Rate and Multiple Cards

Pro Tools|HD supports sample rates of 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz, 176.4 kHz, and 192 kHz. However, due to the processing load required for 176.4 kHz and 192 kHz sessions, a maximum of four Pro Tools|HD cards can be used at these higher sample rates.

The maximum number of Pro Tools|HD cards supported in a single system is seven. If your system includes more than four Pro Tools|HD cards, the fifth card (and any additional cards) will automatically be taken offline when Pro Tools sessions are set to 176.4 kHz or 192 kHz. You do not need to remove any cards; Pro Tools automatically deactivates the additional cards, and reactivates them when the sample rate is switched to 96 kHz or lower.

Any audio interfaces connected to inactive cards will go offline and be unavailable. You should turn off power to offline interfaces connected to cards 5–7 (if any) and re-connect Loop Sync cables (bypassing the inactive interfaces) before starting Pro Tools.

Achieving Maximum Voice Counts

A compatible expansion chassis will provide maximum voice count for most sessions up to a 96 kHz sample rate, but has a reduced voice count at 176.4 and 192 kHz sample rates.

Your results may vary depending on the specific model and capabilities of your computer, the sample rate of the current session, your operating system, and the specific model of your expansion chassis. For current information, visit the Digidesign website (www.digidesign.com).

Number of I/O Channels in Expanded Systems

You can add audio interfaces to your system to increase the number of available channels of hardware input and output. Hardware input and output includes digital and analog connections.

Number of Channels of I/O

Pro Tools|HD audio interfaces provide varying numbers of hardware input and output connectors and ports, a certain number of which can be utilized simultaneously.

For specifications of Pro Tools|HD I/Os, refer to the Pro Tools|HD Getting Started Guide.

The 96 I/O and standard 192 I/O are examples of symmetrical I/O, where there are the same number of input channels as output channels. For example, there are 8 analog inputs and 8 analog outputs. Though these I/Os provide many analog and digital connectors on their back panels, they support a total of 16 channels of simultaneous, discrete input and output. This means you can be listening to or recording as many as 16 channels of input while simultaneously monitoring or sending as many as 16 channels of output through a single I/O.

The 192 I/O can be expanded by adding a 192 A/D or 192 D/A Expansion card to increase the number of analog inputs or analog outputs to 16. Expanded 192 I/O interfaces are an example of asymmetrical I/O when they have a different number of input channels or output channels. For example, when a 192 A/D card is installed on a standard 192 I/O, the I/O now has 16 analog inputs and 8 analog outputs.

On Expanded 192 I/Os, the maximum number of simultaneous, discrete inputs and outputs is still 16.
The maximum number of channels of digital or analog I/O possible with an expanded Pro Tools|HD system depends on whether you use digital or analog connections, and whether you require a symmetrical or asymmetrical number of input and output channels, as in the following examples.

**Maximum I/O Configuration Examples**

**Pro Tools|HD System with Ten Interfaces**
* (Session Sample Rates Up to 96 kHz)*

**Digital** Up to 160 input and output channels (requires ten 192 Digital I/O interfaces)

**Analog** Up to 120 simultaneous channels of input and output. Requires the following:
- Five 192 I/O interfaces configured for 16 analog inputs and 8 analog outputs (with an A/D card added to each interface)
- Five 192 I/O interfaces configured for 8 analog inputs and 16 analog outputs (with a D/A card added to each interface)

**Pro Tools|HD System with Eight Interfaces**
* (Session Sample Rates Higher than 96 kHz)*

**Digital** Up to 128 channels of input and output (requires eight 192 Digital I/O interfaces)

**Analog** Up to 96 simultaneous channels of input and output. Requires the following:
- Four 192 I/O interfaces configured for 16 analog inputs and 8 analog outputs (with an A/D card added to each interface)
- Four 192 I/O interfaces configured for 8 analog inputs and 16 analog outputs (with a D/A card added to each interface)

If you need more analog inputs and do not need all available analog outputs, use more A/D cards and fewer D/A cards. Conversely, to increase analog output capacity, use more D/A cards instead of A/D cards.